

Critical Review of Rate Constants for Reactions of Transients from Metal Ions and Metal Complexes in Aqueous Solution

Cite as: Journal of Physical and Chemical Reference Data **24**, 1055 (1995); <https://doi.org/10.1063/1.555966>

Submitted: 26 October 1994 . Published Online: 15 October 2009

George V. Buxton, Quinto G. Mulazzani, and Alberta B. Ross



[View Online](#)



[Export Citation](#)

ARTICLES YOU MAY BE INTERESTED IN

[Critical Review of rate constants for reactions of hydrated electrons, hydrogen atoms and hydroxyl radicals \(\$\cdot\text{OH}/\cdot\text{O}^-\$ in Aqueous Solution](#)

Journal of Physical and Chemical Reference Data **17**, 513 (1988); <https://doi.org/10.1063/1.555805>

[Rate Constants for Reactions of Inorganic Radicals in Aqueous Solution](#)

Journal of Physical and Chemical Reference Data **17**, 1027 (1988); <https://doi.org/10.1063/1.555808>

[Reduction Potentials of One-Electron Couples Involving Free Radicals in Aqueous Solution](#)

Journal of Physical and Chemical Reference Data **18**, 1637 (1989); <https://doi.org/10.1063/1.555843>

Where in the world is AIP Publishing?
Find out where we are exhibiting next



Critical Review of Rate Constants for Reactions of Transients from Metal Ions and Metal Complexes in Aqueous Solution

George V. Buxton

University of Leeds, Cookridge Radiation Research Centre, Leeds, LS16 6QB, United Kingdom

Quinto G. Mulazzani

Istituto di Fotochimica e Radiazioni d'Alta Energia, Consiglio Nazionale delle Ricerche, Via P. Gobetti 101, 40129 Bologna, Italy

Alberta B. Ross

Radiation Chemistry Data Center, Radiation Laboratory, University of Notre Dame, Notre Dame, Indiana 46556

(Received 26 October 1994; revised manuscript received 28 February 1995)

Kinetic data for transient metal species in aqueous solution have been critically reviewed. The compilation covers over 2000 measurements of rate constants involving 660 metal ions and metal complexes from Groups 4-15; lanthanides and actinides are not included. Most of the data have been obtained by the methods of pulse radiolysis or flash photolysis. Data have been collected from 500 publications through 1993. ©1995 American Institute of Physics and American Chemical Society.

Key words: aqueous solution; chemical kinetics; critical review; data compilation; flash photolysis; metal ions; pulse radiolysis; rate constants; transients.

Contents

1. Introduction.....	1056	3.6.8. References.....	1059
2. Methods of Generation and Detection of Transients.....	1056	4. List of Abbreviations and Symbols.....	1060
2.1. Pulse Radiolysis.....	1056	5. Acknowledgements.....	1062
2.2. Photolysis.....	1057	6. References to Text.....	1062
2.2.1. Photoionization.....	1057	7. References to Tables.....	1263
2.2.2. Oxidative Quenching of Tris(2',bipyridine)ruthenium(II) ion..	1057	8. Molecular Formula Index.....	1276
3. Explanation of the Tables.....	1058	9. Chemical Name Index.....	1301
3.1. Scope of the Compilation.....	1058	10. Appendix I. Spectral Properties, pK_a 's and Other Data.....	1324
3.2. Data Selection.....	1058	11. Appendix II. List of Metal Transients.....	1341
3.3. Uncertainties and Sources of Error.....	1058		
3.4. Spectral Properties and pK_a 's of the Metal Transients.....	1058		
3.5. Nomenclature.....	1058		
3.6. Arrangement of the Tables.....	1059		
3.6.1. Order of Entries.....	1059		
3.6.2. Rate Constants.....	1059		
3.6.3. pH.....	1059		
3.6.4. Ionic Strength.....	1059		
3.6.5. Temperature.....	1059		
3.6.6. Method.....	1059		
3.6.7. Comments.....	1059		

List of Tables

1. Rate constants for silver transients.....	1063
1A. Spectral properties and pK_a 's of silver transients	1324
2. Rate constants for aluminum transients	1071
2A. Spectral properties of aluminum transients ..	1324
3. Rate constants for gold transients.....	1072
3A. Spectral properties and pK_a 's of gold transients	1325
4. Rate constants for bismuth transients.....	1074
4A. Spectral properties of bismuth transients	1325
5. Rate constants for cadmium transients.....	1075
5A. Spectral properties of cadmium transients	1325
6. Rate constants for cobalt transients	1085
6A. Spectral properties and pK_a 's of cobalt transients	1326

©1995 by the U.S. Secretary of Commerce on behalf of the United States. This copyright is assigned to the American Institute of Physics and the American Chemical Society.

Reprints available from ACS; see Reprints List at back of issue.

7.	Rate constants for chromium transients	1112
7A.	Spectral properties of chromium transients	1328
8.	Rate constants for copper transients	1123
8A.	Spectral properties and pK_a 's of copper transients	1329
9.	Rate constants for iron transients	1141
9A.	Spectral properties and pK_a 's of iron transients	1330
10.	Rate constants for mercury transients	1151
10A.	Spectral properties and pK_a 's of mercury transients	1331
11.	Rate constants for indium transients	1155
11A.	Spectral properties and pK_a 's of indium transients	1331
12.	Rate constants for iridium transients	1156
12A.	Spectral properties of iridium transients	1331
13.	Rate constants for manganese transients	1157
13A.	Spectral properties of manganese transients	1332
14.	Rate constants for molybdenum transients	1162
14A.	Spectral properties of molybdenum transients	1332
15.	Rate constants for nickel transients	1163
15A.	Spectral properties and pK_a 's of nickel transients	1333
16.	Rate constants for osmium transients	1184
17.	Rate constants for lead transients	1185
17A.	Spectral properties of lead transients	1334
18.	Rate constants for palladium transients	1188
18A.	Spectral properties of palladium transients	1334
19.	Rate constants for platinum transients	1189
19A.	Spectral properties and pK_a 's of platinum transients	1335
20.	Rate constants for rhenium transients	1200
20A.	Spectral properties of rhenium transients	1335
21.	Rate constants for rhodium transients	1201
21A.	Spectral properties of rhodium transients	1336
22.	Rate constants for ruthenium transients	1204
22A.	Spectral properties and pK_a 's of ruthenium transients	1337
22B.	Values of the bimolecular rate constant for the reaction $\text{Ru}(\text{bpy})_3^{3+} + \text{MV}^- \rightarrow \text{Ru}(\text{bpy})_3^{2+} + \text{MV}^{2+}$ in aqueous solution	1339
23.	Rate constants for antimony transients	1236
24.	Rate constants for tin transients	1237
24A.	Spectral properties of tin transients	1339
25.	Rate constants for thallium transients	1238
25A.	Spectral properties and pK_a 's of thallium transients	1340
26.	Rate constants for vanadium transients	1249
27.	Rate constants for tungsten transients	1250
27A.	Spectral properties of tungsten transients	1340
28.	Rate constants for zinc transients	1251
28A.	Spectral properties of zinc transients	1340

List of Figures

- Effect of Ionic Strength on the Bimolecular Rate Constant for $\text{Ru}(\text{bpy})_3^{3+} + \text{MV}^- \rightarrow \text{Ru}(\text{bpy})_3^{2+} + \text{MV}^{2+}$ in Aqueous Solution

1057

1. Introduction

A wealth of information on the rates of fast reactions of metal ions has been obtained in the last 30 years, but there has been no systematic review of the data since the first tables of rate constants were published in 1978.¹ Such information is valuable in the fields of homogeneous catalysis, radio-sensitisation and solar energy conversion.

The present compilation, which supersedes the previous one,¹ comprises critically reviewed rate constants for the reactions of metal ions and their complexes in aqueous solution, together with pertinent data on their spectral properties and acid dissociation constants.

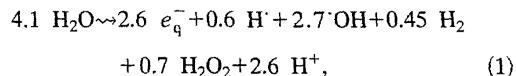
Rate constants are recorded for reactions where the metal species has a transient existence. Thus the compilation contains not only those species that are inherently unstable (e.g., Cd^+ , Tl^{2+}), but also stable ions which react so rapidly under the given conditions that they have to be generated *in situ* usually by the fast time-resolved methods of pulse radiolysis or flash photolysis. To keep the compilation within reasonable bounds we have generally omitted the vast amount of data that has been obtained by the slower time-resolved method of stopped-flow. Nevertheless, a few stopped-flow data have been included when we judge them to be particularly relevant to the pulse radiolysis or flash photolysis data. Finally, a small number of rate constants obtained from competition kinetics studies using γ -radiolysis and other steady-state methods are listed when they are the only available data.

A number of review articles have been published which deal with the mechanistic roles of metal ions²⁻⁴ and the kinetic data compiled here are complementary to this mechanistic information.

2. Methods of Generation and Detection of Transients

2.1. Pulse Radiolysis

When moderately dilute ($\leq 1 \text{ mol L}^{-1}$) aqueous solutions are exposed to ionizing radiation, such as ^{60}Co γ -rays or fast electrons from an accelerator, energy is predominantly absorbed by the solvent to create radical and molecular products. The overall chemical change is summarized by Eq.(1):



where the numbers represent the radiation chemical yields, G -values, in units of molecules per 100 eV of absorbed energy. These units are converted to SI units of mol J^{-1} by multiplying by 1.036×10^{-7} .

The hydrated electron, e_{aq}^- , and the hydrogen atom are powerful reducing agents and the hydroxyl radical is a strong oxidant.⁵ Because of these properties they are very effective in bringing about one-electron changes in the oxidation states of metal ions, so radiolysis, and particularly pulse radiolysis, has been widely exploited for this purpose. Reactions (2)-(4) below are some illustrative examples of how

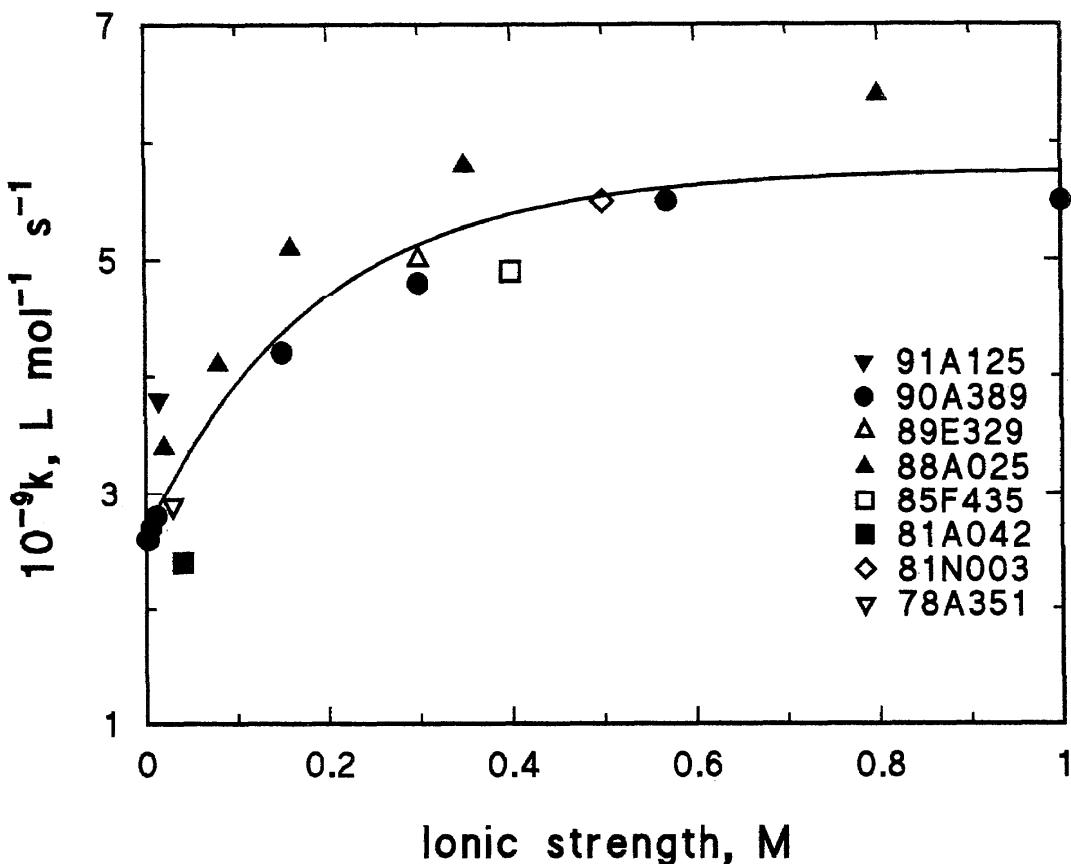
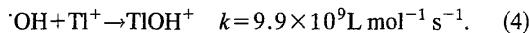
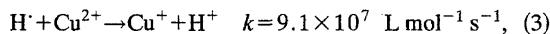
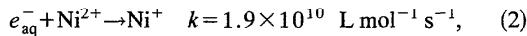


FIG. 1. Effect of Ionic Strength on the Bimolecular Rate Constant for $\text{Ru}(\text{bpy})_3^{3+} + \text{MV}^{\cdot+} \rightarrow \text{Ru}(\text{bpy})_3^{2+} + \text{MV}^{2+}$ in Aqueous Solution.

oxidation states, which are not generally accessible by ordinary chemical means, can be generated in aqueous solution:



Data for the reactions of these free radicals with other metal species can be found in Ref. 6, and details of the conditions used to separate the radicals are described in Ref. 5.

It is sometimes desirable to convert the primary radicals of water radiolysis [reaction (1)] to secondary radicals so that redox changes can be controlled. For example, the reactions of $\cdot\text{OH}$ with metal ions are generally believed to result in the formation of hydroxo-adduct [e.g., reaction (4)] because simple outer-sphere electron transfer is unlikely on energetic grounds. On the other hand, outer-sphere electron transfer is more common with inorganic radicals such as $\text{SO}_4^{\cdot-}$ and N_3^{\cdot} . Judicious choice of the redox agent becomes important when metal ions have ligands which can also be oxidized or reduced. Data for the reactions of these secondary radicals with metal ions and their complexes can be found in Ref. 7.

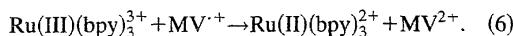
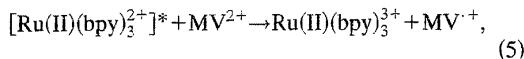
2.2. Photolysis

2.2.1. Photoionization and Photoexcitation

In this case energy is imparted directly to the metal ion or complex when it absorbs a photon. The result may be loss of an electron (photoionization) or excitation of an electron to a higher orbital (photoexcitation). In the first case one-electron oxidation of the metal species occurs, but in the second case the excited state may be quenched oxidatively or reductively by electron transfer to an acceptor or from a donor, respectively. Extensive kinetic data and details of these redox quenching processes can be found in Ref. 8.

2.2.2. Oxidative Quenching of Tris(2,2'-bipyridine)ruthenium(II) ion

The oxidative quenching of $[\text{Ru}(\text{II})(\text{bpy})_3^{2+}]^*$ by 1,1'-dimethyl-4,4'-bipyridinium ion (MV^{2+}) [reaction (5)] provides an illustrative example of the type of process that is relevant to this compilation, namely the back electron transfer reaction (6) between the oxidation product $\text{Ru}(\text{III})(\text{bpy})_3^{3+}$ and the one-electron reduced quencher $\text{MV}^{\cdot+}$:



We highlight reaction (6) here because its rate constant has been measured many times under a wide range of conditions of pH and ionic strength. Figure 1 shows data for $I < 1 \text{ mol L}^{-1}$ which form a self-consistent set. The solid line is given by the empirical expression:

$$k = \{3.1 \times 10^9 [1 - \exp(-5.3I)] \\ + 2.7 \times 10^9\} \text{ L mol}^{-1} \text{ s}^{-1}. \quad (7)$$

The data and their sources are listed in Appendix I, Table 22B; also included are data for $I > 1 \text{ mol L}^{-1}$.

3. Explanation of the Tables

3.1. Scope of the Compilation

The compilation contains data published by the end of 1993; data from a few papers received early in 1994 have also been included. The data were located through literature searches of the bibliographic database maintained by the Radiation Chemistry Data Center, and by examination of reviews.

Rate constants have not been recorded when the metal species is in the form of a macromolecule, a polymer or a colloid, or is contained in a micellar system, or in non-aqueous ($\leq 50\% \text{ v/v H}_2\text{O}$) solvent. Intramolecular electron transfer reactions have also been omitted.

3.2. Data Selection

In order to be included in this compilation, values of the rate constants had to be reported in published papers, including proceedings of conferences, or communicated to us in the detail appropriate for a paper in a refereed journal. Preference has been given to data obtained under well defined experimental conditions for well characterized chemical species. However, data for which the conditions are poorly defined, or even unstated, have been included when no others are available on the grounds that they are better than no data at all. The reader is given sufficient information in each entry to judge the quality of the result.

3.3. Uncertainties and Sources of Error

In many cases authors have quoted the uncertainty of their data but the method of evaluation is not always specified. In others single values are reported to three significant figures. We have decided, therefore, not to report any errors and, since values of rate constants obtained in independent measurements are unlikely to have uncertainties of less than 5–10%, we have reported data to a maximum of two significant figures. In cases where the uncertainty is in the first figure or the data represent upper or lower limit values, only the first figure is recorded. Where the data have an uncertainty of more than 40–50%, they have been prefixed with “~”. When discrepant values of a rate constant have been reported we have endeavoured to judge which is correct from

the information available and report only that one. In a few cases where it has not been possible to make this choice, the data have been marked to indicate that there is an unexplained discrepancy.

For some reactions there is uncertainty about the mechanism and even the structure of the reactant. Where different authors have presented different interpretations we have noted them in a comment along side the entries (e.g., Table 19, entries 19.29 and 19.30). In those cases where subsequent work has shown an earlier identification of the transient reactant to be in error, the correct identification has been used in the entry from the earlier work (e.g., Table 15, entries 15.29.1–15.29.6).

One of the main sources of error in measuring rate constants is the failure to take proper account of temperature. Many measurements are reported without reference to the temperature at which they were made, although the ambient temperature can vary by several °C. Where the measuring temperature is reported we have recorded it in the entry in the column headed “ $t(\text{°C})$ ”, otherwise this column is left blank.

Another source of error in data for reactions between charged species is due to measurement having been made at different, but unspecified, ionic strengths. Accordingly ionic strength is included in an entry only when it is specified by the authors. Lack of pH control can also be a source of error and again the pH has been recorded only if it is reported by the authors, or when it can be calculated from the *stated concentration* of H^+ or OH^- .

3.4. Spectral Properties and pK_a 's of the Metal Transients

We have collected data on the optical absorption spectra and values of ϵ (molar absorptivity) of transient metal species in separate tables for each metal. The species are arranged in order of ascending oxidation number. When the oxidation number is not known it is listed as, for example, Pt(II/?) to indicate that the oxidation number of the starting material is (II) but that of the product is uncertain. The entry numbers in Tables 1–28 to which the data refer are included in these tables; also reported there are values of acid dissociation constants (pK_a).

For reactions between like species where the measured parameter is k/ϵ (or $2k/\epsilon$) discrepancies arise through the use of differing values of ϵ . If divergent values of k have been reported using different values of the molar absorptivity, the latter have been reassessed and values of k recalculated if appropriate.

3.5. Nomenclature

Each chemical species has been named according to IUPAC rules whenever possible. The names of the reacting species appear as headings for the entries. An index of chemical names and synonyms is provided (Sec. 9), as well as a molecular formula index (Sec. 8), as aids in locating reactants which are present in Tables 1–28.

When it is not clear where the redox change occurs in the generation of a transient metal complex, the name used

combines those of the starting material and the redox agent, e.g., Table 7, entry 7.13, "Tris(5-chloro-1,10-phenanthroline)chromium(III), carboxyl radical adduct." Table 19, entry 19.11, "Bis(ethylenediamine)platinum(II), H reaction product" and Table 15, entry 15.59, "Nitriloacetato-nickelate(II), H-abstraction product."

Abbreviations are used in writing the reactions, and these are listed separately in Sec. 4. Generally the metal appears as the first symbol, but where it is clear that a free radical bonds to a metal centre that is bonded to other ligands, the radical symbol precedes that of the metal, e.g., Table 6, entry 6.83.1, $\text{HOCH}(\text{CH}_3)\text{Co}(4,11\text{-dieneN}_4)^{2+}$.

In some cases symbols of different ligands are contained in parentheses for the sake of clarity, e.g., Table 6, entry 6.108.1, $\text{HOCH}_2\text{CoHEDTA}(\text{H}_2\text{O})^-$.

A roman numeral is used to indicate the oxidation state of the metal when it is not obvious from the formula of the complex. Water of hydration has generally been omitted from the formulae. In some cases, free radical species are enclosed in square brackets with a superscripted dot for the sake of clarity, e.g., Table 6, entry 6.98.1, $[\text{Co}(\text{bpy})_2(\text{bpyOH})]^{3+}$ and Table 6, entry 6.1.29 $[\text{2-CH}_3\text{NQ}]^-$.

3.6. Arrangement of the Tables

There is a table for each metal and these are arranged in alphabetical order of the metal symbol. Where a reaction involves two different transient metal species, it is recorded in both tables; but for a reaction between two stable metal species where one of them is produced transiently, the rate constant appears in the table appropriate to the transient. Tables containing spectral properties and pK_a 's have the same number, with the suffix A, as the rate constant tables for the individual metals. These tables are collected in Appendix I, Sec. 10.

3.6.1. Order of Entries

In each table the reactions are listed in order starting with the lowest oxidation state of a particular metal species. Subject to the principle of keeping similar organometallic transients together, they are generally listed within the ligand subgroupings: simple aliphatic, simple alicyclic and simple aromatic derivatives, followed by chelating and macrocyclic ligands. The order of entry of the metal transients in the tables is shown in the listing in Sec. 11 (Appendix II).

The reactions of each species are divided into groups according to whether the second reactant is a radical, an inorganic or an organic. First-order reactions are listed first, then radical-radical reactions, which precede the reactions with inorganics. Reactions with inorganics are grouped in alphabetical order of the main element. Reactions with organics follow, alphabetically by name. Multiple entries for the same

reaction are listed in descending chronological order of publication date. The location of all reactants (including the metal transients) can be found from the Molecular Formula Index (Sec. 8) and the Chemical Name Index (Sec. 9).

3.6.2. Rate Constants

Values of k are in units of $\text{L mol}^{-1} \text{s}^{-1}$ and these units are given at the head of the column. The unit of s^{-1} is included with the value of k when it refers to a first-order reaction or a bimolecular reaction with water.

3.6.3. pH

This is included in the entry when it is reported by the authors or if it can be calculated from the concentration of H^+ or OH^- in the solution.

3.6.4. Ionic Strength

The ionic strength is entered only when it is reported by the authors. The number of significant figures quoted by the authors has been retained.

3.6.5. Temperature

Most data have been obtained at ambient temperature which is not always reported. Unless the temperature was specified it has been omitted from the tables, but in those cases it can be taken to be the room temperature.

3.6.6. Method

This is entered in abbreviated form, e.g., p.r., f.p., etc., and the abbreviations are listed in Sec. 4.

3.6.7. Comments

The comments column contains detailed information in abbreviated form in the following order: The method used to obtain the value of k and the wavelength of measurement if appropriate; the composition of the solution; values of k obtained under other specified conditions. Where a reaction is reversible and the rate constant for the reverse reaction is also known it is reported as k_r . When a value of k has been obtained by computer fitting this is stated. Activation parameters, E_a , ΔH^\ddagger and ΔS^\ddagger , are quoted if they are known. Also included in this column are rate constants for further changes in the primary product.

3.6.8. References to Tables

The references are listed by the serial number in the RCDC bibliographic database. These corresponding full references are presented in ascending chronological order in the bibliography (Sec. 7).

4. List of Abbreviations and Symbols

Methods and Other Symbols

c.k.	competition kinetics
condy.	conductivity
d.k.	decay kinetics
ΔG^\ddagger	free energy of activation
ΔH^\ddagger	enthalpy of activation
ΔS^\ddagger	entropy of activation
ϵ	extinction coefficient (molar absorptivity)
E_a	activation energy
e.d.	discharge
esr	electron spin resonance
f.p.	flash photolysis
f.p./rq	flash photolysis/reductive quenching
f.p./oq	flash photolysis/oxidative quenching
f.p./pi	flash photolysis/photoionization
G	radiation yield (molecules per 100 eV)
γ -r.	gamma radiolysis
I	ionic strength
K	equilibrium constant
k	specific rate of the forward reaction
k_r	specific rate of the reverse reaction
OQ	oxidative quencher
pK_a	negative logarithm of the acid dissociation constant, e.g., where $AH + H_2O \rightleftharpoons A^- + H_3O^+$
phot.	photolysis
p.b.k.	product buildup kinetics
p.r.	pulse radiolysis
RQ	reductive quencher
satd.	saturated
soln.	solution
s.f.	stopped flow

Chemical Species and Ligands

ABTS	2,2'-azinobis(3-ethylbenzothiazoline-6-sulfonate)
Ac	acetyl
acac	acetylacetone (2,4-pentanedionato)
Ala	alanine
aneN ₄	5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradecane
[13]aneN ₄	1,4,7,10-tetraazacyclotetradecane
[15]aneN ₄	1,4,8,12-tetraazacyclopentadecane
[16]aneN ₅	1,4,7,10,13-pentaaazacyclohexadecane
AQ	9,10-anthraquinone
AZAcapten	8-methyl-1,3,13,16-tetraaza-6,10,19-trithiabicyclo[6.6.6]eicosane
bpm	2,2'-bipyrimidine
bpy	2,2'-bipyridine
4,4'-bpy	4,4'-bipyridine
bpz	2,2'-bipyrazine
bth	2,2'-bithiazole
BuOH	butanol
tert-BuOH	tert-butyl alcohol (2-methyl-2-propanol)
chxn	<i>trans</i> -1,2-cyclohexanediamine
Cp	cyclopentadienyl
cyclam	1,4,8,11-tetraazacyclotetradecane
CysSH	cysteine
diamsar	1,8-diamino-3,6,10,13,16,19-hexaaazabicyclo[6.6.6]eicosane
dien	diethylenetriamine
4,11-dieneN ₄	5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene
4,13-dieneN ₄	2,2,4,11,11,13-hexamethyl-1,5,10,14-tetraazacyclooctadeca-4,13-diene

4,14-dieneN ₄	5,7,7,12,12,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,14-diene
10,13-dieneN ₄	11,13-dimethyl-1,4,7,10-tetraazacyclotetradeca-10,13-diene
diHOamsar	1,8-bis(hydroxyamino)-3,6,10,13,16,19-hexaazabicyclo[6.6.]eicosane
dinosar	1,8-dinitro-3,6,10,13,16,19-hexaazabicyclo[6.6.]eicosane
DMCH	6,7-dihydro-5,8-dimethylbenzo[b,j][1,10]phenanthroline
dmg	dimethylglyoxime
DMSO	dimethyl sulfoxide
DP	deuteroporphyrin
dppz	dipyrido[3,2-a:2',3'-c]phenazine
DQ	duroquinone
DTPA	diethylenetriaminepentaacetate ion
EDDA	ethylenediaminediacetate ion
EDTA	ethylenediaminetetraacetate ion
en	ethylenediamine
Et ₄ dien	tetraethylmethylenetriamine
EtOH	ethanol
Fc	ferrocene
HEDTA	N-(2-hydroxyethyl)-N,N',N'-ethylenediaminetriacetate ion
HypO ⁻	hydroxylprolinato
Gly ⁻	glycinato
IDA	iminodacetate ion
Im	imidazole
In	indole
isn	isonicotinamide
mbpy	1-methyl-4,4'-bipyridinium
Me	methyl
Me ₆ [14]aneN ₄	5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradecane
Me ₄ cyclam	1,4,8,11-tetramethyl-1,4,8,11-tetraazacyclotetradecane
Me ₁₀ cyclam	1,4,5,7,7,8,11,12,14,14-decamethyl-1,4,8,11-tetraazacyclotetradecane
MeNH ₂ [18]aneN ₆	8-Amino-8-methyl-1,3,6,10,13,15-hexaazatricyclo[13.1.1.1 ^{13,15}]octadecane
MeNO ₂ [18]aneN ₆	8-Methyl-8-nitro-1,3,6,10,13,15-hexaazatricyclo[13.1.1.1 ^{13,15}]octadecane
MeOH	methanol
Me ₂ pyo[14]aneN ₆	α-2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),13,15-triene
Me ₂ pyo[14]hexaeneN ₄	α-2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,6,11,13,15-hexaene
Me ₂ pyo[14]trieneN ₄	α-2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaene
Me ₄ tetraeneN ₄	1,3,8,10-tetraamethyl-1,4,8,11-tetraazacyclodeca-1,3,8,10-tetraane
MV ²⁺	1,1'-dimethyl-4,4'-bipyridinium (methyl viologen)
na	nicotinamide
NAD	nicotinamide adenine dinucleotide
NTA	nitrilotriacetate ion
NQ	naphthoquinone
PFP	tetra(N-methylisonicotinamidophenyl)phosphine
Ph	phenyl
phen	1,10-phenanthroline
pm	pyrimidine
PP	protoporphyrin
PrOH	propanol
pts	trisulfophthalocyanine
py	pyridine
pytda	2-(1,2,4-thiadiazol-5-yl)pyridine
pyth	2-(2-thiazolyl)pyridine
pz	pyrazine
Q	1,4-benzoquinone
QH ₂	hydroquinone
sar	3,6,10,13,16,19-hexaazabicyclo[6.6.]eicosane
SDS	sodium dodecylsulfate
sep	1,3,6,8,10,13,16,19-octaazabicyclo[6.6.]eicosane
tacn	1,4,7-triazacyclononane
TAP	1,4,5,7-tetraazaphenanthrene

TAPP	tetra(4-trimethylammoniophenyl)porphine
TCPP	tetra(4-carboxyphenyl)porphine
TCPPS	tetra(2,6-dichloro-3-sulfonatophenyl)porphine
TEOA	triethanolamine
terpy	2,2':2'',2''-terpyridine
tetraen	tetraethylidiethylenetriamine
tetraeneN ₄	5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraene
tetren	tetraethylenepentamine
TFPPS	tetra(2-fluoro-3-sulfonatophenyl)porphine
tim	2,3,9,10-tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraene
TMpyP	tetra(1-methyl-4-pyridyl)porphine
2-TMpyP	tetra(1-methyl-2-pyridyl)porphine
3-TMpyP	tetra(1-methyl-3-pyridyl)porphine
TPP	tetr phenylporphine
TPPS	tetra(4-sulfonatophenyl)porphine
TpyP	tetra(4-pyridyl)porphine
2-TpyP	tetra(2-pyridyl)porphine
3-TpyP	tetra(3-pyridyl)porphine
trien	triethylenetetramine
TrpH	tryptophan
tspc	3,10,17,24-tetrasulfophthalocyanine
TTP	tetra(4-methylphenyl)porphine
TxOH ⁻	6-hydroxy-2,5,7,8-tetramethylchroman-2-carboxylate ion (Trolox C anion)
TyrOH	tyrosine
TZP	tetra[4-N-(3-sulfonatopropyl)pyridyl]porphine
U	uracil

5. Acknowledgements

The Radiation Laboratory at the University of Notre Dame is operated under Contract DE-AC02-76ER0038 with the Department of Energy. The Radiation Chemistry Data Center is supported jointly by the Office of Basic Energy Sciences of the Department of Energy and the National Institute of Standards and Technology, Standard Reference Data. This is Radiation Laboratory Document No. NDRL-3757. The authors wish to thank NATO and Consiglio Nazionale delle Ricerche for partial financial support. We also acknowledge the assistance of Dr. W.P. Helman for computer programming and text processing.

6. References to text

- ¹G.V. Buxton and R.M. Sellers, Nat. Stand. Ref. Data Ser., Nat. Bur. Stand. (U.S.), **62** (1978).
- ²G.V. Buxton and R.M. Sellers, Coord. Chem. Rev. **22**, 195 (1977).
- ³D. Meyerstein, Acc. Chem. Res. **11**, 43, (1978).
- ⁴B.G. Ershov, Russ. Chem. Rev. **50**, 1119 (1981).
- ⁵G.V. Buxton, in *Radiation Chemistry. Principles and Applications*, edited by M.A.J. Rodgers and Farhataziz (VCH Publishers, New York, 1987).
- ⁶G.V. Buxton, C.L. Greenstock, W.P. Helman, and A.B. Ross, J. Phys. Chem. Ref. Data **17**, 513 (1988).
- ⁷P. Neta, R.E. Huie, and A.B. Ross, J. Phys. Chem. Ref. Data **17**, 1027 (1988).
- ⁸M.Z. Hoffman, F. Bolletta, L. Moggi, and G.L. Hug, J. Phys. Chem. Ref. Data **18**, 219 (1989).

TABLE 1. Rate constants for silver transients

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
1.1 Silver atom								
1.1.1 Silver atom								
	$\text{Ag}^0 + \text{Ag}^0 \rightarrow \text{Ag}_2^0$	$\sim 1.6 \times 10^{10}$				p.r.	Estimated from comparison of spectral changes and calculated concentration-time profiles of the early products of reduction of Ag^+ .	93A166
1.1.2 Silver(I) ion								
	$\text{Ag}^0 + \text{Ag}^+ \rightarrow \text{Ag}_2^+$	8×10^9				p.r.	D.k. at 360 nm and p.b.k. at 310 nm in soln. contg. 0.1 mol L ⁻¹ 2-PrOH and 1 × 10 ⁻⁴ mol L ⁻¹ AgClO_4 .	93A166
		6.5×10^9	1.0	29		p.r.	D.k. at 410 nm in soln. contg. 0.0042–0.34 mol L ⁻¹ <i>tert</i> -BuOH, 0.1 mol L ⁻¹ HClO_4 and 1 × 10 ⁻⁴ mol L ⁻¹ AgClO_4 .	731053
		5.2×10^9	1.0	29		p.r.	D.k. at 410 nm in soln. contg. 0.0042–0.34 mol L ⁻¹ <i>tert</i> -BuOH, 0.1 mol L ⁻¹ HClO_4 and 1 × 10 ⁻⁴ mol L ⁻¹ AgClO_4 ; measured at pressure of 6.72 kbar.	731053
		5.9×10^9				p.r.	P.b.k. at 260 nm and d.k. at 360 nm in soln. contg. 0.1 mol L ⁻¹ MeOH and 10 ⁻⁵ mol L ⁻¹ Ag_2SO_4 .	680431
1.1.3 Diamminesilver(I) ion								
	$\text{Ag}^0 + \text{Ag}(\text{NH}_3)_2^+ \rightarrow \text{Ag}_2(\text{NH}_3)_n^+$	5.2×10^9				p.r.	D.k. at 360 nm and p.b.k. at 260 nm in soln. contg. 0.1 mol L ⁻¹ MeOH, 0.1 mol L ⁻¹ NH_3 and 10 ⁻⁵ mol L ⁻¹ Ag_2SO_4 . Product contains unknown number of ammine ligands.	680435
1.1.4 Copper(II) ion								
	$\text{Ag}^0 + \text{Cu}^{2+} \rightarrow \text{Ag}^+ + \text{Cu}^+$	6.5×10^8				p.r.	D.k. at 360 nm in soln. contg. 1 × 10 ⁻⁵ mol L ⁻¹ Ag^+ .	78A410
1.1.5 Iron(III) ion								
	$\text{Ag}^0 + \text{Fe}^{3+} \rightarrow \text{Ag}^+ + \text{Fe}^{2+}$	1.2×10^9	2			p.r.	D.k. at 360 nm in soln. contg. 1 × 10 ⁻⁵ mol L ⁻¹ Ag^+ .	78A410
1.1.6 Oxygen								
	$\text{Ag}^0 + \text{O}_2 \rightarrow \text{Ag}^+ + \text{O}_2^{+-}$	5.0×10^9				p.r.	D.k. at 360 nm in soln. contg. 1 × 10 ⁻⁵ mol L ⁻¹ Ag^+ .	78A410
1.1.7 Hydrogen peroxide								
	$\text{Ag}^0 + \text{H}_2\text{O}_2 \rightarrow$	3.5×10^9				p.r.	D.k. at 360 nm in soln. contg. 1 × 10 ⁻⁵ mol L ⁻¹ Ag^+ .	78A410
1.1.8 Bromoform								
	$\text{Ag}^0 + \text{CHBr}_3 \rightarrow$	3.0×10^9				p.r.	D.k. at 360 nm in soln. contg. 1 × 10 ⁻⁵ mol L ⁻¹ Ag^+ .	78A410
1.1.9 Carbon tetrachloride								
	$\text{Ag}^0 + \text{CCl}_4 \rightarrow$	1.1×10^9				p.r.	D.k. at 360 nm in soln. contg. 1 × 10 ⁻⁵ mol L ⁻¹ Ag^+ .	78A410
1.1.10 Chloroacetate ion								
	$\text{Ag}^0 + \text{ClCH}_2\text{CO}_2^- \rightarrow$	1.5×10^8				p.r.	D.k. at 360 nm in soln. contg. 1 × 10 ⁻⁵ mol L ⁻¹ Ag^+ .	78A410
1.1.11 Chloroform								
	$\text{Ag}^0 + \text{CHCl}_3 \rightarrow$	1.1×10^9				p.r.	D.k. at 360 nm in soln. contg. 1 × 10 ⁻⁵ mol L ⁻¹ Ag^+ .	78A410
1.1.12 Nitrobenzene								
	$\text{Ag}^0 + \text{C}_6\text{H}_5\text{NO}_2 \rightarrow$	2.8×10^9				p.r.	D.k. at 360 nm in soln. contg. 1 × 10 ⁻⁵ mol L ⁻¹ Ag^+ .	78A410

TABLE I. Rate constants for silver transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
1.1 Silver atom — Continued								
1.1.13	Nitromethane $\text{Ag}^0 + \text{CH}_3\text{NO}_2 \rightarrow$	2.3×10^9				p.r.	D.k. at 360 nm in soln. contg. 1×10^{-5} mol L ⁻¹ Ag ⁺ .	78A410
1.2 Silver(I) ion, complex with Ag(0)								
1.2.1	Silver(I) ion, complex with Ag(0) $\text{Ag}_2^+ + \text{Ag}_2^+ \rightarrow \text{Ag}_4^{2+}$	1.3×10^9				p.r.	D.k. at 310 nm in N ₂ O-satd. soln. contg. formate.	93A166
1.2.2	Iron(III) ion $\text{Ag}_2^+ + \text{Fe}^{3+} \rightarrow$	3.0×10^8		2		p.r.	D.k. at 310 nm in soln. contg. 0.001 mol L ⁻¹ Ag ⁺ .	78A410
1.2.3	Permanganate ion $\text{Ag}_2^+ + \text{MnO}_4^- \rightarrow$	$\sim 1.2 \times 10^{10}$			20	p.r.	D.k. at 545 nm in soln. contg. 10^{-5} mol L ⁻¹ MnO ₄ ⁻ and varied [Ag ⁺].	650385
1.2.4	Hydrogen peroxide $\text{Ag}_2^+ + \text{H}_2\text{O}_2 \rightarrow$	8.0×10^6				p.r.	D.k. at 310 nm in soln. contg. 0.001 mol L ⁻¹ Ag ⁺ .	78A410
1.2.5	Oxygen $\text{Ag}_2^+ + \text{O}_2 \rightarrow$	4.6×10^8				p.r.	D.k. at 310 nm in soln. contg. 0.001 mol L ⁻¹ Ag ⁺ .	78A410
1.2.6	Tris(2,2'-bipyridine)ruthenium(III) ion $\text{Ag}_2^+ + \text{Ru(bpy)}_3^{3+} \rightarrow 2 \text{Ag}^+ + \text{Ru(bpy)}_3^{2+}$	1.2×10^{10}				f.p./oq	P.b.k. in soln. contg. Ru(bpy) ₃ ²⁺ and Ag ⁺ (OQ).	80C004
1.2.7	1,4-Benzoquinone $\text{Ag}_2^+ + \text{Q} \rightarrow 2 \text{Ag}^+ + \text{Q}^\bullet$	1.5×10^8		5.8	25	p.r.	P.b.k. at 430 nm in soln. contg. 0.005 mol L ⁻¹ Ag ⁺ , (2-4) $\times 10^{-5}$ mol L ⁻¹ benzoquinone and 1 mol L ⁻¹ <i>tert</i> -BuOH.	761134
1.2.8	Bromoform $\text{Ag}_2^+ + \text{CHBr}_3 \rightarrow$	5.0×10^8				p.r.	D.k. at 310 nm in soln. contg. 0.001 mol L ⁻¹ Ag ⁺ .	78A410
1.2.9	Carbon tetrachloride $\text{Ag}_2^+ + \text{CCl}_4 \rightarrow$	1.5×10^7				p.r.	D.k. at 310 nm in soln. contg. 0.001 mol L ⁻¹ Ag ⁺ .	78A410
1.2.10	Nitrobenzene $\text{Ag}_2^+ + \text{C}_6\text{H}_5\text{NO}_2 \rightarrow$	3.0×10^8				p.r.	D.k. at 310 nm in soln. contg. 0.001 mol L ⁻¹ Ag ⁺ .	78A410
1.2.11	Nitromethane $\text{Ag}_2^+ + \text{CH}_3\text{NO}_2 \rightarrow$	1.1×10^8				p.r.	D.k. at 310 nm in soln. contg. 0.001 mol L ⁻¹ Ag ⁺ .	78A410
1.3 Amminesilver(0)-silver(I) complex								
1.3.1	Diamminesilver(I) ion $\text{Ag}_2(\text{NH}_3)_n^+ + \text{Ag}(\text{NH}_3)_2^+ \rightarrow$ $\text{Ag}_3(\text{NH}_3)_n^{2+}$	-10^8				p.r.	Estimated from rate of formation of product in soln. contg. 0.01 mol L ⁻¹ Ag(NH ₃) ₂ ⁺ .	680435
1.3.2	Amminesilver(0)-silver(I) complex $\text{Ag}_2(\text{NH}_3)_n^+ + \text{Ag}_2(\text{NH}_3)_n^+ \rightarrow$ $\text{Ag}_4(\text{NH}_3)_n^{2+}$	2.5×10^9				p.r.	D.k. at 310 nm in soln. contg. 0.001 mol L ⁻¹ Ag ⁺ and 0.01 mol L ⁻¹ NH ₃ .	78A410
1.3.3	Hydrogen peroxide $\text{Ag}_2(\text{NH}_3)_n^+ + \text{H}_2\text{O}_2 \rightarrow$	1.0×10^9				p.r.	D.k. at 310 nm in soln. contg. 0.001 mol L ⁻¹ Ag ⁺ and 0.01 mol L ⁻¹ NH ₃ .	78A410

TABLE 1. Rate constants for silver transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
1.3 Amminesilver(0)-silver(I) complex — Continued								
1.3.4 Oxygen								
	$\text{Ag}_2(\text{NH}_3)_n^+ + \text{O}_2 \rightarrow$	7.0×10^9				p.r.	D.k. at 310 nm in soln. contg. 0.001 mol L ⁻¹ Ag ⁺ and 0.01 mol L ⁻¹ NH ₃ .	78A410
1.3.5 Bromoform								
	$\text{Ag}_2(\text{NH}_3)_n^+ + \text{CHBr}_3 \rightarrow$	2.0×10^9				p.r.	D.k. at 310 nm in soln. contg. 0.001 mol L ⁻¹ Ag ⁺ and 0.01 mol L ⁻¹ NH ₃ .	78A410
1.3.6 Carbon tetrachloride								
	$\text{Ag}_2(\text{NH}_3)_n^+ + \text{CCl}_4 \rightarrow$	1.0×10^8				p.r.	D.k. at 310 nm in soln. contg. 0.001 mol L ⁻¹ Ag ⁺ and 0.01 mol L ⁻¹ NH ₃ .	78A410
1.3.7 Chloroacetate ion								
	$\text{Ag}_2(\text{NH}_3)_n^+ + \text{ClCH}_2\text{CO}_2^- \rightarrow$	3.0×10^6				p.r.	D.k. at 310 nm in soln. contg. 0.001 mol L ⁻¹ Ag ⁺ and 0.01 mol L ⁻¹ NH ₃ .	78A410
1.3.8 Chloroform								
	$\text{Ag}_2(\text{NH}_3)_n^+ + \text{CHCl}_3 \rightarrow$	2.0×10^8				p.r.	D.k. at 310 nm in soln. contg. 0.001 mol L ⁻¹ Ag ⁺ and 0.01 mol L ⁻¹ NH ₃ .	78A410
1.3.9 Nitrobenzene								
	$\text{Ag}_2(\text{NH}_3)_n^+ + \text{C}_6\text{H}_5\text{NO}_2 \rightarrow$	9.0×10^8				p.r.	D.k. at 310 nm in soln. contg. 0.001 mol L ⁻¹ Ag ⁺ and 0.01 mol L ⁻¹ NH ₃ .	78A410
1.3.10 Nitromethane								
	$\text{Ag}_2(\text{NH}_3)_n^+ + \text{CH}_3\text{NO}_2 \rightarrow$	1.5×10^8				p.r.	D.k. at 310 nm in soln. contg. 0.001 mol L ⁻¹ Ag ⁺ and 0.01 mol L ⁻¹ NH ₃ .	78A410
1.4 5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatoargentate(I) ion								
1.4.1 Water								
	$\text{AgTPPS}^{5-} + \text{H}_2\text{O} \rightarrow \text{AgTPPSH}^{4-} + \text{OH}^-$	$5 \times 10^4 \text{ s}^{-1}$		8.0		p.r.	D.k. in N ₂ -satd. soln. contg. AgTPPS ⁴⁻ and 0.1 mol L ⁻¹ 2-PrOH.	81A247
1.5 Silver(II) ion								
1.5.1 Chromate(V)								
	$\text{Ag}^{2+} + \text{Cr(V)} \rightarrow \text{Cr(VI)} + \text{Ag}^+$	5.8×10^7	1		21	p.r.	D.k. at 270 nm in Ar-satd. soln. contg. 10 ⁻⁴ mol L ⁻¹ Cr ₂ O ₇ ²⁻ (mostly HCrO ₄ ⁻), 2 × 10 ⁻⁵ mol L ⁻¹ Ag ⁺ and 0.1 mol L ⁻¹ HClO ₄ .	89A422
1.5.2 Perhydroxyl								
	$\text{Ag}^{2+} + \text{HO}_2^\cdot \rightarrow \text{Ag}^+ + \text{H}^+ + \text{O}_2$	1.7×10^8	1		21	p.r.	D.k. at 280 nm in O ₂ -satd. soln. contg. 10 ⁻⁴ mol L ⁻¹ Cr ₂ O ₇ ²⁻ (mostly HCrO ₄ ⁻), 2 × 10 ⁻⁵ mol L ⁻¹ Ag ⁺ and 0.1 mol L ⁻¹ HClO ₄ .	89A422
1.5.3 Hydrogen peroxide								
	$\text{Ag}^{2+} + \text{H}_2\text{O}_2 \rightarrow \text{Ag}^+ + \text{HO}_2^\cdot + \text{H}^+$	4.5×10^7	3		21	p.r.	D.k. at 280 nm in N ₂ O-satd. soln. contg. 1 × 10 ⁻⁴ mol L ⁻¹ Ag ₂ SO ₄ and 1, 5 and 10 × 10 ⁻⁴ mol L ⁻¹ H ₂ O ₂ .	89A422
1.5.4 5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatozinc(II) ion								
	$\text{Ag}^{2+} + \text{ZnTMpyP}^{4+} \rightarrow \text{Ag}^+ + [\text{ZnTMpyP}]^{5+}$	6.0×10^7	4.0, 5.0	0.004		p.r.	P.b.k. at 690-700 nm in N ₂ O-satd. buffered soln. contg. Ag ₂ SO ₄ and (1-4) × 10 ⁻⁴ mol L ⁻¹ porphyrin; the π-radical cation complexes with Ag(II).	85A038
1.5.5 α-Aminoisobutyric acid								
	$\text{Ag}^{2+} + (\text{CH}_3)_2\text{C}(\text{NH}_3^+) \text{CO}_2^- \rightarrow$	1.7×10^6		4.4		p.r.	D.k. in N ₂ O-satd. soln. contg. 5 × 10 ⁻¹ mol L ⁻¹ AgClO ₄ and (5-100) × 10 ⁻⁵ mol L ⁻¹ aminoisobutyric acid; reaction product assigned as a complex which decays by intramolecular oxidation, $k = 5 \times 10^3 \text{ s}^{-1}$.	80A307

TABLE I. Rate constants for silver transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
1.5 Silver(II) ion — Continued								
1.5.6 6-Aminophenalenone	$\text{Ag}^{2+} + 6\text{-NH}_2\text{PHO} \rightarrow \text{Ag}^+ + [\text{6-NH}_2\text{PHO}]^+$	1.1×10^9				p.r.	P.b.k. at 420 nm in N ₂ O-satd. soln. contg. 0.005 mol L ⁻¹ Ag ₂ SO ₄ .	93A404
1.5.7 Anisole	$\text{Ag}^{2+} + \text{C}_6\text{H}_5\text{OCH}_3 \rightarrow \text{Ag}^+ + [\text{C}_6\text{H}_5\text{OCH}_3]^+$	3.8×10^7	4		20	p.r.	P.b.k. in N ₂ O-satd. soln. contg. AgNO ₃ .	751171
1.5.8 Diethyl disulfide	$\text{Ag}^{2+} + \text{C}_2\text{H}_5\text{SSC}_2\text{H}_5 \rightarrow \text{Ag}^+ + [\text{C}_2\text{H}_5\text{SSC}_2\text{H}_5]^+$	3.5×10^8	4			p.r.	D.k. at 300 nm and p.b.k. at 430 nm in N ₂ O-satd. soln. contg. 0.002 mol L ⁻¹ Ag ⁺ and various lower concn. of disulfide.	761143
1.5.9 1,2-Dimethoxybenzene	$\text{Ag}^{2+} + 2\text{-CH}_3\text{OC}_6\text{H}_4\text{OCH}_3 \rightarrow \text{Ag}^+ + [\text{2-CH}_3\text{OC}_6\text{H}_4\text{OCH}_3]^+$	6.0×10^7	4		20	p.r.	P.b.k. in N ₂ O-satd. soln. contg. AgNO ₃ .	751171
1.5.10 1,3-Dimethoxybenzene	$\text{Ag}^{2+} + 3\text{-CH}_3\text{OC}_6\text{H}_4\text{OCH}_3 \rightarrow \text{Ag}^+ + [\text{3-CH}_3\text{OC}_6\text{H}_4\text{OCH}_3]^+$	6.3×10^7	4		20	p.r.	P.b.k. in N ₂ O-satd. soln. contg. AgNO ₃ .	751171
1.5.11 1,4-Dimethoxybenzene	$\text{Ag}^{2+} + 4\text{-CH}_3\text{OC}_6\text{H}_4\text{OCH}_3 \rightarrow \text{Ag}^+ + [\text{4-CH}_3\text{OC}_6\text{H}_4\text{OCH}_3]^+$	4.6×10^7	4		20	p.r.	P.b.k. in N ₂ O-satd. soln. contg. AgNO ₃ .	751171
1.5.12 2,3-Dimethoxybenzoic acid	$\text{Ag}^{2+} + 2,3\text{-(CH}_3\text{O)}_2\text{C}_6\text{H}_3\text{CO}_2\text{H} \rightarrow \text{Ag}^+ + \text{H}^+ + [2,3\text{-(CH}_3\text{O)}_2\text{C}_6\text{H}_3\text{CO}_2]^+$	6.7×10^8	~3			p.r.	P.b.k. and d.k. in N ₂ O-satd. soln. contg. 0.001 mol L ⁻¹ AgSO ₄ .	771006
1.5.13 3,4-Dimethoxybenzoic acid	$\text{Ag}^{2+} + 3,4\text{-(CH}_3\text{O)}_2\text{C}_6\text{H}_3\text{CO}_2\text{H} \rightarrow \text{Ag}^+ + \text{H}^+ + [3,4\text{-(CH}_3\text{O)}_2\text{C}_6\text{H}_3\text{CO}_2]^+$	4.2×10^8	~3			p.r.	P.b.k. and d.k. in N ₂ O-satd. soln. contg. 0.001 mol L ⁻¹ AgSO ₄ .	771006
1.5.14 2,4-Dimethoxybenzoic acid	$\text{Ag}^{2+} + 2,4\text{-(CH}_3\text{O)}_2\text{C}_6\text{H}_3\text{CO}_2\text{H} \rightarrow \text{Ag}^+ + \text{H}^+ + [2,4\text{-(CH}_3\text{O)}_2\text{C}_6\text{H}_3\text{CO}_2]^+$	4.5×10^8	~3			p.r.	P.b.k. and d.k. in N ₂ O-satd. soln. contg. 0.001 mol L ⁻¹ AgSO ₄ .	771006
1.5.15 2,6-Dimethoxybenzoic acid	$\text{Ag}^{2+} + 2,6\text{-(CH}_3\text{O)}_2\text{C}_6\text{H}_3\text{CO}_2\text{H} \rightarrow \text{Ag}^+ + \text{H}^+ + [2,6\text{-(CH}_3\text{O)}_2\text{C}_6\text{H}_3\text{CO}_2]^+$	2.2×10^9	~3			p.r.	P.b.k. and d.k. in N ₂ O-satd. soln. contg. 0.001 mol L ⁻¹ AgSO ₄ .	771006
1.5.16 3,5-Dimethoxybenzoic acid	$\text{Ag}^{2+} + 3,5\text{-(CH}_3\text{O)}_2\text{C}_6\text{H}_3\text{CO}_2\text{H} \rightarrow \text{Ag}^+ + \text{H}^+ + [3,5\text{-(CH}_3\text{O)}_2\text{C}_6\text{H}_3\text{CO}_2]^+$	6.0×10^8	~3			p.r.	P.b.k. and d.k. in N ₂ O-satd. soln. contg. 0.001 mol L ⁻¹ AgSO ₄ .	771006
1.5.17 Dimethyl disulfide	$\text{Ag}^{2+} + \text{CH}_3\text{SSCH}_3 \rightarrow \text{Ag}^+ + [\text{CH}_3\text{SSCH}_3]^+$	5.2×10^8	3.5			p.r.	D.k. at 300 nm and p.b.k. in N ₂ O-satd. soln. contg. 0.002 mol L ⁻¹ Ag ⁺ and various lower concn. of disulfide.	761143
1.5.18 Ethylene glycol	$\text{Ag}^{2+} + \text{HOCH}_2\text{CH}_2\text{OH} \rightarrow$	1.3×10^6	4.7			p.r.	D.k. at 265 and 300 nm in N ₂ O-satd. soln. contg. 1.1×10^{-3} mol L ⁻¹ AgClO ₄ and $(1.1\text{-}4) \times 10^{-3}$ mol L ⁻¹ ethylene glycol; reaction product assigned as a complex which decays by intramolecular oxidation, $k = 2.8 \times 10^3$ s ⁻¹ .	81A209
1.5.19 Glycine	$\text{Ag}^{2+} + \text{GlyH} \rightarrow \text{AgGly}^+ + \text{H}^+$	1.5×10^6	4.4			p.r.	D.k. at 310 nm in N ₂ O-satd. soln. contg. 1×10^{-4} mol L ⁻¹ AgClO ₄ and -1.2×10^{-3} mol L ⁻¹ glycine; at [GlyH] > 0.01 mol L ⁻¹ $k = 5.2 \times 10^3$ s ⁻¹ for decay of the complex by intramolecular oxidation.	80A307

TABLE 1. Rate constants for silver transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
1.5 Silver(II) ion — Continued								
1.5.20 Methionine								
	$\text{Ag}^{2+} + \text{Met} \rightarrow \text{Ag}^+ + [\text{Met}]^+$	3.3×10^8	<5			p.r.	D.k. in N ₂ O-satd. soln.; evidence is given that amino group of methionine (10^{-2} mol L ⁻¹) is complexed with Ag ⁺ (5×10^{-2} mol L ⁻¹ AgNO ₃).	81A340
1.5.21 2-Methoxybenzoic acid								
	$\text{Ag}^{2+} + 2\text{-CH}_3\text{OC}_6\text{H}_4\text{CO}_2\text{H} \rightarrow \text{Ag}^+ + \text{H}^+ + [2\text{-CH}_3\text{OC}_6\text{H}_4\text{CO}_2]^-$	6.8×10^8	-3			p.r.	P.b.k. and d.k. in N ₂ O-satd. soln. contg. 0.001 mol L ⁻¹ AgSO ₄ .	771006
1.5.22 3-Methoxybenzoic acid								
	$\text{Ag}^{2+} + 3\text{-CH}_3\text{OC}_6\text{H}_4\text{CO}_2\text{H} \rightarrow \text{Ag}^+ + \text{H}^+ + [3\text{-CH}_3\text{OC}_6\text{H}_4\text{CO}_2]^-$	3.0×10^8	-3			p.r.	P.b.k. and d.k. in N ₂ O-satd. soln. contg. 0.001 mol L ⁻¹ AgSO ₄ .	771006
1.5.23 4-Methoxybenzoic acid								
	$\text{Ag}^{2+} + 4\text{-CH}_3\text{OC}_6\text{H}_4\text{CO}_2\text{H} \rightarrow \text{Ag}^+ + \text{H}^+ + [4\text{-CH}_3\text{OC}_6\text{H}_4\text{CO}_2]^-$	3.8×10^8	-3			p.r.	P.b.k. and d.k. in N ₂ O-satd. soln. contg. 0.001 mol L ⁻¹ AgSO ₄ .	771006
1.5.24 1,2,3-Trimethoxybenzene								
	$\text{Ag}^{2+} + 1,2,3\text{-C}_6\text{H}_3(\text{OCH}_3)_3 \rightarrow \text{Ag}^+ + [1,2,3\text{-C}_6\text{H}_3(\text{OCH}_3)_3]^+$	2.5×10^7	4		20	p.r.	P.b.k. in N ₂ O-satd. soln. contg. AgNO ₃ .	751171
1.5.25 1,2,4-Trimethoxybenzene								
	$\text{Ag}^{2+} + 1,2,4\text{-C}_6\text{H}_3(\text{OCH}_3)_3 \rightarrow \text{Ag}^+ + [1,2,4\text{-C}_6\text{H}_3(\text{OCH}_3)_3]^+$	7.0×10^7	4		20	p.r.	P.b.k. in N ₂ O-satd. soln. contg. AgNO ₃ .	751171
1.5.26 1,3,5-Trimethoxybenzene								
	$\text{Ag}^{2+} + 1,3,5\text{-C}_6\text{H}_3(\text{OCH}_3)_3 \rightarrow \text{Ag}^+ + [1,3,5\text{-C}_6\text{H}_3(\text{CH}_3\text{O})_3]^+$	5.6×10^7	4		20	p.r.	P.b.k. in N ₂ O-satd. soln. contg. AgNO ₃ .	751171
1.5.27 2,3,4-Trimethoxybenzoic acid								
	$\text{Ag}^{2+} + 2,3,4\text{-}(\text{CH}_3\text{O})_3\text{C}_6\text{H}_2\text{CO}_2\text{H} \rightarrow \text{Ag}^+ + \text{H}^+ + [2,3,4\text{-}(\text{CH}_3\text{O})_3\text{C}_6\text{H}_2\text{CO}_2]^-$	4.7×10^8	-3			p.r.	P.b.k. and d.k. in N ₂ O-satd. soln. contg. 0.001 mol L ⁻¹ AgSO ₄ .	771006
1.5.28 3,4,5-Trimethoxybenzoic acid								
	$\text{Ag}^{2+} + 3,4,5\text{-}(\text{CH}_3\text{O})_3\text{C}_6\text{H}_2\text{CO}_2\text{H} \rightarrow \text{Ag}^+ + \text{H}^+ + [3,4,5\text{-}(\text{CH}_3\text{O})_3\text{C}_6\text{H}_2\text{CO}_2]^-$	4.0×10^8	-3			p.r.	P.b.k. and d.k. in N ₂ O-satd. soln. contg. 0.001 mol L ⁻¹ AgSO ₄ .	771006
1.5.29 2,4,5-Trimethoxybenzoic acid								
	$\text{Ag}^{2+} + 2,4,5\text{-}(\text{CH}_3\text{O})_3\text{C}_6\text{H}_2\text{CO}_2\text{H} \rightarrow \text{Ag}^+ + \text{H}^+ + [2,4,5\text{-}(\text{CH}_3\text{O})_3\text{C}_6\text{H}_2\text{CO}_2]^-$	2.6×10^8	-3			p.r.	P.b.k. and d.k. in N ₂ O-satd. soln. contg. 0.001 mol L ⁻¹ AgSO ₄ .	771006
1.5.30 2,4,6-Trimethoxybenzoic acid								
	$\text{Ag}^{2+} + 2,4,6\text{-}(\text{CH}_3\text{O})_3\text{C}_6\text{H}_2\text{CO}_2\text{H} \rightarrow \text{Ag}^+ + \text{H}^+ + [2,4,6\text{-}(\text{CH}_3\text{O})_3\text{C}_6\text{H}_2\text{CO}_2]^-$	1.1×10^9	-3			p.r.	P.b.k. and d.k. in N ₂ O-satd. soln. contg. 0.001 mol L ⁻¹ AgSO ₄ .	771006
1.5.31 Trimethylacetate ion								
	$\text{Ag}^{2+} + (\text{CH}_3)_3\text{CCO}_2^- \rightarrow$	-1×10^8	4.3			p.r.	D.k. at 310 nm in N ₂ O-satd. in soln. contg. AgClO ₄ and $\sim 1 \times 10^{-4}$ mol L ⁻¹ trimethylacetic acid (S); reaction product assigned as a complex which decays by intramolecular oxidation, at $[S] = 2 \times 10^{-4}$ to 1×10^{-2} mol L ⁻¹ $k = 1 \times 10^4$ s ⁻¹ .	80A307
1.6 Hydroxysilver(II) ion								
1.6.1 Hydrogen ion								
	$\text{AgOH}^+ + \text{H}^+ \rightarrow \text{Ag}^{2+} + \text{H}_2\text{O}$	8×10^9	4.3			p.r.	P.b.k. in N ₂ O-satd. soln. contg. 0.001 mol L ⁻¹ Ag ⁺ .	79A304
		1.2×10^{10}				p.r.	D.k. at 310 nm in N ₂ O-satd. soln. contg. 0.001 mol L ⁻¹ Ag ⁺ and varied [H ⁺].	78C006
1.6.2 2,3-Dimethoxybenzoate ion								
	$\text{AgOH}^+ + 2,3\text{-}(\text{CH}_3\text{O})_2\text{C}_6\text{H}_3\text{CO}_2^- \rightarrow \text{Ag}^+ + \text{OH}^- + [2,3\text{-}(\text{CH}_3\text{O})_2\text{C}_6\text{H}_3\text{CO}_2]^-$	8.4×10^8	5-6			p.r.	P.b.k. and d.k. in N ₂ O-satd. soln. contg. 0.001 mol L ⁻¹ AgSO ₄ .	771006

TABLE 1. Rate constants for silver transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
1.6 Hydroxysilver(II) ion — Continued								
1.6.3 3,4-Dimethoxybenzoate ion								
	$\text{AgOH}^+ + 3,4-(\text{CH}_3\text{O})_2\text{C}_6\text{H}_3\text{CO}_2^- \rightarrow \text{Ag}^+ + \text{OH}^- + [3,4-(\text{CH}_3\text{O})_2\text{C}_6\text{H}_3\text{CO}_2]^\bullet$	2.2×10^9		5-6		p.r.	P.b.k. and d.k. in N ₂ O-satd. soln. contg. 0.001 mol L ⁻¹ AgSO ₄ .	771006
1.6.4 2,4-Dimethoxybenzoate ion								
	$\text{AgOH}^+ + 2,4-(\text{CH}_3\text{O})_2\text{C}_6\text{H}_3\text{CO}_2^- \rightarrow \text{Ag}^+ + \text{OH}^- + [2,4-(\text{CH}_3\text{O})_2\text{C}_6\text{H}_3\text{CO}_2]^\bullet$	1.9×10^9		5-6		p.r.	P.b.k. and d.k. in N ₂ O-satd. soln. contg. 0.001 mol L ⁻¹ AgSO ₄ .	771006
1.6.5 2,6-Dimethoxybenzoate ion								
	$\text{AgOH}^+ + 2,6-(\text{CH}_3\text{O})_2\text{C}_6\text{H}_3\text{CO}_2^- \rightarrow \text{Ag}^+ + \text{OH}^- + [2,6-(\text{CH}_3\text{O})_2\text{C}_6\text{H}_3\text{CO}_2]^\bullet$	2.4×10^9		5-6		p.r.	P.b.k. and d.k. in N ₂ O-satd. soln. contg. 0.001 mol L ⁻¹ AgSO ₄ .	771006
1.6.6 3,5-Dimethoxybenzoate ion								
	$\text{AgOH}^+ + 3,5-(\text{CH}_3\text{O})_2\text{C}_6\text{H}_3\text{CO}_2^- \rightarrow \text{Ag}^+ + \text{OH}^- + [3,5-(\text{CH}_3\text{O})_2\text{C}_6\text{H}_3\text{CO}_2]^\bullet$	2.3×10^9		5-6		p.r.	P.b.k. and d.k. in N ₂ O-satd. soln. contg. 0.001 mol L ⁻¹ AgSO ₄ .	771006
1.6.7 2-Methoxybenzoate ion								
	$\text{AgOH}^+ + 2-\text{CH}_3\text{OC}_6\text{H}_4\text{CO}_2^- \rightarrow \text{Ag}^+ + \text{OH}^- + [2-\text{CH}_3\text{OC}_6\text{H}_4\text{CO}_2]^\bullet$	4.0×10^9		5-6		p.r.	P.b.k. and d.k. in N ₂ O-satd. soln. contg. 0.001 mol L ⁻¹ AgSO ₄ .	771006
1.6.8 3-Methoxybenzoate ion								
	$\text{AgOH}^+ + 3-\text{CH}_3\text{OC}_6\text{H}_4\text{CO}_2^- \rightarrow \text{Ag}^+ + \text{OH}^- + [3-\text{CH}_3\text{OC}_6\text{H}_4\text{CO}_2]^\bullet$	1.4×10^9		5-6		p.r.	P.b.k. and d.k. in N ₂ O-satd. soln. contg. 0.001 mol L ⁻¹ AgSO ₄ .	771006
1.6.9 4-Methoxybenzoate ion								
	$\text{AgOH}^+ + 4-\text{CH}_3\text{OC}_6\text{H}_4\text{CO}_2^- \rightarrow \text{Ag}^+ + \text{OH}^- + [4-\text{CH}_3\text{OC}_6\text{H}_4\text{CO}_2]^\bullet$	1.6×10^9		5-6		p.r.	P.b.k. and d.k. in N ₂ O-satd. soln. contg. 0.001 mol L ⁻¹ AgSO ₄ .	771006
1.6.10 2,3,4-Trimethoxybenzoate ion								
	$\text{AgOH}^+ + 2,3,4-(\text{CH}_3\text{O})_3\text{C}_6\text{H}_2\text{CO}_2^- \rightarrow \text{Ag}^+ + \text{OH}^- + [2,3,4-(\text{CH}_3\text{O})_3\text{C}_6\text{H}_2\text{CO}_2]^\bullet$	2.1×10^9		5-6		p.r.	P.b.k. and d.k. in N ₂ O-satd. soln. contg. 0.001 mol L ⁻¹ AgSO ₄ .	771006
1.6.11 3,4,5-Trimethoxybenzoate ion								
	$\text{AgOH}^+ + 3,4,5-(\text{CH}_3\text{O})_3\text{C}_6\text{H}_2\text{CO}_2^- \rightarrow \text{Ag}^+ + \text{OH}^- + [3,4,5-(\text{CH}_3\text{O})_3\text{C}_6\text{H}_2\text{CO}_2]^\bullet$	1.2×10^9		5-6		p.r.	P.b.k. and d.k. in N ₂ O-satd. soln. contg. 0.001 mol L ⁻¹ AgSO ₄ .	771006
1.6.12 2,4,5-Trimethoxybenzoate ion								
	$\text{AgOH}^+ + 2,4,5-(\text{CH}_3\text{O})_3\text{C}_6\text{H}_2\text{CO}_2^- \rightarrow \text{Ag}^+ + \text{OH}^- + [2,4,5-(\text{CH}_3\text{O})_3\text{C}_6\text{H}_2\text{CO}_2]^\bullet$	1.2×10^9		5-6		p.r.	P.b.k. and d.k. in N ₂ O-satd. soln. contg. 0.001 mol L ⁻¹ AgSO ₄ .	771006
1.6.13 2,4,6-Trimethoxybenzoate ion								
	$\text{AgOH}^+ + 2,4,6-(\text{CH}_3\text{O})_3\text{C}_6\text{H}_2\text{CO}_2^- \rightarrow \text{Ag}^+ + \text{OH}^- + [2,4,6-(\text{CH}_3\text{O})_3\text{C}_6\text{H}_2\text{CO}_2]^\bullet$	2.4×10^9		5-6		p.r.	P.b.k. and d.k. in N ₂ O-satd. soln. contg. 0.001 mol L ⁻¹ AgSO ₄ .	771006
1.7 Mono- and dihydroxysilver(II)								
1.7.1 2-Aminoethanol								
	$\text{AgOH}^+/\text{Ag}(\text{OH})_2 + \text{H}_2\text{NCH}_2\text{CH}_2\text{OH} \rightarrow \text{Ag}^+ + \text{OH}^- + [\text{Ag}(\text{OH})_2\text{CH}_2\text{CH}_2\text{NH}_2]^\bullet$	5.5×10^8		8.9		p.r.	P.b.k. at 400 nm in N ₂ O-satd. soln. contg. 1.2 × 10 ⁻³ mol L ⁻¹ AgClO ₄ and ~1.7 × 10 ⁻⁴ mol L ⁻¹ ethanolamine; reaction product assigned as a complex which decays by intramolecular oxidation, $k = 2 \times 10^3$ s ⁻¹ ; $k = 8 \times 10^7$ L mol ⁻¹ s ⁻¹ for uptake of another glycol.	82A098
1.7.2 α-Aminoisobutyric acid								
	$\text{AgOH}^+/\text{Ag}(\text{OH})_2 + (\text{CH}_3)_2\text{C}(\text{NH}_3^+) \text{CO}_2^- \rightarrow \text{Ag}^+ + \text{OH}^- + [\text{Ag}(\text{OH})_2\text{C}(\text{NH}_3^+) \text{CO}_2]^\bullet$	4×10^7		8.8		p.r.	D.k. in N ₂ O-satd. soln. contg. 5 × 10 ⁻³ mol L ⁻¹ AgClO ₄ and (5-100) × 10 ⁻⁵ mol L ⁻¹ α-aminoisobutyric acid; reaction product assigned as a complex which decays by intramolecular oxidation, $k = 4 \times 10^3$ s ⁻¹ .	80A307

TABLE 1. Rate constants for silver transients — Continued

No.	Reaction	k (L mol ⁻¹ s ⁻¹)	pH	I	t (°C)	Method	Comment	Ref.
1.7 Mono- and dihydroxysilver(II) — Continued								
1.7.3 <i>cis</i>-1,2-Cyclohexanediol								
	$\text{AgOH}^+/\text{Ag}(\text{OH})_2 + c\text{-C}_6\text{H}_{10}(\text{OH})_2 \rightarrow$	1.5×10^8		8.7		p.r.	P.b.k. at 400 nm in N_2O -satd. soln. contg. 1.2×10^{-3} mol L ⁻¹ AgClO_4 in borate buffer; reaction product assigned as a complex which decays by intramolecular oxidation, $k = 3 \times 10^3$ s ⁻¹ ; $k = 8 \times 10^7$ L mol ⁻¹ s ⁻¹ for uptake of another glycol.	82A098
1.7.4 <i>trans</i>-1,2-Cyclohexanediol								
	$\text{AgOH}^+/\text{Ag}(\text{OH})_2 + c\text{-C}_6\text{H}_{10}(\text{OH})_2 \rightarrow$	3.7×10^8		8.7		p.r.	P.b.k. at 400 nm in N_2O -satd. soln. contg. 1.2×10^{-3} mol L ⁻¹ AgClO_4 ; reaction product assigned as a complex which decays by intramolecular oxidation, $k = 3 \times 10^3$ s ⁻¹ ; $k = 7.5 \times 10^7$ L mol ⁻¹ s ⁻¹ for uptake of another glycol.	82A098
1.7.5 Diethyl disulfide								
	$\text{AgOH}^+/\text{Ag}(\text{OH})_2 + \text{C}_2\text{H}_5\text{SSC}_2\text{H}_5 \rightarrow$ $\text{Ag}^+ + \text{OH}^-/2\text{OH}^- + [\text{C}_2\text{H}_5\text{SSC}_2\text{H}_5]^{++}$	7.0×10^8		8		p.r.	D.k. at 300 nm and p.b.k. in N_2O -satd. soln. contg. 0.002 mol L ⁻¹ Ag^+ and various lower concn. of disulfide.	761143
1.7.6 Dimethyl disulfide								
	$\text{AgOH}^+/\text{Ag}(\text{OH})_2 + \text{CH}_3\text{SSCH}_3 \rightarrow \text{Ag}^+$ $+ \text{OH}^-/2\text{OH}^- + [\text{CH}_3\text{SSCH}_3]^{++}$	5.6×10^8		8		p.r.	D.k. at 300 nm and p.b.k. in N_2O -satd. soln. contg. 0.002 mol L ⁻¹ Ag^+ and various lower concn. of disulfide.	761143
1.7.7 Ethylene glycol								
	$\text{AgOH}^+/\text{Ag}(\text{OH})_2 + \text{HOCH}_2\text{CH}_2\text{OH} \rightarrow$	1.5×10^8		8.6		p.r.	P.b.k. at 400 nm in N_2O -satd. soln. contg. 1.2×10^{-3} mol L ⁻¹ AgClO_4 ; reaction product assigned as a complex which decays by intramolecular oxidation, $k = -2.5 \times 10^3$ s ⁻¹ ; $k = 3 \times 10^7$ L mol ⁻¹ s ⁻¹ for uptake of another glycol.	82A098
1.7.8 Glycine, negative ion								
	$\text{AgOH}^+/\text{Ag}(\text{OH})_2 + \text{Gly}^- \rightarrow$ $\text{AgGly(OH)}/\text{AgGly(OH)}_2^-$	6×10^7		9.0		p.r.	D.k. at 330 and 400 nm in N_2O -satd. soln. contg. 0.001 mol L ⁻¹ AgClO_4 and (0.5-4) $\times 10^{-3}$ mol L ⁻¹ glycine; experimentally indistinguishable from $\text{AgGly(OH)}/\text{AgGly(OH)}_2 + \text{Gly} \rightarrow \text{Ag}(\text{Gly})_2$, extrapolation gives 3×10^8 L mol ⁻¹ s ⁻¹ for reaction of the fully basic form, Gly^- . At $[\text{Gly}^-] > 0.001$ mol L ⁻¹ , $k = 50$ s ⁻¹ for decay of the complex, $\text{Ag}(\text{Gly})_2$, by intramolecular oxidation; at low $[\text{Gly}^-]$, $k = 500$ s ⁻¹ .	80A307
1.7.9 Trimethylacetate ion								
	$\text{AgOH}^+/\text{Ag}(\text{OH})_2 + (\text{CH}_3)_3\text{CCO}_2^- \rightarrow$	$<10^7$		8.8		p.r.	D.k. at 310 nm in N_2O -satd. in soln. contg. AgClO_4 and $\sim 1 \times 10^{-4}$ mol L ⁻¹ trimethylacetic acid.	80A307
1.8 Dihydroxysilver(II)								
1.8.1 Dihydroxysilver(II)								
	$\text{Ag}(\text{OH})_2 + \text{Ag}(\text{OH})_2 \rightarrow$	7.5×10^9		9.2- 9.8		p.r.	D.k. at 270 nm and p.b.k. at 390 nm in N_2O -satd. soln. contg. 0.001 mol L ⁻¹ Ag^+ ; reaction suggested to be dimerization $\rightarrow [\text{Ag}(\text{OH})_2]_2$ and ultimate formation of $\text{Ag}(\text{III})$, which decays with $k = -0.1$ s ⁻¹ .	79A304

TABLE I. Rate constants for silver transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
1.9 Tetraamminesilver(II) ion								
1.9.1	Tetraamminesilver(II) ion							
	$\text{Ag}(\text{NH}_3)_4^{2+} + \text{Ag}(\text{NH}_3)_4^{2+} \rightarrow$	6×10^5		11.5		p.r.	D.k. at 270 nm in N ₂ O-soln. contg. 0.001 mol L ⁻¹ Ag ⁺ and 1 mol L ⁻¹ NH ₃ .	79A304
1.9.2	Alanine, negative ion							
	$\text{Ag}(\text{NH}_3)_4^{2+} + \text{Ala}^- \rightarrow \text{Ag}(\text{NH}_3)_3(\text{Ala})^+$	8×10^5		11.5		p.r.	D.k. at 270-280 nm in N ₂ O-soln. contg. 0.001 mol L ⁻¹ Ag ⁺ and 1 mol L ⁻¹ NH ₃ ; $k = 5 \times 10^3$ s ⁻¹ for decay of the complex by intramolecular oxidation.	80A307
	+ NH ₃							
1.9.3	α -Aminoisobutyrate negative ion							
	$\text{Ag}(\text{NH}_3)_4^{2+} + (\text{CH}_3)_2\text{C}(\text{NH}_2)\text{CO}_2^- \rightarrow$	2×10^6		11.5		p.r.	D.k. in N ₂ O-satd. soln. contg. 0.001 mol L ⁻¹ AgClO ₄ and 1 mol L ⁻¹ NH ₃ ; reaction product assigned as a complex which decays by intramolecular oxidation, $k = 5 \times 10^3$ s ⁻¹ .	80A307
	$\text{Ag}(\text{NH}_3)_3[(\text{CH}_3)_2\text{C}(\text{NH}_2)\text{CO}_2]^+$ + NH ₃							
1.9.4	Aspartate monoanion							
	$\text{Ag}(\text{NH}_3)_4^{2+} + \text{Asp}^- \rightarrow \text{Ag}(\text{NH}_3)_3(\text{Asp})^+$	1.2×10^6		11.5		p.r.	D.k. at 270-280 nm; $k = 4 \times 10^3$ s ⁻¹ for decay of the complex by intramolecular oxidation.	80A307
	+ NH ₃							
1.9.5	Glycine, negative ion							
	$\text{Ag}(\text{NH}_3)_4^{2+} + \text{Gly}^- \rightarrow \text{Ag}(\text{NH}_3)_3(\text{Gly})^+$	5×10^5		11.5		p.r.	D.k. at 270-280 nm in soln. contg. 0.001 mol L ⁻¹ Ag ⁺ and 1 mol L ⁻¹ NH ₃ ; $k = 3 \times 10^3$ s ⁻¹ for decay of the complex by intramolecular oxidation.	80A307
	+ NH ₃							
1.10 Diammine(hydroxy)silver(II)								
1.10.1	Ammonia							
	$\text{Ag}(\text{NH}_3)_2\text{OH}^+ + \text{NH}_3 \rightarrow \text{Ag}(\text{NH}_3)_3\text{OH}^+$	3×10^7		10.5		p.r.	P.b.k. at 270 nm in N ₂ O-satd. soln. contg. 0.001 mol L ⁻¹ Ag ⁺ and (3-12) $\times 10^{-3}$ mol L ⁻¹ NH ₃ .	79A304
1.11	Triammine(hydroxy)silver(II) ion							
1.11.1	Ammonia							
	$\text{Ag}(\text{NH}_3)_3\text{OH}^+ + \text{NH}_3 \rightarrow \text{Ag}(\text{NH}_3)_4^{2+} +$	8×10^6		10.5		p.r.	P.b.k. at 270 nm in N ₂ O-satd. soln. contg. 0.001 mol L ⁻¹ Ag ⁺ and (1-9) $\times 10^{-2}$ mol L ⁻¹ NH ₃ ; $k_t = 8 \times 10^7$ L mol ⁻¹ s ⁻¹ .	79A304
	OH							
1.12	Nitrilotriacetatoargentate(II)							
1.12.1	First-order reaction							
	$\text{Ag(II)NTA} \rightarrow$	2×10^3 s ⁻¹		10.7		p.r.	D.k. in N ₂ O-satd. soln. contg. AgClO ₄ and NTA; decay suggested to occur by intramolecular oxidation.	80A307
1.13	Ethylenediaminetetraacetatoargentate(II)							
1.13.1	First-order reaction							
	$\text{Ag(II)EDTA} \rightarrow$	8 s ⁻¹		11.0		p.r.	D.k. in N ₂ O-satd. soln. contg. AgClO ₄ and EDTA; decay suggested to occur by intramolecular oxidation.	80A307
1.14	Silver(II)-succinate complex							
1.14.1	First-order reaction							
	$\text{Ag(II)}(\text{C}_2\text{O}_4)_2\text{CH}_2\text{CH}_2\text{CO}_2^- \rightarrow$	2×10^2 s ⁻¹		5.6		p.r.	D.k. in N ₂ O-satd. soln. contg. AgClO ₄ and succinic acid; decay suggested to occur by intramolecular oxidation.	80A307

TABLE 2. Rate constants for aluminum transients

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
2.1 Aluminum(III) sulfophthalocyanine, radical anion								
2.1.1	Oxygen							
	[Al(pts)] ^{•+} + O ₂ → Al(pts) + O ₂ ^{•-}	1.5 × 10 ⁸		7		f.p./rq	D.k. in soln. contg. Al(pts) and 5 × 10 ⁻³ mol L ⁻¹ 4-aminophenol (RQ) and varied [O ₂].	89R092
2.1.2	4-Aminophenoxy							
	[Al(pts)] ^{•+} + 4-H ₂ NC ₆ H ₄ O [•] + H ⁺ → Al(pts) + 4-H ₂ NC ₆ H ₄ OH	3.3 × 10 ⁹		7		f.p./rq	D.k. in N ₂ -satd. soln. contg. Al(pts) and 10 ⁻⁴ mol L ⁻¹ 4-aminophenol (RQ).	89R092

TABLE 3. Rate constants for gold transients

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	t (°C)	Method	Comment	Ref.
3.1 Dicyanoaurate(0) ion								
3.1.1 First-order reaction								
	$\text{Au(CN)}_2^{2-} \rightarrow \text{Au}^0 + 2 \text{CN}^-$	† $6.7 \times 10^3 \text{ s}^{-1}$	9.5			p.r.	D.k. at 420 nm in soln. contg. 1×10^{-5} mol L $^{-1}$ KAu(CN) $_2$ and 0.1 mol L $^{-1}$ 2-PrOH.	89A310
							† Different d.k. have been reported for the same species, see following entry.	
3.1.2 Dicyanoaurate(0) ion								
	$\text{Au(CN)}_2^{2-} + \text{Au(CN)}_2^{2-} \rightarrow$	† 3.2×10^9	11			p.r.	D.k. at 410 nm in soln. contg. 0.5 and 1×10^{-4} mol L $^{-1}$ KAu(CN) $_2$, 0.002 mol L $^{-1}$ MeOH and 0.001 mol L $^{-1}$ NaOH. Unclear whether k or $2k$.	680302
		† 2.9×10^9	13			p.r.	D.k. at 410 nm in soln. contg. KAu(CN) $_2$ and 0.098 mol L $^{-1}$ H $_2$. Unclear whether k or $2k$.	680302
							† Different d.k. have been reported for the same species, see previous entry.	
3.1.3 Ferricyanide ion								
	$\text{Au(CN)}_2^{2-} + \text{Fe(CN)}_6^{3-} \rightarrow$	5.5×10^8				p.r.	D.k. at 410 nm.	680302
3.1.4 Nitrous oxide								
	$\text{Au(CN)}_2^{2-} + \text{N}_2\text{O} \rightarrow$	5.5×10^8				p.r.	D.k. at 410 nm.	680302
3.1.5 Oxygen								
	$\text{Au(CN)}_2^{2-} + \text{O}_2 \rightarrow$	3.6×10^9				p.r.	D.k. at 410 nm.	680302
3.2 Hydrogen dicyanoaurate(0) ion								
3.2.1 Hydrogen ion								
	$\text{Au(CN)}_2\text{H}^- + \text{H}^+ \rightarrow \text{Au(CN)}_2\text{H}_2$	5.9×10^{10}	~4.5-5			p.r.	D.k. at 420 nm in soln. contg. 8×10^{-4} mol L $^{-1}$ KAu(CN) $_2$, 0.1 mol L $^{-1}$ 2-PrOH and $\sim(1-3) \times 10^{-5}$ mol L $^{-1}$ H $^+$.	89A310
3.3 Dihydrogen dicyanoaurate(0)								
3.3.1 First-order reaction								
	$\text{Au(CN)}_2\text{H}_2 \rightarrow$	† $5.3 \times 10^4 \text{ s}^{-1}$	3			p.r.	D.k. at 260 nm in soln. contg. 3.6×10^{-5} mol L $^{-1}$ KAu(CN) $_2$ and 5×10^{-3} mol L $^{-1}$ <i>tert</i> -BuOH.	89A310
							† Different d.k. have been reported for the same species, see following entry.	
3.3.2 Dihydrogen dicyanoaurate(0)								
	$\text{Au(CN)}_2\text{H}_2 + \text{Au(CN)}_2\text{H}_2 \rightarrow$	† 5.0×10^9	2			p.r.	D.k. at 270 nm in soln. contg. KAu(CN) $_2$ and MeOH or under 110 atm. H $_2$. Unclear whether k or $2k$.	680302
							† Different d.k. have been reported for the same species, see previous entry.	
3.4 Dicyanohydroxyaurate(II) ion								
3.4.1 Dicyanohydroxyaurate(II) ion								
	$(\text{OH})\text{Au(CN)}_2^- + (\text{OH})\text{Au(CN)}_2^- \rightarrow$	2.5×10^8	7-10			p.r.	D.k. at 270 nm in N $_2$ O-satd. soln. contg. 5×10^{-4} mol L $^{-1}$ Au(CN) $_2^-$. Unclear whether k or $2k$. Au(III) product reported to undergo H $_2$ O elimination, $k = 9.5 \text{ s}^{-1}$, to give O=Au ^{III} (CN) $_2^-$.	91A018

TABLE 3. Rate constants for gold transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
3.4 Dicyanohydroxyaurate(II) ion — Continued								
3.4.2 Hydrogen ion								
	$(\text{OH})\text{Au}(\text{CN})_2^- + \text{H}^+ \rightarrow [\text{(OH})\text{Au}(\text{CN})_2]^\sim \text{H}^+$	2.1×10^{10}		~4.5-5		p.r.	D.k. at 270 nm and condy. change in N ₂ O-satd. soln. contg. 5×10^{-4} mol L ⁻¹ Au(CN) ₂ ⁻ and $\sim(1-3) \times 10^{-5}$ mol L ⁻¹ H ⁺ . Product reported to undergo HCN elimination, <i>k</i> = 4.8 s ⁻¹ at pH 4.4.	91A018
3.5 Dicyano(hydroxy)aurate(II) ion, protonated								
3.5.1 Dicyano(hydroxy)aurate(II) ion, protonated								
	$[(\text{OH})\text{Au}(\text{CN})_2]^\sim \text{H}^+ + (\text{OH})\text{Au}(\text{CN})_2^- \text{H}^+ \rightarrow \text{Au}(\text{CN})_2^- + (\text{OH})_2\text{Au}(\text{CN})_2^\sim \text{H}^+ + \text{H}^+$	1.0×10^9		4.6		p.r.	D.k. at 270 nm and condy. change in N ₂ O-satd. soln. contg. 5×10^{-4} mol L ⁻¹ Au(CN) ₂ ⁻ . Unclear whether <i>k</i> or 2 <i>k</i> .	91A018
3.6 Gold(II)								
3.6.1 Gold(II)								
	$\text{Au(II)} + \text{Au(II)} \rightarrow$	1.4×10^9	2	20	p.r.		D.k. at 270 nm in soln. contg. 5.0×10^{-5} mol L ⁻¹ NaAuCl ₄ and 0.01 mol L ⁻¹ HClO ₄ . In the presence of 0.12 mol L ⁻¹ NaClO ₄ <i>k</i> = 1.5×10^9 L mol ⁻¹ s ⁻¹ .	700580
		8.6×10^8	2	20	p.r.		D.k. at 270 nm in soln. contg. 5.0×10^{-5} mol L ⁻¹ NaAuCl ₄ , 0.01 mol L ⁻¹ HClO ₄ and 0.001 mol L ⁻¹ Cl ⁻ . In the presence of 0.12 mol L ⁻¹ NaClO ₄ <i>k</i> = 1.2×10^9 L mol ⁻¹ s ⁻¹ .	700580
		2.7×10^8	2	20	p.r.		D.k. at 270 nm in soln. contg. 5.0×10^{-5} mol L ⁻¹ NaAuCl ₄ , 0.01 mol L ⁻¹ HClO ₄ and 0.01 mol L ⁻¹ Cl ⁻ .	700580
		2.5×10^7	2	20	p.r.		D.k. at 270 nm in soln. contg. 5.0×10^{-5} mol L ⁻¹ NaAuCl ₄ , 0.01 mol L ⁻¹ HClO ₄ and 0.1 mol L ⁻¹ Cl ⁻ .	700580
		2.4×10^8	2		p.r.		D.k. at 330 nm in soln. contg. Au(CN) ₂ ⁻ , N ₂ O and 0.01 mol L ⁻¹ HCl. Unclear whether <i>k</i> or 2 <i>k</i> .	680302
		4.8×10^8	4,7		p.r.		D.k. at 330 nm in soln. contg. HAuCl ₄ , MeOH and 0.01 mol L ⁻¹ KCl. Unclear whether <i>k</i> or 2 <i>k</i> .	680302

TABLE 4. Rate constants for bismuth transients

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
4.1 Bismuth(II) ion								
4.1.1 Bismuth(II) ion								
	$\text{Bi}^{2+} + \text{Bi}^{2+} \rightarrow$	2.5×10^8	~ 1.5			p.r.	D.k. in Ar-satd. soln. contg. 0.001 mol L ⁻¹ Bi(OAc)_3 .	761233
		6×10^8	~ 1			p.r.	D.k. in aerated soln. contg. 0.01 mol L ⁻¹ BiCl_3 .	761233
4.1.2 Hydroxyl								
	$\text{Bi}^{2+} + \cdot\text{OH} \rightarrow \text{Bi}^{3+} + \text{OH}^-$	2×10^9	≤ 0			p.r.	D.k. in Ar-satd. soln. contg. 1-5 mol L ⁻¹ HClO_4 .	88A493
4.1.3 Perhydroxyl								
	$\text{Bi}^{2+} + \text{HO}_2^\cdot + \text{H}^+ \rightarrow \text{Bi}^{3+} + \text{H}_2\text{O}_2$	2.5×10^9	~ 1.5			p.r.	D.k. in aerated soln. contg. 0.001 mol L ⁻¹ Bi(OAc)_3 .	761233
4.2 Hydroxymethylbismuth(IV) ion								
4.2.1 First-order reaction								
	$\text{BiCH}_2\text{OH}^{3+} \rightarrow$	$4.8 \times 10^3 \text{ s}^{-1}$	≤ 0			p.r.	D.k. in Ar-satd. soln. contg. 1-5 mol L ⁻¹ HClO_4 and MeOH.	88A493
4.3 1-Hydroxyethylbismuth(IV) ion								
4.3.1 First-order reaction								
	$\text{BiCH}(\text{CH}_3)\text{OH}^{3+} \rightarrow$	$3.6 \times 10^4 \text{ s}^{-1}$	≤ 0			p.r.	D.k. in Ar-satd. soln. contg. 1-5 mol L ⁻¹ HClO_4 and EtOH.	88A493
4.4 1-Hydroxy-1-methylethylbismuth(IV) ion								
4.4.1 First-order reaction								
	$\text{BiC}(\text{CH}_3)_2\text{OH}^{3+} \rightarrow$	$1 \times 10^3 \text{ s}^{-1}$	≤ 0			p.r.	D.k. in Ar-satd. soln. contg. 1-5 mol L ⁻¹ HClO_4 and 2-PrOH.	88A493
4.5 2-Hydroxy-2-dimethylethylbismuth(IV) ion								
4.5.1 First-order reaction								
	$\text{BiCH}_2\text{C}(\text{CH}_3)_2\text{OH}^{3+} \rightarrow$	$1.0 \times 10^5 \text{ s}^{-1}$	≤ 0			p.r.	D.k. in Ar-satd. soln. contg. 1-5 mol L ⁻¹ HClO_4 and <i>tert</i> -BuOH.	88A493
4.6 Carboxybismuth(IV) ion								
4.6.1 First-order reaction								
	$\text{BiCOOH}^{3+} \rightarrow$	$< 10^3 \text{ s}^{-1}$	≤ 0			p.r.	D.k. in Ar-satd. soln. contg. 1-5 mol L ⁻¹ HClO_4 and HCO_2H .	88A493

TABLE 5. Rate constants for cadmium transients

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
5.1 Cadmium(I) ions								
5.1.1 Cadmium(I) ions								
	$\text{Cd}^+ + \text{Cd}^+ \rightarrow \text{Cd}_2^{2+}$	2.1×10^9				p.r.	D.k. in soln. contg. $\text{Cd}(\text{ClO}_4)_2$ and <i>tert</i> -BuOH; value cor. for $\epsilon = 1.4 \times 10^4 \text{ L mol}^{-1} \text{ cm}^{-1}$ [92A182].	88A124
		1.5×10^9				p.r.	D.k. at 300 nm and condy. change in soln. contg. $5 \times 10^{-4} \text{ mol L}^{-1} \text{ CdSO}_4$ and MeOH, EtOH or 2-PrOH; value obtained by computer fit.	751064
		2.5×10^9				p.r.	D.k. in Ar-satd. soln. contg. $1 \times 10^{-3} \text{ mol L}^{-1} \text{ Cd}^{2+}$ and $0.025 \text{ mol L}^{-1} \text{ EtOH}$, ethylene glycol or <i>tert</i> -BuOH.	751153
5.1.2 Hydroxyl								
	$\text{Cd}^+ + \cdot\text{OH} \rightarrow \text{Cd}^{2+} + \text{OH}^-$	$\sim 1.3 \times 10^{10}$		25		p.r.	D.k.; value cor. for $\epsilon = 1.4 \times 10^4 \text{ L mol}^{-1} \text{ cm}^{-1}$ [92A182].	751027
		2×10^{10}				p.r.	D.k. at 300 nm, p.b.k. at 240 nm and condy. change in soln. contg. $5 \times 10^{-4} \text{ mol L}^{-1} \text{ CdSO}_4$; value obtained by computer fit.	751064
5.1.3 Hydroxymethyl								
	$\text{Cd}^+ + \cdot\text{CH}_2\text{OH} \rightarrow \text{CdCH}_2\text{OH}^+$	2×10^8				p.r.	D.k. at 300 nm, p.b.k. at 240 nm and condy. change in soln. contg. $5 \times 10^{-4} \text{ mol L}^{-1} \text{ CdSO}_4$ and MeOH; value obtained by computer fit.	751064
5.1.4 1-Hydroxyethyl								
	$\text{Cd}^+ + \text{CH}_3\dot{\text{C}}\text{HOH} \rightarrow \text{CdCHOHCH}_3^+$	1.3×10^9				p.r.	D.k. at 300 nm, p.b.k. at 240 nm and condy. change in soln. contg. $5 \times 10^{-4} \text{ mol L}^{-1} \text{ CdSO}_4$ and EtOII; value obtained by computer fit.	751064
5.1.5 1-Hydroxy-1-methylethyl								
	$\text{Cd}^+ + (\text{CH}_3)_2\dot{\text{C}}\text{OH} \rightarrow \text{CdC}(\text{CH}_3)_2\text{OH}^+$	2.4×10^9				p.r.	D.k. at 300 nm, p.b.k. at 240 nm and condy. change in soln. contg. $5 \times 10^{-4} \text{ mol L}^{-1} \text{ CdSO}_4$ and 2-PrOH; value obtained by computer fit.	751064
5.1.6 2-Hydroxy-2,2-dimethylethyl								
	$\text{Cd}^+ + \cdot\text{CH}_2\text{C}(\text{CH}_3)_2\text{OH} \rightarrow \text{Cd}^{2+} + \text{CH}_2=\text{C}(\text{CH}_3)_2 + \text{OH}^-$	$\sim 1 \times 10^9$				p.r.	D.k. at 300 nm, p.b.k. at 240 nm and condy. change in soln. contg. $5 \times 10^{-4} \text{ mol L}^{-1} \text{ CdSO}_4$ and <i>tert</i> -BuOH; $k(\text{Cd}_2^{2+} + \cdot\text{CH}_2\text{C}(\text{CH}_3)_2\text{OH} \rightarrow \text{Cd}^{2+} + \text{Cd}^{2+} + (\text{CH}_3)_2\text{C}=\text{CH}_2 + \text{OH}^-) = \sim 1 \times 10^9 \text{ L mol}^{-1} \text{ s}^{-1}$; both values obtained by computer fit.	751064
5.1.7 Carbon dioxide radical anion								
	$\text{Cd}^+ + \text{CO}_2^{\cdot-} \rightarrow \text{Cd}^0 + \text{CO}_2$	2×10^9				p.r.	D.k. in deaerated soln. contg. $5 \times 10^{-4} \text{ mol L}^{-1} \text{ Cd}(\text{ClO}_4)_2$ and $10^{-3} \text{ mol L}^{-1}$ formate.	92N098
5.1.8 Bromate ion								
	$\text{Cd}^+ + \text{BrO}_3^- \rightarrow$	1.3×10^8		0.08		p.r.	D.k. at 313 nm in soln. contg. $0.02 \text{ mol L}^{-1} \text{ CdSO}_4$, $0.001 \text{ mol L}^{-1} \text{ MeOH}$ and varied $[\text{BrO}_3^-]$; studied at 3-90 °C. $E_a = 13.4 \text{ kJ mol}^{-1}$ [701228].	68G855
5.1.9 Tris(ethylenediamine)cobalt(III) ion								
	$\text{Cd}^+ + \text{Co}(\text{en})_3^{3+} \rightarrow \text{Cd}^{2+} + \text{Co}(\text{en})_3^{2+}$	1.6×10^7		5-6	0.08	p.r.	D.k. at 310 nm in soln. contg. $0.02 \text{ mol L}^{-1} \text{ CdSO}_4$, $0.001 \text{ mol L}^{-1} \text{ MeOH}$ and $(0.5-3.0) \times 10^{-4} \text{ mol L}^{-1}$ complex.	690428

TABLE 5. Rate constants for cadmium transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
5.1 Cadmium(I) ions — Continued								
5.1.10 <i>cis</i>-Dichlorobis(ethylenediamine)cobalt(III) ion	$\text{Cd}^+ + \text{cis-}\text{Co}(\text{en})_2\text{Cl}_2^+ \rightarrow \text{Cd}^{2+} + \text{cis-}\text{Co}(\text{en})_2\text{Cl}_2$	2.3×10^9	5-6	0.08		p.r.	D.k. at 350 nm in soln. contg. 0.02 mol L ⁻¹ CdSO ₄ , 0.001 mol L ⁻¹ MeOH and (0.5-3.0) × 10 ⁻⁴ mol L ⁻¹ complex.	690428
5.1.11 <i>trans</i>-Dichlorobis(ethylenediamine)cobalt(III) ion	$\text{Cd}^+ + \text{trans-}\text{Co}(\text{en})_2\text{Cl}_2^+ \rightarrow \text{Cd}^{2+} + \text{trans-}\text{Co}(\text{en})_2\text{Cl}_2$	2.6×10^9	5-6	0.08		p.r.	D.k. at 350 nm in soln. contg. 0.02 mol L ⁻¹ CdSO ₄ , 0.001 mol L ⁻¹ MeOH and (0.5-3.0) × 10 ⁻⁴ mol L ⁻¹ complex.	690428
5.1.12 Carbonatobis(ethylenediamine)cobalt(III) ion	$\text{Cd}^+ + \text{Co}(\text{en})_2\text{CO}_3^+ \rightarrow \text{Cd}^{2+} + \text{Co}(\text{en})_2\text{CO}_3$	6.7×10^8	5-6	0.08		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L ⁻¹ CdSO ₄ , 0.001 mol L ⁻¹ MeOH and (0.5-3.0) × 10 ⁻⁴ mol L ⁻¹ complex.	690428
5.1.13 <i>cis</i>-Bis(ethylenediamine)difluorocobalt(III) ion	$\text{Cd}^+ + \text{cis-}\text{Co}(\text{en})_2\text{F}_2^+ \rightarrow \text{Cd}^{2+} + \text{cis-}\text{Co}(\text{en})_2\text{F}_2$	6.0×10^8	5-6	0.08		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L ⁻¹ CdSO ₄ , 0.001 mol L ⁻¹ MeOH and (0.5-3.0) × 10 ⁻⁴ mol L ⁻¹ complex.	690428
5.1.14 Aquabis(ethylenediamine)fluorocobalt(III) ion	$\text{Cd}^+ + \text{Co}(\text{en})_2(\text{H}_2\text{O})\text{F}^{2+} \rightarrow \text{Cd}^{2+} + \text{Co}(\text{en})_2(\text{H}_2\text{O})\text{F}^+$	4.1×10^8	5-6	0.08		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L ⁻¹ CdSO ₄ , 0.001 mol L ⁻¹ MeOH and (0.5-3.0) × 10 ⁻⁴ mol L ⁻¹ complex.	690428
5.1.15 <i>cis</i>-Amminechlorobis(ethylenediamine)cobalt(III) ion	$\text{Cd}^+ + \text{cis-}\text{Co}(\text{en})_2(\text{NH}_3)\text{Cl}^{2+} \rightarrow \text{Cd}^{2+} + \text{cis-}\text{Co}(\text{en})_2(\text{NH}_3)\text{Cl}^+$	1.8×10^9	5-6	0.08		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L ⁻¹ CdSO ₄ , 0.001 mol L ⁻¹ MeOH and (0.5-3.0) × 10 ⁻⁴ mol L ⁻¹ complex.	690428
5.1.16 <i>cis</i>-Nitroamminebis(ethylenediamine)cobalt(III) ion	$\text{Cd}^+ + \text{cis-}\text{Co}(\text{en})_2(\text{NH}_3)\text{NO}_2^{2+} \rightarrow \text{Cd}^{2+} + \text{cis-}\text{Co}(\text{en})_2(\text{NH}_3)\text{NO}_2^+$	2.8×10^9	5-6	0.08		p.r.	D.k. at 350 nm in soln. contg. 0.02 mol L ⁻¹ CdSO ₄ , 0.001 mol L ⁻¹ MeOH and (0.5-3.0) × 10 ⁻⁴ mol L ⁻¹ complex.	690428
5.1.17 Hexaamminecobalt(III) ion	$\text{Cd}^+ + \text{Co}(\text{NH}_3)_6^{3+} \rightarrow \text{Cd}^{2+} + \text{Co}(\text{NH}_3)_6^{2+}$	1.7×10^8	5-6	0.08		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L ⁻¹ CdSO ₄ , 0.001 mol L ⁻¹ MeOH and (0.5-3.0) × 10 ⁻⁴ mol L ⁻¹ complex.	690428
5.1.18 Pentaammine(bromo)cobalt(III) ion	$\text{Cd}^+ + \text{Co}(\text{NH}_3)_5\text{Br}^{2+} \rightarrow \text{Cd}^{2+} + \text{Co}(\text{NH}_3)_5\text{Br}^+$	2.5×10^9	4.0	0.08		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L ⁻¹ CdSO ₄ , 0.001 mol L ⁻¹ MeOH and (0.5-3.0) × 10 ⁻⁴ mol L ⁻¹ complex.	690428
5.1.19 Pentaammine(chloro)cobalt(III) ion	$\text{Cd}^+ + \text{Co}(\text{NH}_3)_5\text{Cl}^{2+} \rightarrow \text{Cd}^{2+} + \text{Co}(\text{NH}_3)_5\text{Cl}^+$	2.2×10^9	5-6	0.08		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L ⁻¹ CdSO ₄ , 0.001 mol L ⁻¹ MeOH and (0.5-3.0) × 10 ⁻⁴ mol L ⁻¹ complex.	690428
5.1.20 Pentaammine(cyano)cobalt(III) ion	$\text{Cd}^+ + \text{Co}(\text{NH}_3)_5(\text{CN})^{2+} \rightarrow \text{Cd}^{2+} + \text{Co}(\text{NH}_3)_5(\text{CN})^+$	9.1×10^8	5-6	0.08		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L ⁻¹ CdSO ₄ , 0.001 mol L ⁻¹ MeOH and (0.5-3.0) × 10 ⁻⁴ mol L ⁻¹ complex.	690428
5.1.21 Pentaammine(fluoro)cobalt(III) ion	$\text{Cd}^+ + \text{Co}(\text{NH}_3)_5\text{F}^{2+} \rightarrow \text{Cd}^{2+} + \text{Co}(\text{NH}_3)_5\text{F}^+$	5.4×10^8	5-6	0.08		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L ⁻¹ CdSO ₄ , 0.001 mol L ⁻¹ MeOH and (0.5-3.0) × 10 ⁻⁴ mol L ⁻¹ complex.	690428
5.1.22 Pentaammine(fumarato)cobalt(III) ion	$\text{Cd}^+ + \text{Co}(\text{NH}_3)_5\text{fumarate}^+ \rightarrow \text{Cd}^{2+} + \text{Co}(\text{NH}_3)_5\text{fumarate}$	8.3×10^8	5-6	0.08		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L ⁻¹ CdSO ₄ , 0.001 mol L ⁻¹ MeOH and (0.5-3.0) × 10 ⁻⁴ mol L ⁻¹ complex.	690428

TABLE 5. Rate constants for cadmium transients — Continued

No.	Reaction	k (L mol ⁻¹ s ⁻¹)	pH	I	t (°C)	Method	Comment	Ref.
5.1 Cadmium(I) ions — Continued								
5.1.23	Pentaammine(aqua)cobalt(III) ion $\text{Cd}^+ + \text{Co}(\text{NH}_3)_5(\text{H}_2\text{O})^{3+} \rightarrow \text{Cd}^{2+} + \text{Co}(\text{NH}_3)_5(\text{H}_2\text{O})^{2+}$	6.2×10^8	4.0	0.08		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L ⁻¹ CdSO ₄ , 0.001 mol L ⁻¹ MeOH and (0.5-3.0) × 10 ⁻⁴ mol L ⁻¹ complex.	690428
5.1.24	Pentaammine(hydroxy)cobalt(III) ion $\text{Cd}^+ + \text{Co}(\text{NH}_3)_5\text{OH}^{2+} \rightarrow \text{Cd}^{2+} + \text{Co}(\text{NH}_3)_5\text{OH}^+$	9.0×10^8	7.1	0.08		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L ⁻¹ CdSO ₄ , 0.001 mol L ⁻¹ MeOH and (0.5-3.0) × 10 ⁻⁴ mol L ⁻¹ complex.	690428
5.1.25	Pentaammine(azido)cobalt(III) ion $\text{Cd}^+ + \text{Co}(\text{NH}_3)_5(\text{N}_3)^{2+} \rightarrow \text{Cd}^{2+} + \text{Co}(\text{NH}_3)_5(\text{N}_3)^+$	1.4×10^9	5-6	0.08		p.r.	D.k. at 350 nm in soln. contg. 0.02 mol L ⁻¹ CdSO ₄ , 0.001 mol L ⁻¹ MeOH and (0.5-3.0) × 10 ⁻⁴ mol L ⁻¹ complex.	690428
5.1.26	Pentaammine(thiocyanato- <i>N</i>)cobalt(III) ion $\text{Cd}^+ + \text{Co}(\text{NH}_3)_5(\text{NCS})^{2+} \rightarrow \text{Cd}^{2+} + \text{Co}(\text{NH}_3)_5(\text{NCS})^+$	1.3×10^9	5-6	0.08		p.r.	D.k. at 350 nm in soln. contg. 0.02 mol L ⁻¹ CdSO ₄ , 0.001 mol L ⁻¹ MeOH and (0.5-3.0) × 10 ⁻⁴ mol L ⁻¹ complex.	690428
5.1.27	(Acetato)pentaamminecobalt(III) ion $\text{Cd}^+ + \text{Co}(\text{NH}_3)_5(\text{OAc})^{2+} \rightarrow \text{Cd}^{2+} + \text{Co}(\text{NH}_3)_5(\text{OAc})^+$	9.0×10^7	5-6	0.08		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L ⁻¹ CdSO ₄ , 0.001 mol L ⁻¹ MeOH and (0.5-3.0) × 10 ⁻⁴ mol L ⁻¹ complex.	690428
5.1.28	μ -Amido- μ -superoxidotetrakis(ethylenediamine)dicobalt(III) ion $\text{Cd}^+ + \text{NH}_2[\text{Co}(\text{en})_2]_2(\text{O}_2)^{4+} \rightarrow \text{Cd}^{2+} + \text{NH}_2[\text{Co}(\text{en})_2]_2(\text{O}_2)^{3+}$	4×10^9				p.r.	D.k. at 310 nm and p.b.k. at 380 nm in soln. contg. 0.02 mol L ⁻¹ CdSO ₄ and 0.01 mol L ⁻¹ MeOH; an intermediate Cd(II) adduct forms the peroxy complex with $k = 2.4 \times 10^3$ s ⁻¹ .	80A069
5.1.29	Hexaamminebis(μ -hydroxy)- μ -(trifluoroacetato)dicobalt(III) ion $\text{Cd}^+ + \text{CF}_3\text{CO}_2[\text{Co}(\text{NH}_3)_3]_2(\text{OH})_2^{3+} \rightarrow$	4.1×10^8	22	p.r.			D.k. in Ar-satd. soln. contg. 0.1 mol L ⁻¹ CdSO ₄ and 0.1 mol L ⁻¹ <i>tert</i> -BuOH.	83A140
5.1.30	Hexaammine- μ -(difluorooacetato)bis(μ -hydroxy)dicobalt(III) ion $\text{Cd}^+ + \text{CHF}_2\text{CO}_2[\text{Co}(\text{NH}_3)_3]_2(\text{OH})_2^{3+} \rightarrow$	3.6×10^8	22	p.r.			D.k. in Ar-satd. soln. contg. 0.1 mol L ⁻¹ CdSO ₄ and 0.1 mol L ⁻¹ <i>tert</i> -BuOH.	83A140
5.1.31	Hexaammine- μ -(fluoroacetato)bis(μ -hydroxy)dicobalt(III) ion $\text{Cd}^+ + \text{CH}_2\text{FC}\text{O}_2[\text{Co}(\text{NH}_3)_3]_2(\text{OH})_2^{3+} \rightarrow$	3.0×10^8	22	p.r.			D.k. in Ar-satd. soln. contg. 0.1 mol L ⁻¹ CdSO ₄ and 0.1 mol L ⁻¹ <i>tert</i> -BuOH.	83A140
5.1.32	μ -Acetatohexaamminebis(μ -hydroxy)dicobalt(III) ion $\text{Cd}^+ + \text{CH}_3\text{CO}_2[\text{Co}(\text{NH}_3)_3]_2(\text{OH})_2^{3+} \rightarrow$	2.2×10^8	22	p.r.			D.k. in Ar-satd. soln. contg. 0.1 mol L ⁻¹ CdSO ₄ and 0.1 mol L ⁻¹ <i>tert</i> -BuOH.	83A140
5.1.33	Tris(2,2'-bipyridine)chromium(III) ion $\text{Cd}^+ + \text{Cr}(\text{bpy})_3^{3+} \rightarrow \text{Cd}^{2+} + \text{Cr}(\text{bpy})_3^{2+}$	1.8×10^9	~7		23	p.r.	D.k. at 310 nm in soln. contg. 0.1 mol L ⁻¹ <i>tert</i> -BuOH, 0.01 mol L ⁻¹ CdSO ₄ and varied concentrations Cr complex.	87A309
5.1.34	Tris(1,10-phenanthroline)chromium(III) ion $\text{Cd}^+ + \text{Cr}(\text{phen})_3^{3+} \rightarrow \text{Cd}^{2+} + \text{Cr}(\text{phen})_3^{2+}$	1.7×10^9	~7		23	p.r.	D.k. at 310 nm in soln. contg. 0.1 mol L ⁻¹ <i>tert</i> -BuOH, 0.01 mol L ⁻¹ CdSO ₄ and varied concentrations Cr complex.	87A309
5.1.35	Bis(2,2'-bipyridine)oxalatochromium(III)ion $\text{Cd}^+ + \text{Cr}(\text{bpy})_2(\text{C}_2\text{O}_4)^+ \rightarrow \text{Cd}^{2+} + \text{Cr}(\text{bpy})_2(\text{C}_2\text{O}_4)$	2.3×10^9	~7		23	p.r.	D.k. at 310 nm in soln. contg. 0.1 mol L ⁻¹ <i>tert</i> -BuOH, 0.01 mol L ⁻¹ CdSO ₄ and varied concentrations Cr complex.	87A309

TABLE 5. Rate constants for cadmium transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
5.1 Cadmium(I) ions — Continued								
5.1.36 Bis(1,10-phenanthroline)(oxalato)chromium(III) ion								
	$\text{Cd}^+ + \text{Cr}(\text{phen})_2(\text{C}_2\text{O}_4)^+ \rightarrow \text{Cd}^{2+} + \text{Cr}(\text{phen})_2(\text{C}_2\text{O}_4)_2^{2-}$	2.5×10^9		-7		23	p.r.	D.k. at 310 nm in soln. contg. 0.1 mol L ⁻¹ <i>tert</i> -BuOH, 0.01 mol L ⁻¹ CdSO ₄ and varied concentrations Cr complex.
5.1.37 2,2'-Bipyridinebis(oxalato)chromate(III) ion								
	$\text{Cd}^+ + \text{Cr}(\text{bpy})(\text{C}_2\text{O}_4)_2^- \rightarrow \text{Cd}^{2+} + \text{Cr}(\text{bpy})(\text{C}_2\text{O}_4)_2^{2-}$	2.2×10^9		-7		23	p.r.	D.k. at 310 nm in soln. contg. 0.1 mol L ⁻¹ <i>tert</i> -BuOH, 0.01 mol L ⁻¹ CdSO ₄ and varied concentrations Cr complex.
5.1.38 Bis(oxalato)phenanthrolinechromate(III) ion								
	$\text{Cd}^+ + \text{Cr}(\text{phen})(\text{C}_2\text{O}_4)_2^- \rightarrow \text{Cd}^{2+} + \text{Cr}(\text{phen})(\text{C}_2\text{O}_4)_2^{2-}$	2.4×10^9		-7		23	p.r.	D.k. at 310 nm in soln. contg. 0.1 mol L ⁻¹ <i>tert</i> -BuOH, 0.01 mol L ⁻¹ CdSO ₄ and varied concentrations Cr complex.
5.1.39 Chromate(VI) ion								
	$\text{Cd}^+ + \text{CrO}_4^{2-} \rightarrow$	9.8×10^9			0.02	25	p.r.	D.k. in soln. contg. Cd ²⁺ .
5.1.40 Dichromate(VI) ion								
	$\text{Cd}^+ + \text{Cr}_2\text{O}_7^{2-} \rightarrow$	1.6×10^{10}			0.02	25	p.r.	D.k. in soln. contg. Cd ²⁺ .
5.1.41 Copper(II) ion								
	$\text{Cd}^+ + \text{Cu}^{2+} \rightarrow$	1.2×10^8			0.08		p.r.	D.k. at 313 nm in coln. contg. 0.02 mol L ⁻¹ CdSO ₄ , 0.001 mol L ⁻¹ MeOH and varied [Cu ²⁺].
5.1.42 Hydrogen peroxide								
	$\text{Cd}^+ + \text{H}_2\text{O}_2 \rightarrow \text{Cd}^{2+} + \cdot\text{OH} + \text{OH}^-$	2.2×10^9				25	p.r.	D.k.; $E_a = 9.2 \text{ kJ mol}^{-1}$.
		1.6×10^9					p.r.	D.k. at 313 nm in soln. contg. 0.02 mol L ⁻¹ CdSO ₄ and 0.001 mol L ⁻¹ MeOH.
5.1.43 Iodate ion								
	$\text{Cd}^+ + \text{IO}_3^- \rightarrow$	2.3×10^9			0.08		p.r.	D.k. at 313 nm in soln. contg. 0.02 mol L ⁻¹ CdSO ₄ , 0.001 mol L ⁻¹ MeOH and varied [IO ₃ ⁻].
5.1.44 Permanganate ion								
	$\text{Cd}^+ + \text{MnO}_4^- \rightarrow \text{Cd}^{2+} + \text{MnO}_4^{2-}$	7.8×10^9		7.0		-22	p.r.	D.k. in Ar-satd. soln. contg. ~1 mol L ⁻¹ <i>tert</i> -BuOH.
		1.3×10^{10}				-20	p.r.	D.k. in deoxygenated soln. contg. 0.64, 1.35, or 2.25×10^{-3} mol L ⁻¹ Cd ²⁺ and 1 $\times 10^{-5}$ mol L ⁻¹ MnO ₄ ⁻ .
5.1.45 Nitrite ion								
	$\text{Cd}^+ + \text{NO}_2^- \rightarrow$	2.0×10^9			0.08		p.r.	D.k. at 313 nm in soln. contg. 0.02 mol L ⁻¹ CdSO ₄ , 0.001 mol L ⁻¹ MeOH and varied [NO ₂ ⁻]; studied at 3-90 °C, $E_a = 12.5 \text{ kJ mol}^{-1}$ [701228].
5.1.46 Nitrate ion								
	$\text{Cd}^+ + \text{NO}_3^- \rightarrow$	3.5×10^8			0.08		p.r.	D.k. at 313 nm in soln. contg. 0.02 mol L ⁻¹ CdSO ₄ , 0.001 mol L ⁻¹ MeOH and varied [NO ₃ ⁻].
5.1.47 Nitrous oxide								
	$\text{Cd}^+ + \text{N}_2\text{O} \rightarrow \text{CdO}^+ + \text{N}_2$	3.5×10^6				25	p.r.	D.k. in N ₂ O-satd. soln.; $E_a = 45.6 \text{ kJ mol}^{-1}$.
		$\leq 2 \times 10^6$					p.r.	D.k. at 313 nm in soln. contg. 1 mol L ⁻¹ CdSO ₄ , 0.001 mol L ⁻¹ MeOH and varied [N ₂ O].
5.1.48 Oxygen								
	$\text{Cd}^+ + \text{O}_2 \rightarrow$	3.6×10^9			25		p.r.	D.k. in O ₂ -satd. soln. contg. 0.1 mol L ⁻¹ Cd ²⁺ and 0.1 mol L ⁻¹ formate ion.

TABLE 5. Rate constants for cadmium transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
5.1 Cadmium(I) ions — Continued								
5.1.48 Oxygen — Continued								
		2.4×10^9		0.08		p.r.	D.k. at 313 nm in soln. contg. 0.02 mol L ⁻¹ CdSO ₄ , 0.001 mol L ⁻¹ MeOH and varied [O ₂].	68G855
		3.3×10^9		18		p.r.	D.k.	66A001
5.1.49 Lead(II) ions								
	$\text{Cd}^{+} + \text{Pb}^{2+} \rightarrow$	7.5×10^8				p.r.	D.k.	66A001
5.1.50 Hexaammineruthenium(III) ion								
	$\text{Cd}^{+} + \text{Ru}(\text{NH}_3)_6^{3+} \rightarrow \text{Cd}^{2+} + \text{Ru}(\text{NH}_3)_6^{2+}$	2.2×10^9		0.08		p.r.	D.k. in soln. contg. 0.02 mol L ⁻¹ CdSO ₄ and $(0.5\text{-}10) \times 10^{-4}$ mol L ⁻¹ Ru(NH ₃) ₆ ³⁺ .	701229
5.1.51 Tris(2,2'-bipyridine)ruthenium(II) ion								
	$\text{Cd}^{+} + \text{Ru(bpy)}_3^{2+} \rightarrow \text{Cd}^{2+} + \text{Ru(bpy)}_3^{+}$	6.1×10^8	5.9		24	p.r.	P.b.k. at 510 nm in soln. contg. 4.0×10^{-5} mol L ⁻¹ Ru(bpy) ₃ ²⁺ and 0.03 mol L ⁻¹ CdSO ₄ .	78A002 771093
5.1.52 Tris(2,2'-bipyridine)ruthenium(III) ion								
	$\text{Cd}^{+} + \text{Ru(bpy)}_3^{3+} \rightarrow \text{Cd}^{2+} + \text{Ru(bpy)}_3^{2+}$	2.8×10^9	4.6		24	p.r.	P.b.k. at 455 nm in Ar-satd. soln. contg. $(2\text{-}8) \times 10^{-4}$ mol L ⁻¹ Ru(bpy) ₃ ³⁺ , 0.5 mol L ⁻¹ <i>tert</i> -BuOH and 0.5 mol L ⁻¹ CdSO ₄ .	78A070
5.1.53 Peroxodisulfate ion								
	$\text{Cd}^{+} + \text{S}_2\text{O}_8^{2-} \rightarrow \text{Cd}^{2+} + \text{SO}_4^{2-} + \text{SO}_4^{2-}$	2.4×10^9		0.02	25	p.r.	D.k. in deaerated soln. contg. 0.01 mol L ⁻¹ CdSO ₄ and $(0.5\text{-}10) \times 10^{-4}$ mol L ⁻¹ S ₂ O ₈ ²⁻ .	761072
5.1.54 5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatozincate(II) ion								
	$\text{Cd}^{+} + \text{ZnTPPS}^{4-} \rightarrow [\text{ZnTPPS}]^{5-} + \text{Cd}^{2+}$	1×10^{10}				p.r.	P.b.k. in deaerated soln.	82A279
5.1.55 5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatozincate(II) ion, triplet state								
	$\text{Cd}^{+} + {}^3(\text{ZnTPPS}^{4-})^* \rightarrow [\text{ZnTPPS}]^{5-} + \text{Cd}^{2+}$	1×10^{10}				p.r.	P.b.k. in deaerated soln. Combined pulse radiolysis and photolysis.	82A279
5.1.56 Acetophenone								
	$\text{Cd}^{+} + \text{C}_6\text{H}_5\text{COCH}_3 \rightarrow \text{Cd}^{2+} + \text{C}_6\text{H}_5\text{CO}^-\text{CH}_3$	2.5×10^8				p.r.	C.k. in Ar-satd. soln. contg. 0.1 mol L ⁻¹ <i>tert</i> -BuOH, Cd(ClO ₄) ₂ and acetophenone.	93A362
5.1.57 9,10-Anthraquinone								
	$\text{Cd}^{+} + \text{AQ} \rightarrow \text{Cd}^{2+} + [\text{AQ}]^{2-}$	1.0×10^9	7.0		-22	p.r.	P.b.k. in Ar-satd. soln. contg. CdSO ₄ and ~ 1 mol L ⁻¹ <i>tert</i> -BuOH.	731104
5.1.58 Benzil								
	$\text{Cd}^{+} + \text{C}_6\text{H}_5\text{COCOC}_6\text{H}_5 \rightarrow \text{Cd}^{2+} + \text{C}_6\text{H}_5\text{COCO}^-\text{C}_6\text{H}_5$	2.1×10^9				p.r.	D.k. in Ar-satd. soln. contg. 0.1 mol L ⁻¹ <i>tert</i> -BuOH, Cd(ClO ₄) ₂ and benzil.	93A362
5.1.59 Benzophenone								
	$\text{Cd}^{+} + (\text{C}_6\text{H}_5)_2\text{CO} \rightarrow \text{Cd}^{2+} + (\text{C}_6\text{H}_5)_2\text{CO}^-$	1.2×10^9				p.r.	P.b.k. in Ar-satd. soln. contg. 0.1 mol L ⁻¹ <i>tert</i> -BuOH, Cd(ClO ₄) ₂ and benzophenone.	93A362
		1.0×10^9	7.0			p.r.	P.b.k. in soln. contg. 5×10^{-3} mol L ⁻¹ CdSO ₄ , 5×10^{-5} mol L ⁻¹ benzophenone, ~ 1 mol L ⁻¹ <i>tert</i> -BuOH and 0.001 mol L ⁻¹ phosphate.	751032
5.1.60 1,4-Benzoquinone								
	$\text{Cd}^{+} + \text{Q} \rightarrow \text{Cd}^{2+} + \text{Q}^{2-}$	3.9×10^9				p.r.	P.b.k. in Ar-satd. soln. contg. 0.1 mol L ⁻¹ <i>tert</i> -BuOH, Cd(ClO ₄) ₂ and benzoquinone.	93A362

TABLE 5. Rate constants for cadmium transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
5.1 Cadmium(I) ions — Continued								
5.1.60 1,4-Benzoquinone — Continued								
		4.1×10^9	5.4		25	p.r.	P.b.k. at 430 nm in soln. contg. 0.01 mol L ⁻¹ CdSO ₄ , 1 mol L ⁻¹ <i>tert</i> -BuOH and (2-4) × 10 ⁻⁵ mol L ⁻¹ benzoquinone.	761134
		4.4×10^9	7.0			p.r.	P.b.k. in soln. contg. 5 × 10 ⁻³ mol L ⁻¹ CdSO ₄ , 5 × 10 ⁻⁵ mol L ⁻¹ benzoquinone, ~1 mol L ⁻¹ <i>tert</i> -BuOH and 0.001 mol L ⁻¹ phosphate.	751032
5.1.61 4,4'-Dimethoxybenzophenone								
	$\text{Cd}^+ + (4\text{-CH}_3\text{OC}_6\text{H}_4)_2\text{CO} \rightarrow \text{Cd}^{2+} + (4\text{-CH}_3\text{OC}_6\text{H}_4)_2\text{CO}^-$	8×10^8				p.r.	D.k. in Ar-satd. soln. contg. 0.1 mol L ⁻¹ <i>tert</i> -BuOH, Cd(ClO ₄) ₂ and 4,4'-dimethoxybenzophenone.	93A362
5.1.62 Duroquinone								
	$\text{Cd}^+ + \text{DQ} \rightarrow \text{Cd}^{2+} + [\text{DQ}]^{--}$	2.0×10^9				p.r.	P.b.k. in Ar-satd. soln. contg. 0.1 mol L ⁻¹ <i>tert</i> -BuOH, Cd(ClO ₄) ₂ and duroquinone.	93A362
5.1.63 9-Fluorenone								
	$\text{Cd}^+ + \text{C}_{13}\text{H}_8\text{O} \rightarrow \text{Cd}^{2+} + [\text{C}_{13}\text{H}_8\text{O}]^{--}$	1.8×10^9				p.r.	P.b.k. in Ar-satd. soln. contg. 0.1 mol L ⁻¹ <i>tert</i> -BuOH, Cd(ClO ₄) ₂ and fluorenone.	93A362
5.1.64 2-Hydroxy-1,4-naphthoquinone								
	$\text{Cd}^+ + 2\text{-}(\text{OH})\text{NQ} \rightarrow \text{Cd}^{2+} + [2\text{-}(\text{OH})\text{NQ}]^{--}$	3.6×10^9	7.0		-22	p.r.	P.b.k. in Ar-satd. soln. contg. CdSO ₄ and ~1 mol L ⁻¹ <i>tert</i> -BuOH.	731104
5.1.65 2-Methyl-1,4-naphthoquinone								
	$\text{Cd}^+ + 2\text{-CH}_3\text{NQ} \rightarrow \text{Cd}^{2+} + [2\text{-CH}_3\text{NQ}]^{--}$	4.7×10^9	7.0		-22	p.r.	P.b.k. in soln. contg. 5 × 10 ⁻³ mol L ⁻¹ CdSO ₄ , 5 × 10 ⁻⁵ mol L ⁻¹ 2-methylnaphthoquinone, ~1 mol L ⁻¹ <i>tert</i> -BuOH and 0.001 mol L ⁻¹ phosphate.	731104 731047 751032
5.1.66 Nicotinamide adenine dinucleotide								
	$\text{Cd}^+ + \text{NAD}^+ \rightarrow \text{Cd}^{2+} + \text{NAD}'$	2.9×10^9	7.0		-22	p.r.	P.b.k. in Ar-satd. soln. contg. CdSO ₄ and ~1 mol L ⁻¹ <i>tert</i> -BuOH.	731104
5.1.67 1,4-Naphthoquinone-2-sulfonate ion								
	$\text{Cd}^+ + 2\text{-SO}_3^-\text{NQ} \rightarrow \text{Cd}^{2+} + [2\text{-SO}_3^-\text{NQ}]^{2-}$	7.4×10^9	7.0		-22	p.r.	P.b.k. in Ar-satd. soln. contg. CdSO ₄ and ~1 mol L ⁻¹ <i>tert</i> -BuOH.	731104
5.1.68 <i>N,N</i>-Dimethyl-4-nitrosoaniline								
	$\text{Cd}^+ + 4\text{-Me}_2\text{NC}_6\text{H}_4\text{NO} \rightarrow$	-1.4×10^{10}				p.r.	D.k. at 440 nm in Ar-satd. soln. contg. Cd ²⁺ .	680066
5.1.69 Riboflavin								
	$\text{Cd}^+ + \text{RF}^- \rightarrow \text{Cd}^{2+} + [\text{RF}]^{--}$	5.1×10^9	7.0		-22	p.r.	P.b.k. in Ar-satd. soln. contg. CdSO ₄ and ~1 mol L ⁻¹ <i>tert</i> -BuOH.	731104
5.2 1,4,10-Trioxa-7,13-diazacyclopentadecane cadmium(I) ion								
5.2.1 Benzil								
	$\text{Cd}^+ 21 + \text{C}_6\text{H}_5\text{COCOC}_6\text{H}_5 \rightarrow \text{C}_6\text{H}_5\text{CO}^-\text{C}_6\text{H}_5 + \text{Cd}^{2+} 21$	2.2×10^9				p.r.	D.k. in Ar-satd. soln. contg. 0.1 mol L ⁻¹ <i>tert</i> -BuOH, coronand (21), Cd(ClO ₄) ₂ and benzil.	93A362
5.2.2 Benzophenone								
	$\text{Cd}^+ 21 + (\text{C}_6\text{H}_5)_2\text{CO} \rightarrow \text{Cd}^{2+} 21 + (\text{C}_6\text{H}_5)_2\text{CO}^-$	1.3×10^9				p.r.	P.b.k. in Ar-satd. soln. contg. 0.1 mol L ⁻¹ <i>tert</i> -BuOH, coronand (21), Cd(ClO ₄) ₂ and benzophenone.	93A362

TABLE 5. Rate constants for cadmium transients — Continued

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t^\circ\text{C}$	Method	Comment	Ref.
5.2 1,4,10-Trioxa-7,13-diazacyclopentadecanecadmium(I) ion — Continued								
5.2.3 4,4'-Dimethoxybenzophenone								
	$\text{Cd}^+ 21 + (\text{4-CH}_3\text{OC}_6\text{H}_4)_2\text{CO} \rightarrow (\text{4-CH}_3\text{OC}_6\text{H}_4)_2\text{CO}^- + \text{Cd}^{2+} 21$	8×10^8				p.r.	D.k. in Ar-satd. soln. contg. 0.1 mol L^{-1} <i>tert</i> -BuOH, coronand (21), $\text{Cd}(\text{ClO}_4)_2$ and 4,4'-dimethoxybenzophenone.	93A362
5.2.4 Duroquinone								
	$\text{Cd}^+ 21 + \text{DQ} \rightarrow \text{Cd}^{2+} 21 + [\text{DQ}]^{+-}$	2.0×10^9				p.r.	P.b.k. in Ar-satd. soln. contg. 0.1 mol L^{-1} <i>tert</i> -BuOH, coronand (21), $\text{Cd}(\text{ClO}_4)_2$ and duroquinone.	93A362
5.3 1,4,10,13-Tetraoxa-7,16-diazacyclooctadecanecadmium(I) ion								
5.3.1 Acetophenone								
	$\text{Cd}^+ 22 + \text{C}_6\text{H}_5\text{COCH}_3 \rightarrow \text{Cd}^{2+} 22 + \text{C}_6\text{H}_5\dot{\text{C}}\text{O}^-\text{CH}_3$	$\sim 4 \times 10^7$				p.r.	C.k. in Ar satd. soln. contg. 0.1 mol L^{-1} <i>tert</i> -BuOH, coronand (22), $\text{Cd}(\text{ClO}_4)_2$ and acetophenone.	93A362
5.3.2 Benzil								
	$\text{Cd}^+ 22 + \text{C}_6\text{H}_5\text{COCOC}_6\text{H}_5 \rightarrow \text{C}_6\text{H}_5\text{CO}\dot{\text{C}}\text{O}^-\text{C}_6\text{H}_5 + \text{Cd}^{2+} 22$	1.6×10^9				p.r.	D.k. in Ar-satd. soln. contg. 0.1 mol L^{-1} <i>tert</i> -BuOH, coronand (22), $\text{Cd}(\text{ClO}_4)_2$ and benzil.	93A362
5.3.3 Benzophenone								
	$\text{Cd}^+ 22 + (\text{C}_6\text{H}_5)_2\text{CO} \rightarrow \text{Cd}^{2+} 22 + (\text{C}_6\text{H}_5)_2\dot{\text{C}}\text{O}^-$	1.1×10^9				p.r.	P.b.k. in Ar-satd. soln. contg. 0.1 mol L^{-1} <i>tert</i> -BuOH, coronand (22), $\text{Cd}(\text{ClO}_4)_2$ and benzophenone.	93A362
5.3.4 4,4'-Dimethoxybenzophenone								
	$\text{Cd}^+ 22 + (\text{4-CH}_3\text{OC}_6\text{H}_4)_2\text{CO} \rightarrow (\text{4-CH}_3\text{OC}_6\text{H}_4)_2\dot{\text{C}}\text{O}^- + \text{Cd}^{2+} 22$	4.7×10^8				p.r.	D.k. in Ar-satd. soln. contg. 0.1 mol L^{-1} <i>tert</i> -BuOH, coronand (22), $\text{Cd}(\text{ClO}_4)_2$ and 4,4'-dimethoxybenzophenone.	93A362
5.3.5 Duroquinone								
	$\text{Cd}^+ 22 + \text{DQ} \rightarrow \text{Cd}^{2+} 22 + [\text{DQ}]^{+-}$	2.0×10^9				p.r.	P.b.k. in Ar-satd. soln. contg. 0.1 mol L^{-1} <i>tert</i> -BuOH, coronand (22), $\text{Cd}(\text{ClO}_4)_2$ and duroquinone.	93A362
5.3.6 9-Fluorenone								
	$\text{Cd}^+ 22 + \text{C}_{13}\text{H}_8\text{O} \rightarrow \text{Cd}^{2+} 22 + [\text{C}_{13}\text{H}_8\text{O}]^{+-}$	1.9×10^9				p.r.	P.b.k. in Ar-satd. soln. contg. 0.1 mol L^{-1} <i>tert</i> -BuOH, coronand (22), $\text{Cd}(\text{ClO}_4)_2$ and fluorenone.	93A362
5.4 4,7,13,16,21-Pentaoxa-1,10-diazabicyclo[8.8.5]tricosanecadmium(I) ion								
5.4.1 Benzophenone								
	$\text{Cd}^+ 221 + (\text{C}_6\text{H}_5)_2\text{CO} \rightarrow \text{Cd}^{2+} 221 + (\text{C}_6\text{H}_5)_2\dot{\text{C}}\text{O}^-$	2.7×10^8				p.r.	P.b.k. in Ar-satd. soln. contg. 0.1 mol L^{-1} <i>tert</i> -BuOH, cryptand (221), $\text{Cd}(\text{ClO}_4)_2$ and benzophenone.	93A362
5.4.2 4,4'-Dimethoxybenzophenone								
	$\text{Cd}^+ 221 + (\text{4-CH}_3\text{OC}_6\text{H}_4)_2\text{CO} \rightarrow (\text{4-CH}_3\text{OC}_6\text{H}_4)_2\dot{\text{C}}\text{O}^- + \text{Cd}^{2+} 221$	2.5×10^8				p.r.	D.k. in Ar-satd. soln. contg. 0.1 mol L^{-1} <i>tert</i> -BuOH, cryptand (221), $\text{Cd}(\text{ClO}_4)_2$ and 4,4'-dimethoxybenzophenone.	93A362
5.4.3 Duroquinone								
	$\text{Cd}^+ 221 + \text{DQ} \rightarrow \text{Cd}^{2+} 221 + [\text{DQ}]^{+-}$	1.8×10^9				p.r.	P.b.k. in Ar-satd. soln. contg. 0.1 mol L^{-1} <i>tert</i> -BuOH, cryptand (221), $\text{Cd}(\text{ClO}_4)_2$ and duroquinone.	93A362
5.4.4 9-Fluorenone								
	$\text{Cd}^+ 221 + \text{C}_{13}\text{H}_8\text{O} \rightarrow \text{Cd}^{2+} 221 + [\text{C}_{13}\text{H}_8\text{O}]^{+-}$	1.8×10^9				p.r.	P.b.k. in Ar-satd. soln. contg. 0.1 mol L^{-1} <i>tert</i> -BuOH, cryptand (221), $\text{Cd}(\text{ClO}_4)_2$ and fluorenone.	93A362

TABLE 5. Rate constants for cadmium transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
5.5 4,7,13,16,21,24-Hexaoxa-1,10-diazabicyclo[8.8.8]hexacosane cadmium(I) ion								
5.5.1 Benzophenone								
	$\text{Cd}^+ 222 + (\text{C}_6\text{H}_5)_2\text{CO} \rightarrow \text{Cd}^{2+} 222 + (\text{C}_6\text{H}_5)_2\dot{\text{C}}\text{O}^-$	1.3×10^8				p.r.	P.b.k. in Ar-satd. soln. contg. 0.1 mol L ⁻¹ <i>tert</i> -BuOH, cryptand (222), Cd(ClO ₄) ₂ and benzophenone.	93A362
5.5.2 Duroquinone								
	$\text{Cd}^+ 222 + \text{DQ} \rightarrow \text{Cd}^{2+} 222 + [\text{DQ}]^{+-}$	1.0×10^9				p.r.	P.b.k. in Ar-satd. soln. contg. 0.1 mol L ⁻¹ <i>tert</i> -BuOH, cryptand (222), Cd(ClO ₄) ₂ and duroquinone.	93A362
5.5.3 9-Fluorenone								
	$\text{Cd}^+ 222 + \text{C}_{13}\text{H}_8\text{O} \rightarrow \text{Cd}^{2+} 222 + [\text{C}_{13}\text{H}_8\text{O}]^{+-}$	1.1×10^9				p.r.	P.b.k. in Ar-satd. soln. contg. 0.1 mol L ⁻¹ <i>tert</i> -BuOH, cryptand (222), Cd(ClO ₄) ₂ and fluorenone.	93A362
5.6 1,4,8,11-Tetrazacyclotetradecane cadmium(I) ion								
5.6.1 Nitrous oxide								
	$\text{Cd}(\text{cyclam})^+ + \text{N}_2\text{O} \rightarrow$	4.5×10^7	5-7		23	p.r.	D.k. in 0-36% N ₂ O-satd. soln. contg. 0.4 mol L ⁻¹ <i>tert</i> -BuOH and 0.01 mol L ⁻¹ Cd(cyclam) ²⁺ .	80A380
5.7 Ethylenediaminetetraacetato cadmium(I) ion								
5.7.1 Ethylenediaminetetraacetato cadmiate(I) ion								
	$\text{CdEDTA}^{3-} + \text{CdEDTA}^{3-} \rightarrow$	4×10^7		11.3	0.16	p.r.	D.k. at 350 nm in soln. contg. 0.01 mol L ⁻¹ CdSO ₄ and 0.02 mol L ⁻¹ EDTA.	701228
5.7.2 Bromate ion								
	$\text{CdEDTA}^{3-} + \text{BrO}_3^- \rightarrow$	8.9×10^6		11.3	0.16	p.r.	D.k. at 350 nm in soln. contg. 0.01 mol L ⁻¹ CdSO ₄ , 0.02 mol L ⁻¹ EDTA and (5-20) × 10 ⁻⁵ mol L ⁻¹ BrO ₃ ⁻ ; studied at 3-90 °C, <i>E</i> _a = 4.6 kJ mol ⁻¹ .	701228
5.7.3 Iodate ion								
	$\text{CdEDTA}^{3-} + \text{IO}_3^- \rightarrow$	2.7×10^8		11.3	0.16	p.r.	D.k. at 350 nm in soln. contg. 0.01 mol L ⁻¹ CdSO ₄ , 0.02 mol L ⁻¹ EDTA and (5-20) × 10 ⁻⁵ mol L ⁻¹ IO ₃ ⁻ .	701228
5.7.4 Hydrogen peroxide								
	$\text{CdEDTA}^{3-} + \text{H}_2\text{O}_2 \rightarrow \text{CdEDTA}^{2-} + \cdot\text{OH} + \text{OH}^-$	2×10^9		11.5		p.r.	D.k. in soln. contg. CdEDTA ²⁻ . Value obtained by computer fit.	80A072
5.7.5 Nitrite ion								
	$\text{CdEDTA}^{3-} + \text{NO}_2^- \rightarrow$	3.2×10^6		11.3	0.16	p.r.	D.k. at 350 nm in soln. contg. 0.01 mol L ⁻¹ CdSO ₄ , 0.02 mol L ⁻¹ EDTA and (5-20) × 10 ⁻⁵ mol L ⁻¹ NO ₂ ⁻ ; studied at 3-90 °C; <i>E</i> _a = 8.4 kJ mol ⁻¹ .	701228
5.7.6 Nitrate ion								
	$\text{CdEDTA}^{3-} + \text{NO}_3^- \rightarrow$	1.7×10^7		11.3	0.16	p.r.	D.k. at 350 nm in soln. contg. 0.01 mol L ⁻¹ CdSO ₄ , 0.02 mol L ⁻¹ EDTA and (5-20) × 10 ⁻⁵ mol L ⁻¹ NO ₃ ⁻ .	701228
5.7.7 Ethylenediaminetetraacetato plumbate(II) ion								
	$\text{CdEDTA}^{3-} + \text{PbEDTA}^{2-} \rightarrow$	4×10^6		11.5	0.25	p.r.	D.k.; value obtained by computer fit.	80A072
5.8 Ethylenediamine cadmium(I) ion								
5.8.1 Bromate ion								
	$\text{Cd}(\text{en})_n^+ + \text{BrO}_3^- \rightarrow$	1.3×10^8		11.4	0.64	p.r.	D.k. at 350 nm in soln. contg. 0.01 mol L ⁻¹ CdSO ₄ , 0.02 mol L ⁻¹ enSO ₄ and (5-20) × 10 ⁻⁵ mol L ⁻¹ BrO ₃ ⁻ .	701228

TABLE 5. Rate constants for cadmium transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
5.8 Ethylenediaminecadmium(I) ion — Continued								
5.8.2 Iodate ion								
	$\text{Cd}(\text{en})_n^+ + \text{IO}_3^- \rightarrow$	2.5×10^9	11.4	0.64		p.r.	D.k. at 350 nm in soln. contg. 0.01 mol L ⁻¹ CdSO ₄ , 0.02 mol L ⁻¹ enSO ₄ and (5-20) × 10 ⁻⁵ mol L ⁻¹ IO ₃ ⁻ .	701228
5.8.3 Nitrite ion								
	$\text{Cd}(\text{en})_n^+ + \text{NO}_2^- \rightarrow$	1.1×10^9	11.4	0.64		p.r.	D.k. at 350 nm in soln. contg. 0.01 mol L ⁻¹ CdSO ₄ , 0.02 mol L ⁻¹ enSO ₄ and (5-20) × 10 ⁻⁵ mol L ⁻¹ NO ₂ ⁻ .	701228
5.8.4 Nitrate ion								
	$\text{Cd}(\text{en})_n^+ + \text{NO}_3^- \rightarrow$	4.5×10^8	11.4	0.64		p.r.	D.k. at 350 nm in soln. contg. 0.01 mol L ⁻¹ CdSO ₄ , 0.02 mol L ⁻¹ enSO ₄ and (5-20) × 10 ⁻⁵ mol L ⁻¹ NO ₃ ⁻ .	701228
5.9 Glycinatocadmium(I) ion								
5.9.1 Bromate ion								
	$\text{CdGly} + \text{BrO}_3^- \rightarrow$	6.1×10^7	10.5	0.21		p.r.	D.k. at 350 nm in soln. contg. 0.01 mol L ⁻¹ CdSO ₄ , 0.02 mol L ⁻¹ glycine and (5-20) × 10 ⁻⁵ mol L ⁻¹ BrO ₃ ⁻ .	701228
5.9.2 Iodate ion								
	$\text{CdGly} + \text{IO}_3^- \rightarrow$	1.8×10^9	10.5	0.21		p.r.	D.k. at 350 nm in soln. contg. 0.01 mol L ⁻¹ CdSO ₄ , 0.02 mol L ⁻¹ glycine and (5-20) × 10 ⁻⁵ mol L ⁻¹ IO ₃ ⁻ .	701228
5.9.3 Nitrite ion								
	$\text{CdGly} + \text{NO}_2^- \rightarrow$	8.5×10^8	10.5	0.21		p.r.	D.k. at 350 nm in soln. contg. 0.01 mol L ⁻¹ CdSO ₄ , 0.02 mol L ⁻¹ glycine and (5-20) × 10 ⁻⁵ mol L ⁻¹ NO ₂ ⁻ .	701228
5.9.4 Nitrate ion								
	$\text{CdGly} + \text{NO}_3^- \rightarrow$	2.4×10^8	10.5	0.21		p.r.	D.k. at 350 nm in soln. contg. 0.01 mol L ⁻¹ CdSO ₄ , 0.02 mol L ⁻¹ glycine and (5-20) × 10 ⁻⁵ mol L ⁻¹ NO ₃ ⁻ .	701228
5.10 Nitrilotriacetatocadmium(I) ion								
5.10.1 Nitrilotriacetatocadmium(I) ion								
	$\text{CdNTA}^{2-} + \text{CdNTA}^{2-} \rightarrow$	8×10^8	10.7	0.10		p.r.	D.k. at 350 nm in soln. contg. 0.01 mol L ⁻¹ CdSO ₄ , 0.02 mol L ⁻¹ NTA.	701228
5.10.2 Bromate ion								
	$\text{CdNTA}^{2-} + \text{BrO}_3^- \rightarrow$	1.0×10^7	10.7	0.10		p.r.	D.k. at 350 nm in soln. contg. 0.01 mol L ⁻¹ CdSO ₄ , 0.02 mol L ⁻¹ NTA and (5-20) × 10 ⁻⁵ mol L ⁻¹ BrO ₃ ⁻ .	701228
5.10.3 Iodate ion								
	$\text{CdNTA}^{2-} + \text{IO}_3^- \rightarrow$	6.1×10^8	10.7	0.10		p.r.	D.k. at 350 nm in soln. contg. 0.01 mol L ⁻¹ CdSO ₄ , 0.02 mol L ⁻¹ NTA and (5-20) × 10 ⁻⁵ mol L ⁻¹ IO ₃ ⁻ .	701228
5.10.4 Nitrite ion								
	$\text{CdNTA}^{2-} + \text{NO}_2^- \rightarrow$	4.2×10^7	10.7	0.10		p.r.	D.k. at 350 nm in soln. contg. 0.01 mol L ⁻¹ CdSO ₄ , 0.02 mol L ⁻¹ NTA and (5-20) × 10 ⁻⁵ mol L ⁻¹ NO ₂ ⁻ .	701228
5.10.5 Nitrate ion								
	$\text{CdNTA}^{2-} + \text{NO}_3^- \rightarrow$	4.5×10^7	10.7	0.10		p.r.	D.k. at 350 nm in soln. contg. 0.01 mol L ⁻¹ CdSO ₄ , 0.02 mol L ⁻¹ NTA and (5-20) × 10 ⁻⁵ mol L ⁻¹ NO ₃ ⁻ .	701228

TABLE 5. Rate constants for cadmium transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
5.11 1-Hydroxyethylcadmium(II) ion								
5.11.1 Water								
	$\text{CdCHOHCH}_3^+ + \text{H}_2\text{O} \rightarrow \text{Cd}^{2+} +$ EtOH + OH ⁻	$2.6 \times 10^2 \text{ s}^{-1}$				p.r.	Cond. change in soln. contg. 5×10^{-4} mol L ⁻¹ CdSO ₄ and EtOH.	751064
5.12 1-Hydroxy-1-methylethylcadmium(II) ion								
5.12.1 Water								
	$\text{CdC(CH}_3)_2\text{OH}^+ + \text{H}_2\text{O} \rightarrow \text{Cd}^{2+} +$ 2-PrOH + OH ⁻	$1.6 \times 10^2 \text{ s}^{-1}$				p.r.	Cond. change in soln. contg. 5×10^{-4} mol L ⁻¹ CdSO ₄ and 2-PrOH.	751064
5.13 5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatocadmate(II) radical anion								
5.13.1 5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatocadmate(II) radical anion								
	$[\text{CdTPPS}]^{5-} + [\text{CdTPPS}]^{5-} \rightarrow$	5.2×10^8	12			p.r.	D.k. in N ₂ -satd. soln. contg. 0.1 mol L ⁻¹ 2-PrOH and CdTPPS ⁴⁻ ; reaction suggested to be disproportionation; $\Delta G = 29 \text{ kJ mol}^{-1}$.	83C026

TABLE 6. Rate constants for cobalt transients

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t(\text{°C})$	Method	Comment	Ref.
6.1 Cobalt(I) ion								
6.1.1 Dibromine radical ion	$\text{Co}^+ + \text{Br}_2^{\cdot\cdot} \rightarrow 2 \text{Br}^- + \text{Co}^{2+}$	1.0×10^{10}				f.p./pi	D.k. in deaerated soln. contg. 0.001 mol L^{-1} NaBr and 0.01-0.05 mol L^{-1} Co^{2+} .	707726
6.1.2 Bromate ion								
	$\text{Co}^+ + \text{BrO}_3^- \rightarrow$	4.8×10^9 7.1×10^9	0.019 →0	25	p.r.		D.k. at 320 nm in deaerated soln. contg. 0.001-0.01 mol L^{-1} Co^{2+} , 0.1 mol L^{-1} <i>tert</i> -BuOH, 2.5×10^{-5} mol L^{-1} BrO_3^- and 0-0.1 mol L^{-1} NaClO_4 .	761072
6.1.3 Cobalt(I) ion	$\text{Co}^+ + \text{Co}^+ \rightarrow$	$\leq 2 \times 10^9$	0.019	25	p.r.		D.k. at 370 nm in soln. contg. 0.1 mol L^{-1} Co^{2+} and 0.1 mol L^{-1} MeOH, 2-PrOH or <i>tert</i> -BuOH.	751027
6.1.4 Tris(ethylenediamine)cobalt(III) ion	$\text{Co}^+ + \text{Co}(\text{en})_3^{3+} \rightarrow \text{Co}^{2+} + \text{Co}(\text{en})_3^{2+}$	2.9×10^8	→0	29	p.r.		D.k. at 320 nm in deaerated soln. contg. 0.01-0.05 mol L^{-1} CoSO_4 , 0.001 mol L^{-1} MeOH and (0.5-1.0) $\times 10^{-4}$ mol L^{-1} Co(III) complex.	761136
6.1.5 Hexaamminecobalt(III) ion	$\text{Co}^+ + \text{Co}(\text{NH}_3)_6^{3+} \rightarrow \text{Co}^{2+} + \text{Co}(\text{NH}_3)_6^{3+}$	3.3×10^8	→0	29	p.r.		D.k. in deaerated soln. contg. 0.01-0.05 mol L^{-1} CoSO_4 , 0.001 mol L^{-1} MeOH and (0.5-1.0) $\times 10^{-4}$ mol L^{-1} Co(III) complex.	761136
6.1.6 Pentaammine(aqua)cobalt(III) ion	$\text{Co}^+ + \text{Co}(\text{NH}_3)_5(\text{H}_2\text{O})^{3+} \rightarrow \text{Co}^{2+} + \text{Co}(\text{NH}_3)_5(\text{H}_2\text{O})^{2+}$	3.7×10^8	→0	29	p.r.		D.k. in deaerated soln. contg. 0.01-0.05 mol L^{-1} CoSO_4 , 0.001 mol L^{-1} MeOH and (0.5-1.0) $\times 10^{-4}$ mol L^{-1} Co(III) complex.	761136
6.1.7 Pentaammine(fluoro)cobalt(III) ion	$\text{Co}^+ + \text{Co}(\text{NH}_3)_5\text{F}^{2+} \rightarrow \text{Co}^{2+} + \text{Co}(\text{NH}_3)_5\text{F}^+$	6.8×10^8	→0	29	p.r.		D.k. in deaerated soln. contg. 0.01-0.05 mol L^{-1} CoSO_4 , 0.001 mol L^{-1} MeOH and (0.5-1.0) $\times 10^{-4}$ mol L^{-1} Co(III) complex.	761136
6.1.8 Pentaammine(chloro)cobalt(III) ion	$\text{Co}^+ + \text{Co}(\text{NH}_3)_5\text{Cl}^{2+} \rightarrow \text{Co}^{2+} + \text{Co}(\text{NH}_3)_5\text{Cl}^+$	8.5×10^8	→0	29	p.r.		D.k. in deaerated soin. contg. 0.01-0.05 mol L^{-1} CoSO_4 , 0.001 mol L^{-1} MeOH and (0.5-1.0) $\times 10^{-4}$ mol L^{-1} Co(III) complex.	761136
6.1.9 Pentaammine(bromo)cobalt(III) ion	$\text{Co}^+ + \text{Co}(\text{NH}_3)_5\text{Br}^{2+} \rightarrow \text{Co}^{2+} + \text{Co}(\text{NH}_3)_5\text{Br}^+$	1.1×10^9	→0	29	p.r.		D.k. in deaerated soin. contg. 0.01-0.05 mol L^{-1} CoSO_4 , 0.001 mol L^{-1} MeOH and (0.5-1.0) $\times 10^{-4}$ mol L^{-1} Co(III) complex.	761136
6.1.10 Tetraamminediaquacobalt(III) ion	$\text{Co}^+ + \text{Co}(\text{NH}_3)_4(\text{H}_2\text{O})_2^{3+} \rightarrow \text{Co}^{2+} + \text{Co}(\text{NH}_3)_4(\text{H}_2\text{O})_2^{2+}$	4.4×10^8	→0	29	p.r.		D.k. in deaerated soin. contg. 0.01-0.05 mol L^{-1} CoSO_4 , 0.001 mol L^{-1} MeOH and (0.5-1.0) $\times 10^{-4}$ mol L^{-1} Co(III) complex.	761136
6.1.11 Trioxalatocobaltate(III) ion	$\text{Co}^+ + \text{Co}(\text{C}_2\text{O}_4)_3^{3-} \rightarrow \text{Co}^{2+} + \text{Co}(\text{C}_2\text{O}_4)_3^{4-}$	1.8×10^{10}	→0	29	p.r.		D.k. in deaerated soln. contg. 0.01-0.05 mol L^{-1} CoSO_4 , 0.001 mol L^{-1} MeOH and (0.5-1.0) $\times 10^{-4}$ mol L^{-1} Co(III) complex.	761136

TABLE 6. Rate constants for cobalt transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
6.1 Cobalt(I) ion — Continued								
6.1.12 Trinitrotetraminecobalt(III)								
	$\text{Co}^+ + \text{Co}(\text{NH}_3)_3(\text{NO}_2)_3 \rightarrow \text{Co}^{2+} + \text{Co}(\text{NH}_3)_3(\text{NO}_2)_3^-$	7.6×10^9		→0	29	p.r.	D.k. in deaerated soln. contg. 0.01-0.05 mol L ⁻¹ CoSO ₄ , 0.001 mol L ⁻¹ MeOH and (0.5-1.0) × 10 ⁻⁴ mol L ⁻¹ Co(III) complex.	761136
6.1.13 2,2'-Bipyridinecobalt(II) ion								
	$\text{Co}^+ + \text{Co}(\text{bpy})^{2+} \rightarrow \text{Co}^{2+} + \text{Co}(\text{bpy})^+$	1.2×10^9		0.2	25	p.r.	D.k. in deaerated soln. contg. <i>tert</i> -BuOH, Co ²⁺ and 2,2'-bipyridine.	85A034
6.1.14 4,4'-Dimethyl-2,2'-bipyridinecobalt(II) ion								
	$\text{Co}^+ + \text{Co}(4,4'\text{-Me}_2\text{bpy})^{2+} \rightarrow \text{Co}^{2+} + \text{Co}(4,4'\text{-Me}_2\text{bpy})^+$	1.0×10^9		0.2	25	p.r.	D.k. in deaerated soln. contg. <i>tert</i> -BuOH, Co ²⁺ and 4,4'-dimethyl-2,2'-bipyridine.	85A034
6.1.15 Copper(II) ion								
	$\text{Co}^+ + \text{Cu}^{2+} \rightarrow$	4.1×10^8		0.019	25	p.r.	D.k. at 320 nm in soln. contg. 0.01 mol L ⁻¹ Co ²⁺ and 0.1 mol L ⁻¹ <i>tert</i> -BuOH.	761072
6.1.16 Hydrogen peroxide								
	$\text{Co}^+ + \text{H}_2\text{O}_2 \rightarrow \text{Co}^{2+} + \cdot\text{OH} + \text{OH}^-$	1.6×10^9			25	p.r.	D.k.; studied at 1-30 °C, <i>E</i> _a = 13.0 kJ mol ⁻¹ .	761072
6.1.17 Iodate ion								
	$\text{Co}^+ + \text{IO}_3^- \rightarrow$	4.3×10^9		0.019	25	p.r.	D.k. at 320 nm in soln. contg. 0.01 mol L ⁻¹ Co ²⁺ and 0.1 mol L ⁻¹ <i>tert</i> -BuOH.	761072
6.1.18 Permanganate ion								
	$\text{Co}^+ + \text{MnO}_4^- \rightarrow$	1.0×10^{10}		-0.004	20	p.r.	D.k. in soln. contg. 0.2, 0.72 or 1.38 × 10 ⁻³ mol L ⁻¹ Co ²⁺ and 10 ⁻⁵ mol L ⁻¹ MnO ₄ ⁻ .	650385
6.1.19 Nitrous oxide								
	$\text{Co}^+ + \text{N}_2\text{O} \rightarrow \text{CoO}^+ + \text{N}_2$	1.0×10^9			25	p.r.	D.k. at 320 nm in N ₂ O-satd. soln. contg. 0.1 mol L ⁻¹ Co ²⁺ .	761072
6.1.20 Nitrate ion								
	$\text{Co}^+ + \text{NO}_3^- \rightarrow$	1.8×10^9		0.019	25	p.r.	D.k. at 320 nm in soln. contg. 0.01 mol L ⁻¹ Co ²⁺ and 0.1 mol L ⁻¹ <i>tert</i> -BuOH.	761072
6.1.21 Oxygen								
	$\text{Co}^+ + \text{O}_2 \rightarrow$	6.0×10^9			25	p.r.	D.k. at 320 nm in O ₂ -satd. soln. contg. 0.1 mol L ⁻¹ Co ²⁺ and 0.1 mol L ⁻¹ formate. Evidence indicates product may be CoO ₂ ⁺ .	761072
6.1.22 Hydroxyl								
	$\text{Co}^+ + \cdot\text{OH} \rightarrow$	-8×10^9			25	p.r.	Estimated from decay of Co ⁺ in absence of ·OH scavengers.	751027
6.1.23 Peroxodisulfate ion								
	$\text{Co}^+ + \text{S}_2\text{O}_8^{2-} \rightarrow \text{Co}^{2+} + \text{SO}_4^{\cdot-} + \text{SO}_4^{2-}$	2.8×10^9		0.019	25	p.r.	D.k. in deaerated soln. contg. 0.01 mol L ⁻¹ Co ²⁺ and (0.5-10) × 10 ⁻⁴ mol L ⁻¹ S ₂ O ₈ ²⁻ .	761072
6.1.24 Tris(2,2'-bipyridine)ruthenium(II) ion								
	$\text{Co}^+ + \text{Ru}(\text{bpy})_3^{2+} \rightarrow \text{Co}^{2+} + \text{Ru}(\text{bpy})_3^+$	1.8×10^9	6.9		24	p.r.	P.b.k. at 510 nm in soln. contg. 1.6 or 4.0×10^{-5} mol L ⁻¹ Ru(bpy) ₃ ²⁺ , 0.0025 mol L ⁻¹ CoSO ₄ and 0.17 mol L ⁻¹ <i>tert</i> -BuOH.	78A002 771093
6.1.25 Allyl alcohol								
	$\text{Co}^+ + \text{H}_2\text{C}=\text{CHCH}_2\text{OH} \rightarrow \text{Co}(\text{allyl alcohol})^+$	-10^8			25	p.r.	D.k. at 320 nm in deaerated soln. contg. 0.01 mol L ⁻¹ Co ²⁺ , 0.0012 mol L ⁻¹ allyl alcohol and 1.24 mol L ⁻¹ MeOH.	761072

TABLE 6. Rate constants for cobalt transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.	
6.1 Cobalt(I) ion — Continued									
6.1.26	9,10-Anthaquinone $\text{Co}^{\text{I}} + \text{AQ} \rightarrow \text{Co}^{2+} + [\text{AQ}]^{2-}$	1.1×10^9	7.0		~22	p.r.	P.b.k. at ~400 nm in deaerated soln. contg. ~1 mol L ⁻¹ <i>tert</i> -BuOH and ~5 × 10 ⁻⁵ mol L ⁻¹ AQ.	731104	
6.1.27	Benzophenone $\text{Co}^{\text{I}} + (\text{C}_6\text{H}_5)_2\text{CO} \rightarrow \text{Co}^{2+} + (\text{C}_6\text{H}_5)_2\dot{\text{C}}\text{O}^-$	2.5×10^9	7.0			p.r.	P.b.k. in soln. contg. ~1 mol L ⁻¹ <i>tert</i> -BuOH and ~5 × 10 ⁻⁵ mol L ⁻¹ benzophenone.	751032	
6.1.28	1,4-Benzquinone $\text{Co}^{\text{I}} + \text{Q} \rightarrow \text{Co}^{2+} + \text{Q}^{2-}$	5.1×10^9	4.7		25	p.r.	P.b.k. at 430 nm in deaerated soln. contg. 1 mol L ⁻¹ <i>tert</i> -BuOH, 0.1 mol L ⁻¹ CoSO ₄ and (2-4) × 10 ⁻⁵ mol L ⁻¹ Q.	761134	
		4.8×10^9	7.0			p.r.	P.b.k. in soln. contg. ~1 mol L ⁻¹ <i>tert</i> -BuOH and ~5 × 10 ⁻⁵ mol L ⁻¹ Q.	751032	
6.1.29	2-Methyl-1,4-naphthoquinone $\text{Co}^{\text{I}} + 2\text{-CH}_3\text{NQ} \rightarrow \text{Co}^{2+} + [2\text{-CH}_3\text{NQ}]^{2-}$	4.1×10^9	7.0, 7.3		~22	p.r.	P.b.k. at ~400 nm in deaerated soln. contg. ~1 mol L ⁻¹ <i>tert</i> -BuOH and ~5 × 10 ⁻⁵ mol L ⁻¹ 2-CH ₃ -NQ.	751032 731047 731104	
6.1.30	1,4-Naphthoquinone-2-sulfonate ion $\text{Co}^{\text{I}} + 2\text{-SO}_3\text{NQ}^- \rightarrow \text{Co}^{2+} + [2\text{-SO}_3\text{NQ}]^{2-}$	6.8×10^9	7.0		~22	p.r.	P.b.k. at ~400 nm in deaerated soln. contg. ~1 mol L ⁻¹ <i>tert</i> -BuOH and ~5 × 10 ⁻⁵ mol L ⁻¹ 2-SO ₃ NQ ⁻ .	731104	
6.1.31	Riboflavin $\text{Co}^{\text{I}} + \text{RF} \rightarrow \text{Co}^{2+} + [\text{RF}]^{2-}$	2.6×10^9	7.0		~22	p.r.	P.b.k. at 560 nm in deaerated soln. contg. ~1 mol L ⁻¹ <i>tert</i> -BuOH and ~10 ⁻⁴ mol L ⁻¹ RF.	731104	
6.2 Pentakis(cyano-C)cobaltate(I) ion									
6.2.1	Water $\text{Co}(\text{CN})_5^{4-} + \text{H}_2\text{O} \rightarrow \text{Co}(\text{CN})_5(\text{H})^{3-} + \text{OH}^-$	$1.1 \times 10^5 \text{ s}^{-1}$		-13		20	p.r.	D.k. at 280-330 nm in soln. contg. 100 atm (0.1 mol L ⁻¹) H ₂ ; <i>k</i> = 1.9 × 10 ⁴ s ⁻¹ in D ₂ O supports proton transfer mechanism.	710097
6.3 Nitrilotriacetatocobaltate(I) ion									
6.3.1	Nitrilotriacetatocobaltate(I) ion $\text{CoNTA}^{2-} + \text{CoNTA}^{2-} \rightarrow [\text{CoNTA}]_2^{4-}$	2.8×10^8	7			p.r.	D.k. at 360 nm in deaerated soln. contg. CoNTA ⁻ , <i>tert</i> -BuOH and 0.001 mol L ⁻¹ phosphate.	79A255	
6.4 2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraenecobalt(I) ion									
6.4.1	Tris(2,2'-bipyridine)cobalt(III) ion $\text{Co}(\text{Me}_4\text{tetraeneN}_4)^+ + \text{Co}(\text{bpy})_3^{3+} \rightarrow$	8.5×10^7	6.5	0.002		p.r.	D.k. at 700 nm in soln. contg. 1 mol L ⁻¹ <i>tert</i> -BuOH, 5 × 10 ⁻⁴ mol L ⁻¹ CoL ²⁺ and (2.5-5.0) × 10 ⁻⁵ mol L ⁻¹ Co(bpy) ₃ ³⁺ .	761001	
6.4.2	Tris(2,2'-bipyridine)chromium(III) ion $\text{Co}(\text{Me}_4\text{tetraeneN}_4)^+ + \text{Cr}(\text{bpy})_3^{3+} \rightarrow$	1.6×10^8	6.5	0.002		p.r.	D.k. at 700 nm in soln. contg. 1 mol L ⁻¹ <i>tert</i> -BuOH, 5 × 10 ⁻⁴ mol L ⁻¹ CoL ²⁺ and (2.5-5.0) × 10 ⁻⁵ mol L ⁻¹ Cr(bpy) ₃ ³⁺ .	761001	

TABLE 6. Rate constants for cobalt transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
6.4 2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraenecobalt(I) ion — Continued								
6.4.3 Hydrogen ion								
	$\text{Co}(\text{Me}_4\text{tetraeneN}_4)^+ + \text{H}^+ \rightarrow$ $\text{Co}(\text{Me}_4\text{tetraeneN}_4)(\text{H})^{2+}$	1.6×10^5	0.25-	0.06-		p.r.	D.k. at 700 nm in Ar-satd. soln. contg. 2 mol L ⁻¹ 2-PrOH and 0.001 mol L ⁻¹ CoL ²⁺ .	761001
6.4.4 Oxygen								
	$\text{Co}(\text{Me}_4\text{tetraeneN}_4)^+ + \text{O}_2 \rightarrow$ $\text{Co}(\text{Me}_4\text{tetraeneN}_4)(\text{O}_2)^+$	1.1×10^9	6.5	0.02		p.r.	D.k. at 700 nm in Ar-satd. soln. contg. 1 mol L ⁻¹ <i>tert</i> -BuOH, 0.007 mol L ⁻¹ CoL ²⁺ and $(7.5-25) \times 10^{-5}$ mol L ⁻¹ O ₂ .	761001
6.4.5 Acetic acid								
	$\text{Co}(\text{Me}_4\text{tetraeneN}_4)^+ + \text{CH}_3\text{CO}_2\text{H} \rightarrow$ $\text{Co}(\text{Me}_4\text{tetraeneN}_4)(\text{H})^{2+} + \text{CH}_3\text{CO}_2^-$	6.2×10^4	4.8	0.01-		p.r.	D.k. at 700 nm in Ar-satd. soln. contg. 2 mol L ⁻¹ 2-PrOH, 0.002 mol L ⁻¹ CoL ²⁺ and 0.002-0.01 mol L ⁻¹ acetate.	761001
6.4.6 9,10-Anthraquinone-2,6-disulfonate ion								
	$\text{Co}(\text{Me}_4\text{tetraeneN}_4)^+ + 2,6\text{-diSO}_3\text{AQ}^{2-} \rightarrow$ $\text{Co}(\text{Me}_4\text{tetraeneN}_4)^{2+} + [2,6\text{-diSO}_3\text{AQ}]^{3-}$	3.8×10^9	6.5	0.004		p.r.	D.k. at 700 nm in Ar-satd. soln. contg. 1 mol L ⁻¹ <i>tert</i> -BuOH, 0.001 mol L ⁻¹ CoL ²⁺ and $(1.25-5.0) \times 10^{-5}$ mol L ⁻¹ 2,6-diSO ₃ AQ ²⁻ .	761001
6.4.7 Indigomonomosulfonate ion								
	$\text{Co}(\text{Me}_4\text{tetraeneN}_4)^+ + \text{IMS}^- \rightarrow$ $\text{Co}(\text{Me}_4\text{tetraeneN}_4)^{2+} + [\text{IMS}]^{2-}$	4.9×10^9	6.5	0.004		p.r.	D.k. at 700 nm in Ar-satd. soln. contg. 1 mol L ⁻¹ <i>tert</i> -BuOH, 0.001 mol L ⁻¹ CoL ²⁺ and $(1.25-5.0) \times 10^{-5}$ mol L ⁻¹ IMS ⁻ .	761001
6.4.8 Riboflavin								
	$\text{Co}(\text{Me}_4\text{tetraeneN}_4)^+ + \text{RF} \rightarrow$ $\text{Co}(\text{Me}_4\text{tetraeneN}_4)^{2+} + [\text{RF}]^{2-}$	1.0×10^9	6.5	0.004		p.r.	D.k. at 700 nm in Ar-satd. soln. contg. 1 mol L ⁻¹ <i>tert</i> -BuOH, 0.001 mol L ⁻¹ CoL ²⁺ and $(1.25-5.0) \times 10^{-5}$ mol L ⁻¹ RF.	761001
6.5 <i>N</i>-meso-5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecobalt(I) ion								
6.5.1 Water								
	$\text{N-meso-Co}(4,11\text{-dieneN}_4)^+ + \text{H}_2\text{O} \rightarrow$	$1.8 \times 10^4 \text{ s}^{-1}$		25	p.r.		D.k. in soln. contg. 0.5 mol L ⁻¹ <i>tert</i> - BuOH; reaction suggested to proceed via Co-N bond rupture.	91A513
6.5.2 <i>N</i>-rac-5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecobalt(II) ion								
	$\text{N-meso-Co}(4,11\text{-dieneN}_4)^+ +$ $\text{N-rac-Co}(4,11\text{-dieneN}_4)^{2+} \rightarrow$ $\text{N-meso-Co}(4,11\text{-dieneN}_4)^{2+} +$ $\text{N-rac-Co}(4,11\text{-dieneN}_4)^+$	$\geq 1 \times 10^7$	7	25	p.r.		Calcd. from study of d.k. in soln. contg. mixtures of <i>N</i> -rac-CoL ²⁺ and <i>N</i> -meso-CoL ²⁺ $(0.2-1.8) \times 10^{-3}$ mol L ⁻¹ total, 0.5 mol L ⁻¹ <i>tert</i> -BuOH and 0.02 mol L ⁻¹ phosphate buffer.	91A513
6.5.3 Carbon dioxide								
	$\text{N-meso-Co}(4,11\text{-dieneN}_4)^+ + \text{CO}_2 \rightarrow$ $\text{N-meso-Co}(4,11\text{-dieneN}_4)(\text{CO}_2)^+$	1.6×10^7	5.8	25	p.r.		D.k. at 630 nm in soln. satd. with 1- 100% CO ₂ in N ₂ contg. $(0.4-1.0) \times$ 10^{-3} mol L ⁻¹ CoL ²⁺ , 0.5 mol L ⁻¹ <i>tert</i> - BuOH and NaHCO ₃ ; <i>k</i> _r = 2.7 s^{-1} .	91A513
6.5.4 Carbon monoxide								
	$\text{N-meso-Co}(4,11\text{-dieneN}_4)^+ + \text{CO} \rightarrow$ $\text{N-meso-Co}(4,11\text{-dieneN}_4)(\text{CO})^+$	8.3×10^8		25	p.r.		D.k. at 630 nm in soln. contg. <i>N</i> - meso-CoL ²⁺ , 9.5×10^{-4} mol L ⁻¹ CO and 0.5 mol L ⁻¹ <i>tert</i> -BuOH; <i>k</i> _r = 11 s ⁻¹ .	91A513
6.5.5 Hydrogen ion								
	$\text{N-meso-Co}(4,11\text{-dieneN}_4)^+ + \text{H}^+ \rightarrow$ $\text{N-meso-Co}(4,11\text{-dieneN}_4)(\text{H})^{2+}$	2.3×10^9		0.015	25	p.r.	D.k. at 630 nm in Ar-satd. soln. contg. 0.5 mol L ⁻¹ <i>tert</i> -BuOH; <i>k</i> _r = $< 10^{-4} \text{ s}^{-1}$.	91A513
6.5.6 Formic acid								
	$\text{N-meso-Co}(4,11\text{-dieneN}_4)^+ + \text{HCO}_2\text{H} \rightarrow$ $\text{N-meso-Co}(4,11\text{-dieneN}_4)(\text{H})^{2+} + \text{HCO}_2^-$	1.8×10^8		0.02	25	p.r.	D.k. at 630 nm in Ar-satd. soln. contg. 0.5 mol L ⁻¹ <i>tert</i> -BuOH.	91A513

TABLE 6. Rate constants for cobalt transients — Continued

Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
<i>N-meso</i> -5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecobalt(I) ion — Continued							
6.5.7 Acetic acid							
<i>N-meso</i> -Co(4,11-dieneN ₄) ⁺ + CH ₃ CO ₂ H →	8 × 10 ⁷			0.1	25	p.r.	D.k. at 630 nm in Ar-satd. soln. contg. 0.5 mol L ⁻¹ <i>tert</i> -BuOH.
<i>N-meso</i> -Co(4,11-dieneN ₄)(H) ²⁺ + CH ₃ CO ₂ ⁻							
6.5.8 Dihydrogen phosphate ion							
<i>N-rac</i> -Co(4,11-dieneN ₄) ⁺ + H ₂ PO ₄ ⁻ →	1.2 × 10 ⁸			0.1	25	p.r.	D.k. at 630 nm in Ar-satd. soln. contg. 0.5 mol L ⁻¹ <i>tert</i> -BuOH.
<i>N-meso</i> -Co(4,11-dieneN ₄)(H) ²⁺ + HPO ₄ ²⁻							
6.5.9 Nitrous oxide							
<i>N-meso</i> -Co(4,11-dieneN ₄) ⁺ + N ₂ O →	1 × 10 ⁷				25	p.r.	
							91A513
6.6 <i>N-rac</i> -5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecobalt(I) ion							
6.6.1 First-order reaction							
<i>N-rac</i> -Co(4,11-dieneN ₄) ⁺ →	2.3 × 10 ³ s ⁻¹				25	p.r.	D.k. in soln. contg. 0.5 mol L ⁻¹ <i>tert</i> -BuOH; reaction suggested to proceed via Co-N bond rupture. At pH 12.7 <i>k</i> = 6.6 × 10 ² s ⁻¹ .
	2.7 × 10 ³ s ⁻¹	9-10	0.001			p.r.	D.k. at 630 nm in Ar-satd. soln. contg. 1 mol L ⁻¹ <i>tert</i> -BuOH and 5 × 10 ⁻⁴ mol L ⁻¹ CoL ²⁺ . Authors reported <i>k</i> = 48 L mol ⁻¹ s ⁻¹ . Reaction assumed to be proton transfer from water to form the hydride.
6.6.2 Boric acid							
<i>N-rac</i> -Co(4,11-dieneN ₄) ⁺ + H ₃ BO ₃ →	7 × 10 ⁴			0.1	25	p.r.	D.k. at 630 nm in Ar-satd. soln. contg. (1-10) × 10 ⁻⁴ mol L ⁻¹ CoL ²⁺ and 0.5 mol L ⁻¹ <i>tert</i> -BuOH.
Co(4,11-dieneN ₄)(H) ²⁺ + H ₂ BO ₃ ⁻							91A513 89A098
6.6.3 Carbon monoxide							
<i>N-rac</i> -Co(4,11-dieneN ₄) ⁺ + CO →	5.0 × 10 ⁸		6		25	p.r.	D.k. at 630 nm in soln. contg. 0.001 mol L ⁻¹ CoL ²⁺ , 9.5 × 10 ⁻⁴ mol L ⁻¹ CO and 0.5 mol L ⁻¹ <i>tert</i> -BuOH; <i>k</i> _r = 3.1 s ⁻¹ .
<i>prim</i> - <i>N-rac</i> -Co(4,11-dieneN ₄)(CO) ⁺							91A513 89A098
6.6.4 Carbon dioxide							
<i>N-rac</i> -Co(4,11-dieneN ₄) ⁺ + CO ₂ →	1.7 × 10 ⁸		3.5-6		25	p.r.	D.k. at 630 nm in soln. satd. with 1-100% CO ₂ in N ₂ contg. (0.4-1.0) × 10 ⁻³ mol L ⁻¹ CoL ²⁺ and 0.5 mol L ⁻¹ <i>tert</i> -BuOH; Δ <i>H</i> _f [‡] = 29 kJ mol ⁻¹ , Δ <i>S</i> _f [‡] = 10.5 J K ⁻¹ mol ⁻¹ ; <i>k</i> _r = 0.38 s ⁻¹ . For sec-isomer, formed via addition of CO ₂ ⁻ to <i>N-rac</i> -Co(4,11-dieneN ₄) ²⁺ , <i>k</i> _r = 1.6 s ⁻¹ .
<i>prim</i> - <i>N-rac</i> -Co(4,11-dieneN ₄)(CO ₂) ⁺							91A513 89A098
6.6.5 Bicarbonate ion							
<i>N-rac</i> -Co(4,11-dieneN ₄) ⁺ + HCO ₃ ⁻ →	2.5 × 10 ⁶			0.1	25	p.r.	D.k. at 630 nm in Ar-satd. soln. contg. (1-10) × 10 ⁻⁴ mol L ⁻¹ CoL ²⁺ and 0.5 mol L ⁻¹ <i>tert</i> -BuOH.
Co(4,11-dieneN ₄)(H) ²⁺ + CO ₃ ²⁻							91A513 89A098
6.6.6 Tris(2,2'-bipyridine)cobalt(III) ion							
<i>N-rac</i> -Co(4,11-dieneN ₄) ⁺ + Co(bpy) ₃ ³⁺ →	1.2 × 10 ⁹		9.2	0.016-0.028		p.r.	D.k. at 630 nm in Ar-satd. soln. contg. 1 mol L ⁻¹ <i>tert</i> -BuOH, 0.005 mol L ⁻¹ CoL ²⁺ and (2-10) × 10 ⁻⁴ mol L ⁻¹ Co(bpy) ₃ ³⁺ .
							761001
6.6.7 Tris(ethylenediamine)cobalt(III) ion							
<i>N-rac</i> -Co(4,11-dieneN ₄) ⁺ + Co(en) ₃ ³⁺ →	7.9 × 10 ⁶		9.2	0.016-0.028		p.r.	D.k. at 630 nm in Ar-satd. soln. contg. 1 mol L ⁻¹ <i>tert</i> -BuOH, 0.005 mol L ⁻¹ CoL ²⁺ and (2-10) × 10 ⁻⁴ mol L ⁻¹ Co(en) ₃ ³⁺ .
							761001

TABLE 6. Rate constants for cobalt transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
6.6 <i>N</i>-rac-5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecobalt(I) ion — Continued								
6.6.8 Hexaamminecobalt(III) ion								
	<i>N</i> -rac-Co(4,11-dieneN ₄) ⁺ + Co(NH ₃) ₆ ³⁺ →	7.5 × 10 ⁶		9.2	0.016-0.028	p.r.	D.k. at 630 nm in Ar-satd. soln. contg. 1 mol L ⁻¹ <i>tert</i> -BuOH, 0.005 mol L ⁻¹ CoL ²⁺ and (2-10) × 10 ⁻⁴ mol L ⁻¹ Co(NH ₃) ₆ ³⁺ .	761001
6.6.9 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienedihydroxycobalt(III) ion								
	<i>N</i> -rac-Co(4,11-dieneN ₄) ⁺ + Co(4,11-dieneN ₄)(OH) ₂ ⁺ →	4.0 × 10 ⁶		9.2	0.016-0.028	p.r.	D.k. at 630 nm in Ar-satd. soln. contg. 1 mol L ⁻¹ <i>tert</i> -BuOH, 0.005 mol L ⁻¹ CoL ²⁺ and (2-10) × 10 ⁻⁴ mol L ⁻¹ Co(4,11-dieneN ₄)(OH) ₂ ⁺ .	761001
6.6.10 Dihydroxy(2,3,9,10-tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraene)cobalt(III) ion								
	<i>N</i> -rac-Co(4,11-dieneN ₄) ⁺ + Co(Me ₄ tetraeneN ₄)(OH) ₂ ⁺ →	6.7 × 10 ⁶		9.2	0.016-0.028	p.r.	D.k. at 630 nm in Ar-satd. soln. contg. 1 mol L ⁻¹ <i>tert</i> -BuOH, 0.005 mol L ⁻¹ CoL ²⁺ and (2-10) × 10 ⁻⁴ mol L ⁻¹ Co(Me ₄ tetraeneN ₄)(OH) ₂ ⁺ .	761001
6.6.11 Tris(2,2'-bipyridine)chromium(III) ion								
	<i>N</i> -rac-Co(4,11-dieneN ₄) ⁺ + Cr(bpy) ₃ ³⁺ →	1.2 × 10 ⁹		9.2	0.016-0.028	p.r.	D.k. at 630 nm in Ar-satd. soln. contg. 1 mol L ⁻¹ <i>tert</i> -BuOH, 0.005 mol L ⁻¹ CoL ²⁺ and (2-10) × 10 ⁻⁴ mol L ⁻¹ Cr(bpy) ₃ ³⁺ .	761001
6.6.12 Tris(2,2'-bipyridine)iron(III) ion								
	<i>N</i> -rac-Co(4,11-dieneN ₄) ⁺ + Fe(bpy) ₃ ³⁺ →	2.3 × 10 ⁷		9.2	0.016-0.028	p.r.	D.k. at 630 nm in Ar-satd. soln. contg. 1 mol L ⁻¹ <i>tert</i> -BuOH, 0.005 mol L ⁻¹ CoL ²⁺ and (2-10) × 10 ⁻⁴ mol L ⁻¹ Fe(bpy) ₃ ³⁺ .	761001
6.6.13 Hydrogen ion								
	<i>N</i> -rac-Co(4,11-dieneN ₄) ⁺ + H ⁺ → prim- <i>N</i> -rac-Co(4,11-dieneN ₄)(H) ²⁺	3.1 × 10 ⁹		3.5-4.2	0.015	p.r.	D.k. at 630 nm in Ar-satd. soln. contg. 1 mol L ⁻¹ <i>tert</i> -BuOH and 0.005 mol L ⁻¹ CoL ²⁺ ; <i>k</i> _f = 1.2 × 10 ⁻² s ⁻¹ [91A513]. For sec-isomer formed by addition of H to <i>N</i> -rac-Co(4,11-dieneN ₄) ⁺ , <i>K</i> = 3.2 × 10 ¹¹ L mol ⁻¹ [91A513].	761001
6.6.14 Ammonium ion								
	<i>N</i> -rac-Co(4,11-dieneN ₄) ⁺ + NH ₄ ⁺ → Co(4,11-dieneN ₄)(H) ²⁺ + NH ₃	6.8 × 10 ⁵		7.0	0.015-0.1	p.r.	D.k. at 630 nm in Ar-satd. soln. contg. 1 mol L ⁻¹ <i>tert</i> -BuOH, 1.5 × 10 ⁻³ mol L ⁻¹ CoL ²⁺ and 0.01-0.1 mol L ⁻¹ NH ₄ ⁺ .	761001
6.6.15 Nitrous oxide								
	<i>N</i> -rac-Co(4,11-dieneN ₄) ⁺ + N ₂ O →	2 × 10 ⁷		25	p.r.			91A513
		2.5 × 10 ⁷			p.r.			78A200
6.6.16 Oxygen								
	<i>N</i> -rac-Co(4,11-dieneN ₄) ⁺ + O ₂ → Co(4,11-dieneN ₄)(O ₂) ⁺	1.7 × 10 ⁹		9.2	0.02	p.r.	D.k. at 630 nm in Ar-satd. soln. contg. 1 mol L ⁻¹ <i>tert</i> -BuOH, 0.007 mol L ⁻¹ CoL ²⁺ and (7.5-25) × 10 ⁻⁵ mol L ⁻¹ O ₂ .	761001

TABLE 6. Rate constants for cobalt transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>t</i>	<i>t</i> (°C)	Method	Comment	Ref.
6.6 <i>N</i>-rac-5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecobalt(I) ion — Continued								
6.6.17 Hydrogen phosphate ion								
	<i>N</i> -rac-Co(4,11-dieneN ₄) ⁺ + HPO ₄ ²⁻ → Co(4,11-dieneN ₄)(H) ²⁺ + PO ₄ ³⁻	1.0 × 10 ⁵	10.0	0.06-0.3		p.r.	D.k. at 630 nm in Ar-satd. soln. contg. 1 mol L ⁻¹ <i>tert</i> -BuOH, 5 × 10 ⁻⁴ mol L ⁻¹ CoL ²⁺ and 0.02-0.1 mol L ⁻¹ HPO ₄ ²⁻ .	761001
6.6.18 Dihydrogen phosphate ion								
	<i>N</i> -rac-Co(4,11-dieneN ₄) ⁺ + H ₂ PO ₄ ⁻ → prim- <i>N</i> -rac-Co(4,11-dieneN ₄)(H) ²⁺ + HPO ₄ ²⁻	8 × 10 ⁷ 1.2 × 10 ⁸	0.1 0.008	25		p.r.	D.k. at 630 nm in Ar-satd. soln. contg. (1-10) × 10 ⁻⁴ mol L ⁻¹ CoL ²⁺ and 0.5 mol L ⁻¹ <i>tert</i> -BuOH.	91A513 89A098
		9.8 × 10 ⁷	5.5 0.005-0.01			p.r.	D.k. at 630 nm in Ar-satd. soln. contg. 1 mol L ⁻¹ <i>tert</i> -BuOH, 5 × 10 ⁻⁴ mol L ⁻¹ CoL ²⁺ and 0.001-0.01 mol L ⁻¹ H ₂ PO ₄ ⁻ .	761001
6.6.19 Hexaammineruthenium(II) ion								
	<i>N</i> -rac-Co(4,11-dieneN ₄) ⁺ + Ru(NH ₃) ₆ ²⁺ →	4.0 × 10 ⁸	9.2	0.016-0.028		p.r.	D.k. at 630 nm in Ar-satd. soln. contg. 1 mol L ⁻¹ <i>tert</i> -BuOH, 0.005 mol L ⁻¹ CoL ²⁺ and (2-10) × 10 ⁻⁴ mol L ⁻¹ Ru(NH ₃) ₆ ²⁺ .	761001
6.6.20 Pentaammine(nitroso)ruthenium(III) ion								
	<i>N</i> -rac-Co(4,11-dieneN ₄) ⁺ + Ru(NH ₃) ₅ NO ³⁺ →	3.9 × 10 ⁷	9.2	0.016-0.028		p.r.	D.k. at 630 nm in Ar-satd. soln. contg. 1 mol L ⁻¹ <i>tert</i> -BuOH, 0.005 mol L ⁻¹ CoL ²⁺ and (2-10) × 10 ⁻⁴ mol L ⁻¹ Ru(NH ₃) ₅ NO ³⁺ .	761001
6.6.21 Acetic acid								
	<i>N</i> -rac-Co(4,11-dieneN ₄) ⁺ + CH ₃ CO ₂ H → Co(4,11-dieneN ₄)(H) ²⁺ + CH ₃ CO ₂ ⁻	1.1 × 10 ⁸	0.1	25		p.r.	D.k. at 630 nm in Ar-satd. soln. contg. (1-10) × 10 ⁻⁴ mol L ⁻¹ CoL ²⁺ and 0.5 mol L ⁻¹ <i>tert</i> -BuOH.	91A513 89A098
		7.5 × 10 ⁷	4.8 0.01-0.05			p.r.	D.k. at 630 nm in Ar-satd. soln. contg. 1 mol L ⁻¹ <i>tert</i> -BuOH, 0.002 mol L ⁻¹ CoL ²⁺ and 0.002-0.01 mol L ⁻¹ acetate.	761001
6.6.22 9,10-Anthraquinone-2-sulfonate ion								
	<i>N</i> -rac-Co(4,11-dieneN ₄) ⁺ + 2-SO ₃ AQ ⁻ → <i>N</i> -rac-Co(4,11-dieneN ₄) ²⁺ + [2-SO ₃ AQ] ²⁻	4.4 × 10 ⁹	9.2	0.004		p.r.	D.k. at 630 nm in Ar-satd. soln. contg. 1 mol L ⁻¹ <i>tert</i> -BuOH, 0.001 mol L ⁻¹ CoL ²⁺ and (1.25-5.0) × 10 ⁻⁵ mol L ⁻¹ 2-SO ₃ AQ ⁻ .	761001
6.6.23 3-Benzoylpyridine								
	<i>N</i> -rac-Co(4,11-dieneN ₄) ⁺ + 3-C ₆ H ₅ COPy →	4.6 × 10 ⁸	9.2	0.004		p.r.	D.k. at 630 nm in Ar-satd. soln. contg. 1 mol L ⁻¹ <i>tert</i> -BuOH, 0.001 mol L ⁻¹ CoL ²⁺ and (1.25-5.0) × 10 ⁻⁵ mol L ⁻¹ 3-C ₆ H ₅ COPy.	761001
6.6.24 9-Fluorenone								
	<i>N</i> -rac-Co(4,11-dieneN ₄) ⁺ + C ₁₃ H ₈ O → <i>N</i> -rac-Co(4,11-dieneN ₄) ²⁺ + [C ₁₃ H ₈ O] ²⁻	4.3 × 10 ⁹	9.2	0.004		p.r.	D.k. at 630 nm in Ar-satd. soln. contg. 1 mol L ⁻¹ <i>tert</i> -BuOH, 0.001 mol L ⁻¹ CoL ²⁺ and (1.25-5.0) × 10 ⁻⁵ mol L ⁻¹ fluorenone.	761001
6.6.25 Formic acid								
	<i>N</i> -rac-Co(4,11-dieneN ₄) ⁺ + HCO ₂ H → Co(4,11-dieneN ₄)(H) ²⁺ + HCO ₂ ⁻	1.7 × 10 ⁸	0.1	25		p.r.	D.k. at 630 nm in soln. contg. (1-10) × 10 ⁻⁴ mol L ⁻¹ CoL ²⁺ and <i>tert</i> -BuOH.	89A098
6.6.26 2-Hydroxy-2,2-dimethylethyl								
	<i>N</i> -rac-Co(4,11-dieneN ₄) ⁺ + ·CH ₂ C(CH ₃) ₂ OH →	2 × 10 ⁸			25	p.r.	D.k. in soln. contg. 0.5 mol L ⁻¹ <i>tert</i> -BuOH.	91A513

TABLE 6. Rate constants for cobalt transients — Continued

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t(\text{°C})$	Method	Comment	Ref.	
6.6 <i>N</i>-rac-5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecobalt(I) ion — Continued									
6.6.27 Iodomethane									
	$N\text{-rac-Co(4,11-dieneN}_4\text{)}^+ + \text{CH}_3\text{I} \rightarrow$	4.7×10^8		9.2	0.015	p.r.	D.k. at 630 nm in Ar-satd. soln. contg. 1 mol L^{-1} <i>tert</i> -BuOH, 0.001 mol L^{-1} CoL^{2+} and $(1.25\text{-}5.0) \times 10^{-5}$ mol L^{-1} CH_3I .	761001	
6.6.28 2-Methyl-1,4-naphthoquinone									
	$N\text{-rac-Co(4,11-dieneN}_4\text{)}^+ + 2\text{-CH}_3\text{NQ} \rightarrow$	4.6×10^9		9.2	0.004	p.r.	D.k. at 630 nm in Ar-satd. soln. contg. 1 mol L^{-1} <i>tert</i> -BuOH, 0.001 mol L^{-1} CoL^{2+} and $(1.25\text{-}5.0) \times 10^{-5}$ mol L^{-1} 2- CH_3NQ .	761001	
6.7 5,7,7,12,12,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,14-dienecobalt(I) ion									
6.7.1 Water									
	$\text{Co(4,14-dieneN}_4\text{)}^+ + \text{H}_2\text{O} \rightarrow$	$1.1 \times 10^3 \text{ s}^{-1}$		9-10	0.001	p.r.	D.k. at 590 nm in Ar-satd. soln. contg. 1 mol L^{-1} <i>tert</i> -BuOH and 5×10^{-4} mol L^{-1} CoL^{2+} . Authors reported $k = 20 \text{ L mol}^{-1} \text{ s}^{-1}$.	761001	
	$\text{Co(4,14-dieneN}_4\text{)(H)}^{2+} + \text{OH}^-$								
6.7.2 Hydrogen ion									
	$\text{Co(4,14-dieneN}_4\text{)}^+ + \text{H}^+ \rightarrow$	1.2×10^9		3.5-	0.015	p.r.	D.k. at 590 nm in Ar-satd. soln. contg. 1 mol L^{-1} <i>tert</i> -BuOH and 5×10^{-3} mol L^{-1} CoL^{2+} .	761001	
	$\text{Co(4,14-dieneN}_4\text{)(H)}^{2+}$			4.2					
6.7.3 Nitrous oxide									
	$\text{Co(4,14-dieneN}_4\text{)}^+ + \text{N}_2\text{O} \rightarrow$	9.0×10^6		9.2	0.01	p.r.	D.k. at 590 nm in soln. contg. 0.003 mol L^{-1} CoL^{2+} and $(7.5\text{-}25) \times 10^{-4}$ mol L^{-1} N_2O . Product suggested to be Co(III) complex.	761001	
6.7.4 Oxygen									
	$\text{Co(4,14-dieneN}_4\text{)}^+ + \text{O}_2 \rightarrow$	9.0×10^8		9.2	0.02	p.r.	D.k. at 590 nm in Ar-satd. soln. contg. 1 mol L^{-1} <i>tert</i> -BuOH, 0.007 mol L^{-1} CoL^{2+} and $(7.5\text{-}25) \times 10^{-4}$ mol L^{-1} O_2 .	761001	
	$\text{Co(4,14-dieneN}_4\text{)(O}_2\text{)}^+$								
6.7.5 Dihydrogen phosphate ion									
	$\text{Co(4,14-dieneN}_4\text{)}^+ + \text{H}_2\text{PO}_4^- \rightarrow$	3.0×10^7		5.5	0.005-	p.r.	D.k. at 590 nm in Ar-satd. soln. contg. 1 mol L^{-1} <i>tert</i> -BuOH, 5×10^{-4} mol L^{-1} CoL^{2+} and 0.001-0.01 mol L^{-1} H_2PO_4^- .	761001	
	$\text{Co(4,14-dieneN}_4\text{)(H)}^{2+} + \text{HPO}_4^{2-}$			0.01					
6.8 2,2'-Bipyridinecobalt(I) ion									
6.8.1 Ascorbate radical anion									
	$\text{Co(bpy)}_n^+ + \cdot\text{A}^- + \text{H}^+ \rightarrow \text{Co(bpy)}_n^{2+} + \text{AH}^-$	1×10^{10}		5-7		25	p.r.	D.k. in soln. contg. $(0.3\text{-}10) \times 10^{-4}$ mol L^{-1} of both CoSO_4 and 2,2'-bipyridine, and 0.001 mol L^{-1} ascorbate; $n = 1$ or 2.	82A278
6.9 2,2'-Bipyridinecobalt(I) ion									
6.9.1 Bis(2,2'-bipyridine)cobalt(II) ion									
	$\text{Co(bpy)}^+ + \text{Co(bpy)}_2^{2+} \rightarrow \text{Co(bpy)}^{2+} + \text{Co(bpy)}_2^+$	2.1×10^9		0.2		25	p.r.	D.k. in deaerated soln. contg. <i>tert</i> -BuOH, Co^{2+} and 2,2'-bipyridine. $k_f = 1.1 \times 10^7 \text{ L mol}^{-1} \text{ s}^{-1}$; $K = 225$.	85A034
6.10 Bis(2,2'-bipyridine)cobalt(II) ion									
6.10.1 Tris(2,2'-bipyridine)cobalt(II) ion									
	$\text{Co(bpy)}_2^+ + \text{Co(bpy)}_3^{2+} \rightarrow \text{Co(bpy)}_2^{2+} + \text{Co(bpy)}_3^+$	2.0×10^9		0.2		25	p.r.	D.k. in deaerated soln. contg. <i>tert</i> -BuOH, Co^{2+} and 2,2'-bipyridine; $K = 200$.	85A034

TABLE 6. Rate constants for cobalt transients — Continued

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t^\circ\text{C}$	Method	Comment	Ref.
6.10 Bis(2,2'-bipyridine)cobalt(I) ion — Continued								
6.10.2	Hydrogen ion							
	$\text{Co(bpy)}_2^+ + \text{H}^+ \rightarrow \text{Co(bpy)}_2(\text{H})^{2+}$	$\sim 1 \times 10^7$			25	p.r.	D.k. at 610 nm in soln. contg. CoSO_4 and 2,2'-bipyridine; pK_a of $\text{Co(bpy)}_2(\text{H})^{2+} = 6.9$ [84A112].	82A278
6.11 Tris(2,2'-bipyridine)cobalt(I) ion								
6.11.1	2,2'-Bipyridine, conjugate acid							
	$\text{Co(bpy)}_3^+ + \text{bpyH}^+ \rightarrow \text{Co(bpy)}_3^{2+} + [\text{bpyH}]^*$	1.8×10^8		-0.25	25	p.r.	D.k. at 610 nm in soln. contg. Co^{2+} , $(0.5-1.9) \times 10^{-3}$ mol L^{-1} 2,2'-bipyridine and 0.1 mol L^{-1} formate; $k_r = 4.5 \times 10^9 \text{ L mol}^{-1} \text{ s}^{-1}$; $K = 4.1 \times 10^{-2}$.	83C017
6.12 4,4'-Dimethyl-2,2'-bipyridinecobalt(I) ion								
6.12.1	Bis(4,4'-dimethyl-2,2'-bipyridine)cobalt(II) ion							
	$\text{Co(4,4'-Me}_2\text{bpy)}^+ + \text{Co(4,4'-Me}_2\text{bpy)}_2^{2+} \rightarrow \text{Co(4,4'-Me}_2\text{bpy)}^{2+} + \text{Co(4,4'-Me}_2\text{bpy)}_2^+$	1.8×10^9		0.2	25	p.r.	D.k. in deaerated soln. contg. <i>tert</i> -BuOH, Co^{2+} and 4,4'-dimethyl-2,2'-bipyridine. $k_r = 2.0 \times 10^7 \text{ L mol}^{-1} \text{ s}^{-1}$; $K = 125$.	85A034
6.13 4,4'-Dimethyl-2,2'-bipyridinecobalt(I) ions								
6.13.1	Ascorbate radical anion							
	$\text{Co(4,4'-Me}_2\text{bpy)}_n^+ + \cdot\text{A}^- + \text{H}^+ \rightarrow \text{Co(4,4'-Me}_2\text{bpy)}_n^{2+} + \text{AH}^-$	1×10^{10}	5-7		25	p.r.	D.k. in soln. contg. $(0.3-10) \times 10^{-4}$ mol L^{-1} of both CoSO_4 and 4,4'-dimethyl-2,2'-bipyridine, and 0.001 mol L^{-1} ascorbate; $n = 1$ or 2.	82A278
6.14 4,4'-Dimethyl-2,2'-bipyridinecobalt(I) ion, protonated								
6.14.1	Ascorbate radical anion							
	$\text{Co(4,4'-Me}_2\text{bpy)}_n(\text{H})^{2+} + \cdot\text{A}^- \rightarrow \text{Co(4,4'-Me}_2\text{bpy)}_n^{2+} + \text{AH}^-$	$\sim 1 \times 10^9$	5-7		25	p.r.	$n = 1$ or 2.	82A278
6.15 Bis(4,4'-dimethyl-2,2'-bipyridine)cobalt(I) ion								
6.15.1	Tris(4,4'-dimethyl-2,2'-bipyridine)cobalt(II) ion							
	$\text{Co(4,4'-Me}_2\text{bpy)}_2^+ + \text{Co(4,4'-Me}_2\text{bpy)}_3^{2+} \rightarrow \text{Co(4,4'-Me}_2\text{bpy)}_2^{2+} + \text{Co(4,4'-Me}_2\text{bpy)}_3^+$	2.5×10^9		0.2	25	p.r.	D.k. in deaerated soln. contg. <i>tert</i> -BuOH, Co^{2+} and 4,4'-dimethyl-2,2'-bipyridine. $k_r = 7.5 \times 10^7 \text{ L mol}^{-1} \text{ s}^{-1}$; $K = 50$ at $I = 0.1$.	85A034
6.15.2	Hydrogen ion							
	$\text{Co(4,4'-Me}_2\text{bpy)}_2^+ + \text{H}^+ \rightarrow \text{Co(4,4'-Me}_2\text{bpy)}_2(\text{H})^{2+}$	$\sim 2 \times 10^8$			25	p.r.		82A278
6.16 Tris(4,4'-dimethyl-2,2'-bipyridine)cobalt(I) ion								
6.16.1	Tris(4,4'-dimethyl-2,2'-bipyridine)cobalt(III) ion							
	$\text{Co(4,4'-Me}_2\text{bpy)}_3^+ + \text{Co(4,4'-Me}_2\text{bpy)}_3^{3+} \rightarrow \sim 1 \times 10^9$		5-7		25	p.r.	D.k. in soln. contg. 1×10^{-4} mol L^{-1} of $\text{Co}(\text{II})$ complex, 1×10^{-5} mol L^{-1} $\text{Co}(\text{III})$ complex and 0.1 mol L^{-1} 2-ProOH.	82A278
6.16.2	4,4'-Dimethyl-2,2'-bipyridine, conjugate monoacid							
	$\text{Co(4,4'-Me}_2\text{bpy)}_3^+ + 4,4'\text{-Me}_2\text{bpyH}^+ \rightarrow \text{Co(4,4'-Me}_2\text{bpy)}_3^{2+} + [\text{4,4'-Me}_2\text{bpyH}]^*$	4.3×10^8	4.4		25	p.r.	D.k. at 610 nm in soln. contg. 0.13 mol L^{-1} 2-ProOH, 0.03 mol L^{-1} acetic acid, 0.001 mol L^{-1} CoSO_4 and 0.003-0.004 mol L^{-1} 4,4'-dimethyl-2,2'-bipyridine; $k_r = 3.3 \times 10^9 \text{ L mol}^{-1} \text{ s}^{-1}$ at pH 10.2.	83C017

TABLE 6. Rate constants for cobalt transients — Continued

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t(\text{°C})$	Method	Comment	Ref.
6.17 5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatocobaltate(I) ion								
6.17.1 Nitrous oxide								
	$\text{CoTPPS}^{5-} + \text{N}_2\text{O} \rightarrow$	$\leq 3 \times 10^2$	13	21	p.r.	D.k. in N_2O -satd. soln. contg. 1.5 mol L^{-1} 2-PrOH.	83A088	
6.17.2 Iodomethane								
	$\text{CoTPPS}^{5-} + \text{CH}_3\text{I} \rightarrow \text{CoTPPS}^{4-} + \cdot\text{CH}_3 + \text{I}^-$	3×10^5	8	21	p.r.	D.k. at 495 and 510 nm and p.b.k. at 550 nm in N_2O -satd. soln. contg. 1.5 mol L^{-1} 2-PrOH, $(0.5-1) \times 10^{-3}$ mol L^{-1} methyl iodide, $(2-7) \times 10^{-5}$ mol L^{-1} CoTPPS^{4-} and 3×10^{-4} mol L^{-1} borate.	83A088	
6.18 Cobal(I)amin								
6.18.1 Nitrous oxide								
	$\text{B12s} + \text{N}_2\text{O} \rightarrow$	2.3×10^2 1.6×10^2	6.1 8.0	18-22	p.r.	D.k. at 385 nm and p.b.k. at 313 nm in N_2O -satd. soln. contg. 2×10^{-5} mol L^{-1} cob(II)alamin, 0.1 mol L^{-1} formate and 0.01 mol L^{-1} phosphate buffer. Effect of [buffer] on k reported.	771018	
6.18.2 Hydroxocob(III)alamin								
	$\text{B12s} + \text{B12a} \rightarrow \text{B12r} + \text{B12r}$	1.5×10^7	3.9- 4.2	22	p.r.	D.k. at 390 and 460 nm in He- or CO_2 -satd. soln. contg. 6×10^{-5} mol L^{-1} cob(II)alamin, $(0.6-2.4) \times 10^{-5}$ mol L^{-1} cob(III) alamin and 0.1 mol L^{-1} 2-PrOH; k decreases from 1.0×10^7 to $2.9 \times 10^4 \text{ L mol}^{-1} \text{ s}^{-1}$ as pH increases from 7.8 to 11.1.	78A373	
6.19 3,10,17,24-Tetrasulfophthalocyaninecobaltate(I) ion								
6.19.1 Hydrogen peroxide								
	$\text{Co(tspc)}^{5-} + \text{H}_2\text{O}_2 \rightarrow$	-2.5×10^6			p.r.	D.k. in N_2O -satd. soln. contg. 0.1 mol L^{-1} formate, 4×10^{-7} mol L^{-1} H_2O_2 and 6×10^{-5} mol L^{-1} Co(tspc)^{4-}	83A238	
6.19.2 Tris(2,2'-bipyridine)ruthenium(III) ion								
	$\text{Co(tspc)}^{5-} + \text{Ru(bpy)}_3^{3+} \rightarrow \text{Co(tspc)}^{4-} + \text{Ru(bpy)}_3^{2+}$	2.9×10^8	1.3		f.p./oq	D.k. at 520 nm in deaerated soln. contg. 0.001-0.1 mol L^{-1} HCl , 0.001-0.01 mol L^{-1} Ru(bpy)_3^{2+} and Co(tspc)^{4-} (OQ).	79A090	
6.20 3,10,17,24-Tetrasulfophthalocyaninecobaltate(I) ion dimer								
6.20.1 First-order reaction								
	$[\text{Co(tspc)}]_2^{10-} \rightarrow 2 \text{Co(tspc)}^{5-}$	4.4 s^{-1}	1		f.p.	D.k. at 535 nm in deaerated soln. contg. Co(tspc)^{4-} , 2-PrOH and HClO_4 .	78A300	
6.21 N-Methyltetrakis(4-sulfonatophenyl)porphinatocobaltate(II) radical anion								
6.21.1 First-order reaction								
	$[\text{Co}(N\text{-Me})\text{TPPS}]^{4-} \rightarrow \text{CH}_3\text{CoTPPS}^{4-}$	$2.0 \times 10^2 \text{ s}^{-1}$			p.r.	D.k. and p.b.k. at 530 nm in Ar-satd. soln. contg. $(1-10) \times 10^{-5}$ mol L^{-1} $\text{Co}(N\text{-Me})\text{TPPS}^{3-}$ and 1% 2-PrOH.	92G183	
6.22 Pentaamminecobalt(II) ion								
6.22.1 First-order reaction								
	$\text{Co}(\text{NH}_3)_5^{2+} \rightarrow \text{Co}(\text{NH}_3)_4^{2+} + \text{NH}_3$	$4.1 \times 10^6 \text{ s}^{-1}$	3		f.p.	Condy. change in Ar-satd. soln. contg. $\text{Co}(\text{NH}_3)_5\text{Cl}^{2+}$ and 0.001 mol L^{-1} HCl . Reaction preceded by fast elimination of Cl from $\text{Co}(\text{NH}_3)_5\text{Cl}^{2+}$.	79A168	

TABLE 6. Rate constants for cobalt transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
6.23 Tetraamminecobalt(II) ion								
6.23.1 First-order reaction								
	$\text{Co}(\text{NH}_3)_4^{2+} \rightarrow \text{Co}(\text{NH}_3)_3^{2+} + \text{NH}_3$	$4.8 \times 10^5 \text{ s}^{-1}$		3		f.p.	Cond. change in Ar-satd. soln. contg. $\text{Co}(\text{NH}_3)_5\text{Cl}^{2+}$ and 0.001 mol L ⁻¹ HCl.	79A168
6.24 Tris(amine)cobalt(II) ion								
6.24.1 First-order reaction								
	$\text{Co}(\text{NH}_3)_3^{2+} \rightarrow \text{Co}(\text{NH}_3)_2^{2+} + \text{NH}_3$	$6.4 \times 10^4 \text{ s}^{-1}$	3-	4.5		p.r.	Cond. change in Ar-satd. soln. contg. $\text{Co}(\text{NH}_3)_6^{3+}$ or $\text{Co}(\text{NH}_3)_5\text{Cl}^{2+}$ or $\text{Co}(\text{NH}_3)_5\text{F}^{2+}$ or $\text{Co}(\text{NH}_3)_4\text{Cl}_2^{+}$ or $\text{Co}(\text{NH}_3)_4\text{Cl}(\text{H}_2\text{O})^{2+}$ and <i>tert</i> -BuOH.	77A234 761149
6.25 Bis(amine)cobalt(II) ion								
6.25.1 First-order reaction								
	$\text{Co}(\text{NH}_3)_2^{2+} \rightarrow \text{Co}(\text{NH}_3)^{2+} + \text{NH}_3$	$8.6 \times 10^3 \text{ s}^{-1}$	3-	4.5		p.r.	Cond. change in Ar-satd. soln. contg. $\text{Co}(\text{NH}_3)_6^{3+}$ or $\text{Co}(\text{NH}_3)_5\text{Cl}^{2+}$ or $\text{Co}(\text{NH}_3)_5\text{F}^{2+}$ or $\text{Co}(\text{NH}_3)_4\text{Cl}_2^{+}$ or $\text{Co}(\text{NH}_3)_4\text{Cl}(\text{H}_2\text{O})^{2+}$ and <i>tert</i> -BuOH.	761149
6.26 Amminecobalt(II) ion								
6.26.1 First-order reaction								
	$\text{Co}(\text{NH}_3)^{2+} \rightarrow \text{Co}^{2+} + \text{NH}_3$	$1.1 \times 10^3 \text{ s}^{-1}$	3-	4.5		p.r.	Cond. change in Ar-satd. soln. contg. $\text{Co}(\text{NH}_3)_6^{3+}$ or $\text{Co}(\text{NH}_3)_5\text{Cl}^{2+}$ or $\text{Co}(\text{NH}_3)_5\text{F}^{2+}$ or $\text{Co}(\text{NH}_3)_4\text{Cl}_2^{+}$ or $\text{Co}(\text{NH}_3)_4\text{Cl}(\text{H}_2\text{O})^{2+}$ and <i>tert</i> -BuOH.	761149
6.27 Tris(ethylenediamine)cobalt(II) ion								
6.27.1 First-order reaction								
	$\text{Co}(\text{en})_3^{2+} \rightarrow \text{Co}(\text{en})_2^{2+} + \text{en}$	$6.8 \times 10^2 \text{ s}^{-1}$	2.3-	4.6	25	p.r.	Cond. change in Ar-satd. soln. contg. $\text{Co}(\text{en})_3^{3+}$ and 0.2 mol L ⁻¹ <i>tert</i> -BuOH; $k = 1.5 \times 10^4 \text{ s}^{-1}$ calcd. for N-Co(II) bond rupture [77A234].	90A303
6.27.2 Hydrogen ion								
	$\text{Co}(\text{en})_3^{2+} + \text{H}^+ \rightarrow \text{Co}(\text{en})_2^{2+} + \text{enH}^+$	6.6×10^6	2.3-	4.6	25	p.r.	Cond. change in Ar-satd. soln. contg. $\text{Co}(\text{en})_3^{3+}$ and 0.2 mol L ⁻¹ <i>tert</i> -BuOH.	90A303
6.28 Bis(ethylenediamine)cobalt(II) ion								
6.28.1 First-order reaction								
	$\text{Co}(\text{en})_2^{2+} \rightarrow \text{Co}(\text{en})^{2+} + \text{en}$	50 s^{-1}	2.3-	4.6	25	p.r.	Cond. change in Ar-satd. soln. contg. $\text{Co}(\text{en})_3^{3+}$ and 0.2 mol L ⁻¹ <i>tert</i> -BuOH; $k = 1.4 \times 10^3 \text{ s}^{-1}$ calcd. for N-Co(II) bond rupture [77A234].	90A303
6.28.2 Hydrogen ion								
	$\text{Co}(\text{en})_2^{2+} + \text{H}^+ \rightarrow \text{Co}(\text{en})^{2+} + \text{enH}^+$	1.4×10^6	2.3-	4.6	25	p.r.	Cond. change in Ar-satd. soln. contg. $\text{Co}(\text{en})_3^{3+}$ and 0.2 mol L ⁻¹ <i>tert</i> -BuOH.	90A303
6.29 Ethylenediaminecobalt(II) ion								
6.29.1 First-order reaction								
	$\text{Co}(\text{en})^{2+} \rightarrow \text{Co}^{2+} + \text{en}$	14 s^{-1}	2.3-	4.6	25	p.r.	Cond. change in Ar-satd. soln. contg. $\text{Co}(\text{en})_3^{3+}$ and 0.2 mol L ⁻¹ <i>tert</i> -BuOH; $k = 1.7 \times 10^2 \text{ s}^{-1}$ calcd. for N-Co(II) bond rupture [77A234].	90A303
6.29.2 Hydrogen ion								
	$\text{Co}(\text{en})^{2+} + \text{H}^+ \rightarrow \text{Co}^{2+} + \text{enH}^+$	3.2×10^5	2.3-	4.6	25	p.r.	Cond. change in Ar-satd. soln. contg. $\text{Co}(\text{en})_3^{3+}$ and 0.2 mol L ⁻¹ <i>tert</i> -BuOH.	90A303

TABLE 6. Rate constants for cobalt transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
6.30 Bis(diethylenetriamine)cobalt(II) ion								
6.30.1 First-order reaction								
	$\text{Co(dien)}_2^{2+} \rightarrow$	$1.8 \times 10^4 \text{ s}^{-1}$	2.5- 4.5		25	p.r.	Cond. change in Ar-satd. soln. contg. Co(dien)_2^{3+} and 0.2 mol L ⁻¹ <i>tert</i> -BuOH. Rate constant refers to N-Co(II) bond rupture.	77A234
6.31 Diethylenetriaminecobalt(II) ion								
6.31.1 First-order reaction								
	$\text{Co(dien)}^{2+} \rightarrow$	$8.7 \times 10^2 \text{ s}^{-1}$	2.5- 4.5		25	p.r.	Cond. change in Ar-satd. soln. contg. Co(dien)_2^{3+} and 0.2 mol L ⁻¹ <i>tert</i> -BuOH. Rate constant refers to N-Co(II) bond rupture.	77A234
6.32 Triethylenetetraminecobalt(II) ion								
6.32.1 First-order reaction								
	$\text{Co(trien)}^{2+} \rightarrow$	$2.1 \times 10^3 \text{ s}^{-1}$	2.5- 4.5		25	p.r.	Cond. change in Ar-satd. soln. contg. Co(trien)^{3+} and 0.2 mol L ⁻¹ <i>tert</i> -BuOH. Rate constant refers to N-Co(II) bond rupture.	77A234
6.32.2 Oxygen								
	$\text{Co(trien)}^{2+} + \text{O}_2 + \text{OH}^- \rightarrow$ $\text{Co(trien)(O}_2\text{)(OH)}^+$	2.2×10^5	9.1- 12.6	0.2		f.p.	P.b.k. at 310 nm in soln. contg. 2×10^{-5} mol L ⁻¹ (trien) $\text{Co}(\mu\text{-OH}, \mu\text{-O}_2)\text{Co(trien)}^{3+}$. Product suggested to react with $\text{Co}(\text{trien})(\text{H}_2\text{O})_2^{2+}$ to give (trien) $\text{Co(OH)}\text{O}_2\text{Co}(\text{H}_2\text{O})(\text{trien})^{3+}$ which gives (trien) $\text{Co}(\mu\text{-OH}, \mu\text{-O}_2)\text{Co(trien)}^{3+}$ with $k = 2 \text{ s}^{-1}$.	91A065
6.33 Hydroxytriethylenetetraminecobalt(II) ion								
6.33.1 Oxygen								
	$\text{Co}(\text{trien})(\text{OH})^+ + \text{O}_2 \rightarrow \text{Co}(\text{trien})(\text{O}_2)(\text{OH})^+$	2.1×10^4	9.1- 12.6	0.2		f.p.	P.b.k. at 310 nm in soln. contg. 2×10^{-5} mol L ⁻¹ (trien) $\text{Co}(\mu\text{-OH}, \mu\text{-O}_2)\text{Co(trien)}^{3+}$. Product suggested to react with $\text{Co}(\text{OH})(\text{trien})(\text{H}_2\text{O})_2^{2+}$ to give (trien) $\text{Co(OH)}\text{O}_2\text{Co}(\text{OH})(\text{trien})^{2+}$ which gives (trien) $\text{Co}(\mu\text{-OH}, \mu\text{-O}_2)\text{Co(trien)}^{3+}$ with $k = 4 \times 10^{-2} \text{ s}^{-1}$.	91A065
6.34 Nitrito(triethylenetetramine)cobalt(II) ion								
6.34.1 Oxygen								
	$\text{Co}(\text{trien})(\text{NO}_2)^+ + \text{O}_2 \rightarrow$ $\text{Co}(\text{trien})(\text{NO}_2)(\text{O}_2)^+$	3.2×10^2	6.3		25	f.p.	Spectral changes in soln. contg. $\text{Co}(\text{trien})(\text{NO}_2)_2^+$. Product suggested to react with $\text{Co}(\text{trien})(\text{NO}_2)_2^+$, $k = 9 \times 10^2 \text{ L mol}^{-1} \text{ s}^{-1}$, to give (trien) $\text{Co}(\text{NO}_2)(\mu\text{-O}_2)\text{Cu}(\text{NO}_2)(\text{trien})^{2+}$; the latter superoxo complex gives the peroxy complex with $k < 0.1 \text{ s}^{-1}$.	92A191

TABLE 6. Rate constants for cobalt transients — Continued

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t(\text{°C})$	Method	Comment	Ref.
6.35 Tetraethyl diethylenetriaminecobalt(II) ion								
6.35.1 Oxygen	$\text{Co}(\text{tetraen})^{2+} + \text{O}_2 \rightarrow \text{Co}(\text{tetraen})(\text{O}_2)^{2+}$	1.0×10^5	6.3		25	f.p.	Spectral changes in soln. contg. $\text{Co}(\text{tetraen})(\text{NO}_2)^{2+}$. Product suggested to react with $\text{Co}(\text{tetraen})(\text{NO}_2)^{2+}$, $k = 8.2 \times 10^4 \text{ L mol}^{-1} \text{s}^{-1}$ to give $(\text{tetraen})\text{Co}(\mu-\text{O}_2)\text{Co}(\text{tetraen})^{5+}$; the latter superoxo complex gives the peroxy complex with $k < 0.1 \text{ s}^{-1}$.	92A191
6.36 Tris(acetylacetonato)cobaltate(II) ion								
6.36.1 First-order reaction	$\text{Co}(\text{acac})_3^- \rightarrow \text{Co}(\text{acac})_2 + \text{acac}^-$	$8 \times 10^3 \text{ s}^{-1}$			25	p.r.	Cond. change in He-satd. soln. contg. $5 \times 10^{-4} \text{ mol L}^{-1} \text{ Co}(\text{acac})_3$, 0.1 mol L^{-1} <i>tert</i> -BuOH and varied $[\text{H}^+]$.	79A297
6.36.2 Hydrogen ion	$\text{Co}(\text{acac})_3^- + \text{H}^+ \rightarrow \text{Co}(\text{acac})_2 + \text{acacH}$	7.2×10^8			25	p.r.	Cond. change in He-satd. soln. contg. $5 \times 10^{-4} \text{ mol L}^{-1} \text{ Co}(\text{acac})_3$, 0.1 mol L^{-1} <i>tert</i> -BuOH and varied $[\text{H}^+]$.	79A297
6.37 Bis(acetylacetonato)cobalt(II)								
6.37.1 First-order reaction	$\text{Co}(\text{acac})_2 \rightarrow \text{Co}(\text{acac})^+ + \text{acac}^-$	30 s^{-1}			25	p.r.	Cond. change in He-satd. soln. contg. $5 \times 10^{-4} \text{ mol L}^{-1} \text{ Co}(\text{acac})_3$, 0.1 mol L^{-1} <i>tert</i> -BuOH and varied $[\text{H}^+]$; $k_t \sim 4.1 \times 10^5 \text{ L mol}^{-1} \text{s}^{-1}$.	79A297
6.37.2 Hydrogen ion	$\text{Cu}(\text{acac})_2 + \text{H}^+ \rightarrow \text{Co}(\text{acac})^+ + \text{acacH}$	3.1×10^6			25	p.r.	Cond. change in He-satd. soln. contg. $5 \times 10^{-4} \text{ mol L}^{-1} \text{ Co}(\text{acac})_3$, 0.1 mol L^{-1} <i>tert</i> -BuOH and varied $[\text{H}^+]$; $k_t \sim 7.5 \times 10^5 \text{ L mol}^{-1} \text{s}^{-1}$.	79A297
6.38 Acetylacetonatocobalt(II) ion								
6.38.1 First-order reaction	$\text{Co}(\text{acac})^+ \rightarrow \text{Co}^{2+} + \text{acac}^-$	3 s^{-1}			25	p.r.	Cond. change in He-satd. soln. contg. $5 \times 10^{-4} \text{ mol L}^{-1} \text{ Co}(\text{acac})_3$, 0.1 mol L^{-1} <i>tert</i> -BuOH and varied $[\text{H}^+]$.	79A297
6.38.2 Hydrogen ion	$\text{Co}(\text{acac})^+ + \text{H}^+ \rightarrow \text{Co}^{2+} + \text{acacH}$	7.5×10^4			25	p.r.	Cond. change in He-satd. soln. contg. $5 \times 10^{-4} \text{ mol L}^{-1} \text{ Co}(\text{acac})_3$, 0.1 mol L^{-1} <i>tert</i> -BuOH and varied $[\text{H}^+]$.	79A297
6.39 Tris(2,2'-bipyridine)cobalt(II) ion								
6.39.1 First-order reaction	$\text{Co}(\text{bpy})_3^{2+} \rightarrow \text{Co}(\text{bpy})_2^{2+} + \text{bpy}$	3.4 s^{-1}		0.5-10.5		p.r.	D.k. at 270-340 nm in Ar- or N_2O -satd. soln. contg. $(1.5) \times 10^{-5} \text{ mol L}^{-1} \text{ Co}(\text{bpy})_3^{3+}$ and MeOH, 2-PrOH, <i>tert</i> -BuOH or formate; $k_t = 1.4 \times 10^5 \text{ L mol}^{-1} \text{s}^{-1}$. At pH 0.3 $k = 8 \text{ s}^{-1}$.	79A034
6.39.2 Tris(2,2'-bipyridine)ruthenium(III) ion	$\text{Co}(\text{bpy})_3^{2+} + \text{Ru}(\text{bpy})_3^{3+} \rightarrow \text{Co}(\text{bpy})_3^{3+} + \text{Ru}(\text{bpy})_3^{2+}$	1.3×10^8		1.0		f.p./oq	Soln. contg. $\text{Ru}(\text{bpy})_3^{2+}$ and $\text{Co}(\text{bpy})_3^{3+} (\text{OQ})$.	82F048

TABLE 6. Rate constants for cobalt transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
6.39 Tris(2,2'-bipyridine)cobalt(II) ion — Continued								
6.39.2 Tris(2,2'-bipyridine)ruthenium(III) ion — Continued								
		2.4×10^8		1.0	25	f.p./oq	D.k. at 675 nm in soln. contg. 7.5×10^{-5} mol L ⁻¹ Ru(bpy) ₃ ²⁺ and (0.5 or 1.0) $\times 10^{-3}$ mol L ⁻¹ Co(bpy) ₃ ³⁺ (OQ); studied at 5-25 °C, <i>E</i> _a = -11.8 kJ mol ⁻¹ .	80A003
6.39.3 Tris(4-triethylphosphonio-2,2'-bipyridine)ruthenium(III) ion								
	$\text{Co}(\text{bpy})_3^{2+} + \text{Ru}[4-(\text{Et}_3\text{P})\text{bpy}]_3^{6+} \rightarrow \text{Co}(\text{bpy})_3^{3+} + \text{Ru}[4-(\text{Et}_3\text{P})\text{bpy}]_3^{5+}$	2.2×10^8		1.0		f.p.	Soln. contg. Ru[4-(Et ₃ P)bpy] ₃ ⁵⁺ and Co(bpy) ₃ ³⁺ (OQ).	82F048
6.39.4 Tris(1,10-phenanthroline)ruthenium(III) ion								
	$\text{Co}(\text{bpy})_3^{2+} + \text{Ru}(\text{phen})_3^{3+} \rightarrow \text{Co}(\text{bpy})_3^{3+} + \text{Ru}(\text{phen})_3^{2+}$	1.9×10^8		0.25		f.p./oq	P.b.k. at 420-450 nm in soln. contg. 1 $\times 10^{-4}$ mol L ⁻¹ Ru(phen) ₃ ²⁺ , 0.25 mol L ⁻¹ LiCl and (2-6) $\times 10^{-4}$ mol L ⁻¹ Co(bpy) ₃ ³⁺ (OQ); <i>k</i> = 2.5×10^8 in presence of 0.166 mol L ⁻¹ Na ₂ SO ₄ and 4.8×10^7 L mol ⁻¹ s ⁻¹ in 50% aqueous acetonitrile contg. 0.25 mol L ⁻¹ LiCl.	85S022
6.39.5 Tris(4,7-dimethyl-1,10-phenanthroline)ruthenium(III) ion								
	$\text{Co}(\text{bpy})_3^{2+} + \text{Ru}(4,7-\text{Me}_2\text{phen})_3^{3+} \rightarrow \text{Co}(\text{bpy})_3^{3+} + \text{Ru}(4,7-\text{Me}_2\text{phen})_3^{2+}$	3.1×10^8		0.25		f.p./oq	P.b.k. at 420-450 nm in soln. contg. 1 $\times 10^{-4}$ mol L ⁻¹ Ru(4,7-Me ₂ phen) ₃ ²⁺ , 0.25 mol L ⁻¹ LiCl and (2-6) $\times 10^{-4}$ mol L ⁻¹ Co(bpy) ₃ ³⁺ (OQ); <i>k</i> = 5.1×10^8 in presence of 0.166 mol L ⁻¹ Na ₂ SO ₄ and 2.2×10^7 L mol ⁻¹ s ⁻¹ in 50% aqueous acetonitrile contg. 0.25 mol L ⁻¹ LiCl.	85S022
6.39.6 Tris(3,4,7,8-tetramethyl-1,10-phenanthroline)ruthenium(III) ion								
	$\text{Co}(\text{bpy})_3^{2+} + \text{Ru}(3,4,7,8-\text{Me}_4\text{phen})_3^{3+} \rightarrow \text{Co}(\text{bpy})_3^{3+} + \text{Ru}(3,4,7,8-\text{Me}_4\text{phen})_3^{2+}$	2.0×10^7		0.25		f.p./oq	P.b.k. at 420-450 nm in 50% aqueous acetonitrile soln. contg. 1 $\times 10^{-4}$ mol L ⁻¹ Ru(3,4,7,8-Me ₄ phen) ₃ ²⁺ , 0.25 mol L ⁻¹ LiCl and (2-6) $\times 10^{-4}$ mol L ⁻¹ Co(bpy) ₃ ³⁺ (OQ).	85S022
6.40 Tris(1,10-phenanthroline)cobalt(II) ion								
6.40.1 Tris(2,2'-bipyridine)ruthenium(III) ion								
	$\text{Co}(\text{phen})_3^{2+} + \text{Ru}(\text{bpy})_3^{3+} \rightarrow \text{Co}(\text{phen})_3^{3+} + \text{Ru}(\text{bpy})_3^{2+}$	1.4×10^8		1.0	25	f.p./oq	D.k. at 675 nm in soln. contg. 7.5×10^{-5} mol L ⁻¹ Ru(bpy) ₃ ²⁺ and (0.25-2.0) $\times 10^{-3}$ mol L ⁻¹ Co(phen) ₃ ³⁺ (OQ); the same value was obtained under pseudo-first order conditions with addn. of 1.0×10^{-4} mol L ⁻¹ Co(phen) ₃ ²⁺ ; studied at 5-25 °C, <i>E</i> _a = -4.6 ± 3.7 kJ mol ⁻¹ .	80A003
6.40.2 Methylene Blue, radical cation								
	$\text{Co}(\text{phen})_3^{2+} + [\text{MB}]^{2+} + \text{H}^+ \rightarrow \text{Co}(\text{phen})_3^{3+} + \text{MBH}^{2+}$	1.3×10^8				f.p./oq	D.k. at 520 nm in soln. contg. methylene blue and Co(phen) ₃ ³⁺ (OQ).	82A290
6.41 3,10,17,24-Tetralsulfophthalocyaninecobaltate(II) ion								
6.41.1 Diiodine radical ion								
	$\text{Co}(\text{tspc})^{4-} + \text{I}_2^{\cdot-} \rightarrow$	6.7×10^9	1	1.0		f.p.	D.k. at ≤420 nm in soln. contg. Co(tspc)(H ₂ O) _{2-n} I ⁽³⁺ⁿ⁾⁻ (n = 1, 2), 0.1 mol L ⁻¹ NaI and 0.1 mol L ⁻¹ HClO ₄ .	79A090
6.41.2 Tris(2,2'-bipyridine)ruthenium(III) ion								
	$\text{Co}(\text{tspc})^{4-} + \text{Ru}(\text{bpy})_3^{3+} \rightarrow \text{Co}(\text{tspc})^{3-} + \text{Ru}(\text{bpy})_3^{2+}$	4.5×10^7				f.p./oq	D.k. at 580 nm; mixed dimer contg. 0.005-0.01 mol L ⁻¹ Ru(bpy) ₃ ²⁺ and (1.5) $\times 10^{-6}$ mol L ⁻¹ Co(tspc) ³⁻ (OQ).	79A090

TABLE 6. Rate constants for cobalt transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
6.42 Chloro(pentacyano)cobaltate(II) ion								
6.42.1	First-order reaction							
	$\text{Co}(\text{CN})_5\text{Cl}^{4-} \rightarrow \text{Co}(\text{CN})_5^{3-} + \text{Cl}^-$	$>1 \times 10^6 \text{ s}^{-1}$	4.5- 5.5			p.r.	Cond. change in soln. contg. $\text{Co}(\text{CN})_5^{3-}$ and 0.5 mol L ⁻¹ <i>tert</i> -BuOH.	771003
6.43 Pentacyanocobaltate(II) ion								
6.43.1	First-order reaction							
	$\text{Co}(\text{CN})_5^{3-} \rightarrow \text{Co}(\text{CN})_4^{2-} + \text{CN}^-$	$1.1 \times 10^4 \text{ s}^{-1}$	4.5- 5.5			p.r.	Cond. change in soln. contg. $\text{Co}(\text{CN})_6^{3-}$ or $\text{Co}(\text{CN})_5\text{Cl}^{3-}$ and 0.5 mol L ⁻¹ <i>tert</i> -BuOH.	771003
6.44 Tetracyanocobaltate(II) ion								
6.44.1	First-order reaction							
	$\text{Co}(\text{CN})_4^{2-} \rightarrow \text{Co}(\text{CN})_3^- + \text{CN}^-$	28 s^{-1}	4.5- 5.5			p.r.	Cond. change in soln. contg. $\text{Co}(\text{CN})_6^{3-}$ or $\text{Co}(\text{CN})_5\text{Cl}^{3-}$ and 0.5 mol L ⁻¹ <i>tert</i> -BuOH.	771003
6.45 Tris(glycinato)cobaltate(II) ion								
6.45.1	First-order reaction							
	$\text{Co}(\text{Gly})_3^- \rightarrow \text{Co}(\text{Gly})_2 + \text{Gly}^-$	$4.2 \times 10^3 \text{ s}^{-1}$	3.0- 4.5, 8.5		-25	p.r.	Cond. change in Ar-satd. soln. contg. 0.003 mol L ⁻¹ $\text{Co}(\text{Gly})_3$ and 0.2 mol L ⁻¹ <i>tert</i> -BuOH.	90A303
6.45.2	Hydrogen ion							
	$\text{Co}(\text{Gly})_3^- + \text{H}^+ \rightarrow \text{Co}(\text{Gly})_2 + \text{GlyH}$	2.7×10^7	3.0- 4.5		-25	p.r.	Cond. change in Ar-satd. soln. contg. 0.003 mol L ⁻¹ $\text{Co}(\text{Gly})_3$ and 0.2 mol L ⁻¹ <i>tert</i> -BuOH.	90A303
6.46 Bis(glycinato)cobalt(II)								
6.46.1	First-order reaction							
	$\text{Co}(\text{Gly})_2 \rightarrow \text{Co}(\text{Gly})^+ + \text{Gly}^-$	$3.5 \times 10^2 \text{ s}^{-1}$	3.0- 4.5, 8.5		-25	p.r.	Cond. change in Ar-satd. soln. contg. 0.003 mol L ⁻¹ $\text{Co}(\text{Gly})_3$ and 0.2 mol L ⁻¹ <i>tert</i> -BuOH.	90A303
6.46.2	Hydrogen ion							
	$\text{Co}(\text{Gly})_2 + \text{H}^+ \rightarrow \text{Co}(\text{Gly})^+ + \text{GlyH}$	8.1×10^5	3.0- 4.5		-25	p.r.	Cond. change in Ar-satd. soln. contg. 0.003 mol L ⁻¹ $\text{Co}(\text{Gly})_3$ and 0.2 mol L ⁻¹ <i>tert</i> -BuOH.	90A303
6.47 Glycinatocobalt(II) ion								
6.47.1	First-order reaction							
	$\text{Co}(\text{Gly})^+ \rightarrow \text{Co}^{2+} + \text{Gly}^-$	49 s^{-1}	3.0- 4.5		-25	p.r.	Cond. change in Ar-satd. soln. contg. 0.003 mol L ⁻¹ $\text{Co}(\text{Gly})_3$ and 0.2 mol L ⁻¹ <i>tert</i> -BuOH.	90A303
6.47.2	Hydrogen ion							
	$\text{Co}(\text{Gly})^+ + \text{H}^+ \rightarrow \text{Co}^{2+} + \text{GlyH}$	2.1×10^4	3.0- 4.5		-25	p.r.	Cond. change in Ar-satd. soln. contg. 0.003 mol L ⁻¹ $\text{Co}(\text{Gly})_3$ and 0.2 mol L ⁻¹ <i>tert</i> -BuOH.	90A303
6.48 Ethylenediaminetetraacetatocobaltate(II) ion								
6.48.1	Tris(2,2'-bipyridine)ruthenium(III) ion							
	$\text{CoEDTA}^{2-} + \text{Ru(bpy)}_3^{3+} \rightarrow \text{CoEDTA}^- + \text{Ru(bpy)}_3^{2+}$	9×10^3	4.75		25		In 0.05 mol L ⁻¹ acetate buffer.	85F089
6.48.2	5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatozinc(II) ion, radical cation							
	$\text{CoEDTA}^{2-} + [\text{ZnTMpyP}]^{5+} \rightarrow \text{CoEDTA}^- + \text{ZnTMpyP}^{4+}$	-2.2×10^9				f.p./oq	D.k. at 700 nm in Ar-satd. soln. contg. ZnTMpyP^{4+} and CoEDTA^- (OQ).	85A430

TABLE 6. Rate constants for cobalt transients — Continued

No.	Reaction	k (L mol ⁻¹ s ⁻¹)	pH	I	t (°C)	Method	Comment	Ref.
6.49 1,4,8,11-Tetraazacyclotetradecane cobalt(II) ion								
6.49.1 Oxygen								
	$\text{Co}(\text{cyclam})^{2+} + \text{O}_2 \rightarrow \text{Co}(\text{cyclam})(\text{O}_2)^{2+}$	1.2×10^7	1-7	0.001- 0.1	25	f.p.	P.b.k. at 360 nm in soln. contg. (1-5) × 10^{-4} mol L ⁻¹ $\text{CH}_3\text{Co}(\text{cyclam})^{2+}$ or $\text{Co}(\text{cyclam})(\text{O}_2)^{2+}$ or $\text{CH}_3\text{CH}_2\text{CH}_2\text{Co}(\text{cyclam})^{2+}$ and (0.25- 1.26) × 10^{-3} mol L ⁻¹ O_2 ; $k_t = 63 \text{ s}^{-1}$ at $I = 1.0$ [80M397].	90A079
6.50 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecane cobalt(II) ion								
6.50.1 Oxygen								
	$\text{Co}(\text{aneN}_4)^{2+} + \text{O}_2 \rightarrow \text{Co}(\text{aneN}_4)(\text{O}_2)^{2+}$	5.0×10^6	1-7	0.001- 0.1	25	f.p.	P.b.k. at 360 nm in soln. contg. 2 × 10^{-4} mol L ⁻¹ $\text{CH}_3\text{Co}(\text{aneN}_4)^{2+}$ or $\text{Co}(\text{aneN}_4)(\text{O}_2)^{2+}$ and (0.25-1.26) × 10^{-3} mol L ⁻¹ O_2 ; $k_t = 1.7 \times 10^6 \text{ s}^{-1}$.	90A079
6.51 1,8-Diamino-3,6,10,13,16,19-hexaaazabicyclo[6.6.6]eicosane cobalt(II) ion, conjugate diacid								
6.51.1 Tris(1,10-phenanthroline)ruthenium(III) ion								
	$\text{Co}(\text{diamsarH}_2)^{4+} + \text{Ru}(\text{phen})_3^{3+} \rightarrow \text{Co}(\text{diamsarH}_2)^{5+} + \text{Ru}(\text{phen})_3^{2+}$	7.9×10^6	1	0.2	25	f.p./oq	P.b.k. at 450 nm in soln. contg. (2-5) × 10^{-5} mol L ⁻¹ $\text{Ru}(\text{phen})_3^{2+}$, 0.001- 0.007 mol L ⁻¹ $\text{Co}(\text{diamsar})^{3+}$ (OQ), and 0.1 mol L ⁻¹ HCl.	84A238
6.52 1,8-Diamino-3,6,10,13,16,19-hexaaazabicyclo[6.6.6]eicosane cobalt(II) ion								
6.52.1 Tris(1,10-phenanthroline)ruthenium(III) ion								
	$\text{Co}(\text{diamsar})^{2+} + \text{Ru}(\text{phen})_3^{3+} \rightarrow \text{Co}(\text{diamsar})^{3+} + \text{Ru}(\text{phen})_3^{2+}$	9.6×10^7	8.3	0.2	25	f.p./oq	P.b.k. at 450 nm in soln. contg. (2-5) × 10^{-5} mol L ⁻¹ $\text{Ru}(\text{phen})_3^{2+}$, 0.001- 0.007 mol L ⁻¹ $\text{Co}(\text{diamsar})^{3+}$ (OQ), 0.1 mol L ⁻¹ LiCl and 0.05 mol L ⁻¹ N-ethylmorpholine.	84A238
6.52.2 Tris(5-chloro-1,10-phenanthroline)ruthenium(III) ion								
	$\text{Co}(\text{diamsar})^{2+} + \text{Ru}(5\text{-Clphen})_3^{3+} \rightarrow \text{Co}(\text{diamsar})^{3+} + \text{Ru}(5\text{-Clphen})_3^{2+}$	1.7×10^8	8.1	0.2	25	f.p./oq	P.b.k. at 450 nm in soln. contg. 0.2 mol L ⁻¹ LiCl, 0.05 mol L ⁻¹ N-ethylmorpholine, (2-5) × 10^{-5} mol L ⁻¹ $\text{Ru}(5\text{-Clphen})_3^{2+}$ and 0.001-0.007 mol L ⁻¹ $\text{Co}(\text{diamsar})^{3+}$ (OQ).	84A238
6.52.3 Tris(4,7-dimethyl-1,10-phenanthroline)ruthenium(III) ion								
	$\text{Co}(\text{diamsar})^{2+} + \text{Ru}(4,7\text{-Me}_2\text{phen})_3^{3+} \rightarrow \text{Co}(\text{diamsar})^{3+} + \text{Ru}(4,7\text{-Me}_2\text{phen})_3^{2+}$	3.1×10^7	8.3	0.2	25	f.p./oq	P.b.k. at 450 nm in soln. contg. 0.2 mol L ⁻¹ LiCl, 0.05 mol L ⁻¹ N-ethylmorpholine, (2-5) × 10^{-5} mol L ⁻¹ $\text{Ru}(4,7\text{-Me}_2\text{phen})_3^{2+}$ and 0.001-0.007 mol L ⁻¹ $\text{Co}(\text{diamsar})^{3+}$ (OQ).	84A238
6.53 8-Methyl-1,3,13,16-tetraaza-6,10,19-trithiabicyclo[6.6.6]eicosane cobalt(II) ion								
6.53.1 Tris(2,2'-bipyridine)ruthenium(III) ion								
	$\text{Co}(\text{AZAcapten})^{2+} + \text{Ru}(\text{bpy})_3^{3+} \rightarrow \text{Co}(\text{AZAcapten})^{3+} + \text{Ru}(\text{bpy})_3^{2+}$	$\sim 5 \times 10^8$				f.p./oq	P.b.k. at 470 nm in soln. contg. $\text{Ru}(\text{bpy})_3^{2+}$ and $\text{Co}(\text{AZAcapten})^{3+}$ (OQ).	85F222
6.54 1,3,6,8,10,13,16,19-Octaazabicyclo[6.6.6]eicosane cobalt(II) ion								
6.54.1 Tris(2,2'-bipyridine)ruthenium(III) ion								
	$\text{Co}(\text{sep})^{2+} + \text{Ru}(\text{bpy})_3^{3+} \rightarrow \text{Co}(\text{sep})^{3+} + \text{Ru}(\text{bpy})_3^{2+}$	5.5×10^8		0.2	25	f.p./oq	P.b.k. at 450 nm in soln. contg. (2-5) × 10^{-5} mol L ⁻¹ $\text{Ru}(\text{bpy})_3^{2+}$ and 0.001- 0.007 mol L ⁻¹ $\text{Co}(\text{sep})^{3+}$ (OQ).	84A238

TABLE 6. Rate constants for cobalt transients — Continued

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t(\text{°C})$	Method	Comment	Ref.
6.54 1,3,6,8,10,13,16,19-Octaazabicyclo[6.6.6]eicosane cobalt(II) ion — Continued								
6.54.2 Tris(1,10-phenanthroline)ruthenium(III) ion								
	$\text{Co(sep)}^{2+} + \text{Ru(phen)}_3^{3+} \rightarrow \text{Co(sep)}^{3+} + \text{Ru(phen)}_3^{2+}$	6.4×10^8		0.2	25	f.p./oq	P.b.k. at 450 nm in soln. contg. (2-5) $\times 10^{-5}$ mol L^{-1} Ru(phen)_3^{2+} and 0.001-0.007 mol L^{-1} Co(sep)^{3+} (OQ).	84A238
6.54.3 Tris(5-chloro-1,10-phenanthroline)ruthenium(III) ion								
	$\text{Co(sep)}^{2+} + \text{Ru(5-Clphen)}_3^{3+} \rightarrow \text{Co(sep)}^{3+} + \text{Ru(5-Clphen)}_3^{2+}$	8.2×10^8		0.2	25	f.p./oq	P.b.k. at 450 nm in soln. contg. (2-5) $\times 10^{-5}$ mol L^{-1} $\text{Ru(5-Clphen)}_3^{2+}$ and 0.001-0.007 mol L^{-1} Co(sep)^{3+} (OQ).	84A238
6.54.4 Tris(4,7-dimethyl-1,10-phenanthroline)ruthenium(III) ion								
	$\text{Co(sep)}^{2+} + \text{Ru(4,7-Me}_2\text{phen)}_3^{3+} \rightarrow \text{Co(sep)}^{3+} + \text{Ru(4,7-Me}_2\text{phen)}_3^{2+}$	5.4×10^8		0.2	25	f.p./oq	P.b.k. at 450 nm in soln. contg. (2-5) $\times 10^{-5}$ mol L^{-1} $\text{Ru(5-Clphen)}_3^{2+}$ and 0.001-0.007 mol L^{-1} Co(sep)^{3+} (OQ).	84A238
6.55 2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraenecobalt(II) ion								
6.55.1 Tris(2,2'-bipyridine)ruthenium(III) ion								
	$\text{Co(Me}_4\text{tetraeneN}_4)_4^{2+} + \text{Ru(bpy)}_3^{3+} \rightarrow \text{Co(Me}_4\text{tetraeneN}_4)_4^{3+} + \text{Ru(bpy)}_3^{2+}$	2.1×10^7		0.1	25	f.p./oq	P.b.k. at 443 nm in soln. contg. Ru(bpy)_3^{2+} and $\text{Co(Me}_4\text{tetraeneN}_4)_4^{3+}$ (OQ).	90A221
6.56 2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraenecobalt(II) ion, superoxide adduct								
6.56.1 2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraenecobalt(II) ion, superoxide adduct								
	$\text{Co(Me}_4\text{tetraeneN}_4)_4^{2+} (\text{O}_2)^+ + \text{Co(Me}_4\text{tetraeneN}_4)_4^{2+} \rightarrow$	2.1×10^3		8.0		p.r.	D.k. in soln. contg. 4×10^{-5} mol L^{-1} $\text{Co(Me}_4\text{tetraeneN}_4)_4^{2+}$, 0.0013 mol L^{-1} O_2 and 0.25 mol L^{-1} <i>tert</i> -BuOH.	771028
6.57 Iminodiacetatocobaltate(II) ion, superoxide adduct								
6.57.1 Iminodiacetatocobalt(II)								
	$\text{CoIDA(O}_2)^- + \text{CoIDA} \rightarrow \text{IDACo(O}_2\text{)CoIDA}^-$	2.4×10^6		7		p.r.	D.k. in O_2 -satd. soln. contg. 0.001 mol L^{-1} CoIDA, 0.05 mol L^{-1} formate and 0.001 mol L^{-1} phosphate.	84A284
6.58 Ethylenediaminetetraacetatocobaltate(II) ion, superoxide adduct								
6.58.1 Ethylenediaminetetraacetatocobaltate(II) ion, superoxide adduct								
	$\text{CuEDTA(O}_2)^{3-} + \text{CoEDTA(O}_2)^{3-} \rightarrow \text{CoEDTA(O}_2)^{2-}$	2×10^5		9		p.r.	D.k. at 330 nm in O_2 -satd. soln. contg. 0.1 mol L^{-1} formate, 0.01 mol L^{-1} borate and 2.5×10^{-4} mol L^{-1} CoEDTA $^{2-}$. Reaction suggested to generate $(\text{Co(II)EDTA}^{2-}, \text{O}_2^{2-})$ which decays with $k = 3 \times 10^{-3} \text{ s}^{-1}$ to give $\text{Co(III)EDTA}^- + \cdot\text{OH} + \text{OH}^-$.	84A249
6.59 Iminodiacetatocobalt(II), H-abstraction product								
6.59.1 Iminodiacetatocobalt(II)								
	$\text{Co[IDA-H]}^{+} + \text{CoIDA} \rightarrow \text{Co[IDA-H]}^{+} + \text{CoIDA}^-$	3.5×10^6		7		p.r.	D.k. in N_2O -satd. soln. contg. CoIDA and 0.001 mol L^{-1} phosphate.	84A284
6.60 Nitrilotriacetatocobaltate(II) ion, H-abstraction product								
6.60.1 First-order reaction								
	$\text{Co[NTA-H]}^{+} \rightarrow \text{Co[NTA]}^-$	$5 \times 10^3 \text{ s}^{-1}$				p.r.	D.k. in N_2O satd. soln. contg. 4×10^{-4} mol L^{-1} Co(NTA)^- . Reaction followed or paralleled by second-order decay, $k = 2.5 \times 10^7, 1 \times 10^6, 3.8 \times 10^5, 2 \times 10^4 \text{ L mol}^{-1} \text{ s}^{-1}$ at pH 3.7, 5.0, 6.5 and 10.0, respectively.	78A436
							*For different results see the following entry.	

TABLE 6. Rate constants for cobalt transients — Continued

No.	Reaction	k (L mol ⁻¹ s ⁻¹)	pH	<i>t</i>	<i>t</i> (°C)	Method	Comment	Ref.
6.60 Nitrilotriacetatocobaltate(II) ion, H-abstraction product — Continued								
6.60.2 Nitrilotriacetatocobaltate(II) ion, H-abstraction product								
	$\text{Co}[\text{NTA-H}]^{*+} + \text{Co}[\text{NTA-H}]^{*+} \rightarrow$	4.7×10^4	7			p.r.	D.k. at 250 nm in N_2O -satd. soln. contg. CoNTA^- and 0.001 mol L ⁻¹ phosphate.	79A255
							*For different results see the preceding entry.	
6.61 Ethylenediaminetetraacetatocobaltate(II) ion, H-abstraction product								
6.61.1 First-order reaction								
	$\text{Co}[\text{EDTA-H}]^{*2-} \rightarrow$	$9 \times 10^3 \text{ s}^{-1}$				p.r.	D.k. in N_2O -satd. soln. contg. 4×10^{-4} mol L ⁻¹ $\text{Co}(\text{EDTA})^{2-}$. Reaction followed or paralleled by pH-dependent second-order decay, $k \sim 1.5 \times 10^4$, 3.8×10^3 and 2.5×10^4 L mol ⁻¹ s ⁻¹ at pH ~3.5, 6 and 10, respectively; values obtained from graph.	78A436
6.62 3,10,17,24-Tetrasulfophthalocyaninecobaltate(II) ion, superoxide adduct								
6.62.1 3,10,17,24-Tetrasulfophthalocyaninecobaltate(II) ion, superoxide adduct								
	$\text{Co}(\text{tspc})(\text{O}_2)^{5-} + \text{Co}(\text{tspc})(\text{O}_2)^{5-} \rightarrow$	3.4×10^2	7.5			p.r.	D.k. in O_2 -satd. soln. contg. (1-10) $\times 10^{-6}$ mol L ⁻¹ $\text{Co}(\text{tspc})^{4-}$ and phosphosphate buffer; unclear whether k or $2k$.	89A497
6.63 1,4,8,11-Tetraazacyclotetradecanecobalt(II) ion, dioxygen adduct								
6.63.1 Iron(II) ion								
	$\text{Co}(\text{cyclam})(\text{O}_2)^{2+} + \text{Fe}^{2+} \rightarrow$	6.3×10^2	1	25	f.p.		D.k. at 360 nm in soln. contg. O_2 , $\text{CH}_3\text{Co}(\text{cyclam})^{2+}$, Fe^{2+} and 0.1 mol L ⁻¹ HClO_4 .	90A079
6.64 5,10,15,10-Tetrakis(1-methylpyridyl)porphinato(thiocyanato)cobalt(II) ion								
6.64.1 First-order reaction								
	$\text{CoTMpyP}(\text{SCN})^{3+} \rightarrow \text{SCN}^- + \text{CoTMpyP}^{4+}$	$7 \times 10^4 \text{ s}^{-1}$				p.r.	D.k. in N_2 -satd. soln. contg. $\text{Co}(\text{III})\text{TMpyP}(\text{SCN})^{4+}$ and 5% 2-PrOII.	90B077
6.65 Cobaltocene								
6.65.1 Hydrogen ion								
	$\text{CoCp}_2 + \text{H}^+ \rightarrow$	42	0.3- 2.1			p.r.	D.k. at 340 nm in Ar-satd. soln. contg. $\sim 10^{-5}$ mol L ⁻¹ CoCp_2^+ and 0.0081-0.47 mol L ⁻¹ H^+ .	88A066
6.66 Pentaammine(1-methyl-4,4'-bipyridinium)cobalt(III) ion, electron adduct								
6.66.1 Pentaammine(1-methyl-4,4'-bipyridinium)cobalt(III) ion								
	$[\text{Co}(\text{NH}_3)_5(\text{mbpy})]^{*3+} + \text{Co}(\text{NH}_3)_5(\text{mbpy})^{4+} \rightarrow \text{Co}(\text{NH}_3)_5(\text{mbpy})^{4+} + \text{Co}(\text{NH}_3)_5(\text{mbpy})^{3+}$	5.4×10^7	7.2	25	p.r.		D.k. at 600 nm in N_2O -satd. soln. contg. (5-200) $\times 10^{-5}$ mol L ⁻¹ $\text{Co}(\text{NH}_3)_5(\text{mbpy})^{4+}$ and 0.1 mol L ⁻¹ formate.	89A115
6.66.2 Pentaammine(1-methyl-4,4'-bipyridinium)cobalt(III) ion, electron adduct								
	$[\text{Co}(\text{NH}_3)_5(\text{mbpy})]^{*3+} + [\text{Co}(\text{NH}_3)_5(\text{mbpy})]^{*3+} \rightarrow \text{Co}(\text{NH}_3)_5(\text{mbpy})^{4+} + [\text{Co}(\text{NH}_3)_5(\text{mbpy})]^{*2+}$	1.2×10^8	7.2	25	p.r.		D.k. at 600 nm in N_2O -satd. soln. contg. (5-200) $\times 10^{-5}$ mol L ⁻¹ $\text{Co}(\text{NH}_3)_5(\text{mbpy})^{4+}$ and 0.1 mol L ⁻¹ formate.	89A115

TABLE 6. Rate constants for cobalt transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
6.67 Pentaammine(4-nitrobenzoato)cobalt(III) ion, electron adduct								
6.67.1 Oxygen								
	$[\text{Co}(\text{NH}_3)_5\text{O}_2\text{CC}_6\text{H}_4\text{-NO}_2]^{*+} + \text{O}_2 \rightarrow$	2.2×10^9		6.9		p.r.	D.k. in soln. contg. 0.001 mol L ⁻¹ pentaammine(4-nitrobenzoato)cobalt(III) ion, 0.1 mol L ⁻¹ formate, 1×10^{-4} mol L ⁻¹ O ₂ and 0.023 mol L ⁻¹ N ₂ O.	771027
6.67.2 2-Methyl-1,4-naphthoquinone								
	$[\text{Co}(\text{NH}_3)_5\text{O}_2\text{CC}_6\text{H}_4\text{-NO}_2]^{*+} + 2\text{-CH}_3\text{NQ} \rightarrow \text{Co}(\text{NH}_3)_5\text{O}_2\text{CC}_6\text{H}_4\text{-NO}_2^{2+} + [\text{2-CH}_3\text{NQ}]^{*-}$	1.6×10^9		6.7		p.r.	D.k. and p.b.k. in soln. contg. 0.002 mol L ⁻¹ pentaammine(4-nitrobenzoato)cobalt(III) ion, 0.1 mol L ⁻¹ formate, 5×10^{-5} mol L ⁻¹ menaquinone and 0.025 mol L ⁻¹ N ₂ O.	771027
6.68 Pentaammine[4-(aminocarbonyl)-1-(carboxymethyl)pyridinio]cobalt(III) radical anion								
6.68.1 Pentaammine[4-(aminocarbonyl)-1-(carboxymethyl)pyridinio]cobalt(III) ion								
	$[\text{Co}(\text{NH}_3)_5(\text{O}_2\text{CCH}_2\text{py-4-CONH}_2)]^{2+} + \text{Co}(\text{NH}_3)_5(\text{O}_2\text{CCH}_2\text{py-4-CONH}_2)^{3+} \rightarrow$	1.5×10^9	4.5-	22	p.r.	D.k. in N ₂ O-satd. soln. contg. (5-30) $\times 10^{-5}$ mol L ⁻¹ CoL ³⁺ and 0.1 mol L ⁻¹ 2-PrOH or formate.	83B029	
	$\text{Co}(\text{NH}_3)_5(\text{O}_2\text{CCH}_2\text{py-4-CONH}_2)^{3+} + \text{Co}(\text{NH}_3)_5(\text{O}_2\text{CCH}_2\text{py-4-CONH}_2)^{2+}$		5.5					
6.69 Pentaammine[4-(aminocarbonyl)-1-(carboxymethyl)pyridinio]cobalt(III) radical, protonated								
6.69.1 Pentaammine[4-(aminocarbonyl)-1-(carboxymethyl)pyridinio]cobalt(III) ion								
	$[\text{Co}(\text{NH}_3)_5(\text{HO}_2\text{CCH}_2\text{py-4-CONH}_2)]^{3+} + \text{Co}(\text{NH}_3)_5(\text{O}_2\text{CCH}_2\text{py-4-CONH}_2)^{3+} \rightarrow$	1.6×10^8	1	22	p.r.	D.k. in N ₂ O-satd. soln. contg. (5-30) $\times 10^{-5}$ mol L ⁻¹ CoL ³⁺ and 0.1 mol L ⁻¹ 2-PrOH or formate.	83B029	
	$\text{Co}(\text{NH}_3)_5(\text{O}_2\text{CCH}_2\text{py-4-CONH}_2)^{3+} + \text{Co}(\text{NH}_3)_5(\text{O}_2\text{CCH}_2\text{py-4-CONH}_2)^{2+} + \text{H}^+$							
6.70 Pentaammine[4-(aminocarbonyl)-1-(1-carboxyethyl)pyridinio]cobalt(III) radical anion								
6.70.1 Pentaammine[4-(aminocarbonyl)-1-(1-carboxyethyl)pyridinio]cobalt(III) ion								
	$[\text{Co}(\text{NH}_3)_5(\text{O}_2\text{CCH}(\text{CH}_3)\text{py-4-CONH}_2)]^{2+} + \text{Co}(\text{NH}_3)_5(\text{O}_2\text{CCH}(\text{CH}_3)\text{py-4-CONH}_2)^{3+} \rightarrow$	1.4×10^9	4.5-	22	p.r.	D.k. in N ₂ O-satd. soln. contg. (5-30) $\times 10^{-5}$ mol L ⁻¹ CoL ³⁺ and 0.1 mol L ⁻¹ 2-PrOH or formate.	83B029	
	$\text{Co}(\text{NH}_3)_5(\text{O}_2\text{CCH}(\text{CH}_3)\text{py-4-CONH}_2)^{3+} + \text{Co}(\text{NH}_3)_5(\text{O}_2\text{CCH}(\text{CH}_3)\text{py-4-CONH}_2)^{2+}$		5.5					
6.71 Pentaammine[4-(aminocarbonyl)-1-(1-carboxyethyl)pyridinio]cobalt(III) radical, protonated								
6.71.1 Pentaammine[4-(aminocarbonyl)-1-(1-carboxyethyl)pyridinio]cobalt(III) ion								
	$[\text{Co}(\text{NH}_3)_5(\text{HO}_2\text{CCH}(\text{CH}_3)\text{py-4-CONH}_2)]^{3+} + \text{Co}(\text{NH}_3)_5(\text{O}_2\text{CCH}(\text{CH}_3)\text{py-4-CONH}_2)^{3+} \rightarrow$	1.5×10^8	1	22	p.r.	D.k. in N ₂ O-satd. soln. contg. (5-30) $\times 10^{-5}$ mol L ⁻¹ CoL ³⁺ and 0.1 mol L ⁻¹ 2-PrOH or formate.	83B029	
	$\text{Co}(\text{NH}_3)_5(\text{O}_2\text{CCH}(\text{CH}_3)\text{py-4-CONH}_2)^{3+} + \text{Co}(\text{NH}_3)_5(\text{O}_2\text{CCH}(\text{CH}_3)\text{py-4-CONH}_2)^{2+} + \text{H}^+$							
6.72 Pentaammine[4-(aminocarbonyl)-1-(1-carboxypropyl)pyridinio]cobalt(III) radical anion								
6.72.1 Pentaammine[4-(aminocarbonyl)-1-(1-carboxypropyl)pyridinio]cobalt(III) ion								
	$[\text{Co}(\text{NH}_3)_5(\text{O}_2\text{C}(\text{CH}_2)_3\text{py-4-CONH}_2)]^{2+} + \text{Co}(\text{NH}_3)_5(\text{O}_2\text{C}(\text{CH}_2)_3\text{py-4-CONH}_2)^{3+} \rightarrow$	1.0×10^8	4.5-	22	p.r.	D.k. in N ₂ O-satd. soln. contg. (5-30) $\times 10^{-5}$ mol L ⁻¹ CoL ³⁺ and 0.1 mol L ⁻¹ 2-PrOH or formate.	83B029	
	$\text{Co}(\text{NH}_3)_5(\text{O}_2\text{C}(\text{CH}_2)_3\text{py-4-CONH}_2)^{3+} + \text{Co}(\text{NH}_3)_5(\text{O}_2\text{C}(\text{CH}_2)_3\text{py-4-CONH}_2)^{2+}$		5.5					
6.73 Pentaammine[4-(aminocarbonyl)-1-(1-carboxypropyl)pyridinio]cobalt(III) radical, protonated								
6.73.1 Pentaammine[4-(aminocarbonyl)-1-(1-carboxypropyl)pyridinio]cobalt(III) ion								
	$[\text{Co}(\text{NH}_3)_5(\text{HO}_2\text{C}(\text{CH}_2)_3\text{py-4-CONH}_2)]^{3+} + \text{Co}(\text{NH}_3)_5(\text{O}_2\text{C}(\text{CH}_2)_3\text{py-4-CONH}_2)^{3+} \rightarrow$	3.0×10^7	1	22	p.r.	D.k. in N ₂ O-satd. soln. contg. (5-30) $\times 10^{-5}$ mol L ⁻¹ CoL ³⁺ and 0.1 mol L ⁻¹ 2-PrOH or formate.	83B029	
	$\text{Co}(\text{NH}_3)_5(\text{O}_2\text{C}(\text{CH}_2)_3\text{py-4-CONH}_2)^{3+} + \text{Co}(\text{NH}_3)_5(\text{O}_2\text{C}(\text{CH}_2)_3\text{py-4-CONH}_2)^{2+} + \text{H}^+$							

TABLE 6. Rate constants for cobalt transients — Continued

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t(\text{°C})$	Method	Comment	Ref.
6.74 3,10,17,24-Tetrasulfophthalocyaninecobaltate(III) radical anion (reduced ligand)								
6.74.1 Oxygen	$[\text{Co}(\text{tspc})]^{4-} + \text{O}_2 \rightarrow$	1.7×10^5	1-3			f.p.	D.k. at 520 nm in soln. contg. $[\text{Co}(\text{tspc})]_2^{6-}$, 4.8 and 16×10^{-4} mol L^{-1} O_2 and 0.001-0.1 mol L^{-1} HClO_4 .	79A090
6.75 3,10,17,24-Tetrasulfophthalocyaninecobaltate(III) radical anion (oxidized ligand)								
6.75.1 2-Propanol	$[\text{Co}(\text{tspc})]^{2-} + 2\text{-PrOH} \rightarrow$	2.6×10^3	1			f.p.	D.k. at 480 nm in soln. contg. $[\text{Co}(\text{tspc})]_2^{6-}$, 0.1-0.6 mol L^{-1} 2-PrOH and 0.1 mol L^{-1} HClO_4 .	79A090
6.76 Dibromo(iminodiacetato)cobaltate(III) ion								
6.76.1 First-order reaction	$\text{CoIDA}Br_2^- \rightarrow \text{CoIDA}(\text{Br}) + \text{Br}^-$	$9.5 \times 10^3 \text{ s}^{-1}$	7			p.r.	P.b.k. at 270 nm in N_2O -satd. soln. contg. 0.1 mol L^{-1} NaBr , CoIDA and 0.001 mol L^{-1} phosphate.	84A284
6.77 Bromo(iminodiacetato)cobalt(III)								
6.77.1 First-order reaction	$\text{CoIDA}(\text{Br}) \rightarrow \text{CoIDA}^+ + \text{Br}^-$	$5.4 \times 10^2 \text{ s}^{-1}$	7			p.r.	D.k. at 270 nm in N_2O -satd. soln. contg. 0.1 mol L^{-1} NaBr , CoIDA and 0.001 mol L^{-1} phosphate.	84A284
6.78 Hydroxy(iminodiacetato)cobalt(III)								
6.78.1 First-order reaction	$\text{CoIDA}(\text{OH}) \rightarrow \text{CoIDA}^+ + \text{OH}^-$	$1.2 \times 10^4 \text{ s}^{-1}$	7			p.r.	D.k. in N_2O -satd. soln. contg. CoIDA and 0.001 mol L^{-1} phosphate.	84A284
6.79 Ethylenediaminetetraacetatocobaltate(III) ion, superoxide adduct								
6.79.1 Ethylenediaminetetraacetatocobaltate(III) ion, superoxide adduct	$\text{CoEDTA}(\text{O}_2)^{2-} + \text{CoEDTA}(\text{O}_2)^{2-} + 2\text{H}_2\text{O} \rightarrow \text{O}_2 + \text{H}_2\text{O}_2 + 2\text{OH}^- + 2\text{CoEDTA}^-$	3.4×10^2	9			p.r.	D.k. at 330 nm in O_2 -satd. soln. contg. 0.1 mol L^{-1} formate, 5×10^{-5} mol L^{-1} CoEDTA ⁻ and 0.01 mol L^{-1} borate.	84A249
6.80 Hydrido-<i>N</i>-rac-5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecobalt(III) ion								
6.80.1 Carbon dioxide radical anion	$N\text{-rac-Co}(4,11\text{-dieneN}_4\text{H})^{2+} + \text{CO}_2^{\cdot-} \rightarrow$	6×10^9		25		p.r.		91A513
6.81 Hydrido-<i>prim-N</i>-rac-5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecobalt(III) ion								
6.81.1 2-Hydroxy-2,2-dimethylethyl	$\text{prim-N-rac-Co}(4,11\text{-dieneN}_4\text{H})^{2+} + \text{CH}_2\text{C}(\text{CH}_3)_2\text{OH} \rightarrow \text{tert-BuOH} + N\text{-rac-Co}(4,11\text{-dieneN}_4)^{2+}$	2×10^8		25		p.r.	Estd. from d.k. in soln. contg. 0.5 mol L^{-1} <i>tert</i> -BuOH and H_2PO_4^- .	91A513
6.82 Hydroxymethyl(5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene)cobalt(III) ion								
6.82.1 First-order reaction	$\text{HOCH}_2\text{Co}(4,11\text{-dieneN}_4)^{2+} \rightarrow N\text{-rac-Co}(4,11\text{-dieneN}_4)^{2+} + \text{HCHO} + \text{H}^+$	0.1 s^{-1}	1-6			p.r.	D.k. in N_2O -satd. soln. contg. $(1\text{-}10) \times 10^{-4}$ mol L^{-1} $\text{Co}(4,11\text{-dieneN}_4)^{2+}$ and 1 mol L^{-1} MeOH.	78A200

TABLE 6. Rate constants for cobalt transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>t</i>	<i>t</i> (°C)	Method	Comment	Ref.	
6.83 1-Hydroxyethyl(5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene)cobalt(III) ion									
6.83.1 First-order reaction									
	$\text{HOCH}(\text{CH}_3)\text{Co}(4,11\text{-dieneN}_4)^{2+} \rightarrow$	$\sim 2 \times 10^3 \text{ s}^{-1}$ 100 s^{-1}		1 7		p.r.	D.k. in N ₂ O-satd. soln. contg. (1-10) × 10 ⁻⁴ mol L ⁻¹ Co(4,11-dieneN ₄) ²⁺ and 1 mol L ⁻¹ EtOH.	78A200	
6.84 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene(2,2,2-trifluoro-1-hydroxyethyl)cobalt(III) ion									
6.84.1 First-order reaction									
	$\text{HOCH}(\text{CF}_3)\text{Co}(4,11\text{-dieneN}_4)^{2+} \rightarrow$	$6 \times 10^{-2} \text{ s}^{-1}$		6		p.r.	D.k. in N ₂ O-satd. soln. contg. (1-10) × 10 ⁻⁴ mol L ⁻¹ Co(4,11-dieneN ₄) ²⁺ and 1 mol L ⁻¹ CF ₃ CH ₂ OH.	78A200	
6.85 1,2-Dihydroxyethyl(5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene)cobalt(III) ion									
6.85.1 First-order reaction									
	$\text{HOCH}_2\text{CHOHCo}(4,11\text{-dieneN}_4)^{2+} \rightarrow$ $\text{HCOCH}_2\text{Co}(4,11\text{-dieneN}_4)^{2+} + \text{H}_2\text{O}$	15 s^{-1} 4 s^{-1}		3.5 5.0		p.r.	D.k. in N ₂ O-satd. soln. contg. (1-10) × 10 ⁻⁴ mol L ⁻¹ Co(4,11-dieneN ₄) ²⁺ and 1 mol L ⁻¹ ethylene glycol. Product decays to Co(4,11-dieneN ₄) ³⁺ + CH ₃ CHO with $k = 1.3 + 1.5 \times 10^5 [\text{H}^+]$ s ⁻¹ .	78A200	
6.86 1-Methylethyltetrakis(4-sulfonatophenyl)porphinatocobaltate(III) ion									
6.86.1 First-order reaction									
	$(\text{CH}_3)_2\text{CHCoTPPS}^{4-} \rightarrow \text{CoTPPS}^{5-} +$ $\text{CH}_3\text{CH}=\text{CH}_2 + \text{H}^+$	$\leq 3.3 \times 10^{-1} \text{ s}^{-1}$ 2.9 s^{-1}		8 13		21	p.r.	D.k. in N ₂ O-satd. soln. contg. 5 × 10 ⁻⁵ mol L ⁻¹ CoTPPS ⁴⁻ and 0.02 mol L ⁻¹ diisopropyl sulfoxide.	83A088
6.87 Hydroxymethyltetrakis(4-sulfonatophenyl)porphinatocobaltate(III) ion									
6.87.1 First-order reaction									
	$\text{HOCH}_2\text{CoTPPS}^{4-} \rightarrow \text{CoTPPS}^{5-} + \text{HCHO} +$ H^+	$3.6 \times 10^2 \text{ s}^{-1}$		8		21	p.r.	D.k. at 565 nm and p.b.k. at 450 and 490 nm in N ₂ O-satd. soln. contg. 5 × 10 ⁻⁵ mol L ⁻¹ CoTPPS ⁴⁻ and 1.5 mol L ⁻¹ MeOH.	83A088
6.88 1-Hydroxy-1-methylethyltetrakis(4-sulfonatophenyl)porphinatocobaltate(III) ion									
6.88.1 First-order reaction									
	$\text{HO}(\text{CH}_3)_2\text{CCoTPPS}^{4-} \rightarrow \text{CoTPPS}^{5-} +$ $\text{CH}_3\text{COCH}_3 + \text{H}^+$	$6.2 \times 10^3 \text{ s}^{-1}$		8		21	p.r.	D.k. at 555 nm and p.b.k. at 450 and 515 nm in N ₂ O-satd. soln. contg. 5 × 10 ⁻⁵ mol L ⁻¹ CoTPPS ⁴⁻ and 1.5 mol L ⁻¹ 2-PrOH.	83A088
6.89 (Methyl)-3,10,17,24-tetrasulfophthalocyaninecobaltate(III) ion									
6.89.1 Water									
	$\text{CH}_3\text{Co}(\text{tspc})^{4-} + \text{H}_2\text{O} \rightarrow \text{Co}(\text{tspc})^{3-} + \text{CH}_4 +$ 3.0 s^{-1} OH^-			6.1			p.r.	D.k. at 450 nm in N ₂ O-satd. soln. contg. 0.1 mol L ⁻¹ DMSO and 2 × 10 ⁻⁵ mol L ⁻¹ Co(tspc) ⁴⁻ . Reaction preceded by first-order process, $k = 2.5 \times 10^3 \text{ s}^{-1}$, suggested to represent radical migration from ligand to metal center.	89A150

TABLE 6. Rate constants for cobalt transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
6.90 (2-Hydroxy-2,2-dimethylethyl)-3,10,17,24-tetrasulfophthalocyaninecobaltate(III) ion								
6.90.1 First-order reaction								
	$\text{HOC(CH}_3)_2\text{CH}_2\text{Co(tspc)}^{4-} \rightarrow (\text{CH}_3)_2\text{C=CH}_2\text{Co(tspc)}^{3-} + \text{OH}^-$	15 s ⁻¹		6.1		p.r.	D.k. in N ₂ O-satd. soln. contg. <i>tert</i> -BuOH and Co(tspc) ⁴⁻ . Reaction preceded by first-order process, <i>k</i> = 2 × 10 ³ s ⁻¹ , suggested to represent radical migration from ligand to metal center. Reaction followed by first-order process, <i>k</i> = 4 s ⁻¹ , suggested to represent formation of Co(tspc) ³⁻ and (CH ₃) ₂ C=CH ₂ .	89A150
6.91 (2-Hydroxy-1-methylpropyl)-3,10,17,24-tetrasulfophthalocyaninecobaltate(III) ion								
6.91.1 Water								
	$\text{CH}_3\text{CHOHCH(CH}_3)\text{Co(tspc)}^{4-} + \text{H}_2\text{O} \rightarrow \text{Co(tspc)}^{3-} + \text{OH}^- + \text{CH}_3\text{CH=CHCH}_3$	6 s ⁻¹		6.1		p.r.	D.k. in N ₂ O-satd. soln. contg. 2-butene and Co(tspc) ⁴⁻ . Reaction preceded by first-order process, <i>k</i> = 2.4 × 10 ³ s ⁻¹ , suggested to represent radical migration from ligand to metal center.	89A150
6.92 (2-Hydroxyethyl)-3,10,17,24-tetrasulfophthalocyaninecobaltate(III) ion								
6.92.1 First-order reaction								
	$\text{HOCH}_2\text{CH}_2\text{Co(tspc)}^{4-} \rightarrow \text{Co(tspc)}^{3-} + \text{OH}^- + \text{H}_2\text{C=CH}_2$	5 s ⁻¹		6.1		p.r.	D.k. in N ₂ O-satd. soln. contg. ethylene and Co(tspc) ⁴⁻ . Reaction preceded by first-order process, <i>k</i> = 1.2 × 10 ³ s ⁻¹ , suggested to represent radical migration from ligand to metal center.	89A150
6.93 (2-Hydroxy-1-methylethyl)-3,10,17,24-tetrasulfophthalocyaninecobaltate(III) ion								
6.93.1 First-order reaction								
	$\text{HOCH}_2\text{CH}(\text{CH}_3)\text{Co(tspc)}^{4-} \rightarrow \text{Co(tspc)}^{3-} + \text{OH}^- + \text{CH}_3\text{CH=CH}_2$	8 s ⁻¹		6.1		p.r.	D.k. in N ₂ O-satd. soln. contg. 2-butene and Co(tspc) ⁴⁻ . Reaction preceded by first-order process, <i>k</i> = 1.0 × 10 ³ s ⁻¹ , suggested to represent radical migration from ligand to metal center.	89A150
6.94 Bromocob(III)alamin								
6.94.1 Water								
	$\text{B12-Br} + \text{H}_2\text{O} \rightarrow \text{B12a} + \text{Br}^-$	$6.4 \times 10^2 \text{ s}^{-1}$	-4.5	0.01-0.11	22	p.r.	D.k. at 365 or 380 nm in N ₂ O-satd. soln. contg. cob(II)alamin and 0.01-0.11 mol L ⁻¹ bromide ion. Reaction preceded by first-order process, <i>k</i> = ~1 × 10 ⁴ s ⁻¹ , suggested to represent loss of Br ⁻ from initially formed dibromine adduct.	79A046

TABLE 6. Rate constants for cobalt transients — Continued

No.	Reaction	k (L mol $^{-1}$ s $^{-1}$)	pH	I	t (°C)	Method	Comment	Ref.
6.95 Pentaammine(pyridine)cobalt(III) ion, OH adduct								
6.95.1 First-order reaction								
	* $[\text{Co}(\text{NH}_3)_5\text{pyOH}]^{3+}$	8.5×10^3 s $^{-1}$	2.9-7.2			p.r.	D.k. at 330 nm in N ₂ O-satd. soln. contg. Co(NH ₃) ₅ py ³⁺ ; suggested to represent ligand modification. Followed by another process which is second-order at pH 3 and pH 9 ($k = 1.8 \times 10^5$ and 1.9×10^7 L mol $^{-1}$ s $^{-1}$, respectively) and first-order but pH-dependent between pH 5.2 ($k = 6.0$ s $^{-1}$) and pH 7.8 ($k = 125$ s $^{-1}$); latter process suggested to represent disproportionation of coordinated radical in competition with intramolecular electron transfer ($k = 2.3 \times 10^{-2}$ s $^{-1}$ at pH 3 and 11 s $^{-1}$ at pH 7) or deprotonation by OH ⁻ of coordinated radical ($k = 1.8 \times 10^8$ L mol $^{-1}$ s $^{-1}$).	79A213
							*For different observations concerning the decay of [Co(NH ₃) ₅ pyOH] ³⁺ see the following entry.	
6.95.2 Pentaammine(pyridine)cobalt(III) ion, OH adduct								
	* $[\text{Co}(\text{NH}_3)_5\text{pyOH}]^{3+} + [\text{Co}(\text{NH}_3)_5\text{pyOH}]^{3+}$	6.5×10^8	5.9	22	p.r.	D.k. in N ₂ O-satd. soln. contg. (1-20) × 10^{-4} mol L $^{-1}$ Co(NH ₃) ₅ py ³⁺ ; followed by two first-order processes, $k = 40$ and 0.3 s $^{-1}$, respectively.	76A265	
							*For different observations concerning the decay of [Co(NH ₃) ₅ pyOH] ³⁺ see the preceding entry.	
6.95.3 Oxygen								
	[Co(NH ₃) ₅ pyOH] ³⁺ + O ₂ →	4.4×10^8	5.2			p.r.	D.k. at 330 nm in N ₂ O-satd. soln. contg. Co(NH ₃) ₅ py ³⁺ .	79A213
6.96 Pentaammine(nicotinamide)cobalt(III) ion, OH adduct								
6.96.1 Pentaammine(nicotinamide)cobalt(III) ion, OH adduct								
	* $[\text{Co}(\text{NH}_3)_5\text{naOH}]^{3+} + [\text{Co}(\text{NH}_3)_5\text{naOH}]^{3+}$	1.5×10^9	5.9	22	p.r.	D.k. in N ₂ O-satd. soln. contg. (1-20) × 10^{-4} mol L $^{-1}$ Co(NH ₃) ₅ na ³⁺ .	76A265	
→								
6.97 Pentaammine(isonicotinamide)cobalt(III) ion, OH adduct								
6.97.1 Pentaammine(isonicotinamide)cobalt(III) ion, OH adduct								
	* $[\text{Co}(\text{NH}_3)_5\text{isnOH}]^{3+} + [\text{Co}(\text{NH}_3)_5\text{isnOH}]^{3+}$	3.0×10^9	5.9	22	p.r.	D.k. in N ₂ O-satd. soln. contg. (1-20) × 10^{-4} mol L $^{-1}$ Co(NH ₃) ₅ isn ³⁺ .	76A265	
	→							
6.98 Tris(2,2'-bipyridine)cobalt(III) ion, OH adduct								
6.98.1 Ferricyanide ion								
	* $[\text{Co}(\text{bpy})_2(\text{bpyOH})]^{3+} + \text{Fe}(\text{CN})_6^{3-}$	2.1×10^8	~6			p.r.	D.k. at 370-440 nm in N ₂ O-satd. soln. contg. (1-2) × 10^{-4} mol L $^{-1}$ Co(bpy) ₃ ³⁺ .	90A015
→								
6.98.2 Oxygen								
	* $[\text{Co}(\text{bpy})_2(\text{bpyOH})]^{3+} + \text{O}_2$	5.5×10^5	~6			p.r.	D.k. at 375 and 425 nm in N ₂ O-satd. soln. contg. 6.0×10^{-4} mol L $^{-1}$ Co(bpy) ₃ ³⁺ .	90A015

TABLE 6. Rate constants for cobalt transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
6.99 Cobalt(III) ion								
6.99.1 Thionine semiquinone, conjugate monoacid								
	$\text{Co}^{3+} + [\text{ThH}]^{*+} \rightarrow \text{Co}^{2+} + \text{Th}^+ + \text{H}^+$	3.0×10^9		2.5	0.2	f.p./oq	D.k. of semithionine in soln. contg. Co^{2+} and thionine (OQ).	777315
6.100 Chlorocobalt(III) ion								
6.100.1 2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraenecobalt(II) ion								
	$\text{CoCl}^{2+} + \text{Co}(\text{Me}_4\text{tetraeneN}_4)^{2+} \rightarrow \text{Co}^{2+} + \text{Co}(\text{Me}_4\text{tetraeneN}_4)\text{Cl}^{2+}$	1.5×10^7	0		25	f.p.	D.k. at 540 nm in deaerated soln.	79A016
6.100.2 <i>N</i>-rac-5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecobalt(II) ion								
	$\text{CoCl}^{2+} + \text{N-rac-Co}(4,11\text{-dieneN}_4)^{2+} \rightarrow \text{Co}^{2+} + \text{Co}(4,11\text{-dicncN}_4)\text{Cl}^{2+}$	1.6×10^6	2	0.1	25	f.p.	D.k. at 340 nm in deaerated soln.	79A016
6.100.3 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecane copper(II) ion								
	$\text{CoCl}^{2+} + \text{Cu}(\text{aneN}_4)^{2+} \rightarrow \text{Co}^{2+} + \text{Cu}(\text{aneN}_4)\text{Cl}^{2+}$	4.5×10^3	0		25	f.p.	P.b.k. at 344 nm in soln. contg. 5×10^{-5} mol L ⁻¹ $\text{Co}(\text{NH}_3)_5\text{Cl}^{2+}$, 0.01-0.9 mol L ⁻¹ Cl^- and Co^{2+} .	83A271
6.100.4 Iron(II) ion								
	$\text{CoCl}^{2+} + \text{Fe}^{2+} \rightarrow \text{Co}^{2+} + \text{FeCl}^{2+}$	1.0×10^4	0		25	f.p.	Spectral changes in soln. contg. 5×10^{-5} mol L ⁻¹ $\text{Co}(\text{NH}_3)_5\text{Cl}^{2+}$, 0.5-0.9 mol L ⁻¹ Cl^- and Co^{2+} .	83A271
6.100.5 5,7-Dimethyl-1,4,8,11-tetraazacyclotetradeca-4,7-dienenickel(II) ion								
	$\text{CoCl}^{2+} + \text{Ni}(\text{Me}_2\text{-4,7-dieneN}_4)^{2+} \rightarrow \text{Co}^{2+} + \text{Ni}(\text{Me}_2\text{-4,7-dieneN}_4)\text{Cl}^{2+}$	1.2×10^7	0		25	f.p.	P.b.k. at 344 nm in soln. contg. 5×10^{-5} mol L ⁻¹ $\text{Co}(\text{NH}_3)_5\text{Cl}^{2+}$, 0.01-0.9 mol L ⁻¹ Cl^- and Co^{2+} .	83A013
6.100.6 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecanenickel(II) ion								
	$\text{CoCl}^{2+} + \text{Ni}(\text{aneN}_4)^{2+} \rightarrow \text{Co}^{2+} + \text{Ni}(\text{aneN}_4)\text{Cl}^{2+}$	5.3×10^7	0		25	f.p.	P.b.k. at 344 nm in soln. contg. 5×10^{-5} mol L ⁻¹ $\text{Co}(\text{NH}_3)_5\text{Cl}^{2+}$, 0.01-0.9 mol L ⁻¹ Cl^- and Co^{2+} .	83A271
6.100.7 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienenickel(II) ion								
	$\text{CoCl}^{2+} + \text{Ni}(4,11\text{-dieneN}_4)^{2+} \rightarrow \text{Co}^{2+} + \text{Ni}(4,11\text{-dieneN}_4)\text{Cl}^{2+}$	7.9×10^5	0		25	f.p.	P.b.k. at 344 nm in soln. contg. 5×10^{-5} mol L ⁻¹ $\text{Co}(\text{NH}_3)_5\text{Cl}^{2+}$, 0.01-0.9 mol L ⁻¹ Cl^- and Co^{2+} .	83A271
6.100.8 2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraenenicke(II) ion								
	$\text{CoCl}^{2+} + \text{Ni}(\text{Me}_4\text{tetraeneN}_4)^{2+} \rightarrow \text{Co}^{2+} + \text{Ni}(\text{Me}_4\text{tetraeneN}_4)\text{Cl}^{2+}$	1.6×10^5	0		25	f.p.	P.b.k. at 344 nm in soln. contg. 5×10^{-5} mol L ⁻¹ $\text{Co}(\text{NH}_3)_5\text{Cl}^{2+}$, 0.01-0.9 mol L ⁻¹ Cl^- and Co^{2+} .	83A271
6.101 Aqua(methyl)nitroltriacetatocobaltate(III) ion								
6.101.1 Water								
	$\text{CH}_3\text{CoNTA}(\text{H}_2\text{O})^- + \text{H}_2\text{O} \rightarrow \cdot\text{CH}_3 + \text{CoNTA}(\text{H}_2\text{O})_2^-$	60 s^{-1}		6.2-6.5		p.r.	D.k. at 310 nm in soln. contg. 0.1 mol L ⁻¹ DMSO, $(0.5-4) \times 10^{-3}$ mol L ⁻¹ CoNTA^- , 5×10^{-5} mol L ⁻¹ O_2 or $(0.1-1) \times 10^{-4}$ mol L ⁻¹ O_2 and 0.001 mol L ⁻¹ CoNTA^- . <i>k</i> obtained as intercept from plot of k_{obs}^{-1} vs. $[\text{O}_2]^{-1}$ or $[\text{CoNTA}^-]$; $k_t = 1.6 \times 10^8 \text{ L mol}^{-1} \text{ s}^{-1}$ [88A343].	89A204
6.101.2 Methyl								
	$\text{CH}_3\text{CoNTA}(\text{H}_2\text{O})^- + \cdot\text{CH}_3 + \text{H}_2\text{O} \rightarrow \text{CoNTA}(\text{H}_2\text{O})_2^- + \text{C}_2\text{H}_6$	3.8×10^7				p.r.	D.k. in N_2O -satd. soln. contg. CoSO_4 , NTA and DMSO.	89A204 88A343

TABLE 6. Rate constants for cobalt transients — Continued

Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
6.102 Aqua(hydroxymethyl)nitrilotriacetatocobaltate(III) ion							
6.102.1 Water							
$\text{HOCH}_2\text{CoNTA}(\text{H}_2\text{O})^- + \text{H}_2\text{O} \rightarrow \cdot\text{CH}_2\text{OH} + \text{CoNTA}(\text{H}_2\text{O})_2^-$	$6.9 \times 10^3 \text{ s}^{-1}$ $3.9 \times 10^4 \text{ s}^{-1}$ $5.5 \times 10^5 \text{ s}^{-1}$	4-7		7 25 55	p.r.	D.k. at 260 nm in N ₂ O-satd. soln. contg. (1-50) × 10 ⁻⁴ mol L ⁻¹ CoNTA ⁻ and 0.2-1 mol L ⁻¹ MeOH; pK _a = 4.7. Δ <i>H</i> _‡ = 66.9 kJ mol ⁻¹ , Δ <i>S</i> _‡ = 68.2 J K ⁻¹ mol ⁻¹ . <i>k</i> _r = 9.7 × 10 ⁷ , 2.0 × 10 ⁸ and 4.1 × 10 ⁸ L mol ⁻¹ s ⁻¹ at 7, 25 and 55 °C respectively. Δ <i>H</i> _‡ = 20 kJ mol ⁻¹ , Δ <i>S</i> _‡ = -19.2 J K ⁻¹ mol ⁻¹ .	88A343
6.102.2 Hydroxymethyl							
$\text{HOCH}_2\text{CoNTA}(\text{H}_2\text{O})^- + \cdot\text{CH}_2\text{OH} + \text{H}_2\text{O} \rightarrow \text{CoNTA}(\text{H}_2\text{O})_2^- + \text{HOCH}_2\text{CH}_2\text{OH}$	5×10^8			25	p.r.	Calcd. from d.k. at 260 nm in N ₂ O-satd. soln. contg. (1-50) × 10 ⁻⁴ mol L ⁻¹ CoNTA ⁻ and 0.2-1 mol L ⁻¹ MeOH.	88A343
6.103 Aqua(1-hydroxyethyl)nitrilotriacetatocobaltate(III) ion							
6.103.1 1-Hydroxyethyl							
$\text{HOCH}(\text{CH}_3)\text{CoNTA}(\text{H}_2\text{O})^- + \text{CH}_3\dot{\text{C}}\text{HOH} + \text{H}_2\text{O} \rightarrow \text{CoNTA}(\text{H}_2\text{O})_2^- + \text{other products}$	3×10^8			25	p.r.	Calcd. from d.k. at 260 nm in N ₂ O-satd. soln. contg. (1-50) × 10 ⁻⁴ mol L ⁻¹ CoNTA ⁻ and 0.2-1 mol L ⁻¹ EtOH, CH ₃ CHO and butane-2,3-diol detected as products.	88A343
6.103.2 Water							
$\text{HOCH}(\text{CH}_3)\text{CoNTA}(\text{H}_2\text{O})^- + \text{H}_2\text{O} \rightarrow \text{CH}_3\dot{\text{C}}\text{HOH} + \text{CoNTA}(\text{H}_2\text{O})_2^-$	$1.0 \times 10^5 \text{ s}^{-1}$	4-7		25	p.r.	D.k. at 260 nm in N ₂ O-satd. soln. contg. (1-50) × 10 ⁻⁴ mol L ⁻¹ CoNTA ⁻ and 0.2-1 mol L ⁻¹ EtOH; pK _a = 3.9; <i>k</i> _r = 9.7 × 10 ⁷ L mol ⁻¹ s ⁻¹ .	88A343
6.104 Aqua(carboxymethyl)nitrilotriacetatocobaltate(III) ion							
6.104.1 First-order reaction							
$\text{O}_2\text{CCH}_2\text{CoNTA}(\text{H}_2\text{O})^{2-} \rightarrow$	$8.8 \times 10^2 \text{ s}^{-1}$			25	p.r.	D.k. in N ₂ O-satd. soln. contg. CoNTA ⁻ and acetate. Reaction suggested to represent an isomerization.	88A343
6.104.2 Water							
$\text{O}_2\text{CCH}_2\text{CoNTA}(\text{H}_2\text{O})^{2-} + \text{H}_2\text{O} \rightarrow \cdot\text{CH}_2\text{CO}_2^- + \text{CoNTA}(\text{H}_2\text{O})_2^-$	$\leq 1 \times 10^3 \text{ s}^{-1}$	4-7		25	p.r.	D.k. at 260 nm in N ₂ O-satd. soln. contg. (1-50) × 10 ⁻⁴ mol L ⁻¹ CoNTA ⁻ and 0.2-1 mol L ⁻¹ AcOH; <i>k</i> _r = 1.5 × 10 ⁷ L mol ⁻¹ s ⁻¹ .	88A343
6.105 Aqua(1-ethoxyethyl)nitrilotriacetatocobaltate(III) ion							
6.105.1 Water							
$\text{C}_2\text{H}_5\text{OCH}(\text{CH}_3)\text{CoNTA}(\text{H}_2\text{O})^- + \text{H}_2\text{O} \rightarrow \text{CH}_3\dot{\text{C}}\text{HOCH}_2\text{C}_2\text{H}_5 + \text{CoNTA}(\text{H}_2\text{O})_2^-$	$4.0 \times 10^5 \text{ s}^{-1}$	4-7		25	p.r.	D.k. at 260 nm in N ₂ O-satd. soln. contg. (1-50) × 10 ⁻⁴ mol L ⁻¹ CoNTA ⁻ and 0.2-1 mol L ⁻¹ Et ₂ O; <i>k</i> _r = 4.9 × 10 ⁷ L mol ⁻¹ s ⁻¹ .	88A343
6.106 Aqua(1-hydroxy-1-methylethyl)nitrilotriacetatocobaltate(III) ion							
6.106.1 Water							
$\text{HOCH}(\text{CH}_3)_2\text{CoNTA}(\text{H}_2\text{O})^- + \text{H}_2\text{O} \rightarrow (\text{CH}_3)_2\dot{\text{C}}\text{OH} + \text{CoNTA}(\text{H}_2\text{O})_2^-$	$3.7 \times 10^4 \text{ s}^{-1}$	4-7		25	p.r.	D.k. at 260 nm in N ₂ O-satd. soln. contg. (1-50) × 10 ⁻⁴ mol L ⁻¹ CoNTA ⁻ and 0.2-1 mol L ⁻¹ 2-PrOH; pK _a = 4.5; <i>k</i> _r = 2.3 × 10 ⁷ L mol ⁻¹ s ⁻¹ .	88A343

TABLE 6. Rate constants for cobalt transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
6.106 Aqua(1-hydroxy-1-methylethyl)nitrilotriacetatocobaltate(III) ion — Continued								
6.106.2 1-Hydroxy-1-methylethyl								
	HOC(CH ₃) ₂ CoNTA(H ₂ O) ⁻ + (CH ₃) ₂ COH → CoNTA(H ₂ O) ⁻ + other products	1.5 × 10 ⁷	6-8		25	p.r.	Calcd. from d.k. at 260 nm in N ₂ O-satd. soln. contg. (1.50) × 10 ⁻⁴ mol L ⁻¹ CoNTA ⁻ and 0.2-1 mol L ⁻¹ 2-ProOH; acetone detected as product.	88A343
6.107 Aqua(bromo)nitrilotriacetatocobaltate(III) ion								
6.107.1 Water								
	CoNTA(Br)(H ₂ O) ⁻ + H ₂ O → CoNTA(H ₂ O) ₂ ⁻	5.6 s ⁻¹ 610 s ⁻¹	4.9 10.4		25	p.r.	D.k. in N ₂ O-satd. soln. contg. CoNTA ⁻ and Br ⁻ .	88A343
6.108 Aqua(hydroxymethyl)[N-(2-hydroxyethyl)-N,N',N'-ethylenediaminetriacetato]cobaltate(III) ion								
6.108.1 First-order reaction								
	HOCH ₂ CoHEDTA(H ₂ O) ⁻ →	1.8 × 10 ⁻² s ⁻¹ 1.0 × 10 ⁻² s ⁻¹	4.1 10.3		25	p.r.	D.k.; pK _a = 9.0.	88A343
6.108.2 Water								
	HOCH ₂ CoHEDTA(H ₂ O) ⁻ + H ₂ O → *CH ₂ OH	≤ 60 s ⁻¹			25	p.r.	D.k.; k _r = 1.25 × 10 ⁷ L mol ⁻¹ s ⁻¹ .	88A343
6.109 O-Sulfito(tetraethylenepentamine)cobalt(III) ion								
6.109.1 First-order reaction								
	Co(tren)OSO ₂ ⁺ + H ⁺ → Co(tren)(OH) ²⁺ + SO ₂				25	f.p.	D.k. at 290 nm in soln. contg. 3.4 × 10 ⁻⁴ mol L ⁻¹ Co(tren)SO ₃ ⁺ and varied [HClO ₄]. Reaction also investigated as a function of [MeOH], [CH ₃ CN] and [DMSO].	88A405
6.110 Decaammine-μ-peroxidodicobalt(III) ion								
6.110.1 Tris(2,2'-bipyridine)ruthenium(III) ion								
	[Co(NH ₃) ₅] ₂ (O ₂) ⁴⁺ + Ru(bpy) ₃ ³⁺ → [Co(NH ₃) ₅] ₂ (O ₂) ⁵⁺ + Ru(bpy) ₃ ²⁺	1.3 × 10 ⁷	0			f.p./oq	P.b.k. at 450 nm in soln. contg. Ru(bpy) ₃ ²⁺ , [(NH ₃) ₅ Co] ₂ (O ₂) ⁵⁺ (OQ) and 1 mol L ⁻¹ HCl.	81A065
6.111 μ-Amido-μ-peroxidoctakisamminedicobalt(III) ion								
6.111.1 Tris(2,2'-bipyridine)ruthenium(III) ion								
	NH ₂ [Co(NH ₃) ₄] ₂ (O ₂) ³⁺ + Ru(bpy) ₃ ³⁺ → NH ₂ [Co(NH ₃) ₄] ₂ (O ₂) ⁴⁺ + Ru(bpy) ₃ ²⁺	3.4 × 10 ⁵	0			f.p./oq	P.b.k. at 450 nm in soln. contg. Ru(bpy) ₃ ²⁺ , NH ₂ [Co(NH ₃) ₄] ₂ (O ₂) ⁴⁺ (OQ) and 1 mol L ⁻¹ HCl.	81A065
6.112 μ-Amido-μ-peroxidotetrakis(ethylenediamine)dicobalt(III) ion								
6.112.1 Tris(2,2'-bipyridine)ruthenium(III) ion								
	NH ₂ [Co(en) ₂] ₂ (O ₂) ³⁺ + Ru(bpy) ₃ ³⁺ → NH ₂ [Co(en) ₂] ₂ (O ₂) ⁴⁺ + Ru(bpy) ₃ ²⁺	2.5 × 10 ⁶	0			f.p./oq	P.b.k. at 450 nm in soln. contg. Ru(bpy) ₃ ²⁺ , NH ₂ [Co(en) ₂] ₂ (O ₂) ⁴⁺ (OQ) and 1 mol L ⁻¹ HCl; k = 7.6 × 10 ⁵ L mol ⁻¹ s ⁻¹ detd. by s.f.	81A065
6.113 μ-Amido-μ-peroxidotetrakis(2,2'-bipyridine)dicobalt(III) ion								
6.113.1 Tris(2,2'-bipyridine)ruthenium(III) ion								
	NH ₂ [Co(bpy) ₂] ₂ (O ₂) ³⁺ + Ru(bpy) ₃ ³⁺ → NH ₂ [Co(bpy) ₂] ₂ (O ₂) ⁴⁺ + Ru(bpy) ₃ ²⁺	3.0 × 10 ⁸	0			f.p./oq	P.b.k. at 450 nm in soln. contg. Ru(bpy) ₃ ²⁺ , NH ₂ [Co(bpy) ₂] ₂ (O ₂) ⁴⁺ (OQ) and 1 mol L ⁻¹ HCl.	81A065

TABLE 6. Rate constants for cobalt transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
6.114 μ-Amido-μ-peroxidotetrakis(1,10-phenanthroline)dicobalt(III) ion								
6.114.1 Tris(2,2'-bipyridine)ruthenium(III) ion								
	$\text{NH}_2[\text{Co}(\text{phen})_2]_2(\text{O}_2)^{3+} + \text{Ru(bpy)}_3^{3+} \rightarrow \text{NH}_2[\text{Co}(\text{phen})_2]_2(\text{O}_2)^{4+} + \text{Ru(bpy)}_3^{2+}$	3.6×10^8	0			f.p./oq	P.b.k. at 450 nm in soln. contg. Ru(bpy) ₃ ²⁺ , NH ₂ [\text{Co}(\text{phen}) ₂] ₂ (O ₂) ⁴⁺ (OQ) and 1 mol L ⁻¹ HCl.	81A065
6.115 5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatocobaltate(III), radical cation								
6.115.1 5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatocobaltate(III), radical cation								
	$[\text{CoTPPS}]^{2-} + [\text{CoTPPS}]^{2-} \rightarrow$	2.1×10^9	7			p.r.	D.k. at 700 nm in N ₂ O-satd. soln. contg. 0.01 mol L ⁻¹ KBr.	86S115

TABLE 7. Rate constants for chromium transients

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t(\text{°C})$	Method	Comment	Ref.
7.1 Chromium(I) ion								
7.1.1 First-order reaction								
	$\text{Cr}^+ \rightarrow$	$\leq 5 \times 10^3 \text{ s}^{-1}$	3.0-4.3	22	p.r.	D.k. at 350 nm in Ar-satd. soln. contg. Cr(II). Reaction thought to be $\text{Cr}^+ + \text{H}_2\text{O}$ in competition with $\text{Cr}^+ + \text{H}_2\text{O}_2$. H_2 detected as product.	741142	
7.2 Chromium(II) ion								
7.2.1 Permanganate ion								
	$\text{Cr}^{2+} + \text{MnO}_4^- \rightarrow$	4×10^9		20	p.r.	D.k. at 545 nm in soln. contg. $10^{-5} \text{ mol L}^{-1} \text{ MnO}_4^-$ and $(0.2-1.9) \times 10^{-3} \text{ mol L}^{-1} \text{ Cr}^{3+}$.	650385	
7.2.2 Hydrogen peroxide								
	$\text{Cr}^{2+} + \text{H}_2\text{O}_2 \rightarrow \text{CrOH}^{2+} + \cdot\text{OH}$	7.1×10^4		1.0	25	f.p.	D.k. in soln. contg. $\geq 1 \times 10^{-4} \text{ mol L}^{-1} \text{ CrCHCl}_2^{2+}$ (or $\text{CrCH}_2\text{OCH}_3^{2+}$) and $(0.19-2.58) \times 10^{-3} \text{ mol L}^{-1} \text{ H}_2\text{O}_2$; s.f. experiments gave the same value.	83A047
7.2.3 Oxygen								
	$\text{Cr}^{2+} + \text{O}_2 \rightarrow \text{CrO}_2^{2+}$	1.6×10^8	2.6-4.3	0.1	25	p.r.	P.b.k. at 300 nm in soln. contg. $0.5 \text{ mol L}^{-1} \text{ tert-BuOH}$, (2 or 10) $\times 10^{-3} \text{ mol L}^{-1} \text{ Cr}^{3+}$ and $(2.6 \text{ or } 13) \times 10^{-4} \text{ mol L}^{-1} \text{ O}_2$.	761134 751063
		1.9×10^8		3.4	25	p.r.	C.k. with 1,4-benzoquinone in soln. contg. O_2 , $10^{-2} \text{ mol L}^{-1} \text{ Cr}^{3+}$ and $0.5 \text{ mol L}^{-1} \text{ tert-BuOH}$; assumed $k(\text{Cr}^{2+} + 1,4\text{-benzoquinone}) = 3.2 \times 10^8 \text{ L mol}^{-1} \text{ s}^{-1}$.	761134
		1.6×10^8		1-3		p.r.	P.b.k. at 290 nm in soln. contg. $(1.40) \times 10^{-3} \text{ mol L}^{-1} \text{ Cr}^{3+}$ and $(0.25-1.25) \times 10^{-3} \text{ mol L}^{-1} \text{ O}_2$.	751215
7.2.4 9,10-Anthraquinone-2,6-disulfonate ion								
	$\text{Cr}^{2+} + 2,6\text{-diSO}_3\text{AQ}^{2-} \rightarrow \text{Cr}^{3+} + [\text{2,6-diSO}_3\text{AQ}]^{3-}$	2.8×10^9		7.0		p.r.	P.b.k. in soln. contg. $\sim 1 \text{ mol L}^{-1} \text{ tert-BuOH}$, $5 \times 10^{-3} \text{ mol L}^{-1} \text{ Cr(ClO}_4)_3$, $5 \times 10^{-5} \text{ mol L}^{-1} 2,6\text{-diSO}_3\text{AQ}^{2-}$ and $\sim 1 \times 10^{-3} \text{ mol L}^{-1}$ phosphates.	751032
7.2.5 1,4-Benzquinone								
	$\text{Cr}^{2+} + \text{Q} \rightarrow \text{Cr}^{3+} + \text{Q}^\bullet$	* 3.2×10^8		3.4	0.1	25	P.b.k. at 410 nm in soln. contg. $0.5 \text{ mol L}^{-1} \text{ tert-BuOH}$, $10^{-2} \text{ mol L}^{-1} \text{ Cr}^{3+}$ and $(2.5-37.5) \times 10^{-5} \text{ mol L}^{-1} \text{ Q}$.	761134
		* 3.5×10^9		7.0		p.r.	P.b.k. in soln. contg. $\sim 1 \text{ mol L}^{-1} \text{ tert-BuOH}$, $5 \times 10^{-3} \text{ mol L}^{-1} \text{ Cr(ClO}_4)_3$, $5 \times 10^{-5} \text{ mol L}^{-1} \text{ Q}$ and $\sim 1 \times 10^{-3} \text{ mol L}^{-1}$ phosphates.	751032
							* Unexplained discrepancy in these data.	
7.2.6 Tetranitromethane								
	$\text{Cr}^{2+} + \text{C}(\text{NO}_2)_4 \rightarrow \text{Cr}^{3+} + \cdot\text{NO}_2 + \text{C}(\text{NO}_2)_3^-$	1.2×10^8		3.4	0.1	25	P.b.k. at 350 nm in deaerated soln. contg. $\sim 1 \text{ mol L}^{-1} \text{ tert-BuOH}$, $10^{-2} \text{ mol L}^{-1} \text{ Cr}^{3+}$ and $(3.18-18.6) \times 10^{-5} \text{ mol L}^{-1}$ tetranitromethane.	761134

TABLE 7. Rate constants for chromium transients — Continued

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t(\text{°C})$	Method	Comment	Ref.
7.3 <i>trans</i>-Diaqua-1,4,8,11-tetraazacyclotetradecanechromium(II) ion								
7.3.1 1,1'-Dimethyl-4,4'-bipyridinium	$\text{trans-Cr(cyclam)(H}_2\text{O)}_2^{2+} + \text{MV}^{2+} \rightarrow \text{trans-Cr(cyclam)(H}_2\text{O)}_2^{3+} + \text{MV}^{+}$	$4.5 \times 10^5 [\text{Cl}^-]$	1.3-3	0.05	25	f.p./rq	P.b.k. at 600 nm in soln. contg. <i>trans</i> -Cr(cyclam)(NH ₃) ₂ ³⁺ , MV ⁺ (RQ) and (1-50) × 10 ⁻³ mol L ⁻¹ H ⁺ . Reaction preceded by rapid aquation of Cr(cyclam)(NH ₃) ₂ ²⁺ . Rate proportional to [Cl ⁻].	90A428
7.3.2 Benzyl bromide	$\text{trans-Cr(cyclam)(H}_2\text{O)}_2^{2+} + \text{C}_6\text{H}_5\text{CH}_2\text{Br} \rightarrow \text{BrCr(cyclam)(H}_2\text{O)}_2^{2+} + \text{C}_6\text{H}_5\text{CH}_2 + \text{H}_2\text{O}$	9.2×10^3				f.p./rq	Soln. contg. <i>trans</i> -Cr(cyclam)(NH ₃) ₂ ³⁺ and MV ⁺ (RQ); monitored by reaction of benzyl radical with MV ⁺ . Reaction preceded by rapid aquation of Cr(cyclam)(NH ₃) ₂ ²⁺ .	90A428
7.3.3 <i>tert</i>-Butyl hydroperoxide	$\text{trans-Cr(cyclam)(H}_2\text{O)}_2^{2+} + (\text{CH}_3)_3\text{COOH} \rightarrow \text{trans-Cr(cyclam)(H}_2\text{O)}_2^{3+} + \cdot\text{CH}_3 + \text{CH}_3\text{COCH}_3 + \text{OH}^-$	1.5×10^5				f.p./rq	Soln. contg. <i>trans</i> -Cr(cyclam)(NH ₃) ₂ ³⁺ and MV ⁺ (RQ); monitored by reaction of methyl radical with MV ⁺ . Reaction preceded by rapid aquation of Cr(cyclam)(NH ₃) ₂ ²⁺ .	90A428
7.4 Tris(2,2'-bipyridine)chromium(II) ion								
7.4.1 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecanesilver(II) ion	$\text{Cr(bpy)}_3^{2+} + \text{Ag(aneN}_4)^{2+} \rightarrow \text{Cr(bpy)}_3^{3+} + \text{Ag(aneN}_4)^+$	1.3×10^8	4	0.03		p.r	N ₂ -sadt. soln. contg. alcohol as OH scavenger.	88A334
7.4.2 Tris(2,2'-bipyridine)silver(II) ion	$\text{Cr(bpy)}_3^{2+} + \text{Ag(bpy)}_3^{2+} \rightarrow \text{Cr(bpy)}_3^{3+} + \text{Ag(bpy)}_3^+$	3.7×10^8	4	0.1		p.r	N ₂ -sadt. soln. contg. alcohol as OH scavenger.	88A334
7.4.3 Tris(2,2'-bipyridine)cobalt(III) ion	$\text{Cr(bpy)}_3^{2+} + \text{Co(bpy)}_3^{3+} \rightarrow \text{Cr(bpy)}_3^{3+} + \text{Co(bpy)}_3^{2+}$	1.1×10^8	5.8	0.15	23	f.p./rq	D.k. at 560 nm in Ar-sadt. soln. contg. Cr(bpy) ₃ ³⁺ , EDTA (RQ) or C ₂ O ₄ ²⁻ (RQ) and Co(bpy) ₃ ³⁺ .	88A514
7.4.4 Tris(1,10-phenanthroline)cobalt(III) ion	$\text{Cr(bpy)}_3^{2+} + \text{Co(phen)}_3^{3+} \rightarrow \text{Cr(bpy)}_3^{3+} + \text{Co(phen)}_3^{2+}$	1.3×10^8	5.8	0.15	23	f.p./rq	D.k. at 560 nm in Ar-sadt. soln. contg. Cr(bpy) ₃ ³⁺ , EDTA (RQ) or C ₂ O ₄ ²⁻ (RQ) and Co(phen) ₃ ³⁺ .	88A514
7.4.5 1,4,8,11-Tetraazacyclotetradecanecobalt(III) ion	$\text{Cr(bpy)}_3^{2+} + \text{Co(cyclam)}^{3+} \rightarrow \text{Cr(bpy)}_3^{3+} + \text{Co(cyclam)}^{2+}$	4.4×10^7	-0		25	f.p./rq	D.k. in soln. contg. (0.6-8) × 10 ⁻⁴ mol L ⁻¹ Co(cyclam) ³⁺ , (0.8-2.5) × 10 ⁻⁵ mol L ⁻¹ Cr(bpy) ₃ ³⁺ , Co(cyclam) ²⁺ (RQ) and 1.0 mol L ⁻¹ H ₂ SO ₄ .	89A050
7.4.6 3,10,17,24-Tetralsulfophthalocyanincobaltate(II) radical cation	$\text{Cr(bpy)}_3^{2+} + [\text{Co(tspc)}]^{3-} \rightarrow \text{Cr(bpy)}_3^{3+} + \text{Co(tspc)}^{4-}$	8.2×10^8	2			f.p./rq	P.b.k. at 560 nm in soln. contg. mixed dimer, ≤ 10 ⁻⁶ mol L ⁻¹ Co(tspc) ⁴⁻ (RQ), (5-10) × 10 ⁻³ mol L ⁻¹ Cr(bpy) ₃ ³⁺ and 10 ⁻² mol L ⁻¹ HClO ₄ .	79A090
7.4.7 Iron(III) ion	$\text{Cr(bpy)}_3^{2+} + \text{Fe}^{3+} \rightarrow \text{Cr(bpy)}_3^{3+} + \text{Fe}^{2+}$	9.2×10^8	0	1.0	25	f.p./rq	D.k. at 560 nm in Ar-sadt. soln. contg. Cr(bpy) ₃ ³⁺ , Fe ²⁺ (RQ), HClO ₄ and excess Fe ³⁺ .	88A104
		9.1×10^8	1	1.0				
		1.0×10^8	1	0.15				
		1.0×10^9	0		15	f.p./rq	D.k. in soln. contg. Cr(bpy) ₃ ³⁺ , Fe ²⁺ (RQ) and 1 mol L ⁻¹ HClO ₄ .	84E387
7.4.8 Chloroiron(III) complexes	$\text{Cr(bpy)}_3^{2+} + \text{FeCl}_x^{(3-x)+} \rightarrow \text{Cr(bpy)}_3^{3+} + \text{FeCl}_x^{(2-x)+}$	1.4×10^9	0		15	f.p./rq	D.k. in soln. contg. Cr(bpy) ₃ ³⁺ , FeCl _x ^{(2-x)+} (RQ) and 1 mol L ⁻¹ HCl.	84E387

TABLE 7. Rate constants for chromium transients — Continued

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t(\text{°C})$	Method	Comment	Ref.
7.4 Tris(2,2'-bipyridine)chromium(II) ion — Continued								
7.4.8 Chloroiron(III) complexes — Continued								
		1.4×10^9	0	1	~23	f.p./rq	D.k. at 420 nm in soln. contg. $\text{Cr}(\text{bpy})_3^{3+}$, 1 mol L^{-1} HCl and $\text{FeCl}_x^{(2-x)+}$ (RQ).	81A060
7.4.9 Sulfatoiron(III) ion								
	$\text{Cr}(\text{bpy})_3^{2+} + \text{FeSO}_4^{+} \rightarrow \text{Cr}(\text{bpy})_3^{3+} + \text{FeSO}_4^{2-}$	7.3×10^8	3	0.2		f.p./rq	D.k. in soln. contg. 5×10^{-5} mol L^{-1} $\text{Cr}(\text{bpy})_3^{3+}$ and 2×10^{-3} mol L^{-1} FeSO_4^{+} (RQ).	767517
7.4.10 Oxygen								
	$\text{Cr}(\text{bpy})_3^{2+} + \text{O}_2 \rightarrow \text{Cr}(\text{bpy})_3^{3+} + \text{O}_2^{+-}$	6.0×10^5	5.8	0.15	22	f.p./rq	D.k. at 560 nm in soln. contg. (1.0-3.3) $\times 10^{-4}$ mol L^{-1} $\text{Cr}(\text{bpy})_3^{3+}$, 0.05 or 0.1 mol L^{-1} oxalate (RQ) or 1.4×10^{-3} mol L^{-1} EDTA (RQ) and varied $[\text{O}_2]$.	88A233
7.4.11 Tetraammine(difluoro)platinum(IV) ion								
	$\text{Cr}(\text{bpy})_3^{2+} + \text{Pt}(\text{NH}_3)_4\text{F}_2^{2+} \rightarrow \text{Cr}(\text{bpy})_3^{3+} + \text{Pt}(\text{NH}_3)_4\text{F}_2^{+}$	4.0×10^5		0.1	20	f.p./rq	Air-satd. soln. contg. $\text{Cr}(\text{bpy})_3^{3+}$ and EDTA (RQ).	92A471
7.4.12 Tris(2,2'-bipyridine)ruthenium(III) ion								
	$\text{Cr}(\text{bpy})_3^{2+} + \text{Ru}(\text{bpy})_3^{3+} \rightarrow \text{Cr}(\text{bpy})_3^{3+} + \text{Ru}(\text{bpy})_3^{2+}$	2.6×10^9	3	0.2		f.p./rq or oq	D.k. in soln. contg. 1×10^{-4} mol L^{-1} $\text{Cr}(\text{bpy})_3^{3+}$ (OQ) and 3.3×10^{-5} mol L^{-1} $\text{Ru}(\text{bpy})_3^{2+}$ (RQ).	767517
7.4.13 Sulfur dioxide								
	$\text{Cr}(\text{bpy})_3^{2+} + \text{SO}_2 \rightarrow \text{Cr}(\text{bpy})_3^{3+} + \text{SO}_2^{+-}$	3.0×10^7	~0		25	f.p./rq	D.k. in soln. contg. (1-5) $\times 10^{-3}$ mol L^{-1} Co(cyclam) ²⁺ (RQ), (1-7.5) $\times 10^{-3}$ mol L^{-1} SO_2 , $\text{Cr}(\text{bpy})_3^{3+}$ and 1.0 mol L^{-1} H_2SO_4 ; $k = 3.4 \times 10^7 \text{ L mol}^{-1} \text{ s}^{-1}$ in the presence of 1.0 mol L^{-1} HClO_4 .	89A050
7.4.14 Uranyl(VI) ion								
	$\text{Cr}(\text{bpy})_3^{2+} + \text{UO}_2^{2+} \rightarrow \text{Cr}(\text{bpy})_3^{3+} + \text{UO}_2^{+}$	1.6×10^6	1.7	0.1	25	f.p./rq	D.k. at 560 nm in soln. contg. 5×10^{-5} mol L^{-1} $\text{Cr}(\text{bpy})_3^{3+}$, $\sim 5 \times 10^{-6}$ mol L^{-1} $\text{Cr}(\text{bpy})_3^{2+}$, (6-15) $\times 10^{-5}$ mol L^{-1} UO_2^{+} (RQ) and (2.5-10) $\times 10^{-4}$ mol L^{-1} UO_2^{2+} ; $[\text{H}^+] = 0.02 \text{ mol L}^{-1}$.	88A065
7.4.15 Tetranitromethane								
	$\text{Cr}(\text{bpy})_3^{2+} + \text{C}(\text{NO}_2)_4 \rightarrow \text{Cr}(\text{bpy})_3^{3+} + \text{C}(\text{NO}_2)_3^- + \cdot\text{NO}_2$	-3×10^9		7		f.p.		88A233
7.5 Tris(2,2'-bipyridine)chromium(III), EDTA radical addn. product								
7.5.1 Tris(2,2'-bipyridine)chromium(III) ion								
	$\text{Cr}(\text{bpy})_2(\text{bpy}\cdot\text{EDTA})^+ + \text{Cr}(\text{bpy})_3^{3+} \rightarrow \text{Cr}(\text{bpy})_2(\text{bpy}\cdot\text{EDTA})^{2+} + \text{Cr}(\text{bpy})_3^{2+}$	1.4×10^9			25	f.p./rq	D.k. at 605 nm in soln. contg. $\text{Cr}(\text{bpy})_3^{3+}$ and EDTA (RQ); transient suggested to be ligand addition product (of EDTA radical).	89A289
7.6 Tris(4,4'-dimethyl-2,2'-bipyridine)chromium(II) ion								
7.6.1 Tris(ethylenediamine)cobalt(III) ion								
	$\text{Cr}(4,4'\text{-Me}_2\text{bpy})_3^{2+} + \text{Co}(\text{en})_3^{3+} \rightarrow \text{Cr}(4,4'\text{-Me}_2\text{bpy})_3^{3+} + \text{Co}(\text{en})_3^{2+}$	6.6×10^4	5.8	0.15	23	f.p./rq	D.k. at 560 nm in Ar-satd. soln. contg. $\text{Cr}(4,4'\text{-Me}_2\text{bpy})_3^{3+}$, EDTA (RQ) or $\text{C}_2\text{O}_4^{2-}$ (RQ) and $\text{Co}(\text{en})_3^{3+}$.	88A514
7.6.2 Tris(2,2'-bipyridine)cobalt(III) ion								
	$\text{Cr}(4,4'\text{-Me}_2\text{bpy})_3^{2+} + \text{Co}(\text{bpy})_3^{3+} \rightarrow \text{Cr}(4,4'\text{-Me}_2\text{bpy})_3^{3+} + \text{Co}(\text{bpy})_3^{2+}$	2.8×10^8	5.8	0.15	23	f.p./rq	D.k. at 560 nm in Ar-satd. soln. contg. $\text{Cr}(4,4'\text{-Me}_2\text{bpy})_3^{3+}$, EDTA (RQ) or $\text{C}_2\text{O}_4^{2-}$ (RQ) and $\text{Co}(\text{bpy})_3^{3+}$.	88A514

TABLE 7. Rate constants for chromium transients — Continued

Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t(\text{°C})$	Method	Comment	Ref.
7.6 Tris(4,4'-dimethyl-2,2'-bipyridine)chromium(II) ion — Continued							
7.6.3 Tris(1,10-phenanthroline)cobalt(III) ion							
$\text{Cr}(4,4'\text{-Me}_2\text{bpy})_3^{2+} + \text{Co}(\text{phen})_3^{3+} \rightarrow$	3.6×10^8	5.8	0.15	23	f.p./rq	D.k. at 560 nm in Ar-satd. soln. contg. $\text{Cr}(4,4'\text{-Me}_2\text{bpy})_3^{3+}$, EDTA (RQ) or $\text{C}_2\text{O}_4^{2-}$ (RQ) and $\text{Co}(\text{phen})_3^{3+}$.	88A514
$\text{Cr}(4,4'\text{-Me}_2\text{bpy})_3^{3+} + \text{Co}(\text{phen})_3^{2+} \rightarrow$							
7.6.4 1,4,8,11-Tetraazacyclotetradecane cobalt(III) ion							
$\text{Cr}(4,4'\text{-Me}_2\text{bpy})_3^{2+} + \text{Co}(\text{cyclam})^{3+} \rightarrow$	$\sim 7 \times 10^8$	-0		25	f.p./rq	D.k. in soln. contg. $(0.6\text{-}8) \times 10^{-4}$ mol L^{-1} $\text{Co}(\text{cyclam})^{3+}$, $(0.8\text{-}2.5) \times 10^{-5}$ mol L^{-1} $\text{Cr}(4,4'\text{-Me}_2\text{bpy})_3^{3+}$, $\text{Co}(\text{cyclam})^{2+}$ (RQ) and 1.0 mol L^{-1} H_2SO_4 .	89A050
$\text{Cr}(4,4'\text{-Me}_2\text{bpy})_3^{3+} + \text{Co}(\text{cyclam})^{2+} \rightarrow$							
7.6.5 Chloroiron(III) complexes							
$\text{Cr}(4,4'\text{-Me}_2\text{bpy})_3^{2+} + \text{FeCl}_x^{(3-x)+} \rightarrow$	1.1×10^{10}	0	1	-23	f.p./rq	D.k. in soln. contg. $\text{Cr}(4,4'\text{-Me}_2\text{bpy})_3^{3+}$, 1 mol L^{-1} HCl and $\text{FeCl}_x^{(2-x)+}$ (RQ).	81A060
$\text{Cr}(4,4'\text{-Me}_2\text{bpy})_3^{3+} + \text{FeCl}_x^{(2-x)+} \rightarrow$							
7.6.6 Sulfatoiron(III) ion							
$\text{Cr}(4,4'\text{-Me}_2\text{bpy})_3^{2+} + \text{FeSO}_4^{+} \rightarrow$	7.0×10^8	1.2	0.15	-25	p.r.	D.k. at 420 nm in Ar-satd. soln. contg. $\text{Cr}(4,4'\text{-Me}_2\text{bpy})_3^{3+}$, 0.05 mol L^{-1} H_2SO_4 , 0.52 mol L^{-1} 2-TrOII and FeSO_4 .	81A060
$\text{Cr}(4,4'\text{-Me}_2\text{bpy})_3^{3+} + \text{FeSO}_4^{+} \rightarrow$							
7.6.7 Oxygen							
$\text{Cr}(4,4'\text{-Me}_2\text{bpy})_3^{2+} + \text{O}_2 \rightarrow$	1.4×10^7	5.8	0.15	22	f.p./rq	D.k. at 560 or 480 nm in soln. contg. $(1.0\text{-}1.6) \times 10^{-4}$ mol L^{-1} $\text{Cr}(4,4'\text{-Me}_2\text{bpy})_3^{3+}$, 0.05 mol L^{-1} oxalate (RQ) or 1.4×10^{-3} mol L^{-1} EDTA (RQ) and varied $[\text{O}_2]$.	88A233
$\text{Cr}(4,4'\text{-Me}_2\text{bpy})_3^{3+} + \text{O}_2 \rightarrow$							
1.8×10^7	5.8	0.15	22	f.p./rq	D.k. at 560 nm in soln. contg. $(1.0\text{-}1.6) \times 10^{-4}$ mol L^{-1} $\text{Cr}(4,4'\text{-Me}_2\text{bpy})_3^{3+}$, 0.01 mol L^{-1} Fe^{2+} (RQ) and varied $[\text{O}_2]$.	88A233	
7.6.8 Tetraammine(difluoro)platinum(IV) ion							
$\text{Cr}(4,4'\text{-Me}_2\text{bpy})_3^{2+} + \text{Pt}(\text{NH}_3)_4\text{F}_2^{2+} \rightarrow$	1.6×10^6	0.1		20	f.p./rq	Air-satd. soln. contg. $\text{Cr}(4,4'\text{-Me}_2\text{bpy})_3^{3+}$ and EDTA (RQ).	92A471
$\text{Cr}(4,4'\text{-Me}_2\text{bpy})_3^{3+} + \text{Pt}(\text{NH}_3)_4\text{F}_2^{+} \rightarrow$							
7.6.9 Uranyl(VI) ion							
$\text{Cr}(4,4'\text{-Me}_2\text{bpy})_3^{2+} + \text{UO}_2^{2+} \rightarrow$	$\sim 1.6 \times 10^7$	2.7	0.1	25	f.p./rq	D.k. at 560 nm in soln. contg. 8×10^{-5} mol L^{-1} $\text{Cr}(4,4'\text{-Me}_2\text{bpy})_3^{3+}$, $\sim 8 \times 10^{-6}$ mol L^{-1} $\text{Cr}(4,4'\text{-Me}_2\text{bpy})_3^{2+}$, $(1.5\text{-}3) \times 10^{-4}$ mol L^{-1} UO_2^{+} (RQ) and $(0.5\text{-}2.0) \times 10^{-3}$ mol L^{-1} UO_2^{2+} ; $[\text{H}^+] = 0.002$ mol L^{-1} ; k obtained by extrapolation to higher values of the $[\text{UO}_2^{+}]/[\text{UO}_2^{2+}]$ ratio.	88A065
$\text{Cr}(4,4'\text{-Me}_2\text{bpy})_3^{3+} + \text{UO}_2^{+} \rightarrow$							
7.7 Tris(4,4'-diphenyl-2,2'-bipyridine)chromium(II) ion							
7.7.1 Chloroiron(III) complexes							
$\text{Cr}(4,4'\text{-Ph}_2\text{bpy})_3^{2+} + \text{FeCl}_x^{(3-x)+} \rightarrow$	1.6×10^9	0	1	-23	f.p./rq	D.k. in soln. contg. $\text{Cr}(4,4'\text{-Ph}_2\text{bpy})_3^{3+}$, 1 mol L^{-1} HCl and $\text{FeCl}_x^{(2-x)+}$ (RQ).	81A060
$\text{Cr}(4,4'\text{-Ph}_2\text{bpy})_3^{3+} + \text{FeCl}_x^{(2-x)+} \rightarrow$							
7.8 Tris(1,10-phenanthroline)chromium(II) ion							
7.8.1 Tris(2,2'-bipyridine)cobalt(III) ion							
$\text{Cr}(\text{phen})_3^{2+} + \text{Co}(\text{bpy})_3^{3+} \rightarrow$	2.0×10^8	5.8	0.15	23	f.p./rq	D.k. at 430 nm in Ar-satd. soln. contg. $\text{Cr}(\text{phen})_3^{3+}$, EDTA (RQ) or $\text{C}_2\text{O}_4^{2-}$ (RQ) and $\text{Co}(\text{bpy})_3^{3+}$.	88A514
$\text{Cr}(\text{phen})_3^{3+} + \text{Co}(\text{bpy})_3^{2+} \rightarrow$							
7.8.2 Tris(1,10-phenanthroline)cobalt(III) ion							
$\text{Cr}(\text{phen})_3^{2+} + \text{Co}(\text{phen})_3^{3+} \rightarrow$	2.0×10^8	5.8	0.15	23	f.p./rq	D.k. at 430 nm in Ar-satd. soln. contg. $\text{Cr}(\text{phen})_3^{3+}$, EDTA (RQ) or $\text{C}_2\text{O}_4^{2-}$ (RQ) and $\text{Co}(\text{phen})_3^{3+}$.	88A514
$\text{Cr}(\text{phen})_3^{3+} + \text{Co}(\text{phen})_3^{2+} \rightarrow$							

TABLE 7. Rate constants for chromium transients — Continued

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	t ($^\circ\text{C}$)	Method	Comment	Ref.
7.8 Tris(1,10-phenanthroline)chromium(II) ion — Continued								
7.8.3 1,4,8,11-Tetraazacyclotetradecane cobalt(III) ion								
	$\text{Cr(phen)}_3^{2+} + \text{Co(cyclam)}^{3+} \rightarrow$ $\text{Cr(phen)}_3^{3+} + \text{Co(cyclam)}^{2+}$	1.3×10^8	-0		25	f.p./rq	D.k. in soln. contg. $(0.6\text{-}8) \times 10^{-4}$ mol L $^{-1}$ Co(cyclam)^{3+} , $(0.8\text{-}2.5) \times 10^{-5}$ mol L $^{-1}$ Cr(phen)_3^{3+} , Co(cyclam)^{2+} (RQ) and 1.0 mol L $^{-1}$ H_2SO_4 .	89A050
7.8.4 Chloroiron(III) complexes								
	$\text{Cr(phen)}_3^{2+} + \text{FeCl}_x^{(3-x)+} \rightarrow$ $\text{Cr(phen)}_3^{3+} + \text{FeCl}_x^{(2-x)+}$	1.3×10^9	0	1	-23	f.p./rq	D.k. in soln. contg. Cr(phen)_3^{3+} , 1 mol L $^{-1}$ HCl and $\text{FeCl}_x^{(2-x)+}$ (RQ).	81A060
7.8.5 Oxygen								
	$\text{Cr(phen)}_3^{2+} + \text{O}_2 \rightarrow \text{Cr(phen)}_3^{3+} + \text{O}_2^{\cdot-}$	1.5×10^6	5.8	0.15	22	f.p./rq	D.k. at 430, 450 or 690 nm in soln. contg. $(1.0\text{-}3.3) \times 10^{-4}$ mol L $^{-1}$ Cr(phen)_3^{3+} , 0.05 or 0.1 mol L $^{-1}$ oxalate (RQ) or 1.4×10^{-3} mol L $^{-1}$ EDTA (RQ) and varied [O ₂].	88A233
7.8.6 Sulfur dioxide								
	$\text{Cr(phen)}_3^{2+} + \text{SO}_2 \rightarrow \text{Cr(phen)}_3^{3+} + \text{SO}_2^{\cdot-}$	9.5×10^7	-0		25	f.p./rq	D.k. in soln. contg. $(1\text{-}5) \times 10^{-3}$ mol L $^{-1}$ Co(cyclam)^{2+} (RQ), $(1\text{-}2.5) \times 10^{-3}$ mol L $^{-1}$ SO_2 , Cr(phen)_3^{3+} and 1.0 mol L $^{-1}$ H_2SO_4 .	89A050
7.8.7 Uranyl(VI) ion								
	$\text{Cr(phen)}_3^{2+} + \text{UO}_2^{2+} \rightarrow \text{Cr(phen)}_3^{3+} + \text{UO}_2^+$	2.4×10^6	2.7	0.1	25	f.p./rq	D.k. at 430 nm in soln. contg. 8×10^{-5} mol L $^{-1}$ Cr(phen)_3^{3+} , $\sim 8 \times 10^{-6}$ mol L $^{-1}$ Cr(phen)_3^{2+} , 1.5×10^{-4} mol L $^{-1}$ UO_2^+ (RQ) and $1\text{-}2 \times 10^{-3}$ mol L $^{-1}$ UO_2^{2+} ; $[\text{H}^+] = 0.002$ mol L $^{-1}$.	88A065
7.9 Tris(1,10-phenanthroline)chromium(III), EDTA radical addn. product								
7.9.1 Tris(1,10-phenanthroline)chromium(III) ion								
	$\text{Cr(phen)}_2(\text{phen}-\text{'EDTA})^+ +$ $\text{Cr(phen)}_3^{3+} \rightarrow$ $\text{Cr(phen)}_2(\text{phen}-\text{'EDTA})^{2+} +$ Cr(phen)_3^{2+}	1.7×10^9			25	f.p./rq	D.k. at 605 nm in soln. contg. Cr(phen)_3^{3+} and EDTA (RQ); transient suggested to be ligand addition product (of EDTA radical).	89A289
7.10 Tris(1,10-phenanthroline)chromium(III), carboxyl radical addn. product								
7.10.1 Tris(1,10-phenanthroline)chromium(III) ion								
	$\text{Cr(phen)}_2(\text{phen}-\text{CO}_2)^{2+} + \text{Cr(phen)}_3^{3+} \rightarrow$ $\text{Cr(phen)}_2(\text{phen}-\text{CO}_2)^{3+} +$ Cr(phen)_3^{2+}	8.2×10^8			25	f.p./rq	D.k. at 605 nm in soln. contg. Cr(phen)_3^{3+} and $\text{C}_2\text{O}_4^{2-}$ (RQ); transient suggested to be ligand addition product (of $\text{CO}_2^{\cdot-}$ radical).	89A289
7.11 Tris(5-chloro-1,10-phenanthroline)chromium(II) ion								
7.11.1 Tris(2,2'-bipyridine)cobalt(III) ion								
	$\text{Cr(5-Clphen)}_3^{2+} + \text{Co(bpy)}_3^{3+} \rightarrow$ $\text{Cr(5-Clphen)}_3^{3+} + \text{Co(bpy)}_3^{2+}$	1.2×10^8	5.8	0.15	23	f.p./rq	D.k. at 440 nm in Ar-satd. soln. contg. $\text{Cr(5-Clphen)}_3^{3+}$, EDTA (RQ) or $\text{C}_2\text{O}_4^{2-}$ (RQ) and Co(bpy)_3^{3+} .	88A514
7.11.2 Tris(1,10-phenanthroline)cobalt(III) ion								
	$\text{Cr(5-Clphen)}_3^{2+} + \text{Co(phen)}_3^{3+} \rightarrow$ $\text{Cr(5-Clphen)}_3^{3+} + \text{Co(phen)}_3^{2+}$	1.6×10^8	5.8	0.15	23	f.p./rq	D.k. at 440 nm in Ar-satd. soln. contg. $\text{Cr(5-Clphen)}_3^{3+}$, EDTA (RQ) or $\text{C}_2\text{O}_4^{2-}$ (RQ) and Co(phen)_3^{3+} .	88A514
7.11.3 1,4,8,11-Tetraazacyclotetradecane cobalt(III) ion								
	$\text{Cr(5-Clphen)}_3^{2+} + \text{Co(cyclam)}^{3+} \rightarrow$ $\text{Cr(5-Clphen)}_3^{3+} + \text{Co(cyclam)}^{2+}$	1.7×10^7	-0		25	f.p./rq	D.k. in soln. contg. $(0.6\text{-}8) \times 10^{-4}$ mol L $^{-1}$ Co(cyclam)^{3+} , $(0.8\text{-}2.5) \times 10^{-5}$ mol L $^{-1}$ $\text{Cr(5-Clphen)}_3^{3+}$, Co(cyclam)^{2+} (RQ) and 1.0 mol L $^{-1}$ H_2SO_4 .	89A050

TABLE 7. Rate constants for chromium transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
7.11 Tris(5-chloro-1,10-phenanthroline)chromium(II) ion — Continued								
7.11.4 Chloroiron(III) complexes								
	$\text{Cr}(\text{5-Clphen})_3^{2+} + \text{FeCl}_x^{(3-x)+} \rightarrow$ $\text{Cr}(\text{5-Clphen})_3^{3+} + \text{FeCl}_x^{(2-x)+}$	6.1×10^8	0	1	-23	f.p./rq	D.k. in soln. contg. $\text{Cr}(\text{5-Clphen})_3^{3+}$, 1 mol L ⁻¹ HCl and $\text{FeCl}_x^{(2-x)+}$ (RQ).	81A060
7.11.5 Oxygen								
	$\text{Cr}(\text{5-Clphen})_3^{2+} + \text{O}_2 \rightarrow$ $\text{Cr}(\text{5-Clphen})_3^{3+} + \text{O}_2^{2-}$	2.5×10^5	5.8	0.15	22	f.p./rq	D.k. at 440 nm in soln. contg. (1.0-1.6) $\times 10^{-4}$ mol L ⁻¹ $\text{Cr}(\text{5-Clphen})_3^{3+}$, 0.05 mol L ⁻¹ oxalate (RQ) and varied [O ₂].	88A233
7.11.6 Tetraammine(difluoro)platinum(IV) ion								
	$\text{Cr}(\text{5-Clphen})_3^{2+} + \text{Pt}(\text{NH}_3)_4\text{F}_2^{2+} \rightarrow$ $\text{Cr}(\text{5-Clphen})_3^{3+} + \text{Pt}(\text{NH}_3)_4\text{F}_2^+$	1.1×10^5		0.1	20	f.p./rq	Air-satd. soln. contg. $\text{Cr}(\text{5-Clphen})_3^{3+}$ and EDTA (RQ).	92A471
7.11.7 Sulfur dioxide								
	$\text{Cr}(\text{5-Clphen})_3^{2+} + \text{SO}_2 \rightarrow$ $\text{Cr}(\text{5-Clphen})_3^{3+} + \text{SO}_2^{2-}$	6.8×10^6	~0		25	f.p./rq	D.k. in soln. contg. (1.5) $\times 10^{-3}$ mol L ⁻¹ Co(cyclam) ²⁺ (RQ), (1-11) $\times 10^{-3}$ mol L ⁻¹ SO ₂ , $\text{Cr}(\text{5-Clphen})_3^{3+}$ and 1.0 mol L ⁻¹ H ₂ SO ₄ .	89A050
7.11.8 Uranyl(VI) ion								
	$\text{Cr}(\text{5-Clphen})_3^{2+} + \text{UO}_2^{2+} \rightarrow$ $\text{Cr}(\text{5-Clphen})_3^{3+} + \text{UO}_2^+$	5.4×10^5	2.7	0.1	25	f.p./rq	D.k. at 440 nm in soln. contg. 8 $\times 10^{-5}$ mol L ⁻¹ $\text{Cr}(\text{5-Clphen})_3^{3+}$, ~8 $\times 10^{-6}$ mol L ⁻¹ $\text{Cr}(\text{5-Clphen})_3^{2+}$, 1.5 $\times 10^{-4}$ mol L ⁻¹ UO_2^+ (RQ) and 1-2 $\times 10^{-3}$ mol L ⁻¹ UO_2^{2+} ; [H ⁺] = 0.002 mol L ⁻¹ .	88A065
7.12 Tris(5-chloro-1,10-phenanthroline)chromium(III), EDTA radical addn. product								
7.12.1 Tris(5-chloro-1,10-phenanthroline)chromium(III) ion								
	$\text{Cr}(\text{5-Clphen})_2(\text{5-Clphen}-\text{'EDTA'})^+ +$ $\text{Cr}(\text{5-Clphen})_3^{3+} \rightarrow$ $\text{Cr}(\text{5-Clphen})_2(\text{5-Clphen}-\text{'EDTA'})^{2+} +$ $\text{Cr}(\text{5-Clphen})_3^{2+}$	1.4×10^9			25	f.p./rq	D.k. at 605 nm in soln. contg. $\text{Cr}(\text{5-Clphen})_3^{3+}$ and EDTA (RQ); transient suggested to be ligand addition product (of EDTA radical).	89A289
7.13 Tris(5-chloro-1,10-phenanthroline)chromium(III), carboxyl radical addn. product								
7.13.1 Tris(5-chloro-1,10-phenanthroline)chromium(III) ion								
	$\text{Cr}(\text{5-Clphen})_2(\text{5-Clphen}-\text{CO}_2)^{2+} +$ $\text{Cr}(\text{5-Clphen})_3^{3+} \rightarrow$ $\text{Cr}(\text{5-Clphen})_2(\text{5-Clphen}-\text{CO}_2)^{3+} +$ $\text{Cr}(\text{5-Clphen})_3^{2+}$	1.1×10^9			25	f.p./rq	D.k. at 605 nm in soln. contg. $\text{Cr}(\text{5-Clphen})_3^{3+}$ and C ₂ O ₄ ²⁻ (RQ); transient suggested to be ligand addition product (of *CO ₂ ⁻ radical).	89A289
7.14 Tris(5-bromo-1,10-phenanthroline)chromium(II) ion								
7.14.1 Chloroiron(III) complexes								
	$\text{Cr}(\text{5-Brphen})_3^{2+} + \text{FeCl}_x^{(3-x)+} \rightarrow$ $\text{Cr}(\text{5-Brphen})_3^{3+} + \text{FeCl}_x^{(2-x)+}$	1.4×10^9	0	1	-23	f.p./rq	D.k. in soln. contg. $\text{Cr}(\text{5-Brphen})_3^{3+}$, 1 mol L ⁻¹ HCl and $\text{FeCl}_x^{(2-x)+}$ (RQ).	81A060
7.15 Tris(5-methyl-1,10-phenanthroline)chromium(II) ion								
7.15.1 Tris(ethylenediamine)cobalt(III) ion								
	$\text{Cr}(\text{5-Mephen})_3^{2+} + \text{Co(en)}_3^{3+} \rightarrow$ $\text{Cr}(\text{5-Mephen})_3^{3+} + \text{Co(en)}_3^{2+}$	1.6×10^4	5.8	0.15	23	f.p./rq	D.k. at 480 or 685 nm in Ar-satd. soln. contg. $\text{Cr}(\text{5-Mephen})_3^{3+}$, EDTA (RQ) or C ₂ O ₄ ²⁻ (RQ) and Co(en) ₃ ³⁺ .	88A514
7.15.2 1,4,8,11-Tetraazacyclotetradecane cobalt(III) ion								
	$\text{Cr}(\text{5-Mephen})_3^{2+} + \text{Co(cyclam)}^{3+} \rightarrow$ $\text{Cr}(\text{5-Mephen})_3^{3+} + \text{Co(cyclam)}^{2+}$	1.1×10^7	~0		25	f.p./rq	D.k. in soln. contg. (0.6-8) $\times 10^{-4}$ mol L ⁻¹ Co(cyclam) ³⁺ , (0.8-2.5) $\times 10^{-5}$ mol L ⁻¹ $\text{Cr}(\text{5-Mephen})_3^{3+}$, Co(cyclam) ²⁺ (RQ) and 1.0 mol L ⁻¹ H ₂ SO ₄ .	89A050
7.15.3 Chloroiron(III) complexes								
	$\text{Cr}(\text{5-Mephen})_3^{2+} + \text{FeCl}_x^{(3-x)+} \rightarrow$ $\text{Cr}(\text{5-Mephen})_3^{3+} + \text{FeCl}_x^{(2-x)+}$	2.0×10^9	0	1	-23	f.p./rq	D.k. in soln. contg. $\text{Cr}(\text{5-Mephen})_3^{3+}$, 1 mol L ⁻¹ HCl and $\text{FeCl}_x^{(2-x)+}$ (RQ).	81A060

TABLE 7. Rate constants for chromium transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
7.15 Tris(5-methyl-1,10-phenanthroline)chromium(II) ion — Continued								
7.15.4 Oxygen								
	$\text{Cr}(\text{5-Mephen})_3^{2+} + \text{O}_2 \rightarrow$ $\text{Cr}(\text{5-Mephen})_3^{3+} + \text{O}_2^{\cdot-}$	2.2×10^6	5.8	0.15	22	f.p./rq	D.k. at 480 nm in soln. contg. (1.0-1.6) $\times 10^{-4}$ mol L ⁻¹ $\text{Cr}(\text{5-Mephen})_3^{3+}$, 0.05 mol L ⁻¹ oxalate (RQ) and varied [O ₂].	88A233
7.15.5 Sulfur dioxide								
	$\text{Cr}(\text{5-Mephen})_3^{2+} + \text{SO}_2 \rightarrow$ $\text{Cr}(\text{5-Mephen})_3^{3+} + \text{SO}_2^{\cdot-}$	1.7×10^8	~0		25	f.p./rq	D.k. in soln. contg. (1.5) $\times 10^{-3}$ mol L ⁻¹ $\text{Co}(\text{cyclam})^{2+}$ (RQ), SO_2 , $\text{Cr}(\text{5-Mephen})_3^{3+}$ and 1.0 mol L ⁻¹ H_2SO_4 .	89A050
7.16 Tris(4,7-dimethyl-1,10-phenanthroline)chromium(II) ion								
7.16.1 Tris(ethylenediamine)cobalt(III) ion								
	$\text{Cr}(4,7\text{-Me}_2\text{phen})_3^{2+} + \text{Co(en)}_3^{3+} \rightarrow$ $\text{Cr}(4,7\text{-Me}_2\text{phen})_3^{3+} + \text{Co(en)}_3^{2+}$	1.1×10^5	5.8	0.15	23	f.p./rq	D.k. at 440 nm in Ar-satd. soln. contg. $\text{Cr}(4,7\text{-Me}_2\text{phen})_3^{3+}$, EDTA (RQ) or $\text{C}_2\text{O}_4^{2-}$ (RQ) and Co(en)_3^{3+} .	88A514
7.16.2 Tris(2,2'-bipyridine)cobalt(III) ion								
	$\text{Cr}(4,7\text{-Me}_2\text{phen})_3^{2+} + \text{Co(bpy)}_3^{3+} \rightarrow$ $\text{Cr}(4,7\text{-Me}_2\text{phen})_3^{3+} + \text{Co(bpy)}_3^{2+}$	3.5×10^8	5.8	0.15	23	f.p./rq	D.k. at 440 nm in Ar-satd. soin. contg. $\text{Cr}(4,7\text{-Me}_2\text{phen})_3^{3+}$, EDTA (RQ) or $\text{C}_2\text{O}_4^{2-}$ (RQ) and Co(bpy)_3^{3+} .	88A514
7.16.3 Tris(1,10-phenanthroline)cobalt(III) ion								
	$\text{Cr}(4,7\text{-Me}_2\text{phen})_3^{2+} + \text{Co(phen)}_3^{3+} \rightarrow$ $\text{Cr}(4,7\text{-Me}_2\text{phen})_3^{3+} + \text{Co(phen)}_3^{2+}$	4.1×10^8	5.8	0.15	23	f.p./rq	D.k. at 440 nm in Ar-satd. soln. contg. $\text{Cr}(4,7\text{-Me}_2\text{phen})_3^{3+}$, EDTA (RQ) or $\text{C}_2\text{O}_4^{2-}$ (RQ) and Co(phen)_3^{3+} .	88A514
7.16.4 1,4,8,11-Tetraazacyclotetradecane cobalt(III) ion								
	$\text{Cr}(4,7\text{-Me}_2\text{phen})_3^{2+} + \text{Co(cyclam)}^{3+} \rightarrow$ $\text{Cr}(4,7\text{-Me}_2\text{phen})_3^{3+} + \text{Co(cyclam)}^{2+}$	$~7 \times 10^8$	~0		25	f.p./rq	D.k. in soln. contg. (0.6-8) $\times 10^{-4}$ mol L ⁻¹ $\text{Co}(\text{cyclam})^{3+}$, (0.8-2.5) $\times 10^{-5}$ mol L ⁻¹ $\text{Cr}(4,7\text{-Me}_2\text{phen})_3^{3+}$, $\text{Co}(\text{cyclam})^{2+}$ (RQ) and 1.0 mol L ⁻¹ H_2SO_4 .	89A050
7.16.5 Sulfatoiron(III) ion								
	$\text{Cr}(4,7\text{-Me}_2\text{phen})_3^{2+} + \text{FeSO}_4^+ \rightarrow$ $\text{Cr}(4,7\text{-Me}_2\text{phen})_3^{3+} + \text{FeSO}_4^-$	7.1×10^8	1.2	0.15	-25	p.r.	D.k. at 420 nm in Ar-satd. soln. contg. $\text{Cr}(4,7\text{-Me}_2\text{phen})_3^{3+}$, 0.05 mol L ⁻¹ H_2SO_4 , 0.52 mol L ⁻¹ 2-PrOH and FeSO_4 ; $k = 7 \times 10^9$ L mol ⁻¹ s ⁻¹ interpolated from quenching rate plot.	81A060
7.16.6 Oxygen								
	$\text{Cr}(4,7\text{-Me}_2\text{phen})_3^{2+} + \text{O}_2 \rightarrow$ $\text{Cr}(4,7\text{-Me}_2\text{phen})_3^{3+} + \text{O}_2^{\cdot-}$	2.5×10^7	5.8	0.15	22	f.p./rq	D.k. at 430 nm in soln. contg. (1.0-1.6) $\times 10^{-4}$ mol L ⁻¹ $\text{Cr}(4,7\text{-Me}_2\text{phen})_3^{3+}$, 0.05 mol L ⁻¹ oxalate (RQ) or 1.4 $\times 10^{-3}$ mol L ⁻¹ EDTA (RQ) and varied [O ₂].	88A233
7.17 Tris(5,6-dimethyl-1,10-phenanthroline)chromium(II) ion								
7.17.1 1,4,8,11-Tetraazacyclotetradecane cobalt(III) ion								
	$\text{Cr}(5,6\text{-Me}_2\text{phen})_3^{2+} + \text{Co(cyclam)}^{3+} \rightarrow$ $\text{Cr}(5,6\text{-Me}_2\text{phen})_3^{3+} + \text{Co(cyclam)}^{2+}$	1.6×10^7	~0		25	f.p./rq	D.k. in soln. contg. (0.6-8) $\times 10^{-4}$ mol L ⁻¹ $\text{Co}(\text{cyclam})^{3+}$, (0.8-2.5) $\times 10^{-5}$ mol L ⁻¹ $\text{Cr}(5,6\text{-Me}_2\text{phen})_3^{3+}$, $\text{Co}(\text{cyclam})^{2+}$ (RQ) and 1.0 mol L ⁻¹ H_2SO_4 .	89A050
7.17.2 Chloroiron(III) complexes								
	$\text{Cr}(5,6\text{-Me}_2\text{phen})_3^{2+} + \text{FeCl}_x^{(3-x)+} \rightarrow$ $\text{Cr}(5,6\text{-Me}_2\text{phen})_3^{3+} + \text{FeCl}_x^{(2-x)+}$	2.7×10^9	0	1	-23	f.p./rq	D.k. in soln. contg. $\text{Cr}(5,6\text{-Me}_2\text{phen})_3^{3+}$, 1 mol L ⁻¹ HCl and $\text{FeCl}_x^{(2-x)+}$ (RQ).	81A060
7.17.3 Sulfatoiron(III) ion								
	$\text{Cr}(5,6\text{-Me}_2\text{phen})_3^{2+} + \text{FeSO}_4^+ \rightarrow$ $\text{Cr}(5,6\text{-Me}_2\text{phen})_3^{3+} + \text{FeSO}_4^-$	4.8×10^8	1.2	0.15	-25	p.r.	D.k. at 420 nm in Ar-satd. soln. contg. $\text{Cr}(5,6\text{-Me}_2\text{phen})_3^{3+}$, 0.05 mol L ⁻¹ H_2SO_4 , 0.52 mol L ⁻¹ 2-PrOH and FeSO_4 .	81A060

TABLE 7. Rate constants for chromium transients — Continued

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t^\circ\text{C}$	Method	Comment	Ref.
7.17 Tris(5,6-dimethyl-1,10-phenanthroline)chromium(II) ion — Continued								
7.17.4 Sulfur dioxide								
	$\text{Cr}(5,6\text{-Me}_2\text{phen})_3^{2+} + \text{SO}_2 \rightarrow$ $\text{Cr}(5,6\text{-Me}_2\text{phen})_3^{3+} + \text{SO}_2^{-}$	2.8×10^6	-0		25	f.p./rq	D.k. in soln. contg. $(1\text{-}5) \times 10^{-3} \text{ mol L}^{-1}$ Co(cyclam) ²⁺ (RQ), SO_2 , $\text{Cr}(5,6\text{-Me}_2\text{phen})_3^{3+}$ and $1.0 \text{ mol L}^{-1} \text{ H}_2\text{SO}_4$.	89A050
7.18 Tris(5-phenyl-1,10-phenanthroline)chromium(II) ion								
7.18.1 Chloroiron(III) complexes								
	$\text{Cr}(\text{5-Phphen})_3^{2+} + \text{FeCl}_x^{(3-x)+} \rightarrow$ $\text{Cr}(\text{5-Phphen})_3^{3+} + \text{FeCl}_x^{(2-x)+}$	-1.9×10^9	0	1	-23	f.p./rq	D.k. in soln. contg. $\text{Cr}(\text{5-Phphen})_3^{3+}$, $1 \text{ mol L}^{-1} \text{ HCl}$ and $\text{FeCl}_x^{(2-x)+}$ (RQ).	81A060
7.19 Tris(4,7-diphenyl-1,10-phenanthroline)chromium(II) ion								
7.19.1 Chloroiron(III) complexes								
	$\text{Cr}(\text{4,7-Ph}_2\text{phen})_3^{2+} + \text{FeCl}_x^{(3-x)+} \rightarrow$ $\text{Cr}(\text{4,7-Ph}_2\text{phen})_3^{3+} + \text{FeCl}_x^{(2-x)+}$	1.4×10^9	0	1	-23	f.p./rq	D.k. at 420 nm in soln. contg. $\text{Cr}(\text{4,7-Ph}_2\text{phen})_3^{3+}$, $1 \text{ mol L}^{-1} \text{ HCl}$ and $\text{FeCl}_x^{(2-x)+}$ (RQ).	81A060
7.20 Bis(2,2'-bipyridine(oxalato)chromate(II)								
7.20.1 First-order reaction								
	$\text{Cr}(\text{bpy})_2(\text{C}_2\text{O}_4) \rightarrow$	$8.9 \times 10^3 \text{ s}^{-1}$			23	p.r.	D.k. in soln. contg. $10^{-3} \text{ mol L}^{-1}$ $\text{Cr}(\text{bpy})_2(\text{C}_2\text{O}_4)^+$ and 0.1 mol L^{-1} <i>tert</i> -BuOH; reaction involves ligand loss.	87A309
7.21 2,2'-Bipyridinebis(oxalato)chromate(II) ion								
7.21.1 First-order reaction								
	$\text{Cr}(\text{bpy})(\text{C}_2\text{O}_4)_2^{2-} \rightarrow$	$7.4 \times 10^4 \text{ s}^{-1}$			23	p.r.	D.k. in soln. contg. $10^{-3} \text{ mol L}^{-1}$ $\text{Cr}(\text{bpy})(\text{C}_2\text{O}_4)_2^-$ and 0.1 mol L^{-1} <i>tert</i> -BuOH; reaction involves ligand loss.	87A309
7.22 Bis(1,10-phenanthroline)(oxalato)chromate(II)								
7.22.1 First-order reaction								
	$\text{Cr}(\text{phen})_2(\text{C}_2\text{O}_4) \rightarrow$	$9.8 \times 10^3 \text{ s}^{-1}$			23	p.r.	D.k. in soln. contg. $10^{-3} \text{ mol L}^{-1}$ $\text{Cr}(\text{phen})_2(\text{C}_2\text{O}_4)^+$ and 0.1 mol L^{-1} <i>tert</i> -BuOH; reaction involves ligand loss.	87A309
7.23 Bis(oxalato)phenanthrolinechromate(II) ion								
7.23.1 First-order reaction								
	$\text{Cr}(\text{phen})(\text{C}_2\text{O}_4)_2^{2-} \rightarrow$	$8.0 \times 10^4 \text{ s}^{-1}$			23	p.r.	D.k. in soln. contg. $10^{-3} \text{ mol L}^{-1}$ $\text{Cr}(\text{phen})(\text{C}_2\text{O}_4)_2^-$ and 0.1 mol L^{-1} <i>tert</i> -BuOH; reaction involves ligand loss.	87A309
7.24 Tris(acetylacetonato)chromate(II) ion								
7.24.1 First-order reaction								
	$\text{Cr}(\text{acac})_3^- \rightarrow \text{Cr}(\text{acac})_2 + \text{acac}^-$	$>2 \times 10^5 \text{ s}^{-1}$		<5	25	p.r.	Cond. change in He-satd. soln. contg. $(2\text{-}5) \times 10^{-4} \text{ mol L}^{-1}$ $\text{Cr}(\text{acac})_3$ and 0.1 mol L^{-1} <i>tert</i> -BuOH.	79A297
7.25 Bis(acetylacetonato)chromate(II)								
7.25.1 Hydrogen ion								
	$\text{Cr}(\text{acac})_2 + \text{H}^+ \rightarrow \text{Cr}(\text{acac})^+ + \text{acacH}$	4×10^7		2.2-5	25	p.r.	Cond. change in <i>H</i> IC-satd. soln. contg. $(2\text{-}5) \times 10^{-4} \text{ mol L}^{-1}$ $\text{Cr}(\text{acac})_3$ and 0.1 mol L^{-1} <i>tert</i> -BuOH.	79A297

TABLE 7. Rate constants for chromium transients — Continued

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t^\circ\text{C}$	Method	Comment	Ref.
7.25 Bis(acetylacetonato)chromate(II) — Continued								
7.25.2 First-order reaction								
	$\text{Cr(acac)}_2 \rightarrow \text{Cr(acac)}^+ + \text{acac}^-$	$3 \times 10^3 \text{ s}^{-1}$	3.2-5		25	p.r.	Cond. change in He-satd. soln. contg. $(2.5) \times 10^{-4} \text{ mol L}^{-1} \text{ Cr(acac)}_3$ and $0.1 \text{ mol L}^{-1} \text{ tert-BuOH}$; $k_t = 1.6 \times 10^9 \text{ L mol}^{-1} \text{ s}^{-1}$.	79A297
7.26 Acetonylacetonechromium(II) ion								
7.26.1 Hydrogen ion								
	$\text{Cr(acac)}^+ + \text{H}^+ \rightarrow \text{Cr}^{2+} + \text{acacH}$	4×10^6	3.2-5		25	p.r.	Cond. change in He-satd. soln. contg. $(2.5) \times 10^{-4} \text{ mol L}^{-1} \text{ Cr(acac)}_3$ and $0.1 \text{ mol L}^{-1} \text{ tert-BuOH}$.	79A297
7.26.2 First-order reaction								
	$\text{Cr(acac)}^+ \rightarrow \text{Cr}^{2+} + \text{acac}^-$	$3 \times 10^2 \text{ s}^{-1}$	3.2-5		25	p.r.	Cond. change in He-satd. soln. contg. $(2.5) \times 10^{-4} \text{ mol L}^{-1} \text{ Cr(acac)}_3$ and $0.1 \text{ mol L}^{-1} \text{ tert-BuOH}$; $k_t = 2.7 \times 10^8 \text{ L mol}^{-1} \text{ s}^{-1}$.	79A297
7.27 Hydridochromium(III) ion								
7.27.1 Hydrogen ion								
	$\text{CrH}^{2+} + \text{H}^+ \rightarrow \text{Cr}^{3+} + \text{H}_2$	1.9×10^4	1, 2			p.r.	D.k. in soln. contg. $(2.10) \times 10^{-4} \text{ mol L}^{-1} \text{ Cr}^{2+}$ and 0.1 mol L^{-1} isobutyric acid.	82A315
		1.0×10^4	0.7-	0.2	26	f.p./pi	D.k. at 330, 380 and 420 nm in soln. contg. $10^{-1} \text{ mol L}^{-1} \text{ Cr(ClO}_4)_2$ and $0.01-0.2 \text{ mol L}^{-1} \text{ H}^+$; $k_H/k_D = 4.8$; $\Delta H^\ddagger = 26.4 \text{ kJ mol}^{-1}$; $\Delta S^\ddagger = -79.9 \text{ J mol}^{-1} \text{ K}^{-1}$; studied at 14.4-48.1 °C.	81A337
		3.2×10^3	2	$\rightarrow 0$				
		1.8×10^4	0.2	var	22	p.r.	D.k. in Ar-satd. soln. contg. $(1.20) \times 10^{-4} \text{ mol L}^{-1} \text{ Cr}^{2+}$; $k < 1 \text{ s}^{-1}$ for $\text{CrH}^{2+} + \text{H}_2\text{O}$.	741142
7.27a Hydroxymethylchromium(III) ion								
7.27a.1 Water								
	$\text{CrCH}_2\text{OH}^{2+} + \text{H}_2\text{O} \rightarrow \text{Cr}^{3+} + \text{MeOH} + \text{OH}^-$	0.20 s^{-1}	5.65			p.r.	D.k. in N_2O -satd. soln. contg. $2 \times 10^{-4} \text{ mol L}^{-1} \text{ Cr}^{2+}$, $0.1 \text{ mol L}^{-1} \text{ MeOII}$ and 0.009 mol L^{-1} acetate buffer; k depends on pH and [acetate].	84A036
7.28 Dihydroxymethylchromium(III) ion								
7.28.1 First-order reaction								
	$\text{CrCH(OH)}_2^{2+} \rightarrow \text{H}_2\text{O} + \text{CrCHO}^{2+}$	$1.0 \times 10^2 \text{ s}^{-1}$	2.8-6			p.r.	D.k. and p.b.k. in N_2O -satd. soln. contg. Cr(II) and formaldehyde; product suggested to react with formaldehyde giving CO and MeOH, $k \sim 1 \text{ L mol}^{-1} \text{ s}^{-1}$.	85A084
7.28a 1-Hydroxyethylchromium(III) ion								
7.28a.1 Water								
	$\text{CrCHOHCH}_3^{2+} + \text{H}_2\text{O} \rightarrow \text{Cr}^{3+} + \text{EtOH} + \text{OH}^-$	0.72 s^{-1}	4.95			p.r.	D.k. in N_2O -satd. soln. contg. $5 \times 10^{-4} \text{ mol L}^{-1} \text{ Cr}^{2+}$, $0.1 \text{ mol L}^{-1} \text{ EtOH}$ and 0.009 mol L^{-1} acetate buffer; k depends on pH and [acetate].	84A036

TABLE 7. Rate constants for chromium transients — Continued

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t(\text{°C})$	Method	Comment	Ref.
7.29 2-Hydroxyethylchromium(III) ion								
7.29.1 Hydrogen ion								
	$\text{CrCH}_2\text{CH}_2\text{OH}^{2+} + \text{H}^+ \rightarrow \text{Cr}^{3+} + \text{H}_2\text{O} + \text{H}_2\text{C}=\text{CH}_2$	1.4×10^4				p.r.	D.k. at 300 nm in soln. contg. Cr^{2+} and satd. with ethylene/ N_2O . For reaction with H_2O , $k = 2 \text{ s}^{-1}$.	91A477
		1.4×10^4	2.5-4	0.05	24	f.p./pi	D.k. at 390 nm in soln. contg. $5.0 \times 10^{-4} \text{ mol L}^{-1} \text{ Cr}^{2+}$, $2.0 \times 10^{-2} \text{ mol L}^{-1} \text{ N}_2\text{O}$, $8.8 \times 10^{-4} \text{ mol L}^{-1}$ ethylene and $(1.0-30) \times 10^{-4} \text{ mol L}^{-1} \text{ HClO}_4$; studied at 13.2-42.6 °C; $\Delta H^\ddagger = 66.1 \text{ kJ mol}^{-1}$; $\Delta S^\ddagger = 57.7 \text{ J mol}^{-1} \text{ K}^{-1}$.	82A030
		1.5×10^4	2-3	0.01	25	f.p.	D.k. at 390 nm in soln. contg. $\sim 1 \times 10^{-3} \text{ mol L}^{-1} \text{ Cr}^{2+}$, $\sim 2 \times 10^{-5} \text{ mol L}^{-1} \text{ HOCH}_2\text{CH}_2\text{Co}(\text{dmgBF}_2)_2\text{ppy}$ and $(1.0-10) \times 10^{-3} \text{ mol L}^{-1} \text{ HClO}_4$.	82A030
		3.6×10^4	1.4-2.6	0.5	25	f.p.	D.k. at 390 nm in soln. contg. Cr^{2+} , $(\text{NH}_3)_5\text{CoO}_2\text{CCH}_2\text{CH}_2\text{OH}^{2+}$ and $(2.5-40) \times 10^{-3} \text{ mol L}^{-1} \text{ HClO}_4$.	82A030
7.29a 1-Hydroxy-1-methylethylchromium(III) ion								
7.29a.1 Water								
	$\text{CrC}(\text{CH}_3)_2\text{OH}^{2+} + \text{H}_2\text{O} \rightarrow \text{Cr}^{3+} + 2\text{-PrOH} + \text{OH}^-$	1.5 s^{-1}		5.05		p.r.	D.k. at 390 nm in N_2O -satd. soln. contg. $5 \times 10^{-4} \text{ mol L}^{-1} \text{ Cr}^{2+}$, 1 mol L^{-1} 2-PrOH and 0.01 mol L^{-1} acetate buffer; k depends on pH and [acetate].	84A036
7.30 2-Hydroxy-1-methylethylchromium(III) ion								
7.30.1 Hydrogen ion								
	$\text{CrCH}(\text{CH}_3)\text{CH}_2\text{OH}^{2+} + \text{H}^+ \rightarrow \text{Cr}^{3+} + \text{H}_2\text{O} + \text{CH}_3\text{CH}=\text{CH}_2$	1.1×10^5				p.r.	D.k. at 300 nm in soln. contg. Cr^{2+} and satd. with propylene/ N_2O . For reaction with H_2O , $k = 21 \text{ s}^{-1}$.	91A477
7.31 2-Hydroxy-1,2-dimethylethylchromium(III) ion								
7.31.1 Hydrogen ion								
	$\text{CrCH}(\text{CH}_3)\text{CH}(\text{CH}_3)\text{OH}^{2+} + \text{H}^+ \rightarrow \text{Cr}^{3+} + \text{Cr}[\text{CH}(\text{CH}_3)=\text{CH}(\text{CH}_3)]^{3+} + \text{H}_2\text{O}$	9.8×10^4		3-7		p.r.	D.k. at 300 nm in soln. contg. Cr^{2+} and satd. with 2-butene/ N_2O . For reaction of $\text{CrCH}(\text{CH}_3)\text{CH}(\text{CH}_3)\text{OH}^{2+}$ with H_2O , $k = 230 \text{ s}^{-1}$. For reaction of the product to give $\text{Cr}^{3+} +$ 2-butene, $k = 0.8 + 6.7[\text{H}^+] \text{ s}^{-1}$ at pH 1-5.	91A477
7.32 2-Hydroxy-2,2-dimethylethylchromium(III) ion								
7.32.1 Hydrogen ion								
	$\text{CrCH}_2\text{C}(\text{CH}_3)_2\text{OH}^{2+} + \text{H}^+ \rightarrow \text{Cr}^{3+} + \text{H}_2\text{O} + \text{CH}_2=\text{C}(\text{CH}_3)_2$	2.7×10^6		2-4		p.r.	D.k. in N_2O -satd. soln. contg. $0.18-0.48 \text{ mol L}^{-1}$ <i>tert</i> -BuOH and $(5-10) \times 10^{-4} \text{ mol L}^{-1} \text{ Cr}^{2+}$. For reaction with H_2O , $k = 160 \text{ s}^{-1}$.	92A073
7.33 2-Ethoxyethylchromium(III) ion								
7.33.1 Hydrogen ion								
	$\text{CrCH}_2\text{CH}_2\text{OC}_2\text{H}_5^{2+} + \text{H}^+ \rightarrow \text{Cr}^{3+} + \text{H}_2\text{C}=\text{CH}_2 + \text{EtOH}$	4.6×10^3		1.8-3.5		p.r.	D.k. at 315 nm in N_2O -satd. soln. contg. $(1-10) \times 10^{-3} \text{ mol L}^{-1} \text{ Cr(II) perchlorate}$ and $0.5 \text{ mol L}^{-1} \text{ Et}_2\text{O}$.	85A331

TABLE 7. Rate constants for chromium transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
7.34 1-Carboxy-1-hydroxyethylchromium(III) ion								
7.34.1 Hydrogen ion								
	$\text{CrCOH}(\text{CH}_3)\text{CO}_2\text{H}^{2+} + \text{H}^+ \rightarrow \text{Cr}^{3+} + \text{CH}_3\text{CH}(\text{OH})\text{CO}_2\text{H}$	2.8×10^2	0.1	22	p.r.	D.k. in Ar-satd. soln. contg. 0.15-1 mol L ⁻¹ lactic acid, (1-15) × 10 ⁻⁴ mol L ⁻¹ Cr ²⁺ and 0.1-1 mol L ⁻¹ HClO ₄ . For reaction with H ₂ O, <i>k</i> = 4.7 × 10 ² s ⁻¹ .	741146	
7.35 2-Carboxy-2,2-dimethylethylchromium(III) ion								
7.35.1 Hydrogen ion								
	$\text{CrCH}_2\text{C}(\text{CH}_3)_2\text{CO}_2\text{H}^{2+} + \text{H}^+ \rightarrow \text{Cr}^{3+} + (\text{CH}_3)_3\text{CCO}_2\text{H}$	60	0.1	22	p.r.	D.k. in Ar-satd. soln. contg. 0.15-1 mol L ⁻¹ trimethylacetic acid, (1-15) × 10 ⁻⁴ mol L ⁻¹ Cr ²⁺ and 0.1-1 mol L ⁻¹ HClO ₄ . For reaction with H ₂ O, <i>k</i> = 1.8 × 10 ² s ⁻¹ .	741146	
7.36 2-Ammonio-2,2-dimethylethylchromium(III) ion								
7.36.1 First-order reaction								
	$\text{CrCH}_2\text{C}(\text{CH}_3)_2\text{NH}_3^{3+} \rightarrow \text{Cr}^{3+} + \text{NH}_3 + \text{CH}_2=\text{C}(\text{CH}_3)_2$	0.015 s^{-1}	1.3		p.r.	D.k. in N ₂ O-satd. soln. contg. 0.08-0.09 mol L ⁻¹ 2-methyl-2-propanamine and (1-10) × 10 ⁻⁴ mol L ⁻¹ Cr ²⁺ .	92A073	
7.37 <i>cis</i>-Diammine(aqua)(1,4,8,11-tetraazacyclotetradecane)chromium(III) ion								
7.37.1 First-order reaction								
	$\text{cis-}[\text{Cr}(\text{cyclam})(\text{H}_2\text{O})(\text{NH}_3)_2]^{3+} \rightarrow \text{cis-}[\text{Cr}(\text{cyclam})(\text{H}_2\text{O})(\text{NH}_3)]^{3+} + \text{NH}_3$	$\sim 3 \times 10^5 \text{ s}^{-1}$	2.7-5.4	22-27 f.p.		Cond. change (from NH ₃ + H ⁺ → NH ₄ ⁺) in soln. contg. (0.6-3.0) × 10 ⁻³ mol L ⁻¹ <i>cis</i> -[Cr(cyclam)(NH ₃) ₂] ³⁺ ; transient has pK ~4.6.	88F171	
7.38 <i>trans</i>-Dihydroxy-1,4,8,11-tetraazacyclotetradecanechromium(III), OH reaction product								
7.38.1 First-order reaction								
	$\text{trans-Cr}(\text{cyclam})(\text{OH})_2^+/\text{OH} \rightarrow$	$2.9 \times 10^3 \text{ s}^{-1}$	9.5-9.6	22	p.r.	D.k. at 320 nm in soln. contg. (1-5) × 10 ⁻³ mol L ⁻¹ <i>trans</i> -Cr(cyclam)(OH) ₂ ⁺ ; reaction is suggested to represent the conversion from Cr(III) to Cr(IV); <i>k</i> = 5.3 × 10 ³ , 1.1 × 10 ⁴ and 1.1 × 10 ⁴ s ⁻¹ at pH 3.1, 4.3, and 10.9, respectively.	87B063	
7.39 Chromate(V)								
7.39.1 Silver(II) ion								
	$\text{Cr(V)} + \text{Ag}^{2+} \rightarrow \text{Cr(VI)} + \text{Ag}^+$	5.8×10^7	1	21	p.r.	D.k. at 270 nm in Ar-satd. soln. contg. 10 ⁻⁴ mol L ⁻¹ Cr ₂ O ₇ ²⁻ (mostly HCrO ₄ ⁻), 2 × 10 ⁻⁵ mol L ⁻¹ Ag ⁺ and 0.1 mol L ⁻¹ HClO ₄ .	89A422	
7.40 Chromate(V) ion								
7.40.1 Hydroxyl								
	$\text{CrO}_4^{3-} + \cdot\text{OH} \rightarrow \text{CrO}_4^{2-} + \text{OH}^-$	5×10^{10}			p.r.	P.b.k. at 365 nm in deaerated soln. contg. 1.6 × 10 ⁻⁵ mol L ⁻¹ CrO ₄ ²⁻ .	650044	

TABLE 8. Rate constants for copper transients

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
8.1 Copper(0) chloride complex								
8.1.1 First-order reaction	$\text{CuCl}_3^{3-} \rightarrow \text{Cu}^0 + 3 \text{Cl}^-$	$4.7 \times 10^7 \text{ s}^{-1}$		5.8		p.r.	P.b.k. at 380 nm in soln. contg. (1-25) × 10^{-4} mol L ⁻¹ CuCl and 2 mol L ⁻¹ NaCl; 80% CuCl_2^{2-} , 20% CuCl_2^- ; reaction includes $\text{CuCl}_2^{2-} \rightarrow \text{Cu}^0 + 2 \text{Cl}^-$.	86G256
8.2 Copper atom								
8.2.1 Copper(I) chloride complex	$\text{Cu}^0 + \text{Cu}^{\text{l}} \rightarrow \text{Cu}^0\text{-Cu}^{\text{l}}$	2.1×10^9		5.8		p.r.	Computer anal. of changes in absorption in soln. contg. (1-25) × 10^{-4} mol L ⁻¹ CuCl, 2 mol L ⁻¹ NaCl and MeOH.	86G256
8.3 Copper(I) chloride complex with copper(0)								
8.3.1 First-order reaction	$\text{Cu}^0\text{-Cu}^{\text{l}} \rightarrow \text{Cu}_2^+$	$4.9 \times 10^7 \text{ s}^{-1}$		5.8		p.r.	Computer anal. of changes in absorption in soln. contg. (1-25) × 10^{-4} mol L ⁻¹ CuCl, 2 mol L ⁻¹ NaCl and MeOH.	86G256
8.4 Copper(I) ion complex with copper(0)								
8.4.1 Copper(I) chloride complex	$\text{Cu}_2^+ + \text{Cu}^{\text{l}} \rightarrow$	1.3×10^8		5.8		p.r.	Computer anal. of changes in absorption in soln. contg. (1-25) × 10^{-4} mol L ⁻¹ CuCl, 2 mol L ⁻¹ NaCl and MeOH. Product of this reaction decays with $k = 4.8 \times 10^5 \text{ s}^{-1}$.	86G256
8.5 Copper(I) ion								
8.5.1 Cerium(IV) sulfate complex	$\text{Cu}^{\text{l}} + \text{Ce}(\text{SO}_4)_3^{2-} \rightarrow \text{Cu}^{2+} + \text{Ce}^{3+} + 3 \text{SO}_4^{2-}$	7.0×10^8		0.8		p.r.	D.k. at 360 nm in soln. contg. 0.03 mol L ⁻¹ $\text{Ce}_2(\text{SO}_4)_3$, 0.1 mol L ⁻¹ CuSO ₄ and 0.1 mol L ⁻¹ H ₂ SO ₄ . Value obtained by computer fit.	93A517
8.5.2 Sulfate radical ion	$\text{Cu}^{\text{l}} + \text{SO}_4^{\cdot-} \rightarrow \text{Cu}^{2+} + \text{SO}_4^{2-}$	1.6×10^{10}		<0		p.r.	D.k. at 450 nm in soln. contg. 0.03 mol L ⁻¹ $\text{Ce}_2(\text{SO}_4)_3$, 0.1 mol L ⁻¹ CuSO ₄ and 1.1 or 2.0 mol L ⁻¹ H ₂ SO ₄ . Value obtained by computer fit.	93A517
8.5.3 Dihydroxycopper(III) ion	$\text{Cu}^{\text{l}} + \text{Cu}(\text{OH})_2^+ \rightarrow 2 \text{Cu}^{2+} + 2 \text{OH}^-$	1.8×10^9 1.6×10^9	4.8 6	0.003 25	25	p.r.	Estimated from decay of Cu(III) in deaerated solutions. Degree of hydrolysis deduced from conductivity experiments [700512].	720844
		3.6×10^9				p.r.	D.k. at 300 nm in Ar-satd. soln. contg. 5×10^{-4} mol L ⁻¹ Cu ²⁺ ; [Cu ^l] = 1.2[Cu(III)].	710174
8.5.4 Iron(III) ion	$\text{Cu}^{\text{l}} + \text{Fe}^{3+} \rightarrow \text{Cu}^{2+} + \text{Fe}^{2+}$	1.3×10^7		2.1		p.r.	D.k. at 238 nm in soln. contg. 10^{-3} mol L ⁻¹ Fe ²⁺ , 10^{-2} mol L ⁻¹ Cu ²⁺ , (3-15) × 10^{-5} mol L ⁻¹ Fe ³⁺ and HClO ₄ ; also determined values in H ₂ SO ₄ soln.	79G260 761074
8.5.5 Permanganate ion	$\text{Cu}^{\text{l}} + \text{MnO}_4^- \rightarrow \text{Cu}^{2+} + \text{MnO}_4^{2-}$	6.4×10^9		0.004	25	p.r.	Measured by the rate of depletion of the MnO ₄ ⁻ absorption.	720844

TABLE 8. Rate constants for copper transients — Continued

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t(\text{°C})$	Method	Comment	Ref.	
8.5 Copper(I) ion — Continued									
8.5.5 Permanganate ion — Continued									
		8×10^9	2		20	p.r.	D.k. in soln. contg. 10^{-5} mol L^{-1} MnO_4^- , 1×10^{-2} mol L^{-1} Cu^{2+} and 0.01 mol L^{-1} HClO_4 . Dependence of k on $[\text{Cu}^{2+}]$ detected.	650385	
8.5.6 Hydrogen atom									
	$\text{Cu}^+ + \text{H}^* \rightarrow \text{CuH}^+$	$\sim 10^{10}$		5.6		p.r.	P.b.k. at 340 nm in soln. contg. 10^{-3} mol L^{-1} CuSO_4 and 100 atm H_2 ; obtained by computer simulation of p.b.k. for initial $[\text{H}^*] = [\text{Cu}^+]$ in the range $(5\text{-}40) \times 10^{-6}$ mol L^{-1} .	82A104	
8.5.7 Hydrogen peroxide									
	$\text{Cu}^+ + \text{H}_2\text{O}_2 \rightarrow \text{Cu}^+\text{O}_2\text{H}^+ + \text{H}^+$	4.7×10^3		2.3		phot.	Sector method.	737514	
8.5.8 Perhydroxyl									
	$\text{Cu}^+ + \text{HO}_2^- + \text{H}_2\text{O} \rightarrow \text{H}_2\text{O}_2 + \text{Cu}^{2+} + \text{OH}^-$	2.3×10^9		2.3		phot.	Sector method; assume $k(\text{HO}_2^- + \text{Cu}^{2+}) = 3.4 \times 10^7 \text{ L mol}^{-1} \text{ s}^{-1}$ and $k(\text{H}_2\text{O}_2 + \text{Cu}^+) = 4.7 \times 10^3 \text{ L mol}^{-1} \text{ s}^{-1}$.	737514	
8.5.9 Superoxide radical anion									
	$\text{Cu}^+ + \text{O}_2^- + 2 \text{H}_2\text{O} \rightarrow \text{Cu}^{2+} + \text{H}_2\text{O}_2 + 2 \text{OH}^-$	$\sim 10^{10}$		-3-6.5		p.r.	D.k. at 245 nm in O_2 -saturated soln. contg. Cu^{2+} and formate. Estimated from dependence of the rate of decay of $\text{HO}_2^*/\text{O}_2^-$ on pH, $[\text{Cu}^{2+}]$ and dose per pulse.	730112	
8.5.10 Oxygen									
	$\text{Cu}^+ + \text{O}_2 \rightarrow \text{Cu}^{2+} + \text{O}_2^-$	4.6×10^5		2.1		γ -r.	Estimated from calculations involving competing reactions and change in Fe^{3+} concn. in mixt. of O_2 , Cu^{2+} , Fe^{3+} , 3×10^{-3} mol L^{-1} Fe^{2+} and H_2SO_4 ; $k = 1.0 \times 10^6 \text{ L mol}^{-1} \text{ s}^{-1}$ in HClO_4 .	79G260 761074	
8.5.11 Tris(2,2'-bipyridine)ruthenium(III) ion									
	$\text{Cu}^+ + \text{Ru(bpy)}_3^{3+} \rightarrow \text{Cu}^{2+} + \text{Ru(bpy)}_3^{2+}$	9.7×10^8		0.3	25	f.p./oq	P.b.k. at 450 nm in soln. contg. 10^{-5} mol L^{-1} Ru(bpy)_3^{2+} , $0.01\text{-}0.06$ mol L^{-1} Cu^{2+} (OQ) and 0.5 mol L^{-1} sulfuric acid; $k = 4.3 \times 10^8$ and $3 \times 10^8 \text{ L mol}^{-1} \text{ s}^{-1}$ in 0.5 and 2.4 mol L^{-1} HClO_4 , respectively.	78A090	
		3.4×10^8		1.0	21	f.p./oq	P.b.k. in deoxygenated soln. contg. Ru(bpy)_3^{2+} and Cu^{2+} (OQ).	78F683	
		1×10^8		0	1.9	24	f.p./oq	D.k. at 480 nm in soln. contg. Ru(bpy)_3^{2+} , Cu^{2+} (OQ) and 1 mol L^{-1} HClO_4 .	771093
8.5.12 Tris(4,4'-dimethyl-2,2'-bipyridine)ruthenium(III) ion									
	$\text{Cu}^+ + \text{Ru}(4,4'\text{-Me}_2\text{bpy})_3^{3+} \rightarrow \text{Cu}^{2+} + \text{Ru}(4,4'\text{-Me}_2\text{bpy})_3^{2+}$	8.7×10^7		0.3	25	f.p./oq	P.b.k. at 450 nm in soln. contg. 10^{-5} mol L^{-1} $\text{Ru}(4,4'\text{-Me}_2\text{bpy})_3^{2+}$, $0.01\text{-}0.06$ mol L^{-1} Cu^{2+} (OQ) and 0.5 mol L^{-1} sulfuric acid.	78A090	
8.5.13 Tris(1,10-phenanthroline)ruthenium(III) ion									
	$\text{Cu}^+ + \text{Ru(phen)}_3^{3+} \rightarrow \text{Cu}^{2+} + \text{Ru(phen)}_3^{2+}$	1.2×10^9		0.3	25	f.p./oq	P.b.k. at 450 nm in soln. contg. 10^{-5} mol L^{-1} Ru(phen)_3^{2+} , $0.01\text{-}0.06$ mol L^{-1} Cu^{2+} (OQ) and 0.5 mol L^{-1} sulfuric acid.	78A090	
8.5.14 Tris(5-bromo-1,10-phenanthroline)ruthenium(III) ion									
	$\text{Cu}^+ + \text{Ru(5-Brphen)}_3^{3+} \rightarrow \text{Cu}^{2+} + \text{Ru(5-Brphen)}_3^{2+}$	2.3×10^9		0.3	25	f.p./oq	P.b.k. at 450 nm in soln. contg. 10^{-5} mol L^{-1} $\text{Ru(5-Brphen)}_3^{2+}$, $0.01\text{-}0.06$ mol L^{-1} Cu^{2+} (OQ) and 0.5 mol L^{-1} sulfuric acid.	78A090	

TABLE 8. Rate constants for copper transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
8.5 Copper(I) ion — Continued								
8.5.15	Tris(5-chloro-1,10-phenanthroline)ruthenium(III) ion							
	$\text{Cu}^+ + \text{Ru}(5\text{-Clphen})_3^{3+} \rightarrow \text{Cu}^{2+} + \text{Ru}(5\text{-Clphen})_3^{2+}$	2.7×10^9	0.3		25	f.p./oq	P.b.k. at 450 nm in soln. contg. 10^{-5} mol L ⁻¹ Ru(5-Clphen) ₃ ²⁺ , 0.01-0.06 mol L ⁻¹ Cu ²⁺ (OQ) and 0.5 mol L ⁻¹ sulfuric acid.	78A090
8.5.16	Tris(5-methyl-1,10-phenanthroline)ruthenium(III) ion							
	$\text{Cu}^+ + \text{Ru}(5\text{-Mephen})_3^{3+} \rightarrow \text{Cu}^{2+} + \text{Ru}(5\text{-Mephen})_3^{2+}$	1.0×10^9	0.3		25	f.p./oq	P.b.k. at 450 nm in soln. contg. 10^{-5} mol L ⁻¹ Ru(5-Mephen) ₃ ²⁺ , 0.01-0.06 mol L ⁻¹ Cu ²⁺ (OQ) and 0.5 mol L ⁻¹ sulfuric acid.	78A090
8.5.17	Tris(4,7-dimethyl-1,10-phenanthroline)ruthenium(III) ion							
	$\text{Cu}^+ + \text{Ru}(4,7\text{-Me}_2\text{phen})_3^{3+} \rightarrow \text{Cu}^{2+} + \text{Ru}(4,7\text{-Me}_2\text{phen})_3^{2+}$	1.4×10^8	0.3		25	f.p./oq	P.b.k. at 450 nm in soln. contg. 10^{-5} mol L ⁻¹ Ru(4,7-Me ₂ phen) ₃ ²⁺ , 0.01-0.06 mol L ⁻¹ Cu ²⁺ (OQ) and 0.5 mol L ⁻¹ sulfuric acid.	78A090
8.5.18	Tris(5,6-dimethyl-1,10-phenanthroline)ruthenium(III) ion							
	$\text{Cu}^+ + \text{Ru}(5,6\text{-Me}_2\text{phen})_3^{3+} \rightarrow \text{Cu}^{2+} + \text{Ru}(5,6\text{-Me}_2\text{phen})_3^{2+}$	5.4×10^8	0.3		25	f.p./oq	P.b.k. at 450 nm in soln. contg. 10^{-5} mol L ⁻¹ Ru(5,6-Me ₂ phen) ₃ ²⁺ , 0.01-0.06 mol L ⁻¹ Cu ²⁺ (OQ) and 0.5 mol L ⁻¹ sulfuric acid.	78A090
8.5.19	Tris(3,4,7,8-tetramethyl-1,10-phenanthroline)ruthenium(III) ion							
	$\text{Cu}^+ + \text{Ru}(3,4,7,8\text{-Me}_4\text{phen})_3^{3+} \rightarrow \text{Cu}^{2+} + \text{Ru}(3,4,7,8\text{-Me}_4\text{phen})_3^{2+}$	6.0×10^7	0.3		25	f.p./oq	P.b.k. at 450 nm in soln. contg. 10^{-5} mol L ⁻¹ Ru(3,4,7,8-Me ₄ phen) ₃ ²⁺ , 0.01-0.06 mol L ⁻¹ Cu ²⁺ (OQ) and 0.5 mol L ⁻¹ sulfuric acid.	78A090
8.5.20	Tris(5-phenyl-1,10-phenanthroline)ruthenium(III) ion							
	$\text{Cu}^+ + \text{Ru}(5\text{-Phphen})_3^{3+} \rightarrow \text{Cu}^{2+} + \text{Ru}(5\text{-Phphen})_3^{2+}$	1.1×10^9	0.3		25	f.p./oq	P.b.k. at 450 nm in soln. contg. 10^{-5} mol L ⁻¹ Ru(5-Phphen) ₃ ²⁺ , 0.01-0.06 mol L ⁻¹ Cu ²⁺ (OQ) and 0.5 mol L ⁻¹ sulfuric acid.	78A090
8.5.21	Acrylamide							
	$\text{Cu}^+ + \text{H}_2\text{C}=\text{CHCONH}_2 \rightarrow \text{Cu}(\text{acrylamide})^+$	2×10^9	2.5			p.r.	Measured from the effect of [acrylamide] on the yield and rate of formation of Cu(acrylamide) ⁺ ; $k_t = 1.1 \times 10^5$ s ⁻¹ .	78A322
8.5.22	Fumaric acid							
	$\text{Cu}^+ + \text{trans-HO}_2\text{CCH}=\text{CHCO}_2\text{H} \rightarrow \text{Cu}(\text{fumaric acid})^+$	1.7×10^9	3.7		22	p.r.	P.b.k. in N ₂ O-satd. soln. contg. 0.01 mol L ⁻¹ CuSO ₄ , 1.0 mol L ⁻¹ MeOH and (1-100) $\times 10^{-5}$ mol L ⁻¹ fumaric acid; $k_t = 2.4 \times 10^5$ s ⁻¹ .	751092
8.5.23	Hydroxymethyl							
	$\text{Cu}^+ + \text{CH}_2\text{OH} \rightarrow \text{CuCH}_2\text{OH}^+$	$\sim 6 \times 10^9$	3.5			p.r.	Estd. from dependence of yield of intermediate and its rate of decomposition on Cu ⁺ yield; He-satd. soln. contg. Cu ²⁺ and MeOH; $K = \sim 5 \times 10^3$ L mol ⁻¹ .	80A278
		$\sim 10^{10}$	4.5			p.r.	Estimated from rate of growth and decay of CuCH ₂ OH ⁺ ; $k_t \sim 10^6$ s ⁻¹ .	78A322
8.5.24	2-Hydroxyethyl							
	$\text{Cu}^+ + \text{CH}_2\text{CH}_2\text{OH} \rightarrow \text{H}_2\text{C}=\text{CH}_2 + \text{OH}^- + \text{Cu}^{2+}$	1.9×10^{10}	4.5			γ -r.	Estimated from yields of Cu(I) in γ -radiolysis of Cu ²⁺ + C ₂ H ₄ solutions.	78A322
8.5.25	Maleic acid							
	$\text{Cu}^+ + \text{cis-HO}_2\text{CCH}=\text{CHCO}_2\text{H} \rightarrow \text{Cu}(\text{maleic acid})^+$	2.0×10^9	3.7		22	p.r.	P.b.k. in N ₂ O-satd. soln. contg. 0.01 mol L ⁻¹ CuSO ₄ , 1.0 mol L ⁻¹ MeOH and (1-100) $\times 10^{-5}$ mol L ⁻¹ maleic acid; $k_t = 1.8 \times 10^5$ s ⁻¹ .	751092

TABLE 8. Rate constants for copper transients — Continued

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t(\text{°C})$	Method	Comment	Ref.
8.5 Copper(I) ion — Continued								
8.5.26 Tetranitromethane								
	$\text{Cu}^+ + \text{C}(\text{NO}_2)_4 \rightarrow \text{Cu}^{2+} + \cdot\text{NO}_2 + \text{C}(\text{NO}_2)_3^-$	4.7×10^8		4.9		25	p.r.	P.b.k. at 350 nm in soln. contg. 0.01 mol L ⁻¹ Cu ²⁺ and (3.12) × 10 ⁻⁵ mol L ⁻¹ tetranitromethane.
		4.2×10^8					p.r.	P.b.k. in O ₂ -free soln. contg. 5 × 10 ⁻³ mol L ⁻¹ Cu ²⁺ and 6.0 × 10 ⁻⁵ mol L ⁻¹ tetranitromethane.
8.6 Copper(I) chloride								
8.6.1 Tris(2,2'-bipyridine)ruthenium(III) ion								
	$\text{CuCl} + \text{Ru(bpy)}_3^{3+} \rightarrow \text{CuCl}^+ + \text{Ru(bpy)}_3^{2+}$	3.5×10^9		1	1.0	21	f.p./oq	P.b.k. in deoxygenated soln. contg. Ru(bpy) ₃ ²⁺ , 0.1 mol L ⁻¹ HClO ₄ , 0.5 mol L ⁻¹ NaCl and Cu(II) (OQ); 75% CuCl ⁺ .
8.7 Tetraformatocuprate(I) ion								
8.7.1 Tris(2,2'-bipyridine)ruthenium(III) ion								
	$\text{Cu}(\text{HCO}_2)_4^{3-} + \text{Ru(bpy)}_3^{3+} \rightarrow \text{Cu}(\text{HCO}_2)_4^{2-} + \text{Ru(bpy)}_3^{2+}$	2.1×10^9		1	1.0	21	f.p./oq	P.b.k. in deoxygenated soln. contg. Ru(bpy) ₃ ²⁺ , 0.1 mol L ⁻¹ HClO ₄ , 0.5 mol L ⁻¹ formate and Cu(II) (OQ); 80% Cu(HCO ₂) ₄ ²⁻ .
8.8 Tetraacetatocuprate(I) ion								
8.8.1 Tris(2,2'-bipyridine)ruthenium(III) ion								
	$\text{Cu(OAc)}_4^{3-} + \text{Ru(bpy)}_3^{3+} \rightarrow \text{Cu(OAc)}_4^{2-} + \text{Ru(bpy)}_3^{2+}$	2.3×10^9		1	1.0	21	f.p./oq	P.b.k. in deoxygenated soln. contg. Ru(bpy) ₃ ²⁺ , 0.1 mol L ⁻¹ HClO ₄ , 0.5 mol L ⁻¹ acetate ion and Cu(II) (OQ); 90% Cu(OAc) ₄ ²⁻ .
8.9 Ethylenediaminetetraacetatocuprate(I) ion								
8.9.1 1-Hydroxybutyl								
	$\text{CuEDTA}^{3-} + \text{CH}_3(\text{CH}_2)_2\dot{\text{C}}\text{HOH} \rightarrow \text{CH}_3(\text{CH}_2)_2\text{CHOHCuEDTA}^{3-}$	5×10^9			7.5		p.r.	P.b.k. at 440 nm in soln. contg. CuEDTA ²⁻ and <i>n</i> -BuOH. Value obtained from computer fit.
8.10 Bis(alaninato)cuprate(I)								
8.10.1 Bis(alaninato)hydroxycopper(II)								
	$\text{Cu}(\text{Ala})_2^- + \text{HOCu}(\text{Ala})_2 \rightarrow \text{Cu}(\text{Ala})_2^- + \text{OH}^-$	1.2×10^9			7.5		p.r.	D.k. at 300 nm in N ₂ O-satd. soln. contg. 2 × 10 ⁻⁴ mol L ⁻¹ Cu(Ala) ₂ , $k = 9 \times 10^8 \text{ L mol}^{-1} \text{s}^{-1}$ in Ar-satd. soln.
8.11 Bleomycin-copper(I) complex								
8.11.1 Hydrogen peroxide								
	$\text{BLM-Cu(I)} + \text{H}_2\text{O}_2 \rightarrow \text{BLM-Cu(III)} + \text{OH}^-$	3.2×10^3		7			p.r.	P.b.k. at 435 nm in N ₂ O-satd. soln. contg. 2 × 10 ⁻² mol L ⁻¹ formate, 10 ⁻³ mol L ⁻¹ H ₂ O ₂ and 5 × 10 ⁻⁵ mol L ⁻¹ BLM-Cu(II); $k_{\text{obs}} = 1.3 \times 10^3 \text{ L mol}^{-1} \text{s}^{-1}$; chain reaction with chain length ~2.5.
8.12 3,6,10,13,16,19-Hexaazabicyclo[6.6.6]eicosane copper(I) ion								
8.12.1 Hydrogen ion								
	$\text{Cu(sar)}^+ + \text{H}^+ \rightarrow \text{Cu(sarH)}^{2+}$	2×10^{10}		3-5		25	p.r.	Condy. change in He-satd. soln. contg. 0.01 mol L ⁻¹ EtOH, HClO ₄ and Cu(sar) ²⁺ ; subsequent protonation was observed with $k = 2 \times 10^7 \text{ L mol}^{-1} \text{s}^{-1}$.

TABLE 8. Rate constants for copper transients — Continued

Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t(\text{°C})$	Method	Comment	Ref.
8.13 1,4,8,11-Tetraazacyclotetradecane copper(I) ion							
8.13.1 Water							
$\text{Cu}(\text{cyclam})^+ + \text{H}_2\text{O} \rightarrow$ $\text{Cu}(\text{cyclam})(\text{H})^{2+} + \text{OH}^-$	$5.4 \times 10^4 \text{ s}^{-1}$		5.1		p.r.	D.k. in Ar-satd. soln. contg. 0.1 mol L^{-1} formate and (2-30) $\times 10^{-5}$ mol L^{-1} $\text{Cu}(\text{cyclam})^{2+}$.	82A320
8.14 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecane copper(I) ion							
8.14.1 Water							
$\text{Cu}(\text{aneN}_4)^+ + \text{H}_2\text{O} \rightarrow$ $\text{Cu}(\text{aneN}_4)(\text{H})^{2+} + \text{OH}^-$	$2.8 \times 10^4 \text{ s}^{-1}$		6.0		p.r.	D.k. in Ar-satd. soln. contg. 0.1 mol L^{-1} MeOH and (2-30) $\times 10^{-5}$ mol L^{-1} $\text{Cu}(\text{aneN}_4)^{2+}$.	82A320
8.14.2 2-Propanol							
$\text{Cu}(\text{aneN}_4)^+ + 2\text{-PrOH} \rightarrow$	5.0×10^5		acid		f.p./pi	D.k. in deaerated soln. contg. $\text{Cu}(\text{aneN}_4)^{2+}$ and 10^{-5} - 10^{-2} mol L^{-1} 2-PrOH.	81A239
8.15 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecopper(I) ion							
8.15.1 Water							
$\text{Cu}(4,11\text{-dieneN}_4)^+ + \text{H}_2\text{O} \rightarrow$ $\text{Cu}(4,11\text{-dieneN}_4)(\text{H})^{2+} + \text{OH}^-$	$1.5 \times 10^5 \text{ s}^{-1}$		6.0		p.r.	D.k. in Ar-satd. soln. contg. 0.1 mol L^{-1} MeOH and (2-30) $\times 10^{-5}$ mol L^{-1} $\text{Cu}(4,11\text{-dieneN}_4)^{2+}$.	80A189
8.15.2 Tris(2,2'-bipyridine)cobalt(III) ion							
$\text{Cu}(4,11\text{-dieneN}_4)^+ + \text{Co}(\text{bpy})_3^{3+} \rightarrow$	1.2×10^7		7.0	0.016- 0.028	p.r.	D.k. in Ar-satd. soln. contg. (2.5-5.0) $\times 10^{-3}$ mol L^{-1} $\text{Cu}(4,11\text{-dieneN}_4)^{2+}$, (2.5-10) $\times 10^{-4}$ mol L^{-1} $\text{Co}(\text{bpy})_3^{3+}$ and 1 mol L^{-1} <i>tert</i> -BuOH.	761039
8.15.3 Tri(2,2'-bipyridine)chromium(III) ion							
$\text{Cu}(4,11\text{-dieneN}_4)^+ + \text{Cr}(\text{bpy})_3^{3+} \rightarrow$ $\text{Cu}(4,11\text{-dieneN}_4)^{2+} + \text{Cr}(\text{bpy})_3^{2+}$	3.7×10^6		4	0.01	p.r.	D.k. and/or p.b.k. in N_2 -satd. soln. contg. $\text{Cu}(4,11\text{-dieneN}_4)^{2+}$ and alcohol.	88A334
	3.7×10^6		7.0	0.016- 0.028	p.r.	D.k. in Ar-satd. soln. contg. (2.5-5.0) $\times 10^{-3}$ mol L^{-1} $\text{Cu}(4,11\text{-dieneN}_4)^{2+}$, (2.5-10) $\times 10^{-4}$ mol L^{-1} $\text{Cr}(\text{bpy})_3^{3+}$ and 1 mol L^{-1} <i>tert</i> -BuOH.	761039
8.15.4 Hydrogen ion							
$\text{Cu}(4,11\text{-dieneN}_4)^+ + \text{H}^+ \rightarrow$	5.0×10^6		<1.3	0.06- 0.3	p.r.	D.k. in Ar-satd. soln. contg. 3×10^{-3} mol L^{-1} $\text{Cu}(4,11\text{-dieneN}_4)^{2+}$ and 1 mol L^{-1} <i>tert</i> -BuOH. Reaction suggested to involve proton transfer to the metal centre to give a hydrido complex.	761039
8.15.5 Nitrous oxide							
$\text{Cu}(4,11\text{-dieneN}_4)^+ + \text{N}_2\text{O} \rightarrow$	1.7×10^6		7.0		p.r.	D.k. in Ar-satd. soln. contg. 3×10^{-3} mol L^{-1} $\text{Cu}(4,11\text{-dieneN}_4)^{2+}$, (7.5-25) $\times 10^{-4}$ mol L^{-1} N_2O and 1 mol L^{-1} <i>tert</i> -BuOH.	761039
8.15.6 Oxygen							
$\text{Cu}(4,11\text{-dieneN}_4)^+ + \text{O}_2 \rightarrow$ $\text{Cu}(4,11\text{-dieneN}_4)\text{O}_2^+$	2.6×10^7		7.0		p.r.	D.k. in Ar-satd. soln. contg. 3×10^{-3} mol L^{-1} $\text{Cu}(4,11\text{-dieneN}_4)^{2+}$, (7.5-25) $\times 10^{-4}$ mol L^{-1} O_2 and 1 mol L^{-1} <i>tert</i> -BuOH.	761039
8.15.7 Hexaammineruthenium(III) ion							
$\text{Cu}(4,11\text{-dieneN}_4)^+ + \text{Ru}(\text{NH}_3)_6^{3+} \rightarrow$ $\text{Cu}(4,11\text{-dieneN}_4)^{2+} + \text{Ru}(\text{NH}_3)_6^{2+}$	7.1×10^4		4	0.01	p.r.	D.k. and/or p.b.k. in N_2 -satd. soln. contg. $\text{Cu}(4,11\text{-dieneN}_4)^{2+}$ and alcohol.	88A334
	7.2×10^4		7.0	0.016- 0.028	p.r.	D.k. in Ar-satd. soln. contg. (2.5-5.0) $\times 10^{-3}$ mol L^{-1} $\text{Cu}(4,11\text{-dieneN}_4)^{2+}$, (2.5-10) $\times 10^{-4}$ mol L^{-1} $\text{Ru}(\text{NH}_3)_6^{3+}$ and 1 mol L^{-1} <i>tert</i> -BuOH.	761039

TABLE 8. Rate constants for copper transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>l</i>	T(°C)	Method	Comment	Ref.
8.15 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecopper(I) ion — Continued								
8.15.8 9,10-Anthraquinone-2,6-disulfonate ion								
	$\text{Cu}(4,11\text{-dieneN}_4)^+ + 2,6\text{-diSO}_3\text{AQ}^{2-} \rightarrow$	4.3×10^9		7.0	0.004	p.r.	D.k. in Ar-satd. soln. contg. 3×10^{-3} mol L ⁻¹ Cu(4,11-dieneN ₄) ²⁺ , (2.5-5) $\times 10^{-4}$ mol L ⁻¹ quinone and 1 mol L ⁻¹ <i>tert</i> -BuOH.	761039
8.15.9 9,10-Anthraquinone-2-sulfonate ion								
	$\text{Cu}(4,11\text{-dieneN}_4)^+ + 2\text{-SO}_3\text{AQ}^- \rightarrow$	1.1×10^9		7.0	0.004	p.r.	D.k. in Ar-satd. soln. contg. 3×10^{-3} mol L ⁻¹ Cu(4,11-dieneN ₄) ²⁺ , (2.5-5) $\times 10^{-4}$ mol L ⁻¹ quinone and 1 mol L ⁻¹ <i>tert</i> -BuOH.	761039
8.15.10 1,4-Benzoquinone								
	$\text{Cu}(4,11\text{-dieneN}_4)^+ + \text{Q} \rightarrow$	2.6×10^9		7.0	0.004	p.r.	D.k. in Ar-satd. soln. contg. 3×10^{-3} mol L ⁻¹ Cu(4,11-dieneN ₄) ²⁺ , (2.5-5) $\times 10^{-4}$ mol L ⁻¹ benzoquinone and 1 mol L ⁻¹ <i>tert</i> -BuOH.	761039
8.15.11 Iodomethane								
	$\text{Cu}(4,11\text{-dieneN}_4)^+ + \text{CH}_3\text{I} \rightarrow$	3.1×10^6		9.2	0.01	p.r.	D.k. in Ar-satd. soln. contg. 3×10^{-3} mol L ⁻¹ Cu(4,11-dieneN ₄) ²⁺ , (2.5-5) $\times 10^{-4}$ mol L ⁻¹ CH ₃ I and 1 mol L ⁻¹ <i>tert</i> -BuOH.	761039
8.16 2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraenecopper(I) ion								
8.16.1 Tris(2,2'-bipyridine)cobalt(III) ion								
	$\text{Cu}(\text{Me}_4\text{tetraeneN}_4)^+ + \text{Co}(\text{bpy})_3^{3+} \rightarrow$	5.6×10^6		4	0.01	p.r.	D.k. and/or p.b.k. in N ₂ -satd. soln. contg. Cu(Me ₄ tetraeneN ₄) ²⁺ and alcohol.	88A334
	$\text{Cu}(\text{Me}_4\text{tetraeneN}_4)^{2+} + \text{Co}(\text{bpy})_3^{2+}$							
8.16.2 Tris(ethylenediamine)cobalt(III) ion								
	$\text{Cu}(\text{Me}_4\text{tetraeneN}_4)^+ + \text{Co}(\text{en})_3^{3+} \rightarrow$	3.3×10^6		6	0.01	p.r.	D.k. and/or p.b.k. in N ₂ -satd. soln. contg. Cu(Me ₄ tetraeneN ₄) ²⁺ and alcohol.	88A334
	$\text{Cu}(\text{Me}_4\text{tetraeneN}_4)^{2+} + \text{Co}(\text{en})_3^{2+}$							
8.16.3 Hexaammineruthenium(III) ion								
	$\text{Cu}(\text{Me}_4\text{tetraeneN}_4)^+ + \text{Ru}(\text{NH}_3)_6^{3+} \rightarrow$	1.2×10^5		4	0.01	p.r.	D.k. and/or p.b.k. in N ₂ -satd. soln. contg. Cu(Me ₄ tetraeneN ₄) ²⁺ and alcohol.	88A334
	$\text{Cu}(\text{NH}_3)_6^{2+}$							
8.17 α-2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaenecopper(I) ion								
8.17.1 Tris(2,2'-bipyridine)cobalt(III) ion								
	$\text{Cu}(\text{Me}_2\text{pyo}[14]\text{trieneN}_4)^+ + \text{Co}(\text{bpy})_3^{3+} \rightarrow$	2.5×10^7		4	0.01	p.r.	D.k. and/or p.b.k. in N ₂ -satd. soln. contg. Cu(Me ₂ pyo[14]trieneN ₄) ²⁺ and alcohol.	88A334
	$\text{Cu}(\text{Me}_2\text{pyo}[14]\text{trieneN}_4)^{2+} + \text{Co}(\text{bpy})_3^{2+}$							
8.17.2 Hexaammineruthenium(III) ion								
	$\text{Cu}(\text{Me}_2\text{pyo}[14]\text{trieneN}_4)^+ + \text{Ru}(\text{NH}_3)_6^{3+} \rightarrow$	1.5×10^6		4	0.01	p.r.	D.k. and/or p.b.k. in N ₂ -satd. soln. contg. Cu(Me ₂ pyo[14]trieneN ₄) ²⁺ and alcohol.	88A334
	$\text{Cu}(\text{Me}_2\text{pyo}[14]\text{trieneN}_4)^{2+} + \text{Ru}(\text{NH}_3)_6^{2+}$							
8.17.3 Tris(2,2'-bipyridine)rhodium(II) ion								
	$\text{Cu}(\text{Me}_2\text{pyo}[14]\text{trieneN}_4)^+ + \text{Rh}(\text{bpy})_3^{2+} \rightarrow$	1.3×10^7		4	0.7	p.r.	D.k. and/or p.b.k. in N ₂ -satd. soln. contg. Cu(Me ₂ pyo[14]trieneN ₄) ²⁺ and alcohol.	88A334
	$\text{Cu}(\text{Me}_2\text{pyo}[14]\text{trieneN}_4)^{2+} + \text{Rh}(\text{bpy})_3^+$							
8.18 Bis(2,2'-bipyridine)copper(I) ion								
8.18.1 Hydrogen peroxide								
	$\text{Cu}(\text{bpy})_2^+ + \text{H}_2\text{O}_2 \rightarrow \text{Cu}(\text{bpy})_2^{2+} + \text{OH} + \text{OH}^-$	1.5×10^3		7		p.r.	D.k. in soln. contg. 3×10^{-5} mol L ⁻¹ Cu(bpy) ₂ ²⁺ , 0.05 mol L ⁻¹ formate and (1-4) $\times 10^{-4}$ mol L ⁻¹ H ₂ O ₂ .	85A059

TABLE 8. Rate constants for copper transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
8.18 Bis(2,2'-bipyridine)copper(I) ion — Continued								
8.18.2 Oxygen								
	$\text{Cu}(\text{bpy})_2^+ + \text{O}_2 \rightarrow \text{Cu}(\text{bpy})_2^{2+} + \text{O}_2^{\cdot-}$	5.8×10^4		7		p.r.	D.k. in O_2 -saturated soln. contg. 0.02 mol L ⁻¹ formate, 1.96×10^{-6} mol L ⁻¹ SOD and $(1-4) \times 10^{-5}$ mol L ⁻¹ $\text{Cu}(\text{bpy})_2^{2+}$.	85A059
8.18.3 Superoxide radical anion								
	$\text{Cu}(\text{bpy})_2^+ + \text{O}_2^{\cdot-} + 2 \text{H}^+ \rightarrow \text{H}_2\text{O}_2 + \text{Cu}(\text{bpy})_2^{2+}$	1.8×10^8		7		p.r.	D.k. in air-saturated soln. contg. 0.02 mol L ⁻¹ formate and $(1-7) \times 10^{-7}$ mol L ⁻¹ $\text{Cu}(\text{bpy})_2^{2+}$.	85A059
8.19 Bis(1,10-phenanthroline)copper(I) ion								
8.19.1 Hydrogen peroxide								
	$\text{Cu}(\text{phen})_2^+ + \text{H}_2\text{O}_2 \rightarrow \text{Cu}(\text{phen})_2^{2+} + \cdot\text{OH} + \text{OH}^-$	9.4×10^2		7		p.r.	D.k. in soln. contg. 3×10^{-5} mol L ⁻¹ $\text{Cu}(\text{phen})_2^{2+}$, 0.05 mol L ⁻¹ formate and $(5-45) \times 10^{-4}$ mol L ⁻¹ H_2O_2 ; [85G297] shows $\cdot\text{OH}$ is not formed directly but through decomposition of a metal-peroxy complex, and <i>k</i> is about 1100 L mol ⁻¹ s ⁻¹ .	83A299
8.19.2 Oxygen								
	$\text{Cu}(\text{phen})_2^+ + \text{O}_2 \rightarrow \text{Cu}(\text{phen})_2^{2+} + \text{O}_2^{\cdot-}$	5.0×10^4		7		p.r.	D.k. in O_2 -saturated soln. contg. 0.02 mol L ⁻¹ formate, and 1.2×10^{-6} mol L ⁻¹ SOD and $-(1-8) \times 10^{-5}$ mol L ⁻¹ $\text{Cu}(\text{phen})_2^{2+}$.	83A299
8.19.3 Superoxide radical anion								
	$\text{Cu}(\text{phen})_2^+ + \text{O}_2^{\cdot-} + 2 \text{H}^+ \rightarrow \text{H}_2\text{O}_2 + \text{Cu}(\text{phen})_2^{2+}$	3.0×10^8		7		p.r.	D.k. at 435 nm in soln. contg. 0.05 mol L ⁻¹ formate and 10^{-3} mol L ⁻¹ phosphate; 1,10-phenanthroline/Cu ²⁺ concn. = 2.0-2.5.	83A299
8.20 Bis(5-chloro-1,10-phenanthroline)copper(I) ion								
8.20.1 Oxygen								
	$\text{Cu}(\text{5-Clphen})_2^+ + \text{O}_2 \rightarrow \text{Cu}(\text{5-Clphen})_2^{2+} + \text{O}_2^{\cdot-}$	5.0×10^3		7		p.r.	D.k. in O_2 -saturated soln. contg. 0.02 mol L ⁻¹ formate, 1.96×10^{-6} mol L ⁻¹ SOD and $(0.1-1) \times 10^{-4}$ mol L ⁻¹ $\text{Cu}(\text{5-Clphen})_2^{2+}$.	85A059
8.20.2 Superoxide radical anion								
	$\text{Cu}(\text{5-Clphen})_2^+ + \text{O}_2^{\cdot-} + 2 \text{H}^+ \rightarrow \text{H}_2\text{O}_2 + \text{Cu}(\text{5-Clphen})_2^{2+}$	2.1×10^8		7		p.r.	D.k. in air-saturated soln. contg. 0.02 mol L ⁻¹ formate and $(1-7) \times 10^{-7}$ mol L ⁻¹ $\text{Cu}(\text{5-Clphen})_2^{2+}$.	85A059
8.21 Bis(5-nitro-1,10-phenanthroline)copper(I) ion								
8.21.1 Hydrogen peroxide								
	$\text{Cu}(\text{5-NO}_2\text{phen})_2^+ + \text{H}_2\text{O}_2 \rightarrow \text{Cu}(\text{5-NO}_2\text{phen})_2^{2+} + \cdot\text{OH} + \text{OH}^-$	4.4×10^2		7		p.r.	D.k. in soln. contg. 3×10^{-5} mol L ⁻¹ $\text{Cu}(\text{5-NO}_2\text{phen})_2^{2+}$, 0.05 mol L ⁻¹ formate and $(1-5) \times 10^{-4}$ mol L ⁻¹ H_2O_2 .	85A059
8.21.2 Oxygen								
	$\text{Cu}(\text{5-NO}_2\text{phen})_2^+ + \text{O}_2 \rightarrow \text{Cu}(\text{5-NO}_2\text{phen})_2^{2+} + \text{O}_2^{\cdot-}$	5.8×10^2		7		p.r.	D.k. in O_2 -saturated soln. contg. 0.02 mol L ⁻¹ formate and 1.96×10^{-6} mol L ⁻¹ SOD and $(1-4) \times 10^{-5}$ mol L ⁻¹ $\text{Cu}(\text{5-NO}_2\text{phen})_2^{2+}$.	85A059
8.21.3 Superoxide radical anion								
	$\text{Cu}(\text{5-NO}_2\text{phen})_2^+ + \text{O}_2^{\cdot-} + 2 \text{H}^+ \rightarrow \text{H}_2\text{O}_2 + \text{Cu}(\text{5-NO}_2\text{phen})_2^{2+}$	8.3×10^8		7		p.r.	D.k. in air-saturated soln. contg. 0.02 mol L ⁻¹ formate and $(1-6) \times 10^{-7}$ mol L ⁻¹ $\text{Cu}(\text{5-NO}_2\text{phen})_2^{2+}$.	85A059

TABLE 8. Rate constants for copper transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
8.22 Bis(5-methyl-1,10-phenanthroline)copper(I) ion								
8.22.1 Hydrogen peroxide								
$\text{Cu}(\text{5-Mephen})_2^{+} + \text{H}_2\text{O}_2 \rightarrow \text{Cu}(\text{5-Mephen})_2^{2+} + \cdot\text{OH} + \text{OH}^-$		1.6×10^3	7			p.r.	D.k. in soln. contg. 3×10^{-5} mol L ⁻¹ Cu(5-Mephen) ₂ ²⁺ , 0.05 mol L ⁻¹ formate and $(1-4) \times 10^{-3}$ mol L ⁻¹ H ₂ O ₂ .	85A059
8.22.2 Oxygen								
$\text{Cu}(\text{5-Mephen})_2^{+} + \text{O}_2 \rightarrow \text{Cu}(\text{5-Mephen})_2^{2+} + \text{O}_2^{\cdot-}$		6.6×10^4	7			p.r.	D.k. in O ₂ -sadt. soln. contg. 0.02 mol L ⁻¹ formate, 1.96×10^{-6} mol L ⁻¹ SOD and $(1-4) \times 10^{-5}$ mol L ⁻¹ Cu(5-Mephen) ₂ ²⁺ .	85A059
8.22.3 Superoxide radical anion								
$\text{Cu}(\text{5-Mephen})_2^{+} + \text{O}_2^{\cdot-} + 2 \text{H}^+ \rightarrow \text{H}_2\text{O}_2 + \text{Cu}(\text{5-Mephen})_2^{2+}$		2.3×10^8	7			p.r.	D.k. in air-sadt. soln. contg. 0.02 mol L ⁻¹ formate and $(1-4) \times 10^{-7}$ mol L ⁻¹ Cu(5-Mephen) ₂ ²⁺ .	85A059
8.23 Bis(2,9-dimethyl-1,10-phenanthroline)copper(I) ion								
8.23.1 Superoxide radical anion								
$\text{Cu}(2,9\text{-Me}_2\text{phen})_2^{+} + \text{O}_2^{\cdot-} + 2 \text{H}^+ \rightarrow \text{H}_2\text{O}_2 + \text{Cu}(2,9\text{-Me}_2\text{phen})_2^{2+}$		2.4×10^8	7			p.r.	D.k. in air-sadt. soln. contg. 0.02 mol L ⁻¹ formate and $(1-6) \times 10^{-7}$ mol L ⁻¹ Cu(2,9-Me ₂ phen) ₂ ²⁺ .	85A059
8.24 5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatocopper(II), radical anion								
8.24.1 5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatocopper(II), radical anion								
$[\text{CuTMpyP}]^{3+} + [\text{CuTMpyP}]^{3+} \rightarrow [\text{CuTMpyP}]^{4+}$		9.1×10^8	6.8			p.r.	D.k. in N ₂ O-sadt. soln. contg. CuTMpyP ⁴⁺ and 2-PrOH; disproportionation reaction; $\Delta G = 27$ kJ mol ⁻¹ .	83C026
8.24.2 Hydrogen ion								
$[\text{CuTMpyP}]^{3+} + \text{H}^+ \rightarrow [\text{CuTMpyPH}]^{4+}$		$\geq 2 \times 10^7$	0.9-1.5	21		p.r.	P.b.k. at 640 nm in deoxygenated soln. contg. 2-PrOH, 0.001 mol L ⁻¹ CuTMpyP ⁴⁺ and varied [H ⁺].	92A390
8.25 5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatocuprate(II), radical anion								
8.25.1 Hydrogen ion								
$[\text{CuTPPS}]^{5-} + \text{H}^+ \rightarrow [\text{CuTPPSH}]^{4-}$		5×10^7	3.5-4.1	21		p.r.	P.b.k. at 650 nm in deoxygenated soln. contg. 2-PrOH, 4.5×10^{-5} mol L ⁻¹ CuTPPS ⁴⁻ and $(0.8-3.4) \times 10^{-4}$ mol L ⁻¹ H ⁺ .	92A390
8.26 Tetrakis-4-(<i>N,N,N</i>-trimethylammonio)phenylporphinecopper(II), radical anion								
8.26.1 Hydrogen ion								
$[\text{CuTAPP}]^{3+} + \text{H}^+ \rightarrow [\text{CuTAPPH}]^{4+}$		8×10^6	2.4-3.0	21		p.r.	P.b.k. at 640 nm in deoxygenated soln. contg. 2-PrOH, CuTAPP ⁴⁺ and varied [H ⁺].	92A390
8.27 Hydridocupper(II) ion								
8.27.1 Water								
$\text{CuH}^+ + \text{H}_2\text{O} \rightarrow \text{Cu}^{2+} + \text{H}_2 + \text{OH}^-$		4×10^3 s ⁻¹	3-6			p.r.	D.k. at 340 nm in soln. contg. $(2-10) \times 10^{-4}$ mol L ⁻¹ CuSO ₄ satd. with 100 atm H ₂ .	82A104

TABLE 8. Rate constants for copper transients — Continued

No.	Reaction	k (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
8.28 Methylcopper(II) ion								
8.28.1	Hydrogen ion							
	$\text{CuCH}_3^+ + \text{H}^+ \rightarrow \text{Cu}^{2+} + \text{CH}_4$	2×10^3	1			p.r.	D.k. in N ₂ O-satd. soln. contg. 9 × 10 ⁻⁴ mol L ⁻¹ CuSO ₄ , 0.09 mol L ⁻¹ DMSO and 2 × 10 ⁻⁴ mol L ⁻¹ Cr ²⁺ . Authors reported $k = 200$ s ⁻¹ at pH 1.	86A115
8.28.2 Methylcopper(II) ion								
	$\text{CuCH}_3^+ + \text{CuCH}_3^+ \rightarrow 2 \text{Cu}^+ + \text{C}_2\text{H}_6$	9×10^6		≥2.5		p.r.	D.k. in N ₂ O-satd. soln. contg. 9 × 10 ⁻⁴ mol L ⁻¹ CuSO ₄ , 0.09 mol L ⁻¹ DMSO and 2 × 10 ⁻⁴ mol L ⁻¹ Cr ²⁺ .	86A115
8.29 Carboxylatocopper(II)								
8.29.1	Copper(I) ion							
	$\text{CuCO}_2 + \text{Cu}^+ \rightarrow \text{Cu}_2^+ + \text{CO}_2$	$\sim 10^8$		7.3		p.r.	D.k. at 480 nm in Ar-satd. soln. contg. 1 × 10 ⁻⁴ mol L ⁻¹ Cu(ClO ₄) ₂ and 0.01 mol L ⁻¹ formate.	91A367
8.29.2	Copper(II) ion							
	$\text{CuCO}_2 + \text{Cu}^{2+} \rightarrow 2 \text{Cu}^+ + \text{CO}_2$	5×10^8		7.3		p.r.	D.k. at 480 nm in N ₂ O-satd. soln. contg. (1-3) × 10 ⁻⁴ mol L ⁻¹ Cu(ClO ₄) ₂ and 5 × 10 ⁻³ mol L ⁻¹ formate.	91A367
8.29.3	Oxalatocuprate(II) ions							
	$\text{CuCO}_2 + \text{Cu}(\text{C}_2\text{O}_4)_n^{(2-n)+} \rightarrow$	2×10^9		0.1		f.p.	D.k. in soln. contg. 2 × 10 ⁻⁴ mol L ⁻¹ Cu(II), 10 ⁻² mol L ⁻¹ oxalate, varied [O ₂] and pH; value refers to basic form of CuCO ₂ . For an acidic form of CoCO ₂ , $k = 1 \times 10^7$ L mol ⁻¹ s ⁻¹ .	80A239
8.29.4	Oxygen							
	$\text{CuCO}_2 + \text{O}_2 \rightarrow$	3×10^7		0.1		f.p.	D.k. in soln. contg. 2 × 10 ⁻⁴ mol L ⁻¹ Cu(II), 10 ⁻² mol L ⁻¹ oxalate, varied [O ₂] and pH; value refers to basic form of CuCO ₂ . For an acidic form of CoCO ₂ , $k = 4 \times 10^5$ L mol ⁻¹ s ⁻¹ .	80A239
8.30 2-Ammonio-1-carboxyethylcopper(II) ion								
8.30.1	First-order reaction							
	$\text{CuCH}(\text{CH}_2\text{NH}_3)\text{CO}_2^+ \rightarrow \text{Cu}^{2+} + \text{NH}_3 + \text{CH}_2=\text{CHCO}_2^-$	2.7×10^4 s ⁻¹		≤3		p.r.	D.k. at 380 nm in N ₂ O-satd. soln. contg. 0.1 mol L ⁻¹ β-alanine, (3.5-11) × 10 ⁻⁵ mol L ⁻¹ Cu ⁺ and (0-1) × 10 ⁻³ mol L ⁻¹ Cu ²⁺ .	92A134
8.31 2-Ammonioethylcopper(II) ion								
8.31.1	First-order reaction							
	$\text{CuCH}_2\text{CH}_2\text{NH}_3^{2+} \rightarrow \text{CuCH}=\text{CH}_2^{2+} + \text{NH}_3$	2.4 s ⁻¹		2.3-		p.r.	D.k. at 370 nm in N ₂ O-satd. soln. contg. 0.05-0.1 mol L ⁻¹ ethylamine, (2.5-8.0) × 10 ⁻⁴ mol L ⁻¹ CuSO ₄ and (0.5-1.0) × 10 ⁻⁴ mol L ⁻¹ Cu ⁺ . Complex formed by reaction of Cu ⁺ with ${}^1\text{CH}_2\text{CH}_2\text{NH}_3^+$, $k = 1.1 \times 10^9$ L mol ⁻¹ s ⁻¹ .	93A473
8.32 2-Hydroxy-2,2-dimethylethylcopper(II) ion								
8.32.1	First-order reaction							
	$\text{CuCH}_2\text{C}(\text{CH}_3)_2\text{OH}^+ \rightarrow \text{CH}_2=\text{C}(\text{CH}_3)_2 + \text{Cu}^{2+} + \text{OH}^-$	2.2×10^5 s ⁻¹		2.7		p.r.	D.k. in N ₂ O-satd. soln. contg. (5-20) × 10 ⁻⁴ mol L ⁻¹ CuSO ₄ , (5-30) × 10 ⁻⁵ mol L ⁻¹ Cu ⁺ , (5-30) × 10 ⁻⁵ mol L ⁻¹ Cr(III), and 0.1-1 mol L ⁻¹ <i>tert</i> -BuOH. $k = 5.0 \times 10^4 + 8.6 \times 10^7 [\text{H}_3\text{O}^+] \text{ s}^{-1}$.	88A410

TABLE 8. Rate constants for copper transients — Continued

No.	Reaction	k (L mol ⁻¹ s ⁻¹)	pH	I	t (°C)	Method	Comment	Ref.
8.33 2-Ammonio-2,2-dimethylethylcopper(II) ion								
8.33.1 First-order reaction								
	$\text{CuCH}_2\text{C}(\text{CH}_3)_2\text{NH}_3^{2+} \rightarrow \text{Cu}^{2+} + \text{CH}_2=\text{C}(\text{CH}_3)_2 + \text{NH}_3$	7.0 s ⁻¹		1.5-3		p.r.	D.k. at 375 nm in N ₂ O-satd. soln. contg. (0.39-1.1) × 10 ⁻⁴ mol L ⁻¹ Cu ⁺ , (0.5) × 10 ⁻⁴ mol L ⁻¹ CuSO ₄ and 0.02-0.2 mol L ⁻¹ 2-methyl-2-propanamine.	92A073
8.34 1,3-Diammonio-2-propylcopper(II) ion								
8.34.1 First-order reaction								
	$\text{CuCH}(\text{CH}_2\text{NH}_3^+)_2^+ \rightarrow$	2.0 s ⁻¹		3.0-3.8		p.r.	D.k. in N ₂ O-satd. soln. contg. 0.05-0.1 mol L ⁻¹ 1,3-propanediamine, (0.2-5) × 10 ⁻⁴ mol L ⁻¹ CuSO ₄ and (0.62-1.2) × 10 ⁻⁴ mol L ⁻¹ Cu ⁺ . Complex formed by reaction of Cu ⁺ with $^*\text{CH}(\text{CH}_2\text{NH}_3^+)_2$, $k = 4.2 \times 10^8$ L mol ⁻¹ s ⁻¹ .	93A473
8.35 2-(Dimethylammonio)-1-(dimethylammoniomethyl)ethylcopper(II) ion								
8.35.1 First-order reaction								
	$\text{CuCH}(\text{CH}_2\text{NMe}_2\text{H}^+)_2^+ \rightarrow$	150 s ⁻¹		2.2-3.8		p.r.	D.k. in N ₂ O-satd. soln. contg. 0.05-0.1 mol L ⁻¹ <i>N,N,N',N'</i> -tetramethyl-1,3-propanediamine, 0-0.001 mol L ⁻¹ CuSO ₄ and (0.05-0.13) × 10 ⁻³ mol L ⁻¹ Cu ⁺ . Complex formed by reaction of Cu ⁺ with $^*\text{CH}(\text{CH}_2\text{NMe}_2\text{H}^+)_2$, $k = 4.2 \times 10^8$ L mol ⁻¹ s ⁻¹ .	93A473
8.36 2-(Dimethylammonio)ethylcopper(II) ion								
8.36.1 First-order reaction								
	$\text{CuCH}_2\text{CH}_2\text{NEt}_2\text{H}^{2+} \rightarrow \text{Cu}^{2+} + \text{CH}_2=\text{CH}_2 + (\text{C}_2\text{H}_5)_2\text{NH}$	190 s ⁻¹		2.2-3.8		p.r.	D.k. at 370 nm in N ₂ O-satd. soln. contg. 0.05-0.1 mol L ⁻¹ triethylamine, (0-8) × 10 ⁻⁴ mol L ⁻¹ CuSO ₄ and (0.59-1.10) × 10 ⁻⁴ mol L ⁻¹ Cu ⁺ . Complex formed by reaction of Cu ⁺ with $^*\text{CH}_2\text{CH}_2\text{NEt}_2\text{H}^+$, $k = 7.5 \times 10^8$ L mol ⁻¹ s ⁻¹ .	93A473
8.37 2-Carboxy-2,2-dimethylethylcopper(II) ion								
8.37.1 First-order reaction								
	$\text{CuCH}_2\text{C}(\text{CH}_3)_2\text{CO}_2\text{H}^+ \rightarrow \text{Cu}^{2+} + \text{CH}_2=\text{C}(\text{CH}_3)_2\text{CO}_2\text{H}$	1.6×10^5 s ⁻¹		3.0		p.r.	Calculated from the intercept of plot of rate of formation of complex on [Cu ⁺] in N ₂ O-satd. soln. contg. 0.001 mol L ⁻¹ Cu ²⁺ , 0.05 mol L ⁻¹ (CH ₃) ₃ CCO ₂ H and (5-30) × 10 ⁻⁵ mol L ⁻¹ Cu ⁺ ; $k_r = 2.4 \times 10^9$ L mol ⁻¹ s ⁻¹ .	90A474
8.37.2 Copper(II) ion								
	$\text{CuCH}_2\text{C}(\text{CH}_3)_2\text{CO}_2\text{H}^+ + \text{Cu}^{2+} + \text{H}^+ \rightarrow 2 \text{Cu}^{2+} + (\text{CH}_3)_3\text{CCO}_2\text{H}$	1×10^7		3.0		p.r.	D.k. in N ₂ O-satd. soln. contg. varied [Cu ²⁺], 0.05 mol L ⁻¹ (CH ₃) ₃ CCO ₂ H and 1 × 10 ⁻⁴ mol L ⁻¹ Cu ⁺ .	90A474
8.38 2-Ammonio-2-carboxypropylcopper(II) ion								
8.38.1 First-order reaction								
	$\text{CuCH}_2\text{C}(\text{CH}_3)(\text{NH}_3)\text{CO}_2^+ \rightarrow \text{Cu}^{2+} + \text{NH}_3 + \text{CH}_2=\text{C}(\text{CH}_3)\text{CO}_2^-$	2.7 s ⁻¹		3		p.r.	D.k. at 300 and 350 nm in N ₂ O-satd. soln. contg. 0.05 mol L ⁻¹ 2-methylalanine, (5-15) × 10 ⁻⁵ mol L ⁻¹ Cu ⁺ and (3-100) × 10 ⁻³ mol L ⁻¹ Cu ²⁺ .	92A215

TABLE 8. Rate constants for copper transients — Continued

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t(\text{°C})$	Method	Comment	Ref.
8.39 Copper(II) ion, complex with cyclohexene								
8.39.1	2-Hydroxycyclohexyl							
	$\text{Cu}(\text{cyclohexene})^+ + \text{CH}_2\text{OH}(\text{CH}_2)_4^- \rightarrow \text{c-C}_6\text{H}_{10} + \text{CuCH}_2(\text{OH})(\text{CH}_2)_4^+$	2.6×10^9	1-	5.5		p.r.	P.b.k. in N_2O -satd. soln. contg. (5-20) $\times 10^{-4}$ mol L^{-1} CuSO_4 , (5-40) $\times 10^{-5}$ mol L^{-1} Cu^+ , (5-40) $\times 10^{-5}$ mol L^{-1} Cr(III) , 0.02-0.15 mol L^{-1} cyclohexene and 0.15-0.65 mol L^{-1} acetonitrile.	91A152
8.40 4-Hydroxyphenoxy copper(II) ion, conjugate base								
8.40.1	4-Hydroxyphenoxy copper(II) ion, conjugate base							
	$\text{CuOC}_6\text{H}_4\text{-4-O} + \text{CuOC}_6\text{H}_4\text{-4-O} \rightarrow$	3.8×10^7		7.0		f.p.	D.k. at 425 nm in soln. contg. Cu^+ and 1 $\times 10^{-4}$ mol L^{-1} hydroquinone.	78A449
8.41 (1-Hydroxybutyl)ethylenediaminetetraacetato cuprate(II) ion								
8.41.1	Nitrite ion							
	$\text{CH}_3(\text{CH}_2)_2\text{CHOHCuEDTA}^{3-} + \text{NO}_2^- \rightarrow$	4×10^5		7.5		p.r.	D.k. at 440 nm in soln. contg. CuEDTA^{2-} and 1-butanol.	80A153
8.42 Bis(1,10-phenanthroline)(2-hydroxyethyl)copper(II) ion								
8.42.1	First-order reaction							
	$\text{HOCH}_2\text{CH}_2\text{Cu}(\text{phen})_2^+ \rightarrow \text{Cu}(\text{phen})_2^{2+} + \text{H}_2\text{C=CH}_2 + \text{OH}^-$	$1.1 \times 10^4 \text{ s}^{-1}$	4-10			p.r.	D.k. at 430 nm in ethylene-satd. soln. contg. $\text{Cu}(\text{phen})_2^{2+}$.	88A392
8.43 Bis(1,10-phenanthroline)(2-hydroxy-2,2-dimethylethyl)copper(II) ion								
8.43.1	First-order reaction							
	$\text{HOC}(\text{CH}_3)_2\text{CH}_2\text{Cu}(\text{phen})_2^+ \rightarrow \text{Cu}(\text{phen})_2^{2+} + \text{CH}_2=\text{C}(\text{CH}_3)_2 + \text{OH}^-$	$1.7 \times 10^3 \text{ s}^{-1}$	4-10			p.r.	D.k. in He -satd. soln. contg. 0.1 mol L^{-1} <i>tert</i> -BuOH and $\text{Cu}(\text{phen})_2^{2+}$.	88A392
8.43a Aminomethyl(glycinato)copper(II)								
8.43a.1	Oxygen							
	$(\text{Gly})\text{CuCH}_2\text{NH}_2 + \text{O}_2 \rightarrow$	2×10^5	6.3			f.p.	Estd. from dependence of d.k. in soln. contg. 2×10^{-4} mol L^{-1} Cu(II) and 10^{-3} mol L^{-1} glycine on $[\text{O}_2]$.	84A293
8.44 α-2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaenecopper(II) ion OH-adduct								
8.44.1	First-order reaction							
	$\text{Cu}(\text{Me}_2\text{pyo}[14]\text{trieneN}_4\text{)}^{2+}(\text{OH})^- \rightarrow$	$6.3 \times 10^5 \text{ s}^{-1}$	3.5, 4.5	0.1		p.r.	D.k. in N_2O -satd. soln. contg. $\text{Cu}(\text{Me}_2\text{pyo}[14]\text{trieneN}_4\text{)}^{2+}$ and NaClO_4 ; the product is a Cu(I) species formed by intramolecular reduction which decays with $k = 1.6 \times 10^3 \text{ s}^{-1}$.	86A210
8.45 Copper(III)								
8.45.1	Iron(II) ion							
	$\text{Cu}(\text{III}) + \text{Fe}^{2+} \rightarrow \text{Cu}^{2+} + \text{Fe}^{3+}$	3.3×10^8		2.1		p.r.	P.b.k. at 238 nm in soln. contg. (5-30) $\times 10^{-4}$ mol L^{-1} Fe^{2+} , 10^{-2} mol L^{-1} Cu^{2+} , 5 $\times 10^{-5}$ mol L^{-1} Fe^{3+} and H_2SO_4 ; $k = 1.3 \times 10^8 \text{ L mol}^{-1} \text{ s}^{-1}$ in HClO_4 .	79G260 761074
8.45.2	Hydrogen peroxide							
	$\text{Cu}(\text{III}) + \text{H}_2\text{O}_2 \rightarrow$	2×10^6				γ-r.	Estimated from computer simulation based on G for HCHO and Cu^+ in N_2O -satd. soln. contg. Cu^{2+} , CH_3OH and H_2O_2 .	88G016

TABLE 8. Rate constants for copper transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
8.45 Copper(III) — Continued								
8.45.3	Methanol							
	Cu(III) + MeOH → *CH ₂ OH + Cu ²⁺ + H ⁺	≤4 × 10 ⁵				γ-r.	Estimated from computer simulation based on <i>G</i> for HCHO and Cu ⁺ in N ₂ O-satd. soln. contg. Cu ²⁺ , CH ₃ OH and H ₂ O ₂ .	88G016
8.46 Dihydroxycopper(III) ion								
8.46.1	First-order reaction							
	Cu(OH) ₂ ⁺ → CuOH ⁺ + ·OH	4.2 × 10 ⁴ s ⁻¹ 2.8 × 10 ⁴ s ⁻¹	3.5 3.65			p.r.	Estimated from decay of Cu(III) in the presence of Br ⁻ , CH ₃ OH, H ₂ O ₂ etc. Values of <i>k</i> _r taken to be same as <i>k</i> (Cu ²⁺ + ·OH); <i>K</i> = 1.3 × 10 ⁻⁴ and 9.0 × 10 ⁻⁵ L mol ⁻¹ at pH 3.5 and 3.65, respectively.	710174
8.46.2	Nitrilotriacetatocuprate(II) ion							
	Cu(OH) ₂ ⁺ + CuNTA ⁻ → Cu ²⁺ + CuNTA	1.2 × 10 ⁸	3.9			p.r.	N ₂ O-satd. soln. contg. 0.001 mol L ⁻¹ CuSO ₄ and (2-8) × 10 ⁻⁵ mol L ⁻¹ NTA.	78A436
8.47 Trihydroxycopper(III)								
8.47.1	Trihydroxycopper(III)							
	Cu(OH) ₃ + Cu(OH) ₃ →	<2.5 × 10 ⁷ 2.3 × 10 ⁷	6 6	0.004 25		p.r. p.r.	D.k. at 300 nm in N ₂ O-satd. soln. contg. 5 × 10 ⁻⁴ mol L ⁻¹ Cu ²⁺ .	720844 710174
8.47.2	Nitritocuppper(II) ion							
	Cu(OH) ₃ + CuNO ₂ ⁺ →	~3 × 10 ⁹	5.2			p.r.	D.k. at 300 nm in N ₂ O-satd. soln. contg. NO ₂ ⁻ .	710174
8.47.3	Glycinatocuppper(II) ion							
	Cu(OH) ₃ + Cu(Gly) ⁺ →	8.1 × 10 ⁷	5.5			p.r.	D.k. in N ₂ O-satd. soln. contg. 0.001 mol L ⁻¹ CuSO ₄ and (1-100) × 10 ⁻⁶ mol L ⁻¹ glycine.	710775
8.47.4	2-Methyl-1,4-naphthoquinone							
	Cu(OH) ₃ + 2-CH ₃ NQ →	2.0 × 10 ⁹	9.0,10.6			p.r.	40% of Cu(III) claimed to react by electron transfer. Cu(III) formed by ·OH + Cu(ClO ₄) ₂ ; 20.3% and 39% electron transfer at pH 8.0 and 10.6, respectively, in CuSO ₄ soln.	731047
8.48 Amminecopper(III) complex								
8.48.1	Amminecopper(III) complex							
	Cu ^{III} (NH ₃) _n + Cu ^{III} (NH ₃) _n →	1.5 × 10 ⁷	11.1			p.r.	D.k. in N ₂ O-satd. soln. contg. (5-50) × 10 ⁻⁵ mol L ⁻¹ CuSO ₄ and [NH ₃] = 1.9[CuSO ₄].	710775
8.49 Ethylenediaminecopper(III) complex								
8.49.1	First-order reaction							
	Cu ^{III} (en) _n →	<3 s ⁻¹ 1'20 s ⁻¹	5.8 11.6			p.r.	D.k. in N ₂ O-satd. soln. contg. (5-50) × 10 ⁻⁵ mol L ⁻¹ CuSO ₄ and [en] = 1.9[CuSO ₄].	710775
8.49.2	Ethylenediaminecopper(III) complex							
	Cu ^{III} (en) _n + Cu ^{III} (en) _n →	2.8 × 10 ⁵ 2.0 × 10 ⁷	5.8 11.6			p.r.	D.k. in N ₂ O-satd. soln. contg. (5-50) × 10 ⁻⁵ mol L ⁻¹ CuSO ₄ and [en] = 1.9[CuSO ₄].	710775

TABLE 8. Rate constants for copper transients — Continued

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t(\text{°C})$	Method	Comment	Ref.
8.50 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecane copper(III) ion								
8.50.1	First-order reaction							
	$\text{Cu}(\text{aneN}_4)_4^{3+} \rightarrow$	6.1 s^{-1}	1	1.0	25	f.p.	D.k. at 360 nm in soln. contg. 0.01-1 mol L ⁻¹ Cl ⁻ and (1-2) × 10 ⁻⁵ mol L ⁻¹ Cu(aneN ₄) ²⁺ .	83A271
8.51 Chloro-5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecopper(III) ion								
8.51.1	Chloride ion							
	$\text{Cu}(4,11\text{-dieneN}_4)_4\text{Cl}^{2+} + \text{Cl}^- \rightarrow$	1.5×10^3	1		22	f.p.	D.k. in N ₂ O-satd. soln. contg. (1-5) × 10 ⁻⁴ mol L ⁻¹ Cu(4,11-dieneN ₄) ²⁺ , 0.1 mol L ⁻¹ Cl ⁻ , 0.001-0.01 mol L ⁻¹ H ₂ O ₂ and 0.1 mol L ⁻¹ H ⁺ ; $k_t = 1.5 \times 10^6 \text{ L mol}^{-1} \text{ s}^{-1}$.	79A080
	$\text{Cu}(4,11\text{-dieneN}_4)_4^{2+} + \text{Cl}_2^- \rightarrow$							
8.52 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecopper(III) ion								
8.52.1	First-order reaction							
	$\text{Cu}(4,11\text{-dieneN}_4)_4^{3+} \rightarrow$	0.36 s^{-1}	1	1.0	25	f.p.	D.k. at 340 or 400 nm in soln. contg. 0.01-1 mol L ⁻¹ Cl ⁻ and (0.4-1.0) × 10 ⁻⁴ mol L ⁻¹ Cu(4,11-dieneN ₄) ²⁺ .	83A271
8.52.2	Chloride ion							
	$\text{Cu}(4,11\text{-dieneN}_4)_4^{3+} + \text{Cl}^- \rightarrow$	0.63	1	1.0	25	f.p.	D.k. at 340 or 400 nm in soln. contg. 0.01-1 mol L ⁻¹ Cl ⁻ and (0.4-1.0) × 10 ⁻⁴ mol L ⁻¹ Cu(4,11-dieneN ₄) ²⁺ .	83A271
8.52.3	Hydrogen peroxide							
	$\text{Cu}(4,11\text{-dieneN}_4)_4^{3+} + \text{H}_2\text{O}_2 \rightarrow$	7.0×10^2	1		22	f.p.	D.k. in soln. contg. Cu(4,11-dieneN ₄) ²⁺ and (1-10) × 10 ⁻³ mol L ⁻¹ H ₂ O ₂ .	79A080
	$\text{Cu}(4,11\text{-dieneN}_4)_4^{2+} + \text{H}^+ + \text{HO}_2^- \rightarrow$							
8.52.4	Azide ion							
	$\text{Cu}(4,11\text{-dieneN}_4)_4^{3+} + \text{N}_3^- \rightarrow$	2.5×10^4	1		22	f.p.	D.k. in soln. contg. Cu(4,11-dieneN ₄) ²⁺ , (8-40) × 10 ⁻⁴ mol L ⁻¹ azide ion, 0.1 mol L ⁻¹ Cl ⁻ , 0.1 mol L ⁻¹ H ⁺ and Co(NH ₃) ₅ Cl ²⁺ .	79A080
	$\text{Cu}(4,11\text{-dieneN}_4)_4^{2+} + \text{N}_3 \cdot \rightarrow$							
8.53 1,4,8,11-Tetraazacyclotetradecane(hydrido)copper(III) ion								
8.53.1	Hydrogen ion							
	$\text{Cu}(\text{cyclam})(\text{H})^{2+} + \text{H}^+ \rightarrow \text{Cu}^+ +$	$\sim 2 \times 10^8$		6.0		p.r.	D.k. in Ar-satd. soln. contg. 0.1 mol L ⁻¹ MeOH and (2-30) × 10 ⁻⁵ mol L ⁻¹ Cu(cyclam) ²⁺ .	82A320
	cyclamH_2^{2+}							
8.54 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecane(hydrido)copper(III) ion								
8.54.1	Hydrogen ion							
	$\text{Cu}(\text{aneN}_4)(\text{H})^{2+} + \text{H}^+ \rightarrow \text{Cu}^+ +$	1.6×10^6		<5.5		p.r.	D.k. in Ar-satd. soln. contg. 0.1 mol L ⁻¹ formate and (2-30) × 10 ⁻⁵ mol L ⁻¹ Cu(aneN ₄) ²⁺ .	82A320
	$\text{aneN}_4\text{H}_2^{2+}$							
8.55 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene(hydrido)copper(III) ion								
8.55.1	Hydrogen ion							
	$\text{Cu}(4,11\text{-dieneN}_4)(\text{H})^{2+} + \text{H}^+ \rightarrow \text{Cu}^+ +$	6×10^6		4.0-		p.r.	D.k. in Ar-satd. soln. contg. 0.1 mol L ⁻¹ MeOH and (2-30) × 10 ⁻⁵ mol L ⁻¹ Cu(4,11-dieneN ₄) ²⁺ .	80A189
	$+ 4,11\text{-dieneN}_4\text{H}_2^{2+}$			5.5				

TABLE 8. Rate constants for copper transients — Continued

No.	Reaction	k (L mol $^{-1}$ s $^{-1}$)	pH	I	t (°C)	Method	Comment	Ref.
8.56 2,2,4,11,11,13-Hexamethyl-1,5,10,14-tetraazacyclooctadeca-4,13-diene(hydrido)copper(III) ion								
8.56.1 Hydrogen ion								
	$\text{Cu}(4,13\text{-dieneN}_4)(\text{H})^{2+} + \text{H}^+ \rightarrow \text{Cu}^+$ + 4,13-dieneN ₄ H ₂ ²⁺	$\sim 6 \times 10^8$		6.1		p.r.	D.k. in Ar-satd. soln. contg. 0.1 mol L $^{-1}$ formate and (2-30) $\times 10^{-5}$ mol L $^{-1}$ Cu(4,13-dieneN ₄) ²⁺ ; k was estimated from rate constants measured at pH 6.1 and 7.0.	82A320
8.57 Bis(glycine)copper(III) complex								
8.57.1 First-order reaction								
	$\text{Cu}^{\text{III}}(\text{Gly})_2 \rightarrow$	6.0 $\times 10^3$ s $^{-1}$ 2.2 $\times 10^4$ s $^{-1}$	6.1 7.5			p.r.	D.k. in N ₂ O-satd. soln. contg. (5-50) $\times 10^{-5}$ mol L $^{-1}$ CuSO ₄ and [glycine] = 1.9[CuSO ₄].	710775
8.58 Bis(alanine)copper(III) complex								
8.58.1 First-order reaction								
	$\text{Cu}^{\text{III}}(\text{Ala})_2 \rightarrow$	8.0 $\times 10^3$ s $^{-1}$	6.3			p.r.	D.k. in N ₂ O-satd. soln. contg. (5-50) $\times 10^{-5}$ mol L $^{-1}$ CuSO ₄ and [alanine] = 1.9[CuSO ₄].	710775
8.59 Bis(β-alanine)copper(III) complex								
8.59.1 First-order reaction								
	$\text{Cu}^{\text{III}}(\beta\text{-Ala})_2 \rightarrow$	7.0 $\times 10^3$ s $^{-1}$	5.8			p.r.	D.k. in N ₂ O-satd. soln. contg. (5-50) $\times 10^{-5}$ mol L $^{-1}$ CuSO ₄ and [β -alanine] = 1.9[CuSO ₄].	710775
8.60 Bis(α-aminobutyric acid)copper(III) complex								
8.60.1 First-order reaction								
	$\text{Cu}^{\text{III}}(\alpha\text{-aminobutyric acid})_2 \rightarrow$	5.0 $\times 10^3$ s $^{-1}$	6.1			p.r.	D.k. in N ₂ O-satd. soln. contg. (5-50) $\times 10^{-5}$ mol L $^{-1}$ CuSO ₄ and [α -aminobutyric acid] = 1.9[CuSO ₄].	710775
8.61 Bis(β-aminobutyric acid)copper(III) complex								
8.61.1 First-order reaction								
	$\text{Cu}^{\text{III}}(\beta\text{-aminobutyric acid})_2 \rightarrow$	4.5 $\times 10^3$ s $^{-1}$	6.0			p.r.	D.k. in N ₂ O-satd. soln. contg. (5-50) $\times 10^{-5}$ mol L $^{-1}$ CuSO ₄ and [β -aminobutyric acid] = 1.9[CuSO ₄].	710775
8.62 Bis(γ-aminobutyric acid)copper(III) complex								
8.62.1 First-order reaction								
	$\text{Cu}^{\text{III}}(\gamma\text{-aminobutyric acid})_2 \rightarrow$	1.2 $\times 10^3$ s $^{-1}$	4.8			p.r.	D.k. in N ₂ O-satd. soln. contg. (5-50) $\times 10^{-5}$ mol L $^{-1}$ CuSO ₄ and [γ -aminobutyric acid] = 1.9[CuSO ₄].	710775
8.63 Bis(α-aminoisobutyric acid)copper(III) complex								
8.63.1 First-order reaction								
	$\text{Cu}^{\text{III}}(\alpha\text{-aminoisobutyric acid})_2 \rightarrow$	1.5 $\times 10^3$ s $^{-1}$ 2.5 $\times 10^3$ s $^{-1}$	6.2 7.3			p.r.	D.k. in N ₂ O-satd. soln. contg. (5-50) $\times 10^{-5}$ mol L $^{-1}$ CuSO ₄ and [α -aminoisobutyric acid] = 1.9[CuSO ₄].	710775
8.64 Hydroperoxocopper(III) ion								
8.64.1 First-order reaction								
	$\text{CuO}_2\text{H}^{2+} \rightarrow \text{Cu(I)} + \text{O}_2 + \text{H}^+$	2.2 $\times 10^3$ s $^{-1}$				p.r.	D.k. in O ₂ -satd. soln. contg. 1 $\times 10^{-4}$ mol L $^{-1}$ Cu ²⁺ , 0.05 mol L $^{-1}$ formate and 0.01 mol L $^{-1}$ arginine. Reactant includes [Cu(HCO ₃ ⁻)(HO ₂) ⁺].	87A160

TABLE 8. Rate constants for copper transients — Continued

No.	Reaction	k (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
8.65 Methylcopper(III) ion								
8.65.1 First-order reaction								
	$\text{CuCH}_3^{2+} \rightarrow$	$7 \times 10^2 \text{ s}^{-1}$		6		p.r.	D.k. in N ₂ O-satd. soln. contg. CuSO ₄ and DMSO.	78F301
8.66 Trichloromethylcopper(III) ion								
8.66.1 Water								
	$\text{CuCCl}_3^{2+} + \text{H}_2\text{O} \rightarrow \text{Cu}^+ + \text{HOCCl}_3 + \text{H}^+$	0.9 s^{-1}		6		p.r.	D.k. in Ar-satd. soln. contg. (2-10) × 10 ⁻⁵ mol L ⁻¹ CuSO ₄ and (1-10) × 10 ⁻² mol L ⁻¹ CHCl ₃ ; CuCHCl ₂ ⁺ also present. Authors did not distinguish between the two species.	80A277
8.67 2-Hydroxyethylcopper(III) ion								
8.67.1 First-order reaction								
	$\text{CuCH}_2\text{CH}_2\text{OH}^{2+} \rightarrow \text{Cu}^+ + \text{H}^+ + \text{OCH}_2\text{CH}_2^-$	$3.3 \times 10^2 \text{ s}^{-1}$		6		p.r.	D.k. in N ₂ O-ethylene (1:1) satd. soln. contg. (1-5) × 10 ⁻⁴ mol L ⁻¹ CuSO ₄ .	80A277
8.68 Carboxymethylcopper(III) ion								
8.68.1 Water								
	$\text{CuCH}_2\text{CO}_2^+ + \text{H}_2\text{O} \rightarrow \text{Cu}^+ + \text{H}^+ + \text{HOCH}_2\text{CO}_2^-$	2.8 s^{-1}		6		p.r.	D.k. in N ₂ O-satd. soln. contg. CuSO ₄ and acetate; an initial process with $k = 1 \times 10^2 \text{ s}^{-1}$ was also reported.	80A277
8.69 1-Carboxyethylcopper(III) ion								
8.69.1 Water								
	$\text{CuCH}(\text{CH}_3)\text{CO}_2^+ + \text{H}_2\text{O} \rightarrow \text{Cu}^+ + \text{H}^+ + \text{CH}_3\text{CHOHCO}_2^-$	0.2 s^{-1}		6		p.r.	D.k. in N ₂ O-satd. soln. contg. (5-10) × 10 ⁻⁵ mol L ⁻¹ CuSO ₄ and 0.01 mol L ⁻¹ propionate; an initial process with $k = 8.6 \times 10^3 \text{ s}^{-1}$ was also reported.	80A277
8.70 2-Hydroxy-2,2-dimethylethylcopper(III) ion								
8.70.1 Water								
	$\text{CuCH}_2\text{C}(\text{CH}_3)_2\text{OH}^{2+} + \text{H}_2\text{O} \rightarrow \text{Cu}^+ + \text{H}^+ + \text{HOCH}_2\text{C}(\text{CH}_3)_2\text{OH}$	$4.5 \times 10^2 \text{ s}^{-1}$		6		p.r.	D.k. in N ₂ O-satd. soln. contg. (1-5) × 10 ⁻⁵ mol L ⁻¹ CuSO ₄ and 0.1 mol L ⁻¹ <i>tert</i> -BuOH.	80A277
8.71 1,2-Dicarboxy-2-hydroxyethylcopper(III) ion								
8.71.1 First-order reaction								
	$\text{CuCH}(\text{CO}_2)\text{C}(\text{OH})\text{CO}_2 \rightarrow$	1 s^{-1}		6		p.r.	D.k. in N ₂ O-satd. soln. contg. (5-10) × 10 ⁻⁵ mol L ⁻¹ CuSO ₄ and (2.5-10) × 10 ⁻⁴ mol L ⁻¹ fumarate; an initial process with $k = 2 \times 10^2 \text{ s}^{-1}$ was also reported.	80A277
8.72 2-Carboxy-2,2-dimethylethylcopper(III) ion								
8.72.1 First-order reaction								
	$\text{CuCH}_2\text{C}(\text{CH}_3)_2\text{CO}_2\text{H}^{2+} \rightarrow \text{Cu}^+ + \text{CO}_2 + \text{CH}_2=\text{C}(\text{CH}_3)_2 + \text{H}^+$	0.03 s^{-1}		3.0-		p.r.	D.k. at 400 nm in N ₂ O-satd. soln. contg. 0.05 mol L ⁻¹ trimethylacetic acid, (5-30) × 10 ⁻⁴ mol L ⁻¹ Cu ²⁺ and ((5-30) × 10 ⁻⁵ mol L ⁻¹ Cu ⁺).	90A474
8.73 2-Ammonio-2-carboxypropylcopper(III) ion								
8.73.1 First-order reaction								
	$\text{CuCH}_2\text{C}(\text{CH}_3)(\text{NH}_3)\text{CO}_2^{2+} \rightarrow \text{Cu}^+ + \text{CO}_2 + \text{CH}_2=\text{C}(\text{CH}_3)\text{NH}_3^+$	0.15 s^{-1}		3		p.r.	D.k. in N ₂ O-satd. soln. contg. 0.05 mol L ⁻¹ 2-methylalanine and (0.5-2.0) × 10 ⁻³ mol L ⁻¹ Cu ²⁺ .	92A215

TABLE 8. Rate constants for copper transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
8.74 Benzylcopper(III) ion								
8.74.1 First-order reaction								
	$\text{CuCH}_2\text{C}_6\text{H}_5^{2+} \rightarrow \text{Cu}^{2+} + \text{C}_6\text{H}_5\dot{\text{C}}\text{H}_2$	$1.2 \times 10^6 \text{ s}^{-1}$				f.p.	D.k. in deaerated soln. contg. (0.4-1.2) × 10 ⁻³ mol L ⁻¹ Co(NH ₃) ₅ (C ₆ H ₅ CH ₂ CO ₂) ²⁺ and Cu(ClO ₄) ₂ ; <i>k</i> _r = 2.8 × 10 ⁶ L mol ⁻¹ s ⁻¹ . In soln. contg. 10% acetonitrile and dibenzyl ketone, <i>k</i> = 1.3 × 10 ⁶ s ⁻¹ and <i>k</i> _r = 2.5 × 10 ⁷ L mol ⁻¹ s ⁻¹ at 20 °C; <i>E</i> _a = 7.0 kJ mol ⁻¹ , log <i>A</i> = 7.58, studied at 1-60 °C [92A148].	93A346
		$1.1 \times 10^6 \text{ s}^{-1}$	2.8	27		f.p.	D.k. at 375 nm in soln. contg. ~0.002 mol L ⁻¹ Co(NH ₃) ₅ (C ₆ H ₅ CH ₂ CO ₂) ²⁺ and 0.001-0.004 mol L ⁻¹ CuSO ₄ ; <i>k</i> _r = 2.1 × 10 ⁷ L mol ⁻¹ s ⁻¹ .	84A367
8.74.2 Water								
	$\text{CuCH}_2\text{C}_6\text{H}_5^{2+} + \text{H}_2\text{O} \rightarrow \text{Cu}^+ + \text{C}_6\text{H}_5\dot{\text{C}}\text{H}_2\text{OH} + \text{H}^+$	$4.3 \times 10^4 \text{ s}^{-1}$				f.p.	D.k. in soln. contg. Co(NH ₃) ₅ (C ₆ H ₅ CH ₂ CO ₂) ²⁺ and Cu(ClO ₄) ₂ ; in soln. contg. dibenzyl ketone, Cu(ClO ₄) ₂ and 10% acetonitrile <i>k</i> = 3.5 × 10 ⁵ s ⁻¹ at 20 °C; <i>E</i> _a = 6.9 kJ mol ⁻¹ , log <i>A</i> = 6.61, studied at 1-60 °C [92A148].	93A346
		$-1.2 \times 10^4 \text{ s}^{-1}$	2.8	27		f.p.	D.k. in soln. contg. ~0.002 mol L ⁻¹ [Co(NH ₃) ₅ OCOCH ₂ C ₆ H ₅] ²⁺ and 0.001-0.004 mol L ⁻¹ CuSO ₄ .	84A367
8.75 (4-Chlorophenyl)methylcopper(III) ion								
8.75.1 First-order reaction								
	$\text{CuCH}_2\text{C}_6\text{H}_4\text{-4-Cl}^{2+} \rightarrow \text{Cu}^{2+} + 4\text{ClC}_6\text{H}_4\dot{\text{C}}\text{H}_2$	$1.5 \times 10^6 \text{ s}^{-1}$				f.p.	D.k. in soln. contg. Co(NH ₃) ₅ (4-ClC ₆ H ₄ CH ₂ CO ₂) ²⁺ and Cu(ClO ₄) ₂ ; <i>k</i> _r = 1.6 × 10 ⁶ L mol ⁻¹ s ⁻¹ .	93A346
8.75.2 Water								
	$\text{CuCH}_2\text{C}_6\text{H}_4\text{-4-Cl}^{2+} + \text{H}_2\text{O} \rightarrow \text{Cu}^+ + 4\text{ClC}_6\text{H}_4\dot{\text{C}}\text{H}_2\text{OH} + \text{H}^+$	$3.3 \times 10^4 \text{ s}^{-1}$				f.p.	D.k. in soln. contg. Co(NH ₃) ₅ (4-ClC ₆ H ₄ CH ₂ CO ₂) ²⁺ and Cu(ClO ₄) ₂ .	93A346
8.76 2-Hydroxyphenoxy copper(III) ion								
8.76.1 2-Hydroxyphenoxy copper(III) ion								
	$\text{CuOC}_6\text{H}_4\text{-2-OH}^{2+} + \text{CuOC}_6\text{H}_4\text{-2-OH}^{2+} \rightarrow$	1.6×10^6	2.0	→0		f.p.	D.k. at 380 nm in soln. contg. (1.5-20) × 10 ⁻² mol L ⁻¹ Cu ²⁺ and 1 × 10 ⁻⁴ mol L ⁻¹ catechol.	78A449 757592
8.77 3-Hydroxyphenoxy copper(III) ion								
8.77.1 First-order reaction								
	$\text{CuOC}_6\text{H}_4\text{-3-OH}^{2+} \rightarrow$	$3.0 \times 10^3 \text{ s}^{-1}$	2.6			f.p.	D.k. at 420 nm in soln. contg. (2-300) × 10 ⁻⁴ mol L ⁻¹ Cu ²⁺ and 2 × 10 ⁻³ mol L ⁻¹ resorcinol.	79A272
8.77.2 3-Hydroxyphenoxy copper(III) ion								
	$\text{CuOC}_6\text{H}_4\text{-3-OH}^{2+} + \text{CuOC}_6\text{H}_4\text{-3-OH}^{2+} \rightarrow$	5.0×10^9	2.6	0.04		f.p.	D.k. at 420 nm in soln. contg. > 10 ⁻² mol L ⁻¹ Cu ²⁺ and 2 × 10 ⁻³ mol L ⁻¹ resorcinol.	79A272
8.78 4-Hydroxyphenoxy copper(III) ion, conjugate base								
8.78.1 4-Hydroxyphenoxy copper(III) ion, conjugate base								
	$\text{CuOC}_6\text{H}_4\text{-4-O}^+ + \text{CuOC}_6\text{H}_4\text{-4-O}^+ \rightarrow$	1.6×10^6	7.0	→0		f.p.	D.k. at 425 nm in soln. contg. Cu ²⁺ and 1 × 10 ⁻⁴ mol L ⁻¹ hydroquinone.	78A449

TABLE 8. Rate constants for copper transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
8.79 3-Hydroxy-5-methylphenoxy copper(III) ion								
8.79.1 First-order reaction								
	$\text{CuOC}_6\text{H}_3\text{-5-CH}_3\text{-3-OH}^{2+} \rightarrow$	$3.0 \times 10^3 \text{ s}^{-1}$	2-6			f.p.	D.k. at 420 nm in soln. contg. (2-300) × 10^{-4} mol L ⁻¹ Cu ²⁺ and 2×10^{-3} mol L ⁻¹ 5-methylresorcinol.	79A272
8.79.2 3-Hydroxy-5-methylphenoxy copper(III) ion								
	$\text{CuOC}_6\text{H}_3\text{-5-CH}_3\text{-3-OH}^{2+} + \text{CuOC}_6\text{H}_3\text{-5-CH}_3\text{-3-OH}^{2+} \rightarrow$	5.0×10^9	2-6	0.04		f.p.	D.k. at 420 nm in soln. contg. > 10^{-2} mol L ⁻¹ Cu ²⁺ and 2×10^{-3} mol L ⁻¹ 5-methylresorcinol.	79A272
8.80 (4-Methoxyphenyl)methylcopper(III) ion								
8.80.1 First-order reaction								
	$\text{CuCH}_2\text{C}_6\text{H}_4\text{-4-OCH}_3^{2+} \rightarrow \text{Cu}^{2+} + 4\text{-CH}_3\text{OC}_6\text{H}_4\text{CH}_2$	$6.2 \times 10^5 \text{ s}^{-1}$				f.p.	D.k. in soln. contg. Co(NH ₃) ₅ (4-CH ₃ OC ₆ H ₄ CH ₂ CO ₂) ²⁻ and Cu(ClO ₄) ₂ ; $k_r = 8.0 \times 10^6 \text{ L mol}^{-1} \text{ s}^{-1}$.	93A346
8.80.2 Water								
	$\text{CuCH}_2\text{C}_6\text{H}_4\text{-4-OCH}_3^{2+} + \text{H}_2\text{O} \rightarrow \text{Cu}^+ + 4\text{-CH}_3\text{OC}_6\text{H}_4\text{CH}_2\text{OH} + \text{H}^+$	$1.5 \times 10^4 \text{ s}^{-1}$				f.p.	D.k. in soln. contg. Co(NH ₃) ₅ (4-CH ₃ OC ₆ H ₄ CH ₂ CO ₂) ²⁻ and Cu(ClO ₄) ₂ .	93A346
8.81 (4-Methylphenyl)methylcopper(III) ion								
8.81.1 First-order reaction								
	$\text{CuCH}_2\text{C}_6\text{H}_4\text{-4-CH}_3^{2+} \rightarrow \text{Cu}^{2+} + 4\text{-CH}_3\text{C}_6\text{H}_4\text{CH}_2$	$7.9 \times 10^5 \text{ s}^{-1}$				f.p.	D.k. in soln. contg. Co(NH ₃) ₅ (4-CH ₃ C ₆ H ₄ CH ₂ CO ₂) ²⁻ and Cu(ClO ₄) ₂ ; $k_r = 5.7 \times 10^6 \text{ L mol}^{-1} \text{ s}^{-1}$.	93A346
8.81.2 Water								
	$\text{CuCH}_2\text{C}_6\text{H}_4\text{-4-CH}_3^{2+} + \text{H}_2\text{O} \rightarrow \text{Cu}^+ + 4\text{-CH}_3\text{C}_6\text{H}_4\text{CH}_2\text{OH} + \text{H}^+$	$3.4 \times 10^4 \text{ s}^{-1}$				f.p.	D.k. in soln. contg. Co(NH ₃) ₅ (4-CH ₃ C ₆ H ₄ CH ₂ CO ₂) ²⁻ and Cu(ClO ₄) ₂ .	93A346
8.82 Bis(glycinato)methylcopper(III) ion								
8.82.1 Methyl								
	$(\text{Gly})_2\text{CuCH}_3 + \cdot\text{CH}_3 \rightarrow \text{Cu}(\text{Gly})_2 + \text{C}_2\text{H}_6$	$>5 \times 10^9$				γ-r.	Estd. from yield of ethane in low-dose experiments.	90A421
8.83 β-Alaninato(2-aminoethyl)copper(III)								
8.83.1 Water								
	$(\beta\text{-Ala})\text{CuCH}_2\text{CH}_2\text{NH}_2 + \text{H}_2\text{O} \rightarrow \text{Cu}(\beta\text{-Ala}) + \text{H}_2\text{NCH}_2\text{CH}_2\text{OH} + \text{H}^+$	$1.2 \times 10^1 \text{ s}^{-1}$				f.p.	D.k. in soln. contg. Cu(β-Ala) ₂ ; the transient is from reaction of the Cu(II) complex with aminoalkyl radical.	81F406
8.83.2 Hydroxide ion								
	$(\beta\text{-Ala})\text{CuCH}_2\text{CH}_2\text{NH}_2 + \text{OH}^- \rightarrow \text{Cu}(\beta\text{-Ala}) + \text{H}_2\text{NCH}_2\text{CH}_2\text{O}^- + \text{H}_2\text{O}$	4.0×10^8				f.p.	D.k. in soln. contg. Cu(β-Ala) ₂ .	81F406
8.84 cis-Aqua(hydroxymethyl)(nitrilotriacetato)cuprate(III) ion								
8.84.1 Hexaamminecobalt(III) ion								
	$cis\text{-}[\text{HOCH}_2\text{Cu}(\text{NTA})(\text{H}_2\text{O})]^{3+} + \text{Co}(\text{NH}_3)_6^{3+} \rightarrow$	3.8×10^5	5-8			p.r.	D.k. in N ₂ O-satd. soln. contg. CuSO ₄ , nitrilotriacetate ion and MeOH; 'CH ₂ OH in the complex may be ionized to 'CH ₂ O ⁻ in this pH region.	86B151
8.84.2 Hexaammineruthenium(III) ion								
	$cis\text{-}[\text{HOCH}_2\text{Cu}(\text{NTA})(\text{H}_2\text{O})]^{3+} + \text{Ru}(\text{NH}_3)_6^{3+} \rightarrow$	1.8×10^8	5-8			p.r.	D.k. in N ₂ O-satd. soln. contg. CuSO ₄ , nitrilotriacetate ion and MeOH; 'CH ₂ OH in the complex may be ionized to 'CH ₂ O ⁻ in this pH region.	86B151

TABLE 8. Rate constants for copper transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
8.84 <i>cis</i>-Aqua(hydroxymethyl)(nitrilotriacetato)cuprate(III) ion — Continued								
8.84.3 Ferricyanide ion								
	<i>cis</i> -[HOCH ₂ Cu(NTA)(H ₂ O)] ⁻ + Fe(CN) ₆ ³⁻ →	1.9 × 10 ⁷	5-8			p.r.	D.k. in N ₂ O-satd. soln. contg. CuSO ₄ , nitrilotriacetate ion and MeOH; *CH ₂ OH in the complex may be ionized to *CH ₂ O ⁻ in this pH region.	86B151
8.84.4 <i>cis</i>-Diaqua(nitrilotriacetato)copper(II) ion								
	<i>cis</i> -[HOCH ₂ Cu(NTA)(H ₂ O)] ⁻ + <i>cis</i> -[Cu(NTA)(H ₂ O) ₂] ⁻ + H ₂ O →	4.0 × 10 ⁵	5-8			p.r.	D.k. at 425 nm in N ₂ O-satd. soln. contg. (1-100) × 10 ⁻⁵ mol L ⁻¹ CuSO ₄ , 0.001 mol L ⁻¹ nitrilotriacetate ion and 0.1 mol L ⁻¹ MeOH; *CH ₂ OH in the complex may be ionized to *CH ₂ O ⁻ in this pH region.	86B151
8.85 <i>cis</i>-Aqua(1-hydroxyethyl)(nitrilotriacetato)cuprate(III) ion								
8.85.1 <i>cis</i>-Diaqua(nitrilotriacetato)copper(II) ion								
	<i>cis</i> -[HOCH(CH ₃) ₂ Cu(NTA)(H ₂ O)] ⁻ + <i>cis</i> -[Cu(NTA)(H ₂ O) ₂] ⁻ + H ₂ O →	1.3 × 10 ⁶	5-8			p.r.	D.k. in N ₂ O-satd. soln. contg. CuSO ₄ , nitrilotriacetate ion and EtOH.	86B151
8.86 <i>cis</i>-Aqua(1-hydroxy-1-methylethyl)(nitrilotriacetato)cuprate(III) ion								
8.86.1 <i>cis</i>-Diaqua(nitrilotriacetato)copper(II) ion								
	<i>cis</i> -[HOC(CH ₃) ₂ Cu(NTA)(H ₂ O)] ⁻ + <i>cis</i> -[Cu(NTA)(H ₂ O) ₂] ⁻ + CH ₃ COCH ₃ + H ⁺ →	1.5 × 10 ⁶	5-8			p.r.	D.k. in N ₂ O-satd. soln. contg. CuSO ₄ , nitrilotriacetate ion and 2-PrOH.	86B151

TABLE 9. Rate constants for iron transients

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
9.1 Bis(2,2'-bipyridine)dicyanoferrate(II), electron adduct								
9.1.1 Dicyanobis(2,2'-bipyridine)iron(III) ion								
	$\text{Fe}(\text{bpy})_2(\text{CN})_2^- + \text{Fe}(\text{bpy})_2(\text{CN})_2^+ \rightarrow 2 \text{Fe}(\text{bpy})_2(\text{CN})_2$	3.1×10^{10}				f.p./pi or p.r.	D.k. in soln. contg. $\text{Fe}(\text{bpy})_2(\text{CN})_2$.	90A499
9.2 Dicyanobis(4,4'-dimethyl-2,2'-bipyridine)ferrate(II), electron adduct								
9.2.1 Dicyanobis(4,4'-dimethyl-2,2'-bipyridine)iron(III) ion								
	$\text{Fe}(4,4'\text{-Me}_2\text{bpy})_2(\text{CN})_2^- + \text{Fe}(4,4'\text{-Me}_2\text{bpy})_2(\text{CN})_2^+ \rightarrow 2 \text{Fe}(4,4'\text{-Me}_2\text{bpy})_2(\text{CN})_2$	3.0×10^{10}				f.p./pi or p.r.	D.k. in soln. contg. $\text{Fe}(4,4'\text{-Me}_2\text{bpy})_2(\text{CN})_2$.	90A499
9.3 2,2'-Bipyridinetetracyanoferrate(II) ion, electron adduct								
9.3.1 Tetracyano(2,2'-bipyridine)ferrate(III) ion								
	$\text{Fe}(\text{bpy})(\text{CN})_4^{3-} + \text{Fe}(\text{bpy})(\text{CN})_4^- \rightarrow 2 \text{Fe}(\text{bpy})(\text{CN})_4^{2-}$	1.8×10^{10}				f.p./pi	D.k. at 370 nm in soln. contg. $\text{Fe}(\text{bpy})(\text{CN})_4^{2-}$.	90A499 90A171 91A067
9.3.2 1,1'-Dimethyl-4,4'-bipyridinium								
	$\text{Fe}(\text{bpy})(\text{CN})_4^{3-} + \text{MV}^{2+} \rightarrow \text{Fe}(\text{bpy})(\text{CN})_4^{2-} + \text{MV}^{+}$	9.0×10^9				f.p./pi	D.k. in soln. contg. $\text{Fe}(\text{bpy})(\text{CN})_4^{2-}$ and MV^{2+} . Value obtained from computer fit.	91A067
9.4 Tetracyano(4,4'-dimethyl-2,2'-bipyridine)ferrate(II) ion, electron adduct								
9.4.1 Tetracyano(4,4'-dimethyl-2,2'-bipyridine)ferrate(III) ion								
	$\text{Fe}(4,4'\text{-Me}_2\text{bpy})(\text{CN})_4^{3-} + \text{Fe}(4,4'\text{-Me}_2\text{bpy})(\text{CN})_4^- \rightarrow 2 \text{Fe}(4,4'\text{-Me}_2\text{bpy})(\text{CN})_4^{2-}$	1.2×10^{10}				f.p./pi or p.r.	D.k. in soln. contg. $\text{Fe}(4,4'\text{-Me}_2\text{bpy})(\text{CN})_4^{2-}$.	90A499 90A171
9.4.2 1,1'-Dimethyl-4,4'-bipyridinium								
	$\text{Fe}(4,4'\text{-Me}_2\text{bpy})(\text{CN})_4^{3-} + \text{MV}^{2+} \rightarrow \text{Fe}(4,4'\text{-Me}_2\text{bpy})(\text{CN})_4^{2-} + \text{MV}^{+}$	9.4×10^9				f.p./pi or p.r.	D.k. in soln. contg. $\text{Fe}(4,4'\text{-Me}_2\text{bpy})(\text{CN})_4^{2-}$.	90A499
9.5 Iron(II) oxalate								
9.5.1 Iron(III) oxalate								
	$\text{Fe}(\text{C}_2\text{O}_4) + \text{Fe}(\text{C}_2\text{O}_4)^+ \rightarrow \text{Fe}^{2+} + \text{O}_2\text{CCO}_2^- + \text{Fe}(\text{C}_2\text{O}_4)^+$	2.5×10^6	~ 0.8	1.0	22	f.p./pi	D.k. in soln. contg. added Fe^{3+} , 5×10^{-4} mol L ⁻¹ oxalate and $0.14 \text{ mol L}^{-1} \text{ H}^+$; Log <i>A</i> = 12.9, $E_a = 37 \text{ kJ mol}^{-1}$; studied at 18.5-46.8°C.	727193
9.5.2 Iron(III) ion								
	$\text{Fe}(\text{C}_2\text{O}_4) + \text{Fe}^{3+} \rightarrow \text{Fe}^{2+} + \text{O}_2\text{CCO}_2^- + \text{Fe}^{3+}$	1.0×10^5	~ 0.8	1.0	22	f.p.	D.k. in soln. contg. $(1\text{-}14) \times 10^{-4} \text{ mol L}^{-1}$ ferric oxalate and $0.15 \text{ mol L}^{-1} \text{ H}^+$; Log <i>A</i> = 17.7, $E_a = 71 \text{ kJ mol}^{-1}$; studied at 18.3-31.8°C.	727193
9.6 Pentacyanoferrate(II) ion								
9.6.1 2-Methylpyrazine								
	$\text{Fe}(\text{CN})_5^{3-} + 2\text{-Mepz} \rightarrow \text{Fe}(\text{CN})_5(2\text{-Mepz})^{3-}$	4.8×10^2	8-10	0.1	25	f.p.	D.k. at 440-470 nm in soln. contg. $\text{Fe}(\text{CN})_5(2\text{-Mepz})^{3-}$ and $0.1\text{-}9.6 \text{ mol L}^{-1}$ 2-methylpyrazine; at 1 and 50°C, <i>k</i> = 44 and $4.6 \times 10^3 \text{ L mol}^{-1} \text{ s}^{-1}$, respectively, giving $\Delta H^\ddagger = 67 \text{ kJ mol}^{-1}$ and $\Delta S^\ddagger = 32 \text{ J K}^{-1} \text{ mol}^{-1}$. Product suggested to be N1 isomer which rearranges to N4 isomer.	81A238

TABLE 9. Rate constants for iron transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
9.7 Pentacyanonitrosylferrate(II) ion								
9.7.1	2-Hydroxy-2,2-dimethylethyl							
	$\text{Fe}(\text{CN})_5\text{NO}^{3-} + \cdot\text{CH}_2\text{C}(\text{CH}_3)_2\text{OH} \rightarrow [\text{Fe}(\text{CN})_5\text{N}(\text{O})\text{CH}_2\text{C}(\text{CH}_3)_2\text{OH}]^{3-}$	2.5×10^9	6.0-7.5			p.r.	P.b.k. and d.k. at 380 nm in Ar-satd. soln. contg. $\text{Fe}(\text{CN})_5\text{NO}^{2-}$ and 0.3 mol L ⁻¹ <i>tert</i> -BuOH.	79A13
9.7.2	2-Amino-2-carboxy-2-methylethyl							
	$\text{Fe}(\text{CN})_5\text{NO}^{3-} + \cdot\text{CH}_2\text{C}(\text{CH}_3)(\text{NH}_3^+) \text{CO}_2^- \rightarrow [\text{Fe}(\text{CN})_5\text{N}(\text{O})\text{CH}_2\text{C}(\text{CH}_3)(\text{NH}_3^+) \text{CO}_2]^{3-}$	1.6×10^9	6.0-7.5			p.r.	P.b.k. and d.k. at 380 nm in Ar-satd. soln. contg. $\text{Fe}(\text{CN})_5\text{NO}^{2-}$ and 0.3 mol L ⁻¹ α -aminoisobutyrate ion.	79A13
9.7.3	(<i>N</i>-Acetyl-<i>N</i>-methylamino)methyl							
	$\text{Fe}(\text{CN})_5\text{NO}^{3-} + \cdot\text{CH}_2\text{N}(\text{CH}_3)\text{C}(\text{O})\text{CH}_3 \rightarrow [\text{Fe}(\text{CN})_5\text{N}(\text{O})\text{CH}_2\text{N}(\text{CH}_3)\text{C}(\text{O})\text{CH}_3]^{3-}$	3.5×10^{10}	6.0-7.5			p.r.	P.b.k. and d.k. at 380 nm in Ar-satd. soln. contg. $\text{Fe}(\text{CN})_5\text{NO}^{2-}$ and 0.3 mol L ⁻¹ <i>N,N</i> -dimethylacetamide.	79A13
9.7.4	2-Amino-2-methylpropyl, conjugate acid							
	$\text{Fe}(\text{CN})_5\text{NO}^{3-} + \cdot\text{CH}_2\text{C}(\text{CH}_3)_2\text{NH}_3^+ \rightarrow [\text{Fe}(\text{CN})_5\text{N}(\text{O})\text{CH}_2\text{C}(\text{CH}_3)_2\text{NH}_3]^{2-}$	1.2×10^{10}	6.0-7.5			p.r.	P.b.k. and d.k. at 380 nm in Ar-satd. soln. contg. $\text{Fe}(\text{CN})_5\text{NO}^{2-}$ and 0.3 mol L ⁻¹ <i>tert</i> -butylamine.	79A13
9.7.5	2-Carboxy-2-hydroxy-2-methylethyl, anion							
	$\text{Fe}(\text{CN})_5\text{NO}^{3-} + \cdot\text{CH}_2\text{C}(\text{CH}_3)(\text{OH})\text{CO}_2^- \rightarrow [\text{Fe}(\text{CN})_5\text{N}(\text{O})\text{CH}_2\text{COH}(\text{CH}_3)\text{CO}_2]^{4-}$	6.3×10^8	6.0-7.5			p.r.	P.b.k. and d.k. at 380 nm in Ar-satd. soln. contg. $\text{Fe}(\text{CN})_5\text{NO}^{2-}$ and 0.3 mol L ⁻¹ α -hydroxisobutyrate ion.	79A134
9.7.6	2-Carboxy-2,2-dimethylethyl anion							
	$\text{Fe}(\text{CN})_5\text{NO}^{3-} + \cdot\text{CH}_2\text{C}(\text{CH}_3)_2\text{CO}_2^- \rightarrow [\text{Fe}(\text{CN})_5\text{N}(\text{O})\text{CH}_2\text{C}(\text{CH}_3)_2\text{CO}_2]^{4-}$	2.0×10^9	6.3			p.r.	P.b.k. and d.k. at 380 nm in Ar-satd. soln. contg. $\text{Fe}(\text{CN})_5\text{NO}^{2-}$ and 0.3 mol L ⁻¹ pivalate ion.	79A134
9.8	Acetonitrile(aqua)-2,3,9,10-tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraeneiron(II) ion							
9.8.1	Carbon monoxide							
	$\text{Fe}(\text{tim})(\text{CH}_3\text{CN})(\text{H}_2\text{O})^{2+} + \text{CO} \rightarrow \text{Fe}(\text{tim})\text{CO}(\text{CH}_3\text{CN})^{2+} + \text{H}_2\text{O}$	7.1×10^3	0.5	23	f.p.		D.k. at 550 nm in soln. contg. 9.8×10^{-4} mol L ⁻¹ CO, $\sim 10^{-5}$ mol L ⁻¹ $\text{Fe}(\text{tim})\text{CO}(\text{H}_2\text{O})^{2+}$ and 0.031-2.55 mol L ⁻¹ acetonitrile; $k_t = 1.2 \times 10^{-3}$ s ⁻¹ [84M388].	84A403
9.9	Diaqua(2,3,9,10-tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraeneiron(II) ion							
9.9.1	Carbon monoxide							
	$\text{Fe}(\text{tim})(\text{H}_2\text{O})_2^{2+} + \text{CO} \rightarrow \text{Fe}(\text{tim})\text{CO}(\text{H}_2\text{O})^{2+} + \text{H}_2\text{O}$	1.3×10^6	0.5	23	f.p.		D.k. at 650 nm in soln. contg. CO and $\text{Fe}(\text{tim})\text{CO}(\text{H}_2\text{O})^{2+}$ (pseudo-first order reaction) or Ar-satd. to remove CO (second order reaction); $k_t = 1.8 \times 10^{-3}$ s ⁻¹ [84M388].	84A403
9.10	5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatoiron(II) ion							
9.10.1	Carbon monoxide							
	$\text{FeTMpyP}^{4+} + \text{CO} \rightarrow \text{FeTMpyP}(\text{CO})^{4+}$	6.8×10^6	8			p.r.	D.k. at 450 nm in soln. contg. 0.1 mol L ⁻¹ formate, 0.005-0.022 mol L ⁻¹ N ₂ O, (1-9) $\times 10^{-4}$ mol L ⁻¹ CO and (2-3) $\times 10^{-5}$ mol L ⁻¹ FeTMpyP ⁵⁺ .	82A119
9.11	$\alpha,\alpha,\alpha,\beta$-Tetrakis(<i>N</i>-methylisonicotinamidophenyl)porphinatoiron(II) ion							
9.11.1	Carbon monoxide							
	$\text{FePFP}^{4+} + \text{CO} \rightarrow \text{FePFP}(\text{CO})^{4+}$	2.9×10^5	7.9	0.1		p.r.	D.k. at 440 nm in soln. contg. 0.1 mol L ⁻¹ formate, 0.005-0.022 mol L ⁻¹ N ₂ O, (1-9) $\times 10^{-4}$ mol L ⁻¹ CO and (2-3) $\times 10^{-5}$ mol L ⁻¹ FePFP ⁵⁺ .	86A154

TABLE 9. Rate constants for iron transients — Continued

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t(\text{°C})$	Method	Comment	Ref.
9.12 Iron(II) deuteroporphyrin (2-propanol)₂								
9.12.1 Trichloromethyl								
	$\text{FeDP(2-ProOH)}_2 + \text{CCl}_3 \rightarrow \text{CCl}_3\text{FeDP(2-ProOH)}_2$	$\sim 2 \times 10^9$	7.2			p.r.	D.k. at 412 nm in soln. contg. 10^{-4} mol L^{-1} Fe(III) deuteroporphyrin, 6.5 mol L^{-1} 2-ProOH, 0.034 mol L^{-1} acetone, (0.25-1.0) $\times 10^{-4}$ mol L^{-1} CCl_3 and 6.2×10^{-3} mol L^{-1} phosphate. Reaction is followed by first-order process, $k = 70 \text{ s}^{-1}$; suggested to represent structural rearrangement.	80A011
9.13 Tris(2,2'-bipyridine)iron(II) ion, OH-adduct								
9.13.1 First-order reaction								
	$\text{Fe(bpy)}_3(\text{bpyOH})^{2+} \rightarrow$	$1.4 \times 10^3 \text{ s}^{-1}$				p.r.	D.k. at 400 nm in N_2O -saturated soln. contg. (0.32-1.0) $\times 10^{-4}$ mol L^{-1} Fe(bpy)_3^{2+} . At 520 nm decay is mixed order; $k = 1 \times 10^3 \text{ s}^{-1}$ from condy. change at pH 4 and 9.	90A105
		$1.3 \times 10^3 \text{ s}^{-1}$	7	20		p.r.	D.k. at 400 nm in N_2O -saturated soln. contg. Fe(bpy)_3^{2+} . At 520 nm decay is mixed order suggesting existence of at least two isomers.	82A343
9.13.2 Ferricyanide ion								
	$\text{Fe(bpy)}_2(\text{bpyOH})^{2+} + \text{Fe(CN)}_6^{3-} \rightarrow$	$\dagger 2.1 \times 10^5$	-6			p.r.	D.k. at 375 and 620 nm in N_2O -saturated soln. contg. 8.0×10^{-4} mol L^{-1} Fe(CN)_6^{3-} .	90A015
		$\dagger 8 \times 10^5$	-6			p.r.	D.k. at 825 nm in N_2O -saturated soln. contg. (0.8-2.0) $\times 10^{-3}$ mol L^{-1} Fe(CN)_6^{3-} .	90A015
							\dagger Wavelength dependence of k attributed to the presence of more than one form of the reactant.	
9.13.3 Oxygen								
	$\text{Fe(bpy)}_2(\text{bpyOH})^{2+} + \text{O}_2 \rightarrow$	$\dagger 4 \times 10^6$	-6			p.r.	D.k. at 400 nm in N_2O -saturated soln. contg. 6.0×10^{-4} mol L^{-1} O_2 .	90A015
		$\dagger 7.6 \times 10^6$	-6			p.r.	D.k. at 525 nm in N_2O -saturated soln. contg. 6.0×10^{-4} mol L^{-1} O_2 .	90A015
							\dagger Wavelength dependence of k attributed to the presence of more than one form of the reactant.	
9.14 Bis(2,2'-bipyridine)dicyanoferrate(II), OH reaction product								
9.14.1 First-order reaction								
	$\text{Fe(bpy)}_2(\text{CN})_2/\text{OH} \rightarrow$	$\sim 3 \times 10^3 \text{ s}^{-1}$	4, nat			p.r.	D.k. at 310, 330, 515-530 nm in N_2O -saturated soln. contg. (3.1-5.6) $\times 10^{-5}$ mol L^{-1} $\text{Fe(bpy)}_2(\text{CN})_2$. From condy. measurements $k = 4 \times 10^3 \text{ s}^{-1}$. At pH 9.0, 9.5 d.k. is complex. Reactant suggested to be a mixture of $[\text{Fe(bpy)}_2(\text{CN})_2]^+$ and various 'OH adducts.	90A015
9.15 Hydroperoxide-iron(III) iron(II) complex								
9.15.1 First-order reaction								
	$\text{FeHO}_2\text{Fe}^{4+} \rightarrow \text{Fe}^{3+} + \text{FeHO}_2^+$	$1.8 \times 10^4 \text{ s}^{-1}$ $2.5 \times 10^4 \text{ s}^{-1}$	0.1- 0.3	1.0 25	20 25	p.r.	D.k. at 450 nm in O_2 -saturated soln. contg. $\text{Fe}(\text{ClO}_4)_2$ and HClO_4 ; $E_a = 48 \text{ kJ mol}^{-1}$, studied at 20-40°C. For the equilibrium $\text{Fe}^{3+}\text{HO}_2^- + \text{Fe}^{2+} \rightleftharpoons \text{FeHO}_2\text{Fe}^{4+}$ $K = 22, 27, 33, 37.5 \text{ L mol}^{-1}$ at 20, 25, 30 and 40°C, respectively.	730038

TABLE 9. Rate constants for iron transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
9.16 Hydridoiron(III) ion								
9.16.1 Hydrogen ion								
	$\text{FeH}^{2+} + \text{H}^+ \rightarrow \text{Fe}^{3+} + \text{H}_2$	1.1×10^4	0.1- 1.0	0.1- 1.0	19-24	p.r.	D.k. at 320-370 nm in deaerated soln. contg. $\text{Fe}(\text{ClO}_4)_2$ and HClO_4 .	690434
9.17 Hydroperoxide-iron(III) complex								
9.17.1 First-order reaction								
	$\text{FeHO}_2^{2+} \rightarrow \text{Fe}^{3+} + \text{HO}_2^-$	$1.8 \times 10^3 \text{ s}^{-1}$	0.1- 0.3	1.0	20,25	p.r.	Calcd. from d.k. at 450 nm in O_2 -satd. soln. contg. $\text{Fe}(\text{ClO}_4)_2$ and HClO_4 ; $E_a = 8.8 \text{ kJ mol}^{-1}$; studied at 20-40°C.	730038
9.18 Hydroperoxide-sulfatoiron(III) complex								
9.18.1 First-order reaction								
	$\text{FeHO}_2\text{SO}_4 \rightarrow \text{FeSO}_4^{+} + \text{HO}_2^-$	$\sim 10^4 \text{ s}^{-1}$	0.1- 0.3	22		p.r.	Estd. from d.k. at 450 nm in O_2 -satd. soln. contg. $(1.5-2.3) \times 10^{-2} \text{ mol L}^{-1}$ Fe^{2+} and 0.13 mol L^{-1} sulfate. For the equilibrium $\text{Fe}^{3+}\text{HO}_2^- + \text{SO}_4^{2-} \rightleftharpoons \text{FeHO}_2\text{SO}_4$, $K = 90 \text{ L mol}^{-1}$.	731022
9.19 Hydroperoxide-sulfatoiron(III) iron(II) complex								
9.19.1 First-order reaction								
	$\text{FeHO}_2\text{FeSO}_4^{2+} \rightarrow \text{FeSO}_4^{+}\text{Fe}^{3+} + \text{HO}_2^-$	$\sim 10^4 \text{ s}^{-1}$	0.1- 0.3	22		p.r.	Estd. from d.k. at 450 nm in O_2 -satd. soln. contg. $(1.5-2.3) \times 10^{-2} \text{ mol L}^{-1}$ Fe^{2+} and 0.13 mol L^{-1} sulfate. For the equilibrium $\text{FeHO}_2\text{Fe}^{4+} + \text{SO}_4^{2-} \rightleftharpoons \text{FeHO}_2\text{FeSO}_4^{2+}$, $K = 100 \text{ L mol}^{-1}$.	731022
9.20 Hydridoiron(III) protoporphyrin								
9.20.1 Water								
	$\text{Fe}(\text{III})\text{PP}(\text{H}) + \text{H}_2\text{O} \rightarrow \text{Fe}(\text{III})\text{PP} + \text{H}_2 + \text{OH}^-$	$2.5 \times 10^3 \text{ s}^{-1}$	10			p.r.	D.k. in Ar-satd. soln. contg. $2 \times 10^{-5} \text{ mol L}^{-1}$ Fe(II) protoporphyrin and 0.1 mol L^{-1} <i>tert</i> -BuOH. In N_2O -satd. soln. contg. $(2-10) \times 10^{-5} \text{ mol L}^{-1}$ Fe(II)PP and 0.1 mol L^{-1} formate, $k = 2.0 \times 10^3 \text{ s}^{-1}$.	85A006
9.21 Hydroxymethyliron(III) protoporphyrin								
9.21.1 Water								
	$\text{HOCH}_2\text{Fe}(\text{III})\text{PP} + \text{H}_2\text{O} \rightarrow \text{Fe}(\text{III})\text{PP} + \text{MeOH} + \text{OH}^-$	$2.5 \times 10^2 \text{ s}^{-1}$	10			p.r.	D.k. in N_2O -satd. soln. contg. $2 \times 10^{-5} \text{ mol L}^{-1}$ Fe(II) protoporphyrin and 0.1 mol L^{-1} MeOH.	85A006
9.22 1-Hydroxyethyliron(III) protoporphyrin								
9.22.1 Water								
	$\text{CH}_3\text{CHOHFe}(\text{III})\text{PP} + \text{H}_2\text{O} \rightarrow \text{Fe}(\text{III})\text{PP} + \text{EtOH} + \text{OH}^-$	$2.5 \times 10^2 \text{ s}^{-1}$	10			p.r.	D.k. in N_2O -satd. soln. contg. $2 \times 10^{-5} \text{ mol L}^{-1}$ Fe(II) protoporphyrin and 0.1 mol L^{-1} EtOH.	85A006
9.23 1-Hydroxy-1-methylethyliron(III) protoporphyrin								
9.23.1 Water								
	$(\text{CH}_3)_2\text{C}(\text{OH})\text{Fe}(\text{III})\text{PP} + \text{H}_2\text{O} \rightarrow \text{Fe}(\text{III})\text{PP} + 2\text{-PrOH} + \text{OH}^-$	$3.0 \times 10^2 \text{ s}^{-1}$	10			p.r.	D.k. in N_2O -satd. soln. contg. $2 \times 10^{-5} \text{ mol L}^{-1}$ Fe(II) protoporphyrin and 0.1 mol L^{-1} 2-PrOH.	85A006

TABLE 9. Rate constants for iron transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>t</i>	<i>t</i> (°C)	Method	Comment	Ref.
9.24 2-Hydroxyethyliron(III) protoporphyrin								
9.24.1 First-order reaction								
$\text{HOCH}_2\text{CH}_2\text{Fe(III)PP} \rightarrow \text{Fe(III)PP} + \text{H}_2\text{C}=\text{CH}_2 + \text{OH}^-$		80 s ⁻¹		10-13		p.r.	D.k. in ethylene-N ₂ O (9:1) satd. soln. contg. (1-3) × 10 ⁻⁵ mol L ⁻¹ Fe(II) protoporphyrin.	86A511
9.25 2-Hydroxy-1-methylethyliron(III) protoporphyrin								
9.25.1 First-order reaction								
$\text{HOCH}_2\text{CH}(\text{CH}_3)\text{Fe(III)PP} \rightarrow \text{Fe(III)PP} + \text{CH}_3\text{CH}=\text{CH}_2 + \text{OH}^-$		40 s ⁻¹		10-13		p.r.	D.k. in propylene-N ₂ O (9:1) satd. soln. contg. (1-3) × 10 ⁻⁵ mol L ⁻¹ Fe(II) protoporphyrin.	86A511
9.26 Trifluoromethyliron(III) deuteroporphyrin (2-propoxy)(2-propanol)								
9.26.1 Iron(II) deuteroporphyrin (2-propoxy)(2-propanol)								
$\text{CF}_3\text{Fe(III)DP(2-PrO')}(2-\text{PrOH}) + \text{Fe(II)DP(2-PrO')}(2-\text{PrOH}) \rightarrow \text{CF}_2\text{FeDP(2-PrO')}(2-\text{PrOH}) + \text{Fe(III)DP(2-PrO')}(2-\text{PrOH}) + \text{F}^-$		5.1 × 10 ⁶		12.7		p.r.	P.b.k. at 460 nm in CF ₃ Br-satd. soln. contg. 6.5 mol L ⁻¹ 2-PrOH, (0.6-2) × 10 ⁻⁴ mol L ⁻¹ Fe(II) deuteroporphyrin and 0.05 mol L ⁻¹ NaOH; CF ₂ FeDP is suggested to hydrolyze slowly to give FeDP(CO).	87A232
9.27 Tris(1,10-phenanthroline)iron(III) ion								
9.27.1 Iron(II) ion								
$\text{Fe}(\text{phen})_3^{3+} + \text{Fe}^{2+} \rightarrow \text{Fe}(\text{phen})_3^{2+} + \text{Fe}^{3+}$		5.4 × 10 ⁴	0	1.0	25	f.p./oq	Absorbance changes at 450 nm in soln. contg. 3.0 × 10 ⁻⁶ mol L ⁻¹ Ru(bpy) ₃ ²⁺ , 2.5 × 10 ⁻⁶ mol L ⁻¹ Fe(phen) ₃ ²⁺ , 4.0 × 10 ⁻³ mol L ⁻¹ Fe ³⁺ (OQ), 3.0 × 10 ⁻⁵ mol L ⁻¹ Fe ²⁺ and 1.0 or 0.076 mol L ⁻¹ H ⁺ , respectively.	777164
9.28 Aqua(methyl)nitrilotriacetatoferate(III) ion								
9.28.1 First-order reaction								
$\text{CH}_3\text{FeNTA}(\text{H}_2\text{O})^- \rightarrow \text{FeNTA}(\text{H}_2\text{O})^- + \cdot\text{CH}_3$		9 × 10 ³ s ⁻¹	4-8			p.r.	D.k. in N ₂ O-satd. soln. contg. 0.002-0.006 mol L ⁻¹ NTA, (0.5-5.0) × 10 ⁻³ mol L ⁻¹ FeSO ₄ and 0.1-0.5 mol L ⁻¹ DMSO; <i>k</i> _r = 2.1 × 10 ⁷ and 5.3 × 10 ⁶ L mol ⁻¹ s ⁻¹ at pH 4-8 and 10.5, respectively.	88A426
9.28.2 Methyl								
$\text{CH}_3\text{FeNTA}(\text{H}_2\text{O})^- + \cdot\text{CH}_3 \rightarrow \text{FeNTA}(\text{H}_2\text{O})^- + \text{C}_2\text{H}_6$		5.5 × 10 ⁸	4-8			p.r.	Calcd. from concn. dependence of d.k. in N ₂ O-satd. soln. contg. 0.002-0.006 mol L ⁻¹ NTA, (0.5-5.0) × 10 ⁻³ mol L ⁻¹ FeSO ₄ and 0.1-0.5 mol L ⁻¹ DMSO; at pH 10.5, <i>k</i> ~ 2 × 10 ⁷ L mol ⁻¹ s ⁻¹ .	88A426
9.29 Carboxylato(nitrilotriacetato)ferrate(III) ion								
9.29.1 First-order reaction								
$[\text{CO}_2\text{FeNTA}]^{2-} \rightarrow \text{FeNTA}^- + \text{CO}_2^{2-}$		140 s ⁻¹	7			p.r.	Calcd. from concn. dependence of d.k. in N ₂ O-satd. soln. contg. FeSO ₄ , formate, NTA, with and without Co(NH ₃) ₆ ³⁺ or Fe(III); <i>k</i> _r = 1.5 × 10 ⁷ L mol ⁻¹ s ⁻¹ .	88A184
9.29.2 Carbon dioxide radical anion								
$[\text{CO}_2\text{FeNTA}]^{2-} + \text{CO}_2^{2-} + \text{H}_2\text{O} \rightarrow \text{FeNTA}^- + \text{CO}_2 + \text{CO} + 2\text{OH}^-$		1.9 × 10 ⁷	7			p.r.	Calcd. from concn. dependence of d.k. in N ₂ O-satd. soln. contg. formate and FeSO ₄ with and without Co(NH ₃) ₆ ³⁺ , NTA or Fe(III).	88A184

TABLE 9. Rate constants for iron transients — Continued

No.	Reaction	k (L mol ⁻¹ s ⁻¹)	pH	<i>J</i>	<i>t</i> (°C)	Method	Comment	Ref.
9.30 Carboxylato(2-hydroxyethylenediaminetriacetato)ferrate(III) ion								
9.30.1 First-order reaction								
	$\text{CO}_2\text{FeHEDTA}^{2-} \rightarrow \text{FeHEDTA}^- + \text{CO}_2$	25	7			p.r.	Calcd. from concn. dependence of d.k. in N ₂ O-satd. soln. contg. ferrous ammonium sulfate, formate, HEDTA, with and without Co(NH ₃) ₆ ³⁺ or Fe(III); $k_t = 6.2 \times 10^6$ L mol ⁻¹ s ⁻¹ .	88A184
9.30.2 Carbon dioxide radical anion								
	$\text{CO}_2\text{FeHEDTA}^{2-} + \text{CO}_2^- + \text{H}_2\text{O} \rightarrow \text{FeHEDTA}^- + \text{CO}_2 + \text{CO} + 2\text{OH}^-$		4.5×10^6	7		p.r.	Calcd. from concn. dependence of d.k. in N ₂ O-satd. soln. contg. formate, ferrous ammonium sulfate and HEDTA with and without Co(NH ₃) ₆ ³⁺ or Fe(III).	88A184
9.31 Diethylenetriaminepentaacetatoferrate(III), DTPA radical adduct								
9.31.1 First-order reaction								
	$\text{DTPAFe}^{\text{III}}\text{DTPA}^\cdot \rightarrow \text{DTPAFe}^{\text{III}}\text{DTPA}_f^\cdot$		2.1×10^4 s ⁻¹	8-11	0.1	p.r.	Calcd. from d.k. in N ₂ O-satd. soln. contg. 0.1 mol L ⁻¹ NaClO ₄ , 0.001 mol L ⁻¹ DTPA, and (4.5-143) $\times 10^{-6}$ mol L ⁻¹ FeDTPA ²⁻ . Reaction suggested to represent rearrangement of the ligand radical. Product reacts with parent complex, $k = 2.5 \times 10^7$ L mol ⁻¹ s ⁻¹ at pH 8-10.	89A135
9.32 Tetracyano(2,2'-bipyridine)ferrate(III) ion								
9.32.1 1,1'-Dimethyl-4,4'-bipyridinium radical cation								
	$\text{Fe}(\text{bpy})(\text{CN})_4^- + \text{MV}^{2+} \rightarrow \text{Fe}(\text{bpy})(\text{CN})_4^{2-} + \text{MV}^{2+}$		1.8×10^{10}			f.p./pi	D.k. in soln. contg. Fe(bpy)(CN) ₄ ²⁻ and MV ²⁺ . Value obtained from computer fit.	91A067
9.33 Sulfatoiron(III) ion								
9.33.1 First-order reaction								
	$\text{FeSO}_4^+ \rightarrow \text{SO}_4^{2-} + \text{Fe}^{3+}$		6.5×10^3 s ⁻¹	2.1	20	f.p.	D.k. at 450 nm in Ar-satd. soln. contg. 0.001 mol L ⁻¹ K ₂ S ₂ O ₈ and 7.5 $\times 10^{-5}$ mol L ⁻¹ Fe ²⁺ ; value obtained from computer fit.	90A261
	$\text{FeSO}_4^+ \rightarrow \text{SO}_4^{2-} + \text{Fe}^{2+}$		$\sim 5 \times 10^4$ s ⁻¹	2.1	20	f.p.	D.k. at 450 nm in Ar-satd. soln. contg. 0.001 mol L ⁻¹ K ₂ S ₂ O ₈ and 7.5 $\times 10^{-5}$ mol L ⁻¹ Fe ²⁺ ; value obtained from computer fit; $k_t = 3 \times 10^8$ L mol ⁻¹ s ⁻¹ .	90A261
9.34 Ferricyanide ion								
9.34.1 3,4-Dimethoxyphenoxide ion								
	$\text{Fe}(\text{CN})_6^{3-} + 3,4-(\text{CH}_3\text{O})_2\text{C}_6\text{H}_3\text{O}^- \rightarrow \text{Fe}(\text{CN})_6^{4-} + 3,4-(\text{CH}_3\text{O})_2\text{C}_6\text{H}_3\text{O}^\cdot$		2.7×10^4	13.5	20	p.r.	P.b.k. in N ₂ O-satd. soln. contg. (1-10) $\times 10^{-3}$ mol L ⁻¹ K ₄ Fe(CN) ₆ , ~0.04 mol L ⁻¹ 3,4-dimethoxyphenoxide ion and Br ⁻ ; $k_t = 6.5 \times 10^5$ L mol ⁻¹ s ⁻¹ .	91A455
9.34.2 5-Hydroxyindole, conjugate base								
	$\text{Fe}(\text{CN})_6^{3-} + 5-\text{InH-O}^- \rightarrow \text{Fe}(\text{CN})_6^{4-} + 5-\text{InH-O}^\cdot$		4.0×10^6	13.5	20	f.p./pi	P.b.k. at 500 nm in Ar-satd. soln. contg. (2-4) $\times 10^{-3}$ mol L ⁻¹ K ₄ Fe(CN) ₆ and 0.1 mol L ⁻¹ 2-chloroethanol.	90C007
9.34.3 5-Hydroxyindole-3-acetate ion, conjugate base								
	$\text{Fe}(\text{CN})_6^{3-} + \text{R-InH-O}^- \rightarrow \text{Fe}(\text{CN})_6^{4-} + \text{R-InH-O}^\cdot$		2.7×10^6	13.5	20	f.p./pi	P.b.k. at 500 nm in Ar-satd. soln. contg. (2-4) $\times 10^{-3}$ mol L ⁻¹ K ₄ Fe(CN) ₆ and 0.1 mol L ⁻¹ 2-chloroethanol.	90C007

TABLE 9. Rate constants for iron transients — Continued

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t^\circ\text{C}$	Method	Comment	Ref.
9.34 Ferricyanide ion — Continued								
9.34.4 5-Hydroxytryptophan, conjugate base								
	$\text{Fe}(\text{CN})_6^{3-} + 5-(\text{O}^-)\text{TrpH} \rightarrow \text{Fe}(\text{CN})_6^{4-} + 5-(\text{O}')\text{TrpH}$	2.1×10^6	13.5	20	f.p./pi	P.b.k. at 500 nm in Ar-satd. soln. contg. $(2-4) \times 10^{-3}$ mol L^{-1} $\text{K}_4\text{Fe}(\text{CN})_6$ and 0.1 mol L^{-1} 2-chloroethanol; $k_t = 2.8 \times 10^4 \text{ L mol}^{-1} \text{ s}^{-1}$.	90C007	
		1.6×10^6	13.5	20	p.r.	P.b.k. at 500 nm in N_2O -satd. soln. contg. 1×10^{-4} mol L^{-1} $\text{K}_4\text{Fe}(\text{CN})_6$ and 0.1 mol L^{-1} azide ion; $k_t = 2.7 \times 10^4 \text{ L mol}^{-1} \text{ s}^{-1}$.	90C007	
9.34.5 Sesamol, conjugate base								
	$\text{Fe}(\text{CN})_6^{3-} + 3,4-(\text{CH}_2\text{O}_2)\text{C}_6\text{H}_3\text{O}^- \rightarrow \text{Fe}(\text{CN})_6^{4-} + 3,4-(\text{CH}_2\text{O}_2)\text{C}_6\text{H}_3\text{O}'$	2.4×10^5	13.5	20	p.r.	P.b.k. in N_2O -satd. soln. contg. $(1-10) \times 10^{-3}$ mol L^{-1} $\text{K}_4\text{Fe}(\text{CN})_6$, $\sim 0.04 \text{ mol L}^{-1}$ sesamol and Br^- ; $k_t = 8.2 \times 10^5 \text{ L mol}^{-1} \text{ s}^{-1}$.	91A455	
9.34.6 Serotonin, conjugate base								
	$\text{Fe}(\text{CN})_6^{3-} + \text{R-InH-O}^- \rightarrow \text{Fe}(\text{CN})_6^{4-} + \text{R-InH-O}'$	5.9×10^6	13.7	20	f.p./pi	P.b.k. at 500 nm in Ar-satd. soln. contg. $(2-4) \times 10^{-3}$ mol L^{-1} $\text{K}_4\text{Fe}(\text{CN})_6$ and 0.1 mol L^{-1} 2-chloroethanol; $k_t = 1 \times 10^5 \text{ L mol}^{-1} \text{ s}^{-1}$.	90C007	
9.34.7 <i>N,N,N',N'</i>-Tetramethyl-p-phenylenediamine								
	$\text{Fe}(\text{CN})_6^{3-} + \text{TMPD} \rightarrow \text{Fe}(\text{CN})_6^{4-} + [\text{TMPD}]^+$	5.4×10^6	9.1	20	f.p./pi	P.b.k. in Ar-satd. soln. contg. $(2-4) \times 10^{-3}$ mol L^{-1} $\text{K}_4\text{Fe}(\text{CN})_6$ and 0.1 mol L^{-1} 2-chloroethanol; $k_t = 1.4 \times 10^5 \text{ L mol}^{-1} \text{ s}^{-1}$.	90C007	
		9.8×10^6	13.5	20	p.r.	P.b.k. at 500 nm in N_2O -satd. soln. contg. 0.01 mol L^{-1} $\text{K}_4\text{Fe}(\text{CN})_6$ and 0.1 mol L^{-1} azide ion.	90C007	
9.35 Carboxyferricenium								
9.35.1 <i>N,N,N,N'</i>-Tetramethyl-p-phenylenediamine								
	$\text{Fc}^+(\text{CO}_2^-)_2 + \text{TMPD} \rightarrow \text{Fc}(\text{CO}_2^-)_2 + [\text{TMPD}]^+$	7.2×10^8	8	20	p.r.	P.b.k. at 565 nm in N_2O -satd. soln. contg. $(1-5) \times 10^{-3}$ mol L^{-1} $\text{Fc}(\text{CO}_2^-)_2$, $(0.05-0.2)$ mol L^{-1} SCN^- and $(1-5) \times 10^{-5}$ mol L^{-1} TMPD.	92A363	
9.36 1,1'-Dicarboxyferricenium								
9.36.1 3,5-Dimethoxyphenoxide ion								
	$\text{Fc}^+(\text{CO}_2^-)_2 + 3,5-(\text{CH}_3\text{O})_2\text{C}_6\text{H}_3\text{O}^- \rightarrow \text{Fc}(\text{CO}_2^-)_2 + 3,5-(\text{CH}_3\text{O})_2\text{C}_6\text{H}_3\text{O}'$	6×10^5	7.0	20	p.r.	P.b.k. in N_2O -satd. soln. contg. Br^- ; $k_t = 1.1 \times 10^9$ and $7.0 \times 10^8 \text{ L mol}^{-1} \text{ s}^{-1}$ at pH 7.0 and 8.0, respectively.	91A455	
		2×10^6	8.0					
9.36.2 2,6-Dimethoxyphenoxide ion								
	$\text{Fc}^+(\text{CO}_2^-)_2 + 2,6-(\text{CH}_3\text{O})_2\text{C}_6\text{H}_5\text{O}^- \rightarrow \text{Fc}(\text{CO}_2^-)_2 + 2,6-(\text{CH}_3\text{O})_2\text{C}_6\text{H}_5\text{O}'$	6.5×10^6	7.0	20	p.r.	P.b.k. in N_2O -satd. soln. contg. Br^- .	91A455	
9.36.3 <i>N,N,N,N'</i>-Tetramethyl-p-phenylenediamine								
	$\text{Fc}^+(\text{CO}_2^-)_2 + \text{TMPD} \rightarrow \text{Fc}(\text{CO}_2^-)_2 + [\text{TMPD}]^+$	9.3×10^8	8	20	p.r.	P.b.k. at 565 nm in N_2O -satd. soln. contg. $(1-5) \times 10^{-3}$ mol L^{-1} $\text{Fc}(\text{CO}_2^-)_2$, $(0.05-0.2)$ mol L^{-1} SCN^- and $(1-5) \times 10^{-5}$ mol L^{-1} TMPD.	92A363	
9.37 Hydroxymethylferricenium								
9.37.1 <i>N,N,N,N'</i>-Tetramethyl-p-phenylenediamine								
	$\text{Fc}^+\text{CH}_2\text{OH} + \text{TMPD} \rightarrow \text{FcCH}_2\text{OH} + [\text{TMPD}]^+$	1.7×10^8	8	20	p.r.	P.b.k. at 565 nm in N_2O -satd. soln. contg. $(1-5) \times 10^{-3}$ mol L^{-1} FcCH_2OH , $(0.05-0.2)$ mol L^{-1} SCN^- and $(1-5) \times 10^{-5}$ mol L^{-1} TMPD.	92A363	

TABLE 9. Rate constants for iron transients — Continued

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t(\text{°C})$	Method	Comment	Ref.
9.38 (Dimethylaminomethyl)ferricenium								
9.38.1 <i>N,N,N',N'-Tetramethyl-p-phenylenediamine</i>								
	$\text{Fc}^+ \text{CH}_2\text{N}(\text{CH}_3)_2 + \text{TMPD} \rightarrow$ $\text{FcCH}_2\text{N}(\text{CH}_3)_2 + [\text{TMPD}]^{+}$	2.2×10^8	8		20	p.r.	P.b.k. at 565 nm in N_2O -satd. soln. contg. (1-5) $\times 10^{-3}$ mol L^{-1} $\text{FcCH}_2\text{N}(\text{CH}_3)_2$, (0.05-0.2) mol L^{-1} SCN^- and (1-5) $\times 10^{-5}$ mol L^{-1} TMPD.	92A363
9.38.2 3,4-Dimethoxyphenol								
	$\text{Fc}^+ \text{CH}_2\text{N}(\text{CH}_3)_2 +$ 3,4-(CH_3O) ₂ $\text{C}_6\text{H}_3\text{OH} \rightarrow$ $\text{FcCH}_2\text{N}(\text{CH}_3)_2 +$ 3,4-(CH_3O) ₂ $\text{C}_6\text{H}_3\text{O}^+ + \text{H}^+$	8.7×10^5	7.0		20	p.r.	P.b.k. in N_2O -satd. soln. contg. Br^- ; $k_f = 2.9 \times 10^7 \text{ L mol}^{-1} \text{ s}^{-1}$.	91A455
9.39 Tris(2,2'-bipyridine)iron(III) ion, OH-adduct								
9.39.1 First-order reaction								
	$\text{Fe}(\text{bpy})_2(\text{bpyOH})^{3+} \rightarrow$	$8.6 \times 10^2 \text{ s}^{-1}$	3		20	p.r.	D.k. at 400 nm in N_2O -satd. soln. contg. 1×10^{-4} mol L^{-1} $\text{Fe}(\text{bpy})_3^{3+}$.	82A343
9.40 Tris(2,2'-bipyridine)iron(III) ion, H-adduct								
9.40.1 First-order reaction								
	$\text{Fe}(\text{bpy})_2(\text{bpyH})^{3+} \rightarrow$	$6 \times 10^4 \text{ s}^{-1}$	3		20	p.r.	D.k. at 400 nm in Ar-satd. soln. contg. 1×10^{-4} mol L^{-1} $\text{Fe}(\text{bpy})_3^{3+}$ and 0.5 mol L^{-1} <i>tert</i> -BuOH.	82A343
9.41 5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphineiron(III)-superoxide complex								
9.41.1 Superoxide radical anion								
	$[\text{FeTMpyP-O}_2]^{4+} + \text{O}_2^- + 2 \text{H}^+ \rightarrow$ $\text{FeTMpyP}^{5+} + \text{H}_2\text{O}_2 + \text{O}_2$	2.3×10^9	8.1			p.r.	Calcd. from equil. concn. formed in O_2 -satd. soln. of Fe(III) complex; in presence of formate $k = 7.6 \times 10^8 \text{ L mol}^{-1} \text{ s}^{-1}$, difference attributed to change in ionic strength.	82A119
9.42 Methyliron(IV) deuteroporphyrin (2-propanol)₂								
9.42.1 Iron(II) deuteroporphyrin (2-propanol)₂								
	$\text{CH}_3\text{Fe}(\text{IV})\text{DP}(2\text{-PrOH})_2 +$ $\text{Fe}(\text{II})\text{DP}(2\text{-PrOH})_2 \rightarrow$ $\text{CH}_3\text{Fe}(\text{III})\text{DP}(2\text{-PrOH})_2 +$ $\text{Fe}(\text{III})\text{DP}(2\text{-PrOH})_2$	4×10^8	7			p.r.	D.k. at 470 nm in soln. contg. 6.5 mol L^{-1} 2-PrOH, 10^{-4} mol L^{-1} Fe(III) deuteroporphyrin and CH_3Cl .	81A123
9.43 Iron(III) deuteroporphyrin (2-propanol)₂, ${}^\bullet\text{CHCl}_2$ radical adduct								
9.43.1 First-order reaction								
	$\text{FeDP}(2\text{-PrOH})_2 / {}^\bullet\text{CHCl}_2 \rightarrow$	-10^3 s^{-1}	7.2			p.r.	D.k. in soln. contg. 10^{-4} mol L^{-1} Fe(III) deuteroporphyrin, 6.5 mol L^{-1} 2-PrOH and chloroform.	80A011
9.44 Iron(III) deuteroporphyrin (2-propoxy)(2-propanol), ${}^\bullet\text{CF}_3$ reaction product								
9.44.1 First-order reaction								
	$\text{FeDP}(2\text{-PrO}^-)(2\text{-PrOH}) / {}^\bullet\text{CF}_3 \rightarrow$	$2.8 \times 10^3 \text{ s}^{-1}$	12.7			p.r.	D.k. at 520 nm in CF_3Br -satd. soln. contg. 6.5 mol L^{-1} 2-PrOH, varied concn. of Fe(III) deuteroporphyrin and 0.05 mol L^{-1} NaOH. Species suggested to be Fe(IV)- CF_3 adduct or Fe(III) DP^+ (oxidized porphyrin).	87A232

TABLE 9. Rate constants for iron transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
9.45 Iron(III) deuteroporphyrin dimethyl ester (2-propanol)₂, 1-hydroxy-1-methylethylperoxyl adduct								
9.45.1 First-order reaction								
	$(\text{CH}_3)_2\text{C}(\text{OH})\text{OOFeDPDME(2-PrOH)}_2 \rightarrow [\text{Fe(III)DPDME(2-PrOH)}_2]^{+} + (\text{CH}_3)_2\text{C}(\text{OH})\text{OO}^{-}$	$\sim 4 \times 10^7 \text{ s}^{-1}$	0-2			p.r.	Calcd. from d.k. at 660 nm in air-satd. soln. contg. 6.5 mol L ⁻¹ 2-PrOH, 1 × 10 ⁻⁴ mol L ⁻¹ Fe(III) deuteroporphyrin dimethyl ester and 0.01-1 mol L ⁻¹ H ⁺ .	85A311
	$(\text{CH}_3)_2\text{C}(\text{OH})\text{OOFeDPDME(2-PrOH)}_2 \rightarrow \text{Fe(III)DPDME(2-PrOH)}_2 + (\text{CH}_3)_2\text{C}(\text{OH})\text{OO}^{-}$	$\sim 2 \times 10^8 \text{ s}^{-1}$	0-2			p.r.	Calcd. from d.k. at 660 nm in air-satd. soln. contg. 6.5 mol L ⁻¹ 2-PrOH, 1 × 10 ⁻⁴ mol L ⁻¹ Fe(III) deuteroporphyrin dimethyl ester and 0.01-1 mol L ⁻¹ H ⁺ ; $k_t = \sim 6 \times 10^7 \text{ L mol}^{-1} \text{ s}^{-1}$.	85A311
9.46 Ferrate(IV) ion								
9.46.1 First-order reaction								
	$\text{FeO(OH)}_n^{2-n} \rightarrow$	$\sim 2 \text{ s}^{-1}$	14		25	p.r.	D.k. in N ₂ O-satd. soln. contg. (1-3.5) × 10 ⁻⁵ mol L ⁻¹ Fe(OH) ₄ ⁻ and 1 mol L ⁻¹ NaOH.	86A018
9.47 5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatoferate(III) radical cation								
9.47.1 5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatoferate(III) radical cation								
	$[\text{FeTPPS}]^{2-} + [\text{FeTPPS}]^{2-} \rightarrow$	1.3×10^9	7			p.r.	D.k. at 700 nm in N ₂ O-satd. soln. contg. 0.01 mol L ⁻¹ KBr.	86S115
9.48 Carbonatoiron(IV)								
9.48.1 Carbonatoiron(IV)								
	$\text{Fe}^{\text{IV}}(\text{CO}_3)_m + \text{Fe}^{\text{IV}}(\text{CO}_3)_m \rightarrow$	1.3×10^5	13			p.r.	D.k. at 420 nm in N ₂ O-satd. soln. contg. Fe(III) and carbonate; unclear whether k or $2k$.	90A278
9.49 Iron(IV) pyrophosphate								
9.49.1 Iron(IV) pyrophosphate								
	$\text{FeO}(\text{P}_2\text{O}_7)_2^{6-} + \text{FeO}(\text{P}_2\text{O}_7)_2^{6-} \rightarrow (\text{P}_2\text{O}_7)_2\text{FeOOF}(\text{P}_2\text{O}_7)_2^{12-}$	1.0×10^6	10		25	p.r.	D.k. at 420 nm in N ₂ O-satd. soln. contg. (4-10) × 10 ⁻⁴ mol L ⁻¹ Fe(III) and 0.1 mol L ⁻¹ Na pyrophosphate. Computer simulation suggested that k could be 10-20% lower; unclear whether k or $2k$.	90A373
9.49.2 Hydrogen peroxide								
	$\text{FeO}(\text{P}_2\text{O}_7)_2^{6-} + \text{H}_2\text{O}_2 \rightarrow \text{FeOH}(\text{P}_2\text{O}_7)_2^{6-} + \text{O}_2^{2-} + \text{H}^+$	3.9×10^5	10		25	p.r.	D.k. at 420 nm in N ₂ O-satd. soln. contg. (1-10) × 10 ⁻⁴ mol L ⁻¹ Fe(III) and 0.1 mol L ⁻¹ Na pyrophosphate. Average of values obtained with and without added H ₂ O ₂ .	90A373
9.49.3 Manganese(II) pyrophosphate								
	$\text{FeO}(\text{P}_2\text{O}_7)_2^{6-} + \text{Mn}(\text{P}_2\text{O}_7)_n^{(4n-2)-} \rightarrow$	1.2×10^6	10		25	p.r.	D.k. in N ₂ O-satd. soln. contg. 0.1 mol L ⁻¹ pyrophosphate and (1-13) × 10 ⁻⁵ mol L ⁻¹ Mn(II) pyrophosphate.	90A373
9.49.4 Iron(II) pyrophosphate								
	$\text{FeO}(\text{P}_2\text{O}_7)_2^{6-} + \text{Fe}(\text{P}_2\text{O}_7)_n^{(4n-2)-} \rightarrow$	1.6×10^6	10		25	p.r.	D.k. in N ₂ O-satd. soln. contg. 0.1 mol L ⁻¹ pyrophosphate and Fe(II) pyrophosphate.	90A373
9.49.5 Cobalt(II) pyrophosphate								
	$\text{FeO}(\text{P}_2\text{O}_7)_2^{6-} + \text{Co}(\text{P}_2\text{O}_7)_n^{(4n-2)-} \rightarrow$	5.5×10^5	10		25	p.r.	D.k. in N ₂ O-satd. soln. contg. 0.1 mol L ⁻¹ pyrophosphate and Co(II) pyrophosphate.	90A373
9.49.6 Nickel(II) pyrophosphate								
	$\text{FeO}(\text{P}_2\text{O}_7)_2^{6-} + \text{Ni}(\text{P}_2\text{O}_7)_n^{(4n-2)-} \rightarrow$	$<4.0 \times 10^2$	10		25	p.r.	No effect on d.k. of Fe(IV) in N ₂ O-satd. soln. contg. 0.1 mol L ⁻¹ pyrophosphate and Ni(II) pyrophosphate.	90A373

TABLE 9. Rate constants for iron transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>t</i>	<i>t</i> (°C)	Method	Comment	Ref.
9.49 Iron(IV) pyrophosphate — Continued								
9.49.7 Copper(II) pyrophosphate								
	$\text{FeO}(\text{P}_2\text{O}_7)_2^{6-} + \text{Cu}(\text{P}_2\text{O}_7)_n^{(4n-2)-} \rightarrow$	$<4.0 \times 10^2$	10		25	p.r.	No effect on d.k. of Fe(IV) in N ₂ O-satd. soln. contg. 0.1 mol L ⁻¹ pyrophosphate and Cu(II) pyrophosphate.	90A373
9.49.8 Ferrocyanide ion								
	$\text{FeO}(\text{P}_2\text{O}_7)_2^{6-} + \text{Fe}(\text{CN})_6^{4-} \rightarrow$	$<1 \times 10^2$	10		25	p.r.	No effect on d.k. of Fe(IV) in N ₂ O-satd. soln. contg. 0.1 mol L ⁻¹ pyrophosphate with added 0.1 mol L ⁻¹ ferrocyanide.	90A373
9.50 Iron(IV) (hydroxo)undecatungstosilicate ion								
9.50.1 Iron(IV) (hydroxo)undecatungstosilicate ion								
	$\text{HOFeSiW}_{11}\text{O}_{39}^{5-} + \text{HOFeSiW}_{11}\text{O}_{39}^{5-} \rightarrow$	3.2×10^9	4		20-23	p.r.	D.k. at 355 nm in N ₂ O-satd. soln. contg. (0.13-2) × 10 ⁻³ mol L ⁻¹ Fe(III) complex and 0.1 mol L ⁻¹ NaClO ₄ .	90A253
9.51 Dihydrogenferrate(V) ion								
9.51.1 Dihydrogenferrate(V) ion								
	$\text{H}_2\text{FeO}_4^- + \text{H}_2\text{FeO}_4^- \rightarrow$	-9×10^7			25	p.r.	Calcd. from d.k. as a function of pH (6.3-13) in N ₂ O-satd. soln. contg. Fe(VI), 2-PrOH or EtOH and 0.001 mol L ⁻¹ phosphate/borate buffer.	89A354
9.51.2 Hydrogenferrate(V) ion								
	$\text{H}_2\text{FeO}_4^- + \text{HFeO}_4^{2-} \rightarrow$	-3×10^7			25	p.r.	Calcd. from d.k. as a function of pH (6.3-13) in N ₂ O-satd. soln. contg. Fe(VI), 2-PrOH or EtOH and 0.001 mol L ⁻¹ phosphate/borate buffer; pK _a of H ₂ FeO ₄ ⁻ = 7.5.	89A354
9.52 Hydrogenferrate(V) ion								
9.52.1 Hydrogenferrate(V) ion								
	$\text{HFeO}_4^{2-} + \text{HFeO}_4^{2-} \rightarrow$	-1.5×10^7			25	p.r.	Calcd. from d.k. as a function of pH (6.3-13) in N ₂ O-satd. soln. contg. Fe(VI), 2-PrOH or EtOH and 0.001 mol L ⁻¹ phosphate/borate buffer.	89A354
9.52.2 Ferrate(V) ion								
	$\text{HFeO}_4^{2-} + \text{FeO}_4^{2-} \rightarrow$	1.0×10^7			25	p.r.	Calcd. from d.k. as a function of pH (6.3-13) in N ₂ O-satd. soln. contg. Fe(VI), 2-PrOH or EtOH and 0.001 mol L ⁻¹ phosphate/borate buffer; pK _a of HFeO ₄ ²⁻ = 10.1.	89A354
9.53 Ferrate(V) ion								
9.53.1 First-order reaction								
	$\text{FeO}_4^{3-} \rightarrow$	8 s^{-1}	10.4-13		25	p.r.	D.k. in N ₂ O-satd. soln. contg. K ₂ FeO ₄ ; the major products are Fe(III) and H ₂ O ₂ . At 15°C, <i>k</i> = 4 s ⁻¹ [86A018].	89A354

TABLE 10. Rate constants for mercury transients

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t(\text{°C})$	Method	Comment	Ref.
10.1 Mercury atom								
10.1.1	Mercury(II) ion							
	$\text{Hg}^0 + \text{Hg}^{2+} \rightarrow \text{Hg}_2^{2+}$	5.9×10^8	3-4			p.r.	Calcd. from pH dependence of p.b.k. at 236 nm in soln. contg. $(1.5-5.9) \times 10^{-5} \text{ mol L}^{-1}$ HgO .	731080
10.1.2	Hydroxymercury(II) ion							
	$\text{Hg}^0 + \text{HgOH}^+ \rightarrow \text{Hg}_2^{2+} + \text{OH}^-$	5.0×10^8	3-4			p.r.	Calcd. from pH dependence of p.b.k. at 236 nm in soln. contg. $(1.5-5.9) \times 10^{-5} \text{ mol L}^{-1}$ HgO .	731080
10.1.3	Mercury(II) dihydroxide							
	$\text{Hg}^0 + \text{Hg(OH)}_2 \rightarrow \text{Hg}_2^{2+} + 2 \text{OH}^-$	$\leq 5 \times 10^7$	3-4			p.r.	Calcd. from pH dependence of p.b.k. at 236 nm in soln. contg. $(1.5-5.9) \times 10^{-5} \text{ mol L}^{-1}$ HgO .	731080
10.2 Mercury(I) ion, complex with mercury(0)								
10.2.1	Mercury(I) ion, complex with mercury(0)							
	$\text{Hg}_2^+ + \text{Hg}_2^+ \rightarrow$	* 7.5×10^9	2.3			p.r.	D.k. at 285 nm in Ar-satd. soln. contg. Hg_2^{2+} and HClO_4 .	92A466
		* 1.6×10^9	1.0-3.5	≤ 0.2		p.r.	D.k. at 300 nm in Ar-satd. soln. contg. HgSO_4 and HClO_4 ; average of 8 values; $k = 2.5 \times 10^9 \text{ L mol}^{-1} \text{ s}^{-1}$ in presence of 1 mol L^{-1} HClO_4 . In strong acid observed initial slow component attributed to presence of Hg_2H^{2+} .	79A063
		* 7×10^9	1.9	≤ 0.017		p.r.	D.k. at 285 nm in Ar-satd. soln. contg. 0.01 mol L^{-1} <i>tert</i> -BuOH and $\text{Hg}_2(\text{ClO}_4)_2$.	720290
							* Unexplained discrepancy in these data.	
10.2.2	Mercury(I) dimer ion							
	$\text{Hg}_2^+ + \text{Hg}_2^{2+} \rightarrow \text{Hg}_4^{3+}$	4.2×10^7	1			p.r.	P.b.k. at 390 nm in Ar-satd. soln. contg. 0.2 mol L^{-1} Hg_2^{2+} and HClO_4 ; $k_t = 7 \times 10^6 \text{ s}^{-1}$.	92A466
10.2.3	Oxygen							
	$\text{Hg}_2^+ + \text{O}_2 \rightarrow$	1.1×10^9	3, 3.5			p.r.	D.k. at 300 nm in O_2 -satd. soln. contg. HgSO_4 and HClO_4 ; $k = \sim 7 \times 10^8 \text{ L mol}^{-1} \text{ s}^{-1}$ at pH 0 and 1.	79A063
10.3 Mercury(I) ion								
10.3.1	Mercury(I) ion							
	$\text{Hg}^+ + \text{Hg}^+ \rightarrow \text{Hg}^0 + \text{Hg}^{2+}$	2.5×10^9 2.6×10^9	1.2 3.15			p.r.	D.k. at 360 nm in deaerated soln. contg. $0.05 \times 10^{-3} \text{ mol L}^{-1}$ <i>tert</i> -BuOH and $8 \times 10^{-4} \text{ mol L}^{-1}$ $\text{Hg}(\text{ClO}_4)_2$.	751218
		2.5×10^9 2.6×10^9	2.0 4.3	$\rightarrow 0$ $\rightarrow 0$		p.r.	D.k. at 255 nm in soln. contg. $2 \times 10^{-3} \text{ mol L}^{-1}$ <i>tert</i> -BuOH and 1×10^{-3} or $5 \times 10^{-5} \text{ mol L}^{-1}$ HgO at pH 2.0 and 4.3, respectively.	731080
10.3.2	Tris(2,2'-bipyridine)ruthenium(III) ion							
	$\text{Hg}^+ + \text{Ru(bpy)}_3^{3+} \rightarrow \text{Hg}^{2+} + \text{Ru(bpy)}_3^{2+}$	2.9×10^9	~ 1	0.23	21	f.p./oq	P.b.k. at 436 nm in deaerated soln. contg. $3.6 \times 10^{-6} \text{ mol L}^{-1}$ Ru(bpy)_3^{2+} , $1 \times 10^{-2} \text{ mol L}^{-1}$ $\text{Hg}(\text{NO}_3)_2$ (OQ), 0.11 mol L^{-1} HNO_3 and 0.09 mol L^{-1} NaNO_3 ; assumed $k(\text{Hg}^+ + \text{Hg}^+) = 8 \times 10^9 \text{ L mol}^{-1} \text{ s}^{-1}$.	84A148
10.3.3	Tris(1,10-phenanthroline)ruthenium(III) ion							
	$\text{Hg}^+ + \text{Ru(phen)}_3^{3+} \rightarrow \text{Hg}^{2+} + \text{Ru(phen)}_3^{2+}$	2.5×10^9	acid			f.p./oq	P.b.k. at 436 nm in deaerated soln. contg. Ru(phen)_3^{2+} , excess $\text{Hg}(\text{NO}_3)_2$ (OQ), HNO_3 and NaNO_3 ; assumed $k(\text{Hg}^+ + \text{Hg}^+) = 8 \times 10^9 \text{ L mol}^{-1} \text{ s}^{-1}$.	84A148

TABLE 10. Rate constants for mercury transients — Continued

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t(\text{°C})$	Method	Comment	Ref.
10.3 Mercury(I) ion — Continued								
10.3.4 Tris(5-chloro-1,10-phenanthroline)ruthenium(III) ion								
	$\text{Hg}^+ + \text{Ru}(5\text{-Clphen})_3^{3+} \rightarrow \text{Hg}^{2+} + \text{Ru}(5\text{-Clphen})_3^{2+}$	3.9×10^9	acid			f.p./oq	P.b.k. at 436 nm in deaerated soln. contg. $\text{Ru}(5\text{-Clphen})_3^{2+}$, excess $\text{Hg}(\text{NO}_3)_2$ (OQ), HNO_3 and NaNO_3 ; assumed $k(\text{Hg}^+ + \text{Hg}^+) = 8 \times 10^9 \text{ L mol}^{-1} \text{s}^{-1}$.	84A148
10.3.5 Tris(5,6-dimethyl-1,10-phenanthroline)ruthenium(III) ion								
	$\text{Hg}^+ + \text{Ru}(5,6\text{-Me}_2\text{phen})_3^{3+} \rightarrow \text{Hg}^{2+} + \text{Ru}(5,6\text{-Me}_2\text{phen})_3^{2+}$	3.2×10^9	acid			f.p./oq	P.b.k. at 436 nm in deaerated soln. contg. $\text{Ru}(5,6\text{-Me}_2\text{phen})_3^{2+}$, excess $\text{Hg}(\text{NO}_3)_2$ (OQ), HNO_3 and NaNO_3 ; assumed $k(\text{Hg}^+ + \text{Hg}^+) = 8 \times 10^9 \text{ L mol}^{-1} \text{s}^{-1}$.	84A148
10.3.6 Tris(4,7-dimethyl-1,10-phenanthroline)ruthenium(III) ion								
	$\text{Hg}^+ + \text{Ru}(4,7\text{-Me}_2\text{phen})_3^{3+} \rightarrow \text{Hg}^{2+} + \text{Ru}(4,7\text{-Me}_2\text{phen})_3^{2+}$	3.0×10^9	acid			f.p./oq	P.b.k. at 436 nm in deaerated soln. contg. $\text{Ru}(4,7\text{-Me}_2\text{phen})_3^{2+}$, excess $\text{Hg}(\text{NO}_3)_2$ (OQ), HNO_3 and NaNO_3 ; assumed $k(\text{Hg}^+ + \text{Hg}^+) = 8 \times 10^9 \text{ L mol}^{-1} \text{s}^{-1}$.	84A148
10.3.7 Tris(5-methyl-1,10-phenanthroline)ruthenium(III) ion								
	$\text{Hg}^+ + \text{Ru}(5\text{-Mephen})_3^{3+} \rightarrow \text{Hg}^{2+} + \text{Ru}(5\text{-Mephen})_3^{2+}$	3.1×10^9	acid			f.p./oq	P.b.k. at 436 nm in deaerated soln. contg. $\text{Ru}(5\text{-Mephen})_3^{2+}$, excess $\text{Hg}(\text{NO}_3)_2$ (OQ), HNO_3 and NaNO_3 ; assumed $k(\text{Hg}^+ + \text{Hg}^+) = 8 \times 10^9 \text{ L mol}^{-1} \text{s}^{-1}$.	84A148
10.4 Mercury(I) hydroxide								
10.4.1 Mercury(I) hydroxide								
	$\text{HgOH} + \text{HgOH} \rightarrow$	2.2×10^9	7			p.r.	D.k. in Ar-satd. soln. contg. 0.05 mol L^{-1} <i>tert</i> -BuOH and HgO . In 1 mol L^{-1} KOH, $k = 3.5 \times 10^9 \text{ L mol}^{-1} \text{s}^{-1}$ [751218]. <i>pK</i> of the equilibrium $\text{Hg}^+ + \text{H}_2\text{O} \rightleftharpoons \text{HgOH} + \text{H}^+$ is reported to be 5.1 [751044].	83A178
		2.2×10^9	≤ 0.1			p.r.	D.k. at 260 nm in soln. contg. 0.01 mol L^{-1} <i>tert</i> -BuOH and $2.0 \times 10^{-4} \text{ mol L}^{-1}$ HgO . Products suggested to be Hg_2O or $\text{Hg}_2(\text{OH})_2$.	751044
10.5 Mercury(I)								
10.5.1 Oxygen								
	$\text{Hg(I)} + \text{O}_2 \rightarrow$	1.2×10^9	11.2			p.r.	D.k.; at pH 2.7, $k = 4.2 \times 10^8 \text{ L mol}^{-1} \text{s}^{-1}$.	751218
		1.6×10^9	14					
10.6 Mercury(I) bromide								
10.6.1 Mercury(I) bromide								
	$\text{HgBr} + \text{HgBr} \rightarrow \text{Hg}_2\text{Br}_2$	4×10^9				p.r.	P.b.k. in soln. contg. HgBr_2 .	761042
		5×10^9				p.r.	D.k. at 350 nm in soln. contg. $5 \times 10^{-4} \text{ mol L}^{-1}$ HgBr_2 and 0.01 mol L^{-1} MeOH, EtOH, 2-PrOH or formate.	761087
10.6.2 Oxygen								
	$\text{HgBr} + \text{O}_2 \rightarrow \text{HgBrO}_2$	$\geq 10^9$				p.r.	D.k. in air-satd. soln. contg. HgBr_2 .	761042
10.6.3 1,4-Benzoquinone								
	$\text{HgBr} + \text{Q} \rightarrow \text{HgBr}^+ + \text{Q}^-$	$> 10^9$	5-5.5			p.r.	P.b.k. in soln. contg. HgBr_2 .	761042
10.6.4 Tetranitromethane								
	$\text{HgBr} + \text{C}(\text{NO}_2)_4 \rightarrow \text{HgBr}^+ + \text{C}(\text{NO}_2)_3^- + \cdot\text{NO}_2$	2.2×10^9				p.r.	P.b.k. in soln. contg. HgBr_2 .	761042

TABLE 10. Rate constants for mercury transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
10.7 Bromomercury(I)peroxy								
10.7.1	1,4-Benzoquinone							
	$HgBrO_2 + Q \rightarrow HgBr^+ + O_2 + Q^{+-}$	7×10^8				p.r.	P.b.k. in air-satd. soln. contg. $HgBr_2$.	761042
10.8 Mercury(I) chloride								
10.8.1	Mercury(I) chloride							
	$HgCl + HgCl \rightarrow Hg_2Cl_2$	3.9×10^9	7			p.r.	D.k. in Ar-satd. soln. contg. 0.05 mol L^{-1} <i>tert</i> -BuOH and $HgCl_2$.	83A178
		4.0×10^9				p.r.	P.b.k. at 235 nm and d.k. at 330 nm in Ar-satd. soln. contg. 0.1 mol L^{-1} 2-PrOH and $2 \times 10^{-4} \text{ mol L}^{-1} HgCl_2$.	730043
10.8.2	Oxygen							
	$HgCl + O_2 \rightarrow HgClO_2$	-10^9				p.r.	D.k. in air-satd. soln. contg. $5 \times 10^{-3} \text{ mol L}^{-1} HgCl_2$.	730043
10.8.3	Hydroxyl							
	$HgCl + \cdot OH \rightarrow HgCl^+ + OH^-$	$\sim 10^{10}$	5.0			p.r.	Estd. from the yield of Hg_2Cl_2 in Ar-satd. soln. contg. $2 \times 10^{-4} \text{ mol L}^{-1} HgCl_2$.	730043
10.8.4	1,4-Benzoquinone							
	$HgCl + Q \rightarrow HgCl^+ + Q^{+-}$	3.0×10^9				p.r.	P.b.k. in soln. contg. $HgCl_2$.	761042
		3.9×10^9	5.1	25		p.r.	P.b.k. at 430 nm in deaerated soln. contg. 1 mol L^{-1} <i>tert</i> -BuOH and $6 \times 10^{-3} \text{ mol L}^{-1} HgCl_2$.	761134
10.8.5	Tetranitromethane							
	$HgCl + C(NO_2)_4 \rightarrow HgCl^+ + C(NO_2)_3^- + NO_2$	4.5×10^9				p.r.	D.k. at 270 nm and p.b.k. at 370 nm in Ar-satd. soln. contg. 0.2 mol L^{-1} 2-PrOH and $10^{-3} \text{ mol L}^{-1} HgCl_2$.	730043
10.9 Chloromercury(I)peroxy								
10.9.1	1,4-Benzoquinone							
	$HgClO_2 + Q \rightarrow HgCl^+ + O_2 + Q^{+-}$	6×10^8				p.r.	P.b.k. in air-satd. soln. contg. $HgCl_2$.	761042
		1.1×10^9	5.1	25		p.r.	P.b.k. in O_2 -satd. soln. contg. $HgCl_2$, 1,4-benzoquinone and 1 mol L^{-1} <i>tert</i> -BuOH.	761134
10.10 Mercury(I) cyanide								
10.10.1	Mercury(I) cyanide							
	$HgCN + HgCN \rightarrow Hg_2(CN)_2$	* 6.0×10^9				p.r.	P.b.k. in soln. contg. $Hg(CN)_2$.	761042
		* 1.7×10^9		≤ 0.2		p.r.	D.k. at 285 nm in deaerated soln. contg. 0.005 mol L^{-1} formate and $2 \times 10^{-4} \text{ mol L}^{-1} Hg(CN)_2$.	751203
		* Unexplained discrepancy in these data.						
10.10.2	Oxygen							
	$HgCN + O_2 \rightarrow HgCN^+ + O_2^{+-}$	4×10^9				p.r.	P.b.k. in air-satd. soln. contg. $Hg(CN)_2$.	761042
10.10.3	Hydroxyl							
	$HgCN + \cdot OH \rightarrow$	3.1×10^9				p.r.	Estimated from initial decay of $HgCN$ in the absence of OH scavengers.	751203
10.10.4	Hydroxymethyl							
	$HgCN + \cdot CH_2OH \rightarrow$	4.0×10^9				p.r.	Estimated from initial decay of $HgCN$ in the presence of <i>methanol</i> .	751203
10.10.5	1-Hydroxyethyl							
	$HgCN + CH_3CHOH \rightarrow$	3.9×10^9				p.r.	Estimated from initial decay of $HgCN$ in the presence of <i>ethanol</i> .	751203

TABLE 10. Rate constants for mercury transients — Continued

No.	Reaction	<i>k</i> (L·mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
10.10 Mercury(I) cyanide — Continued								
10.10.6 1-Hydroxy-1-methylethyl								
	HgCN + (CH ₃) ₂ COH →	2.4 × 10 ⁹				p.r.	Estimated from initial decay of HgCN in the presence of 2-propanol.	751203
10.10.7 2-Hydroxy-2,2-dimethylethyl								
	HgCN + *CH ₂ C(CH ₃) ₂ OH →	1.6 × 10 ⁹				p.r.	Estimated from initial decay of HgCN in the presence of <i>tert</i> -BuOH.	751203
10.10.8 1,4-Benzoquinone								
	HgCN + Q → HgCN ⁺ + Q ^{·-}	3.5 × 10 ⁹				p.r.	P.b.k. in soln. contg. Hg(CN) ₂ .	761042
10.10.9 Tetranitromethane								
	HgCN + C(NO ₂) ₄ → IIgCN ⁺ + C(NO ₂) ₃ ^{·-} + *NO ₂	3.1 × 10 ⁹				p.r.	P.b.k. in soln. contg. Hg(CN) ₂ .	761042
10.11 Mercury(I) iodide								
10.11.1 Mercury(I) iodide								
	HgI + HgI → Hg ₂ I ₂	2.5 × 10 ⁹				p.r.	P.b.k. in soln. contg. HgI ₂ .	761042
10.11.2 Oxygen								
	HgI + O ₂ → HgIO ₂	≥10 ⁹				p.r.	P.b.k. in air-satd. soln. contg. HgI ₂ .	761042
10.11.3 1,4-Benzoquinone								
	HgI + Q → HgI ⁺ + Q ^{·-}	>10 ⁹				p.r.	P.b.k. in soln. contg. HgI ₂ .	761042
10.11.4 Tetranitromethane								
	HgI + C(NO ₂) ₄ → HgI ⁺ + C(NO ₂) ₃ ^{·-} + *NO ₂	1.4 × 10 ⁹				p.r.	P.b.k. in soln. contg. HgI ₂ .	761042
10.12 Mercury(I) thiocyanate								
10.12.1 Mercury(I) thiocyanate								
	HgSCN + HgSCN → Hg ₂ (SCN) ₂	3.0 × 10 ⁹				p.r.	P.b.k. in soln. contg. Hg(SCN) ₂ .	761042
10.12.2 Oxygen								
	HgSCN + O ₂ → HgSCNO ₂	≥10 ⁹				p.r.	P.b.k. in air-satd. soln. contg. Hg(SCN) ₂ .	761042
10.12.3 1,4-Benzoquinone								
	HgSCN + Q → HgSCN ⁺ + Q ^{·-}	>10 ⁹				p.r.	P.b.k. in soln. contg. Hg(SCN) ₂ .	761042
10.12.4 Tetranitromethane								
	HgSCN + C(NO ₂) ₄ → HgSCN ⁺ + C(NO ₂) ₃ ^{·-} + *NO ₂	2.8 × 10 ⁹				p.r.	P.b.k. in soln. contg. Hg(SCN) ₂ .	761042
10.13 Thiocyanatomercury(I)peroxy								
10.13.1 1,4-Benzoquinone								
	HgSCNO ₂ + Q → HgSCN ⁺ + O ₂ + Q ^{·-}	1.0 × 10 ⁹				p.r.	P.b.k. in air-satd. soln. contg. Hg(SCN) ₂ .	761042

TABLE 11. Rate constants for indium transients

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t^\circ(\text{C})$	Method	Comment	Ref.
11.1 Indium atoms								
11.1.1 Indium(I) ion								
	$\text{In}^0 + \text{In}^+ \rightarrow \text{In}_2^{+}$	1.5×10^9		6.8		p.r.	P.b.k. at 310 nm in Ar-satd. soln. contg. 0.005 mol L^{-1} InDr ; $k_t = 3 \times 10^6 \text{ s}^{-1}$. Product reported to disappear in second-order reaction, $k = 5 \times 10^9 \text{ L mol}^{-1} \text{ s}^{-1}$, suggested to represent mainly formation of In_4^{2+} .	89A492
11.2 Indium(II) ion								
11.2.1 Indium(II) ion								
	$\text{In}^{2+} + \text{In}^{2+} \rightarrow \text{In}^{3+} + \text{In}^+$	1.3×10^9	2.7-4.3	0.09	22	p.r.	D.k. in He-satd. soln. contg. 0.05 mol L^{-1} 2-PrOH. Value obtained by computer fit.	84A008
11.2.2 Hydroxyl								
	$\text{In}^{2+} + \cdot\text{OH} \rightarrow \text{In}^{3+} + \text{OH}^-$	3.2×10^{10}	1.5-3.5			p.r.	D.k. in Ar-satd. soln. contg. (3-700) $\times 10^{-5} \text{ mol L}^{-1}$ In^{3+} .	83A206
11.2.3 Hydrogen peroxide								
	$\text{In}^{2+} + \text{H}_2\text{O}_2 \rightarrow \text{In}^{3+} + \cdot\text{OH} + \text{OH}^-$	6.0×10^8	2.7-3.3	0.09	22	p.r.	D.k. in He-satd. soln. contg. 0.05 mol L^{-1} 2-PrOH and added H_2O_2 . At pH 4.3, $k = 3 \times 10^8 \text{ L mol}^{-1} \text{ s}^{-1}$. Value obtained by computer fit.	84A008
11.2.4 Hydroxymethyl								
	$\text{In}^{2+} + \text{CH}_2\text{OH} \rightarrow$	1.9×10^9	1.5-2.2			p.r.	D.k. in Ar-satd. soln. contg. (0.2-2) $\times 10^{-3} \text{ mol L}^{-1}$ In^{3+} and 0.1 mol L^{-1} MeOH.	83A206
11.2.5 1-Hydroxy-1-methylethyl								
	$\text{In}^{2+} + (\text{CH}_3)_2\dot{\text{C}}\text{OH} \rightarrow \text{CH}_3\text{COCH}_3 + \text{H}^+$	9×10^8	2.7-4.3	0.09	22	p.r.	D.k. in He-satd. soln. contg. 0.05 mol L^{-1} 2-PrOH. Value obtained by computer fit.	84A008
11.3 Tetrakis(4-N-methylpyridyl)porphineindium(III) radical anion								
11.3.1 Sulfur dioxide								
	$[\text{InTMpyP}]^{4+} + \text{SO}_2 \rightarrow \text{InTMpyP}^{5+} + \text{SO}_2^{2-}$	2×10^8	1			p.r.	D.k. at 700 nm in N_2 -satd. soln. contg. NaHSO_3 , InTMpyP^{5+} and 0.1 mol L^{-1} HCl or HClO_4 .	87A083
11.4 5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatoindate(III) radical cation								
11.4.1 5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatoindate(III) radical cation								
	$[\text{InTPPS}]^{2-} + [\text{InTPPS}]^{2-} \rightarrow$	1.3×10^9	7			p.r.	D.k. at 700 nm in N_2O -satd. soln. contg. 0.01 mol L^{-1} KBr.	86S115

TABLE 12. Rate constants for iridium transients

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
12.1 Hexachloroiridate(III) ion, electron adduct								
12.1.1 Hexachloroiridate(III) ion, electron adduct								
	$\text{Ir}(\text{II}) + \text{Ir}(\text{II}) \rightarrow \text{Ir}(\text{I}) + \text{Ir}(\text{III})$	1.7×10^9				p.r.	D.k. at 280 nm in N ₂ -satd. soln. contg. 3 $\times 10^{-4}$ mol L ⁻¹ $[\text{IrCl}_6]^{3-}$ and 0.1 mol L ⁻¹ 2-PrOH.	731066
12.2 Bis(2,2'-bipyridine)([2,2'-bipyridin]-3-yl-C,N')iridium(III) ion, conjugate acid, electron adduct								
12.2.1 Hydrogen ion								
	$\text{Ir}(\text{bpy})_2(C^3,N'\text{-Hbpy})^{2+} + \text{H}^+ \rightarrow \text{IrH}(\text{bpy})_2(C^3,N'\text{-Hbpy})^{3+}$	2.3		0-1.7		p.r.	D.k. in soln. contg. 0.02-1 mol L ⁻¹ HClO_4 , 1 mol L ⁻¹ 2-PrOH and (6-30) $\times 10^{-5}$ mol L ⁻¹ Ir(III) complex ($\text{pK}_a = 3.0$).	87A165
12.2.2 Dibromine radical ion								
	$\text{Ir}(\text{bpy})_2(C^3,N'\text{-Hbpy})^{2+} + \text{Br}_2^{\cdot-} \rightarrow \text{Ir}(\text{bpy})_2(C^3,N'\text{-Hbpy})^{3+} + 2 \text{Br}^-$	2.5×10^{10}		1.0		p.r.	D.k. at 380 nm in Ar-satd. soln. contg. 0.1 mol L ⁻¹ NaBr, 0.9 mol L ⁻¹ 2-PrOH and 2×10^{-4} mol L ⁻¹ Ir(III) complex; pK_a of reduced complex = 0.9.	85A160
12.3 Bis(2,2'-bipyridine)([2,2'-bipyridin]-3-yl-C,N')iridium(III) ion, electron adduct								
12.3.1 Dibromine radical ion								
	$\text{Ir}(\text{bpy})_2(C^3,N'\text{-bpy})^+ + \text{Br}_2^{\cdot-} \rightarrow \text{Ir}(\text{bpy})_2(C^3,N'\text{-bpy})^{2+} + 2 \text{Br}^-$	-10^9			20	f.p./rq	Estd. from d.k. in soln. contg. Ir(III) complex, Br ⁻ and 1,4-dimethoxybenzene (RQ); reaction in competition with disproportionation of Br ₂ ^{·-} .	89A025
12.3.2 Oxygen								
	$\text{Ir}(\text{bpy})_2(C^3,N'\text{-bpy})^+ + \text{O}_2 \rightarrow \text{Ir}(\text{bpy})_2(C^3,N'\text{-bpy})^{2+} + \text{HO}_2/\text{O}_2^-$	9.0×10^8		1-6		p.r.	Reaction includes protonated form $\text{Ir}(\text{bpy})_2(C^3,N'\text{-Hbpy})^{2+}$.	85A160
12.3.3 1,4-Dimethoxybenzene radical cation								
	$\text{Ir}(\text{bpy})_2(C^3,N'\text{-bpy})^+ + [1,4-\text{C}_6\text{H}_4(\text{OCH}_3)_2]^{1+} \rightarrow \text{Ir}(\text{bpy})_2(C^3,N'\text{-bpy})^{2+} + 1,4-\text{C}_6\text{H}_4(\text{OCH}_3)_2$	2.3×10^9	1.5-	$\rightarrow 0$	20	f.p./rq	D.k. at 400, 420 and 460 nm in soin. contg. $(3-5) \times 10^{-5}$ mol L ⁻¹ Ir(III) complex and $(1-6.4) \times 10^{-3}$ mol L ⁻¹ 1,4-dimethoxybenzene (RQ).	89A025
12.4 Bis(2,2'-bipyridine)([2,2'-bipyridin]-3-yl-C,N')iridium(IV) ion, conjugate monoacid \ddagger								
12.4.1 1,1'-Dimethyl-4,4'-bipyridinium radical cation								
	$\text{Ir}(\text{bpy})_2(C^3,N'\text{-Hbpy})^{4+} + \text{MV}^{2+} \rightarrow \text{Ir}(\text{bpy})_2(C^3,N'\text{-Hbpy})^{3+} + \text{MV}^{2+}$	3.1×10^9		1.4	20	f.p./oq	D.k. at various wavelengths in soln. contg. 5×10^{-5} mol L ⁻¹ $[\text{Ir}(\text{Hbpy}-C^3,N'\text{-bpy})_2]^{3+}$ and 0.07 mol L ⁻¹ MV ²⁺ (OQ).	86A057
\ddagger It is not known whether $[\text{Ir}(\text{Hbpy}-C^3,N'\text{-bpy})_2]^{4+}$ has been oxidized at the metal or ligand.								
12.4.2 Chloride ion								
	$\text{Ir}(\text{bpy})_2(C^3,N'\text{-Hbpy})^{4+} + \text{Cl}^- \rightarrow \text{Ir}(\text{bpy})_2(C^3,N'\text{-Hbpy})^{3+} + \text{Cl}^-$	-8×10^8	1.4	0.2	20	f.p./oq	P.b.k. at 350 nm ($\text{Cl}^- + \text{Cl}^- \rightarrow \text{Cl}_2^{\cdot-}$) in soin. contg. 5×10^{-5} mol L ⁻¹ $[\text{Ir}(\text{Hbpy}-C^3,N'\text{-bpy})_2]^{3+}$, 0.04 mol L ⁻¹ $\text{S}_2\text{O}_8^{2-}$ (OQ) and 6.6×10^{-4} mol L ⁻¹ chloride ion.	86A057
12.5 Hexachloroiridate(IV) ion								
12.5.1 5-Hydroxyindole								
	$\text{IrCl}_6^{2-} + 5\text{-HOInH} \rightarrow \text{IrCl}_6^{3-} + \text{H}^+ + 5\text{-OInH}$	3.8×10^6		3		f.p./pi	P.b.k. in Ar-satd. soln. contg. $(2-3) \times 10^{-3}$ mol L ⁻¹ $[\text{IrCl}_6]^{3-}$, 0.1 mol L ⁻¹ 2-chloroethanol and $(1-10) \times 10^{-4}$ mol L ⁻¹ 5-hydroxyindole; also used 5-HO-tryptamine, 5-HO-tryptophan or 5-HO-indole-3-acetic acid.	90C007

TABLE 13. Rate constants for manganese transients

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.	
13.1 5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatomanganate(II) radical anion									
13.1.1 5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatomanganate(II) radical anion									
	$[\text{MnTPPS}]^{5-} + [\text{MnTPPS}]^{5-} \rightarrow$	3.9×10^7		6.8		p.r.	D.k. at 770 nm in N ₂ O-satd. soln. contg. 0.1 mol L ⁻¹ 2-PrOH and MnTPPS ⁴⁻ .	84A120	
13.2 5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatomanganate(II) radical anion									
13.2.1 5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatomanganate(II) radical anion									
	$[\text{MnTMpyP}]^{3+} + [\text{MnTMpyP}]^{3+} \rightarrow$	3.7×10^7		6.8		p.r.	D.k. at 770 nm in N ₂ O-satd. soln. contg. 0.1 mol L ⁻¹ 2-PrOH and MnTMpyP ⁴⁺ .	84A120	
13.3 5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatomanganate(II) ion									
13.3.1 Hydrogen ion									
	$\text{MnTPPS}^{4-} + \text{H}^+ \rightarrow \text{MnTPPSH}^{3-}$	1.0×10^6		1.2- 1.7	0.1	p.r.	D.k. and p.b.k. in N ₂ O-satd. soln. contg. MnTPPS ³⁻ , 0.1 mol L ⁻¹ 2-PrOH and 0.02-0.06 mol L ⁻¹ H ⁺ ; at [H ⁺] ≤ 0.01 mol L ⁻¹ , <i>k</i> ~ $3.3 \times 10^7 \text{ L}^2 \text{ mol}^{-2} \text{ s}^{-1}$.	84A190	
13.3.2 Oxygen									
	$\text{MnTPPS}^{4-} + \text{O}_2 \rightarrow [\text{MnTPPS-O}_2]^{4-}$	1.5×10^5		8.5	0.05	18	s.f.	Soln. contg. ~ 10^{-6} - 10^{-5} mol L ⁻¹ MnTPPS ⁴⁻ and (5-200) × 10^{-5} mol L ⁻¹ O ₂ .	
13.4 5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatomanganate(II) ion									
13.4.1 Hydrogen ion									
	$\text{MnTMpyP}^{4+} + 2 \text{H}^+ \rightarrow \text{Mn}^{2+} + \text{H}_2\text{TMpyP}^{4+}$	$4.7 \times 10^4 \text{ L}^2 \text{ mol}^{-2} \text{ s}^{-1}$		0-1	1.0	p.r.	D.k. and p.b.k. in N ₂ O-satd. soln. contg. MnTMpyP ³⁺ , 0.1 mol L ⁻¹ 2-PrOH and 0.1-1.0 mol L ⁻¹ HClO ₄ .	84A190	
13.4.2 Oxygen									
	$\text{MnTMpyP}^{4+} + \text{O}_2 \rightarrow [\text{MnTMpyP-O}_2]^{4+}$	1.6×10^5				p.r.		86A313	
		1.2×10^5		8.5	0.05	18	s.f.	Soln. contg. ~ 10^{-6} - 10^{-5} mol L ⁻¹ MnTMpyP ⁴⁺ and (5-200) × 10^{-5} mol L ⁻¹ O ₂ .	80R105
13.5 5,10,15,20-Tetrakis(4-pyridyl)porphinatomanganate(II)									
13.5.1 Hydrogen ion									
	$\text{MnTpyP} + 2 \text{H}^+ \rightarrow \text{Mn}^{2+} + \text{H}_2\text{TpyP}$	$5 \times 10^4 \text{ L}^2 \text{ mol}^{-2} \text{ s}^{-1}$		0-1	1.0	p.r.	D.k. and p.b.k. in N ₂ O-satd. soln. contg. MnTpyP ³⁺ , 0.1 mol L ⁻¹ 2-PrOH and 0.1-1.0 mol L ⁻¹ HClO ₄ .	84A190	
13.5.2 Oxygen									
	$\text{MnTpyP} + \text{O}_2 \rightarrow [\text{MnTpyP-O}_2]$	5×10^2		8.5	0.05	18	s.f.	Soln. contg. varied [O ₂].	80R105
13.6 5,10,15,20-Tetrakis[4-(<i>N,N,N</i>-trimethylammonio)phenyl]porphinatomanganate(II) ion									
13.6.1 Oxygen									
	$\text{MnTAPP}^{4+} + \text{O}_2 \rightarrow [\text{MnTAPP-O}_2]^{4+}$	1.6×10^5				p.r.		86A313	
13.7 $\alpha,\alpha,\alpha,\beta$-Tetrakis[2-(<i>N</i>-methylisonicotinamido)phenyl]porphinatomanganate(II) ion									
13.7.1 Oxygen									
	$\text{MnPFP}^{4+} + \text{O}_2 \rightarrow [\text{MnPFP-O}_2]^{4+}$	1.6×10^5				p.r.		86A313	
13.8 5,10,15,20-Tetrakis(4-carboxyphenyl)porphinatomanganate(II) ion									
13.8.1 Oxygen									
	$\text{MnTCPP}^{4+} + \text{O}_2 \rightarrow [\text{MnTCPP-O}_2]^{4+}$	2.2×10^5		8.5	0.05	18	s.f.	Soln. contg. varied [O ₂].	80R105

TABLE 13. Rate constants for manganese transients — Continued

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t(\text{°C})$	Method	Comment	Ref.
13.9 Nitrilotriacetatomanganese(II) ion, H-abstraction product								
13.9.1 First-order reaction								
	$\text{Mn[NTA-H]}^- \rightarrow$	$3.0 \times 10^3 \text{ s}^{-1}$	4-9			p.r.	D.k. in N_2O -satd. soln. contg. MnNTA^- ; followed by second-order reaction, $k = 2.9 \times 10^7 \text{ L mol}^{-1} \text{ s}^{-1}$ at pH 4.5-5.5.	78A436
13.10 Ethylenediaminetetraacetatomanganese(II) ion, H-abstraction product								
13.10.1 First-order reaction								
	$\text{Mn[EDTA-H]}^{2-} \rightarrow$	$2.5 \times 10^3 \text{ s}^{-1}$	4-9			p.r.	D.k. in N_2O -satd. soln. contg. MnEDTA^{2-} ; followed by pH-dependent (pH 3-10) second-order reaction.	78A436
13.11 Manganese(III) ion								
13.11.1 Thionine semiquinone, conjugate monoacid								
	$\text{Mn}^{3+} + [\text{ThH}]^{++} \rightarrow \text{Mn}^{2+} + \text{Th}^+ + \text{H}^+$	3.5×10^9	2.5	0.2		f.p./oq	D.k. of semithionine in soln. contg. Mn^{2+} and thionine (OQ).	777315
13.12 Hydroxymanganese(III) ion								
13.12.1 Zinc(I) ion								
	$\text{MnOH}^{2+} + \text{Zn}^+ \rightarrow \text{Mn}^{2+} + \text{Zn}^{2+} + \text{OH}^-$	2.4×10^9	~6		23	p.r.	D.k. at 310 nm in soin. contg. 0.02 mol L^{-1} MnSO_4 and 0.03 mol L^{-1} ZnSO_4 . Value obtained from computer fit.	78A041
13.13 Peroxidomanganese(III) ion								
13.13.1 First-order reaction								
	$\text{MnO}_2^+ \rightarrow \text{Mn}^{2+} + \text{O}_2^{--}$	$2.7 \times 10^3 \text{ s}^{-1}$ $6.1 \times 10^3 \text{ s}^{-1}$	6.7 6.7	0.01 0.5	24	p.r.	Calcd. from equilibration obs. at 254 and 275 nm in O_2 -satd. soln. contg. $4.0 \times 10^{-5} \text{ mol L}^{-1}$ Mn^{2+} and 0.01 mol L^{-1} formate; $k_f = 1.1 \times 10^8 \text{ L mol L}^{-1} \text{ s}^{-1}$. In the presence of 0.5 mol L^{-1} formate, $k = 2.2 \times 10^3 \text{ s}^{-1}$; species present as MnO_2^+ -formate. Measurements reported in [84A384] indicate that MnO_2^+ -formate disappeared by a first-order process with $k = 5 \text{ s}^{-1}$.	761109
13.14 Peroxidomanganese(III) formate								
13.14.1 Ascorbate ion								
	MnO_2^+ -formate + $\text{AH}^- \rightarrow$ MnO_2 -formate + $\text{A}^- + \text{H}^+$	3.5×10^5	7.4		23.5	s.f.	P.b.k. in N_2O -satd. soln. contg. ascorbate, formate, O_2 and Mn^{2+} .	85Z381
13.15 Hydroperoxidomanganese(III) formate complex								
13.15.1 First-order reaction								
	$\text{MnO}_2\text{H}^{2+}$ -formate \rightarrow Mn(III)-formate + HO_2^-	79 s^{-1}			25	p.r.	P.b.k. in O_2 -satd. soln. contg. 0.5 mol L^{-1} formate and varied $[\text{Mn}^{2+}]$.	84A189
13.15.2 <i>tert</i>-Butylhydroquinone								
	$\text{MnO}_2\text{H}^{2+}$ -formate + $(\text{CH}_3)_3\text{CC}_6\text{H}_3\text{-1,4-(OH)}_2 \rightarrow$	2.2×10^4	0.9		23	phot., s.f.	D.k. in soln. contg. $0.1\text{-}0.2 \text{ mol L}^{-1}$ $\text{Mn}(\text{ClO}_4)_2$, 0.25 mol L^{-1} formate, HClO_4 and $(1.4\text{-}5.8) \times 10^{-4} \text{ mol L}^{-1}$ <i>tert</i> -butylhydroquinone.	83A382
13.15.3 1,2-Benzenediol								
	$\text{MnO}_2\text{H}^{2+}$ -formate + $1,2\text{-C}_6\text{H}_4(\text{OH})_2 \rightarrow$	2.6×10^4	0.9		23	phot., s.f.	D.k. in soln. contg. $0.1\text{-}0.2 \text{ mol L}^{-1}$ $\text{Mn}(\text{ClO}_4)_2$, 0.25 mol L^{-1} formate, HClO_4 and $(1\text{-}4) \times 10^{-4} \text{ mol L}^{-1}$ 1,2-benzenediol (most likely complexed with Mn^{2+}).	83A382

TABLE 13. Rate constants for manganese transients — Continued

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t(\text{°C})$	Method	Comment	Ref.
13.15 Hydroperoxidomanganese(III) formate complex — Continued								
13.15.4 1,3-Benzenediol								
	$\text{MnO}_2^{\cdot+}\text{-formate} + 1,3\text{-C}_6\text{H}_4(\text{OH})_2 \rightarrow$	5.2×10^4	0.9		23	phot., s.f.	D.k. in soln. contg. 0.1-0.2 mol L^{-1} $\text{Mn}(\text{ClO}_4)_2$, 0.25 mol L^{-1} formate, HClO_4 and $(0.5\text{-}2.0) \times 10^{-3}$ mol L^{-1} 1,3-benzenediol.	83A382
13.16 Peroxidomanganese(III)-manganese(II) formate complex								
13.16.1 First-order reaction								
	$(\text{MnOOHMn}^{4+})\text{-formate} \rightarrow$	$2.8 \times 10^3 \text{ s}^{-1}$	1-1.3		25	p.r.	P.b.k. in O_2 -satd. soln. contg. 0.5 mol L^{-1} formate and varied $[\text{Mn}^{2+}]$.	84A189
13.17 Manganese(III) phosphate complex								
13.17.1 Ascorbate ion								
	$\text{Mn}(\text{III})\text{-phosphate} + \text{AH}^- \rightarrow$	1.4×10^6	4.7		23.5	p.r.	N_2O -satd. soln. Reactant includes ~20% ascorbic acid ($\text{pK}_a = 4.1$).	85Z381
	$\text{Mn}(\text{II})\text{-phosphate} + \text{A}^- + \text{H}^+$							
13.17.2 6-Hydroxy-2,5,7,8-tetramethylchroman-2-carboxylate ion								
	$\text{Mn}(\text{III})\text{-phosphate} + \text{TxOH}^- \rightarrow$	8.2×10^4	4.6			p.r.	D.k. and p.b.k. in N_2O -satd. soln. contg. 0.2 mol L^{-1} phosphate, 0.1 mol L^{-1} MnSO_4 and $(0.35\text{-}1.75) \times 10^{-4}$ mol L^{-1} TxOH^- .	86A492
	$\text{Mn}(\text{II})\text{-phosphate} + \text{HTxO}'$							
13.18 Peroxidomanganese(III) phosphate complex								
13.18.1 First-order reaction								
	$\text{MnO}_2^{\cdot+}\text{-phosphate} \rightarrow$	$2 \times 10^3 \text{ s}^{-1}$	3.5-5.3			p.r.	P.b.k. in O_2 -satd. soln. contg. 0.5 mol L^{-1} phosphate, 0.005 mol L^{-1} formate and 0.005 mol L^{-1} MnSO_4 . Reaction suggested to generate $\text{Mn}(\text{III})\text{-phosphate}$ and H_2O_2 ; k invariant in the pH range 3.5-5.3.	84A384
13.18.2 tert-Butylhydroquinone								
	$\text{MnO}_2^{\cdot+}\text{-phosphate} + (\text{CH}_3)_3\text{CC}_6\text{H}_3\text{-}1,4\text{-}(\text{OH})_2 \rightarrow$	8.7×10^3	5-7		23	phot., s.f.	D.k. in soln. contg. 5×10^{-4} mol L^{-1} MnSO_4 and 0.5 mol L^{-1} phosphate.	83A382
13.18.3 1,2-Benzenediol								
	$\text{MnO}_2^{\cdot+}\text{-phosphate} + 1,2\text{-C}_6\text{H}_4(\text{OH})_2 \rightarrow$	6.7×10^5	5-7		23	phot., s.f.	D.k. in soln. contg. 5×10^{-4} mol L^{-1} MnSO_4 and 0.5 mol L^{-1} phosphate.	83A382
13.18.4 6-Hydroxy-2,5,7,8-tetramethylchroman-2-carboxylate ion								
	$\text{MnO}_2^{\cdot+}\text{-phosphate} + \text{TxOH}^- \rightarrow$	1.1×10^5	5.0-5.6			p.r.	D.k. and p.b.k. in O_2 -satd. soln. contg. 0.2 mol L^{-1} phosphate, 0.05 mol L^{-1} formate, 5×10^{-6} mol L^{-1} MnSO_4 and $(0.68\text{-}2.65) \times 10^{-4}$ mol L^{-1} TxOH^- .	86A492
	$\text{MnO}_2^{\cdot+}\text{-phosphate} + \text{HTxO}'$							
13.18.5 Nicotinamide adenine dinucleotide, reduced								
	$\text{MnO}_2^{\cdot+}\text{-phosphate} + \text{NADH} \rightarrow$	$\sim 1 \times 10^2$	5-7		23	phot., s.f.	D.k. in soln. contg. 5×10^{-4} mol L^{-1} MnSO_4 and 0.5 mol L^{-1} phosphate.	83A382
13.18.6 Nicotinamide-adenine dinucleotide phosphate, reduced								
	$\text{MnO}_2^{\cdot+}\text{-phosphate} + \text{NADPH} \rightarrow$	$\sim 1 \times 10^2$	5-7		23	phot., s.f.	D.k. in soln. contg. 5×10^{-4} mol L^{-1} MnSO_4 and 0.5 mol L^{-1} phosphate.	83A382
13.18.7 1,3-Benzenediol								
	$\text{MnO}_2^{\cdot+}\text{-phosphate} + 1,3\text{-C}_6\text{H}_4(\text{OH})_2 \rightarrow$	67	5-7		23	phot., s.f.	D.k. in soln. contg. 5×10^{-4} mol L^{-1} MnSO_4 and 0.5 mol L^{-1} phosphate.	83A382
13.19 Manganese(III) pyrophosphate complex								
13.19.1 Ascorbate ion								
	$\text{Mn}(\text{III})\text{-pyrophosphate} + \text{AH}^- \rightarrow$	1.4×10^4	7.0		23.5	p.r.	N_2O -satd. soln.	85Z381
	$\text{Mn}(\text{II})\text{-pyrophosphate} + \text{A}^- + \text{H}^+$							

TABLE 13. Rate constants for manganese transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
13.20 Manganese(III) sulfate complex								
13.20.1	Ascorbate ion							
Mn(III)-sulfate + AH ⁻ → Mn(II)-sulfate + A ⁻ + H ⁺	1.8×10^6		5.6		23.5	p.r.	N ₂ O-satd. soln.	85Z381
13.20.2 Nicotinamide-adenine dinucleotide phosphate, reduced								
Mn(III)-sulfate + NADPH → Mn(II)-sulfate + NADP + H ⁺	3.1×10^6		5.4		23.5	p.r.	N ₂ O-satd. soln.	85Z381
13.21 Peroxidomanganese(III) sulfate complex								
13.21.1	Superoxide radical anion							
MnO ₂ ⁺ -sulfate + O ₂ ^{·-} + 2 H ⁺ → Mn(II)-sulfate + O ₂ + H ₂ O ₂	3.3×10^7		6			p.r.	Calcd. from d.k. in O ₂ -satd. soln. contg. (0.1-2) × 10 ⁻³ mol L ⁻¹ Mn ²⁺ , 0.5 mol L ⁻¹ Na ₂ SO ₄ and 0.005 mol L ⁻¹ formate.	84A384
13.22 Hydroperoxidomanganese(III) sulfate complex								
13.22.1	First-order reaction							
MnO ₂ H ²⁺ -sulfate → Mn(III)-sulfate + HO ₂ ^{·-}	13 s^{-1}				25	p.r.	P.b.k. in O ₂ -satd. soln. contg. 0.5 mol L ⁻¹ sulfate, and varied [formate] and [Mn ²⁺].	84A189
13.23 Peroxidomanganese(III)-manganese(II) sulfate complex								
13.23.1	First-order reaction							
(MnOOHMn ⁴⁺)-sulfate →	$3.1 \times 10^3 \text{ s}^{-1}$		1-1.3		25	p.r.	P.b.k. in O ₂ -satd. soln. contg. 0.5 mol L ⁻¹ sulfate, and varied [formate] and [Mn ²⁺].	84A189
13.24 Dibromomanganese(III) ion								
13.24.1	First-order reaction							
MnBr ₂ ⁺ → Mn ³⁺ + 2 Br ⁻	$2.3 \times 10^5 \text{ s}^{-1}$	1	0.25	25	f.p.	D.k. of Br ₂ ^{·-} in soln. contg. 0.1 mol L ⁻¹ Br ⁻ and (1-20) × 10 ⁻³ mol L ⁻¹ Mn ²⁺ ; value of <i>k</i> obtained from the intercept of plot of (<i>k</i> _{obs}) ⁻¹ vs [Mn ²⁺] ⁻¹ .	737317	
13.25 Chloromanganese(III) ion								
13.25.1	2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraenecobalt(II) ion							
MnCl ²⁺ + Co(Me ₄ tetraeneN ₄) ²⁺ → Mn ²⁺ + Co(Me ₄ tetraeneN ₄)Cl ²⁺	2.4×10^7	0		25	f.p.	D.k. at 540 nm in soln. contg. ~10 ⁻² mol L ⁻¹ Mn ²⁺ and 1 mol L ⁻¹ HCl.	79A016	
13.25.2	<i>N</i> -rac-5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecobalt(II) ion							
MnCl ²⁺ + <i>N</i> -rac-Co(4,11-dieneN ₄) ²⁺ → Mn ²⁺ + Co(4,11-dieneN ₄)Cl ²⁺	5.3×10^6	0		25	f.p.	D.k. at 340 nm in soln. contg. ~10 ⁻² mol L ⁻¹ Mn ²⁺ and 1 mol L ⁻¹ HCl.	79A016	
13.26 Dichloromanganese(III) ion								
13.26.1	First-order reaction							
MnCl ₂ ⁺ → Mn ³⁺ + 2 Cl ⁻	$2.1 \times 10^5 \text{ s}^{-1}$	1	0.2	25	f.p.	D.k. of Cl ₂ ^{·-} in soln. contg. 0.1 mol L ⁻¹ Cl ⁻ and (1-20) × 10 ⁻³ mol L ⁻¹ Mn ²⁺ ; value of <i>k</i> obtained from the intercept of plot of (<i>k</i> _{obs}) ⁻¹ vs [Mn ²⁺].	737317	
13.27 Peroxido(ethylenediaminediacetato)manganate(III) ion								
13.27.1	Water							
MnEDDA(O ₂) ^{·-} + 2 H ₂ O → MnEDDA(OH) ₂ ^{·-} + H ₂ O ₂	220 s^{-1}	6.3	0.1			p.r.	D.k. in O ₂ -satd. soln. contg. MnEDDA and 0.01 mol L ⁻¹ formate; product reacts with O ₂ ^{·-} to give MnEDDA(OH) ₂ (O ₂) ^{·-} which decays by first-order reaction. <i>k</i> = 55 s ⁻¹ .	90A116

TABLE 13. Rate constants for manganese transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
13.28 Aqua(methyl)nitrolotriacetatomanganate(III) ion								
13.28.1 First-order reaction								
	$\text{CH}_3\text{MnNTA}(\text{H}_2\text{O})^-\rightarrow\text{MnNTA}(\text{H}_2\text{O})^- + \cdot\text{CH}_3$	$1.2\times 10^5 \text{ s}^{-1}$		6		p.r.	D.k. in N ₂ O-satd. soln. contg. 0.002-0.006 mol L ⁻¹ NTA, (0.5-5.0) × 10 ⁻³ mol L ⁻¹ MnSO ₄ and 0.1-0.5 mol L ⁻¹ DMSO; <i>k</i> _r = 1.5 × 10 ⁸ L mol ⁻¹ s ⁻¹ .	88A426
13.28.2 Methyl								
	$\text{CH}_3\text{MnNTA}(\text{H}_2\text{O})^-\cdot\text{CH}_3 \rightarrow \text{MnNTA}(\text{H}_2\text{O})^- + \text{C}_2\text{H}_6$	1.6×10^9		6		p.r.	Calcd. from concn. dependence of d.k. in N ₂ O-satd. soln. contg. 0.002-0.006 mol L ⁻¹ NTA, (0.5-5.0) × 10 ⁻³ mol L ⁻¹ MnSO ₄ and 0.1-0.5 mol L ⁻¹ DMSO.	88A426
13.29 Bromo[5,10,15,20-tetrakis(4-sulfonatophenyl)porphinatomanganate(III) ion								
13.29.1 Water								
	$[\text{BrMnTPPS}]^{4-} + \text{H}_2\text{O} \rightarrow (\text{H}_2\text{O})\text{MnTPPS}^{3-} + \text{Br}^-$	$4\times 10^3 \text{ s}^{-1}$ $9\times 10^3 \text{ s}^{-1}$		6.8 12.9		p.r.	D.k. in N ₂ O-satd. soln. contg. 0.1 mol L ⁻¹ KBr and MnTPPS ⁴⁻ .	84A120
13.30 2-Hydroxy-2,2-dimethylethyltetrakis(4-sulfonatophenyl)porphinatomanganate(III) ion								
13.30.1 Water								
	$\text{HOC}(\text{CH}_3)_2\text{CH}_2\text{MnTPPS}^{4-} + \text{H}_2\text{O} \rightarrow \text{MnTPPS}^{3-} + \text{tert-BuOH} + \text{OH}^-$	$-4\times 10^2 \text{ s}^{-1}$		6.8		p.r.	D.k. in N ₂ O-satd. soln. contg. 0.1 mol L ⁻¹ tert-BuOH and MnTPPS ⁴⁻ .	84A120
13.31 Bromo[5,10,15,20-tetrakis(1-methylpyridinium-4-yl)porphinatomanganate(III) ion								
13.31.1 Water								
	$[\text{BrMnTMyP}]^{4+} + \text{H}_2\text{O} \rightarrow (\text{H}_2\text{O})\text{MnTMyP}^{5+} + \text{Br}^-$	$6\times 10^4 \text{ s}^{-1}$ $1.5\times 10^5 \text{ s}^{-1}$		6.8 12.9		p.r.	D.k. in N ₂ O-satd. soln. contg. 0.1 mol L ⁻¹ KBr and MnTMyP ⁴⁺ .	84A120
13.32 2-Hydroxy-2,2-dimethylethyl[5,10,15,20-tetrakis(1-methylpyridinium-4-yl)porphinatomanganate(III) ion								
13.32.1 Water								
	$\text{HOC}(\text{CH}_3)_2\text{CH}_2\text{MnTMyP}^{4+} + \text{H}_2\text{O} \rightarrow \text{MnTMyP}^{5+} + \text{tert-BuOH} + \text{OH}^-$	$-7\times 10^3 \text{ s}^{-1}$		6.8		p.r.	D.k. in N ₂ O-satd. soln. contg. 0.1 mol L ⁻¹ tert-BuOH and MnTMyP ⁴⁺ .	84A120
13.33 Dichlorohydroxy(1,4,7,11-tetraazacyclotetradecane)manganese(IV) ion								
13.33.1 First-order reaction								
	$[\text{HOMn}(\text{cyclam})\text{Cl}_2]^+ \rightarrow$	$1.3\times 10^5 \text{ s}^{-1}$				p.r.	D.k. in N ₂ O-satd. soln. contg. Mn(cyclam) ²⁺ ; reaction suggested to represent loss of ligand.	87A488
13.34 Dichloro-<i>meso</i>-5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradecane(hydroxy)manganese(IV) ion								
13.34.1 First-order reaction								
	$[\text{HO-}meso\text{-Mn}(\text{aneN}_4)\text{Cl}_2]^+ \rightarrow$	$5.0\times 10^3 \text{ s}^{-1}$				p.r.	D.k. in N ₂ O-satd. soln. contg. <i>meso</i> -Mn(aneN ₄) ²⁺ ; reaction suggested to represent loss of ligand.	87A488
13.35 Dichloro-<i>rac</i>-5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradecane(hydroxy)manganese(IV) ion								
13.35.1 First-order reaction								
	$[\text{HO-}rac\text{-Mn}(\text{aneN}_4)\text{Cl}_2]^+ \rightarrow$	$9.0\times 10^3 \text{ s}^{-1}$				p.r.	D.k. in N ₂ O-satd. soln. contg. <i>rac</i> -Mn(aneN ₄) ²⁺ ; reaction suggested to represent loss of ligand.	87A488
13.36 Manganese(V)								
13.36.1 Manganate(VI) ion								
	$\text{Mn(V)} + \text{MnO}_4^{2-} \rightarrow \text{Mn(IV)} + \text{MnO}_4^-$	$<4\times 10^4$	13	0.1	22	p.r.	Estd. from abs. changes in Ar-satd. soln. contg. MnO ₄ ²⁻ and 0.1 mol L ⁻¹ OH ⁻ .	81A057

TABLE 14. Rate constants for molybdenum transients

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
14.1	18-Molybdodiphosphate ion(7-), conjugate acid							
14.1.1	18-Molybdodiphosphate ion(7-), conjugate acid							
	$\text{HP}_2\text{Mo}_{18}\text{O}_{62}^{6-} + \text{HP}_2\text{Mo}_{18}\text{O}_{62}^{6-} \rightarrow \text{P}_2\text{Mo}_{18}\text{O}_{62}^{6-} + \text{H}_2\text{P}_2\text{Mo}_{18}\text{O}_{62}^{6-}$	1.0×10^4	2		22	p.r.	P.b.k. at 750 nm in N ₂ O-satd. soln. contg. ~10 ⁻⁴ mol L ⁻¹ P ₂ Mo ₁₈ O ₆₂ ⁶⁻ and 0.5 mol L ⁻¹ alcohol.	82A107
14.2	Bis(μ-oxo)(ethylenediaminetetraacetato)bis[oxomolybdate(IV)(V)] ion							
14.2.1	Oxygen							
	$[\text{Mo}_2\text{O}_4(\text{EDTA})]^{3-} + \text{O}_2 \rightarrow$	-2×10^8			25	p.r.	D.k. in soln. contg. (0.2-2.0) × 10 ⁻⁴ mol L ⁻¹ Mo ₂ O ₄ (EDTA) ²⁻ , 0.1 mol L ⁻¹ 1-BuOH and (1-5) × 10 ⁻⁶ mol L ⁻¹ O ₂ ; concn. of transient ~1 × 10 ⁻⁵ mol L ⁻¹ .	85A367
14.3	Bis(μ-oxo)bis[aqua(oxalato)oxomolybdate(IV)(V)] ion							
14.3.1	Oxygen							
	$[\text{Mo}_2\text{O}_4(\text{ox})(\text{H}_2\text{O})_2]^{3-} + \text{O}_2 \rightarrow$	$\sim 1 \times 10^8$			25	p.r.	D.k. in soln. contg. (0.2-2.0) × 10 ⁻⁴ mol L ⁻¹ Mo ₂ O ₄ (ox)(H ₂ O) ₂ ²⁻ , 0.1 mol L ⁻¹ 1-BuOH and (1-5) × 10 ⁻⁶ mol L ⁻¹ O ₂ ; concn. of transient ~1 × 10 ⁻⁵ mol L ⁻¹ .	85A367
14.4	Octacyanomolybdate(V) ion							
14.4.1	10-Methylphenothiazine							
	$\text{Mo}(\text{CN})_8^{3-} + \text{MPTH} \rightarrow \text{Mo}(\text{CN})_8^{4-} + [\text{MPTH}]^{+}$	9.6×10^7	1		22	p.r.	D.k. at 520 nm in N ₂ O-satd. soln. contg. 0.17 mol L ⁻¹ EtOH, 2 × 10 ⁻⁴ mol L ⁻¹ Mo(CN) ₈ ⁴⁻ , 1 × 10 ⁻⁵ mol L ⁻¹ MPTH, 0.10 mol L ⁻¹ HClO ₄ and 0.2 mol L ⁻¹ NaBr; <i>k</i> _r = 3.3 × 10 ⁷ L mol ⁻¹ s ⁻¹	83N00
14.5	cis-Octaaqua-μ-oxo-bis(oxo)dimolybdenum(IV) ion							
14.5.1	First-order reaction							
	$\text{cis-}\text{Mo}_2\text{O}_3(\text{H}_2\text{O})_8^{2+} \rightarrow \text{trans-}\text{Mo}_2\text{O}_3(\text{H}_2\text{O})_8^{2+}$	$2.4 \times 10^4 \text{ s}^{-1}$	0.7	0.5		f.p.	D.k. in deaerated soln. (satd. with ethylene) contg. 0.2 mol L ⁻¹ HClO ₄ and 7.5 × 10 ⁻⁵ mol L ⁻¹ Mo ₂ O ₄ (H ₂ O) ₆ ²⁺ .	89A42
14.6	Hexaaquadi-μ-oxodioxodimolybdenum(V,VI) ion							
14.6.1	First-order reaction							
	$\text{Mo}_2\text{O}_4(\text{OH}_2)_6^{3+} \rightarrow$	$2.9 \times 10^3 \text{ s}^{-1}$	2	0.5		p.r.	D.k. at 290 nm in N ₂ O-satd. soln. contg. 0.01 mol L ⁻¹ HClO ₄ and 7.5 × 10 ⁻⁵ mol L ⁻¹ Mo ₂ O ₄ (H ₂ O) ₆ ²⁺ .	89A42

TABLE 15. Rate constants for nickel transients

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
15.1 Nickel(I) ion								
15.1.1	Hydroxyl $\text{Ni}^+ + \cdot\text{OH} \rightarrow \text{Ni}^{2+} + \text{OH}^-$	2×10^{10}				p.r.	D.k. at 300 nm in Ar-satd. soln. contg. 10^{-4} mol L ⁻¹ NiSO ₄ ; value obtained by computer fit assuming $2k(\cdot\text{OH} + \cdot\text{OH}) = 1 \times 10^{10}$ L mol ⁻¹ s ⁻¹ .	741037
15.1.2	Hydroxymethyl $\text{Ni}^+ + \cdot\text{CH}_2\text{OH} \rightarrow \text{NiCH}_2\text{OH}^+$	4.2×10^9				p.r.	D.k. at 300 nm, p.b.k. at 250 nm and condy. change in Ar-satd. soln. contg. 10^{-4} mol L ⁻¹ NiSO ₄ and 0.1 mol L ⁻¹ MeOH; value obtained by computer fit.	741037
15.1.3	Carbon dioxide radical anion $\text{Ni}^+ + \cdot\text{CO}_2 \rightarrow \text{NiCO}_2$	6.6×10^9				p.r.	D.k. at 300 nm, p.b.k. at 250 nm and condy. change in Ar-satd. soln. contg. 5×10^{-5} mol L ⁻¹ NiSO ₄ and 5×10^{-5} mol L ⁻¹ formate ion; value obtained by computer fit; product suggested to undergo protonation.	741037
15.1.4	1-Hydroxyethyl $\text{Ni}^+ + \text{CH}_3\dot{\text{C}}\text{HOH} \rightarrow \text{NiCHOHCH}_3^+$	2.3×10^9				p.r.	D.k. at 300 nm, p.b.k. at 250 nm and condy. change in Ar-satd. soln. contg. 10^{-4} mol L ⁻¹ NiSO ₄ and EtOH; value obtained by computer fit.	741037
15.1.5	1-Hydroxy-1-methylethyl $\text{Ni}^+ + (\text{CH}_3)_2\dot{\text{C}}\text{OH} \rightarrow \text{NiCOH(CH}_3)_2^+$	1.4×10^9				p.r.	D.k. at 300 nm, p.b.k. at 250 nm and condy. change in Ar-satd. soln. contg. 10^{-4} mol L ⁻¹ NiSO ₄ and 2-PrOH; value obtained by computer fit.	741037
15.1.6	2-Hydroxy-2,2-dimethylethyl $\text{Ni}^+ + \cdot\text{CH}_2\text{C}(\text{CH}_3)_2\text{OH} \rightarrow \text{Ni}^{2+} + \text{OH}^- + \text{CH}_2=\text{C}(\text{CH}_3)_2$	3×10^9				p.r.	D.k. at 300 nm, p.b.k. at 250 nm and condy. change in Ar-satd. soln. contg. 10^{-4} mol L ⁻¹ NiSO ₄ and 0.5 mol L ⁻¹ <i>tert</i> -BuOH; value obtained by computer fit.	741037
15.1.7	Cyclopentyl $\text{Ni}^+ + c\text{-C}_5\text{H}_9 \rightarrow c\text{-C}_5\text{H}_9\text{Ni}^+$	2.8×10^9				p.r.	D.k. at 300 nm, p.b.k. at 250 nm and condy. change in Ar-satd. soln. contg. 10^{-4} mol L ⁻¹ NiSO ₄ and cyclopentane; value obtained by computer fit.	741037
15.1.8	Bromate ion $\text{Ni}^+ + \text{BrO}_3^- \rightarrow$	$\leq 8.4 \times 10^6$		0.08		p.r.	D.k. at 313 nm in Ar-satd. soln. contg. 0.02 mol L ⁻¹ NiSO ₄ , 0.001 mol L ⁻¹ MeOH and $(2.5-5) \times 10^{-3}$ mol L ⁻¹ BrO ₃ ⁻ .	68G855
15.1.9	Tris(ethylenediamine)cobalt(III) ion $\text{Ni}^+ + \text{Co}(\text{en})_3^{3+} \rightarrow$	$\leq 5 \times 10^6$	5-6	0.08		p.r.	D.k. at 310 nm in Ar-satd. soln. contg. 0.02 mol L ⁻¹ NiSO ₄ and 0.001 mol L ⁻¹ MeOH.	690428
15.1.10	cis-Dichlorobis(ethylenediamine)cobalt(III) ion $\text{Ni}^+ + cis\text{-Co}(\text{en})_2\text{Cl}_2^+ \rightarrow$	5.9×10^8	5-6	0.08		p.r.	D.k. at 350 nm in Ar-satd. soln. contg. 0.02 mol L ⁻¹ NiSO ₄ and 0.001 mol L ⁻¹ MeOH.	690428
15.1.11	trans-Dichlorobis(ethylenediamine)cobalt(III) ion $\text{Ni}^+ + trans\text{-Co}(\text{en})_2\text{Cl}_2^+ \rightarrow$	8.3×10^8	5-6	0.08		p.r.	D.k. at 350 nm in Ar-satd. soln. contg. 0.02 mol L ⁻¹ NiSO ₄ and 0.001 mol L ⁻¹ MeOH.	690428

TABLE 15. Rate constants for nickel transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
15.1 Nickel(I) ion — Continued								
15.1.12 Carbonatobis(ethylenediamine)cobalt(III) ion								
	$\text{Ni}^+ + \text{Co}(\text{en})_2\text{CO}_3^{+} \rightarrow$	$\leq 5 \times 10^6$	5-6	0.08		p.r.	D.k. at 310 nm in Ar-satd. soln. contg. 0.02 mol L ⁻¹ NiSO ₄ and 0.001 mol L ⁻¹ MeOH.	690428
15.1.13 <i>cis</i>-Bis(ethylenediamine)difluorocobalt(III) ion								
	$\text{Ni}^+ + \text{cis}-\text{Co}(\text{en})_2\text{F}_2^{+} \rightarrow$	$\leq 5 \times 10^6$	5-6	0.08		p.r.	D.k. at 310 nm in Ar-satd. soln. contg. 0.02 mol L ⁻¹ NiSO ₄ and 0.001 mol L ⁻¹ MeOH.	690428
15.1.14 Aquabis(ethylenediamine)fluorocobalt(III) ion								
	$\text{Ni}^+ + \text{Co}(\text{en})_2(\text{H}_2\text{O})\text{F}^{2+} \rightarrow$	$\leq 5 \times 10^6$	5-6	0.08		p.r.	D.k. at 310 nm in Ar-satd. soln. contg. 0.02 mol L ⁻¹ NiSO ₄ and 0.001 mol L ⁻¹ MeOH.	690428
15.1.15 <i>cis</i>-Amminechlorobis(ethylenediamine)cobalt(III) ion								
	$\text{Ni}^+ + \text{cis}-\text{Co}(\text{en})_2(\text{NH}_3)\text{Cl}^{2+} \rightarrow$	4.7×10^8	5-6	0.08		p.r.	D.k. at 310 nm in Ar-satd. soln. contg. 0.02 mol L ⁻¹ NiSO ₄ and 0.001 mol L ⁻¹ MeOH.	690428
15.1.16 <i>cis</i>-Nitroamminebis(ethylenediamine)cobalt(III) ion								
	$\text{Ni}^+ + \text{cis}-\text{Co}(\text{en})_2(\text{NH}_3)\text{NO}_2^{2+} \rightarrow$	3.3×10^8	5-6	0.08		p.r.	D.k. at 350 nm in Ar-satd. soln. contg. 0.02 mol L ⁻¹ NiSO ₄ and 0.001 mol L ⁻¹ MeOH.	690428
15.1.17 Hexaamminecobalt(III) ion								
	$\text{Ni}^+ + \text{Co}(\text{NH}_3)_6^{3+} \rightarrow$	$\leq 5 \times 10^6$	5-6	0.08		p.r.	D.k. at 310 nm in Ar-satd. soln. contg. 0.02 mol L ⁻¹ NiSO ₄ and 0.001 mol L ⁻¹ MeOH.	690428
15.1.18 Pentaammine(bromo)cobalt(III) ion								
	$\text{Ni}^+ + \text{Co}(\text{NH}_3)_5\text{Br}^{2+} \rightarrow$	1.1×10^9	4.0	0.08		p.r.	D.k. at 310 nm in Ar-satd. soln. contg. 0.02 mol L ⁻¹ NiSO ₄ and 0.001 mol L ⁻¹ MeOH.	690428
15.1.19 Pentaammine(chloro)cobalt(III) ion								
	$\text{Ni}^+ + \text{Co}(\text{NH}_3)_5\text{Cl}^{2+} \rightarrow$	6.5×10^8	5-6	0.08		p.r.	D.k. at 310 nm in Ar-satd. soln. contg. 0.02 mol L ⁻¹ NiSO ₄ and 0.001 mol L ⁻¹ MeOH.	690428
15.1.20 Pentaammine(cyano)cobalt(III) ion								
	$\text{Ni}^+ + \text{Co}(\text{NH}_3)_5(\text{CN})^{2+} \rightarrow$	3.3×10^8	5-6	0.08		p.r.	D.k. at 310 nm in Ar-satd. soln. contg. 0.02 mol L ⁻¹ NiSO ₄ and 0.001 mol L ⁻¹ MeOH.	690428
15.1.21 Pentaammine(fluoro)cobalt(III) ion								
	$\text{Ni}^+ + \text{Co}(\text{NH}_3)_5\text{F}^{2+} \rightarrow$	$\leq 5 \times 10^6$	5-6	0.08		p.r.	D.k. at 310 nm in Ar-satd. soln. contg. 0.02 mol L ⁻¹ NiSO ₄ and 0.001 mol L ⁻¹ MeOH.	690428
15.1.22 Pentaammine(aqua)cobalt(III) ion								
	$\text{Ni}^+ + \text{Co}(\text{NH}_3)_5(\text{H}_2\text{O})^{3+} \rightarrow$	$\leq 5 \times 10^6$	4.0	0.08		p.r.	D.k. at 310 nm in Ar-satd. soln. contg. 0.02 mol L ⁻¹ NiSO ₄ and 0.001 mol L ⁻¹ MeOH.	690428
15.1.23 Pentaammine(hydroxy)cobalt(III) ion								
	$\text{Ni}^+ + \text{Co}(\text{NH}_3)_5\text{OH}^{2+} \rightarrow$	1.3×10^7	7.6	0.08		p.r.	D.k. at 310 nm in Ar-satd. soln. contg. 0.02 mol L ⁻¹ NiSO ₄ and 0.001 mol L ⁻¹ MeOH.	690428
15.1.24 Pentaammine(azido)cobalt(III) ion								
	$\text{Ni}^+ + \text{Co}(\text{NH}_3)_5(\text{N}_3)^{2+} \rightarrow$	5.8×10^8	5-6	0.08		p.r.	D.k. at 350 nm in Ar-satd. soln. contg. 0.02 mol L ⁻¹ NiSO ₄ and 0.001 mol L ⁻¹ MeOH.	690428

TABLE 15. Rate constants for nickel transients — Continued

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t(\text{°C})$	Method	Comment	Ref.
15.1 Nickel(I) ion — Continued								
15.1.25	Pentaammine(thiocyanato- <i>N</i>)cobalt(III) ion $\text{Ni}^+ + \text{Co}(\text{NH}_3)_5(\text{NCS})^{2+} \rightarrow$	4.1×10^8	5-6	0.08		p.r.	D.k. at 350 nm in Ar-satd. soln. contg. 0.02 mol L^{-1} NiSO_4 and 0.001 mol L^{-1} MeOH.	690428
15.1.26 (Acetato)pentaamminecobalt(III) ion								
	$\text{Ni}^+ + \text{Co}(\text{NH}_3)_5(\text{OAc})^{2+} \rightarrow$	$\leq 5 \times 10^6$	5-6	0.08		p.r.	D.k. at 310 nm in Ar-satd. soln. contg. 0.02 mol L^{-1} NiSO_4 and 0.001 mol L^{-1} MeOH.	690428
15.1.27 μ-5-Pyrimidinecarboxylatobis[hydroxotris(ammine)cobalt(III)] ion								
	$\text{Ni}^+ + 5\text{-pmCO}_2[\text{Co}(\text{NH}_3)_3]_2(\text{OH})_2^{3+} \rightarrow$	$\leq 1 \times 10^7$	4.0		22	p.r.	D.k. in Ar-satd. soln. contg. 0.01 mol L^{-1} NiSO_4 and 0.1 mol L^{-1} <i>tert</i> -BuOH.	82A146
15.1.28 μ-4-Pyrimidinecarboxylatobis[hydroxotris(ammine)cobalt(III)] ion								
	$\text{Ni}^+ + 4\text{-pmCO}_2[\text{Co}(\text{NH}_3)_3]_2(\text{OH})_2^{3+} \rightarrow$	2.7×10^8	4.0		22	p.r.	D.k. in Ar-satd. soln. contg. 0.01 mol L^{-1} NiSO_4 and 0.1 mol L^{-1} <i>tert</i> -BuOH.	82A146
15.1.29 Copper(II) ion								
	$\text{Ni}^+ + \text{Cu}^{2+} \rightarrow$	$\leq 2.4 \times 10^7$		0.08		p.r.	D.k. at 313 nm in Ar-satd. soln. contg. 0.02 mol L^{-1} NiSO_4 and 0.001 mol L^{-1} MeOH.	68G855
15.1.30 Hydrogen peroxide								
	$\text{Ni}^+ + \text{H}_2\text{O}_2 \rightarrow \text{Ni}^{2+} + \cdot\text{OH} + \text{OH}^-$	3.2×10^7			25	p.r.		761072
		5×10^7				p.r.	D.k. at 300 nm and condy. change in Ar-satd. soln. contg. 1×10^{-4} mol L^{-1} NiSO_4 ; value obtained from computer fit assuming $2k(\cdot\text{OH} + \cdot\text{OH}) = 1 \times 10^{10}$ $\text{L mol}^{-1} \text{s}^{-1}$.	741037
		4.3×10^7		0.08		p.r.	D.k. at 313 nm in Ar-satd. soln. contg. 0.02 mol L^{-1} NiSO_4 and 0.001 mol L^{-1} MeOH.	68G855
15.1.31 Hydrogen ion								
	$\text{Ni}^+ + \text{H}^+ \rightarrow$	$\leq 10^6$		0.08		p.r.	D.k. at 313 nm in Ar-satd. soln. contg. 0.02 mol L^{-1} NiSO_4 and 0.001 mol L^{-1} MeOH.	68G855
15.1.32 Iodate ion								
	$\text{Ni}^+ + \text{IO}_3^- \rightarrow$	2.2×10^8		0.08		p.r.	D.k. at 313 nm in Ar-satd. soln. contg. 0.02 mol L^{-1} NiSO_4 and 0.001 mol L^{-1} MeOH.	68G855
15.1.33 Permanganate ion								
	$\text{Ni}^+ + \text{MnO}_4^- \rightarrow$	7.2×10^9			20	p.r.	D.k. at 545 nm in Ar-satd. or deaerated soln. contg. 10^{-5} mol L^{-1} MnO_4^- and (0.2, 0.75 or 1.45) $\times 10^{-3}$ mol L^{-1} Ni^{2+} .	650385
15.1.34 Nitrite ion								
	$\text{Ni}^+ + \text{NO}_2^- \rightarrow$	1.5×10^8		0.08		p.r.	D.k. at 313 nm in Ar-satd. soln. contg. 0.02 mol L^{-1} NiSO_4 and 0.001 mol L^{-1} MeOH.	68G855
15.1.35 Nitrate ion								
	$\text{Ni}^+ + \text{NO}_3^- \rightarrow$	$\leq 1.4 \times 10^6$		0.08		p.r.	D.k. at 313 nm in Ar-satd. soln. contg. 0.02 mol L^{-1} NiSO_4 and 0.001 mol L^{-1} MeOH.	68G855
15.1.36 Nitrous oxide								
	$\text{Ni}^+ + \text{N}_2\text{O} \rightarrow \text{NiO}^+ + \text{N}_2$	9.1×10^6			25	p.r.	D.k. in N_2O -satd. soln. contg. 0.5 mol L^{-1} NiSO_4 ; studied at 1-30 °C, $E_a = 40.6 \text{ kJ mol}^{-1}$.	761072

TABLE 15. Rate constants for nickel transients — Continued

No.	Reaction	k (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.	
15.1 Nickel(I) ion — Continued									
15.1.36 Nitrous oxide — Continued									
		$\leq 6.3 \times 10^6$				p.r.	D.k. at 313 nm in N ₂ O-satd. soln. contg. 1.0 mol L ⁻¹ NiSO ₄ and 0.001 mol L ⁻¹ MeOH.	68G855	
15.1.37 Oxygen									
	Ni ⁺ + O ₂ → NiO ₂ ⁺	1.4×10^9		0.08		p.r.	D.k. at 313 nm in soln. contg. 0.02 mol L ⁻¹ NiSO ₄ and 0.001 mol L ⁻¹ MeOH.	68G855	
		2.2×10^9		18		p.r.	D.k. in soln. contg. Ni ²⁺ .	66A001	
15.1.38 Hexaammineruthenium(III) ion									
	Ni ⁺ + Ru(NH ₃) ₆ ³⁺ →	4.0×10^8		0.08		p.r.	D.k. in soln. contg. 0.02 mol L ⁻¹ NiSO ₄ and varied [Ru(NH ₃) ₆ ³⁺].	701229	
15.1.39 Peroxodisulfate ion									
	Ni ⁺ + S ₂ O ₈ ²⁻ → Ni ²⁺ + SO ₄ ¹⁻ + SO ₄ ²⁻	1.5×10^8		0.049	25	p.r.	D.k. in deaerated soln. contg. 0.05 mol L ⁻¹ Ni ²⁺ and (0.5-10) × 10 ⁻⁴ mol L ⁻¹ S ₂ O ₈ ²⁻ .	761072	
15.1.40 Allyl alcohol									
	Ni ⁺ + H ₂ C=CHCH ₂ OH → [Ni(CH ₂ CHCH ₂ OH)] ⁺	$\sim 10^8$			25	p.r.	D.k. in deaerated soln. contg. 0.01 mol L ⁻¹ NiSO ₄ , 1.2 × 10 ⁻³ mol L ⁻¹ allyl alcohol and 1.24 mol L ⁻¹ MeOH.	761072	
15.1.41 1,4-Benzoquinone									
	Ni ⁺ + Q → Ni ²⁺ + Q ^{•-}	2.3×10^8		6.0		25	p.r.	P.b.k. at 430 nm in deaerated soln. contg. 0.01 mol L ⁻¹ Ni ²⁺ , 1 mol L ⁻¹ <i>tert</i> -BuOH and (2-4) × 10 ⁻⁵ mol L ⁻¹ Q.	761134
15.1.42 2-Methyl-1,4-naphthoquinone									
	Ni ⁺ + 2-CH ₃ NQ → Ni ²⁺ + [2-CH ₃ NQ] ^{•-}	2.4×10^9		7.0		-25	p.r.	P.b.k. at 395 nm in soln. contg. 0.005 mol L ⁻¹ NiSO ₄ , 1 mol L ⁻¹ <i>tert</i> -BuOH, (2.5-5.0) × 10 ⁻³ mol L ⁻¹ 2-CH ₃ -NQ and 0.001 mol L ⁻¹ phosphate.	751032 731047
15.1.43 4-Pyrimidinecarboxylate ion									
	Ni ⁺ + 4-pmCO ₂ ^{•-} → Ni ²⁺ + [4-pmCO ₂] ²⁻	4×10^8					p.r.	D.k. in Ar-satd. soln. contg. 0.1 mol L ⁻¹ <i>tert</i> -BuOH, 0.01 mol L ⁻¹ NiSO ₄ and 8 × 10 ⁻⁴ mol L ⁻¹ 4-pmCO ₂ ^{•-} .	82A146
15.1.44 Tetranitromethane									
	Ni ⁺ + C(NO ₂) ₄ → Ni ²⁺ + C(NO ₂) ₃ ^{•-} + NO ₂	1.4×10^9		5.9		25	p.r.	P.b.k. in deaerated soln. contg. 1 mol L ⁻¹ <i>tert</i> -BuOH, 0.01 mol L ⁻¹ Ni ²⁺ and (32-136) × 10 ⁻⁶ mol L ⁻¹ tetranitromethane.	761134
15.2 Tetracyanonickelate(I) ion									
15.2.1 First-order reaction									
	Ni(CN) ₄ ³⁻ → Ni(CN) ₃ ²⁻ + CN ^{•-}	8.1×10^3 s ⁻¹			20	p.r.	P.b.k. at 350 nm and d.k. at 240 nm in N ₂ O-satd. soln. contg. 0.53 or 4.4 × 10 ⁻⁴ mol L ⁻¹ Ni(CN) ₄ ³⁻ and 0.1 mol L ⁻¹ formate ion; $k_f = 8 \times 10^7$ L mol ⁻¹ s ⁻¹ [78Z002].	741072	
15.3 Tris(cyano)nickelate(I) ion									
15.3.1 Tris(cyano)nickelate(I) ion									
	Ni(CN) ₃ ²⁻ + Ni(CN) ₃ ²⁻ → Ni ₂ (CN) ₆ ⁴⁻	7.4×10^7			20	p.r.	P.b.k. at 313 nm in N ₂ O-satd. soln. contg. 0.06 or 2 × 10 ⁻⁴ mol L ⁻¹ Ni(CN) ₃ ²⁻ and 0.1 mol L ⁻¹ formate ion.	74107	

TABLE 15. Rate constants for nickel transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
15.4 1,4,7,10-Tetraazacyclotridecanenickel(I) ion								
15.4.1 First-order reaction								
	$\text{Ni}([13]\text{aneN}_4)^+ \rightarrow$	$8.8 \times 10^3 \text{ s}^{-1}$		5.5		p.r.	D.k. in Ar-satd. soln. contg. 2×10^{-4} mol L ⁻¹ $\text{Ni}([13]\text{aneN}_4)^{2+}$ and 0.1 mol L ⁻¹ formate ion; ligand loss reaction suggested.	85A145
15.4.2 Nitrous oxide								
	$\text{Ni}([13]\text{aneN}_4)^+ + \text{N}_2\text{O} + 2 \text{H}_3\text{O}^+ \rightarrow$ $\text{Ni}([13]\text{aneN}_4)^{2+} + \text{N}_2 + 3 \text{H}_2\text{O}$	8.4×10^7		6.0		p.r.	D.k. at 370 nm and p.b.k. at 525 nm in Ar-satd. soln. contg. 2×10^{-4} mol L ⁻¹ $\text{Ni}([13]\text{aneN}_4)^{2+}$, 0.1 mol L ⁻¹ formate ion and 0.002-0.02 mol L ⁻¹ N_2O .	85A145
15.5 9-Methyl-9-nitro-1,4,7,11-tetraazacyclotridecanenickel(II) ion, electron adduct								
15.5.1 First-order reaction								
	$\text{Ni}(\text{MeNO}_2[13]\text{aneN}_4)^+ \rightarrow$	$3.5 \times 10^3 \text{ s}^{-1}$		22		p.r.	D.k. at 290 nm in soln. contg. 0.001 mol L ⁻¹ $\text{Ni}(\text{MeNO}_2[13]\text{aneN}_4)^{2+}$ and 0.1 mol L ⁻¹ <i>tert</i> -BuOH.	88A391
15.6 1,4,8,11-Tetraazacyclotetradecanenickel(I) ion								
15.6.1 Hexaamminecobalt(III) ion								
	$\text{Ni}(\text{cyclam})^+ + \text{Co}(\text{NH}_3)_6^{3+} \rightarrow$ $\text{Ni}(\text{cyclam})^{2+} + \text{Co}(\text{NH}_3)_6^{2+}$	6.2×10^6				p.r.		85A032
15.6.2 Nitrous oxide								
	$\text{Ni}(\text{cyclam})^+ + \text{N}_2\text{O} + 2 \text{H}_3\text{O}^+ \rightarrow$ $\text{Ni}(\text{cyclam})^{2+} + \text{N}_2 + 3 \text{H}_2\text{O}$	3.2×10^7				p.r.		85A032
15.6.3 Oxygen								
	$\text{Ni}(\text{cyclam})^+ + \text{O}_2 \rightarrow \text{Ni}(\text{cyclam})^{2+} + \text{O}_2^-$	2.5×10^9				p.r.		85A032
15.6.4 Hexaammineruthenium(III) ion								
	$\text{Ni}(\text{cyclam})^+ + \text{Ru}(\text{NH}_3)_6^{3+} \rightarrow$ $\text{Ni}(\text{cyclam})^{2+} + \text{Ru}(\text{NH}_3)_6^{2+}$	6.4×10^8				p.r.		85A032
15.7 1,4,8,11-Tetramethyl-1,4,8,11-tetraazacyclotetradecanenickel(I) ion								
15.7.1 Hexaamminecobalt(III) ion								
	$\text{Ni}(\text{Me}_4[14]\text{aneN}_4)^+ + \text{Co}(\text{NH}_3)_6^{3+} \rightarrow$ $\text{Ni}(\text{Me}_4[14]\text{aneN}_4)^{2+} + \text{Co}(\text{NH}_3)_6^{2+}$	8.0×10^5				p.r.		85A032
15.7.2 Nitrous oxide								
	$\text{Ni}(\text{Me}_4[14]\text{aneN}_4)^+ + \text{N}_2\text{O} + 2 \text{H}_3\text{O}^+ \rightarrow$ $\text{Ni}(\text{Me}_4[14]\text{aneN}_4)^{2+} + \text{N}_2 + 3 \text{H}_2\text{O}$	8.3×10^2				p.r.		85A032
15.7.3 Oxygen								
	$\text{Ni}(\text{Me}_4[14]\text{aneN}_4)^+ + \text{O}_2 \rightarrow$ $\text{Ni}(\text{Me}_4[14]\text{aneN}_4)^{2+} + \text{O}_2^-$	1.6×10^9				p.r.		85A032
15.7.4 Hexaammineruthenium(III) ion								
	$\text{Ni}(\text{Me}_4[14]\text{aneN}_4)^+ + \text{Ru}(\text{NH}_3)_6^{3+} \rightarrow$ $\text{Ni}(\text{Me}_4[14]\text{aneN}_4)^{2+} + \text{Ru}(\text{NH}_3)_6^{2+}$	4.9×10^7				p.r.		85A032
15.8 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecanenickel(I) ion								
15.8.1 Hexaamminecobalt(III) ion								
	$\text{Ni}(\text{aneN}_4)^+ + \text{Co}(\text{NH}_3)_6^{3+} \rightarrow$ $\text{Ni}(\text{aneN}_4)^{2+} + \text{Co}(\text{NH}_3)_6^{2+}$	1.9×10^5	7.0	0.016-0.028		p.r.	D.k. at 380 nm in Ar-satd. soln. contg. $(2.5-5.0) \times 10^{-3}$ mol L ⁻¹ $\text{Ni}(\text{aneN}_4)^{2+}$, 1 mol L ⁻¹ <i>tert</i> -BuOH, 0.001 mol L ⁻¹ phosphate buffer and $(2.5-10) \times 10^{-4}$ mol L ⁻¹ $\text{Co}(\text{NH}_3)_6^{3+}$.	761039

TABLE 15. Rate constants for nickel transients — Continued

No.	Reaction	k (L mol ⁻¹ s ⁻¹)	pH	I	t (°C)	Method	Comment	Ref.
15.8 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecanenickel(I) ion — Continued								
15.8.2 Tris(ethylenediamine)cobalt(III) ion								
	$\text{Ni}(\text{aneN}_4)^+ + \text{Co}(\text{en})_3^{3+} \rightarrow \text{Ni}(\text{aneN}_4)^{2+}$ + $\text{Co}(\text{en})_3^{2+}$	1.1×10^5	7.0	0.016- 0.028		p.r.	D.k. at 380 nm in Ar-satd. soln. contg. (2.5-5.0) $\times 10^{-3}$ mol L ⁻¹ $\text{Ni}(\text{aneN}_4)^{2+}$, 1 mol L ⁻¹ <i>tert</i> -BuOH, 0.001 mol L ⁻¹ phosphate buffer and (2.5-10) $\times 10^{-4}$ mol L ⁻¹ $\text{Co}(\text{en})_3^{3+}$.	761039
15.8.3 Aqua(5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene)hydroxycobalt(III) ion								
	$\text{Ni}(\text{aneN}_4)^+ +$ $\text{Co}(4,11\text{-dieneN}_4)(\text{H}_2\text{O})\text{OH}^{2+} \rightarrow$ $\text{Ni}(\text{aneN}_4)^{2+} +$ $\text{Co}(4,11\text{-dieneN}_4)(\text{H}_2\text{O})\text{OH}^+$	1.1×10^6	7.0	0.016- 0.028		p.r.	D.k. at 380 nm in Ar-satd. soln. contg. (2.5-5.0) $\times 10^{-3}$ mol L ⁻¹ $\text{Ni}(\text{aneN}_4)^{2+}$, 1 mol L ⁻¹ <i>tert</i> -BuOH, 0.001 mol L ⁻¹ phosphate buffer and (2.5-10) $\times 10^{-4}$ mol L ⁻¹ $\text{Co}(4,11\text{-dieneN}_4)(\text{H}_2\text{O})\text{OH}^{2+}$.	761039
15.8.4 Dihydroxy(2,3,9,10-tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraene)cobalt(III) ion								
	$\text{Ni}(\text{aneN}_4)^+ +$ $\text{Co}(\text{Me}_4\text{tetraeneN}_4)(\text{OH})_2^+ \rightarrow$ $\text{Ni}(\text{aneN}_4)^{2+} +$ $\text{Co}(\text{Me}_4\text{tetraeneN}_4)(\text{OH})_2^+$	1.7×10^7	7.0	0.016- 0.028		p.r.	D.k. at 380 nm in Ar-satd. soln. contg. (2.5-5.0) $\times 10^{-3}$ mol L ⁻¹ $\text{Ni}(\text{aneN}_4)^{2+}$, 1 mol L ⁻¹ <i>tert</i> -BuOH, 0.001 mol L ⁻¹ phosphate buffer and (2.5-10) $\times 10^{-4}$ mol L ⁻¹ $\text{Co}(\text{Me}_4\text{tetraeneN}_4)(\text{OH})_2^+$.	761039
15.8.5 Tris(2,2'-bipyridine)cobalt(III) ion								
	$\text{Ni}(\text{aneN}_4)^+ + \text{Co}(\text{bpy})_3^{3+} \rightarrow$ $\text{Ni}(\text{aneN}_4)^{2+} + \text{Co}(\text{bpy})_3^{2+}$	1.3×10^9	7.0	0.016- 0.028		p.r.	D.k. at 380 nm in Ar-satd. soln. contg. (2.5-5.0) $\times 10^{-3}$ mol L ⁻¹ $\text{Ni}(\text{aneN}_4)^{2+}$, 1 mol L ⁻¹ <i>tert</i> -BuOH, 0.001 mol L ⁻¹ phosphate buffer and (2.5-10) $\times 10^{-4}$ mol L ⁻¹ $\text{Co}(\text{bpy})_3^{3+}$.	761039
15.8.6 Tris(2,2'-bipyridine)chromium(III) ion								
	$\text{Ni}(\text{aneN}_4)^+ + \text{Cr}(\text{bpy})_3^{3+} \rightarrow$ $\text{Ni}(\text{aneN}_4)^{2+} + \text{Cr}(\text{bpy})_3^{2+}$	7.7×10^8	7.0	0.016- 0.028		p.r.	D.k. at 380 nm in Ar-satd. soln. contg. (2.5-5.0) $\times 10^{-3}$ mol L ⁻¹ $\text{Ni}(\text{aneN}_4)^{2+}$, 1 mol L ⁻¹ <i>tert</i> -BuOH, 0.001 mol L ⁻¹ phosphate buffer and (2.5-10) $\times 10^{-4}$ mol L ⁻¹ $\text{Cr}(\text{bpy})_3^{3+}$.	761039
15.8.7 Tris(2,2'-bipyridine)iron(III) ion								
	$\text{Ni}(\text{aneN}_4)^+ + \text{Fe}(\text{bpy})_3^{3+} \rightarrow$ $\text{Ni}(\text{aneN}_4)^{2+} + \text{Fe}(\text{bpy})_3^{2+}$	6.4×10^7	7.0	0.016- 0.028		p.r.	D.k. at 380 nm in Ar-satd. soln. contg. (2.5-5.0) $\times 10^{-3}$ mol L ⁻¹ $\text{Ni}(\text{aneN}_4)^{2+}$, 1 mol L ⁻¹ <i>tert</i> -BuOH, 0.001 mol L ⁻¹ phosphate buffer and (2.5-10) $\times 10^{-4}$ mol L ⁻¹ $\text{Fe}(\text{bpy})_3^{3+}$.	761039
15.8.8 Hydrogen ion								
	$\text{Ni}(\text{aneN}_4)^+ + \text{H}^+ \rightarrow$	1.1×10^5	0.5- 1.25	0.06- 0.3		p.r.	D.k. at 380 nm in Ar-satd. soln. contg. 0.003 mol L ⁻¹ $\text{Ni}(\text{aneN}_4)^{2+}$ and 1 mol L ⁻¹ <i>tert</i> -BuOH.	761039
15.8.9 Dihydrogen phosphate ion								
	$\text{Ni}(\text{aneN}_4)^+ + \text{H}_2\text{PO}_4^- \rightarrow$	$<10^4$	5.50	0.01- 0.1		p.r.	D.k. at 380 nm in Ar-satd. soln. contg. 0.003 mol L ⁻¹ $\text{Ni}(\text{aneN}_4)^{2+}$, 1 mol L ⁻¹ <i>tert</i> -BuOH and 0.01-0.1 mol L ⁻¹ $\text{H}_2\text{PO}_4^{2-}$.	761039
15.8.10 Nitrous oxide								
	$\text{Ni}(\text{aneN}_4)^+ + \text{N}_2\text{O} \rightarrow$	3.9×10^7	7.0	0.01		p.r.	D.k. at 380 nm in soln. contg. 0.003 mol L ⁻¹ $\text{Ni}(\text{aneN}_4)^{2+}$, 1 mol L ⁻¹ <i>tert</i> - BuOH, (7.5-25) $\times 10^{-4}$ mol L ⁻¹ N_2O and 0.001 mol L ⁻¹ phosphate buffer.	761039
15.8.11 Oxygen								
	$\text{Ni}(\text{aneN}_4)^+ + \text{O}_2 \rightarrow \text{Ni}(\text{aneN}_4)^{2+} + \text{O}_2^{--}$	1.5×10^9	4.0			p.r.	D.k. at 300 nm in He-satd. soln. contg. 0.1 mol L ⁻¹ formate ion, 1×10^{-4} mol L ⁻¹ $\text{Ni}(\text{aneN}_4)^{2+}$ and varied [O ₂].	92A165

TABLE 15. Rate constants for nickel transients — Continued

Reaction	k (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
15.8 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecanenickel(I) ion — Continued							
15.8.11 Oxygen — Continued							
	1.6×10^9	7.0			p.r.	D.k. at 380 nm in soln. contg. 0.003 mol L ⁻¹ Ni(aneN ₄) ²⁺ , 1 mol L ⁻¹ <i>tert</i> -BuOH, (7-25) × 10 ⁻⁵ mol L ⁻¹ O ₂ and 0.001 mol L ⁻¹ phosphate buffer.	761039
15.8.12 Hexaammineruthenium(III) ion							
$\text{Ni}(\text{aneN}_4)^+ + \text{Ru}(\text{NH}_3)_6^{3+} \rightarrow$ $\text{Ni}(\text{aneN}_4)^{2+} + \text{Ru}(\text{NH}_3)_6^{2+}$	6.9×10^8	4	0.01		p.r.	N ₂ -satd. soln. contg. alcohol.	88A334
	3.8×10^8	7.0	0.016-0.028		p.r.	D.k. at 380 nm in Ar-satd. soln. contg. (2.5-5.0) × 10 ⁻³ mol L ⁻¹ Ni(aneN ₄) ²⁺ , 1 mol L ⁻¹ <i>tert</i> -BuOH, 0.001 mol L ⁻¹ phosphate buffer and (2.5-10) × 10 ⁻⁴ mol L ⁻¹ Ru(NH ₃) ³⁺ .	761039
15.8.13 Pentaammine(nitroso)ruthenium(III) ion							
$\text{Ni}(\text{aneN}_4)^+ + \text{Ru}(\text{NH}_3)_5\text{NO}^{3+} \rightarrow$ $\text{Ni}(\text{aneN}_4)^{2+} + \text{Ru}(\text{NH}_3)_5\text{NO}^{2+}$	7.4×10^7	7.0	0.016-0.028		p.r.	D.k. at 380 nm in Ar-satd. soln. contg. (2.5-5.0) × 10 ⁻³ mol L ⁻¹ Ni(aneN ₄) ²⁺ , 1 mol L ⁻¹ <i>tert</i> -BuOH, 0.001 mol L ⁻¹ phosphate buffer and (2.5-10) × 10 ⁻⁴ mol L ⁻¹ Ru(NH ₃) ³⁺ .	761039
15.8.14 Acetic acid							
$\text{Ni}(\text{aneN}_4)^+ + \text{CH}_3\text{CO}_2\text{H} \rightarrow$	1.2×10^4	4.85	0.015-0.06		p.r.	D.k. at 380 nm in Ar-satd. soln. contg. 0.003 mol L ⁻¹ Ni(aneN ₄) ²⁺ , 1 mol L ⁻¹ <i>tert</i> -BuOH, 0.001 mol L ⁻¹ phosphate buffer and 0.005-0.05 mol L ⁻¹ acetate buffer.	761039
15.8.15 9,10-Anthraquinone-2,6-disulfonate ion							
$\text{Ni}(\text{aneN}_4)^+ + 2,6\text{-diSO}_3\text{AQ}^{2-} \rightarrow$ $\text{Ni}(\text{aneN}_4)^{2+} + [2,6\text{-diSO}_3\text{AQ}]^{3-}$	4.8×10^9	7.0	0.004		p.r.	D.k. or p.b.k. in Ar-satd. soln. contg. 0.001 mol L ⁻¹ Ni(aneN ₄) ²⁺ , 1 mol L ⁻¹ <i>tert</i> -BuOH, 0.001 mol L ⁻¹ phosphate buffer and (2.5-5.0) × 10 ⁻⁵ mol L ⁻¹ 2,6-diSO ₃ AQ ²⁻ .	761039
15.8.16 1,4-Benzoquinone							
$\text{Ni}(\text{aneN}_4)^+ + \text{Q} \rightarrow \text{Ni}(\text{aneN}_4)^{2+} + \text{Q}^{*-}$	4.8×10^9	7.0	0.004		p.r.	D.k. or p.b.k. in Ar-satd. soln. contg. 0.001 mol L ⁻¹ Ni(aneN ₄) ²⁺ , 1 mol L ⁻¹ <i>tert</i> -BuOH, 0.001 mol L ⁻¹ phosphate buffer and (2.5-5.0) × 10 ⁻⁵ mol L ⁻¹ Q.	761039
15.8.17 3-Benzoylpyridine							
$\text{Ni}(\text{aneN}_4)^+ + 3\text{-C}_6\text{H}_5\text{COPy} \rightarrow$	2.5×10^8	7.0	0.004		p.r.	D.k. or p.b.k. in Ar-satd. soln. contg. 0.001 mol L ⁻¹ Ni(aneN ₄) ²⁺ , 1 mol L ⁻¹ <i>tert</i> -BuOH, 0.001 mol L ⁻¹ phosphate buffer and (2.5-5.0) × 10 ⁻⁵ mol L ⁻¹ 3-C ₆ H ₅ COPy.	761039
15.8.18 Fluorescein dianion							
$\text{Ni}(\text{aneN}_4)^+ + \text{Fl}^{2-} \rightarrow$	3.2×10^9	7.0	0.004		p.r.	D.k. or p.b.k. in Ar-satd. soln. contg. 0.001 mol L ⁻¹ Ni(aneN ₄) ²⁺ , 1 mol L ⁻¹ <i>tert</i> -BuOH, 0.001 mol L ⁻¹ phosphate buffer and (2.5-5.0) × 10 ⁻⁵ mol L ⁻¹ Fl ²⁻ .	761039
15.8.19 Iodomethane							
$\text{Ni}(\text{aneN}_4)^+ + \text{CH}_3\text{I} \rightarrow$	4.6×10^8	9.2	0.01		p.r.	D.k. at 380 nm in Ar-satd. soln. contg. 0.003 mol L ⁻¹ Ni(aneN ₄) ²⁺ , 1 mol L ⁻¹ <i>tert</i> -BuOH, (2.5-5.0) × 10 ⁻⁴ mol L ⁻¹ CH ₃ I and 0.001 mol L ⁻¹ tetraborate buffer.	761039

TABLE 15. Rate constants for nickel transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
15.9 1,4,5,7,8,11,12,14,14-Decamethyl-1,4,8,11-tetraazacyclotetradecanenickel(I) ion								
15.9.1	Hexaamminecobalt(III) ion							
	Ni(Me ₁₀ cyclam) ⁺ + Co(NH ₃) ₆ ³⁺ → Ni(Me ₁₀ cyclam) ²⁺ + Co(NH ₃) ₆ ²⁺	1.7 × 10 ⁴				p.r.		85A032
15.9.2	Hexaamminebis(μ-hydroxy)-μ-(trifluoroacetato)dicobalt(III) ion							
	Ni(Me ₁₀ cyclam) ⁺ + CF ₃ CO ₂ [Co(NH ₃) ₃] ₂ (OH) ₂ ³⁺ →	3.0 × 10 ⁵		22	p.r.	D.k. at 335 nm in Ar-satd. soln.		83A140
15.9.3	Hexaammine-μ-(difluoroacetato)bis(μ-hydroxy)dicobalt(III) ion							
	Ni(Me ₁₀ cyclam) ⁺ + CHF ₂ CO ₂ [Co(NH ₃) ₃] ₂ (OH) ₂ ³⁺ →	1.8 × 10 ⁵		22	p.r.	D.k. at 335 nm in Ar-satd. soln.		83A140
15.9.4	Hexaammine-μ-(fluoroacetato)bis(μ-hydroxy)dicobalt(III) ion							
	Ni(Me ₁₀ cyclam) ⁺ + CH ₂ FCO ₂ [Co(NH ₃) ₃] ₂ (OH) ₂ ³⁺ →	1.4 × 10 ⁵		22	p.r.	D.k. at 335 nm in Ar-satd. soln.		83A140
15.9.5	μ-Acetatohexaamminebis(μ-hydroxy)dicobalt(III) ion							
	Ni(Me ₁₀ cyclam) ⁺ + CH ₃ CO ₂ [Co(NH ₃) ₃] ₂ (OH) ₂ ³⁺ →	8.8 × 10 ⁴		22	p.r.	D.k. at 335 nm in Ar-satd. soln.		83A140
15.9.6	Nitrous oxide							
	Ni(Me ₁₀ cyclam) ⁺ + N ₂ O →	<0.1				p.r.		85A032
15.9.7	Oxygen							
	Ni(Me ₁₀ cyclam) ⁺ + O ₂ → Ni(Me ₁₀ cyclam) ²⁺ + O ₂ ^{·-}	4 × 10 ⁷				p.r.		85A032
15.9.8	Hexaammineruthenium(III) ion							
	Ni(Me ₁₀ cyclam) ⁺ + Ru(NH ₃) ₆ ³⁺ → Ni(Me ₁₀ cyclam) ²⁺ + Ru(NH ₃) ₆ ²⁺	3.0 × 10 ⁷				p.r.		85A032
15.10 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienenickel(I) ion								
15.10.1	5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecanesilver(II) ion							
	Ni(4,11-dieneN ₄) ⁺ + Ag(aneN ₄) ²⁺ → Ni(4,11-dieneN ₄) ²⁺ + Ag(aneN ₄) ⁺	5.7 × 10 ⁸	4	0.03		p.r.	D.k. or p.b.k. in N ₂ -satd. soln. contg. alcohol.	88A33c
15.10.2	Hexaamminecobalt(III) ion							
	Ni(4,11-dieneN ₄) ⁺ + Co(NH ₃) ₆ ³⁺ → Ni(4,11-dieneN ₄) ²⁺ + Co(NH ₃) ₆ ²⁺	1.9 × 10 ⁶	7.0	0.016- 0.028		p.r.	D.k. at 460 nm in Ar-satd. soln. contg. (2.5-5.0) × 10 ⁻³ mol L ⁻¹ Ni(4,11- dieneN ₄) ²⁺ , 1 mol L ⁻¹ <i>tert</i> -BuOH, 0.001 mol L ⁻¹ phosphate buffer and (2.5-10) × 10 ⁻⁴ mol L ⁻¹ Co(NH ₃) ₆ ³⁺ .	761039
15.10.3	Tris(ethylenediamine)cobalt(III) ion							
	Ni(4,11-dieneN ₄) ⁺ + Co(en) ₃ ³⁺ → Ni(4,11-dieneN ₄) ²⁺ + Co(en) ₃ ²⁺	1.1 × 10 ⁶	4	0.01		p.r.	D.k. or p.b.k. in N ₂ -satd. soln. contg. alcohol.	88A33
		1.1 × 10 ⁶	7.0	0.016- 0.028		p.r.	D.k. at 460 nm in Ar-satd. soln. contg. (2.5-5.0) × 10 ⁻³ mol L ⁻¹ Ni(4,11- dieneN ₄) ²⁺ , 1 mol L ⁻¹ <i>tert</i> -BuOH, 0.001 mol L ⁻¹ phosphate buffer and (2.5-10) × 10 ⁻⁴ mol L ⁻¹ Co(en) ₃ ³⁺ .	761039
15.10.4	Tris(2,2'-bipyridine)cobalt(III) ion							
	Ni(4,11-dieneN ₄) ⁺ + Co(bpy) ₃ ³⁺ → Ni(4,11-dieneN ₄) ²⁺ + Co(bpy) ₃ ²⁺	1.3 × 10 ⁹	7.0	0.016- 0.028		p.r.	D.k. at 460 nm in Ar-satd. soln. contg. (2.5-5.0) × 10 ⁻³ mol L ⁻¹ Ni(4,11- dieneN ₄) ²⁺ , 1 mol L ⁻¹ <i>tert</i> -BuOH, 0.001 mol L ⁻¹ phosphate buffer and (2.5-10) × 10 ⁻⁴ mol L ⁻¹ Co(bpy) ₃ ³⁺ .	76103

TABLE 15. Rate constants for nickel transients — Continued

Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
15.10 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienenickel(I) ion — Continued							
15.10.5 Aqua(5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene)hydroxycobalt(III) ion							
Ni(4,11-dieneN ₄) ⁺ + Co(4,11-dieneN ₄)(H ₂ O)OH ²⁺ → Ni(4,11-dieneN ₄) ²⁺ + Co(4,11-dieneN ₄)(H ₂ O)OH ⁺	2.6 × 10 ⁶	7.0	0.016- 0.028		p.r.	D.k. at 460 nm in Ar-satd. soln. contg. (2.5-5.0) × 10 ⁻³ mol L ⁻¹ Ni(4,11- dieneN ₄) ²⁺ , 1 mol L ⁻¹ <i>tert</i> -BuOH, 0.001 mol L ⁻¹ phosphate buffer and (2.5-10) × 10 ⁻⁴ mol L ⁻¹ Co(4,11- dieneN ₄)(H ₂ O)OH ²⁺ .	761039
15.10.6 2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraenecobalt(III) ion							
Ni(4,11-dieneN ₄) ⁺ + Co(Me ₄ tetraeneN ₄) ³⁺ → Ni(4,11-dieneN ₄) ²⁺ + Co(Me ₄ tetraeneN ₄)(H ₂ O) ₂ ²⁺	4.0 × 10 ⁷	4	0.01		p.r.	D.k. or p.b.k. in N ₂ -satd. soln. contg. alcohol.	88A334
15.10.7 Dihydroxy(2,3,9,10-tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraene)cobalt(III) ion							
Ni(4,11-dieneN ₄) ⁺ + Co(Me ₄ tetraeneN ₄)(OH) ₂ ⁺ → Ni(4,11-dieneN ₄) ²⁺ + Co(Me ₄ tetraeneN ₄)(OH) ₂	3.6 × 10 ⁷	7.0	0.016- 0.028		p.r.	D.k. at 460 nm in Ar-satd. soln. contg. (2.5-5.0) × 10 ⁻³ mol L ⁻¹ Ni(4,11- dieneN ₄) ²⁺ , 1 mol L ⁻¹ <i>tert</i> -BuOH, 0.001 mol L ⁻¹ phosphate buffer and (2.5-10) × 10 ⁻⁴ mol L ⁻¹ Co(Me ₄ tetraeneN ₄)(OH) ₂ ⁺ .	761039
15.10.8 Tris(2,2'-bipyridine)chromium(III) ion							
Ni(4,11-dieneN ₄) ⁺ + Cr(bpy) ₃ ³⁺ → Ni(4,11-dieneN ₄) ²⁺ + Cr(bpy) ₃ ²⁺	3.1 × 10 ⁸	4	0.01		p.r.	D.k. or p.b.k. in N ₂ -satd. soln. contg. alcohol.	88A334
	1.1 × 10 ⁸	7.0	0.016- 0.028		p.r.	D.k. at 460 nm in Ar-satd. soln. contg. (2.5-5.0) × 10 ⁻³ mol L ⁻¹ Ni(4,11- dieneN ₄) ²⁺ , 1 mol L ⁻¹ <i>tert</i> -BuOH, 0.001 mol L ⁻¹ phosphate buffer and (2.5-10) × 10 ⁻⁴ mol L ⁻¹ Cr(bpy) ₃ ³⁺ .	761039
15.10.9 α-2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaenecopper(II) ion							
Ni(4,11-dieneN ₄) ⁺ + Cu(Me ₂ pyo[14]trieneN ₄) ²⁺ → Ni(4,11-dieneN ₄) ²⁺ + Cu(Me ₂ pyo[14]trieneN ₄) ⁺	1.0 × 10 ⁸	4	0.01		p.r.	D.k. or p.b.k. in N ₂ -satd. soln. contg. alcohol.	88A334
15.10.10 Tris(2,2'-bipyridine)iron(III) ion							
Ni(4,11-dieneN ₄) ⁺ + Fe(bpy) ₃ ³⁺ → Ni(4,11-dieneN ₄) ²⁺ + Fe(bpy) ₃ ²⁺	2.2 × 10 ⁶	7.0	0.016- 0.028		p.r.	D.k. at 460 nm in Ar-satd. soln. contg. (2.5-5.0) × 10 ⁻³ mol L ⁻¹ Ni(4,11- dieneN ₄) ²⁺ , 1 mol L ⁻¹ <i>tert</i> -BuOH, 0.001 mol L ⁻¹ phosphate buffer and (2.5-10) × 10 ⁻⁴ mol L ⁻¹ Fe(bpy) ₃ ³⁺	761039
15.10.11 Hydrogen ion							
Ni(4,11-dieneN ₄) ⁺ + H ⁺ →	1.3 × 10 ⁶	<1.25	0.06- 0.3		p.r.	D.k. at 460 nm in Ar-satd. soln. contg. 0.003 mol L ⁻¹ Ni(4,11-dieneN ₄) ²⁺ and 1 mol L ⁻¹ <i>tert</i> -BuOH. Reaction may involve proton transfer to the metal center to give a hydrido complex.	761039
15.10.12 Nitrous oxide							
Ni(4,11-dieneN ₄) ⁺ + N ₂ O →	1.8 × 10 ⁷	7.0			p.r.	D.k. at 460 nm in soln. contg. 0.003 mol L ⁻¹ Ni(4,11-dieneN ₄) ²⁺ , 1 mol L ⁻¹ <i>tert</i> -BuOH, (7.5-25) × 10 ⁻⁴ mol L ⁻¹ N ₂ O and 0.001 mol L ⁻¹ phosphate buffer.	761039
15.10.13 α-2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaennickel(II) ion							
Ni(4,11-dieneN ₄) ⁺ + Ni(Me ₂ pyo[14]trieneN ₄) ²⁺ → Ni(4,11-dieneN ₄) ²⁺ + Ni(Me ₂ pyo[14]trieneN ₄) ⁺	2.1 × 10 ⁷	4	0.01		p.r.	D.k. or p.b.k. in N ₂ -satd. soln. contg. alcohol.	88A334

TABLE 15. Rate constants for nickel transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
15.10 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienenickel(I) ion — Continued								
15.10.14 Oxygen								
	$\text{Ni}(4,11\text{-dieneN}_4)^+ + \text{O}_2 \rightarrow \text{Ni}(4,11\text{-dieneN}_4)^{2+} + \text{O}_2^-$	1.7×10^9		7.0		p.r.	D.k. at 460 nm in soln. contg. 0.003 mol L ⁻¹ Ni(4,11-dieneN ₄) ²⁺ , 1 mol L ⁻¹ <i>tert</i> -BuOH, (7.25) × 10 ⁻⁵ mol L ⁻¹ O ₂ and 0.001 mol L ⁻¹ phosphate buffer.	761039
15.10.15 Dihydrogen phosphate ion								
	$\text{Ni}(4,11\text{-dieneN}_4)^+ + \text{H}_2\text{PO}_4^- \rightarrow$	2.4×10^5		5.5	0.01-0.1	p.r.	D.k. at 460 nm in Ar-satd. soln. contg. 0.003 mol L ⁻¹ Ni(4,11-dieneN ₄) ²⁺ , 1 mol L ⁻¹ <i>tert</i> -BuOH and 0.01-0.1 mol L ⁻¹ H ₂ PO ₄ ²⁻ .	761039
15.10.16 Hexaammineruthenium(III) ion								
	$\text{Ni}(4,11\text{-dieneN}_4)^+ + \text{Ru}(\text{NH}_3)_6^{3+} \rightarrow \text{Ni}(4,11\text{-dieneN}_4)^{2+} + \text{Ru}(\text{NH}_3)_6^{2+}$	4.5×10^8		4	0.01	p.r.	D.k. or p.b.k. in N ₂ -satd. soln. contg. alcohol.	88A334
		4.5×10^8		7.0	0.016-0.028	p.r.	D.k. at 460 nm in Ar-satd. soln. contg. (2.5-5.0) × 10 ⁻³ mol L ⁻¹ Ni(4,11-dieneN ₄) ²⁺ , 1 mol L ⁻¹ <i>tert</i> -BuOH, 0.001 mol L ⁻¹ phosphate buffer and (2.5-10) × 10 ⁻⁴ mol L ⁻¹ Ru(NH ₃) ³⁺ .	761039
15.10.17 Pentaammine(nitroso)ruthenium(III) ion								
	$\text{Ni}(4,11\text{-dieneN}_4)^+ + \text{Ru}(\text{NH}_3)_5\text{NO}^{3+} \rightarrow \text{Ni}(4,11\text{-dieneN}_4)^{2+} + \text{Ru}(\text{NH}_3)_5\text{NO}^{2+}$	3.5×10^7		7.0	0.016-0.028	p.r.	D.k. at 460 nm in Ar-satd. soln. contg. (2.5-5.0) × 10 ⁻³ mol L ⁻¹ Ni(4,11-dieneN ₄) ²⁺ , 1 mol L ⁻¹ <i>tert</i> -BuOH, 0.001 mol L ⁻¹ phosphate buffer and (2.5-10) × 10 ⁻⁴ mol L ⁻¹ Ru(NH ₃) ³⁺ .	761039
15.10.18 Acetic acid								
	$\text{Ni}(4,11\text{-dieneN}_4)^+ + \text{CH}_3\text{CO}_2\text{H} \rightarrow$	1.9×10^5		4.85	0.015-0.06	p.r.	D.k. at 460 nm in Ar-satd. soln. contg. 0.003 mol L ⁻¹ Ni(4,11-dieneN ₄) ²⁺ , 1 mol L ⁻¹ <i>tert</i> -BuOH and 0.005-0.05 mol L ⁻¹ acetate buffer.	761039
15.10.19 9,10-Anthraquinone-2,6-disulfonate ion								
	$\text{Ni}(4,11\text{-dieneN}_4)^+ + 2,6\text{-diSO}_3\text{AQ}^{2-} \rightarrow \text{Ni}(4,11\text{-dieneN}_4)^{2+} + [\text{2,6-diSO}_3\text{AQ}]^{3-}$	5.0×10^9		7.0	0.004	p.r.	D.k. at 460 nm in Ar-satd. soln. contg. 0.001 mol L ⁻¹ Ni(4,11-dieneN ₄) ²⁺ , 1 mol L ⁻¹ <i>tert</i> -BuOH, 0.001 mol L ⁻¹ phosphate buffer and (2.5-5) × 10 ⁻⁵ mol L ⁻¹ 2,6-diSO ₃ AQ ²⁻ .	761039
15.10.20 1,4-Benzoquinone								
	$\text{Ni}(4,11\text{-dieneN}_4)^+ + \text{Q} \rightarrow \text{Ni}(4,11\text{-dieneN}_4)^{2+} + \text{Q}'^-$	3.8×10^9		7.0	0.004	p.r.	D.k. at 460 nm in Ar-satd. soln. contg. 0.001 mol L ⁻¹ Ni(4,11-dieneN ₄) ²⁺ , 1 mol L ⁻¹ <i>tert</i> -BuOH, 0.001 mol L ⁻¹ phosphate buffer and (2.5-5) × 10 ⁻⁵ mol L ⁻¹ Q.	761039
15.10.21 3-Benzoylpyridine								
	$\text{Ni}(4,11\text{-dieneN}_4)^+ + 3\text{-C}_6\text{H}_5\text{COPy} \rightarrow$	7.5×10^8		7.0	0.004	p.r.	D.k. at 460 nm in Ar-satd. soln. contg. 0.001 mol L ⁻¹ Ni(4,11-dieneN ₄) ²⁺ , 1 mol L ⁻¹ <i>tert</i> -BuOH, 0.001 mol L ⁻¹ phosphate buffer and (2.5-5) × 10 ⁻⁵ mol L ⁻¹ 3-C ₆ H ₅ COPy.	761039
15.10.22 Eosin dianion								
	$\text{Ni}(4,11\text{-dieneN}_4)^+ + \text{Eos} \rightarrow$	2.7×10^9		7.0	0.004	p.r.	D.k. at 460 nm in Ar-satd. soln. contg. 0.001 mol L ⁻¹ Ni(4,11-dieneN ₄) ²⁺ , 1 mol L ⁻¹ <i>tert</i> -BuOH, 0.001 mol L ⁻¹ phosphate buffer and (2.5-5) × 10 ⁻⁵ mol L ⁻¹ Eos.	761039

TABLE 15. Rate constants for nickel transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
15.10 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienenickel(I) ion — Continued								
15.10.23 Fluorescein dianion								
	$\text{Ni}(4,11\text{-dieneneN}_4)^+ + \text{Fl}^{2-} \rightarrow$	3.3×10^9	7.0	0.004		p.r.	D.k. at 460 nm in Ar-satd. soln. contg. 0.001 mol L ⁻¹ $\text{Ni}(4,11\text{-dieneneN}_4)^{2+}$, 1 mol L ⁻¹ <i>tert</i> -BuOH, 0.001 mol L ⁻¹ phosphate buffer and $(2.5\text{-}5) \times 10^{-5}$ mol L ⁻¹ Fl^{2-} .	761039
15.10.24 Iodomethane								
	$\text{Ni}(4,11\text{-dieneneN}_4)^+ + \text{CH}_3\text{I} \rightarrow$	1.3×10^8	9.2	0.01		p.r.	D.k. at 460 nm in Ar-satd. soln. contg. 0.003 mol L ⁻¹ $\text{Ni}(4,11\text{-dieneneN}_4)^{2+}$, 1 mol L ⁻¹ <i>tert</i> -BuOH, $(2.5\text{-}5) \times 10^{-5}$ mol L ⁻¹ CH_3I and 0.001 mol L ⁻¹ tetraborate buffer.	761039
15.11 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-1,4,8,11-tetraennickel(I) ion								
15.11.1 Tris(2,2'-bipyridine)chromium(III) ion								
	$\text{Ni}(\text{tetraeneN}_4)^+ + \text{Cr}(\text{bpy})_3^{3+} \rightarrow$ $\text{Ni}(\text{tetraeneN}_4)^{2+} + \text{Cr}(\text{bpy})_3^{2+}$	8.0×10^8	4	0.01		p.r.	D.k. or p.b.k. in N ₂ -satd. soln. contg. alcohol.	88A334
15.11.2 Hexaammineruthenium(III) ion								
	$\text{Ni}(\text{tetraeneN}_4)^+ + \text{Ru}(\text{NH}_3)_6^{3+} \rightarrow$ $\text{Ni}(\text{tetraeneN}_4)^{2+} + \text{Ru}(\text{NH}_3)_6^{2+}$	3.0×10^8	4	0.01		p.r.	D.k. or p.b.k. in N ₂ -satd. soln. contg. alcohol.	88A334
15.12 α-2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),13,15-trienenickel(I) ion								
15.12.1 α-2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),13,15-trienenickel(I) ion								
	$\text{Ni}(\text{Me}_2\text{pyo}[14]\text{aneN}_4)^+ +$ $\text{Ni}(\text{Me}_2\text{pyo}[14]\text{aneN}_4)^+ \rightarrow$	2.5×10^8				p.r.	D.k. at 290 and 320 nm in N ₂ -satd. soln. contg. 10^{-4} mol L ⁻¹ $\text{Ni}(\text{Me}_2\text{pyo}[14]\text{aneN}_4)^{2+}$ and 0.01 mol L ⁻¹ Br ⁻ . Reaction in competition with Ni(I) + Ni(III), $k \sim 10^8\text{-}10^9$ L mol ⁻¹ s ⁻¹ .	81A144
15.13 α-2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaennickel(I) ion								
15.13.1 Tris(2,2'-bipyridine)chromium(III) ion								
	$\text{Ni}(\text{Me}_2\text{pyo}[14]\text{trieneN}_4)^+ + \text{Cr}(\text{bpy})_3^{3+} \rightarrow$ $\text{Ni}(\text{Me}_2\text{pyo}[14]\text{trieneN}_4)^{2+} + \text{Cr}(\text{bpy})_3^{2+}$	5.1×10^8	4	0.01		p.r.	D.k. or p.b.k. in N ₂ -satd. soln. contg. alcohol.	88A334
15.13.2 Hexaammineruthenium(III) ion								
	$\text{Ni}(\text{Me}_2\text{pyo}[14]\text{trieneN}_4)^+ +$ $\text{Ru}(\text{NH}_3)_6^{3+} \rightarrow$ $\text{Ni}(\text{Me}_2\text{pyo}[14]\text{trieneN}_4)^{2+} + \text{Ru}(\text{NH}_3)_6^{2+}$	2.3×10^8	4	0.01		p.r.	D.k. or p.b.k. in N ₂ -satd. soln. contg. alcohol.	88A334
15.14 8-Methyl-8-nitro-1,3,6,10,13,15-hexaazatricyclo[13.1.1.1^{13,15}]octadecanenickel(II) ion, electron adduct								
15.14.1 First-order reaction								
	$\text{Ni}(\text{MeNO}_2[18]\text{aneN}_6)^+ \rightarrow$	1.8×10^3 s ⁻¹		22	p.r.	D.k. at 290 nm in soln. contg. 0.001 mol L ⁻¹ $\text{Ni}(\text{MeNO}_2[18]\text{aneN}_6)^{2+}$ and 0.1 mol L ⁻¹ <i>tert</i> -BuOH.	88A391	
15.15 8-Amino-8-methyl-1,3,6,10,13,15-hexaazatricyclo[13.1.1.1^{13,15}]octadecanenickel(I) ion								
15.15.1 First-order reaction								
	$\text{Ni}(\text{MeNH}_2[18]\text{aneN}_6)^+ \rightarrow$	3.5×10^3 s ⁻¹		22	p.r.	D.k. at 360 nm in soln. contg. 0.001 mol L ⁻¹ $\text{Ni}(\text{MeNH}_2[18]\text{aneN}_6)^{2+}$ and 0.1 mol L ⁻¹ <i>tert</i> -BuOH.	88A391	

TABLE 15. Rate constants for nickel transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
15.16 3,7-Bis(2-aminoethyl)-1,3,5,7-tetraazabicyclo[3.3.1]nonanenickel(I) ion								
15.16.1 First-order reaction								
	NiL ⁺ →	2.2 × 10 ⁴ s ⁻¹			22	p.r.	D.k. at 360 nm in soln. contg. 0.001 mol L ⁻¹ NiL ²⁺ and 0.1 mol L ⁻¹ <i>tert</i> -BuOH.	88A391
15.17 Nitrilotriacetatonickelate(I) ion								
15.17.1 Nitrilotriacetatonickelate(I) ion								
	NiNTA ²⁻ + NiNTA ²⁻ → (NiNTA) ₂ ⁴⁻	7.5 × 10 ⁸		5-9		p.r.	D.k. in soln. contg. NiNTA ⁻ and 0.1 mol L ⁻¹ <i>tert</i> -BuOH.	80A194
15.18 N-Methyl-5,10,15,20-tetrakis(4-sulfonatophenyl)porphinonickelate(II), radical anion								
15.18.1 First-order reaction								
	[Ni(N-Me)TPPS] ⁴⁻ → CH ₃ NiTPPS ⁴⁻	2.0 × 10 ² s ⁻¹				p.r.	D.k. in Ar-satd. soln. contg. (1-10) × 10 ⁻⁵ mol L ⁻¹ Ni(N-Me)TPPS ³⁻ and 1% 2-PrOH.	92GJ83
15.19 Hydroxymethylnickel(II) ion								
15.19.1 Water								
	NiCH ₂ OH ⁺ + H ₂ O → Ni ²⁺ + MeOH + OH ⁻	7 s ⁻¹				p.r.	D.k. at 250 nm and condy. change in Ar-satd. soln. contg. 10 ⁻⁴ mol L ⁻¹ NiSO ₄ and 0.1 mol L ⁻¹ MeOH.	741037
15.19.2 Hydrogen peroxide								
	NiCH ₂ OH ⁺ + H ₂ O ₂ →	7.3 × 10 ³				p.r.	Condy. change in Ar-satd. soln. contg. NiSO ₄ and MeOH.	741037
15.20 Carboxylatonickel(II)								
15.20.1 Water								
	NiCO ₂ + H ₂ O →	< 1 s ⁻¹				p.r.	D.k. at 250 nm and condy. change in Ar-satd. soln. contg. NiSO ₄ and formate ion: NiCO ₂ is probably protonated.	741037
15.21 1-Hydroxyethylnickel(II) ion								
15.21.1 Water								
	NiCHOHCH ₃ ⁺ + H ₂ O → Ni ²⁺ + EtOH + OH ⁻	5 s ⁻¹				p.r.	D.k. at 250 nm and condy. change in Ar-satd. soln. contg. NiSO ₄ and EtOH.	741037
15.21.2 Hydrogen peroxide								
	NiCHOHCH ₃ ⁺ + H ₂ O ₂ →	2.3 × 10 ⁴				p.r.	Condy. change in Ar-satd. soln. contg. NiSO ₄ and EtOH.	741037
15.22 1-Hydroxy-1-methylethylnickel(II) ion								
15.22.1 Water								
	NiCOH(CH ₃) ₂ ⁺ + H ₂ O →	< 1 s ⁻¹				p.r.	D.k. at 250 nm and condy. change in Ar-satd. soln. contg. NiSO ₄ and 2-PrOH.	741037
15.22.2 Hydrogen peroxide								
	NiCOH(CH ₃) ₂ ⁺ + H ₂ O ₂ →	1.1 × 10 ⁶				p.r.	Condy. change in Ar-satd. soln. contg. 5 × 10 ⁻⁴ mol L ⁻¹ NiSO ₄ and 0.005 mol L ⁻¹ 2-PrOH.	741037
15.23 1-Ethoxyethylnickel(II) ion								
15.23.1 Water								
	NiCH(CH ₃)OC ₂ H ₅ ⁺ + H ₂ O →	< 1 s ⁻¹				p.r.	D.k. at 250 nm and condy. change in Ar-satd. soln. contg. NiSO ₄ and diethyl ether.	741037

TABLE 15. Rate constants for nickel transients — Continued

Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t(\text{°C})$	Method	Comment	Ref.
15.23 1-Ethoxyethylnickel(II) ion — Continued							
15.23.2 Hydrogen peroxide							
$\text{Ni}(\text{CH}(\text{CH}_3)\text{OC}_2\text{H}_5)^+ + \text{H}_2\text{O}_2 \rightarrow$	1.3×10^3				p.r.	Cond. change in Ar-satd. soln. contg. NiSO_4 and diethyl ether.	741037
15.24 Cyclopentynickel(II) ion							
15.24.1 Water							
$c\text{-C}_5\text{H}_9\text{Ni}^+ + \text{H}_2\text{O} \rightarrow \text{Ni}^{2+} + c\text{-C}_5\text{H}_{10} + \text{OH}^-$	49 s^{-1}				p.r.	D.k. at 250 nm and condy. change in Ar-satd. soln. contg. NiSO_4 and cyclopentane.	741037
15.24.2 Hydrogen peroxide							
$c\text{-C}_5\text{H}_9\text{Ni}^+ + \text{H}_2\text{O}_2 \rightarrow$	$<5 \times 10^5$				p.r.	Cond. change in Ar-satd. soln. contg. NiSO_4 and cyclopentane.	741037
15.25 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecanenickel(II) ion, OH reaction product							
15.25.1 Hydrogen peroxide							
$\text{Ni}(\text{ancN}_4\text{-H})^{2+} + \text{H}_2\text{O}_2 \rightarrow$	2×10^4	5		22	p.r./f.p.	D.k.	79A038
15.26 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienenickel(II) ion, OH reaction product							
15.26.1 First-order reaction							
$\text{Ni}(4,11\text{-dieneN}_4\text{-H})^{2+} \rightarrow$	$1 \times 10^6 \text{ s}^{-1}$			22	p.r./f.p.	Value obtained by computer simulation; $k_r = 1 \times 10^3 \text{ s}^{-1}$.	79A038
15.26.2 Hydrogen ion							
$\text{Ni}(4,11\text{-dieneN}_4\text{-H})^{2+} + \text{H}^+ \rightarrow \text{Ni}(4,11\text{-dieneN}_4\text{-})^{3+}$	6×10^7			22	p.r./f.p.	Value obtained by computer simulation; $k_r = 1 \times 10^3 \text{ s}^{-1}$.	79A038
15.26.3 Hydrogen peroxide							
$\text{Ni}(4,11\text{-dieneN}_4\text{-H})^{2+} + \text{H}_2\text{O}_2 \rightarrow$	5×10^2	5		22	p.r./f.p.		79A038
15.27 Iminodiacetatonickelate(II), H-abstraction product							
15.27.1 First-order reaction							
$\text{Ni}(\text{IDA-H}) \rightarrow$	$2.6 \times 10^5 \text{ s}^{-1}$	7			p.r.	D.k. in N_2O -satd. soln. contg. 0.01 mol L^{-1} $\text{Ni}(\text{IDA})$.	81A023
15.27.2 Oxygen							
$\text{Ni}(\text{IDA-H}) + \text{O}_2 \rightarrow$	3×10^4	7			p.r.	D.k. in soln. satd. with various mixtures of N_2O and O_2 contg. $\text{Ni}(\text{IDA})$.	81A023
15.28 Bis(iminodiacetato)nickelate(II), H-abstraction product							
15.28.1 Oxygen							
$\text{Ni}(\text{IDA})(\text{IDA-H})^{2-} + \text{O}_2 \rightarrow$	5×10^3	7			p.r.	D.k. in soln. satd. with various mixtures of N_2O and O_2 contg. $\text{Ni}(\text{IDA})^{2-}$.	81A023
15.28.2 Ferricyanide ion							
$\text{Ni}(\text{IDA})(\text{IDA-H})^{2-} + \text{Fe}(\text{CN})_6^{3-} \rightarrow$	7×10^4	7			p.r.	D.k. at 420 nm in N_2O -satd. soln. contg. $\text{Ni}(\text{IDA})^{2-}$ and $\text{Fe}(\text{CN})_6^{3-}$.	81A023
15.29 Nitrilotriacetatonickelate(II), H-abstraction product							
15.29.1 Bromide ion							
$\text{Ni}(\text{NTA-H})^- + \text{Br}^- \rightarrow$	2×10^3				p.r.	D.k. in N_2O -satd. soln. contg. $4 \times 10^{-4} \text{ mol L}^{-1}$ NiNTA and Br^- .	78A436
15.29.2 Copper(II) ion							
$\text{Ni}(\text{NTA-H})^- + \text{Cu}^{2+} \rightarrow$	7.8×10^7				p.r.	D.k. at 290 nm in N_2O -satd. soln. contg. NiNTA^- and Cu^{2+} .	80A194

TABLE 15. Rate constants for nickel transients — Continued

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t(\text{°C})$	Method	Comment	Ref.
15.29 Nitrilotriacetatonickelate(II), H-abstraction product — Continued								
15.29.3 Iodide ion								
	$\text{Ni}(\text{NTA-H})^- + \text{I}^- \rightarrow$	4×10^2				p.r.	D.k. in N_2O -satd. soln. contg. 4×10^{-4} mol L^{-1} NiNTA, I^- and HClO_4 .	78A436
15.29.4 Hexachloroiridate(IV) ion								
	$\text{Ni}(\text{NTA-H})^- + \text{IrCl}_6^{2-} \rightarrow$	3.6×10^7		7		p.r.	D.k. at 490 nm (IrCl_6^{2-}) and d.k. at 290 nm (radical) in N_2O -satd. soln. contg. NiNTA ⁻ and IrCl_6^{2-} .	80A194
15.29.5 Nickel(II) ion								
	$\text{Ni}(\text{NTA-H})^- + \text{Ni}^{2+} \rightarrow$	3.6×10^3				p.r.	D.k. at 290 nm in N_2O -satd. soln. contg. NiNTA ⁻ and Ni^{2+} .	80A194
15.29.6 Oxygen								
	$\text{Ni}(\text{NTA-H})^- + \text{O}_2 \rightarrow$	3.9×10^3				p.r.	D.k. at 290 nm in soln. contg. NiNTA ⁻ and $\text{N}_2\text{O-O}_2$ (1:1).	80A194
		4.0×10^3				p.r.	D.k. in N_2O -satd. soln. contg. 4×10^{-4} mol L^{-1} NiNTA and O_2 .	78A436
15.30 Ethylenediaminetetraacetatonickelate(II), H-abstraction product								
15.30.1 Ethylenediaminetetraacetatonickelate(II) ion								
	$\text{Ni}(\text{EDTA-H})^{2-} + \text{NiEDTA}^{2-} \rightarrow$	9.3×10^4				f.p./pi	D.k.; reaction suggested to produce Ni(I)EDTA ³⁻ .	91A292
15.31 Amminenickel(III) ions								
15.31.1 Hydrazine								
	$\text{Ni}(\text{III})(\text{NH}_3)_n + \text{H}_2\text{NNH}_2 \rightarrow$	4×10^6		11.3		p.r.	D.k. at 300 nm in N_2O -satd. soln. contg. $(1-2) \times 10^{-3}$ mol L^{-1} NiSO_4 , $(1-5) \times 10^{-4}$ mol L^{-1} hydrazine and 0.67 mol L^{-1} NH_3 .	720460
15.31.2 Amminenickel(III) ions								
	$\text{Ni}(\text{III})(\text{NH}_3)_n + \text{Ni}(\text{III})(\text{NH}_3)_n \rightarrow$	$<1.8 \times 10^7$		11.3		p.r.	D.k. at 300 nm in N_2O -satd. soln. contg. 0.67 mol L^{-1} NH_3 and $(5-200) \times 10^{-5}$ mol L^{-1} NiSO_4 .	720460
15.32 Ethylenediaminenickel(III) ions								
15.32.1 Ethylenediaminenickel(III) ions								
	$\text{Ni}(\text{en})_n^{3+} + \text{Ni}(\text{en})_n^{3+} \rightarrow$	3.9×10^4 to 1.3×10^7		8.5-10		p.r.	D.k. at 300 nm in N_2O -satd. soln. contg. $(2-100) \times 10^{-5}$ mol L^{-1} NiSO_4 and $(6-400) \times 10^{-5}$ mol L^{-1} ethylenediamine; k is a function of pH, $[\text{NiSO}_4]$ and [ethylenediamine].	720461
15.33 Glycinatonickel(III) ion								
15.33.1 Glycinatonickel(III) ion								
	$\text{Ni}(\text{Gly})_n^{(3-n)+} + \text{Ni}(\text{Gly})_n^{(3-n)+} \rightarrow$	-8×10^8		8.9, 10		p.r.	D.k. at 350 nm in N_2O -satd. soln. contg. $(1-20) \times 10^{-4}$ mol L^{-1} NiSO_4 and $(3-60) \times 10^{-4}$ mol L^{-1} glycine; k is a function of pH, $[\text{NiSO}_4]$ and [glycine].	720461
15.34 Bis(1,4,7-triazacyclononane)nickel(III) ion								
15.34.1 Tryptophan								
	$\text{Ni}(\text{tacn})_2^{3+} + \text{TrpH} \rightarrow \text{Ni}(\text{tacn})_2^{2+} + \text{Trp}^+ + \text{H}^+$	5×10^4		7		p.r.	D.k. at 520 nm in N_2O -satd. soln. contg. 0.1 mol L^{-1} KBr, 0.011 mol L^{-1} tryptophan, $(0-10) \times 10^{-3}$ mol L^{-1} $\text{Ni}(\text{tacn})_2(\text{ClO}_4)_2$, and 0.01 mol L^{-1} phosphate buffer; $k_r = 4.8 \times 10^5 \text{ L mol}^{-1} \text{ s}^{-1}$.	91A015

TABLE 15. Rate constants for nickel transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.	
15.35 1,4,7,10-Tetraazacyclotridecanenickel(III) ion									
15.35.1 First-order reaction									
Ni([13]aneN ₄) ³⁺ →									
		2.5 × 10 ² s ⁻¹		3.3		p.r.	D.k. at ~550 nm and p.b.k. at ~300 nm in N ₂ O-satd. soln. contg. (1-10) × 10 ⁻⁴ mol L ⁻¹ Ni([13]aneN ₄) ²⁺ and perchlorate ion; process suggested to represent configurational isomerization; followed by first-order reaction, <i>k</i> = 0.017 s ⁻¹ . In the presence of 0.1 mol L ⁻¹ Na ₂ SO ₄ , <i>k</i> = 1 × 10 ⁴ s ⁻¹ ; product suggested to be stabilized by axial sulfate ligands.	86A470	
15.36 9-Methyl-9-nitro-1,4,7,11-tetraazacyclotridecanenickel(III) ion									
15.36.1 First-order reaction									
Ni(MeNO ₂ [13]aneN ₄) ³⁺ →									
		3.6 × 10 ³ s ⁻¹			22	p.r.	D.k. at 520 nm in N ₂ O-satd. soln.	88A391	
15.37 11,13-Dimethyl-1,4,7,10-tetraazacyclotrideca-10,13-dienenickel(III) ion									
15.37.1 First-order reaction									
Ni(10,13-dieneN ₄) ³⁺ →									
		(1.0 to 7.0) × 10 ² s ⁻¹	3.6		22	p.r.	D.k. in N ₂ O-satd. soln. contg. Ni(10,13-dieneN ₄) ²⁺ and 0.1 mol L ⁻¹ NaBr; pK _a = 8.8.	82A060	
15.38 11,13-Dimethyl-1,4,7,10-tetraazacyclotrideca-10,13-dienenickel(III) ion, conjugate base									
15.38.1 11,13-Dimethyl-1,4,7,10-tetraazacyclotrideca-10,13-dienenickel(III) ion, conjugate base									
Ni(10,13-dieneN ₄ -H) ²⁺ +									
Ni(10,13-dieneN ₄ -H) ²⁺ →									
		3.5 × 10 ⁸		10.6		22	p.r.	D.k. in N ₂ O-satd. soln. contg. Ni(10,13-dieneN ₄ -H) ²⁺ and 0.1 mol L ⁻¹ NaBr; <i>k</i> = 3.9 × 10 ⁸ L mol ⁻¹ s ⁻¹ at pH 8.2. Product suggested to be dimer.	82A060
15.39 Aquabromo-11-methyl-13-(trifluoromethyl)-1,4,7,10-tetraazacyclotrideca-10,13-dienenickel(III) ion									
15.39.1 First-order reaction									
Ni(trifluoro-10,13-dieneN ₄)(H ₂ O)Br ²⁺ →									
		1 × 10 ³ s ⁻¹ 7.6 × 10 ⁴ s ⁻¹	4.8 8.4			p.r.	D.k. in soln. contg. 0.001 mol L ⁻¹ acetate or phosphate buffer. Reaction suggested to represent deprotonation of ligand and loss of Br ⁻ .	84A277	
15.40 Diaqua-11-methyl-13-(trifluoromethyl)-1,4,7,10-tetraazacyclotrideca-10,13-dienenickel(III) ion, conjugate base									
15.40.1 Diaqua-11-methyl-13-(trifluoromethyl)-1,4,7,10-tetraazacyclotrideca-10,13-dienenickel(III) ion, conjugate base									
Ni(trifluoro-10,13-dieneN ₄ -H)(H ₂ O) ₂ ²⁺ +									
Ni(trifluoro-10,13-dieneN ₄ -H)(H ₂ O) ₂ ²⁺ →									
		7.5 × 10 ⁷				p.r.	D.k. in N ₂ O-satd. soln. contg. Br ⁻ and Ni(L-H)(H ₂ O) ²⁺ ; pK _a = 5.1 for NiL(H ₂ O) ₂ ³⁺ .	84A277	
15.41 Aquamethyl(1,4,8,11-tetraazacyclotetradecane)nickel(III) ion									
15.41.1 First-order reaction									
CH ₃ Ni(cyclam)(H ₂ O) ²⁺ →									
Ni(cyclam) ²⁺ + *CH ₃ + H ₂ O									
		57 s ⁻¹		3.0		p.r.	Derived from p.b.k. at 300 nm for formation of CH ₃ ONi(cyclam)(H ₂ O) ²⁺ in N ₂ O-satd. soln. contg. Ni(cyclam) ²⁺ , O ₂ and 0.1 mol L ⁻¹ DMSO; <i>k</i> _f = 6.5 × 10 ⁸ L mol ⁻¹ s ⁻¹ ; ΔV‡ = 24.4 × 10 ⁻³ L mol ⁻¹ [90A321].	88A444	
15.41.2 Hexaaquachromium(II) ion									
CH ₃ Ni(cyclam)(H ₂ O) ²⁺ + Cr(H ₂ O) ₆ ²⁺ →									
Ni(cyclam) ²⁺ + (H ₂ O) ₅ CrCH ₃ ²⁺ + 2 H ₂ O									
		1.1 × 10 ⁵		3.0		p.r.	D.k. at 300 nm soln. contg. 0.001 mol L ⁻¹ Ni(cyclam) ²⁺ , 1 × 10 ⁻⁴ mol L ⁻¹ Cr ²⁺ and 0.1 mol L ⁻¹ DMSO.	88A444	

TABLE 15. Rate constants for nickel transients — Continued

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t(\text{°C})$	Method	Comment	Ref.
15.42 1,4,8,11-Tetraazacyclotetradecanenickel(III) ion								
15.42.1 First-order reaction								
	$\text{Ni}(\text{cyclam})^{3+} \rightarrow$	$7.5 \times 10^1 \text{ s}^{-1}$ $1.3 \times 10^4 \text{ s}^{-1}$		3.1 6		p.r.	D.k. in N_2O -satd. soln. contg. 0.3 mol $\text{L}^{-1} \text{ClO}_4^-$ or 0.1 mol $\text{L}^{-1} \text{SO}_4^{2-}$ and $\text{Ni}(\text{cyclam})^{2+}$; followed by further d.k., $k = 0.36$ and 3.5 s^{-1} at pH 3 and 6, respectively. Transient stabilized by the presence of sulfate ions, $K \sim 10^5 \text{ L}^2 \text{ mol}^{-2}$ [81A285].	80A350
15.42.2 Hydroxide ion								
	$\text{Ni}(\text{cyclam})^{3+} + \text{OH}^- \rightarrow \text{Ni}(\text{cyclam-H})^{2+} + \text{H}_2\text{O}$	1.5×10^5		9-11 0.3		p.r.	D.k. in N_2O -satd. soln. contg. $\text{Ni}(\text{aneN}_4)(\text{ClO}_4)_2$.	81A285
15.43 β-rac-(5,7,7,12,12,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecane)nickel(III) ion								
15.43.1 First-order reaction								
	$\beta\text{-Ni}(\text{aneN}_4)^{3+} \rightarrow$	$2.6 \times 10^3 \text{ s}^{-1}$		3.2		p.r.	D.k. in N_2O -satd. soln. contg. $1 \times 10^{-4} \text{ mol L}^{-1} \beta\text{-Ni}(\text{aneN}_4)(\text{ClO}_4)_2$ and 0.3 mol $\text{L}^{-1} \text{NaClO}_4$; reaction attributed to isomerization; a subsequent first-order process has $k \sim 0.04 \text{ s}^{-1}$ at pH 3.0-6.0 and is attributed to oxidation of the ligand by the tervalent nickel.	81A285
15.43.2 Hydroxide ion								
	$\beta\text{-Ni}(\text{aneN}_4)^{3+} + \text{OH}^- \rightarrow \beta\text{-Ni}(\text{aneN}_4\text{-H})^{2+} + \text{H}_2\text{O}$	2.7×10^4		9-11 0.3		p.r.	D.k. in N_2O -satd. soln. contg. $\beta\text{-Ni}(\text{aneN}_4)(\text{ClO}_4)_2$.	81A285
15.44 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecanenickel(III) ion								
15.44.1 Perhydroxyl								
	$\text{Ni}(\text{aneN}_4)^{3+} + \text{HO}_2^\cdot \rightarrow \text{O}_2 + \text{Ni}(\text{aneN}_4)^{2+} + \text{H}^+$	1.0×10^5		2.0	22	p.r./f.p.	D.k.	79A038
15.44.2 Superoxide radical anion								
	$\text{Ni}(\text{aneN}_4)^{3+} + \text{O}_2^{\cdot-} \rightarrow \text{O}_2 + \text{Ni}(\text{aneN}_4)^{2+}$	2.1×10^9		6.2	22	p.r./f.p.	D.k.	79A038
15.44.3 Iron(II) ion								
	$\text{Ni}(\text{aneN}_4)^{3+} + \text{Fe}^{2+} \rightarrow \text{Ni}(\text{aneN}_4)^{2+} + \text{Fe}^{3+}$	4.2×10^4		1	22	p.r./f.p.	D.k.	79A038
15.44.4 Hydroxide ion								
	$\text{Ni}(\text{aneN}_4)^{3+} + \text{OH}^- \rightarrow \text{Ni}(\text{aneN}_4\text{-H})^{2+} + \text{H}_2\text{O}$	2.2×10^4		9-11 0.3		p.r.	D.k. in N_2O -satd. soln. contg. $\text{Ni}(\text{aneN}_4)(\text{ClO}_4)_2$.	81A285
15.44.5 Sulfate ion								
	$\text{Ni}(\text{aneN}_4)^{3+} + \text{SO}_4^{2-} \rightarrow \text{Ni}(\text{aneN}_4)\text{SO}_4^+$	1.0×10^6		3.2 5.2	0.03 22	p.r.	P.b.k. at 320 nm in N_2O -satd. soln. contg. 3×10^{-5} to 0.01 mol $\text{L}^{-1} \text{SO}_4^{2-}$ and $\text{Ni}(\text{aneN}_4)^{2+}$.	79A249
15.45 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecanedi(phosphato)nickel(III) ion								
15.45.1 Ascorbate ion								
	$\text{Ni}(\text{aneN}_4)(\text{HPO}_4)_2^- + \text{AH}^- \rightarrow$	2×10^5		7.0		p.r.	D.k. in air-satd. soln. contg. $\text{Ni}(\text{aneN}_4)^{2+}$, 0.005 mol L^{-1} formate ion and 0.02 mol $\text{L}^{-1} \text{HPO}_4^{2-}$.	90A422
15.46 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienenickel(III) ion								
15.46.1 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienenickel(I) ion								
	$\text{Ni}(4,11\text{-dienN}_4)^{3+} + \text{Ni}(4,11\text{-dienN}_4)^{+} \rightarrow$	8×10^7		5	$\rightarrow 0$	p.r.	D.k. at 450 nm and 535 nm in soln. contg. 2×10^{-4} mol $\text{L}^{-1} \text{Ni}(4,11\text{-dienN}_4)^{2+}$.	78A299

TABLE 15. Rate constants for nickel transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
15.46 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienenickel(III) ion — Continued								
15.46.2	Perhydroxyl							
Ni(4,11-dieneN ₄) ³⁺ + HO ₂ ^{·-} → Ni(4,11-dieneN ₄) ²⁺ + O ₂ + H ⁺	1.6 × 10 ⁵		2.0		22	p.r./f.p.	D.k.	79A038
15.46.3	Superoxide radical anion							
Ni(4,11-dieneN ₄) ³⁺ + O ₂ ^{·-} → Ni(4,11-dieneN ₄) ²⁺ + O ₂	1.6 × 10 ⁹		6.2		22	p.r./f.p.	D.k.	79A038
15.46.4	Iron(II) ion							
Ni(4,11-dieneN ₄) ³⁺ + Fe ²⁺ → Ni(4,11-dieneN ₄) ²⁺ + Fe ³⁺	2.1 × 10 ⁴		1		22	p.r./f.p.	D.k.	79A038
		2 × 10 ⁵				p.r.		78A299
15.46.5	Hydrogen peroxide							
Ni(4,11-dieneN ₄) ³⁺ + H ₂ O ₂ →	2.3 × 10 ³		1		22	p.r./f.p.		79A038
15.46.6	Iodide ion							
Ni(4,11-dieneN ₄) ³⁺ + I ⁻ →	3 × 10 ⁴					p.r.		78A299
15.46.7	Hydroxide ion							
Ni(4,11-dieneN ₄) ³⁺ + OH ⁻ → Ni(4,11-dieneN ₄ -H) ²⁺ + H ₂ O	1.2 × 10 ³		9-11	0.3		p.r.	D.k. in N ₂ O-satd. soln. contg. Ni(4,11-dieneN ₄)(ClO ₄) ₂ .	81A285
15.47 5,7,7,12,14,14-Hexamethyl-1,4,7,11-tetraazacyclotetradeca-4,11-diene(hydroxo)nickel(III) ion								
15.47.1	First-order reaction							
Ni(4,11-dieneN ₄)OH ⁺ →	~0.02 s ⁻¹		3.5			p.r.	D.k. in N ₂ O-satd. soln. contg. (1-10) × 10 ⁻⁵ mol L ⁻¹ Ni(4,11-dieneN ₄) ²⁺ ; uncertain whether first- or second-order.	79A002
		~0.01 s ⁻¹	4.9					
15.48 Bromo(5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene)nickel(III) ion								
15.48.1	Water							
Ni(4,11-dieneN ₄)Br ²⁺ + H ₂ O → Ni(4,11-dieneN ₄)(H ₂ O) ³⁺ + Br ⁻	120 s ⁻¹		3.0			p.r.	D.k. in N ₂ O-satd. soln. contg. (1-10) × 10 ⁻⁵ mol L ⁻¹ Ni(4,11-dieneN ₄) ²⁺ and 0.01-0.1 mol L ⁻¹ Br ⁻ ; k _r = 1300 L mol ⁻¹ s ⁻¹ ; at pH 8.2, k = 2.5 × 10 ⁵ s ⁻¹ ; pK _a of Ni(4,11-dieneN ₄)(H ₂ O) ³⁺ = 3.45.	79A002
15.48.2	Bromide ion							
Ni(4,11-dieneN ₄)Br ²⁺ + Br ⁻ → Ni(4,11-dieneN ₄) ²⁺ + Br ₂	~40		3.0			p.r.	D.k. in N ₂ O-satd. soln. contg. (1-10) × 10 ⁻⁵ mol L ⁻¹ Ni(4,11-dieneN ₄) ²⁺ and 0.01-0.1 mol L ⁻¹ Br ⁻ ; k _r = 9 × 10 ⁹ L mol ⁻¹ s ⁻¹ .	79A002
15.49 Dichloro(5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene)nickel(III) ion								
15.49.1	5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecanesilver(II) ion							
Ni(4,11-dieneN ₄)Cl ₂ ⁺ + Ag(aneN ₄) ²⁺ → Ni(4,11-dieneN ₄)Cl ₂ + Ag(aneN ₄) ³⁺	4.8 × 10 ⁸		4	0.1		p.r.	D.k. or p.b.k. in N ₂ O-satd. soln.	88A334
15.50 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-1,4,8,11-tetraenenickel(III) ion								
15.50.1	Perhydroxyl							
Ni(tetraeneN ₄) ³⁺ + HO ₂ ^{·-} → Ni(tetraeneN ₄) ²⁺ + O ₂ + H ⁺	8.5 × 10 ⁵		2.0			p.r./f.p.	D.k.	79A038
15.50.2	Superoxide radical anion							
Ni(tetraeneN ₄) ³⁺ + O ₂ ^{·-} → Ni(tetraeneN ₄) ²⁺ + O ₂	1.0 × 10 ⁹		6.2			p.r./f.p.	D.k.	79A038
15.50.3	Iron(II) ion							
Ni(tetraeneN ₄) ³⁺ + Fe ²⁺ → Ni(tetraeneN ₄) ²⁺ + Fe ³⁺	3.6 × 10 ⁴		1		22	p.r./f.p.	D.k.	79A038

TABLE 15. Rate constants for nickel transients — Continued

No.	Reaction	k (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	(°C)	Method	Comment	Ref.
15.50 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-1,4,8,11-tetraennickel(III) ion — Continued								
15.50.4 Hydrogen peroxide								
	Ni(tetraeneN ₄) ³⁺ + H ₂ O ₂ →	3.3 × 10 ³	1		22	p.r./f.p.	D.k.	79A038
15.50.5 Manganese(II) ion								
	Ni(tetraeneN ₄) ³⁺ + Mn ²⁺ →	1.5 × 10 ²	1		22	p.r./f.p.	D.k.	79A038
	Ni(tetraeneN ₄) ²⁺ + Mn ³⁺							
15.51 1,4,8,12-Tetraazacyclopentadecanickel(III) ion								
15.51.1 First-order reaction								
	Ni([15]aneN ₄) ³⁺ →	5.0 × 10 ⁴ s ⁻¹	3.3			p.r.	D.k. at 550 nm and p.b.k. at ~300 nm in N ₂ O-satd. soln. contg. (1-10) × 10 ⁻⁴ mol L ⁻¹ Ni([15]aneN ₄) ²⁺ and perchlorate or sulfate ion; process suggested to represent configurational isomerization; followed by first-order reaction, $k = 0.33$ and 0.14 s ⁻¹ in the presence of perchlorate or sulfate ions, respectively.	86A470
15.52 1,4,7,10,13-Pentaaazacyclohexadecanickel(III) ion								
15.52.1 1,4,7,10,13-Pentaaazacyclohexadecanickel(III) ion								
	Ni([16]aneN ₅) ³⁺ + Ni([16]aneN ₅) ³⁺ →	5.1 × 10 ⁴	3.0-11.5			p.r.	D.k.; unclear whether k or 2 k . Reaction preceded by first-order decay, $k = 6 \times 10^3$ s ⁻¹ , suggested to represent intramolecular rearrangement.	83A32
15.52.2 Iron(II) ion								
	Ni([16]aneN ₅) ³⁺ + Fe ²⁺ →	≤1 × 10 ³	3.3			p.r.	No effect on d.k. by addn. of 1 × 10 ⁻⁴ mol L ⁻¹ FeSO ₄ .	83A32
15.52.3 Oxygen								
	Ni([16]aneN ₅) ³⁺ + O ₂ →	2 × 10 ³	3.5			p.r.		83A32
15.53 8-Methyl-8-nitro-1,3,6,10,13,15-hexaaazatricyclo[13.1.1.1^{13,15}]octadecanickel(III) ion								
15.53.1 First-order reaction								
	Ni(MeNO ₂ [18]aneN ₆) ³⁺ →	8.1 × 10 ³ s ⁻¹		22	p.r.	D.k. at 545 nm in N ₂ O-satd. soln.		88A39
15.54 8-Amino-8-methyl-1,3,6,10,13,15-hexaaazatricyclo[13.1.1.1^{13,15}]octadecanickel(III) ion								
15.54.1 First-order reaction								
	Ni(MeNH ₂ [18]aneN ₆) ³⁺ →	1.5 × 10 ³ s ⁻¹		22	p.r.	D.k. at 545 nm in N ₂ O-satd. soln.		88A39
15.55 3,7-Bis(2-aminoethyl)-1,3,5,7-tetraazabicyclo[3.3.1]nonanenickel(III) ion								
15.55.1 First-order reaction								
	NiL ³⁺ →	3.5 × 10 ³ s ⁻¹		22	p.r.	D.k. at 530 nm in N ₂ O-satd. soln.		88A39
15.56 Diaqua-α-2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),13,15-trienenickel(III) ion								
15.56.1 First-order reaction								
	Ni(Me ₂ pyo[14]aneN ₄)(H ₂ O) ₂ ³⁺ →	~220 s ⁻¹	4.5			p.r.	Estd. from d.k. in N ₂ O-satd. soln. contg. Ni(Me ₂ pyo[14]aneN ₄) ²⁺ and low [Br ⁻]; pK _a = 4. The product eliminates water to produce Ni(Me ₂ pyo[14]aneN ₄)(OH) ²⁺ .	81A1
	Ni(Me ₂ pyo[14]aneN ₄)(H ₂ O)(OH) ²⁺ + H ⁺		4.8					

TABLE 15. Rate constants for nickel transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
15.57 Hydroxy-α-2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),13,15-trienenickel(III) ion								
15.57.1 Hydroxide ion								
	$\text{Ni}(\text{Me}_2\text{pyo}[14]\text{aneN}_4)(\text{OH})^{2+} + \text{OH}^- \rightarrow$ $\text{Ni}(\text{Me}_2\text{pyo}[14]\text{aneN}_4\text{-H})(\text{OH})^+ + \text{H}_2\text{O}$	1.4×10^7	8.5-			p.r.	D.k. at 550 nm in N ₂ O-satd. soln. contg. 10^{-4} mol L ⁻¹ Ni(Me ₂ pyo[14]aneN ₄) ²⁺ and 0.01 mol L ⁻¹ Br ⁻ . Rate constant for deprotonation of ligand estimated to be 70 s^{-1} at pH ≤ 8 ; $k = 1.5 \times 10^7 \text{ L mol}^{-1} \text{ s}^{-1}$ in N ₂ O-satd. soln. contg. SCN ⁻ [82A106].	81A144
15.58 Aquabromo-α-2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),13,15-trienenickel(III) ion								
15.58.1 Hydroxide ion								
	$\text{Ni}(\text{Me}_2\text{pyo}[14]\text{aneN}_4)(\text{H}_2\text{O})\text{Br}^{2+} + \text{OH}^- \rightarrow \text{Ni}(\text{Me}_2\text{pyo}[14]\text{aneN}_4)(\text{OH})^{2+} + \text{Br}^- + \text{H}_2\text{O}$	$\sim 6.1 \times 10^9$	5.5			p.r.	D.k. in unbuffered N ₂ O-satd. soln. contg. 10^{-4} mol L ⁻¹ Ni(Me ₂ pyo[14]aneN ₄) ²⁺ and (5-25) $\times 10^{-3}$ mol L ⁻¹ Br ⁻ . Reaction is faster in solution buffered at pH 5.9 with phosphate or tetraborate. Dependence on pH and [buffer] is complex.	81A144
15.58.2 Water								
	$\text{Ni}(\text{Me}_2\text{pyo}[14]\text{aneN}_4)(\text{H}_2\text{O})\text{Br}^{2+} + \text{H}_2\text{O} \rightarrow \text{Ni}(\text{Me}_2\text{pyo}[14]\text{aneN}_4)(\text{H}_2\text{O})_2^{3+} + \text{Br}^-$	$7.2 \times 10^2 \text{ s}^{-1}$	<4.0			p.r.	D.k. at 320 nm in N ₂ O-satd. soln. contg. Ni(Me ₂ pyo[14]aneN ₄) ²⁺ and Br ⁻ ; $k_t = 2.6 \times 10^5 \text{ L mol}^{-1} \text{ s}^{-1}$.	81A144
15.59 Aqua-α-2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),13,15-triene(thiocyanato)nickel(III) ion								
15.59.1 Aqua-α-2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),13,15-triene(thiocyanato)nickel(III) ion								
	$\text{Ni}(\text{Me}_2\text{pyo}[14]\text{aneN}_4)(\text{H}_2\text{O})\text{SCN}^{2+} + \text{Ni}(\text{Me}_2\text{pyo}[14]\text{aneN}_4)(\text{H}_2\text{O})\text{SCN}^{2+} \rightarrow$	6.5×10^5	3.2			p.r.	D.k. in N ₂ O-satd. soln. contg. Ni(Me ₂ pyo[14]aneN ₄) ²⁺ and SCN ⁻ .	82A106
15.60 α-2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaene(hydroxo)nickel(III) ion								
15.60.1 Hydroxide ion								
	$\text{Ni}(\text{Me}_2\text{pyo}[14]\text{trieneN}_4)(\text{OH})^{2+} + \text{OH}^- \rightarrow \text{Ni}(\text{Me}_2\text{pyo}[14]\text{trieneN}_4\text{-H})(\text{OH})^+ + \text{H}_2\text{O}$	2.5×10^6	alk.			p.r.	D.k. in N ₂ O-satd. soln. contg. Ni(Me ₂ pyo[14]tricncN ₄) ²⁺ and SCN ⁻ .	82A106
15.61 α-2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaenabis(hydroxo)nickel(III) ion								
15.61.1 Hydroxide ion								
	$\text{Ni}(\text{Me}_2\text{pyo}[14]\text{trieneN}_4)(\text{OH})_2^{2+} + \text{OH}^- \rightarrow \text{Ni}(\text{Me}_2\text{pyo}[14]\text{trieneN}_4\text{-H})(\text{OH})_2^+ + \text{H}_2\text{O}$	1.0×10^5	alk.			p.r.	D.k. in N ₂ O-satd. soln. contg. Ni(Me ₂ pyo[14]tricncN ₄) ²⁺ and SCN ⁻ .	82A106
15.62 Aquabromo-α-2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaenenickel(III) ion								
15.62.1 Aquabromo-α-2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaenenickel(III) ion								
	$\text{Ni}(\text{Me}_2\text{pyo}[14]\text{trieneN}_4)\text{Br}^{2+} + \text{Ni}(\text{Me}_2\text{pyo}[14]\text{trieneN}_4)\text{Br}^{2+} \rightarrow$	1.1×10^7	3.2			p.r.	D.k. in N ₂ O-satd. soln. contg. Ni(Me ₂ pyo[14]tricncN ₄) ²⁺ and Br ⁻ .	82A106
15.63 Aqua-α-2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaene(thiocyanato)nickel(III) ion								
15.63.1 Aqua-α-2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaene(thiocyanato)nickel(III) ion								
	$\text{Ni}(\text{Me}_2\text{pyo}[14]\text{trieneN}_4)(\text{H}_2\text{O})\text{SCN}^{2+} + \text{Ni}(\text{Me}_2\text{pyo}[14]\text{trieneN}_4)(\text{H}_2\text{O})\text{SCN}^{2+} \rightarrow$	5.0×10^7	3.2			p.r.	D.k. in N ₂ O-satd. soln. contg. Ni(Me ₂ pyo[14]tricncN ₄) ²⁺ and SCN ⁻ .	82A106
15.63.2 Thiocyanate ion								
	$\text{Ni}(\text{Me}_2\text{pyo}[14]\text{trieneN}_4)(\text{H}_2\text{O})\text{SCN}^{2+} + \text{SCN}^- \rightarrow \text{H}_2\text{O} + \text{Ni}(\text{Me}_2\text{pyo}[14]\text{trieneN}_4)(\text{SCN})_2^+$	1.0×10^6	3.2			p.r.	D.k. in N ₂ O-satd. soln. contg. Ni(Me ₂ pyo[14]tricncN ₄) ²⁺ and SCN ⁻ ; $k_t = 3 \times 10^3 \text{ s}^{-1}$.	82A106

TABLE 15. Rate constants for nickel transients — Continued

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t(\text{°C})$	Method	Comment	Ref.
15.64	α -2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaenabis(thiocyanato)nickel(III) ion							
15.64.1	α -2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaenabis(thiocyanato)nickel(III) ion							
	$\text{Ni}(\text{Me}_2\text{pyo}[14]\text{trieneN}_4)(\text{SCN})_2^+ + \text{Ni}(\text{Me}_2\text{pyo}[14]\text{trieneN}_4)(\text{SCN})_2^+ \rightarrow$	1.6×10^8		3.2		p.r.	D.k. in N_2O -saturated soln. contg. $\text{Ni}(\text{Me}_2\text{pyo}[14]\text{trieneN}_4)^{2+}$ and SCN^- .	82A106
15.65	Aquabromo- α -2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,6,11,13,15-hexaenenicke(III) ion							
15.65.1	Aquabromo- α -2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,6,11,13,15-hexaenenicke(III) ion							
	$\text{Ni}(\text{Me}_2\text{pyo}[14]\text{hexaeneN}_4)(\text{H}_2\text{O})\text{Br}^{2+} + \text{Ni}(\text{Me}_2\text{pyo}[14]\text{hexaeneN}_4)(\text{H}_2\text{O})\text{Br}^{2+} \rightarrow$	6.9×10^7		3.2		p.r.	D.k. in N_2O -saturated soln. contg. $\text{Ni}(\text{Me}_2\text{pyo}[14]\text{hexaeneN}_4)^{2+}$ and Br^- .	82A106
15.65.2	Hydroxide ion							
	$\text{Ni}(\text{Me}_2\text{pyo}[14]\text{hexaeneN}_4)(\text{H}_2\text{O})\text{Br}^{2+} + \text{OH}^- \rightarrow \text{Br}^- + \text{Ni}(\text{Me}_2\text{pyo}[14]\text{hexaeneN}_4)(\text{H}_2\text{O})\text{OH}^{2+}$	$\sim 4.7 \times 10^9$				p.r.	D.k. in N_2O -saturated soln. contg. $\text{Ni}(\text{Me}_2\text{pyo}[14]\text{hexaeneN}_4)^{2+}$ and Br^- ; $k_t = \sim 6.9 \times 10^5 \text{ L mol}^{-1} \text{ s}^{-1}$.	82A106
15.65.3	Bromide ion							
	$\text{Ni}(\text{Me}_2\text{pyo}[14]\text{hexaeneN}_4)(\text{H}_2\text{O})\text{Br}^{2+} + \text{Br}^- \rightarrow \text{H}_2\text{O} + \text{Ni}(\text{Me}_2\text{pyo}[14]\text{hexaeneN}_4)\text{Br}_2^+$	$\sim 8.0 \times 10^5$				p.r.	D.k. in N_2O -saturated soln. contg. $\text{Ni}(\text{Me}_2\text{pyo}[14]\text{hexaeneN}_4)^{2+}$ and Br^- ; $k_t = \sim 6 \times 10^3 \text{ s}^{-1}$.	82A106
15.66	Dibromo- α -2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,6,11,13,15-hexaenenicke(III) ion							
15.66.1	Dibromo- α -2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,6,11,13,15-hexaenenicke(III) ion							
	$\text{Ni}(\text{Me}_2\text{pyo}[14]\text{hexaeneN}_4)\text{Br}_2^+ + \text{Ni}(\text{Me}_2\text{pyo}[14]\text{hexaeneN}_4)\text{Br}_2^+ \rightarrow$	2.8×10^8		3.2		p.r.	D.k. in N_2O -saturated soln. contg. $\text{Ni}(\text{Me}_2\text{pyo}[14]\text{hexaeneN}_4)^{2+}$ and Br^- .	82A106
15.67	Aqua- α -2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,6,11,13,15-hexaene(thiocyanato)nickel(III) ion							
15.67.1	Thiocyanate ion							
	$\text{Ni}(\text{Me}_2\text{pyo}[14]\text{hexaeneN}_4)(\text{H}_2\text{O})\text{SCN}^{2+} + \text{SCN}^- \rightarrow \text{H}_2\text{O} + \text{Ni}(\text{Me}_2\text{pyo}[14]\text{hexaeneN}_4)(\text{SCN})_2^+$	6.0×10^6		3.2,7		p.r.	D.k. in N_2O -saturated soln. contg. $\text{Ni}(\text{Me}_2\text{pyo}[14]\text{hexaeneN}_4)^{2+}$ and SCN^- .	82A106
15.68	α -2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,6,11,13,15-hexaenabis(thiocyanato)nickel(III) ion							
15.68.1	α -2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,6,11,13,15-hexaenabis(thiocyanato)nickel(III) ion							
	$\text{Ni}(\text{Me}_2\text{pyo}[14]\text{hexaeneN}_4)(\text{SCN})_2^+ + \text{Ni}(\text{Me}_2\text{pyo}[14]\text{hexaeneN}_4)(\text{SCN})_2^+ \rightarrow$	3.7×10^8		3.2		p.r.	D.k. in N_2O -saturated soln. contg. $\text{Ni}(\text{Me}_2\text{pyo}[14]\text{hexaeneN}_4)^{2+}$ and SCN^- .	82A106
15.69	Bromo- α -2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,6,11,13,15-hexaenenicke(III) ion							
15.69.1	Dibromine radical ion							
	$\text{Ni}(\text{Me}_2\text{pyo}[14]\text{hexaeneN}_4)\text{Br}_2^{2+} + \text{Br}_2^{\cdot-} \rightarrow \text{Ni}(\text{Me}_2\text{pyo}[14]\text{hexaeneN}_4)^{2+} + \text{Br}_2^{\cdot-} + \text{Br}^-$	1.0×10^{10}		3.2		p.r.	Calcd. from d.k. at 360 nm in soln. contg. $4.6 \times 10^{-6} \text{ mol L}^{-1}$ $\text{Ni}(\text{Me}_2\text{pyo}[14]\text{hexaeneN}_4)^{2+}$ and $0.001 \text{ mol L}^{-1} \text{ Br}^{\cdot-}$ assuming $2k(\text{Br}_2^{\cdot-} + \text{Br}_2^{\cdot-}) = 4.5 \times 10^9$, $k(\text{Br}_2^{\cdot-} + \text{Ni}(\text{Me}_2\text{pyo}[14]\text{hexaeneN}_4)^{2+}) = 1.1 \times 10^{10} \text{ L mol}^{-1} \text{ s}^{-1}$.	82A087
15.70	Ethylenediaminetetraacetatonickelate(III) ion							
15.70.1	Water							
	$\text{NiEDTA}^- + \text{H}_2\text{O} \rightarrow \text{NiEDTA}(\text{H}_2\text{O})^-$	$1.1 \times 10^3 \text{ s}^{-1}$		11.4 0.2		f.p./pi	D.k. at 300 nm in N_2O -saturated soln. contg. NiEDTA^{2-} and Na_2CO_3 ; $k = 2 \times 10^3 \text{ s}^{-1}$ associated with similar spectral changes observed for the product of reaction of NiEDTA^{2-} with OH [751135].	91A292

TABLE 15. Rate constants for nickel transients — Continued

No.	Reaction	k (L mol $^{-1}$ s $^{-1}$)	pH	I	t (°C)	Method	Comment	Ref.
15.70 Ethylenediaminetetraacetatonickelate(III) ion — Continued								
15.70.2 Carbonate ion								
	$\text{NiEDTA}^- + \text{CO}_3^{2-} \rightarrow \text{NiEDTA}^{2-} + \text{CO}_3^{2-}$	8.8×10^4	11.4	0.2		f.p./pi	D.k. at 600 nm in N_2O -satd. soln. contg. NiEDTA^{2-} and Na_2CO_3 ; $k_t = 4.5 \times 10^7$ L mol $^{-1}$ s $^{-1}$.	91A292
15.71 Hydroxy(ethylenediaminetetraacetato)nickelate(III) ion								
15.71.1 First-order reaction								
	$\text{NiEDTA(OH)}^{2-} \rightarrow \text{Ni(EDTA-H)}^{2-} + \text{H}_2\text{O}$	1.4×10^2 s $^{-1}$	11.4	13		f.p./pi		91A292
15.72 Aqua(ethylenediaminetetraacetato)nickelate(III) ion								
15.72.1 Iodide ion								
	$\text{NiEDTA(H}_2\text{O)}^- + \text{I}^- \rightarrow$	* 5.5×10^5	11.4	0.2		f.p./pi	D.k. at 300 nm in N_2O -satd. soln. contg. NiEDTA^{2-} and Na_2CO_3 .	91A292
		* 1.3×10^3		4-9		p.r.	D.k. at 300 nm in N_2O -satd. soln. contg. NiEDTA^{2-} and I^- .	751135
							* Unexplained discrepancy in these data.	
15.72.2 Oxygen								
	$\text{NiEDTA(H}_2\text{O)}^- + \text{O}_2 \rightarrow$	6.5×10^2				p.r.	D.k. at 300 nm in N_2O -satd. soln. contg. NiEDTA^{2-} and O_2 .	751135
15.73 Dioxonickel(IV) ion								
15.73.1 First-order reaction								
	$\text{NiO}_2^+ \rightarrow \text{Ni}^{2+} + \text{O}_2^{+}$	780 s $^{-1}$	5.7	25	p.r.	Estd. from p.b.k. (nitroform anion) in soln. contg. $(5-100) \times 10^{-3}$ mol L $^{-1}$ Ni^{2+} , $(31.8-106.4) \times 10^{-6}$ mol L $^{-1}$ tetraniromethane, 1 mol L $^{-1}$ <i>tert</i> -BuOH and $(2.6 \text{ or } 13) \times 10^{-4}$ mol L $^{-1}$ O_2 .	761134	
15.74 Dioxonickel(IV) ion, protonated								
15.74.1 First-order reaction								
	$\text{NiO}_2\text{H}^{2+} \rightarrow \text{Ni}^{2+} + \text{HO}_2^+$	≥ 2800 s $^{-1}$	3.0	25	p.r.	Estd. from p.b.k. (nitroform anion) in soln. contg. $(5-100) \times 10^{-3}$ mol L $^{-1}$ Ni^{2+} , $(31.8-106.4) \times 10^{-6}$ mol L $^{-1}$ tetraniromethane, 1 mol L $^{-1}$ <i>tert</i> -BuOH and $(2.6 \text{ or } 13) \times 10^{-4}$ mol L $^{-1}$ O_2 ; $\text{p}K_a = 3.2$.	761134	

TABLE 16. Rate constants for osmium transients

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
16.1 Tris(2,2'-bipyridine)osmium(III) ion								
16.1.1 Iron(II) ion								
	$\text{Os}(\text{bpy})_3^{3+} + \text{Fe}^{2+} \rightarrow \text{Os}(\text{bpy})_3^{2+} + \text{Fe}^{3+}$	1.4×10^4		~0	20	f.p./oq	Calcd. from current-time curve; soln. contg. 0.5 mol L ⁻¹ H ₂ SO ₄ , 3×10^{-4} mol L ⁻¹ Os(bpy) ₃ ²⁺ and [Fe ²⁺] = [Fe ³⁺] (OQ).	80E224
16.2 Tris(5,5'-dimethyl-2,2'-bipyridine)osmium(III) ion								
16.2.1 Iron(II) ion								
	$\text{Os}(5,5'\text{-Me}_2\text{bpy})_3^{3+} + \text{Fe}^{2+} \rightarrow \text{Os}(5,5'\text{-Me}_2\text{bpy})_3^{2+} + \text{Fe}^{3+}$	1.0×10^3		~0	20	f.p./oq	Calcd. from current-time curve; soln. contg. 0.5 mol L ⁻¹ H ₂ SO ₄ , 3×10^{-4} mol L ⁻¹ Os(5,5'-Me ₂ bpy) ₃ ²⁺ and [Fe ²⁺] = [Fe ³⁺] (OQ).	80E224
16.3 Tris(1,10-phenanthroline)osmium(III) ion								
16.3.1 Iron(II) ion								
	$\text{Os}(\text{phen})_3^{3+} + \text{Fe}^{2+} \rightarrow \text{Os}(\text{phen})_3^{2+} + \text{Fe}^{3+}$	1.1×10^4		~0	20	f.p./oq	Calcd. from current-time curve; soln. contg. 0.5 mol L ⁻¹ H ₂ SO ₄ , 1.5×10^{-4} mol L ⁻¹ Os(phen) ₃ ²⁺ and [Fe ²⁺] = [Fe ³⁺] (OQ).	80E224
16.4 Tris(5-chloro-1,10-phenanthroline)osmium(III) ion								
16.4.1 Iron(II) ion								
	$\text{Os}(5\text{-Clphen})_3^{3+} + \text{Fe}^{2+} \rightarrow \text{Os}(5\text{-Clphen})_3^{2+} + \text{Fe}^{3+}$	7.0×10^4		~0	20	f.p./oq	Calcd. from current-time curve; soln. contg. 0.5 mol L ⁻¹ H ₂ SO ₄ , 2×10^{-4} mol L ⁻¹ Os(5-Clphen) ₃ ²⁺ and [Fe ²⁺] = [Fe ³⁺] (OQ).	80E224

TABLE 17. Rate constants for lead transients

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
17.1 Lead atom								
17.1.1 Lead atom								
	Pb ⁰ + Pb ⁰ → Pb ₂ ⁺	7.5 × 10 ⁸		5.4		p.r.	D.k. at 300 nm and 660 nm in Ar-satd. soln. contg. 2 × 10 ⁻⁴ mol L ⁻¹ Pb(ClO ₄) ₂ and 2 × 10 ⁻³ mol L ⁻¹ formate. Species could be Pb ₂ ²⁺ .	92A206
17.1.2 Silver(I) ion								
	Pb ⁰ + Ag ⁺ → PbAg ⁺	8.2 × 10 ⁸		4		p.r.	D.k. at 660 nm in soln. contg. 1 × 10 ⁻⁴ mol L ⁻¹ Pb ²⁺ , 0.01 mol L ⁻¹ formate and varied [Ag ⁺]. Value obtained from computer fit.	92A348
17.2 Lead(I) ion								
17.2.1 Lead(I) ion								
	Pb ⁺ + Pb ⁺ → Pb ⁰ + Pb ²⁺	4.1 × 10 ⁹		5.4		p.r.	P.b.k. at 660 nm in Ar-satd. soln. contg. 1 × 10 ⁻⁴ to 0.5 mol L ⁻¹ Pb(ClO ₄) ₂ and 2 × 10 ⁻³ mol L ⁻¹ formate; p.b.k. at 300 nm gave k = 2.8 × 10 ⁹ L mol ⁻¹ s ⁻¹ .	92A206
17.2.2 Oxygen								
	Pb ⁺ + O ₂ → Pb ²⁺ + O ₂ ^{·-}	3.9 × 10 ⁹				p.r.	D.k. in soln. contg. Pb ²⁺ .	66A001
17.2.3 1,4-Benzoquinone								
	Pb ⁺ + Q → Pb ²⁺ + Q ^{·-}	4.1 × 10 ⁹		6.3	25	p.r.	P.b.k. at 430 nm in soln. contg. Pb(II) acetate and 1 mol L ⁻¹ <i>tert</i> -BuOH. Pb ⁺ may be complexed to acetate.	761134
17.2.4 2-Methyl-1,4-naphthoquinone								
	Pb ⁺ + 2-CH ₃ NQ → Pb ²⁺ + [2-CH ₃ NQ] ^{·-}	3.7 × 10 ⁹		7		p.r.	P.b.k. in soln. contg. 5 × 10 ⁻³ mol L ⁻¹ Pb(ClO ₄) ₂ , 5 × 10 ⁻⁵ mol L ⁻¹ 2-CH ₃ -NQ and 1 mol L ⁻¹ <i>tert</i> -BuOH.	751032 731047
17.3 Lead(I)								
17.3.1 Hexaamminecobalt(III) ion								
	Pb(I) + Co(NH ₃) ₆ ³⁺ → Pb(II) + Co(NH ₃) ₆ ²⁺	5.6 × 10 ⁷		0.06	29	p.r.	D.k. at 315 nm in Ar-satd. soln. contg. 0.02 mol L ⁻¹ PbCl ₂ , 0.001 mol L ⁻¹ MeOH and 1.5 × 10 ⁻⁴ mol L ⁻¹ Co(NH ₃) ₆ ³⁺ .	78A206
17.3.2 Pentaammine(aqua)cobalt(III) ion								
	Pb(I) + Co(NH ₃) ₅ (H ₂ O) ³⁺ → Pb(II) + Co(NH ₃) ₅ (H ₂ O) ²⁺	2.3 × 10 ⁸		0.06	29	p.r.	D.k. at 315 nm in Ar-satd. soln. contg. 0.02 mol L ⁻¹ PbCl ₂ , 0.001 mol L ⁻¹ MeOH and 1.5 × 10 ⁻⁴ mol L ⁻¹ Co(NH ₃) ₅ (H ₂ O) ³⁺ .	78A206
17.3.3 Pentaammine(chloro)cobalt(III) ion								
	Pb(I) + Co(NH ₃) ₅ Cl ²⁺ → Pb(II) + Co(NH ₃) ₅ Cl ⁺	2.6 × 10 ⁸		0.06	29	p.r.	D.k. at 315 nm in Ar-satd. soln. contg. 0.02 mol L ⁻¹ PbCl ₂ , 0.001 mol L ⁻¹ MeOH and 1.5 × 10 ⁻⁴ mol L ⁻¹ Co(NH ₃) ₅ Cl ²⁺ .	78A206
17.3.4 Pentaammine(bromo)cobalt(III) ion								
	Pb(I) + Co(NH ₃) ₅ Br ²⁺ → Pb(II) + Co(NH ₃) ₅ Br ⁺	4.8 × 10 ⁸		0.06	29	p.r.	D.k. at 315 nm in Ar-satd. soln. contg. 0.02 mol L ⁻¹ PbCl ₂ , 0.001 mol L ⁻¹ MeOH and 1.5 × 10 ⁻⁴ mol L ⁻¹ Co(NH ₃) ₅ Br ²⁺ .	78A206
17.3.5 Tetraamminediaquacobalt(III) ion								
	Pb(I) + Co(NH ₃) ₄ (H ₂ O) ₂ ³⁺ → Pb(II) + Co(NH ₃) ₄ (H ₂ O) ₂ ²⁺	3.0 × 10 ⁸		0.06	29	p.r.	D.k. at 315 nm in Ar-satd. soln. contg. 0.02 mol L ⁻¹ PbCl ₂ , 0.001 mol L ⁻¹ MeOH and 1.5 × 10 ⁻⁴ mol L ⁻¹ Co(NH ₃) ₄ (H ₂ O) ₂ ³⁺ .	78A206

TABLE 17. Rate constants for lead transients — Continued

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t(\text{°C})$	Method	Comment	Ref.
17.3 Lead(I) — Continued								
17.3.6 Trinitrotriamminecobalt(III)								
	$\text{Pb(I)} + \text{Co}(\text{NH}_3)_3(\text{NO}_2)_3 \rightarrow \text{Pb(II)} + \text{Co}(\text{NH}_3)_3(\text{NO}_2)_3^-$	2.0×10^9		0.06	29	p.r.	D.k. at 315 and 275 nm in Ar-satd. soln. contg. 0.02 mol L^{-1} PbCl_2 , 0.001 mol L^{-1} MeOH and 1.5×10^{-4} mol L^{-1} $\text{Co}(\text{NH}_3)_3(\text{NO}_3)_3$.	78A206
17.3.7 Tris(ethylenediamine)cobalt(III) ion								
	$\text{Pb(I)} + \text{Co(en)}_3^{3+} \rightarrow \text{Pb(II)} + \text{Co(en)}_3^{2+}$	7.9×10^7		0.06	29	p.r.	D.k. at 315 nm in Ar-satd. soln. contg. 0.02 mol L^{-1} PbCl_2 , 0.001 mol L^{-1} MeOH and 1.5×10^{-4} mol L^{-1} Co(en)_3^{3+} .	78A206
17.3.8 Trioxalatocobaltate(III) ion								
	$\text{Pb(I)} + \text{Co}(\text{C}_2\text{O}_4)_3^{3-} \rightarrow \text{Pb(II)} + \text{Co}(\text{C}_2\text{O}_4)_3^{4-}$	6.0×10^8		0.06	29	p.r.	D.k. at 315 nm in Ar-satd. soln. contg. 0.02 mol L^{-1} PbCl_2 , 0.001 mol L^{-1} MeOH and 1.5×10^{-4} mol L^{-1} $\text{Co}(\text{C}_2\text{O}_4)_3^{3-}$.	78A206
17.4 Tetrakis(1-methylpyridinium-4-yl)porphinatolead(II) radical cation								
17.4.1 Tetrakis(1-methylpyridinium-4-yl)porphinatolead(II) radical cation								
	$[\text{PbTMpyP}]^{5+} + [\text{PbTMpyP}]^{5+} \rightarrow \text{PbTMpyP}^{4+} + \text{PbTMpyP}^{6+}$	5.4×10^7	9			p.r.	D.k. at 750 nm and p.b.k. at 425 nm in N_2O -satd. soln. contg. PbTMpyP^{4+} and 0.01 mol L^{-1} KBr; unclear whether k or $2k$. PbTMpyP^{6+} represents a Pb(IV) species; subsequent decay of the Pb(IV) species occurs with $k = 0.93$ and 2 s^{-1} at pH 9 and 12, respectively.	86A241
17.5 Tetrakis(1-methylpyridinium-3-yl)porphinatolead(II) radical cation								
17.5.1 Tetrakis(1-methylpyridinium-3-yl)porphinatolead(II) radical cation								
	$[\text{Pb(3-TMpyP)}]^{5+} + [\text{Pb(3-TMpyP)}]^{5+} \rightarrow \text{Pb(3-TMpyP)}^{4+} + \text{Pb(3-TMpyP)}^{6+}$	7.4×10^7	9			p.r.	D.k. at 750 nm and p.b.k. at 425 nm in N_2O -satd. soln. contg. Pb(3-TMpyP)^{4+} and 0.01 mol L^{-1} KBr; unclear whether k or $2k$. Pb(3-TMpyP)^{6+} represents a Pb(IV) species; subsequent decay of the Pb(IV) species occurs with $k = 0.93$ and 2 s^{-1} at pH 9 and 12, respectively.	86A241
17.6 5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatoplumbate(II) radical cation								
17.6.1 5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatoplumbate(II) radical cation								
	$[\text{PbTPPS}]^{3-} + [\text{PbTPPS}]^{3-} \rightarrow \text{PbTPPS}^{2-} + \text{PbTPPS}^{4-}$	1.6×10^7	7			p.r.	D.k. at 700 nm in N_2O -satd. soln. contg. 0.01 mol L^{-1} KBr.	86S115
17.7 Lead(III)								
17.7.1 Lead(III)								
	$\text{Pb(III)} + \text{Pb(III)} \rightarrow \text{Pb(II)} + \text{Pb(IV)}$	4.8×10^8	<0			p.r.	D.k. in soin. contg. 11 mol L^{-1} HCl and Pb(II) and Pb(IV) .	84A446
17.8 Dihydroxylead(III) ion								
17.8.1 Dihydroxylead(III) ion								
	$\text{Pb(OH)}_2^+ + \text{Pb(OH)}_2^+ \rightarrow \text{Pb(OH)}^+ + \text{Pb(OH)}_3^+$	3.5×10^9	5-7			p.r.	D.k. in N_2O -satd. soln. contg. $\text{Pb(ClO}_4)_2$.	90A095
17.9 Tetrahydroxyplumbate(III) ion								
17.9.1 Tetrahydroxyplumbate(III) ion								
	$\text{Pb(OH)}_4^- + \text{Pb(OH)}_4^- \rightarrow \text{Pb(OH)}_3^- + \text{PbO(OH)}^+ + \text{H}_2\text{O} + 2 \text{ OH}^-$	2.1×10^9	11.4			p.r.	D.k. at 280 nm and condy. change in N_2O -satd. soln. contg. Pb(OH)_3^- .	90A095

TABLE 17. Rate constants for lead transients — Continued

Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t(\text{°C})$	Method	Comment	Ref.
Tetrahydroxyplumbate(III) ion — Continued							
17.9.3 2-Methyl-2-propanol							
$\text{Pb(OH)}_4^- + \text{tert-BuOH} \rightarrow$	5.0×10^5	13			p.r.	D.k. at 280 nm in Ar-satd. soln. contg. Pb(OH)_6^{2-} and 0.02-0.1 mol L^{-1} <i>tert</i> -BuOH.	90A095
$\text{Pb(OH)}_4^- + 2\text{-PrOH} + \text{OH}^- \rightarrow$	1.2×10^4	13			γ -r.	Estd. from yield of Pb(OH)_3^- formed by a chain reaction in soln. contg. 2.2×10^{-4} mol L^{-1} Pb(OH)_6^{2-} and 0.1 mol L^{-1} 2-PrOH.	90A095
$\text{Pb(OH)}_3^- + (\text{CH}_3)_2\text{CO}^- + 2\text{H}_2\text{O} \rightarrow$							
17.10 Hydroxy(oxo)lead(IV) ion							
17.10.1 Hydroxide ion							
$\text{PbO(OH)}^+ + \text{OH}^- \rightarrow \text{PbO(OH)}_2$	6×10^5	11.4			p.r.	Cond. change in N_2O -satd. soln. contg. 5×10^{-4} mol L^{-1} Pb(OH)_3^- ; $k = 5 \times 10^6$ $\text{L mol}^{-1} \text{s}^{-1}$ was derived for subsequent dimerization of the product.	90A095

TABLE 18. Rate constants for palladium transients

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
18.1 Palladium(I) ion								
18.1.1 Palladium(III) ion								
	$\text{Pd}^+ + \text{Pd}^{3+} \rightarrow 2 \text{Pd}^{2+}$	1×10^9		0		p.r.	D.k. at 250 nm and 290 nm in Ar-satd. soln. contg. 1 mol L ⁻¹ HClO ₄ and (5-10) × 10 ⁻⁵ mol L ⁻¹ Pd(ClO ₄) ₂ . In N ₂ O-satd. soln. a slower reaction was also observed, $k \sim 4 \times 10^7$ L mol ⁻¹ s ⁻¹ , suggested to represent Pd ³⁺ + Pd ³⁺ and/or Pd ³⁺ + H ₂ O ₂ .	94A210
18.2 Bis(hydroxyprolinato)palladate(I) ion								
18.2.1 Bis(hydroxyprolinato)palladate(I) ion								
	$\text{Pd}(\text{HypO})_2^- + \text{Pd}(\text{HypO})_2^- \rightarrow$	1.4×10^8		6.0		p.r.	D.k. at 260 nm in N ₂ -satd. soln. contg. 0.5 mol L ⁻¹ <i>tert</i> -BuOH and Pd(HypO) ₂ . Unclear whether k or $2k$.	93A224
18.3 5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatopalladate(II) radical anion								
18.3.1 5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatopalladate(II) radical anion								
	$[\text{PdTPPS}]^{5-} + [\text{PdTPPS}]^{5-} \rightarrow$	2.4×10^7 1.3×10^8		6.8 12		p.r.	D.k. in N ₂ -satd. soln. contg. 0.1 mol L ⁻¹ 2-PrOH and PdTPPS ⁴⁻ . Reaction suggested to be disproportionation, $\Delta G = 31$ kJ mol ⁻¹ .	83C026

TABLE 19. Rate constants for platinum transients

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t^\circ\text{C}$	Method	Comment	Ref.
19.1 Triammineaquaplatinum(I) ion								
19.1.1 Water								
	$\text{Pt}(\text{NH}_3)_3(\text{H}_2\text{O})^+ + \text{H}_2\text{O} \rightarrow \text{Pt}(\text{NH}_3)_2(\text{H}_2\text{O})_2^+ + \text{NH}_3$	$4.2 \times 10^4 \text{ s}^{-1}$	4.1-7		-23	p.r.	D.k. in soln. contg. $\text{Pt}(\text{NH}_3)_4^{2+}$ and alcohol; average of two values obtained from optical and conductivity measurements. Reaction preceded by rapid release of NH_3 .	81A353
		$1.2 \times 10^4 \text{ s}^{-1}$	11.4		-23	p.r.	D.k. in soln. contg. $\text{Pt}(\text{NH}_3)_4^{2+}$ and 2.0 mol L^{-1} 2-PrOH; condy. decrease gave $k = 1.2 \times 10^4 \text{ s}^{-1}$; implies pK_a of product ~11.	81A353
19.2 cis-Diamminedichloroplatinate(I) ion								
19.2.1 Water								
	$\text{cis-Pt}(\text{NH}_3)_2\text{Cl}_2^- + \text{H}_2\text{O} \rightarrow \text{cis-Pt}(\text{NH}_3)_2\text{Cl}(\text{H}_2\text{O}) + \text{Cl}^-$	$1.3 \times 10^6 \text{ s}^{-1}$	6-8			p.r.	P.b.k. at 390 nm in deaerated soln. contg. $(0.25-1) \times 10^{-3} \text{ mol L}^{-1}$ <i>cis</i> -Pt(NH_3) ₂ Cl ₂ , 0.1 mol L^{-1} NaCl and 1.0 mol L^{-1} <i>tert</i> -BuOH; for loss of second Cl^- , $k = 380 \text{ s}^{-1}$; subsequent second-order decay ($k = 5.5 \times 10^7 \text{ L mol}^{-1} \text{ s}^{-1}$) may represent disproportionation of product.	85A090
19.3 trans-Diamminedichloroplatinate(I) ion								
19.3.1 Water								
	$\text{trans-Pt}(\text{NH}_3)_2\text{Cl}_2^- + \text{H}_2\text{O} \rightarrow \text{trans-Pt}(\text{NH}_3)_2\text{Cl}(\text{H}_2\text{O}) + \text{Cl}^-$	$3.1 \times 10^4 \text{ s}^{-1}$				p.r.	P.b.k. at 390 nm in deaerated soln. contg. <i>trans</i> -Pt(NH_3) ₂ Cl ₂ , 0.1 mol L^{-1} NaCl and 1.0 mol L^{-1} <i>tert</i> -BuOH; for loss of second Cl^- , $k = 870 \text{ s}^{-1}$.	85A090
19.4 Tetrabromoplatinate(I) ion								
19.4.1 First-order reaction								
	$\text{PtBr}_4^{3-} \rightarrow$	$3.2 \times 10^3 \text{ s}^{-1}$	2			p.r.	D.k. at 320 nm in Ar-satd. soln. contg. 0.01 mol L^{-1} HClO_4 , <i>tert</i> -BuOH and PtBr_4^{2-} .	92A259
19.5 Tetrachloroplatinate(I) ion								
19.5.1 Tetrachloroplatinate(I) ion								
	$\text{PtCl}_4^{3-} + \text{PtCl}_4^{3-} \rightarrow$	2.1×10^9				p.r.	D.k. at 310 nm in deaerated soln. contg. $(0.25-1.0) \times 10^{-4} \text{ mol L}^{-1}$ PtCl_4^{2-} and 0.002 mol L^{-1} MeOH; $k = 1.6 \times 10^9 \text{ L mol}^{-1} \text{ s}^{-1}$ in the presence of 0.1 mol L^{-1} KCl and 0.002 mol L^{-1} MeOH; $k = -1.3 \times 10^9 \text{ L mol}^{-1} \text{ s}^{-1}$ in the presence of 0.005 mol L^{-1} H_2SO_4 and 0.001 mol L^{-1} MeOH.	690144
19.6 Tetracyanoplatinate(I) ion								
19.6.1 Nitrous oxide								
	$\text{Pt}(\text{CN})_4^{3-} + \text{N}_2\text{O} \rightarrow$	1.8×10^7				p.r.	D.k. at 360 nm in soln. contg. $5 \times 10^{-4} \text{ mol L}^{-1}$ $\text{Pt}(\text{CN})_4^{2-}$, 0.001 mol L^{-1} NaOH, 0.01 mol L^{-1} MeOH and $(1.2-2.4) \times 10^{-4} \text{ mol L}^{-1}$ N_2O .	690144
19.6.2 Oxygen								
	$\text{Pt}(\text{CN})_4^{3-} + \text{O}_2 \rightarrow$	3.5×10^9				p.r.	D.k. at 360 nm in soln. contg. $5 \times 10^{-4} \text{ mol L}^{-1}$ $\text{Pt}(\text{CN})_4^{2-}$, 0.001 mol L^{-1} NaOH, 0.01 mol L^{-1} MeOH and $(9-18) \times 10^{-6} \text{ mol L}^{-1}$ O_2 .	690144

TABLE 19. Rate constants for platinum transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
19.7 Bis(ethylenediamine)platinum(I) ion								
19.7.1	Bis(ethylenediamine)platinum(I) ion							
	Pt(en) ₂ ⁺ + Pt(en) ₂ ⁺ →	4.5 × 10 ⁸			-25	p.r.	D.k. at 300 nm in soln. contg. ~1.1 × 10 ⁻⁴ mol L ⁻¹ Pt(en) ₂ ²⁺ and 0.1-0.5 mol L ⁻¹ 2-PrOH or 1.24 mol L ⁻¹ MeOH; unclear whether <i>k</i> or 2 <i>k</i> .	751188
19.8 Chloro(diethylenetriamine)platinum(I)								
19.8.1	First-order reaction							
	Pt(dien)Cl →	2.3 × 10 ⁵ s ⁻¹			-25	p.r.	D.k. at 260-400 nm in soln. contg. ~1.6 or ~2.3 × 10 ⁻⁴ mol L ⁻¹ Pt(dien)Cl ⁺ and 0.1-0.5 mol L ⁻¹ 2-PrOH or 1.24 mol L ⁻¹ MeOH; reaction may represent substitution of Cl ⁻ by H ₂ O. Product disappears by second-order kinetics, <i>k</i> = 2.3 × 10 ⁷ L mol ⁻¹ s ⁻¹ ; unclear whether <i>k</i> or 2 <i>k</i> .	751188
19.9 <i>cis</i>-Bis(glycinato)platinate(I) ion								
19.9.1	<i>cis</i> -Bis(glycinato)platinate(I) ion							
	<i>cis</i> -Pt(Gly) ₂ ⁻ + <i>cis</i> -Pt(Gly) ₂ ⁻ →	4.2 × 10 ⁹			-25	p.r.	D.k. at 250-310 nm in deaerated soln. contg. 4.5 × 10 ⁻⁵ mol L ⁻¹ <i>cis</i> -Pt(Gly) ₂ ⁻ and 1.0 mol L ⁻¹ 2-PrOH; unclear whether <i>k</i> or 2 <i>k</i> .	771053
19.10 <i>trans</i>-Bis(glycinato)platinate(I) ion								
19.10.1	<i>trans</i> -Bis(glycinato)platinate(I) ion							
	<i>trans</i> -Pt(Gly) ₂ ⁻ + <i>trans</i> -Pt(Gly) ₂ ⁻ →	4.2 × 10 ⁹			-25	p.r.	D.k. at 250-270 nm in deaerated soln. contg. 3.0 or 4.5 × 10 ⁻⁵ mol L ⁻¹ <i>trans</i> -Pt(Gly) ₂ ⁻ and 1.0 mol L ⁻¹ 2-PrOH; unclear whether <i>k</i> or 2 <i>k</i> .	771053
19.11 Bis(ethylenediamine)platinum(II), H reaction product								
19.11.1	Bis(ethylenediamine)platinum(II), H reaction product							
	Pt(en) ₂ ²⁺ /H + Pt(en) ₂ ²⁺ /H →	1.4 × 10 ⁸	2-3		-25	p.r.	D.k. at 420 nm in soln. contg. 4.1 × 10 ⁻⁴ mol L ⁻¹ Pt(en) ₂ ²⁺ , 0.1-1 mol L ⁻¹ <i>tert</i> -BuOH and 0.001-0.01 mol L ⁻¹ HClO ₄ ; unclear whether <i>k</i> or 2 <i>k</i> .	751188
19.12 Chloro(diethylenetriamine)platinum(II), H reaction product								
19.12.1	Chloro(diethylenetriamine)platinum(II), H reaction product							
	Pt(dien)Cl ⁺ /H + Pt(dien)Cl ⁺ /H →	3.4 × 10 ⁹	2-3		-25	p.r.	D.k. at 410 nm in soln. contg. 3.1 or 4.2 × 10 ⁻⁴ mol L ⁻¹ Pt(dien)Cl ⁺ , 0.1-1 mol L ⁻¹ <i>tert</i> -BuOH and 0.001-0.01 mol L ⁻¹ HClO ₄ ; unclear whether <i>k</i> or 2 <i>k</i> .	751188
19.13 Chloro(tetraethylidethylenetriamine)platinum(II), H reaction product								
19.13.1	Chloro(tetraethylidethylenetriamine)platinum(II), H reaction product							
	Pt(Et ₄ dien)Cl ⁺ /H + Pt(Et ₄ dien)Cl ⁺ /H →	6.6 × 10 ¹⁰	2-3			p.r.	D.k. at 290 nm in soln. contg. 1.0 and 1.9 × 10 ⁻⁴ mol L ⁻¹ Pt(Et ₄ dien)Cl ⁺ , 0.1-1 mol L ⁻¹ <i>tert</i> -BuOH and 0.001-0.01 mol L ⁻¹ HClO ₄ ; unclear whether <i>k</i> or 2 <i>k</i> .	751188

TABLE 19. Rate constants for platinum transients — Continued

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t(\text{°C})$	Method	Comment	Ref.
19.14 <i>cis</i>-Bis(glycinato)platinum(II), H reaction product								
19.14.1	First-order reaction							
	$cis\text{-Pt}(\text{Gly})_2/\text{H} \rightarrow$	$7.3 \times 10^3 \text{ s}^{-1}$	2		~25	p.r.	D.k. at 250-310 nm in deaerated soln. contg. $\sim 1 \times 10^{-4} \text{ mol L}^{-1} cis\text{-Pt}(\text{Gly})_2$, 0.01 mol $\text{L}^{-1} \text{HClO}_4$ and 0.5 mol $\text{L}^{-1} tert\text{-BuOH}$.	771053
19.15 <i>trans</i>-Bis(glycinato)platinum(II), H reaction product								
19.15.1	First-order reaction							
	$trans\text{-Pt}(\text{Gly})_2/\text{H} \rightarrow$	$2.5 \times 10^5 \text{ s}^{-1}$	2		~25	p.r.	P.b.k. at 320-370 nm in deaerated soln. contg. $(1.5\text{-}10) \times 10^{-5} \text{ mol L}^{-1} trans\text{-Pt}(\text{Gly})_2$, 0.01 mol $\text{L}^{-1} \text{HClO}_4$ and 0.5 mol $\text{L}^{-1} tert\text{-BuOH}$. A subsequent first-order decay observed at 250-360 nm, $k = 6.4 \times 10^3 \text{ s}^{-1}$.	771053
19.16 Octahydrogen tetrakis(μ-diphosphito)diplatinate(I)(II) ion								
19.16.1	First-order reaction							
	$[\text{Pt}_2(\text{P}_2\text{O}_5\text{H}_2^{2-})_4]^{5-} \rightarrow$	$2.9 \times 10^4 \text{ s}^{-1}$	6.8			p.r.	D.k. at 420 nm in N_2 -satd. soln. contg. $5 \times 10^{-5} \text{ mol L}^{-1} \text{Pt}_2(\text{P}_2\text{O}_5\text{H}_2^{2-})_4^{4-}$, 1% <i>tert</i> -BuOH and $2 \times 10^{-3} \text{ mol L}^{-1}$ phosphate buffer.	84A241
19.17 Tetraamminehydridoplatinum(III) ion								
19.17.1	First-order reaction							
	$\text{Pt}(\text{NH}_3)_4(\text{H})^{2+} \rightarrow$	$2.2 \times 10^4 \text{ s}^{-1}$	1.1- 2.9		~23	p.r.	D.k. in soln. contg. $(0.15\text{-}2.45) \times 10^{-4} \text{ mol L}^{-1} \text{Pt}(\text{NH}_3)_4^{2+}$ and 0.1-2.0 mol $\text{L}^{-1} tert\text{-BuOH}$; no condy. change observed on the same time frame suggests reaction may represent rearrangement of the hydride.	81A353
		$2.0 \times 10^3 \text{ s}^{-1}$	1.1- 2.9		~23	p.r.	Rearranged hydride; p.b.k. below 400 nm in soln. contg. <i>tert</i> -BuOH; average of two values obtained from optical and condy. measurements; reaction may represent loss of NH_3 .	81A353
19.18 Tetraammine(aqua)hydroxyplatinum(III) ion								
19.18.1	First-order reaction							
	$\text{Pt}(\text{NH}_3)_4(\text{H}_2\text{O})(\text{OH})^{2+} \rightarrow$	$1.3 \times 10^5 \text{ s}^{-1}$	3.3- 10.2		~23	p.r.	D.k. or p.b.k. at different wavelengths in N_2O -satd. soln. contg. $\text{Pt}(\text{NH}_3)_4^{2+}$. Average of two values obtained as intercepts from pH studies. Reaction may represent H_2O elimination to give $\text{Pt}(\text{NH}_3)_3(\text{NH}_2)^{2+}$ in competition with protonation or deprotonation of $\text{Pt}(\text{NH}_3)_4(\text{H}_2\text{O})(\text{OH})^{2+}$ to give $\text{Pt}(\text{NH}_3)_4(\text{H}_2\text{O})_2^{3+}$ or $\text{Pt}(\text{NH}_3)_4(\text{OH})_2^+$, respectively.	82A074
19.18.2	Hydrogen ion							
	$\text{Pt}(\text{NH}_3)_4(\text{H}_2\text{O})(\text{OH})^{2+} + \text{H}^+ \rightarrow$ $\text{Pt}(\text{NH}_3)_4(\text{H}_2\text{O})_2^{3+}$	7.0×10^9	<5.6		~23	p.r.	P.b.k. at 340, 350 and 510-540 nm in N_2O -satd. soln. contg. $\sim 6 \times 10^{-4} \text{ mol L}^{-1} \text{Pt}(\text{NH}_3)_4^{2+}$ and varied $[\text{H}^+]$; reaction in competition with H_2O elimination to give $\text{Pt}(\text{NH}_3)_3(\text{NH}_2)^{2+}$, $k_r = 3 \times 10^3 \text{ s}^{-1}$; pK_a of $\text{Pt}(\text{NH}_3)_4(\text{H}_2\text{O})_2^{3+} = -6.4, -9.8$.	82A074

TABLE 19. Rate constants for platinum transients. — Continued

No.	Reaction	k , L mol ⁻¹ s ⁻¹	pH	I	t(°C)	Method	Comment	Ref.
19.18 Tetraammine(aqua)hydroxyplatinum(III) ion — Continued								
19.18.3 Hydroxide ion								
	$\text{Pt}(\text{NH}_3)_4(\text{H}_2\text{O})(\text{OH})^{2+} + \text{OH}^- \rightarrow \text{Pt}(\text{NH}_3)_4(\text{OH})_2^{+} + \text{H}_2\text{O}$	8.3×10^9	7-	9.6	~23	p.r.	D.k. at 270-290 nm, p.b.k. at 340-530 nm and decrease in condy. in N ₂ O-satd. soln. contg. 1.1 or 5.0×10^{-4} mol L ⁻¹ . Pt(NH ₃) ₄ ²⁺ ; effect of [OH ⁻]; reaction in competition with H ₂ O elimination to give Pt(NH ₃) ₃ (NH ₂) ²⁺ ; $k_r = 5 \times 10^5$ s ⁻¹ ; pK _a of Pt(NH ₃) ₄ (H ₂ O)(OH) ²⁺ = ~9.8.	82A074
19.19 Tetraamminebis(hydroxy)platinum(III) ion								
19.19.1 First-order reaction								
	$\text{Pt}(\text{NH}_3)_4(\text{OH})_2^{+} \rightarrow$	1.8×10^6 s ⁻¹	8.7		~23	p.r.	Absorption and condy. change in soln. contg. <i>tert</i> -BuOH and <i>trans</i> -Pt(NH ₃) ₄ (OH) ₂ ²⁺ . Reaction may represent competition between NH ₃ elimination and proton transfer from water to give Pt(NH ₃) ₄ (H ₂ O) ₂ ³⁺ .	82A074
19.20 Tetraamminebis(aqua)platinum(III) ion								
19.20.1 Tetraamminebis(aqua)platinum(III) ion								
	$\text{Pt}(\text{NH}_3)_4(\text{H}_2\text{O})_2^{3+} + \text{Pt}(\text{NH}_3)_4(\text{H}_2\text{O})_2^{3+} \rightarrow$	1.4×10^6	3.3		~23	p.r.	D.k. at 260 nm and increase in condy. in N ₂ O-satd. soln. contg. Pt(NH ₃) ₄ ²⁺ ; pK _a of Pt(NH ₃) ₄ (H ₂ O) ₂ ³⁺ = ~6.4, ~9.8.	82A074
19.20.2 Chloride ion								
	$\text{Pt}(\text{NH}_3)_4(\text{H}_2\text{O})_2^{3+} + \text{Cl}^- \rightarrow \text{Pt}(\text{NH}_3)_4(\text{H}_2\text{O})\text{Cl}^{2+} + \text{H}_2\text{O}$	1.9×10^9	3.35,	3.7	~23	p.r.	P.b.k. at 270 nm in N ₂ O-satd. soln. contg. Pt(NH ₃) ₄ ²⁺ and 1 or 4×10^{-5} mol L ⁻¹ Cl ⁻ ; product decays by second-order kinetics with $k = 7.5 \times 10^6$ L mol ⁻¹ s ⁻¹ .	86A017
19.21 Tetraammineplatinum(II), Cl₂^{..} reaction product								
19.21.1 First-order reaction								
	$\text{Pt}(\text{NH}_3)_4^{2+}/\text{Cl}_2^{..} \rightarrow$	7.6×10^3 s ⁻¹	0.3			p.r.	D.k. at 270 nm in He-satd. soln. contg. 2 $\times 10^{-4}$ mol L ⁻¹ Pt(NH ₃) ₄ ²⁺ and 0.5 mol L ⁻¹ HCl. Reaction may represent equilibration between Pt(NH ₃) ₄ Cl ₂ ⁺ and Pt(NH ₃) ₄ (H ₂ O)Cl ²⁺ ; a subsequent complex decay has been approximated to a second-order decay, $k \sim 1 \times 10^7$ L mol ⁻¹ s ⁻¹ at 270 nm.	86A017
19.22 <i>cis</i>-Diamminedichloroplatinum(II), OH reaction product								
19.22.1 First-order reaction								
	$\text{cis-Pt}(\text{NH}_3)_2\text{Cl}_2/\text{OH} \rightarrow$	3.4×10^4 s ⁻¹				p.r.	D.k. in N ₂ O-satd. soln. contg. <i>cis</i> -Pt(NH ₃) ₂ Cl ₂ ; reaction may represent loss of one Cl ⁻ ; for loss of second Cl ⁻ , $k = 370$ s ⁻¹ . Product decays by second-order kinetics, probably disproportionation, $k = 1.8 \times 10^7$ L mol ⁻¹ s ⁻¹ .	85A090
19.23 <i>trans</i>-Diamminedichloroplatinum(II), OH reaction product								
19.23.1 First-order reaction								
	$\text{trans-Pt}(\text{NH}_3)_2\text{Cl}_2/\text{OH} \rightarrow$	6.3×10^4 s ⁻¹				p.r.	D.k. in N ₂ O-satd. soln. contg. <i>trans</i> -Pt(NH ₃) ₂ Cl ₂ ; reaction may represent loss of one Cl ⁻ ; for loss of second Cl ⁻ , $k = 810$ s ⁻¹ . Product decays by second-order kinetics, probably disproportionation, $k = 8 \times 10^7$ L mol ⁻¹ s ⁻¹ .	85A090

TABLE 19. Rate constants for platinum transients — Continued

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t(\text{°C})$	Method	Comment	Ref.
19.24 <i>cis</i>-Dichlorobis(isopropylamine)-<i>trans</i>-dihydroxyplatinate(III) ion								
19.24.1	First-order reaction							
	$\text{cis-PtCl}_2(\text{OH})_2(2\text{-PrNH}_2)_2^- \rightarrow$	$6.0 \times 10^6 \text{ s}^{-1}$				p.r.	P.b.k. at 390 nm in deaerated soln. contg. $\text{cis-PtCl}_2(\text{OH})_2(2\text{-PrNH}_2)_2^-$ and 1.0 mol L^{-1} <i>tert</i> -BuOH; reaction may represent loss of one Cl^- ; for loss of second Cl^- , $k = 1200 \text{ s}^{-1}$. Product decays by second-order kinetics, probably disproportionation, $k = 6.5 \times 10^6 \text{ L mol}^{-1} \text{ s}^{-1}$.	85A090
19.25 Tetrachloroplatinate(II), Cl_2^{++} reaction product								
19.25.1	First-order reaction							
	$\text{PtCl}_4^{2-}/\text{Cl}_2^{++} \rightarrow$	$3 \times 10^5 \text{ s}^{-1}$	0.3		-25	p.r.	D.k. in soln. contg. PtCl_4^{2-} and 0.5 mol L^{-1} HCl; reaction probably associated with change in number of chloride ligands and/or substitution of Cl^- by H_2O ; followed by second-order reaction, $k = \sim 1 \times 10^9 \text{ L mol}^{-1} \text{ s}^{-1}$.	751188
19.25.2	Copper(II) ions							
	$\text{PtCl}_4^{2-}/\text{Cl}_2^{++} + \text{Cu(II)} \rightarrow$	1.5×10^8	0.3	0.5	-25	p.r.	D.k. in soln. contg. $(1\text{-}2)} \times 10^{-4} \text{ mol L}^{-1}$ PtCl_4^{2-} , 0.5 mol L^{-1} HCl and $(0.5\text{-}1.2)} \times 10^{-4} \text{ mol L}^{-1}$ CuCl_2 .	751188
19.26 Hexachloroplatinate(III) ion								
19.26.1	Water							
	$\text{PtCl}_6^{3-} + 2 \text{H}_2\text{O} \rightarrow \text{PtCl}_4(\text{H}_2\text{O})(\text{OH})^{2-} + \text{H}^+ + 2 \text{Cl}^-$	* $4.8 \times 10^5 \text{ s}^{-1}$	4.4,		20-28	p.r.	D.k. at 279-309 nm and p.b.k. at 435-450 nm in Ar-satd. soln. contg. 0.11 or 0.51 mol L^{-1} <i>tert</i> -BuOH and 1 or $3.8 \times 10^{-4} \text{ mol L}^{-1}$ PtCl_6^{3-} ; condy. increase gave $k = 4.2 \times 10^5 \text{ s}^{-1}$; pK_a of $\text{PtCl}_4(\text{H}_2\text{O})_2^- = 3.5$ [87A472].	89A203
		* $1.1 \times 10^5 \text{ s}^{-1}$	5.9		-20	p.r.	P.b.k. at 410 nm, d.k. at 440 nm, condy. increase (in acidic soln.) and decrease (in alkaline soln.) in Ar-satd. soln. contg. $\sim 1 \times 10^{-4} \text{ mol L}^{-1}$ PtCl_6^{3-} and 0.01 mol L^{-1} <i>tert</i> -BuOH.	89A250
							* Unexplained discrepancy in these data.	
19.27 Pentachloroplatinate(III) ion								
19.27.1	First-order reaction							
	$\text{PtCl}_5^{2-} \rightarrow$	$4.8 \times 10^9 \text{ s}^{-1}$	2			f.p.	D.k. at 450-460 and 635-644 nm in aerated soln. contg. $5 \times 10^{-3} \text{ mol L}^{-1}$ PtCl_5^{2-} and $1 \times 10^{-2} \text{ mol L}^{-1}$ HClO_4 . Reaction suggested to represent solvation or aquation.	87A088
19.28 Aquapentachloroplatinate(III) ion								
19.28.1	Water							
	$\text{PtCl}_5(\text{H}_2\text{O})^{2-} + \text{H}_2\text{O} \rightarrow \text{PtCl}_4(\text{H}_2\text{O})_2^- + \text{Cl}^-$	$5 \times 10^5 \text{ s}^{-1}$	2.6		20-28	p.r.	P.b.k. at 450 nm in Ar-satd. soln. contg. 0.11 mol L^{-1} <i>tert</i> -BuOH and 0.98 or 2.0 $\times 10^{-4} \text{ mol L}^{-1}$ PtCl_6^{3-} . Reaction suggested to be preceded by Cl-abstraction by H-atom.	89A203
		$4.8 \times 10^5 \text{ s}^{-1}$	3.0-			f.p.	P.b.k. at 435 nm in soln. contg. $4.0 \times 10^{-5} \text{ mol L}^{-1}$ PtCl_6^{3-} . Reaction suggested to be preceded by rapid hydration of PtCl_5^{2-} .	89A203

TABLE 19. Rate constants for platinum transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.								
19.29 Aquatetrachlorohydroxyplatinate(III) ion																
19.29.1 First-order reaction																
	* PtCl ₄ (H ₂ O)(OH) ²⁻ → PtCl ₂ (OH) ₂ ⁻ + H ⁺ + 2 Cl ⁻	1.5 × 10 ⁵ s ⁻¹	2.2-2.6		20-28 p.r.	P.b.k. at 410-470 nm in Ar-satd. soln. contg. 0.11 mol L ⁻¹ <i>tert</i> -BuOH and (1-2) × 10 ⁻⁴ mol L ⁻¹ PtCl ₆ ²⁻ ; condy. increase gave <i>k</i> = 1.3 × 10 ⁵ s ⁻¹ .	89A203									
		1.4 × 10 ⁵ s ⁻¹	2.0-4.5		20-28 f.p.	P.b.k. at 400-480 nm in Ar-satd. soln. contg. (1-8) × 10 ⁻⁵ mol L ⁻¹ PtCl ₆ ²⁻ ; condy. increase gave <i>k</i> = 1.7 × 10 ⁵ s ⁻¹ .	89A203									
		1.4 × 10 ⁵ s ⁻¹	3.4-4.6		20-28 p.r.	P.b.k. at 259-470 nm in N ₂ O-satd. soln. contg. (8.5-51) × 10 ⁻⁵ mol L ⁻¹ PtCl ₄ ²⁻ ; condy. increase gave <i>k</i> = 1.4 × 10 ⁵ s ⁻¹ ; <i>k</i> = 1.2 × 10 ⁵ s ⁻¹ at pH 9 (1 × 10 ⁵ s ⁻¹ by condy.); <i>k</i> = 4 × 10 ⁴ s ⁻¹ at pH 10; <i>k</i> = 1.2 × 10 ⁴ s ⁻¹ at pH 11.1; in alkaline soln. transient could be PtCl ₄ (OH) ₂ ³⁻ .	89A203									
		1.1 × 10 ⁵ s ⁻¹	4.0-5.1		20-28 p.r.	P.b.k. at 369-480 nm in Ar-satd. soln. contg. 0.11 mol L ⁻¹ <i>tert</i> -BuOH and (1-4) × 10 ⁻⁴ mol L ⁻¹ PtCl ₆ ²⁻ ; condy. increase gave <i>k</i> = 1.1 × 10 ⁵ s ⁻¹ .	89A203									
	* For a different interpretation of this process and structure of the reactant see the following entry.															
19.30 Tetrachlorohydroxyplatinate(III)																
19.30.1 Water																
	* PtCl ₄ (OH) ²⁻ + H ₂ O → PtCl ₄ (OH) ₂ ³⁻ + H ⁺	1.6 × 10 ⁵ s ⁻¹	5-9		p.r.	P.b.k. at 410 nm, d.k. at 450 nm and condy. increase (in acidic soln.) and decrease (in alkaline soln.) in N ₂ O-satd. soln. contg. ~1 × 10 ⁴ mol L ⁻¹ PtCl ₄ ²⁻ .	89A250									
	* For a different interpretation of this process and structure of the reactant see the previous entry.															
19.31 Dichlorobis(hydroxy)platinate(III) ion																
19.31.1 Ferrocyanide ion																
	PtCl ₂ (OH) ₂ ⁻ + Fe(CN) ₆ ⁴⁻ →	8.2 × 10 ⁵	5.8-6.0	→0	20-28 p.r.	D.k. at 410 nm in N ₂ O-satd. soln. contg. 5 × 10 ⁻⁴ mol L ⁻¹ PtCl ₄ ²⁻ and (2.5-5.0) × 10 ⁻⁵ mol L ⁻¹ Fe(CN) ₆ ⁴⁻ .	89A203									
19.32 Tetrabromo(hydroxy)platinate(III) ion																
19.32.1 Water																
	PtBr ₄ (OH) ²⁻ + H ₂ O → PtBr ₄ (OH) ₂ ³⁻ + H ⁺	1.0 × 10 ⁵ s ⁻¹			p.r.	D.k. at 530 nm, p.b.k. at 420 nm and condy. change at pH 3.7 and 8.5 and 21 °C, in N ₂ O-satd. soln. contg. 1 × 10 ⁻⁴ mol L ⁻¹ PtBr ₄ ²⁻ .	92A259									
19.33 Hexabromoplatinate(III) ion																
19.33.1 Water																
	PtBr ₆ ³⁻ + H ₂ O → PtBr ₅ (OH) ³⁻ + H ⁺ + Br ⁻	3.7 × 10 ⁴ s ⁻¹			p.r.	D.k. at 540 nm and p.b.k. at 440 nm in Ar-satd. soln. contg. 0.1 mol L ⁻¹ <i>tert</i> -BuOH and 0.001 mol L ⁻¹ PtBr ₆ ²⁻ and condy. change in Ar-satd. soln. contg. 1 × 10 ⁻⁴ mol L ⁻¹ PtBr ₆ ²⁻ at pH 4.0 and 9.25.	92A259									

TABLE 19. Rate constants for platinum transients — Continued

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	t (°C)	Method	Comment	Ref.
19.34 Bis(ethylenediamine)platinum(II), Cl_2^{+} reaction product								
19.34.1	First-order reaction							
	$\text{Pt(en)}_2^{2+}/\text{Cl}_2^{+} \rightarrow$	$1.3 \times 10^3 \text{ s}^{-1}$	0.3		~25	p.r.	D.k. in deaerated soln. contg. Pt(en)_2^{2+} and $0.5 \text{ mol L}^{-1} \text{ HCl}$; followed by another first-order reaction, $k = 7.7 \text{ s}^{-1}$.	751188
19.34.2	Copper(II) ion							
	$\text{Pt(en)}_2^{2+}/\text{Cl}_2^{+} + \text{Cu(II)} \rightarrow$	2×10^8	0.3	0.5	~25	p.r.	D.k. in deaerated soln. contg. $(1\text{-}2) \times 10^{-4} \text{ mol L}^{-1} \text{ Pt(en)}_2^{2+}$, $0.5 \text{ mol L}^{-1} \text{ HCl}$ and $(5\text{-}12) \times 10^{-5} \text{ mol L}^{-1} \text{ CuCl}_2$.	751188
19.34.3	Iron(II) ions							
	$\text{Pt(en)}_2^{2+}/\text{Cl}_2^{+} + \text{Fe(II)} \rightarrow$	2.5×10^5	0.3	0.5	~25	p.r.	D.k. in deaerated soln. contg. $(1\text{-}2) \times 10^{-4} \text{ mol L}^{-1} \text{ Pt(en)}_2^{2+}$, $0.5 \text{ mol L}^{-1} \text{ HCl}$ and $6.1 \times 10^{-4} \text{ mol L}^{-1} \text{ FeCl}_2$.	751188
19.35 Chlorobis(ethylenediamine)platinum(III) ion								
19.35.1	Chlorobis(ethylenediamine)platinum(III) ion							
	$\text{Pt(en)}_2\text{Cl}^{2+} + \text{Pt(en)}_2\text{Cl}^{2+} \rightarrow$	1.8×10^7	3.3		23	p.r.	D.k. at 260 nm and condy. increase in N_2O -satd. soln. contg. $1 \times 10^{-4} \text{ mol L}^{-1} \text{ Pt(en)}_2^{2+}$ and $(1\text{-}2) \times 10^{-5} \text{ mol L}^{-1} \text{ Cl}^-$.	80A286
		2.5×10^7	3.4			p.r.	D.k. in N_2O -satd. soln. contg. Pt(en)_2^{2+} and $10^{-5} \text{ mol L}^{-1} \text{ Cl}^-$.	80A286
		2.1×10^7	2.0			f.p.	D.k. in soln. contg. $\text{Pt(en)}_2\text{Cl}_2^{2+}$, $(0\text{-}1) \times 10^{-5} \text{ mol L}^{-1} \text{ Cl}^-$ and $0\text{-}0.5 \text{ mol L}^{-1} \text{ tert-BuOH}$.	80A286
		2.2×10^7	2		~25	p.r.	D.k. at 260-300 nm in soln. contg. $(8\text{-}20) \times 10^{-4} \text{ mol L}^{-1} \text{ trans-Pt(en)}_2\text{Cl}_2^{2+}$, $0.01 \text{ mol L}^{-1} \text{ HClO}_4$ and $0.11\text{-}2 \text{ mol L}^{-1} \text{ tert-BuOH}$.	751188
19.35.2	Copper(II) ion							
	$\text{Pt(en)}_2\text{Cl}^{2+} + \text{Cu(II)} \rightarrow$	2.7×10^5	2.1			p.r.	D.k. at 260 and 280 nm in N_2O -satd. soln. contg. $(1.83\text{-}9.86) \times 10^{-4} \text{ mol L}^{-1} \text{ Pt(en)}_2^{2+}$, $5 \times 10^{-6} \text{ mol L}^{-1} \text{ Cl}^-$ and 1.3 or $2.25 \times 10^{-4} \text{ mol L}^{-1} \text{ Cu}^{2+}$. Mechanism of reaction may be complex as the rate constants were appreciably higher (25-50%) at the lower [Cu(II)] employed.	761093
		3.2×10^5	2.0			f.p.	D.k. at 260-280 nm in N_2O -satd. soln. contg. $(0.85\text{-}1.28) \times 10^{-4} \text{ mol L}^{-1} \text{ Pt(en)}_2\text{Cl}_2^{2+}$, 1 or $2 \times 10^{-4} \text{ mol L}^{-1} \text{ Cu}^{2+}$ and $0.5 \text{ mol L}^{-1} \text{ tert-BuOH}$. Mechanism of reaction may be complex as the rate constants were appreciably higher (25-50%) at the lower [Cu(II)] employed.	761093
19.36 quabis(ethylenediamine)hydroxyplatinum(III) ion								
19.36.1	First-order reaction							
	$\text{Pt(en)}_2(\text{H}_2\text{O})(\text{OH})^{2+} \rightarrow \text{Pt(en)(en-H)}^{2+} + 2 \text{H}_2\text{O}$	$3 \times 10^5 \text{ s}^{-1}$	<4.5		~23	p.r.	D.k. at 260 nm, p.b.k. at 340 nm and condy. change in N_2O -satd. soln. contg. Pt(en)_2^{2+} .	80A286
		$2.5 \times 10^5 \text{ s}^{-1}$	4.0-9.6			p.r.	D.k. in N_2O -satd. soln. contg. $(2.5\text{-}5.1) \times 10^{-4} \text{ mol L}^{-1} \text{ Pt(en)}_2^{2+}$; average of two values obtained as intercepts from plots of k_{obs} vs $[\text{H}^+]$ and $[\text{OH}^-]$, respectively.	761093
19.36.2	Hydroxide ion							
	$\text{Pt(en)}_2(\text{H}_2\text{O})(\text{OH})^{2+} + \text{OH}^- \rightarrow \text{Pt(en)(en-H)}^{2+} + 2 \text{H}_2\text{O} + \text{OH}^-$	3.1×10^{10}	7.0-9.6			p.r.	Effect of $[\text{OH}^-]$ on d.k. in N_2O -satd. soln. contg. $(2.5\text{-}5.1) \times 10^{-4} \text{ mol L}^{-1} \text{ Pt(en)}_2^{2+}$.	80A286 761093

TABLE 19. Rate constants for platinum transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
19.36 Aquabis(ethylenediamine)hydroxyplatinum(III) ion — Continued								
19.36.3 Hydrogen ion								
Pt(en) ₂ (H ₂ O)(OH) ²⁺ + H ⁺ →	4.2 × 10 ⁹	4.0-				p.r.	D.k. in N ₂ O-satd. soln. contg. (2.5-5.0) × 10 ⁻⁴ mol L ⁻¹ Pt(en) ₂ ²⁺ ; <i>k</i> _r = 6.6 × 10 ² s ⁻¹ .	80A286
Pt(en) ₂ (H ₂ O) ₂ ³⁺		7.0						761093
	5.4 × 10 ⁹	<4.5			~23	p.r.	D.k. at 260 nm, p.b.k. at 340 nm and condy change in N ₂ O-satd. soln. contg. Pt(en) ₂ ²⁺ .	80A286
19.37 Bis(ethylenediamine)platinum(III) ion, deprotonated								
19.37.1 Bis(ethylenediamine)platinum(III) ion, deprotonated								
Pt(en)(en-H) ²⁺ + Pt(en)(en-H) ²⁺ →	8.0 × 10 ⁵	4.4-			~23	p.r.	D.k. or condy. change (pH 8.9-10.5) in N ₂ O-satd. soln. contg. Pt(en) ₂ ²⁺ .	80A286
	7.5 × 10 ⁵	2.9-				p.r.	D.k. at 330-480 nm in N ₂ O-satd. soln. contg. (1.83-9.86) × 10 ⁻⁴ mol L ⁻¹ Pt(en) ₂ ²⁺ and (0-2) × 10 ⁻³ mol L ⁻¹ Cl ⁻ .	761093
19.37.2 Copper(II) ion								
Pt(en)(en-H) ²⁺ + Cu(II) →	<10 ⁴	6.3-				p.r.	D.k. at 480 nm in N ₂ O-satd. soln. contg. (1.83-9.86) × 10 ⁻⁴ mol L ⁻¹ Pt(en) ₂ ²⁺ and 1.6 × 10 ⁻⁴ mol L ⁻¹ Cu ²⁺ .	761093
19.37.3 Ferrocyanide ion								
Pt(en)(en-H) ²⁺ + Fe(CN) ₆ ⁴⁻ →	2.3 × 10 ⁸	6.3-				p.r.	D.k. at 480 nm in N ₂ O-satd. soln. contg. (1.83-9.86) × 10 ⁻⁴ mol L ⁻¹ Pt(en) ₂ ²⁺ and 2.4 × 10 ⁻⁵ mol L ⁻¹ Fe(CN) ₆ ⁴⁻ ; formation of Fe(CN) ₆ ³⁻ observed.	761093
19.37.4 Oxygen								
Pt(en)(en-H) ²⁺ + O ₂ →	<10 ⁵	6.3-				p.r.	D.k. at 340 and 480 nm in N ₂ O-satd. soln. contg. (1.83-9.86) × 10 ⁻⁴ mol L ⁻¹ Pt(en) ₂ ²⁺ and 1.8 × 10 ⁻⁴ mol L ⁻¹ O ₂ .	761093
19.37.5 1-Hydroxy-1-methylethyl								
Pt(en)(en-H) ²⁺ + (CH ₃) ₂ COH →	6.5 × 10 ⁹	4.5,8.5			~23	p.r.	D.k. at 340 and 480 nm in deaerated soln. contg. Pt(en) ₂ (OH) ₂ ²⁺ and 2-PrOH. Value obtained from computer fit. Rate constants independent of concentrations of complex and alcohol.	80A286
19.37.6 2-Hydroxy-2,2-dimethylethyl								
Pt(en)(en-H) ²⁺ + *CH ₂ C(CH ₃) ₂ OH →	4 × 10 ⁹	4.5,8.5			~23	p.r.	D.k. at 340 and 480 nm in deaerated soln. contg. Pt(en) ₂ (OH) ₂ ²⁺ and <i>tert</i> -BuOH. Value obtained from computer fit. Rate constants independent of concentrations of complex and alcohol.	80A286
19.38 Diaquabis(ethylenediamine)platinum(III) ion								
19.38.1 Chloride ion								
Pt(en) ₂ (H ₂ O) ₂ ³⁺ + Cl ⁻ →	~3 × 10 ⁸		3.3			p.r.	P.b.k. at 260 nm and condy. change in N ₂ O-satd. soln. contg. 1 × 10 ⁻⁴ mol L ⁻¹ Pt(en) ₂ ²⁺ and 1 or 2 × 10 ⁻⁵ mol L ⁻¹ Cl ⁻ ; <i>k</i> _r ~ 10 ³ s ⁻¹ .	80A286
Pt(en) ₂ (H ₂ O)Cl ²⁺ + H ₂ O								
19.39 Chloro(diethylenetriamine)platinum(II), Cl₂^{..-} reaction product								
19.39.1 Copper(II) ions								
Pt(dien)Cl ⁺ /Cl ₂ ^{..-} + Cu(II) →	3.2 × 10 ⁸	0.3			~25	p.r.	D.k. in deaerated soln. contg. Pt(dien)Cl ⁺ , 0.5 mol L ⁻¹ HCl and (0.5-1.2) × 10 ⁻⁴ mol L ⁻¹ CuCl ₂ .	751188

TABLE 19. Rate constants for platinum transients—Continued

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t^\circ(\text{C})$	Method	Comment	Ref.
19.39 Chloro(diethylenetriamine)platinum(II), Cl_2^{+} reaction product — Continued								
19.39.2 Chloro(diethylenetriamine)platinum(II), Cl_2^{+} reaction product								
	$\text{Pt}(\text{dien})\text{Cl}^+/\text{Cl}_2^{+} + \text{Pt}(\text{dien})\text{Cl}^+/\text{Cl}_2^{+} \rightarrow$	3.4×10^8	0.3		~25	p.r.	D.k. in deaerated soln. contg. $\text{Pt}(\text{dien})\text{Cl}^+$, $0.5 \text{ mol L}^{-1} \text{ HCl}$ and $0.1\text{-}0.2 \text{ mol L}^{-1} 2\text{-PrOH}$; unclear whether k or $2k$.	751188
19.40 Chloro(diethylenetriamine)platinum(II), OH reaction product								
19.40.1 First-order reaction								
	$\text{Pt}(\text{dien})\text{Cl}^+/\text{OH} \rightarrow$	$4.8 \times 10^3 \text{ s}^{-1}$				p.r.	D.k. at 270 nm in N_2O -satd. soln. contg. $1.1 \times 10^{-4} \text{ mol L}^{-1} \text{ Pt}(\text{dien})\text{Cl}^+$; followed by an intermediate complex decay and by a second-order decay with $k = 3.8 \times 10^4 \text{ L mol}^{-1} \text{ s}^{-1}$.	761093
19.41 Diethylenetriamine(pyridine)platinum(II) ion OH-adduct								
19.41.1 First-order reaction								
	$[\text{Pt}(\text{dien})\text{pyOH}]^{2+} \rightarrow$	$1.5 \times 10^5 \text{ s}^{-1}$	3.5 9.7			p.r.	D.k. at 280 nm in N_2O -satd. soln. contg. $(2\text{-}25) \times 10^{-5} \text{ mol L}^{-1} \text{ Pt}(\text{dien})\text{py}^{2+}$.	78A363
19.41.2 Diethylenetriamine(pyridine)platinum(II) ion								
	$[\text{Pt}(\text{dien})\text{pyOH}]^{2+} + \text{Pt}(\text{dien})\text{py}^{2+} \rightarrow$	-3×10^9	3.5 9.7			p.r.	D.k. at 280 nm in N_2O -satd. soln. contg. $(2\text{-}25) \times 10^{-5} \text{ mol L}^{-1} \text{ Pt}(\text{dien})\text{py}^{2+}$.	78A363
19.42 Chloro(tetraethyl-diethylenetriamine)platinum(II), Cl_2^{+} reaction product								
19.42.1 Copper(II) ions								
	$\text{Pt}(\text{Et}_4\text{dien})\text{Cl}^+/\text{Cl}_2^{+} + \text{Cu}(\text{II}) \rightarrow$	1.5×10^7	0.3		~25	p.r.	D.k. in soln. contg. $(1\text{-}2) \times 10^{-4} \text{ mol L}^{-1} \text{ Pt}(\text{Et}_4\text{dien})\text{Cl}^+$, $(0.5\text{-}1.2) \times 10^{-4} \text{ mol L}^{-1} \text{ CuCl}_2$ and $0.5 \text{ mol L}^{-1} \text{ HCl}$.	751188
19.42.2 Chloro(tetraethyl-diethylenetriamine)platinum(II), Cl_2^{+} reaction product								
	$\text{Pt}(\text{Et}_4\text{dien})\text{Cl}^+/\text{Cl}_2^{+} +$	-4×10^5	0.3		~25	p.r.	D.k. in soln. contg. $\text{Pt}(\text{Et}_4\text{dien})\text{Cl}^+$, $0.1\text{-}0.2 \text{ mol L}^{-1} 2\text{-PrOH}$ and $0.5 \text{ mol L}^{-1} \text{ HCl}$; unclear whether k or $2k$.	751188
19.43 Chloro(tetraethyl-diethylenetriamine)platinum(II), OH reaction product								
19.43.1 First-order reaction								
	$\text{Pt}(\text{Et}_4\text{dien})\text{Cl}^+/\text{OH} \rightarrow$	1.8 s^{-1}			~25	p.r.	D.k. at 280 and 360 nm and p.b.k. at 520 nm in N_2O -satd. soln. contg. 1.87 or $3.74 \times 10^{-4} \text{ mol L}^{-1} \text{ Pt}(\text{Et}_4\text{dien})\text{Cl}^+$; preceded by other undefined processes.	761093
19.44 1,8-Diamino-3,6,10,13,16,19-hexaazabicyclo[6.6.6]eicosaneplatinum(III) ion								
19.44.1 First-order reaction								
	$\text{Pt}(\text{diamsar})^{3+} \rightarrow$	$6 \times 10^3 \text{ s}^{-1}$	6,8,10			p.r.	D.k. at 390 nm in He-satd. soln. contg. $\text{Pt}(\text{diamsar})^{4+}$ and $0.1 \text{ mol L}^{-1} \text{ tert-BuOH}$.	83A148
19.45 cis-Bis(glycinato)platinum(II), OH reaction product								
19.45.1 First-order reaction								
	$\text{cis-Pt}(\text{Gly})_2/\text{OH} \rightarrow$	$1.1 \times 10^3 \text{ s}^{-1}$	2.9		~25	p.r.	Absorbance changes at 250-260 and 340-390 nm in N_2O -satd. soln. contg. $2.5 \times 10^{-4} \text{ mol L}^{-1} \text{ cis-Pt}(\text{Gly})_2$; subsequent changes at 290-330 and 400-420 nm gave $k = 4.2 \times 10^2 \text{ s}^{-1}$.	771053

TABLE 19. Rate constants for platinum transients — Continued

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t(\text{°C})$	Method	Comment	Ref.	
19.45 <i>cis</i>-Bis(glycinato)platinum(II), OH reaction product — Continued									
19.45.1 First-order reaction — Continued									
		$2.2 \times 10^6 \text{ s}^{-1}$	5.7-10		~25	p.r.	P.b.k. at 305-520 nm in N_2O -satd soln. contg. $(2.4-4.35) \times 10^{-4} \text{ mol L}^{-1} \text{ cis-Pt(Gly)}_2$. At pH 10, $k = 7.2 \times 10^4 \text{ s}^{-1}$ from d.k. at 270-300 nm in soln. contg. $1.9 \times 10^{-4} \text{ mol L}^{-1} \text{ cis-Pt(gly)}_2$. At pH 4.8-10, $k = 2.0 \times 10^4 \text{ L mol}^{-1} \text{ s}^{-1}$ from d.k. at 310-540 nm in soln. contg. $(0.8-9.4) \times 10^{-4} \text{ mol L}^{-1} \text{ cis-Pt(gly)}_2$.		771053
19.45.2 Copper(II) ion									
	$\text{cis-Pt(Gly)}_2/\text{OH} + \text{Cu(II)} \rightarrow$	1.7×10^7	3.0		~25	p.r.	P.b.k. at 360 and 520 nm in N_2O -satd. soln. contg. $(1.09-3.08) \times 10^{-4} \text{ mol L}^{-1} \text{ cis-Pt(Gly)}_2$ and 1.2 or $3.4 \times 10^{-4} \text{ mol L}^{-1} \text{ Cu(ClO}_4)_2$.	771053	
19.45.3 Ferrocyanide ion									
	$\text{cis-Pt(Gly)}_2/\text{OH} + \text{Fe(CN)}_6^{4-} \rightarrow$	3.7×10^9	2.9		~25	p.r.	D.k. at 260 and 270 nm and p.b.k. at 340-430 nm in N_2O -satd. soln. contg. $(1.09-3.08) \times 10^{-4} \text{ mol L}^{-1} \text{ cis-Pt(Gly)}_2$ and 1.2 or $1.7 \times 10^{-5} \text{ mol L}^{-1} \text{ K}_4\text{Fe(CN)}_6$; variation of k with wavelength indicates some complexity.	771053	
		3.0×10^8			~25	p.r.	P.b.k. at 340-520 nm in N_2O -satd. soln. contg. $(1.09-3.08) \times 10^{-4} \text{ mol L}^{-1} \text{ cis-Pt(Gly)}_2$ and 3.2 or $9.1 \times 10^{-5} \text{ mol L}^{-1} \text{ K}_4\text{Fe(CN)}_6$; kinetics could be fitted to two consecutive reactions, the second with $k = 3.7 \times 10^7 \text{ L mol}^{-1} \text{ s}^{-1}$.	771053	
19.46 <i>trans</i>-Bis(glycinato)platinum(II), OH reaction product									
19.46.1 First-order reaction									
	$\text{trans-Pt(Gly)}_2/\text{OH} \rightarrow$	$1.9 \times 10^3 \text{ s}^{-1}$	2.9,3.0		~25	p.r.	Absorbance changes at 250-280 and 300-630 nm in N_2O -satd. soln. contg. $(0.88$ or $1.29) \times 10^{-4} \text{ mol L}^{-1} \text{ trans-Pt(Gly)}_2$. At pH 3.6, $k = 3.2 \times 10^3 \text{ s}^{-1}$ for $1.46 \times 10^{-4} \text{ mol L}^{-1} \text{ trans-Pt(Gly)}_2$; at pH 4.1, $k = 4.1 \times 10^3 \text{ s}^{-1}$ for $2.5 \times 10^{-4} \text{ mol L}^{-1} \text{ trans-Pt(Gly)}_2$. At pH 3-4.1 subsequent changes at 260-310 nm gave $k = 2.4 \times 10^2 \text{ s}^{-1}$ for $(0.88-2.5) \times 10^{-4} \text{ mol L}^{-1} \text{ trans-Pt(Gly)}_2$. At pH 2.9-4.3, $k = 3.5 \times 10^5 \text{ L mol}^{-1} \text{ s}^{-1}$ in soln. contg. $(0.57-2.5) \times 10^{-4} \text{ mol L}^{-1} \text{ trans-Pt(Gly)}_2$. At pH ~5.7 and 6.3, $k = 1.6 \times 10^9 \text{ L mol}^{-1} \text{ s}^{-1}$ in soln. contg. $(0.97-2.16) \times 10^{-4} \text{ mol L}^{-1} \text{ trans-Pt(Gly)}_2$. At pH 10, $k = \sim 9 \times 10^5 \text{ s}^{-1}$ from changes at 320-480 nm and $k = \sim 1 \times 10^5 \text{ s}^{-1}$ from changes at 250-480 nm in soln. contg. $(0.46-1.02) \times 10^{-4} \text{ mol L}^{-1} \text{ trans-Pt(Gly)}_2$. At pH 9 and ~10, $k = 6.5 \times 10^8 \text{ L mol}^{-1} \text{ s}^{-1}$ from changes at 300-520 nm in soln. contg. $(0.46-1.97) \times 10^{-4} \text{ mol L}^{-1} \text{ trans-Pt(Gly)}_2$.	771053	
19.46.2 Copper(II) ion									
	$\text{trans-Pt(Gly)}_2/\text{OH} + \text{Cu(II)} \rightarrow$	4.2×10^3	2.9		~25	p.r.	D.k. at 260 nm in N_2O -satd. soln. contg. $(1.09-3.08) \times 10^{-4} \text{ mol L}^{-1} \text{ trans-Pt(Gly)}_2$ and 0.82 or $1.47 \times 10^{-4} \text{ mol L}^{-1} \text{ Cu(ClO}_4)_2$; species involved represents second transient.	771053	

TABLE 19. Rate constants for platinum transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	t(°C)	Method	Comment	Ref.
19.46 <i>trans</i>-Bis(glycinato)platinum(II), OH reaction product — Continued								
19.46.3	Copper(II) ions							
	<i>trans</i> -Pt(Gly) ₂ /OH + Cu(II) →	9.9 × 10 ⁶	10.0		~25	p.r.	P.b.k. at 370 nm in N ₂ O-satd. soln. contg. (1.09-3.08) × 10 ⁻⁴ mol L ⁻¹ <i>trans</i> -Pt(Gly) ₂ and 0.58 or 2.42 × 10 ⁻⁴ mol L ⁻¹ Cu(ClO ₄) ₂ .	771053
19.46.4 Ferrocyanide ion								
	<i>trans</i> -Pt(Gly) ₂ /OH + Fe(CN) ₆ ⁴⁻ →	2.5 × 10 ⁹	3.3		~25	p.r.	D.k. at 270-300 nm and p.b.k. at 320-440 nm in N ₂ O-satd. soln. contg. (1.09-3.08) × 10 ⁻⁴ mol L ⁻¹ <i>trans</i> -Pt(Gly) ₂ and 1.0 or 3.3 × 10 ⁻⁵ mol L ⁻¹ K ₄ Fe(CN) ₆ .	771053
		3.8 × 10 ⁹	8.4		~25	p.r.	D.k. at 260-280 nm in N ₂ O-satd. soln. contg. (1.09-3.08) × 10 ⁻⁴ mol L ⁻¹ <i>trans</i> -Pt(Gly) ₂ and 2.2 × 10 ⁻⁵ mol L ⁻¹ K ₄ Fe(CN) ₆ .	771053
19.47 Octahydrogen tetrakis(μ-diphosphito)diplatinate(II)(III) ion								
19.47.1	Octahydrogen tetrakis(μ-diphosphito)diplatinate(II)(III) ion							
	[Pt ₂ (P ₂ O ₅ H ₂ ²⁻) ₄] ³⁻ + [Pt ₂ (P ₂ O ₅ H ₂ ²⁻) ₄] ³⁻ →	6.7 × 10 ⁸				p.r.	D.k. at 310 nm in N ₂ O-satd. soln. contg. [Pt ₂ (P ₂ O ₅ ²⁻) ₄] ⁴⁻ ; unclear whether <i>k</i> or 2 <i>k</i> .	86A578
19.47.2	1,1'-Bis(2-sulfonatoethyl)-4,4'-bipyridinium radical anion							
	[Pt ₂ (P ₂ O ₅ H ₂ ²⁻) ₄] ³⁻ + [SEV] ^{·-} →	1 × 10 ⁹			25	f.p./oq	D.k. in soln. contg. ~1 × 10 ⁻⁴ mol L ⁻¹ [Pt ₂ (P ₂ O ₅ ²⁻) ₄] ⁴⁻ and SEV (OQ).	81A344
19.47.3	1,1'-Bis(3-sulfonatopropyl)-4,4'-bipyridinium radical anion							
	[Pt ₂ (P ₂ O ₅ H ₂ ²⁻) ₄] ³⁻ + [SPV] ^{·-} →	1.6 × 10 ⁹				f.p./oq	D.k. at 600 nm in soln. contg. 2.7 × 10 ⁻⁵ mol L ⁻¹ [Pt ₂ (P ₂ O ₅ ²⁻) ₄] ⁴⁻ and 5 × 10 ⁻⁴ mol L ⁻¹ SPV (OQ).	85A161
19.48 <i>cis</i>-[Dichlorobis(1-(2-hydroxyethyl)-2-methyl-5-nitroimidazole-N³)]platinum(III) ion								
19.48.1	Water							
	A ₂ Pt ^{III} Cl ₂ ⁺ + H ₂ O → A ₂ Pt ^{III} (H ₂ O)Cl ²⁺ + Cl ⁻	7.1 × 10 ⁴ s ⁻¹				p.r.	D.k. in N ₂ O-satd. soln. contg. A ₂ Pt ^{II} Cl ₂ ; for loss of second Cl ⁻ , <i>k</i> = 820 s ⁻¹ . Subsequent second-order decay (<i>k</i> = 5 × 10 ⁷ L mol ⁻¹ s ⁻¹) may represent disproportionation of product.	85A090
19.49 <i>cis</i>-Dichlorobis(isopropylamine)-<i>trans</i>-dihydroxyplatinum(IV), OH reaction product								
19.49.1	Water							
	PtCl ₂ (OH) ₂ (2-PrNH ₂) ₂ /OH + H ₂ O →	1.1 × 10 ³ s ⁻¹				p.r.	D.k. in N ₂ O-satd. soln. contg. 2.5 × 10 ⁻⁴ mol L ⁻¹ complex; for loss of second Cl ⁻ , <i>k</i> = 20 s ⁻¹ . Subsequent slower decay (<i>k</i> < 10 ⁵ L mol ⁻¹ s ⁻¹) may represent disproportionation of product.	85A090
	Pt(H ₂ O)Cl(OH) ₂ (2-PrNH ₂) ₂ ²⁺ + Cl ⁻							

TABLE 20. Rate constants for rhenium transients

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
20.1 Rhenate(VI) ion								
20.1.1 Rhenate(VI) ion								
	$\text{ReO}_4^{2-} + \text{ReO}_4^{2-} \rightarrow$	1.7×10^9	7			p.r.	D.k. at 290 nm in N ₂ -satd. soln. contg. 0.1 mol L ⁻¹ <i>tert</i> -BuOH and ReO ₄ ⁻ .	85A234

TABLE 21. Rate constants for rhodium transients

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
21.1 Chlorotris[3-(diphenylphosphino)benzenesulfonato]rhodate(0) ion								
21.1.1 Hydrogen ion								
$\text{RhCl}(\text{dpdm})_3^{4-} + \text{H}^+ \rightarrow$ $\text{RhCl}(\text{H})(\text{dpdm})_3^{3-}$	6.0×10^9	5				p.r.	Ar-satd. soln. contg. 0.12 mol L ⁻¹ RhCl(dpdm) ₃ ³⁻ , 0.2 mol L ⁻¹ <i>tert</i> -BuOH and 0.02 mol L ⁻¹ phosphate.	87F040
21.2 η⁵-Pentamethylcyclopentadienyl(2,2'-bipyridine)rhodium(I) ion								
21.2.1 Hydrogen ion								
$(\text{C}_5\text{Me}_5)\text{Rh}^{\text{I}}(\text{bpy}) + \text{H}^+ \rightarrow$ $(\text{C}_5\text{Me}_5)\text{Rh}^{\text{III}}\text{H}(\text{bpy})^+$	1.6×10^6	acid				p.r.	Soln. contg. 5% 2-PrOH and (C ₅ Me ₅)Rh ^{III} (bpy)L ⁺ (L = I ⁻ or OH ⁻).	87N149
21.3 Tris(2,2'-bipyridine)rhodium(I) ion								
21.3.1 First-order reaction								
$\text{Rh}(\text{bpy})_3^+ \rightarrow \text{Rh}(\text{bpy})_2^+ + \text{bpy}$	$5.0 \times 10^4 \text{ s}^{-1}$					p.r.	P.b.k. at 500 nm in soln. contg. 10 ⁻³ mol L ⁻¹ Rh(bpy) ₃ ³⁺ and 0.1 mol L ⁻¹ 2-PrOH.	83A046
21.4 Tetrakis[μ-(1,3-diisocyanopropane)]dirhodium(I)(II) ion								
21.4.1 Tetrakis[μ-(1,3-diisocyanopropane)]dirhodium(I)(II) ion								
$\text{Rh}_2(1,3\text{-diisocyanopropane})_4^{3+} +$ $\text{Rh}_2(1,3\text{-diisocyanopropane})_4^{3+} \rightarrow$ $[\text{Rh}_2(1,3\text{-diisocyanopropane})_4]_2^{6+}$	1.7×10^7 4×10^5	0.3 →0		25	f.p.	D.k. in soln. contg. (1-10) × 10 ⁻⁶ mol L ⁻¹ [Rh ₂ (1,3-diisocyanopropane) ₄] ₂ ⁶⁺ and 1 N H ₂ SO ₄ .	79A167	
21.4.2 Sulfatoiron(III) ion								
$\text{Rh}_2(1,3\text{-diisocyanopropane})_4^{3+} +$ $\text{FeSO}_4^+ \rightarrow$	6.9×10^4	0.3		25	f.p.	D.k. at 440 and 700 nm in soln. contg. [Rh ₂ (1,3-diisocyanopropane) ₄] ₂ ⁶⁺ , (0-7) × 10 ⁻⁴ mol L ⁻¹ FeSO ₄ ⁺ and 1 N H ₂ SO ₄ .	79A167	
21.5 η⁵-Pentamethylcyclopentadienyl(2,2'-bipyridine)(hydroxy)rhodium(II) ion								
21.5.1 η⁵-Pentamethylcyclopentadienyl(2,2'-bipyridine)(hydroxy)rhodium(II) ion								
$(\text{C}_5\text{Me}_5)\text{Rh}^{\text{II}}(\text{bpy})(\text{OH}) +$ $(\text{C}_5\text{Me}_5)\text{Rh}^{\text{II}}(\text{bpy})(\text{OH}) \rightarrow$ $(\text{C}_5\text{Me}_5)\text{Rh}^{\text{I}}(\text{bpy}) +$ $(\text{C}_5\text{Me}_5)\text{Rh}^{\text{III}}(\text{bpy})(\text{OH})^+ + \text{OH}^-$	$1.6 \times 10^4 \text{ s}^{-1}$					p.r.	Soln. contg. 5% 2-PrOH and (C ₅ Me ₅)Rh ^{III} (bpy)(OH) ⁺ ; reaction between first- and second-order; <i>k</i> may represent ligand loss followed by rapid disproportionation.	87N149
21.6 η⁵-Pentamethylcyclopentadienyl(2,2'-bipyridine)(iodo)rhodium(II) ion								
21.6.1 η⁵-Pentamethylcyclopentadienyl(2,2'-bipyridine)(iodo)rhodium(II) ion								
$(\text{C}_5\text{Me}_5)\text{Rh}^{\text{II}}(\text{bpy})(\text{I}) +$ $(\text{C}_5\text{Me}_5)\text{Rh}^{\text{II}}(\text{bpy})(\text{I}) \rightarrow$ $(\text{C}_5\text{Me}_5)\text{Rh}^{\text{I}}(\text{bpy}) +$ $(\text{C}_5\text{Me}_5)\text{Rh}^{\text{III}}(\text{bpy})(\text{I})^+ + \text{I}^-$	$1.6 \times 10^3 \text{ s}^{-1}$					p.r.	Soln. contg. 5% 2-PrOH and (C ₅ Me ₅)Rh ^{III} (bpy)(I) ⁺ ; reaction between first- and second-order; <i>k</i> may represent ligand loss followed by rapid disproportionation.	87N149
21.7 Aquatriamminerhodium(II) ion								
21.7.1 Water								
$\text{Rh}(\text{NH}_3)_3\text{H}_2\text{O}^{2+} + \text{H}_2\text{O} \rightarrow$ $\text{Rh}(\text{NH}_3)_2(\text{H}_2\text{O})_2^{2+} + \text{NH}_3$	40 s^{-1}	4				p.r.	Cond. change from NH ₃ + H ⁺ → NH ₄ ⁺ in Ar-satd. soln. contg. 0.5 mol L ⁻¹ <i>tert</i> -BuOH and 10 ⁻³ mol L ⁻¹ Rh(NH ₃) ₅ Cl ²⁺ or Rh(NH ₃) ₅ H ₂ O ³⁺ .	751128
21.8 Tetraamminerhodium(II) ion								
21.8.1 Water								
$\text{Rh}(\text{NH}_3)_4^{2+} + \text{H}_2\text{O} \rightarrow \text{Rh}(\text{NH}_3)_3\text{H}_2\text{O}^{2+}$ + NH ₃	$3.5 \times 10^2 \text{ s}^{-1}$	4				p.r.	Cond. change from NH ₃ + H ⁺ → NH ₄ ⁺ in Ar-satd. soln. contg. 0.5 mol L ⁻¹ <i>tert</i> -BuOH and 10 ⁻³ mol L ⁻¹ Rh(NH ₃) ₅ Cl ²⁺ or Rh(NH ₃) ₅ H ₂ O ³⁺ .	751128

TABLE 21. Rate constants for rhodium transients — Continued

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t(\text{°C})$	Method	Comment	Ref.
21.8 Tetraamminerhodium(II) ion — Continued								
21.8.2 Oxygen								
	$\text{Rh}(\text{NH}_3)_4^{2+} + \text{O}_2 \rightarrow \text{Rh}(\text{NH}_3)_4\text{O}_2^{2+}$	3.1×10^8		4		p.r.	P.b.k. at 260 nm in soln. contg. 0.5 mol L ⁻¹ <i>tert</i> -BuOH, 10 ⁻³ mol L ⁻¹ $\text{Rh}(\text{NH}_3)_5\text{H}_2\text{O}^{3+}$ and various [O ₂].	751128
21.8.3 Tetraamminedibromorhodium(III) ion								
	$\text{Rh}(\text{NH}_3)_4^{2+} + \text{Rh}(\text{NH}_3)_4\text{Br}_2^{+} \rightarrow \text{Rh}(\text{NH}_3)_4^{3+} + \text{Rh}(\text{NH}_3)_4\text{Br}_2$	$\sim 1.4 \times 10^6$		4		p.r.	Estd. from condy. increase in Ar-satd. soln. contg. 0.5 mol L ⁻¹ <i>tert</i> -BuOH and 10 ⁻³ mol L ⁻¹ $\text{Rh}(\text{NH}_3)_4\text{Br}_2^{+}$.	751128
21.8.4 Tetraamminerhodium(II) ion								
	$\text{Rh}(\text{NH}_3)_4^{2+} + \text{Rh}(\text{NH}_3)_4^{2+} \rightarrow \text{Rh}(\text{NH}_3)_4^{3+} + \text{Rh}(\text{NH}_3)_4^{3+}$	$\sim 6 \times 10^6$		4		p.r.	Estd. from dependence of chain length in the $\text{Rh}(\text{NH}_3)_4^{2+} + \text{Rh}(\text{NH}_3)_4\text{Br}_2^{+}$ reaction on dose rate in Ar-satd. soln.	751128
21.9 1,3,6,8,10,13,16,19-Octaazabicyclo[6.6.6]eicosanerhodium(II) ion								
21.9.1 First-order reaction								
	$\text{Rh}(\text{sep})^{2+} \rightarrow \text{Rh}(\text{sep})^{3+}$	0.5 s^{-1}		6.9	25	p.r.	D.k. at 340 nm in He-satd. soln. contg. (1-10) $\times 10^{-4}$ mol L ⁻¹ $\text{Rh}(\text{sep})^{3+}$ and 0.02 mol L ⁻¹ phosphate buffer; reaction could involve reduction of water.	83A298
21.10 Bis(2,2'-bipyridine)rhodium(II) ion								
21.10.1 Bis(2,2'-bipyridine)rhodium(II) ion								
	$\text{Rh}(\text{bpy})_2^{2+} + \text{Rh}(\text{bpy})_2^{2+} \rightarrow [\text{Rh}(\text{bpy})_2]_{2+}^{4+}$	1.7×10^8		8.9	25	p.r.	Soln. contg. $\text{Rh}(\text{bpy})_2(\text{OH})_2^{+}$ and 2-PrOH. Reaction is pH dependent due to different aquated forms involved. The dimer dissociates to $\text{Rh}(\text{bpy})_2(\text{OH})_2^{+}$ and $\text{Rh}(\text{bpy})_2^{2+}$ with $k = 9 \times 10^{-3} \text{ s}^{-1}$ at 25 °C and $k = 8 \times 10^{-2} \text{ s}^{-1}$ at 60 °C.	83A046
21.11 Tris(2,2'-bipyridine)rhodium(II) ion								
21.11.1 First-order reaction								
	$\text{Rh}(\text{bpy})_3^{2+} \rightarrow \text{Rh}(\text{bpy})_2^{2+} + \text{bpy}$	0.3 s^{-1}		5, 8.1		f.p./oq.	D.k. in soln. contg. $\text{Ru}(\text{bpy})_3^{2+}$, $\text{Rh}(\text{bpy})_3^{3+}(\text{OQ})$ and EDTA.	87A460
		0.6 s^{-1}		8.8	25	p.r.	Soln. contg. $\text{Rh}(\text{bpy})_3^{3+}$, 0.1 mol L ⁻¹ 2-PrOH and negligible [bpy]; $k = 4.3 \text{ s}^{-1}$ at 50 °C; $k_t = 3 \times 10^8 \text{ L mol}^{-1} \text{ s}^{-1}$.	83A046
		0.45 s^{-1}		3-10		p.r.	D.k. and p.b.k. in Ar-purged soln. contg. (2.5-50) $\times 10^{-5}$ mol L ⁻¹ $\text{Rh}(\text{bpy})_3^{3+}$ and 0.1 mol L ⁻¹ formate ion or 0.1 mol L ⁻¹ 2-PrOH.	81A134
21.11.2 Bis(2,2'-bipyridine)rhodium(II) ion								
	$\text{Rh}(\text{bpy})_3^{2+} + \text{Rh}(\text{bpy})_2^{2+} \rightarrow \text{Rh}(\text{bpy})_3^{3+} + \text{Rh}(\text{bpy})_2^{2+}$	3×10^8		8.9	25	p.r.	P.b.k. at 510 nm in soln. contg. $\text{Rh}(\text{bpy})_3^{3+}$ and $\text{Rh}(\text{bpy})_2(\text{OH})_2^{+}$.	83A046
21.11.3 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecanesilver(II) ion								
	$\text{Rh}(\text{bpy})_3^{2+} + \text{Ag}(\text{aneN}_4)^{2+} \rightarrow \text{Rh}(\text{bpy})_3^{3+} + \text{Ag}(\text{aneN}_4)^+$	1.3×10^8		4	0.04	p.r.		88A334
21.11.4 Oxygen								
	$\text{Rh}(\text{bpy})_3^{2+} + \text{O}_2 \rightarrow \text{Rh}(\text{bpy})_3^{3+} + \text{O}_2^{2-}$	4.9×10^8		7.3		p.r.	D.k. at 250 nm in N ₂ O-satd. soln. contg. 2% air, $\text{Rh}(\text{bpy})_3^{3+}$ and formate ion.	81A134
21.11.5 1,1'-Dimethyl-4,4'-bipyridinium								
	$\text{Rh}(\text{bpy})_3^{2+} + \text{MV}^{2+} \rightarrow \text{Rh}(\text{bpy})_3^{3+} + \text{MV}^{2+}$	4×10^8		8.1		f.p./oq.	P.b.k. in soln. contg. 3 $\times 10^{-5}$ mol L ⁻¹ $\text{Ru}(\text{bpy})_3^{2+}$, 5 $\times 10^{-3}$ mol L ⁻¹ $\text{Rh}(\text{bpy})_3^{3+}$ (OQ), 0.1 mol L ⁻¹ TEOA and (0.3-3) $\times 10^{-4}$ mol L ⁻¹ MV ²⁺ .	81N003 79A317

TABLE 21. Rate constants for rhodium transients — Continued

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t(\text{°C})$	Method	Comment	Ref.
21.12 η^5-Pentamethylcyclopentadienyl(2,2'-bipyridine)hydridorhodium(III) ion								
21.12.1	Hydrogen ion							
	$(\text{C}_5\text{Me}_5)\text{Rh}^{\text{III}}\text{H}(\text{bpy})^+ + \text{H}^+ \rightarrow \text{H}_2 + (\text{C}_5\text{Me}_5)\text{Rh}^{\text{III}}(\text{bpy})^{2+}$	1.8×10^3	<2			p.r.	Soln. contg. 5% 2-PrOH and $(\text{C}_5\text{Me}_5)\text{Rh}^{\text{III}}(\text{bpy})\text{L}^+$ ($\text{L} = \text{I}^-$ or OH^-). Reaction accompanied by ligand addition to reform $(\text{C}_5\text{Me}_5)\text{Rh}^{\text{III}}(\text{bpy})\text{L}^+$.	87N149
21.13 Tetraammine(superoxido)rhodium(III) ion								
21.13.1	Tetraammine(hydrido)rhodium(III) ion							
	$\text{Rh}(\text{NH}_3)_4\text{O}_2^{2+} + \text{Rh}(\text{NH}_3)_4\text{H}^{2+} \rightarrow \text{Rh}(\text{NH}_3)_4\text{O}_2\text{H}^{2+} + \text{Rh}(\text{NH}_3)_4^{2+}$	$<4 \times 10^7$	1			f.p.	P.b.k. at 240 nm in soln. contg. 0.1 mol L^{-1} HClO_4 and $\text{Rh}(\text{NH}_3)_4\text{H}^{2+}$; estd. assuming chain reaction involving $k(\text{Rh}(\text{NH}_4)_4^{2+} + \text{O}_2) = 3.1 \times 10^8 \text{ L mol}^{-1} \text{ s}^{-1}$.	79A004

TABLE 22. Rate constants for ruthenium transients

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t(\text{°C})$	Method	Comment	Ref.
22.1 Pentaammine(dinitrogen)ruthenium(I) ion								
22.1.1	Pentaammine(dinitrogen)ruthenium(I) ion							
	$\text{Ru(NH}_3)_5\text{N}_2^+ + \text{Ru(NH}_3)_5\text{N}_2^+ \rightarrow \text{Ru(NH}_3)_5\text{N}_2^{2+} + \text{Ru(NH}_3)_5\text{N}_2^+$	1.4×10^9			20	p.r.	D.k. in soln. contg. MeOH or <i>tert</i> -BuOH and $\text{Ru(NH}_3)_5\text{N}_2^{2+}$.	710234
22.2 Bis(2,2'-bipyridine)bis(cyano)ruthenate(II) ion, electron adduct								
22.2.1	Bis(2,2'-bipyridine)bis(cyano)ruthenium(III) ion							
	$\text{Ru(bpy)}_2(\text{CN})_2^- + \text{Ru(bpy)}_2(\text{CN})_2^+ \rightarrow$	2.0×10^{10}				f.p./pi	D.k. at 540 nm in deaerated soln. contg. 10^{-4} mol L^{-1} $\text{Ru(bpy)}_2(\text{CN})_2$.	84A177
22.3 Tris(2,2'-bipyridine)ruthenium(II) ion, electron adduct								
22.3.1	First-order reaction							
	$\text{Ru(bpy)}_3^+ \rightarrow$	0.2 s^{-1}		11-13		p.r.	D.k. in soln. contg. Ru(bpy)_3^{2+} , independent of $[\text{OH}^-]$, $[\text{Ru(bpy)}_3^{2+}]$, or nature of the alcohol used to generate the reducing radicals (CH_2O^- , $\text{CH}_3\dot{\text{C}}\text{HO}^-$, or $(\text{CH}_3)_2\dot{\text{C}}\text{O}^-$); radiation dose <2.5 Gy.	78A068
22.3.2	Cobalt(II) ion							
	$\text{Ru(bpy)}_3^+ + \text{Co}^{2+} \rightarrow \text{Ru(bpy)}_3^{2+} + \text{Co}^+$	$<1 \times 10^4$			25	f.p./rq	Soln. contg. Ru(bpy)_3^{2+} , 0.5 mol L^{-1} ascorbate ion (RQ) and 0.5 mol L^{-1} ascorbic acid.	82A278
22.3.3	Hexaamminecobalt(III) ion							
	$\text{Ru(bpy)}_3^+ + \text{Co}(\text{NH}_3)_6^{3+} \rightarrow \text{Ru(bpy)}_3^{2+} + \text{Co}(\text{NH}_3)_6^{2+}$	2.7×10^9	0.6	1.0	23	f.p./rq	D.k. at 510 nm in Ar-satd. soln. contg. 0.1 mol L^{-1} Eu^{2+} (RQ), (3-4) $\times 10^{-5}$ mol L^{-1} Ru(bpy)_3^{2+} , 0.25 mol L^{-1} HCl and (0.36-2.92) $\times 10^{-4}$ mol L^{-1} $\text{Co}(\text{NH}_3)_6^{3+}$.	86A161
		3.5×10^8	11	$\sim 10^{-3}$		p.r.		84A255
22.3.4	Tris(ethylenediamine)cobalt(III) ion							
	$\text{Ru(bpy)}_3^+ + \text{Co}(\text{en})_3^{3+} \rightarrow \text{Ru(bpy)}_3^{2+} + \text{Co}(\text{en})_3^{2+}$	2.3×10^9	0.6	1.0	23	f.p./rq	D.k. at 510 nm in Ar-satd. soln. contg. 0.1 mol L^{-1} Eu^{2+} (RQ), (3-4) $\times 10^{-5}$ mol L^{-1} Ru(bpy)_3^{2+} , 0.25 mol L^{-1} HCl and (0.77-3.54) $\times 10^{-4}$ mol L^{-1} $\text{Co}(\text{en})_3^{3+}$.	86A161
		3.2×10^8	11	$\sim 10^{-3}$		p.r.		84A255
22.3.5	2,2'-Bipyridinecobalt(II) ion							
	$\text{Ru(bpy)}_3^+ + \text{Co(bpy)}^{2+} \rightarrow \text{Ru(bpy)}_3^{2+} + \text{Co(bpy)}^+$	7×10^8	7.3		25	f.p./rq	Soln. contg. Ru(bpy)_3^{2+} , 0.1 mol L^{-1} ascorbate ion (RQ) and 0.01 mol L^{-1} phosphate.	82A278
22.3.6	4,4'-Dimethyl-2,2'-bipyridinecobalt(II) ion							
	$\text{Ru(bpy)}_3^+ + \text{Co}(4,4'\text{-Me}_2\text{bpy})^{2+} \rightarrow \text{Ru(bpy)}_3^{2+} + \text{Co}(4,4'\text{-Me}_2\text{bpy})^+$	3×10^8	7.3		25	f.p./rq	Soln. contg. Ru(bpy)_3^{2+} , 0.1 mol L^{-1} ascorbate ion (RQ) and 0.01 mol L^{-1} phosphate.	82A278
22.3.7	Tris(4,4'-dimethyl-2,2'-bipyridine)cobalt(II) ion							
	$\text{Ru(bpy)}_3^+ + \text{Co}(4,4'\text{-Me}_2\text{bpy})_3^{2+} \rightarrow \text{Ru(bpy)}_3^{2+} + \text{Co}(4,4'\text{-Me}_2\text{bpy})_3^+$	3×10^9	7.3		25	f.p./rq	Soln. contg. Ru(bpy)_3^{2+} , 0.1 mol L^{-1} ascorbate ion (RQ) and 0.01 mol L^{-1} phosphate.	82A278
22.3.8	5,7,7,12,12,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,14-dienecobalt(II) ion							
	$\text{Ru(bpy)}_3^+ + \text{Co}(4,14\text{-dieneN}_4)^{2+} \rightarrow \text{Ru(bpy)}_3^{2+} + \text{Co}(4,14\text{-dieneN}_4)^{3+}$	1.8×10^8			25	f.p./rq	D.k. in soln. contg. Ru(bpy)_3^{2+} and Eu^{2+} (RQ).	79F046

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	t ($^\circ\text{C}$)	Method	Comment	Ref.
22.3 Tris(2,2'-bipyridine)ruthenium(II) ion, electron adduct — Continued								
22.3.9 1,3,6,8,10,13,16,19-Octaazabicyclo[6.6.6]eicosanecobalt(III) ion								
	$\text{Ru(bpy)}_3^{+} + \text{Co(sep)}^{3+} \rightarrow \text{Ru(bpy)}_3^{2+} + \text{Co(sep)}^{2+}$	$>2 \times 10^9$	0.6	1.0	23	f.p./rq	D.k. at 510 nm in Ar-satd. soln. contg. 0.1 mol L^{-1} Eu^{2+} (RQ), (3-4) $\times 10^{-5}$ mol L^{-1} Ru(bpy)_3^{2+} , 0.25 mol L^{-1} HCl and $(0.86-2.85) \times 10^{-4}$ mol L^{-1} Co(sep)^{3+} . Lower limit due to reaction of Eu^{2+} with Co(sep)^{3+} .	86A161
22.3.10 Tris(2,2'-bipyridine)cobalt(III) ion								
	$\text{Ru(bpy)}_3^{+} + \text{Co(bpy)}_3^{3+} \rightarrow \text{Ru(bpy)}_3^{2+} + \text{Co(bpy)}_3^{2+}$	1.6×10^9	11	$\sim 10^{-3}$		p.r.	D.k. in soln. contg. Ru(bpy)_3^{2+} and 0.1 mol L^{-1} CH_3OH .	78A068
22.3.11 Bis(dimethylglyoximato)methylcobalt(III) difluoroborate								
	$\text{Ru(bpy)}_3^{+} + \text{CH}_3\text{Co}((\text{dmg})\text{BF}_2)_2 \rightarrow \text{Ru(bpy)}_3^{2+} + \text{CH}_3\text{Co}((\text{dmg})\text{BF}_2)_2^-$	3.2×10^9	0.6	1.0	23	f.p./rq	D.k. at 510 nm in Ar-satd. soln. contg. 0.12 mol L^{-1} ascorbate (RQ), (3-4) $\times 10^{-5}$ mol L^{-1} Ru(bpy)_3^{2+} , 0.25 mol L^{-1} HCl and $(0.14-0.97) \times 10^{-4}$ mol L^{-1} $\text{CH}_3\text{Co}((\text{dmg})\text{BF}_2)_2$.	86A161
22.3.12 Chromium(III) ion								
	$\text{Ru(bpy)}_3^{+} + \text{Cr}^{3+} \rightarrow \text{Ru(bpy)}_3^{2+} + \text{Cr}^{2+}$	4.6×10^6	0.6	1.0	23	f.p./rq	D.k. at 510 nm in Ar-satd. soln. contg. 0.1 mol L^{-1} Eu^{2+} (RQ), (3-4) $\times 10^{-5}$ mol L^{-1} Ru(bpy)_3^{2+} , 0.25 mol L^{-1} HCl and $(2.8-45) \times 10^{-4}$ mol L^{-1} CrCl_3 .	86A161
22.3.13 Pentaqua(trifluoromethyl)chromium(III) ion								
	$\text{Ru(bpy)}_3^{+} + (\text{H}_2\text{O})_5\text{CrCF}_3^{2+} \rightarrow$	$<5 \times 10^5$	0.6	1.0	23	f.p./rq	D.k. at 510 nm in Ar-satd. soln. contg. 0.1 mol L^{-1} Eu^{2+} (RQ), (3-4) $\times 10^{-5}$ mol L^{-1} Ru(bpy)_3^{2+} , 0.25 mol L^{-1} HCl and $(2.2-11.3) \times 10^{-4}$ mol L^{-1} $(\text{H}_2\text{O})_5\text{CrCF}_3^{2+}$.	86A161
22.3.14 Pentaqua(methoxymethyl)chromium(III) ion								
	$\text{Ru(bpy)}_3^{+} + (\text{H}_2\text{O})_5\text{CrCH}_2\text{OCH}_3^{2+} \rightarrow \text{Ru(bpy)}_3^{2+} + (\text{H}_2\text{O})_5\text{CrCH}_2\text{OCH}_3^{+}$	2.2×10^6	0.6	1.0	23	f.p./rq	D.k. at 510 nm in Ar-satd. soln. contg. 0.1 mol L^{-1} Eu^{2+} (RQ), (3-4) $\times 10^{-5}$ mol L^{-1} Ru(bpy)_3^{2+} , 0.25 mol L^{-1} HCl and $(1.56-7.80) \times 10^{-4}$ mol L^{-1} $(\text{H}_2\text{O})_5\text{CrCH}_2\text{OCH}_3^{2+}$.	86A161
22.3.15 Pentaqua(dichloromethyl)chromium(III) ion								
	$\text{Ru(bpy)}_3^{+} + (\text{H}_2\text{O})_5\text{CrCHCl}_2^{2+} \rightarrow \text{Ru(bpy)}_3^{2+} + (\text{H}_2\text{O})_5\text{CrCHCl}_2^{+}$	2.1×10^7	0.6	1.0	23	f.p./rq	D.k. at 510 nm in Ar-satd. soln. contg. 0.1 mol L^{-1} Eu^{2+} (RQ), (3-4) $\times 10^{-5}$ mol L^{-1} Ru(bpy)_3^{2+} , 0.25 mol L^{-1} HCl and $(0.90-3.89) \times 10^{-4}$ mol L^{-1} $(\text{H}_2\text{O})_5\text{CrCHCl}_2^{2+}$.	86A161
22.3.16 Pentaqua(benzyl)chromium(III) ion								
	$\text{Ru(bpy)}_3^{+} + (\text{H}_2\text{O})_5\text{CrCH}_2\text{C}_6\text{H}_5^{2+} \rightarrow \text{Ru(bpy)}_3^{2+} + (\text{H}_2\text{O})_5\text{CrCH}_2\text{C}_6\text{H}_5^{+}$	3.2×10^7	0.6	1.0	23	f.p./rq	D.k. at 510 nm in Ar-satd. soln. contg. 0.1 mol L^{-1} Eu^{2+} (RQ), (3-4) $\times 10^{-5}$ mol L^{-1} Ru(bpy)_3^{2+} , 0.25 mol L^{-1} HCl and $(0.18-2.14) \times 10^{-4}$ mol L^{-1} $(\text{H}_2\text{O})_5\text{CrCH}_2\text{C}_6\text{H}_5^{2+}$.	86A161
22.3.17 Pentaqua(4-pyridiniomethyl)chromium(III) ion								
	$\text{Ru(bpy)}_3^{+} + 4[(\text{H}_2\text{O})_5\text{CrCH}_2]\text{C}_5\text{H}_4\text{NH}^{3+} \rightarrow \text{Ru(bpy)}_3^{2+} + 4[(\text{H}_2\text{O})_5\text{CrCH}_2]\text{C}_5\text{H}_4\text{NH}^{2+}$	1.4×10^9	0.6	1.0	23	f.p./rq	D.k. at 510 nm in Ar-satd. soln. contg. 0.1 mol L^{-1} Eu^{2+} (RQ), (3-4) $\times 10^{-5}$ mol L^{-1} Ru(bpy)_3^{2+} , 0.25 mol L^{-1} HCl and $(7.6-39.8) \times 10^{-4}$ mol L^{-1} $4[(\text{H}_2\text{O})_5\text{CrCH}_2]\text{C}_5\text{H}_4\text{NH}^{3+}$.	86A161

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
22.3 Tris(2,2'-bipyridine)ruthenium(II) ion, electron adduct — Continued								
22.3.18 Pentaqua(4-methylpyridine)chromium(III) ion								
	Ru(bpy) ₃ ⁺ + (H ₂ O) ₅ CrNC ₅ H ₄ -4-CH ₃ ³⁺ → Ru(bpy) ₃ ²⁺ + (H ₂ O) ₅ CrNC ₅ H ₄ -4-CH ₃ ²⁺	4.2 × 10 ⁸	0.6	1.0	23	f.p./rq	D.k. at 510 nm in Ar-satd. soln. contg. 0.1 mol L ⁻¹ Eu ²⁺ (RQ), (3-4) × 10 ⁻⁵ mol L ⁻¹ Ru(bpy) ₃ ²⁺ , 0.25 mol L ⁻¹ HCl and (0.97-3.69) × 10 ⁻⁴ mol L ⁻¹ (H ₂ O) ₅ CrNC ₅ H ₄ -4-CH ₃ ³⁺ .	86A161
22.3.19 Pentaqua(pyridine)chromium(III) ion								
	Ru(bpy) ₃ ⁺ + (H ₂ O) ₅ Cr(NC ₅ H ₅) ³⁺ → Ru(bpy) ₃ ²⁺ + (H ₂ O) ₅ Cr(NC ₅ H ₅) ²⁺	5.5 × 10 ⁸	0.6	1.0	23	f.p./rq	D.k. at 510 nm in Ar-satd. soln. contg. 0.1 mol L ⁻¹ Eu ²⁺ (RQ), (3-4) × 10 ⁻⁵ mol L ⁻¹ Ru(bpy) ₃ ²⁺ , 0.25 mol L ⁻¹ HCl and (1.22-6.12) × 10 ⁻⁴ mol L ⁻¹ (H ₂ O) ₅ Cr(NC ₅ H ₅) ³⁺ .	86A161
22.3.20 Pentaqua(3-chloropyridine)chromium(III) ion								
	Ru(bpy) ₃ ⁺ + (H ₂ O) ₅ Cr(NC ₅ H ₄ -3-Cl) ³⁺ → Ru(bpy) ₃ ²⁺ + (H ₂ O) ₅ Cr(NC ₅ H ₄ -3-Cl) ²⁺	1.3 × 10 ⁹	0.6	1.0	23	f.p./rq	D.k. at 510 nm in Ar-satd. soln. contg. 0.1 mol L ⁻¹ Eu ²⁺ (RQ), (3-4) × 10 ⁻⁵ mol L ⁻¹ Ru(bpy) ₃ ²⁺ , 0.25 mol L ⁻¹ HCl and (1.02-4.5) × 10 ⁻⁴ mol L ⁻¹ (H ₂ O) ₅ Cr(NC ₅ H ₄ -3-Cl) ³⁺ .	86A161
22.3.21 Pentaqua(3-cyanopyridine)chromium(III) ion								
	Ru(bpy) ₃ ⁺ + (H ₂ O) ₅ Cr(NC ₅ H ₄ -3-CN) ³⁺ → Ru(bpy) ₃ ²⁺ + (H ₂ O) ₅ Cr(NC ₅ H ₄ -3-CN) ²⁺	2.6 × 10 ⁹	0.6	1.0	23	f.p./rq	D.k. at 510 nm in Ar-satd. soln. contg. 0.1 mol L ⁻¹ Eu ²⁺ (RQ), (3-4) × 10 ⁻⁵ mol L ⁻¹ Ru(bpy) ₃ ²⁺ , 0.25 mol L ⁻¹ HCl and (0.73-2.70) × 10 ⁻⁴ mol L ⁻¹ (H ₂ O) ₅ Cr(NC ₅ H ₄ -3-CN) ³⁺ .	86A161
22.3.22 Tetraaquabis(pyridine)chromium(III) ion								
	Ru(bpy) ₃ ⁺ + <i>cis</i> -(H ₂ O) ₄ Cr(py) ₂ ³⁺ → Ru(bpy) ₃ ²⁺ + <i>cis</i> -(H ₂ O) ₄ Cr(py) ₂ ²⁺	1.5 × 10 ⁹	0.6	1.0	23	f.p./rq	D.k. at 510 nm in Ar-satd. soln. contg. 0.1 mol L ⁻¹ Eu ²⁺ (RQ), (3-4) × 10 ⁻⁵ mol L ⁻¹ Ru(bpy) ₃ ²⁺ , 0.25 mol L ⁻¹ HCl and (0.40-4.48) × 10 ⁻⁴ mol L ⁻¹ <i>cis</i> -(H ₂ O) ₄ Cr(py) ₂ ³⁺ .	86A161
22.3.23 Tetraqua(2,2'-bipyridine)chromium(III) ion								
	Ru(bpy) ₃ ⁺ + (H ₂ O) ₄ Cr(bpy) ³⁺ → Ru(bpy) ₃ ²⁺ + (H ₂ O) ₄ Cr(bpy) ²⁺	1.8 × 10 ⁹	0.6	1.0	23	f.p./rq	D.k. at 510 nm in Ar satd. soln. contg. 0.1 mol L ⁻¹ Eu ²⁺ (RQ), (3-4) × 10 ⁻⁵ mol L ⁻¹ Ru(bpy) ₃ ²⁺ , 0.25 mol L ⁻¹ HCl and (1.12-4.49) × 10 ⁻⁴ mol L ⁻¹ (H ₂ O) ₄ Cr(bpy) ³⁺ .	86A161
22.3.24 Copper(II) ion								
	Ru(bpy) ₃ ⁺ + Cu ²⁺ → Ru(bpy) ₃ ²⁺ + Cu ⁺	3.9 × 10 ⁸ 5.2 × 10 ⁸	6.6 6.6	0.04 0.5	25	p.r.	D.k. at 510 nm in soln. contg. Ru(bpy) ₃ ²⁺ , 0.5 mol L ⁻¹ <i>tert</i> -BuOH and cacodylate buffer.	78A090
		3.4 × 10 ⁸	6-7	<0.0002	24	f.p./pi	D.k. at 510 nm in soln. contg. 2 × 10 ⁻⁵ mol L ⁻¹ Ru(bpy) ₃ ²⁺ and (2.6-39) × 10 ⁻⁶ mol L ⁻¹ Cu ²⁺ .	771093
22.3.25 Europium(III) ion								
	Ru(bpy) ₃ ⁺ + Eu ³⁺ → Ru(bpy) ₃ ²⁺ + Eu ²⁺	2.7 × 10 ⁷	1.3	0.5	25	f.p./rq	D.k. at 490-510 nm in soln. contg. (0.3-3.0) × 10 ⁻⁴ mol L ⁻¹ Ru(bpy) ₃ ²⁺ , ~0.1 mol L ⁻¹ Eu ²⁺ (RQ) and 0.05 mol L ⁻¹ H ⁺ .	78A087 767412
22.3.26 4,7,13,16,21-Pentaoxa-1,10-diazabicyclo[8.8.5]tricosaneeuropium(III) ion								
	Ru(bpy) ₃ ⁺ + [Eu 2.2.1] ³⁺ → Ru(bpy) ₃ ²⁺ + [Eu 2.2.1] ²⁺	7.0 × 10 ⁸	1		22	f.p./rq	D.k. at 500 nm and p.b.k. at 454 nm in deaerated soln. contg. Ru(bpy) ₃ ²⁺ , excess [Eu 2.2.1] ²⁺ (RQ) and 1 mol L ⁻¹ KCl.	86E195

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.	
22.3 Tris(2,2'-bipyridine)ruthenium(II) ion, electron adduct — Continued									
22.3.27 Nitrite ion									
	Ru(bpy) ₃ ⁺ + NO ₂ ⁻ →	2.5 × 10 ⁷		-7		p.r.	D.k. at 510 nm in soln. contg. Ru(bpy) ₃ ²⁺ and 0.5 mol L ⁻¹ <i>tert</i> -BuOH.	720381	
22.3.28 1,4,8,11-Tetramethyl-1,4,8,11-tetraazacyclotetradecanenickel(II) ion									
	Ru(bpy) ₃ ⁺ + Ni(Me ₄ [14]aneN ₄) ²⁺ →	5.1 × 10 ⁸		0.6	1.0	23	f.p./rq	D.k. at 510 nm in Ar-satd. soln. contg. 0.12 mol L ⁻¹ ascorbate (RQ), (3-4) × 10 ⁻⁵ mol L ⁻¹ Ru(bpy) ₃ ²⁺ , 0.25 mol L ⁻¹ HCl, and (1.05-4.04) × 10 ⁻⁴ mol L ⁻¹ Ni(Me ₄ [14]aneN ₄) ²⁺ .	86A161
	Ru(bpy) ₃ ²⁺ + Ni(Me ₄ [14]aneN ₄) ⁺								
22.3.29 Tetracyanonickelate(II) ion									
	Ru(bpy) ₃ ⁺ + Ni(CN) ₄ ²⁻ →	4.1 × 10 ⁷		11		p.r.	D.k. in soln. contg. Ru(bpy) ₃ ²⁺ and 0.1 mol L ⁻¹ CH ₃ OH.	78A068	
	Ru(bpy) ₃ ²⁺ + Ni(CN) ₄ ³⁻								
22.3.30 Oxygen									
	Ru(bpy) ₃ ⁺ + O ₂ → Ru(bpy) ₃ ²⁺ + O ₂ ^{·-}	5.5 × 10 ⁹		6.9	0.04	25	f.p./rq	D.k. in soln. contg. 10 ⁻⁴ mol L ⁻¹ Ru(bpy) ₃ ²⁺ , hydroquinone (RQ) and 2.4 × 10 ⁻⁴ mol L ⁻¹ O ₂ .	81A042
		4 × 10 ⁹			0.5				
		7.4 × 10 ⁹		11		p.r.	D.k. at 500 nm in soln. contg. Ru(bpy) ₃ ²⁺ and Fe(CN) ₆ ⁴⁻ (RQ).	78A087	
		7.2 × 10 ⁹		6.7		24	f.p./pi	D.k. at 510 nm in soln. contg. 2 × 10 ⁻⁵ mol L ⁻¹ Ru(bpy) ₃ ²⁺ and (0.5-2.5) × 10 ⁻⁶ mol L ⁻¹ O ₂ .	771093
22.3.31 Pentaammine(chloro)osmium(III) ion									
	Ru(bpy) ₃ ⁺ + Os(NH ₃) ₅ Cl ²⁺ →	1.0 × 10 ⁹		1.3	0.5	25	f.p./rq	D.k. at 490 nm in soln. contg. 10 ⁻⁴ mol L ⁻¹ Ru(bpy) ₃ ²⁺ , (0.5-2.0) × 10 ⁻³ mol L ⁻¹ Os(NH ₃) ₅ Cl ²⁺ , 0.03 mol L ⁻¹ Eu ²⁺ (RQ), 0.45 mol L ⁻¹ NaCl and 0.05 mol L ⁻¹ HCl.	82A145
	Ru(bpy) ₃ ²⁺ + Os(NH ₃) ₅ Cl ⁺								
22.3.32 Ethylenediaminetetraacetatoosmate(III) ion									
	Ru(bpy) ₃ ⁺ + OsEDTA ⁻ → Ru(bpy) ₃ ²⁺ + OsEDTA ²⁻	1.1 × 10 ⁹		4.5	0.5	25	f.p./rq	D.k. at 490 nm in soln. contg. Ru(bpy) ₃ ²⁺ , 1.0 mol L ⁻¹ ascorbate ion (RQ) and OsEDTA ⁻ .	82A145
22.3.33 Chlorotris[3-(diphenylphosphino)benzenesulfonato]rhodate(I) ion									
	Ru(bpy) ₃ ⁺ + RhCl(dpm) ₃ ³⁻ →	1.9 × 10 ⁸		5.0		f.p./rq	D.k. at 500 nm in soln. contg. Ru(bpy) ₃ ²⁺ , 0.1 mol L ⁻¹ ascorbate ion (RQ) and RhCl(dpm) ₃ ³⁻ .	87F040	
	Ru(bpy) ₃ ²⁺ + RhCl(dpm) ₃ ⁴⁻								
22.3.34 Tris(4,4'-dimethyl-2,2'-bipyridinerhodium(III) ion									
	Ru(bpy) ₃ ⁺ + Rh(4,4'-Me ₂ bpy) ₃ ³⁺ →	3.7 × 10 ⁹		4.5	0.5	25	f.p./rq	D.k. at 490 nm in soln. contg. Ru(bpy) ₃ ²⁺ , 1.0 mol L ⁻¹ ascorbate ion (RQ) and Rh(4,4'-Me ₂ bpy) ₃ ³⁺ .	82A145
	Ru(bpy) ₃ ²⁺ + Rh(4,4'-Me ₂ bpy) ₃ ²⁺								
22.3.35 Hexaammineruthenium(III) ion									
	Ru(bpy) ₃ ⁺ + Ru(NH ₃) ₆ ³⁺ →	4.7 × 10 ⁹			0.5	25	f.p./rq	D.k. at 500 nm in soln. contg. Ru(bpy) ₃ ²⁺ and Ru(NH ₃) ₆ ²⁺ (RQ).	78A087
	Ru(bpy) ₃ ²⁺ + Ru(NH ₃) ₆ ²⁺								
22.3.36 Tris(2,2'-bipyridine)ruthenium(III) ion									
	Ru(bpy) ₃ ⁺ + Ru(bpy) ₃ ³⁺ →	3.4 × 10 ⁹		4.6		24	p.r.	D.k. at 510 nm in Ar-satd. soln. contg. 0.5 mol L ⁻¹ <i>tert</i> -BuOH, 2 × 10 ⁻³ mol L ⁻¹ Ru(bpy) ₃ ²⁺ and 10 ⁻⁴ mol L ⁻¹ Ru(bpy) ₃ ³⁺ .	78A070
	2 Ru(bpy) ₃ ²⁺								
22.3.37 Sulfite radical ion									
	Ru(bpy) ₃ ⁺ + SO ₃ ^{·-} →	≤10 ⁶				25	f.p./rq	P.b.k. in soln. contg. 5 × 10 ⁻⁵ mol L ⁻¹ Ru(bpy) ₃ ²⁺ and 0.1-1.0 mol L ⁻¹ Na ₂ SO ₃ (RQ).	79F045

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
22.3 Tris(2,2'-bipyridine)ruthenium(II) ion, electron adduct — Continued								
22.3.38 Samarium(III) ion								
	$\text{Ru(bpy)}_3^{+} + \text{Sm}^{3+} \rightarrow \text{Ru(bpy)}_3^{2+} + \text{Sm}^{2+}$	$<2 \times 10^4$	0.6	1.0-1.58	23	f.p./rq	D.k. at 510 nm in Ar-satd. soln. contg. 0.1 mol L ⁻¹ Eu ²⁺ (RQ), (3-4) $\times 10^{-5}$ mol L ⁻¹ Ru(bpy) ₃ ²⁺ , 0.25 mol L ⁻¹ HCl and (0.07-0.14) $\times 10^{-4}$ mol L ⁻¹ Sm(III) perchlorate.	86A161
22.3.39 Ytterbium(III) ions								
	$\text{Ru(bpy)}_3^{+} + \text{Yb}^{3+} \rightarrow \text{Ru(bpy)}_3^{2+} + \text{Yb}^{2+}$	1.2×10^5	0.6	1.0	23	f.p./rq	D.k. at 510 nm in Ar-satd. soln. contg. 0.1 mol L ⁻¹ Eu ²⁺ (RQ), (3-4) $\times 10^{-5}$ mol L ⁻¹ Ru(bpy) ₃ ²⁺ , 0.25 mol L ⁻¹ HCl and (0.01-0.05) $\times 10^{-4}$ mol L ⁻¹ Yb(ClO ₄) ₃ .	86A161
22.3.40 Ascorbate radical anion								
	$\text{Ru(bpy)}_3^{+} + \text{A}^{\cdot-} + \text{H}^+ \rightarrow \text{Ru(bpy)}_3^{2+} + \text{AH}^{\cdot-}$	1×10^9	4			f.p./rq	D.k. at 500 nm in soln. contg. 0.5 mol L ⁻¹ ascorbic acid, 0.5 mol L ⁻¹ ascorbate ion (RQ) and 5×10^{-5} mol L ⁻¹ Ru(bpy) ₃ ²⁺ .	79F045
22.3.41 1,4-Benzoquinone								
	$\text{Ru(bpy)}_3^{+} + \text{Q} \rightarrow \text{Ru(bpy)}_3^{2+} + \text{Q}^{\cdot-}$	$>2 \times 10^9$	6.9	0.04		f.p./rq	D.k. in soln. contg. 10^{-4} mol L ⁻¹ Ru(bpy) ₃ ²⁺ , hydroquinone (RQ) a 10^{-4} mol L ⁻¹ benzoquinone.	81A042
22.3.42 2,2'-Bipyridine, conjugate acid								
	$\text{Ru(bpy)}_3^{+} + \text{bpyH}^+ \rightarrow \text{Ru(bpy)}_3^{2+} + \text{bpyH}^{\cdot-}$	2×10^9			25	f.p./rq	Soln. contg. Ru(bpy) ₃ ²⁺ , 0.1 mol L ⁻¹ ascorbate ion (RQ), 0.01 mol L ⁻¹ phosphate and bipyridine.	82A278
22.3.43 1,1'-Bis(4-sulfonatobenzyl)-4,4'-bipyridinium zwitterion								
	$\text{Ru(bpy)}_3^{+} + \text{BSV} \rightarrow \text{Ru(bpy)}_3^{2+} + \text{BSV}^{\cdot-}$	5.7×10^9	10		24	p.r.	P.b.k. at 590 nm in soln. contg. 0.01 mol L ⁻¹ <i>tert</i> -BuOH, 2×10^{-5} mol L ⁻¹ BSV and 6.6×10^{-5} mol L ⁻¹ Ru(bpy) ₃ ²⁺ .	85A064
22.3.44 4-Bromophenoxy								
	$\text{Ru(bpy)}_3^{+} + 4\text{-BrC}_6\text{H}_4\text{O}^{\cdot-} \rightarrow \text{Ru(bpy)}_3^{2+} + 4\text{-BrC}_6\text{H}_4\text{O}^-$	1.0×10^{10}	12.7	0.05	23	f.p./rq	D.k. at 510 nm in soln. contg. (1-2) $\times 10^{-4}$ mol L ⁻¹ Ru(bpy) ₃ ²⁺ and (0.1-40) $\times 10^{-3}$ mol L ⁻¹ 4-bromophenoxy ion (RQ).	82A365
22.3.45 Carbon dioxide radical anion								
	$\text{Ru(bpy)}_3^{+} + \text{CO}_2^{\cdot-} \rightarrow \text{Ru(bpy)}_2(\text{bpyCO}_2)$	1.9×10^9	-7-12			p.r.	P.b.k. at 390 nm in Ar-satd. soln. contg. (5-10) $\times 10^{-5}$ mol L ⁻¹ Ru(bpy) ₃ ²⁺ and 0.5 mol L ⁻¹ formate ion; value obtained from computer fit. Product undergoes protonation by H ₂ O and H ₂ PO ₄ ²⁻ , <i>k</i> = 290 s ⁻¹ and 3.2×10^5 L mol ⁻¹ s ⁻¹ , respectively.	91A218
22.3.46 4-Carboxyphenoxy, conjugate base								
	$\text{Ru(bpy)}_3^{+} + 4\text{-O}_2\text{CC}_6\text{H}_4\text{O}^{\cdot-} \rightarrow \text{Ru(bpy)}_3^{2+} + 4\text{-O}_2\text{CC}_6\text{H}_4\text{O}^-$	9.8×10^9	12.7	0.05	23	f.p./rq	D.k. at 510 nm in soln. contg. (1-2) $\times 10^{-4}$ mol L ⁻¹ Ru(bpy) ₃ ²⁺ and (0.1-40) $\times 10^{-3}$ mol L ⁻¹ 4-hydroxybenzoate dianion (RQ).	82A365
22.3.47 4-Chlorophenoxy								
	$\text{Ru(bpy)}_3^{+} + \text{ClC}_6\text{H}_4\text{O}^{\cdot-} \rightarrow \text{Ru(bpy)}_3^{2+} + \text{ClC}_6\text{H}_4\text{O}^-$	1.0×10^{10}	12.7	0.05	23	f.p./rq	D.k. at 510 nm in soln. contg. (1-2) $\times 10^{-4}$ mol L ⁻¹ Ru(bpy) ₃ ²⁺ and (0.1-40) $\times 10^{-3}$ mol L ⁻¹ 4-chlorophenoxy ion (RQ).	82A365

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t^\circ\text{C}$	Method	Comment	Ref.
22.3 Tris(2,2'-bipyridine)ruthenium(II) ion, electron adduct — Continued								
22.3.48	1,1'-Dimethyl-4,4'-bipyridinium							
	$\text{Ru(bpy)}_3^{+} + \text{MV}^{2+} \rightarrow \text{Ru(bpy)}_3^{2+} + \text{MV}^{+}$	3.5×10^9	13	0.1		p.r.	P.b.k. at 602 nm in N_2O -satd. soln. contg. 0.13 mol L^{-1} 2-PrOH; Ru(bpy)_3^{2+} and MV^{2+} ; $k_t = 2.1 \times 10^{-4}$ $\text{L mol}^{-1} \text{s}^{-1}$ calculated from K_{eq} and k_f .	91A081 91A198
		1.6×10^9	4-5	0.5	25	f.p./rq	D.k. at 490 nm in soln. contg. Ru(bpy)_3^{2+} , 1.0 mol L^{-1} ascorbate ion (RQ) and MV^{2+} .	82A145
22.3.49	Duroquinone							
	$\text{Ru(bpy)}_3^{+} + \text{DQ} \rightarrow \text{Ru(bpy)}_3^{2+} + [\text{DQ}]^-$	4.0×10^9	6-7		24	f.p./pi	D.k. at 510 nm in soln. contg. 2×10^{-5} mol L^{-1} Ru(bpy)_3^{2+} and $(0.61-3.0) \times 10^{-6}$ mol L^{-1} DQ.	771093
22.3.50	4-Ethoxyphenoxy							
	$\text{Ru(bpy)}_3^{+} + 4\text{-EtOC}_6\text{H}_4\text{O}^\cdot \rightarrow \text{Ru(bpy)}_3^{2+} + 4\text{-EtOC}_6\text{H}_4\text{O}^-$	1.2×10^{10}	12.7	0.05	23	f.p./rq	D.k. at 510 nm in soln. contg. $(1.2) \times 10^{-4}$ mol L^{-1} Ru(bpy)_3^{2+} and $(0.1-40) \times 10^{-3}$ mol L^{-1} 4-ethoxyphenoxy ion (RQ).	82A365
22.3.51	4-Ethylphenoxy							
	$\text{Ru(bpy)}_3^{+} + 4\text{-EtC}_6\text{H}_4\text{O}^\cdot \rightarrow \text{Ru(bpy)}_3^{2+} + 4\text{-EtC}_6\text{H}_4\text{O}^-$	7.2×10^9	12.7	0.05	23	f.p./rq	D.k. at 510 nm in soln. contg. $(1.2) \times 10^{-4}$ mol L^{-1} Ru(bpy)_3^{2+} and $(0.1-40) \times 10^{-3}$ mol L^{-1} 4-ethylphenoxy ion (RQ).	82A365
22.3.52	2-Hydroxy-2,2-dimethylethyl							
	$\text{Ru(bpy)}_3^{+} + \text{CH}_2\text{C}(\text{CH}_3)_2\text{OH} \rightarrow \text{Ru(bpy)}_2[\text{bpyCH}_2\text{C}(\text{CH}_3)_2\text{OH}]^+$	1.9×10^9	-7-		12	p.r.	P.b.k. at 390 nm in Ar-satd. soln. contg. $(5-10) \times 10^{-5}$ mol L^{-1} Ru(bpy)_3^{2+} and 0.5 mol L^{-1} <i>tert</i> -BuOH; value obtained from computer fit. Product undergoes protonation by H_2O and $\text{H}_2\text{PO}_4^{2-}$, $k = 530 \text{ s}^{-1}$ and $1.3 \times 10^5 \text{ L mol}^{-1} \text{ s}^{-1}$, respectively.	91A218
22.3.53	1-Hydroxyethyl							
	$\text{Ru(bpy)}_3^{+} + \text{CH}_3\dot{\text{C}}\text{HOH} \rightarrow \text{Ru(bpy)}_2[\text{bpyCHOHCH}_3]^+$	1.9×10^9				p.r.	P.b.k. at 390 nm in Ar-satd. soln. contg. $(5-10) \times 10^{-5}$ mol L^{-1} Ru(bpy)_3^{2+} and 0.5 mol L^{-1} EtOH; value obtained from computer fit. Product undergoes protonation by H_2O and $\text{H}_2\text{PO}_4^{2-}$, $k = 140 \text{ s}^{-1}$ and $1.1 \times 10^5 \text{ L mol}^{-1} \text{ s}^{-1}$, respectively.	91A218
22.3.54	Hydroxymethyl							
	$\text{Ru(bpy)}_3^{+} + \text{CH}_2\dot{\text{O}}\text{H} \rightarrow \text{Ru(bpy)}_2[\text{bpyCH}_2\text{OH}]^+$	1.9×10^9				p.r.	P.b.k. at 390 nm in Ar-satd. soln. contg. $(5-10) \times 10^{-5}$ mol L^{-1} Ru(bpy)_3^{2+} and 0.5 mol L^{-1} MeOH; value obtained from computer fit. Product undergoes protonation by H_2O and $\text{H}_2\text{PO}_4^{2-}$, $k = 410 \text{ s}^{-1}$ and $1.3 \times 10^5 \text{ L mol}^{-1} \text{ s}^{-1}$, respectively.	91A218
22.3.55	1-Hydroxy-1-methylethyl							
	$\text{Ru(bpy)}_3^{+} + (\text{CH}_3)_2\dot{\text{C}}\text{OH} \rightarrow \text{Ru(bpy)}_2[\text{bpyCOH}(\text{CH}_3)_2]^+$	1.9×10^9				p.r.	P.b.k. at 390 nm in Ar-satd. soln. contg. $(5-10) \times 10^{-5}$ mol L^{-1} Ru(bpy)_3^{2+} and 0.5 mol L^{-1} 2-PrOH; value obtained from computer fit. Product undergoes protonation by H_2O and $\text{H}_2\text{PO}_4^{2-}$, $k = 85 \text{ s}^{-1}$ and $3.4 \times 10^5 \text{ L mol}^{-1} \text{ s}^{-1}$, respectively.	91A218

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
22.3 Tris(2,2'-bipyridine)ruthenium(II) ion, electron adduct — Continued								
22.3.56 4-Iodophenoxy								
	Ru(bpy) ₃ ⁺ + 4-IC ₆ H ₄ O [·] → Ru(bpy) ₃ ²⁺ + 4-IC ₆ H ₄ O ^{·-}	1.1 × 10 ¹⁰	12.7	0.05	23	f.p./rq	D.k. at 510 nm in soln. contg. (1-2) × 10 ⁻⁴ mol L ⁻¹ Ru(bpy) ₃ ²⁺ and (0.1-40) × 10 ⁻³ mol L ⁻¹ 4-iodophenoxyde ion (RQ).	82A365
22.3.57 4-Isopropylphenoxy								
	Ru(bpy) ₃ ⁺ + 4-(CH ₃) ₂ CC ₆ H ₄ O [·] → Ru(bpy) ₃ ²⁺ + 4-(CH ₃) ₂ CC ₆ H ₄ O ^{·-}	1.2 × 10 ¹⁰	12.7	0.05	23	f.p./rq	D.k. at 510 nm in soln. contg. (1-2) × 10 ⁻⁴ mol L ⁻¹ Ru(bpy) ₃ ²⁺ and (0.1-40) × 10 ⁻³ mol L ⁻¹ 4-isopropylphenoxyde ion (RQ).	82A365
22.3.58 4-Methoxy-<i>N,N</i>-dimethylaniline radical cation								
	Ru(bpy) ₃ ⁺ + [4-CH ₃ OC ₆ H ₄ N(CH ₃) ₂] ^{·+} → Ru(bpy) ₃ ²⁺ + 4-CH ₃ OC ₆ H ₄ N(CH ₃) ₂	9.6 × 10 ⁹	7	0.05	23	f.p./rq	D.k. at 510 nm in soln. contg. (1-2) × 10 ⁻⁴ mol L ⁻¹ Ru(bpy) ₃ ²⁺ and (0.1-40) × 10 ⁻³ mol L ⁻¹ 4-methoxy- <i>N,N</i> -dimethylaniline (RQ).	82A365
22.3.59 3-Methoxyphenoxy								
	Ru(bpy) ₃ ⁺ + 3-CH ₃ OC ₆ H ₄ O [·] → Ru(bpy) ₃ ²⁺ + 3-CH ₃ OC ₆ H ₄ O ^{·-}	7.2 × 10 ⁹	12.7	0.05	23	f.p./rq	D.k. at 510 nm in soln. contg. (1-2) × 10 ⁻⁴ mol L ⁻¹ Ru(bpy) ₃ ²⁺ and (0.1-40) × 10 ⁻³ mol L ⁻¹ 3-methoxyphenoxyde ion (RQ).	82A365
22.3.60 4-Methoxyphenoxy								
	Ru(bpy) ₃ ⁺ + 4-CH ₃ OC ₆ H ₄ O [·] → Ru(bpy) ₃ ²⁺ + 4-CH ₃ OC ₆ H ₄ O ^{·-}	1.2 × 10 ¹⁰	12.7	0.05	23	f.p./rq	D.k. at 510 nm in soln. contg. (1-2) × 10 ⁻⁴ mol L ⁻¹ Ru(bpy) ₃ ²⁺ and (0.1-40) × 10 ⁻³ mol L ⁻¹ 4-methoxyphenoxyde ion (RQ).	82A365
22.3.61 3-Methylphenoxy								
	Ru(bpy) ₃ ⁺ + 3-CH ₃ C ₆ H ₄ O [·] → Ru(bpy) ₃ ²⁺ + 3-CH ₃ C ₆ H ₄ O ^{·-}	8.1 × 10 ⁹	12.7	0.05	23	f.p./rq	D.k. at 510 nm in soln. contg. (1-2) × 10 ⁻⁴ mol L ⁻¹ Ru(bpy) ₃ ²⁺ and (0.1-40) × 10 ⁻³ mol L ⁻¹ 3-methylphenoxyde ion (RQ).	82A365
22.3.62 4-Methylphenoxy								
	Ru(bpy) ₃ ⁺ + 4-CH ₃ C ₆ H ₄ O [·] → Ru(bpy) ₃ ²⁺ + 4-CH ₃ C ₆ H ₄ O ^{·-}	1.1 × 10 ¹⁰	12.7	0.05	23	f.p./rq	D.k. at 510 nm in soln. contg. (1-2) × 10 ⁻⁴ mol L ⁻¹ Ru(bpy) ₃ ²⁺ and (0.1-40) × 10 ⁻³ mol L ⁻¹ 4-methylphenoxyde ion (RQ).	82A365
22.3.63 Phenoxy								
	Ru(bpy) ₃ ⁺ + C ₆ H ₅ O [·] → Ru(bpy) ₃ ²⁺ + C ₆ H ₅ O ^{·-}	5.3 × 10 ⁹	12.7	0.05	23	f.p./rq	D.k. at 510 nm in soln. contg. (1-2) × 10 ⁻⁴ mol L ⁻¹ Ru(bpy) ₃ ²⁺ and (0.1-40) × 10 ⁻³ mol L ⁻¹ phenoxyde ion (RQ).	82A365
22.3.64 4-Phenylphenoxy								
	Ru(bpy) ₃ ⁺ + 4-PhC ₆ H ₄ O [·] → Ru(bpy) ₃ ²⁺ + 4-PhC ₆ H ₄ O ^{·-}	7.6 × 10 ⁹	12.7	0.05	23	f.p./rq	D.k. at 510 nm in soln. contg. (1-2) × 10 ⁻⁴ mol L ⁻¹ Ru(bpy) ₃ ²⁺ and (0.1-40) × 10 ⁻³ mol L ⁻¹ 4-phenylphenoxyde ion (RQ).	82A365
22.3.65 2,4,6-Trimethylphenoxy								
	Ru(bpy) ₃ ⁺ + 2,4,6-Me ₃ C ₆ H ₂ O [·] → Ru(bpy) ₃ ²⁺ + 2,4,6-Me ₃ C ₆ H ₂ O ^{·-}	1.2 × 10 ¹⁰	12.7	0.05	23	f.p./rq	D.k. at 510 nm in soln. contg. (1-2) × 10 ⁻⁴ mol L ⁻¹ Ru(bpy) ₃ ²⁺ and (0.1-40) × 10 ⁻³ mol L ⁻¹ 2,4,6-trimethylphenoxyde ion (RQ).	82A365

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
22.4 Bis(2,2'-bipyridine)(4-carboxy-4'-methyl-2,2'-bipyridine)ruthenium(II) ion, electron adduct								
22.4.1 Pentaammine(1-L-prolyl-L-prolinato)cobalt(III) ion								
	[Ru(bpy) ₂ (4-CO ₂ -4'-CH ₃ bpy)] ⁺ + Co(NH ₃) ₅ (Pro) ₂ ²⁺ → [Ru(bpy) ₂ (4-CO ₂ -4'-CH ₃ bpy)] ⁺ + Co(NH ₃) ₅ (Pro) ₂ ⁺	7.2 × 10 ⁸	6.3		25	p.r.	D.k. at 350 and 500 nm in soln. contg. 6.6 × 10 ⁻⁵ mol L ⁻¹ [Ru(bpy) ₂ (4-CO ₂ -4'-CH ₃ bpy)] ⁺ , (1.3-7.7) × 10 ⁻⁵ mol L ⁻¹ Co(NH ₃) ₅ (Pro) ₂ ²⁺ , 0.13 mol L ⁻¹ <i>tert</i> -BuOH and 0.005 mol L ⁻¹ sodium acetate buffer; studied between 5 and 50 °C., Δ <i>H</i> _f = 15 kJ mol ⁻¹ , Δ <i>S</i> _f = -24.2 J mol ⁻¹ K ⁻¹ .	93A434
22.5 Bis(2,2'-bipyridine)ruthenium(II)(4-carboxy-4'-methyl-2,2'-bipyridine)(prolylprolinato)pentaamminecobalt(III), electron adduct								
22.5.1 Bis(2,2'-bipyridine)(4-carboxy-4'-methyl-2,2'-bipyridine)ruthenium(II) ion								
	[Ru(bpy) ₂ (4-CO ₂ -4'-CH ₃ bpy)(Pro) ₂ -Co(NH ₃) ₅] ³⁺ + [Ru(bpy) ₂ (4-CO ₂ -4'-CH ₃ bpy)] ⁺ → [Ru(bpy) ₂ (4-CO ₂ -4'-CH ₃ bpy)(Pro) ₂ -Co(NH ₃) ₅] ⁴⁺ + [Ru(bpy) ₂ (4-CO ₂ -4'-CH ₃ bpy)] ⁺	6.6 × 10 ⁸	6.3			p.r.	P.b.k. in soln. contg. [Ru(bpy) ₂ (4-CO ₂ -4'-CH ₃ bpy)(Pro) ₂ -Co(NH ₃) ₅] ⁴⁺ , 0.13 mol L ⁻¹ <i>tert</i> -BuOH and 0.005 mol L ⁻¹ sodium acetate buffer.	93A434
22.6 Bis(2,2'-bipyridine)(2,2'-bipyrimidine)ruthenium(II) ion, electron adduct								
22.6.1 1,1'-Dimethyl-4,4'-bipyridinium								
	Ru(bpy) ₂ (bpm) ⁺ + MV ²⁺ → Ru(bpy) ₂ (bpm) ²⁺ + MV ⁺	1.5 × 10 ⁹	10-13	0.15		p.r.	P.b.k. at 602 nm in N ₂ O-satd. soln. contg. 0.1 mol L ⁻¹ formate ion, Ru(bpy) ₂ (bpm) ²⁺ and MV ²⁺ ; <i>k</i> _r = 3.7 × 10 ² L mol ⁻¹ s ⁻¹ calculated from <i>K</i> _{eq} and <i>k</i> _f .	91A081 91A198
22.7 Bis(2,2'-bipyridine)(2,2'-bipyrimidine)ruthenium(II) ion, electron adduct, protonated								
22.7.1 1,1'-Dimethyl-4,4'-bipyridinium								
	Ru(bpy) ₂ (bpmH) ²⁺ + MV ²⁺ → Ru(bpy) ₂ (bpm) ²⁺ + MV ⁺ + H ⁺	1.8 × 10 ⁶	3.0	0.14		p.r.	P.b.k. at 602 nm in N ₂ O-satd. soln. contg. 0.1 mol L ⁻¹ formate ion, Ru(bpy) ₂ (bpm) ²⁺ and MV ²⁺ ; <i>k</i> _r = 4.5 × 10 ⁴ L mol ⁻¹ s ⁻¹ .	91A081 91A198
22.8 (2,2'-Bipyrazine)bis(2,2'-bipyridine)ruthenium(II) ion, electron adduct								
22.8.1 1,1'-Dimethyl-4,4'-bipyridinium								
	Ru(bpy) ₂ (bpz) ⁺ + MV ²⁺ → Ru(bpy) ₂ (bpz) ²⁺ + MV ⁺	1.2 × 10 ⁹	10-13	0.15		p.r.	P.b.k. at 602 nm in N ₂ O-satd. soln. contg. 0.1 mol L ⁻¹ formate ion, Ru(bpy) ₂ (bpz) ²⁺ and MV ²⁺ ; <i>k</i> _r = 3.1 × 10 ³ L mol ⁻¹ s ⁻¹ calculated from <i>K</i> _{eq} and <i>k</i> _f .	91A081 91A198
22.9 (2,2'-Bipyrazine)bis(2,2'-bipyridine)ruthenium(II) ion, electron adduct, protonated								
22.9.1 1,1'-Dimethyl-4,4'-bipyridinium								
	Ru(bpy) ₂ (bpzH) ²⁺ + MV ²⁺ → Ru(bpy) ₂ (bpz) ²⁺ + MV ⁺ + H ⁺	1.9 × 10 ⁵	3.0	0.14		p.r.	P.b.k. at 602 nm in N ₂ O-satd. soln. contg. 0.1 mol L ⁻¹ formate ion, Ru(bpy) ₂ (bpz) ²⁺ and MV ²⁺ ; <i>k</i> _r = 9.3 × 10 ⁵ L mol ⁻¹ s ⁻¹ .	91A081 91A198
22.10 (2,2'-Bipyrazine)(2,2'-bipyridine)(2,2'-bipyrimidine)ruthenium(II) ion, electron adduct								
22.10.1 1,1'-Dimethyl-4,4'-bipyridinium								
	Ru(bpy)(bpm)(bpz) ⁺ + MV ²⁺ → Ru(bpy)(bpm)(bpz) ²⁺ + MV ⁺	1.0 × 10 ⁹	10-13	0.15		p.r.	P.b.k. at 602 nm in N ₂ O-satd. soln. contg. 0.1 mol L ⁻¹ formate ion, Ru(bpy)(bpm)(bpz) ²⁺ and MV ²⁺ ; <i>k</i> _r = 1.3 × 10 ⁵ L mol ⁻¹ s ⁻¹ calculated from <i>K</i> _{eq} and <i>k</i> _f .	91A081 91A198

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	k (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
22.11 (2,2'-Bipyrazine)(2,2'-bipyridine)(2,2'-bipyrimidine)ruthenium(II) ion, electron adduct, protonated								
22.11.1 1,1'-Dimethyl-4,4'-bipyridinium	$\text{Ru(bpy)(bpm)(bpzH)}^{2+} + \text{MV}^{2+} \rightarrow$ $\text{Ru(bpy)(bpm)(bpz)}^{2+} + \text{MV}^{+} + \text{H}^+$	1.1×10^4	3.0	0.14		p.r.	P.b.k. at 602 nm in N ₂ O-satd. soln. contg. 0.1 mol L ⁻¹ formate ion, Ru(bpy)(bpm)(bpz) ²⁺ and MV ²⁺ ; $k_f = 7.8 \times 10^3$ L mol ⁻¹ s ⁻¹ .	91A081 91A198
22.12 Tris(2,2'-bipyrimidine)ruthenium(II) ion, electron adduct								
22.12.1 Tris(2,2'-bipyrimidine)ruthenium(II) ion, electron adduct	$\text{Ru(bpm)}_3^+ + \text{Ru(bpm)}_3^+ \rightarrow$	2.8×10^7	7.0			p.r.	D.k. at 350 and 450 nm in N ₂ O-satd. soln. contg. 0.1 mol L ⁻¹ formate ion and Ru(bpm) ₃ ²⁺ . Reaction suggested to involve the protonated electron adduct; $k = 1.5 \times 10^7$ and $\sim 5 \times 10^7$ L mol ⁻¹ s ⁻¹ , at pH 5 and pH 6-7, respectively, and $k = 18$ s ⁻¹ at pH 13.0.	89A280
22 - 1,1'-Dimethyl-4,4'-bipyridinium								
	$\text{Ru(bpm)}_3^+ + \text{MV}^{2+} \rightarrow \text{Ru(bpm)}_3^{2+} +$ MV^{+}	1.0×10^9	13.0			p.r.	P.b.k. at 602 nm in N ₂ O-satd. soln. contg. 0.1 mol L ⁻¹ formate ion, (1.3) $\times 10^{-5}$ mol L ⁻¹ MV ²⁺ and 1.0×10^{-4} mol L ⁻¹ Ru(bpm) ₃ ²⁺ ; $k_f = 1.2 \times 10^4$ L mol ⁻¹ s ⁻¹ calculated from K_{eq} and k_f [91A081].	89A280
22.12.3 Ascorbate radical anion								
	$\text{Ru(bpm)}_3^+ + \text{A}^- + \text{H}^+ \rightarrow$ $\text{Ru(bpm)}_3^{2+} + \text{AH}^-$	2.1×10^9	10	1.0		f.p./rq	D.k. at 490 nm in soln. contg. Ru(bpm) ₃ ²⁺ and ascorbate ion (RQ).	89A280
22.13 Tris(2,2'-bipyrimidine)ruthenium(II) ion, electron adduct, protonated								
22.13.1 1,1'-Dimethyl-4,4'-bipyridinium	$\text{Ru(bpm)}_2(\text{bpmH})^{2+} + \text{MV}^{2+} \rightarrow$ $\text{Ru(bpm)}_2^{2+} + \text{MV}^{+} + \text{H}^+$	1.0×10^6	3.0			p.r.	P.b.k. at 602 nm in N ₂ O-satd. soln. contg. 0.1 mol L ⁻¹ formate ion, (1.5-4.5) $\times 10^{-5}$ mol L ⁻¹ MV ²⁺ and 1.0×10^{-4} mol L ⁻¹ Ru(bpm) ₂ ²⁺ ; pK _a = 6.3; $k_f = 6.3 \times 10^4$ L mol ⁻¹ s ⁻¹ .	89A280
22.14 (2,2'-Bipyridine)bis(2,2'-bipyrimidine)ruthenium(II) ion, electron adduct								
22.14.1 1,1'-Dimethyl-4,4'-bipyridinium	$\text{Ru(bpm)}_2(\text{bpy})^+ + \text{MV}^{2+} \rightarrow$ $\text{Ru(bpm)}_2(\text{bpy})^{2+} + \text{MV}^{+}$	1.3×10^9	10-13	0.15		p.r.	P.b.k. at 602 nm in N ₂ O-satd. soln. contg. 0.1 mol L ⁻¹ formate ion, Ru(bpm) ₂ (bpy) ²⁺ and MV ²⁺ ; $k_f = 3.3 \times 10^3$ L mol ⁻¹ s ⁻¹ calculated from K_{eq} and k_f .	91A081 91A198
22.15 (2,2'-Bipyridine)bis(2,2'-bipyrimidine)ruthenium(II) ion, electron adduct, protonated								
22.15.1 1,1'-Dimethyl-4,4'-bipyridinium	$\text{Ru(bpm)(bpmH)(bpy)}^{2+} + \text{MV}^{2+} \rightarrow$ $\text{Ru(bpm)}_2(\text{bpy})^{2+} + \text{MV}^{+} + \text{H}^+$	4.7×10^5	3.0	0.14		p.r.	P.b.k. at 602 nm in N ₂ O-satd. soln. contg. 0.1 mol L ⁻¹ formate ion, Ru(bpm) ₂ (bpy) ²⁺ and MV ²⁺ ; $k_f = 7.2 \times 10^4$ L mol ⁻¹ s ⁻¹ .	91A081 91A198

TABLE 22. Rate constants for ruthenium transients — Continued

Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
22.16 (2,2'-Bipyrazine)bis(2,2'-bipyrimidine)ruthenium(II) ion, electron adduct							
22.16.1 1,1'-Dimethyl-4,4'-bipyridinium							
Ru(bpmp) ₂ (bpz) ⁺ + MV ²⁺ → Ru(bpmp) ₂ (bpz) ²⁺ + MV ⁺	6.0 × 10 ⁸	10-13	0.15		p.r.	P.b.k. at 602 nm in N ₂ O-satd. soln. contg. 0.1 mol L ⁻¹ formate ion, Ru(bpmp) ₂ (bpz) ²⁺ and MV ²⁺ ; <i>k</i> _r = 7.9 × 10 ⁵ L mol ⁻¹ s ⁻¹ calculated from <i>K</i> _{eq} and <i>k</i> _r .	91A081 91A198
22.17 (2,2'-Bipyrazine)bis(2,2'-bipyrimidine)ruthenium(II) ion, electron adduct, protonated							
22.17.1 1,1'-Dimethyl-4,4'-bipyridinium							
Ru(bpmp) ₂ (bpzH) ²⁺ + MV ²⁺ → Ru(bpmp) ₂ (bpz) ²⁺ + MV ⁺ + H ⁺	8.7 × 10 ³	3.0	0.14		p.r.	P.b.k. at 602 nm in N ₂ O-satd. soln. contg. 0.1 mol L ⁻¹ formate ion, Ru(bpmp) ₂ (bpz) ²⁺ and MV ²⁺ ; <i>k</i> _r = 1.7 × 10 ⁶ L mol ⁻¹ s ⁻¹ .	91A081 91A198
22.18 Tris(2,2'-bipyrazine)ruthenium(II) ion, electron adduct							
22.18.1 1,3,6,8,10,13,16,19-Octaazabicyclo[6.6.6]eicosanecobalt(III) ion							
Ru(bpz) ₃ ⁺ + Co(sep) ³⁺ → Ru(bpz) ₃ ²⁺ + Co(sep) ²⁺	3.3 × 10 ⁵	10.3			p.r.	D.k. at 490 nm in N ₂ O-satd. soln. contg. 0.13 mol L ⁻¹ 2-PrOH, 1 × 10 ⁻⁴ mol L ⁻¹ Ru(bpz) ₃ ²⁺ and <3 × 10 ⁻⁵ mol L ⁻¹ Co(sep) ³⁺ .	88A091
22.18.2 Oxygen							
Ru(bpz) ₃ ⁺ + O ₂ → Ru(bpz) ₃ ²⁺ + O ₂ ^{..-}	5.8 × 10 ⁸	11.0			f.p./rq	Soln. contg. Ru(bpz) ₃ ²⁺ , EDTA (RQ) and 1.3 × 10 ⁻³ mol L ⁻¹ O ₂ .	86A120
22.18.3 Ascorbate radical anion							
Ru(bpz) ₃ ⁺ + A ^{·-} + H ⁺ → Ru(bpz) ₃ ²⁺ + AH ^{·-}	1.5 × 10 ⁹	4.5- 9.5	1	22	f.p./rq	D.k. in soln. contg. 5 × 10 ⁻⁵ mol L ⁻¹ Ru(bpz) ₃ ²⁺ and 3 × 10 ⁻³ mol L ⁻¹ ascorbate ion (RQ).	89E105
22.18.4 1,1'-Dimethyl-4,4'-bipyridinium							
Ru(bpz) ₃ ⁺ + MV ²⁺ → Ru(bpz) ₃ ²⁺ + MV ⁺	1.3 × 10 ⁸	10-13	0.15		p.r.	P.b.k. at 602 nm in N ₂ O-satd. soln. contg. 0.1 mol L ⁻¹ formate ion, Ru(bpz) ₃ ²⁺ and MV ²⁺ ; <i>k</i> _r = 1.7 × 10 ⁷ L mol ⁻¹ s ⁻¹ .	91A081 91A198
	3.8 × 10 ⁸	12	1.0	22	f.p./rq	D.k. at 490 nm and p.b.k. at 440 and 605 nm in soln. contg. Ru(bpz) ₃ ²⁺ , 0.05 mol L ⁻¹ triethanolamine (RQ) and 2 and 5 × 10 ⁻⁴ mol L ⁻¹ MV ²⁺ ; <i>k</i> = 5 × 10 ⁸ L mol ⁻¹ s ⁻¹ was obtained using 2 × 10 ⁻⁴ mol L ⁻¹ MV ²⁺ and (CH ₃) ₂ NCH ₂ CH ₂ S ^{·-} as RQ.	89E105
22.19 Tris(2,2'-bipyrazine)ruthenium(II) ion, electron adduct, protonated							
22.19.1 1,1'-Dimethyl-4,4'-bipyridinium							
Ru(bpz) ₂ (bpzH) ²⁺ + MV ²⁺ → Ru(bpz) ₂ ²⁺ + MV ⁺ + H ⁺	4.4 × 10 ⁴	3.0	0.14		p.r.	P.b.k. at 602 nm in N ₂ O-satd. soln. contg. 0.1 mol L ⁻¹ formate ion, Ru(bpz) ₂ ²⁺ and MV ²⁺ ; <i>k</i> _r = 3.3 × 10 ⁷ L mol ⁻¹ s ⁻¹ .	91A081 91A198
22.19.2 1,3,6,8,10,13,16,19-Octaazabicyclo[6.6.6]eicosanecobalt(III) ion							
Ru(bpz) ₂ (bpzH) ²⁺ + Co(sep) ³⁺ → Ru(bpz) ₂ ²⁺ + Co(sep) ²⁺ + H ⁺	<10 ³	4.0			p.r.	No reaction obs. in the presence of 0.1 mol L ⁻¹ Co(sep) ³⁺ in N ₂ O-satd. soln. contg. 0.13 mol L ⁻¹ 2-PrOH and 1 × 10 ⁻⁴ mol L ⁻¹ Ru(bpz) ₂ ²⁺ ; <i>pK</i> _a of protonated electron adduct = 7.1.	88A091

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.	
22.20 Bis(2,2'-bipyrazine)(2,2'-bipyridine)ruthenium(II) ion, electron adduct									
22.20.1	1,1'-Dimethyl-4,4'-bipyridinium								
	Ru(bpz) ₂ (bpyp) ⁺ + MV ²⁺ →	8.0 × 10 ⁸		10-13	0.15	p.r.	P.b.k. at 602 nm in N ₂ O-satd. soln.	91A081	
	Ru(bpz) ₂ (bpyp) ²⁺ + MV ⁺						contg. 0.1 mol L ⁻¹ formate ion,	91A198	
							Ru(bpz) ₂ (bpyp) ²⁺ and MV ²⁺ ; <i>k</i> _r = 4.8 ×		
							10 ⁵ L mol ⁻¹ s ⁻¹ calculated from <i>K</i> _{eq}		
							and <i>k</i> _f .		
22.21 Bis(2,2'-bipyrazine)(2,2'-bipyridine)ruthenium(II) ion, electron adduct, protonated									
22.21.1	1,1'-Dimethyl-4,4'-bipyridinium								
	Ru(bpz)(bpzH)(bpyp) ²⁺ + MV ²⁺ →	9.0 × 10 ⁴		3.0	0.14	p.r.	P.b.k. at 602 nm in N ₂ O-satd. soln.	91A081	
	Ru(bpz) ₂ (bpyp) ²⁺ + MV ⁺ + H ⁺						contg. 0.1 mol L ⁻¹ formate ion,	91A198	
							Ru(bpz) ₂ (bpyp) ²⁺ and MV ²⁺ ; <i>k</i> _r = 4.5 ×		
							10 ⁶ L mol ⁻¹ s ⁻¹ .		
22.22 Bis(2,2'-bipyrazine)(2,2'-bipyrimidine)ruthenium(II) ion, electron adduct									
22.22.1	1,1'-Dimethyl-4,4'-bipyridinium								
	Ru(bpz) ₂ (bpm) ⁺ + MV ²⁺ →	5.3 × 10 ⁸		10-13	0.15	p.r.	P.b.k. at 602 nm in N ₂ O-satd. soln.	91A081	
	Ru(bpz) ₂ (bpm) ²⁺ + MV ⁺						contg. 0.1 mol L ⁻¹ formate ion,	91A198	
							Ru(bpz) ₂ (bpm) ²⁺ and MV ²⁺ ; <i>k</i> _r = 7.2 × 10 ⁶ L mol ⁻¹ s ⁻¹ calculated from <i>K</i> _{eq}		
							and <i>k</i> _f .		
22.23 Bis(2,2'-bipyrazine)(2,2'-bipyrimidine)ruthenium(II) ion, electron adduct, protonated									
22.23.1	1,1'-Dimethyl-4,4'-bipyridinium								
	Ru(bpz)(bpzH)(bpm) ²⁺ + MV ²⁺ →	3.0 × 10 ⁴		3.0	0.14	p.r.	P.b.k. at 602 nm in N ₂ O-satd. soln.	91A081	
	Ru(bpz) ₂ (bpm) ²⁺ + MV ⁺ + H ⁺						contg. 0.1 mol L ⁻¹ formate ion,	91A198	
							Ru(bpz) ₂ (bpm) ²⁺ and MV ²⁺ ; <i>k</i> _r = 8.1 × 10 ⁶ L mol ⁻¹ s ⁻¹ .		
22.24 Tris(2,2'-bipyridine)ruthenium(II) ion, OH-adduct									
22.24.1	Tris(2,2'-bipyridine)ruthenium(II) ion, OH-adduct								
	Ru(bpy) ₃ -OH ²⁺ + Ru(bpy) ₃ -OH ²⁺ →	6 × 10 ⁶		-7		21	p.r.	D.k. at 750 nm in N ₂ O-satd. soln.	86A034
							contg. Ru(bpy) ₃ ²⁺ ; mixt. of adducts;		
							unclear whether <i>k</i> or 2 <i>k</i> .		
		(5-10) × 10 ⁶		5-11	1.0	25	p.r.	D.k. at 750 nm in N ₂ O-satd. soln.	757415
							contg. Ru(bpy) ₃ ²⁺ .		
22.24.2 Ferricyanide ion									
	Ru(bpy) ₃ -OH ²⁺ + Fe(CN) ₆ ³⁻ →	4.1 × 10 ⁵		9.7		p.r.	D.k. at 800 nm and p.b.k. at 479 nm	90A015	
							in N ₂ O-satd. soln. contg. (1-6) × 10 ⁻⁴ mol L ⁻¹ Ru(bpy) ₃ ²⁺ and (1.32-5.97) × 10 ⁻⁴ mol L ⁻¹ Fe(CN) ₆ ³⁻ ; <i>k</i> = 3.4 × 10 ⁵ L mol ⁻¹ s ⁻¹ by condy.		
							measurement.		
22.25 Tris(2,2'-bipyrazine)ruthenium(II) ion, OH-adduct									
22.25.1	Tris(2,2'-bipyrazine)ruthenium(II) ion, OH-adduct								
	Ru(bpz) ₃ -OH ²⁺ + Ru(bpz) ₃ -OH ²⁺ →	~4 × 10 ⁸		4.0		p.r.	D.k. at 450 nm in N ₂ O-satd. soln.	88A091	
							contg. Ru(bpz) ₃ ²⁺ ; unclear whether <i>k</i> or 2 <i>k</i> .		
22.26 Bis(2,2'-bipyridine)(dipyrido[3,2-<i>a</i>:2',3'-<i>c</i>]phenazine)ruthenium(II) ion, electron adduct, diprotonated									
22.26.1	Bis(2,2'-bipyridine)(dipyrido[3,2- <i>a</i> :2',3'- <i>c</i>]phenazine)ruthenium(II) ion, electron adduct, diprotonated								
	Ru(bpy) ₂ (dppzH ₂) ³⁺ +	1.2 × 10 ⁸		3		p.r.	D.k. at 390 nm in N ₂ O-satd. soln.	89A312	
	Ru(bpy) ₂ (dppzH ₂) ³⁺ →						contg. Ru(bpy) ₂ (dppz) ²⁺ and 0.1 mol L ⁻¹ formate ion; p <i>K</i> _a of reduced		
	Ru(bpy) ₂ (dppz) ²⁺ +						species = 4 and 10.		
	Ru(bpy) ₂ (dppzH ₂) ²⁺ + 2 H ⁺								

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
22.27 Bis(2,2'-bipyridine)(dipyrido[3,2-<i>a</i>:2',3'-<i>c</i>]phenazine)ruthenium(II) ion, electron adduct, protonated								
22.27.1 Bis(2,2'-bipyridine)(dipyrido[3,2-<i>a</i>:2',3'-<i>c</i>]phenazine)ruthenium(II) ion, electron adduct, protonated								
	Ru(bpy) ₂ (dppzH) ²⁺ +	4.7 × 10 ⁸	7			p.r.	D.k. at 390 nm in N ₂ O-satd. soln. contg. Ru(bpy) ₂ (dppz) ²⁺ and 0.1 mol L ⁻¹ formate ion; pK _a of reduced species = 4 and 10.	89A312
	Ru(bpy) ₂ (dppzH) ²⁺ →							
	Ru(bpy) ₂ (dppz) ²⁺ +							
	Ru(bpy) ₂ (dppzH ₂) ²⁺							
22.28 Bis(2,2'-bipyridine)(dipyrido[3,2-<i>a</i>:2',3'-<i>c</i>]phenazine)ruthenium(II) ion, electron adduct								
22.28.1 Bis(2,2'-bipyridine)(dipyrido[3,2-<i>a</i>:2',3'-<i>c</i>]phenazine)ruthenium(II) ion, electron adduct								
	2 Ru(bpy) ₂ (dppz) ⁺ + 2 H ₂ O →	4.3 × 10 ⁸	12-13			p.r.	D.k. at 390 nm in N ₂ O-satd. soln. contg. Ru(bpy) ₂ (dppz) ²⁺ and 0.1 mol L ⁻¹ formate ion; pK _a of reduced species = 4 and 10.	89A312
	Ru(bpy) ₂ (dppz) ²⁺ +							
	Ru(bpy) ₂ (dppzH ₂) ²⁺ + 2 OH ⁻							
22.28.2 1,1'-Dimethyl-4,4'-bipyridinium								
	Ru(bpy) ₂ (dppz) ⁺ + MV ²⁺ →	1.6 × 10 ⁹	13			p.r.	P.b.k. in N ₂ O-satd. soln. contg. Ru(bpy) ₂ (dppz) ²⁺ and 0.1 mol L ⁻¹ formate ion; at pH 3 and 7 the reduction of Ru(bpy) ₂ (dppz) ²⁺ by MV ⁺ was observed, pK _a of the reduced species = 4 and 10.	89A312
	Ru(bpy) ₂ (dppz) ²⁺ + MV ⁺							
22.29 Bis(2,2'-bipyridine)(6,7-dihydro-5,8-dimethylbenzo[<i>b,j</i>][1,10]phenanthroline)ruthenium(II) ion, electron adduct								
22.29.1 4,7,13,16,21-Pentaoxa-1,10-diazabicyclo[8.8.5]tricosaneeuropium(III) ion								
	Ru(bpy) ₂ (DMCH) ⁺ + [Eu 2.2.1] ³⁺ →	5.9 × 10 ⁷	1	22	f.p./rq	D.k. at 500 nm in soln. contg. Ru(bpy) ₂ (DMCH) ²⁺ , excess [Eu 2.2.1] ²⁺ (RQ) and 1 mol L ⁻¹ KCl.	86E195	
	Ru(bpy) ₂ (DMCH) ²⁺ + [Eu 2.2.1] ²⁺							
22.30 Tris(4,4'-dimethyl-2,2'-bipyridine)ruthenium(II) ion, electron adduct								
22.30.1 Copper(II) ion								
	Ru(4,4'-Me ₂ bpy) ₃ ⁺ + Cu ²⁺ →	3.7 × 10 ⁸	6.6	0.04	25	p.r.	D.k. at 510 nm in soln. contg. Ru(4,4'-Me ₂ bpy) ₃ ²⁺ , 0.5 mol L ⁻¹ <i>tert</i> -BuOH and cacodylate buffer.	78A090
	Ru(4,4'-Me ₂ bpy) ₃ ²⁺ + Cu ⁺							
22.30.2 Europium(III) ion								
	Ru(4,4'-Me ₂ bpy) ₃ ⁺ + Eu ³⁺ →	4.5 × 10 ⁷	0.5	25	f.p./rq	D.k. at 490-510 nm in soln. contg. (0.3-3.0) × 10 ⁻⁴ mol L ⁻¹ Ru(4,4'-Me ₂ bpy) ₃ ²⁺ and ~0.1 mol L ⁻¹ Eu ²⁺ (RQ).	78A087	
	Ru(4,4'-Me ₂ bpy) ₃ ²⁺ + Eu ²⁺							
22.31 Tris(1,10-phenanthroline)ruthenium(II) ion, electron adduct								
22.31.1 Copper(II) ion								
	Ru(phen) ₃ ⁺ + Cu ²⁺ → Ru(phen) ₃ ²⁺ + Cu ⁺	4.7 × 10 ⁸	6.6	0.04	25	p.r.	D.k. at 510 nm in soln. contg. Ru(phen) ₃ ²⁺ , 0.5 mol L ⁻¹ <i>tert</i> -BuOH and cacodylate buffer.	78A090
22.31.2 Europium(III) ion								
	Ru(phen) ₃ ⁺ + Eu ³⁺ → Ru(phen) ₃ ²⁺ + Eu ²⁺	5.2 × 10 ⁷	0.5	25	f.p./rq	D.k. at 490-510 nm in soln. contg. (0.3-3.0) × 10 ⁻⁴ mol L ⁻¹ Ru(phen) ₃ ²⁺ and ~0.1 mol L ⁻¹ Eu ²⁺ (RQ).	78A087	
22.32 Tris(4,7-dimethyl-1,10-phenanthroline)ruthenium(II) ion, electron adduct								
22.32.1 Europium(III) ion								
	Ru(4,7-Me ₂ phen) ₃ ⁺ + Eu ³⁺ →	5.7 × 10 ⁷	0.5	25	f.p./rq	D.k. at 490-510 nm in soln. contg. (0.3-3.0) × 10 ⁻⁴ mol L ⁻¹ Ru(4,7-Me ₂ phen) ₃ ²⁺ and ~0.1 mol L ⁻¹ Eu ²⁺ (RQ).	78A087	
	Ru(4,7-Me ₂ phen) ₃ ²⁺ + Eu ²⁺							

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
22.33 Tris(5-chloro-1,10-phenanthroline)ruthenium(II) ion, electron adduct								
22.33.1 Copper(II) ion	$\text{Ru}(\text{5-Clphen})_3^{2+} + \text{Cu}^{2+} \rightarrow \text{Ru}(\text{5-Clphen})_3^{2+} + \text{Cu}^+$	2.6×10^8	6.6	0.04	25	p.r.	D.k. at 510 nm in soln. contg. $\text{Ru}(\text{5-Clphen})_3^{2+}$, 0.5 mol L ⁻¹ <i>tert</i> -BuOH and cacodylate buffer.	78A090
22.33.2 Europium(III) ion								
	$\text{Ru}(\text{5-Clphen})_3^{2+} + \text{Eu}^{3+} \rightarrow \text{Ru}(\text{5-Clphen})_3^{2+} + \text{Eu}^{2+}$	1.6×10^7		0.5	25	f.p./rq	D.k. at 490-510 nm in soln. contg. $(0.3\text{-}3.0) \times 10^{-4}$ mol L ⁻¹ $\text{Ru}(\text{5-Clphen})_3^{2+}$ and 0.1 mol L ⁻¹ Eu^{2+} (RQ).	78A087
22.34 Tris(1,4,5,8-tetraazaphenanthrene)ruthenium(II) ion, electron adduct, protonated								
22.34.1 Tris(1,4,5,8-tetraazaphenanthrene)ruthenium(II) ion, electron adduct, protonated	$\text{Ru}(\text{TAP})_2(\text{TAPH})^{2+} + \text{H}^+ \rightarrow \text{Ru}(\text{TAP})_2(\text{TAPH})^{2+}$	1.0×10^9		5		f.p./rq	D.k. at 470 nm in Ar- or O ₂ -satd. soln. contg. 6×10^{-5} mol L ⁻¹ $\text{Ru}(\text{TAP})_2^{2+}$ and 10^{-2} mol L ⁻¹ guanosine 5'-monophosphate (RQ); $\text{pK}_a = 7.6$; unclear whether <i>k</i> or $2k$.	92R075
22.35 Tris(1,4,5,8-tetraazaphenanthrene)ruthenium(II) ion, electron adduct								
22.35.1 Oxygen	$\text{Ru}(\text{TAP})_3^{2+} + \text{O}_2 \rightarrow \text{Ru}(\text{TAP})_3^{2+} + \text{O}_2^{--}$	1.9×10^7 4.4×10^7 8.4×10^7 2.2×10^8		7.5 8.0 8.4 8.9		f.p./rq	D.k. at 170 nm in O ₂ -satd. soln. contg. 6×10^{-5} mol L ⁻¹ $\text{Ru}(\text{TAP})_3^{2+}$ and 10^{-2} mol L ⁻¹ guanosine 5'-monophosphate (RQ).	92R075
22.35.2 1,4-Benzosemiquinone, radical ion	$\text{Ru}(\text{TAP})_3^{2+} + \text{Q}^{--} + 2 \text{H}^+ \rightarrow \text{Ru}(\text{TAP})_3^{2+} + \text{QH}_2$	-5×10^9				f.p./rq	D.k. at 480 nm in soln. contg. 1.1×10^{-4} mol L ⁻¹ $\text{Ru}(\text{TAP})_3^{2+}$ and 10^{-2} mol L ⁻¹ hydroquinone (RQ).	87A267
22.35.3 1,4-Benzoquinone	$\text{Ru}(\text{TAP})_3^{2+} + \text{Q} \rightarrow \text{Ru}(\text{TAP})_3^{2+} + \text{Q}^{--}$	4.3×10^8 5.6×10^8		6.5 8.4		f.p./rq	D.k. at 470 nm in Ar-satd. soln. contg. 10^{-4} mol L ⁻¹ $\text{Ru}(\text{TAP})_3^{2+}$, 10^{-2} mol L ⁻¹ guanosine 5'-monophosphate (RQ) and 8×10^{-5} mol L ⁻¹ benzoquinone. Change in <i>k</i> with pH attributed to protonation of $\text{Ru}(\text{TAP})_3^{2+}$; $\text{pK}_a \text{ Ru}(\text{TAP})_2(\text{TAPH})^{2+} = 7.6$.	92R075
22.35.4 Guanosine 5'-monophosphate radical	$\text{Ru}(\text{TAP})_3^{2+} + [\text{GMP}(\text{-H})]^{\bullet} + \text{H}^+ \rightarrow \text{Ru}(\text{TAP})_3^{2+} + \text{GMP}$	1.0×10^9 1.5×10^9		6 9		f.p./rq	D.k. at 470 nm in Ar-satd. soln. contg. 10^{-4} mol L ⁻¹ $\text{Ru}(\text{TAP})_3^{2+}$ and 10^{-2} mol L ⁻¹ GMP (RQ); $\text{pK}_a (\text{GMP}^\bullet) = 4$, $\text{pK}_a \text{ Ru}(\text{TAP})_2(\text{TAPH})^{2+} = 7.6$.	92R075
22.36 <i>trans</i>-Tetraammine(aqua)nitrosylruthenium(II) ion								
22.36.1 Pentaammine(nitroso)ruthenium(III) ion	$\text{trans-Ru}(\text{NH}_3)_4\text{NO}(\text{H}_2\text{O})^{2+} + \text{Ru}(\text{NH}_3)_5\text{NO}^{3+} \rightarrow \text{trans-Ru}(\text{NH}_3)_4\text{NO}(\text{H}_2\text{O})^{3+} + \text{Ru}(\text{NH}_3)_5\text{NO}^{2+}$	8		7.5 0.4	26.0	γ -r.	Kinetic anal. of zero-order k_{obs} in N ₂ O-satd. soln. contg. 2.0×10^{-3} mol L ⁻¹ $\text{Ru}(\text{NH}_3)_5\text{NO}^{3+}$ and 0.4 mol L ⁻¹ HCO_2^- .	78A110

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
22.37 Pentaamminenitrosylruthenium(II) ion								
22.37.1 Water								
	Ru(NH ₃) ₅ NO ²⁺ + H ₂ O → <i>trans</i> -Ru(NH ₃) ₄ NO(H ₂ O) ²⁺ + NH ₃	1.8 × 10 ⁻² s ⁻¹	7.1	0.4	25.0	γ-r.	Kinetic anal. of abs. increase at 315 nm in N ₂ O-satd. soln. contg. 1.7 × 10 ⁻³ mol L ⁻¹ Ru(NH ₃) ₅ NO ³⁺ and 0.4 mol L ⁻¹ HCO ₃ ⁻ (or 2-PrOH); Δ <i>H</i> [‡] = 99.2 kJ mol ⁻¹ , Δ <i>S</i> [‡] = 45.2 J K ⁻¹ mol ⁻¹ .	78A110
22.37.2 2-Hydroxy-2,2-dimethylethyl								
	Ru(NH ₃) ₅ NO ²⁺ + *CH ₂ C(CH ₃) ₂ OH → Ru(NH ₃) ₅ N(O)CH ₂ C(CH ₃) ₂ OH ²⁺	3.7 × 10 ⁹	6.0-	7.5		p.r.	D.k. at 280 nm and p.b.k. in Ar-satd. soln. contg. Ru(NH ₃) ₅ NO ³⁺ and 0.3 mol L ⁻¹ <i>tert</i> -BuOH.	79A134
		3.7 × 10 ⁹	1.0-	10.3	23	p.r.	D.k. at 280 nm and p.b.k. in deoxygenated soln. contg. (5-50) × 10 ⁻⁴ mol L ⁻¹ Ru(NH ₃) ₅ NO ³⁺ and 0.1-2 mol L ⁻¹ <i>tert</i> -BuOH.	751077
22.37.3 2-Amino-2-carboxy-2-methylethyl								
	Ru(NH ₃) ₅ NO ²⁺ + *CH ₂ C(CH ₃)(NH ₃) ⁺ CO ₂ ⁻ → Ru(NH ₃) ₅ N(O)CH ₂ C(CH ₃)(NH ₃)CO ₂ ²⁺	3.1 × 10 ⁹	6.0-	7.5		p.r.	D.k. at 280 nm and p.b.k. in Ar-satd. soln. contg. Ru(NH ₃) ₅ NO ³⁺ and 0.3 mol L ⁻¹ α-aminoisobutyrate ion.	79A134
22.37.4 (<i>N</i>-Acetyl-<i>N</i>-methylamino)methyl								
	Ru(NH ₃) ₅ NO ²⁺ + *CH ₂ N(CH ₃)C(O)CH ₃ → Ru(NH ₃) ₅ N(O)CH ₂ N(CH ₃)C(O)CH ₃ ²⁺	2.9 × 10 ⁹	6.0-	7.5		p.r.	D.k. at 280 nm and p.b.k. in Ar-satd. soln. contg. Ru(NH ₃) ₅ NO ³⁺ and 0.3 mol L ⁻¹ <i>N,N</i> -dimethylacetamide.	79A134
22.37.5 2-Amino-2-methylpropyl, conjugate acid								
	Ru(NH ₃) ₅ NO ²⁺ + *CH ₂ C(CH ₃) ₂ NH ₃ ⁺ → Ru(NH ₃) ₅ N(O)CH ₂ C(CH ₃) ₂ NH ₃ ²⁺	2.0 × 10 ⁹	7.0			p.r.	D.k. at 280 nm and p.b.k. in Ar-satd. soln. contg. 5 × 10 ⁻⁴ mol L ⁻¹ Ru(NH ₃) ₅ NO ³⁺ and 0.3 mol L ⁻¹ <i>tert</i> -butylamine.	79A134
22.37.6 2-Carboxy-2-hydroxy-2-methylethyl, anion								
	Ru(NH ₃) ₅ NO ²⁺ + *CH ₂ C(CH ₃)(OH)CO ₂ ⁻ → Ru(NH ₃) ₅ N(O)CH ₂ C(CH ₃)(OH)CO ₂ ⁺	3.0 × 10 ⁹	7.0			p.r.	D.k. at 280 nm and p.b.k. in Ar-satd. soln. contg. 5 × 10 ⁻⁴ mol L ⁻¹ Ru(NH ₃) ₅ NO ³⁺ and 0.3 mol L ⁻¹ α-hydroxyisobutyrate ion.	79A134
22.37.7 2-Carboxy-2,2-dimethylethyl anion								
	Ru(NH ₃) ₅ NO ²⁺ + *CH ₂ C(CH ₃) ₂ CO ₂ ⁻ → Ru(NH ₃) ₅ N(O)CH ₂ C(CH ₃) ₂ CO ₂ ⁺	2.9 × 10 ⁹	6.3			p.r.	P.b.k. at 343 nm and d.k. at 280 nm in Ar-satd. soln. contg. 5 × 10 ⁻⁴ mol L ⁻¹ Ru(NH ₃) ₅ NO ³⁺ and 0.3 mol L ⁻¹ pivalate ion.	79A134
22.37.8 Oxygen								
	Ru(NH ₃) ₅ NO ²⁺ + O ₂ →	7.6 × 10 ⁶				p.r.	D.k. at 280 nm in air-satd. soln. contg. Ru(NH ₃) ₅ NO ³⁺ .	751049
22.37.9 2-Hydroxy-2,2-dimethylethylperoxy								
	Ru(NH ₃) ₅ NO ²⁺ + (CH ₃) ₂ C(OH)CH ₂ OO [·] →	3 × 10 ⁹				p.r.	D.k. in air-satd. soln. contg. 1 × 10 ⁻³ mol L ⁻¹ Ru(NH ₃) ₅ NO ³⁺ and 1 mol L ⁻¹ <i>tert</i> -BuOH. Authors suggested that oxidation to Ru(NH ₃) ₅ NO ³⁺ could occur.	751077
22.38 Decaammine(dinitrogen)diruthenium(I-II) ion								
22.38.1 Water								
	[(NH ₃) ₅ RuN ₂ Ru(NH ₃) ₅] ³⁺ + H ₂ O → Ru(NH ₃) ₅ N ₂ ²⁺ + other products	8.0 × 10 ⁴ s ⁻¹	7.2		23.5	p.r.	D.k. at 500 nm in N ₂ -satd. soln. contg. 1 × 10 ⁻⁴ mol L ⁻¹ [(NH ₃) ₅ RuN ₂ Ru(NH ₃) ₅] ⁴⁺ and 0.1 mol L ⁻¹ <i>tert</i> -BuOH; other products include Ru(I)-Ru(0) species.	82A135

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
22.39 Decaammine(dinitrogen)diruthenium(II) ion, OH-adduct								
22.39.1 First-order reaction								
	$[(\text{NH}_3)_5\text{RuN}_2\text{Ru}(\text{NH}_3)_5]\text{OH}^{4+} \rightarrow$ $[(\text{NH}_3)_5\text{RuN}_2\text{Ru}(\text{NH}_3)_5]^{5+} + \text{OH}^-$	$1.4 \times 10^4 \text{ s}^{-1}$		6.8	23.5	p.r.	D.k. at 435 nm in N ₂ O-satd. soln. contg. $1 \times 10^{-4} \text{ mol L}^{-1}$ $[(\text{NH}_3)_5\text{RuN}_2\text{Ru}(\text{NH}_3)_5]^{4+}$.	82A135
22.40 Decaammine(dinitrogen)diruthenium(II-III) ion								
22.40.1 Water								
	$[(\text{NH}_3)_5\text{RuN}_2\text{Ru}(\text{NH}_3)_5]^{5+} + \text{H}_2\text{O} \rightarrow$ $\text{Ru}(\text{NH}_3)_5\text{N}_2^{2+} + \text{Ru}(\text{NH}_3)_5\text{OH}^{2+} +$ H^+	0.16 s^{-1}		6.8	23.5	p.r.	D.k. at 235 nm in N ₂ O-satd. soln. contg. $(2.5) \times 10^{-4} \text{ mol L}^{-1}$ $[(\text{NH}_3)_5\text{RuN}_2\text{Ru}(\text{NH}_3)_5]^{4+}$.	82A135
22.41 Tris(acetylacetonato)ruthenate(II) ion								
22.41.1 Hydrogen ion								
	$\text{Ru}(\text{acac})_3^- + \text{H}^+ \rightarrow \text{Ru}(\text{acac})_2 +$ acacH	$\leq 1 \times 10^2$		3.5- 7.0	25	p.r.	Estd. from condy. change in He-satd. soln. contg. $5 \times 10^{-4} \text{ mol L}^{-1}$ $\text{Ru}(\text{acac})_3$ and 0.1 mol L^{-1} <i>tert</i> - BuOH; pK _a of $\text{Ru}(\text{acac})_3\text{H} < 3.5$.	79A297
22.41.2 First-order reaction								
	$\text{Ru}(\text{acac})_3^- \rightarrow \text{Ru}(\text{acac})_2 + \text{acac}^-$	$\leq 3 \times 10^{-2} \text{ s}^{-1}$		3.5- 7.0	25	p.r.	Estd. from condy. change in He-satd. soln. contg. $5 \times 10^{-4} \text{ mol L}^{-1}$ $\text{Ru}(\text{acac})_3$ and 0.1 mol L^{-1} <i>tert</i> - BuOH.	79A297
22.42 Pentaammine(chloro)ruthenium(II) ion								
22.42.1 Water								
	$\text{Ru}(\text{NH}_3)_5\text{Cl}^+ + \text{H}_2\text{O} \rightarrow$ $\text{Ru}(\text{NH}_3)_5(\text{H}_2\text{O})^{2+} + \text{Cl}^-$	4.7 s^{-1}			20	p.r.	D.k. at 280 nm in soln. contg. 0.1 mol L^{-1} MeOH and $\sim 1.5 \times 10^{-4} \text{ mol L}^{-1}$ $\text{Ru}(\text{NH}_3)_5\text{Cl}^{2+}$.	700178
22.43 Pentaammine(aquo)ruthenium(II) ion								
22.43.1 Pentaammine(chloro)ruthenium(III) ion								
	$\text{Ru}(\text{NH}_3)_5(\text{H}_2\text{O})^{2+} + \text{Ru}(\text{NH}_3)_5\text{Cl}^{2+} \rightarrow$ $\rightarrow \text{Ru}(\text{NH}_3)_5(\text{H}_2\text{O})^{3+} + \text{Ru}(\text{NH}_3)_5\text{Cl}^+$	1.0×10^3		0.0003	20	p.r.	D.k. at 330 nm in soln. contg. 0.1 mol L^{-1} MeOH and $\sim 1.5 \times 10^{-4} \text{ mol L}^{-1}$ $\text{Ru}(\text{NH}_3)_5\text{Cl}^{2+}$.	700178
22.44 Tris(2,2'-bipyridine)ruthenium(II) ion, H-adduct								
22.44.1 Tris(2,2'-bipyridine)ruthenium(II) ion, H-adduct								
	$\text{Ru}(\text{bpy})_3\text{H}^{2+} + \text{Ru}(\text{bpy})_3\text{H}^{2+} \rightarrow$ $\text{Ru}(\text{bpy})_3^{2+} + \text{Ru}(\text{bpy})_2(\text{bpyH}_2)^{2+}$	6.6×10^8		~1		p.r.	D.k. in soln. contg. $\text{Ru}(\text{bpy})_3^{2+}$, 0.05 mol L^{-1} HClO_4 and 0.5 mol L^{-1} <i>tert</i> - BuOH; unclear whether <i>k</i> or <i>2k</i> .	720381
22.45 Pentaammine(dinitrogen)ruthenium(III) ion								
22.45.1 Water								
	$\text{Ru}(\text{NH}_3)_5\text{N}_2^{3+} + \text{H}_2\text{O} \rightarrow$ $\text{Ru}(\text{NH}_3)_5\text{OH}^{2+} + \text{H}^+ + \text{N}_2$	260 s^{-1}			20	p.r.	P.b.k. at 310 nm and d.k. at 430 nm in N ₂ O-satd. soln. contg. $(5.5 \text{ or } 11) \times 10^{-4} \text{ mol L}^{-1}$ $\text{Ru}(\text{NH}_3)_5\text{N}_2^{2+}$; average of two values.	710234
22.46 Hexacyanoruthenate(III) ion								
22.46.1 Ferrocyanide ion								
	$\text{Ru}(\text{CN})_6^{3-} + \text{Fe}(\text{CN})_6^{4-} \rightarrow$ $\text{Ru}(\text{CN})_6^{4-} + \text{Fe}(\text{CN})_6^{3-}$	2.8×10^6 2.4×10^7 9.6×10^7 1.7×10^8		0.03 0.075 0.24 0.44	25	f.p./pi	P.b.k. at 420 nm and d.k. at 455 nm in soln. contg. $4 \times 10^{-3} \text{ mol L}^{-1}$ $\text{Ru}(\text{CN})_6^{4-}$, $\text{Fe}(\text{CN})_6^{4-}$ and KCl.	90A168

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.	
22.46 Hexacyanoruthenate(III) ion — Continued									
22.46.2 Hexacyanoosmate(II) ion									
	Ru(CN) ₆ ³⁻ + Os(CN) ₆ ⁴⁻ →	2.1 × 10 ⁵		0.03	25	f.p./pi	D.k. at 455 nm in soln. contg. Ru(CN) ₆ ⁴⁻ and Os(CN) ₆ ⁴⁻ and KCl.	90A168	
	Ru(CN) ₆ ⁴⁻ + Os(CN) ₆ ³⁻	2.1 × 10 ⁶		0.075					
		6.6 × 10 ⁶		0.24					
		1.2 × 10 ⁷		0.44					
22.47 Bis(2,2'-bipyridine)bis(cyano)ruthenium(III) ion									
22.47.1 Iron(II) sulfate									
	Ru(bpy) ₂ (CN) ₂ ⁺ + FeSO ₄ →	2.0 × 10 ⁵		0.3	20	f.p./oq	Calcd. from current-time curve; soln. contg. 0.5 mol L ⁻¹ H ₂ SO ₄ , 3 × 10 ⁻⁴ mol L ⁻¹ Ru(bpy) ₂ (CN) ₂ and [Fe ²⁺] = [Fe ³⁺] (OQ).	80E224	
	Ru(bpy) ₂ (CN) ₂ ⁺ + FeSO ₄ ⁺								
22.47.2 1,1'-Dimethyl-4,4'-bipyridinium radical cation									
	Ru(bpy) ₂ (CN) ₂ ⁺ + MV ⁺⁺ →	9.4 × 10 ⁹		5-7		f.p./oq	D.k. at 600 nm in soln. contg. 5.5 × 10 ⁻⁵ mol L ⁻¹ Ru(bpy) ₂ (CN) ₂ and 3 × 10 ⁻³ mol L ⁻¹ MV ²⁺ (OQ).	85B030	
	Ru(bpy) ₂ (CN) ₂ ⁺ + MV ²⁺								
		1.8 × 10 ¹⁰				f.p./pi	D.k. at 395 nm in N ₂ -satd. soln. contg. 10 ⁻² mol L ⁻¹ MV ²⁺ and 10 ⁻⁴ mol L ⁻¹ Ru(bpy) ₂ (CN) ₂ .	84A177	
22.48 2-(Aminomethyl)pyridinebis(2,2'-bipyridine)ruthenium(III) ion									
22.48.1 2-(Aminomethyl)pyridinebis(2,2'-bipyridine)ruthenium(III) ion, deprotonated									
	Ru(bpy) ₂ (pyCH ₂ NH ₂) ³⁺ +	1 × 10 ⁹		0-2	1.0	24	f.p./oq	D.k. at 436 nm in deaerated soln. contg. 1.01 × 10 ⁻⁵ mol L ⁻¹ Ru(bpy) ₂ (pyCH ₂ NH ₂) ²⁺ , 2 × 10 ⁻³ mol L ⁻¹ Fe ³⁺ (OQ) and 0.01-1.00 mol L ⁻¹ HClO ₄ ; <i>k</i> = 9 × 10 ⁸ L mol ⁻¹ s ⁻¹ in 1.0 mol L ⁻¹ H ₂ SO ₄ ; <i>k_r</i> = 5 × 10 ⁶ L mol ⁻¹ s ⁻¹ .	81A225
	Ru(bpy) ₂ (pyCH ₂ NH) ²⁺ →								
	Ru(bpy) ₂ (pyCH ₂ NH ₂) ²⁺ +								
	Ru(bpy) ₂ (pyCH ₂ NH) ³⁺								
22.49 2-(Aminomethyl)pyridinebis(2,2'-bipyridine)ruthenium(III) ion, deprotonated									
22.49.1 Hydrogen ion									
	Ru(bpy) ₂ (pyCH ₂ NH) ²⁺ + H ⁺ →	1 × 10 ⁹		0-2	1.0	24	f.p./oq	D.k. at 436 nm in deaerated soln. contg. 1.01 × 10 ⁻⁵ mol L ⁻¹ Ru(bpy) ₂ (pyCH ₂ NH ₂) ²⁺ , 2 × 10 ⁻³ mol L ⁻¹ Fe ³⁺ (OQ) and 0.01-1.00 mol L ⁻¹ HClO ₄ ; <i>k</i> = 2 × 10 ⁹ L mol ⁻¹ s ⁻¹ in 1.0 mol L ⁻¹ H ₂ SO ₄ ; <i>k_r</i> = 5 × 10 ⁶ L mol ⁻¹ s ⁻¹ .	81A225
	Ru(bpy) ₂ (pyCH ₂ NH ₂) ³⁺								
22.50 Tris(2,2'-bipyridine)ruthenium(III) ion									
22.50.1 Silver(I) ion, complex with Ag(0)									
	Ru(bpy) ₃ ³⁺ + Ag ₂ ⁺ → Ru(bpy) ₃ ²⁺ + 2 Ag ⁺	1.2 × 10 ¹⁰				f.p./oq	P.b.k. in soln. contg. Ru(bpy) ₃ ²⁺ and Ag ⁺ (OQ).	80C004	
22.50.2 Ethylenediaminetetraacetatocobaltate(II) ion									
	Ru(bpy) ₃ ³⁺ + CoEDTA ²⁻ →	9 × 10 ³		4.75	25		In 0.05 mol L ⁻¹ acetate buffer.	85F089	
	Ru(bpy) ₃ ²⁺ + CoEDTA ⁻								
22.50.3 8-Methyl-1,3,13,16-tetraaza-6,10,19-trithiabicyclo[6.6.6]eicosane cobalt(II) ion									
	Ru(bpy) ₃ ³⁺ + Co(AZAcapten) ²⁺ →	~5 × 10 ⁸				f.p./oq	P.b.k. at 470 nm in soln. contg. Ru(bpy) ₃ ²⁺ and Co(AZAcapten) ³⁺ (OQ).	85F222	
	Ru(bpy) ₃ ²⁺ + Co(AZAcapten) ³⁺								
22.50.4 1,3,6,8,10,13,16,19-Octaazabicyclo[6.6.6]eicosane cobalt(II) ion									
	Ru(bpy) ₃ ³⁺ + Co(sep) ²⁺ →	5.5 × 10 ⁸		0.2	25	f.p./oq	P.b.k. at 450 nm in soln. contg. (2-5) × 10 ⁻⁵ mol L ⁻¹ Ru(bpy) ₃ ²⁺ and (1-7) × 10 ⁻³ mol L ⁻¹ Co(sep) ³⁺ (OQ).	84A238	
	Ru(bpy) ₃ ²⁺ + Co(sep) ³⁺								

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t(\text{°C})$	Method	Comment	Ref.
22.50 Tris(2,2'-bipyridine)ruthenium(III) ion — Continued								
22.50.5 1,4,8,11-Tetraazacyclotetradecanecobalt(II) ion								
	$\text{Ru(bpy)}_3^{3+} + \text{Co(cyclam)}^{2+} \rightarrow$ $\text{Ru(bpy)}_3^{2+} + \text{Co(cyclam)}^{3+}$	3.2×10^7		0.1	25	f.p./oq	P.b.k. at 443 nm in soln. contg. Ru(bpy)_3^{2+} , $\text{Co}(\text{NH}_3)_5\text{py}^{3+}$ (OQ) and $\text{Co}(\text{cyclam})^{2+}$.	90A221
22.50.6 2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradecanecobalt(II) ion								
	$\text{Ru(bpy)}_3^{3+} + \text{Co}(\text{Me}_4[14]\text{aneN}_4)^{2+} \rightarrow$ $\text{Ru(bpy)}_3^{2+} + \text{Co}(\text{Me}_4[14]\text{aneN}_4)^{3+}$	5.9×10^5		0.1	25	f.p./oq	P.b.k. at 443 nm in soln. contg. Ru(bpy)_3^{2+} , $\text{Co}(\text{NH}_3)_5\text{Br}^{3+}$ (OQ), $\text{Co}(\text{NH}_3)_5\text{Cl}^{3+}$ (OQ) or $\text{S}_2\text{O}_8^{2-}$ (OQ) and $\text{Co}(\text{Me}_4[14]\text{aneN}_4)^{2+}$; average of three values.	90A221
22.50.7 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecanecobalt(II) ion								
	$\text{Ru(bpy)}_3^{3+} + \text{Co}(\text{Me}_6[14]\text{aneN}_4)^{2+} \rightarrow$ $\text{Ru(bpy)}_3^{2+} + \text{Co}(\text{Me}_6[14]\text{aneN}_4)^{3+}$	7.7×10^6		0.1	25	f.p./oq	P.b.k. at 443 nm in soln. contg. Ru(bpy)_3^{2+} , $\text{Co}(\text{NH}_3)_5\text{Br}^{2+}$ (OQ) or $\text{Co}(\text{NH}_3)_5\text{Cl}^{2+}$ (OQ) and $\text{Co}(\text{Me}_6[14]\text{aneN}_4)^{2+}$; average of two values.	90A221
22.50.8 2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraenecobalt(II) ion								
	$\text{Ru(bpy)}_3^{3+} + \text{Co}(\text{Me}_4\text{tetraeneN}_4)^{2+} \rightarrow$ $\text{Ru(bpy)}_3^{2+} + \text{Co}(\text{Me}_4\text{tetraeneN}_4)^{3+}$	2.1×10^7		0.1	25	f.p./oq	P.b.k. at 443 nm in soln. contg. Ru(bpy)_3^{2+} and $\text{Co}(\text{Me}_4\text{tetraeneN}_4)^{3+}$ (OQ).	90A221
22.50.9 1,4,8,12-Tetraazacyclopentadecanecobalt(II) ion								
	$\text{Ru(bpy)}_3^{3+} + \text{Co}([15]\text{aneN}_4)^{2+} \rightarrow$ $\text{Ru(bpy)}_3^{2+} + \text{Co}([15]\text{aneN}_4)^{3+}$	1.8×10^7		0.1	25	f.p./oq	P.b.k. at 443 nm in soln. contg. Ru(bpy)_3^{2+} , $\text{Co}(\text{NH}_3)_5\text{Br}^{2+}$ (OQ) or $\text{Co}(\text{NH}_3)_5\text{Cl}^{2+}$ (OQ) and $\text{Co}([15]\text{aneN}_4)^{2+}$; average of two values.	90A221
22.50.10 Tris(2,2'-bipyridine)cobalt(II) ion								
	$\text{Ru(bpy)}_3^{3+} + \text{Co}(\text{bpy})_3^{2+} \rightarrow$ $\text{Ru(bpy)}_3^{2+} + \text{Co}(\text{bpy})_3^{3+}$	1.3×10^8		1.0		f.p./oq	Soln. contg. Ru(bpy)_3^{2+} and $\text{Co}(\text{bpy})_3^{3+}$ (OQ).	82F048
		2.4×10^8		1.0	25	f.p./oq	D.k. at 675 nm in soln. contg. 7.5×10^{-5} mol L^{-1} Ru(bpy)_3^{2+} and 0.5 or 1.0×10^{-3} mol L^{-1} $\text{Co}(\text{bpy})_3^{3+}$ (OQ); studied at 5-25 °C, $E_a = -11.8$ kJ mol^{-1} .	80A003
22.50.11 Tris(1,10-phenanthroline)cobalt(II) ion								
	$\text{Ru(bpy)}_3^{3+} + \text{Co}(\text{phen})_3^{2+} \rightarrow$ $\text{Ru(bpy)}_3^{2+} + \text{Co}(\text{phen})_3^{3+}$	1.4×10^8		1.0	25	f.p./oq	D.k. at 675 nm in soln. contg. 7.5×10^{-5} mol L^{-1} Ru(bpy)_3^{2+} and 0.25- 2.0×10^{-3} mol L^{-1} $\text{Co}(\text{phen})_3^{3+}$ (OQ); the same value was obtained under pseudo-first order conditions with addn. of 1.0×10^{-4} mol L^{-1} $\text{Co}(\text{phen})_3^{2+}$. Studied at 5-25 °C, $E_a = -4.6 \pm 3.7$ kJ mol^{-1} .	80A003
22.50.12 3,10,17,24-Tetrasulfophthalocyaninecobaltate(II) ion								
	$\text{Ru(bpy)}_3^{3+} + \text{Co}(\text{tspc})^{4-} \rightarrow$ $\text{Ru(bpy)}_3^{2+} + \text{Co}(\text{tspc})^{3-}$	4.5×10^7				f.p./oq	D.k. at 580 nm; mixed dimer contg. $(5-10) \times 10^{-3}$ mol L^{-1} Ru(bpy)_3^{2+} and $(1-5) \times 10^{-6}$ mol L^{-1} $\text{Co}(\text{tspc})^{3-}$ (OQ).	79A090
22.50.13 3,10,17,24-Tetrasulfophthalocyaninecobaltate(I) ion								
	$\text{Ru(bpy)}_3^{3+} + \text{Co}(\text{tspc})^{5-} \rightarrow$ $\text{Ru(bpy)}_3^{2+} + \text{Co}(\text{tspc})^{4-}$	2.9×10^8		1-3		f.p./oq	D.k. at 520 nm in deaerated soln. contg. 0.001-0.1 mol L^{-1} HCl, 0.001-0.01 mol L^{-1} Ru(bpy)_3^{2+} and $\text{Co}(\text{tspc})^{4-}$ (OQ).	79A090
22.50.14 Decaammine-μ-peroxododicobalt(III) ion								
	$\text{Ru(bpy)}_3^{3+} + [\text{Co}(\text{NH}_3)_5]_2(\text{O}_2)^{4+} \rightarrow$ $\text{Ru(bpy)}_3^{2+} + [\text{Co}(\text{NH}_3)_5]_2(\text{O}_2)^{5+}$	1.3×10^7		0		f.p./oq	P.b.k. at 450 nm in soln. contg. Ru(bpy)_3^{2+} , $[\text{Co}(\text{NH}_3)_5]_2(\text{O}_2)^{5+}$ (OQ) and 1 mol L^{-1} HCl.	81A065

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref
22.50 Tris(2,2'-bipyridine)ruthenium(III) ion — Continued								
22.50.15	$\mu\text{-Amido-}\mu\text{-peroxidoctakisamminedacobalt(III) ion}$	3.4×10^5	0			f.p./oq	P.b.k. at 450 nm in soln. contg. Ru(bpy) ₃ ²⁺ , NH ₂ [Co(NH ₃) ₄] ₂ (O ₂) ⁴⁺ (OQ) and 1 mol L ⁻¹ HCl.	81A065
	$\text{Ru(bpy)}_3^{3+} + \text{NH}_2[\text{Co}(\text{NH}_3)_4]_2(\text{O}_2)^{3+} \rightarrow \text{Ru(bpy)}_3^{2+} + \text{NH}_2[\text{Co}(\text{NH}_3)_4]_2(\text{O}_2)^{4+}$							
22.50.16	$\mu\text{-Amido-}\mu\text{-peroxidotetrakis(ethylenediamine)dacobalt(III) ion}$	2.5×10^6	0			f.p./oq	P.b.k. at 450 nm in soln. contg. Ru(bpy) ₃ ²⁺ , NH ₂ [Co(en) ₂] ₂ (O ₂) ⁴⁺ (OQ) and 1 mol L ⁻¹ HCl; $k = 7.6 \times 10^5$ L mol ⁻¹ s ⁻¹ detd. by s.f.	81A065
	$\text{Ru(bpy)}_3^{3+} + \text{NH}_2[\text{Co}(\text{en})_2]_2(\text{O}_2)^{3+} \rightarrow \text{Ru(bpy)}_3^{2+} + \text{NH}_2[\text{Co}(\text{en})_2]_2(\text{O}_2)^{4+}$							
22.50.17	$\mu\text{-Amido-}\mu\text{-peroxidotetrakis(2,2'-bipyridine)dacobalt(III) ion}$	3.0×10^8	0			f.p./oq	P.b.k. at 450 nm in soln. contg. Ru(bpy) ₃ ²⁺ , NH ₂ [Co(bpy) ₂] ₂ (O ₂) ⁴⁺ (OQ) and 1 mol L ⁻¹ HCl.	81A065
	$\text{Ru(bpy)}_3^{3+} + \text{NH}_2[\text{Co}(\text{bpy})_2]_2(\text{O}_2)^{3+} \rightarrow \text{Ru(bpy)}_3^{2+} + \text{NH}_2[\text{Co}(\text{bpy})_2]_2(\text{O}_2)^{4+}$							
22.50.18	$\mu\text{-Amido-}\mu\text{-peroxidotetrakis(1,10-phenanthroline)dacobalt(III) ion}$	3.6×10^8	0			f.p./oq	P.b.k. at 450 nm in soln. contg. Ru(bpy) ₃ ²⁺ and NH ₂ [Co(phen) ₂] ₂ (O ₂) ⁴⁺ (OQ) and 1 mol L ⁻¹ HCl.	81A065
	$\text{Ru(bpy)}_3^{3+} + \text{NH}_2[\text{Co}(\text{phen})_2]_2(\text{O}_2)^{3+} \rightarrow \text{Ru(bpy)}_3^{2+} + \text{NH}_2[\text{Co}(\text{phen})_2]_2(\text{O}_2)^{4+}$							
22.50.19	Chromium(II) ion	7.6×10^7						86A536
	$\text{Ru(bpy)}_3^{3+} + \text{Cr}^{2+} \rightarrow \text{Ru(bpy)}_3^{2+} + \text{Cr}^{3+}$							
22.50.20	Pentaquaethylchromium(III) ion	$<10^3$	1-	0.1	25	f.p./oq	P.b.k. at 450 nm in soln. contg. (1.2-2.6) $\times 10^{-5}$ mol L ⁻¹ Ru(bpy) ₃ ²⁺ , (2-10) $\times 10^{-3}$ mol L ⁻¹ Co(NH ₃) ₅ Br ²⁺ (OQ) and (2-210) $\times 10^{-5}$ mol L ⁻¹ (H ₂ O) ₅ CrCH ₃ ²⁺ ; [H ⁺] = 0.07-0.095 mol L ⁻¹ .	86A536
	$\text{Ru(bpy)}_3^{3+} + (\text{H}_2\text{O})_5\text{CrCH}_3^{2+} \rightarrow \text{Ru(bpy)}_3^{2+} + (\text{H}_2\text{O})_5\text{CrCH}_3^{3+}$		1.2					
22.50.21	Pentaqua(ethyl)chromium(III) ion	2.0×10^5	1-	0.1	25	f.p./oq	P.b.k. at 450 nm in soln. contg. (1.2-2.6) $\times 10^{-5}$ mol L ⁻¹ Ru(bpy) ₃ ²⁺ , (2-10) $\times 10^{-3}$ mol L ⁻¹ Co(NH ₃) ₅ Br ²⁺ (OQ) and (2-210) $\times 10^{-5}$ mol L ⁻¹ (H ₂ O) ₅ CrCH ₂ CH ₃ ²⁺ ; [H ⁺] = 0.07-0.095 mol L ⁻¹ .	86A536
	$\text{Ru(bpy)}_3^{3+} + (\text{H}_2\text{O})_5\text{CrCH}_2\text{CH}_3^{2+} \rightarrow \text{Ru(bpy)}_3^{2+} + (\text{H}_2\text{O})_5\text{CrCH}_2\text{CH}_3^{3+}$		1.2					
22.50.22	Pentaqua(isopropyl)chromium(III) ion	4.3×10^7	1-	0.1	25	f.p./oq	P.b.k. at 450 nm in soln. contg. (1.2-2.6) $\times 10^{-5}$ mol L ⁻¹ Ru(bpy) ₃ ²⁺ , (2-10) $\times 10^{-3}$ mol L ⁻¹ Co(NH ₃) ₅ Br ²⁺ (OQ) and (2-210) $\times 10^{-5}$ mol L ⁻¹ (H ₂ O) ₅ CrCH(CH ₃) ₂ ²⁺ ; [H ⁺] = 0.07-0.095 mol L ⁻¹ .	86A536
	$\text{Ru(bpy)}_3^{3+} + (\text{H}_2\text{O})_5\text{CrCH}(\text{CH}_3)_2^{2+} \rightarrow \text{Ru(bpy)}_3^{2+} + (\text{H}_2\text{O})_5\text{CrCH}(\text{CH}_3)_2^{3+}$		1.2					
22.50.23	Pentaqua(methoxymethyl)chromium(III) ion	1.0×10^7	1-	0.1	25	f.p./oq	P.b.k. at 450 nm in soln. contg. (1.2-2.6) $\times 10^{-5}$ mol L ⁻¹ Ru(bpy) ₃ ²⁺ , (2-10) $\times 10^{-3}$ mol L ⁻¹ Co(NH ₃) ₅ Br ²⁺ (OQ) and (2-210) $\times 10^{-5}$ mol L ⁻¹ (H ₂ O) ₅ CrCH ₂ OCH ₃ ²⁺ ; [H ⁺] = 0.07-0.095 mol L ⁻¹ .	86A536
	$\text{Ru(bpy)}_3^{3+} + (\text{H}_2\text{O})_5\text{CrCH}_2\text{OCH}_3^{2+} \rightarrow \text{Ru(bpy)}_3^{2+} + (\text{H}_2\text{O})_5\text{CrCH}_2\text{OCH}_3^{3+}$		1.2					
22.50.24	Pentaqua(4-cyanobenzyl)chromium(III) ion	9.5×10^6	1-	0.1	25	f.p./oq	P.b.k. at 450 nm in soln. contg. (1.2-2.6) $\times 10^{-5}$ mol L ⁻¹ Ru(bpy) ₃ ²⁺ , (2-10) $\times 10^{-3}$ mol L ⁻¹ Co(NH ₃) ₅ Br ²⁺ (OQ) and (2-210) $\times 10^{-5}$ mol L ⁻¹ (H ₂ O) ₅ Cr(4-CH ₂ C ₆ H ₄ CN) ²⁺ ; [H ⁺] = 0.07-0.095 mol L ⁻¹ .	86A536
	$\text{Ru(bpy)}_3^{3+} + (\text{H}_2\text{O})_5\text{Cr}(4\text{-CH}_2\text{C}_6\text{H}_4\text{CN})^{2+} \rightarrow \text{Ru(bpy)}_3^{2+} + (\text{H}_2\text{O})_5\text{Cr}(4\text{-CH}_2\text{C}_6\text{H}_4\text{CN})^{3+}$		1.2					

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
22.50 Tris(2,2'-bipyridine)ruthenium(III) ion — Continued								
22.50.25 Pentaqua[4-(trifluoromethyl)benzyl]chromium(III) ion								
	Ru(bpy) ₃ ³⁺ + (H ₂ O) ₅ CrCH ₂ C ₆ H ₄ -4-CF ₃ ²⁺ → Ru(bpy) ₃ ²⁺ + (H ₂ O) ₅ CrCH ₂ C ₆ H ₄ -4-CF ₃ ³⁺	1.7 × 10 ⁷	1-	0.1	25	f.p./oq	P.b.k. at 450 nm in soln. contg. (1.2-2.6) × 10 ⁻⁵ mol L ⁻¹ Ru(bpy) ₃ ³⁺ , (2-10) × 10 ⁻³ mol L ⁻¹ Co(NH ₃) ₅ Br ²⁺ (OQ) and (2-210) × 10 ⁻⁵ mol L ⁻¹ (H ₂ O) ₅ Cr(4-CH ₂ C ₆ H ₄ CF ₃) ²⁺ ; [H ⁺] = 0.07-0.095 mol L ⁻¹ .	86A536
22.50.26 Pentaqua(benzyl)chromium(III) ion								
	Ru(bpy) ₃ ³⁺ + (H ₂ O) ₅ CrCH ₂ C ₆ H ₅ ²⁺ → Ru(bpy) ₃ ²⁺ + (H ₂ O) ₅ CrCH ₂ C ₆ H ₅ ³⁺	5.3 × 10 ⁸	1-	0.1	25	f.p./oq	P.b.k. at 450 nm in soln. contg. (1.2-2.6) × 10 ⁻⁵ mol L ⁻¹ Ru(bpy) ₃ ²⁺ , (2-10) × 10 ⁻³ mol L ⁻¹ Co(NH ₃) ₅ Br ²⁺ (OQ) and (2-210) × 10 ⁻⁵ mol L ⁻¹ (H ₂ O) ₅ CrCH ₂ C ₆ H ₅ ²⁺ ; [H ⁺] = 0.07-0.095 mol L ⁻¹ .	86A536
22.50.27 Pentaqua(4-methylbenzyl)chromium(III) ion								
	Ru(bpy) ₃ ³⁺ + (H ₂ O) ₅ CrCH ₂ C ₆ H ₄ -4-CH ₃ ²⁺ → Ru(bpy) ₃ ²⁺ + (H ₂ O) ₅ CrCH ₂ C ₆ H ₄ -4-CH ₃ ³⁺	2.9 × 10 ⁸	1-	0.1	25	f.p./oq	P.b.k. at 450 nm in soln. contg. (1.2-2.6) × 10 ⁻⁵ mol L ⁻¹ Ru(bpy) ₃ ²⁺ , (2-10) × 10 ⁻³ mol L ⁻¹ Co(NH ₃) ₅ Br ²⁺ (OQ) and (2-210) × 10 ⁻⁵ mol L ⁻¹ (H ₂ O) ₅ Cr(4-CH ₂ C ₆ H ₄ CH ₃) ²⁺ ; [H ⁺] = 0.07-0.095 mol L ⁻¹ .	86A536
22.50.28 (Methyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion								
	Ru(bpy) ₃ ³⁺ + CH ₃ Cr([15]aneN ₄) ²⁺ → Ru(bpy) ₃ ²⁺ + CH ₃ Cr([15]aneN ₄) ³⁺	14	2	0.21	25	therm.	P.b.k. at 450 nm in soln. contg. Ru(bpy) ₃ ²⁺ , 0.01 mol L ⁻¹ H ⁺ , 0.2 mol L ⁻¹ NaClO ₄ and CH ₃ Cr([15]aneN ₄) ²⁺ .	91A511
22.50.29 (Ethyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion								
	Ru(bpy) ₃ ³⁺ + CH ₃ CH ₂ Cr([15]aneN ₄) ²⁺ → Ru(bpy) ₃ ²⁺ + CH ₃ CH ₂ Cr([15]aneN ₄) ³⁺	2.1 × 10 ⁴	2	0.21	25	f.p./oq	P.b.k. at 450 nm in soln. contg. Ru(bpy) ₃ ²⁺ , Co(NH ₃) ₅ Br ²⁺ or Co(NH ₃) ₅ py ³⁺ or Co(NH ₃) ₅ (H ₂ O) ³⁺ (OQ), 0.01 mol L ⁻¹ H ⁺ , 0.2 mol L ⁻¹ NaClO ₄ and CH ₃ CH ₂ Cr([15]aneN ₄) ²⁺ .	91A511
22.50.30 (Propyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion								
	Ru(bpy) ₃ ³⁺ + CH ₃ CH ₂ CH ₂ Cr([15]aneN ₄) ²⁺ → Ru(bpy) ₃ ²⁺ + CH ₃ CH ₂ CH ₂ Cr([15]aneN ₄) ³⁺	3.5 × 10 ³	2	0.21	25	f.p./oq	P.b.k. at 450 nm in soln. contg. Ru(bpy) ₃ ²⁺ , Co(NH ₃) ₅ Br ²⁺ (OQ), 0.01 mol L ⁻¹ H ⁺ , 0.2 mol L ⁻¹ NaClO ₄ and CH ₃ CH ₂ CH ₂ Cr([15]aneN ₄) ²⁺ .	91A511
22.50.31 (1-Methylethyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion								
	Ru(bpy) ₃ ³⁺ + (CH ₃) ₂ CHCr([15]aneN ₄) ²⁺ → Ru(bpy) ₃ ²⁺ + (CH ₃) ₂ CHCr([15]aneN ₄) ³⁺	4.7 × 10 ⁶	2	0.21	25	f.p./oq	P.b.k. at 450 nm in soln. contg. Ru(bpy) ₃ ²⁺ , Co(NH ₃) ₅ Br ²⁺ (OQ), 0.01 mol L ⁻¹ H ⁺ , 0.2 mol L ⁻¹ NaClO ₄ and (CH ₃) ₂ CHCr([15]aneN ₄) ²⁺ .	91A511
22.50.32 (Butyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion								
	Ru(bpy) ₃ ³⁺ + CH ₃ (CH ₂) ₃ Cr([15]aneN ₄) ²⁺ → Ru(bpy) ₃ ²⁺ + CH ₃ (CH ₂) ₃ Cr([15]aneN ₄) ³⁺	3.8 × 10 ³	2	0.21	25	f.p./oq	P.b.k. at 450 nm in soln. contg. Ru(bpy) ₃ ²⁺ , Co(NH ₃) ₅ Br ²⁺ (OQ), 0.010 mol L ⁻¹ H ⁺ , 0.20 mol L ⁻¹ NaClO ₄ and NaClO ₄ and CH ₃ (CH ₂) ₃ Cr([15]aneN ₄) ²⁺ .	91A511
22.50.33 (2-Butyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion								
	Ru(bpy) ₃ ³⁺ + CH ₃ CH ₂ CH(CH ₃)Cr([15]aneN ₄) ²⁺ → Ru(bpy) ₃ ²⁺ + CH ₃ CH ₂ CH(CH ₃)Cr([15]aneN ₄) ³⁺	1.4 × 10 ⁶	2	0.21	25	f.p./oq	P.b.k. at 450 nm in soln. contg. Ru(bpy) ₃ ²⁺ , Co(NH ₃) ₅ Br ²⁺ (OQ), 0.01 mol L ⁻¹ H ⁺ , 0.2 mol L ⁻¹ NaClO ₄ and CH ₃ CH ₂ CH(CH ₃)Cr([15]aneN ₄) ²⁺ .	91A511

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
22.50 Tris(2,2'-bipyridine)ruthenium(III) ion — Continued								
22.50.34 (Cyclohexyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion								
	Ru(bpy) ₃ ³⁺ + c-C ₆ H ₁₁ Cr([15]aneN ₄) ²⁺ → Ru(bpy) ₃ ²⁺ + c-C ₆ H ₁₁ Cr([15]aneN ₄) ³⁺	1.2 × 10 ⁷	2	0.21	25	f.p./oq	P.b.k. at 450 nm in soln. contg. Ru(bpy) ₃ ²⁺ , Co(NH ₃) ₅ Br ²⁺ (OQ), 0.01 mol L ⁻¹ H ⁺ , 0.2 mol L ⁻¹ NaClO ₄ and c-C ₆ H ₁₁ Cr([15]aneN ₄) ²⁺ .	91A511
22.50.35 (Phenylmethyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion								
	Ru(bpy) ₃ ³⁺ + C ₆ H ₅ CH ₂ Cr([15]aneN ₄) ²⁺ → Ru(bpy) ₃ ²⁺ + C ₆ H ₅ CH ₂ Cr([15]aneN ₄) ³⁺	5.5 × 10 ⁸	2	0.21	25	f.p./oq	P.b.k. at 450 nm in soln. contg. Ru(bpy) ₃ ²⁺ , Co(NH ₃) ₅ Br ²⁺ (OQ), 0.01 mol L ⁻¹ H ⁺ , 0.2 mol L ⁻¹ NaClO ₄ and C ₆ H ₅ CH ₂ Cr([15]aneN ₄) ²⁺ .	91A511
22.50.36 (4-Bromobenzyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion								
	Ru(bpy) ₃ ³⁺ + 4-BrC ₆ H ₄ CH ₂ Cr([15]aneN ₄) ²⁺ → Ru(bpy) ₃ ²⁺ + 4-BrC ₆ H ₄ CH ₂ Cr([15]aneN ₄) ³⁺	4.3 × 10 ⁸	2	0.21	25	f.p./oq	P.b.k. at 450 nm in soln. contg. Ru(bpy) ₃ ²⁺ , Co(NH ₃) ₅ Br ²⁺ (OQ), 0.01 mol L ⁻¹ H ⁺ , 0.2 mol L ⁻¹ NaClO ₄ and 4-BrC ₆ H ₄ CH ₂ Cr([15]aneN ₄) ²⁺ .	91A511
22.50.37 (4-Chlorophenylmethyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion								
	Ru(bpy) ₃ ³⁺ + 4-ClC ₆ H ₄ CH ₂ Cr([15]aneN ₄) ²⁺ → Ru(bpy) ₃ ²⁺ + 4-ClC ₆ H ₄ CH ₂ Cr([15]aneN ₄) ³⁺	3.8 × 10 ⁸	2	0.21	25	f.p./oq	P.b.k. at 450 nm in soln. contg. Ru(bpy) ₃ ²⁺ , Co(NH ₃) ₅ Br ²⁺ (OQ), 0.01 mol L ⁻¹ H ⁺ , 0.2 mol L ⁻¹ NaClO ₄ and 4-ClC ₆ H ₄ CH ₂ Cr([15]aneN ₄) ²⁺ .	91A511
22.50.38 (4-Fluorophenylmethyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion								
	Ru(bpy) ₃ ³⁺ + 4-FC ₆ H ₄ CH ₂ Cr([15]aneN ₄) ²⁺ → Ru(bpy) ₃ ²⁺ + 4-FC ₆ H ₄ CH ₂ Cr([15]aneN ₄) ³⁺	3.0 × 10 ⁸	2	0.21	25	f.p./oq	P.b.k. at 450 nm in soln. contg. Ru(bpy) ₃ ²⁺ , Co(NH ₃) ₅ Br ²⁺ (OQ), 0.01 mol L ⁻¹ H ⁺ , 0.2 mol L ⁻¹ NaClO ₄ and 4-FC ₆ H ₄ CH ₂ Cr([15]aneN ₄) ²⁺ .	91A511
22.50.39 (4-Methylbenzyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion								
	Ru(bpy) ₃ ³⁺ + 4-CH ₃ C ₆ H ₄ CH ₂ Cr([15]aneN ₄) ²⁺ → Ru(bpy) ₃ ²⁺ + 4-CH ₃ C ₆ H ₄ CH ₂ Cr([15]aneN ₄) ³⁺	1.1 × 10 ⁹	2	0.21	25	f.p./oq	P.b.k. at 450 nm in soln. contg. Ru(bpy) ₃ ²⁺ , Co(NH ₃) ₅ Br ²⁺ (OQ), 0.01 mol L ⁻¹ H ⁺ , 0.2 mol L ⁻¹ NaClO ₄ and 4-CH ₃ C ₆ H ₄ CH ₂ Cr([15]aneN ₄) ²⁺ .	91A511
22.50.40 (4-Trifluoromethyl)phenylmethyl-1,4,8,12-tetraazacyclopentadecanechromium(III) ion								
	Ru(bpy) ₃ ³⁺ + 4-CF ₃ C ₆ H ₄ CH ₂ Cr([15]aneN ₄) ²⁺ → Ru(bpy) ₃ ²⁺ + 4-CF ₃ C ₆ H ₄ CH ₂ Cr([15]aneN ₄) ³⁺	2.7 × 10 ⁷	2	0.21	25	f.p./oq	P.b.k. at 450 nm in soln. contg. Ru(bpy) ₃ ²⁺ , Co(NH ₃) ₅ Br ²⁺ (OQ), 0.01 mol L ⁻¹ H ⁺ , 0.2 mol L ⁻¹ NaClO ₄ and 4-CF ₃ C ₆ H ₄ CH ₂ Cr([15]aneN ₄) ²⁺ .	91A511
22.50.41 (4-Methoxyphenylmethyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion								
	Ru(bpy) ₃ ³⁺ + 4-CH ₃ OC ₆ H ₄ CH ₂ Cr([15]aneN ₄) ²⁺ → Ru(bpy) ₃ ²⁺ + 4-CH ₃ OC ₆ H ₄ CH ₂ Cr([15]aneN ₄) ³⁺	1.2 × 10 ⁹	2	0.21	25	f.p./oq	P.b.k. at 450 nm in soln. contg. Ru(bpy) ₃ ²⁺ , Co(NH ₃) ₅ Br ²⁺ (OQ), 0.01 mol L ⁻¹ H ⁺ , 0.2 mol L ⁻¹ NaClO ₄ and 4-CH ₃ OC ₆ H ₄ CH ₂ Cr([15]aneN ₄) ²⁺ .	91A511
22.50.42 Copper(I) ion								
	Ru(bpy) ₃ ³⁺ + Cu ⁺ → Ru(bpy) ₃ ²⁺ + Cu ²⁺	4.3 × 10 ⁸		0.3	25	f.p./oq	P.b.k. at 450 nm in soln. contg. 10 ⁻⁵ mol L ⁻¹ Ru(bpy) ₃ ²⁺ , 0.01-0.06 mol L ⁻¹ Cu ²⁺ (OQ) and in 0.5 and 2.4 mol L ⁻¹ HClO ₄ , respectively.	78A090
		3 × 10 ⁸	<0					
		9.7 × 10 ⁸	0.3		25	f.p./oq	P.b.k. at 450 nm in soln. contg. 10 ⁻⁵ mol L ⁻¹ Ru(bpy) ₃ ²⁺ , 0.01-0.06 mol L ⁻¹ Cu ²⁺ (OQ) and 0.5 mol L ⁻¹ sulfuric acid.	78A090
		3.4 × 10 ⁸	1.0		21	f.p./oq	P.b.k. in deoxygenated soln. contg. Ru(bpy) ₃ ²⁺ and Cu ²⁺ (OQ).	78F683
		1 × 10 ⁸	0	1.9	24	f.p./oq	D.k. at 480 nm in soln. contg. Ru(bpy) ₃ ²⁺ , Cu ²⁺ (OQ) and 1 mol L ⁻¹ HClO ₄ .	771093

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
22.50 Tris(2,2'-bipyridine)ruthenium(III) ion — Continued								
22.50.43 Copper(I) chloride								
	Ru(bpy) ₃ ³⁺ + CuCl → Ru(bpy) ₃ ²⁺ + CuCl ⁺	3.5 × 10 ⁹	1	1.0	21	f.p./oq	P.b.k. in deoxygenated soln. contg. Ru(bpy) ₃ ²⁺ , 0.10 mol L ⁻¹ HClO ₄ , 0.5 mol L ⁻¹ NaCl and Cu(II) ions (OQ); 75% CuCl ⁺ .	78F683
22.50.44 Tetraformatocuprate(I) ion								
	Ru(bpy) ₃ ³⁺ + Cu(HCO ₂) ₄ ³⁻ → Ru(bpy) ₃ ²⁺ + Cu(HCO ₂) ₄ ²⁻	2.1 × 10 ⁹	1	1.0	21	f.p./oq	P.b.k. in deoxygenated soln. contg. Ru(bpy) ₃ ²⁺ , 0.10 mol L ⁻¹ HClO ₄ , 0.5 mol L ⁻¹ formate ion and Cu(II) ions (OQ); 80% Cu(HCO ₂) ₄ ²⁻ .	78F683
22.50.45 Tetraacetatocuprate(I) ion								
	Ru(bpy) ₃ ³⁺ + Cu(OAc) ₄ ³⁻ → Ru(bpy) ₃ ²⁺ + Cu(OAc) ₄ ²⁻	2.3 × 10 ⁹	1	1.0	21	f.p./oq	P.b.k. in deoxygenated soln. contg. Ru(bpy) ₃ ²⁺ , 0.10 mol L ⁻¹ HClO ₄ , 0.5 mol L ⁻¹ acetate ion and Cu(II) ions (OQ); 90% Cu(OAc) ₄ ²⁻ .	78F683
22.50.46 4,7,13,16,21-Pentaoxa-1,10-diazabicyclo[8.8.5]tricosaneeuropium(II) ion								
	Ru(bpy) ₃ ³⁺ + [Eu 2.2.1] ²⁺ → Ru(bpy) ₃ ²⁺ + [Eu 2.2.1] ³⁺	1.3 × 10 ⁹	1		22	f.p./oq	P.b.k. at 454 nm in soln. contg. Ru(bpy) ₃ ²⁺ , excess [Eu 2.2.1] ³⁺ (OQ) and 1 mol L ⁻¹ KCl.	86E195
22.50.47 Iron(II) ion								
	Ru(bpy) ₃ ³⁺ + Fe ²⁺ → Ru(bpy) ₃ ²⁺ + Fe ³⁺	1.2 × 10 ⁶		0.3	22-23	phot.	Step-excitation method, $\lambda_{exc} = 488.8$ nm; soln. contg. 7.6 × 10 ⁻⁶ mol L ⁻¹ Ru(bpy) ₃ ²⁺ , 1.02 × 10 ⁻³ mol L ⁻¹ Fe ³⁺ (OQ), 2.8 × 10 ⁻⁶ mol L ⁻¹ Fe ²⁺ and 0.5 mol L ⁻¹ HClO ₄ ; at $\lambda_{exc} = 496.5$ and 514.5 nm, $k = 9.3 \times 10^5$ and 1.5×10^6 L mol ⁻¹ s ⁻¹ , respectively.	79F488
		2.6 × 10 ⁶	≤1	0.1	18	f.p./oq	P.b.k. at 452 nm in soln. contg. Ru(bpy) ₃ ²⁺ , Fe ³⁺ (OQ) and 0.1, 0.5, 1.0, 2.5 and 5.0 mol L ⁻¹ HClO ₄ , respectively.	79A218
		7.2 × 10 ⁵		0.5				
		6.4 × 10 ⁵		1.0				
		4.3 × 10 ⁵		2.5				
		1.5 × 10 ⁵		5.0				
		1.6 × 10 ⁶	≤1	0.1	18	f.p./oq	P.b.k. at 452 nm in soln. contg. Ru(bpy) ₃ ²⁺ , Fe ³⁺ (OQ) and 0.1, 0.5, 1.0, 2.5 and 5.0 mol L ⁻¹ HClO ₄ , respectively.	79A218
		1.2 × 10 ⁶		0.5				
		9.8 × 10 ⁵		1.0				
		1.2 × 10 ⁶	0	1.0	25	f.p./oq	P.b.k. in soln. contg. 3.0 × 10 ⁻⁶ mol L ⁻¹ Ru(bpy) ₃ ²⁺ , 3.0 × 10 ⁻⁶ mol L ⁻¹ Ru(phen) ₃ ²⁺ , 1.0 or 0.076 mol L ⁻¹ HClO ₄ , 4.0 × 10 ⁻⁵ mol L ⁻¹ Fe ³⁺ (OQ) and 3.0 × 10 ⁻⁵ mol L ⁻¹ Fe ²⁺ ; independent of temperature 5-50 °C.	777164
		1.4 × 10 ⁶	-1	0.1	25			
		8.5 × 10 ⁵	0	1.9	24	f.p./oq	D.k. at 480 nm in soln. contg. Ru(bpy) ₃ ²⁺ , Fe ³⁺ (OQ) and 1 mol L ⁻¹ HClO ₄ .	771093
		1.0 × 10 ⁶	0			f.p./oq	P.b.k. at 450 nm in soln. contg. Ru(bpy) ₃ ²⁺ , Fe ³⁺ (OQ) and 1.0 mol L ⁻¹ HClO ₄ .	747159
22.50.48 Iron(II) acetate								
	Ru(bpy) ₃ ³⁺ + Fe(OAc) _n ²⁻ⁿ⁺ → Ru(bpy) ₃ ²⁺ + Fe(OAc) _n ³⁻ⁿ⁺	3.4 × 10 ⁸		5.0		f.p./oq	P.b.k. at 452 nm in deaerated soln. contg. 5 × 10 ⁻⁵ mol L ⁻¹ Ru(bpy) ₃ ²⁺ , 4 × 10 ⁻⁴ mol L ⁻¹ Fe ³⁺ (OQ) and 0.1 mol L ⁻¹ acetate ion.	81N178

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
22.50 Tris(2,2'-bipyridine)ruthenium(III) ion — Continued								
22.50.49 Tetrachloroferrate(II) ion								
	Ru(bpy) ₃ ³⁺ + FeCl ₄ ²⁻ → Ru(bpy) ₃ ²⁺ + FeCl ₄ ⁻	4.1 × 10 ⁶	1	0.1	18	f.p./oq	P.b.k. at 452 nm in soln. contg. Ru(bpy) ₃ ²⁺ , Fe ³⁺ (OQ) (primarily FeCl ₄ ⁻) and 0.1, 0.5 and 1.0 mol L ⁻¹ HCl, respectively.	79A218
		4.7 × 10 ⁶	0.3	0.5				
		5.3 × 10 ⁶	0	1.0				
22.50.50 Triphosphatoferrate(II) ion								
	Ru(bpy) ₃ ³⁺ + Fe(PO ₄) ₃ ⁷⁻ → Ru(bpy) ₃ ²⁺ + Fe(PO ₄) ₃ ⁶⁻	1.9 × 10 ⁷		<1.2	18	f.p./oq	P.b.k. at 452 nm in soln. contg. Ru(bpy) ₃ ²⁺ , Fe ³⁺ (OQ) (various species including Fe(PO ₄) ₃ ⁶⁻) and 0.5 and 5.0 mol L ⁻¹ H ₃ PO ₄ , respectively.	79A218
		1.5 × 10 ⁷						
22.50.51 Iron(II) sulfate								
	Ru(bpy) ₃ ³⁺ + FeSO ₄ → Ru(bpy) ₃ ²⁺ + FeSO ₄ ⁺	1.3 × 10 ⁷		-2		f.p./oq	P.b.k. at 455 nm in soln. contg. 2 × 10 ⁻⁵ mol L ⁻¹ Ru(bpy) ₃ ²⁺ , Fe(III) (OQ), (0.7) × 10 ⁻⁴ mol L ⁻¹ Fe(II) and 7 × 10 ⁻³ or 0.16 mol L ⁻¹ H ₂ SO ₄ , respectively.	89E329
		8 × 10 ⁶		-0.8				
		4.0 × 10 ⁶	0.3	1.0		f.p./oq	Soln. contg. Ru(bpy) ₃ ²⁺ , Fe(III) (OQ) and 0.5 mol L ⁻¹ H ₂ SO ₄ .	82F048
		4.8 × 10 ⁶	0.3		20	f.p./oq	Calcd. from current-time curve; soln. contg. 0.5 mol L ⁻¹ H ₂ SO ₄ , 3 × 10 ⁻⁴ mol L ⁻¹ Ru(bpy) ₃ ²⁺ and [Fe ²⁺] = [Fe ³⁺] (OQ).	80E224
		5.1 × 10 ⁶	-0.8		18	f.p./oq	P.b.k. at 452 nm in soln. contg. Ru(bpy) ₃ ²⁺ , Fe ³⁺ (OQ) (FeSO ₄ ⁺ and Fe(SO ₄) ₂ ⁻) and 0.17, 0.5 or 2.5 mol L ⁻¹ H ₂ SO ₄ , respectively.	79A218
		5.2 × 10 ⁶	0.3					
		4.0 × 10 ⁶	<0					
		5.2 × 10 ⁶	0.3		25	f.p./oq	P.b.k. in soln. contg. Ru(bpy) ₃ ²⁺ , Fe(III) (OQ) and 0.5 mol L ⁻¹ H ₂ SO ₄ ; <i>k</i> = 4.9 × 10 ⁶ L mol ⁻¹ s ⁻¹ detd. by s.f.	766404
22.50.52 Tris(1,10-phenanthroline)iron(II) ion								
	Ru(bpy) ₃ ³⁺ + Fe(phen) ₃ ²⁺ → Ru(bpy) ₃ ²⁺ + Fe(phen) ₃ ³⁺	1.8 × 10 ⁹	0	1.0	25	f.p./oq	P.b.k. at 450 nm in soln. contg. 3.0 × 10 ⁻⁶ mol L ⁻¹ Ru(bpy) ₃ ²⁺ , 2.5 × 10 ⁻⁶ mol L ⁻¹ Fe(phen) ₃ ²⁺ , 1.0 or 0.076 mol L ⁻¹ HClO ₄ , 4.0 × 10 ⁻³ mol L ⁻¹ Fe ³⁺ (OQ) and 3.0 × 10 ⁻⁵ mol L ⁻¹ Fe ²⁺ .	777164
		1.3 × 10 ⁹	-1	0.1				
22.50.53 Ferrocyanide ion								
	Ru(bpy) ₃ ³⁺ + Fe(CN) ₆ ⁴⁻ → Ru(bpy) ₃ ²⁺ + Fe(CN) ₆ ³⁻	9.8 × 10 ⁹	6.8	0.1	23	f.p./oq	P.b.k. at 450 nm in soln. contg. 4.2 × 10 ⁻¹ Ru(bpy) ₃ ²⁺ , 0.01 mol L ⁻¹ MV ²⁺ (OQ) and 2.0 × 10 ⁻⁴ mol L ⁻¹ Fe(CN) ₆ ³⁻ .	82A130
22.50.54 Mercury(I) ion								
	Ru(bpy) ₃ ³⁺ + Hg ²⁺ → Ru(bpy) ₃ ²⁺ + Hg ²⁺	2.9 × 10 ⁹	-1	1.0	21	f.p./oq	P.b.k. at 436 nm in deaerated soln. contg. 3.6 × 10 ⁻⁶ mol L ⁻¹ Ru(bpy) ₃ ²⁺ , 1 × 10 ⁻² mol L ⁻¹ Hg(NO ₃) ₂ (OQ), 0.11 mol L ⁻¹ HNO ₃ and 0.09 mol L ⁻¹ NaNO ₃ ; assumed <i>k</i> (Hg ⁺ + Hg ²⁺) = 8 × 10 ⁹ L mol ⁻¹ s ⁻¹ .	84A148
22.50.55 Mercury(I) dimer ion								
	Ru(bpy) ₃ ³⁺ + Hg ₂ ²⁺ → Ru(bpy) ₃ ²⁺ + Hg ²⁺ + Hg ⁺	4.5	-1	1.0	21	f.p./oq	P.b.k. at 436 nm in deaerated soln. contg. 3.6 × 10 ⁻⁶ mol L ⁻¹ Ru(bpy) ₃ ²⁺ , 1 × 10 ⁻² mol L ⁻¹ Hg(NO ₃) ₂ (OQ), 0.11 mol L ⁻¹ HNO ₃ and 0.09 mol L ⁻¹ NaNO ₃ .	84A148

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	k ($\text{L} \cdot \text{mol}^{-1} \text{s}^{-1}$)	pH	I	$t(\text{°C})$	Method	Comment	Ref.	
22.50 Tris(2,2'-bipyridine)ruthenium(III) ion — Continued									
22.50.56 Dichloromercurate(I) ion									
	$\text{Ru(bpy)}_3^{3+} + \text{HgCl}_2^- \rightarrow \text{Ru(bpy)}_3^{2+} + \text{HgCl}_2$	$>2 \times 10^{10}$		1.0		f.p./oq	Soln. contg. Ru(bpy)_3^{2+} and HgCl_2 (OQ).	84A077	
22.50.57 Superoxide radical anion									
	$\text{Ru(bpy)}_3^{3+} + \text{O}_2^{\cdot-} \rightarrow \text{Ru(bpy)}_3^{2+} + \text{O}_2$	* 8.0×10^9		0.2	23	f.p./oq	P.b.k. at 450 nm in O_2 satd. soln. contg. 5.5×10^{-5} mol L^{-1} Ru(bpy)_3^{2+} and $(5.50) \times 10^{-3}$ mol L^{-1} MV^{2+} (OQ) in D_2O .	88A105	
		* 1.4×10^{10}		>7	0.1	23	f.p./oq	P.b.k. at 450 nm in soln. contg. 5×10^{-5} mol L^{-1} Ru(bpy)_3^{2+} , ~ 0.01 mol L^{-1} MV^{2+} (OQ) and $(0.7-10) \times 10^{-4}$ mol L^{-1} O_2 . Calcd. from pH study; unreactive with HO_2 .	85F449
		* 3.5×10^{10}			24	f.p./oq	P.b.k. at 450 nm in air-satd. soln. contg. Ru(bpy)_3^{2+} and BSV (OQ).	85A064	
							* Unexplained discrepancy in these data.		
22.50.58 Tris(2,2'-bipyridine)rhodium(II) ion									
	$\text{Ru(bpy)}_3^{3+} + \text{Rh(bpy)}_3^{2+} \rightarrow \text{Ru(bpy)}_3^{2+} + \text{Rh(bpy)}_3^{3+}$	1.3×10^9	5	0.056	20	f.p./oq	D.k. at 670 nm and p.b.k. at 450 nm in soln. contg. Ru(bpy)_3^{2+} and Rh(bpy)_3^{3+} (OQ) in 0.04 mol L^{-1} acetate buffer.	87A460	
		3×10^9		0.3	25	f.p./oq	P.b.k. at 450 nm in soln. contg. 5×10^{-5} mol L^{-1} Ru(bpy)_3^{2+} , 4.0×10^{-3} mol L^{-1} Rh(bpy)_3^{3+} (OQ) and 0.5 mol L^{-1} H_2SO_4 .	81N003	
								79A317	
22.50.59 Hexaammineruthenium(II) ion									
	$\text{Ru(bpy)}_3^{3+} + \text{Ru}(\text{NH}_3)_6^{2+} \rightarrow \text{Ru(bpy)}_3^{2+} + \text{Ru}(\text{NH}_3)_6^{3+}$	3.7×10^9		0.3		f.p./oq	P.b.k. at 450 nm in soln. contg. Ru(bpy)_3^{2+} , $\text{Ru}(\text{NH}_3)_6^{3+}$ (OQ) and 1.0 mol L^{-1} $\text{CF}_3\text{CO}_2\text{H}$.	747159	
22.50.60 Ammine(2,2'-bipyridine)(2,2':6',2''-terpyridine)ruthenium(II) ion									
	$\text{Ru(bpy)}_3^{3+} + \text{Ru}(\text{terpy})(\text{bpy})(\text{NH}_3)^{2+} \rightarrow \text{Ru(bpy)}_3^{2+} + \text{Ru}(\text{terpy})(\text{bpy})(\text{NH}_3)^{3+}$	2.7×10^9		0		f.p./oq	P.b.k. at 450 nm and d.k. at 480 nm in soln. contg. 5.64×10^{-6} mol L^{-1} Ru(bpy)_3^{2+} , 3.48×10^{-6} mol L^{-1} $\text{Ru}(\text{terpy})(\text{bpy})\text{NH}_3^{2+}$, 4.2×10^{-3} mol L^{-1} Fe^{3+} (OQ), 5.25×10^{-5} mol L^{-1} Fe^{2+} and 1.0 mol L^{-1} HClO_4 ; average of two values.	84A302	
22.50.61 Thiocyanate ion									
	$\text{Ru(bpy)}_3^{3+} + 2 \text{SCN}^- \rightarrow \text{Ru(bpy)}_3^{2+} + (\text{SCN})_2^-$	2×10^5		7.0	25	p.r.	D.k. at 500 nm in N_2O -satd. soln. contg. 0.01 mol L^{-1} KSCN , 4.5×10^{-5} mol L^{-1} Ru(bpy)_3^{2+} and 5×10^{-3} mol L^{-1} phosphate ion; $k_f = 7 \times 10^{10}$ $\text{L mol}^{-1} \text{s}^{-1}$.	90C005	
22.50.62 Sulfite ion									
	$\text{Ru(bpy)}_3^{3+} + \text{SO}_3^{2-} \rightarrow$	2×10^9				f.p./oq	Soln. contg. Ru(bpy)_3^{2+} and $\text{Co}(\text{NH}_3)_5\text{X}^{2+}$ ($\text{X} = \text{Br}, \text{Cl}, \text{I}$) (OQ).	79Z056	
22.50.63 Thallium(II) ion									
	$\text{Ru(bpy)}_3^{3+} + \text{Ti}^{2+} \rightarrow \text{Ru(bpy)}_3^{2+} + \text{Ti}^{3+}$	2.9×10^{10}	<0	3.0		f.p./oq	P.b.k. at 452 nm in soln. contg. Ru(bpy)_3^{2+} , 3.0 mol L^{-1} HCl and $\text{Ti}(\text{NO}_3)_3$ (OQ); Cl^- complexes of Ti are present.	82A111	

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t^\circ\text{C}$	Method	Comment	Ref.
22.50 Tris(2,2'-bipyridine)ruthenium(III) ion — Continued								
22.50.64 1,4-Benzenediol	$\text{Ru(bpy)}_3^{3+} + \text{QH}_2 \rightarrow \text{Ru(bpy)}_3^{2+} + \text{Q}^- + 2 \text{H}^+$	2.1×10^9	6.9	0.04		f.p./oq	P.b.k. at 470 nm in soln. contg. 2×10^{-5} mol L^{-1} Ru(bpy)_3^{2+} , 10^{-2} mol L^{-1} MV^{2+} (OQ) and $(2.5-20) \times 10^{-4}$ mol L^{-1} QH_2 .	81A042
22.50.65 1,1'-Bis(carboxymethyl)-4,4'-bipyridinium radical cation	$\text{Ru(bpy)}_3^{3+} + [\text{CMV}]^+ \rightarrow \text{Ru(bpy)}_3^{2+} + \text{CMV}^{2+}$	6.5×10^9		-0.0003		f.p./oq	Soln. contg. Ru(bpy)_3^{2+} and CMV^{2+} (OQ).	82N022
22.50.66 1,1'-Bis(2-hydroxyethyl)-4,4'-bipyridinium radical cation	$\text{Ru(bpy)}_3^{3+} + [\text{BP}]^+ \rightarrow \text{Ru(bpy)}_3^{2+} + \text{BP}^{2+}$	1.2×10^9	5			f.p./oq	Soln. contg. Ru(bpy)_3^{2+} and N,N' -bis(2-hydroxyethyl)-4,4'-bipyridinium (OQ).	82C019
22.50.67 1,1'-Bis(4-sulfonatobenzyl)-4,4'-bipyridinium zwitterion, radical anion	$\text{Ru(bpy)}_3^{3+} + [\text{BSV}]^- \rightarrow \text{Ru(bpy)}_3^{2+}$ + BSV^+	2.1×10^{10}				f.p./oq	P.b.k. at 450 nm and d.k. at 590 nm in soln. contg. Ru(bpy)_3^{2+} and BSV (OQ).	82N118
22.50.68 1,1'-Bis(2-sulfonatoethyl)-4,4'-bipyridinium radical anion	$\text{Ru(bpy)}_3^{3+} + [\text{SEV}]^- \rightarrow \text{Ru(bpy)}_3^{2+}$ + SEV	5.8×10^9	6.5	0.066	20	f.p./oq	D.k. at 600 nm in soln. contg. Ru(bpy)_3^{2+} and SEV (OQ).	86N260
22.50.69 1,1'-Bis(3-sulfonatopropyl)-4,4'-bipyridinium radical anion	$\text{Ru(bpy)}_3^{3+} + [\text{SPV}]^- \rightarrow \text{Ru(bpy)}_3^{2+}$ + SPV	* 1.4×10^{10} * 4.0×10^9	6.2 8.2			f.p./oq	D.k. at 602 nm in soln. contg. Ru(bpy)_3^{2+} and SPV (OQ).	91A143
		3.5×10^9	7	0.4		f.p./oq	Soln. contg. Ru(bpy)_3^{2+} and SPV (OQ).	85F435
		5.0×10^9				f.p./oq	D.k. at 603 nm in soln. contg. 2.0×10^{-5} mol L^{-1} Ru(bpy)_3^{2+} and 5×10^{-4} mol L^{-1} SPV (OQ).	85F007
		7.8×10^9		-0.0003		f.p./oq	Soln. contg. Ru(bpy)_3^{2+} and SPV (OQ).	82N022
		7.9×10^9				f.p./oq	Soln. contg. Ru(bpy)_3^{2+} and SPV (OQ).	81N054
22.50.70 1,1'-Bis(3-sulfonatopropyl)-3,3'-dimethyl-4,4'-bipyridinium radical anion	$\text{Ru(bpy)}_3^{3+} + [3-\text{MSPV}]^- \rightarrow$ $\text{Ru(bpy)}_3^{2+} + 3-\text{MSPV}$	3.8×10^9				f.p./oq	Soln. contg. Ru(bpy)_3^{2+} and 3-MSPV (OQ).	90N140
22.50.71 1,1'-Bis[3-(trimethylammonio)propyl]-4,4'-bipyridinium radical cation	$\text{Ru(bpy)}_3^{3+} + [\text{APV}]^{3+} \rightarrow$ $\text{Ru(bpy)}_3^{2+} + \text{APV}^{4+}$	1.2×10^9	6.5	0.066	20	f.p./oq	D.K. at 600 nm in soln. contg. Ru(bpy)_3^{2+} and APV^{4+} (OQ).	86N260
22.50.72 Cysteine	$\text{Ru(bpy)}_3^{3+} + \text{CysSH} \rightarrow \text{Ru(bpy)}_3^{2+} + \text{CysS}^- + \text{H}^+$	3.7×10^6				f.p./oq	P.b.k. at 452 nm in soln. contg. 4×10^{-5} mol L^{-1} Ru(bpy)_3^{2+} , cysteine and 0.01 mol L^{-1} MV^{2+} (OQ).	78A351
22.50.73 1,1'-Dibenzyl-4,4'-bipyridinium radical cation	$\text{Ru(bpy)}_3^{3+} + \text{BV}^{2+} \rightarrow \text{Ru(bpy)}_3^{2+} + \text{BV}^{2+}$	2.4×10^9	5		22	f.p.	D.k. at -600 nm in soln. contg. Ru(bpy)_3^{2+} and BV^{2+} (OQ).	82S257
		2.3×10^9	5			f.p./oq	Soln. contg. Ru(bpy)_3^{2+} and BV^{2+} (OQ).	82C019

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t(\text{°C})$	Method	Comment	Ref.
22.50 Tris(2,2'-bipyridine)ruthenium(III) ion — Continued								
22.50.74 1,1'-Dimethyl-4,4'-bipyridinium radical cation								
	$\text{Ru(bpy)}_3^{3+} + \text{MV}^{2+} \rightarrow \text{Ru(bpy)}_3^{2+} + \text{MV}^{2+}$	2.5×10^9		$\rightarrow 0$			Deduced from the analysis of data reported in [91A143], [91N125], [90A389], [89E329], [88A025], [85F435], [81A042], [81N003], [78A351]; k depends on I , see Appendix, Table A1 and Fig. 1.	
22.50.75 Ethylenediaminetetraacetate ions								
	$\text{Ru(bpy)}_3^{3+} + \text{EDTA} \rightarrow \text{Ru(bpy)}_3^{2+} + [\text{EDTA}_{\text{ox}}]^{*}$	1.2×10^6 4.6×10^7 5.0×10^7	4.7 8.7 11.0	1.0 0.6 1.0		f.p./oq	P.b.k. at 450 nm in soln. contg. Ru(bpy)_3^{2+} and MV^{2+} (OQ). Studied at various concentrations and ionic strength; extrapolation to $I = 0$ at pH 4.7 indicates $k > 4 \times 10^8 \text{ L mol}^{-1} \text{s}^{-1}$.	89A065
22.50.76 1,1',2,2',6,6'-Hexamethyl-4,4'-bipyridinium radical cation								
	$\text{Ru(bpy)}_3^{3+} + [\text{HMV}]^{*+} \rightarrow \text{Ru(bpy)}_3^{2+} + \text{HMV}^{2+}$	2.9×10^9	5		22	f.p./oq	Soln. contg. $6.0 \times 10^{-5} \text{ mol L}^{-1}$ Ru(bpy)_3^{2+} and $1.6 \times 10^{-3} \text{ mol L}^{-1}$ HMV^{2+} (OQ).	82F316 82S257
22.50.77 1-Methyl-4,4'-bipyridinyl								
	$\text{Ru(bpy)}_3^{3+} + [1\text{-Me-4,4'-bpy}]^{*} \rightarrow \text{Ru(bpy)}_3^{2+} + 1\text{-Me-4,4'-bpy}^{*}$	-10^9	5.6		25	f.p./oq	D.k. at 600 nm in soln. contg. Ru(bpy)_3^{2+} and 1-methyl-4,4'-bipyridinium (OQ).	78E293
22.50.78 1-Methyl-1'-tetradecyl-4,4'-bipyridinium radical cation								
	$\text{Ru(bpy)}_3^{3+} + [\text{C}_{14}\text{MV}]^{*+} \rightarrow \text{Ru(bpy)}_3^{2+} + \text{C}_{14}\text{MV}^{2+}$	4×10^9		0.0014		f.p./oq	D.k. at 602 nm in soln. contg. Ru(bpy)_3^{2+} and $5 \times 10^{-4} \text{ mol L}^{-1}$ $\text{C}_{14}\text{MV}^{2+}$ (OQ); addn. of $10^{-2} \text{ mol L}^{-1}$ NaCl increases k by 30%.	80N025 81N002
22.50.79 Oxalate ion								
	$\text{Ru(bpy)}_3^{3+} + \text{O}_2\text{CCO}_2^{-} \rightarrow \text{Ru(bpy)}_3^{2+} + \text{O}_2\text{CCO}_2^{-}$	1.0×10^5 3×10^4	0.30-1.0 2.1-3.0		23	f.p./oq	P.b.k. at 450 nm in soln. contg. Ru(bpy)_3^{2+} , $(1.0\text{-}10) \times 10^{-3} \text{ mol L}^{-1}$ MV^{2+} (OQ) and 0.10 mol L^{-1} oxalate ion.	90A389
22.50.80 1,1'-Tetramethylene-2,2'-bipyridinium radical cation								
	$\text{Ru(bpy)}_3^{3+} + [\text{BP}]^{*+} \rightarrow \text{Ru(bpy)}_3^{2+} + \text{BP}^{2+}$	1.5×10^9	5			f.p./oq	Soln. contg. Ru(bpy)_3^{2+} and BP^{2+} (OQ).	82C019
22.50.81 1,1',2,2'-Tetramethyl-4,4'-bipyridinium radical cation								
	$\text{Ru(bpy)}_3^{3+} + [\text{TMV}]^{*+} \rightarrow \text{Ru(bpy)}_3^{2+} + \text{TMV}^{2+}$	2.6×10^9	5		22	f.p./oq	D.k. at 605 nm in soln. contg. $6.0 \times 10^{-5} \text{ mol L}^{-1}$ Ru(bpy)_3^{2+} and $1.6 \times 10^{-3} \text{ mol L}^{-1}$ TMV^{2+} (OQ).	82F316 82S257
22.50.82 1,1'-Trimethylene-2,2'-bipyridinium radical cation								
	$\text{Ru(bpy)}_3^{3+} + [\text{TQ}]^{*+} \rightarrow \text{Ru(bpy)}_3^{2+} + \text{TQ}^{2+}$	2.8×10^9	5			f.p./oq	Soln. contg. Ru(bpy)_3^{2+} and TQ^{2+} (OQ).	82C019
22.50.83 Triethanolamine								
	$\text{Ru(bpy)}_3^{3+} + \text{TEOA} \rightarrow \text{Ru(bpy)}_3^{2+} + [\text{TEOA}]^{*+}$	2×10^7 4.7×10^7	8.1 9	0.5	25	f.p./oq	P.b.k. in soln. contg. $5 \times 10^{-5} \text{ mol L}^{-1}$ Ru(bpy)_3^{2+} , $4.0 \times 10^{-3} \text{ mol L}^{-1}$ Rh(bpy)_3^{3+} (OQ) and 0.01 mol L^{-1} TEOA/TEOAH ⁺ ($pK_a = 8.1$).	79A317
						f.p./oq	P.b.k. at 452 nm in soln. contg. $4 \times 10^{-5} \text{ mol L}^{-1}$ Ru(bpy)_3^{2+} , $0.05\text{-}0.125 \text{ mol L}^{-1}$ TEOA and 0.01 mol L^{-1} MV^{2+} (OQ); at pH 5 and 7, $k_{\text{obs}} = 2.4 \times 10^5$ and $6.5 \times 10^6 \text{ L mol}^{-1} \text{s}^{-1}$, respectively, indicating that only the unprotonated amine is reactive.	78A351

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	t ($^\circ\text{C}$)	Method	Comment	Ref.
22.50 Tris(2,2'-bipyridine)ruthenium(III) ion — Continued								
22.50.84 Trimethylhydroquinone								
	$\text{Ru(bpy)}_3^{3+} + 2,3,5-(\text{CH}_3)_3\text{QH}_2 \rightarrow \text{Ru(bpy)}_3^{2+} + 2 \text{H}^+ + [2,3,5-(\text{CH}_3)_3\text{Q}]^{2-}$	3.3×10^9	6.9	0.04		f.p./oq	P.b.k. at 470 nm (Ru(bpy)_3^{2+}) in soln. contg. 2×10^{-5} mol L^{-1} Ru(bpy)_3^{2+} , 10^{-2} mol L^{-1} MV^{2+} (OQ) and $(2.5-20) 10^{-4}$ mol L^{-1} trimethylhydroquinone.	81A042
22.51 Tris(4,4'-dimethyl-2,2'-bipyridine)ruthenium(III) ion								
22.51.1 Copper(I) ion								
	$\text{Ru}(4,4'\text{-Me}_2\text{bpy})_3^{3+} + \text{Cu}^+ \rightarrow \text{Ru}(4,4'\text{-Me}_2\text{bpy})_3^{2+} + \text{Cu}^{2+}$	8.7×10^7	0.3		25	f.p./oq	P.b.k. at ~ 450 nm in soln. contg. 10^{-5} mol L^{-1} $\text{Ru}(4,4'\text{-Me}_2\text{bpy})_3^{2+}$, 0.01-0.06 mol L^{-1} Cu^{2+} (OQ) and 0.5 mol L^{-1} sulfuric acid.	78A090
22.51.2 Iron(II) sulfate								
	$\text{Ru}(4,4'\text{-Me}_2\text{bpy})_3^{3+} + \text{FeSO}_4 \rightarrow \text{Ru}(4,4'\text{-Me}_2\text{bpy})_3^{2+} + \text{FeSO}_4^+$	1.0×10^5	0.3		20	f.p./oq	Calcd. from current-time curve; soln. contg. 0.5 mol L^{-1} H_2SO_4 , 3×10^{-4} mol L^{-1} Ru(bpy)_3^{2+} and $[\text{Fe}^{2+}] = [\text{Fe}^{3+}]$ (OQ).	80E224
22.51.3 Dichloromercurate(I) ion								
	$\text{Ru}(4,4'\text{-Me}_2\text{bpy})_3^{3+} + \text{HgCl}_2^- \rightarrow \text{Ru}(4,4'\text{-Me}_2\text{bpy})_3^{2+} + \text{HgCl}_2$	$>2 \times 10^{10}$	1.0			f.p./oq	Soln. contg. Ru(bpy)_3^{2+} and HgCl_2 (OQ).	84A077
22.52 Tris(5,5'-dimethyl-2,2'-bipyridine)ruthenium(III) ion								
22.52.1 Iron(II) sulfate								
	$\text{Ru}(5,5'\text{-Me}_2\text{bpy})_3^{3+} + \text{FeSO}_4 \rightarrow \text{Ru}(5,5'\text{-Me}_2\text{bpy})_3^{2+} + \text{FeSO}_4^+$	6.0×10^5	0.3		20	f.p./oq	Calcd. from current-time curve; soln. contg. 0.5 mol L^{-1} H_2SO_4 , 3×10^{-4} mol L^{-1} Ru(bpy)_3^{2+} and $[\text{Fe}^{2+}] = [\text{Fe}^{3+}]$ (OQ).	80E224
22.53 Ammine(2,2'-bipyridine)(2,2';6,2''-terpyridine)ruthenium(III) ion								
22.53.1 Iron(II) ion								
	$\text{Ru(terpy)(bpy)(NH}_3)^{3+} + \text{Fe}^{2+} \rightarrow \text{Ru(terpy)(bpy)(NH}_3)^{2+} + \text{Fe}^{3+}$	3.1×10^4	0			f.p./oq	P.b.k. at 450 and 480 nm in soln. contg. 5.64×10^{-6} mol L^{-1} Ru(bpy)_3^{2+} , 3.48×10^{-6} mol L^{-1} $\text{Ru(terpy)(bpy)NH}_3^{2+}$, 4.2×10^{-3} mol L^{-1} Fe^{3+} (OQ), 5.25×10^{-5} mol L^{-1} Fe^{2+} and 1.0 mol L^{-1} HClO_4 ; same value obtained by s.f.	84A302
22.54 Tris(4-triethylphosphonio-2,2'-bipyridine)ruthenium(III) ion								
22.54.1 Tris(2,2'-bipyridine)cobalt(II) ion								
	$\text{Ru[4-(Et}_3\text{P)bpy]}_3^{6+} + \text{Co(bpy)}_3^{2+} \rightarrow \text{Ru[4-(Et}_3\text{P)bpy]}_3^{5+} + \text{Co(bpy)}_3^{3+}$	2.2×10^8	1.0			f.p.	Soln. contg. $\text{Ru[4-(Et}_3\text{P)bpy]}_3^{5+}$ and Co(bpy)_3^{3+} (OQ).	82F048
22.54.2 Iron(II) sulfate								
	$\text{Ru[4-(Et}_3\text{P)bpy]}_3^{6+} + \text{FeSO}_4 \rightarrow \text{Ru[4-(Et}_3\text{P)bpy]}_3^{5+} + \text{FeSO}_4^+$	1.9×10^8	0.3			f.p./oq	Soln. contg. $\text{Ru[4-(Et}_3\text{P)bpy]}_3^{5+}$ and FeSO_4^+ (OQ) in 0.5 mol L^{-1} H_2SO_4 .	82F048

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.	
22.55 Tris(1,10-phenanthroline)ruthenium(III) ion									
22.55.1	Tris(2,2'-bipyridine)cobalt(II) ion								
	Ru(phen) ₃ ³⁺ + Co(bpy) ₃ ²⁺ → Ru(phen) ₃ ²⁺ + Co(bpy) ₃ ³⁺	1.9 × 10 ⁸		0.25		f.p./oq	P.b.k. at 420-450 nm in soln. contg. 1 × 10 ⁻⁴ mol L ⁻¹ Ru(phen) ₃ ²⁺ , 0.25 mol L ⁻¹ LiCl and (2-6) × 10 ⁻⁴ mol L ⁻¹ Co(bpy) ₃ ³⁺ (OQ); <i>k</i> = 2.5 × 10 ⁸ in presence of 0.166 mol L ⁻¹ Na ₂ SO ₄ and 4.8 × 10 ⁷ L mol ⁻¹ s ⁻¹ in 50% aqueous acetonitrile contg. 0.25 mol L ⁻¹ LiCl.	85S022	
22.55.2	2,3,9,10-tetramethyl-1,4,8,11-tetraazacyclotetradecanecobalt(II) ion	Ru(phen) ₃ ³⁺ + Co(Me ₄ [14]aneN ₄) ²⁺ → Ru(phen) ₃ ²⁺ + Co(Me ₄ [14]aneN ₄) ³⁺	9.7 × 10 ⁵	0.1	25	f.p./oq	P.b.k. in soln. contg. Ru(phen) ₃ ²⁺ and Co(NH ₃) ₅ Br ²⁺ (OQ).	90A221	
22.55.3	1,3,6,8,10,13,16,19-Octaazabicyclo[6.6.6]eicosane cobalt(II) ion	Ru(phen) ₃ ³⁺ + Co(sep) ²⁺ → Ru(phen) ₃ ²⁺ + Co(sep) ³⁺	6.4 × 10 ⁸	0.2	25	f.p./oq	P.b.k. at 450 nm in soln. contg. (2-5) × 10 ⁻⁵ mol L ⁻¹ Ru(phen) ₃ ²⁺ and (1-7) × 10 ⁻³ mol L ⁻¹ Co(sep) ³⁺ (OQ).	84A238	
22.55.4	1,8-Diamino-3,6,10,13,16,19-hexaaazabicyclo[6.6.6]eicosane cobalt(II) ion, conjugate diacid	Ru(phen) ₃ ³⁺ + Co(diamsarH ₂) ⁴⁺ → Ru(phen) ₃ ²⁺ + Co(diamsarH ₂) ⁵⁺	7.9 × 10 ⁶	1	0.2	25	f.p./oq	P.b.k. at 450 nm in soln. contg. (2-5) × 10 ⁻⁵ mol L ⁻¹ Ru(phen) ₃ ²⁺ , (1-7) × 10 ⁻³ mol L ⁻¹ Co(diamsar) ³⁺ (OQ), and 0.1 mol L ⁻¹ HCl.	84A238
22.55.5	1,8-Diamino-3,6,10,13,16,19-hexaaazabicyclo[6.6.6]eicosane cobalt(II) ion	Ru(phen) ₃ ³⁺ + Co(diamsar) ²⁺ → Ru(phen) ₃ ²⁺ + Co(diamsar) ³⁺	9.6 × 10 ⁷	8.3	0.2	25	f.p./oq	P.b.k. at 450 nm in soln. contg. (2-5) × 10 ⁻⁵ mol L ⁻¹ Ru(phen) ₃ ²⁺ , (1-7) × 10 ⁻³ mol L ⁻¹ Co(diamsar) ³⁺ (OQ), 0.1 mol L ⁻¹ LiCl and 0.05 mol L ⁻¹ <i>N</i> -ethylmorpholine.	84A238
22.55.6	Copper(I) ion	Ru(phen) ₃ ³⁺ + Cu ⁺ → Ru(phen) ₃ ²⁺ + Cu ²⁺	1.2 × 10 ⁹	0.3	25	f.p./oq	P.b.k. at 450 nm in soln. contg. 10 ⁻⁵ mol L ⁻¹ Ru(phen) ₃ ²⁺ , 0.01-0.06 mol L ⁻¹ Cu ²⁺ (OQ) and 0.5 mol L ⁻¹ sulfuric acid.	78A090	
22.55.7	Iron(II) ion	Ru(phen) ₃ ³⁺ + Fe ²⁺ → Ru(phen) ₃ ²⁺ + Fe ³⁺	1.2 × 10 ⁶	0	1.0	25	f.p./oq	P.b.k. in soln. contg. 3.0 × 10 ⁻⁶ mol L ⁻¹ Ru(bpy) ₃ ²⁺ , 3.0 × 10 ⁻⁶ mol L ⁻¹ Ru(phen) ₃ ²⁺ , 1.0 or 0.076 mol L ⁻¹ HClO ₄ , respectively, 4.0 × 10 ⁻⁵ mol L ⁻¹ Fe ³⁺ (OQ) and 3.0 × 10 ⁻⁵ mol L ⁻¹ Fe ²⁺ ; for <i>I</i> = 0.1, <i>k</i> is independent of temperature in the range 5-50 °C.	777164
22.55.8	Mercury(I) ion	Ru(phen) ₃ ³⁺ + Hg ⁺ → Ru(phen) ₃ ²⁺ + Hg ²⁺	2.5 × 10 ⁹	acid		f.p./oq	P.b.k. at 436 nm in deaerated soln. contg. Ru(phen) ₃ ²⁺ , excess Hg(NO ₃) ₂ (OQ), HNO ₃ and NaNO ₃ ; assumed <i>k</i> (Hg ⁺ + Hg ⁺) = 8 × 10 ⁹ L mol ⁻¹ s ⁻¹ .	84A148	
22.55.9	Mercury(I) dimer ion	Ru(phen) ₃ ³⁺ + Hg ₂ ²⁺ → Ru(phen) ₃ ²⁺ + Hg ²⁺ + Hg ⁺	10	acid		f.p./oq	P.b.k. at 436 nm in deaerated soln. contg. Ru(phen) ₃ ²⁺ , excess Hg(NO ₃) ₂ (OQ), HNO ₃ and NaNO ₃ .	84A148	

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t^\circ(\text{C})$	Method	Comment	Ref.
22.55 Tris(1,10-phenanthroline)ruthenium(III) ion — Continued								
22.55.10 Tris(2,2'-bipyridine)ruthenium(II) ion								
	$\text{Ru(phen)}_3^{3+} + \text{Ru(bpy)}_3^{2+} \rightarrow$ $\text{Ru(phen)}_3^{2+} + \text{Ru(bpy)}_3^{3+}$	1.2×10^9	0	1.0	25	f.p./oq	P.b.k. in soln. contg. 3.0×10^{-6} mol L $^{-1}$ Ru(bpy)_3^{2+} , 3.0×10^{-6} mol L $^{-1}$ Ru(phen)_3^{3+} , 1.0 or 0.076 mol L $^{-1}$ HClO_4 , respectively, 4.0×10^{-5} mol L $^{-1}$ Fe^{2+} (OQ) and 3.0×10^{-5} mol L $^{-1}$ Fe^{2+} ; $\Delta H^\ddagger = 32 \text{ kJ mol}^{-1}$, $\Delta S^\ddagger = -28 \text{ J K}^{-1} \text{ mol}^{-1}$, $\Delta G^\ddagger = 24 \text{ kJ mol}^{-1}$ for $I = 1$; measured over 5-50 °C,	777164
	$\text{Ru(phen)}_3^{3+} + [3\text{-MSPV}]^- \rightarrow$ $\text{Ru(phen)}_3^{2+} + 3\text{-MSPV}$	2.1×10^9				f.p./oq	Soln. contg. Ru(phen)_3^{2+} and 3-MPVS (OQ).	90N140
22.56 Tris(5-bromo-1,10-phenanthroline)ruthenium(III) ion								
22.56.1 Copper(I) ion								
	$\text{Ru(5-Brphen)}_3^{3+} + \text{Cu}^+ \rightarrow$ $\text{Ru(5-Brphen)}_3^{2+} + \text{Cu}^{2+}$	2.3×10^9	0.3		25	f.p./oq	P.b.k. at 450 nm in soln. contg. 10^{-5} mol L $^{-1}$ $\text{Ru(5-Brphen)}_3^{2+}$, 0.01-0.06 mol L $^{-1}$ Cu^{2+} (OQ) and 0.5 mol L $^{-1}$ sulfuric acid.	78A090
22.56.2 Dichloromercurate(I) ion								
	$\text{Ru(5-Brphen)}_3^{3+} + \text{HgCl}_2^- \rightarrow$ $\text{Ru(5-Brphen)}_3^{2+} + \text{HgCl}_2$	$>2 \times 10^{10}$		1.0		f.p./oq	Soln. contg. $\text{Ru(5-Brphen)}_3^{2+}$ and HgCl_2 (OQ).	84A077
22.57 Tris(5-chloro-1,10-phenanthroline)ruthenium(III) ion								
22.57.1 1,3,6,8,10,13,16,19-Octaazabicyclo[6.6.6]eicosanecobalt(II) ion								
	$\text{Ru(5-Clphen)}_3^{3+} + \text{Co(sep)}^{2+} \rightarrow$ $\text{Ru(5-Clphen)}_3^{2+} + \text{Co(sep)}^{3+}$	8.2×10^8	0.2		25	f.p./oq	P.b.k. at 450 nm in soln. contg. (2-5) $\times 10^{-5}$ mol L $^{-1}$ $\text{Ru(5-Clphen)}_3^{2+}$ and (1-7) $\times 10^{-3}$ mol L $^{-1}$ Co(sep)^{3+} (OQ).	84A238
22.57.2 1,8-Diamino-3,6,10,13,16,19-hexaazabicyclo[6.6.6]eicosanecobalt(II) ion								
	$\text{Ru(5-Clphen)}_3^{3+} + \text{Co(diamsar)}^{2+} \rightarrow$ $\text{Ru(5-Clphen)}_3^{2+} + \text{Co(diamsar)}^{3+}$	1.7×10^8	8.1	0.2	25	f.p./oq	P.b.k. at 450 nm in soln. contg. 0.2 mol L $^{-1}$ LiCl, 0.05 mol L $^{-1}$ N-ethylmorpholine, (2-5) $\times 10^{-5}$ mol L $^{-1}$ $\text{Ru(5-Clphen)}_3^{2+}$ and (1-7) $\times 10^{-3}$ mol L $^{-1}$ Co(diamsar)^{3+} (OQ).	84A238
22.57.3 Copper(I) ion								
	$\text{Ru(5-Clphen)}_3^{3+} + \text{Cu}^+ \rightarrow$ $\text{Ru(5-Clphen)}_3^{2+} + \text{Cu}^{2+}$	2.7×10^9	0.3		25	f.p./oq	P.b.k. at 450 nm in soln. contg. 10^{-5} mol L $^{-1}$ $\text{Ru(5-Clphen)}_3^{2+}$, 0.01-0.06 mol L $^{-1}$ Cu^{2+} (OQ) and 0.5 mol L $^{-1}$ sulfuric acid.	78A090
22.57.4 Iron(II) sulfate								
	$\text{Ru(5-Clphen)}_3^{3+} + \text{FeSO}_4 \rightarrow$ $\text{Ru(5-Clphen)}_3^{2+} + \text{FeSO}_4^{2-}$	2.2×10^7	0.3		25	f.p./oq	P.b.k. in soln. contg. $\text{Ru(5-Clphen)}_3^{2+}$, Fe(III) (OQ) and 0.5 mol L $^{-1}$ H_2SO_4 ; $k = 1.8 \times 10^7 \text{ L mol}^{-1} \text{ s}^{-1}$ detd. by s.f.	766404
22.57.5 Mercury(I) ion								
	$\text{Ru(5-Clphen)}_3^{3+} + \text{Hg}^+ \rightarrow$ $\text{Ru(5-Clphen)}_3^{2+} + \text{Hg}^{2+}$	3.5×10^9	acid			f.p./oq	P.b.k. at 436 nm in deaerated soln. contg. $\text{Ru(5-Clphen)}_3^{2+}$, excess $\text{Hg(NO}_3)_2$ (OQ), HNO_3 and NaNO_3 ; assumed $k(\text{Hg}^+ + \text{Hg}^{2+}) = 8 \times 10^9 \text{ L mol}^{-1} \text{ s}^{-1}$	84A148
22.57.6 Mercury(I) dimer ion								
	$\text{Ru(5-Clphen)}_3^{3+} + \text{Hg}_2^{2+} \rightarrow$ $\text{Ru(5-Clphen)}_3^{2+} + \text{Hg}^{2+} + \text{Hg}^+$	79	acid			f.p./oq	P.b.k. at 436 nm in deaerated soln. contg. $\text{Ru(5-Clphen)}_3^{2+}$, excess $\text{Hg(NO}_3)_2$ (OQ), HNO_3 and NaNO_3 .	84A148

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
22.58 Tris(5,6-dimethyl-1,10-phenanthroline)ruthenium(III) ion								
22.58.1	Copper(I) ion							
	$\text{Ru(5,6-Me}_2\text{phen)}_3^{3+} + \text{Cu}^+ \rightarrow \text{Ru(5,6-Me}_2\text{phen)}_3^{2+} + \text{Cu}^{2+}$	5.4×10^8	0.3		25	f.p./oq	P.b.k. at 450 nm in soln. contg. 10^{-5} mol L ⁻¹ Ru(5,6-Me ₂ phen) ₃ ²⁺ , 0.01-0.06 mol L ⁻¹ Cu ²⁺ (OQ) and 0.5 mol L ⁻¹ sulfuric acid.	78A090
22.58.2	Mercury(I) ion							
	$\text{Ru(5,6-Me}_2\text{phen)}_3^{3+} + \text{Hg}^+ \rightarrow \text{Ru(5,6-Me}_2\text{phen)}_3^{2+} + \text{Hg}^{2+}$	3.2×10^9	acid			f.p./oq	P.b.k. at 436 nm in deaerated soln. contg. Ru(5,6-Me ₂ phen) ₃ ²⁺ , excess Hg(NO ₃) ₂ (OQ), HNO ₃ and NaNO ₃ ; assumed $k(\text{Hg}^+ + \text{Hg}^+) = 8 \times 10^9$ L mol ⁻¹ s ⁻¹ .	84A148
22.58.3	Mercury(I) dimer ion							
	$\text{Ru(5,6-Me}_2\text{phen)}_3^{3+} + \text{Hg}_2^{2+} \rightarrow \text{Ru(5,6-Me}_2\text{phen)}_3^{2+} + \text{Hg}^{2+} + \text{Hg}^+$	3.0	acid			f.p./oq	P.b.k. at 436 nm in deaerated soln. contg. Ru(5,6-Me ₂ phen) ₃ ²⁺ , excess Hg(NO ₃) ₂ (OQ), HNO ₃ and NaNO ₃ .	84A148
22.59 Tris(4,7-dimethyl-1,10-phenanthroline)ruthenium(III) ion								
22.59.1	Tris(2,2'-bipyridine)cobalt(II) ion							
	$\text{Ru(4,7-Me}_2\text{phen)}_3^{3+} + \text{Co(bpy)}_3^{2+} \rightarrow \text{Ru(4,7-Me}_2\text{phen)}_3^{2+} + \text{Co(bpy)}_3^{3+}$	3.1×10^8	0.25			f.p./oq	P.b.k. at 420-450 nm in soln. contg. 1×10^{-4} mol L ⁻¹ Ru(4,7-Me ₂ phen) ₃ ²⁺ , 0.25 mol L ⁻¹ LiCl and 2.6×10^{-4} mol L ⁻¹ Co(bpy) ₃ ³⁺ (OQ); $k = 5.1 \times 10^8$ in presence of 0.166 mol L ⁻¹ Na ₂ SO ₄ and 2.2×10^7 L mol ⁻¹ s ⁻¹ in 50% aqueous acetonitrile contg. 0.25 mol L ⁻¹ LiCl.	85S022
22.59.2	2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradecanecobalt(II) ion							
	$\text{Ru(4,7-Me}_2\text{phen)}_3^{3+} + \text{Co(Me}_4\text{[14]aneN}_4\text{)}^{2+} \rightarrow \text{Ru(4,7-Me}_2\text{phen)}_3^{2+} + \text{Co(Me}_4\text{[14]aneN}_4\text{)}^{3+}$	9.7×10^5	0.10		25	f.p./oq	P.b.k. in soln. contg. Ru(4,7-Me ₂ phen) ₃ ²⁺ and Co(NH ₃) ₅ Br ²⁺ (OQ).	90A221
22.59.3	1,3,6,8,10,13,16,19-Octaazabicyclo[6.6.6]eicosanecobalt(II) ion							
	$\text{Ru(4,7-Me}_2\text{phen)}_3^{3+} + \text{Co(sep)}^{2+} \rightarrow \text{Ru(4,7-Me}_2\text{phen)}_3^{2+} + \text{Co(sep)}^{3+}$	5.4×10^8	0.2		25	f.p./oq	P.b.k. at 450 nm in soln. contg. (2-5) $\times 10^{-5}$ mol L ⁻¹ Ru(5-Clphen) ₃ ²⁺ and (1-7) $\times 10^{-3}$ mol L ⁻¹ Co(sep) ³⁺ (OQ).	84A238
22.59.4	1,8-Diamino-3,6,10,13,16,19-hexaazabicyclo[6.6.6]eicosanecobalt(II) ion							
	$\text{Ru(4,7-Me}_2\text{phen)}_3^{3+} + \text{Co(diamsar)}^{2+} \rightarrow \text{Ru(4,7-Me}_2\text{phen)}_3^{2+} + \text{Co(diamsar)}^{3+}$	3.1×10^7	8.3	0.2	25	f.p./oq	P.b.k. at 450 nm in soln. contg. 0.2 mol L ⁻¹ LiCl, 0.05 mol L ⁻¹ N-ethylmorpholine, (2-5) $\times 10^{-5}$ mol L ⁻¹ Ru(5-Clphen) ₃ ²⁺ and (1-7) $\times 10^{-3}$ mol L ⁻¹ Co(diamsar) ³⁺ (OQ).	84A238
22.59.5	Copper(I) ion							
	$\text{Ru(4,7-Me}_2\text{phen)}_3^{3+} + \text{Cu}^+ \rightarrow \text{Ru(4,7-Me}_2\text{phen)}_3^{2+} + \text{Cu}^{2+}$	1.4×10^8	0.3		25	f.p./oq	P.b.k. at 450 nm in soln. contg. 10^{-5} mol L ⁻¹ Ru(4,7-Me ₂ phen) ₃ ²⁺ , 0.01-0.06 mol L ⁻¹ Cu ²⁺ (OQ) and 0.5 mol L ⁻¹ sulfuric acid.	78A090
22.59.6	Europium(II) ion							
	$\text{Ru(4,7-Me}_2\text{phen)}_3^{3+} + \text{Eu}^{2+} \rightarrow \text{Ru(4,7-Me}_2\text{phen)}_3^{2+} + \text{Eu}^{3+}$	4×10^8			25	f.p./oq	Soln. contg. Ru(4,7-Me ₂ phen) ₃ ²⁺ and Eu ³⁺ (OQ).	766404
22.59.7	Mercury(I) ion							
	$\text{Ru(4,7-Me}_2\text{phen)}_3^{3+} + \text{Hg}^+ \rightarrow \text{Ru(4,7-Me}_2\text{phen)}_3^{2+} + \text{Hg}^{2+}$	3.0×10^9	acid			f.p./oq	P.b.k. at 436 nm in deaerated soln. contg. Ru(4,7-Me ₂ phen) ₃ ²⁺ , excess Hg(NO ₃) ₂ (OQ), HNO ₃ and NaNO ₃ ; assumed $k(\text{Hg}^+ + \text{Hg}^+) = 8 \times 10^9$ L mol ⁻¹ s ⁻¹ .	84A148

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
22.59 Tris(4,7-dimethyl-1,10-phenanthroline)ruthenium(III) ion — Continued								
22.59.8 Mercury(I) dimer ion	$\text{Ru}(4,7\text{-Me}_2\text{phen})_3^{3+} + \text{Hg}_2^{2+} \rightarrow \text{Ru}(4,7\text{-Me}_2\text{phen})_3^{2+} + \text{Hg}^+$	0.20	acid			f.p./oq	P.b.k. at 436 nm in deaerated soln. contg. $\text{Ru}(4,7\text{-Me}_2\text{phen})_3^{2+}$, excess $\text{Hg}(\text{NO}_3)_2$ (OQ), HNO_3 and NaNO_3 .	84A148
22.59.9 Triethanolamine								
	$\text{Ru}(4,7\text{-Me}_2\text{phen})_3^{3+} + \text{TEOA} \rightarrow \text{Ru}(4,7\text{-Me}_2\text{phen})_3^{2+} + [\text{TEOA}]^\ddagger$	5.2×10^6		0.25	25	f.p./oq	P.b.k. at 420-450 nm in 50% aqueous acetonitrile soln. contg. 1×10^{-4} mol L ⁻¹ $\text{Ru}(4,7\text{-Me}_2\text{phen})_3^{2+}$, 0.25 mol L ⁻¹ LiCl , 2.6×10^{-4} mol L ⁻¹ TEOA and 1×10^{-4} mol L ⁻¹ $\text{Co}(\text{bpy})_3^{3+}$ (OQ).	85S022
22.60 Tris(5-methyl-1,10-phenanthroline)ruthenium(III) ion								
22.60.1 Copper(I) ion	$\text{Ru}(5\text{-Mephen})_3^{3+} + \text{Cu}^+ \rightarrow \text{Ru}(5\text{-Mephen})_3^{2+} + \text{Cu}^{2+}$	1.0×10^9	0.3		25	f.p./oq	P.b.k. at 450 nm in soln. contg. 10^{-5} mol L ⁻¹ $\text{Ru}(5\text{-Mephen})_3^{2+}$, 0.01-0.06 mol L ⁻¹ Cu^{2+} (OQ) and 0.5 mol L ⁻¹ sulfuric acid.	78A090
22.60.2 Mercury(I) ion	$\text{Ru}(5\text{-Mephen})_3^{3+} + \text{Hg}^+ \rightarrow \text{Ru}(5\text{-Mephen})_3^{2+} + \text{Hg}^{2+}$	3.1×10^9	acid			f.p./oq	P.b.k. at 436 nm in deaerated soln. contg. $\text{Ru}(5\text{-Mephen})_3^{2+}$, excess $\text{Hg}(\text{NO}_3)_2$ (OQ), HNO_3 and NaNO_3 , assumed $k(\text{Hg}^+ + \text{Hg}^+) = 8 \times 10^9$ L mol ⁻¹ s ⁻¹ .	84A148
22.60.3 Mercury(I) dimer ion	$\text{Ru}(5\text{-Mephen})_3^{3+} + \text{Hg}_2^{2+} \rightarrow \text{Ru}(5\text{-Mephen})_3^{2+} + \text{Hg}^{2+} + \text{Hg}^+$	5.7	acid			f.p./oq	P.b.k. at 436 nm in deaerated soln. contg. $\text{Ru}(5\text{-Mephen})_3^{2+}$, excess $\text{Hg}(\text{NO}_3)_2$ (OQ), HNO_3 and NaNO_3 .	84A148
22.61 Tris(5-phenyl-1,10-phenanthroline)ruthenium(III) ion								
22.61.1 Copper(I) ion	$\text{Ru}(5\text{-Phphen})_3^{3+} + \text{Cu}^+ \rightarrow \text{Ru}(5\text{-Phphen})_3^{2+} + \text{Cu}^{2+}$	1.1×10^9	0.3		25	f.p./oq	P.b.k. at 450 nm in soln. contg. 10^{-5} mol L ⁻¹ $\text{Ru}(5\text{-Phphen})_3^{2+}$, 0.01-0.06 mol L ⁻¹ Cu^{2+} (OQ) and 0.5 mol L ⁻¹ sulfuric acid.	78A090
22.62 Tris(3,4,7,8-tetramethyl-1,10-phenanthroline)ruthenium(III) ion								
22.62.1 Tris(2,2'-bipyridine)cobalt(II) ion	$\text{Ru}(3,4,7,8\text{-Me}_4\text{phen})_3^{3+} + \text{Co}(\text{bpy})_3^{2+} \rightarrow \text{Ru}(3,4,7,8\text{-Me}_4\text{phen})_3^{2+} + \text{Co}(\text{bpy})_3^{3+}$	2.0×10^7	0.25			f.p./oq	P.b.k. at 420-450 nm in 50% aqueous acetonitrile soln. contg. 1×10^{-4} mol L ⁻¹ $\text{Ru}(3,4,7,8\text{-Me}_4\text{phen})_3^{2+}$, 0.25 mol L ⁻¹ LiCl and 2.6×10^{-4} mol L ⁻¹ $\text{Co}(\text{bpy})_3^{3+}$ (OQ).	85S022
22.62.2 Copper(I) ion	$\text{Ru}(3,4,7,8\text{-Me}_4\text{phen})_3^{3+} + \text{Cu}^+ \rightarrow \text{Ru}(3,4,7,8\text{-Me}_4\text{phen})_3^{2+} + \text{Cu}^{2+}$	6.0×10^7	0.3		25	f.p./oq	P.b.k. at 450 nm in soln. contg. 10^{-5} mol L ⁻¹ $\text{Ru}(3,4,7,8\text{-Me}_4\text{phen})_3^{2+}$, 0.01-0.06 mol L ⁻¹ Cu^{2+} (OQ) and 0.5 mol L ⁻¹ sulfuric acid.	78A090
22.62.3 Dichloromercurate(I) ion	$\text{Ru}(3,4,7,8\text{-Me}_4\text{phen})_3^{3+} + \text{HgCl}_2^- \rightarrow \text{Ru}(3,4,7,8\text{-Me}_4\text{phen})_3^{2+} + \text{HgCl}_2$	$>2 \times 10^{10}$		1.0		f.p./oq	Soln. contg. $\text{Ru}(3,4,7,8\text{-Me}_4\text{phen})_3^{2+}$ and HgCl_2 (OQ).	84A077
22.63 Bis(2,2'-bipyridine)[2-(2-thiazolyl)pyridine]ruthenium(III) ion								
22.63.1 Ethylenediaminetetraacetate ions	$\text{Ru}(\text{bpy})_2(\text{pyth})^{3+} + \text{EDTA} \rightarrow \text{Ru}(\text{bpy})_2(\text{pyth})^{2+} + [\text{EDTA}_{\text{ox}}]^\ddagger$	2×10^6				f.p./oq	Soln. contg. $\text{Ru}(\text{bpy})_2(\text{pyth})^{2+}$ and MV^{2+} (OQ).	83N214

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t(\text{°C})$	Method	Comment	Ref.
22.63 Bis(2,2'-bipyridine)[2-(2-thiazolyl)pyridine]ruthenium(III) ion — Continued								
22.63.2 1,1'-Dimethyl-4,4'-bipyridinium radical cation								
	$\text{Ru(bpy)}_2(\text{pyth})^{3+} + \text{MV}^{2+} \rightarrow$ $\text{Ru(bpy)}_2(\text{pyth})^{2+} + \text{MV}^{2+}$	2.7×10^9				f.p./oq	Soln. contg. $\text{Ru(bpy)}_2(\text{pyth})^{2+}$ and MV^{2+} (OQ).	83N214
22.64 2,2'-Bipyridinebis[2-(2-thiazolyl)pyridine]ruthenium(III) ion								
22.64.1 1,1'-Dimethyl-4,4'-bipyridinium radical cation								
	$\text{Ru(bpy)}_2(\text{pyth})_2^{3+} + \text{MV}^{2+} \rightarrow$ $\text{Ru(bpy)}_2(\text{pyth})_2^{2+} + \text{MV}^{2+}$	2.7×10^9				f.p./oq	Soln. contg. $\text{Ru(bpy)}_2(\text{pyth})_2^{2+}$ and MV^{2+} (OQ).	83N214
22.65 Tris[2-(2-thiazolyl)pyridine]ruthenium(III) ion								
22.65.1 1,1'-Dimethyl-4,4'-bipyridinium radical cation								
	$\text{Ru(pyth)}_3^{3+} + \text{MV}^{2+} \rightarrow \text{Ru(pyth)}_3^{2+}$ * 1.6×10^{10} + MV^{2+}		5.0			f.p./oq	D.k. at 602 nm in Ar-satd. buffered soln. contg. 2.0×10^{-5} mol L ⁻¹ Ru(pyth)_3^{2+} and 5.0×10^{-2} mol L ⁻¹ MV^{2+} (OQ).	87E949
		* 2.7×10^9				f.p./oq	Soln. contg. Ru(pyth)_3^{2+} and MV^{2+} (OQ).	83N214
	* Unexplained discrepancy in these data.							
22.65.2 Ethylenediaminetetraacetate ions								
	$\text{Ru(pyth)}_3^{3+} + \text{EDTA} \rightarrow \text{Ru(pyth)}_3^{2+}$ * 4.0×10^8 + $[\text{EDTA}_{\text{ox}}]$		5.0			f.p./oq	P.b.k. in Ar-satd. buffered soln. contg. 2.0×10^{-5} mol L ⁻¹ Ru(pyth)_3^{2+} , $5.0 \times$ 10^{-2} mol L ⁻¹ MV^{2+} (OQ) and $5.0 \times$ 10^{-2} mol L ⁻¹ EDTA.	87E949
22.66 Tris(2,2'-bithiazole)ruthenium(III) ion								
22.66.1 Ethylenediaminetetraacetate ions								
	$\text{Ru(bth)}_3^{3+} + \text{EDTA} \rightarrow \text{Ru(bth)}_3^{2+}$ * 8.2×10^8 + $[\text{EDTA}_{\text{ox}}]$		5.0			f.p./oq	P.b.k. in Ar-satd. buffered soln. contg. 2.0×10^{-5} mol L ⁻¹ Ru(bth)_3^{2+} , $5.0 \times$ 10^{-2} mol L ⁻¹ MV^{2+} (OQ) and $5.0 \times$ 10^{-2} mol L ⁻¹ EDTA.	87E949
22.67 Tris[2-(1,2,4-thiadiazol-5-yl)pyridine]ruthenium(III) ion								
22.67.1 Ethylenediaminetetraacetate ions								
	$\text{Ru(pytda)}_3^{3+} + \text{EDTA} \rightarrow$ $\text{Ru(pytda)}_3^{2+} + [\text{EDTA}_{\text{ox}}]$	3.9×10^8	5.0			f.p./oq	P.b.k. in Ar-satd. buffered soln. contg. 2.0×10^{-5} mol L ⁻¹ Ru(pytda)_3^{2+} , $5.0 \times$ 10^{-2} mol L ⁻¹ MV^{2+} (OQ) and $5.0 \times$ 10^{-2} mol L ⁻¹ EDTA.	87E949
22.68 Hexaammineruthenium(III) ion, OH reaction product								
22.68.1 Hexaammineruthenium(III) ion, OH reaction product								
	$[\text{Ru(NH}_3)_6^{3+}/\text{OH}] +$ $[\text{Ru(NH}_3)_6^{3+}/\text{OH}] \rightarrow$	4.5×10^9		-3×10^{-3}	20	p.r.	D.k. at 400 nm in N_2O -satd. soln. contg. 5×10^{-4} mol L ⁻¹ $\text{Ru(NH}_3)_6^{3+}$; unclear whether k or $2k$.	700178
22.69 Pentaammine(chloro)ruthenium(III) ion, OH reaction product								
22.69.1 First-order reaction								
	$[\text{Ru(NH}_3)_5\text{Cl}^{2+}/\text{OH}] \rightarrow$	$2.5 \times 10^5 \text{ s}^{-1}$		-3×10^{-3}	20	p.r.	P.b.k. at 360 nm in N_2O -satd. soln. contg. 5×10^{-4} mol L ⁻¹ $\text{Ru(NH}_3)_5\text{Cl}^{2+}$.	700178

TABLE 22. Rate constants for ruthenium transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
22.70 Pentaammine(acetylenedicarboxylato)ruthenium(III), OH-adduct								
22.70.1 Pentaammine(acetylenedicarboxylato)ruthenium(III), OH-adduct								
	$(\text{NH}_3)_5\text{Ru}(\text{C}_4\text{O}_4\text{-OH}) + \text{OH}^- \rightarrow (\text{NH}_3)_5\text{Ru}(\text{C}_4\text{O}_4\text{-OH}_2)$	$\sim 2 \times 10^7$	3.5			p.r.	D.k. in N ₂ O-satd. soln. contg. (NH ₃) ₅ RuC ₄ O ₄ ; unclear whether <i>k</i> or 2 <i>k</i> .	88A030

TABLE 23. Rate constants for antimony transients

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
23.1 3,8,13,18-Tetrakis(carboxymethyl)porphine-2,7,12,17-tetrapropanoato(chloro)oxoantimony(V) radical anion								
23.1.1 1,1'-Dimethyl-4,4'-bipyridinium								
	$[\text{SbO}(\text{Cl})(\text{uroporphyrin I})]^{2+} + \text{MV}^{2+} \rightarrow 4.6 \times 10^8$ $\text{SbO}(\text{Cl})(\text{uroporphyrin I})^{2+} + \text{MV}^{+}$	9.0		f.p./rq	P.b.k. at 578 nm in deaerated soln. contg. 88N184 10 ⁻⁵ mol L ⁻¹ SbO(Cl)(uroporphyrin I) ²⁺ , 0.02 mol L ⁻¹ EDTA (RQ) and <10 ⁻³ mol L ⁻¹ MV ²⁺ .			

TABLE 24. Rate constants for tin transients

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	T	(°C)	Method	Comment	Ref.
24.1 Tin(III)								
24.1.1 Tin(III)								
	$\text{Sn(III)} + \text{Sn(III)} \rightarrow \text{Sn(II)} + \text{Sn(IV)}$	1.9×10^6	0			f.p.	D.k. at 280 nm in soln. contg. 1 mol L^{-1} HCl and Sn(II) and Sn(IV). In soln. contg. only Sn(II) or Sn(IV), $k = 2.5 \times 10^9$ and $1.2 \times 10^9 \text{ L mol}^{-1} \text{s}^{-1}$, respectively.	86A208
24.1.2 Oxygen								
	$\text{Sn(III)} + \text{O}_2 + \text{H}^+ \rightarrow \text{Sn(IV)} + \text{HO}_2^\cdot$	1.7×10^8	0			f.p.	D.k. at 280 nm in soln. contg. 1 mol L^{-1} HCl, 5.0×10^{-4} mol L^{-1} Sn(IV) and 8.83×10^{-5} , 1.6×10^{-4} , 2.84×10^{-4} or 1.38×10^{-3} mol L^{-1} oxygen.	86A208 89B054
24.2 Dichloro[5,10,15,20-tetrakis(4-sulfonatophenyl)porphinatostannate(IV) radical anion]								
24.2.1 First-order reaction								
	$[\text{SnTPPSCl}_2]^{5-} \rightarrow$	$6.2 \times 10^4 \text{ s}^{-1}$	7			f.p./rq	D.k. in N_2 -satd. soln. contg. SnTPPSCl_2^{4-} and $4\text{-HOC}_6\text{H}_4\text{NH}_2$ (RQ). Reaction suggested to represent protonation followed by disproportionation to form a Sn(IV) chlorin.	90A022
24.2.2 Oxygen								
	$[\text{SnTPPSCl}_2]^{5-} + \text{O}_2 \rightarrow \text{SnTPPSCl}_2^{4-} + \text{O}_2^\cdot$	2.6×10^8	7			f.p./rq	D.k. in N_2 -satd. soln. contg. SnTPPSCl_2^{4-} and $4\text{-HOC}_6\text{H}_4\text{NH}_2$ (RQ) and varied $[\text{O}_2]$.	90A022
24.3 5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatotin(IV) radical anion								
24.3.1 5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatotin(IV) radical anion								
	$[\text{SnTMyP}]^{5+} + [\text{SnTMyP}]^{5+} + \text{H}^+ \rightarrow \text{SnTMyP}^{6+} + \text{SnTMyPH}^{5+}$	1.5×10^5	2.9			p.r.	D.k.	84A121

TABLE 25. Rate constants for thallium transients

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
25.1 Thallium(0)								
25.1.1 Silver(I) ion	$Tl^0 + Ag^+ \rightarrow AgTl^+$	1.7×10^9				p.r.	D.k. at 400 nm in soln. contg. 0.1 mol L ⁻¹ 2-PrOH and 8×10^{-5} mol L ⁻¹ Tl ⁺ .	80A123
25.1.2 Carbon dioxide	$Tl^0 + CO_2 \rightarrow Tl^+ + CO_2^{+-}$	3×10^7		3.7	25	p.r.	Calcd. from rate of approach to equilibrium in soln. contg. 0.01–0.04 mol L ⁻¹ Tl ⁺ ; $k_t = 3 \times 10^6$ L mol ⁻¹ s ⁻¹ .	89C001
25.1.3 Cadmium(II) ion	$Tl^0 + Cd^{2+} \rightarrow$	3.6×10^8				p.r.	D.k. at 400 nm in soln. contg. 0.1 mol L ⁻¹ 2-PrOH and 8×10^{-5} mol L ⁻¹ Tl ⁺ .	80A123
25.1.4 Chromium(III) ion	$Tl^0 + Cr^{3+} \rightarrow$	6.0×10^8				p.r.	D.k. at 400 nm in soln. contg. 0.1 mol L ⁻¹ 2-PrOH and 8×10^{-5} mol L ⁻¹ Tl ⁺ .	80A123
25.1.5 Copper(II) ion	$Tl^0 + Cu^{2+} \rightarrow$	3.5×10^9				p.r.	D.k. at 400 nm in soln. contg. 0.1 mol L ⁻¹ 2-PrOH and 8×10^{-5} mol L ⁻¹ Tl ⁺ .	80A123
25.1.6 Ferricyanide ion	$Tl^0 + Fe(CN)_6^{3-} \rightarrow$	3.7×10^9				p.r.	D.k. at 400 nm in soln. contg. 0.1 mol L ⁻¹ 2-PrOH and 8×10^{-5} mol L ⁻¹ Tl ⁺ .	80A123
25.1.7 Nitrous oxide	$Tl^0 + N_2O \rightarrow$	5×10^6		25		p.r.	D.k. in N ₂ O-satd. soln.; reaction suggested to produce ·OH.	84C015
25.1.8 Nickel(II) ion	$Tl^0 + Ni^{2+} \rightarrow$	$<1 \times 10^7$				p.r.	D.k. at 400 nm in soln. contg. 0.1 mol L ⁻¹ 2-PrOH and 8×10^{-5} mol L ⁻¹ Tl ⁺ .	80A123
25.1.9 Hydrogen peroxide	$Tl^0 + H_2O_2 \rightarrow Tl^+ + \cdot OH + OH^-$	3.7×10^9				p.r.	D.k. at 400 nm in soln. contg. 0.1 mol L ⁻¹ 2-PrOH and 8×10^{-5} mol L ⁻¹ Tl ⁺ .	80A123
25.1.10 Oxygen	$Tl^0 + O_2 \rightarrow Tl^+ + O_2^{+-}$	3.5×10^9				p.r.	D.k. at 400 nm in soln. contg. 0.1 mol L ⁻¹ 2-PrOH and 8×10^{-5} mol L ⁻¹ Tl ⁺ .	80A123
25.1.11 Lead(II) ions	$Tl^0 + Pb^{2+} \rightarrow$	2.3×10^9				p.r.	D.k. at 400 nm in soln. contg. 0.1 mol L ⁻¹ 2-PrOH and 8×10^{-5} mol L ⁻¹ Tl ⁺ .	80A123
25.1.12 Tris(2,2'-bipyridine)ruthenium(II) ion	$Tl^0 + Ru(bpy)_3^{2+} \rightarrow Tl^+ + Ru(bpy)_3^+$	1.0×10^{10}	7		25	p.r.	P.b.k. at 505 nm in Ar-satd. soln. contg. 0.5 mol L ⁻¹ 2-PrOH, 5×10^{-5} mol L ⁻¹ Ru(bpy) ₃ ²⁺ and varied [Tl ⁺].	89C001
25.1.13 Samarium(II) ion	$Tl^0 + Sm^{2+} \rightarrow$	$<2 \times 10^7$				p.r.	D.k. at 400 nm in soln. contg. 0.1 mol L ⁻¹ 2-PrOH and 8×10^{-5} mol L ⁻¹ Tl ⁺ .	80A123
25.1.14 Thallium(I) ion	$Tl^0 + Tl^+ \rightarrow Tl_2^+$	1.4×10^9	7		25	p.r.	Calcd. from $k_{obs} = 1.7 \times 10^7$ s ⁻¹ for increase in absorption at 420 nm in soln. contg. 0.5 mol L ⁻¹ 2-PrOH and 10^{-4} – 10^{-2} mol L ⁻¹ TlClO ₄ ; $k_t = 1 \times 10^7$ s ⁻¹ .	89C001
25.1.15 Acetaldehyde	$Tl^0 + CH_3CHO \rightarrow Tl^+ + CH_3\dot{C}HO^-$	1.0×10^9			25	p.r.	Calcd. from rate of approach to equilibrium in soln. contg. acetaldehyde and Tl ⁺ ; $k_t = 4.7 \times 10^8$ L mol ⁻¹ s ⁻¹ .	89C001

TABLE 25. Rate constants for thallium transients. — Continued

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	t ($^\circ\text{C}$)	Method	Comment	Ref.
25.1 Thallium(0) — Continue								
25.1.16	Acetone	$\text{Ti}^0 + \text{CH}_3\text{COCH}_3 \rightarrow \text{Ti}^+ + (\text{CH}_3)_2\dot{\text{C}}\text{O}^-$	1.6×10^7	11.3, 12	25	p.r.	Calcd. from rate of approach to equilibrium in soln. contg. acetone, Ti^+ and 0.002 or 0.01 mol L^{-1} OH^- ; $k_t = 7.1 \times 10^9 \text{ L mol}^{-1} \text{ s}^{-1}$.	89C001
25.1.17	1,4-Benzoquinone	$\text{Ti}^0 + \text{Q} \rightarrow \text{Ti}^+ + \text{Q}^+$	2.8×10^9	7.0	25	p.r.	P.b.k. in soln. contg. 5×10^{-5} mol L^{-1} benzoquinone, 1 mol L^{-1} <i>tert</i> -BuOH and 5×10^{-3} mol L^{-1} Ti_2SO_4 ; 42% Ti^0 .	751032
25.1.18	Formaldehyde	$\text{Ti}^0 + \text{HCHO} \rightarrow \text{Ti}^+ + \cdot\text{CH}_2\text{O}^-$	6×10^6		25	p.r.	Calcd. from rate of approach to equilibrium in soln. contg. formaldehyde and Ti^+ ; $k_t = 1.5 \times 10^4 \text{ L mol}^{-1} \text{ s}^{-1}$.	89C001
25.2 Thallium(I) ion, complex with $\text{Ti}(0)$								
25.2.1	Thallium(I) ion, complex with $\text{Ti}(0)$	$\text{Ti}_2^+ + \text{Ti}_2^+ \rightarrow \text{Ti}_4^{2+}$	8×10^8	12.7		p.r.	D.k. at 420 nm in Ar-satd. soln. contg. 0.2 mol L^{-1} 2-PrOH, 0.01 mol L^{-1} acetone and 0.05 mol L^{-1} TiClO_4 .	93A299
			1.5×10^9	13		p.r.	D.k. at 420 nm and p.b.k. at 300 nm in soln. contg. 0.1 mol L^{-1} EtOH or 2-PrOH and 0.02 mol L^{-1} TiClO_4 .	80A123
25.2.2	Silver(I) ion	$\text{Ti}_2^+ + \text{Ag}^+ \rightarrow \text{Ti}^+ + \text{AgTi}^+$	1.3×10^9			p.r.	D.k. at 420 nm in soln. contg. 0.1 mol L^{-1} 2-PrOH and TiClO_4 .	80A123
25.2.3	Cadmium(II) ion	$\text{Ti}_2^+ + \text{Cd}^{2+} \rightarrow$	1.2×10^8			p.r.	D.k. at 420 nm in soln. contg. 0.1 mol L^{-1} 2-PrOH and TiClO_4 .	80A123
25.2.4	Chromium(III) ion	$\text{Ti}_2^+ + \text{Cr}^{3+} \rightarrow$	2.5×10^8			p.r.	D.k. at 420 nm in soln. contg. 0.1 mol L^{-1} 2-PrOH and TiClO_4 .	80A123
25.2.5	Copper(II) ion	$\text{Ti}_2^+ + \text{Cu}^{2+} \rightarrow$	3.1×10^9			p.r.	D.k. at 420 nm in soln. contg. 0.1 mol L^{-1} 2-PrOH and TiClO_4 .	80A123
25.2.6	Ferricyanide ion	$\text{Ti}_2^+ + \text{Fe}(\text{CN})_6^{3-} \rightarrow$	3.0×10^9			p.r.	D.k. at 420 nm in soln. contg. 0.1 mol L^{-1} 2-PrOH and TiClO_4 .	80A123
25.2.7	Nitrous oxide	$\text{Ti}_2^+ + \text{N}_2\text{O} \rightarrow$	1.4×10^7		25	p.r.	γ -radiolysis studies indicate that N_2 is one of the products of this reaction.	720844
25.2.8	Nickel(II) ion	$\text{Ti}_2^+ + \text{Ni}^{2+} \rightarrow$	$<1 \times 10^5$			p.r.	D.k. at 420 nm in soln. contg. 0.1 mol L^{-1} 2-PrOH and TiClO_4 .	80A123
25.2.9	Hydrogen peroxide	$\text{Ti}_2^+ + \text{H}_2\text{O}_2 \rightarrow 2 \text{Ti}^+ + \cdot\text{OH} + \text{OH}^-$	3.0×10^9			p.r.	D.k. at 420 nm in soln. contg. 0.1 mol L^{-1} 2-PrOH and TiClO_4 .	80A123
25.2.10	Oxygen	$\text{Ti}_2^+ + \text{O}_2 \rightarrow 2 \text{Ti}^+ + \text{O}_2^{\cdot-}$	3.0×10^9			p.r.	D.k. at 420 nm in soln. contg. 0.1 mol L^{-1} 2-PrOH and TiClO_4 .	80A123
25.2.11	Lead(II) ions	$\text{Ti}_2^+ + \text{Pb}^{2+} \rightarrow$	1.5×10^9			p.r.	D.k. at 420 nm in soln. contg. 0.1 mol L^{-1} 2-PrOH and TiClO_4 .	80A123

TABLE 25. Rate constants for thallium transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
25.2 Thallium(I) ion, complex with Tl(0) — Continued								
25.2.12 Tris(2,2'-bipyridine)ruthenium(II) ion								
	$Tl_2^+ + Ru(bpy)_3^{2+} \rightarrow 2 Tl^+ + Ru(bpy)_3^+$	5.2×10^9		12.7		p.r.	P.b.k. at 510 nm in Ar-satd. soln. contg. 0.05 mol L ⁻¹ TlClO ₄ , 0.2 mol L ⁻¹ 2-PrOH, 0.01 mol L ⁻¹ acetone and 2.2 × 10 ⁻⁵ mol L ⁻¹ Ru(bpy) ₃ (ClO ₄) ₂ .	93A299
		5×10^9	7	25		p.r.	P.b.k. at 505 nm in Ar-satd. soln. contg. 0.5 mol L ⁻¹ 2-PrOH, 5 × 10 ⁻⁵ mol L ⁻¹ Ru(bpy) ₃ ²⁺ and varied [Tl ⁺].	89C001
25.2.13 Samarium(II) ion								
	$Tl_2^+ + Sm^{2+} \rightarrow$	$<6 \times 10^6$				p.r.	D.k. at 420 nm in soln. contg. 0.1 mol L ⁻¹ 2-PrOH and TlClO ₄ .	80A123
25.2.14 1,4-Dicyanobenzene								
	$Tl_2^+ + DCNB \rightarrow 2 Tl^+ + [DCNB]^-$	2.7×10^9		-7		p.r.	D.k. at 490 nm in deaerated soln. contg. 10 ⁻⁴ mol L ⁻¹ DCNB and 10 ⁻² mol L ⁻¹ Tl ₂ SO ₄ .	730121
25.2.15 Hydroxymethyl								
	$Tl_2^+ + CH_2OH + H^+ \rightarrow 2 Tl^+ + MeOH$	4.0×10^9		6		p.r.	Calcd. from d.k. at 420 nm. and condy. change in soln. contg. MeOH and Tl ⁺ assuming values for 2k(Tl ₂ ⁺ + Tl ₂ ⁺), k(Tl ₂ ⁺ + H ₂ O ₂) and 2k(R + R).	80A123
25.2.16 1-Hydroxyethyl								
	$Tl_2^+ + CH_3CHOH + H^+ \rightarrow 2 Tl^+ + EtOH$	3.0×10^9		6		p.r.	Calcd. from d.k. at 420 nm. and condy. change in soln. contg. EtOH and Tl ⁺ assuming values for 2k(Tl ₂ ⁺ + Tl ₂ ⁺), k(Tl ₂ ⁺ + H ₂ O ₂) and 2k(R + R).	80A123
25.2.17 1-Hydroxy-1-methylethyl								
	$Tl_2^+ + (CH_3)_2COH + H^+ \rightarrow 2 Tl^+ + 2-PrOH$	3.0×10^9		6		p.r.	Calcd. from d.k. at 420 nm. and condy. change in soln. contg. 2-PrOH and Tl ⁺ assuming values for 2k(Tl ₂ ⁺ + Tl ₂ ⁺), k(Tl ₂ ⁺ + H ₂ O ₂) and 2k(R + R).	80A123
25.3 Thallium(0), complex with thallium(I) ion, dimer								
25.3.1 Thallium(0), complex with thallium(I) ion, dimer								
	$Tl_4^{2+} + Tl_4^{2+} \rightarrow$	1.8×10^6		13		p.r.	Estd from dose effect on abs. at 300 nm in soln. contg. 0.02 mol L ⁻¹ TlClO ₄ and 0.1 mol L ⁻¹ EtOH or 2-PrOH. Unclear whether <i>k</i> or 2 <i>k</i> .	80A123
25.3.2 Tris(2,2'-bipyridine)ruthenium(II) ion, electron adduct								
	$Tl_4^{2+} + Ru(bpy)_3^+ \rightarrow Tl_4^+ + Ru(bpy)_3^{2+}$	6×10^8		12.7		p.r.	D.k. at 510 nm in Ar-satd. soln. contg. 0.05 mol L ⁻¹ TlClO ₄ , 0.2 mol L ⁻¹ 2-PrOH, 0.01 mol L ⁻¹ acetone and 2.2 × 10 ⁻⁵ mol L ⁻¹ Ru(bpy) ₃ (ClO ₄) ₂ ; value obtained from computer fit.	93A299
25.4 Thallium(II) ion								
25.4.1 Chloride ion								
	$Tl^{2+} + Cl^- \rightarrow TlCl^+$	9×10^9	0	1	23	p.r.	D.k. at 290 nm in soln. contg. 3.0 × 10 ⁻³ mol L ⁻¹ Tl ³⁺ , 3.0 × 10 ⁻³ mol L ⁻¹ HCl and 1 mol L ⁻¹ HClO ₄ ; <i>k</i> _f = 1.4 × 10 ⁵ s ⁻¹ .	741038
25.4.2 Cobalt(II) ion								
	$Tl^{2+} + Co^{2+} \rightarrow Tl^+ + Co^{3+}$	6.2×10^3	0.6	0.75	25	f.p.	D.k. at 270 nm in soln. contg. 10 ⁻³ mol L ⁻¹ Tl ³⁺ , 0.25 mol L ⁻¹ HClO ₄ and 0.02-0.2 mol L ⁻¹ Co ²⁺ ; <i>k</i> _f = 3.1 × 10 ⁻³ L mol ⁻¹ s ⁻¹ .	747625

TABLE 25. Rate constants for thallium transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
25.4 Thallium(II) ion — Continued								
25.4.3 Cobalt(III) ion								
	$Tl^{2+} + Co^{3+} \rightarrow Tl^{3+} + Co^{2+}$	9.5×10^6	0.3	0.55	22	f.p.	D.k. at 303 nm in soln. contg. 10^{-3} mol L ⁻¹ Tl^{3+} and 0.5 mol L ⁻¹ H^+ .	757093
25.4.4 Iron(II) ion								
	$Tl^{2+} + Fe^{2+} \rightarrow Tl^+ + Fe^{3+}$	2.6×10^6	0.6	0.30	25	f.p.	D.k. at 303 nm in soln. contg. 10^{-3} mol L ⁻¹ Tl^{3+} and 0.25 mol L ⁻¹ H^+ ; studied at 14.7–39.6 °C.; $E_a = 4.8$ kJ mol ⁻¹ .	757093
		6.7×10^6	0	1	23	p.r.	D.k. at 290 nm in soln. contg. 10^{-3} mol L ⁻¹ Tl^+ , 10^{-2} mol L ⁻¹ Tl^{3+} , 1 mol L ⁻¹ $HClO_4$ and $(1-2) \times 10^{-3}$ mol L ⁻¹ Fe^{2+} .	741017
25.4.5 Iron(II) tris(1,10-phenanthroline-5,6-dione)								
	$Tl^{2+} + Fe[1,10-PD]_3^{2+} \rightarrow$	4.0×10^8		3.2		p.r.	P.b.k. at 600 nm in N_2O -satd. soln. contg. Tl_2SO_4 , $FeSO_4$ and 1,10-phenanthroline-5,6-dione.	93A292
25.4.6 Iron(III) ion								
	$Tl^{2+} + Fe^{3+} \rightarrow Tl^{3+} + Fe^{2+}$	1.1×10^6	0.6	0.30	25	f.p.	D.k. at 270 nm in soln. contg. 10^{-2} mol L ⁻¹ Tl^+ , 2×10^{-3} mol L ⁻¹ Tl^{3+} and 0.25 mol L ⁻¹ $HClO_4$.	747625
25.4.7 Perhydroxyl								
	$Tl^{2+} + HO_2 \rightarrow Tl^+ + H^+ + O_2$	2.5×10^9	1			p.r.	D.k. in aerated soln. contg. 10^{-3} mol L ⁻¹ Tl^+ . Estimated from initial decay of Tl^{2+} .	660097
25.4.8 Hydrogen peroxide								
	$Tl^{2+} + H_2O_2 \rightarrow Tl^+ + HO_2^{\cdot} + H^+$	2.8×10^7	1			p.r.	D.k. in aerated soln. contg. 10^{-3} mol L ⁻¹ Tl^+ and 8.9×10^{-4} mol L ⁻¹ H_2O_2 . Evidence for products from H_2O_2 and H_2 yields in γ -r.-irradiated Tl^+ solutions. [710036].	660097
25.4.9 Manganese(II) ion								
	$Tl^{2+} + Mn^{2+} \rightarrow Tl^+ + Mn^{3+}$	1.9×10^4	0.3	0.75	22	f.p.	D.k. at 303 nm in soln. contg. 10^{-3} mol L ⁻¹ Tl^{3+} and 0.5 mol L ⁻¹ H^+ .	757093
25.4.10 Thallium(II) ion								
	$Tl^{2+} + Tl^{2+} \rightarrow Tl^{3+} + Tl^+$	1.9×10^8	0	1	23	p.r.	D.k. at 280 nm in soln. contg. 10^{-2} mol L ⁻¹ Tl^{3+} , 10^{-3} mol L ⁻¹ Tl^+ and 1 mol L ⁻¹ $HClO_4$.	741017
		1.8×10^8	1	0.25	25	f.p.	D.k. at 270 nm in soln. contg. 10^{-3} mol L ⁻¹ Tl^{3+} , 10^{-3} mol L ⁻¹ Tl^+ and 0.25 mol L ⁻¹ $HClO_4$; studied at 15–45 °C., $E_a = 7.9$ kJ mol ⁻¹ ; recalcd. from the original data using $\epsilon_{270} = 3800$ L mol ⁻¹ cm ⁻¹ [741017].	747625
		1.9×10^8	0.6	0.25				
		3.2×10^8	0.6	0.50				
		4.5×10^8	0.6	1.0				
		4.1×10^8	0.3	1.0				
		4.5×10^8	0	1.0				
25.4.11 5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatozinc(II) ion								
	$Tl^{2+} + ZnTMyP^{4+} \rightarrow Tl^+ + [ZnTMyP]^5+$	4.3×10^8	3.3	0.004		p.r.	P.b.k. at 690–700 nm in N_2O -satd. buffered soln. contg. Tl_2SO_4 and $(1-4) \times 10^{-4}$ mol L ⁻¹ porphyrin.	85A038
25.4.12 6-Aminophenalenone								
	$Tl^{2+} + 6-NH_2PHO \rightarrow Tl^+ + [6-NH_2PHO]^{+}$	6.0×10^9				p.r.	P.b.k. at 420 nm in N_2O -satd. soln. contg. 0.005 mol L ⁻¹ Tl_2SO_4 .	93A404
25.4.13 Anisole								
	$Tl^{2+} + C_6H_5OCH_3 \rightarrow Tl^+ + [C_6H_5OCH_3]^{+}$	5.0×10^8	4		20	p.r.	P.b.k. and d.k. in N_2O -satd. soln. contg. 10^{-3} mol L ⁻¹ Tl_2SO_4 and 10^{-4} mol L ⁻¹ anisole.	751171

TABLE 25. Rate constants for thallium transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
25.4 Thallium(II) ion — Continued								
25.4.14	Chlorpromazine, conjugate acid							
	Tl ²⁺ + CZH ⁺ → Tl ⁺ + [CZH] ²⁺	1.5 × 10 ⁹		2.0		p.r.	P.b.k. at 505 nm in N ₂ O-satd. soln. contg. 0.003 mol L ⁻¹ Tl ₂ SO ₄ ; overall rate constant, 86% electron transfer.	83A272
25.4.15 Diethyl disulfide								
	Tl ²⁺ + C ₂ H ₅ SSC ₂ H ₅ → Tl ⁺ + [C ₂ H ₅ SSC ₂ H ₅] ⁺	1.4 × 10 ⁹		3.5		p.r.	D.K. at 260 nm and p.b.k. in N ₂ O-satd. soln. contg. 2 × 10 ⁻³ mol L ⁻¹ Tl ⁺ and various lower concn. of disulfide.	76I143
25.4.16	Diethyl sulfoxide							
	Tl ²⁺ + (C ₂ H ₅) ₂ SO → Tl ⁺ + [(C ₂ H ₅) ₂ SO] ⁺	1.4 × 10 ⁷		3.2		p.r.	D.k. in N ₂ O-satd. soln. contg. 5 × 10 ⁻³ mol L ⁻¹ Tl ⁺ .	89A465
25.4.17	3,5-Diodotyrosine							
	Tl ²⁺ + 3,5-I ₂ TyrOH →	1.0 × 10 ⁹		2		p.r.	P.b.k. at 350 nm in soln. contg. 0.005 mol L ⁻¹ Tl ⁺ . Reaction occurs by split path forming phenoxy type radical and radical cation.	94A179
25.4.18	1,2-Dimethoxybenzene							
	Tl ²⁺ + 1,2-C ₆ H ₄ (OCH ₃) ₂ → Tl ⁺ + [1,2-C ₆ H ₄ (OCH ₃) ₂] ⁺	6.0 × 10 ⁸		4	20	p.r.	P.b.k. and d.k. in N ₂ O-satd. soln. contg. 10 ⁻³ mol L ⁻¹ Tl ₂ SO ₄ and 10 ⁻⁴ mol L ⁻¹ dimethoxybenzene.	75I171
25.4.19	1,3-Dimethoxybenzene							
	Tl ²⁺ + 1,3-C ₆ H ₄ (OCH ₃) ₂ → Tl ⁺ + [1,3-C ₆ H ₄ (OCH ₃) ₂] ⁺	8.0 × 10 ⁸		4	20	p.r.	P.b.k. and d.k. in N ₂ O-satd. soln. contg. 10 ⁻³ mol L ⁻¹ Tl ₂ SO ₄ and 10 ⁻⁴ mol L ⁻¹ dimethoxybenzene.	75I171
25.4.20	1,4-Dimethoxybenzene							
	Tl ²⁺ + 1,4-C ₆ H ₄ (OCH ₃) ₂ → Tl ⁺ + [1,4-C ₆ H ₄ (OCH ₃) ₂] ⁺	6.5 × 10 ⁸		4	20	p.r.	P.b.k. and d.k. in N ₂ O-satd. soln. contg. 10 ⁻³ mol L ⁻¹ Tl ₂ SO ₄ and 10 ⁻⁴ mol L ⁻¹ dimethoxybenzene.	75I171
		5.2 × 10 ⁸		4	22	p.r.	P.b.k. at 430-460 nm in N ₂ O-satd. soln. contg. 10 ⁻³ mol L ⁻¹ Tl ₂ SO ₄ .	87A041
25.4.21	1,4-Dimethoxybenzene radical cation							
	Tl ²⁺ + [1,4-C ₆ H ₄ (OCH ₃) ₂] ⁺ → Tl ³⁺ + 1,4-C ₆ H ₄ (OCH ₃) ₂	6.0 × 10 ⁹		4	22	p.r.	Dtd. from dependence of [1,4-C ₆ H ₄ (OCH ₃) ₂] ⁺ on pulse intensity in N ₂ O-satd. soln. contg. 10 ⁻³ mol L ⁻¹ Tl ₂ SO ₄ .	87A041
25.4.22	2,3-Dimethoxybenzoic acid							
	Tl ²⁺ + 2,3-(CH ₃ O) ₂ C ₆ H ₃ CO ₂ H → Tl ⁺ + H ⁺ + [2,3-(CH ₃ O) ₂ C ₆ H ₃ CO ₂] ⁺	2.1 × 10 ⁹		-3	20	p.r.	P.b.k. and d.k. in N ₂ O-satd. soln. contg. 1 × 10 ⁻³ mol L ⁻¹ Tl ₂ SO ₄ .	77I006
25.4.23	3,4-Dimethoxybenzoic acid							
	Tl ²⁺ + 3,4-(CH ₃ O) ₂ C ₆ H ₃ CO ₂ H → Tl ⁺ + H ⁺ + [3,4-(CH ₃ O) ₂ C ₆ H ₃ CO ₂] ⁺	1.7 × 10 ⁹		-3	20	p.r.	P.b.k. and d.k. in N ₂ O-satd. soln. contg. 1 × 10 ⁻³ mol L ⁻¹ Tl ₂ SO ₄ .	77I006
25.4.24	2,4-Dimethoxybenzoic acid							
	Tl ²⁺ + 2,4-(CH ₃ O) ₂ C ₆ H ₃ CO ₂ H → Tl ⁺ + H ⁺ + [2,4-(CH ₃ O) ₂ C ₆ H ₃ CO ₂] ⁺	9.1 × 10 ⁸		-3	20	p.r.	P.b.k. and d.k. in N ₂ O-satd. soln. contg. 1 × 10 ⁻³ mol L ⁻¹ Tl ₂ SO ₄ .	77I006
25.4.25	2,6-Dimethoxybenzoic acid							
	Tl ²⁺ + 2,6-(CH ₃ O) ₂ C ₆ H ₃ CO ₂ H → Tl ⁺ + H ⁺ + [2,6-(CH ₃ O) ₂ C ₆ H ₃ CO ₂] ⁺	1.8 × 10 ⁹		-3	20	p.r.	P.b.k. and d.k. in N ₂ O-satd. soln. contg. 1 × 10 ⁻³ mol L ⁻¹ Tl ₂ SO ₄ .	77I006
25.4.26	3,5-Dimethoxybenzoic acid							
	Tl ²⁺ + 3,5-(CH ₃ O) ₂ C ₆ H ₃ CO ₂ H → Tl ⁺ + H ⁺ + [3,5-(CH ₃ O) ₂ C ₆ H ₃ CO ₂] ⁺	2.4 × 10 ⁹		-3	20	p.r.	P.b.k. and d.k. in N ₂ O-satd. soln. contg. 1 × 10 ⁻³ mol L ⁻¹ Tl ₂ SO ₄ .	77I006

TABLE 25. Rate constants for thallium transients — Continued

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t^\circ\text{C}$	Method	Comment	Ref.
25.4 Thallium(II) ion — Continued								
25.4.27 Dimethyl disulfide								
	$\text{Ti}^{2+} + \text{CH}_3\text{SSCH}_3 \rightarrow \text{Ti}^+ + [\text{CH}_3\text{SSCH}_3]^{+}$	2.3×10^9	3.5			p.r.	D.k. at 260 nm and p.b.k. in N_2O -satd. soln. contg. 2×10^{-3} mol L^{-1} Ti^+ and various lower concn. of disulfide.	761143
25.4.28 Dimethyl sulfoxide								
	$\text{Ti}^{2+} + \text{DMSO} \rightarrow \text{Ti}^+ + [\text{DMSO}]^{+}$	1.1×10^7	3.2			p.r.	D.k. in N_2O -satd. soln. contg. 5×10^{-3} mol L^{-1} Ti^+ .	89A465
25.4.29 Dimethyl 3,3'-thiodipropionate								
	$\text{Ti}^{2+} + 2 \text{S}(\text{CH}_2\text{CH}_2\text{CO}_2\text{CH}_3)_2 \rightarrow \text{Ti}^+ + [\text{CH}_3\text{O}_2\text{CCH}_2\text{CH}_2\text{S}]^{+}$	1.7×10^9	1.5	23		p.r.	P.b.k. at 510 nm in O_2 -satd. soln. contg. 0.01 mol L^{-1} Ti^+ and $(0.4\text{--}1.1) \times 10^{-3}$ mol L^{-1} dimethyl 3,3'-thiodipropionate.	92A059
25.4.30 Diphenyl selenide								
	$\text{Ti}^{2+} + (\text{C}_6\text{H}_5)_2\text{Se} \rightarrow \text{Ti}^+ + [\text{(C}_6\text{H}_5)_2\text{Se}]^{+}$	2.6×10^9				p.r.	P.b.k. at 750 nm in N_2O -satd. soln. contg. Ti_2SO_4 .	94A098
25.4.31 Diphenyl sulfide								
	$\text{Ti}^{2+} + (\text{C}_6\text{H}_5)_2\text{S} \rightarrow \text{Ti}^+ + [(\text{C}_6\text{H}_5)_2\text{S}]^{+}$	3×10^9				p.r.	P.b.k. at 750 nm in N_2O -satd. soln. contg. Ti_2SO_4 .	94A098
25.4.32 Diphenyl telluride								
	$\text{Ti}^{2+} + (\text{C}_6\text{H}_5)_2\text{Te} \rightarrow \text{Ti}^+ + [(\text{C}_6\text{H}_5)_2\text{Te}]^{+}$	3.2×10^9				p.r.	P.b.k. at 580 nm in N_2O -satd. soln. contg. Ti_2SO_4 .	94A098
25.4.33 Dipropyl sulfoxide								
	$\text{Ti}^{2+} + (\text{CH}_3\text{CH}_2\text{CH}_2)_2\text{SO} \rightarrow \text{Ti}^+ + [(\text{CH}_3\text{CH}_2\text{CH}_2)_2\text{SO}]^{+}$	2.2×10^7	3.2			p.r.	D.k. in N_2O -satd. soln. contg. 5×10^{-3} mol L^{-1} Ti^+ .	89A465
25.4.34 Ethanol								
	$\text{Ti}^{2+} + \text{EtOH} \rightarrow \text{Ti}^+ + \text{H}^+ + \text{CH}_3\text{CHOH}$	8.8×10^3	0.43	23	γ -r.		Calculated from the γ -ray induced chain reaction in Ti^{2+} + ethanol solutions, taking $k(\text{Ti}^{2+} + \text{Ti}^{2+}) = 1.9 \times 10^8 \text{ L mol}^{-1} \text{ s}^{-1}$ [741017].	700336
25.4.35 Methanol								
	$\text{Ti}^{2+} + \text{MeOH} \rightarrow \text{Ti}^+ + \text{H}^+ + \text{CH}_2\text{OH}$	6.9×10^3	0.43	23	γ -r.		Calculated from the γ -ray induced chain reaction in Ti^{2+} + methanol solutions, taking $k(\text{Ti}^{2+} + \text{Ti}^{2+}) = 1.9 \times 10^8 \text{ L mol}^{-1} \text{ s}^{-1}$ [741017].	700336
25.4.36 Methionine								
	$\text{Ti}^{2+} + \text{Met} \rightarrow \text{Ti}^+ + [\text{Met}]^{+}$	2.5×10^9	3.35			p.r.	D.k. at 260 nm and p.b.k. at 290 nm in N_2O -satd. soln. contg. 2×10^{-3} mol L^{-1} Ti^+ and 2×10^{-5} mol L^{-1} methionine.	81A340
25.4.37 2-Methoxybenzoic acid								
	$\text{Ti}^{2+} + 2\text{-CH}_3\text{OC}_6\text{H}_4\text{CO}_2\text{H} \rightarrow \text{Ti}^+ + \text{H}^+ + [2\text{-CH}_3\text{OC}_6\text{H}_4\text{CO}_2]^{+}$	1.2×10^9	-3	20	p.r.		P.b.k. and d.k. in N_2O -satd. soln. contg. 1×10^{-3} mol L^{-1} Ti_2SO_4 .	771006
25.4.38 3-Methoxybenzoic acid								
	$\text{Ti}^{2+} + 3\text{-CH}_3\text{OC}_6\text{H}_4\text{CO}_2\text{H} \rightarrow \text{Ti}^+ + \text{H}^+ + [3\text{-CH}_3\text{OC}_6\text{H}_4\text{CO}_2]^{+}$	1.6×10^9	-3	20	p.r.		P.b.k. and d.k. in N_2O -satd. soln. contg. 1×10^{-3} mol L^{-1} Ti_2SO_4 .	771006
25.4.39 4-Methoxybenzoic acid								
	$\text{Ti}^{2+} + 4\text{-CH}_3\text{OC}_6\text{H}_4\text{CO}_2\text{H} \rightarrow \text{Ti}^+ + \text{H}^+ + [4\text{-CH}_3\text{OC}_6\text{H}_4\text{CO}_2]^{+}$	5.3×10^8	-3	20	p.r.		P.b.k. and d.k. in N_2O -satd. soln. contg. 1×10^{-3} mol L^{-1} Ti_2SO_4 .	771006
25.4.40 Methylene Blue cation								
	$\text{Ti}^{2+} + \text{MB}^+ + \text{H}^+ \rightarrow \text{Ti}^+ + [\text{MBH}]^{3+}$	2.4×10^9	1.7			p.r.	P.b.k. at 525 nm in O_2 -satd. soln. contg. 10^{-4} mol L^{-1} methylene blue and 2×10^{-3} mol L^{-1} Ti^{2+} .	89A375

TABLE 25. Rate constants for thallium transients — Continued

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t^\circ\text{C}$	Method	Comment	Ref.
25.4 Thallium(II) ion — Continued								
25.4.41 Neutral Red cation								
	$\text{Ti}^{2+} + \text{NRH}^+ + \text{H}^+ \rightarrow \text{Ti}^+ + [\text{NRH}_2]^{3+}$	1.7×10^9		1.8		p.r.	P.b.k. in O_2 -satd. soln. contg. 0.002 mol L^{-1} Ti^+ and $1 \times 10^{-4} \text{ mol L}^{-1}$ Neutral Red.	93A100
25.4.42 N-Nitrosodimethylamine								
	$\text{Ti}^{2+} + (\text{CH}_3)_2\text{NNO} \rightarrow$	1.4×10^7		2.7		p.r.	D.k. at 340 nm in N_2O -satd. soln. contg. Ti_2SO_4 .	91D17
25.4.43 Phenylthiourea								
	$\text{Ti}^{2+} + \text{C}_6\text{H}_5\text{NHCSNH}_2 \rightarrow$	3.2×10^9		3.5		p.r.	P.b.k. at 580 nm in soln. contg. Ti^+ and $5 \times 10^{-4} \text{ mol L}^{-1}$ phenylthiourea; product suggested to be deprotonated radical cation.	94A002
25.4.44 Promethazine, conjugate acid								
	$\text{Ti}^{2+} + \text{PZH}^+ \rightarrow \text{Ti}^+ + [\text{PZH}]^{2+}$	1.2×10^9		2.5		p.r.	P.b.k. at 505 nm in N_2O -satd. soln. contg. 0.003 mol L^{-1} Ti_2SO_4 ; overall rate constant, 93% electron transfer.	83A272
25.4.45 2-Propanol								
	$\text{Ti}^{2+} + 2\text{-PrOH} \rightarrow \text{Ti}^+ + \text{H}^+ + (\text{CH}_3)_2\text{COH}$	5.8×10^3		0.43	23	γ -r.	Calculated from the γ -ray induced chain reaction in $\text{Ti}^{2+} + 2\text{-propanol}$ solutions, taking $k(\text{Ti}^{2+} + \text{Ti}^+) = 1.9 \times 10^8 \text{ L mol}^{-1} \text{ s}^{-1}$ [741017].	700336
25.4.46 Safranine cation, conjugate monoacid								
	$\text{Ti}^{2+} + \text{STH}^{2+} \rightarrow [\text{STH}]^{3+} + \text{Ti}^+$	2.2×10^9		2		p.r.	P.b.k. at 460 nm in O_2 -satd. soln. contg. 0.002 mol L^{-1} Ti_2SO_4 .	92A008
25.4.47 Sulfacetamide								
	$\text{Ti}^{2+} + \text{H}_2\text{NC}_6\text{H}_4\text{SO}_2\text{NHAc} \rightarrow [\text{H}_2\text{NC}_6\text{H}_4\text{SO}_2\text{NHAc}]^+ + \text{Ti}^+$	7.0×10^8		3.3		p.r.	P.b.k. at 440 nm in N_2O -satd. soln. contg. Ti^+ and sulfacetamide.	94A208
25.4.48 1,2,4,5-Tetramethoxybenzene								
	$\text{Ti}^{2+} + 1,2,4,5\text{-C}_6\text{H}_2(\text{CH}_3\text{O})_4 \rightarrow \text{Ti}^+ + [\text{1,2,4,5-C}_6\text{H}_2(\text{CH}_3\text{O})_4]^+$	1.0×10^9		4		p.r.	P.b.k. at 447 nm in N_2O -satd. soln. contg. $10^{-3} \text{ mol L}^{-1}$ Ti_2SO_4 .	87A041
25.4.49 3,3'-Thiodipropanol								
	$\text{Ti}^{2+} + \text{S}(\text{CH}_2\text{CH}_2\text{CH}_2\text{OH})_2 \rightarrow \text{Ti}^+ + [\text{CH}_2\text{OHCH}_2\text{CH}_2\text{S}]^{+}$	2.0×10^9		1.5	23	p.r.	P.b.k. in O_2 -satd. soln. contg. 0.01 mol L^{-1} Ti^+ .	92A05
25.4.50 3,3'-Thiodipropionic acid								
	$\text{Ti}^{2+} + \text{S}(\text{CH}_2\text{CH}_2\text{CO}_2\text{H})_2 \rightarrow \text{Ti}^+ + [\text{S}(\text{CH}_2\text{CH}_2\text{CO}_2\text{H})_2]^{+}$	3.8×10^9		1.5		p.r.	P.b.k. at 390 nm in O_2 -satd. soln. contg. $2.0 \times 10^{-3} \text{ mol L}^{-1}$ Ti^+ .	90A488
25.4.51 Thionine cation								
	$\text{Ti}^{2+} + \text{Th}^+ + \text{H}^+ \rightarrow \text{Ti}^+ + [\text{ThH}]^{3+}$	3×10^9		2.5		p.r.	P.b.k. at 480 nm in N_2O -satd. soln. contg. $2 \times 10^{-3} \text{ mol L}^{-1}$ Ti^+ ; product is semioxidized thionine. $\text{Ti}(\text{OH})^+$ generates same product at pH 5.8.	87A452
25.4.52 Toluidine Blue cation								
	$\text{Ti}^{2+} + \text{TB}^+ + \text{H}^+ \rightarrow \text{Ti}^+ + [\text{TBH}]^{3+}$	1.7×10^9		1.8		p.r.	P.b.k. at 500 nm in soln. contg. 0.002 mol L^{-1} Ti^+ .	90A238
25.4.53 1,2,3-Trimethoxybenzene								
	$\text{Ti}^{2+} + 1,2,3\text{-C}_6\text{H}_3(\text{OCH}_3)_3 \rightarrow \text{Ti}^+ + [\text{1,2,3-C}_6\text{H}_3(\text{OCH}_3)_3]^{+}$	3.2×10^8		4	20	p.r.	P.b.k. and d.k. in N_2O -satd. soln. contg. $10^{-3} \text{ mol L}^{-1}$ Ti_2SO_4 and $10^{-4} \text{ mol L}^{-1}$ trimethoxybenzene.	751171
25.4.54 1,2,4-Trimethoxybenzene								
	$\text{Ti}^{2+} + 1,2,4\text{-C}_6\text{H}_3(\text{OCH}_3)_3 \rightarrow \text{Ti}^+ + [\text{1,2,4-C}_6\text{H}_3(\text{OCH}_3)_3]^{+}$	6.8×10^8		4	20	p.r.	P.b.k. and d.k. in N_2O -satd. soln. contg. $10^{-3} \text{ mol L}^{-1}$ Ti_2SO_4 and $10^{-4} \text{ mol L}^{-1}$ trimethoxybenzene.	751171

TABLE 25. Rate constants for thallium transients — Continued

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t^\circ\text{C}$	Method	Comment	Ref.
25.4 Thallium(II) ion — Continued								
25.4.55	1,3,5-Trimethoxybenzene							
	$\text{Ti}^{2+} + 1,3,5-\text{C}_6\text{H}_3(\text{OCH}_3)_3 \rightarrow \text{Ti}^+ + [\text{1},3,5-\text{C}_6\text{H}_3(\text{CH}_3\text{O})_3]^{+}$	7.0×10^8	4		20	p.r.	P.b.k. and d.k. in N_2O -satd. soln. contg. 10^{-3} mol L^{-1} Ti_2SO_4 and 10^{-4} mol L^{-1} trimethoxybenzene.	751171
25.4.56	2,3,4-Trimethoxybenzoic acid							
	$\text{Ti}^{2+} + 2,3,4-(\text{CH}_3\text{O})_3\text{C}_6\text{H}_2\text{CO}_2\text{H} \rightarrow \text{Ti}^+ + \text{H}^+ + [2,3,4-(\text{CH}_3\text{O})_3\text{C}_6\text{H}_2\text{CO}_2]^{+}$	1.6×10^9	~3		20	p.r.	P.b.k. and d.k. in N_2O -satd. soln. contg. 1×10^{-3} mol L^{-1} Ti_2SO_4 .	771006
25.4.57	3,4,5-Trimethoxybenzoic acid							
	$\text{Ti}^{2+} + 3,4,5-(\text{CH}_3\text{O})_3\text{C}_6\text{H}_2\text{CO}_2\text{H} \rightarrow \text{Ti}^+ + \text{H}^+ + [3,4,5-(\text{CH}_3\text{O})_3\text{C}_6\text{H}_2\text{CO}_2]^{+}$	8.4×10^8	~3		20	p.r.	P.b.k. and d.k. in N_2O -satd. soln. contg. 1×10^{-3} mol L^{-1} Ti_2SO_4 .	771006
25.4.58	2,4,5-Trimethoxybenzoic acid							
	$\text{Ti}^{2+} + 2,4,5-(\text{CH}_3\text{O})_3\text{C}_6\text{H}_2\text{CO}_2\text{H} \rightarrow \text{Ti}^+ + \text{H}^+ + [2,4,5-(\text{CH}_3\text{O})_3\text{C}_6\text{H}_2\text{CO}_2]^{+}$	8.2×10^8	~3		20	p.r.	P.b.k. and d.k. in N_2O -satd. soln. contg. 1×10^{-3} mol L^{-1} Ti_2SO_4 .	771006
25.4.59	2,4,6-Trimethoxybenzoic acid							
	$\text{Ti}^{2+} + 2,4,6-(\text{CH}_3\text{O})_3\text{C}_6\text{H}_2\text{CO}_2\text{H} \rightarrow \text{Ti}^+ + \text{H}^+ + [2,4,6-(\text{CH}_3\text{O})_3\text{C}_6\text{H}_2\text{CO}_2]^{+}$	1.5×10^9	~3		20	p.r.	P.b.k. and d.k. in N_2O -satd. soln. contg. 1×10^{-3} mol L^{-1} Ti_2SO_4 .	771006
25.5 Hydroxythallium(II) ion								
25.5.1	Iron(II) tris(1,10-phenanthroline-5,6-dione)							
	$\text{TiOH}^+ + \text{Fe}[1,10\text{-PD}]_3^{2+} \rightarrow$	7.0×10^8	5.1			p.r.	P.b.k. at 600 nm in N_2O -satd. soln. contg. Ti_2SO_4 , FeSO_4 and 1,10-phenanthroline-5,6-dione.	93A292
25.5.2	Hydrogen ion							
	$\text{TiOH}^+ + \text{H}^+ \rightarrow \text{Ti}^{2+} + \text{H}_2\text{O}$	1.4×10^{10}	2-7	var	21	p.r.	D.k. at 360 nm in N_2O -satd. soln. contg. 10^{-3} mol L^{-1} Ti_2SO_4 and HClO_4 . Evidence for equilibrium from optical and conductivity measurements.	751130
		1.0×10^{10}		0.01	25	p.r.	D.k. at 360 nm in soln. contg. 0.001 mol L^{-1} Ti^+ , 0.01 mol L^{-1} NaClO_4 and varied $[\text{H}^+]$; $K_{eq} = 6.0 \times 10^4 \text{ M}^{-1}$.	84C015
25.5.3	Hydroxythallium(III) ion							
	$\text{TiOH}^+ + \text{TiOH}^+ \rightarrow$	1.9×10^9	6.5	~0		p.r.	D.k. at 260 nm in N_2O -satd. soln. contg. 5×10^{-4} mol L^{-1} Ti^+ .	660097
		1.9×10^9	5.6			p.r.	D.k. in N_2O -satd. soln.	761192
25.5.4	Adenosine							
	$\text{TiOH}^+ + \text{A} \rightarrow \text{Ti}^+ + \text{OH}^- + \text{A}^{++}$	6.3×10^7	7-7.4	0.006	20	p.r.	D.k. at 360 nm in N_2O -satd. soln. contg. 2×10^{-3} mol L^{-1} Ti_2SO_4 ; mixt. with Ti(OH)_2 .	89A247
25.5.5	Adenyllyl-(3'→5')-guanosine							
	$\text{TiOH}^+ + \text{ApG} \rightarrow$	5×10^8	~7		20	p.r.	D.k. in N_2O -satd. soln. contg. 0.002 mol L^{-1} Ti^+ and 1×10^{-4} mol L^{-1} ApG.	93A118
25.5.6	Chlorpromazine, conjugate acid							
	$\text{TiOH}^+ + \text{CZH}^+ \rightarrow \text{Ti}^+ + \text{OH}^- + [\text{CZH}]^{2+}$	1.6×10^9	6.5			p.r.	P.b.k. at 505 nm in N_2O -satd. soln. contg. 0.003 mol L^{-1} Ti_2SO_4 ; overall rate constant, 59% electron transfer.	83A272
25.5.7	2'-Deoxyadenosine 5'-monophosphate							
	$\text{TiOH}^+ + \text{dAMP} \rightarrow \text{Ti}^+ + \text{OH}^- + [\text{dAMP}]^{++}$	1.6×10^8	7-7.4	0.006	20	p.r.	D.k. at 360 nm in N_2O -satd. soln. contg. 2×10^{-3} mol L^{-1} Ti_2SO_4 ; mixt. with Ti(OH)_2 .	89A247
25.5.8	2'-Deoxyguanosine 5'-monophosphate ⁹							
	$\text{TiOH}^+ + \text{dGMP} \rightarrow \text{Ti}^+ + \text{OH}^- + [\text{dGMP}]^{++}$	3.4×10^9	7-7.4	→0	20	p.r.	D.k. at 360 nm in N_2O -satd. soln. contg. 2×10^{-3} mol L^{-1} Ti_2SO_4 ; mixt. with Ti(OH)_2 .	89A247

TABLE 25. Rate constants for thallium transients — Continued

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t(\text{°C})$	Method	Comment	Ref
25.5 Hydroxythallium(II) ion — Continued								
25.5.9 Diethyl disulfide								
	$\text{TIOH}^+ + \text{C}_2\text{H}_5\text{SSC}_2\text{H}_5 \rightarrow \text{Ti}^+ + \text{OH}^- + [\text{C}_2\text{H}_5\text{SSC}_2\text{H}_5]^+$	1.4×10^9	5.5-6			p.r.	D.k. at 260 nm and p.b.k. in N_2O -satd. soln. contg. $2 \times 10^{-3} \text{ mol L}^{-1} \text{ Ti}^+$ and various lower concn. of disulfide.	761143
25.5.10 1,2-Dimethoxybenzene								
	$\text{TIOH}^+ + 1,2-\text{C}_6\text{H}_4(\text{OCH}_3)_2 \rightarrow$	1.2×10^9	>4.7			p.r.	P.b.k. and d.k. in N_2O -satd. soln. contg. $10^{-3} \text{ mol L}^{-1} \text{ Ti}_2\text{SO}_4$ and $10^{-4} \text{ mol L}^{-1}$ dimethoxybenzene	751086
25.5.11 1,4-Dimethoxybenzene								
	$\text{TIOH}^+ + 1,4-\text{C}_6\text{H}_4(\text{OCH}_3)_2 \rightarrow$	4.5×10^8	>4.7			p.r.	P.b.k. and d.k. in N_2O -satd. soln. contg. $10^{-3} \text{ mol L}^{-1} \text{ Ti}_2\text{SO}_4$ and $10^{-4} \text{ mol L}^{-1}$ dimethoxybenzene.	751086
25.5.12 Dimethyl disulfide								
	$\text{TIOH}^+ + \text{CH}_3\text{SSCH}_3 \rightarrow \text{Ti}^+ + \text{OH}^- + [\text{CH}_3\text{SSCH}_3]^+$	-1.5×10^9	5.6			p.r.	D.k. at 260 nm and p.b.k. at 440 nm in N_2O -satd. soln. contg. $2 \times 10^{-3} \text{ mol L}^{-1} \text{ Ti}^+$ and various lower concn. of disulfide	761143
25.5.13 Ethanol								
	$\text{TIOH}^+ + \text{EtOH} \rightarrow \text{Ti}^+ + \text{H}_2\text{O} + \text{CH}_3\text{CHOH}$	-1×10^6				p.r.	D.k. at 360 nm; mixt. with Ti(OH)_2 .	89C001
25.5.14 Formaldehyde								
	$\text{TIOH}^+ + \text{HCHO} \rightarrow \text{Ti}^+ + \text{H}_2\text{O} + \text{CHO}$	-1×10^6				p.r.	D.k. at 420 nm; mixt. with Ti(OH)_2 .	89C001
25.5.15 Guanosine								
	$\text{TIOH}^+ + \text{G} \rightarrow$	1.3×10^9	7-7.4	0.006	20	p.r.	D.k. at 360 nm in N_2O -satd. soln. contg. $2 \times 10^{-3} \text{ mol L}^{-1} \text{ Ti}_2\text{SO}_4$.	89A247
25.5.16 Glycyltryptophan								
	$\text{TIOH}^+ + \text{GlyTrpH} \rightarrow \text{Ti}^+ + [\text{GlyTrp}]^+ + \text{H}_2\text{O}$	1.4×10^9	7-7.4	0.006	20	p.r.	D.k. at 360 nm in N_2O -satd. soln. contg. $2 \times 10^{-3} \text{ mol L}^{-1} \text{ Ti}_2\text{SO}_4$; mixt. with Ti(OH)_2 .	89A247
25.5.17 Methanol								
	$\text{TIOH}^+ + \text{MeOH} \rightarrow \text{Ti}^+ + \text{H}_2\text{O} + \text{CH}_2\text{OH}$	-1×10^6				p.r.	D.k. at 360 nm in N_2O -satd. soln.; mixt. with Ti(OH)_2 .	89C001
25.5.18 1-Methylcytosine								
	$\text{TIOH}^+ + 1\text{-MeCy} \rightarrow$	$<10^7$	7-7.4	0.006	20	p.r.	D.k. at 360 nm in N_2O -satd. soln. contg. $2 \times 10^{-3} \text{ mol L}^{-1} \text{ Ti}_2\text{SO}_4$; mixt. with Ti(OH)_2 .	89A247
25.5.19 Methylene Blue cation								
	$\text{TIOH}^+ + \text{MB}^+ \rightarrow \text{Ti}^+ + [\text{MB}]^{2+} + \text{OH}^-$	2.4×10^9	6.7			p.r.	P.b.k. at 525 nm in N_2O satd. soln. contg. $10^{-4} \text{ mol L}^{-1}$ methylene blue and $2 \times 10^{-3} \text{ mol L}^{-1} \text{ Ti}^{2+}$.	89A375
25.5.20 1-Methylthymine								
	$\text{TIOH}^+ + 1,5\text{-Me}_2\text{U} \rightarrow$	$<10^7$	7-7.4	0.006	20	p.r.	D.k. at 360 nm in N_2O -satd. soln. contg. $2 \times 10^{-3} \text{ mol L}^{-1} \text{ Ti}_2\text{SO}_4$; mixt. with Ti(OH)_2 .	89A247
25.5.21 1,10-Phenanthroline-5,6-dione								
	$\text{TIOH}^+ + 1,10\text{-PD} \rightarrow$	9.5×10^8	5.6			p.r.	P.b.k. at 600 nm in N_2O -satd. soln. contg. Ti_2SO_4 and 1,10-phenanthroline-5,6-dione.	93A292
25.5.22 2-Propanol								
	$\text{TIOH}^+ + 2\text{-PrOH} \rightarrow \text{Ti}^+ + \text{H}_2\text{O} + (\text{CH}_3)_2\text{COH}$	-1×10^6				p.r.	D.k. at 360 nm in N_2O -satd. soln.; mixt. with Ti(OH)_2 .	89C001

TABLE 25. Rate constants for thallium transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
25.5 Hydroxythallium(II) ion — Continued								
25.5.23 Safranine cation								
	$\text{TIOH}^+ + \text{ST}^{2+} \rightarrow [\text{ST}]^{2+} + \text{Tl}^+ + \text{OH}^-$	2.0×10^9	6			p.r.	P.b.k. at 460 nm in N_2O -satd. soln. contg. 0.002 mol L ⁻¹ Ti_2SO_4 .	92A008
25.5.24 Thymidylyl-(3'→5')-2'-deoxyguanosine								
	$\text{TIOH}^+ + \text{TpdG} \rightarrow$	5×10^8	~7	0		p.r.	D.k. in N_2O -satd. soln. contg. 0.002 mol L ⁻¹ Ti^+ and 1×10^{-4} mol L ⁻¹ TpdG.	93A118
25.5.25 Toluidine Blue cation								
	$\text{TIOH}^+ + \text{TB}^+ \rightarrow \text{Ti}^+ + \text{OH}^- + [\text{TB}]^{2+}$	1.7×10^6	6.8			p.r.	P.b.k. in soln. contg. 0.002 mol L ⁻¹ Ti^+ .	90A238
25.6 Dihydroxythallium(II)								
25.6.1 Dihydroxythallium(II)								
	$\text{Ti(OH)}_2 + \text{Ti(OH)}_2 \rightarrow$	3.2×10^4	9.0			p.r.	D.k. in N_2O -satd. soln.	761192
25.6.2 Metiazinic acid, conjugate base								
	$\text{Ti(OH)}_2 + \text{MZ}^- \rightarrow [\text{MZ}]^+ + \text{Ti}^+ + 2\text{OH}^-$	2.5×10^9	10			p.r.	D.k. at 460 nm in N_2O -satd. soln. contg. 3×10^{-3} mol L ⁻¹ TiSO_4 ; 71% <i>e</i> -transfer.	81A162
25.6.3 Tetranitromethane								
	$\text{Ti(OH)}_2 + \text{C}(\text{NO}_2)_4 \rightarrow \text{Ti(III)} + \text{NO}_2 + \text{C}(\text{NO}_2)_3$	4×10^8	8-9			p.r.	D.k. at 410 nm and p.b.k. at 350 nm in N_2O -satd. soln. contg. 2×10^{-3} mol L ⁻¹ Ti^+ and $\sim 10^{-4}$ mol L ⁻¹ tetranitromethane.	761192
25.7 Chlorothallium(II) ion								
25.7.1 Iron(II) ion								
	$\text{TiCl}^+ + \text{Fe}^{2+} \rightarrow \text{TiCl} + \text{Fe}^{3+}$	8×10^6	0	1	21	p.r.	Calcd. from p.b.k. at 340 nm in soln. contg. 1 mol L ⁻¹ HClO_4 , 1×10^{-4} mol L ⁻¹ Cl^- , 2.6×10^{-4} mol L ⁻¹ Ti(III) and 9×10^{-4} mol L ⁻¹ Ti(I) .	761154
		6×10^5	0	1	21	p.r.	Calcd. from p.b.k. at 340 nm in soln. contg. 1 mol L ⁻¹ HClO_4 , 1×10^{-4} mol L ⁻¹ Cl^- , 2.6×10^{-4} mol L ⁻¹ Ti(III) and 9×10^{-4} mol L ⁻¹ Ti(I) .	761154
25.7.2 Chloroiron(III) ion								
	$\text{TiCl}^+ + \text{FeCl}^{2+} \rightarrow \text{TiCl}_2^+ + \text{Fe}^{2+}$	3.9×10^8	0	1	21	p.r.	D.k. at 340 nm in soln. contg. 1 mol L ⁻¹ HClO_4 , 1×10^{-4} mol L ⁻¹ Cl^- , 2.6×10^{-4} mol L ⁻¹ Ti(III) and 9×10^{-4} mol L ⁻¹ Ti(I) ; same <i>k</i> for $\text{TiCl}_2^+ + \text{FeCl}^{2+}$, $\text{TiCl}_3^- + \text{FeCl}^{2+}$, etc. For reaction of same Ti(II) species with FeOH^{2+} , <i>k</i> = 3×10^8 L mol ⁻¹ s ⁻¹ .	761154
25.8 Dichlorothallium(II)								
25.8.1 Iron(II) ion								
	$\text{TiCl}_2 + \text{Fe}^{2+} \rightarrow \text{TiCl} + \text{FeCl}^{2+}$	2×10^6	0	1	21	p.r.	Calcd. from p.b.k. at 340 nm in soln. contg. 1 mol L ⁻¹ HClO_4 , 1×10^{-4} mol L ⁻¹ Cl^- , 2.6×10^{-4} mol L ⁻¹ Ti(III) and 9×10^{-4} mol L ⁻¹ Ti(I) .	761154
		2×10^6	0	1	21	p.r.	Calcd. from p.b.k. at 340 nm in soln. contg. 1 mol L ⁻¹ HClO_4 , 1×10^{-4} mol L ⁻¹ Cl^- , 2.6×10^{-4} mol L ⁻¹ Ti(III) and 9×10^{-4} mol L ⁻¹ Ti(I) .	761154

TABLE 25. Rate constants for thallium transients — Continued

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t(\text{°C})$	Method	Comment	Ref.
25.9 Trichlorothallate(II) ion								
25.9.1 Iron(II) ion								
	$\text{TlCl}_3^- + \text{Fe}^{2+} \rightarrow \text{TlCl}_3^{2-} + \text{Fe}^{3+}$	$<1 \times 10^6$	0	1	21	p.r.	Calcd. from p.b.k. at 340 nm in soln. contg. 1 mol L^{-1} HClO_4 , 1×10^{-4} -1 mol L^{-1} Cl^- , 2.6×10^{-4} mol L^{-1} Tl(III) and 9×10^{-4} mol L^{-1} Tl(I) .	761154
		1.5×10^7	0	1	21	p.r.	Calcd. from p.b.k. at 340 nm in soln. contg. 1 mol L^{-1} HClO_4 , 1×10^{-4} -1 mol L^{-1} Cl^- , 2.6×10^{-4} mol L^{-1} Tl(III) and 9×10^{-4} mol L^{-1} Tl(I) .	761154
25.10 Tetrachlorothallate(II) ion								
25.10.1 Iron(II) ion								
	$\text{TlCl}_4^{2-} + \text{Fe}^{2+} \rightarrow \text{TlCl}_3^{2-} + \text{FeCl}^{2+}$	1×10^8	0	1	21	p.r.	Calcd. from p.b.k. at 340 nm in soln. contg. 1 mol L^{-1} HClO_4 , 1×10^{-4} -1 mol L^{-1} Cl^- , 2.6×10^{-4} mol L^{-1} Tl(III) and 9×10^{-4} mol L^{-1} Tl(I) .	761154
25.10.2 Tris(2,2'-bipyridine)ruthenium(III) ion								
	$\text{TlCl}_4^{2-} + \text{Ru(bpy)}_3^{3+} \rightarrow \text{TlCl}_4^- + \text{Ru(bpy)}_3^{2+}$	2.9×10^{10}	<0	3.0		f.p./oq	P.b.k. at 452 nm, in soln. contg. Ru(bpy)_3^{2+} , 3.0 mol L^{-1} HCl and $\text{Tl(NO}_3)_3$ (OQ).	82A111
25.11 Thallium(II) ions								
25.11.1 Thallium(II) ions								
	$\text{Tl(II)} + \text{Tl(II)} \rightarrow$	2.7×10^9	0	1	23	p.r.	D.k. at 300 nm in deaerated soln. contg. 0.001 mol L^{-1} Tl(I) , 5×10^{-4} mol L^{-1} Tl(III) , 0.001 mol L^{-1} Cl^- and 1 mol L^{-1} HClO_4 ; $k = 2.8 \times 10^9$, 2.4×10^9 and $1.9 \times 10^9 \text{ L mol}^{-1} \text{ s}^{-1}$ in the presence of 9.7×10^{-3} , 0.1 and 0.98 mol L^{-1} Cl^- , respectively. In each case $[\text{H}^+] = 1 \text{ mol L}^{-1}$ and $I = 1$.	741038

TABLE 26. Rate constants for vanadium transients

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t(\text{°C})$	Method	Comment	Ref.
26.1 Vanadyl(III) ion								
26.1.1 Hydrogen ion								
	$\text{VO}^+ + \text{H}^+ \rightarrow \text{VOH}^{2+}$	1.5×10^{10}	3.8- 4.6	25	p.r.		Cond. change in Ar-satd. soln. contg. VO^{2+} and 0.12 mol L^{-1} <i>tert</i> -BuOH or 0.01-0.05 mol L^{-1} EtOH. For $\text{VOOH} + \text{H}^+ \rightarrow \text{V(OH)}_2^+$, $k = 3.5 \times 10^{10} \text{ L mol}^{-1} \text{ s}^{-1}$. Values obtained by computer fit.	86A152

TABLE 27. Rate constants for tungsten transients

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
27.1 12-Tungstate ion(7-), dihydrogen								
27.1.1 Oxygen								
	$\text{H}_2\text{W}_{12}\text{O}_{40}^{7-} + \text{O}_2 \rightarrow$	* ~90				p.r.	D.k. in air-satd. or O_2 -satd. soln. contg. 0.01 mol L ⁻¹ $\text{H}_2\text{W}_{12}\text{O}_{40}^{6-}$; complex kinetics.	90A069
							* Calcd. from data reported by the authors.	

TABLE 28. Rate constants for zinc transients

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	t ($^\circ\text{C}$)	Method	Comment	Ref.
28.1 Zinc(I) ion								
28.1.1 First-order reaction								
	$\text{Zn(I)} \rightarrow \text{Zn(II)} + e_{\text{aq}}^-$	$4.3 \times 10^6 \text{ s}^{-1}$	≥ 14			p.r.	D.k. at 380 nm in deaerated soln. contg. <i>tert</i> -BuOH, ZnO and 1 to 5 mol L^{-1} OH^- .	81A195
28.2 Zinc(II) ion								
28.2.1 Zinc(I) ion								
	$\text{Zn}^+ + \text{Zn}^+ \rightarrow \text{Zn}^{2+} + \text{Zn}^0$	3.5×10^8		22		p.r.	D.k. at 310 nm in soln. contg. 0.01 mol L^{-1} ZnSO_4 in the presence of 107 atm H_2 , or 0.01-0.2 mol L^{-1} MeOH, 2-PrOH or <i>tert</i> -BuOH. Value obtained from computer fit.	771011
28.2.2 Hydrogen atom								
	$\text{Zn}^+ + \text{H}^\cdot \rightarrow \text{ZnH}^+$	1.9×10^9		22		p.r.	D.k. at 310 nm in soln. contg. 0.01 mol L^{-1} ZnSO_4 in the presence of 107 atm H_2 . Value obtained from computer fit.	771011
28.2.3 Hydroxyl								
	$\text{Zn}^+ + \cdot\text{OH} \rightarrow$	$\sim 1.5 \times 10^{10}$		18		p.r.	D.k. in soln. contg. Zn^{2+} ; value corrected for $\epsilon(\text{Zn}^+) = 12,800 \text{ L mol}^{-1} \text{ cm}^{-1}$ [92A182].	66A001
		$\sim 2 \times 10^{10}$		25		p.r.	Estimated from d.k. at 300 nm in Ar-satd. soln. contg. ZnSO_4 in absence of $\cdot\text{OH}$ scavengers taking into account competing reactions such as $\text{Zn}^+ + \text{Zn}^+$, $\text{Zn}^+ + \text{H}_2\text{O}_2$, $\cdot\text{OH} + \cdot\text{OH}$ etc.; value corrected for $\epsilon(\text{Zn}^+) = 12,800 \text{ L mol}^{-1} \text{ cm}^{-1}$ [92A182].	751027
28.2.4 Hydroxymethyl								
	$\text{Zn}^+ + \cdot\text{CH}_2\text{OH} + \text{H}^+ \rightarrow \text{Zn}^{2+} + \text{MeOH}$	2.5×10^9		22		p.r.	D.k. at 310 nm in soln. contg. 0.2 mol L^{-1} MeOH and 0.005 mol L^{-1} ZnSO_4 in absence and presence of 0.02 atm. N_2O . Value obtained from computer fit.	771011
28.2.5 1-Hydroxy-1-methylethyl								
	$\text{Zn}^+ + (\text{CH}_3)_2\dot{\text{CO}}\text{OH} + \text{H}^+ \rightarrow \text{Zn}^{2+} + 2\text{-PrOH}$	1.3×10^9		22		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L^{-1} 2-PrOH and 0.01 mol L^{-1} ZnSO_4 in presence and absence of HClO_4 . Value obtained from computer fit.	771011
28.2.6 Carbon dioxide radical anion								
	$\text{Zn}^+ + \text{CO}_2^\cdot - + \text{H}^+ \rightarrow \text{Zn}^{2+} + \text{HCO}_2^-$	$\sim 4 \times 10^9$		22		p.r.	D.k. at 310 nm in soln. contg. 0.01 mol L^{-1} formate and 0.002 mol L^{-1} ZnSO_4 . Value obtained from computer fit.	771011
28.2.7 2-Hydroxy-2,2-dimethylethyl								
	$\text{Zn}^+ + \cdot\text{CH}_2\text{C}(\text{CH}_3)_2\text{OH} + \text{H}^+ \rightarrow \text{Zn}^{2+} + \text{tert-BuOH}$	1.0×10^9		22		p.r.	D.k. at 310 nm in soln. contg. <i>tert</i> -BuOH and ZnSO_4 . Value obtained from computer fit.	771011
28.2.8 bromate ion								
	$\text{Zn}^+ + \text{BrO}_3^- \rightarrow$	2.1×10^9		0.08		p.r.	D.k. at 313 nm in soln. contg. 0.02 mol L^{-1} ZnSO_4 , 0.001 mol L^{-1} MeOH and varied $[\text{BrO}_3^-]$.	68G855
28.2.9 Chlorate ion								
	$\text{Zn}^+ + \text{ClO}_3^- \rightarrow$	$\sim 3 \times 10^6$		0.08		p.r.	D.k. at 313 nm in soln. contg. 0.02 mol L^{-1} ZnSO_4 , 0.001 mol L^{-1} MeOH and varied $[\text{ClO}_3^-]$.	68G855
28.2.10 Cobalt(II) ion								
	$\text{Zn}^+ + \text{Co}^{2+} \rightarrow$	$< 3 \times 10^6$		0.08		p.r.	D.k. at 313 nm in soln. contg. 0.02 mol L^{-1} ZnSO_4 , 0.001 mol L^{-1} MeOH and varied $[\text{Co}^{2+}]$.	68G855

TABLE 28. Rate constants for zinc transients — Continued

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t^\circ\text{C}$	Method	Comment	Ref.
28.2 Zinc(I) ion — Continued								
28.2.11	Tris(2,2'-bipyridine)cobalt(III) ion $\text{Zn}^+ + \text{Co(bpy)}_3^{3+} \rightarrow \text{Zn}^{2+} + \text{Co(bpy)}_3^{2+}$	2.6×10^9				p.r.	D.k. in soln. contg. 0.05 mol L^{-1} Zn^{2+} , 0.1 mol L^{-1} <i>tert</i> -BuOH and 1×10^{-4} mol L^{-1} Co(bpy)_3^{3+} .	720381
28.2.12	Tris(ethylenediamine)cobalt(III) ion $\text{Zn}^+ + \text{Co(en)}_3^{3+} \rightarrow \text{Zn}^{2+} + \text{Co(en)}_3^{2+}$	2.5×10^8	5-6	0.08		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L^{-1} ZnSO_4 , 0.001 mol L^{-1} MeOH and (0.5-3.0) $\times 10^{-4}$ mol L^{-1} complex.	690428
28.2.13	cis-Dichlorobis(ethylenediamine)cobalt(III) ion $\text{Zn}^+ + \text{cis-Co(en)}_2\text{Cl}_2^+ \rightarrow \text{Zn}^{2+} + \text{Co(en)}_2\text{Cl}_2$	1.9×10^9	5-6	0.08		p.r.	D.k. at 350 nm in soln. contg. 0.02 mol L^{-1} ZnSO_4 , 0.001 mol L^{-1} MeOH and (0.5-3.0) $\times 10^{-4}$ mol L^{-1} complex.	690428
28.2.14	trans-Dichlorobis(ethylenediamine)cobalt(III) ion $\text{Zn}^+ + \text{trans-Co(en)}_2\text{Cl}_2^+ \rightarrow \text{Zn}^{2+} + \text{Co(en)}_2\text{Cl}_2$	2.3×10^9	5-6	0.08		p.r.	D.k. at 350 nm in soln. contg. 0.02 mol L^{-1} ZnSO_4 , 0.001 mol L^{-1} MeOH and (0.5-3.0) $\times 10^{-4}$ mol L^{-1} complex.	690428
28.2.15	Carbonatobis(ethylenediamine)cobalt(III) ion $\text{Zn}^+ + \text{Co(en)}_2\text{CO}_3^+ \rightarrow \text{Zn}^{2+} + \text{Co(en)}_2\text{CO}_3$	4.7×10^8	5-6	0.08		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L^{-1} ZnSO_4 , 0.001 mol L^{-1} MeOH and (0.5-3.0) $\times 10^{-4}$ mol L^{-1} complex.	690428
28.2.16	cis-Bis(ethylenediamine)difluorocobalt(III) ion $\text{Zn}^+ + \text{cis-Co(en)}_2\text{F}_2^+ \rightarrow \text{Zn}^{2+} + \text{cis-Co(en)}_2\text{F}_2$	5.4×10^8	5-6	0.08		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L^{-1} ZnSO_4 , 0.001 mol L^{-1} MeOH and (0.5-3.0) $\times 10^{-4}$ mol L^{-1} complex.	690428
28.2.17	Aquabis(ethylenediamine)fluorocobalt(III) ion $\text{Zn}^+ + \text{Co(en)}_2(\text{H}_2\text{O})\text{F}^+ \rightarrow \text{Zn}^{2+} + \text{Co(en)}_2(\text{H}_2\text{O})\text{F}^-$	4.7×10^8	5-6	0.08		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L^{-1} ZnSO_4 , 0.001 mol L^{-1} MeOH and (0.5-3.0) $\times 10^{-4}$ mol L^{-1} complex.	690428
28.2.18	cis-Amminechlorobis(ethylenediamine)cobalt(III) ion $\text{Zn}^+ + \text{cis-Co(en)}_2(\text{NH}_3)\text{Cl}^{2+} \rightarrow \text{Zn}^{2+} + \text{cis-Co(en)}_2(\text{NH}_3)\text{Cl}^+$	1.5×10^9	5-6	0.08		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L^{-1} ZnSO_4 , 0.001 mol L^{-1} MeOH and (0.5-3.0) $\times 10^{-4}$ mol L^{-1} complex.	690428
28.2.19	cis-Nitroamminebis(ethylenediamine)cobalt(III) ion $\text{Zn}^+ + \text{cis-Co(en)}_2(\text{NH}_3)\text{NO}_2^{2+} \rightarrow \text{Zn}^{2+} + \text{Zn}^{2+} + \text{cis-Co(en)}_2(\text{NH}_3)\text{NO}_2^+$	2.7×10^9	5-6	0.08		p.r.	D.k. at 350 nm in soln. contg. 0.02 mol L^{-1} ZnSO_4 , 0.001 mol L^{-1} MeOH and (0.5-3.0) $\times 10^{-4}$ mol L^{-1} complex.	690428
28.2.20	Hexaamminecobalt(III) ion $\text{Zn}^+ + \text{Co}(\text{NH}_3)_6^{3+} \rightarrow \text{Zn}^{2+} + \text{Co}(\text{NH}_3)_6^{2+}$	8.4×10^8	5-6	0.08		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L^{-1} ZnSO_4 , 0.001 mol L^{-1} MeOH and (0.5-3.0) $\times 10^{-4}$ mol L^{-1} complex.	690428
28.2.21	Pentaammine(bromo)cobalt(III) ion $\text{Zn}^+ + \text{Co}(\text{NH}_3)_5\text{Br}^{2+} \rightarrow \text{Zn}^{2+} + \text{Co}(\text{NH}_3)_5\text{Br}^+$	2.6×10^9	4.0	0.08		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L^{-1} ZnSO_4 , 0.001 mol L^{-1} MeOH and (0.5-3.0) $\times 10^{-4}$ mol L^{-1} complex.	690428
28.2.22	Pentaammine(chloro)cobalt(III) ion $\text{Zn}^+ + \text{Co}(\text{NH}_3)_5\text{Cl}^{2+} \rightarrow \text{Zn}^{2+} + \text{Co}(\text{NH}_3)_5\text{Cl}^+$	2.2×10^9	5-6	0.08		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L^{-1} ZnSO_4 , 0.001 mol L^{-1} MeOH and (0.5-3.0) $\times 10^{-4}$ mol L^{-1} complex.	690428
28.2.23	Pentaammine(cyano)cobalt(III) ion $\text{Zn}^+ + \text{Co}(\text{NH}_3)_5(\text{CN})^{2+} \rightarrow \text{Zn}^{2+} + \text{Co}(\text{NH}_3)_5(\text{CN})^+$	1.3×10^9	5-6	0.08		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L^{-1} ZnSO_4 , 0.001 mol L^{-1} MeOH and (0.5-3.0) $\times 10^{-4}$ mol L^{-1} complex.	690428

TABLE 28. Rate constants for zinc transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.	
28.2 Zinc(I) ion — Continued									
28.2.24	Pentaammine(fluoro)cobalt(III) ion								
	$Zn^+ + Co(NH_3)_5F^{2+} \rightarrow Zn^{2+} + Co(NH_3)_5F^+$	8.2×10^8	5-6	0.08		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L ⁻¹ ZnSO ₄ , 0.001 mol L ⁻¹ MeOH and (0.5-3.0) $\times 10^{-4}$ mol L ⁻¹ complex.	690428	
28.2.25	Pentaammine(fumarato)cobalt(III) ion								
	$Zn^+ + Co(NH_3)_5fumarate^+ \rightarrow Zn^{2+} + Co(NH_3)_5fumarate$	1.2×10^9	5-6	0.08		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L ⁻¹ ZnSO ₄ , 0.001 mol L ⁻¹ MeOH and (0.5-3.0) $\times 10^{-4}$ mol L ⁻¹ complex.	690428	
28.2.26	Pentaammine(aqua)cobalt(III) ion								
	$Zn^+ + Co(NH_3)_5(H_2O)^{3+} \rightarrow Zn^{2+} + Co(NH_3)_5(H_2O)^{2+}$	1.6×10^9	4.0	0.08		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L ⁻¹ ZnSO ₄ , 0.001 mol L ⁻¹ MeOH and (0.5-3.0) $\times 10^{-4}$ mol L ⁻¹ complex.	690428	
28.2.27	Pentaammine(hydroxy)cobalt(III) ion								
	$Zn^+ + Co(NH_3)_5OH^{2+} \rightarrow Zn^{2+} + Co(NH_3)_5OH^+$	1.1×10^9	6.6	0.08		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L ⁻¹ ZnSO ₄ , 0.001 mol L ⁻¹ MeOH and (0.5-3.0) $\times 10^{-4}$ mol L ⁻¹ complex.	690428	
28.2.28	Pentaammine(azido)cobalt(III) ion								
	$Zn^+ + Co(NH_3)_5(N_3)^{2+} \rightarrow Zn^{2+} + Co(NH_3)_5(N_3)^+$	1.5×10^9	5-6	0.08		p.r.	D.k. at 350 nm in soln. contg. 0.02 mol L ⁻¹ ZnSO ₄ , 0.001 mol L ⁻¹ MeOH and (0.5-3.0) $\times 10^{-4}$ mol L ⁻¹ complex.	690428	
28.2.29	Pentaammine(thiocyanato- <i>N</i>)cobalt(III) ion								
	$Zn^+ + Co(NH_3)_5(NCS)^{2+} \rightarrow Zn^{2+} + Co(NH_3)_5(NCS)^+$	1.7×10^9	5-6	0.08		p.r.	D.k. at 350 nm in soln. contg. 0.02 mol L ⁻¹ ZnSO ₄ , 0.001 mol L ⁻¹ MeOH and (0.5-3.0) $\times 10^{-4}$ mol L ⁻¹ complex.	690428	
28.2.30	(Acetato)pentaamminecobalt(III) ion								
	$Zn^+ + Co(NH_3)_5(OAc)^{2+} \rightarrow Zn^{2+} + Co(NH_3)_5(OAc)^+$	5.0×10^8	5-6	0.08		p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L ⁻¹ ZnSO ₄ , 0.001 mol L ⁻¹ MeOH and (0.5-3.0) $\times 10^{-4}$ mol L ⁻¹ complex.	690428	
28.2.31	Hexaamminebis(μ-hydroxy)-μ-(trifluoroacetato)dicobalt(III) ion								
	$Zn^+ + CF_3CO_2[Co(NH_3)_3]_2(OH)_2^{3+} \rightarrow$	1.2×10^9	22			p.r.	D.k. in Ar-satd. soln. contg. 0.1 mol L ⁻¹ ZnSO ₄ and 0.1 mol L ⁻¹ <i>tert</i> -BuOH.	83A140	
28.2.32	Hexaammine-μ-(difluoroacetato)bis(μ-hydroxy)dicobalt(III) ion								
	$Zn^+ + CH_2FCO_2[Co(NH_3)_3]_2(OH)_2^{3+} \rightarrow$	1.0×10^9	22			p.r.	D.k. in Ar-satd. soln. contg. 0.1 mol L ⁻¹ ZnSO ₄ and 0.1 mol L ⁻¹ <i>tert</i> -BuOH.	83A140	
28.2.33	Hexaammine-μ-(fluoroacetato)bis(μ-hydroxy)dicobalt(III) ion								
	$Zn^+ + CH_2FCO_2[Co(NH_3)_3]_2(OH)_2^{3+} \rightarrow$	7.6×10^8	22			p.r.	D.k. in Ar-satd. soln. contg. 0.1 mol L ⁻¹ ZnSO ₄ and 0.1 mol L ⁻¹ <i>tert</i> -BuOH.	83A140	
28.2.34	μ-Acetatohexaamminebis(μ-hydroxy)dicobalt(III) ion								
	$Zn^+ + CH_3CO_2[Co(NH_3)_3]_2(OH)_2^{3+} \rightarrow$	5.5×10^8	22			p.r.	D.k. in Ar-satd. soln. contg. 0.1 mol L ⁻¹ ZnSO ₄ and 0.1 mol L ⁻¹ <i>tert</i> -BuOH.	83A140	
28.2.35	Tris(2,2'-bipyridine)chromium(III) ion								
	$Zn^+ + Cr(bpy)_3^{3+} \rightarrow Zn^{2+} + Cr(bpy)_3^{2+}$	1.9×10^9	-7			23	p.r.	D.k. at 310 nm in soln. contg. 0.1 mol L ⁻¹ <i>tert</i> -BuOH, 0.01 mol L ⁻¹ ZnSO ₄ and varied [Cr(bpy) ₃ ³⁺].	87A309
28.2.36	Tris(1,10-phenanthroline)chromium(III) ion								
	$Zn^+ + Cr(phen)_3^{3+} \rightarrow Zn^{2+} + Cr(phen)_3^{2+}$	1.7×10^9	-7			23	p.r.	D.k. at 310 nm in soln. contg. 0.1 mol L ⁻¹ <i>tert</i> -BuOH, 0.01 mol L ⁻¹ ZnSO ₄ and varied [Cr(phen) ₃ ³⁺].	87A309
28.2.37	Bis(2,2'-bipyridine)oxalatochromium(III)ion								
	$Zn^+ + Cr(bpy)_2(C_2O_4)^+ \rightarrow Zn^{2+} + Cr(bpy)_2(C_2O_4)$	2.2×10^9	-7			23	p.r.	D.k. at 310 nm in soln. contg. 0.1 mol L ⁻¹ <i>tert</i> -BuOH, 0.01 mol L ⁻¹ ZnSO ₄ and varied [Cr(bpy) ₂ (C ₂ O ₄) ⁺].	87A309

TABLE 28. Rate constants for zinc transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
28.2 Zinc(I) ion — Continued								
28.2.38 Bis(1,10-phenanthroline)(oxalato)chromium(III) ion								
	$Zn^+ + Cr(\text{phen})_2(C_2O_4)^+ \rightarrow Zn^{2+} + Cr(\text{phen})_2(C_2O_4)_2^{2-}$	2.1×10^9	~7		23	p.r.	D.k. at 310 nm in soln. contg. 0.1 mol L ⁻¹ <i>tert</i> -BuOH, 0.01 mol L ⁻¹ ZnSO ₄ and varied [Cr(phen) ₂ (C ₂ O ₄) ⁺].	87A309
28.2.39 2,2'-Bipyridinebis(oxalato)chromate(III) ion								
	$Zn^+ + Cr(\text{bpy})(C_2O_4)_2^{2-} \rightarrow Zn^{2+} + Cr(\text{bpy})(C_2O_4)_2^{2-}$	2.2×10^9	~7		23	p.r.	D.k. at 310 nm in soln. contg. 0.1 mol L ⁻¹ <i>tert</i> -BuOH, 0.01 mol L ⁻¹ ZnSO ₄ and varied [Cr(bpy)(C ₂ O ₄) ₂ ²⁻].	87A309
28.2.40 Bis(oxalato)phenanthrolinechromate(III) ion								
	$Zn^+ + Cr(\text{phen})(C_2O_4)_2^{2-} \rightarrow Zn^{2+} + Cr(\text{phen})(C_2O_4)_2^{2-}$	2.2×10^9	~7		23	p.r.	D.k. at 310 nm in soln. contg. 0.1 mol L ⁻¹ <i>tert</i> -BuOH, 0.01 mol L ⁻¹ ZnSO ₄ and varied [Cr(phen)(C ₂ O ₄) ₂ ²⁻].	87A309
28.2.41 Dichromate(VI) ion								
	$Zn^+ + Cr_2O_7^{2-} \rightarrow$	1.6×10^{10}		0.02	25	p.r.	D.k. in soln. contg. 0.01 mol L ⁻¹ ZnSO ₄ .	761072
28.2.42 Copper(II) ion								
	$Zn^+ + Cu^{2+} \rightarrow$	2.5×10^8		0.08		p.r.	D.k. at 313 nm in soln. contg. 0.02 mol L ⁻¹ ZnSO ₄ , 0.001 mol L ⁻¹ MeOH and varied [Cu ²⁺].	68G855
28.2.43 Hydrogen peroxide								
	$Zn^+ + H_2O_2 \rightarrow Zn^{2+} + OH^- + \cdot OH$	2.5×10^9			22	p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L ⁻¹ 2-PrOH, 6.8 or 18.3×10^{-5} mol L ⁻¹ H ₂ O ₂ and 0.01 mol L ⁻¹ ZnSO ₄ .	771011
		2.3×10^9			25	p.r.	D.k. in soln. contg. ZnSO ₄ ; <i>E</i> _a = 10.5 kJ mol ⁻¹ .	761072
		1.8×10^9				p.r.	D.k. at 313 nm in soln. contg. 0.02 mol L ⁻¹ ZnSO ₄ and 0.001 mol L ⁻¹ MeOH.	68G855
28.2.44 Hydrogen ion								
	$Zn^+ + H^+ \rightarrow$	$\leq 10^6$		0.08		p.r.	D.k. at 313 nm in soln. contg. 0.02 mol L ⁻¹ ZnSO ₄ , 0.001 mol L ⁻¹ MeOH and varied [H ⁺].	68G855
28.2.45 Iodate ion								
	$Zn^+ + IO_3^- \rightarrow$	3.6×10^9		0.08		p.r.	D.k. at 313 nm in soln. contg. 0.02 mol L ⁻¹ ZnSO ₄ , 0.001 mol L ⁻¹ MeOH and varied [IO ₃ ⁻].	68G855
28.2.46 Hydroxymanganese(III) ion								
	$Zn^+ + MnOH^{2+} \rightarrow Zn^{2+} + Mn^{2+} + OH^-$	2.4×10^9	~6		23	p.r.	D.k. at 310 nm in soln. contg. 0.02 mol L ⁻¹ MnSO ₄ and 0.03 mol L ⁻¹ ZnSO ₄ . Value obtained from computer fit.	78A041
28.2.47 Bis(μ-oxo)(ethylenediaminetetraacetato)bis[oxomolybdate(V)] ion								
	$Zn^+ + [Mo2O4(EDTA)]^{2-} \rightarrow Zn^{2+} + [Mo2O4(EDTA)]^{3-}$	5.0×10^9	6		25	p.r.	D.k. at 320 nm in soln. contg. 1×10^{-4} mol L ⁻¹ complex, 0.1 mol L ⁻¹ ZnSO ₄ and 0.1 mol L ⁻¹ <i>tert</i> -BuOH.	85A363
28.2.48 Bis(μ-oxo)bis[(cysteinato)oxomolybdate(V)] ion								
	$Zn^+ + [Mo2O4(Cys)]^{2-} \rightarrow Zn^{2+} + [Mo2O4(Cys)]^{3-}$	4.5×10^9	6		25	p.r.	D.k. at 320 nm in soln. contg. 1×10^{-4} mol L ⁻¹ complex, 0.1 mol L ⁻¹ ZnSO ₄ and 0.1 mol L ⁻¹ <i>tert</i> -BuOH.	85A363
28.2.49 Nitrite ion								
	$Zn^+ + NO_2^- \rightarrow$	2.2×10^9		0.08		p.r.	D.k. at 313 nm in soln. contg. 0.02 mol L ⁻¹ ZnSO ₄ , 0.001 mol L ⁻¹ MeOH and varied [NO ₂ ⁻].	68G855

TABLE 28. Rate constants for zinc transients. — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
28.2 Zinc(I) ion — Continued								
28.2.50 Nitrate ion								
	$Zn^+ + NO_3^- \rightarrow$	2.1×10^9		0.08		p.r.	D.k. at 313 nm in soln. contg. 0.02 mol L ⁻¹ ZnSO ₄ , 0.001 mol L ⁻¹ MeOH and varied [NO ₃ ⁻].	68G855
28.2.51 Nitrous oxide								
	$Zn^+ + N_2O \rightarrow ZnO^+ + N_2$	1.6×10^7		22		p.r.	D.k. at 310 nm in soln. satd. with 0.3 or 1.0 atm N ₂ O, contg. 0.1 mol L ⁻¹ <i>tert</i> -BuOH and 0.1 mol L ⁻¹ ZnSO ₄ .	771011
						p.r.	Studied at 1-30 °C, <i>E</i> _a = 35.5 kJ mol ⁻¹ .	761072
28.2.52 Nickel(II) ion								
	$Zn^+ + Ni^{2+} \rightarrow$	$<5 \times 10^6$		0.08		p.r.	D.k. at 313 nm in soln. contg. 0.02 mol L ⁻¹ ZnSO ₄ , 0.001 mol L ⁻¹ MeOH and varied [Ni ²⁺].	68G855
28.2.53 Oxygen								
	$Zn^+ + O_2 \rightarrow Zn^{2+} + O_2^{\cdot-}$	2.4×10^9				p.r.	D.k. at 313 nm in soln. contg. 0.02 mol L ⁻¹ ZnSO ₄ , 0.001 mol L ⁻¹ MeOH and varied [O ₂].	68G855
		3.3×10^9		18		p.r.	D.k. in soln. contg. Zn ²⁺ .	66A001
28.2.54 Lead(II) ions								
	$Zn^+ + Pb^{2+} \rightarrow Zn^{2+} + Pb^{\cdot+}$	4.0×10^8		18		p.r.	D.k. in soln. contg. Zn ²⁺ .	66A001
28.2.55 Tris(2,2'-bipyridine)ruthenium(II) ion								
	$Zn^+ + Ru(bpy)_3^{2+} \rightarrow Zn^{2+} + Ru(bpy)_3^{+}$	1.6×10^9	5.2		24	p.r.	P.b.k. at 510 nm in deaerated soln. contg. 4×10^{-5} mol L ⁻¹ Ru(bpy) ₃ ²⁺ , 0.05 mol L ⁻¹ ZnSO ₄ and 0.017 mol L ⁻¹ <i>tert</i> -BuOH.	78A002
		1.5×10^9	6-7		24	f.p./pi	P.b.k. at 510 nm in soln. contg. $(9.0-27) \times 10^{-6}$ mol L ⁻¹ Ru(bpy) ₃ ²⁺ and $(1.3-10) \times 10^{-3}$ mol L ⁻¹ ZnSO ₄ .	771093
		2.5×10^9				p.r.	P.b.k. in soln. contg. 0.05 mol L ⁻¹ Zn ²⁺ , 1.0 mol L ⁻¹ <i>tert</i> -BuOH and 5.0×10^{-5} mol L ⁻¹ Ru(bpy) ₃ ²⁺ .	720381
28.2.56 Hexaammineruthenium(III) ion								
	$Zn^+ + Ru(NH3)6^{3+} \rightarrow Zn^{2+} + Ru(NH3)_5^{2+}$	2.2×10^9		0.08		p.r.	D.k. in soln. contg. 0.02 mol L ⁻¹ ZnSO ₄ and $(0.5-6.0) \times 10^{-4}$ mol L ⁻¹ Ru(NH ₃) ₆ ³⁺ .	701229
28.2.57 Peroxodisulfate ion								
	$Zn^+ + S_2O_8^{2-} \rightarrow Zn^{2+} + SO_4^{\cdot-} + SO_4^{2-}$	1.3×10^9	0.02	25		p.r.	D.k. in soln. contg. 0.01 mol L ⁻¹ ZnSO ₄ and $(0.5-10) \times 10^{-4}$ mol L ⁻¹ S ₂ O ₈ ²⁻ .	761072
28.2.58 Acetone								
	$Zn^+ + CH_3COCH_3 \rightarrow$	$<10^8$		22		p.r.	Decay at 310 nm was unaffected by presence of 3×10^{-4} mol L ⁻¹ acetone in soln. contg. 0.1 mol L ⁻¹ ZnSO ₄ and 0.025 mol L ⁻¹ MeOH.	771011
28.2.59 Allyl alcohol								
	$Zn^+ + H_2C=CHCH_2OH \rightarrow [Zn(CH_2CHCH_2OH)]^+$	$\sim 10^8$			25	p.r.	D.k. in soln. contg. 0.01 mol L ⁻¹ ZnSO ₄ , 1.24 mol L ⁻¹ MeOH and 1.2×10^{-3} mol L ⁻¹ allyl alcohol.	761072
28.2.60 Benzophenone								
	$Zn^+ + (C_6H_5)_2CO \rightarrow Zn^{2+} + (C_6H_5)_2CO^-$	2.5×10^9	7.0			p.r.	P.b.k. in soln. contg. 5×10^{-3} mol L ⁻¹ ZnSO ₄ , ~1.0 mol L ⁻¹ <i>tert</i> -BuOH and 5×10^{-5} mol L ⁻¹ benzophenone.	751032
28.2.61 1,4-Benzoquinone								
	$Zn^+ + Q \rightarrow Zn^{2+} + Q^{\cdot-}$	3.0×10^9	5.7		25	p.r.	P.b.k. at 430 nm in soln. contg. Zn ²⁺ and 1 mol L ⁻¹ <i>tert</i> -BuOH.	761134

TABLE 28. Rate constants for zinc transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ .s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
28.2 Zinc(I) ion — Continued								
28.2.61	1,4-Benzoquinone — Continued							
	Zn ⁺ + 2-CH ₃ NQ → Zn ²⁺ + [2-CH ₃ NQ] ^{·-}	4.8 × 10 ⁹	7.0			p.r.	P.b.k. in soln. contg. 5 × 10 ⁻³ mol L ⁻¹ ZnSO ₄ , ~1.0 mol L ⁻¹ <i>tert</i> -BuOH and 5 × 10 ⁻⁵ mol L ⁻¹ 1,4-benzoquinone.	751032
28.2.62	2-Methyl-1,4-naphthoquinone							
	Zn ⁺ + 2-CH ₃ NQ → Zn ²⁺ + [2-CH ₃ NQ] ^{·-}	3.8 × 10 ⁹	7.1			p.r.	P.b.k. in soln. contg. 0.005 mol L ⁻¹ Zn ²⁺ , ~1.0 mol L ⁻¹ <i>tert</i> -BuOH and 5 × 10 ⁻⁵ mol L ⁻¹ 2-CH ₃ -NQ.	751032 731047
28.3 1,4,8,11-Tetrazacyclotetradecanezinc(I) ion								
28.3.1	Nitrous oxide							
	Zn(cyclam) ⁺ + N ₂ O →	6.4 × 10 ⁷	5-7		23	p.r.	D.k. in 0-30% N ₂ O-satd. soln. contg. 1.7 mol L ⁻¹ <i>tert</i> -BuOH and 0.09 mol L ⁻¹ Zn(cyclam) ²⁺ .	80A380
28.4 Tetrakis-4-(<i>N,N,N</i>-trimethylammonio)phenylporphinezinc(II) radical anion								
28.4.1	Dihydroxytetrakis(4-sulfonatophenyl)porphinatocobaltate(II) ion							
	[ZnTAPP] ³⁺ + CoTPPS(OH) ₂ ⁶⁻ →	3.8 × 10 ⁸	13			p.r.	D.k. at 700-740 nm in N ₂ - or N ₂ O-satd. soln. contg. 0.1 mol L ⁻¹ 2-PrOH and varied [Co(III) complex].	81A317
28.4.2	Dihydroxytetrakis[4-(<i>N,N,N</i> -trimethylammonio)phenyl]porphinecobalt(II) ion							
	[ZnTAPP] ³⁺ + CoTAPP(OH) ₂ ²⁺ →	5.4 × 10 ⁸	13			p.r.	D.k. at 700-740 nm in N ₂ - or N ₂ O-satd. soln. contg. 0.1 mol L ⁻¹ 2-PrOH and varied [Co(III) complex].	81A317
28.4.3	Dihydroxytetrakis(1-methylpyridinium-4-yl)porphinecobalt(II) ion							
	[ZnTAPP] ³⁺ + CoTMpyP(OH) ₂ ²⁺ →	4.9 × 10 ⁸	13			p.r.	D.k. at 700-740 nm in N ₂ - or N ₂ O-satd. soln. contg. 0.1 mol L ⁻¹ 2-PrOH and varied [Co(III) complex].	81A317
28.5 5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinezinc(II) radical anion								
28.5.1	Dihydroxytetrakis(4-sulfonatophenyl)porphinatocobaltate(II) ion							
	[ZnTMpyP] ³⁺ + CoTPPS(OH) ₂ ⁶⁻ →	1.1 × 10 ⁹	13			p.r.	D.k. at 700-740 nm in N ₂ - or N ₂ O-satd. soln. contg. 0.1 mol L ⁻¹ 2-PrOH and varied [Co(III) complex].	81A317
28.5.2	Dihydroxytetrakis[4-(<i>N,N,N</i> -trimethylammonio)phenyl]porphinecobalt(II) ion							
	[ZnTMpyP] ³⁺ + CoTAPP(OH) ₂ ²⁺ →	1.6 × 10 ⁸	13			p.r.	D.k. at 700-740 nm in N ₂ - or N ₂ O-satd. soln. contg. 0.1 mol L ⁻¹ 2-PrOH and varied [Co(III) complex].	81A317
28.5.3	Dihydroxytetrakis(1-methylpyridinium-4-yl)porphinecobalt(II) ion							
	[ZnTMpyP] ³⁺ + CoTMpyP(OH) ₂ ²⁺ →	4.0 × 10 ⁸	13			p.r.	D.k. at 700-740 nm in N ₂ - or N ₂ O-satd. soln. contg. 0.1 mol L ⁻¹ 2-PrOH and varied [Co(III) complex].	81A317
28.5.4	Sulfur dioxide							
	[ZnTMpyP] ³⁺ + SO ₂ → ZnTMpyP ⁴⁺ + SO ₂ ^{·-}	8 × 10 ⁸	1			p.r.	D.k. at 700 nm in N ₂ -satd. soln. contg. NaHSO ₃ , ZnTMpyP ⁴⁺ and 0.1 mol L ⁻¹ HCl or HClO ₄ .	87A083
28.6 5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatozincate(II) radical anion								
28.6.1	Dihydroxytetrakis(4-sulfonatophenyl)porphinatocobaltate(II) ion							
	[ZnTPPS] ⁵⁻ + CoTPPS(OH) ₂ ⁶⁻ →	2.0 × 10 ⁷	13			p.r.	D.k. at 700-740 nm in N ₂ - or N ₂ O-satd. soln. contg. 0.1 mol L ⁻¹ 2-PrOH and varied [Co(III) complex].	81A317

TABLE 28. Rate constants for zinc transients — Continued

Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t(\text{°C})$	Method	Comment	Ref.
28.6 5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatozincate(II) radical anion — Continued							
28.6.2 Dihydroxytetrakis[4-(<i>N,N,N</i>-trimethylammonio)phenyl]porphinecobalt(II) ion							
$[\text{ZnTPPS}]^{5-} + \text{CoTAPP(OH)}_2^{2+} \rightarrow$	5.5×10^8	13			p.r.	D.k. at 700-740 nm in N_2 - or N_2O -satd. soln. contg. 0.1 mol L^{-1} 2-PrOH and varied [Co(III) complex].	81A317
28.6.3 Dihydroxytetrakis(1-methylpyridinium-4-yl)porphinecobalt(II) ion							
$[\text{ZnTPPS}]^{5-} + \text{CoTMpyp(OH)}_2^{2+} \rightarrow$	1.4×10^9	13			p.r.	D.k. at 700-740 nm in N_2 - or N_2O -satd. soln. contg. 0.1 mol L^{-1} 2-PrOH and varied [Co(III) complex].	81A317
28.6.4 Ferricyanide ion							
$[\text{ZnTPPS}]^{5-} + \text{Fe}(\text{CN})_6^{3-} \rightarrow$	1.0×10^9	7	0.5		f.p./pi	D.k. at 650 nm in soln. contg. 2×10^{-3} mol L^{-1} $\text{Fe}(\text{CN})_6^{4-}$, 5.0×10^{-5} mol L^{-1} ZnTPPS^{4-} and 0.5 mol L^{-1} NaCl.	87A200 86A265
28.7 5,10,15,20-Tetrakis[1-(3-sulfonatopropyl)pyridinium-4-yl]porphinatozinc(II) radical anion							
28.7.1 5,10,15,20-Tetrakis[1-(3-sulfonatopropyl)pyridinium-4-yl]porphinatozinc(II) radical anion							
$[\text{ZnTZP}]^{\cdot-} + [\text{ZnTZP}]^{\cdot-} \rightarrow$	4.1×10^6	6.8			p.r.	D.k. at 620 nm in soln. contg. ZnTZP and 0.1 mol L^{-1} 2-PrOH; disproportionation reaction.	83C026
28.8 Tetrakis-<i>N</i>-methyl-2,3-pyridinoporphyrazinezinc(II) radical anion							
28.8.1 Tetrakis-<i>N</i>-methyl-2,3-pyridinoporphyrazinezinc(II) radical anion							
$[\text{ZnTMPz}]^{3+} + [\text{ZnTMPz}]^{3+} \rightarrow$	1.7×10^9	7			p.r.	D.k. at 550 nm in N_2O -satd. phosphate buffered soln. contg. 10% 2-PrOH (v:v).	86B153
28.9 Trisulfophthalocyaninezinc(II) radical anion							
28.9.1 Oxygen							
$[\text{ZnPCS}]^{4-} + \text{O}_2 \rightarrow \text{ZnPCS}^{3-} + \text{O}_2^{\cdot-}$	4.6×10^8	7			f.p./rq	D.k. in aerated soln. contg. $[\text{ZnPCS}]^{3-}$ and 4-aminophenol (RQ).	90A022
28.10 Nitrilotriacetatozinc(II), H-abstraction product							
28.10.1 First-order reaction							
* A →	$4.0 \times 10^3 \text{ s}^{-1}$ $7 \times 10^2 \text{ s}^{-1}$ $8 \times 10^2 \text{ s}^{-1}$	4.0 7.0 9.0		22	p.r.	D.k. in N_2O -satd. soln. contg. $\text{Zn}(\text{NTA})^{\cdot-}$. * Species A suggested to have site of H-abstraction different from Species B.	78A436
28.10.2 Nitrilotriacetatozinc(II), H-abstraction product							
* B + B →	1.9×10^8 1.3×10^7 0.8×10^7	4.0 5.0 7.0		22	p.r.	D.k. in N_2O -satd. soln. contg. $\text{Zn}(\text{NTA})^{\cdot-}$. * Species B suggested to have site of H-abstraction different from Species A.	78A436
28.10.3 Oxygen							
$[\text{ZnNTA-H}]^{\cdot-} + \text{O}_2 \rightarrow$	1.5×10^8 3.4×10^8	4.0 9.0		22	p.r.	D.k. in $\text{N}_2\text{O}/\text{O}_2$ satd. soln. contg. $\text{Zn}(\text{NTA})^{\cdot-}$.	78A436
28.11 Ethylenediaminetetraacetatozinc(II), H-abstraction product							
28.11.1 First-order reaction							
* C →	$5.0 \times 10^2 \text{ s}^{-1}$	4.5,7,9		22	p.r.	D.k. in N_2O -satd. soln. contg. $\text{Zn}(\text{EDTA})^{2-}$. * Species C suggested to have site of H-abstraction different from Species D.	78A436
28.11.2 Ethylenediaminetetraacetatozinc(II), H-abstraction product							
* D + D →	0.5×10^7 1.2×10^6 1.6×10^6 1.0×10^6	4.0 5.0 7.0 9.0		22	p.r.	D.k. in N_2O -satd. soln. contg. $\text{Zn}(\text{EDTA})^{2-}$. * Species D suggested to have site of H-abstraction different from Species C.	78A436

TABLE 28. Rate constants for zinc transients — Continued

No.	Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t(\text{°C})$	Method	Comment	Ref.
28.11 Ethylenediaminetetraacetatozinc(II), H-abstraction product — Continued								
28.11.3 Oxygen								
	$[\text{ZnEDTA-H}]^{2-} + \text{O}_2 \rightarrow$	2.3×10^8 4.0×10^8		4.0 9.0		22	p.r.	D.k. in $\text{N}_2\text{O}/\text{O}_2$ satd. soln. contg. $\text{Zn}(\text{EDTA})^{2-}$.
28.12 5,10,15,20-Tetrakis(1-methylpyridinium-3-yl)porphinatozinc(II), H-adduct								
28.12.1 First-order reaction								
	$[\text{Zn}(3-\text{TMpyP-H})]^{4+} \rightarrow$	$5.7 \times 10^3 \text{ s}^{-1}$		3-10			p.r.	D.k. at 470 nm in N_2O -satd. soln. contg. $\text{Zn}(3-\text{TMpyP})^{4+}$ and 0.01 mol L^{-1} KBr.
28.13 5,10,15,20-Tetrakis(1-methylpyridinium-3-yl)porphinatozinc(II) radical cation								
28.13.1 5,10,15,20-Tetrakis(1-methylpyridinium-3-yl)porphinatozinc(II) radical cation								
	$[\text{Zn}(3-\text{TMpyP})]^{5+} +$ $[\text{Zn}(3-\text{TMpyP})]^{5+} \rightarrow$	$\sim 1.5 \times 10^7$ $\sim 1.3 \times 10^8$		4-9 11			p.r.	D.k. at 700 nm in N_2O -satd. soln. contg. $\text{Zn}(3-\text{TMpyP})^{4+}$ and 0.01 mol L^{-1} KBr; values taken from graph of k vs pH.
		3.7×10^7		2	0.01		f.p./oq	D.k. at 700 nm in soln. contg. $\text{Zn}(3-\text{TMpyP})^{4+}$ and $\text{S}_2\text{O}_8^{2-}$ (OQ).
28.13.2 Iron(II) ion								
	$[\text{Zn}(3-\text{TMpyP})]^{5+} + \text{Fe}^{2+} \rightarrow$ $\text{Zn}(3-\text{TMpyP})^{4+} + \text{Fe}^{3+}$	1.2×10^8		2	0.01		f.p./oq	D.k. at 700 nm in soln. contg. $\text{Zn}(3-\text{TMpyP})^{4+}$ and Fe^{3+} (OQ) and Fe^{2+} .
28.13.3 Ferrocyanide ion								
	$[\text{Zn}(3-\text{TMpyP})]^{5+} + \text{Fe}(\text{CN})_6^{4-} \rightarrow$ $\text{Zn}(3-\text{TMpyP})^{4+} + \text{Fe}(\text{CN})_6^{3-}$	3.2×10^9		11	0.01			
28.14 5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatozinc(II) radical cation								
28.14.1 5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatozinc(II) radical cation								
	$[\text{ZnTMpyP}]^{5+} + [\text{ZnTMpyP}]^{5+} \rightarrow$	3.2×10^9		7.0	4.4- 32.4×10^{-3}		p.r.	D.k. at 700 nm in N_2O -satd. soln. contg. ZnTMpyP^{4+} , 2.0×10^{-3} mol L^{-1} N_3^- and 2×10^{-4} mol L^{-1} phosphate buffer; $k = 4.2 \times 10^9$ and $1.1 \times 10^{10} \text{ L mol}^{-1} \text{ s}^{-1}$ in the presence of 5×10^{-3} and 3.0×10^{-2} mol L^{-1} N_3^- , respectively. Decay involves complexes of the radical cation with azide.
		3.2×10^9		7.0			p.r.	D.k. at 700 nm in N_2O -satd. soln. contg. ZnTMpyP^{4+} and N_3^- . Decay involves complexes of the radical cation with azide.
		1.1×10^9		3.2	0.1		p.r.	D.k. at 700 nm in N_2O -satd. soln. contg. ZnTMpyP^{4+} and 0.1 mol L^{-1} NaCl. Decay involves complexes of the radical cation with chloride.
		9.7×10^7 5.0×10^8 7.0×10^8 9.0×10^8		3.2-7 9.0 11.0 12.0			p.r..	D.k. at 700 nm in N_2O -satd. soln. contg. ZnTMpyP^{4+} and 0.01 mol L^{-1} KBr. Decay involves complexes of the radical cation with bromide.
		6×10^8		7			p.r.	D.k. at 700 nm in N_2O -satd. soln. contg. ZnTMpyP^{4+} and SCN^- . Decay involves complexes of the radical cation with thiocyanate.
		4.5×10^8		7			p.r.	D.k. at 700 nm in N_2O -satd. soln. contg. 10^{-4} mol L^{-1} ZnTMpyP^{4+} , 0.01 mol L^{-1} KBr and 0.1% v/v pyridine. Decay involves a complex of the radical cation with pyridine.
		1.5×10^7		4.0			p.r.	D.k. at 700 nm in N_2O -satd. soln. contg. ZnTMpyP^{4+} and Ag^+ ; $k = 1.8 \times 10^7 \text{ L mol}^{-1} \text{ s}^{-1}$ in the presence of Ti^{4+} .

TABLE 28. Rate constants for zinc transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
28.14 5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatozinc(II) radical cation — Continued								
28.14.2 Ethylenediaminetetraacetatocobaltate(II) ion								
	[ZnTMyP] ⁵⁺ + CoEDTA ²⁻ → ZnTMyP ⁴⁺ + CoEDTA ⁻	~2.2 × 10 ⁹				f.p./oq	D.k. at 700 nm in Ar-satd. soln. contg. ZnTMyP ⁴⁺ and CoEDTA ⁻ (OQ).	85A430
28.14.3 5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatocobaltate(II) ion								
	[ZnTMyP] ⁵⁺ + CoTPPS ⁴⁻ →	2.8 × 10 ⁹	7			p.r.	D.k. at 700 nm in N ₂ O-satd. soln. contg. 0.1 mol L ⁻¹ bromide ion and varied [Co(II) complex].	81A317
28.14.4 Iron(II) ion								
	[ZnTMyP] ⁵⁺ + Fe ²⁺ → ZnTMyP ⁴⁺ + Fe ³⁺	2 × 10 ⁸	2.5	0.1		f.p./oq	Soln. contg. ZnTMyP ⁴⁺ , Fe ³⁺ (OQ) and 0.1 mol L ⁻¹ NaCl.	82A321
28.14.5 1,1'-Bis(2-sulfonatoethyl)-4,4'-bipyridinium radical anion								
	[ZnTMyP] ⁵⁺ + [SEV] ⁻ → ZnTMyP ⁴⁺ + SEV	8.3 × 10 ⁹	6.5		20	f.p./oq	D.k. in soln. contg. ZnTMyP ⁴⁺ , SEV (OQ) and 0.04 mol L ⁻¹ phosphate buffer.	89A362
28.14.6 1,1'-Bis(3-sulfonatopropyl)-4,4'-bipyridinium radical anion								
	[ZnTMyP] ⁵⁺ + [SPV] ⁻ → ZnTMyP ⁴⁺ + SPV	3.5 × 10 ⁹				f.p./oq	D.k. at 700 nm in soln. contg. 3 × 10 ⁻⁵ mol L ⁻¹ ZnTMyP ⁴⁺ and 1 × 10 ⁻³ mol L ⁻¹ SPV (OQ).	86N075
		2 × 10 ⁹				f.p./oq	D.k. at 395 nm in soln. contg. ZnTMyP ⁴⁺ and SPV (OQ).	84N212
28.14.7 1,1'-Bis[3-(trimethylammonio)propyl]-4,4'-bipyridinium radical cation								
	[ZnTMyP] ⁵⁺ + [APV] ³⁺ → ZnTMyP ⁴⁺ + APV ⁴⁺	3.3 × 10 ⁸	6.5		20	f.p./oq	D.k. in soln. contg. ZnTMyP ⁴⁺ , APV ⁴⁺ (OQ) and 0.04 mol L ⁻¹ phosphate buffer.	89A362
28.14.8 1,1'-Dimethyl-4,4'-bipyridinium radical cation								
	[ZnTMyP] ⁵⁺ + MV ²⁺ → ZnTMyP ⁴⁺ + MV ²⁺	2.0 × 10 ⁹	6.5		20	f.p./oq	D.k. in soln. contg. ZnTMyP ⁴⁺ , MV ²⁺ (OQ) and 0.04 mol L ⁻¹ phosphate buffer.	89A362
		1.2 × 10 ⁹	0.03			f.p./oq	D.k. at 390, 605 and 700 nm in Ar-satd. soln. contg. 0.01 mol L ⁻¹ ZnTMyP ⁴⁺ and (2-10) × 10 ⁻³ mol L ⁻¹ MV ²⁺ (OQ).	84A264
		5.0 × 10 ⁸	0.015					
		3.9 × 10 ⁸	0.006					
		1.3 × 10 ⁸	→0					
		4 × 10 ⁸				f.p./oq	D.k. at 395 nm in soln. contg. ZnTMyP ⁴⁺ and MV ²⁺ (OQ).	84N212
		1.4 × 10 ⁹	4.7	0.1		f.p./oq	D.k. at 605 and 705 nm in soln. contg. ZnTMyP ⁴⁺ and 0.015 mol L ⁻¹ MV ²⁺ (OQ).	82N168
		3.7 × 10 ⁸	5.0	0.05		f.p./oq	D.k. in soln. contg. ZnTMyP ⁴⁺ and MV ²⁺ (OQ).	81F164
28.14.9 1,1'-Dipropyl-4,4'-bipyridinium radical cation								
	[ZnTMyP] ⁵⁺ + [C ₃ V] ⁺ → ZnTMyP ⁴⁺ + C ₃ V ²⁺	3 × 10 ⁸				f.p./oq	D.k. at 395 nm in soln. contg. ZnTMyP ⁴⁺ and C ₃ V ²⁺ (OQ).	84N212
28.14.10 1,1'-Dihexyl-4,4'-bipyridinium radical cation								
	[ZnTMyP] ⁵⁺ + [C ₆ V] ⁺ → ZnTMyP ⁴⁺ + C ₆ V ²⁺	4 × 10 ⁸				f.p./oq	D.k. at 395 nm in soln. contg. ZnTMyP ⁴⁺ and C ₆ V ²⁺ (OQ).	84N212
28.14.11 1,1'-Diheptyl-4,4'-bipyridinium radical cation								
	[ZnTMyP] ⁵⁺ + [C ₇ V] ⁺ → ZnTMyP ⁴⁺ + C ₇ V ²⁺	8.4 × 10 ⁸				f.p./oq	D.k. at 700 nm in soln. contg. ZnTMyP ⁴⁺ and 3 × 10 ⁻³ mol L ⁻¹ C ₇ V ²⁺ (OQ).	85A430
28.14.12 1,1'-Diocetyl-4,4'-bipyridinium radical cation								
	[ZnTMyP] ⁵⁺ + [C ₈ V] ⁺ → ZnTMyP ⁴⁺ + C ₈ V ²⁺	6 × 10 ⁸				f.p./oq	D.k. at 395 nm in soln. contg. ZnTMyP ⁴⁺ and C ₈ V ²⁺ (OQ).	84N212
28.14.13 1,1'-Didodecyl-4,4'-bipyridinium radical cation								
	[ZnTMyP] ⁵⁺ + [C ₁₂ V] ⁺ → ZnTMyP ⁴⁺ + C ₁₂ V ²⁺	3 × 10 ⁸				f.p./oq	D.k. at 395 nm in soln. contg. ZnTMyP ⁴⁺ and C ₁₂ V ²⁺ (OQ).	84N212

TABLE 28. Rate constants for zinc transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
28.14 5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatozinc(II) radical cation — Continued								
28.14.14 1-Dodecyl-1'-methyl-4,4'-bipyridinium radical cation								
	[ZnTMyP] ⁵⁺ + [C ₁₂ MV] ⁺ → ZnTMyP ⁴⁺ + C ₁₂ MV ²⁺	6 × 10 ⁸				f.p./oq	D.k. at 395 nm in soln. contg. ZnTMyP ⁴⁺ and C ₁₂ MV ²⁺ (OQ).	84N212
28.14.15 Ethylenediaminetetraacetate ions								
	[ZnTMyP] ⁵⁺ + EDTA → ZnTMyP ⁴⁺ + [EDTA _{ox}] [*]	* 1.9 × 10 ⁷				f.p./oq	D.k. at 700 nm in Ar-satd. soln. contg. 2 × 10 ⁻⁴ mol L ⁻¹ ZnTMyP ⁴⁺ , 0.001 mol L ⁻¹ CoEDTA ⁻ (OQ) and 5 × 10 ⁻³ mol L ⁻¹ EDTA.	85A430
		* 2.7 × 10 ⁶	5.0	0.05		f.p./oq	D.k. in soln. contg. ZnTMyP ⁴⁺ , 0.005 mol L ⁻¹ MV ²⁺ (OQ) and (1-20) × 10 ⁻³ mol L ⁻¹ EDTA.	81F164
							* Unexplained discrepancy in these data.	
28.14.16 1-Methyl-1'-tetradecyl-4,4'-bipyridinium radical cation								
	[ZnTMyP] ⁵⁺ + [C ₁₄ MV] ⁺ → ZnTMyP ⁴⁺ + C ₁₄ MV ²⁺	5 × 10 ⁹				f.p./oq	D.k. at 602 nm in soln. contg. 5 × 10 ⁻⁵ mol L ⁻¹ ZnTMyP ⁴⁺ and 10 ⁻³ mol L ⁻¹ C ₁₄ MV ²⁺ (OQ).	81N002
28.14.17 1-Methyl-1'-(2-sulfonato)ethyl-4,4'-bipyridinium radical cation								
	[ZnTMyP] ⁵⁺ + [MSEV] [*] → ZnTMyP ⁴⁺ + MSEV ⁻	5.5 × 10 ⁹	6.5	20	f.p./oq	D.k. in soln. contg. ZnTMyP ⁴⁺ , MSEV ⁻ (OQ) and 0.04 mol L ⁻¹ phosphate buffer.	89A362	
28.14.18 1-Methyl-1'-[3-(trimethylammonio)propyl]-4,4'-bipyridinium radical cation								
	[ZnTMyP] ⁵⁺ + [MTMAPV] ²⁺ → ZnTMyP ⁴⁺ + MTMAPV ³⁺	1.0 × 10 ⁹	6.5	20	f.p./oq	D.k. in soln. contg. ZnTMyP ⁴⁺ , MTMAPV ³⁺ (OQ) and 0.04 mol L ⁻¹ phosphate buffer.	89A362	
28.15 5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatozincate(II) radical cation								
28.15.1 5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatozincate(II) radical cation								
	[ZnTPPS] ³⁻ + [ZnTPPS] ³⁻ →	1.5 × 10 ⁵	7			p.r.	D.k. at 700 nm in N ₂ O-satd. soln. contg. 0.01 mol L ⁻¹ SCN ⁻ and 10 ⁻⁴ mol L ⁻¹ ZnTPPS ⁴⁻ . Decay involves complexes of the radical cation with SCN ⁻ . When SCN ⁻ is replaced by Br ⁻ decay is approximately first-order with half-life ~6 s between pH 3.2 and 7 and then half-life decreases with increasing pH (half-life = 3 ms at pH 13).	85A038
28.15.2 Superoxide radical anion								
	[ZnTPPS] ³⁻ + O ₂ ^{·-} →	1.1 × 10 ⁹	7.5			f.p./oq	D.k. at 700 nm in N ₂ /O ₂ (95:5) satd. soln. contg. 1.5 × 10 ⁻⁴ mol L ⁻¹ ZnTPPS ⁴⁻ , 3 × 10 ⁻³ mol L ⁻¹ metronidazole (OQ) and 2.5 × 10 ⁻² mol L ⁻¹ phosphate buffer.	88A285
28.15.3 5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatocobaltate(II) ion								
	[ZnTPPS] ³⁻ + CoTPPS ⁴⁻ →	1.1 × 10 ⁸	7			p.r.	D.k. at 700 nm in N ₂ O-satd. soln. contg. 0.1 mol L ⁻¹ bromide ion and varied [Co(II) complex].	81A317
28.15.4 Ferrocyanide ion								
	[ZnTPPS] ³⁻ + Fe(CN) ₆ ⁴⁻ → ZnTPPS ⁴⁻ + Fe(CN) ₆ ³⁻	3.7 × 10 ⁷	9	0.01		p.r.	D.k. at 700 nm in N ₂ O-satd. soln. contg. ZnTPPS ⁴⁻ and 0.01 mol L ⁻¹ KBr.	85S167
28.15.5 Oxygen								
	[ZnTPPS] ³⁻ + O ₂ →	<2 × 10 ⁴	7.5			f.p./oq	D.k. at 700 nm in N ₂ /O ₂ (95:5) satd. soln. contg. 1.5 × 10 ⁻⁴ mol L ⁻¹ ZnTPPS ⁴⁻ , 3 × 10 ⁻³ mol L ⁻¹ metronidazole (OQ) and 2.5 × 10 ⁻² mol L ⁻¹ phosphate buffer.	88A285
28.15.6 1,1'-Bis(carboxyethyl)-4,4'-bipyridinium radical ion (1+)								
	[ZnTPPS] ³⁻ + [CEV] ⁺ → ZnTPPS ⁴⁻ + CEV ²⁺	6 × 10 ⁸			25	f.p./oq	D.k. in soln. contg. ZnTPPS ⁴⁻ and CEV ²⁺ (OQ).	82N022

TABLE 28. Rate constants for zinc transients — Continued

Reaction	k ($\text{L mol}^{-1} \text{s}^{-1}$)	pH	I	$t(\text{°C})$	Method	Comment	Ref.
28.15 5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatozincate(II) radical cation — Continued							
28.15.7 1,1'-Bis(2-sulfonatoethyl)-4,4'-bipyridinium radical anion	$[ZnTPPS]^{3-} + [SEV]^- \rightarrow ZnTPPS^{4-}$ + SEV	9×10^8	6.5	20	f.p./oq	D.k. in soln. contg. $ZnTPPS^{4-}$, SEV (OQ) and 0.04 mol L^{-1} phosphate buffer.	89A362
28.15.8 1,1'-Bis[3-(trimethylammonio)propyl]-4,4'-bipyridinium radical cation	$[ZnTPPS]^{3-} + [APV]^{3+} \rightarrow ZnTPPS^{4-}$ $ZnTPPS^{4-} + APV^{4+}$	3.3×10^{10}	6.5	20	f.p./oq	D.k. in soln. contg. $ZnTPPS^{4-}$, APV^{4+} (OQ) and 0.04 mol L^{-1} phosphate buffer.	89A362
28.15.9 1,1'-Dimethyl-4,4'-bipyridinium radical cation	$[ZnTPPS]^{3-} + MV^{2+} \rightarrow ZnTPPS^{4-}$ MV^{2+}	2×10^9	-7	22	f.p./oq	D.k. at 600 and 460 nm in soln. contg. $2 \times 10^{-5} \text{ mol L}^{-1}$ $ZnTPPS^{4-}$, $(2.5) \times 10^{-4} \text{ mol L}^{-1}$ MV^{2+} (OQ) and 0.2 mol L^{-1} NaCl or 0.05 mol L^{-1} $ZnSO_4$.	85F141
28.15.10 1-Methyl-1'-(2-sulfonato)ethyl-4,4'-bipyridinium radical cation	$[ZnTPPS]^{3-} + [MSEV]^- \rightarrow ZnTPPS^{4-} + MSEV^-$	3.7×10^9	6.5	20	f.p./oq	D.k. in soln. contg. $ZnTPPS^{4-}$, MSEV (OQ) and 0.04 mol L^{-1} phosphate buffer.	89A362
28.15.11 1-Methyl-1'-[3-(trimethylammonio)propyl]-4,4'-bipyridinium radical cation	$[ZnTPPS]^{3-} + [MTMAPV]^{2+} \rightarrow ZnTPPS^{4-} + MMAPV^{3+}$	2×10^{10}	6.5	20	f.p./oq	D.k. in soln. contg. $ZnTPPS^{4-}$, MMAPV ³⁺ (OQ) and 0.04 mol L^{-1} phosphate buffer.	89A362
28.15.12 Nitrobenzene radical anion	$[ZnTPPS]^{3-} + [C_6H_5NO_2]^{1-} \rightarrow ZnTPPS^{4-} + C_6H_5NO_2$	2×10^8	-7		f.p./oq	D.k. in soln. contg. $ZnTPPS^{4-}$ nitrobenzene (OQ).	85F141
28.15.13 Tryptophan	$[ZnTPPS]^{3-} + TrpH \rightarrow$	$<4 \times 10^5$	9.2		f.p./oq	D.k. at 700 nm in Ar-satd. soln. contg. $ZnTPPS^{4-}$ and $4 \times 10^{-4} \text{ mol L}^{-1}$ metronidazole (OQ).	86A063
28.15.14 Tyrosine	$[ZnTPPS]^{3-} + TyrOH \rightarrow$	8.2×10^7	9.2		f.p./oq	D.k. at 700 nm in Ar-satd. soln. contg. $ZnTPPS^{4-}$ and $4 \times 10^{-4} \text{ mol L}^{-1}$ metronidazole (OQ).	86A063
28.16 Hydroxy(tetrakis(2-hydroxyphenyl)porphinato)zinc(II) radical cation, deprotonated							
28.16.1 Hydroxy(tetrakis(2-hydroxyphenyl)porphinato)zinc(II) radical cation, deprotonated							
$(HO)[ZnT(o-OP)P]^{4-} +$	2.7×10^7	12		p.r.	D.k. at 680 nm in N_2O -satd. soln. contg. $10^{-4} \text{ mol L}^{-1}$ zinc porphyrin and 0.01 mol L^{-1} KBr.	86A242	
$(HO)[ZnT(o-OP)P]^{4-} \rightarrow$							
28.17 Hydroxy(tetrakis(3-hydroxyphenyl)porphinato)zinc(II) radical cation, deprotonated							
28.17.1 Hydroxy(tetrakis(3-hydroxyphenyl)porphinato)zinc(II) radical cation, deprotonated							
$(HO)[ZnT(m-OP)P]^{4-} +$	3.4×10^7	12		p.r.	D.k. at 680 nm in N_2O -satd. soln. contg. $10^{-4} \text{ mol L}^{-1}$ zinc porphyrin and 0.01 mol L^{-1} KBr; $k = 3.2 \times 10^7$ and $4.0 \times 10^7 \text{ L mol}^{-1} \text{ s}^{-1}$ at pH 13 and 14, respectively.	86A242	
$(HO)[ZnT(m-OP)P]^{4-} \rightarrow$							
28.18 5,10,15,20-Tetrakis[1-(3-sulfonatopropyl)pyridinium-4-yl]porphinatozinc(II) radical cation							
28.18.1 5,10,15,20-Tetrakis[1-(3-sulfonatopropyl)pyridinium-4-yl]porphinatozinc(II) radical cation							
$[ZnTZP]^{4+} + [ZnTZP]^{4+} \rightarrow$	3.0×10^9	7.0		p.r.	D.k. at 700 nm in N_2O -satd. soln. contg. $10^{-4} \text{ mol L}^{-1}$ $ZnTZP$ and 0.01 mol L^{-1} KBr. Decay involves a complex of the radical cation with bromide.	85A038	

TABLE 28. Rate constants for zinc transients — Continued

No.	Reaction	<i>k</i> (L mol ⁻¹ s ⁻¹)	pH	<i>I</i>	<i>t</i> (°C)	Method	Comment	Ref.
28.19 5,10,15,20-Tetrakis[1-(3-sulfonatopropyl)pyridinium-2-yl]porphinatozinc(II) radical cation								
28.19.1	Iron(II) ions							
	[Zn(2-TZP)] ⁺ + Fe(II) → Zn(2-TZP) + Fe(III)	3.2×10^5	0			f.p./oq	D.k. at 700 nm in soln. contg. Zn(2-TZP), Fe(III) (OQ), 1 mol L ⁻¹ nitric acid and added Fe(II).	87A261
28.20 5,10,15,20-Tetrakis(2-N-hexylpyridyl)porphinatozinc(II) radical cation								
28.20.1	Iron(II) ions							
	[Zn(2-THPyP)] ⁵⁺ + Fe(II) → Zn(2-THPyP) ⁴⁺ + Fe(III)	3.2×10^5	0			f.p./oq	D.k. at 700 nm in soln. contg. Zn(2-THPyP) ⁴⁺ , Fe(III) (OQ), 1 mol L ⁻¹ nitric acid and added Fe(II).	87A261
28.21 Tetrakis-4-(<i>N,N,N</i>-trimethylammonio)phenylporphinezinc(II) radical cation								
28.21.1	Tetrakis-4-(<i>N,N,N</i> -trimethylammonio)phenylporphinezinc(II) radical cation							
	[ZnTAPP] ⁵⁺ + [ZnTAPP] ⁵⁺ →	7×10^6	7			p.r.	D.k. at 700 nm in N ₂ O-satd. soln. contg. 10 ⁻⁴ mol L ⁻¹ ZnTAPP ⁴⁺ and 0.01 mol L ⁻¹ KBr. Decay involves a complex of the radical cation with bromide.	85A038
28.22 5,10,15,20-Tetrakis(2,6-dichloro-3-sulfonatophenyl)porphinatozincate(II) radical cation								
28.22.1	5,10,15,20-Tetrakis(2,6-dichloro-3-sulfonatophenyl)porphinatozincate(II) radical cation							
	[ZnTCPPS] ³⁻ + [ZnTCPPS] ³⁻ → ZnTCPPS ⁴⁻ + ZnTCPPS ²⁻	2×10^7	7			p.r.	D.k. at 700 nm in N ₂ O-satd. soln. contg. ZnTCPPS ⁴⁻ and 0.01 mol L ⁻¹ NaN ₃ ; unclear whether <i>k</i> or 2 <i>k</i> .	90R041
28.22.2	1,4-Benzosemiquinone radical ion							
	[ZnTCPPS] ³⁻ + Q ^{·-} → ZnTCPPS ⁴⁻ + Q	4.8×10^9	7			f.p./oq	D.k. in N ₂ -satd. soln. contg. ZnTCPPS ⁴⁻ , benzoquinone (OQ) and 0.2 mol L ⁻¹ Na ₂ SO ₄ .	90R041
28.22.3	2,6-Dimethylbenzosemiquinone radical ion							
	[ZnTCPPS] ³⁻ + [2,6-(CH ₃) ₂ Q] ^{·-} → ZnTCPPS ⁴⁻ + 2,6-(CH ₃) ₂ Q	4.8×10^9	7			f.p./oq	D.k. in N ₂ -satd. soln. contg. ZnTCPPS ⁴⁻ , 2,6-dimethylbenzoquinone (OQ) and 0.2 mol L ⁻¹ Na ₂ SO ₄ .	90R041
28.22.4	1,4-Benzenediol							
	[ZnTCPPS] ³⁻ + QH ₂ → ZnTCPPS ⁴⁻ + Q ^{·-} + 2 H ⁺	8.8×10^8	7			f.p./oq	D.k. in N ₂ -satd. soln. contg. ZnTCPPS ⁴⁻ , benzoquinone (OQ), excess hydroquinone and 0.2 mol L ⁻¹ Na ₂ SO ₄ .	90R041
28.23 Zinc(II) uroporphyrin radical cation								
28.23.1	Nicotinamide adenine dinucleotide							
	[ZnUP] ⁺ + NAD → ZnUP + NAD ⁺	1.4×10^8	7	25		f.p./oq	D.k. at 380 and 670 nm in soln. contg. zinc(II) uroporphyrin, NAD ⁺ (OQ), 1.1 × 10 ⁻⁴ mol L ⁻¹ K ₂ HPO ₄ and 0.1 mol L ⁻¹ KCl.	75A245
28.23.2	<i>N</i> -Benzyl-3-carbamylpyridinyl							
	[ZnUP] ⁺ + C ₆ H ₅ CH ₂ pyCONH ₂ → ZnUP + C ₆ H ₅ CH ₂ py ⁺ CONH ₂	1.4×10^8	7	25		f.p./oq	D.k. at 380 and 670 nm in soln. contg. zinc(II) uroporphyrin, <i>N</i> -benzylnicotinamide (OQ), 1.1 × 10 ⁻⁴ mol L ⁻¹ K ₂ HPO ₄ and 0.1 mol L ⁻¹ KCl.	75A245
28.24 Zinc(II) hematoporphyrin radical anion								
28.24.1	Zinc(II) hematoporphyrin radical anion							
	[ZnHP] ^{·-} + [ZnHP] ^{·-} → [ZnHP] ₂ ²⁻	2.1×10^8	13			p.r.	D.k. in N ₂ O-satd. soln. contg. 1.0 mol L ⁻¹ 2-PrOH, 1 × 10 ⁻⁵ mol L ⁻¹ zinc(II) hematoporphyrin, 1 × 10 ⁻⁴ mol L ⁻¹ ZnSO ₄ and 0.1 mol L ⁻¹ NaOH; unclear whether <i>k</i> or 2 <i>k</i> .	741040

7. References to Tables

- 640133 Pulsradiolytische Untersuchung schneller Reaktionen von hydratisierten Elektronen, freien Radikalen und Ionen mit Tetranitromethan in Waessriger Loesung. Asmus, K.-D.; Henglein, A.; Ebert, M.; Keene, J.P., *Ber. Bunsenges. Phys. Chem.* **68**: 657-63 (1964)
- 650044 The pulse radiolysis of aqueous solutions of some inorganic compounds. Baxendale, J.H.; Fielden, E.M.; Keene, J.P., *Proc. Roy. Soc. (London) Ser. A* **286**: 320-36 (1965)
- 650385 Determination of some fast reaction rates using the pulsed radiolysis of permanganate solutions. Baxendale, J.H.; Keene, J.P.; Stott, D.A., *Pulse Radiolysis*, Ebert, M.; Keene, J.P.; Swallow, A.J.; Baxendale, J.H. (eds.), Academic Press, New York, 1965, p.107-15
- 660097 Novel valence states of thallium as studied by pulse radiolysis. Cercek, B.; Ebert, M.; Swallow, A.J., *J. Chem. Soc. Pt. A* : 612-5 (1966)
- 66A001 Reactions and relative potentials of some metal ions in unstable valency states. Baxendale, J.H.; Keene, J.P.; Stott, D.A., *Chem. Commun.* : 713-6 (1966)
- 680066 Reactions of nitrosodimethylaniline with free radicals. Dainton, F.S.; Wiseall, B., *Trans. Faraday Soc.* **64**: 694-705 (1968)
- 680169 Pulse radiolysis studies on stable and transient complexes of platinum. Adams, G.E.; Broszkiewicz, R.B.; Michael, B.D., *Trans. Faraday Soc.* **64**: 1256-64 (1968)
- 680302 A pulse radiolysis study of bivalent and zerovalent gold in aqueous solutions. Ghosh-Mazumdar, A.S.; Hart, E.J., *Adv. Chem. Ser.* **61**: 193-209 (1968)
- 680431 Pulsradiolytische Untersuchung einiger Elementarprozesse der Silberreduktion. Pukies, J.; Roebke, W.; Henglein, A., *Ber. Bunsenges. Phys. Chem.* **72**: 842-7 (1968)
- 680435 Pulsradiolytische Untersuchung der Reduktion des Ag⁺-Ions in ammoniakalischer Loesung. Pukies, J.; Roebke, W., *Ber. Bunsenges. Phys. Chem.* **72**: 1101-5 (1968)
- 68G855 Reductions by monovalent zinc, cadmium, and nickel cations. Meyerstein, D.; Mulac, W.A., *J. Phys. Chem.* **72**: 784-8 (1968)
- 690144 Electron pulse radiolysis of aqueous tetrachloro and tetracyano complexes of Pt^{II}. Ghosh-Mazumdar, A.S.; Hart, E.J., *Int. J. Radiat. Phys. Chem.* **1**: 165-76 (1969)
- 690277 Effect of ligands on reactivity of metal cations towards the hydrated electron. Part 2. Effect of glycine, ethylenediamine and nitrilotriacetic acid. Meyerstein, D.; Mulac, W.A., *Trans. Faraday Soc.* **65**: 1818-26 (1969)
- 690428 Reduction of cobalt(III) complexes by monovalent zinc, cadmium, and nickel ions in aqueous solutions. Meyerstein, D.; Mulac, W.A., *J. Phys. Chem.* **73**: 1091-5 (1969)
- 690434 Pulse-radiolysis study of some unstable complexes of iron. Jayson, G.G.; Keene, J.P.; Stirling, D.A.; Swallow, A.J., *Trans. Faraday Soc.* **65**: 2453-64 (1969)
- 700178 Radiolysis of aqueous solutions of ruthenium(III) hexa-ammine and chloropenta-ammine. Baxendale, J.H.; Rodgers, M.A.J.; Ward, M.D., *J. Chem. Soc. Pt. A* : 1246-50 (1970)
- 700336 Radiation-induced oxidation of alcohols by Ti(III) in acid aqueous solution. Burchill, C.E.; Hickling, G.G., *Can. J. Chem.* **48**: 2466-73 (1970)
- 700512 Pulse radiolytic induced transient electrical conductance in liquid solutions. Part 3. Radiolysis of aqueous solutions of some inorganic systems. Barker, G.C.; Fowles, P., *Trans. Faraday Soc.* **66**: 1661-9 (1970)
- 700580 Une etude par radiolyse pulsee sur l'espèce transitoire Au II. Baxendale, J.H.; Koulkes-Pujo, A.-M., *J. Chim. Phys.* **67**: 1602-7 (1970)
- 701228 The effect of ligands on the chemical properties of monovalent cadmium ions. Meyerstein, D.; Mulac, W.A., *Inorg. Chem.* **9**: 1762-6 (1970)
- 701229 The reduction of ruthenium(III) hexaammine by hydrogen atoms and monovalent zinc, cadmium, and nickel ions in aqueous solutions. Navon, G.; Meyerstein, D., *J. Phys. Chem.* **74**: 4067-70 (1970)
- 707726 The rates of oxidation of Fe²⁺, Mn²⁺, and Co⁺ by Br₂⁻ radical ions. Thornton, A.T.; Laurence, G.S., *Chem. Commun.* : 443-4 (1970)
- 710036 Effect of thallous ions on the yields of hydrogen and hydrogen peroxide in radiolyzed aqueous solutions. Faraggi, M.; Zehavi, D.; Anbar, M., *Trans. Faraday Soc.* **67**: 2057-67 (1971)
- 710097 Pulse radiolysis of aqueous solutions of pentacyanocobaltate(II). The detection and characterization of pentacyanocobaltate(I). Venerable, G.D.; Halpern, J., *J. Am. Chem. Soc.* **93**: 2176-9 (1971)
- 710174 Trivalent copper. I. A pulse radiolytic study of the chemical properties of the aquo complex. Meyerstein, D., *Inorg. Chem.* **10**: 638-41 (1971)
- 710234 A study of the oxidation and reduction of Ru(NH₃)₅N₂²⁺ by γ and electron pulse radiolysis. Baxendale, J.H.; Mulazzani, O.G., *J. Inorg. Nucl. Chem.* **33**: 823-30 (1971)
- 710775 Trivalent copper. II. A pulse radiolytic study of the formation and decomposition of amino complexes. Meyerstein, D., *Inorg. Chem.* **10**: 2244-9 (1971)
- 720290 Pulse radiolysis of metallic ions in aqueous solutions: I. Pulse radiolysis in Hg²⁺ and Hg₂²⁺ ions aqueous solutions. Faraggi, M.; Amozig, A., *Int. J. Radiat. Phys. Chem.* **4**: 353-8 (1972)
- 720381 Transient species in the reactions of some pyridyl complex ions with hydrated electrons. Baxendale, J.H.; Fiti, M., *J. Chem. Soc. Dalton Trans.* : 1995-8 (1972)
- 720460 Trivalent nickel. I. A pulse radiolytic study of the formation and decomposition of the ammoniacal complex in aqueous solution. Lati, J.; Meyerstein, D., *Inorg. Chem.* **11**: 2393-7 (1972)
- 720461 Trivalent nickel. II. A pulse radiolytic study of the formation and decomposition of the ethylenediamine and glycine complexes in aqueous solution. Lati, J.; Meyerstein, D., *Inorg. Chem.* **11**: 2397-401 (1972)
- 720844 Sellers, R.M., Ph.D. Thesis, Univ. of Leeds, 1972
- 727193 The photochemistry of the mono-oxalatoiron(III) ion. Cooper, G.D.; DeGraff, B.A., *J. Phys. Chem.* **76**: 2618-25 (1972)
- 730038 Oxidation of ferrous ions by perhydroxyl radicals. Jayson, G.G.; Parsons, B.J.; Swallow, A.J., *J. Chem. Soc., Faraday Trans. I* **69**: 236-42 (1973)
- 730039 Radiation chemical study of the reaction of Ni⁺, Co⁺ and Cd⁺ with N₂O. Evidence for the formation of a hyperoxidised state by oxygen atom transfer. Buxton, G.V.; Dainton, F.S.; McCracken, D.R., *J. Chem. Soc., Faraday Trans. I* **69**: 243-54 (1973)
- 730043 Reduction of mercuric chloride by hydrated electrons and reducing radicals in aqueous solutions. Formation and reactions of HgCl. Nazhat, N.B.; Asmus, K.-D., *J. Phys. Chem.* **77**: 614-20 (1973)
- 730112 Pulse radiolytic investigations of the catalyzed disproportionation of peroxy radicals. Aqueous cupric ions. Rabani, J.; Klug-Roth, D.; Lilie, J., *J. Phys. Chem.* **77**: 1169-75 (1973)
- 730121 Pulse radiolysis of 1,4-dicyanobenzene in aqueous solutions in the presence and absence of thallium(I) ions. Robinson, E.A.; Schulte-Frohlinde, D., *J. Chem. Soc., Faraday Trans. I* **69**: 707-18 (1973)
- 731022 Appearance of sulphatoferric complexes in the oxidation of ferrous sulphate solutions. A study by pulse radiolysis. Jayson, G.G.; Parsons, B.J.; Swallow, A.J., *J. Chem. Soc., Faraday Trans. I* **69**: 1079-89 (1973)
- 731047 One-electron redox reactions of free radicals in solution. Rate of electron transfer processes to quinones. Rao, P.S.; Hayon, E., *Biochim. Biophys. Acta* **292**: 516-33 (1973)
- 731053 Pulse radiolysis of liquids at high pressures. IV. Hydrogen-atom reactions in aqueous 0.1M HClO₄ solutions. Farhatiaziz; Mihalcea, I.; Sharp, L.J.; Hentz, R.R., *J. Chem. Phys.* **59**: 2309-15 (1973)
- 731066 Pulse radiolysis studies on complexes of iridium. Broszkiewicz, R.K., *J. Chem. Soc., Dalton Trans.* : 1799-802 (1973)
- 731080 Pulse radiolysis of mercuric ion in aqueous solutions. Fujita, S.; Horii, H.; Taniguchi, S., *J. Phys. Chem.* **77**: 2868-71 (1973)
- 731104 Rate constants of electron transfer processes in solution: Dependence on the redox potential of the acceptor. Rao, P.S.; Hayon, E., *Nature (London)* **243**: 344-6 (1973)
- 737317 Kinetics of oxidation of transition-metal ions by halogen radical anions. Part III. The oxidation of manganese(II) by dibromide and dichloride ions generated by flash photolysis. Laurence, G.S.; Thornton, A.T., *J. Chem. Soc., Dalton Trans.* : 1637-44 (1973)
- 737514 Photodecomposition of hydrogen peroxide in the presence of copper ions. IV. Determination of rate constants of elementary reactions. Kozlov, Yu.N.; Berdnikov, V.M., *Russ. J. Phys. Chem.* **47**: 338-40 (1973) Translated from: *Zh. Fiz. Khim.* **47**: 598-602 (1973)

- 741017 A pulse radiolytic study of thallium(II) in aqueous perchloric acid solutions. Schwarz, H.A.; Comstock, D.; Yandell, J.K.; Dodson, R.W., *J. Phys. Chem.* **78**: 488-93 (1974)
- 741037 Pulse radiolytic study of Ni⁺. Nickel-carbon bond formation. Kelm, M.; Lilie, J.; Henglein, A.; Janata, E., *J. Phys. Chem.* **78**: 882-7 (1974)
- 741038 Pulse radiolytic studies of chloride complexes of thallium(II). Absorption spectra and stability constants of TlCl⁺, TlCl₂, and TlCl₃. Dodson, R.W.; Schwarz, H.A., *J. Phys. Chem.* **78**: 892-9 (1974)
- 741040 On the mechanism of reduction of porphyrins. A pulse radiolytic study. Harel, Y.; Meyerstein, D., *J. Am. Chem. Soc.* **96**: 2720-7 (1974)
- 741072 Gamma and pulse radiolysis of tetracyanonickelate(II) anion in aqueous solution. Mulazzani, Q.G.; Ward, M.D.; Semerano, G.; Emmi, S.S.; Giordani, P., *Int. J. Radiat. Phys. Chem.* **6**: 187-201 (1974)
- 741142 Ultraviolet-visible spectrum, and kinetics of formation and decomposition, of penta-aqua hydridochromium(III) and chromium(I) in aqueous perchlorate solutions: A pulse-radiolysis study. Cohen, H.; Meyerstein, D., *J. Chem. Soc., Dalton Trans.* : 2559-64 (1974)
- 741146 Chromium-carbon bonds in aqueous solutions. A pulse radiolytic study. Cohen, H.; Meyerstein, D., *Inorg. Chem.* **13**: 2434-43 (1974)
- 747159 Electron transfer quenching of the luminescent excited state of tris(2,2'-bipyridine)ruthenium(II). A flash photolysis relaxation technique for measuring the rates of very rapid electron transfer reactions. Bock, C.R.; Meyer, T.J.; Whitten, D.G., *J. Am. Chem. Soc.* **96**: 4710-2 (1974)
- 747625 Aqueous chemistry of thallium(II). Part I. Kinetics of reaction of thallium(II) with cobalt(II) and iron(III) ions and oxidation-reduction potentials of thallium(II). Falcinella, B.; Felgate, P.D.; Laurence, G.S., *J. Chem. Soc. Dalton Trans.* : 1367-73 (1974)
- 751027 Pulse radiolysis study of monovalent cadmium, cobalt, nickel and zinc in aqueous solution. Pt. 1. Formation and decay of the monovalent ions. Buxton, G.V.; Sellers, R.M., *J. Chem. Soc., Faraday Trans. I* **71**: 558-67 (1975)
- 751032 One electron oxidation of odd-valent metal ions in solution. Rao, P.S.; Hayon, E., *J. Phys. Chem.* **79**: 865-8 (1975)
- 751044 Pulse radiolysis of mercuric oxide in neutral aqueous solutions. Fujita, S.; Horii, H.; Mori, T.; Taniguchi, S., *J. Phys. Chem.* **79**: 960-4 (1975)
- 751049 Reactivity of coordinated nitrosyls. IV. One-electron reduction of ruthenium nitrosylpentaammine(3+) ion in aqueous solution. Armor, J.N.; Hoffman, M.Z., *Inorg. Chem.* **14**: 444-6 (1975)
- 751063 Formation of CrO₂²⁺ in oxidation of chromium(II) by molecular oxygen. Sellers, R.M.; Simic, M.G., *J. Chem. Soc., Chem. Commun.* : 401-2 (1975)
- 751064 Pulse radiolytic investigation of the reduction of cadmium(II) ions. Kelm, M.; Lilie, J.; Henglein, A., *J. Chem. Soc., Faraday Trans. I* **71**: 1132-42 (1975)
- 751077 Reactivity of coordinated nitrosyls. V. Generation and characterization of a ruthenium(II) alkynitroso complex. Armor, J.N.; Furman, R.; Hoffman, M.Z., *J. Am. Chem. Soc.* **97**: 1737-42 (1975)
- 751086 Formation of radical cations from 1,2- and 1,4-dimethoxybenzene by electron transfer to Tl²⁺ and Ag²⁺ in aqueous solution. A pulse radiolysis and in situ radiolysis EPR study. O'Neill, P.; Steenken, S.; Schulte-Frohlinde, D., *Angew. Chem., Int. Ed. Engl.* **14**: 430-1 (1975)
- 751092 Kinetics of complexation of copper(I) ions with malonate and fumarate in aqueous solutions. A pulse radiolytic study. Meyerstein, D., *Inorg. Chem.* **14**: 1716-7 (1975)
- 751128 Chemical behavior of rhodium(II)-ammine complexes generated by the pulse radiolytic one-electron reduction of rhodium(III) ammines. Lilie, J.; Simic, M.G.; Endicott, J.F., *Inorg. Chem.* **14**: 2129-33 (1975)
- 751130 Evidence for formation of a (TIOH)⁺ complex. O'Neill, P.; Schulte-Frohlinde, D., *J. Chem. Soc., Chem. Commun.* : 387-8 (1975)
- 751135 Formation and properties of the trivalent nickel-ethylene diamine tetra-acetic acid (EDTA) complex in aqueous solutions: A pulse-radiolytic study. Lati, J.; Meyerstein, D., *Int. J. Radiat. Phys. Chem.* **7**: 611-6 (1975)
- 751153 Kinetics of spur reactions of electrons in ethylene glycol-water glassy ice. A pulse radiolytic study. Barkatt, A.; Rabani, J., *J. Phys. Chem.* **79**: 2592-7 (1975)
- 751171 Formation of radical cations of methoxylated benzenes by reaction with OH radicals, Tl²⁺, Ag²⁺, and SO₄⁻ in aqueous solution. An optical and conductometric pulse radiolysis and in situ radiolysis electron spin resonance study. O'Neill, P.; Steenken, S.; Schulte-Frohlinde, D., *J. Phys. Chem.* **79**: 2773-9 (1975)
- 751188 A pulse radiolytic study of some platinum(II) and platinum(IV) complex ions in aqueous solutions. The formation and characterization of platinum(I) and platinum(III) transients. Storer, D.K.; Waltz, W.L.; Brodovitch, J.C.; Eager, R.L., *Int. J. Radiat. Phys. Chem.* **7**: 693-704 (1975)
- 751203 Pulse radiolysis of Hg(CN)₂ in aqueous solutions. Fujita, S.; Horii, H.; Mori, T.; Taniguchi, S., *Bull. Chem. Soc. Jpn.* **48**: 3067-72 (1975)
- 751215 The formation of CrO₂²⁺ in the reaction of Cr²⁺ + O₂ in aqueous acid solutions. Ilan, Y.A.; Czapski, G.; Ardon, M., *Isr. J. Chem.* **13**: 15-21 (1975)
- 751218 Pulsed radiolysis of aqueous solutions of compounds of divalent mercury. Pikaev, A.K.; Sibirskaia, G.K.; Spitsyn, V.I., *Dokl. Phys. Chem.* **224**: 994-7 (1975) Translated from: *Dokl. Akad. Nauk SSSR* **224**: 638-41 (1975)
- 757093 Aqueous chemistry of thallium(II). Part II. Kinetics of reaction of thallium(II) with manganese(II), iron(II), and cobalt(III) ions. Falcinella, B.; Felgate, P.D.; Laurence, G.S., *J. Chem. Soc., Dalton Trans.* : 1-9 (1975)
- 757415 Reaction of tris(bipyridine)ruthenium(III) with hydroxide and its application in a solar energy storage system. Creutz, C.; Sutin, N., *Proc. Natl. Acad. Sci. U.S.A.* **72**: 2858-62 (1975)
- 757592 Interaction of the o-benzosemiquinone radical with the divalent copper ion. Kuz'min, V.A.; Khudyakov, I.V.; Popkov, A.V.; Koroli, L.L., *Bull. Acad. Sci. USSR, Div. Chem. Sci.* **24**: 2319-22 (1975) Translated from: *Izv. Akad. Nauk SSSR, Ser. Khim.* : 2431-5 (1975)
- 75A245 Photosynthesis and porphyrin excited state redox reactions. Carapellucci, P.A.; Mauzerall, D.C., *Ann. N.Y. Acad. Sci.* **244**: 214-37 (1975)
- 761001 The reactivity of cobalt(I) complexes containing unsaturated macrocyclic ligands in aqueous solution. Tait, A.M.; Hoffman, M.Z.; Hayon, E., *J. Am. Chem. Soc.* **98**: 86-93 (1976)
- 761039 Reactivity of nickel(I) and copper(I) complexes containing 14-membered macrocyclic ligands in aqueous solution. Tait, A.M.; Hoffman, M.Z.; Hayon, E., *Inorg. Chem.* **15**: 934-9 (1976)
- 761042 Reduction of mercuric halides and pseudohalides in aqueous solution. Formation and some physicochemical properties of HgCl, HgBr, HgI, HgSCN, and HgCN radical molecules. Jungbluth, H.; Beyrich, J.; Asmus, K.-D., *J. Phys. Chem.* **80**: 1049-53 (1976)
- 761072 Pulse radiolysis study of monovalent cadmium, cobalt, nickel and zinc in aqueous solution. Part 2. Reactions of the monovalent ions. Buxton, G.V.; Sellers, R.M.; McCracken, D.R., *J. Chem. Soc., Faraday Trans. I* **72**: 1464-76 (1976)
- 761074 The reaction mechanism and rate constants in the radiolysis of Fe²⁺-Cu²⁺ solutions. Bjergbakke, E.; Sehested, K.; Rasmussen, O.L., *Radiat. Res.* **66**: 433-42 (1976)
- 761087 Pulse radiolysis of HgBr₂ in aqueous solutions. Fujita, S.; Horii, H.; Mori, T.; Taniguchi, S., *Bull. Chem. Soc. Jpn.* **49**: 1250-3 (1976)
- 761093 A pulse radiolysis and flash photolysis study of the formation and characterization of platinum (III) amine complex ions. Brodovitch, J.C.; Storer, D.K.; Waltz, W.L.; Eager, R.L., *Int. J. Radiat. Phys. Chem.* **8**: 465-75 (1976)
- 761109 Pulse radiolytic studies of aqueous Mn(ClO₄)₂ solutions. Pick-Kaplan, M.; Rabani, J., *J. Phys. Chem.* **80**: 1840-3 (1976)
- 761134 Pulse radiolysis study of the reactions of some reduced metal ions with molecular oxygen in aqueous solution. Sellers, R.M.; Simic, M.G., *J. Am. Chem. Soc.* **98**: 6145-50 (1976)
- 761136 Kinetics of the reduction of some cobalt(III) complexes with monovalent cobalt. Mihalcea, I.; Hentz, R.R., *Radiochem. Radioanal. Lett.* **26**: 309-18 (1976)
- 761143 Free radical oxidation of organic disulfides. Bonifaciu, M.; Asmus, K.-D., *J. Phys. Chem.* **80**: 2426-30 (1976)
- 761149 The kinetics of ligand detachment from labile cobalt(II)-amine complexes in aqueous solution. Lilie, J.; Shinohara, N.; Simic, M.G., *J. Am. Chem. Soc.* **98**: 6516-20 (1976)

- 761154 Reactions of thallium(II) chloride complexes with iron(II) and iron(III). Schwarz, H.A.; Dodson, R.W., *J. Phys. Chem.* **80**: 2543-8 (1976)
- 761186 Oxidation of copper(I)-olefin complexes in aqueous solution by oxygen and hydrogen peroxide. Buxton, G.V.; Green, J.C.; Sellers, R.M., *J. Chem. Soc., Dalton Trans.* : 2160-5 (1976)
- 761192 On the equilibrium between thallium(II) hydroxide and hydroxoethallium(II) ion: A pulse-radiolysis study. Bonifacis, M.; Asmus, K.-D., *J. Chem. Soc., Dalton Trans.* : 2074-6 (1976)
- 761233 Pulse radiolysis of aqueous solutions of bismuth salts. Panchvidze, M.V.; Makhonina, L.V.; Nanobashvili, E.M., *Sovetsk. Akad. Nauk. SSSR* **82**: 377-80 (1976)
- 766404 Mechanism of the quenching of the emission of substituted polypyridineruthenium(II) complexes by iron(III), chromium(III), and europium(III) ions. Lin, C.-T.; Boettcher, W.; Chou, M.; Creutz, C.; Sutin, N., *J. Am. Chem. Soc.* **98**: 6536-44 (1976)
- 767412 Electron-transfer reactions of excited states: Direct evidence for reduction of the charge-transfer excited state of tris(2,2'-bipyridine)ruthenium(II). Creutz, C.; Sutin, N., *J. Am. Chem. Soc.* **98**: 6384-5 (1976)
- 767517 Bimolecular electron transfer processes of electronically excited tris(2,2'-bipyridine)chromium(III). Ballardini, R.; Varani, G.; Scandola, F.; Balzani, V., *J. Am. Chem. Soc.* **98**: 7432-3 (1976)
- 76A265 Contrast in the effect of penta-amminecobalt(III) on the chemical properties of nicotinamide and isonicotinamide ligands. Cohen, H.; Meyerstein, D., *J. Chem. Soc., Dalton Trans.* : 1976-9 (1976)
- 77003 The trans-influence and axial interactions in low spin, tetragonal cobalt(II) complexes containing macrocyclic and/or cyano ligands. Pulse radiolytic studies in fluid solution, electron paramagnetic resonance spectra at 77K, and single-crystal X-ray structures. Endicott, J.F.; Lilie, J.; Kuszaj, J.M.; Ramaswamy, B.S.; Schmonsees, W.G.; Simic, M.G.; Glick, M.D.; Rillema, D.P., *J. Am. Chem. Soc.* **99**: 429-39 (1977)
- 771006 Formation of radical zwitterions from methoxylated benzoic acids. I. One electron oxidation by Ti²⁺, Ag²⁺, and SO₄²⁻. Steenken, S.; O'Neill, P.; Schulte-Frohlinde, D., *J. Phys. Chem.* **81**: 26-30 (1977)
- 771011 Pulse radiolysis studies of Zn²⁺ reactions. Rabani, J.; Mulac, W.A.; Matheson, M.S., *J. Phys. Chem.* **81**: 99-104 (1977)
- 771018 Reaction of Cob(I)alamin with nitrous oxide and Cob(III)alamin. Blackburn, R.; Kyaw, M.; Swallow, A.J., *J. Chem. Soc., Faraday Trans. 1* **73**: 250-5 (1977)
- 771027 Kinetics of ligand-to-metal intramolecular electron transfer in cobalt(III)-ammine complexes containing a coordinated radical. Simic, M.G.; Hoffman, M.Z.; Brezniak, N.V., *J. Am. Chem. Soc.* **99**: 2166-72 (1977)
- 771028 Addition of superoxide radical anion to cobalt(II) macrocyclic complexes in aqueous solution. Simic, M.G.; Hoffman, M.Z., *J. Am. Chem. Soc.* **99**: 2370-1 (1977)
- 771053 A pulse radiolysis study of the reactions of platinum(II) glycine complexes in aqueous media. Waltz, W.L.; Brodovitch, J.C.; Kundu, K.P., *Radiat. Phys. Chem.* **10**: 77-87 (1977)
- 771093 Transients in the flash photolysis of aqueous solutions of tris(2,2'-bipyridine)ruthenium(II) ion. Meisel, D.; Matheson, M.S.; Mulac, W.A.; Rabani, J., *J. Phys. Chem.* **81**: 1449-55 (1977)
- 771151 Spectroscopic evidence for non-planarity in nickel(III) complexes of macrocyclic ligands. Pulse radiolysis and electron spin resonance studies in aqueous solution. Ferraudi, G.; Patterson, L., *J. Chem. Soc., Chem. Commun.* : 755-6 (1977)
- 771164 Measurement of rates of electron transfer between Ru(bpy)₃³⁺ and Fe(phen)₃²⁺ and between Ru(phen)₃³⁺ and Ru(bpy)₃²⁺ by differential excitation flash photolysis. Young, R.C.; Keene, F.R.; Meyer, T., *J. Am. Chem. Soc.* **99**: 2468-73 (1977)
- 777315 Photoredox reactions of thionine. Ferreira, M.I.C.; Harriman, A., *J. Chem. Soc., Faraday Trans. 1* **73**: 1085-92 (1977)
- 77A234 Kinetics and mechanism of ligand dissociation of cobalt(II)-polyamine complexes in aqueous solution. Shinohara, N.; Lilie, J.; Simic, M.G., *Inorg. Chem.* **16**: 2809-13 (1977)
- 78A002 Photolytic and radiolytic studies of Ru(bpy)₃²⁺ in micellar solutions. Meisel, D.; Matheson, M.S.; Rabani, J., *J. Am. Chem. Soc.* **100**: 117-22 (1978)
- 78A041 Radiolytic studies of reactions in the Zn²⁺ + Mn(III) system. Rabani, J.; Matheson, M.S., *Radiat. Phys. Chem.* **11**: 1-10 (1978)
- 78A068 On the nature of Ru(bpy)₃⁺ in aqueous solution. Mulazzani, Q.G.; Emmi, S.; Fuochi, P.G.; Hoffman, M.Z.; Venturi, M., *J. Am. Chem. Soc.* **100**: 981-3 (1978)
- 78A070 Reaction of e_{aq}⁻ into excited states of Ru(bpy)₃²⁺. Jonah, C.D.; Matheson, M.S.; Meisel, D., *J. Am. Chem. Soc.* **100**: 1449-56 (1978)
- 78A087 Mechanism of the quenching of the emission of substituted poly(pyridine)ruthenium(II) complexes by europium(II). Creutz, C., *Inorg. Chem.* **17**: 1046-51 (1978)
- 78A090 Kinetics and mechanism of the quenching of the emission of substituted polypyridineruthenium(II) complexes. Reactions of RuL₃⁺, *RuL₃²⁺, and RuL₃³⁺ with the copper(I)-copper(II) couple. Hoselton, M.A.; Lin, C.-T.; Schwarz, H.A.; Sutin, N., *J. Am. Chem. Soc.* **100**: 2383-8 (1978)
- 78A110 Redox-catalyzed aquation of nitrosylpentaammineruthenium(3+) ion. Cheney, R.P.; Hoffman, M.Z.; Lust, J.A., *Inorg. Chem.* **17**: 1177-80 (1978)
- 78A186 An electrochemical method for studying the kinetics of quenching reactions. Ohsawa, Y.; Aoyagi, S., *J. Electroanal. Chem. Interfacial Electrochem.* **90**: 143-6 (1978)
- 78A200 Kinetics of the formation and decomposition of carbon-cobalt(III) bonds in aqueous solutions by the reaction of aliphatic free radicals with a coenzyme B-12r model cobalt(II) complex. Elroi, H.; Meyerstein, D., *J. Am. Chem. Soc.* **100**: 5540-8 (1978)
- 78A206 Pulse radiolytic formation of univalent lead and its reactivity towards some Co(III) complexes. Mihalcea, I.; Hentz, R.R., *Radiochem. Radioanal. Lett.* **34**: 15-22 (1978)
- 78A299 Redox reactions of free radicals with Ni(II) complexes. A pulse radiolytic study. Maruthamuthu, P.; Patterson, L.K.; Ferraudi, G., *Inorg. Chem.* **17**: 3157-63 (1978)
- 78A300 Photochemical redox reactivity of dimeric and monomeric copper(II) and cobalt(II) sulfophthalocyanines. Ferraudi, G.; Srisankar, E.V., *Inorg. Chem.* **17**: 3164-8 (1978)
- 78A322 Reactions of some simple α- and β-hydroxyalkyl radicals with Cu²⁺ and Cu⁺ ions in aqueous solution. A radiation chemical study. Buxton, G.V.; Green, J.C., *J. Chem. Soc., Faraday Trans. 1* **74**: 697-714 (1978)
- 78A351 Hydrogen evolution from water by visible light, a homogeneous three component test system for redox catalysis. Kalyanasundaram, K.; Kiwi, J.; Graetzel, M., *Helv. Chim. Acta* **61**: 2720-30 (1978)
- 78A363 The reactions of hydroxyl radical with some transition-metal compounds containing organic molecules. Waltz, W.L.; Woods, R.J.; Whitburn, K.D., *Photochem. Photobiol.* **28**: 681-5 (1978)
- 78A373 Electron transfer between cobalt(I) and cobalt(III) in vitamin B₁₂. Ryan, D.A.; Espenson, J.H.; Meyerstein, D.; Mulac, W.A., *Inorg. Chem.* **17**: 3725-6 (1978)
- 78A410 Reactivity of silver atoms in aqueous solution. II. A pulse radiolysis study. Tausch-Treml, R.; Henglein, A.; Lilie, J., *Ber. Bunsenges. Phys. Chem.* **82**: 1335-43 (1978)
- 78A436 Oxidation of first-row bivalent transition-metal complexes containing ethylenediaminetetra-acetate and nitrilotriacetate ligands by free radicals: A pulse-radiolysis study. Lati, J.; Meyerstein, D., *J. Chem. Soc., Dalton Trans.* : 1105-18 (1978)
- 78A449 Decay kinetics of aryloxy and semiquinone radicals in the presence of copper ions. Khudyakov, I.V.; Kuz'min, V.A.; Emanuel, N.M., *Int. J. Chem. Kinet.* **10**: 1005-18 (1978)
- 78C006 On the hydrolysis of Ag^{II}, Ti^{II}, Sn^{III} and Cu^{III}. Asmus, K.-D.; Bonifacis, M.; Toffel, P.; O'Neill, P.; Schulte-Frohlinde, D.; Steenken, S., *J. Chem. Soc., Faraday Trans. 1* **74**: 1820-6 (1978)
- 78E293 Quenching of the luminescent excited state of tris(2,2'-bipyridine)ruthenium(II) by complexes of pentaamminecobalt(III) with pyridine, 4,4'-bipyridine, and derivatives of 4,4'-bipyridine. Leopold, K.R.; Haim, A., *Inorg. Chem.* **17**: 1753-7 (1978)
- 78F301 Photochemical generation of metastable methylcopper complexes. Oxidation-reduction of methyl radicals by copper complexes. Ferraudi, G., *Inorg. Chem.* **17**: 2506-8 (1978)

- 78F683 Reversible excited-state electron-transfer reactions of transition metal complexes. DeGraff, B.A.; Demas, J.N.; Taylor, D.G., *Solar Energy, Chemical Conversion and Storage*, R.R. Hautala, R.B. King and C. Katal (eds.), Humana Press Inc., Clifton, NJ, Pub. 1979, p.189-202.
- 78Z002 Complexes of cations in unstable oxidation states in aqueous solutions as studied by pulse radiolysis. Meyerstein, D., *Acc. Chem. Res.* **11**: 43-8 (1978).
- 79A002 Oxidation of a nickel(II) complex with an unsaturated macrocyclic ligand in aqueous solutions. A pulse radiolytic study. Jaacobi, M.; Meyerstein, D.; Lilie, J., *Inorg. Chem.* **18**: 429-33 (1979).
- 79A004 Photoinduced oxygenation of trans-aquoxydrotetraamminerhodium (III). Evidence for a transition-metal chain carrier. Endicott, J.F.; Wong, C.-L.; Inoue, T.; Natarajan, P., *Inorg. Chem.* **18**: 450-4 (1979).
- 79A016 Oxidation-reduction reactions of complexes with macrocyclic ligands. Halide-mediated electron transfer involving low-spin cobalt(III)-(II) couples. Durham, B.; Endicott, J.F.; Wong, C.-L.; Rilcock, D.P., *J. Am. Chem. Soc.* **101**: 847-57 (1979).
- 79A034 One-electron reduction of tris(2,2'-bipyridine) and tris(1,10-phenanthroline) complexes of cobalt(III) in aqueous solution. Simic, M.G.; Hoffman, M.Z.; Cheney, R.P.; Mulazzani, Q.G., *J. Phys. Chem.* **83**: 439-43 (1979).
- 79A038 Radical oxidation of nickel(II) complexes of tetraazamacrocyclic ligands and the reactions of the resulting nickel(III) complexes: A pulse-radiolysis and flash-photolysis study. Whitburn, K.D.; Laurence, G.S., *J. Chem. Soc., Dalton Trans.* : 139-48 (1979).
- 79A046 Pulse radiolytic study of the oxidation of vitamin B₁₂ by dibromide ions. Meyerstein, D.; Espenson, J.H.; Ryan, D.A.; Mulac, W.A., *Inorg. Chem.* **18**: 863-4 (1979).
- 79A063 Pulse radiolysis of aqueous solutions of mercurous sulfate. Pikaev, A.K.; Sibirskaya, G.K., *Radiochem. Radioanal. Lett.* **38**: 39-45 (1979).
- 79A080 Oxidation of (5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4, 11-diene)copper(II) by radicals produced by flash photolysis and reactions of the oxidized copper complex. Whitburn, K.D.; Laurence, G.S., *J. Chem. Soc., Dalton Trans.* : 334-7 (1979).
- 79A090 Photochemical pathways of the dimeric, mixed dimer, and monomeric sulfophthalocyanines of cobalt(III) and iron(II). Ferraudi, G., *Inorg. Chem.* **18**: 1005-13 (1979).
- 79A134 Radiation synthesis of iron(II) and ruthenium(II) alkylnitroso complexes. Cheney, R.P.; Pell, S.D.; Hoffman, M.Z., *J. Inorg. Nucl. Chem.* **41**: 489-93 (1979).
- 79A167 Solar energy storage reactions involving polynuclear rhodium isocyanide complexes. Flash photolysis studies in aqueous sulfuric acid solutions. Miskowski, V.M.; Sigal, I.S.; Mann, K.R.; Gray, H.B.; Miller, S.J.; Hammond, G.S.; Ryason, P.R., *J. Am. Chem. Soc.* **101**: 4383-5 (1979).
- 79A168 Primary processes in the photochemistry of Co(NH₃)₅Cl⁴⁺. Linn, J., *J. Am. Chem. Soc.* **101**: 4417-9 (1979).
- 79A213 Intramolecular electron transfer in the reaction of hydroxyl radicals with (pyridine)pentaamminecobalt(III) ion in aqueous solution. Hoffman, M.Z.; Kimmel, D.W.; Simic, M.G., *Inorg. Chem.* **18**: 2479-85 (1979).
- 79A218 Influence of acid on the photoredox reaction between tris(2,2'-bipyridyl)ruthenium(II) and iron(III). Ferreira, M.I.C.; Harriman, A., *J. Chem. Soc., Faraday Trans. 2* **75**: 874-9 (1979).
- 79A249 Complexation of a nickel(III) macrocyclic complex by sulfate ion. A pulse radiolytic study. Cohen, H.; Kirschenbaum, L.J.; Zeigerson, E.; Jaacobi, M.; Fuchs, E.; Ginzburg, G.; Meyerstein, D., *Inorg. Chem.* **18**: 2763-6 (1979).
- 79A255 Radiation chemistry of cobalt(II) nitrilotriacetate in aqueous solutions. Bhattacharyya, S.N.; Srisankar, E.V., *J. Chem. Soc., Faraday Trans. 1* **75**: 2089-99 (1979).
- 79A272 The interaction of 3-hydroxyphenoxyl and 5-methyl-3-hydroxyphenoxyl radicals with copper(II) ions. Renge, I.V.; Khudyakov, I.V.; Gubergrits, M.Ya., *Bull. Acad. Sci. USSR, Div. Chem. Sci.* **28**: 278-81 (1979) Izv. Akad. Nauk SSSR, Ser. Khim. (2): 304-7 (1979).
- 79A297 Kinetics of aquation of the tris(acetylacetone) complexes of divalent chromium, cobalt, and ruthenium. A pulse radiolytic study. Meisel, D.; Schmidt, K.H.; Meyerstein, D., *Inorg. Chem.* **18**: 971-5 (1979).
- 79A304 Oxidation of Ag⁺ and Ag(NH₃)₂⁺ as studied by pulse radiolysis. Kumar, A.; Neta, P., *J. Phys. Chem.* **83**: 3091-5 (1979).
- 79A317 Mechanism of the formation of dihydrogen from the photoinduced reactions of tris(bipyridine)ruthenium(II) with tris(bipyridine)rhodium(III). Brown, G.M.; Chan, S.-F.; Creutz, C.; Schwarz, H.A.; Sutin, N., *J. Am. Chem. Soc.* **101**: 7638-40 (1979).
- 79F045 Excited-state photochemistry in the tris(2,2'-bipyridine)ruthenium(II)-sulfite system. Creutz, C.; Sutin, N.; Brunschwig, B.S., *J. Am. Chem. Soc.* **101**: 1297-8 (1979).
- 79F046 Homogeneous catalysis of the photoreduction of water by visible light. Mediation by a tris(2,2'-bipyridine)ruthenium(II)-cobalt(II) macrocycle system. Brown, G.M.; Brunschwig, B.S.; Creutz, C.; Endicott, J.F.; Sutin, N., *J. Am. Chem. Soc.* **101**: 1298-300 (1979).
- 79F488 The step excitation method for studying reversible excited-state electron-transfer reactions: Experimental realization. Taylor, D.G.; Demas, J.N., *J. Chem. Phys.* **71**: 1032-3 (1979).
- 79G260 The radiation chemistry of electron- and gamma-irradiated aqueous solutions of Fe²⁺ and Cu²⁺. Bjergbakke, E., *Nukleonika* **24**: 825-45 (1979).
- 79Z056 Light-induced electron transfer reactions. Sutin, N., *J. Photochem.* **10**: 19-40 (1979).
- 80A003 Measurement of the rates of the electron-transfer reactions between Ru(bpy)₃³⁺ and Co(phen)₃²⁺ or Co(bpy)₃²⁺ by flash photolysis techniques. Berkoff, R.; Krist, K.; Gafney, H.D., *Inorg. Chem.* **19**: 1-7 (1980).
- 80A011 One-electron reduction of ferrideuteroporphyrin IX and reaction of the oxidized and reduced forms with chlorinated methyl radicals. Brault, D.; Bizet, C.; Morliere, P.; Rougee, M.; Land, E.J.; Santus, R.; Swallow, A.J., *J. Am. Chem. Soc.* **102**: 1015-20 (1980).
- 80A069 Reduction of superoxobridged dicobalt(III) cation by cadmium(I) via an inner-sphere pathway: Pulse radiolysis study. Natarajan, P.; Raghavan, N.V., *J. Chem. Soc., Chem. Commun.* : 268-9 (1980).
- 80A072 Pulse radiolysis study of Cd EDTA²⁻ and Pb EDTA²⁻ in alkaline solution in the presence of alcohols. Buitenhuis, R.; Bakker, C.N.M.; Stock, F.R.; Louwrier, P.W.F., *Radiochim. Acta* **27**: 15-8 (1980).
- 80A123 Elementary reactions of the reduction of Ti⁴⁺ in aqueous solution. Butler, J.; Henglein, A., *Radiat. Phys. Chem.* **15**: 603-12 (1980).
- 80A153 Pulse radiolysis study of Cu(EDTA)²⁻ in aqueous solution in the presence of alcohols. Buitenhuis, R.; Bakker, C.N.M.; Stock, F.R.; Louwrier, P.W.F., *Radiat. Phys. Chem.* **16**: 5-10 (1980).
- 80A189 Nature and mechanism of decomposition of the complex of copper(I) with 5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4, 11-diene in aqueous solutions. A pulse radiolytic study. Freiberg, M.; Lilie, J.; Meyerstein, D., *Inorg. Chem.* **19**: 1908-12 (1980).
- 80A194 Pulse and γ -radiolysis of nickel(II) nitrilotriacetate in aqueous solutions. Srisankar, E.V.; Bhattacharyya, S.N., *J. Chem. Soc., Dalton Trans.* : 675-80 (1980).
- 80A239 Photolysis of copper(II) oxalato complexes in aqueous solution. Das, S.; Johnson, G.R.A., *J. Chem. Soc., Faraday Trans. 2* **76**: 1779-89 (1980).
- 80A277 Reactions of aliphatic free radicals with copper cations in aqueous solution. Part 2. Reactions with cupric ions: A pulse radiolysis study. Freiberg, M.; Mulac, W.A.; Schmidt, K.H.; Meyerstein, D., *J. Chem. Soc., Faraday Trans. 1* **76**: 1825-37 (1980).
- 80A278 Reactions of aliphatic free radicals with copper cations in aqueous solutions. Part 3. Reactions with cuprous ions: A pulse radiolysis study. Freiberg, M.; Mulac, W.A.; Schmidt, K.H.; Meyerstein, D., *J. Chem. Soc., Faraday Trans. 1* **76**: 1838-48 (1980).
- 80A286 Formation and characterization of platinum(III)-ethylenediamine complex ions using pulse radiolysis. Waltz, W.L.; Lilie, J.; Walters, R.T.; Woods, R.J., *Inorg. Chem.* **19**: 3284-91 (1980).
- 80A307 Complexation and oxidation of glycine and related compounds by Ag(II). Kumar, A.; Neta, P., *J. Am. Chem. Soc.* **102**: 7284-9 (1980).

- 80A350 Comparative study of the electrochemical and pulse-radiolytic oxidation of the complexes of nickel(II) and copper(II) containing 1,4,8,11-tetraazacyclotetradecane. Zeigerson, E.; Ginzburg, G.; Meyerstein, D.; Kirschenbaum, L.J., *J. Chem. Soc., Dalton Trans.* : 1243-7 (1980)
- 80A380 Complexes of zinc(I), cadmium(I), and mercury(I) with 1,4,8,11-tetraazacyclotetradecane in aqueous solutions. A pulse radiolytic study. Weddell, J.K.; Allred, A.L.; Meyerstein, D.; Mulac, W.A., *J. Inorg. Nucl. Chem.* **42**: 219-22 (1980)
- 80C004 Applications of light-induced electron-transfer reactions: Generation and reaction of Ag^0 in solution via visible light photolysis of $\text{Ru}(\text{bpy})_3^{2+}$. Foreman, T.K.; Giannotti, C.; Whitten, D.G., *J. Am. Chem. Soc.* **102**: 1170-1 (1980)
- 80E224 An electrochemical study of quenching reactions of polypyridine complexes of Ru(II) and Os(II) in excited states. Ohsawa, Y.; Saji, T.; Aoyagi, S., *J. Electroanal. Chem. Interfacial Electrochem.* **106**: 327-38 (1980)
- 80M397 Oxidation-reduction reactions of complexes with macrocyclic ligands. Oxygen uptake kinetics, equilibria, and intermediates in aqueous $\text{Co}^{II}(\text{N}_4)$ systems. Wong, C.-L.; Switzer, J.A.; Balakrishnan, K.P.; Endicott, J.F., *J. Am. Chem. Soc.* **102**: 5511-8 (1980)
- 80N025 Light-induced charge separation by functional micellar assemblies. Brugger, P.-A.; Graetzel, M., *J. Am. Chem. Soc.* **102**: 2461-3 (1980)
- 80R105 Photochemistry of manganese porphyrins. Part 3. Interconversion of $\text{Mn}^{II}/\text{Mn}^{III}$. Duncan, I.A.; Harriman, A.; Porter, G., *J. Chem. Soc., Faraday Trans. 2* **76**: 1415-28 (1980)
- 81A023 Hydrogen abstraction and one-electron oxidation in nickel(II)-iminodiacetate complexes. Bhattacharyya, S.N.; Saha, N.C.; Neta, P., *J. Phys. Chem.* **85**: 300-5 (1981)
- 81A042 Electron-transfer reactions of quinones, hydroquinones and methyl viologen, photosensitized by tris(2,2'-bipyridine)-ruthenium(II). Darwent, J.R.; Kalyanasundaram, K., *J. Chem. Soc., Faraday Trans. 2* **77**: 373-82 (1981)
- 81A057 A pulse radiolysis study of the MnO_4^{2-} ion. The stability of Mn(V) in 0.1-M NaOH. Kirschenbaum, L.J.; Meyerstein, D., *Inorg. Chim. Acta* **53**: L99-L100 (1981)
- 81A060 Chromium(II)-polypyridyl complexes: Formation, spectra, and electron-transfer kinetics. Serpone, N.; Jamieson, M.A.; Emmi, S.S.; Fuochi, P.G.; Mulazzani, Q.G.; Hoffman, M.Z., *J. Am. Chem. Soc.* **103**: 1091-8 (1981)
- 81A065 Flash-photolysis studies of the electron-transfer reactions of dioxygen complexes of cobalt(III) with tris(2,2'-bipyridyl)ruthenium(II). Chandrasekaran, K.; Natarajan, P., *J. Chem. Soc., Dalton Trans.* : 478-80 (1981)
- 81A123 Reactions of iron porphyrins with methyl radicals. Brault, D.; Neta, P., *J. Am. Chem. Soc.* **103**: 2705-10 (1981)
- 81A134 Generation of rhodium(II) and rhodium(I) from the one-electron reduction of tris(2,2'-bipyridine)rhodium(III) ion in aqueous solution. Mulazzani, Q.G.; Emmi, S.; Hoffman, M.Z.; Venturi, M., *J. Am. Chem. Soc.* **103**: 3362-70 (1981)
- 81A144 Anion radical oxidation of nickel(II) macrocyclic complexes. Pulse radiolysis of (2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),13,15-triene)nickel(II) in sodium bromide solution. Morliere, P.; Patterson, L.K., *Inorg. Chem.* **20**: 1458-65 (1981)
- 81A162 Free radical reactions of the phenothiazine, metiazinic acid. Bahnemann, D.; Asmus, K.-D.; Willson, R.L., *J. Chem. Soc., Perkin Trans. 2* : 890-5 (1981)
- 81A195 Investigation of the reversible reaction of the hydrated electron with divalent zinc in alkaline solutions by the method of pulse radiolysis. Gogolev, A.V.; Makarov, I.E.; Pikaev, A.K., *High Energy Chem.* **15**: 85-9 (1981) Translated from: *Khim. Vys. Energ.* **15**: 109-13 (1981)
- 81A209 Oxidative C-C bond cleavage of 1,2-diols by silver(II). Kumar, A., *J. Am. Chem. Soc.* **103**: 5179-82 (1981)
- 81A225 Mechanism of oxidation of an amine coordinated to ruthenium. Ridd, M.J.; Keene, F.R., *J. Am. Chem. Soc.* **103**: 5733-40 (1981)
- 81A238 Laser-flash-induced dissociation and recombination of aqueous pentacyano(2-methylpyrazine)ferrate(II) ion. Malin, J.M.; Brunschwig, B.S.; Brown, G.M.; Kwan, K.-S., *Inorg. Chem.* **20**: 1438-41 (1981)
- 81A239 Photochemistry of copper(II) complexes with macrocyclic amine ligands. Muralidharan, S.; Ferraudi, G., *Inorg. Chem.* **20**: 2306-11 (1981)
- 81A247 Reduction and demetalation of silver porphyrins in aqueous solutions. Kumar, A.; Neta, P., *J. Phys. Chem.* **85**: 2830-2 (1981)
- 81A285 Difference in the stabilities of the diastereoisomers of the tervalent nickel complex with 5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradecane in sulfate- and perchlorate-containing aqueous solutions. An electrochemical and pulse radiolysis study. Zeigerson, E.; Ginzburg, G.; Becker, J.Y.; Kirschenbaum, L.J.; Cohen, H.; Meyerstein, D., *Inorg. Chem.* **20**: 3988-92 (1981)
- 81A317 One-electron transfer reactions involving zinc and cobalt porphyrins in aqueous solutions. Neta, P., *J. Phys. Chem.* **85**: 3678-84 (1981)
- 81A337 Photochemical generation and chemical reactivity of hydridopentaquochromium(III) ions. Ryan, D.A.; Espenson, J.H., *Inorg. Chem.* **20**: 4401-4 (1981)
- 81A340 Tl^{2+} and Ag^{2+} metal-ion-induced oxidation of methionine in aqueous solution. A pulse radiolysis study. Hiller, K.-O.; Asmus, K.-D., *Int. J. Radiat. Biol. Relat. Stud. Phys., Chem. Med.* **40**: 597-604 (1981)
- 81A344 Spectroscopic properties and redox chemistry of the phosphorescent excited state of $\text{Pt}_2(\text{P}_2\text{O}_5)_4\text{H}_8^{4+}$. Che, C.-M.; Butler, L.G.; Gray, H.B., *J. Am. Chem. Soc.* **103**: 7796-7 (1981)
- 81A353 Formation and characterization of transitory platinum-ammonia complex ions using pulse radiolysis. Khan, H.M.; Waltz, W.L.; Woods, R.J.; Lilie, J., *Can. J. Chem.* **59**: 3319-25 (1981)
- 81C041 On the one and two-electron oxidations of water-soluble zinc porphyrins in aqueous media. Neumann-Spallart, M.; Kalyanasundaram, K., *Z. Naturforsch., Teil B* **36B**: 596-600 (1981)
- 81F164 Photosensitised reduction of water to hydrogen using water-soluble zinc porphyrins. Harriman, A.; Porter, G.; Richoux, M.-C., *J. Chem. Soc., Faraday Trans. 2* **77**: 833-44 (1981)
- 81F406 Photochemical properties of copper(II)-amino acid complexes. Natarajan, P.; Ferraudi, G., *Inorg. Chem.* **20**: 3708-12 (1981)
- 81N002 Photoredox reactions in functional micellar assemblies: Use of amphiphilic redox relays to achieve light energy conversion and charge separation. Brugger, P.-A.; Infelta, P.P.; Braun, A.M.; Graetzel, M., *J. Am. Chem. Soc.* **103**: 320-6 (1981)
- 81N003 Mechanism of the formation of dihydrogen from the photoinduced reactions of poly(pyridine)ruthenium(II) and poly(pyridine)rhodium(III) complexes. Chan, S.-F.; Chou, M.; Creutz, C.; Matsubara, T.; Sutin, N., *J. Am. Chem. Soc.* **103**: 369-79 (1981)
- 81N054 Photosensitized electron-transfer reactions in colloidal SiO_2 systems: Charge separation at a solid-aqueous interface. Willner, I.; Otvos, J.W.; Calvin, M., *J. Am. Chem. Soc.* **103**: 3203-5 (1981)
- 81N178 Photo-oxidation of water to oxygen sensitised by tris(2,2'-bipyridyl)ruthenium(II). Harriman, A.; Porter, G.; Walters, P., *J. Chem. Soc., Faraday Trans. 2* **77**: 2373-83 (1981)
- 81S157 Visible light-induced oxygen generation and cyclic water cleavage sensitized by porphyrins. Borgarello, E.; Kalyanasundaram, K.; Okuno, Y.; Graetzel, M., *Helv. Chim. Acta* **64**: 1937-42 (1981)
- 82A030 Photochemical generation of the acid-labile (β -hydroxyethyl)pentaaquochromium(III) ion. Ryan, D.A.; Espenson, J.H., *Inorg. Chem.* **21**: 527-30 (1982)
- 82A060 Ligand-metal interrelationships. I. The tervalent nickel complex of 11,13-dimethyl-1,4,7,10-tetraazacyclotetradeca-10,13-diene. A pulse radiolytic study. Ulman, A.; Cohen, H.; Meyerstein, D., *Inorg. Chim. Acta* **64**: L127-L129 (1982)
- 82A074 Formation and characterization of platinum(III)-ammonia complex ions using pulse radiolysis. Khan, H.M.; Waltz, W.L.; Lilie, J.; Woods, R.J., *Inorg. Chem.* **21**: 1489-97 (1982)
- 82A087 Evidence for Br_2^- reaction with Ni(III) macrocyclic complexes: Br_2^- as a possible reducing agent. Morliere, P.; Patterson, L.K., *Inorg. Chim. Acta* **64**: L183-L185 (1982)
- 82A098 Kinetics of complexation and oxidation of ethanolamine and diols by silver(II). Kumar, A., *J. Phys. Chem.* **86**: 1674-8 (1982)
- 82A104 Properties of copper(II) hydride formed in the reaction of aquacopper(I) ions with hydrogen atoms. A pulse radiolytic study. Mulac, W.A.; Meyerstein, D., *Inorg. Chem.* **21**: 1782-4 (1982)

- 82A106 Chemical kinetics of nickel(III) macrocyclic complexes. Pulse radiolysis study of $\text{Ni}^{\text{II}}(\text{CR}+4\text{H})$, $\text{Ni}^{\text{II}}(\text{CR})$, and $\text{Ni}^{\text{II}}(\text{CR}-2\text{H})$ in aqueous solutions of Br^- and CNS^- . Morliere, P.; Patterson, L.K., *Inorg. Chem.* **21**: 1837-45 (1982).
- 82A107 One-electron reduction of 18-molybdodiphosphate and 18-tungstodiphosphate ions in aqueous solution. A pulse radiolysis study. Papacostantinou, E.; Hoffman, M.Z., *Inorg. Chem.* **21**: 2087-9 (1982).
- 82A111 Influence of added salts on the cage escape yields in the photoredox quenching of $\text{Ru}(\text{bpy})_3^{2+}$ excited states. Kalyanasundaram, K.; Neumann-Spallart, M., *Chem. Phys. Lett.* **88**: 7-12 (1982).
- 82A119 Chemical properties of water-soluble porphyrins. 2. The reaction of iron(III) tetrakis(4-N-methylpyridyl)porphyrin with the superoxide radical dioxygen couple. Solomon, D.; Peretz, P.; Faraggi, M., *J. Phys. Chem.* **86**: 1842-9 (1982).
- 82A130 Kinetics and mechanism of the forward and reverse reactions between N,N'-dimethyl-4,4'-bipyridinium and hexacyanoferrate(II). de Oliveira, L.A.A.; Haim, A., *J. Am. Chem. Soc.* **104**: 3363-6 (1982).
- 82A135 Reaction mechanisms for the radiation-induced oxidation and reduction of (dinitrogen)decaaminediruthenium(II). Cabelli, D.E.; Bielski, B.H.J., *J. Phys. Chem.* **86**: 2072-5 (1982).
- 82A145 Poly(pyridine)ruthenium(II)-photoinduced redox reactions of bipyridinium cations, poly(pyridine)rhodium complexes, and osmium ammines. Creutz, C.; Keller, A.D.; Sutin, N.; Zipp, A.P., *J. Am. Chem. Soc.* **104**: 3618-27 (1982).
- 82A146 Reduction of cobalt(III) complexes by intramolecular electron transfer from bound free radicals. A pulse radiolytic study. Cohen, H.; Nutkovich, M.; Meyerstein, D.; Wieghardt, K., *J. Chem. Soc., Dalton Trans.* : 943-50 (1982).
- 82A278 Homogeneous catalysis of the photoreduction of water by visible light. 3. Mediation by polypyridine complexes of ruthenium(II) and cobalt(II). Krishnan, C.V.; Creutz, C.; Mahajan, D.; Schwarz, H.A.; Sutin, N., *Isr. J. Chem.* **22**: 98-106 (1982).
- 82A279 Reactions of photoexcited triplet states of zinc porphyrin with transient radicals in aqueous solutions. Neta, P.; Levanon, H., *Isr. J. Chem.* **22**: 107-11 (1982).
- 82A290 Electron transfer in the quenching of triplet states of zinc phthalocyanine and methylene blue by the use of Fe(III), Co(III), and organic oxidants. Ohno, T.; Kato, S.; Lichtin, N.N., *Bull. Chem. Soc. Jpn.* **55**: 2753-9 (1982).
- 82A315 Homolytic decomposition of tertiary organochromium(III) complexes and evidence for their decomposition via reactions with aliphatic free radicals. A pulse radiolysis study. Mulac, W.A.; Cohen, H.; Meyerstein, D., *Inorg. Chem.* **21**: 4016-20 (1982).
- 82A320 On the nature and mechanism of decomposition of monovalent copper complexes with tetra-aza macrocyclic ligands in aqueous solutions. A pulse radiolytic study. Freiberg, M.; Meyerstein, D.; Yamamoto, Y., *J. Chem. Soc., Dalton Trans.* : 1137-41 (1982).
- 82A321 Photogalvanic effect from a metalloporphyrin. Harriman, A.; Williams, D., *J. Electroanal. Chem. Interfacial Electrochem.* **139**: 413-8 (1982).
- 82A343 Pulse-radiolytic investigation of the oxidation of iron(II) and iron(III) complexes with 2,2'-bipyridine. Dimitrijevic, N.M.; Micic, O.I., *J. Chem. Soc., Dalton Trans.* : 1953-7 (1982).
- 82A365 Tris(2,2'-bipyridine)ruthenium(II)-sensitized photooxidation of phenols. Environmental effects on electron transfer yields and kinetics. Miedlar, K.; Das, P.K., *J. Am. Chem. Soc.* **104**: 7462-9 (1982).
- 82B053 Measurement of the extinction coefficient of the methyl viologen cation radical and the efficiency of its formation by semiconductor photocatalysis. Watanabe, T.; Honda, K., *J. Phys. Chem.* **86**: 2617-9 (1982).
- 82C019 On the effect of electron relay redox potential on electron transfer reactions in a water photoreduction model system. Amouyal, E.; Zidler, B., *Isr. J. Chem.* **22**: 117-24 (1982).
- 82F048 Effect of nitro and triethylphosphonium substituents on the photophysical and photoredox properties of tris(2,2'-bipyridine)ruthenium(II) complexes. Basu, A.; Weiner, M.A.; Strekas, T.C.; Gafney, H.D., *Inorg. Chem.* **21**: 1085-92 (1982).
- 82F316 Improved hydrogen production with tetrarnethyl- and hexamethylviologen as electron-transfer agents in the system $\text{H}_2\text{O}-\text{Ru}(\text{bpy})_3^{2+}$ -edta-Pt. Launikonis, A.; Loder, J.W.; Mau, A.W.-H.; Sasse, W.H.F.; Wells, D., *Isr. J. Chem.* **22**: 158-62 (1982).
- 82N022 "Zwitterion" mediator/quenchers. Coulombic minimization of the back-reaction in photocatalysis. Brugger, P.-A.; Graetzel, M.; Guarr, T.; McLendon, G., *J. Phys. Chem.* **86**: 944-6 (1982).
- 82N118 A novel effect of a polyelectrolyte on a photochemically induced electron transfer process involving a zwitterion. Sassoone, R.E.; Rabani, J., *Isr. J. Chem.* **22**: 138-41 (1982).
- 82N168 Colloidal platinum catalysts for reversible photoredox processes. Harriman, A.; Porter, G.; Richoux, M.-C., *J. Chem. Soc., Faraday Trans. 2* **78**: 1955-70 (1982).
- 82S257 Solar reduction of water. III. Improved electron-transfer agents for the system water-tris(2,2'-bipyridine)ruthenium(II) indicator ethylenediaminetetraacetic acid-platinum. Launikonis, A.; Loder, J.W.; Mau, A.W.-H.; Sasse, W.H.F.; Summers, L.A.; Wells, D., *Aust. J. Chem.* **35**: 1341-55 (1982).
- 83A013 Oxidation-reduction reactions of complexes with macrocyclic ligands. Kinetic and electrochemical studies of metal-ligand synergism. Switzer, J.A.; Endicott, J.F.; Khalifa, M.A.; Rotzinger, F.P.; Kumar, K., *J. Am. Chem. Soc.* **105**: 56-61 (1983).
- 83A046 Reactions of tris- and bis(2,2'-bipyridine)rhodium(II) complexes in aqueous solution. Schwarz, H.A.; Creutz, C., *Inorg. Chem.* **22**: 707-13 (1983).
- 83A047 Kinetics of the oxidation of chromium(II) by hydrogen peroxide. Flash-photolytic and stopped-flow studies based on radical-trapping reactions. Bakac, A.; Espenson, J.H., *Inorg. Chem.* **22**: 779-83 (1983).
- 83A088 Reduction and alkylation of cobalt(II) tetrakis(4-sulfonophenyl)porphyrin in aqueous solutions. A kinetic spectrophotometric study. Baral, S.; Neta, P., *J. Phys. Chem.* **87**: 1502-9 (1983).
- 83A140 Selectivity of outer-sphere electron-transfer reactions. 3. Cohen, H.; Efriama, S.; Meyerstein, D.; Nutkovich, M.; Wieghardt, K., *Inorg. Chem.* **22**: 688-90 (1983).
- 83A148 Macrocyclic (hexaamine)platinum(IV) complexes: Synthesis, characterization, and electrochemistry. Boucher, H.A.; Lawrence, G.A.; Lay, P.A.; Sargeson, A.M.; Bond, A.M.; Sangster, D.F.; Sullivan, J.C., *J. Am. Chem. Soc.* **105**: 4652-61 (1983).
- 83A178 Pulse radiolysis of alkaline aqueous solutions of divalent mercury compounds. Liu, E.; Makarov, I.E.; Pikaev, A.K., *High Energy Chem.* **17**: 41-6 (1983). Translated from: *Khim. Vys. Energ.* **17**: 50-5 (1983).
- 83A206 Pulse radiolysis of aqueous solutions of In(III). Sukhov, N.L.; Ershov, B.G., *High Energy Chem.* **17**: 91-4 (1983). Translated from: *Khim. Vys. Energ.* **17**: 113-6 (1983).
- 83A238 Reaction of $\cdot\text{CH}_2\text{C}(\text{CH}_3)_2\text{OH}$ radicals with cobalt(II) tetrasulfophthalocyanine in aqueous solutions. A pulse radiolytic study. Sorek, Y.; Cohen, H.; Mulac, W.A.; Schmidt, K.H.; Meyerstein, D., *Inorg. Chem.* **22**: 3040-6 (1983).
- 83A271 Oxidation-reduction reactions with macrocyclic ligands. Dependence of the rate advantage for the inner-sphere electron-transfer pathway on electronic structure for low-spin $\text{Co}^{\text{III},\text{II}}$, $\text{Ni}^{\text{III},\text{II}}$, and $\text{Cu}^{\text{III},\text{II}}$ couples. Kumar, K.; Rotzinger, F.P.; Endicott, J.F., *J. Am. Chem. Soc.* **105**: 7064-74 (1983).
- 83A272 Free radical induced one-electron oxidation of the phenothiazine: chlorpromazine and promethazine. Bahneemann, D.; Asmus, K.-D.; Willson, R.L., *J. Chem. Soc., Perkin Trans. 2* : 1661-8 (1983).
- 83A298 Synthesis and properties of macrobicyclic amine complexes of rhodium(III) and iridium(III). Harrowfield, J.M.; Herlt, A.J.; Lay, P.A.; Sargeson, A.M.; Bond, A.M.; Mulac, W.A.; Sullivan, J.C., *J. Am. Chem. Soc.* **105**: 5503-5 (1983).
- 83A299 Mechanisms of the dismutation of superoxide catalyzed by the copper(II) phenanthroline complex and of the oxidation of the copper(I) phenanthroline complex by oxygen in aqueous solution. Goldstein, S.; Czapski, G., *J. Am. Chem. Soc.* **105**: 7276-80 (1983).
- 83A322 Properties of (1,4,7,10,13-penta-azacyclohexadecane)nickel(III) in aqueous solutions: A pulse radiolytic study. Fabbrizzi, L.; Cohen, H.; Meyerstein, D., *J. Chem. Soc., Dalton Trans.* : 2125-6 (1983).
- 83A382 Spectral and kinetic properties of the products resulting from reactions of HO_2/O_2^- with manganese(II) complexes. Bielski, B.H.J.; Arudi, R.L.; Cabelli, D.E., *Oxygen Radicals Chem. Biol.*, W. Bors, M. Saran and D. Tait (eds.), de Gruyter, Berlin, Fed. Rep. Germany, Pub. 1984, p.1-15.

- 83B029 Intermolecular vs. intramolecular reduction of cobalt(III) center by coordinated pyridinyl radicals. Cohen, H.; Gould, E.S.; Meyerstein, D.; Nutkovich, M.; Radlowski, C.A., *Inorg. Chem.* **22**: 1374-7 (1983)
- 83C017 Reduction potentials for 2,2'-bipyridine and 1,10-phenanthroline couples in aqueous solutions. Krishnan, C.V.; Creutz, C.; Schwarz, H.A.; Sutin, N., *J. Am. Chem. Soc.* **105**: 5617-23 (1983)
- 83C026 Redox chemistry of metalloporphyrins in aqueous solution. Harriman, A.; Richoux, M.C.; Neta, P., *J. Phys. Chem.* **87**: 4957-65 (1983)
- 83N008 One-electron transfer equilibria and kinetics of N-methylphenothiazine in micellar systems. Minero, C.; Pramauro, E.; Pelizzetti, E.; Meisel, D., *J. Phys. Chem.* **87**: 399-407 (1983)
- 83N214 Light-induced electron-transfer reactions involving the tris(2,2'-bipyridine)ruthenium dication and related complexes. II. Effect of the 2-(thiazol-2'-yl)pyridine ligand. Fitzpatrick, L.J.; Goodwin, H.A.; Launikonis, A.; Mau, A.W.-H.; Sasse, W.H.F., *Aust. J. Chem.* **36**: 2169-73 (1983)
- 84A008 Pulse radiolysis of aqueous indium(III) perchlorate solutions. Schwok, A.S.; Rabani, J., *Radiat. Phys. Chem.* **23**: 211-6 (1984)
- 84A036 Effect of pH and acetate on the rate of hydrolysis of the chromium-carbon bond in (α -hydroxyalkyl)chromium(III) complexes. Cohen, H.; Meyerstein, D., *Inorg. Chem.* **23**: 84-87 (1984)
- 84A077 Electron-transfer quenching of ruthenium(II) photosensitizers by mercury(II) chlorides. I. Reactions in aqueous solution. Hauenstein, B.L.Jr.; Mandal, K.; Demas, J.N.; DeGraff, B.A., *Inorg. Chem.* **23**: 1101-7 (1984)
- 84A112 Free radical route to formation of the metal hydride complex hydrodoaquobis(2,2'-bipyridine)cobalt(III). Creutz, C.; Schwarz, H.A.; Sutin, N., *J. Am. Chem. Soc.* **106**: 3036-7 (1984)
- 84A120 Redox reactions of manganese porphyrins in aqueous solutions. Steady-state and pulse radiolysis spectrophotometric studies. Morehouse, K.M.; Neta, P., *J. Phys. Chem.* **88**: 1575-9 (1984)
- 84A121 One- and two-electron reduction of aluminum and tin pyridylporphyrins. A kinetic spectrophotometric study. Baral, S.; Hambright, P.; Neta, P., *J. Phys. Chem.* **88**: 1595-600 (1984)
- 84A148 Electron-transfer quenching of ruthenium(II) photosensitizers by mercury(II) in aqueous nitrate media. Hauenstein, B.L.Jr.; Dressick, W.J.Jr.; Demas, J.N.; DeGraff, B.A., *J. Phys. Chem.* **88**: 2418-22 (1984)
- 84A177 Photoionization of Ru(bipy)₂(CN)₂ in aqueous and aqueous sodium dodecyl sulfate solutions. Atherton, S.J., *J. Phys. Chem.* **88**: 2840-4 (1984)
- 84A189 Pulse radiolysis study of the kinetics and mechanisms of the reactions between manganese(II) complexes and HO₂/O₂⁻ radicals. I. Sulfate, formate, and pyrophosphate complexes. Cabelli, D.E.; Bielski, B.H.J., *J. Phys. Chem.* **88**: 3111-5 (1984)
- 84A190 Kinetics of demetallation of manganese(II) porphyrins in aqueous solutions. Morehouse, K.M.; Neta, P., *J. Phys. Chem.* **88**: 3118-20 (1984)
- 84A238 Ground- and excited-state electron-transfer reactions: Photoinduced redox reactions of poly(pyridine)ruthenium(II) complexes and cobalt(III) cage compounds. Mok, C.-Y.; Zanella, A.W.; Creutz, C.; Sutin, N., *Inorg. Chem.* **23**: 2891-7 (1984)
- 84A241 Generation of binuclear (d⁸-d⁸)⁰ platinum and rhodium complexes by pulse radiolysis. Che, C.-M.; Atherton, S.J.; Butler, L.G.; Gray, H.B., *J. Am. Chem. Soc.* **106**: 5143-5 (1984)
- 84A249 Reactivity of superoxide anion towards Co^{II} and Co^{III}edta complexes. Lecheheb, A.; Takakubo, M.; Faure, J.; Belloni, J., *Radiat. Phys. Chem.* **23**: 703-9 (1984)
- 84A255 Electron-transfer quenching of the luminescence of ruthenium and osmium polypyridine complexes by cobalt(III) complexes. Sandini, D.; Gandolfi, M.T.; Maestri, M.; Bolletta, F.; Balzani, V., *Inorg. Chem.* **23**: 3017-23 (1984)
- 84A264 Electron-transfer reactions of a photosensitized water-soluble zinc porphyrin. Le Roux, D.; Mialocq, J.-C.; Anitoff, O.; Folcher, G., *J. Chem. Soc., Faraday Trans. 2* **80**: 909-20 (1984)
- 84A277 Ligand-metal interrelationships. 2. Effect of the change from square-planar to octahedral coordination on the pK_a of the ligand in unsaturated tetraaza macrocyclic nickel complexes: A pulse-radiolytic study. Cohen, H.; Nutkovich, M.; Meyerstein, D.; Shusterman, A., *Inorg. Chem.* **23**: 2361-3 (1984)
- 84A284 Some aspects of the radiolysis of cobalt(II) iminodiacetate in aqueous solution. Srisankar, E.V.; Saha, N.C.; Mandal, P.C.; Bhattacharyya, S.N., *J. Chem. Soc., Dalton Trans.* : 1629-34 (1984)
- 84A293 Ligand decomposition in the photolysis of copper(II)-amino-acid complexes in aqueous solution. Das, S.; Johnson, G.R.A.; Nazhat, N.B.; Saadalla-Nazhat, R., *J. Chem. Soc., Faraday Trans. 1* **80**: 2759-66 (1984)
- 84A302 Flash photolysis of a photoactive ruthenium complex mixture. Nagle, J.K.; Meyer, T.J., *Inorg. Chem.* **23**: 3663-5 (1984)
- 84A367 Flash photolysis of phenylacetatopentaminecobalt(III) in aqueous solution. Generation of benzyl radicals and their reversible trapping by cupric ions in homogeneous and micellar solutions. Scaiano, J.C.; Leigh, W.J.; Ferraudi, G., *Can. J. Chem.* **62**: 2355-8 (1984)
- 84A384 Pulse radiolysis study of the kinetics and mechanisms of the reactions between manganese(II) complexes and HO₂/O₂⁻ radicals. 2. The phosphate complex and an overview. Cabelli, D.E.; Bielski, B.H.J., *J. Phys. Chem.* **88**: 6291-4 (1984)
- 84A403 Flash photolysis of Fe(TIM)CO(X)²⁺ complexes. Butler, A.; Linck, R.G., *Inorg. Chem.* **23**: 4545-9 (1984)
- 84A439 Preparation of copper atoms in aqueous solution. Ershov, B.G.; Sukhov, N.L.; Akinshin, M.A., *Bull. Acad. Sci. USSR, Div. Chem. Sci.* **33**: 1329 (1984) Translated from: *Izv. Akad. Nauk SSSR, Ser. Khim.* : 1440 (1984)
- 84A446 Pulse radiolysis of aqueous hydrochloric acid solutions of lead ions. Gogolev, A.V.; Makarov, I.E.; Pikaev, A.K., *High Energy Chem.* **18**: 336-9 (1984) Translated from: *Khim. Vys. Energ.* **18**: 429-32 (1984)
- 84C015 Equilibrium between hydroxyl radicals and thallium(II) and the oxidation potential of OH(aq). Schwarz, H.A.; Dodson, R.W., *J. Phys. Chem.* **88**: 3643-7 (1984)
- 84E387 Yields of electron transfer reactions in the quenching of the phosphorescent states (²E) of tris(2,2'-bipyridine)chromium(III) and tris(4,7-diphenyl-1,10-phenanthroline)chromium(III) compounds. Ohno, T.; Kato, S., *Bull. Chem. Soc. Jpn.* **57**: 1528-33 (1984)
- 84M388 Equilibrium and kinetic studies of substitution reactions of Fe(TIM)XY²⁺ in aqueous solution. Butler, A.; Linck, R.G., *Inorg. Chem.* **23**: 2227-31 (1984)
- 84N212 Micellar effects on the forward and the back photoelectron transfer from a water-soluble porphyrin to dialkyl viologens. Chevalier, S.; Lerebours, B.; Pileni, M.P., *J. Photochem.* **27**: 301-10 (1984)
- 85A006 Reactions of iron(II) protoporphyrin with strongly reducing free radicals in aqueous solutions. A pulse-radiolytic study. Sorek, Y.; Cohen, H.; Meyerstein, D., *J. Chem. Soc., Faraday Trans. 1* **81**: 233-9 (1985)
- 85A032 Stabilization of the monovalent nickel complex with 1,4,8,11-tetraazacyclotetradecane in aqueous solutions by N- and C-methylation. An electrochemical and pulse radiolysis study. Jubran, N.; Ginzburg, G.; Cohen, H.; Koresh, Y.; Meyerstein, D., *Inorg. Chem.* **24**: 251-8 (1985)
- 85A034 Cobalt(I) polypyridine complexes. Redox and substitutional kinetics and thermodynamics in the aqueous 2,2'-bipyridine and 4,4'-dimethyl-2,2'-bipyridine series studied by the pulse-radiolysis technique. Schwarz, H.A.; Creutz, C.; Sutin, N., *Inorg. Chem.* **24**: 433-9 (1985)
- 85A038 Zinc porphyrin π -radical cations in aqueous solution. Formation, spectra and decay kinetics. Neta, P.; Harriman, A., *J. Chem. Soc., Faraday Trans. 2* **81**: 123-38 (1985)
- 85A059 Kinetics of oxidation of cuprous complexes of substituted phenanthroline and 2,2'-bipyridyl by molecular oxygen and by hydrogen peroxide in aqueous solution. Goldstein, S.; Czapski, G., *Inorg. Chem.* **24**: 1087-92 (1985)
- 85A064 Effects of the polyelectrolyte poly(vinyl sulfate) on the photosensitized electron-transfer reactions of tris(2,2'-bipyridine)ruthenium(II) with a dipolar zwitterionic viologen. Sassoon, R.E.; Aizenshtat, Z.; Rabani, J., *J. Phys. Chem.* **89**: 1182-90 (1985)
- 85A084 A novel formyl complex [(H₂O)₅CrCHO]²⁺. A pulse radiolysis study. Cohen, H.; Meyerstein, D.; Shusterman, A.J.; Weiss, M., *J. Chem. Soc., Chem. Commun.* : 424-5 (1985)
- 85A090 The radiation chemistry of some platinum-containing radiosensitizers and related compounds. Butler, J.; Hoey, B.M.; Swallow, A.J., *Radiat. Res.* **102**: 1-13 (1985)

- 85A145 Ring size effect on the chemical properties of monovalent nickel complexes with tetraazamacrocyclic ligands in aqueous solutions. Jubran, N.; Cohen, H.; Meyerstein, D., *Isr. J. Chem.* **25**: 118-21 (1985)
- 85A160 Reduction of the $[(\text{NH})\text{2,2'-bipyrid-3-yl}]^{\text{3+}}$ complex in aqueous solutions: A pulse radiolytic study. Cohen, H.; Slama-Schwok, A.; Rabani, J.; Watts, R.J.; Meyerstein, D., *J. Phys. Chem.* **89**: 2465-7 (1985)
- 85A161 Energy- and electron-transfer processes of the lowest triplet excited state of tetrakis(diphosphito)diplatinate(II). Peterson, J.R.; Kalyanasundaram, K., *J. Phys. Chem.* **89**: 2486-92 (1985)
- 85A234 Pulsed radiolysis of perphenate in neutral aqueous solution: Comparison with pertechnetate. Lawrence, G.A.; Sangster, D.F., *Polyhedron* **4**: 1095-6 (1985)
- 85A311 Oxidation of Fe^{III} porphyrins by peroxy radicals derived from propanol and methanol. Evidence for acid-dependent and acid-independent pathways. Brault, D.; Neta, P., *Chem. Phys. Lett.* **121**: 28-32 (1985)
- 85A331 Cleavage of an ether bond via β -elimination of ethanol from $[(\text{H}_2\text{O})_5\text{CrCH}_2\text{CH}_2\text{OC}_2\text{H}_5]^{2+}$ in aqueous solutions. A pulse radiolysis study. Cohen, H.; Meyerstein, D., *Angew. Chem., Int. Ed. Engl.* **24**: 779-81 (1985)
- 85A363 Pulse-radiolysis study of mixed-valence $\text{Mo}^{\text{IV,V}}$ complexes of EDTA, L-cysteine, and oxalate. Rush, J.D.; Bielski, B.H.J., *Inorg. Chem.* **24**: 3895-8 (1985)
- 85A430 Photosensitized charge transfer and recombination of the ionic products in micellar solutions. Le Roux, D.; Takakubo, M.; Mialocq, J.C., *J. Chim. Phys. Phys.-Chim. Biol.* **82**: 739-46 (1985)
- 85B030 Charge separation in photoinitiated electron-transfer systems with polyviologen polyelectrolytes as quenchers. Sassoon, R.E.; Gershuni, S.; Rabani, J., *J. Phys. Chem.* **89**: 1937-45 (1985)
- 85F007 Photochemical generation of long-living redox pairs by the use of polypyridineruthenium(II) complex, zwitterionic electron mediator, and viologen polymer as an electron pool. Ohsako, T.; Sakamoto, T.; Matsuo, T., *J. Phys. Chem.* **89**: 222-5 (1985)
- 85F089 Light-induced ligand-substitution reactions. Reaction between the chloropentaamminecobalt(III) ion and ethylenediaminetetraacetate by irradiation with visible light of aqueous solutions containing the tris(2,2'-bipyridine)ruthenium(II) ion. Kimura, M.; Yamashita, M.; Nishida, S., *Inorg. Chem.* **24**: 1527-31 (1985)
- 85F141 Charge separation and photoreduction of zinc tetrakis(sulfonatophenyl)porphyrin by nitrobenzene and methylviologen in aqueous solutions. Nahor, G.S.; Rabani, J., *J. Phys. Chem.* **89**: 2468-72 (1985)
- 85F222 Energy transfer vs. electron transfer in the excited-state quenching of tris(2,2'-bipyridine-N,N')ruthenium(II) complexes by cobalt(III) cage complexes: Applications to the photoreduction of water. Creaser, I.I.; Gahan, L.R.; Geue, R.J.; Launikonis, A.; Lay, P.A.; Lydon, J.D.; McCarthy, M.G.; Mau, A.W.-H.; Sargeson, A.M.; Sasse, W.H.F., *Inorg. Chem.* **24**: 2671-80 (1985)
- 85F435 Efficiency of polymer sensitizers in photosensitized reaction of tris(bipyridine)ruthenium(II) complex-containing polymer. Sumi, K.; Furue, M.; Nozakura, S.-I., *J. Polym. Sci., Polym. Chem. Ed.* **23**: 3059-67 (1985)
- 85F449 Quantitative generation of singlet dioxygen via the reaction of tris(bipyridine)ruthenium(III) with superoxide ion in aqueous solution. Miller, S.S.; Zahir, K.; Haim, A., *Inorg. Chem.* **24**: 3978-80 (1985)
- 85G125 Radiation chemistry of Na_3IrCl_6 solutions: Catalysed H_2 formation by radicals and postirradiation reduction of IrCl_6^{3-} by propanol-2. Mills, G.; Henglein, A., *Radiat. Phys. Chem.* **26**: 391-9 (1985)
- 85G297 Mechanism and reaction products of the oxidation of Cu(I)-phenanthroline by H_2O_2 . Goldstein, S.; Czapski, G., *J. Free Radicals Biol. Med.* **1**: 373-80 (1985)
- 85S022 Homogeneous catalysis of the photoreduction of water. 6. Mediation by polypyridine complexes of ruthenium(II) and cobalt(II) in alkaline media. Krishnan, C.V.; Brunschwig, B.S.; Creutz, C.; Sutin, N., *J. Am. Chem. Soc.* **107**: 2005-15 (1985)
- 85S167 Photo-oxidation of water using Prussian Blue as catalyst. Christensen, P.A.; Harriman, A.; Neta, P.; Richoux, M.-C., *J. Chem. Soc., Faraday Trans. 1* **81**: 2461-6 (1985)
- 85Z381 Fast kinetic studies of dioxygen-derived species and their metal complexes. Bielski, B.H.J., *Philos. Trans. R. Soc. London, B* **311**: 473-82 (1985)
- 86A017 A pulse radiolysis study of tetraammineplatinum(II) complex ion in aqueous chloride media. Khan, H.M.; Waltz, W.L.; Woods, R.J., *Radiat. Phys. Chem.* **27**: 41-5 (1986)
- 86A018 Pulse radiolysis studies of alkaline Fe(III) and Fe(VI) solutions. Observation of transient iron complexes with intermediate oxidation states. Rush, J.D.; Bielski, B.H.J., *J. Am. Chem. Soc.* **108**: 523-5 (1986)
- 86A034 Radiation-induced reactions of polymer radicals with ruthenium tris(bipyridyl)-OH adducts in aqueous solutions. Neta, P.; Silverman, J.; Markovic, V.; Rabani, J., *J. Phys. Chem.* **90**: 703-7 (1986)
- 86A057 Photochemical oxidation of $[\text{Ir}((\text{C}_3\text{N}-\text{Hbpy})(\text{bpy}))_2]^{3+}$ by redox quenching. Slama-Schwok, A.; Rabani, J., *J. Phys. Chem.* **90**: 1176-9 (1986)
- 86A063 Selective type I photooxidations in mixtures of porphyrins and electrophilic nitroimidazoles. Bazin, M.; Santus, R., *Photochem. Photobiol.* **43**: 235-42 (1986)
- 86A115 Kinetics of formation and decomposition of the methyl-copper(II) complex in aqueous solutions. A pulse-radiolysis study. Cohen, H.; Meyerstein, D., *Inorg. Chem.* **25**: 1505-6 (1986)
- 86A120 Photodynamics of the tris(2,2'-bipyrazine)ruthenium(2+)/methylviologen/EDTA system in aqueous solution. Prasad, D.R.; Hoffman, M.Z., *J. Am. Chem. Soc.* **108**: 2568-73 (1986)
- 86A152 Pulse-radiolysis study of the reduction of VO^{2+} by the hydrated electron. Fourest, B.; Schmidt, K.H.; Sullivan, J.C., *Inorg. Chem.* **25**: 2096-7 (1986)
- 86A154 Chemical properties of water-soluble porphyrins. 4. The reaction of a 'picket-fence-like' iron(III) complex with the superoxide oxygen couple. Faraggi, M.; Perez, P.; Weinraub, D., *Int. J. Radiat. Biol. Relat. Stud. Phys., Chem. Med.* **49**: 951-68 (1986)
- 86A161 Kinetics and mechanism of electron transfer to transition-metal complexes by photochemically reduced tris(bipyridyl)ruthenium(1+)ion. Connolly, P.; Espenson, J.H.; Bakac, A., *Inorg. Chem.* **25**: 2169-75 (1986)
- 86A208 Aqueous chemistry of tin(III). A flash photolysis study. Shinohara, N.; Mori, K.; Inoue, M., *Chem. Lett.* : 661-4 (1986)
- 86A210 Reductive addition of OH radicals to macrocyclic complexes. Geiger, D.K.; Ferraudi, G., *Inorg. Chim. Acta* **117**: 139-44 (1986)
- 86A241 One- and two-electron oxidation of lead(II) tetrakis(N-methylpyridyl)porphyrins in aqueous solution. Richoux, M.-C.; Neta, P.; Harriman, A., *J. Chem. Soc., Faraday Trans. 2* **82**: 201-7 (1986)
- 86A242 Resonance stabilisation of zinc porphyrin π -radical cations. Neta, P.; Richoux, M.-C.; Harriman, A.; Milgrom, L.R., *J. Chem. Soc., Faraday Trans. 2* **82**: 209-17 (1986)
- 86A243 Formation and decay of zinc tetrakis(N-methyl-3-pyridyl)porphine π -radical cation in water. Richoux, M.-C.; Neta, P.; Christensen, P.A.; Harriman, A., *J. Chem. Soc., Faraday Trans. 2* **82**: 235-49 (1986)
- 86A265 Electron transfer between cytochrome c and metalloporphyrins at high exothermicities. Cho, K.C.; Ng, K.M.; Choy, C.L.; Che, C.M., *Chem. Phys. Lett.* **129**: 521-5 (1986)
- 86A313 Chemical properties of water-soluble porphyrins. 5. Reactions of some manganese(III) porphyrins with the superoxide and other reducing radicals. Weinraub, D.; Levy, P.; Faraggi, M., *Int. J. Radiat. Biol. Relat. Stud. Phys., Chem. Med.* **50**: 649-58 (1986)
- 86A470 Ring size effects on the chemical properties of tervalent nickel complexes with tetra-aza macrocyclic ligands in aqueous solutions. An electrochemical and pulse radiolytic study. Jubran, N.; Meyerstein, D.; Koresh, J.; Cohen, H., *J. Chem. Soc., Dalton Trans.* : 2509-13 (1986)
- 86A492 Studies of the reactivity of Trolox with manganese(3+)/iron(3+) complexes by pulse radiolysis. Cabelli, D.E.; Bielski, B.H.J., *J. Free Radicals Biol. Med.* **2**: 71-5 (1986)
- 86A511 Kinetics of the β -hydroxy elimination reactions from the protoporphyrin iron(III)- CHRCH_2OH complexes in aqueous solutions. A pulse-radiolytic study. Sorek, Y.; Cohen, H.; Meyerstein, D., *J. Chem. Soc., Faraday Trans. 1* **82**: 3431-8 (1986)

- 86A536 Electron-transfer reactions between pentaaquo(organo)chromium(2+) and tris(bipyridyl)ruthenium(3+) ions. Melton, J.D.; Espenson, J.H.; Bakac, A., *Inorg. Chem.* **25**: 4104-8 (1986)
- 86A578 Detection and kinetics of formation and disproportionation of the mixed-valence Pt₂(II,III)-complex Pt₂(μ-PtO₃H₂)₄³⁺. Roundhill, D.M.; Atherton, S.J., *J. Am. Chem. Soc.* **108**: 6829-31 (1986)
- 86B151 Effect of nitrilotriacetate on the mechanism of reduction of copper(II) ions by α-hydroxyalkyl free radicals via complexes with copper-carbon bonds as intermediates. A pulse-radiolytic study. Masarwa, M.; Cohen, H.; Meyerstein, D., *Inorg. Chem.* **25**: 4897-900 (1986)
- 86E153 Redox properties of zinc(II)-tetra-N-methyl-2,3-pyridinoporphyrazine in aqueous solution. Richoux, M.-C.; Abou-Gamra, Z.M., *Inorg. Chim. Acta* **118**: 115-8 (1986)
- 86E195 Photoinduced electron-transfer reactions of poly(pyridine)ruthenium(II) complexes with europium(III/II) cryptates. Sabbatini, N.; Dellonte, S.; Bonazzi, A.; Ciano, M.; Balzani, V., *Inorg. Chem.* **25**: 1738-42 (1986)
- 86G256 Pulse radiolysis of aqueous solutions of monovalent copper. Sukhov, N.L.; Akinshin, M.A.; Ershov, B.G., *High Energy Chem.* **20**: 303-6 (1986) Translated from: *Khim. Vys. Energ.* **20**: 392-6 (1986)
- 86N075 Novel effect of man-made molecular assemblies on photoinduced charge separation. 5. Extremely efficient harvesting of electrons photoliberated from water-soluble zinc porphyrin in the presence of an amphiphatic viologen bilayer membrane and a zwitterionic electron mediator. Nagamura, T.; Takeyama, N.; Tanaka, K.; Matsuo, T., *J. Phys. Chem.* **90**: 2247-51 (1986)
- 86N260 Electron transfer through a lipid-bilayer-membrane-aqueous-solution interface and kinetics of the oxidation of viologen radicals in homogeneous and vesicular systems. Shafirovich, V.Ya.; Levin, P.P.; Khannanov, N.K.; Kuz'min, V.A., *Bull. Acad. Sci. USSR, Div. Chem. Sci.* **35**: 728-33 (1986) Translated from: *Izv. Akad. Nauk SSSR, Ser. Khim.* **801**: 6 (1986)
- 86S115 Catalyzed decay of oxidizing radicals in water. Harriman, A.; Neta, P.; Richoux, M.C., *NATO ASI Ser., Ser. C* **174**: 123-45 (1986)
- 87A041 Pulse radiolytic investigations of aqueous solutions of methoxybenzene cation radicals: The effect of colloidal RuO₂. Brandys, M.; Sassoon, R.E.; Rabani, J., *J. Phys. Chem.* **91**: 953-62 (1987)
- 87A083 One-electron-transfer reactions of the couple SO₂/SO₂⁻ in aqueous solutions. Pulse radiolytic and cyclic voltammetric studies. Neta, P.; Huie, R.E.; Harriman, A., *J. Phys. Chem.* **91**: 1606-11 (1987)
- 87A088 Experimental and theoretical study of the nascent photoredox behavior of the aqueous hexachloroplatinate(IV) ion. Goursof, A.; Kirk, A.D.; Waltz, W.L.; Porter, G.B.; Sharma, D.K., *Inorg. Chem.* **26**: 14-8 (1987)
- 87A160 Interaction between copper(II)-arginine complexes and HO₂/O₂⁻ radicals, a pulse radiolysis study. Cabello, D.E.; Bielski, B.H.J.; Holcman, J., *J. Am. Chem. Soc.* **109**: 3665-9 (1987)
- 87A165 Pulse radiolysis studies of aqueous [Ir(C³,N³Hbpy)(bpy)₂]³⁺ and its basic form. Mechanism of H₂ formation. Slama-Schwok, A.; Gershuni, S.; Rabani, J., *J. Phys. Chem.* **91**: 2986-9 (1987)
- 87A184 Mechanism of reduction of bleomycin-Cu(II) by CO₂⁻ and oxidation of bleomycin-Cu(I) by H₂O₂ in the absence and presence of DNA. Goldstein, S.; Czapski, G., *Int. J. Radiat. Biol. Relat. Stud. Phys., Chem. Med.* **51**: 693-706 (1987)
- 87A200 Electron transfer between azurin and metalloporphyrins. Cho, K.C.; Che, C.M.; Ng, K.M.; Choy, C.L., *J. Phys. Chem.* **91**: 3690-3 (1987)
- 87A232 Reactions of iron porphyrins with CF₃, CF₃O₂⁻, and CBr₃O₂⁻ radicals. Brault, D.; Neta, P., *J. Phys. Chem.* **91**: 4156-60 (1987)
- 87A261 Sterically-hindered zinc porphyrins for solar-energy conversion. Davila, J.; Harriman, A.; Richoux, M.-C.; Milgrom, L.R., *J. Chem. Soc., Chem. Commun.* : 525-7 (1987)
- 87A267 The ruthenium tris-(1,4,5,8-tetraazaphenanthrene)-hydroquinone system: A correlation between kinetic studies by flash photolysis and by pulsed laser induced photopotentials at an SnO₂ electrode. Masschelein, A.; Kirsch-De Mesmaeker, A., *New J. Chem.* **11**: 329-35 (1987)
- 87A309 Reactions of chromium(III) complexes of 1,10-phenanthroline, 2,2'-bipyridyl, and oxalate with the pulse radiolytically generated aquated electron, zinc(0), and cadmium(I). Lawrence, G.A.; Sangster, D.F., *J. Chem. Soc., Dalton Trans.* : 1425-9 (1987)
- 87A452 Pulse radiolysis study of one-electron oxidation of thionine in aqueous solutions. Kishore, K.; Guha, S.N.; Moorthy, P.N., *Proc. Indian Acad. Sci., Chem. Sci.* **99**: 351-9 (1987)
- 87A460 Photochemical formation of a strong reducing reagent in the Rh(dipy)₃³⁺-Ru(dipy)₃²⁺-EDTA system. Maier, V.E.; Shafirovich, V.Ya., *Kinet. Catal.* **28**: 728-31 (1987) Translated from: *Kinet. Katal.* **28**: 835-8 (1987)
- 87A472 The acid-base properties of chloride complexes of platinum(III). Balashov, K.P.; Blinov, I.I.; Shagisultanova, G.A., *Russ. J. Inorg. Chem.* **32**: 1439-42 (1987) Translated from: *Zh. Neorg. Khim.* **32**: 2470-4 (1987)
- 87A488 Characterization, redox properties and pulse radiolysis study of dichloro-(tetraazacyclotetradecane)manganese(III) complexes, and X-ray crystal structure of the meso-5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradecane complex. Hambley, T.W.; Lawrence, G.A.; Sangster, D.F.; Ward, C.B., *Aust. J. Chem.* **40**: 883-93 (1987)
- 7B063 A pulse radiolysis study of the reaction of hydroxyl radicals with trans-dihydroxo(1,4,8,11-tetraazacyclotetradecane)chromium(III). Monsted, O.; Nord, G.; Pagsberg, P., *Acta Chem. Scand., Ser. A* **41**: 104-9 (1987)
- 87E949 Spectroscopic, electrochemical, and kinetic characterization of new ruthenium(II) tris-chelates containing five-membered heterocyclic moieties. Orellana, G.; Quiroga, M.L.; Braun, A.M., *Helv. Chim. Acta* **70**: 2073-86 (1987)
- 87F040 A water-soluble Wilkinson's complex as homogeneous catalyst for the photochemical reduction of water. Oishi, S., *J. Mol. Catal.* **39**: 225-32 (1987)
- 87G275 Kinetics and mechanism of the reaction of the bis(1,10-phenanthroline)copper(I) ion with hydrogen peroxide in aqueous solution. Johnson, G.R.A.; Nazhat, N.B., *J. Am. Chem. Soc.* **109**: 1990-4 (1987)
- 87N149 Organometallic rhodium(III) complexes as catalysts for the photoreduction of protons to hydrogen on colloidal TiO₂. Koelle, U.; Graetzel, M., *Angew. Chem. Int. Ed. Engl.* **26**: 567-70 (1987)
- 88A025 Salt effects on nearly diffusion controlled electron-transfer reactions. Bimolecular rate constants and cage escape yields in oxidative quenching of tris(2,2'-bipyridine)ruthenium(II). Chiorboli, C.; Indelli, M.T.; Rampi Scandola, M.A.; Scandola, F., *J. Phys. Chem.* **92**: 156-63 (1988)
- 88A030 Enhancement of the rate of addition of free radicals to dicarboxylacetylene by π acid complexation to ruthenium(II)-pentaamine. A pulse radiolysis study. Simhon, E.; Cohen, H.; Meyerstein, D., *Inorg. Chim. Acta* **142**: 5-6 (1988)
- 88A065 Electron-transfer reactions of uranium(V): Kinetics of the uranium(V)-uranium(VI) self-exchange reaction. Howes, K.R.; Bakac, A.; Espenson, J.H., *Inorg. Chem.* **27**: 791-4 (1988)
- 88A066 Kinetics and mechanism of the reduction of protons to hydrogen by cobaltocene. Koelle, U.; Infelta, P.P.; Graetzel, M., *Inorg. Chem.* **27**: 879-83 (1988)
- 88A091 Interaction of tris(2,2'-bipyrazine)ruthenium(2+) ion with radiolytically-generated radicals in aqueous solution. Reactivity of Ru(bpz)₃²⁺ toward electron relays. Mulazzani, Q.G.; Venturi, M.; Hoffman, M.Z., *Radiat. Phys. Chem.* **32**: 71-8 (1988)
- 88A104 Reductive quenching of ²E Cr(bpy)₃³⁺ by Fe²⁺ and Cr(bpy)₃²⁺. Bakac, A.; Zahir, K.; Espenson, J.H., *Inorg. Chem.* **27**: 315-8 (1988)
- 88A105 Singlet molecular oxygen: Not a major product of the reaction between tris(2,2'-bipyridine)ruthenium(3+) and superoxide radical anions. Mulazzani, Q.G.; Ciano, M.; D'Angelantonio, M.; Venturi, M.; Rodgers, M.A.J., *J. Am. Chem. Soc.* **110**: 2451-7 (1988)
- 88A124 Reduction des cryptates par l'électron hydrate: Observation de la valence I du cadmium. Lardinois, P.; Rebena, I.; Hickel, B., *New J. Chem.* **12**: 21-5 (1988)
- 88A184 Formation and decomposition of iron-carbon σ-bonds in the reaction of iron(II)-poly(amino carboxylate) complexes with CO₂⁻ free radicals. A pulse radiolysis study. Goldstein, S.; Czapski, G.; Cohen, H.; Meyerstein, D., *J. Am. Chem. Soc.* **110**: 3903-7 (1988)

- 88A233 Reactions of polypyridylchromium(II) ions with oxygen: Determination of the self-exchange rate constant of O_2/O_2^- . Zahir, K.; Espenson, J.H.; Bakac, A., *J. Am. Chem. Soc.* **110**: 5059-63 (1988)
- 88A277 Formation and decay of zinc tetrakis(N-methyl-4-pyridinio)porphyrin π -radical cation in aqueous solutions containing azide ions and a polyelectrolyte. Nahor, G.S., *J. Phys. Chem.* **92**: 4359-66 (1988)
- 88A285 Superoxide dismutase as an amplifier of the chemical reactivity of porphyrin radical-cations. Bazin, M.; Patterson, L.K.; Ronford-Haret, J.C.; Santus, R., *Photochem. Photobiol.* **48**: 177-80 (1988)
- 88A334 Thermal and photochemical reactions of d^9 metal complexes: The silver(II) macrocycles. Ronco, S.; Van Vlierberge, B.; Ferraudi, G., *Inorg. Chem.* **27**: 3453-8 (1988)
- 88A343 Properties of complexes with cobalt-carbon bonds formed by reactions of aliphatic free radicals with nitrilotriacetate-cobalt(II) in aqueous solution. A pulse radiolysis study. Meyerstein, D.; Schwarz, H.A., *J. Chem. Soc., Faraday Trans. I* **84**: 2933-49 (1988)
- 88A391 Nickel(I) and nickel(III) complexes of substituted tetraaza macrocycles formed by pulse radiolysis and electrochemistry of nickel(II) precursors. Bernhardt, P.V.; Lawrence, G.A.; Sangster, D.F., *Inorg. Chem.* **27**: 4055-9 (1988)
- 88A392 Formation and decomposition of transient complexes with a copper-carbon σ -bond in the reaction of copper(I) phenanthroline with aliphatic free radicals. A pulse radiolysis study. Goldstein, S.; Czapski, G.; Cohen, H.; Meyerstein, D., *Inorg. Chem.* **27**: 4130-5 (1988)
- 88A405 Solvent effects on reactions of coordination complexes. Part IV. Acid catalysed aquation of oxygen bonded ($\alpha\beta S$)-(sulphito)(tetraethylenepentamine)cobalt(III) in aqueous binary mixtures of protic and dipolar aprotic cosolvents. A flash photolysis study on sulphur bonded ($\alpha\beta S$)-(sulphito)(tetraethylenepentamine)-cobalt(III) ion. Dash, A.C.; Dash, N.; Aditya, S.; Roy, A., *Indian J. Chem., Sect. A* **27A**: 398-403 (1988)
- 88A410 Kinetics of β -hydroxyl elimination from $[(H_2O)_m Cu^{II}CH_2C(CH_3)_2OH]^+$ in aqueous solution. A pulse-radiolysis study. Cohen, H.; Meyerstein, D., *J. Chem. Soc., Faraday Trans. I* **84**: 4157-60 (1988)
- 88A426 Equilibrium constants for the homolysis of the metal-carbon σ bond in $[(nta)(H_2O)M^{III}CH_3]^-$ ($M = Mn, Fe, Co$, nta = nitrilotriacetate) in aqueous solutions. Cohen, H.; Meyerstein, D., *Inorg. Chem.* **27**: 3429-31 (1988)
- 88A444 The methyl(cyclam)nickel(III) dication in aqueous solutions: Determination of the equilibrium constant of homolysis, kinetics of O_2 insertion, and methyl transfer to Cr^{2+}_{aq} . Sauer, A.; Cohen, H.; Meyerstein, D., *Inorg. Chem.* **27**: 4578-81 (1988)
- 88A493 Pulse radiolysis of perchloric acid solutions of Bi(III). Sukhov, N.L.; Akinshin, M.A.; Ershov, B.G., *High Energy Chem.* **22**: 343-5 (1988) Translated from: *Khim. Vys. Energ.* **22**: 409-12 (1988)
- 88A514 Oxidation of a series of tris(polypyridyl)chromium(II) ions by several cobalt(III) complexes. Zahir, K.; Espenson, J.H.; Bakac, A., *Inorg. Chem.* **27**: 3144-6 (1988)
- 88F171 Occurrence of a chemically reactive intermediate formed via a doublet-state pathway in the photoaquation of the cis-diammine(1,4,8,11-tetraazacyclotetradecane)chromium(III) ion. Waltz, W.L.; Lee, S.H.; Friesen, D.A.; Lilie, J., *Inorg. Chem.* **27**: 1132-3 (1988)
- 88G016 Reaction of the aquacopper(I) ion with hydrogen peroxide. Evidence for a Cu^{III} (cupryl) intermediate. Johnson, G.R.A.; Nazhat, N.B.; Saadalla-Nazhat, R.A., *J. Chem. Soc., Faraday Trans. I* **84**: 501-10 (1988)
- 88N184 Sensitization and photoredox reactions of zinc(II) and antimony(V) uroporphyrins in aqueous media. Kalyanasundaram, K.; Shelnutt, J.A.; Graetzl, M., *Inorg. Chem.* **27**: 2820-5 (1988)
- 89A025 Electron transfer from methoxybenzenes to the excited state of an Ir(III) complex studied by the pulsed laser technique. Slama-Schwok, A.; Rabani, J., *J. Phys. Chem.* **93**: 785-91 (1989)
- 89A050 Reactions of sulfur dioxide with photochemically generated polypyridyl complexes of chromium(II). Calculation of the SO_2/SO_2^- self-exchange rate constant. Simmons, C.A.; Bakac, A.; Espenson, J.H., *Inorg. Chem.* **28**: 581-4 (1989)
- 89A065 Rate constants for the scavenging of $Ru(bpy)_3^{3+}$ by EDTA in aqueous solution. Hoffman, M.Z., *Inorg. Chem.* **28**: 978-80 (1989)
- 89A098 A dissociative pathway for equilibration of a hydrido $Co(H)^{2+}$ complex with CO_2 and CO: Ligand-binding constants in the macrocyclic [14]diene cobalt(I) system. Creutz, C.; Schwarz, H.A.; Wishart, J.F.; Fujita, E.; Sutin, N., *J. Am. Chem. Soc.* **111**: 1153-4 (1989)
- 89A115 Reduction by CO_2^- of (1-methyl-4,4'-bipyridinium)pentaamminecobalt(III) perchlorate and kinetic behavior of the transient radical in aqueous solution. Tsukahara, K.; Wilkins, R.G., *Inorg. Chem.* **28**: 1605-7 (1989)
- 89A135 Kinetics of the free-radical-induced reduction of $Fe^{III}DTPA$ to $Fe^{II}DTPA$. A pulse radiolysis study. Cabelli, D.E.; Rush, J.D.; Thomas, M.J.; Bielski, B.H.J., *J. Phys. Chem.* **93**: 3579-86 (1989)
- 89A150 Mechanistic study of β -hydroxy elimination from [tetra-sulphophthalocyanine $Co^{III}-CR_1R_2CR_3R_4OH$] in aqueous solutions. A pulse radiolysis study. Sorek, Y.; Cohen, H.; Meyerstein, D., *J. Chem. Soc., Faraday Trans. I* **85**: 1169-79 (1989)
- 89A203 Photolytic and radiolytic study of platinum(III) complex ions containing aquo and chloro ligands. Waltz, W.L.; Lilie, J.; Goursot, A.; Chermette, H., *Inorg. Chem.* **28**: 2247-56 (1989)
- 89A204 Kinetics of the homolytic dioxygen insertion into the cobalt-carbon bond in (nta)($H_2O)Co^{III}-CH_3^-$. Sauer, A.; Cohen, H.; Meyerstein, D., *Inorg. Chem.* **28**: 2511-2 (1989)
- 89A247 The DNA guanyl radical: Kinetics and mechanisms of generation and repair. Jovanovic, S.V.; Simic, M.G., *Biochim. Biophys. Acta* **1008**: 39-44 (1989)
- 89A250 Platinum(III) in the REOA [reductive elimination/oxidative addition] mechanism of $PtCl_4^{2-}$ and $PtCl_6^{2-}$. A pulse-radiolysis study. Bothe, E.; Broszkiewicz, R.K., *Inorg. Chem.* **28**: 2988-91 (1989)
- 89A280 One-electron reduction of tris(2,2'-bipyrimidine)ruthenium(2+) ion in aqueous solution. A photochemical, radiation chemical, and electrochemical study. Neshvad, G.; Hoffman, M.Z.; Mulazzani, Q.G.; Venturi, M.; Ciano, M.; D'Angelantonio, M., *J. Phys. Chem.* **93**: 6080-8 (1989)
- 89A289 Quenching of the doublet excited state of tris(polypyridine)chromium(III) ions by oxalate ions: An example of irreversible electron transfer. Steffan, C.R.; Bakac, A.; Espenson, J.H., *Inorg. Chem.* **28**: 2992-5 (1989), 31(16): 1122 (1992)
- 89A310 Reduction of $Au(CN)_2^-$ in aqueous solution. Formation of nonmetallic clusters and colloidal gold. Mosseri, S.; Henglein, A.; Janata, E., *J. Phys. Chem.* **93**: 6791-5 (1989)
- 89A312 The reduction of $Ru(bpy)_2(dipyridophenazine)^{2+}$ in aqueous solution. A radiolytic study. Mulazzani, Q.G.; D'Angelantonio, M.; Venturi, M.; Boillot, M.-L.; Chambron, J.-C.; Amouyal, E., *New J. Chem.* **13**: 441-7 (1989)
- 89A354 Kinetics of ferrate(V) decay in aqueous solution. A pulse-radiolysis study. Rush, J.D.; Bielski, B.H.J., *Inorg. Chem.* **28**: 3947-51 (1989)
- 89A362 Photochemical reactivity of xanthene dyes and zinc porphyrins with viologens. Maier, V.E.; Kuz'min, V.A.; Levin, P.P.; Khannanov, N.K.; Shafirovich, V.Ya., *Khim. Fiz.* **8**: 1191-6 (1989)
- 89A375 Redox reactions of methylene blue: A pulse radiolysis study. Kishore, K.; Guha, S.N.; Mahadevan, J.; Moorthy, P.N.; Mittal, J.P., *Radiat. Phys. Chem.* **34**: 721-7 (1989)
- 89A422 The dichromate dosimeter: A pulse-radiolysis study. Sharpe, P.H.G.; Sehested, K., *Radiat. Phys. Chem.* **34**: 763-8 (1989)
- 89A428 Intermediates in the charge-transfer and ligand-labilization photoreactions of molybdenum(V) μ -oxo dimers. Feliz, M.; Ferraudi, G., *Inorg. Chem.* **28**: 4422-5 (1989)
- 89A465 Radical cations from one-electron oxidation of aliphatic sulphoxides in aqueous solution. A radiation chemical study. Kishore, K.; Asmus, K.-D., *J. Chem. Soc., Perkin Trans. 2* : 2079-84 (1989)
- 89A492 Production and study of indium atoms in aqueous solution by pulse radiolysis. Sukhov, N.L.; Ershov, B.G., *Bull. Acad. Sci. USSR, Div. Chem. Sci.* **38**: 683-6 (1989) Translated from: *Izv. Akad. Nauk SSSR, Ser. Khim.* : 759-62 (1989)
- 89A497 Pulsed radiolysis of aqueous solutions of cobalt tetralsulfophthalocyanine. Volod'ko, V.V.; Revina, A.A.; Protasova, E.L.; Vannikov, A.V., *High Energy Chem.* **23**: 381-7 (1989) Translated from: *Khim. Vys. Energ.* **23**: 483-9 (1989)
- 89B054 Photochemical generation of Sn(III) in hydrochloric acid solutions. Shinohara, N.; Inoue, M., *Bull. Chem. Soc. Jpn.* **62**: 730-3 (1989)

- 89C001 Reduction potentials of CO_2^- and the alcohol radicals. Schwarz, H.A.; Dodson, R.W., *J. Phys. Chem.* **93**: 409-14 (1989)
- 89E105 Reductive quenching of the luminescent excited state of tris(2,2'-bipyrazine)ruthenium(2+) ion in aqueous solution. Neshvad, G.; Hoffman, M.Z., *J. Phys. Chem.* **93**: 2445-52 (1989)
- 89E329 Photoredox reactions of a positively charged water-soluble polymer containing covalently bound tris(2,2'-bipyridyl)ruthenium(II)-like centers: N-ethylated copolymers of 4-vinylpyridine and bis(2,2'-bipyridyl)(4-methyl-4'-vinyl-2,2'-bipyridyl)ruthenium(II). Ennis, P.M.; Kelly, J.M., *J. Phys. Chem.* **93**: 5735-40 (1989)
- 89G017 Reactions of the hydroxyl free radical with copper(II)-amino-acid complexes in aqueous solution. Johnson, G.R.A.; Nazhat, N.B.; Saadalla-Nazhat, R.A., *J. Chem. Soc., Faraday Trans 1* **85**: 677-89 (1989)
- 89R092 Photosensitized oxidation of biomaterials and related model compounds. Davila, J.; Harriman, A., *Photochem. Photobiol.* **50**: 29-35 (1989)
- 90A015 Radiolytic study of the reactions of hydroxyl radical with cobalt(III), iron(II), and ruthenium(II) complexes containing 2,2'-bipyridyl and cyano ligands. Maliyackel, A.C.; Waltz, W.L.; Lilie, J.; Woods, R.J., *Inorg. Chem.* **29**: 340-8 (1990)
- 90A022 Photoreactions of macrocyclic dyes bound to human serum albumin. Davila, J.; Harriman, A., *Photochem. Photobiol.* **51**: 9-19 (1990)
- 90A069 Etude par radiolyse pulsee d'un heteropolyanion: L'ion metatungstate. Lerat, O.; Chauveau, F.; Hickel, B., *New J. Chem.* **14**: 37-41 (1990)
- 90A079 Formation and homolysis of a mononuclear cobalt-oxygen adduct. Bakac, A.; Espenson, J.H., *J. Am. Chem. Soc.* **112**: 2273-8 (1990)
- 90A095 Trivalent lead as an intermediate in the oxidation of Pb^{II} and the reduction of Pb^{IV} species. Mosseri, S.; Henglein, A.; Janata, E., *J. Phys. Chem.* **94**: 2722-6 (1990)
- 90A105 Experimental investigation of excited-state electron-transfer reaction: Effects of free energy and solvent on rates. Chen, J.-M.; Ho, T.-I.; Mou, C.-Y., *J. Phys. Chem.* **94**: 2889-96 (1990)
- 90A116 Mechanism of catalase activity in aqueous solutions of dimanganese(III,IV) ethylenediamine-N,N'-diacetate. Rush, J.D.; Maskos, Z., *Inorg. Chem.* **29**: 897-905 (1990)
- 90A168 Kinetics of electron transfer between metal hexacyanide complexes. Cho, K.C.; Cham, P.M.; Che, C.M., *Chem. Phys. Lett.* **168**: 361-4 (1990)
- 90A171 Formation of $\text{Fe}(\text{bpy})(\text{CN})_4^{3-}$ and $\text{Fe}(\text{DMbpy})(\text{CN})_4^{3-}$ in the photo-induced redox reaction of $\text{Fe}(\text{bpy})(\text{CN})_4^{2-}$ and $\text{Fe}(\text{DMbpy})(\text{CN})_4^{2-}$. Horvath, A.; Uzonyi, Z., *Inorg. Chim. Acta* **170**: 1-4 (1990)
- 90A221 Oxidation of cobalt(II) macrocycles by tris(bipyridyl)ruthenium(III) ions. Lee, S.; Bakac, A.; Espenson, J.H., *Inorg. Chem.* **29**: 2480-2 (1990)
- 90A238 One-electron oxidation of toluidine blue. A pulse radiolysis study. Mahadevan, J.; Guha, S.N.; Kishore, K.; Moorthy, P.N., *Proc. Indian Acad. Sci., Chem. Sci.* **102**: 147-57 (1990)
- 90A253 Electrochemistry and redox chemistry of $\text{H}_2\text{OFe}^{\text{III}}\text{SiW}_{11}\text{O}_{39}^{5-}$ in the presence of H_2O_2 and OH. Toth, J.E.; Melton, J.D.; Cabelli, D.; Bielski, B.H.J.; Anson, F.C., *Inorg. Chem.* **29**: 1952-7 (1990)
- 90A261 Kinetics of the reactions of the SO_4^- radical with SO_4^- , $\text{S}_2\text{O}_8^{2-}$, H_2O and Fe^{2+} . McElroy, W.J.; Waygood, S.J., *J. Chem. Soc., Faraday Trans. 86*: 2557-64 (1990)
- 90A278 Generation of iron(IV) and iron(V) complexes in aqueous solutions. Bielski, B.H.J., *Methods Enzymol.* **186**: 108-13 (1990)
- 90A303 Kinetics and mechanism of aquation of cobalt(II)-glycine complexes in aqueous solutions: A pulse radiolytic study. Shinohara, N.; Lilie, J., *Inorg. Chem.* **29**: 3812-5 (1990)
- 90A321 The methyl(cyclam)nickel(III) dication in aqueous solutions: Determination of the volume of reaction and volume of activation for the homolysis of the nickel-carbon bond. A pulse-radiolysis study. van Eldik, R.; Cohen, H.; Meshulam, A.; Meyerstein, D., *Inorg. Chem.* **29**: 4156-8 (1990)
- 90A373 Studies of the kinetic, spectral and chemical properties of Fe(IV) pyrophosphate by pulse radiolysis. Melton, J.D.; Bielski, B.H.J., *Radiat. Phys. Chem.* **36**: 725-33 (1990)
- 90A389 Oxalate ion as a sacrificial electron donor in the $\text{Ru}(\text{bpy})_3^{2+}$ -methylviologen model photochemical system. Hoffman, M.Z.; Prasad, D.R., *J. Photochem. Photobiol. A* **54**: 197-204 (1990)
- 90A421 Oxidation of copper(II) bis(glycinate) by methyl free radicals in aqueous solutions. A pulse-radiolysis study. Masarwa, M.; Cohen, H.; Glaser, R.; Meyerstein, D., *Inorg. Chem.* **29**: 5031-5 (1990)
- 90A422 5,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecane-nickel(II) as a catalyst for oxidations by superoxide in aqueous solutions. A pulse radiolysis study. Meshulam, A.; Cohen, H.; Meyerstein, D., *Inorg. Chim. Acta* **176**: 75-7 (1990)
- 90A428 Electron-transfer reactivity of the ${}^2\text{E}$ excited state of trans-diammine(1,4,8,11-tetraazacyclotetradecane)chromium(III). Bakac, A.; Espenson, J.H., *J. Chem. Soc., Chem. Commun.* : 1646-7 (1990)
- 90A474 Metal induced decarboxylation of aliphatic free radicals. I. Kinetics of the reactions of copper(I) and copper(II) ions with the 2-methyl-2-carboxylic acid-propyl free radical in aqueous solutions. A pulse radiolysis study. Masarwa, M.; Cohen, H.; Saar, J.; Meyerstein, D., *Isr. J. Chem.* **30**: 361-8 (1990)
- 90A488 Intra- and inter-molecular electron transfer reactions in 3,3'-thiodipropionic acid. Mohan, H., *J. Chem. Soc., Perkin Trans. 2* : 1821-4 (1990)
- 90A499 Mechanism of redox reactions induced by light and electron pulse in solutions of mixed ligand iron(II) complex cyanides. Horvath, A.; Szoke, J.; Wojnarovits, L., *Proc. Tihany Symp. Radiat. Chem.* **7**: 71-5 (1990, Pub. 1991)
- 90B077 Reduction reactions of water soluble cyano-cobalt(III)-porphyrins: Metal versus ligand centered processes. Mosseri, S.; Neta, P.; Harriman, A.; Hambricht, P., *J. Inorg. Biochem.* **39**: 93-100 (1990)
- 90C005 Redox potentials of the azide and dithiocyanate radicals. DeFelippis, M.R.; Faraggi, M.; Klapper, M.H., *J. Phys. Chem.* **94**: 2420-4 (1990)
- 90C007 One-electron reduction potentials of 5-indoxyl radicals. A pulse radiolysis and laser photolysis study. Jovanovic, S.V.; Steenken, S.; Simic, M.G., *J. Phys. Chem.* **94**: 3583-8 (1990)
- 90N140 Application of Ru-(II)-polypyridine sensitizers in the reduction of CO_2 to CH_4 and H_2 -evolution using Ru-colloids. Duerr, H.; Trierweiler, H.-P.; Willner, I.; Maidan, R., *New J. Chem.* **14**: 317-20 (1990)
- 90R041 Photochemical and radiolytic oxidation of a zinc porphyrin bound to human serum albumin. Davila, J.; Harriman, A., *J. Am. Chem. Soc.* **112**: 2686-90 (1990)
- 91A015 Kinetics and energetics of one-electron-transfer reactions involving tryptophan neutral and cation radicals. Jovanovic, S.V.; Steenken, S.; Simic, M.G., *J. Phys. Chem.* **95**: 684-7 (1991)
- 91A018 Oxidation of $[\text{Au}^{\text{l}}(\text{CN})_2]^-$. Formation of dicyanogold(III) oxide and colloidal monocyanogold(III) oxide. Mosseri, S., *J. Phys. Chem.* **95**: 854-8 (1991)
- 91A065 Photochemistry of the μ -hydroxo- μ -peroxo-bis[triethylenetetraamine]cobalt(III) complex in basic aqueous solutions. Shinohara, N.; Matsufuji, S.; Okubo, W., *Polyhedron* **10**: 107-12 (1991)
- 91A067 Mechanism of photoinduced redox reactions in aqueous solutions of $[\text{Fe}(\text{bpy})(\text{CN})_4]^{2-}$. Horvath, A.; Szoke, J.; Wojnarovits, L., *Inorg. Chim. Acta* **179**: 97-104 (1991)
- 91A081 Radiation-induced electron-transfer processes in Ru(II)-diimine complexes in aqueous solution. An application of Marcus electron-transfer theory. Venturi, M.; Mulazzani, Q.G.; D'Angelantonio, M.; Ciano, M.; Hoffman, M.Z., *Radiat. Phys. Chem.* **37**: 449-56 (1991)
- 91A143 Photoinduced charge separation in polymer pendant $\text{Ru}(\text{bpy})_3^{2+}$ complex: Influence of the microstructure of the polymer. Barrie, M.S.; Delaire, J.A.; Kaneko, M., *New J. Chem.* **15**: 65-70 (1991)
- 91A152 Mechanism of oxidation of the 2-hydroxycyclohexyl radical to cyclopentanecarbaldehyde by copper ions in aqueous solutions. Masarwa, M.; Cohen, H.; Meyerstein, D., *Inorg. Chem.* **30**: 1849-54 (1991)

- 91A198 One-electron reduction of ruthenium(II)-diimine complexes. Characterization of reduced species containing 2,2'-bipyridine, 2,2'-bipyrimidine, and 2,2'-bipyrazine in aqueous solution. D'Angelantonio, M.; Mulazzani, Q.G.; Venturi, M.; Ciano, M.; Hoffman, M.Z., *J. Phys. Chem.* **95**: 5121-9 (1991)
- 91A218 Reactivity of Ru(bpy)₃⁺ towards the radicals originating from the scavenging of hydrogen atoms and hydroxyl radicals by methanol, ethanol, propan-2-ol, tert-butyl alcohol and formate ions in aqueous solution: A pulse radiolytic study. Mulazzani, Q.G.; D'Angelantonio, M.; Carnaioni, N.; Venturi, M., *J. Chem. Soc., Faraday Trans.* **87**: 2179-85 (1991)
- 91A292 Oxidation of nickel(II) ethylenediaminetetraacetate by carbonate radical. Mandal, P.C.; Bardhan, D.K.; Sarkar, S.; Bhattacharyya, S.N., *J. Chem. Soc., Dalton Trans.* : 1457-61 (1991)
- 91A367 Reduction of Cu²⁺_(aq) by CO₃²⁻: First steps and the formation of colloidal copper. Ershov, B.G.; Janata, E.; Michaelis, M.; Henglein, A., *J. Phys. Chem.* **95**: 8996-9 (1991)
- 91A387 Rapid reduction of [Cu^{II}(sarcophagine)]²⁺ ion and elimination of Cu^I from the cage: A pulse radiolysis study. Creaser, I.I.; Harrowfield, J.M.; Lawrence, G.A.; Mulac, W.; Sangster, D.; Sargeson, A.M.; Schmidt, K.; Sullivan, J.C., *J. Coord. Chem.* **23**: 389-95 (1991)
- 91A455 Use of the Hammett correlation and σ⁺ for calculation of one-electron redox potentials of antioxidants. Jovanovic, S.V.; Tasic, M.; Simic, M.G., *J. Phys. Chem.* **95**: 10824-7 (1991)
- 91A477 Stereospecificity of the β-hydroxyl elimination from the (hydroxyalkyl)chromium complex (H₂O)₅Cr^{III}-CH(CH₃)CH(CH₃)OH²⁺. Cohen, H.; Feldman, A.; Ish-Shalom, R.; Meyerstein, D., *J. Am. Chem. Soc.* **113**: 5292-9 (1991)
- 91A511 Oxidative homolysis of organochromium macrocycles. Steffan, C.R.; Espenson, J.H.; Bakac, A., *Inorg. Chem.* **30**: 1134-7 (1991)
- 91A513 Thermodynamics and kinetics of carbon dioxide binding to two stereoisomers of a cobalt(I) macrocycle in aqueous solution. Creutz, C.; Schwarz, H.A.; Wishart, J.F.; Fujita, E.; Sutin, N., *J. Am. Chem. Soc.* **113**: 3361-71 (1991)
- 91D177 Unusual spin-trap chemistry for the reaction of hydroxyl radical with the carcinogen N-nitrosodimethylamine. Wink, D.A.; Desrosiers, M.F., *Radiat. Phys. Chem.* **38**: 467-72 (1991)
- 91N125 Effect of anionic molecular assembly environments on fluorescence quenching by electron transfer. Wolszczak, M.; Thomas, J.K., *Radiat. Phys. Chem.* **38**: 155-64 (1991)
- 91Z208 Studies of hypervalent iron. Bielski, B.H.J., *Free Radical Res. Commun.* **12-13**: 469-77 (1991)
- 92A008 Pulse radiolysis study of redox reactions of safranine T in aqueous solutions: One electron oxidation. Guha, S.N.; Moorthy, P.N.; Mittal, J.P., *Radiat. Phys. Chem.* **39**: 183-90 (1992)
- 92A059 Pulse radiolysis investigations on electron-transfer reactions in aqueous solutions of substituted alkyl sulfides. Mohan, H.; Mittal, J.P., *J. Chem. Soc., Perkin Trans. 2* : 207-12 (1992)
- 92A073 Deamination of 2-methyl-2-propanamine induced by hydroxyl radicals and metal ions: A comparison between the rates of β elimination of ammonia and water. Goldstein, S.; Czapski, G.; Cohen, H.; Meyerstein, D.; Cho, J.-K.; Shaik, S.S., *Inorg. Chem.* **31**: 798-803 (1992)
- 92A134 Deamination of β-alanine induced by hydroxyl radicals and monovalent copper ions. A pulse radiolysis study. Goldstein, S.; Czapski, G.; Cohen, H.; Meyerstein, D., *Inorg. Chim. Acta* **192**: 87-93 (1992)
- 92A148 Kinetics of formation, dissociation, and redox reactions of the benzyl radical-Cu(II) ion complex in a 10% acetonitrile-90% water mixture. Mayouf, A.; Lemmetyinen, H.; Sychttchikova, I.; Koskikallio, J., *Int. J. Chem. Kinet.* **24**: 579-85 (1992)
- 92A165 Mechanism of oxidation of (meso-5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradecane)nickel(II) by HO₂ free radicals in aqueous solutions. A pulse radiolysis study. Meshulam, A.; Cohen, H.; Van Eldik, R.; Meyerstein, D., *Inorg. Chem.* **31**: 2151-6 (1992)
- 92A182 Buxton, G.V., Unpublished data (Letter, 23 May 1992), 1992
- 92A191 A new approach to the study of the oxygenation reactions of transition-metal complexes. Formation of the μ-superoxo cobalt(III) complexes in the oxygenation reactions of cobalt(II) amines. Dhanasekaran, T.; Natarajan, P., *J. Am. Chem. Soc.* **114**: 4621-4 (1992)
- 92A206 Reduction of Pb²⁺ in aqueous solution: Early steps and colloid formation, and the atom → metal transition. Henglein, A.; Janata, E.; Fojtik, A., *J. Phys. Chem.* **96**: 4734-6 (1992)
- 92A215 Hydroxyl radical induced decarboxylation and deamination of 2-methylalanine catalyzed by copper ions. Goldstein, S.; Czapski, G.; Cohen, H.; Meyerstein, D., *Inorg. Chem.* **31**: 2439-44 (1992)
- 92A259 Redox reactions in aqueous solutions of PbBr₄²⁻ and PtBr₆²⁻. Broszkiewicz, R.K.; Vojnovic, B., *Radiat. Phys. Chem.* **40**: 11-6 (1992)
- 92A348 Electrochemistry of mixed metal clusters in aqueous solution: Reduction of Ag⁺ by the lead atom. Fojtik, A.; Henglein, A.; Janata, E., *J. Phys. Chem.* **96**: 8203-6 (1992)
- 92A363 Electron-transfer reactions of alkyl peroxy radicals. Jovanovic, S.V.; Jankovic, I.; Josimovic, L., *J. Am. Chem. Soc.* **114**: 9018-21 (1992)
- 92A390 One-electron reduction and demetallation of copper porphyrins. Kumar, M.; Neta, P.; Sutter, T.P.G.; Hambright, P., *J. Phys. Chem.* **96**: 9571-5 (1992)
- 92A466 Formation of mercury clusters during pulsed radiolysis of aqueous Hg²⁺ solutions. Sukhov, N.L.; Ershov, B.G., *Bull. Russ. Acad. Sci., Div. Chem. Sci.* **41**: 1-4 (1992) Translated from: *Izv. Akad. Nauk, Ser. Khim.* : 9-12 (1992)
- 92A471 Outer-sphere electron transfer reactions involving the [Pt(NH₃)₄F₂]²⁺ ion. Rogovoi, A.V.; Puzyk, M.V.; Balashev, K.P.; Ponyaev, A.I., *Russ. J. Phys. Chem.* **66**: 293-5 (1992) Translated from: *Zh. Fiz. Khim.* **66**: 559-61 (1992)
- 92G183 Ring reduction of [N-methyltetraakis(4-sulfonatophenyl)porphinato]cobalt(II), -nickel(II), and -copper(II) and subsequent methyl group migration. Reversible reaction between methyl radicals and Ni^{II}TSPP. Guldi, D.M.; Neta, P.; Hambright, P.; Rahimi, R., *Inorg. Chem.* **31**: 4849-53 (1992)
- 92N098 Absorption spectrum and chemical reactions of colloidal cadmium in aqueous solution. Henglein, A.; Gutierrez, M.; Janata, E.; Ershov, B.G., *J. Phys. Chem.* **96**: 4598-602 (1992)
- 92R075 Photo-induced electron transfer from nucleotides to ruthenium-tris-1,4,5,8-tetraazaphenanthrene: Model for photosensitized DNA oxidation. Lecomte, J.P.; Kirsch-De Mesmaeker, A.; Kelly, J.M.; Tossi, A.B.; Goerner, H., *Photochem. Photobiol.* **55**: 681-9 (1992)
- 93A100 Redox reactions of neutral red. A pulse radiolysis study. Guha, S.N.; Moorthy, P.N.; Mittal, J.P., *J. Chem. Soc., Perkin Trans. 2* : 409-15 (1993)
- 93A118 Electron transfer in di(deoxy)nucleoside phosphates in aqueous solution: Rapid migration of oxidative damage (via adenine) to guanine. Candeias, L.P.; Steenken, S., *J. Am. Chem. Soc.* **115**: 2437-40 (1993)
- 93A166 Silver atoms and clusters in aqueous solution: Absorption spectra and the particle growth in the absence of stabilizing Ag⁺ ions. Ershov, B.G.; Janata, E.; Henglein, A.; Fojtik, A., *J. Phys. Chem.* **97**: 4589-94 (1993)
- 93A224 Steady-state and pulse radiolysis of some palladium(II) complexes. Patel, R.P.; Kulshreshtha, S.K.; Mohan, H., *J. Chem. Soc., Dalton Trans.* : 1245-51 (1993)
- 93A292 One-electron oxidation of the iron(II) complex of 1,10-phenanthroline-5,6-quinone. A pulse radiolysis study. Bao, H.; Navaratnam, S.; Parsons, B.J.; Phillips, G.O., *Radiat. Phys. Chem.* **42**: 989-92 (1993)
- 93A299 Redox reactions of thallium clusters in aqueous solution. Mulvaney, P., *Isr. J. Chem.* **33**: 89-94 (1993)
- 93A346 Oxidation-reduction reaction of photoinduced benzyl radicals in water: Para substituent effect. Mayouf, A.M.; Lemmetyinen, H., *Photochem. Photobiol.*, A **73**: 205-11 (1993), 77(2-3): 285 (1994)
- 93A362 Transfert d'électron du cadmium en valence I. Lerat-Parizot, O.; Potier, J.; Hickel, B., *J. Chim. Phys. Phys.-Chim. Biol.* **90**: 789-800 (1993)
- 93A404 Pulse radiolysis of aqueous solutions of 6-aminophenalenone. II. Intermediate products of the reactions of the dye with OH radicals. Semenova, G.V.; Ponorev, A.V.; Kartasheva, L.I.; Pikaev, A.K., *High Energy Chem.* **27**: 23-7 (1993) Translated from: *Khim. Vys. Energ.* **27**: 26-9 (1993)

- 93A434 Distance dependence of intramolecular electron transfer across oligoprolines in $[(\text{bpy})_2\text{Ru}^{\text{II}}\text{L}\cdots(\text{Pro})_n\text{Co}^{\text{III}}(\text{NH}_3)_5]^{3+}$, $n = 1\text{-}6$: Different effects for helical and nonhelical polyproline II structures. Ogawa, M.Y.; Wishart, J.F.; Young, Z.; Miller, J.R.; Isied, S.S., *J. Phys. Chem.* **97**: 11456-63 (1993)
- 93A473 Effect of N-alkylation on the rate of β -amine elimination from transients with Cu^{II} -carbon σ bonds. Goldstein, S.; Czapski, G.; Cohen, H.; Meyerstein, D.; Shaik, S., *J. Chem. Soc., Faraday Trans.* **89**: 4045-51 (1993)
- 93A517 The use of conjugated scavengers to determine the rate constants of fast reactions in aqueous solutions by pulse radiolysis. Gogolev, A.V.; Shilov, V.P.; Fedoseev, A.M.; Pikaev, A.K., *Mendeleev Commun.* : 155-6 (1993)
- 94A002 Kinetic and spectral characteristics of transients formed in the pulse radiolysis of phenylthiourea in aqueous solution. Dey, G.R.; Naik, D.B.; Kishore, K.; Moorthy, P.N., *Radiat. Phys. Chem.* **43**: 365-9 (1994)
- 94A098 Redox properties of diaryl chalcogenides and their oxides. Engman, L.; Lind, J.; Merenyi, G., *J. Phys. Chem.* **98**: 3174-82 (1994)
- 94A179 Characterization of transients produced in aqueous medium by pulse radiolytic oxidation of 3,5-diiodotyrosine. Das, T.N.; Priyadarsini, K.I., *J. Phys. Chem.* **98**: 5272-8 (1994)
- 94A208 Pulse radiolysis study of oxidation reactions of sulphacetamide in aqueous solutions. Sabharwal, S.; Kishore, K.; Moorthy, P.N., *Radiat. Phys. Chem.* **44**: 499-506 (1994)
- 94A210 A pulse radiolysis study of Pd^+ and Pd^{3+} ions obtained in aqueous acid solutions. Troitskii, D.A.; Ershov, B.G.; Sukhov, N.L., *High Energy Chem.* **28**: 190-2 (1994) Translated from: *Khim. Vys. Energ.* **28**: 221-3 (1994)

8. Molecular Formula Index

Ag	Silver atom 1.1	CH ₃ Cu ⁺	Methylcopper(II) ion 8.28, 8.28.2
Ag ⁺	Silver(I) ion 1.1.2, 17.1.2, 25.1.1, 25.2.2	CH ₃ Cu ²⁺	Methylcopper(III) ion 8.65
Ag ²⁺	Silver(II) ion 1.5, 7.39.1	CH ₃ I	Iodomethane 6.6.27, 6.17.2, 8.15.11, 15.8.19, 15.10.24
AgHO ⁺	Hydroxysilver(II) ion 1.6	CH ₃ NO ₂	Nitromethane 1.1.13, 1.2.11, 1.3.10
AgH ₂ O ₂	Dihydroxysilver(II) 1.8	CH ₃ NiO ⁺	Hydroxymethylnickel(II) ion 15.19
AgH ₆ N ₂ ⁺	Diamminesilver(I) ion 1.1.3, 1.3.1	CH ₃ O	Hydroxymethyl 5.1.3, 6.10.2, 8.5.23, 10.10.4, 11.2.4, 15.1.2, 22.3.54
AgH ₇ N ₂ O ⁺	Diammine(hydroxy)silver(II) 1.10	CH ₄ O	Methanol 8.45.3, 25.4.35, 25.5.17
AgH ₁₀ N ₃ O ⁺	Triammine(hydroxy)silver(II) ion 1.11	CH ₁₀ CrF ₃ O ₅ ²⁺	Pentaqua(trifluoromethyl)chromium(III) ion 22.3.13
AgH ₁₂ N ₄ ²⁺	Tetraamminesilver(II) ion 1.9	CH ₁₁ Cl ₂ CrO ₆ ²⁺	Pentaqua(dichloromethyl)chromium(III) ion 22.3.15
Ag ₂ ⁺	Silver(I) ion, complex with Ag(0) 1.2 22.50.1	CH ₁₃ CrO ₅ ²⁺	Pentaquamethylchromium(III) ion 22.50.20
Au(CN) ₂ H ⁻	Hydrogen dicyanoaurate(0) ion 3.2	CH ₁₅ CoN ₆ ²⁺	Pentaammine(cyano)cobalt(III) ion 5.1.20, 15.1.20, 28.2.23
BH ₃ O ₃	Boric acid 6.6.2	CH ₁₅ CoN ₆ S ²⁺	Pentaammine(thiocyanato- <i>N</i>)cobalt(III) ion 5.1.26, 15.1.25, 28.2.29
Bi ²⁺	Bismuth(II) ion 4.1	CHgN	Mercury(I) cyanide 10.10
Br ⁻	Bromide ion 15.29.1, 15.48.2, 15.65.3	CHgNO ₂ S	Thiocyanatomercury(I)peroxy 10.13
BrCoH ₁₅ N ₅ ²⁺	Pentaammine(bromo)cobalt(III) ion 5.1.18, 6.1.9, 15.1.18, 17.3.4, 28.2.21	CHgNS	Mercury(I) thiocyanate 10.12
BrHg	Mercury(I) bromide 10.6	CNS ⁻	Thiocyanate ion 15.63.2, 15.67.1
BrHgO ₂	Bromomercury(I)peroxy 10.7	CN ₄ O ₈	Tetranitromethane 7.2.6, 7.4.15, 8.5.26, 10.6.4, 10.8.5, 10.10.9, 10.11.4, 10.12.4, 15.1.44, 25.6.3
BrO ₃ ⁻	Bromate ion 5.1.8, 5.7.2, 5.8.1, 5.9.1, 5.10.2, 6.1.2, 15.1.8, 28.2.8	CNiO ₂	Carboxylatnickel(II) 15.20
Br ₂ ⁻	Dibromine radical ion 6.1.1, 12.2.2, 12.3.1, 15.69.1	CO	Carbon monoxide 6.5.4, 6.6.3, 9.8.1, 9.9.1, 9.10.1, 9.11.1
Br ₂ H ₁₂ N ₄ Rh ⁺	Tetraamminedibromorhodium(III) ion 21.8.3	CO ₂	Carbon dioxide 6.5.3, 6.6.4, 25.1.2
Br ₂ Mn ⁺	Dibromomanganese(III) ion 13.24	CO ₂ ⁻	Carbon dioxide radical anion 5.1.7, 6.80.1, 15.1.3, 22.3.45
Br ₄ HOPt ²⁻	Tetrabromo(hydroxy)platinate(III) ion 19.32	CO ₃ ²⁻	Carbonate ion 15.70.2
Br ₄ Pt ³⁻	Tetrabromoplatinate(I) ion 19.4	C ₂ AuN ₂ ²⁻	Dicyanoaurate(0) ion 3.1
Br ₆ Pt ³⁻	Hexabromoplatinate(III) ion 19.33	C ₂ FeO ₄	Iron(II) oxalate 9.5
CCl ₃	Trichloromethyl 9.12.1	C ₂ FeO ₄ ⁺	Iron(III) oxalate 9.5.1
CCl ₃ Cu ²⁺	Trichloromethylcopper(III) ion 8.66	C ₂ HAuN ₂ O ⁻	Dicyanohydroxyaurate(II) ion 3.4
CCl ₄	Carbon tetrachloride 1.1.9, 1.2.9, 1.3.6	C ₂ H ₂ AuN ₂	Dihydrogen dicyanoaurate(0) 3.3
CCuO ₂	Carboxylatocuppper(II) 8.29	C ₂ H ₂ AuN ₂ O	Dicyano(hydroxy)aurate(II) ion, protonated 3.5, 3.5.1
CHBiO ₂ ³⁺	Carboxylatobismuth(IV) ion 4.6	C ₂ H ₂ ClO ₂ ⁻	Chloroacetate ion 1.1.10, 1.3.7
CHBr ₃	Bromoform 1.1.8, 1.2.8, 1.3.5	C ₂ H ₂ CuO ₂ ⁺	Carboxymethylcopper(III) ion 8.68
CHCl ₃	Chloroform 1.1.11, 1.3.8	C ₂ H ₂ MnO ₆	Peroxidomanganese(III) formate 13.14
CHO ₃ ⁻	Bicarbonate ion 6.6.5	C ₂ H ₃ MnO ₆	Hydroperoxidomanganese(III) formate complex 13.15
CH ₂ O	Formaldehyde 25.1.18, 25.5.14	C ₂ H ₄ CdNO ₂	Glycinatcadmium(I) ion 5.9
CH ₂ O ₂	Formic acid 6.5.6, 6.6.25		
CH ₃	Methyl 6.10.2, 8.82.1, 9.28.2, 13.28.2		
CH ₃ BiO ³⁺	Hydroxymethylbismuth(IV) ion 4.2		
CH ₃ CrO ²⁺	Hydroxymethylchromium(III) ion 7.27a		
CH ₃ CrO ₂ ²⁺	Dihydroxymethylchromium(III) ion 7.28		

$\text{C}_2\text{H}_4\text{CoNO}_2^+$	Glycinatocobalt(II) ion	6.47	$\text{C}_2\text{O}_4^{2-}$	Oxalate ion	22.50.79
$\text{C}_2\text{H}_4\text{CuNO}_2^+$	Glycinatocuppper(II) ion	8.47.3	$\text{C}_3\text{H}_3\text{CuNO}_2^+$	2-Ammonio-1-carboxyethylcopper(II) ion	8.30
$\text{C}_2\text{H}_4\text{NO}_2^-$	Glycine, negative ion	1.7.8, 1.9.5	$\text{C}_3\text{H}_4\text{CuO}_2^+$	1-Carboxyethylcopper(III) ion	8.69
$\text{C}_2\text{H}_4\text{O}$	Acetaldehyde	25.1.15	$\text{C}_3\text{H}_5\text{CrO}_3^{2+}$	1-Carboxy-1-hydroxyethylchromium(III) ion	7.34
$\text{C}_2\text{H}_4\text{O}_2$	Acetic acid	6.4.5, 6.5.7, 6.6.21, 15.8.14, 15.10.18	$\text{C}_3\text{H}_5\text{NO}$	Acrylamide	8.5.21
$\text{C}_2\text{H}_5\text{BiO}^{3+}$	1-Hydroxyethylbismuth(IV) ion	4.3	$\text{C}_3\text{H}_6\text{NO}_2^-$	Alanine, negative ion	1.9.2
$\text{C}_2\text{H}_5\text{CdO}^+$	1-Hydroxyethylcadmium(II) ion	5.11	$\text{C}_3\text{H}_6\text{O}$	Acetone	25.1.16, 28.2.58
$\text{C}_2\text{H}_5\text{CrO}^{2+}$	1-Hydroxyethylchromium(III) ion	7.28a		Allyl alcohol	6.1.25, 15.1.40, 28.2.59
	2-Hydroxyethylchromium(III) ion	7.29	$\text{C}_3\text{H}_7\text{BiO}^{3+}$	1-Hydroxy-1-methylethylbismuth(IV) ion	4.4
$\text{C}_2\text{H}_5\text{CuO}^{2+}$	2-Hydroxyethylcopper(III) ion	8.67	$\text{C}_3\text{H}_7\text{CdO}^+$	1-Hydroxy-1-methylethylcadmium(II) ion	5.12
$\text{C}_2\text{H}_5\text{NO}_2$	Glycine	1.5.19	$\text{C}_3\text{H}_7\text{CrO}^{2+}$	1-Hydroxy-1-methylethylchromium(III) ion	7.29a
$\text{C}_2\text{H}_5\text{NO}_2\text{Ni}$	Glycinatonickel(III) ion	15.33		2-Hydroxy-1-methylethylchromium(III) ion	7.30
$\text{C}_2\text{H}_5\text{NiO}^+$	1-Hydroxyethylnickel(II) ion	15.21	$\text{C}_3\text{H}_7\text{NO}_2\text{S}$	Cysteine	22.50.71
$\text{C}_2\text{H}_5\text{O}$	1-Hydroxyethyl	5.1.4, 6.103.1, 10.10.5, 15.1.4, 22.3.53	$\text{C}_3\text{H}_7\text{NiO}^+$	1-Hydroxy-1-methylethynickel(II) ion	15.22
	2-Hydroxyethyl	8.5.24	$\text{C}_3\text{H}_7\text{O}$	1-Hydroxy-1-methylethyl	5.1.5, 6.106.2, 10.10.6, 11.2.5, 15.1.5, 19.37.5, 22.3.55
$\text{C}_2\text{H}_6\text{N}_2\text{O}$	<i>N</i> -Nitrosodimethylamine	25.4.42	$\text{C}_3\text{H}_8\text{O}$	2-Propanol	6.75.1, 8.14.2, 25.4.45, 25.5.22
$\text{C}_2\text{H}_6\text{O}$	Ethanol	25.4.34, 25.5.13	$\text{C}_3\text{H}_9\text{CuN}_2\text{O}_2$	Aminomethyl(glycinato)copper(II)	8.43a
$\text{C}_2\text{H}_6\text{OS}$	Dimethyl sulfoxide	25.4.28	$\text{C}_3\text{H}_{11}\text{CuN}_2^{3+}$	1,3-Diammonio-2-propylcopper(II) ion	8.34
$\text{C}_2\text{H}_6\text{O}_2$	Ethylene glycol	1.5.18, 1.7.7	$\text{C}_3\text{H}_{17}\text{CrO}_5^{2+}$	Pentaqua(isopropyl)chromium(III) ion	22.50.22
$\text{C}_2\text{H}_6\text{S}_2$	Dimethyl disulfide	1.5.17, 1.7.6, 25.4.27, 25.5.12	$\text{C}_3\text{N}_3\text{Ni}^{2-}$	Tris(cyano)nickelate(I) ion	15.3
$\text{C}_2\text{H}_7\text{Cu}^{2+}$	2-Ammonioethylcopper(II) ion	8.31	$\text{C}_4\text{CoN}_4^{2-}$	Tetracyanocobaltate(II) ion	6.44
$\text{C}_2\text{H}_7\text{NO}$	2-Aminoethanol	1.7.1	$\text{C}_4\text{H}_3\text{CuO}_5$	1,2-Dicarboxy-2-hydroxyethylcopper(III) ion	8.71
$\text{C}_2\text{H}_8\text{CoN}_2^+$	Ethylenediaminecobalt(II) ion	6.29	$\text{C}_4\text{H}_4\text{AgO}_4$	Silver(II)-succinate complex	1.14
$\text{C}_2\text{H}_8\text{N}_2\text{Ni}$	Ethylenediaminenickel(III) ions	15.32	$\text{C}_4\text{H}_4\text{CoNO}_4$	Iminodiacetatocobalt(II), H-abstraction product	6.59
$\text{C}_2\text{H}_{15}\text{CrO}_5^{2+}$	Pentaqua(ethyl)chromium(III) ion	22.50.21	$\text{C}_4\text{H}_4\text{CuO}_8^{3-}$	Tetraformatocuprate(I) ion	8.7, 22.50.44
$\text{C}_2\text{H}_{15}\text{CrO}_6^{2+}$	Pentaqua(methoxymethyl)chromium(III) ion	22.3.14, 22.50.23	$\text{C}_4\text{H}_4\text{Mo}_2\text{O}_{14}^{3-}$	Bis(μ -oxo)bis[aqua(oxalato)-oxomolybdate(IV)(V) ion	14.3
$\text{C}_2\text{H}_{18}\text{CoN}_5\text{O}_2^{2+}$	(Acetato)pentaamminecobalt(III) ion	5.1.27, 15.1.26, 28.2.30	$\text{C}_4\text{H}_4\text{NNiO}_4$	Iminodiacetonickelate(II), H-abstraction product	15.27
$\text{C}_2\text{H}_{20}\text{Co}_2\text{F}_3\text{N}_6\text{O}_2^{3+}$	Hexaamminebis(μ -hydroxy)- μ -(trifluoroacetato)dicobalt(III) ion	5.1.29, 15.9.2, 28.2.31	$\text{C}_4\text{H}_4\text{O}_4$	Fumaric acid	8.5.22
$\text{C}_2\text{H}_{21}\text{Co}_2\text{F}_2\text{N}_6\text{O}_2^{3+}$	Hexaammine- μ -(difluoroacetato)bis(μ -hydroxy)dicobalt(III) ion	5.1.30, 15.9.3, 28.2.32	$\text{C}_4\text{H}_5\text{BrCoNO}_4$	Maleic acid	8.5.25
$\text{C}_2\text{H}_{22}\text{Co}_2\text{F}_6\text{N}_6\text{O}_2^{3+}$	Hexaammine- μ -(fluoroacetato)bis(μ -hydroxy)dicobalt(III) ion	5.1.31, 15.9.4, 28.2.33	$\text{C}_4\text{H}_5\text{Br}_2\text{CoNO}_4^-$	Bromo(iminodiacetato)cobalt(III)	6.77
$\text{C}_2\text{H}_{23}\text{Co}_2\text{N}_6\text{O}_2^{3+}$	μ -Acetatohexaamminebis(μ -hydroxy)dicobalt(III) ion	5.1.32, 15.9.5, 28.2.34		Dibromo(iminodiacetato)cobaltate(III) ion	6.76

$C_4H_5CoNO_4$	Iminodiacetatocobalt(II)	6.57.1, 6.59.1	$C_4H_{10}OS$	Diethyl sulfoxide	25.4.16
$C_4H_5CoNO_6^-$	Iminodiacetatocobaltate(II) ion, superoxide adduct	6.57	$C_4H_{10}O_2$	<i>tert</i> -Butyl hydroperoxide	7.3.3
$C_4H_5CuNO_2^+$	2-Ammonio-2-carboxypropylcopper(II) ion	8.38	$C_4H_{10}S_2$	Diethyl disulfide	1.5.8, 1.7.5, 25.4.15, 25.5.9
$C_4H_5CuNO_2^{2+}$	2-Ammonio-2-carboxypropylcopper(III) ion	8.73	$C_4H_{11}CrN^{3+}$	2-Ammonio-2,2-dimethylchromium(III) ion	7.36
$C_4H_6CoNO_5$	Hydroxy(iminodiacetato)cobalt(III)	6.78	$C_4H_{11}CuN^{2+}$	2-Ammonio-2,2-dimethylethylcopper(II) ion	8.33
$C_4H_6NO_4^-$	Aspartate monoanion	1.9.4	$C_4H_{11}N^+$	2-Amino-2-methylpropyl, conjugate acid	9.7.4, 22.37.5
$C_4H_6O_3^-$	2-Carboxy-2-hydroxy-2-methylethyl, anion	9.7.5, 22.37.6	$C_4H_{13}ClN_3Pt$	Chloro(diethylenetriamine)platinum(II), H reaction product	19.12, 19.12.1
$C_4H_8CoN_2O_4$	Bis(glycinato)cobalt(II)	6.46		Chloro(diethylenetriamine)platinum(II), OH reaction product	19.40
$C_4H_8CuN_2O_4^+$	Bis(glycine)copper(III) complex	8.57		Chloro(diethylenetriamine)platinum(II), OH reaction product	19.8
C_4H_8NO	(<i>N</i> -Acetyl- <i>N</i> -methylamino)methyl	9.7.3, 22.37.4	$C_4H_{13}CoN_3^{2+}$	Diethylenetriaminecobalt(II) ion	6.31
$C_4H_8NO_2$	2-Amino-2-carboxy-2-methylethyl	9.7.2, 22.37.3	$C_4H_{15}Cl_2N_3OPt^+$	Chloro(diethylenetriamine)platinum(II), Cl_2^- reaction product	19.39
$C_4H_8NO_2^-$	α -Aminoisobutyrate negative ion	1.9.3	$C_4H_{15}N_4Pt^{2+}$	Bis(ethylenediamine)platinum(III) ion, deprotonated	19.37
$C_4H_8N_2O_4Pt$	<i>cis</i> -Bis(glycinato)platinum(II), H reaction product	19.14	$C_4H_{16}ClN_4Pt^{2+}$	Chlorobis(ethylenediamine)platinum(III) ion	19.35
	<i>trans</i> -Bis(glycinato)platinum(II), H reaction product	19.15	$C_4H_{16}Cl_2CoN_4^+$	<i>cis</i> -Dichlorobis(ethylenediamine)cobalt(III) ion	5.1.10, 28.2.13
$C_4H_8N_2O_4Pt^+$	<i>cis</i> -Bis(glycinato)platinum(II), OH reaction product	19.45		<i>trans</i> -Dichlorobis(ethylenediamine)-cobalt(III) ion	5.1.11, 28.2.14
	<i>trans</i> -Bis(glycinato)platinum(II), OH reaction product	19.46	$C_4H_{16}CoF_2N_4^+$	<i>cis</i> -Bis(ethylenediamine)difluorocobalt(III) ion	5.1.13, 28.2.16
$C_4H_8N_2O_4Pt^-$	<i>cis</i> -Bis(glycinato)platinate(I) ion	19.9, 19.9.1	$C_4H_{16}CoN_4^{2+}$	Bis(ethylenediamine)cobalt(II) ion	6.28
	<i>trans</i> -Bis(glycinato)platinate(I) ion	19.10, 19.10.1	$C_4H_{16}N_4Pt^+$	Bis(ethylenediamine)platinum(I) ion	19.7
$C_4H_9BiO^{3+}$	2-Hydroxy-2-dimethylethylbismuth(IV) ion	4.5	$C_4H_{16}N_4Pt^{2+}$	Bis(ethylenediamine)platinum(II), H reaction product	19.11
$C_4H_9CrO^{2+}$	2-Ethoxyethylchromium(III) ion	7.33	$C_4H_{16}N_5O_5Ru$	Pentaammine(acetylenedicarboxylato)-ruthenium(III), OH-adduct	22.70
	2-Hydroxy-1,2-dimethylethylchromium(III) ion	7.31	$C_4H_{18}ClN_4OPt^{2+}$	Bis(ethylenediamine)platinum(II), Cl_2^- reaction product	19.34
	2-Hydroxy-2,2-dimethylethylchromium(III) ion	7.32	$C_4H_{18}CoFN_4O^{2+}$	Aquabis(ethylenediamine)fluorocobalt(III) ion	5.1.14, 28.2.17
$C_4H_9CuO^+$	2-Hydroxy-2,2-dimethylethylcopper(II) ion	8.32	$C_4H_{18}CoN_5O_4^+$	Pentaammine(fumarato)cobalt(III) ion	5.1.22, 28.2.25
$C_4H_9CuO^{2+}$	2-Hydroxy-2,2-dimethylethylcopper(III) ion	8.70	$C_4H_{19}ClCoN_5^{2+}$	<i>cis</i> -Amminechlorobis(ethylenediamine)-cobalt(III) ion	5.1.15, 28.2.18
$C_4H_9NO_2$	α -Aminoisobutyric acid	1.5.5, 1.7.2			
$C_4H_9NiO^+$	1-Ethoxyethylnickel(II) ion	15.23			
C_4H_9O	1-Hydroxybutyl	8.9.1			
	2-Hydroxy-2,2-dimethylethyl	5.1.6, 6.6.26, 6.81.1, 9.7.1, 10.10.7, 15.1.6, 19.37.6, 22.3.52, 22.37.2			
$C_4H_9O_3$	2-Hydroxy-2,2-dimethylethylperoxy	22.37.9			
$C_4H_{10}O$	2-Methyl-2-propanol	17.9.2			

$C_4H_{19}CoN_6O_2^{2+}$	cis -Nitroamminebis(ethylenediamine)-cobalt(III) ion	5.1.16, 28.2.19	$C_5H_{21}CoN_6O_3^{3+}$	Pentaammine(pyridine)cobalt(III) ion, OH adduct	6.95
$C_4H_{19}N_4O_2Pt^{2+}$	Aquaabis(ethylenediamine)hydroxy-platinum(III) ion	19.36	$C_5H_{23}Co_2N_8O_4^{3+}$	μ -4-Pyrimidinecarboxylatobis[hydroxo-tris(ammine)cobalt(III)] ion	15.1.28
$C_4H_{20}N_4O_2Pt^{3+}$	Diaquaabis(ethylenediamine)platinum(III) ion	19.38	$C_5H_{23}Co_2N_8O_4^{3+}$	μ -5-Pyrimidinecarboxylatobis[hydroxo-tris(ammine)cobalt(III)] ion	15.1.27
$C_4N_4Ni^{2-}$	Tetracyanonickelate(II) ion	22.3.29	$C_6CoO_12^{3-}$	Trioxalatocobaltate(III) ion	6.1.11, 17.3.8
$C_4N_4Ni^{3-}$	Tetracyanonickelate(I) ion	15.2	$C_6FeN_6^{3-}$	Ferricyanide ion	3.1.3, 6.98.1, 8.84.3, 9.13.2, 9.34, 15.28.2, 22.24.2, 25.1.6, 25.2.6, 28.6.4
$C_4N_4Pt^{3-}$	Tetracyanoplatinate(I) ion	19.6	$C_6FeN_6^{4-}$	Ferrocyanide ion	9.49.8, 19.31.1, 19.37.3, 19.45.3, 19.46.4, 22.46.1, 22.50.53, 28.13.3, 28.15.4
$C_5ClCoN_5^{4-}$	Chloro(pentacyano)cobaltate(II) ion	6.42	C_6H_4BrO	4-Bromophenoxy	22.3.44
$C_5CoN_5^{3-}$	Pentacyanocobaltate(II) ion	6.43	C_6H_4ClO	4-Chlorophenoxy	22.3.47
$C_5CoN_5^{4-}$	Pentakis(cyano-C)cobaltate(I) ion	6.2	$C_6H_4CuO_2$	4-Hydroxyphenoxy copper(II) ion, conjugate base	8.40
$C_5FeN_5^{3-}$	Pentacyanoferrate(II) ion	9.6	$C_6H_4CuO_2^+$	4-Hydroxyphenoxy copper(III) ion, conjugate base	8.78
$C_5FeN_6O^{3-}$	Pentacyanonitrosylferrate(II) ion	9.7	C_6H_4IO	4-Iodophenoxy	22.3.56
$C_5H_3N_2O_2^-$	4-Pyrimidinecarboxylate ion	15.1.43	$C_6H_4O_2$	1,4-Benzosemiquinone, radical ion	28.22.2
$C_5H_6N_2$	4-Methylpyrazine	9.6.1	$C_6H_5CoNO_6^-$	Nitrilotriacetatocobaltate(II) ion, H-abstraction product	6.60
$C_5H_7CoO_2^+$	Acetylacetonatocobalt(II) ion	6.38	$C_6H_5CuO_2^{2+}$	2-Hydroxyphenoxy copper(III) ion	8.76
$C_5H_7CrO_2^+$	Acetonylacetonatochromium(II) ion	7.26	$C_6H_5CuO_2^{2+}$	3-Hydroxyphenoxy copper(III) ion	8.77
$C_5H_7N_3O$	1-Methylcytosine	25.5.18	$C_6H_5MnNO_6^-$	Nitrilotriacetatomanganate(II) ion, H-abstraction product	13.9
$C_5H_8O_2^-$	2-Carboxy-2,2-dimethylethyl anion	9.7.6, 22.37.7	$C_6H_5NNiO_6^-$	Nitrilotriacetatonickelate(II), H-abstraction product	15.29
C_5H_9	Cyclopentyl	15.1.7	$C_6H_5NO_2$	Nitrobenzene	1.1.12, 1.2.10, 1.3.9
$C_5H_9CrO_2^{2+}$	2-Carboxy-2,2-dimethylethylchromium(III) ion	7.35	$C_6H_5NO_2^-$	Nitrobenzene radical anion	28.15.12
$C_5H_9CuO_2^+$	2-Carboxy-2,2-dimethylethylcopper(II) ion	8.37	$C_6H_5NO_6^{2-}Zn$	Nitrilotriacetatozinc(II) H-abstraction product	28.10
$C_5H_9CuO_2^{2+}$	2-Carboxy-2,2-dimethylethylcopper(III) ion	8.72	C_6H_5O	Phenoxy	22.3.63
$C_5H_9Ni^{2+}$	Cyclopentylnickel(II) ion	15.24	$C_6H_6AgNO_6^-$	Nitrilotriacetatoargentate(II)	1.12
$C_5H_9O_2^-$	Trimethylacetate ion	1.5.31, 1.7.9	$C_6H_6CdNO_6^{2-}$	Nitrilotriacetatocadmium(II) ion	5.10
$C_5H_{11}NO_2S$	Methionine	1.5.20, 25.4.36	$C_6H_6CoNO_6^{2-}$	Nitrilotriacetatocobaltate(I) ion	6.3
$C_5H_{13}CuN_2O_2$	β -Alaninato(2-aminoethyl)copper(III) ion	8.83	$C_6H_6CuNO_6^-$	Nitrilotriacetatocuprate(II) ion	8.46.2
$C_5H_{13}CuN_2O_4^+$	Bis(glycinato)methylcopper(III) ion	8.82	$C_6H_6NNiO_6^{2-}$	Nitrilotriacetatonickelate(I) ion	15.17
$C_5H_{14}ClCrNO_5^{3+}$	Pentaqua(3-chloropyridine)chromium(III) ion	22.3.20			
$C_5H_{15}CrNO_5^{3+}$	Pentaqua(pyridine)chromium(III) ion	22.3.19			
$C_5H_{16}CoN_4O_3^+$	Carbonatobis(ethylenediamine)cobalt(III) ion	5.1.12, 28.2.15			

$C_6H_6O_2$	1,2-Benzenediol 13.15.3, 13.18.3	$C_6H_{18}CoN_5O_2^+$	Nitrito(triethylenetetramine)cobalt(II) ion 6.34
	1,3-Benzenediol 13.15.4, 13.18.7		
	1,4-Benzenediol 22.50.76, 28.22.4		
$C_6H_6O_6^-$	Ascorbate radical anion 6.13.1, 6.14.1	$C_6H_{19}CoN_4O^+$	
$C_6H_7O_6^-$	Ascorbate ion 13.14.1, 13.17.1, 13.19.1, 13.20.1, 15.45.1		Hydroxytriethylenetetraminecobalt(II) ion 6.33
$C_6H_8BrCoNO_7^-$	Aqua(bromo)nitrilotriacetatocobaltate(III) ion 6.107	$C_6H_{20}Cl_2N_2O_2Pt$	<i>cis</i> -Dichlorobis(isopropylamine)- <i>trans</i> - dihydroxyplatinum(IV), OH reaction product 19.49
$C_6H_8N_2O_2$	1-Methylthymine 25.5.20	$C_6H_{20}Cl_2N_2O_2Pt^-$	<i>cis</i> -Dichlorobis(isopropylamine)- <i>trans</i> - dihydroxyplatinate(III) ion 19.24
$C_6H_{10}Cu^{2+}$	Copper(II) ion, complex with cyclohexene 8.39	$C_6H_{22}CoN_7O_2^{3+}$	Pentaammine(isonicotinamide)cobalt(III) ion, OH adduct 6.97
$C_6H_{10}CuNO_8^-$	<i>cis</i> -Diaqua(nitrilotriacetato)copper(II) ion 8.84.4, 8.85.1, 8.86.1		Pentaammine(nicotinamide)cobalt(III) ion, OH adduct 6.96
$C_6H_{10}MnN_2O_6^-$	Peroxido(ethylenediaminediacetato)- manganate(III) ion 13.27	$C_6H_{24}CoN_6^{2+}$	Tris(ethylenediamine)cobalt(II) ion 6.27
$C_6H_{10}Mo_2N_2O_8S_2^{2-}$	Bis(μ -oxo)bis[(cysteinato)- oxomolybdate(V)] ion 28.2.48	$C_6H_{24}CoN_6^{3+}$	Tris(ethylenediamine)cobalt(III) ion 5.1.9, 6.1.4, 6.6.7, 7.6.1, 7.15.1, 7.16.1, 8.16.2, 15.1.9, 15.8.2, 15.10.3, 17.3.7, 22.3.4, 28.2.12
$C_6H_{10}O_4S$	3,3'-Thiodipropionic acid 25.4.50	$C_6N_6Os^{4-}$	Hexacyanoosmate(II) ion 22.46.2
$C_6H_{11}O$	2-Hydroxycyclohexyl 8.39.1	$C_6N_6Ru^{3-}$	Hexacyanoruthenate(III) ion 22.46
$C_6H_{12}CoN_3O_6$	Tris(glycinato)cobaltate(II) ion 6.45	$C_7H_4O_3^-$	4-Carboxyphenoxy, conjugate base 22.3.46
$C_6H_{12}O_2$	<i>cis</i> -1,2-Cyclohexanediol 1.7.3 <i>trans</i> -1,2-Cyclohexanediol 1.7.4	$C_7H_5O_3^-$	Sesamol, conjugate base 9.34.5
$C_6H_{14}CrN_2O_5^{3+}$	Pentaqua(3-cyanopyridine)chromium(III) ion 22.3.21	$C_7H_6ClCu^{2+}$	(4-Chlorophenyl)methylcopper(III) ion 8.75
$C_6H_{14}CuN_2O_4^+$	Bis(alanine)copper(III) complex 8.58	$C_7H_6FeNO_9^{2-}$	Carboxylato(nitrilotriacetato)ferrate(III) ion 9.29
$C_6H_{14}CuN_2O_4^-$	Bis(alaninato)cuprate(I) 8.10	C_7H_7Br	Benzyl bromide 7.3.2
$C_6H_{14}CuN_4O_4^+$	Bis(β -alanine)copper(III) complex 8.59	$C_7H_7Cu^{2+}$	Benzylcopper(III) ion 8.74
$C_6H_{14}OS$	Dipropyl sulfoxide 25.4.33	$C_7H_7CuO_2^{2+}$	3-Hydroxy-5-methylphenoxy copper(III) ion 8.79
$C_6H_{14}O_2S$	3,3'-Thiodipropanol 25.4.49	C_7H_7O	3-Methylphenoxy 22.3.61 4-Methylphenoxy 22.3.62
$C_6H_{15}CuN^{2+}$	2-(Dimethylammonio)ethylcopper(II) ion 8.36	$C_7H_7O_2$	3-Methoxyphenoxy 22.3.59 4-Methoxyphenoxy 22.3.60
$C_6H_{15}CuN_2O_5$	Bis(alaninato)hydroxycopper(II) 8.10.1	$C_7H_8N_2S$	Phenylthiourea 25.4.43
$C_6H_{15}NO_3$	Triethanolamine 22.50.83, 22.59.9	C_7H_8O	Anisole 1.5.7, 25.4.13
$C_6H_{16}CrNO_5^{3+}$	Pentaqua(4-pyridiniomethyl)chromium(III) ion 22.3.17	$C_7H_{11}CoNO_7^-$	Aqua(methyl)nitrilotriacetatocobaltate(III) ion 6.101
$C_6H_{17}CrNO_5^{3+}$	Pentaqua(4-methylpyridine)chromium(III) ion 22.3.18	$C_7H_{11}CoNO_8^-$	Aqua(hydroxymethyl)nitrilotriacetato- cobaltate(III) ion 6.102
$C_6H_{18}CoN_4^{2+}$	Triethylenetetraminecobalt(II) ion 6.32	$C_7H_{11}CuNO_8^-$	<i>cis</i> -Aqua(hydroxymethyl)(nitrilotriacetato)- cuprate(III) ion 8.84

$C_7H_{11}FeNO_7^-$	Aqua(methyl)nitrilotriacetatoferate(III) ion	9.28	$C_8H_{13}CoNO_8^-$	Aqua(1-hydroxyethyl)nitrilotriacetato-cobaltate(III) ion	6.103
$C_7H_{11}MnNO_7^-$	Aqua(methyl)nitrilotriacetato-manganate(III) ion	13.28	$C_8H_{13}CuNO_8^-$	cis-Aqua(1-hydroxyethyl)(nitrilotriacetato)-cuprate(III) ion	8.85
$C_7H_{17}CrO_5^{2+}$	Pentaqua(benzyl)chromium(III) ion	22.3.16, 22.50.26	$C_8H_{16}CrF_3O_5^{2+}$	Pentaqua[4-(trifluoromethyl)benzyl]-chromium(III) ion	22.50.25
$C_7H_{19}CoN_6O_4^+$	Pentaammine(4-nitrobenzoato)cobalt(III) ion, electron adduct	6.67	$C_8H_{16}CrNO_5^{3+}$	Pentaqua(4-cyanobenzyl)chromium(III) ion	22.50.24
$C_7H_{19}CuN_2^{3+}$	2-(Dimethylammonio)-1-(dimethylammoniomethyl)ethylcopper(II) ion	8.35	$C_8H_{18}CuN_2O_4^+$	Bis(α -aminobutyric acid)copper(III) complex	8.60
$C_8H_4N_2$	1,4-Dicyanobenzene	25.2.14		Bis(α -aminoisobutyric acid)copper(III) complex	8.63
$C_8H_6NO^-$	5-Hydroxyindole, conjugate base	9.34.2		Bis(β -aminobutyric acid)copper(III) complex	8.61
C_8H_7NO	5-Hydroxyindole	12.5.1		Bis(γ -aminobutyric acid)copper(III) complex	8.62
$C_8H_7O_3^-$	2-Methoxybenzoate ion	1.6.7	$C_8H_{19}CrO_5^{2+}$	Pentaqua(4-methylbenzyl)chromium(III) ion	22.50.27
	3-Methoxybenzoate ion	1.6.8	$C_8H_{23}CoN_5O_3S^+$	O-Sulfito(tetraethylenepentamine)-cobalt(III) ion	6.109
	4-Methoxybenzoate ion	1.6.9	$C_8H_{23}CoN_7O_3^{2+}$	Pentaammine[4-(aminocarbonyl)-1-(carboxymethyl)pyridinio]cobalt(III) radical anion	6.68
C_8H_8O	Acetophenone	5.1.56, 5.3.1	$C_8H_{23}CoN_7O_3^{3+}$	Pentaammine[4-(aminocarbonyl)-1-(carboxymethyl)pyridinio]cobalt(III) ion	6.68.1
$C_8H_8O_2^-$	2,6-Dimethylbenzosemiquinone, radical ion	28.22.3	$C_8H_{24}CoN_7O_3^{3+}$	Pentaammine[4-(aminocarbonyl)-1-(carboxymethyl)pyridinio]cobalt(III) radical, protonated	6.69
$C_8H_8O_3$	2-Methoxybenzoic acid	1.5.21, 25.4.37	$C_8H_{26}CoN_6^{2+}$	Bis(diethylenetriamine)cobalt(II) ion	6.30
	3-Methoxybenzoic acid	1.5.22, 25.4.38	$C_8H_{34}Co_2N_9O_2^{3+}$	μ -Amido- μ -peroxidotetrakis-(ethylenediamine)dicobalt(III) ion	6.112, 22.50.16
	4-Methoxybenzoic acid	1.5.23, 25.4.39	$C_8H_{34}Co_2N_9O_2^{4+}$	μ -Amido- μ -superoxidotetrakis-(ethylenediamine)dicobalt(III) ion	5.1.28
$C_8H_9Cu^{2+}$	(4-Methylphenyl)methylcopper(III) ion	8.81	$C_8MoN_8^{3-}$	Octacyanomolybdate(V) ion	14.4
$C_8H_9CuO^{2+}$	(4-Methoxyphenyl)methylcopper(III) ion	8.80	$C_9H_9I_2NO_3$	3,5-Diiodotyrosine	25.4.17
$C_8H_9N_2NiO_8^{2-}$	Bis(iminodiacetato)nickelate(II), H-abstraction product	15.28	$C_9H_9O_4^-$	2,3-Dimethoxybenzoate ion	1.6.2
C_8H_9O	4-Ethylphenoxy	22.3.51		2,4-Dimethoxybenzoate ion	1.6.4
$C_8H_9O_2$	4-Ethoxyphenoxy	22.3.50		2,6-Dimethoxybenzoate ion	1.6.5
$C_8H_9O_3^-$	2,6-Dimethoxyphenoxide ion	9.36.2		3,4-Dimethoxybenzoate ion	1.6.3
	3,4-Dimethoxyphenoxide ion	9.34.1		3,5-Dimethoxybenzoate ion	1.6.6
	3,5-Dimethoxyphenoxide ion	9.36.1			
$C_8H_{10}CoNO_9^{2-}$	Aqua(carboxymethyl)nitrilotriacetato-cobaltate(III) ion	6.104			
$C_8H_{10}N_2O$	<i>N,N</i> -Dimethyl-4-nitrosoaniline	5.1.68			
$C_8H_{10}N_2O_3S$	Sulfacetamide	25.4.47			
$C_8H_{10}O_2$	1,2-Dimethoxybenzene	1.5.9, 25.4.18, 25.5.10			
	1,3-Dimethoxybenzene	1.5.10, 25.4.19			
	1,4-Dimethoxybenzene	1.5.11, 25.4.20, 25.5.11			
$C_8H_{10}O_2^+$	1,4-Dimethoxybenzene radical cation	12.3.3, 25.4.21			
$C_8H_{10}O_3$	3,4-Dimethoxyphenol	9.38.2			
$C_8H_{12}CuO_8^{3-}$	Tetraacetatocuprate(I) ion	8.8, 22.50.45			

$C_9H_{10}O_4$	2,3-Dimethoxybenzoic acid 25.4.22	$C_9H_{26}CoN_7O_3^{3+}$	Pentaammine[4-(aminocarbonyl)-1-(1-carboxyethyl)pyridinio]cobalt(III) radical, protonated <i>6.71</i>
	2,4-Dimethoxybenzoic acid 25.4.24	$C_{10}H_5O_5S^-$	1,4-Naphthoquinone-2-sulfonate ion <i>5.1.67, 6.1.30</i>
	2,6-Dimethoxybenzoic acid 25.4.25	$C_{10}H_6O_3$	2-Hydroxy-1,4-naphthoquinone <i>5.1.64</i>
	3,4-Dimethoxybenzoic acid 25.4.23	$C_{10}H_7NO_3^{2-}$	5-Hydroxyindole-3-acetate ion, conjugate base <i>9.34.3</i>
	3,5-Dimethoxybenzoic acid 25.4.26	$C_{10}H_8CoN_2^+$	2,2'-Bipyridinecobalt(I) ion <i>6.9</i>
$C_9H_{11}NO_3$	Tyrosine <i>28.15.14</i>	$C_{10}H_8CoN_2^{2+}$	2,2'-Bipyridinecobalt(II) ion <i>6.1.13, 22.3.5</i>
$C_9H_{11}O$	2,4,6-Trimethylphenoxy 4-Isopropylphenoxy <i>22.3.57</i>	$C_{10}H_9N_2^+$	2,2'-Bipyridine, conjugate acid <i>6.11.1, 22.3.42</i>
$C_9H_{12}O_2$	Trimethylhydroquinone <i>22.50.84</i>	$C_{10}H_{10}Co$	Cobaltocene <i>6.65</i>
$C_9H_{12}O_3$	1,2,3-Trimethoxybenzene 1,2,4-Trimethoxybenzene 1,3,5-Trimethoxybenzene <i>1.5.24, 25.4.53, 1.5.25, 25.4.54, 1.5.26, 25.4.55</i>	$C_{10}H_{11}CoN_2O_8^{2-}$	Ethylenediaminetetraacetatocobaltate(II) ion, H-abstraction product <i>6.61</i>
$C_9H_{13}NO^+$	4-Methoxy- <i>N,N</i> -dimethylaniline radical cation <i>22.3.58</i>	$C_{10}H_{11}MnN_2O_8^{2-}$	Ethylenediaminetetraacetatomanganate(II) ion, H-abstraction product <i>13.10</i>
$C_9H_{13}N_2O_9P$	Uridine 5'-monophosphate radical <i>22.35.4</i>	$C_{10}H_{11}N_2NiO_6^{2-}$	Ethylenediaminetetraacetatonickelate(II), H-abstraction product <i>15.30</i>
$C_9H_{15}B_2CoF_4$	Bis(dimethylglyoximato)methylcobalt(III) disfluoroborate <i>22.3.11</i>	$C_{10}H_{11}N_2O^-$	Serotonin, conjugate base <i>9.34.6</i>
$C_9H_{15}CoNO_8^-$	Aqua(1-hydroxy-1-methylethyl)nitrilotriacetatocobaltate(III) ion <i>6.106</i>	$C_{10}H_{11}N_2O_8Zn^{2-}$	Ethylenediaminetetraacetatozinc(II) H-abstraction product <i>28.11</i>
$C_9H_{15}CuNO_8^-$	<i>cis</i> -Aqua(1-hydroxy-1-methylethyl)-(nitrilotriacetato)cuprate(III) ion <i>8.86</i>	$C_{10}H_{11}O_5^-$	2,3,4-Trimethoxybenzoate ion <i>1.6.10</i> 2,4,5-Trimethoxybenzoate ion <i>1.6.12</i> 2,4,6-Trimethoxybenzoate ion <i>1.6.13</i> 3,4,5-Trimethoxybenzoate ion <i>1.6.11</i>
$C_9H_{18}N_4Pt^{2+}$	Diethylenetriamine(pyridine)platinum(II) ion <i>19.41.2</i>	$C_{10}H_{12}AgN_2O_8^{2-}$	Ethylenediaminetetraacetatoargentate(II) <i>1.13</i>
$C_9H_{20}N_4OPt^{2+}$	Diethylenetriamine(pyridine)platinum(II) ion OH-adduct <i>19.41</i>	$C_{10}H_{12}CdN_2O_8^{3-}$	Ethylenediaminetetraacetatocadmiate(I) ion <i>5.7</i>
$C_9H_{22}N_4Ni^+$	1,4,7,10-Tetraazacyclotridecanenickel(I) ion <i>15.4</i>	$C_{10}H_{12}CoN_2O_8^{2-}$	Ethylenediaminetetraacetatocobaltate(II) ion <i>6.48, 22.50.2, 28.14.2</i>
$C_9H_{22}N_4Ni^{3+}$	1,4,7,10-Tetraazacyclotridecanenickel(III) ion <i>15.35</i>	$C_{10}H_{12}CoN_2O_{10}^{2-}$	Ethylenediaminetetraacetatocobaltate(III) ion, superoxide adduct <i>6.79</i>
$C_9H_{22}N_6Ni^+$	3,7-Bis(2-aminoethyl)-1,3,5,7-tetraazabicyclo[3.3.1]nonanenickel(I) ion <i>15.16</i>	$C_{10}H_{12}CoN_2O_{10}^{3-}$	Ethylenediaminetetraacetatocobaltate(II) ion, superoxide adduct <i>6.58</i>
$C_9H_{22}N_6Ni^{3+}$	3,7-Bis(2-aminoethyl)-1,3,5,7-tetraazabicyclo[3.3.1]nonanenickel(III) ion <i>15.55</i>	$C_{10}H_{12}CuN_2O_8^{3-}$	Ethylenediaminetetraacetatocuprate(I) ion <i>8.9</i>
$C_9H_{25}CoN_7O_3^{2+}$	Pentaammine[4-(aminocarbonyl)-1-(1-carboxyethyl)pyridinio]cobalt(III) radical anion <i>6.71</i>	$C_{10}H_{12}Mo_2N_2O_{12}^{2-}$	Bis(μ -oxo)(ethylenediaminetetraacetato)-bis[oxomolybdate(V)] ion <i>28.2.47</i>
$C_9H_{25}CoN_7O_3^{3+}$	Pentaammine[4-(aminocarbonyl)-1-(1-carboxyethyl)pyridinio]cobalt(III) ion <i>6.70.1, 6.71.1</i>		

$C_{10}H_{12}Mo_2N_2O_{12}^{3-}$	Bis(μ -oxo)(ethylenediaminetetraacetato)-bis[oxomolybdate(IV)(V)] ion 14.2	$C_{10}H_{17}CoNO_8^-$	Aqua(1-ethoxyethyl)nitrilotriacetato-cobaltate(III) ion 6.105
$C_{10}H_{12}N_2NiO_8^-$	Ethylenediaminetetraacetatonicelate(III) ion 15.70	$C_{10}H_{18}CrN_2O_4^{3+}$	Tetraaquabis(pyridine)chromium(III) ion 22.3.22
$C_{10}H_{12}N_2NiO_8^{2-}$	Ethylenediaminetetraacetatonicelate(II) ion 15.30.1	$C_{10}H_{22}CdN_2O_3^+$	1,4,10-Trioxa-7,13-diazacyclopentadecane-cadmium(I) ion 5.2
$C_{10}H_{12}N_2O_8Os^-$	Ethylenediaminetetraacetatoosmate(III) ion 22.3.32	$C_{10}H_{23}N_5NiO_2^+$	9-Methyl-9-nitro-1,4,7,11-tetraazacyclotridecanenickel(II) ion, electron adduct 15.5
$C_{10}H_{12}N_2O_8Pb^{2-}$	Ethylenediaminetetraacetatoplumbate(II) ion 5.7.7	$C_{10}H_{23}N_5NiO_2^{3+}$	9-Methyl-9-nitro-1,4,7,11-tetraazacyclotridecanenickel(III) ion 15.36
$C_{10}H_{12}O_2$	Duroquinone 5.1.62, 5.2.4, 5.3.5, 5.4.3, 5.5.2, 22.3.49	$C_{10}H_{24}CdN_4^+$	1,4,8,11-Tetrazacyclotetradecanecadmium(I) ion 5.6
$C_{10}H_{12}O_5$	2,3,4-Trimethoxybenzoic acid 1.5.27, 25.4.56 2,4,5-Trimethoxybenzoic acid 1.5.29, 25.4.58 2,4,6-Trimethoxybenzoic acid 1.5.30, 25.4.59 3,4,5-Trimethoxybenzoic acid 1.5.28, 25.4.57	$C_{10}H_{24}CoN_4^{2+}$	1,4,8,11-Tetraazacyclotetradecanecobalt(II) ion 6.49, 22.50.5
$C_{10}H_{13}N_2NiO_9^{2-}$	Hydroxy(ethylenediaminetetraacetato)-nickelate(III) ion 15.71	$C_{10}H_{24}CoN_4^{3+}$	1,4,8,11-Tetraazacyclotetradecane-cobalt(III) ion 7.4.5, 7.6.4, 7.8.3, 7.11.3, 7.15.2, 7.16.4, 7.17.1
$C_{10}H_{13}N_5O_4$	Adenosine 25.5.4	$C_{10}H_{24}CoN_4O_2^{2+}$	1,4,8,11-Tetraazacyclotetradecanecobalt(II) ion, dioxygen adduct 6.63
$C_{10}H_{13}N_5O_5$	Guanosine 25.5.15	$C_{10}H_{24}CuN_4^+$	1,4,8,11-Tetraazacyclotetradecanecopper(I) ion 8.13
$C_{10}H_{14}CoO_4$	Bis(acetylacetonato)cobalt(II) 6.37	$C_{10}H_{24}N_4Ni^+$	1,4,8,11-Tetraazacyclotetradecanenickel(I) ion 15.6
$C_{10}H_{14}CrO_4$	Bis(acetylacetonato)chromate(II) 7.25	$C_{10}H_{24}N_4Ni^{3+}$	1,4,8,11-Tetraazacyclotetradecane-nickel(III) ion 15.42
$C_{10}H_{14}N_2NiO_9^-$	Aqua(ethylenediaminetetraacetato)-nickelate(III) ion 15.72	$C_{10}H_{24}N_4Zn^+$	1,4,8,11-Tetrazacyclotetradecanezinc(I) ion 28.3
$C_{10}H_{14}N_5O_6P$	2'-Deoxyadenosine 5'-monophosphate 25.5.7	$C_{10}H_{25}Cl_2MnN_4O^+$	Dichlorohydroxy(1,4,7,11-tetraazacyclotetradecane)manganese(IV) ion 13.33
$C_{10}H_{14}N_5O_7P$	2'-Deoxyguanosine 5'-monophosphate 25.5.8	$C_{10}H_{25}CuN_4^{2+}$	1,4,8,11-Tetraazacyclotetradecane-(hydrido)copper(III) ion 8.53
$C_{10}H_{14}O_2$	tert-Butylhydroquinone 13.15.2, 13.18.2	$C_{10}H_{26}CrN_4O_2$	trans-Dihydroxy-1,4,8,11-tetraazacyclotetradecanechromium(III), OH reaction product 7.38
$C_{10}H_{14}O_4$	1,2,4,5-Tetramethoxybenzene 25.4.48	$C_{10}H_{27}CoN_7O_3^{2+}$	Pentaammine[4-(aminocarbonyl)-1-(1-carboxypropyl)pyridinio]cobalt(III) radical anion 6.72
$C_{10}H_{16}CrN_2O_4^{3+}$	Tetraqua(2,2'-bipyridine)chromium(III) ion 22.3.23		
$C_{10}H_{16}N_2$	<i>N,N,N',N'</i> -Tetramethyl-p-phenylene-diamine 9.34.7, 9.35.1, 9.36.3, 9.37.1, 9.38.1		
$C_{10}H_{16}N_2O_6Pd^-$	Bis(hydroxyprolinato)palladate(I) ion 18.2		
$C_{10}H_{16}N_2O_8$	Ethylenediaminetetraacetate ions 22.50.74, 22.63.1, 22.65.2, 22.66.1, 22.67.1, 28.14.15		

$C_{10}H_{27}CoN_7O_3^{3+}$	Pentaammine[4-(aminocarbonyl)-1-(1-carboxypropyl)pyridinio]cobalt(III) ion 6.72.1, 6.73.1	$C_{11}H_{26}CoN_4^{2+}$ 1,4,8,12-Tetraazacyclopentadecane-cobalt(II) ion 22.50.9
$C_{10}H_{28}CoN_7O_3^{3+}$	Pentaammine[4-(aminocarbonyl)-1-(1-carboxypropyl)pyridinio]cobalt(III) radical, protonated 6.73	$C_{11}H_{26}CoN_7^{3+}$ Pentaammine(1-methyl-4,4'-bipyridinium)cobalt(III) ion, electroadduct 6.66
$C_{10}H_{28}CrN_4O_2^{2+}$	<i>trans</i> -D aqua-1,4,8,11-tetraazacyclotetradecanechromium(II) ion 7.3	$C_{11}H_{26}CoN_7^{4+}$ Pentaammine(1-methyl-4,4'-bipyridinium)cobalt(III) ion 6.66.1
$C_{10}H_{30}CoN_7O_3^{2+}$	Pentaammine(1-L-prolyl-L-prolinato)cobalt(III) ion 22.4.1	$C_{11}H_{26}N_4Ni^{3+}$ 1,4,8,12-Tetraazacyclopentadecane-nickel(III) ion 15.51
$C_{10}H_{32}CrN_6O_3^{3+}$	<i>cis</i> -Diammine(aqua)(1,4,8,11-tetraazacyclotetradecane)chromium(III) ion 7.37	$C_{11}H_{27}N_5Ni^{3+}$ 1,4,7,10,13-Pentaazacyclohexadecane-nickel(III) ion 15.52
$C_{11}H_8O_2$	2-Methyl-1,4-naphthoquinone 5.1.65, 6.1.29, 6.6.28, 6.67.2, 8.47.4, 15.1.42, 17.2.4, 28.2.62	$C_{11}H_{29}N_4NiO^{2+}$ Aquamethyl(1,4,8,11-tetraazacyclotetradecane)nickel(III) ion 15.41
$C_{11}H_9FeO_2$	Carboxyferricenium 9.35	$C_{12}H_6N_2O_2$ 1,10-Phenanthroline-5,6-dione 25.5.21
$C_{11}H_{11}N_2$	1-Methyl-4,4'-bipyridinyl 22.50.77	$C_{12}H_8FeO_4^-$ 1,1'-Dicarboxyferricenium 9.36
$C_{11}H_{11}N_2O_3^-$	5-Hydroxytryptophan, conjugate base 9.34.4	$C_{12}H_9NO$ 3-Benzoylpyridine 6.6.23, 15.8.17, 15.10.21
$C_{11}H_{12}Fe^+$	Hydroxymethylferricenium 9.37	$C_{12}H_9O$ 4-Phenylphenoxy 22.3.64
$C_{11}H_{12}N_2O_2$	Tryptophan 15.34.1, 28.15.13	$C_{12}H_{10}S$ Diphenyl sulfide 25.4.31
$C_{11}H_{15}FeN_2O_9^{2-}$	Carboxylato(2-hydroxyethyl-ethylenediaminetriacetato)ferrate(III) ion 9.30	$C_{12}H_{10}Se$ Diphenyl selenide 25.4.30
$C_{11}H_{20}CoN_2O_9^-$	Aqua(hydroxymethyl)[<i>N</i> -(2-hydroxyethyl)- <i>N,N,N'</i> -ethylenediaminetriacetato]cobaltate(III) ion 6.108	$C_{12}H_{10}Te$ Diphenyl telluride 25.4.32
$C_{11}H_{21}BrF_3N_4NiO^{2+}$	Aquabromo-11-methyl-13-(trifluoromethyl)-1,4,7,10-tetraazacyclotrideca-10,13-dienenickel(III) ion 15.39	$C_{12}H_{11}N_3S^+$ Thionine semiquinone, conjugate monoacid 6.99.1, 13.11.1
$C_{11}H_{21}N_4Ni^{2+}$	11,13-Dimethyl-1,4,7,10-tetraazacyclotrideca-10,13-dienenickel(III) ion, conjugate base 15.38	$C_{12}H_{12}CoN_2^+$ 4,4'-Dimethyl-2,2'-bipyridinecobalt(I) ion 6.12
$C_{11}H_{22}F_3N_4NiO_2^{2+}$	D aqua-11-methyl-13-(trifluoromethyl)-1,4,7,10-tetraazacyclotrideca-10,13-dienenickel(III) ion, conjugate base 15.40	$C_{12}H_{12}CoN_2^{2+}$ 4,4'-Dimethyl-2,2'-bipyridinecobalt(II) ion 6.1.14, 22.3.6
$C_{11}H_{22}N_2N_4Ni^{3+}$	11,13-Dimethyl-1,4,7,10-tetraazacyclotrideca-10,13-dienenickel(III) ion 15.37	$C_{12}H_{12}N_2\cdot Co$ 4,4'-Dimethyl-2,2'-bipyridinecobalt(I) ions 6.13
		$C_{12}H_{13}N_2^+$ 4,4'-Dimethyl-2,2'-bipyridine, conjugate monoacid 6.16.2
		$C_{12}H_{14}N_2^+$ 1,1'-Dimethyl-4,4'-bipyridinium radical cation 9.32.1, 12.4.1, 22.47.2, 22.50.73, 22.63.2, 22.64.1, 22.65.1, 28.14.8, 28.15.9
		$C_{12}H_{14}N_2^{2+}$ 1,1'-Dimethyl-4,4'-bipyridinium 7.3.1, 9.3.2, 9.4.2, 21.11.5, 22.3.48, 22.6.1, 22.7.1, 22.8.1, 22.9.1, 22.10.1, 22.11.1, 22.12.2, 22.13.1, 22.14.1, 22.15.1, 22.16.1, 22.17.1, 22.18.4, 22.19.1, 22.20.1, 22.21.1, 22.22.1, 22.23.1, 22.28.2, 23.1.1
		$C_{12}H_{18}Cl_2N_6O_6Pt^+$ <i>cis</i> -[Dichlorobis(1-(2-hydroxyethyl)-2-methyl-5-nitroimidazole- <i>N</i> ³)]platinum(III) ion 19.48

$C_{12}H_{24}N_4Ni^{2+}$	5,7-Dimethyl-1,4,8,11-tetraaza-cyclotetradeca-4,7-dienenickel(II) ion 6.100.5	$C_{13}H_{27}N_7NiO_2^+$ 8-Methyl-8-nitro-1,3,6,10,13,15-hexaazatricyclo[13.1.1.1 ^{13,15}]octadecane-nickel(II) ion, electron adduct 15.14
$C_{12}H_{26}CdN_2O_4^+$	1,4,10,13-Tetraoxa-7,16-diazacyclooctadecanecadmium(I) ion 5.3	$C_{13}H_{27}N_7NiO_2^{3+}$ 8-Methyl-8-nitro-1,3,6,10,13,15-hexaazatricyclo[13.1.1.1 ^{13,15}]octadecane-nickel(III) ion 15.53
$C_{12}H_{29}ClN_3Pt^+$	Chloro(tetraethyl-diethylenetriamine)platinum(II) H reaction product 19.13	8-Amino-8-methyl-1,3,6,10,13,15-hexaazatricyclo[13.1.1.1 ^{13,15}]octadecane-nickel(I) ion 15.15
$C_{12}H_{29}CoN_3^{2+}$	Tetraethyl-diethylenetriaminecobalt(II) ion 6.35	$C_{13}H_{29}N_7Ni^{3+}$ 8-Amino-8-methyl-1,3,6,10,13,15-hexaazatricyclo[13.1.1.1 ^{13,15}]octadecane-nickel(III) ion 15.54
$C_{12}H_{29}CrN_4^{2+}$	(Methyl)-1,4,8,12-tetraaza-cyclopentadecanecromium(III) ion 22.50.28	$C_{13}H_{31}CrN_4^{2+}$ (Ethyl)-1,4,8,12-tetraazacyclopentadecanecromium(III) ion 22.50.29
$C_{12}H_{30}CoN_8^{2+}$	1,3,6,8,10,13,16,19-Octaaazabicyclo[6.6.6]-eicosanecobalt(II) ion 6.54, 22.50.4, 22.55.3, 22.57.1, 22.59.3	$C_{14}H_6O_8S_2^{2-}$ 9,10-Anthraquinone-2,6-disulfonate ion 6.4.6, 7.2.4, 8.15.8, 15.8.15, 15.10.19
$C_{12}H_{30}CoN_8^{3+}$	1,3,6,8,10,13,16,19-Octaaazabicyclo[6.6.6]-eicosanecobalt(III) ion 22.3.9, 22.18.1, 22.19.2	$C_{14}H_7O_5S^-$ 9,10-Anthraquinone-2-sulfonate ion 6.6.22, 8.15.9
$C_{12}H_{30}N_6Ni^{3+}$	Bis(1,4,7-triazacyclononane)nickel(III) ion 15.34	$C_{14}H_8CrN_2O_8^-$ 2,2'-Bipyridinebis(oxalato)chromate(III) ion 5.1.37, 28.2.39
$C_{12}H_{30}N_8Rh^{2+}$	1,3,6,8,10,13,16,19-Octaaazabicyclo[6.6.6]-eicosanerhodium(II) ion 21.9	$C_{14}H_8CrN_2O_8^{2-}$ 2,2'-Bipyridinebis(oxalato)chromate(II) ion 7.21
$C_{12}H_{32}Cl_2N_3OPt^+$	Chloro(tetraethyl-diethylenetriamine)-platinum(II), Cl_2^- reaction product 19.42	$C_{14}H_8FeN_6^-$ Tetracyano(2,2'-bipyridine)ferrate(III) ion 9.3.1, 9.32
$C_{12}H_{33}ClN_3O_2Pt^+$	Chloro(tetraethyl-diethylenetriamine)-platinum(II), OH reaction product 19.43	$C_{14}H_8FeN_6^{3-}$ 2,2'-Bipyridinetetracyanoferrate(II) ion, electron adduct 9.3
$C_{13}H_8O$	9-Fluorenone 5.1.63, 5.3.6, 5.4.4, 5.5.3, 6.6.24	$C_{14}H_8O_2$ 9,10-Anthraquinone 5.1.57, 6.1.26
$C_{13}H_9NO$	6-Aminophenalenone 1.5.6, 25.4.12	$C_{14}H_{10}O_2$ Benzil 5.1.58, 5.2.1, 5.3.2
$C_{13}H_{10}O$	Benzophenone 5.1.59, 5.2.2, 5.3.3, 5.4.1, 5.5.1, 6.1.27, 28.2.60	$C_{14}H_{14}N_2O_4^+$ 1,1'-Bis(carboxymethyl)-4,4'-bipyridinium radical cation 22.50.64
$C_{13}H_{11}NS$	10 Methylphenothiazine 14.4.1	$C_{14}H_{16}N_2^+$ 1,1'-Tetramethylene-2,2'-bipyridinium radical cation 22.50.80
$C_{13}H_{13}N_2O$	N-Benzyl-3-carbamylpyridinyl 28.23.2	$C_{14}H_{16}N_2O_6S_2^-$ 1,1'-Bis(2-sulfonatoethyl)-4,4'-bipyridinium radical anion 19.47.2, 22.50.67, 28.14.5, 28.15.7
$C_{13}H_{14}N_2^+$	1,1'-Trimethylene-2,2'-bipyridinium radical cation 22.50.82	$C_{14}H_{17}O_4^-$ 6-Hydroxy-2,5,7,8-tetramethylchroman-2-carboxylate ion 13.17.2, 13.18.4
$C_{13}H_{15}N_2O_3S$	1-Methyl-1'-(2-sulfonato)ethyl-4,4'-bipyridinium radical cation 28.14.17, 28.15.10	$C_{14}H_{18}N_2^+$ 1,1',2,2'-Tetramethyl-4,4'-bipyridinium radical cation 22.50.81
$C_{13}H_{15}N_3O_3$	Glycyltryptophan 25.5.16	$C_{14}H_{18}N_2O_2^-$ 1,1'-Bis(2-hydroxyethyl)-4,4'-bipyridinium radical cation 22.50.65
$C_{13}H_{17}FeN^+$	(Dimethylaminomethyl)ferricenium 9.38	$C_{14}H_{21}CuN_2O_{10}^{3-}$ (1-Hydroxybutyl)ethylenediamine-tetraacetatocuprate(II) ion 8.41

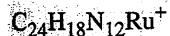
$C_{14}H_{24}CoN_4^+$	2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraenecobalt(I) ion	6.4	$C_{14}H_{34}CoN_8^{2+}$	1,8-Diamino-3,6,10,13,16,19-hexaaza-bicyclo[6.6.6]eicosanecobalt(II) ion
$C_{14}H_{24}CoN_4^{2+}$	2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraenecobalt(II) ion	6.55, 6.100.1, 13.25.1, 22.50.8	$C_{14}H_{34}N_8Pt^{3+}$	1,8-Diamino-3,6,10,13,16,19-hexaazabicyclo[6.6.6]eicosaneplatinum(IV) ion
$C_{14}H_{24}CoN_4O_2^+$	2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraenecobalt(II) ion, superoxide adduct	6.56	$C_{14}H_{36}CoN_8^{4+}$	1,8-Diamino-3,6,10,13,16,19-hexaaza-bicyclo[6.6.6]eicosanecobalt(II) ion, conjugate diacid
$C_{14}H_{24}CuN_4^+$	2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraenecopper(I) ion	8.16	$C_{15}H_{12}NO_2^-$	Metiazinic acid, conjugate base
$C_{14}H_{24}N_4Ni^{3+}$	2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraenenickel(II) ion	6.100.8	$C_{15}H_{14}O_3$	4,4'-Dimethoxybenzophenone
$C_{14}H_{26}CoN_4O_2^+$	Dihydroxy(2,3,9,10-tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraene)cobalt(III) ion	6.6.10, 15.8.4, 15.10.7	$C_{15}H_{16}N_3S^+$	Toluidine Blue cation
$C_{14}H_{28}CoN_4O_2^{3+}$	2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraenecobalt(III) ion	15.10.6	$C_{15}H_{19}BrN_4Ni^{2+}$	Bromo- α -2,12-dimethyl-3,7,11,17-tetraaza-bicyclo[11.3.1]heptadeca-1(17),2,6,11,13,15-hexaenenickel(III) ion
$C_{14}H_{28}FeN_4O_2^{2+}$	Diaqua(2,3,9,10-tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraeneiron(II) ion	9.9	$C_{15}H_{19}Br_2N_4Ni^+$	Dibromo- α -2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,6,11,13,15-hexaenenickel(III) ion
$C_{14}H_{30}CoN_4S_3^{2+}$	8-Methyl-1,3,13,16-tetraaza-6,10,19-trithiabicyclo[6.6.6]eicosanecobalt(II) ion	6.53, 22.50.3	$C_{15}H_{21}BrN_4NiO^{2+}$	Aquabromo- α -2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,6,11,13,15-hexaenenickel(III) ion
$C_{14}H_{32}CoN_4^{2+}$	2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradecanecobalt(II) ion	22.50.6, 22.55.2, 22.59.2	$C_{15}H_{21}CoO_6^-$	Tris(acetylacetonato)cobaltate(II) ion
$C_{14}H_{32}CuN_6^+$	3,6,10,13,16,19-Hexaazabicyclo[6.6.6]eicosanecopper(I) ion	8.12	$C_{15}H_{21}CrO_6^-$	Tris(acetylacetonato)chromate(II) ion
$C_{14}H_{32}N_4Ni^+$	1,4,8,11-Tetramethyl-1,4,8,11-tetraazacyclotetradecanenickel(I) ion	15.7	$C_{15}H_{21}O_6Ru^-$	Tris(acetylacetonato)ruthenate(II) ion
$C_{14}H_{32}N_4Ni^{2+}$	1,4,8,11-Tetramethyl-1,4,8,11-tetraazacyclotetradecanenickel(II) ion	22.3.28	$C_{15}H_{22}CuN_4^{2+}$	α -2,12-Dimethyl-3,7,11,17-tetraaza-bicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaenecopper(I) ion
$C_{14}H_{33}CrN_4^{2+}$	(1-Methylethyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion	22.50.31	$C_{15}H_{22}N_4Ni^{2+}$	α -2,12-Dimethyl-3,7,11,17-tetraaza-bicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaenecopper(II) ion
	(Propyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion	22.50.30	$C_{15}H_{22}N_4Ni^{2+}$	α -2,12-Dimethyl-3,7,11,17-tetraaza-bicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaenecnickel(II) ion

$C_{15}H_{22}N_4NiO^{2+}$	α -2,12-Dimethyl-3,7,11,17-tetraaza-bicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaene(hydroxo)nickel(III) ion 15.60	$C_{16}H_{18}N_2O_4^+$ 1,1'-Bis(carboxyethyl)-4,4'-bipyridinium radical ion (1+) 28.15.6
$C_{15}H_{23}BrN_4NiO^{2+}$	Aquabromo- α -2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaennickel(III) ion 15.62	$C_{16}H_{18}N_3S^+$ Methylene Blue cation 25.5.19
$C_{15}H_{23}CuN_4O^{2+}$	α -2,12-Dimethyl-3,7,11,17-tetraaza-bicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaenecopper(II) ion OH-adduct 8.44	$C_{16}H_{18}N_3S^{2+}$ $C_{16}H_{18}N_3S^+$ Methylene Blue radical cation 6.40.2
$C_{15}H_{23}N_4NiO_2^{2+}$	α -2,12-Dimethyl-3,7,11,17-tetraaza-bicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaenabis(hydroxo)nickel(III) ion 15.61	$C_{16}H_{20}N_2O_6S_2^-$ 1,1'-Bis(3-sulfonatopropyl)-4,4'-bipyridinium radical anion 22.50.68, 28.14.6
$C_{15}H_{26}N_4Ni^+$	α -2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),13,15-trienenickel(I) ion 15.12	$C_{16}H_{21}N_5NiOS^{2+}$ Aqua- α -2,12-dimethyl-3,7,11,17-tetraaza-bicyclo[11.3.1]heptadeca-1(17),2,6,11,13,15-hexaene(thiocyanato)nickel(III) ion 15.67
$C_{15}H_{27}N_4NiO^{2+}$	Hydroxy- α -2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),13,15-trienenickel(III) ion 15.57	$C_{16}H_{22}N_2^+$ 1,1',2,2',6,6'-Hexamethyl-4,4'-bipyridinium radical cation 22.50.75
$C_{15}H_{28}BrN_4NiO^{2+}$	Aquabromo- α -2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),13,15-trienenickel(III) ion 15.58	1,1'-Dipropyl-4,4'-bipyridinium radical cation 28.14.9
$C_{15}H_{30}N_4NiO_2^{3+}$	Diaqua- α -2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),13,15-trienenickel(III) ion 15.56	$C_{16}H_{23}N_5NiOS^{2+}$ Aqua- α -2,12-dimethyl-3,7,11,17-tetraaza-bicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaene(thiocyanato)nickel(III) ion 15.63
$C_{15}H_{35}CrN_4^{2+}$	(2-Butyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion 22.50.33 (Butyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion 22.50.32	$C_{16}H_{28}N_4Ni^{3+}$ 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-1,4,8,11-tetraennickel(I) ion 15.11
$C_{16}H_8CrN_2O_8^-$	Bis(oxalato)phenanthrolinechromate(III) ion 5.1.38, 28.2.40	$C_{16}H_{28}N_5NiOS^{2+}$ Aqua- α -2,12-dimethyl-3,7,11,17-tetraaza-bicyclo[11.3.1]heptadeca-1(17),13,15-triene(thiocyanato)nickel(III) ion 15.59
$C_{16}H_8CrN_2O_8^{2-}$	Bis(oxalato)phenanthrolinechromate(II) ion 7.23	$C_{16}H_{29}FeN_5O^{2+}$ Acetonitrile(aqua)-2,3,9,10-tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraeneiron(II) ion 9.8
$C_{16}H_9N_2O_5S^-$	Indigomonosulfonate ion 6.4.7	$C_{16}H_{31}N_4Ni^{2+}$ 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienenickel(II) ion; OH reaction product 15.26
$C_{16}H_{12}FeN_6^-$	Tetracyano(4,4'-dimethyl-2,2'-bipyridine)ferrate(III) ion 9.4.1	$C_{16}H_{32}BrN_4Ni^{2+}$ Bromo(5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene)nickel(III) ion 15.48
$C_{16}H_{12}FeN_6^{3-}$	Tetracyano(4,4'-dimethyl-2,2'-bipyridine)ferrate(II) ion, electron adduct 9.4	$C_{16}H_{32}CdN_2O_5^+$ 4,7,13,16,21-Penta-1,10-diaza-bicyclo[8.8.5]tricosanecadmium(I) ion 5.4

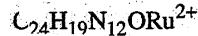
$C_{16}H_{32}ClCuN_4^{2+}$	Chloro-5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecopper(III) ion 8.51	$C_{16}H_{33}CoN_4^{2+}$	Hydrido- <i>prim-N-rac</i> -5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecobalt(III) ion 6.81
$C_{16}H_{32}Cl_2N_4Ni^{2+}$	Dichloro(5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene)nickel(III) ion 15.49	$C_{16}H_{33}CoN_4O^{2+}$	Hydrido- <i>N-rac</i> -5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecobalt(III) ion 6.80
$C_{16}H_{32}CoN_4^+$	5,7,7,12,12,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,14-dienecobalt(I) ion 6.7 <i>N-meso</i> -5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecobalt(I) ion 6.5 <i>N-rac</i> -5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecobalt(I) ion 6.6	$C_{16}H_{33}CuN_4^{2+}$	5,7,7,12,14,14-Hexamethyl-1,4,7,11-tetraazacyclotetradeca-4,11-diene(hydroxo)nickel(III) ion 15.47
$C_{16}H_{32}CoN_4^{2+}$	5,7,7,12,12,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,14-dienecobalt(II) ion 22.3.8 <i>N-rac</i> -5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecobalt(II) ion 6.5.2, 6.100.2, 13.25.2	$C_{16}H_{34}CoN_4O_2^+$	5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienedihydroxycobalt(III) ion 6.6.9
$C_{16}H_{32}CuN_4^+$	5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecopper(I) ion 8.15	$C_{16}H_{35}CoN_4O_2^{2+}$	Aqua(5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene)hydroxycobalt(III) ion 15.8.3, 15.10.5
$C_{16}H_{32}CuN_4^{3+}$	5,7,7,12,14,14 Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecopper(III) ion 8.52	$C_{16}H_{35}N_4Ni^{2+}$	5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecanenickel(II) ion, OH reaction product 15.25
$C_{16}H_{32}EuN_2O_5^{2+}$	4,7,13,16,21-Pentaoxa-1,10-diaza-bicyclo[8.8.5]tricosaneeuropium(II) ion 22.50.46	$C_{16}H_{36}AgN_4^{2+}$	5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecanesilver(II) ion 7.4.1, 15.10.1, 15.49.1, 21.11.3
$C_{16}H_{32}EuN_2O_5^{3+}$	4,7,13,16,21-Pentaoxa-1,10-diaza-bicyclo[8.8.5]tricosaneeuropium(III) ion 22.3.26, 22.29.1	$C_{16}H_{36}CoN_4^{2+}$	5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecanecobalt(II) ion 6.50, 22.50.7
$C_{16}H_{32}N_4Ni^{2+}$	5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienenicke(II) ion 15.10, 15.46.1	$C_{16}H_{36}CuN_4^+$	5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecanecopper(I) ion 8.14
$C_{16}H_{32}N_4Ni^{2+}$	5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienenicke(II) ion 6.100.7	$C_{16}H_{36}CuN_4^{2+}$	5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecanecopper(II) ion 6.100.3
$C_{16}H_{32}N_4Ni^{3+}$	5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienenicke(III) ion 15.46	$C_{16}H_{36}CuN_4^{3+}$	5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecanecopper(III) ion 8.50
$C_{16}H_{32}N_4Ni^{2+}$	5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienenicke(II) ion 6.100.7	$C_{16}H_{36}N_4Ni^{2+}$	5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecanenickel(II) ion 15.8
$C_{16}H_{32}N_4Ni^{2+}$	5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienenicke(III) ion 15.46	$C_{16}H_{36}N_4Ni^{2+}$	5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecanenickel(II) ion 6.100.6

$C_{16}H_{36}N_4Ni^{3+}$	$C_{17}H_{37}CrN_4^{2+}$
β - <i>rac</i> -(5,7,7,12,12,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradecane)nickel(III) ion 15.43	(Cyclohexyl)-1,4,8,12-tetraaza-cyclopentadecanechromium(III) ion 22.50.34
5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecanenickel(III) ion 15.44	
$C_{16}H_{37}Cl_2MnN_4O^+$	$C_{18}H_{12}N_6RuS_6^{3+}$
Dichloro- <i>meso</i> -5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclo-tetradecane(hydroxy)manganese(IV) ion 13.34	Tris(2,2'-bithiazole)ruthenium(III) ion 22.66
Dichloro- <i>rac</i> -5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclo-tetradecane(hydroxy)manganese(IV) ion 13.35	
$C_{16}H_{37}CuN_4^{2+}$	$C_{18}H_{24}N_2O_6S_2^-$
5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradecane(hydrido)copper(III) ion 8.54	1,1'-Bis(3-sulfonatopropyl)-3,3'-dimethyl-4,4'-bipyridinium radical anion 22.50.69, 22.55.11
$C_{16}H_{38}N_4NiO_8P_2^-$	$C_{18}H_{32}ClCrN_4^{2+}$
5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradecanedi(phosphato)nickel(III) ion 15.45	(4-Chlorophenylmethyl)-1,4,8,12-tetraaza-cyclopentadecanechromium(III) ion 22.50.37
$C_{17}H_{19}N_6NiS_2^+$	$C_{18}H_{32}CrFN_4^{2+}$
α -2,12-Dimethyl-3,7,11,17-tetraaza-bicyclo[11.3.1]heptadeca-1(17),2,6,11,13,15-hexaenebis(thiocyanato)nickel(III) ion 15.68	(4-Fluorophenylmethyl)-1,4,8,12-tetraaza-cyclopentadecanechromium(III) ion 22.50.38
$C_{17}H_{20}ClN_2S^+$	$C_{18}H_{32}CrN_4^{2+}$
Chlorpromazine, conjugate acid 25.4.14, 25.5.6	(4-Bromobenzyl)-1,4,8,12-tetraaza-cyclopentadecanechromium(III) ion 22.50.36
$C_{17}H_{20}N_4O_6$	$C_{18}H_{33}CrN_4^{2+}$
Riboflavin 5.1.69, 6.1.31, 6.4.8	(Phenylmethyl)-1,4,8,12-tetraaza-cyclopentadecanechromium(III) ion 22.50.35
$C_{17}H_{21}N_2S^+$	$C_{18}H_{34}CoF_3N_4O^{2+}$
Promethazine, conjugate acid 25.4.44	5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene(2,2,2-trifluoro-1-hydroxyethyl)cobalt(III) ion 6.84
$C_{17}H_{21}N_6NiS_2^+$	$C_{18}H_{36}CdN_2O_6^{2+}$
α -2,12-Dimethyl-3,7,11,17-tetraaza-bicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaenebis(thiocyanato)nickel(III) ion 15.64	4,7,13,16,21,24-Hexaoxa-1,10-diaza-bicyclo[8.8.8]hexacosanecadmium(I) ion 5.5
$C_{17}H_{26}N_3^{2+}$	$C_{18}H_{36}N_4Ni^+$
1-Methyl-1'-[3-(trimethylammonio)propyl]-4,4'-bipyridinium radical cation 28.14.18, 28.15.11	1,4,5,7,7,8,11,12,14,14-Decamethyl-1,4,8,11-tetraazacyclotetradecanenickel(I) ion 15.9
$C_{17}H_{35}CoN_4O^{2+}$	$C_{18}H_{37}CoN_4O^{2+}$
Hydroxymethyl(5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-4,11-diene)cobalt(III) ion 6.82	1-Hydroxyethyl(5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-4,11-diene)cobalt(III) ion 6.83
	$C_{18}H_{37}CoN_4O_2^{2+}$
	1,2-Dihydroxyethyl(5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-4,11-diene)cobalt(III) ion 6.85
	$C_{19}H_{32}CrF_3N_4^{2+}$
	(4-Trifluoromethyl)phenylmethyl-1,4,8,12-tetraazacyclopentadecanechromium(III) ion 22.50.40

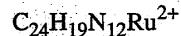
$C_{19}H_{35}CrN_4^{2+}$	(4-Methylbenzyl)-1,4,8,12-tetraaza-cyclopentadecanechromium(III) ion 22.50.39	$C_{21}H_{29}N_7O_{14}P_2$	Nicotinamide adenine dinucleotide, reduced 13.18.5
$C_{19}H_{35}CrN_4O^{2+}$	(4-Methoxyphenylmethyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion 22.50.41	$C_{21}H_{30}N_7O_{17}P_3$	Nicotinamide-adenine dinucleotide phosphate, reduced 13.18.6, 13.20.2
$C_{20}H_6Br_4O_5^{2-}$	Eosin dianion 15.10.22	$C_{22}H_{16}CrN_4O_4$	Bis(2,2'-bipyridine)(oxalato)chromate(II) 7.20
$C_{20}H_{10}O_5^{2-}$	Fluorescein dianion 15.8.18, 15.10.23	$C_{22}H_{16}CrN_4O_4^+$	Bis(2,2'-bipyridine)oxalato-chromium(III)ion 5.1.35, 28.2.37
$C_{20}H_{16}CoN_4^+$	Bis(2,2'-bipyridine)cobalt(I) ion 6.10	$C_{22}H_{16}FeN_6^+$	Dicyanobis(2,2'-bipyridine)iron(III) ion 9.1.1
$C_{20}H_{16}CoN_4^{2+}$	Bis(2,2'-bipyridine)cobalt(II) ion 6.9.1	$C_{22}H_{16}FeN_6^-$	Bis(2,2'-bipyridine)dicyanoferrate(II), electron adduct 9.1
$C_{20}H_{16}CuN_4^+$	Bis(2,2'-bipyridine)copper(I) ion 8.18	$C_{22}H_{16}N_6Ru^+$	Bis(2,2'-bipyridine)bis(cyano)ruthenium(III) ion 22.2.1, 22.47
$C_{20}H_{19}N_4^+$	Safranine cation 25.5.23	$C_{22}H_{16}N_6Ru^-$	Bis(2,2'-bipyridine)bis(cyano)ruthenate(II) ion, electron adduct 22.2
$C_{20}H_{20}N_4^{2+}$	Safranine cation, conjugate monoacid 25.4.46	$C_{22}H_{17}FeN_6O$	Bis(2,2'-bipyridine)dicyanoferrate(II), OH reaction product 9.14
$C_{20}H_{20}N_4Rh^{2+}$	Bis(2,2'-bipyridine)rhodium(II) ion 21.10, 21.11.2	$C_{22}H_{34}N_2^+$	1,1'-Dihexyl-4,4'-bipyridinium radical cation 28.14.10
$C_{20}H_{23}IN_2Rh$	η^5 -Pentamethylcyclopentadienyl(2,2'-bipyridine)(iodo)rhodium(II) ion 21.6	$C_{22}H_{38}N_4^{3+}$	1,1'-Bis[3-(trimethylammonio)propyl]-4,4'-bipyridinium radical cation 22.50.70, 28.14.7, 28.15.8
$C_{20}H_{23}N_2Rh$	η^5 -Pentamethylcyclopentadienyl(2,2'-bipyridine)rhodium(I) ion 21.2	$C_{23}H_{36}N_2^+$	1-Dodecyl-1'-methyl-4,4'-bipyridinium radical cation 28.14.14
$C_{20}H_{24}N_2ORh$	η^5 -Pentamethylcyclopentadienyl(2,2'-bipyridine)(hydroxy)rhodium(II) ion 21.5	$C_{24}H_{14}Cl_2CuN_4^+$	Bis(5-chloro-1,10-phenanthroline)copper(I) ion 8.20
$C_{20}H_{24}N_2Rh^+$	η^5 -Pentamethylcyclopentadienyl(2,2'-bipyridine)hydridorhodium(III) ion 21.12	$C_{24}H_{14}CuN_6O_4^+$	Bis(5-nitro-1,10-phenanthroline)copper(I) ion 8.21
$C_{20}H_{24}N_8Rh_2^{3+}$	Tetrakis[μ -(1,3-diisocyanopropane)]-dirhodium(I)(II) ion 21.4	$C_{24}H_{16}CuN_4^+$	Bis(1,10-phenanthroline)copper(I) ion 8.19
$C_{20}H_{25}N_{10}O_{11}P$	Adenylyl-(3' \rightarrow 5')-guanosine 25.5.5	$C_{24}H_{18}N_6RuS_3^{3+}$	Tris[2-(2-thiazolyl)pyridine]ruthenium(III) ion 22.65
$C_{20}H_{26}N_7O_{11}P$	Thymidylyl-(3' \rightarrow 5')-2'-deoxyguanosine 25.5.24		
$C_{20}H_{41}CuN_4^{2+}$	2,2,4,11,11,13-Hexamethyl-1,5,10,14-tetraazacyclooctadeca-4,13-diene(hydrido)copper(III) ion 8.56		
$C_{21}H_{15}N_9RuS_3^{3+}$	Tris[2-(1,2,4-thiadiazol-5-yl)pyridine]-ruthenium(III) ion 22.67		
$C_{21}H_{26}N_7O_{13}P_2^+$	Nicotinamide adenine dinucleotide 5.1.66		
$C_{21}H_{27}N_7O_{14}P_2$	Nicotinamide adenine dinucleotide, hydroxide, inner salt 28.23.1		



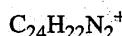
- (2,2'-Bipyrazine)(2,2'-bipyridine)(2,2'-bipyrimidine)ruthenium(II) ion, electron adduct 22.10
 (2,2'-Bipyrazine)bis(2,2'-bipyrimidine)-ruthenium(II) ion, electron adduct 22.16
 (2,2'-Bipyrazine)bis(2,2'-bipyridine)-ruthenium(II) ion, electron adduct 22.8
 (2,2'-Bipyridine)bis(2,2'-bipyrimidine)-ruthenium(II) ion, electron adduct 22.14
 Bis(2,2'-bipyrazine)(2,2'-bipyrimidine)-ruthenium(II) ion, electron adduct 22.22
 Bis(2,2'-bipyrazine)(2,2'-bipyridine)-ruthenium(II) ion, electron adduct 22.20
 Bis(2,2'-bipyridine)(2,2'-bipyrimidine)-ruthenium(II) ion, electron adduct 22.6
 Tris(2,2'-bipyrazine)ruthenium(II) ion, electron adduct 22.18
 Tris(2,2'-bipyrimidine)ruthenium(II) ion, electron adduct 22.12



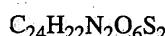
- Iris(2,2'-bipyrazine)ruthenium(II) ion, OH-adduct 22.25



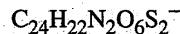
- (2,2'-Bipyrazine)(2,2'-bipyridine)(2,2'-bipyrimidine)ruthenium(II) ion, electron adduct, protonated 22.1
 (2,2'-Bipyrazine)bis(2,2'-bipyridine)-ruthenium(II) ion, electron adduct, protonated 22.9
 (2,2'-Bipyrazine)bis(2,2'-bipyrimidine)-ruthenium(II) ion, electron adduct, protonated 22.17
 (2,2'-Bipyridine)bis(2,2'-bipyrimidine)-ruthenium(II) ion, electron adduct, protonated 22.15
 Bis(2,2'-bipyrazine)(2,2'-bipyridine)-ruthenium(II) ion, electron adduct, protonated 22.21
 Bis(2,2'-bipyrazine)(2,2'-bipyrimidine)-ruthenium(II) ion, electron adduct, protonated 22.23
 Bis(2,2'-bipyridine)(2,2'-bipyrimidine)-ruthenium(II) ion, electron adduct, protonated 22.7
 Tris(2,2'-bipyrazine)ruthenium(II) ion, electron adduct, protonated 22.19
 Tris(2,2'-bipyrimidine)ruthenium(II) ion, electron adduct, protonated 22.13



- 1,1'-Dibenzyl-4,4'-bipyridinium radical cation 22.50.72



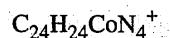
- 1,1'-Bis(4-sulfonatobenzyl)-4,4'-bipyridinium zwitterion 22.3.43



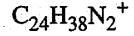
- 1,1'-Bis(4-sulfonatobenzyl)-4,4'-bipyridinium zwitterion, radical anion 22.50.66



- Bis(4,4'-dimethyl-2,2'-bipyridine)cobalt(II) ion 6.12.1



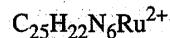
- Bis(4,4'-dimethyl-2,2'-bipyridine)cobalt(I) ion 6.15



- 1,1'-Diheptyl-4,4'-bipyridinium radical cation 28.14.11



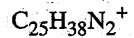
- Bis(1,10-phenanthroline)(2-hydroxyethyl)-copper(II) ion 8.42



- Ammine(2,2'-bipyridine)(2,2':6',2''-terpyridine)ruthenium(II) ion 22.50.60



- Ammine(2,2'-bipyridine)(2,2':6',2''-terpyridine)ruthenium(III) ion 22.53



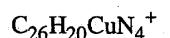
- 1-Methyl-1'-tetradecyl-4,4'-bipyridinium radical cation 22.50.78, 28.14.16



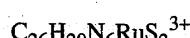
- Bis(1,10-phenanthroline)(oxalato)-chromate(II) 7.22



- Bis(1,10-phenanthroline)(oxalato)-chromium(III) ion 5.1.36, 28.2.38



- Bis(5-methyl-1,10-phenanthroline)copper(I) ion 8.22



- 2,2'-Bipyridinebis[2-(2-thiazolyl)pyridine]-ruthenium(III) ion 22.64



- 2-(Aminomethyl)pyridinebis(2,2'-bipyridine)ruthenium(III) ion, deprotonated 22.48.1, 22.49



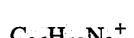
- Dicyanobis(4,4'-dimethyl-2,2'-bipyridine)iron(III) ion 9.2.1



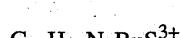
- Dicyanobis(4,4'-dimethyl-2,2'-bipyridine)ferrate(II), electron adduct 9.2



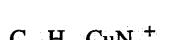
- 2-(Aminomethyl)pyridinebis(2,2'-bipyridine)ruthenium(III) ion 22.48



- 1,1'-Diocetyl-4,4'-bipyridinium radical cation 28.14.12



- Bis(2,2'-bipyridine)[2-(2-thiazolyl)pyridine]ruthenium(III) ion 22.63



- Bis(2,9-dimethyl-1,10-phenanthroline)copper(I) ion 8.23

$C_{28}H_{25}CuN_4O^+$	Bis(1,10-phenanthroline)(2-hydroxy-2,2-dimethylethyl)copper(II) ion 8.43	$C_{30}H_{24}N_6R^{3+}$	Tris(2,2'-bipyridine)ruthenium(III) ion 1.2.6, 5.1.52, 6.19.2, 6.39.2, 6.40.1, 6.41.2, 6.48.1, 6.53.1, 6.54.1, 6.55.1, 6.110.1, 6.111.1, 6.112.1, 6.113.1, 6.114.1, 7.4.12, 8.5.11, 8.6.1, 8.7.1, 8.8.1, 10.3.2, 22.3.36, 22.50, 25.10.2
$C_{28}H_{35}FeN_6O_{20}^{4-}$	Diethylenetriaminepentaacetatoferate(III), DTPA radical adduct 9.31	$C_{30}H_{25}CoN_6O^{3+}$	Tris(2,2'-bipyridine)cobalt(III) ion, OH adduct 6.98
$C_{30}H_{18}N_{12}Ru^{+}$	Tris(1,4,5,8-tetraazaphenanthrene)-ruthenium(II) ion, electron adduct 22.35	$C_{30}H_{25}FeN_6^{3+}$	Tris(2,2'-bipyridine)iron(III) ion, H-adduct 9.40
$C_{30}H_{18}N_{12}Ru^{2+}$	Tris(1,4,5,8-tetraazaphenanthrene)-ruthenium(II) ion, electron adduct, protonated 22.34	$C_{30}H_{25}FeN_6O^{2+}$	Tris(2,2'-bipyridine)iron(II) ion, OH-adduct 9.13
$C_{30}H_{23}IrN_6^+$	Bis(2,2'-bipyridine)([2,2'-bipyridin]-3-yl-C,N')iridium(III) ion, electron adduct 12.3	$C_{30}H_{25}FeN_6O^{3+}$	Tris(2,2'-bipyridine)iron(III) ion, OH-adduct 9.39
$C_{30}H_{24}AgN_6^{2+}$	Tris(2,2'-bipyridine)silver(II) ion 7.4.2	$C_{30}H_{25}N_6ORu^{2+}$	Tris(2,2'-bipyridine)ruthenium(II) ion, OH-adduct 22.24
$C_{30}H_{24}CoN_6^+$	Tris(2,2'-bipyridine)cobalt(I) ion 6.11	$C_{30}H_{25}N_6Ru^{2+}$	Tris(2,2'-bipyridine)ruthenium(II) ion, H-adduct 22.44
$C_{30}H_{24}CoN_6^{2+}$	Tris(2,2'-bipyridine)cobalt(II) ion 6.10.1, 6.39, 22.50.10, 22.54.1, 22.55.1, 22.59.1, 22.62.1	$C_{30}H_{30}N_6Rh^{2+}$	Tris(2,2'-bipyridine)rhodium(II) ion 8.17.3, 21.11, 22.50.58
$C_{30}H_{24}CoN_6^{3+}$	Tris(2,2'-bipyridine)cobalt(III) ion 6.4.1, 6.6.6, 7.4.3, 7.6.2, 7.8.1, 7.11.1, 7.16.2, 8.15.2, 8.16.1, 8.17.1, 15.8.5, 15.10.4, 22.3.10, 28.2.11	$C_{32}H_{12}AlN_8O_9S_3^-$	Aluminum(III) sulfophthalocyanine radical anion 2.1
$C_{30}H_{24}CrN_6^{2+}$	Tris(2,2'-bipyridine)chromium(II) ion 7.4	$C_{32}H_{12}CoN_8O_{12}S_4^{2-}$	3,10,17,24-Tetrasulfophthalocyanine-cobaltate(III) radical anion (oxidized ligand) 6.75
$C_{30}H_{24}CrN_6^{3+}$	Tris(2,2'-bipyridine)chromium(III) ion 5.1.33, 6.4.2, 6.6.11, 7.5.1, 8.15.3, 15.8.6, 15.10.8, 15.11.1, 15.13.1, 28.2.35	$C_{32}H_{12}CoN_8O_{12}S_4^{3-}$	3,10,17,24-Tetrasulfophthalocyanine-cobaltate(II) radical cation 7.4.6
$C_{30}H_{24}FeN_6^{3+}$	Tris(2,2'-bipyridine)iron(III) ion 6.6.12, 15.8.7, 15.10.10	$C_{32}H_{12}CoN_8O_{12}S_4^{4-}$	3,10,17,24-Tetrasulfophthalocyanine-cobaltate(III) radical anion (reduced ligand) 6.74
$C_{30}H_{24}IrN_6^{2+}$	Bis(2,2'-bipyridine)([2,2'-bipyridin]-3-yl-C,N')iridium(III) ion, conjugate acid, electron adduct 12.2	$C_{32}H_{12}CoN_8O_{12}S_4^{5-}$	3,10,17,24-Tetrasulfophthalocyanine-cobaltate(II) ion 6.41, 22.50.12
$C_{30}H_{24}IrN_6^{4+}$	Bis(2,2'-bipyridine)([2,2'-bipyridin]-3-yl-C,N')iridium(IV) ion, conjugate monoacid 12.4	$C_{32}H_{12}CoN_8O_{14}S_4^{5-}$	3,10,17,24-Tetrasulfophthalocyanine-cobaltate(I) ion 6.19, 22.50.13
$C_{30}H_{24}N_6Os^{3+}$	Tris(2,2'-bipyridine)osmium(III) ion 16.1	$C_{32}H_{13}N_8O_9S_3Zn^{4-}$	3,10,17,24-Tetrasulfophthalocyanine-cobaltate(II) ion, superoxide adduct 6.62
$C_{30}H_{24}N_6Rh^+$	Tris(2,2'-bipyridine)rhodium(I) ion 21.3		Trisulfophthalocyaninezincate(II) radical anion 28.9
$C_{30}H_{24}N_6Ru^+$	Tris(2,2'-bipyridine)ruthenium(II) ion, electron adduct 22.3, 25.3.2		
$C_{30}H_{24}N_6Ru^{2+}$	Tris(2,2'-bipyridine)ruthenium(II) ion 5.1.51, 6.1.24, 22.55.10, 25.1.12, 25.2.12, 28.2.55		

$C_{32}H_{24}N_{12}Zn^{3+}$	Tetrakis- <i>N</i> -methyl-2,3-pyridino-porphyrazinezinc(II) radical anion 28.6	$C_{36}H_{21}Cl_3N_6Ru^{3+}$	Tris(5-chloro-1,10-phenanthroline)-ruthenium(III) ion 6.52.2, 6.54.3, 8.5.15, 10.3.4, 22.57
$C_{32}H_{25}N_6O_2Ru^+$	Bis(2,2'-bipyridine)(4-carboxy-4'-methyl-2,2'-bipyridine)ruthenium(II) ion 22.5.1	$C_{36}H_{21}CoN_8O_{13}S_4^{4-}$	(2-Hydroxy-1-methylpropyl)-3,10,17,24-tetrasulfophthalocyaninecobaltate(III) ion 6.91 (2-Hydroxy-2,2-dimethylethyl)-3,10,17,24-tetrasulfophthalocyaninecobaltate(III) ion 6.90
$C_{32}H_{26}N_6O_2Ru$	Bis(2,2'-bipyridine)(4-carboxy-4'-methyl-2,2'-bipyridine)ruthenium(II) ion, electron adduct 22.4	$C_{36}H_{24}CoN_6^{2+}$	Tris(1,10-phenanthroline)cobalt(II) ion 6.40, 22.50.11
$C_{33}H_{15}CoN_8O_{12}S_4^{4-}$	(Methyl)-3,10,17,24-tetrasulfophthalocyaninecobaltate(III) ion 6.89	$C_{36}H_{24}CoN_6^{3+}$	Tris(1,10-phenanthroline)cobalt(III) ion 7.4.4, 7.6.3, 7.8.2, 7.11.2, 7.16.3
$C_{34}H_{17}CoN_8O_{13}S_4^{4-}$	(2-Hydroxyethyl)-3,10,17,24-tetrasulfophthalocyaninecobaltate(III) ion 6.92	$C_{36}H_{24}CrN_6^{2+}$	Tris(1,10-phenanthroline)chromium(II) ion 7.8
$C_{34}H_{35}FeN_4O_4$	Hydrodoiron(III) protoporphyrin 9.20	$C_{36}H_{24}CrN_6^{3+}$	Tris(1,10-phenanthroline)chromium(III) ion 5.1.34, 7.9.1, 7.10.1, 28.2.36
$C_{34}H_{36}N_4O_6Zn^-$	Zinc(II) hematoporphyrin radical anion 28.24	$C_{36}H_{24}FeN_6^{2+}$	Tris(1,10-phenanthroline)iron(II) ion 22.50.52
$C_{34}H_{58}N_4^+$	1,1'-Didodecyl-4,4'-bipyridinium radical cation 28.14.13	$C_{36}H_{24}FeN_6^{3+}$	Tris(1,10-phenanthroline)iron(III) ion 9.27
$C_{35}H_{19}CoN_8O_{13}S_4^{4-}$	(2-Hydroxy-1-methylethyl)-3,10,17,24-tetrasulfophthalocyaninecobaltate(III) ion 6.93	$C_{36}H_{24}N_6Os^{3+}$	Tris(1,10-phenanthroline)osmium(III) ion 16.3
$C_{35}H_{19}FeN_4O_5$	Hydroxymethyliron(III) protoporphyrin 9.21	$C_{36}H_{24}N_6Ru^{3+}$	Tris(1,10-phenanthroline)ruthenium(II) ion, electron adduct 22.31
$C_{36}H_{18}FeN_6O_6^{2+}$	Iron(II) tris(1,10-phenanthroline-5,6-dione) 25.4.5, 25.5.1	$C_{36}H_{24}N_6Ru^{3+}$	Tris(1,10-phenanthroline)ruthenium(III) ion 6.39.4, 6.51.1, 6.52.1, 6.52.2, 8.5.13, 10.3.3, 22.55
$C_{36}H_{21}Br_3CrN_6^{2+}$	Tris(5-bromo-1,10-phenanthroline)-chromium(II) ion 7.14	$C_{36}H_{36}CoN_6^+$	Tris(4,4'-dimethyl-2,2'-bipyridine)cobalt(I) ion 6.16
$C_{36}H_{21}Br_3N_6Ru^{3+}$	Tris(5-bromo-1,10-phenanthroline)-ruthenium(III) ion 8.5.14, 22.56	$C_{36}H_{36}CoN_6^{2+}$	Tris(4,4'-dimethyl-2,2'-bipyridine)cobalt(II) ion 6.15.1, 22.3.7
$C_{36}H_{21}Cl_3CrN_6^{2+}$	Tris(5-chloro-1,10-phenanthroline)-chromium(II) ion 7.11	$C_{36}H_{36}CoN_6^{3+}$	Tris(4,4'-dimethyl-2,2'-bipyridine)-cobalt(III) ion 6.16.1
$C_{36}H_{21}Cl_3CrN_6^{3+}$	Tris(5-chloro-1,10-phenanthroline)-chromium(III) ion 7.12.1, 7.13.1	$C_{36}H_{36}CrN_6^{2+}$	Tris(4,4'-dimethyl-2,2'-bipyridine)-chromium(II) ion 7.6
$C_{36}H_{21}Cl_3N_6Os^{3+}$	Tris(5-chloro-1,10-phenanthroline)-osmium(III) ion 16.4	$C_{36}H_{36}N_6Os^{3+}$	Tris(5,5'-dimethyl-2,2'-bipyridine)-osmium(III) ion 16.2
$C_{36}H_{21}Cl_3N_6Ru^+$	Tris(5-chloro-1,10-phenanthroline)-ruthenium(II) ion, electron adduct 22.33		

$C_{36}H_{36}N_6Rh^{3+}$	Tris(4,4'-dimethyl-2,2'-bipyridine)-rhodium(III) ion 22.3.34	$C_{38}H_{32}N_8Ru^{3+}$	Bis(2,2'-bipyridine)(dipyrido[3,2- <i>a</i> :2',3'- <i>c</i>]phenazine)ruthenium(II) ion, electron adduct, diprotonated 22.26
$C_{36}H_{36}N_6Ru^+$	Tris(4,4'-dimethyl-2,2'-bipyridine)-ruthenium(II) ion, electron adduct 22.30	$C_{39}H_{30}CrN_6^{2+}$	Tris(5-methyl-1,10-phenanthroline)-chromium(II) ion 7.15
$C_{36}H_{36}N_6Ru^{3+}$	Tris(4,4'-dimethyl-2,2'-bipyridine)-ruthenium(III) ion 8.5.12, 22.51	$C_{39}H_{30}N_6Ru^{3+}$	Tris(5-methyl-1,10-phenanthroline)-ruthenium(III) ion 8.5.16, 10.3.7, 22.60
$C_{36}H_{36}Ru^{3+}$	Tris(5,5'-dimethyl-2,2'-bipyridine)-ruthenium(III) ion 22.52	$C_{40}H_{24}MnN_8$	5,10,15,20-Tetrakis(4-pyridyl)porphinatomanganese(II) 13.5
$C_{36}H_{37}FeN_4O_5$	1-Hydroxyethyliron(III) protoporphyrin 9.22 2-Hydroxyethyliron(III) protoporphyrin 9.24	$C_{40}H_{34}Co_2N_9O_2^{3+}$	μ -Amido- μ -peroxidotetrakis(2,2'-bipyridine)dicobalt(III) ion 6.113, 22.50.17
$C_{36}H_{43}FeN_4O_4$	Iron(II) deuteroporphyrin (2-propoxy)(2-propanol) 9.26.1	$C_{40}H_{36}ClN_4O_{17}Sb^+$	Chloro(oxo)antimony(V) uroporphyrin I radical anion 23.1
$C_{36}H_{44}FeN_4O_4$	Iron(II) deuteroporphyrin (2-propanol) ₂ 9.12, 9.42.1	$C_{40}H_{36}N_4O_{16}Zn^+$	Zinc(II) uroporphyrin radical cation 28.23
$C_{37}H_{21}Cl_3CrN_6O_2^{2+}$	Tris(5-chloro-1,10-phenanthroline)-chromium(III), carboxyl radical addn. product 7.13	$C_{40}H_{37}CrN_8O_8^-$	Tris(2,2'-bipyridine)chromium(III), EDTA radical addn. product 7.5
$C_{37}H_{24}CrN_6O_2^{2+}$	Tris(1,10-phenanthroline)chromium(III), carboxyl radical addn. product 7.10	$C_{41}H_{57}FeN_4O_7$	Iron(III) deuteroporphyrin dimethyl ester (2-propanol) ₂ , 1-hydroxy-1-methylethylperoxyl adduct 9.45
$C_{37}H_{39}FeN_4O_5$	1-Hydroxy-1-methylethyliron(III) protoporphyrin 9.23 2-Hydroxy-1-methylethyliron(III) protoporphyrin 9.25	$C_{42}H_{32}N_6Ru^+$	Bis(2,2'-bipyridine)(6,7-dihydro-5,8-dimethyldibenzo[<i>b,j</i>][1,10]phenanthroline) ion, electron adduct 22.29
$C_{37}H_{43}F_3FeN_4O_4^+$	Iron(III) deuteroporphyrin (2-propoxy)(2-propanol), $\cdot CF_3$ reaction product 9.44	$C_{42}H_{36}CrN_6^{2+}$	Tris(4,7-dimethyl-1,10-phenanthroline)-chromium(II) ion 7.16 Tris(5,6-dimethyl-1,10-phenanthroline)-chromium(II) ion 7.17
$C_{37}H_{44}F_3FeN_4O_4$	Trifluoromethyliron(III) deuteroporphyrin (2-propoxy)(2-propanol) 9.26	$C_{42}H_{36}N_6Ru^+$	Tris(4,7-dimethyl-1,10-phenanthroline)-ruthenium(II) ion, electron adduct 22.32
$C_{37}H_{45}Cl_2FeN_4O_4^+$	Iron(III) deuteroporphyrin (2-propanol) ₂ , $\cdot CHCl_2$ radical adduct 9.43	$C_{42}H_{36}N_6Ru^{3+}$	Tris(4,7-dimethyl-1,10-phenanthroline)-ruthenium(III) ion 6.39.5, 6.52.3, 6.54.4, 8.5.17, 10.3.6, 22.59 Tris(5,6-dimethyl-1,10-phenanthroline)-ruthenium(III) ion 8.5.18, 10.3.5, 22.58
$C_{37}H_{47}FeN_4O_4^+$	Iron(III) deuteroporphyrin (2-propanol) ₂ , methyl radical adduct 9.42	$C_{42}H_{54}CoN_{13}O_4Ru^{3+}$	Bis(2,2'-bipyridine)ruthenium(II)(4-carboxy-4'-methyl-2,2'-bipyridine)-(prolylprolinato)pentaamminecobalt(III) ion, electron adduct 22.5
$C_{38}H_{30}N_8Ru^+$	Bis(2,2'-bipyridine)(dipyrido[3,2- <i>a</i> :2',3'- <i>c</i>]phenazine)ruthenium(II) ion, electron adduct 22.28	$C_{44}H_{16}Cl_8N_4O_{12}S_4Zn^{3-}$	5,10,15,20-Tetrakis(2,6-dichloro-3-sulfonatophenyl)porphinatozincate(II) radical cation 28.22
$C_{38}H_{31}N_8Ru^{2+}$	Bis(2,2'-bipyridine)(dipyrido[3,2- <i>a</i> :2',3'- <i>c</i>]phenazine)ruthenium(II) ion, electron adduct, protonated 22.27		

$C_{44}H_{24}BrMnN_4O_{12}S_4^{4-}$	Bromo[5,10,15,20-tetrakis(4-sulfonato-phenyl)porphinatomanganate(III) ion 13.29	$C_{44}H_{24}N_4O_{12}S_4Zn^{4-}$	5,10,15,20-Tetrakis(4-sulfonato-phenyl)porphinatozincate(II) ion 5.1.54
$C_{44}H_{24}CdN_4O_{12}S_4^{5-}$	5,10,15,20-Tetrakis(4-sulfonato-phenyl)porphinatocadmate(II) radical anion 5.13	$C_{44}H_{24}N_4O_{12}S_4Zn^{5-}$	5,10,15,20-Tetrakis(4-sulfonato-phenyl)porphinatozincate(II) radical anion 5.1.55
$C_{44}H_{24}Cl_2N_4O_{12}S_4Sn^{5-}$	Dichloro[5,10,15,20-tetrakis(4-sulfonato-phenyl)porphinatostannate(IV) radical anion 24.2	$C_{44}H_{25}N_4O_5Zn^+$	Hydroxy(tetrakis(2-hydroxy-phenyl)porphinato)zinc(II) radical cation, deprotonated 28.16
$C_{44}H_{24}CoN_4O_2S_4^{4-}$	5,10,15,20-Tetrakis(4-sulfonato-phenyl)porphinatocobaltate(II) ion 28.14.3, 28.15.3	$C_{44}H_{26}CoN_4O_{14}S_4^{6-}$	Hydroxy(tetrakis(3-hydroxy-phenyl)porphinato)zinc(II) radical cation, deprotonated 28.17
$C_{44}H_{24}CoN_4O_2S_4^{5-}$	5,10,15,20-Tetrakis(4-sulfonato-phenyl)porphinatocobaltate(I) ion 6.17	$C_{44}H_{36}BrMnN_8^{4+}$	Dihydroxytetrakis(4-sulfonato-phenyl)porphinatocobaltate(II) ion 28.4.1, 28.5.1, 28.6.1
$C_{44}H_{24}CoN_4O_{12}S_4^{2-}$	5,10,15,20-Tetrakis(4-sulfonato-phenyl)porphinatocobaltate(III) radical cation 6.115	$C_{44}H_{36}CuN_8^{3+}$	Bromo[5,10,15,20-tetrakis(1-methyl-pyridinium-4-yl)porphinatomanganate(III) ion 13.31
$C_{44}H_{24}CuN_4O_{12}S_4^{5-}$	5,10,15,20-Tetrakis(4-sulfonato-phenyl)porphinatocuprate(II) radical anion 8.25	$C_{44}H_{36}FeN_8^{4+}$	5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatocopper(II) radical anion 8.24
$C_{44}H_{24}FeN_4O_{12}S_4^{2-}$	5,10,15,20-Tetrakis(4-sulfonato-phenyl)porphinatoferrate(III) radical cation 9.47	$C_{44}H_{36}FeN_8O_2^{4+}$	5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatoiron(II) ion 9.10
$C_{44}H_{24}InN_4O_{12}S_4^{2-}$	5,10,15,20-Tetrakis(4-sulfonato-phenyl)porphinatoindate(III) radical cation 11.4	$C_{44}H_{36}InN_8^{4+}$	5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphineindium(III) radical anion 11.3
$C_{44}H_{24}MnN_4O_{12}S_4^{4-}$	5,10,15,20-Tetrakis(4-sulfonato-phenyl)porphinatomanganate(II) ion 13.3	$C_{44}H_{36}MnN_8^{3+}$	5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatomanganese(II) radical anion 13.2
$C_{44}H_{24}MnN_4O_{12}S_4^{5-}$	5,10,15,20-Tetrakis(4-sulfonato-phenyl)porphinatomanganate(II) radical anion 13.1	$C_{44}H_{36}MnN_8^{4+}$	5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatomanganese(II) ion 13.4
$C_{44}H_{24}N_4O_{12}PbS_4^{3-}$	5,10,15,20-Tetrakis(4 sulfonato-phenyl)porphinatoplumbate(II) radical cation 17.6	$C_{44}H_{36}N_8Pb^{5+}$	Tetrakis(1-methylpyridinium-3-yl)porphinatolead(II) radical cation 17.5
$C_{44}H_{24}N_4O_{12}PdS_4^{5-}$	5,10,15,20-Tetrakis(4-sulfonato-phenyl)porphinatopalladate(II) radical anion 18.2	$C_{44}H_{36}N_8Sn^{5+}$	Tetrakis(1-methylpyridinium-4-yl)porphinatolead(II) radical cation 17.4
$C_{44}H_{24}N_4O_{12}S_4Zn^{3-}$	5,10,15,20-Tetrakis(4-sulfonato-phenyl)porphinatozincate(II) radical cation 28.15		5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatotin(IV) radical anion 24.3

$C_{44}H_{36}N_8Zn^{3+}$	5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinezinc(II) radical anion 28.5	$C_{48}H_{33}MnN_4O_{13}S_4^{4-}$	2-Hydroxy-2,2-dimethylethyltetrakis(4-sulfonatophenyl)porphinatomanganate(III) ion 13.30
$C_{44}H_{36}N_8Zn^{4+}$	5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatozinc(II) ion 1.5.4, 25.4.11	$C_{48}H_{34}Co_2N_9O_2^{3+}$	μ -Amido- μ -peroxidotetrakis(1,10-phenanthroline)dicobalt(III) ion 6.114, 22.50.18
$C_{44}H_{36}N_8Zn^{5+}$	5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatozinc(II) radical cation 6.48.2, 28.14	$C_{48}H_{40}FeN_{12}O_4^{4+}$	$\alpha,\alpha,\alpha,\beta$ -Tetrakis(<i>N</i> -methylisonicotinamido phenyl)porphinatoiron(II) ion 9.11
	5,10,15,20-Tetrakis(1-methylpyridinium-3-yl)porphinatozinc(II) radical cation 28.13	$C_{48}H_{45}MnN_8O^{4+}$	2-Hydroxy-2,2-dimethylethyl[5,10,15,20-tetrakis(1-methylpyridinium-4-yl)porphinatomanganate(III) ion 13.32
$C_{44}H_{37}N_8Zn^{4+}$	5,10,15,20-Tetrakis(1-methylpyridinium-3-yl)porphinatozinc(II) H-adduct 28.12	$C_{48}H_{48}N_6Ru^{3+}$	Tris(3,4,7,8-tetramethyl-1,10-phenanthroline)ruthenium(III) ion 6.39.6, 8.5.19, 22.62
$C_{44}H_{38}CoN_8O_2^{2+}$	Dihydroxytetrakis(1-methylpyridinium-4-yl)porphinecobalt(II) ion 28.4.3, 28.5.3, 28.6.3	$C_{48}H_{66}N_6P_3Ru^{6+}$	Tris(4-triethylphosphonio-2,2'-bipyridine)-ruthenium(III) ion 6.39.3, 22.54
$C_{44}N_{24}AgN_4O_{12}S_4^{5-}$	5,10,15,20-Tetrakis(4-sulfonato-phenyl)porphinatoargentate(I) ion 1.4	$C_{51}H_{48}N_8O_{12}S_4Zn^{+}$	5,10,15,20-Tetrakis[1-(3-sulfonato-propyl)pyridinium-2-yl]porphinatozinc(II) radical cation 28.19
$C_{45}H_{27}CoN_4O_2S_4^{4-}$	<i>N</i> -Methyltetrakis(4-sulfonato-phenyl)porphinatocobaltate(II) radical anion 6.21	$C_{52}H_{48}N_8O_{12}S_4Zn^{+}$	5,10,15,20-Tetrakis[1-(3-sulfonato-propyl)pyridinium-4-yl]porphinatozinc(II) radical cation 28.18
$C_{45}H_{27}CoN_4O_{13}S_4^{4-}$	Hydroxymethyltetrakis(4-sulfonato-phenyl)porphinatocobaltate(III) ion 6.87	$C_{52}H_{48}N_8O_{12}S_4Zn^{-}$	5,10,15,20-Tetrakis[1-(3-sulfonato-propyl)pyridinium-4-yl]porphinatozinc(II) radical anion 28.7
$C_{45}H_{28}N_4NiO_{12}S_4^{4-}$	<i>N</i> -Methyl-5,10,15,20-tetrakis(4-sulfonato-phenyl)porphinatonickelate(II) radical anion 15.18	$C_{54}H_{36}CrN_6^{2+}$	Tris(5-phenyl-1,10-phenanthroline)-chromium(II) ion 7.18
$C_{45}H_{36}CoN_9S^{3+}$	5,10,15,10-Tetrakis(1-methylpyridyl)-porphinato(thiocyanato)cobalt(II) ion 6.64	$C_{54}H_{36}N_6Ru^{3+}$	Tris(5-phenyl-1,10-phenanthroline)-ruthenium(III) ion 8.5.20, 22.61
$C_{46}H_{34}Cl_3CrN_8O_8^{+}$	Tris(5-chloro-1,10-phenanthroline)-chromium(III), EDTA radical addn. product 7.12	$C_{54}H_{42}ClO_9P_3RhS_3^{3-}$	Chlorotris[3-(diphenylphosphino)-benzenesulfonato]rhodate(I) ion 22.3.33
$C_{46}H_{37}CrN_8O_8^{+}$	Tris(1,10-phenanthroline)chromium(III), EDTA radical addn. product 7.9	$C_{54}H_{42}ClO_9P_3RhS_3^{4-}$	Chlorotris[3-(diphenylphosphino)-benzenesulfonato]rhodate(0) ion 21.1
$C_{47}H_{31}CoN_4O_2S_4^{4-}$	1-Methylethyltetrakis(4-sulfonato-phenyl)porphinatocobaltate(III) ion 6.86	$C_{56}H_{60}CuN_8^{3+}$	Tetrakis-4-(<i>N,N,N</i> -trimethylammonio)-phenylporphinecopper(II) radical anion 8.26
$C_{47}H_{31}CoN_4O_3S_4^{4-}$	1-Hydroxy-1-methylethyltetrakis(4-sulfonatophenyl)porphinatocobaltate(III) ion 6.88	$C_{56}H_{60}MnN_8^{4+}$	5,10,15,20-Tetrakis[4-(<i>N,N,N</i> -trimethylammonio)phenyl]porphinatomanganese(II) ion 13.6
$C_{48}H_{24}MnN_4O_8^{4-}$	5,10,15,20-Tetrakis(4-carboxyphenyl)porphinatomanganate(II) ion 13.8		

$C_{56}H_{60}N_8Zn^{3+}$	Tetrakis-4-(<i>N,N,N</i> -trimethylammonio)phenylporphinezinc(II) radical anion	28.4	$ClMn^{2+}$	Chloromanganese(III) ion	13.25
$C_{56}H_{60}N_8Zn^{5+}$	Tetrakis-4-(<i>N,N,N</i> -trimethylammonio)phenylporphinezinc(II) radical cation	28.21	ClO_3^-	Chlorate ion	28.2.9
$C_{56}H_{62}CoN_8O_2^{2+}$	Dihydroxytetrakis[4-(<i>N,N,N</i> -trimethylammonio)phenyl]porphinecobalt(II) ion	28.4.2, 28.5.2, 28.6.2	$ClTi^+$	Chlorothallium(II) ion	25.7
$C_{62}H_{89}CoN_{13}O_{14}P$	Cobal(I)amin	6.18	Cl_2Cu^-	Copper(I) chloride complex	8.2.1, 8.4.1
$C_{62}H_{89}CoN_{13}O_{15}P$	Hydroxocob(III)alamin	6.18.2	$Cl_2H_2O_2Pt^-$	Dichlorobis(hydroxy)platinate(III) ion	19.31
$C_{62}H_{90}BrCoN_{13}O_{14}P$	Bromocob(III)alamin	6.94	$Cl_2H_6N_2Pt^-$	cis-Diamminedichloroplatinate(I) ion	19.2
$C_{64}H_{24}Co_2N_{16}O_{24}S_8^{10-}$	3,10,17,24-Tetrasulfophthalocyanine-cobaltate(I) ion dimer	6.20	$Cl_2H_7N_2OPt$	trans-Diamminedichloroplatinate(I) ion	19.3
$C_{64}H_{76}N_8Zn^{5+}$	5,10,15,20-Tetrakis(2- <i>N</i> -hexylpyridyl)-porphinatozinc(II) radical cation	28.20	$Cl_2H_8N_4Pt^+$	cis-Diamminedichloroplatinum(II), Cl_2^- reaction product	19.21
$C_{66}H_{48}CrN_6^{2+}$	Tris(4,4'-diphenyl-2,2'-bipyridine)-chromium(II) ion	7.7	Cl_2Hg^-	Dichloromercurate(I) ion	22.50.56, 22.51.3, 22.56.2, 22.62.3
$C_{72}H_{48}CrN_6^{2+}$	Tris(4,7-diphenyl-1,10-phenanthroline)-chromium(II) ion	7.19	Cl_2Mn^+	Dichloromanganese(III) ion	13.26
$C_{72}H_{56}MnN_{12}O_4^{4+}$	$\alpha,\alpha,\alpha,\beta$ -Tetrakis[2-(<i>N</i> -methylisonicotinamido)phenyl]-porphinatomanganese(II) ion	13.7	Cl_2Ti	Dichlorothallium(II)	25.8
Cd^+	Cadmium(I) ion	5.1, 5.1.1	Cl_3Cu^{3-}	Copper(0) chloride complex	8.1
Cd^{2+}	Cadmium(II) ion	25.1.3, 25.2.3	Cl_3Ti^-	Trichlorothallate(II) ion	25.9
$CeO_{12}S_3^{2-}$	Cerium(IV) sulfate complex	8.5.1	Cl_4Fe^{2-}	Tetrachloroferrate(II) ion	22.50.49
Cl^-	Chloride ion	8.51.1, 8.52.2, 12.4.2, 19.20.2, 19.38.1, 25.4.1	$Cl_4HO Pt^{2-}$	Tetrachlorohydroxyplatinate(III)	19.30
$ClCo^{2+}$	Chlorocobalt(III) ion	6.100	$Cl_4H_3O_2Pt^{2-}$	Aqua tetrachlorohydroxyplatinate(III) ion	19.29
$ClCoH_{15}N_5^{2+}$	Pentaammine(chloro)cobalt(III) ion	5.1.19, 6.1.8, 15.1.19, 17.3.3, 28.2.22	Cl_4Pt^{3-}	Tetrachloroplatinate(I) ion	19.5
$ClCu$	Copper(I) chloride	8.6, 22.50.43	Cl_4Ti^{2-}	Tetrachlorothallate(II) ion	25.10
$ClFe^{2+}$	Chloroiron(III) ion	25.7.2	$Cl_5H_2O Pt^{2-}$	Aquapentachloroplatinate(III) ion	19.28
$ClH_{15}N_5Os^{2+}$	Pentaammine(chloro)osmium(III) ion	22.3.31	Cl_5Pt^{2-}	Pentachloroplatinate(III) ion	19.27
$ClH_{15}N_5Ru^+$	Pentaammine(chloro)ruthenium(II) ion	22.42	Cl_6Ir^{2-}	Hexachloroiridate(IV) ion	12.5, 15.29.4
$ClH_{15}N_5Ru^{2+}$	Pentaammine(chloro)ruthenium(III) ion	22.43.1	Cl_6Pt^{3-}	Hexachloroplatinate(III) ion	19.26
$ClHg$	Mercury(I) chloride	10.8	Co^+	Tetrachloroplatinate(II), Cl_2^- reaction product	19.25
$ClHgO_2$	Chloromercury(I)peroxy	10.9	Co^{2+}	Cobalt(I) ion	6.1, 6.1.3
			Co^{3+}	Cobalt(II) ion	22.3.2, 25.4.2, 28.2.10
			$CoFH_{15}N_5^{2+}$	Cobalt(III) ion	6.99, 25.4.3
			CoH_3N^{2+}	Pentaammine(fluoro)cobalt(III) ion	5.1.21, 6.1.7, 15.1.21, 28.2.24
			$CoH_6N_2^{2+}$	Amminecobalt(II) ion	6.26
			$CoH_9N_3^{2+}$	Bis(ammine)cobalt(II) ion	6.25
			$CoH_9N_6O_6$	Tris(ammine)cobalt(II) ion	6.24
			$CoH_{12}N_4^{2+}$	Trinitrotrisamminecobalt(III)	6.1.12, 17.3.6
			$CoH_{15}N_5^{2+}$	Tetraamminecobalt(II) ion	6.23
			$CoH_{15}N_8^{2+}$	Pentaamminecobalt(II) ion	6.22
				Pentaammine(azido)cobalt(III) ion	5.1.25, 15.1.24, 28.2.28

$\text{CoH}_{16}\text{N}_4\text{O}_2^{3+}$	Tetraamminediaquacobalt(III) ion	6.1.10, 17.3.5	Fe^{2+}	Iron(II) ion	6.63.1, 6.100.4, 8.45.1, 9.27.1, 15.44.3, 15.46.4, 15.50.3, 15.52.2 16.1.1, 16.2.1, 16.3.1, 16.4.1, 22.50.47, 22.53.1, 22.55.7, 25.4.4, 25.7.1, 25.8.1, 25.9.1, 25.10.1, 28.13.2, 28.14.4
$\text{CoH}_{16}\text{N}_5\text{O}^{2+}$	Pentaammine(hydroxy)cobalt(III) ion	5.1.24, 15.1.23, 28.2.27	Fe^{3+}	Iron(III) ion	1.1.5, 1.2.2, 7.4.7, 8.5.4, 9.5.2, 25.4.6
$\text{CoH}_{17}\text{N}_5\text{O}^{3+}$	Pentaammine(aqua)cobalt(III) ion	5.1.23, 6.1.6, 15.1.22, 17.3.2, 28.2.26	FeH^{2+}	Hydridoiron(III) ion	9.16
$\text{CoH}_{18}\text{N}_6^{3+}$	Hexaamminecobalt(III) ion	5.1.17, 6.1.5, 6.6.8, 8.84.1, 15.1.17, 15.6.1, 15.7.1, 15.8.1, 15.9.1, 15.10.2, 17.3.1, 22.3.3, 28.2.20	FeHO_2^{2+}	Hydroperoxide-iron(III) complex	9.17
$\text{CoO}_{14}\text{P}_2^{6-}$	Cobalt(II) pyrophosphate	9.49.5	FeHO_6S	Hydroperoxide-sulfatoiron(III) complex	9.18
$\text{Co}_2\text{H}_{26}\text{N}_9\text{O}_2^{3+}$	μ -Amido- μ -peroxido-octakisamminedicobalt(III) ion	6.111, 22.50.15	FeO_4^{4-}	Ferrate(V) ion	9.52.2, 9.53
$\text{Co}_2\text{H}_{30}\text{N}_{10}\text{O}_2^{4+}$	Decaammine- μ -peroxidodicobalt(III) ion	6.110, 22.50.14	FeO_4S	Iron(II) sulfate	22.47.1, 22.50.51, 22.51.2, 22.52.1, 22.54.2, 22.57.4
Cr^+	Chromium(I) ion	7.1	$\text{FeO}_{12}\text{P}_3^{7-}$	Sulfatoiron(III) ion	7.4.9, 7.6.6, 7.16.5, 7.17.3, 9.33, 21.4.2
Cr^{2+}	Chromium(II) ion	7.2, 22.50.19	$\text{FeO}_{14}\text{P}_2^{6-}$	Triphosphatoferrate(II) ion	22.50.50
Cr^{3+}	Chromium(III) ion	22.3.12, 25.1.4, 25.2.4	$\text{FeO}_{15}\text{P}_2^{6-}$	Iron(II) pyrophosphate	9.49.4
CrH^{2+}	Hydriochromium(III) ion	7.27	$\text{FeO}_{41}\text{SiW}_{11}^{5-}$	Iron(IV) pyrophosphate	9.49
$\text{CrH}_{12}\text{O}_6^{2+}$	Hexaaquachromium(II) ion	15.41.2	$\text{Fe}_2\text{HO}_2^{4+}$	Iron(IV) (hydroxo)undecatungstosilicate ion	9.50
CrO_4^{2-}	Chromate(VI) ion	5.1.39	$\text{Fe}_2\text{HO}_6\text{S}^{2+}$	Hydroperoxide-iron(III) iron(II) complex	9.15
CrO_4^{3-}	Chromate(V) ion	7.40	H	Hydroperoxide-sulfatoiron(III) iron(II) complex	9.19
$\text{Cr}_2\text{O}_7^{2-}$	Dichromate(VI) ion	5.1.40, 28.2.41	H^+	Hydrogen atom	8.5.6, 28.2.2
Cu	Copper atom	8.2		Hydrogen ion	1.6.1, 3.2.1, 3.4.2, 6.4.3, 6.5.5, 6.6.13, 6.7.2, 6.10.2, 6.15.2, 6.27.2, 6.28.2, 6.29.2, 6.36.2, 6.37.2, 6.38.2, 6.45.2, 6.46.2, 6.47.2, 6.65.1, 7.25.1, 7.26.1, 7.27.1, 7.29.1, 7.30.1, 7.31.1, 7.32.1, 7.33.1, 7.34.1, 7.35.1, 8.12.1, 8.15.4, 8.24.2, 8.25.1, 8.26.1, 8.28.1, 8.53.1, 8.54.1, 8.55.1, 8.56.1, 9.16.1, 12.2.1, 13.3.1, 13.30.1, 13.32.1, 15.1.31, 15.8.8, 15.10.11, 15.26.2, 19.18.2, 19.36.3, 21.1.1, 21.2.1, 21.12.1, 22.41.1, 22.49.1, 25.5.2, 26.1.1, 28.2.44
Cu^+	Copper(I) ion	8.5, 8.29.1, 22.50.42, 22.51.1, 22.55.6, 22.56.1, 22.57.3, 22.58.1, 22.59.5, 22.60.1, 22.61.1, 22.62.2		Mercury(I) hydroxide	10.4
Cu^{2+}	Copper(II) ion	1.1.4, 5.1.41, 6.1.15, 8.29.2, 15.1.29, 15.29.2, 19.35.2, 19.37.2, 19.45.2, 19.46.2, 22.3.24, 22.30.1, 22.31.1, 22.33.1, 25.1.5, 25.2.5, 28.2.42		Hydroxymercury(II) ion	10.1.2
CuH^+	Hydridocopper(II) ion	8.27		Hydroxymanganese(III) ion	13.12, 28.2.46
CuHO_2^{2+}	Hydroperoxocopper(III) ion	8.64			
CuH_2O_2^+	Dihydroxycopper(III) ion	8.5.3, 8.46	HHgO	18-Molybdodiphosphate ion(7-), conjugate acid	14.1
CuH_3O_3	Trihydroxycopper(III)	8.47, 8.47.1	HHgO^+	Dioxonickel(IV) ion, protonated	15.7.4
CuNO_2^+	Nitritocupper(II) ion	8.47.2	HMnO^{2+}	Hydroxyl	4.1.2, 5.1.2, 6.1.22, 7.40.1, 10.8.3, 10.10.3, 11.2.2, 15.1.1, 28.2.3
$\text{CuO}_{14}\text{P}_2^{6-}$	Copper(II) pyrophosphate	9.49.7	$\text{HMnO}_{18}\text{O}_{62}\text{P}_2^{6-}$	Hydroxide ion	8.83.2, 15.42.2, 15.43.2, 15.44.4, 15.46.7, 15.57.1, 15.58.1, 15.60.1, 15.61.1, 15.65.2, 17.10.1, 19.18.3, 19.36.2
Cu_2^+	Copper(I) ion complex with copper(0)	8.4			
Eu^{2+}	Europium(II) ion	22.59.6			
Eu^{3+}	Europium(III) ion	22.3.25, 22.30.2, 22.31.2, 22.32.1, 22.33.2			
$\text{F}_2\text{H}_{12}\text{N}_4\text{Pt}^{2+}$	Tetraammine(difluoro)platinum(IV) ion	7.4.11, 7.6.8, 7.11.6			

HOI^+	Hydroxythallium(II) ion 25.5, 25.5.3	$\text{H}_{15}\text{N}_7\text{Ru}^+$	Pentaammine(dinitrogen)ruthenium(I) ion 22.1
HO_2^-	Perhydroxyl 1.5.2, 15.44.1, 15.46.2, 15.50.1, 25.4.7	$\text{H}_{15}\text{N}_7\text{Ru}^{3+}$	Pentaammine(dinitrogen)ruthenium(III) ion 22.45
HO_2Pb^+	Hydroxy(oxo)lead(IV) ion 17.10	$\text{H}_{16}\text{Mo}_2\text{O}_{11}^{2+}$	cis-Octaaqua- μ -oxo-bis(oxo)dimolybdenum(IV) ion 14.5
HO_4P^{2-}	Hydrogen phosphate ion 6.6.17	$\text{H}_{16}\text{N}_4\text{O}_2\text{Pt}^{3+}$	Tetraamminebis(aqua)platinum(III) ion 19.20
H_2HgO_2	Mercury(II) dihydroxide 10.1.3	$\text{H}_{17}\text{N}_5\text{ORu}^{2+}$	Pentaammine(aquo)ruthenium(II) ion 22.43
H_2O_2	Hydrogen peroxide 1.1.7, 1.2.4, 1.3.3, 1.5.3, 5.1.42, 5.7.4, 6.1.16, 6.19.1, 7.2.2, 8.5.7, 8.11.1, 8.18.1, 8.19.1, 8.21.1, 8.22.1, 8.45.2, 8.52.3, 9.49.2, 11.2.3, 15.1.30, 15.19.2, 15.21.2, 15.22.2, 15.23.2, 15.24.2, 15.25.1, 15.26.3, 15.46.5, 15.50.4, 25.1.9, 25.2.9, 25.4.8, 28.2.43	$\text{H}_{18}\text{N}_6\text{Ru}^{2+}$	Hexaammineruthenium(II) ion 6.6.19, 22.50.59
$\text{H}_2\text{O}_2\text{Pb}^+$	Dihydroxylead(III) ion 17.0	$\text{H}_{18}\text{N}_6\text{Ru}^{3+}$	Hexaammineruthenium(III) ion 5.1.50, 8.15.7, 8.16.3, 8.17.2, 8.84.2, 15.1.38, 15.6.4, 15.7.4, 15.8.12, 15.9.8, 15.10.16, 15.11.2, 15.13.2, 22.3.35, 28.2.56
$\text{H}_2\text{O}_2\text{Ti}$	Dihydroxythallium(II) 25.6	$\text{H}_{30}\text{N}_{12}\text{Ru}_{2}^{3+}$	Decaammine(dinitrogen)diruthenium(I-II) ion 22.38
$\text{H}_2\text{O}_4\text{P}^-$	Dihydrogen phosphate ion 6.5.8, 6.6.18, 6.7.5, 15.8.9, 15.10.15	$\text{H}_{30}\text{N}_{12}\text{Ru}_{2}^{5+}$	Decaammine(dinitrogen)diruthenium(II-III) ion 22.40
$\text{H}_2\text{O}_{40}\text{W}_{12}^{-7}$	12-Tungstate ion(7-), dihydrogen 27.1	$\text{H}_{31}\text{N}_{12}\text{ORu}_{2}^{4+}$	Decaammine(dinitrogen)diruthenium(II) ion, OH-adduct 22.39
H_3Ni	Amminenickel(III) ions 15.31	Hg	Mercury atom 10.1
H_4N^+	Ammonium ion 6.6.14	Hg^+	Mercury(I) ion 10.3, 22.50.54, 22.55.8, 22.57.5, 22.58.2, 22.59.7, 22.60.2
H_4N_2^-	Hydrazine 15.31.1	Hg^{2+}	Mercury(II) ion 10.1.1
$\text{H}_4\text{O}_4\text{Pb}^-$	Tetrahydroxyplumbate(III) ion 17.9	HgI	Mercury(I) iodide 10.11
$\text{H}_8\text{N}_3\text{ORh}^{2+}$	Aquatriamminerhodium(II) ion 21.7	Hg_2^+	Mercury(I) ion, complex with mercury(0) 10.2
$\text{H}_8\text{O}_{20}\text{P}_8\text{Pt}_2^{4-}$	Octahydrogen tetrakis(μ -diphosphito)-diplatinate(II)(III) ion 19.47	Hg_2^{2+}	Mercury(I) dimer ion 10.2.2, 22.50.55, 22.55.9, 22.57.6, 22.58.3, 22.59.8, 22.60.3
$\text{H}_8\text{O}_{20}\text{P}_8\text{Pt}_2^{5-}$	Octahydrogen tetrakis(μ -diphosphito)-diplatinate(I)(II) ion 19.16	Γ	Iodide ion 15.29.3, 15.46.6, 15.72.1
$\text{H}_{11}\text{N}_3\text{OPt}^+$	Triammineaqua platinum(I) ion 19.1	IO_3^-	Iodate ion 5.1.43, 5.7.3, 5.8.2, 5.9.2, 5.10.3, 6.1.17, 15.1.32, 28.2.45
$\text{H}_{12}\text{Mo}_2\text{O}_{10}^{3+}$	Hexaaquadi- μ -oxodioxomolybdenum(V,VI) ion 14.6	I_2^-	Diiodine radical ion 6.41.1
$\text{H}_{12}\text{N}_4\text{O}_2\text{Rh}^{2+}$	Tetraamminerhodium(II) ion 21.8, 21.8.4	In	Indium atom 11.1
$\text{H}_{13}\text{N}_4\text{Pt}^{2+}$	Tetraamminehydridoplatinum(III) ion 19.17	In^+	Indium(I) ion 11.1.1
$\text{H}_{13}\text{N}_4\text{Rh}^{2+}$	Tetraammine(hydrido)rhodium(III) ion 21.13.1	In^{2+}	Indium(II) ion 11.2
$\text{H}_{14}\text{N}_4\text{O}_2\text{Pt}^+$	Tetraamminebis(hydroxy)platinum(III) ion 19.19	Mn^{2+}	Manganese(II) ion 15.50.5, 25.4.9
$\text{H}_{14}\text{N}_5\text{O}_2\text{Ru}^{2+}$	<i>trans</i> -Tetraammine(aqua)nitrosylruthenium(II) ion, electron adduct 22.36	Mn^{3+}	Manganese(III) ion 13.11
$\text{H}_{15}\text{N}_4\text{O}_2\text{Pt}^{2+}$	Tetraammine(aqua)hydroxyplatinum(III) ion 19.18	MnO_2^+	Peroxidomanganese(III) ion 13.13
$\text{H}_{15}\text{N}_6\text{ORu}^{2+}$	Pentaamminenitrosylruthenium(II) ion 22.37	MnO_4^-	Permanganate ion 1.2.3, 5.1.44, 6.1.18, 7.2.1, 8.5.5, 15.1.33
$\text{H}_{15}\text{N}_6\text{ORu}^{3+}$	Pentaammine(nitroso)ruthenium(III) ion 6.6.20, 15.8.13, 15.10.17, 22.36.1	MnO_4^{2-}	Manganate(VI) ion 13.36.1
		$\text{Mn}_2\text{O}_7\text{P}_2$	Manganese(II) pyrophosphate 9.49.3
		NH_3	Ammonia 1.10.1, 1.11.1
		NO_2^-	Nitrite ion 5.1.45, 5.7.5, 5.8.3, 5.9.3, 5.10.4, 8.41.1, 15.1.34, 22.3.27, 28.2.49

NO_3^-	Nitrate ion 5.1.46, 5.7.6, 5.8.4, 5.9.4, 5.10.5, 6.1.20, 15.1.35, 28.2.50	Tl^+	Thallium(I) ion 25.1.14
N_2O	Nitrous oxide 3.1.4, 5.1.47, 5.6.1, 6.1.19, 6.5.9, 6.6.15, 6.7.3, 6.17.1, 6.18.1, 8.15.5, 15.1.36, 15.8.10, 15.9.6, 15.10.12, 19.6.1, 25.1.7, 25.2.7, 28.2.51, 28.3.1	Tl^{2+}	Thallium(II) ion 22.50.63, 25.4, 25.4.10
N_3^-	Azide ion 8.52.4	Tl_2^+	Thallium(I) ion, complex with $\text{Tl}(0)$ 25.2
Ni^+	Nickel(I) ion 15.1	Tl_4^{2+}	Thallium(0), complex with thallium(I) ion, dimer 25.3
Ni^{2+}	Nickel(II) ion 15.29.5, 25.1.8, 25.2.8, 28.2.52	Yb^{3+}	Ytterbium(III) ion 22.3.39
NiO_2^+	Dioxonickel(IV) ion 15.73	Zn^+	Zinc(I) ion 13.12.1, 28.2, 28.2.1
$\text{NiO}_{14}\text{P}_2^{6-}$	Nickel(II) pyrophosphate 9.49.6		
OV^+	Vanadyl(III) ion 26.1		
O_2	Oxygen 1.1.6, 1.2.5, 1.3.4, 2.1.1, 3.1.5, 5.1.48, 6.1.21, 6.4.4, 6.6.16, 6.7.4, 6.34.2, 6.33.1, 6.34.1, 6.35.1, 6.49.1, 6.50.1, 6.67.1, 6.74.1, 6.95.3, 6.98.2, 7.2.3, 7.4.10, 7.6.7, 7.8.5, 7.11.5, 7.15.4, 7.16.6, 8.5.10, 8.15.6, 8.18.2, 8.19.2, 8.20.1, 8.21.2, 8.22.2, 8.29.4, 8.43a.1, 9.13.3, 10.2.3, 10.5.1, 10.6.2, 10.8.2, 10.10.2, 10.11.2, 10.12.2, 12.3.2, 13.3.2, 13.4.2, 13.5.2, 13.6.1, 13.7.1, 13.8.1, 14.2.1, 14.3.1, 15.1.37, 15.6.3, 15.7.3, 15.8.11, 15.9.7, 15.10.14, 15.27.2, 15.28.1, 15.29.6, 15.52.3, 15.72.2, 17.2.2, 19.6.2, 19.37.4, 21.8.2, 21.11.4, 22.3.30, 22.18.2, 22.35.1, 22.37.8, 24.2.2, 25.1.10, 25.2.10, 27.1.1, 28.2.53, 28.9.1, 28.10.3, 28.11.3, 28.15.5		
O_2^-	Superoxide radical anion 15.44.2, 15.46.3, 15.50.2, 22.50.57, 28.15.2		
O_2S	Sulfur dioxide 7.4.13, 7.8.6, 7.11.7, 7.15.5, 7.17.4, 11.3.1, 28.5.4		
O_2U^{2+}	Uranyl(VI) ion 7.4.14, 7.6.9, 7.8.7, 7.11.8		
O_3S^-	Sulfite radical ion 22.3.37		
O_3S^{2-}	Sulfite ion 22.50.62		
O_4Re^{2-}	Rhenate(VI) ion 20.1		
O_4S^-	Sulfate radical ion 8.5.2		
O_4S^{2-}	Sulfate ion 15.44.5		
$\text{O}_8\text{S}_2^{2-}$	Peroxodisulfate ion 5.1.53, 6.1.23, 15.1.39, 28.2.57		
Pb	Lead atom 17.1		
Pb^+	Lead(I) ion 17.2		
Pb^{2+}	Lead(II) ion 5.1.49, 25.1.11, 25.2.11, 28.2.54		
Pd^+	Palladium(I) ion 18.1		
Pd^{3+}	Palladium(III) ion 18.1.1		
Sm^{2+}	Samarium(II) ion 25.1.13, 25.2.13		
Sm^{3+}	Samarium(III) ion 22.3.38		
Tl	Thallium(0) 25.1		

9. Chemical Name Index

- Acetaldehyde 25.1.15
 μ -Acetato)bis(μ -hydroxo)bis[triamminecobalt(III)] ion 5.1.32, 15.9.5, 28.2.34
 μ -Acetatohexaamminebis(μ -hydroxy)dicobalt(III) ion 5.1.32, 15.9.5, 28.2.34
(Acetato)pentaamminecobalt(III) ion 5.1.27, 15.1.26, 28.2.30
Acetic acid 6.4.5, 6.5.7, 6.6.21, 15.8.14, 15.10.18
Acetic acid, chloro-, ion(1-) 1.1.10, 1.3.7
Acetone 25.1.16, 28.2.58
Acetonitrile(aqua)-2,3,9,10-tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraeneiron(II) ion 9.8
Acetylacetonatochromium(II) ion 7.26
Acetophenone 5.1.56, 5.3.1
Acetylacetonatocobalt(II) ion 6.38
(N-Acetyl-N-methylamino)methyl 9.7.3, 22.37.4
N'-Acetylsulfanilamide 25.4.47
Acrylamide 8.5.21
Adenosine 25.5.4
Adenosine triphosphate, ester with 1- β -D-ribofuranosyl-3-pyridinecarboxamide 13.18.6, 13.20.2
Adenyllyl-(3' \rightarrow 5')-guanosine 25.5.5
 β -Alaninato(2-aminoethyl)copper(III) 8.83
 β -Alanine, copper(III) complex 8.59
Alanine, 2-methyl- 1.5.5, 1.7.2
Alanine, negative ion 1.9.2
Allyl alcohol 6.1.25, 15.1.40, 28.2.59
Aluminum(III) sulfophthalocyanine, radical anion 2.1
 μ -Amido- μ -peroxidoctakisamminedicobalt(III) ion 6.111, 22.50.15
 μ -Amido- μ -peroxidotetrakis(2,2'-bipyridine)dicobalt(III) ion 6.113, 22.50.17
 μ -Amido- μ -peroxidotetrakis(ethylenediamine)dicobalt(III) ion 6.112, 22.50.16
 μ -Amido- μ -peroxidotetrakis(1,10-phenanthroline)-dicobalt(III) ion 6.114, 22.50.18
 μ -Amido- μ -superoxidotetrakis(ethylenediamine)-dicobalt(III) ion 5.1.28
2-Amino-2-carboxy-2-methylethyl 9.7.2, 22.37.3
3-Amino-7-(dimethylamino)-2-methylphenothiazinium 25.5.25
2-Aminoethanol 1.7.1
 α -Aminoisobutyrate negative ion 1.9.3
 α -Aminoisobutyric acid 1.5.5, 1.7.2
Aminomethyl(glycinato)copper(III) 8.43a
8-Amino-8-methyl-1,3,6,10,13,15-hexaaza-tricyclo[13.1.1.1^{13,15}]octadecanenickel(I) ion 15.15
8-Amino-8-methyl-1,3,6,10,13,15-hexaaza-tricyclo[13.1.1.1^{13,15}]octadecanenickel(III) ion 15.54
2-Amino-2-methylpropanoic acid 1.5.5, 1.7.2
2-Amino-2-methylpropionate ion 1.9.3
2-Amino-2-methylpropyl, conjugate acid 9.7.4, 22.37.5
2-(Aminomethyl)pyridinebis(2,2'-bipyridine)ruthenium(III), ion 22.48
2-(Aminomethyl)pyridinebis(2,2'-bipyridine)ruthenium(III) ion, deprotonated 22.49
4-Amino-1-methyl-2-pyrimidinone 25.5.18
2-Amino-4-(methylthio)butanoic acid 1.5.20, 25.4.36
6-Aminophenalenone 1.5.6, 25.4.12
Ammine(2,2'-bipyridine)(2,2':6',2''-terpyridine)ruthenium(III) ion 22.53
Ammine(2,2'-bipyridine)(2,2':6',2''-terpyridine)ruthenium(II) ion 22.50.60
cis-Amminechlorobis(ethylenediamine)cobalt(III) ion 5.1.15, 15.1.15, 28.2.18
Amminecobalt(II) ion 6.26
Amminecopper(III) complex 8.48
Amminenickel(III) ions 15.31
Amminesilver(0)-silver(I) complex 1.3
Ammonia 1.10.1, 1.11.1
2-Ammonio-1-carboxyethylcopper(II) ion 8.30
2-Ammonio-2-carboxypropylcopper(II) ion 8.38
2-Ammonio-2-carboxypropylcopper(III) ion 8.73
2-Ammonio-2,2-dimethylethylchromium(III) ion 7.36
2-Ammonio-2,2-dimethylethylcopper(II) ion 8.33
2-Ammonioethylcopper(II) ion 8.31
Ammonium ion 6.6.14
Aniline, N,N-dimethyl-4-nitroso- 5.1.68
m-Anisic acid 1.5.22, 25.4.38
o-Anisic acid 1.5.21, 25.4.37
p-Anisic acid 1.5.23, 25.4.39
Anisole 1.5.7, 25.4.13
9,10-Anthraquinone 5.1.57, 6.1.26
9,10-Anthraquinone-2,6-disulfonate ion 6.4.6, 7.2.4, 8.15.8, 15.8.15, 15.10.19
9,10-Anthraquinone-2-sulfonate ion 6.6.22, 8.15.9
Aquabis(ethylenediamine)fluorocobalt(III) ion 5.1.14, 15.1.14, 28.2.17
Aquabis(ethylenediamine)hydroxyplatinum(III) ion 19.36
Aquabromo- α -2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),13,15-trienenickel(III) ion 15.58
Aquabromo- α -2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,6,11,13,15-hexaennickel(III) ion 15.65
Aquabromo- α -2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaenennickel(III) ion 15.62
Aquabromo-11-methyl-13-(trifluoromethyl)-1,4,7,10-tetraazacyclotrideca-10,13-dienenickel(III) ion 15.39
Aqua(bromo)nitrilotriacetatocobaltate(III) ion 6.107
Aqua(carboxymethyl)nitrilotriacetatocobaltate(III) ion 6.104

- Aqua(chloro)tetraethyl diethylenetriamine(hydroxy)platinum(III) ion 19.43
- Aquadichloro(diethylenetriamine)platinum(III) ion 19.39
- Aqua(dichloro)tetraethyl diethylenetriamineplatinum(III) ion 19.42
- Aqua- α -2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,6,11,13,15-hexaene(thiocyanato)nickel(III) ion 15.67
- Aqua- α -2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),13,15-triene(thiocyanato)nickel(III) ion 15.59
- Aqua- α -2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaene(thiocyanato)nickel(III) ion 15.63
- Aqua(1-ethoxyethyl)nitrilotriacetatocobaltate(III) ion 6.105
- Aqua(ethylenediaminetetraacetato)nickelate(III) ion 15.72
- Aqua(5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene)hydroxycobalt(III) ion 15.8.3, 15.10.5
- Aqua(1-hydroxyethyl)nitrilotriacetatocobaltate(III) ion 6.103
- cis-Aqua(1-hydroxyethyl)(nitrilotriacetato)cuprate(III) ion 8.84.4, 8.85, 8.86.1
- Aqua(1-hydroxy-1-methylethyl)nitrilotriacetatocobaltate(III) ion 6.106
- cis-Aqua(1-hydroxy-1-methylethyl)(nitrilotriacetato)cuprate(III) ion 8.86
- Aqua(hydroxymethyl)[N-(2-hydroxyethyl)-N,N',N'-ethylenediaminetriacetato]cobaltate(III) ion 6.108
- Aqua(hydroxymethyl)nitrilotriacetatocobaltate(III) ion 6.102
- cis-Aqua(hydroxymethyl)(nitrilotriacetato)cuprate(III) ion 8.84
- Aqua(methyl)nitrilotriacetatocobaltate(III) ion 6.101
- Aqua(methyl)nitrilotriacetatoferrate(III) ion 9.28
- Aqua(methyl)nitrilotriacetatomanganate(III) ion 13.28
- Aquamethyl(1,4,8,11-tetraazacyclotetradecane)nickel(III) ion 15.41
- Aquapentachloroplatinate(III) ion 19.28
- Aquatetrachlorohydroxyplatinate(III) ion 19.29
- Aquatriamminerhodium(II) ion 21.7
- Asaronic acid 1.5.29, 25.4.58
- Ascorbate ion 13.14.1, 13.17.1, 13.19.1, 13.20.1, 15.45.1
- Ascorbate radical anion 6.14.1
- Aspartate monoanion 1.9.4
- Azide ion 8.52.4
- Benzene, (bromomethyl)- 7.3.2
- Benzene, 1,4-dicyano- 25.2.14
- Benzene, 1,2-dimethoxy- 1.5.9, 25.4.18, 25.5.10
- Benzene, 1,3-dimethoxy- 1.5.10, 25.4.19
- Benzene, 1,4-dimethoxy- 1.5.11, 25.4.20, 25.5.11
- Benzene, methoxy- 1.5.7, 25.4.13
- Benzene, nitro- 1.1.12, 1.2.10, 1.3.9
- Benzene, 1,1'-tellurobis- 25.4.32
- Benzene, 1,2,4,5-tetramethoxy- 25.4.48
- Benzene, 1,1'-thiobis- 25.4.31
- Benzene, 1,2,3-trimethoxy- 1.5.24, 25.4.53
- Benzene, 1,2,4-trimethoxy- 1.5.25, 25.4.54
- Benzene, 1,3,5-trimethoxy- 1.5.26, 25.4.55
- 1,4-Benzenediamine, N,N,N',N'-tetramethyl- 9.34.7, 9.35.1, 9.36.3, 9.37.1, 9.38.1
- 1,4-Benzenediol, (1,1-dimethylethyl)- 13.15.2, 13.18.2
- 1,4-Benzenediol, trimethyl- 22.50.84
- 1,2-Benzenediol 13.15.3, 13.18.3
- 1,3-Benzenediol 13.15.4, 13.18.7
- 1,4-Benzenediol 22.50.64, 28.22.4
- Benzil 5.1.58, 5.2.1, 5.3.2
- Benzoate ion, 2,3-dimethoxy- 1.6.2
- Benzoate ion, 2,4-dimethoxy- 1.6.4
- Benzoate ion, 2,6-dimethoxy- 1.6.5
- Benzoate ion, 3,4-dimethoxy- 1.6.3
- Benzoate ion, 3,5-dimethoxy- 1.6.6
- Benzoate ion, 2-methoxy- 1.6.7
- Benzoate ion, 3-methoxy- 1.6.8
- Benzoate ion, 4-methoxy- 1.6.9
- 1,3-Benzodioxol-5-ol, ion(1-) 9.34.5
- Benzoic acid, 2-methoxy- 1.5.21, 25.4.37
- Benzoic acid, 3-methoxy- 1.5.22, 25.4.38
- Benzoic acid, 4-methoxy- 1.5.23, 25.4.39
- Benzoic acid, 3,4,5-trimethoxy- 1.5.28, 25.4.57
- Benzophenone 5.1.59, 5.2.2, 5.3.3, 5.4.1, 5.5.1, 6.1.27, 28.2.60
- Benzophenone, 4,4'-dimethoxy- 5.1.61, 5.2.3, 5.3.4, 5.4
- 1-Benzopyran-2-carboxylic acid, 3,4-dihydro-6-hydroxy- 2,5,7,8-tetramethyl-, ion(1-) 13.17.2, 13.18.4
- 1,4-Benzoquinone, tetramethyl- 5.1.62, 5.2.4, 5.3.5, 5.4, 5.5.2, 22.3.49
- 1,4-Benzoquinone 1.2.7, 5.1.60, 6.1.28, 7.2.5, 8.15.10, 10.6.3, 10.7.1, 10.8.4, 10.9.1, 10.10.8, 10.11.3, 10.12.3, 10.13.1, 15.1.41, 15.8.16, 15.10.20, 17.2.1, 22.3.41, 22.35.3, 25.1.17, 28.2.61
- 1,4-Benzosemiquinone, radical ion 28.22.2
- 3-Benzoylpyridine 6.6.23, 15.8.17, 15.10.21
- Benzyl bromide 7.3.2
- N-Benzyl-3-carbamylpyridinyl 28.23.2
- Benzylcopper(III) ion 8.74
- 1-Benzylnicotinamide radical 28.23.2
- Benzyl viologen radical cation 22.50.7
- Bicarbonate ion 6.6.5
- (2,2'-Bipyrazine)(2,2'-bipyridine)(2,2'-bipyrimidine)ruthenium(II) ion, electron adduct 22.10
- (2,2'-Bipyrazine)(2,2'-bipyridine)(2,2'-bipyrimidine)ruthenium(II) ion, electron adduct, protonated 22.11

- (2,2'-Bipyrazine)bis(2,2'-bipyridine)ruthenium(II) ion, electron adduct 22.8
- (2,2'-Bipyrazine)bis(2,2'-bipyridine)ruthenium(II) ion, electron adduct, protonated 22.9
- (2,2'-Bipyrazine)bis(2,2'-bipyrimidine)ruthenium(II) ion, electron adduct 22.16
- (2,2'-Bipyrazine)bis(2,2'-bipyrimidine)ruthenium(II) ion, electron adduct, protonated 22.17
- 2,2'-Bipyridine, conjugate acid 6.11.1, 22.3.42
- (2,2'-Bipyridine)bis(2,2'-bipyrimidine)ruthenium(II) ion, electron adduct 22.14
- (2,2'-Bipyridine)bis(2,2'-bipyrimidine)ruthenium(II) ion, electron adduct, protonated 22.15
- 2,2'-Bipyridinebis(oxalato)chromate(II) ion 7.21
- 2,2'-Bipyridinebis(oxalato)chromate(III) ion 5.1.37, 28.2.39
- 2,2'-Bipyridinebis[2-(2-thiazolyl)pyridine]ruthenium(III) ion 22.64
- 2,2'-Bipyridinecobalt(II) ion 6.1.13, 22.3.5
- 2,2'-Bipyridinecobalt(I) ion 6.9
- 2,2'-Bipyridinecobalt(I) ion 6.8
- 2,2'-Bipyridinetetracyanoferrate(II) ion, electron adduct 9.3
- 4,4'-Bipyridinium, 1,1'-bis(3-sulfonatopropyl)-, radical anion 19.47.3, 22.50.69, 28.14.6
- 4,4'-Bipyridinium, 1,1'-bis(3-sulfonatopropyl)-3,3'-dimethyl-, radical anion 22.50.70, 22.55.11
- 4,4'-Bipyridinium, 1,1'-bis(4-sulfonatobenzyl)-, dihydroxide bis(inner salt) 22.3.43
- 4,4'-Bipyridinium, 1,1'-bis(4-sulfonatobenzyl)-, dihydroxide bis(inner salt), radical anion 22.50.67
- 4,4'-Bipyridinium, 1,1'-diheptyl-, radical cation 28.14.11
- 4,4'-Bipyridinium, 1,1'-dihexyl-, radical cation 28.14.10
- 4,4'-Bipyridinium, 1,1'-dimethyl- 7.3.1, 9.3.2, 9.4.2, 21.11.5, 22.3.48, 22.6.1, 22.7.1, 22.8.1, 22.9.1, 22.10.1, 22.11.1, 22.12.2, 22.13.1, 22.14.1, 22.15.1, 22.16.1, 22.17.1, 22.18.4, 22.19.1, 22.20.1, 22.21.1, 22.22.1, 22.23.1, 22.28.2, 23.1.1
- 4,4'-Bipyridinium, 1,1'-dioctyl-, radical cation 28.14.12
- 4,4'-Bipyridinium, 1,1'-dipropyl-, radical cation 28.14.9
- 4,4'-Bipyridinyl, 1-methyl- 22.50.77
- 2,2'-Bipyrid-3-ylum-C³,N'-bis(2,2'-bipyridine-N,N')iridium(III) ion, electron adduct 12.3
- 2,2'-Bipyrid-3-ylum-C³,N'-bis(2,2'-bipyridine-N,N')iridium(III) ion, conjugate monoacid, electron adduct 12.2
- 2,2'-Bipyrid-3-ylum-C³,N'-bis(2,2'-bipyridine-N,N')iridium(IV) ion, conjugate monoacid 12.4
- Bis(acetylacetonato)chromate(II) 7.25
- Bis(acetylacetonato)cobalt(II) 6.37
- Bis(alaninato)cuprate(I) 8.10
- Bis(β -alanine)copper(III) complex 8.59
- Bis(alanine)copper(III) complex 8.58
- Bis(α -aminobutyric acid)copper(III) complex 8.60
- Bis(β -aminobutyric acid)copper(III) complex 8.61
- Bis(γ -aminobutyric acid)copper(III) complex 8.62
- 3,7-Bis(2-aminoethyl)-1,3,5,7-tetraazabicyclo[3.3.1]nonanenickel(I) ion 15.16
- 3,7-Bis(2-aminoethyl)-1,3,5,7-tetraazabicyclo[3.3.1]nonanenickel(III) ion 15.55
- Bis(α -aminoisobutyric acid)copper(III) complex 8.63
- Bis(ammine)cobalt(II) ion 6.25
- Bisaquatetraammineplatinum(III) ion 19.20
- Bis(2,2'-bipyrazine)(2,2'-bipyridine)ruthenium(II) ion, electron adduct 22.20
- Bis(2,2'-bipyrazine)(2,2'-bipyridine)ruthenium(II) ion, electron adduct, protonated 22.21
- Bis(2,2'-bipyrazine)(2,2'-bipyrimidine)ruthenium(II) ion, electron adduct 22.22
- Bis(2,2'-bipyrazine)(2,2'-bipyrimidine)ruthenium(II) ion, electron adduct, protonated 22.23
- Bis(2,2'-bipyridine)([2,2'-bipyridin]-3-yl-C,N')iridium(III) ion, electron adduct 12.3
- Bis(2,2'-bipyridine)([2,2'-bipyridin]-3-yl-C,N')iridium(III) ion, conjugate acid, electron adduct 12.2
- Bis(2,2'-bipyridine)([2,2'-bipyridin]-3-yl-C,N')iridium(IV) ion, conjugate monoacid 12.4
- Bis(2,2'-bipyridine)(2,2'-bipyrimidine)ruthenium(II) ion, electron adduct 22.6
- Bis(2,2'-bipyridine)(2,2'-bipyrimidine)ruthenium(II) ion, electron adduct, protonated 22.7
- Bis(2,2'-bipyridine)bis(cyano)ruthenate(II) ion, electron adduct 22.2
- Bis(2,2'-bipyridine)bis(cyano)ruthenium(III) ion 22.47
- Bis(2,2'-bipyridine)(4-carboxy-4'-methyl-2,2'-bipyridine)ruthenium(II) ion 22.5.1
- Bis(2,2'-bipyridine)(4-carboxy-4'-methyl-2,2'-bipyridine)ruthenium(II) ion, electron adduct 22.4
- Bis(2,2'-bipyridine)cobalt(II) ion 6.9.1
- Bis(2,2'-bipyridine)cobalt(I) ion 6.10
- Bis(2,2'-bipyridine)copper(I) ion 8.18
- Bis(2,2'-bipyridine)dicyanoferrate(II), OH reaction product 9.14
- Bis(2,2'-bipyridine)dicyanoferrate(II), electron adduct 9.1
- Bis(2,2'-bipyridine)(6,7-dihydro-5,8-dimethyldibenzo[b,j][1,10]phenanthroline)ruthenium(II) ion, electron adduct 22.29
- Bis(2,2'-bipyridine)(dipyrido[3,2-a:2',3'-c]phenazine)ruthenium(II) ion, electron adduct, diprotonated 22.26
- Bis(2,2'-bipyridine)(dipyrido[3,2-a:2',3'-c]phenazine)ruthenium(II) ion, electron adduct, protonated 22.27
- Bis(2,2'-bipyridine)(dipyrido[3,2-a:2',3'-c]phenazine)ruthenium(II) ion, electron adduct 22.28
- Bis(2,2'-bipyridine)(4'-methyl[2,2'-bipyridine]4-carboxylato)ruthenium(II) ion 22.5.1
- Bis(2,2'-bipyridine)(oxalato)chromate(II) 7.20

- Bis(2,2'-bipyridine)oxalatochromium(III)ion 5.1.35,
28.2.37
- Bis(2,2'-bipyridine)rhodium(II) ion 21.10, 21.11.2
- Bis(2,2'-bipyridine)ruthenium(II)(4-carboxy-4'-methyl-
2,2'-bipyridine)(prolylprolinato)-
pentaamminecobalt(III) ion, electron adduct 22.5
- Bis(2,2'-bipyridine)[2-(2-thiazolyl]pyridine]ruthenium(III)
ion 22.63
- 1,1'-Bis(carboxyethyl)-4,4'-bipyridinium radical ion (1+)
28.15.6
- 1,1'-Bis(carboxymethyl)-4,4'-bipyridinium radical cation
22.50.65
- Bis(5-chloro-1,10-phenanthroline)copper(I) ion 8.20
- Bis(diethylenetriamine)cobalt(II) ion 6.30
- 1,4-Bis(*N,N*-dimethylamino)benzene 9.34.7, 9.35.1,
9.36.3, 9.37.1, 9.38.1
- 3,7-Bis(dimethylamino)phenothiazinium 25.5.19
- Bis(4,4'-dimethyl-2,2'-bipyridine)cobalt(I) ion 6.15
- Bis(4,4'-dimethyl-2,2'-bipyridine)cobalt(II) ion 6.12.1
- Bis(dimethylglyoximato)methylcobalt(III) difluoroborate
22.3.11
- Bis(2,9-dimethyl-1,10-phenanthroline)copper(I) ion 8.23
- Bis(ethylenediamine)cobalt(II) ion 6.28
- cis*-Bis(ethylenediamine)difluorocobalt(III) ion 5.1.13,
15.1.13, 28.2.16
- Bis(ethylenediamine)platinum(I) ion 19.7, 19.7.1
- Bis(ethylenediamine)platinum(II), Cl₂⁺ reaction product
19.34
- Bis(ethylenediamine)platinum(II), H reaction product
19.11
- Bis(ethylenediamine)platinum(III) ion, deprotonated 19.37
- Bis(glycinato)cobalt(II) 6.46
- Bis(glycinato)methylcopper(III) ion 8.82
- cis*-Bis(glycinato)platinate(I) ion 19.9
- trans*-Bis(glycinato)platinate(I) ion 19.10
- cis*-Bis(glycinato)platinum(II), H reaction product 19.14
- trans*-Bis(glycinato)platinum(II), H reaction product 19.15
- cis*-Bis(glycinato)platinum(II), OH reaction product 19.45
- trans*-Bis(glycinato)platinum(II), OH reaction product
19.46
- Bis(glycinato)platinum(III) 19.45
- Bis(glycine)copper(III) complex 8.57
- 1,1'-Bis(2-hydroxyethyl)-4,4'-bipyridinium radical cation
22.50.66
- Bis(hydroxyprolinato)palladate(I) ion 18.2
- Bis(hydroxyprolinato)palladium(II), electron adduct 18.2
- Bis(iminodiacetato)nickelate(II), H-abstraction product
15.28
- Bis(5-methyl-1,10-phenanthroline)copper(I) ion 8.22
- Bismuth(II) ion 4.1, 4.1.1
- Bis(5-nitro-1,10-phenanthroline)copper(I) ion 8.21
- Bis(octahydro-1,4,7-triazonine)nickel(III) ion 15.34
- Bis(oxalato)phenanthrolinechromate(II) ion 7.23
- Bis(oxalato)phenanthrolinechromate(III) ion 5.1.38,
28.2.40
- Bis(μ -oxo)bis[aqua(oxalato)oxomolybdate(IV)(V)] ion
- Bis(μ -oxo)bis[(cysteinato)oxomolybdate(V)] ion 28.2.4
- Bis(μ -oxo)(ethylenediaminetetraacetato)-
bis[oxomolybdate(V)] ion 28.2.47
- Bis(μ -oxo)(ethylenediaminetetraacetato)-
bis[oxomolybdate(IV)(V)] ion 14.2
- Bis(2,4-pentanedionato)cobalt(II) 6.37
- Bis(1,10-phenanthroline)copper(I) ion 8.19
- Bis(1,10-phenanthroline)(2-hydroxy-2,2'-
dimethylethyl)copper(II) ion 8.43
- Bis(1,10-phenanthroline)(2-hydroxyethyl)copper(II) ion
8.42
- Bis(1,10-phenanthroline)(oxalato)chromate(II) 7.22
- Bis(1,10-phenanthroline)(oxalato)chromium(III) ion
5.1.36, 28.2.38
- 1,1'-Bis(4-sulfonatobenzyl)-4,4'-bipyridinium zwitterion
22.3.43
- 1,1'-Bis(4-sulfonatobenzyl)-4,4'-bipyridinium zwitterion
radical anion 22.50.67
- 1,1'-Bis(2-sulfonatoethyl)-4,4'-bipyridinium radical anion
19.17.2, 22.50.68, 28.11.5, 28.15.7
- 1,1'-Bis(3-sulfonatopropyl)-4,4'-bipyridinium radical
anion 19.47.3, 22.50.69, 28.14.6
- 1,1'-Bis(3-sulfonatopropyl)-3,3'-dimethyl-4,4'-bipyridinium
radical anion 22.50.70, 22.55.11
- Bis(1,4,7-triazacyclononane)nickel(III) ion 15.34
- 1,1'-Bis[3-(trimethylammonio)propyl]-4,4'-bipyridinium
radical cation 22.50.71, 28.14.7, 28.15.8
- Bleomycin-copper(I) complex 8.11
- Boric acid 6.6.2
- Bromate ion 5.1.8, 5.7.2, 5.8.1, 5.9.1, 5.10.2, 6.1.2, 1:
28.2.8
- Bromide ion 15.29.1, 15.48.2, 15.65.3
- (4-Bromobenzyl)-1,4,8,12-tetraazacyclopenta-
decanechromium(III) ion 22.50.36
- Bromocob(III)alamin 6.94
- Bromo- α -2,12-dimethyl-3,7,11,17-
tetraazabicyclo[11.3.1]heptadeca-1(17),2,6,11,13
hexaenenicke(III) ion 15.69
- Bromoform 1.1.8, 1.2.8, 1.3.5
- Bromo(5,7,7,12,14,14-hexamethyl-1,4,8,11-
tetraazacyclotetradeca-4,11-diene)nickel(III) ion
15.48
- Bromo(iminodiacetato)cobalt(III) 6.77
- Bromomercury(I) 10.6
- Bromomercury(I)peroxyxyl 10.7
- 4-Bromophenoxy 22.3.44
- Bromo[5,10,15,20-tetrakis(1-methylpyridinium-4-
yl)porphinatomanganate(III) ion 13.31
- Bromo[5,10,15,20-tetrakis(4-sulfonatophenyl)-
porphinatomanganate(III) ion 13.29
- α -Bromotoluene 7.3.2

- tert*-Butyl alcohol 17.9.2
 1,1'-Butylene-2,2'-bipyridinium radical cation 22.50.80
tert-Butyl hydroperoxide 7.3.3
tert-Butylhydroquinone 13.15.2, 13.18.2
(2-Butyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion 22.50.33
(Butyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion 22.50.32
C.I. 75480 5.1.64
Cadmium(II) ion 25.1.3, 25.2.3
Cadmium(I) ions 5.1
Carbonate ion 15.70.2
Carbonatobis(ethylenediamine)cobalt(III) ion 5.1.12, 15.1.12, 28.2.15
Carbonatoiron(IV) 9.48
Carbon dioxide 6.5.3, 6.6.4, 25.1.2
Carbon dioxide radical anion 5.1.7, 6.80.1, 15.1.3, 22.3.45
Carbon monoxide 6.5.4, 6.6.3, 9.8.1, 9.9.1, 9.10.1, 9.11.1
Carbon tetrachloride 1.1.9, 1.2.9, 1.3.6
Carboxybismuth(IV) ion 4.6
2-Carboxy-2,2-dimethylethyl, anion 9.7.6, 22.37.7
2-Carboxy-2,2-dimethylethylchromium(III) ion 7.35
2-Carboxy-2,2-dimethylethylcopper(II) ion 8.37
2-Carboxy-2,2-dimethylethylcopper(III) ion 8.72
1-Carboxyethylcopper(III) ion 8.69
Carboxyferricenium 9.35
1-Carboxy-1-hydroxyethylchromium(III) ion 7.34
2-Carboxy-2-hydroxy-2-methylethyl, anion 9.7.5, 22.37.6
2-Carboxy-2-hydroxypropyl anion 9.7.5, 22.37.6
Carboxylatocopper(II) 8.29
Carboxylato(2-) hydroxyethylethylenediaminetriacetato)ferrate(III) ion 9.30
Carboxylatomethylcopper(III) ion 8.68
Carboxylatonickel(II) 15.20
Carboxylato(nitrilotriacetato)ferrate(III) ion 9.29
Carboxyl radical anion 5.1.7, 6.80.1, 15.1.3, 22.3.45
Carboxymethylcopper(III) ion 8.68
4-Carboxyphenoxy, conjugate base 22.3.46
Catechol 13.15.3, 13.18.3
Cerium(IV) sulfate complex 8.5.1
Chlorate ion 28.2.9
Chloride ion 8.51.1, 8.52.2, 12.4.2, 19.20.2, 19.38.1, 25.4.1
Chloroacetate ion 1.1.10, 1.3.7
Chlorobis(ethylenediamine)platinum(III) ion 19.35
Chlorocobalt(III) ion 6.100
Chloro(diethylenetriamine)platinum(I) 19.8
Chloro(diethylenetriamine)platinum(II), Cl₂⁻ reaction product 19.39
Chloro(diethylenetriamine)platinum(II), H reaction product 19.12
Chloro(diethylenetriamine)platinum(II), OH reaction product 19.40
2-Chloro-10-dimethylaminopropylphenothiazine, conjugate acid 25.4.14, 25.5.6
Chloroform 1.1.11, 1.3.8
Chloro-5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecopper(III) ion 8.51
Chloroiron(III) complexes 7.4.8, 7.6.5, 7.7.1, 7.8.4, 7.11.4, 7.14.1, 7.15.3, 7.17.2, 7.18.1, 7.19.1
Chloroiron(III) ion 25.7.2
Chloromanganese(III) ion 13.25
Chloromercury(I) 10.8
Chloromercury(I)peroxy 10.9
Chloro(oxo)antimony(V) uroporphyrin I, radical anion 23.1
Chloropentaammineruthenium(III) ion 22.43.1
Chloro(pentacyano)cobaltate(II) ion 6.42
4-Chlorophenoxy 22.3.47
(4-Chlorophenyl)methylcopper(III) ion 8.75
(4-Chlorophenylmethyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion 22.50.37
Chloro(tetraethyl-diethylenetriamine)platinum(II), OH reaction product 19.43
Chloro(tetraethyl-diethylenetriamine)platinum(II), Cl₂⁻ reaction product 19.42
Chloro(tetraethyl-diethylenetriamine)platinum(II), H reaction product 19.13
Chlorothallium(II) ion 25.7
Chlorotris[3-(diphenylphosphino)-benzenesulfonato]rhodate(I) ion 22.3.33
Chlorotris[3-(diphenylphosphino)-benzenesulfonato]rhodate(0) ion 21.1
Chlorpromazine, conjugate acid 25.4.14, 25.5.6
Chromate(V) 1.5.1, 7.39
Chromate(VI) ion 5.1.39
Chromate(V) ion 7.40
Chromium(II), pentaaqua(1-methylethyl)- 22.50.22
Chromium(III), tris(1,10-phenanthroline-N₁,N₁₀)- 5.1.34, 7.9.1, 7.10.1, 28.2.36
Chromium(III) ion 22.3.12, 25.1.4, 25.2.4
Chromium(II) bis(acetylacetone) 7.25
Chromium(II) ion 7.2, 22.50.19
Chromium(II) tris(2,2'-bipyridine) 5.1.33, 6.4.2, 6.6.11, 7.5.1, 8.15.3, 15.8.6, 15.10.8, 15.11.1, 15.13.1, 28.2.35
Chromium(II) tris(4,7-dimethyl-1,10-phenanthroline) 7.16
Chromium(II) tris(4,4'-diphenyl-2,2'-bipyridine) 7.7
Chromium(II) tris(4,7-diphenyl-1,10-phenanthroline) 7.19
Chromium(II) tris(5-phenyl-1,10-phenanthroline) 7.18
Chromium(I) ion 7.1
Cob(III)alamin 6.18.2
Cob(I)alamin 6.18

- Cobal(I)amin 6.18
 Cobalt(II), bis(4,4'-dimethyl-2,2'-bipyridine) 6.12.1
 Cobalt(II), 4,4'-dimethyl-2,2'-bipyridine 6.1.14, 22.3.6
 Cobalt(II), 5,7,7,12,12,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,14-diene 22.3.8
 Cobalt(II), 5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene 6.5.2, 6.100.2, 13.25.2
 Cobalt(II), 8-methyl-1,3,13,16-tetraaza-6,10,19-trithiabicyclo[6.6.6]eicosane 6.53, 22.50.3
 Cobalt(II), 2,3,9,10-tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraene 6.55, 6.100.1, 13.25.1, 22.50.8
 Cobalt(II), tris(4,4'-dimethyl-2,2'-bipyridine) 6.15.1, 22.3.7
 Cobalt(III), 2,3,9,10-tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraene 15.10.6
 Cobalt(III), tris(4,4'-dimethyl-2,2'-bipyridine) 6.16.1
 Cobalt(III) (1-hydroxy-1-methylethyl)-5,10,15,20-tetraphenylporphyrin 6.88
 Cobalt(III) ion 6.99, 25.4.3
 Cobalt(III) (1-methylethyl)-5,10,15,20-tetraphenylporphyrin 6.86
 Cobalt(III) tris(2,2'-bipyridine) 6.4.1, 6.6.6, 7.4.3, 7.6.2, 7.8.1, 7.11.1, 7.16.2, 8.15.2, 8.16.1, 8.17.1, 15.8.5, 15.10.4, 22.3.10, 28.2.11
 Cobalt(III) tris(1,10-phenanthroline) 7.4.4, 7.6.3, 7.8.2, 7.11.2, 7.16.3
 Cobalt(II) 2,2'-bipyridine 6.1.13, 22.3.5
 Cobalt(II) bis(acetylacetone) 6.37
 Cobalt(II) bis(2,2'-bipyridine) 6.9.1
 Cobalt(II) dihydroxytetrakis(1-methylpyridinium-4-yl)porphyrin 28.4.3, 28.5.3, 28.6.3
 Cobalt(II) dihydroxytetrakis(4-sulfonatophenyl)porphyrin 28.4.1, 28.5.1, 28.6.1
 Cobalt(II) dihydroxytetrakis[4-(*N,N,N*-trimethylammonio)-phenyl]porphyrin 28.4.2, 28.5.2, 28.6.2
 Cobalt(II) iminodiacetate 6.57.1, 6.59.1
 Cobalt(II) ion 22.3.2, 25.4.2, 28.2.10
 Cobalt(II) pyrophosphate 9.49.5
 Cobalt(II) 5,10,15,20-tetrakis(4-sulfonatophenyl)porphyrin 28.14.3, 28.15.3
 Cobalt(II) tris(2,2'-bipyridine) 6.10.1, 6.39, 22.50.10, 22.54.1, 22.55.1, 22.59.1, 22.62.1
 Cobalt(II) tris(1,10-phenanthroline) 6.40, 22.50.11
 Cobalt(I) 2,2'-bipyridine 6.9
 Cobalt(I) bis(2,2'-bipyridine) 6.10
 Cobalt(I) ion 6.1, 6.1.3
 Cobalt(I) 5,10,15,20-tetrakis(4-sulfonatophenyl)porphyrin 6.17
 Cobalt(I) tris(2,2'-bipyridine) 6.11
 Cobaltate(II), [phthalocyaninetetrasulfonato- 22.50.12
 Cobaltocene 6.65
 Copper, (C,O)-carbon dioxide 8.29
 Copper(II), 5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradecane 6.100.3
 Copper(III) 8.45
 Copper(III), bis(β -alanine) 8.59
 Copper(III), 5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene 8.52
 Copper(III) hydroxide 8.47
 Copper(II) ion 1.1.4, 5.1.41, 6.1.15, 8.29.2, 15.1.29, 15.29.2, 22.3.24, 22.30.1, 22.31.1, 22.33.1, 25.1.5, 25.2.5, 28.2.42
 Copper(II) ion, complex with cyclohexene 8.39
 Copper(II) ions 19.25.2, 19.34.2, 19.35.2, 19.37.2, 19.39.1, 19.42.1, 19.45.2, 19.46.2, 19.46.3
 Copper(II) pyrophosphate 9.49.7
 Copper(I) bis(2,2'-bipyridine) 8.18
 Copper(I) chloride 8.6, 22.50.43
 Copper(I) chloride complex 8.2.1, 8.4.1
 Copper(I) chloride complex with copper(0) 8.3
 Copper(I) ion 8.5, 8.29.1, 22.50.42, 22.51.1, 22.55.6, 22.56.1, 22.57.3, 22.58.1, 22.59.5, 22.60.1, 22.61.1, 22.62.2
 Copper(I) ion complex with copper(0) 8.4
 Copper(I) sarcophagine 8.12
 Copper atoms 8.2
 Copper(0) chloride complex 8.1
 Cuprous chloride 8.6, 22.50.43
 Cyclohexane, 1,2-dihydroxy- (*cis*) 1.7.3
 Cyclohexane, 1,2-dihydroxy- (*trans*) 1.7.4
cis-1,2-Cyclohexanediol 1.7.3
trans-1,2-Cyclohexanediol 1.7.4
 Cyclohexene-copper(II) complex 8.39
 (Cyclohexyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion 22.50.1
 Cyclopentyl 15.1.7
 Cyclopentylnickel(II) ion 15.24
 Cysteine 22.50.72
 Cytosine, 1-methyl- 25.5.18
 DPN 28.23.1
 Decaammine(dinitrogen)diruthenium(I-II) ion 22.38
 Decaammine(dinitrogen)diruthenium(II) ion, OH-adduct 22.39
 Decaammine(dinitrogen)diruthenium(II-III) ion 22.40
 Decaammine- μ -peroxidodicobalt(III) ion 6.110, 22.50.1, 4,5,7,8,11,12,14,14-Decamethyl-1,4,8,11-tetraazacyclotetradecanenickel(I) ion 15.9
 2'-Deoxyadenosine 5'-monophosphate 25.5.7
 Deoxyadenosine monophosphate 25.5.7
 Deoxyadenylic acid 25.5.7
 2'-Deoxy-5'-adenylic acid 25.5.7
 2'-Deoxyguanosine 5'-monophosphate 25.5.8
 Deoxyguanylic acid 25.5.8

- 3,7-Diamino-2,8-dimethyl-5-phenylphenazinium 25.5.23
 3,7-Diamino-2,8-dimethyl-5-phenylphenazinium, conjugate monoacid 25.4.46
 1,8-Diamino-3,6,10,13,16,19-hexaaza-bicyclo[6.6.6]eicosane cobalt(II) ion 6.52, 22.55.5, 22.57.2, 22.59.4
 1,8-Diamino-3,6,10,13,16,19-hexaaza-bicyclo[6.6.6]eicosane cobalt(II) ion, conjugate diaacid 6.51, 22.55.4
 1,8-Diamino-3,6,10,13,16,19-hexaaza-bicyclo[6.6.6]eicosane platinum(III) ion 19.44
cis-Diammine(aqua)(1,4,8,11-tetraazacyclotetradecane)-chromium(III) ion 7.37
cis-Diamminedichloroplatinate(I) ion 19.2
trans-Diamminedichloroplatinate(I) ion 19.3
cis-Diamminedichloroplatinum(II), OH reaction product 19.22
trans-Diamminedichloroplatinum(II), OH reaction product 19.23
 Diammine(hydroxy)silver(II) 1.10
 Diamminesilver(I) ion 1.1.3, 1.3.1
 1,3-Diammonio-2-propylcopper(II) ion 8.34
 Diaqua- α -2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),13,15-trienenickel(III) ion 15.56
 Diaquabis(ethylenediamine)platinum(III) ion 19.38
 Diaqua-11-methyl-13-(trifluoromethyl)-1,4,7,10-tetraazacyclotrideca-10,13-dienenickel(III) ion, conjugate base 15.40
trans-Diaqua-1,4,8,11-tetraazacyclotetradecanechromium(II) ion 7.3
 Diaqua(2,3,9,10-tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraeneiron(II) ion 9.9
 1,1'-Dibenzyl-4,4'-bipyridinium radical cation 22.50.73
 Dibenzylsulfonate viologen 22.3.43
 Dibenzylsulfonate viologen radical anion 22.50.67
 Dibromine radical ion 6.1.1, 12.2.2, 12.3.1, 15.69.1
 Dibromo- α ,2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),2,6,11,13,15-hexaenickel(III) ion 15.66
 Dibromo(iminodiacetato)cobaltate(III) ion 6.76
 Dibromomanganese(III) ion 13.24
 1,1'-Dicarboxyferricium 9.36
 1,2-Dicarboxy-2-hydroxyethylcopper(III) ion 8.71
cis-Dichlorobis(ethylenediamine)cobalt(III) ion 5.1.10, 15.1.10, 28.2.13
trans-Dichlorobis(ethylenediamine)cobalt(III) ion 5.1.11, 15.1.11, 28.2.14
cis-[Dichlorobis(1-(2-hydroxyethyl)-2-methyl-5-nitroimidazole- N^3)]platinum(III) ion 19.48
 Dichlorobis(hydroxy)platinato(III) ion 19.31
cis-Dichlorobis(isopropylamine)-*trans*-dihydroxyplatinum(IV), OH reaction product 19.49
cis-Dichlorobis(isopropylamine)-*trans*-dihydroxyplatinato(III) ion 19.24
cis-Dichlorodiammineplatinato(I) ion 19.2
trans-Dichlorodiammineplatinato(I) ion 19.3
cis-Dichlorodiammineplatinum(II), OH reaction product 19.22
cis-Dichlorodiammineplatinum(III) ion 19.22
trans-Dichlorodiammineplatinum(II), OH reaction product 19.23
trans-Dichlorodiammineplatinum(III) ion 19.23
 Dichloro(5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene)nickel(III) ion 15.49
 Dichloro-*meso*-5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradecane(hydroxy)manganese(IV) ion 13.34
 Dichloro-*rac*-5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradecane(hydroxy)manganese(IV) ion 13.35
 Dichlorohydroxy(1,4,7,11-tetraazacyclotetradecane)-manganese(IV) ion 13.33
 Dichloromanganese(III) ion 13.26
 Dichloromercurate(I) ion 22.50.56, 22.51.3, 22.56.2, 22.62.3
 Dichloromethyliron(IV) deuteroporphyrin (2-propanol)₂, 9.43
 Dichloro[5,10,15,20-tetrakis(4-sulfonatophenyl)-porphinatostannate(IV) radical anion 24.2
 Dichlorothallium(II) 25.8
 Dichromate(VI) ion 5.1.40, 28.2.41
 Dicyanoaurate(0) ion 3.1
 1,4-Dicyanobenzene 25.2.14
 Dicyanobis(2,2'-bipyridine)iron(III) ion 9.1.1
 Dicyanobis(4,4'-dimethyl-2,2'-bipyridine)ferrate(II), electron adduct 9.2
 Dicyano(hydroxy)aurate(II) ion, protonated 3.5
 Dicyanohydroxyaurate(II) ion 3.4
 Dicyclopentadienylcobalt(II) 6.65
 1,1'-Didodecyl-4,4'-bipyridinium radical cation 28.14.13
 Diethyl disulfide 1.5.8, 1.7.5, 25.4.15, 25.5.9
 Diethylenetriaminecobalt(II) ion 6.31
 Diethylenetriaminopentaacetatoferate(III), DTPA radical adduct 9.31
 Diethylenetriamine(pyridine)platinum(II) ion 19.41.2
 Diethylenetriamine(pyridine)platinum(II) ion OH-adduct 19.41
 Diethyl sulfoxide 25.4.16
 (μ -Difluoroacetato)bis(μ -hydroxo)bis[triamminecobalt(III)] ion 5.1.30, 15.9.3, 28.2.32
 1,1'-Diheptyl-4,4'-bipyridinium radical cation 28.14.11
 1,1'-Dihexyl-4,4'-bipyridinium radical cation 28.14.10
 7,8-Dihydrodipyrido[1,2-*a*:2',1'-*c*][1,4]diazepinedium, radical cation 22.50.82

- Dihydrogen dicyanoaurate(0) 3.3
 Dihydrogenferrate(V) ion 9.51
 Dihydrogen phosphate ion 6.5.8, 6.6.18, 6.7.5, 15.8.9,
 15.10.15
 Dihydronicotinamide adenine dinucleotide 13.18.5
 1,2-Dihydroxybenzene 13.15.3, 13.18.3
 1,3-Dihydroxybenzene 13.15.4, 13.18.7
 1,4-Dihydroxybenzene 22.50.64, 28.22.4
 Dihydroxycopper(III) ion 8.5.3, 8.46
 1,4-Dihydroxy(1,1-dimethylethyl)benzene 13.15.2, 13.18.2
 1,2-Dihydroxyethyl(5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene)cobalt(III) ion
 6.85
 Dihydroxylead(III) ion 17.8
 Dihydroxymethylchromium(III) ion 7.28
 Dihydroxysilver(II) 1.8
trans-Dihydroxy-1,4,8,11-tetraazacyclotetradecane-chromium(III), OH reaction product 7.38
 Dihydroxytetrakis(1-methylpyridinium-4-yl)porphinecobalt(II) ion 28.4.3, 28.5.3, 28.6.3
 Dihydroxytetrakis(4-sulfonatophenyl)-porphinatocobaltate(II) ion 28.4.1, 28.5.1, 28.6.1
 Dihydroxytetrakis[4-(*N,N,N*-trimethylammonio)-phenyl]porphinecobalt(II) ion 28.4.2, 28.5.2, 28.6.2
 Dihydroxy(2,3,9,10-tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraene)cobalt(III) ion 6.6.10, 15.8.4, 15.10.7
 Dihydroxythallium(II) 25.6
 Diiodine radical ion 6.41.1
 3,5-Diodotyrosine 25.4.17
 1,2-Dimethoxybenzene 1.5.9, 25.4.18, 25.5.10
 1,3-Dimethoxybenzene 1.5.10, 25.4.19
 1,4-Dimethoxybenzene 1.5.11, 25.4.20, 25.5.11
 1,4-Dimethoxybenzene radical cation 12.3.3, 25.4.21
 2,3-Dimethoxybenzoate ion 1.6.2
 2,4-Dimethoxybenzoate ion 1.6.4
 2,6-Dimethoxybenzoate ion 1.6.5
 3,4-Dimethoxybenzoate ion 1.6.3
 3,5-Dimethoxybenzoate ion 1.6.6
 2,3-Dimethoxybenzoic acid 1.5.12, 25.4.22
 2,4-Dimethoxybenzoic acid 1.5.14, 25.4.24
 2,6-Dimethoxybenzoic acid 1.5.15, 25.4.25
 3,4-Dimethoxybenzoic acid 1.5.13, 25.4.23
 3,5-Dimethoxybenzoic acid 1.5.16, 25.4.26
 4,4'-Dimethoxybenzophenone 5.1.61, 5.2.3, 5.3.4, t ?
 3,4-Dimethoxyphenol 9.38.2
 2,6-Dimethoxyphenoxyde ion 9.36.2
 3,4-Dimethoxyphenoxyde ion 9.34.1
 3,5-Dimethoxyphenoxyde ion 9.36.1
 (Dimethylaminomethyl)ferricenium 9.38
 2-(Dimethylammonio)-1-(dimethylammoniomethyl)-ethylcopper(II) ion 8.35
 2-(Dimethylammonio)ethylcopper(II) ion 8.36
 2,6-Dimethylbenzosemiquinone, radical ion 28.22.2
 4,4'-Dimethyl-2,2'-bipyridine, conjugate monoacid 6.11
 4,4'-Dimethyl-2,2'-bipyridinecobalt(I) ion 6.12
 4,4'-Dimethyl-2,2'-bipyridinecobalt(I) ion, protonated 6.13
 4,4'-Dimethyl-2,2'-bipyridinecobalt(II) ion 6.1.14, 22.1
 4,4'-Dimethyl-2,2'-bipyridine(hydrido)cobalt(III) ion 6.1
 1,1'-Dimethyl-4,4'-bipyridinium 7.3.1, 9.3.2, 9.4.2,
 21.11.5, 22.3.48, 22.6.1, 22.7.1, 22.8.1, 22.9.1,
 22.10.1, 22.11.1, 22.12.2, 22.13.1, 22.14.1, 22.15.
 22.16.1, 22.17.1, 22.18.4, 22.19.1, 22.20.1, 22.21.
 22.22.1, 22.23.1, 22.28.2, 23.1.1
 1,1'-Dimethyl-4,4'-bipyridinium radical cation 9.32.1,
 12.4.1, 22.47.2, 22.50.74, 22.63.2, 22.64.1, 22.65.
 28.14.8, 28.15.9
 Dimethyl disulfide 1.5.17, 1.7.6, 25.4.27, 25.5.12
 1,1-Dimethylethanol 17.9.2
 N,N-Dimethyl-4-nitrosoaniline 5.1.68
 Dimethyl sulfoxide 25.4.28
 α -2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]-heptadeca-1(17),2,11,13,15-pentaenenicke(I) ion 15.13
 α -2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]-heptadeca-1(17),2,11,13,15-pentaenecopper(II) ion 15.10.9
 α -2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]-heptadeca-1(17),2,11,13,15-pentaenenicke(II) ion 15.10.13
 α -2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]-heptadeca-1(17),2,11,13,15-pentaenecopper(I) ion 8.17
 α -2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]-heptadeca-1(17),2,6,11,13,15-hexaenabis(thiocyanato)nickel(III) ion 15.68
 α -2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]-heptadeca-1(17),2,11,13,15-pentaenabis(hydroxo)nickel(III) ion 15.01
 α -2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]-heptadeca-1(17),2,11,13,15-pentaenabis(thiocyanato)nickel(III) ion 15.64
 α -2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]-heptadeca-1(17),13,15-trienenicke(I) ion 15.12
 α -2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]-heptadeca-1(17),2,11,13,15-pentaenecopper(II) ion OH-adduct 8.44
 α -2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]-heptadeca-1(17),2,11,13,15-pentaen(hydroxo)nickel(III) ion 15.60
 5,7-Dimethyl-1,4,8,11-tetraazacyclotetradeca-4,7-dienenicke(II) ion 6.100.5
 11,13-Dimethyl-1,4,7,10-tetraazacyclotrideca-10,13-dienenicke(III) ion 15.37
 11,13-Dimethyl-1,4,7,10-tetraazacyclotrideca-10,13-dienenicke(III) ion, conjugate base 15.38

- 11,13-Dimethyl-1,4,7,10-tetraazacyclotrideca-10,13-dienatonickel(III) ion 15.38
- 1,5-Dimethyluracil 25.5.20
- 1,1'-Diethyl-4,4'-bipyridinium radical cation 28.14.12
- Dioxomanganese(III) ion 13.13
- Dioxomethylnickel(II) 15.20
- Dioxonickel(IV) ion 15.73
- Dioxonickel(IV) ion, protonated 15.74
- Dioxygen anion 15.44.2, 15.46.3, 15.50.2, 22.50.57, 28.15.2
- Diphenyl selenide 25.4.30
- Diphenyl sulfide 25.4.31
- Diphenyl telluride 25.4.32
- Diphosphoocatadecamolybdate ion(7-), protonated 14.1
- 1,1'-Dipropyl-4,4'-bipyridinium radical cation 28.14.9
- Dipropyl sulfoxide 25.4.33
- Dipyrido[1,2-a:2',1'-c][1,4]diazocene, 6,7,8,9-tetrahydro-, radical ion (1+) 22.50.80
- 1-Dodecyl-1'-methyl-4,4'-bipyridinium radical cation 28.14.14
- Dodecyl methyl viologen radical cation 28.14.14
- Duroquinone 5.1.62, 5.2.4, 5.3.5, 5.4.3, 5.5.2, 22.3.49
- Electron adduct of nitrobenzene 28.15.12
- Eosin dianion 15.10.22
- Ethanol 25.4.34, 25.5.13
- Ethanolamine 1.7.1
- 2-Ethoxyethylchromium(III) ion 7.33
- 1-Ethoxyethylnickel(II) ion 15.23
- 4-Ethoxyphenoxy 22.3.50
- Ethyl alcohol 25.4.34, 25.5.13
- Ethyl disulfide 1.5.8, 1.7.5, 25.4.15, 25.5.9
- Ethylenediaminecadmium(I) ion 5.8
- Ethylenediaminecobalt(II) ion 6.29
- Ethylenediaminecopper(III) complex 8.49, 8.49.2
- Ethylenediaminenickel(III) ions 15.32
- Ethylenediaminetetraacetate ions 22.50.75, 22.63.1, 22.65.2, 22.66.1, 22.67.1, 28.14.15
- Ethylenediaminetetraacetato(1-hydroxybutyl)cuprate(II) ion 8.41
- Ethylenediaminetetraacetatoargentate(II) 1.13
- Ethylenediaminetetraacetatocadmiate(I) ion 5.7
- Ethylenediaminetetraacetatocobaltate(II) ion 6.48, 22.50.2, 28.14.2
- Ethylenediaminetetraacetatocobaltate(II) ion, H-abstraction product 6.61
- Ethylenediaminetetraacetatocobaltate(II) ion, superoxide adduct 6.58
- Ethylenediaminetetraacetatocobaltate(III) ion, superoxide adduct 6.79
- Ethylenediaminetetraacetatocuprate(I) ion 8.9
- Ethylenediaminetetraacetatomanganate(II), ion H-abstraction product 13.10
- Ethylenediaminetetraacetatonickelate(II) ion 15.30.1
- Ethylenediaminetetraacetatonickelate(II), H-abstraction product 15.30
- Ethylenediaminetetraacetatonickelate(III) ion 15.70
- Ethylenediaminetetraacetatoosmate(III) ion 22.3.32
- Ethylenediaminetetraacetatoplumbate(II) ion 5.7.7
- Ethylenediaminetetraacetatozinc(II) H-abstraction product 28.11
- Ethylene glycol 1.5.18, 1.7.7
- Ethylperoxy, 2-hydroxy-2,2-dimethyl- 22.37.9
- 4-Ethylphenoxy 22.3.51
- (Ethyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion 22.50.29
- Europium(II), 4,7,13,16,21-pentaoxa-1,10-diazabicyclo[8.8.5]tricosane 22.50.46
- Europium(III), 4,7,13,16,21-pentaoxa-1,10-diazabicyclo[8.8.5]tricosane 22.3.26, 22.29.1
- Europium(III) ion 22.3.25, 22.30.2, 22.31.2, 22.32.1, 22.33.2
- Europium(II) ion 22.59.6
- Ferrate(IV) ion 9.46
- Ferrate(V) ion 9.52.2, 9.53
- Ferricenium, (dimethylamino)methyl- 9.38
- Ferric oxalate 9.5.1
- Ferricyanide ion 3.1.3, 6.98.1, 8.84.3, 9.13.2, 9.34, 15.28.2, 22.24.2, 25.1.6, 25.2.6, 28.6.4
- Ferrocyanide ion 9.49.8, 19.31.1, 19.37.3, 19.45.3, 19.46.4, 22.46.1, 22.50.53, 28.13.3, 28.15.4
- Ferrous oxalate 9.5
- Ferrous sulfate 22.47.1, 22.50.51, 22.51.2, 22.52.1, 22.54.2, 22.57.4
- 9-Fluorenone 5.1.63, 5.3.6, 5.4.4, 5.5.3, 6.6.24
- Fluoren-9-one 5.1.63, 5.3.6, 5.4.4, 5.5.3, 6.6.24
- Fluorescein dianion 15.8.18, 15.10.23
- Fluorosccin dianion, 2',4',5',7'-tetrabromo- 15.10.22
- (μ -Fluoroacetato)bis(μ -hydroxo)bis[triamminecobalt(III)] ion 5.1.31, 15.9.4, 28.2.33
- (4-Fluorophenylmethyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion 22.50.38
- Formaldehyde 25.1.18, 25.5.14
- Formic acid 6.5.6, 6.6.25
- Fumaric acid 8.5.22
- Glycinate ion 1.7.8, 1.9.5
- Glycinatocadmium(I) ion 5.9
- Glycinatocobalt(II) ion 6.47
- Glycinatocuppper(II) ion 8.47.3
- Glycinatonickel(III) ion 15.33
- Glycine 1.5.19
- Glycine, negative ion 1.7.8, 1.9.5
- Glycine ion(1-) 1.7.8, 1.9.5
- Glycyltryptophan 25.5.16
- Gold(II) 3.6

- Guanosine 25.5.15
- H-abstraction product of ethylenediaminetetraacetatomanganate(II) ion 13.10
- H-abstraction product of nitrilotriacetatocobaltate(II) ion 6.60
- H-abstraction product of nitrilotriacetatomanganate(II) ion 13.9
- Hexaamminebis(μ -hydroxy)- μ -(trifluoroacetato)dicobalt(III) ion 5.1.29, 15.9.2, 28.2.31
- Hexaamminecobalt(III) ion 5.1.17, 6.1.5, 6.6.8, 8.84.1, 15.1.17, 15.6.1, 15.7.1, 15.8.1, 15.9.1, 15.10.2, 17.3.1, 22.3.3, 28.2.20
- Hexaammine- μ -(difluoroacetato)bis(μ -hydroxy)dicobalt(III) ion 5.1.30, 15.9.3, 28.2.32
- Hexaammine- μ -(fluoroacetato)bis(μ -hydroxy)dicobalt(III) ion 5.1.31, 15.9.4, 28.2.33
- Hexaammineruthenium(III) ion 5.1.50, 8.15.7, 8.16.3, 8.17.2, 8.84.2, 15.1.38, 15.6.4, 15.7.4, 15.8.12, 15.9.8, 15.10.16, 15.11.2, 15.13.2, 22.3.35, 28.2.56
- Hexaammineruthenium(III) ion, OH reaction product 22.68
- Hexaammineruthenium(II) ion 6.6.19, 22.50.59
- Hexaaquachromium(II) ion 15.41.2
- Hexaaquadi- μ -oxodioxodimolybdenum(V,VI) ion 14.6
- 3,6,10,13,16,19-Hexaazabicyclo[6.6.6]eicosane copper(I) ion 8.12
- Hexabromoplatinate(III) ion 19.33
- Hexachloroiridate(III) ion, electron adduct 12.1
- Hexachloroiridate(IV) ion 12.5, 15.29.4
- Hexachloroplatinate(III) ion 19.26
- Hexacyanoferrate(III) ion 3.1.3, 6.98.1, 8.84.3, 9.13.2, 9.34, 15.28.2, 22.24.2, 25.1.6, 25.2.6, 28.6.4
- Hexacyanoferrate(II) ion 9.49.8, 19.31.1, 19.37.3, 19.45.3, 19.46.4, 22.46.1, 22.50.53, 28.13.3, 28.15.4
- Hexacyanoosmate(II) ion 22.46.2
- Hexacyanoruthenate(III) ion 22.46
- 1,1',2,2',6,6'-Hexamethyl-4,4'-bipyridinium radical cation 22.50.76
- 2,2,4,11,11,13-Hexamethyl-1,5,10,14-tetraaza-cyclooctadeca-4,13-diene(hydrido)copper(III) ion 8.56
- 2,2,4,11,11,13-Hexamethyl-1,5,10,14-tetraaza-cyclooctadeca-4,13-dienecopper(III) H-adduct 8.56
- β -rac-(5,7,7,12,12,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradecane)nickel(III) ion 15.43
- 5,7,7,12,12,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-4,14-dienecobalt(I) ion 6.7
- 5,7,7,12,12,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-4,14-dienecobalt(II) ion 22.3.8
- 5,7,7,12,14,14-Hexamethyl-1,4,7,11-tetraaza-cyclotetradeca-4,11-diene(hydroxo)nickel(III) ion 15.47
- 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-4,11-dienenickel(I) ion 15.10, 15.46.1
- 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-4,11-diene(hydrido)cobalt(III) ion 6.80
- 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-4,11-dienedihydroxycobalt(III) ion 6.6.9
- 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-4,11-dienenickel(II) ion 6.100.7
- 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradecanenickel(II) ion 6.100.6
- 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradecanecopper(II) ion 6.100.3
- 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-4,11-dienecobalt(II) ion 6.5.2, 6.100.2, 13.25.2
- 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradecanesilver(II) ion 7.4.1, 15.10.1, 15.49.1, 21.11.3
- 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-4,11-dienecobalt(I) ion 6.6
- 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-4,11-dienecopper(I) ion 8.15
- 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradecanenickel(I) ion 15.8
- 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradecanecobalt(II) ion 6.50, 22.50.7
- 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-4,11-dienenickel(III) ion 15.46
- 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-4,14,8,11-tetraenenicnickel(III) ion 15.50
- 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-4,11-diene(hydrido)copper(III) ion 8.55
- 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-1,4,8,11-tetraenenicnickel(I) ion 15.11
- 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-4,11-dienecopper(III) ion 8.52
- 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradecanenickel(III) ion 15.44
- 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-4,11-diene(2,2,2-trifluoro-1-hydroxyethyl)cobalt(III) ion 6.84
- 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradecanecopper(I) ion 8.14
- 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradecane(hydrido)copper(III) ion 8.54
- 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-4,11-dienenickel(II) ion, OH reaction product 15.26
- 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradecanenickel(II) ion, OH reaction product 15.25
- 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradecanedi(phosphato)nickel(III) ion 15.45

- 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradecane copper(III) ion 8.50
- N-d,l*-5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-4,11-dienecobalt(II) ion 6.5.2, 6.100.2, 13.25.2
- meso*-5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradecane(dichloro)manganese(III) ion OH reaction product 13.34
- prim*-5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-4,11-diene(hydrido)cobalt(III) ion 6.81
- prim-N-rac*-5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-4,11-diene(hydrido)cobalt(III) ion 6.81
- rac*-5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-4,11-dienecobalt(II) ion 6.5.2, 6.100.2, 13.25.2
- rac*-5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradecane(dichloro)manganese(III) ion OH reaction product 13.35
- N-meso*-5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-4,11-dienecobalt(I) ion 6.5
- N-rac*-5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-4,11-diene(hydrido)cobalt(III) ion 6.80
- N-rac*-5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-4,11-dienecobalt(II) ion 6.5.2, 6.100.2, 13.25.2
- N-rac*-5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-4,11-dienecobalt(I) ion 6.6
- 4,7,13,16,21,24-Hexaoxa-1,10-diazabicyclo[8.8.8]hexacosane cadmium(I) ion 5.5
- Hexyl viologen radical cation 28.14.10
- Hydrazine 15.31.1
- Hydridochromium(III) ion 7.27
- Hydridocopper(II) ion 8.27
- (Hydrido)-7,12-diethenyl-3,8,13,17-tetramethylporphine-2,18-dipropionate ferrate(III), dihydrogen 9.20
- Hydrido-*prim-N-rac*-5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecobalt(III) ion 6.81
- Hydrido-*N-rac*-5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecobalt(III) ion 6.80
- Hydridoiron(III) ion 9.16
- Hydridoiron(III) protoporphyrin 9.20
- Hydrodioxy 1.5.2, 15.44.1, 15.46.2, 15.50.1, 25.4.7
- Hydrogen atom 8.5.6, 28.2.2
- Hydrogen dicyanoaurate(0) ion 3.2
- Hydrogenferrate(V) ion 9.51.2, 9.52
- Hydrogen ion 1.6.1, 3.2.1, 3.4.2, 6.4.3, 6.5.5, 6.6.13, 6.7.2, 6.10.2, 6.15.2, 6.27.2, 6.28.2, 6.29.2, 6.36.2, 6.37.2, 6.38.2, 6.45.2, 6.46.2, 6.47.2, 6.65.1, 7.25.1, 7.26.1, 7.27.1, 7.29.1, 7.30.1, 7.31.1, 7.32.1, 7.33.1, 7.34.1, 7.35.1, 8.12.1, 8.15.4, 8.24.2, 8.25.1, 8.26.1, 8.28.1, 8.53.1, 8.54.1, 8.55.1, 8.56.1, 9.16.1, 12.2.1, 13.3.1, 13.30.1, 13.32.1, 15.1.31, 15.8.8, 15.10.11, 15.26.2, 19.18.2, 19.36.3, 21.1.1, 21.2.1, 21.12.1, 22.41.1, 22.49.1, 25.5.2, 26.1.1, 28.2.44
- Hydrogen peroxide 1.1.7, 1.2.4, 1.3.3, 1.5.3, 5.1.42, 5.7.4, 6.1.16, 6.19.1, 7.2.2, 8.5.7, 8.11.1, 8.18.1, 8.19.1, 8.21.1, 8.22.1, 8.45.2, 8.52.3, 9.49.2, 11.2.3, 15.1.30, 15.19.2, 15.21.2, 15.22.2, 15.23.2, 15.24.2, 15.25.1, 15.26.3, 15.46.5, 15.50.4, 25.1.9, 25.2.9, 25.4.8, 28.2.43
- Hydrogen phosphate ion 6.6.17
- Hydroperoxide, 1,1-dimethylethyl- 7.3.3
- Hydroperoxide-iron(III) complex 9.17
- Hydroperoxide-iron(III) iron(II) complex 9.15
- Hydroperoxide-sulfatoiron(III) complex 9.18
- Hydroperoxide-sulfatoiron(III) iron(II) complex 9.19
- Hydroperoxidomanganese(III) formate complex 13.15
- Hydroperoxidomanganese(III) sulfate complex 13.22
- Hydroperoxocopper(III) ion 8.64
- Hydroperoxyl 1.5.2, 15.44.1, 15.46.2, 15.50.1, 25.4.7
- Hydroquinone 22.50.64, 28.22.4
- Hydroquinone, *tert*-butyl- 13.15.2, 13.18.2
- Hydroquinone, trimethyl- 22.50.84
- Hydroquinone dimethyl ether 1.5.11, 25.4.20, 25.5.11
- Hydroxide ion 8.83.2, 15.42.2, 15.43.2, 15.44.4, 15.46.7, 15.57.1, 15.58.1, 15.60.1, 15.61.1, 15.65.2, 17.10.1, 19.18.3, 19.36.2
- Hydroxocob(III)alamin 6.18.2
- Hydroxomercury(I) 10.4
- 1-Hydroxybutyl 8.9.1
- (1-Hydroxybutyl)ethylenediaminetetraacetatocuprate(II) ion 8.41
- 2-Hydroxycyclohexyl 8.39.1
- 2-Hydroxy-2,2-dimethylethyl 5.1.6, 6.6.26, 6.81.1, 9.7.1, 10.10.7, 15.1.6, 19.37.6, 22.3.52, 22.37.2
- 2-Hydroxy-2-dimethylethylbismuth(IV) ion 4.5
- 2-Hydroxy-1,2-dimethylethylchromium(III) ion 7.31
- 2-Hydroxy-2,2-dimethylethylchromium(III) ion 7.32
- 2-Hydroxy-2,2-dimethylethylcopper(II) ion 8.32
- 2-Hydroxy-2,2-dimethylethylcopper(III) ion 8.70
- 2-Hydroxy-2,2-dimethylethylperoxy 22.37.9
- (2-Hydroxy-2,2-dimethylethyl)-3,10,17,24-tetrasulfophthalocyanine cobaltate(III) ion 6.90
- 2-Hydroxy-2,2-dimethylethyl[5,10,15,20-tetrakis(1-methylpyridinium-4-yl)porphinatomanganate(III) ion 13.32
- 2-Hydroxy-2,2-dimethylethyl[5,10,15,20-tetrakis(4-sulfonatophenyl)porphinatomanganate(III) ion 13.30

- 2-Hydroxy-2,2-dimethylethyltetakis(4-sulfonatophenyl)-porphinatomanganese(III) ion 13.30
- Hydroxy- α -2,12-dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]heptadeca-1(17),13,15-trienickel(III) ion 15.57
- 1-Hydroxyethyl 5.1.4, 6.103.1, 10.10.5, 15.1.4, 22.3.53
- 2-Hydroxyethyl 8.5.24
- 1-Hydroxyethylbismuth(IV) ion 4.3
- 1-Hydroxyethylcadmium(II) ion 5.1.1
- 1-Hydroxyethylchromium(III) ion 7.28a
- 2-Hydroxyethylchromium(III) ion 7.29
- 2-Hydroxyethylcopper(III) ion 8.67
- (1-Hydroxyethyl)-7,12-diethenyl-3,8,13,17-tetramethylporphine-2,18-dipropanoatoferate(III), dihydrogen 9.22
- (2-Hydroxyethyl)-7,12-diethenyl-3,8,13,17-tetramethylporphine-2,18-dipropanoatoferate(III), dihydrogen 9.24
- Hydroxy(ethylenediaminetetraacetato)nickelate(III) ion 15.71
- 1-Hydroxyethyl(5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene)cobalt(III) ion 6.83
- 1-Hydroxyethyliron(III) protoporphyrin 9.22
- 2-Hydroxyethyliron(III) protoporphyrin 9.24
- 1-Hydroxyethylnickel(II) ion 15.21
- (2-Hydroxyethyl)-3,10,17,24-tetrasulfophthalocyanine-cobaltate(III) ion 6.92
- Hydroxy-*meso*-5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradecane(dichloro)manganese(IV) ion 13.34
- Hydroxy-*rac*-5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradecane(dichloro)manganese(IV) ion 13.35
- Hydroxy(iminodiacetato)cobalt(III) 6.78
- 5-Hydroxyindole, conjugate base 9.34.2
- 5-Hydroxyindole 12.5.1
- 5-Hydroxyindole-3-acetate ion, conjugate base 9.34.3
- Hydroxyl 4.1.2, 5.1.2, 6.1.22, 7.40.1, 10.8.3, 10.10.3, 11.2.2, 15.1.1, 28.2.3
- Hydroxymanganese(III) ion 13.12, 28.2.46
- Hydroxymercury(II) ion 10.1.2
- Hydroxymethyl 5.1.3, 6.102.2, 8.5.23, 10.10.4, 11.2.4, 15.1.2, 22.3.54
- Hydroxymethylbismuth(IV) ion 4.2
- Hydroxymethylchromium(III) ion 7.27a
- (Hydroxymethyl)-7,12-diethenyl-3,8,13,17-tetramethylporphine-2,18-dipropanoatoferate(III), dihydrogen 9.21
- 1-Hydroxy-1-methylethyl 5.1.5, 6.106.2, 10.10.6, 11.2.5, 15.1.5, 19.37.5, 22.3.55
- 1-Hydroxy-1-methylethylbismuth(IV) ion 4.4
- 1-Hydroxy-1-methylethylcadmium(II) ion 5.1.2
- 1-Hydroxy-1-methylethylchromium(III) ion 7.29a
- 2-Hydroxy-1-methylethylchromium(III) ion 7.30
- (1-Hydroxy-1-methylethyl)-7,12-diethenyl-3,8,13,17-tetramethylporphine-2,18-dipropanoatoferate(III), dihydrogen 9.23
- 1-Hydroxy-1-methylethyliron(III) protoporphyrin 9.23
- 2-Hydroxy-1-methylethyliron(III) protoporphyrin 9.25
- 1-Hydroxy-1-methylethylnickel(II) ion 15.22
- (1-Hydroxy-1-methylethyl)tetakis(4-sulfonatophenyl)porphinatocobaltate(III) ion 6.88
- 1-Hydroxy-1-methylethyltetakis(4-sulfonatophenyl)porphinatocobaltate(III) ion 6.88
- (2-Hydroxy-1-methylethyl)-3,10,17,24-tetrasulfophthalocyaninecobaltate(III) ion 6.93
- Hydroxymethylferricenium 9.37
- Hydroxymethyl(5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene)cobalt(III) ion 6.82
- Hydroxymethyliron(III) protoporphyrin 9.21
- Hydroxymethylnickel(II) ion 15.19
- 3-Hydroxy-5-methylphenoxy copper(III) ion 8.79, 8.79
- 2-Hydroxy-2-methylpropyl 5.1.6, 6.6.26, 6.81.1, 9.7.1, 10.10.7, 15.1.6, 19.37.6, 22.3.52, 22.37.2
- (2-Hydroxy-1-methylpropyl)-3,10,17,24-tetrasulfophthalocyaninecobaltate(III) ion 6.91
- Hydroxymethyltetakis(4-sulfonatophenyl)porphinatocobaltate(III) ion 6.87
- 2-Hydroxy-1,4-naphthoquinone 5.1.64
- Hydroxy(oxo)lead(IV) ion 17.10
- 2-Hydroxyphenoxy copper(III) ion 8.76
- 3-Hydroxyphenoxy copper(III) ion 8.77
- 4-Hydroxyphenoxy copper(III) ion, conjugate base
- 4-Hydroxyphenoxy copper(II) ion, conjugate base 8.40
- 4-Hydroxyphenoxy, conjugate base 28.22.2
- Hydroxysilver(II) ion 1.6
- Hydroxy-1,4,8,11-tetraazacyclotetradecane(dichloro)manganese(IV) ion 13.34
- Hydroxy(tetrakis(2-hydroxyphenyl)porphinato)zinc(II), ical cation, deprotonated 28.16
- Hydroxy(tetrakis(3-hydroxyphenyl)porphinato)zinc(II), ical cation, deprotonated 28.17
- 6-Hydroxy-2,5,7,8-tetramethylchroman-2-carboxylate ion 13.17.2, 13.18.4
- Hydroxythallium(II) ion 25.5
- Hydroxytriethylenetetraminecobalt(II) ion 6.33
- 5-Hydroxytryptamine, conjugate base 9.34.6
- 5-Hydroxytryptophan, conjugate base 9.34.4
- Iminodiacetatocobalt(II) 6.57.1, 6.59.1
- Iminodiacetatocobalt(II), H-abstraction product 6.59
- Iminodiacetatocobalt(II) OH-adduct 6.78
- Iminodiacetatocobaltate(II) ion, superoxide adduct 6.1
- Iminodiacetatonickelate(II), H-abstraction product 15
- Indigomonosulfonate ion 6.4.7
- Indium(II) ion 11.2
- Indium atoms 11.1

- Indole, 5-hydroxy- 12.5.1
 Indol-5-ol, 3-(2-aminoethyl)-, conjugate base 9.34.6
 Indol-5-ol, 3-carboxymethyl-, conjugate dibase 9.34.3
 5-Indolol 12.5.1
 Iodate ion 5.1.43, 5.7.3, 5.8.2, 5.9.2, 5.10.3, 6.1.17, 15.1.32, 28.2.45
 Iodide ion 15.29.3, 15.46.6, 15.72.1
 Iodomercury(I) 10.11
 Iodomethane 6.6.27, 6.17.2, 8.15.11, 15.8.19, 15.10.24
 4-Iodophenoxy 22.3.56
 Iridium(IV) tris(2,2'-bipyridine), ortho-metallated complex, conjugate monoacid 12.4
 Iron(2+), (hydroperoxy)- 9.17
 Iron(III), 5,10,15,20-tetrakis(1-methylpyridinium-4-yl)porphine, superoxide complex 9.41
 Iron(III) deuteroporphyrin dimethyl ester (2-propanol)₂, 1-hydroxy-1-methylethylperoxyl adduct 9.45
 Iron(III) deuteroporphyrin (2-propanol)₂, ·CHCl₂ radical adduct 9.43
 Iron(III) deuteroporphyrin (2-propanol)₂, dichloromethyl radical adduct 9.43
 Iron(III) deuteroporphyrin (2-propanol)₂, methyl radical adduct 9.42
 Iron(III) deuteroporphyrin (2-propoxy)(2-propanol), ·CF₃ reaction product 9.44
 Iron(III) ion 1.1.5, 1.2.2, 7.4.7, 8.5.4, 9.5.2, 25.4.6
 Iron(III) oxalate 9.5.1
 Iron(III) tris(2,2'-bipyridine) 6.6.12, 15.8.7, 15.10.10
 Iron(III) tris(1,10-phenanthroline) 9.27
 Iron(II) acetate 22.50.48
 Iron(II) deuteroporphyrin (2-propanol)₂ 9.12, 9.42.1
 Iron(II) deuteroporphyrin (2-propanol)₂-trifluoromethyl adduct 9.26
 Iron(II) ion 6.63.1, 6.100.4, 8.45.1, 9.27.1, 15.44.3, 15.46.4, 15.50.3, 15.52.2, 16.1.1, 16.2.1, 16.3.1, 16.4.1, 22.50.47, 22.53.1, 22.55.7, 25.4.4, 25.7.1, 25.8.1, 25.9.1, 25.10.1, 28.13.2, 28.14.4
 Iron(II) ions 19.34.3, 28.19.1, 28.20.1
 Iron(II) oxalate 9.5
 Iron(II) protoporphyrin 1-hydroxy-1-methylethyl complex 9.23
 Iron(II) protoporphyrin 1-hydroxyethyl complex 9.22
 Iron(II) protoporphyrin 2-hydroxy-1-methylethyl complex 9.25
 Iron(II) protoporphyrin 2-hydroxyethyl complex 9.24
 Iron(II) protoporphyrin hydroxymethyl complex 9.21
 Iron(II) pyrophosphate 9.49.4
 Iron(II) sulfate 22.47.1, 22.50.51, 22.51.2, 22.52.1, 22.54.2, 22.57.4
 Iron(II) α,α,α,β-tetrakis(*N*-methylisonicotinamidophenyl)porphyrin 9.11
 Iron(II) 5,10,15,20-tetrakis(1-methylpyridinium-4-yl)porphyrin 9.10
 Iron(II) tris(1,10-phenanthroline) 22.50.52
 Iron(II) tris(1,10-phenanthroline-5,6-dione) 25.4.5, 25.5.1
 Iron(II) tris(1,10-phenanthroline-5,6-quinone) 25.4.5, 25.5.1
 Iron(IV) (hydroxo)undecatungstosilicate ion 9.50
 Iron(IV) pyrophosphate 9.49
 Isopropanol 6.75.1, 8.14.2, 25.4.45, 25.5.22
 Isopropyl alcohol 6.75.1, 8.14.2, 25.4.45, 25.5.22
 4-Isopropylphenoxy 22.3.57
 Isopropyltetrakis(4-sulfonatophenyl)-porphinatocobaltate(III) ion 6.86
 Lawsons 5.1.64
 Lead(I) 17.3
 Lead(III) 17.7
 Lead(II) ions 5.1.49, 25.1.11, 25.2.11, 28.2.54
 Lead(I) ions 17.2
 Lead atom 17.1
 Maleic acid 8.5.25
 Manganese(VI) ion 13.36.1
 Manganese(III) 2-hydroxy-2,2-dimethylethyl-5,10,15,20-tetrakis(4-sulfonatophenyl)porphyrin 13.30
 Manganese(III) ion 13.11
 Manganese(III) phosphate complex 13.17
 Manganese(III) pyrophosphate complex 13.19
 Manganese(III) sulfate complex 13.20
 Manganese(II) formate-hydroperoxyl adduct 13.15
 Manganese(II) formate-superoxide adduct 13.14
 Manganese(II) ion 15.50.5, 25.4.9
 Manganese(II) phosphate-superoxide adduct 13.18
 Manganese(II) pyrophosphate 9.49.3
 Manganese(II) sulfate hydroperoxyl adduct 13.22
 Manganese(II) sulfate-superoxide adduct 13.21
 Manganese(II) 5,10,15,20-tetrakis(4-carboxyphenyl)porphyrin 13.8
 Manganese(II) α,α,α,β-tetrakis(*N*-methylisonicotinamidophenyl)porphyrin 13.7
 Manganese(II) 5,10,15,20-tetrakis(1-methylpyridinium-4-yl)porphyrin 13.4
 Manganese(II) 5,10,15,20-tetrakis(1-methylpyridinium-4-yl)porphyrin radical anion 13.2
 Manganese(II) 5,10,15,20-tetrakis(2,1-phenyleneiminocarbonyl)tetrakis[1-methylpyridiniumato]porphyrin 13.7
 Manganese(II) 5,10,15,20-tetrakis(4-pyridyl)porphyrin 13.5
 Manganese(II) 5,10,15,20-tetrakis(4-sulfonatophenyl)-porphyrin 13.3
 Manganese(II) 5,10,15,20-tetrakis(4-sulfonatophenyl)-porphyrin radical anion 13.1
 Manganese(II) tetrakis[4-(*N,N,N*-trimethylamino)phenyl]porphyrin 13.6
 Manganese(V) 13.36

- Menadione 5.1.65, 6.1.29, 6.6.28, 6.67.2, 8.47.4, 15.1.42, 17.2.4, 28.2.62
 Menaquinone 5.1.65, 6.1.29, 6.6.28, 6.67.2, 8.47.4, 15.1.42, 17.2.4, 28.2.62
 Mercurous bromide 10.6
 Mercurous chloride 10.8
 Mercurous cyanide 10.10
 Mercurous iodide 10.11
 Mercurous thiocyanate 10.12
 Mercury(I) 10.5
 Mercury(II) dihydroxide 10.1.3
 Mercury(II) ion 10.1.1
 Mercury(I) bromide 10.6
 Mercury(I) chloride 10.8
 Mercury(I) cyanide 10.10
 Mercury(I) dimer ion 10.2.2, 22.50.55, 22.55.9, 22.57.6, 22.58.3, 22.59.8, 22.60.3
 Mercury(I) hydroxide 10.4
 Mercury(I) iodide 10.11
 Mercury(I) ion 10.3, 22.50.54, 22.55.8, 22.57.5, 22.58.2, 22.59.7, 22.60.2
 Mercury(I) ion, complex with mercury(0) 10.2
 Mercury(I) thiocyanate 10.12
 Mercury atom 10.1
 Methanol 8.45.3, 25.4.35, 25.5.17
 Methionine 1.5.20, 25.4.36
 Methoxybenzene 1.5.7, 25.4.13
 2-Methoxybenzoate ion 1.6.7
 3-Methoxybenzoate ion 1.6.8
 4-Methoxybenzoate ion 1.6.9
 2-Methoxybenzoic acid 1.5.21, 25.4.37
 3-Methoxybenzoic acid 1.5.22, 25.4.38
 4-Methoxybenzoic acid 1.5.23, 25.4.39
m-Methoxybenzoic acid 1.5.22, 25.4.38
o-Methoxybenzoic acid 1.5.21, 25.4.37
p-Methoxybenzoic acid 1.5.23, 25.4.39
 4-Methoxy-*N,N*-dimethylaniline radical cation 22.3.58
 3-Methoxyphenoxy 22.3.59
 4-Methoxyphenoxy 22.3.60
 (4-Methoxyphenyl)methylcopper(III) ion 8.80
 (4-Methoxyphenylmethyl)-1,4,8,12-tetraaza-cyclopentadecanechromium(III) ion 22.50.41
 Methyl 6.101.2, 8.82.1, 9.28.2, 13.28.2
 2-Methylalanine 1.5.5, 1.7.2
 Methyl alcohol 8.45.3, 25.4.35, 25.5.17
 (4-Methylbenzyl)-1,4,8,12-tetraaza-cyclopentadecanechromium(III) ion 22.50.39
 1-Methyl-4,4'-bipyridinyl 22.50.77
 Methylcopper(III) ion 8.65
 Methylcopper(II) ion 8.28, 8.28.2
 1-Methylcytosine 25.5.18
*N*₁-Methylcytosine 25.5.18
 10-(2-Methyl-2-dimethylaminoethyl)phenothiazine, conjugate acid 25.4.44
 Methyl disulfide 1.5.17, 1.7.6, 25.4.27, 25.5.12
 Methylene Blue cation 25.5.19
 3,4-Methylenedioxypheinoxide ion 9.34.5
 (1-Methylethyl)-1,4,8,12-tetraaza-cyclopentadecanechromium(III) ion 22.50.31
 1-Methylethyltetrakis(4-sulfonatophenyl)-porphinatocobaltate(III) ion 6.86
 (1-Methyl-2-hydroxyethyl)-7,12-Diethenyl-3,8,13,17-tetramethylporphine-2,18-dipropanoatoferrate(III), dihydrogen 9.25
 Methyl iodide 6.6.27, 6.17.2, 8.15.11, 15.8.19, 15.10.24
 Methyliron(IV) deuteroporphyrin (2-propanol)₂ 9.42
 2-Methyl-1,4-naphthoquinone 5.1.65, 6.1.29, 6.6.28, 6.67.2, 8.47.4, 15.1.42, 17.2.4, 28.2.62
 8-Methyl-8-nitro-1,3,6,10,13,15-hexaaazatricyclo[13.1.1.1^{13,15}]octadecanenickel(III) ion 15.53
 8-Methyl-8-nitro-1,3,6,10,13,15-hexaaazatricyclo[13.1.1.1^{13,15}]octadecanenickel(II) ion, electron adduct 15.14
 9-Methyl-9-nitro-1,4,7,11-tetraazacyclotridecanenickel(III) ion 15.36
 9-Methyl-9-nitro-1,4,7,11-tetraazacyclotridecanenickel(II) ion, electron adduct 15.5
 10-Methylphenothiazine 14.4.1
N-Methylphenothiazine 14.4.1
 10-Methylphenothiazin-2-ylacetate ion 25.6.2
 3-Methylphenoxy 22.3.61
 4-Methylphenoxy 22.3.62
 (4-Methylphenyl)methylcopper(III) ion 8.81
 2-Methyl-2-propanol 17.9.2
 2-Methylpyrazine 9.6.1
 1-Methyl-1'-(2-sulfonatoethyl)-4,4'-bipyridinium radical cation 28.14.17, 28.15.10
 Methyl sulfoxide 25.4.28
 (Methyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion 22.50.28
 8-Methyl-1,3,13,16-tetraaza-6,10,19-trithiabicyclo[6.6.6]-eicosanecobalt(II) ion 6.53, 22.50.3
 1-Methyl-1'-tetradecyl-4,4'-bipyridinium radical cation 22.50.78, 28.14.16
N-Methyl-5,10,15,20-tetrakis(4-sulfonatophenyl)-porphinatonicelate(II), radical anion 15.18
N-Methyltetrakis(4-sulfonatophenyl)porphinatocobaltate(II) radical anion 6.21
 (Methyl)-3,10,17,24-tetrasulfophthalocyaninecobaltate(II) ion 6.89
 1-Methylthymine 25.5.20
*N*₁-Methylthymine 25.5.20
 1-Methyl-1'-(3-(trimethylammonio)propyl)-4,4'-bipyridinium radical cation 28.14.18, 28.15.11

- Methyl viologen 7.3.1, 9.3.2, 9.4.2, 21.11.5, 22.3.48, 22.6.1, 22.7.1, 22.8.1, 22.9.1, 22.10.1, 22.11.1, 22.12.2, 22.13.1, 22.14.1, 22.15.1, 22.16.1, 22.17.1, 22.18.4, 22.19.1, 22.20.1, 22.21.1, 22.22.1, 22.23.1, 22.28.2, 23.1.1
- Methyl viologen radical cation 9.32.1, 12.4.1, 22.47.2, 22.50.74, 22.63.2, 22.64.1, 22.65.1, 28.14.8, 28.15.9
- Metiazinic acid, conjugate base 25.6.2
- Molybdate(IV)(V), bis[ethylenediaminetetraacetato]di- μ -oxodioxodi- 14.2
- Molybdate(V), bis[cysteinato]di- μ -oxodioxodi- 28.2.48
- Molybdate(V), bis[ethylenediaminetetraacetato]di- μ -oxodioxodi- 28.2.47
- 18-Molybdodiphosphate ion(7-), conjugate acid 14.1
- Mono- and dihydroxysilver(II) 1.7
- Nadide 28.23.1
- 1,4-Naphthoquinone, 2-hydroxy- 5.1.64
- 1,4-Naphthoquinone, 2-methyl- 5.1.65, 6.1.29, 6.6.28, 6.6.7.2, 8.47.4, 15.1.42, 17.2.4, 28.2.62
- 1,4-Naphthoquinone-2-sulfonate ion 5.1.67, 6.1.30
- Natural Orange 6 5.1.64
- Nickel(I), 5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-4,11-diene 15.10, 15.46.1
- Nickel(I), 5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-1,4,8,11-tetraene 15.11
- Nickel(I), 1,4,8,11-tetramethyl-1,4,8,11-tetraaza-cyclotetradecane 15.7
- Nickel(II), 5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-4,11-diene 6.100.7
- Nickel(II), 5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraaza-cyclotetradecane 6.100.6
- Nickel(II), (1*R*,4*R*,8*S*,11*S*)-1,4,8,11-tetramethyl-1,4,8,11-tetraazacyclotetradecane 22.3.28
- Nickel(III), bis(octahydro-1,4,7-triazonine) 15.34
- Nickel(III), bromo- α -2,12-dimethyl-3,7,11,17-tetraaza-bicyclo[11.3.1]heptadeca-1(17),2,6,11,13,15-hexaene 15.69
- Nickel(III), 11,13-dimethyl-1,4,7,10-tetraazacyclotrideca-10,13-diene 15.37
- Nickel(II) ion 15.29.5, 25.1.8, 25.2.8, 28.2.52
- Nickel(II) pyrophosphate 9.49.6
- Nickel(I) ion 15.1
- Nicotinamide adenine dinucleotide 5.1.66
- Nicotinamide adenine dinucleotide, hydroxide, inner salt 28.23.1
- Nicotinamide adenine dinucleotide, reduced 13.18.5
- Nicotinamide-adenine dinucleotide phosphate, reduced 13.18.6, 13.20.2
- Nitrate ion 5.1.46, 5.7.6, 5.8.4, 5.9.4, 5.10.5, 6.1.20, 15.1.35, 28.2.50
- Nitrilotriacetatoargentate(II) 1.12
- Nitrilotriacetatocadmium(I) ion 5.10
- Nitrilotriacetatocobaltate(I) ion 6.3
- Nitrilotriacetatocobaltate(II) ion, H-abstraction product 6.60
- Nitrilotriacetatocuprate(II) ion 8.46.2
- Nitrilotriacetatomanganate(II) ion, H-abstraction product 13.9
- Nitrilotriacetatonickelate(I) ion 15.17
- Nitrilotriacetatonickelate(II), H-abstraction product 15.29
- Nitrilotriacetatozinc(II) H-abstraction product 28.10
- 2,2',2''-Nitrilotriethanol 22.50.83, 22.59.9
- Nitrite ion 5.1.45, 5.7.5, 5.8.3, 5.9.3, 5.10.4, 8.41.1, 15.1.34, 22.3.27, 28.2.49
- Nitritocopper(II) ion 8.47.2
- Nitrito(triethylenetetramine)cobalt(II) ion 6.34
- cis-Nitroamminebis(ethylenediamine)cobalt(III) ion 5.1.16, 15.1.16, 28.2.19
- Nitrobenzene 1.1.12, 1.2.10, 1.3.9
- Nitrobenzene radical anion 28.15.12
- Nitromethane 1.1.13, 1.2.11, 1.3.10
- N*-Nitrosodimethylamine 25.4.42
- 4-Nitroso-*N,N* dimethylaniline 5.1.68
- Nitrous oxide 3.1.4, 5.1.47, 5.6.1, 6.1.19, 6.5.9, 6.6.15, 6.7.3, 6.17.1, 6.18.1, 8.15.5, 15.1.36, 15.8.10, 15.9.6, 15.10.12, 19.6.1, 25.1.7, 25.2.7, 28.2.51, 28.3.1
- Octaammine- μ -amido- μ -peroxidodicobalt(III) ion 6.111, 22.50.15
- cis-Octaaqua- μ -oxo-bis(oxo)dimolybdenum(IV) ion 14.5
- 1,3,6,8,10,13,16,19-Octaazabicyclo[6.6.6]eicosanecobalt(II) ion 6.54, 22.50.4, 22.55.3, 22.57.1, 22.59.3
- 1,3,6,8,10,13,16,19-Octaazabicyclo[6.6.6]eicosanecobalt(III) ion 22.3.9, 22.18.1, 22.19.2
- 1,3,6,8,10,13,16,19-Octaazabicyclo[6.6.6]eicosanerhodium(II) ion 21.9
- Octacyanomolybdate(V) ion 14.4
- Octahydrogen tetrakis(μ -diphosphito)diplatinate(I)(II) ion 19.16
- Octahydrogen tetrakis(μ -diphosphito)diplatinate(II)(III) ion 19.47
- Osmium(III) tris(2,2'-bipyridine) 16.1
- Oxalate ion 22.50.79
- Oxalatobis(1,10-phenanthroline)chromium(II) 7.22
- Oxalatobis(1,10-phenanthroline)chromium(III) ion 5.1.36, 28.2.38
- Oxalatocuprate(II) ions 8.29.3

- Oxygen 1.1.6, 1.2.5, 1.3.4, 2.1.1, 3.1.5, 5.1.48, 6.1.21, 6.4.4, 6.6.16, 6.7.4, 6.33.1, 6.34.1, 6.35.1, 6.49.1, 6.50.1, 6.67.1, 6.74.1, 6.95.3, 6.98.2, 7.2.3, 7.4.10, 7.6.7, 7.8.5, 7.11.5, 7.15.4, 7.16.6, 8.5.10, 8.15.6, 8.18.2, 8.19.2, 8.20.1, 8.21.2, 8.22.2, 8.29.4, 8.43a.1, 9.13.3, 10.2.3, 10.5.1, 10.6.2, 10.8.2, 10.10.2, 10.11.2, 10.12.2, 12.3.2, 13.3.2, 13.4.2, 13.5.2, 13.6.1, 13.7.1, 13.8.1, 14.2.1, 14.3.1, 15.1.37, 15.6.3, 15.7.3, 15.8.11, 15.9.7, 15.10.14, 15.27.2, 15.28.1, 15.29.6, 15.52.3, 15.72.2, 17.2.2, 19.6.2, 19.37.4, 21.8.2, 21.11.4, 22.3.30, 22.18.2, 22.35.1, 22.37.8, 24.2.2, 25.1.10, 25.2.10, 27.1.1, 28.2.53, 28.9.1, 28.10.3, 28.11.3, 28.15.5
- Palladium(III) ion 18.1.1
- Palladium(I) ion 18.1
- Paraquat 7.3.1, 9.3.2, 9.4.2, 21.11.5, 22.3.48, 22.6.1, 22.7.1, 22.8.1, 22.9.1, 22.10.1, 22.11.1, 22.12.2, 22.13.1, 22.14.1, 22.15.1, 22.16.1, 22.17.1, 22.18.4, 22.19.1, 22.20.1, 22.21.1, 22.22.1, 22.23.1, 22.28.2, 23.1.1
- Pentaammine(acetylenedicarboxylato)ruthenium(III), OH-adduct 22.7.0
- Pentaammine[4-(aminocarbonyl)-1-(1-carboxyethyl)-pyridinio]cobalt(III) ion 6.70.1, 6.71.1
- Pentaammine[4-(aminocarbonyl)-1-(1-carboxyethyl)-pyridinio]cobalt(III) radical anion 6.70
- Pentaammine[4-(aminocarbonyl)-1-(1-carboxyethyl)-pyridinio]cobalt(III) radical, protonated 6.71
- Pentaammine[4-(aminocarbonyl)-1-(1-carboxypropyl)-pyridinio]cobalt(III) radical anion 6.72
- Pentaammine[4-(aminocarbonyl)-1-(1-carboxypropyl)-pyridinio]cobalt(III) radical, protonated 6.73
- Pentaammine[4-(aminocarbonyl)-1-(3-carboxypropyl)-pyridinio]cobalt(III) ion 6.72.1, 6.73.1
- Pentaammine[4-(aminocarbonyl)-1-(carboxymethyl)-pyridinio]cobalt(III) ion 6.68.1, 6.69.1
- Pentaammine[4-(aminocarbonyl)-1-(carboxymethyl)-pyridinio]cobalt(III) radical anion 6.68
- Pentaammine[4-(aminocarbonyl)-1-(carboxymethyl)-pyridinio]cobalt(III) radical, protonated 6.69
- Pentaammine(aqua)cobalt(III) ion 5.1.23, 6.1.6, 15.1.22, 17.3.2, 28.2.26
- Pentaammine(aquo)ruthenium(II) ion 22.43
- Pentaammine(azido)cobalt(III) ion 5.1.25, 15.1.24, 28.2.28
- Pentaammine(bromo)cobalt(III) ion 5.1.18, 6.1.9, 15.1.18, 17.3.4, 28.2.21
- Pentaammine(chloro)cobalt(III) ion 5.1.19, 6.1.8, 15.1.19, 17.3.3, 28.2.22
- Pentaammine(chloro)osmium(III) ion 22.3.31
- Pentaammine(chloro)ruthenium(II) ion 22.42
- Pentaammine(chloro)ruthenium(III) ion 22.43.1
- Pentaammine(chloro)ruthenium(III) ion, OH reaction product 22.69
- Pentaamminecobalt(II) ion 6.22
- Pentaammine(cyano)cobalt(III) ion 5.1.20, 15.1.20, 28.2.23
- Pentaammine(dinitrogen)ruthenium(I) ion 22.1
- Pentaammine(dinitrogen)ruthenium(III) ion 22.45
- Pentaammine(fluoro)cobalt(III) ion 5.1.21, 6.1.7, 15.1.21, 28.2.24
- Pentaammine(fumarato)cobalt(III) ion 5.1.22, 28.2.25
- Pentaammine(hydroxy)cobalt(III) ion 5.1.24, 15.1.23, 28.2.27
- Pentaammine(isonicotinamide)cobalt(III) ion, OH adduct 6.97, 6.97.1
- Pentaammine(1-methyl-4,4'-bipyridinium)cobalt(III) ion 6.66.1
- Pentaammine(1-methyl-4,4'-bipyridinium)cobalt(III) ion, electron adduct 6.66, 6.66.2
- Pentaammine(nicotinamide)cobalt(III) ion, OH adduct 6.67
- Pentaammine(4-nitrobenzoato)cobalt(III) ion, electron adduct 6.67
- Pentaammine(4-nitrobenzoato)cobalt(III) ion, radical anion 6.67
- Pentaammine(nitroso)ruthenium(III) ion 6.6.20, 15.8.13, 15.10.17, 22.36.1
- Pentaamminenitrosylruthenium(II) ion 22.37
- Pentaammine(1-L-prolyl-L-prolinato)cobalt(III) ion 22.4.
- Pentaammine(pyridine)cobalt(III) ion, OH adduct 6.95, 6.95.2
- Pentaammine(thiocyanato-*N*)cobalt(III) ion 5.1.26, 15.1.25, 28.2.29
- Pentaaqua(benzyl)chromium(III) ion 22.3.16, 22.50.26
- Pentaaqua(3-chloropyridine)chromium(III) ion 22.3.20
- Pentaaqua(4-cyanobenzyl)chromium(III) ion 22.50.24
- Pentaaqua(3-cyanopyridine)chromium(III) ion 22.3.21
- Pentaaqua(dichloromethyl)chromium(III) ion 22.3.15
- Pentaaqua(ethyl)chromium(III) ion 22.50.21
- Pentaaqua(isopropyl)chromium(III) ion 22.50.22
- Pentaaqua(methoxymethyl)chromium(III) ion 22.3.14, 22.50.23
- Pentaaqua(4-methylbenzyl)chromium(III) ion 22.50.27
- Pentaaquamethylchromium(III) ion 22.50.20
- Pentaaqua(4-methylpyridine)chromium(III) ion 22.3.18
- Pentaaqua(pyridine)chromium(III) ion 22.3.19
- Pentaaqua(pyridinio)chromium(III) ion 22.3.19
- Pentaaqua(4-pyridiniomethyl)chromium(III) ion 22.3.17
- Pentaaqua[4-(trifluoromethyl)benzyl]chromium(III) ion 22.50.25
- Pentaaqua(trifluoromethyl)chromium(III) ion 22.3.13
- 1,4,7,10,13-Pentaazacyclohexadecanenickel(III) ion 15.5
- Pentachloroplatinate(III) ion 19.27
- Pentacyanocobaltate(II) ion 6.43
- Pentacyanoferrate(II) ion 9.6
- Pentacyanonitrosylferrate(II) ion 9.7
- Pentakis(cyano-*C*)cobaltate(I) ion 6.2

- η^5 -Pentamethylcyclopentadienyl(2,2'-bipyridine)hydridorhodium(III) ion 21.12
- η^5 -Pentamethylcyclopentadienyl(2,2'-bipyridine)rhodium(I) ion 21.2
- η^5 -Pentamethylcyclopentadienyl(2,2'-bipyridine)(hydroxy)rhodium(II) ion 21.5
- η^5 -Pentamethylcyclopentadienyl(2,2'-bipyridine)(iodo)rhodium(II) ion 21.6
- 4,7,13,16,21-Pentaoxa-1,10-diazabicyclo[8.8.5]-tricosaneeuropium(III) ion 22.3.26, 22.29.1
- 4,7,13,16,21-Pentaoxa-1,10-diazabicyclo[8.8.5]-tricosaneeuropium(II) ion 22.50.46
- 4,7,13,16,21-Pentaoxa-1,10-diazabicyclo[8.8.5]-tricosanecadmium(I) ion 5.4
- Perhydroxyl 1.5.2, 15.44.1, 15.46.2, 15.50.1, 25.4.7
- Permanganate ion 1.2.3, 5.1.44, 6.1.18, 7.2.1, 8.5.5, 15.1.33
- Peroxido(ethylenediaminediacetato)manganate(III) ion 13.27
- Peroxidomanganese(III) formate 13.14
- Peroxidomanganese(III) ion 13.13
- Peroxidomanganese(III)-manganese(II) formate complex 13.16
- Peroxidomanganese(III)-manganese(II) sulfate complex 13.23
- Peroxidomanganese(III) phosphate complex 13.18
- Peroxidomanganese(III) sulfate complex 13.21
- Peroxodisulfate ion 5.1.53, 6.1.23, 15.1.39, 28.2.57
- Phenalen-1-one, 6-amino- 1.5.6, 25.4.12
- 1,10-Phenanthrolinebis(oxalato)chromate(II) ion 7.23
- 1,10-Phenanthroline-5,6-dione 25.5.21
- 1,10-Phenanthroline-5,6-quinone 25.5.21
- Phenazinium, 3,7-diamino-2,8-dimethyl-5-phenyl- 25.5.23
- Phenazinium, 3,7-diamino-2,8-dimethyl-5-phenyl-, conjugate monoacid 25.4.46
- Phenol, 2,6-dimethoxy-, ion(1-) 9.36.2
- Phenol, 3,4-methylenedioxy-, conjugate base 9.34.5
- Phenothiazine, 2-chloro-10-dimethylaminopropyl-, conjugate acid 25.4.14, 25.5.6
- Phenothiazine, 10-methyl- 14.4.1
- Phenothiazine, 10-(2-methyl-2-dimethylaminomethyl)-, conjugate acid 25.4.44
- Phenothiazine-2-acetate ion, 10-methyl- 25.6.2
- Phenothiazinium, 3-amino-7-(dimethylamino)-2-methyl- 25.5.25
- Phenothiazinium, 3,7-bis(dimethylamino)- 25.5.19
- Phenothiazin-10-yl, 3,7-diamino-, conjugate monoacid 6.99.1, 13.11.1
- Phenoxyde ion, 2,6-dimethoxy- 9.36.2
- Phenoxyl 22.3.63
- Phenoxyl, 4-methoxy- 22.3.60
- Phenoxyl, 2,4,6-trimethyl- 22.3.65
- p-Phenylenediamine, N,N,N',N'-tetramethyl- 9.34.7, 9.35.1, 9.36.3, 9.37.1, 9.38.1
- Phenylmethylcopper(III) ion 8.74
- (Phenylmethyl)-1,4,8,12-tetraaza-cyclopentadecanechromium(III) ion 22.50.35
- 4-Phenylphenoxy 22.3.64
- Phenyl 3-pyridyl ketone 6.6.23, 15.8.17, 15.10.21
- Phenyl selenide 25.4.30
- Phenyl sulfide 25.4.31
- Phenylthiourea 25.4.43
- 1-Phenyl-2-thiourea 25.4.43
- Phthalocyanine, tetrasulfo-, cobalt(II) 6.41, 22.50.12
- Phthalocyanine, trisulfo-, zinc(II), radical anion 28.9
- Pivalate ion 1.5.31, 1.7.9
- Porphine, 5,10,15,20-Tetrakis[2-(3-sulfonatopropyl)pyridyl]-, zinc(II), radical cation 28.19
- Porphine, dihydroxy-5,10,15,20-tetrakis(4-sulfonatophenyl)-, cobalt(II) 28.4.1, 28.5.1, 28.6.1
- Porphine, dihydroxytetrakis(1-methylpyridinium-4-yl)-, cobalt(II) 28.4.3, 28.5.3, 28.6.3
- Porphine, 2-hydroxy-2,2-dimethylethyl-5,10,15,20-tetrakis(4-sulfonatophenyl)-, manganese(III) 13.30
- Porphine, (1-hydroxy-1-methylethyl)-5,10,15,20-tetrakis(4-sulfonatophenyl)-, cobalt(III) 6.88
- Porphine, hydroxymethyl-5,10,15,20-tetrakis(4-sulfonatophenyl)-, cobalt(III) 6.87
- Porphine, (1-methylethyl)-5,10,15,20-tetrakis(4-sulfonatophenyl)-, cobalt(III) 6.86
- Porphine, 5,10,15,20-tetra(4-carboxyphenyl)-, manganese(II) 13.8
- Porphine, 5,10,15,20-tetrakis(2,6-dichloro-3-sulfonatophenyl)-, zinc(II), radical cation 28.22
- Porphine, 5,10,15,20-tetrakis(2-N-hexylpyridyl)-, zinc(II), radical cation 28.20
- Porphine, $\alpha,\alpha,\alpha,\beta$ -tetrakis(*N*-methylisonicotinamidophenyl)-, iron(II) 9.11
- Porphine, $\alpha,\alpha,\alpha,\beta$ -tetrakis(*N*-methylisonicotinamidophenyl)-, manganese(II) ion 13.7
- Porphine, 5,10,15,20-tetrakis(1-methylpyridinium-4-yl)-, iron(II) ion 9.10
- Porphine, 5,10,15,20-tetrakis(1-methylpyridinium-4-yl)-, manganese(II) ion 13.4
- Porphine, tetrakis(1-methylpyridinium-4-yl)-, zinc(II) 1.5.4, 25.4.11
- Porphine, 5,10,15,20-tetrakis(4-pyridyl)-, manganese(II) 13.5
- Porphine, 5,10,15,20-tetrakis(4-sulfonatophenyl)-, manganese(II) 13.3
- Porphine, 5,10,15,20-tetrakis(4-sulfonatophenyl)-, cobalt(II) 28.14.3, 28.15.3
- Porphine, 5,10,15,20-tetrakis(4-sulfonatophenyl)-, zinc(II) 5.1.54

- Porphine, 5,10,15,20-tetrakis(4-sulfonatophenyl)-, cobalt(I) 6.17
 Porphine, 5,10,15,20-tetrakis(4-sulfonatophenyl)-, silver(I) 1.4
 Porphine, 5,10,15,20-tetrakis[4-(*N,N,N*-trimethylammonio)-phenyl]-, manganese(II) 13.6
 Porphine, tetrakis[4-(*N,N,N*-trimethylammonio)phenyl]-, dihydroxycobalt(II) 28.4.2, 28.5.2, 28.6.2
 Porphine-2,7,12,17-tetrapropanoic acid, 3,8,13,18-tetrakis(carboxymethyl)-, (chloro)oxoantimony(V), radical anion 23.1
 Porphinetetrapropanoic acid, tetrakis(carboxymethyl)-, zinc(II), radical cation 28.23
 (4,4',4'',4'''-Porphine-5,10,15,20-tetrayl)tetrakis[1-(3-sulfopropyl)pyridiniumato]zinc(II) radical cation 28.18
 Product of DTPA radical with Fe(III)DTPA 9.31
 Promethazine, conjugate acid 25.4.44
 Propanoic acid, 2-amino-2-methyl- 1.5.5, 1.7.2
 1-Propanol, 3,3'-thiodi- 25.4.49
 2-Propanol 6.75.1, 8.14.2, 25.4.45, 25.5.22
 2-Propanol radical 5.1.5, 6.106.2, 10.10.6, 11.2.5, 15.1.5, 19.37.5, 22.3.55
 2-Propanone 25.1.16, 28.2.58
 Propenamide 8.5.21
 2-Propen-1-ol 6.1.25, 15.1.40, 28.2.59
 Propionate ion, 2,2-dimethyl- 1.5.31, 1.7.9
 Propyl, 2-amino-2-methyl-, conjugate acid 9.7.4, 22.37.5
 Propyl, 2-carboxy-2-hydroxy-, anion 9.7.5, 22.37.6
 1,1'-Propylene-2,2'-bipyridinium radical cation 22.50.82
 (Propyl)-1,4,8,12-tetraazacyclopentadecanechromium(III) ion 22.50.30
 Propyl viologen radical cation 28.14.9
 Pyrazine, 2-methyl- 9.6.1
 Pyridine, 3-benzoyl- 6.6.23, 15.8.17, 15.10.21
 Pyridinyl, 3-(aminocarbonyl)-1,?-dihydro-1-(phenylmethyl)- 28.23.2
 4-Pyrimidinecarboxylate ion 15.1.43
 μ -4-Pyrimidinecarboxylatobis-[hydroxotris(ammine)cobalt(III)] ion 15.1.28
 μ -5-Pyrimidinecarboxylatobis-[hydroxotris(ammine)cobalt(III)] ion 15.1.27
 2,4-Pyrimidinedione, 1,5-dimethyl- 25.5.20
 2-Pyrimidinone, 4-amino-1-methyl- 25.5.18
 Pyrocatechol 13.15.3, 13.18.3
 Quinone 1.2.7, 5.1.60, 6.1.28, 7.2.5, 8.15.10, 10.6.3, 10.7.1, 10.8.4, 10.9.1, 10.10.8, 10.11.3, 10.12.3, 10.13.1, 15.1.41, 15.8.16, 15.10.20, 17.2.3, 22.3.41, 22.35.3, 25.1.17, 28.2.61
 Resorcinol 13.15.4, 13.18.7
 Resorcinol dimethyl ether 1.5.10, 25.4.19
 Rhenate(VI) ion 20.1
 Rhodium, chlorotris[3-(diphenylphosphino)-benzenesulfonate] 21.1
 Rhodium(II) bis(2,2'-bipyridine) 21.10, 21.11.2
 Rhodium(II) tris(2,2'-bipyridine) 8.17.3, 21.11, 22.50.50
 Rhodium(I) chlorotris[3-(diphenylphosphino)-benzenesulfonate] 22.3.33
 Riboflavin 5.1.69, 6.1.31, 6.4.8
 Ruthenium(III), 2-(aminomethyl)pyridinebis(2,2'-bipyridine) 22.48
 Ruthenium(III), tris([2,2'-bipyridin]-4-yltriethylphosphonium)- 6.39.3, 22.54
 Ruthenium(III), tris(5-bromo-1,10-phenanthroline) 8.5.14, 22.56
 Ruthenium(III), tris(5-chloro-1,10-phenanthroline) 6.5.2, 6.54.3, 8.5.15, 10.3.4, 22.57
 Ruthenium(III), tris(4,7-dimethyl-1,10-phenanthroline) 6.39.5, 6.52.3, 6.54.4, 8.5.17, 10.3.6, 22.59
 Ruthenium(III), tris(5,6-dimethyl-1,10-phenanthroline) 8.5.18, 10.3.5, 22.58
 Ruthenium(III), tris[2-(1,2,4-thiadiazol-5-yl)pyridine] 22.67
 Ruthenium(III) dicyanobis(2,2'-bipyridine) 22.2.1, 22.41
 Ruthenium(III) tris(2,2'-bipyridine) 1.2.6, 5.1.52, 6.19.2, 6.39.2, 6.40.1, 6.41.2, 6.48.1, 6.53.1, 6.54.1, 6.55.1, 6.110.1, 6.111.1, 6.112.1, 6.113.1, 6.114.1, 7.4.12, 8.5.11, 8.6.1, 8.7.1, 8.8.1, 10.3.2, 22.3.36, 22.50, 25.10.2
 Ruthenium(III) tris(1,10-phenanthroline) 6.39.4, 6.51.1, 6.52.1, 6.54.2, 8.5.13, 10.3.3, 22.55
 Ruthenium(II) tris(2,2'-bipyridine) 5.1.51, 6.1.24, 22.55.10, 25.1.12, 25.2.12, 28.2.55
 Safranine T, conjugate acid 25.4.46
 Safranine cation 25.5.23
 Safranine cation, conjugate monoacid 25.4.46
 Samarium(III) ion 22.3.38
 Samarium(II) ion 25.1.13, 25.2.13
 Semithionine, conjugate monoacid 6.99.1, 13.11.1
 Serotonin, conjugate base 9.34.6
 Sesamol, conjugate base 9.34.5
 Silver(II) hydroxide 1.8
 Silver(II) ion 1.5, 7.39.1
 Silver(II)-succinate complex 1.14
 Silver(I) ion 1.1.2, 17.1.2, 25.1.1, 25.2.2
 Silver(I) ion, complex with Ag(0) 1.2, 22.50.1
 Silver(I) 5,10,15,20-tetrakis(4-sulfonatophenyl)porphyrin 1.4
 Silver atom 1.1
 Sulfacetamide 25.4.47
 Sulfanilamide, *N*'-acetyl- 25.4.47
 Sulfate(1-), tetraoxo- 8.5.2
 Sulfate(1-), trioxo- 22.3.37
 Sulfate ion 15.44.5
 Sulfate radical ion 8.5.2

- Sulfatoiron(III) ion 7.4.9, 7.6.6, 7.16.5, 7.17.3, 9.33, 21.4.2
- 1,1'-Sulfinylbisethane 25.4.16
- Sulfinylbismethane 25.4.28
- 1,1'-Sulfinylbispropane 25.4.33
- Sulfite ion 22.50.62
- Sulfite radical ion 22.3.37
- O-Sulfito(tetrachloroepentamine)cobalt(III) ion 6.109
- Sulfophthalocyaninatoaluminato(III) radical anion 2.1
- Sulfur dioxide 7.4.13, 7.8.6, 7.11.7, 7.15.5, 7.17.4, 11.3.1, 28.5.4
- Superoxide ion 15.44.2, 15.46.3, 15.50.2, 22.50.57, 28.15.2
- Superoxide radical anion 15.44.2, 15.46.3, 15.50.2, 22.50.57, 28.15.2
- Superoxido(ethylenediaminetetraacetato)cobaltate(III) ion 6.79
- Superoxido(ethylenediaminetetraacetato)cobaltate(II) ion 6.58
- Superoxido(iminodiacetato)cobaltate(III) ion 6.57
- Superoxo(1,4,8,11-tetraazacyclotetradecanecobalt(III) ion 6.63
- Terephthalonitrile 25.2.14
- Tetraacetatocuprate(I) ion 8.8, 22.50.45
- Tetraammine(aqua)hydroxyplatinum(II) ion 19.18
- trans*-Tetraammine(aqua)nitrosylruthenium(II) ion, electron adduct 22.36
- Tetraamminebis(aqua)platinum(III) ion 19.20
- Tetraamminebis(hydroxy)platinum(III) ion 19.19
- Tetraamminecobalt(II) ion 6.23
- Tetraamminediaquacobalt(III) ion 6.1.10, 17.3.5
- Tetraamminedibromorhodium(III) ion 21.8.3
- Tetraammine(difluoro)platinum(IV) ion 7.4.11, 7.6.8, 7.11.6
- Tetraamminehydridoplatinum(III) ion 19.17
- Tetraammine(hydrido)rhodium(III) ion 21.13.1
- Tetraammineplatinum(II), Cl₂⁻ reaction product 19.21
- Tetraaminerhodium(II) ion 21.8, 21.8.4
- Tetraamminesilver(II) ion 1.9
- Tetraammine(superoxido)rhodium(III) ion 21.13
- Tetraaqua(2,2'-bipyridine)chromium(III) ion 22.3.23
- Tetraaquabis(pyridine)chromium(III) ion 22.3.22
- 1,4,8,12-Tetraazacyclopentadecanecobalt(II) ion 22.50.9
- 1,4,8,12-Tetraazacyclopentadecanenickel(III) ion 15.51
- 1,4,8,11-Tetraazacyclotetradecanecobalt(II) ion 6.49, 22.50.5
- 1,4,8,11-Tetraazacyclotetradecanecobalt(II) ion, dioxygen adduct 6.63
- 1,4,8,11-Tetraazacyclotetradecanecobalt(III) ion 7.4.5, 7.6.4, 7.8.3, 7.11.3, 7.15.2, 7.16.4, 7.17.1
- 1,4,8,11-Tetraazacyclotetradecanecopper(I) ion 8.13
- 1,4,8,11-Tetraazacyclotetradecanecopper(II) H-adduct 8.53
- 1,4,8,11-Tetraazacyclotetradecane(dichloro)manganese(III) ion OH reaction product 13.33
- 1,4,8,11-Tetraazacyclotetradecane(hydrido)copper(III) ion 8.53
- 1,4,8,11-Tetraazacyclotetradecanenickel(I) ion 15.6
- 1,4,8,11-Tetraazacyclotetradecanenickel(III) ion 15.42
- 1,4,7,10-Tetraazacyclotridecanenickel(I) ion 15.4
- 1,4,7,10-Tetraazacyclotridecanenickel(III) ion 15.35
- 2',4',5',7'-Tetrabromofluorescein dianion 15.10.22
- Tetrabromo(hydroxy)platinate(III) ion 19.32
- Tetrabromoplatinate(I) ion 19.4
- Tetrachloroferrate(II) ion 22.50.49
- Tetrachlorohydroxyplatinate(III) 19.30
- Tetrachloromethane 1.1.9, 1.2.9, 1.3.6
- Tetrachloroplatinate(II), Cl₂⁻ reaction product 19.25
- Tetrachloroplatinate(I) ion 19.5
- Tetrachlorothallate(II) ion 25.10
- Tetracyano(2,2'-bipyridine)ferrate(III) ion 9.3.1, 9.32
- Tetracyanocobaltate(II) ion 6.44
- Tetracyano(4,4'-dimethyl-2,2'-bipyridine)ferrate(II) ion, electron adduct 9.4
- Tetracyanonickelate(II) ion 22.3.29
- Tetracyanonickelate(I) ion 15.2
- Tetracyanoplatinate(I) ion 19.6
- Tetraethyldiethylenetriaminecobalt(II) ion 6.35
- Tetraformatocuprate(I) ion 8.7, 22.50.44
- 6,7,8,9-Tetrahydropyrido[1,2-a:2',1'-c][1,4]diazocene, radical cation 22.50.80
- Tetrahydroxyplumbate(III) ion 17.9
- 5,10,15,20-Tetrakis(4-benzoato)porphinatomanganate(II) ion 13.8
- Tetrakis(2,2'-bipyridine)-μ-amido-μ-peroxidodicobalt(III) ion 6.113, 22.50.17
- 3,8,13,18-Tetrakis(carboxymethyl)porphine-2,7,12,17-tetrapropanoato(chloro)oxoantimony(V), radical anion 23.1
- Tetrakis(carboxymethyl)porphinetetrapropionatozinc(II), radical cation 28.23
- 5,10,15,20-Tetrakis(4-carboxyphenyl)-porphinatomanganate(II) ion 13.8
- 5,10,15,20-Tetrakis(2,6-dichloro-3-sulfonatophenyl)-porphinatozincate(II) radical cation 28.22
- Tetrakis[μ-(1,3-diisocyanopropane)]dirhodium(I)(II) ion 21.4
- Tetrakis(ethylenediamine)-μ-amido-μ-peroxidodicobalt(III) ion 6.112, 22.50.16
- Tetrakis(ethylenediamine)-μ-amido-μ-superoxidodicobalt(III) ion 5.1.28
- 5,10,15,20-Tetrakis(2-N-hexylpyridyl)porphinatozinc(II) radical cation 28.20
- α,α,α,β-Tetrakis(N-methylisonicotinamidophenyl)-porphinatoiron(II) ion 9.11

- $\alpha,\alpha,\alpha,\beta$ -Tetrakis[2-(*N*-methylisonicotinamido)phenyl]-porphinatomanganese(II) ion 13.7
- 5,10,15,20-Tetrakis(1-methylpyridinium-3-yl)porphinatozinc(II) ion, radical cation 28.13
- 5,10,15,20-Tetrakis(1-methylpyridinium-3-yl)porphinatozinc(II) H-adduct 28.12
- 5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatozinc(II) ion 1.5.4, 25.4.11
- 5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatoiron(II) ion 9.10
- 5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatomanganese(II) ion 13.4
- 5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatozinc(II) ion, radical cation 6.48.2, 28.14
- 5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinezinc(II) radical anion 28.5
- 5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatocupper(II), radical anion 8.24
- 5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatotin(IV) radical anion 24.3
- 5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphineiron(III)-superoxide complex 9.41
- 5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatomanganese(II) radical anion 13.2
- Tetrakis(1-methylpyridinium-3-yl)porphinatolead(II) radical cation 17.5
- Tetrakis(1-methylpyridinium-4-yl)porphinatolead(II) radical cation 17.4
- Tetrakis-*N*-methyl-2,3-pyridinoporphyrazinezinc(II) radical anion 28.8
- 5,10,15,10-Tetrakis(1-methylpyridyl)porphinato(thiocyanato)cobalt(II) ion 6.64
- Tetrakis(4-*N*-methylpyridyl)porphineindium(III) radical anion 11.3
- Tetrakis(1,10-phenanthroline)- μ -amido- μ -peroxidodicobalt(III) ion 6.114, 22.50.18
- 5,10,15,20-Tetrakis(4-pyridyl)porphinatomanganese(II) 13.5
- 5,10,15,20-Tetrakis(4-pyridyl)porphinatomanganese(III) radical 13.5
- 5,10,15,20-Tetrakis(4-sulfonatophenyl)-porphinatoargentate(I) ion 1.4
- 5,10,15,20-Tetrakis(4-sulfonatophenyl)-porphinatocadmate(II) radical anion 5.13
- 5,10,15,20-Tetrakis(4-sulfonatophenyl)-porphinatocabaltate(II) ion 28.14.3, 28.15.3
- 5,10,15,20-Tetrakis(4-sulfonatophenyl)-porphinatocabaltate(I) ion 6.17
- 5,10,15,20-Tetrakis(4-sulfonatophenyl)-porphinatocabaltate(III), radical cation 6.115
- 5,10,15,20-Tetrakis(4-sulfonatophenyl)-porphinatocuprate(II), radical anion 8.25
- 5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatoferrous radical cation 9.47
- 5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatoindate(II) radical cation 11.4
- 5,10,15,20-Tetrakis(4-sulfonatophenyl)-porphinatomanganate(II) ion 13.3
- 5,10,15,20-Tetrakis(4-sulfonatophenyl)-porphinatomanganate(II) radical anion 13.1
- 5,10,15,20-Tetrakis(4-sulfonatophenyl)-porphinatopalladate(II) radical anion 18.3
- 5,10,15,20-Tetrakis(4-sulfonatophenyl)-porphinatoplumbate(II) radical cation 17.6
- 5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatozincated(II) ion 5.1.54
- 5,10,15,20-Tetrakis(4-sulfonatophenyl)-porphinatozincate(II), radical anion 28.6
- 5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatozincated(II) radical cation 28.15
- 5,10,15,20-Tetrakis(4-sulfonatophenyl)porphinatozincated(II) ion, triplet state 5.1.55
- 5,10,15,20-Tetrakis[1-(3-sulfonatopropyl)pyridinium-4-yl]porphinatozinc(II) radical anion 28.7
- 5,10,15,20-Tetrakis[1-(3-sulfonatopropyl)pyridinium-4-yl]porphinatozinc(II) radical cation 28.18
- 5,10,15,20-Tetrakis[1-(3-sulfonatopropyl)pyridinium-2-yl]porphinatozinc(II) radical cation 28.19
- 5,10,15,20-Tetrakis[4-(*N,N,N*-trimethylammonio)-phenyl]porphinatomanganese(II) ion 13.6
- Tetrakis-4-(*N,N,N*-trimethylammonio)-phenylporphinezinc(II), radical cation 28.21
- Tetrakis-4-(*N,N,N*-trimethylammonio)-phenylporphinezinc(II), radical anion 28.4
- Tetrakis-4-(*N,N,N*-trimethylammonio)-phenylporphinecopper(II), radical anion 8.26
- 1,2,4,5-Tetramethoxybenzene 25.4.48
- Tetramethyl-1,4-benzoquinone 5.1.62, 5.2.4, 5.3.5, 5.4.3, 5.5.2, 22.3.49
- 2,3,5,6-Tetramethylbenzoquinone 5.1.62, 5.2.4, 5.3.5, 5.4.3, 5.5.2, 22.3.49
- 1,1',2,2'-Tetramethyl-4,4'-bipyridinium radical cation 22.50.81
- 1,1'-Tetramethylene-2,2'-bipyridinium radical cation 22.50.80
- N,N,N',N'*-Tetramethyl-*p*-phenylenediamine 9.34.7, 9.35.1, 9.36.3, 9.37.1, 9.38.1
- (1*R*,4*R*,8*S*,11*S*)-1,4,8,11-Tetramethyl-1,4,8,11-tetraaza-cyclotetradecanickel(II) ion 22.3.28
- 1,4,8,11-Tetramethyl-1,4,8,11-tetraaza-cyclotetradecanickel(II) ion 22.3.28
- 1,4,8,11-Tetramethyl-1,4,8,11-tetraaza-cyclotetradecanickel(I) ion 15.7
- 2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraenecobalt(I) ion 6.4
- 2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraenecobalt(III) ion 15.10.6

- 2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradeca-
1,3,8,10-tetraenenickel(II) ion 6.100.8
- 2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradeca-
1,3,8,10-tetraenecobalt(II) ion 6.55, 6.100.1, 13.25.1,
22.50.8
- 2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradeca-
1,3,8,10-tetraenecopper(I) ion 8.16
- 2,3,9,10-Tetramethyl-1,4,8,11-tetraaza-
cyclotetradecanecobalt(II) ion 22.50.6, 22.55.2,
22.59.2
- 2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradeca-
1,3,8,10-tetraenecobalt(II) ion, superoxide adduct
6.56, 6.56.1
- Tetranitromethane 7.2.6, 7.4.15, 8.5.26, 10.6.4, 10.8.5,
10.10.9, 10.11.4, 10.12.4, 15.1.44, 25.6.3
- 1,4,10,13-Tetraoxa-7,16-diazacyclooctadecanecadmium(I)
ion 5.3
- Tetraquat radical cation 22.50.80
- 3,10,17,24-Tetrasulfophthalocyaninecobaltate(I) ion 6.19,
22.50.13
- 3,10,17,24-Tetrasulfophthalocyaninecobaltate(I) ion dimer
6.20
- 3,10,17,24-Tetrasulfophthalocyaninecobaltate(II) ion 6.41,
22.50.12
- 3,10,17,24-Tetrasulfophthalocyaninecobaltate(II) ion,
superoxide adduct 6.62
- 3,10,17,24-Tetrasulfophthalocyaninecobaltate(II) radical
cation 7.4.6
- 3,10,17,24-Tetrasulfophthalocyaninecobaltate(III) radical
anion (reduced ligand) 6.74
- 3,10,17,24-Tetrasulfophthalocyaninecobaltate(III) radical
anion (oxidized ligand) 6.75
- 3,10,17,24-Tetrasulfophthalocyanine(superoxo)cobalt(II)
6.62
- 1,4,8,11-Tetrazacyclotetradecanecadmium(I) ion 5.6
- 1,4,8,11-Tetrazacyclotetradecanezinc(I) ion 28.3
- Thallium(0), complex with thallium(I) ion, dimer 25.3
- Thallium(0) 25.1
- Thallium(II) chloride 25.8
- Thallium(II) ion 22.50.63, 25.4, 25.4.10
- Thallium(II) ions 25.11
- Thallium(I) ion 25.1.14
- Thallium(I) ion, complex with Tl(0) 25.2
- Thallium hydroxide 25.6
- Thiocyanate ion 15.63.2, 15.67.1
- Thiocyanatomercury(I) 10.12
- Thiocyanatomercury(I)peroxy 10.13
- 3,3'-Thiodipropanol 25.4.49
- 3,3'-Thiodipropionic acid 25.4.50
- Thionine semiquinone, conjugate monoacid 6.99.1, 13.11.1
- Thymidylyl-(3'→5')-2'-deoxyguanosine 25.5.24
- Thymine, 1-methyl- 25.5.20
- Tin(III) 24.1
- Toluidine Blue cation 25.5.25
- Triammineaquaplatinum(I) ion 19.1
- Triammine(hydroxy)silver(II) ion 1.11
- Trichloromethyl 9.12.1
- Trichloromethylcopper(III) ion 8.66
- Trichlorothallate(II) ion 25.9
- Triethanolamine 22.50.83, 22.59.9
- Triethylenetetraminecobalt(II) ion 6.32
- (μ-Trifluoroacetato)bis(μ-hydroxo)bis[triamminecobalt(III)]
ion 5.1.29, 15.9.2, 28.2.31
- Trifluoromethyliron(III) deuteroporphyrin (2-propoxy)(2-
propanol) 9.26
- (4-Trifluoromethyl)phenylmethyl-1,4,8,12-tetraaza-
cyclopentadecanechromium(III) ion 22.50.40
- Trihydroxycopper(III) 8.47
- 1,2,3-Trimethoxybenzene 1.5.24, 25.4.53
- 1,2,4-Trimethoxybenzene 1.5.25, 25.4.54
- 1,3,5-Trimethoxybenzene 1.5.26, 25.4.55
- 2,3,4-Trimethoxybenzoate ion 1.6.10
- 2,4,5-Trimethoxybenzoate ion 1.6.12
- 2,4,6-Trimethoxybenzoate ion 1.6.13
- 3,4,5-Trimethoxybenzoate ion 1.6.11
- 2,3,4-Trimethoxybenzoic acid 1.5.27, 25.4.56
- 2,4,5-Trimethoxybenzoic acid 1.5.29, 25.4.58
- 2,4,6-Trimethoxybenzoic acid 1.5.30, 25.4.59
- 3,4,5-Trimethoxybenzoic acid 1.5.28, 25.4.57
- Trimethylacetate ion 1.5.31, 1.7.9
- 1,1'-Trimethylene-2,2'-bipyridinium radical cation
22.50.82
- Trimethylhydroquinone 22.50.84
- 2,4,6-Trimethylphenoxy 22.3.65
- Trinitrotriamminecobalt(III) 6.1.12, 17.3.6
- 1,4,10-Trioxa-7,13-diazacyclopentadecanecadmium(I) ion
5.2
- Trioxalatocobaltate(III) ion 6.1.11, 17.3.8
- Triphosphatoferrate(II) ion 22.50.50
- Triquat radical cation 22.50.82
- Tris(acetylacetato)chromate(II) ion 7.24
- Tris(acetylacetato)cobaltate(II) ion 6.36
- Tris(acetylacetato)ruthenate(II) ion 22.41
- Tris(ammine)cobalt(II) ion 6.24
- Tris(2,2'-bipyrazine)ruthenium(II) ion, OH-adduct 22.25
- Tris(2,2'-bipyrazine)ruthenium(II) ion, electron adduct
22.18
- Tris(2,2'-bipyrazine)ruthenium(II) ion, electron adduct, pro-
tonated 22.19
- Tris(2,2'-bipyridine)chromium(III) ion 5.1.33, 6.4.2,
6.6.11, 7.5.1, 8.15.3, 15.8.6, 15.10.8, 15.11.1,
15.13.1, 28.2.35
- Tris(2,2'-bipyridine)chromium(III), EDTA radical addn. pro-
duct 7.5
- Tris(2,2'-bipyridine)chromium(II) ion 7.4

- Tris(2,2'-bipyridine)cobalt(III) ion 6.4.1, 6.6.6, 7.4.3, 7.6.2, 7.8.1, 7.11.1, 7.16.2, 8.15.2, 8.16.1, 8.17.1, 15.8.5, 15.10.4, 22.3.10, 28.2.11
 Tris(2,2'-bipyridine)cobalt(III) ion, OH adduct 6.98
 Tris(2,2'-bipyridine)cobalt(II) ion 6.10.1, 6.39, 22.50.10, 22.54.1, 22.55.1, 22.59.1, 22.62.1
 Tris(2,2'-bipyridine)cobalt(I) ion 6.11
 Tris(2,2'-bipyridine)iron(III) ion, H-adduct 9.40
 Tris(2,2'-bipyridine)iron(III) ion, OH-adduct 9.39
 Tris(2,2'-bipyridine)iron(III) ion 6.6.12, 15.8.7, 15.10.10
 Tris(2,2'-bipyridine)iron(II) ion, OH-adduct 9.13
 Tris(2,2'-bipyridine)osmium(III) ion 16.1
 Tris(2,2'-bipyridine)rhodium(II) ion 8.17.3, 21.11, 22.50.58
 Tris(2,2'-bipyridine)rhodium(I) ion 21.3
 Tris(2,2'-bipyridine)ruthenium(II) ion 5.1.51, 6.1.24, 22.55.10, 25.1.12, 25.2.12, 28.2.55
 Tris(2,2'-bipyridine)ruthenium(II) ion, H-adduct 22.44
 Tris(2,2'-bipyridine)ruthenium(II) ion, OH-adduct 22.24
 Tris(2,2'-bipyridine)ruthenium(II) ion, electron adduct 22.3
 Tris(2,2'-bipyridine)ruthenium(III) ion 1.2.6, 5.1.52, 6.19.2, 6.39.2, 6.40.1, 6.41.2, 6.48.1, 6.53.1, 6.54.1, 6.55.1, 6.110.1, 6.111.1, 6.112.1, 6.113.1, 6.114.1, 7.4.12, 8.5.11, 8.6.1, 8.7.1, 8.8.1, 10.3.2, 22.3.36, 22.50, 25.10.2
 Tris(2,2'-bipyridine)silver(II) ion 7.4.2
 Tris(2,2'-bipyrimidine)ruthenium(II) ion, electron adduct, protonated 22.13
 Tris(2,2'-bipyrimidine)ruthenium(II) ion, electron adduct 22.12
 Tris(2,2'-bithiazole)ruthenium(III) ion 22.66
 Tris(5-bromo-1,10-phenanthroline)chromium(II) ion 7.14
 Tris(5-bromo-1,10-phenanthroline)ruthenium(III) ion 8.5.14, 22.56
 Tris(5-chloro-1,10-phenanthroline)chromium(II) ion 7.11
 Tris(5-chloro-1,10-phenanthroline)chromium(III) ion 7.12.1, 7.13.1
 Tris(5-chloro-1,10-phenanthroline)chromium(III), EDTA radical addn. product 7.12
 Tris(5-chloro-1,10-phenanthroline)chromium(III), carboxyl radical addn. product 7.13
 Tris(5-chloro-1,10-phenanthroline)osmium(III) ion 16.4
 Tris(5-chloro-1,10-phenanthroline)ruthenium(II) ion, electron adduct 22.33
 Tris(5-chloro-1,10-phenanthroline)ruthenium(III) ion 6.52.2, 6.54.3, 8.5.15, 10.3.4, 22.57
 Tris(cyano)nickelate(I) ion 15.3, 15.3.1
 Tris(4,4'-dimethyl-2,2'-bipyridine)chromium(II) ion 7.6
 Tris(4,4'-dimethyl-2,2'-bipyridine)cobalt(II) ion 6.15.1, 22.3.7
 Tris(4,4'-dimethyl-2,2'-bipyridine)cobalt(III) ion 6.16.1
 Tris(5,5'-dimethyl-2,2'-bipyridine)osmium(III) ion 16.2
 Tris(4,4'-dimethyl-2,2'-bipyridinerhodium(III) ion 22.3.34
 Tris(4,4'-dimethyl-2,2'-bipyridine)ruthenium(II) ion, electron adduct 22.30
 Tris(4,4'-dimethyl-2,2'-bipyridine)ruthenium(III) ion 8.5.12, 22.51
 Tris(5,5'-dimethyl-2,2'-bipyridine)ruthenium(III) ion 22.3
 Tris(4,4'-dimethyl-2,2'-bipyridine)cobalt(I) ion 6.16
 Tris(4,7-dimethyl-1,10-phenanthroline)chromium(II) ion 7.16
 Tris(4,7-dimethyl-1,10-phenanthroline)ruthenium(II) ion, electron adduct 22.32
 Tris(4,7-dimethyl-1,10-phenanthroline)ruthenium(III) ion 6.39.5, 6.52.3, 6.54.4, 8.5.17, 10.3.6, 22.59
 Tris(5,6-dimethyl-1,10-phenanthroline)chromium(II) ion 7.17
 Tris(5,6-dimethyl-1,10-phenanthroline)ruthenium(III) ion 8.5.18, 10.3.5, 22.58
 Tris(4,4'-diphenyl-2,2'-bipyridine)chromium(II) ion 7.7
 Tris(4,7-diphenyl-1,10-phenanthroline)chromium(II) ion 7.19
 Tris(dipyrido[3,2-c:2',3'-e]pyridazine)ruthenium(II) ion, electron adduct 22.35
 Tris(dipyrido[3,2-c:2',3'-e]pyridazine)ruthenium(II) ion, electron adduct, protonated 22.34
 Tris(ethylenediamine)cobalt(II) ion 6.27
 Tris(ethylenediamine)cobalt(III) ion 5.1.9, 6.1.4, 6.6.7, 7.6.1, 7.15.1, 7.16.1, 8.16.2, 15.1.9, 15.8.2, 15.10.3, 17.3.7, 22.3.4, 28.2.12
 Tris(glycinato)cobaltate(II) ion 6.45
 Tris(5-methyl-1,10-phenanthroline)chromium(II) ion 7.15
 Tris(5-methyl-1,10-phenanthroline)ruthenium(III) ion 8.5.16, 10.3.7, 22.60
 Tris(2,4-pantanediolato)ruthenate(II) ion 22.41
 Tris(1,10-phenanthroline)chromium(II) ion 7.8
 Tris(1,10-phenanthroline)chromium(III) ion 5.1.34, 7.9.1, 7.10.1, 28.2.36
 Tris(1,10-phenanthroline)chromium(III), EDTA radical addn. product 7.9
 Tris(1,10-phenanthroline)chromium(III), carboxyl radical addn. product 7.10
 Tris(1,10-phenanthroline)cobalt(II) ion 6.40, 22.50.11
 Tris(1,10-phenanthroline)cobalt(III) ion 7.4.4, 7.6.3, 7.8.1, 7.11.2, 7.16.3
 Tris(1,10-phenanthroline)iron(III) ion 9.27
 Tris(1,10-phenanthroline)iron(II) ion 22.50.52
 Tris(1,10-phenanthroline)osmium(III) ion 16.3
 Tris(1,10-phenanthroline)ruthenium(II) ion, electron adduct 22.31
 Tris(1,10-phenanthroline)ruthenium(III) ion 6.39.4, 6.51.6, 6.52.1, 6.54.2, 8.5.13, 10.3.3, 22.55
 Tris(5-phenyl-1,10-phenanthroline)chromium(II) ion 7.1
 Tris(5-phenyl-1,10-phenanthroline)ruthenium(III) ion 8.5.20, 22.61
 Tris(1,4,5,8-tetraazaphenanthrene)ruthenium(II) ion, electron adduct 22.35

- Tris(1,4,5,8-tetraazaphenanthrene)ruthenium(II) ion, electron adduct, protonated 22.34, 22.34.1
- Tris(3,4,7,8-tetramethyl-1,10-phenanthroline)ruthenium(III) ion 6.39.6, 8.5.19, 22.62
- Tris[2-(1,2,4-thiadiazol-5-yl)pyridine]ruthenium(III) ion 22.67
- Tris[2-(2-thiazolyl)pyridine]ruthenium(III) ion 22.65
- Tris(4-triethylphosphonio-2,2'-bipyridine)ruthenium(III) ion 6.39.3, 22.54
- Trisulfatocerate(IV) ion 8.5.1
- Trisulfophthalocyaninezincate(II) radical anion 28.9
- Trolox C anion 13.17.2, 13.18.4
- Tryptophan 15.34.1, 28.15.13
- Tryptophan, glycyl- 25.5.16
- Tryptophan, 5-hydroxy-, conjugate base 9.34.4
- 12-Tungstate ion(7-), dihydrogen 27.1
- Tyrosine 28.15.14
- Tyrosine, 3,5-diido- 25.4.17
- Uranyl(VI) ion 7.4.14, 7.6.9, 7.8.7, 7.11.8
- Uridine 5'-monophosphate radical 22.35.4
- Vanadyl(III) ion 26.1
- Veratic acid 1.5.13, 25.4.23
- Veratrole 1.5.9, 25.4.18, 25.5.10
- Vitamin B₂ 5.1.69, 6.1.31, 6.4.8
- Vitamin B12a 6.18.2
- Vitamin B12s 6.18
- Ytterbium(III) ions 22.3.39
- Zinc(II) hematoporphyrin radical anion 28.24
- Zinc(II) tetrakis(2,6-dichloro-3-sulfonatophenyl)porphyrin radical cation 28.22
- Zinc(II) 5,10,15,20-tetrakis(2-N-hexylpyridyl)porphyrin radical cation 28.20
- Zinc(II) 5,10,15,20-tetrakis(1-methylpyridinium-4-yl)porphyrin 1.5.4, 25.4.11
- Zinc(II) tetrakis(4-N-methylpyridyl)porphyrin 1.5.4, 25.4.11
- Zinc(II) tetrakis(4-sulfonatophenyl)porphyrin 5.1.54
- Zinc(II) 5,10,15,20-tetrakis[2-(3-sulfonatopropyl)-pyridyl]porphyrin radical cation 28.19
- Zinc(II) trisulfophthalocyanine radical anion 28.9
- Zinc(II) uroporphyrin radical cation 28.23
- Zinc(I) ion 13.12.1, 28.1, 28.2

10. Appendix I. Spectral Properties, pK_a 's and Other Data

This section contains data which are relevant to the tables of rate constants. Table 22B contains the data set for the reaction in Table 22, entry 22.50.74, where a selected val-

is given. Figure 1 is a graphical display of the data. Data for optical absorption and acid-base equilibria of metal transients have been collected in tables having the same number as the rate constant tables, but with the suffix A. Thus, Table 13A contains spectral data for manganese transients. References in the tables which follow are listed by RCDC serial number and may be found in Sec. 7, References to Tables.

TABLE 1A. Spectral properties and pK_a 's of silver transients

	Species	λ_{\max} (nm)	ϵ (L mol ⁻¹ cm ⁻¹)	Ref.	pK_a	Ref.	Entry No. ^a
Ag(0)	Ag ⁰	360	16000	93A166			1.1
	Ag ₂ ⁺	310	~14500 ^b	93A166			1.2
	Ag ₄ ²⁺	265	30000-40000	93A166			1.2.1
	Ag ₂ (NH ₃) _n ⁺	~340	~9000 ^b	680435			1.3
	Ag ₄ (NH ₃) _n ²⁺	~250	~6000 ^b	680435			1.3.2
Ag(II)	Ag ²⁺	275	5400	78C006	5.35 ^c	78C006	1.4
	Ag(trimethylacetate) _n ⁽²⁻ⁿ⁾⁺	~320 ^b	~3700 ^b	80A307			1.4.31
	AgOH ⁺	315	5500	78C006	8.35 ^c	78C006	1.5
	Ag(2-aminoethanol) ²⁺	~300 ^b	~5200 ^b	82A098			1.6.1
	Ag(2-aminoethanol) ₂ ²⁺	~300 ^b	~4300 ^b	82A098			1.6.1
	Ag(α -aminoisobutyrate)(OH)	~310 ^b	~7100 ^b	80A307			1.6.2
	Ag(α -aminoisobutyrate) ₂	~310 ^b	~7800 ^b	80A307			1.6.2
	Ag(ethylene glycol) ²⁺	~310 ^b	~6000 ^b	82A098			1.6.7
	Ag(ethylene glycol) ₂ ²⁺	~310 ^b	~4600 ^b	82A098			1.6.7
	AgGly(OH)/AgGly(OH) ₂ ⁻	~310 ^b	~5900 ^b	80A307			1.6.8
	Ag(Gly) ₂	~315 ^b	~7000 ^b	80A307			1.6.8
	Ag(OH) ₂	290	6500	78C006			1.7
	Ag(NH ₃) ₄ ²⁺	265	~10500 ^b	79A304			1.8
	Ag(NH ₃) ₃ OH ⁺	290	~7900 ^b	79A304			1.9
	AgNTA ⁻	~280 ^b	~5700 ^b	80A307			1.11
	AgEDTA ²⁻	~280 ^b	~4100 ^b	80A307			1.12
	Ag(II)($\text{O}_2\text{CCH}_2\text{CH}_2\text{CO}_2$)	~310 ^b	~3700 ^b	80A307			1.13

^aIn Table 1.^bEvaluated from graph.^cRefers to Ag(H₂O)²⁺ ⇌ AgOH⁺ + H⁺, etc.

TABLE 2A. Spectral properties of aluminum transients

	Species	λ_{\max} (nm)	ϵ (L mol ⁻¹ cm ⁻¹)	Ref.	Entry No. ^a
Al(III)	[Al(pts)] ⁻	580	27000 ^b	89R092	2.1
		635	27000 ^b		

^aIn Table 2.^bEvaluated from graph.

TABLE 3A. Spectral properties and pK_a s of gold transients

	Species	λ_{\max} (nm)	ϵ (L mol ⁻¹ cm ⁻¹)	Ref.	pK_a	Ref.	Entry No. ^a
Au(0)	Au(CN) ₂ ²⁻	410 ^b	10500 ^b	89A310			3.1
		410	7500	680302			
	Au(CN) ₂ H ⁻	430	6000	89A310	5.9	89A310	
	Au(CN) ₂ H ₂	260 ^b	4200 ^b	89A310	5.2	89A310	3.3
		270	3200	680302			
Au(II)	(OH)Au(CN) ₂ ⁻	270	6300	91A018			3.4
		440 ^b	2000 ^b				
	(OH)Au(CN) ₂ H	270	1400	91A018	5.7	91A018	3.5
		270 ^{b,c}	4700 ^b	700580			3.6
	d	260 ^{b,c}	6200 ^b				
		310 ^b	4000 ^b				
		325	5800	680302			
	e	260 ^b	7300 ^b	700580			
		320 ^b	4300 ^b				
		265 ^b	8800 ^b				
Au(III)	(OH) ₂ Au(CN) ₂ H	270	700	91A018	~6	91A018	3.5.1

^aIn Table 3.^bEvaluated from graph.^cShoulder.^dAu^{II} in the absence of Cl⁻.^e10⁻³ mol L⁻¹ Cl⁻.^f10⁻² mol L⁻¹ Cl⁻.^g10⁻¹ mol L⁻¹ Cl⁻.

TABLE 4A. Spectral properties of bismuth transients

	Species	λ_{\max} (nm)	ϵ (L mol ⁻¹ cm ⁻¹)	Ref.	Entry No. ^a
Bi(II)	Bi ²⁺	285	24000	88A493	4.1
Bi(IV)	BiCH ₂ OH ³⁺	420	20000	88A493	4.2
	BiCH(CH ₃)OH ³⁺	420	9000	88A493	4.3
	BiC(CH ₃) ₂ OH ³⁺	415	8000	88A493	4.4
	BiCH ₂ C(CH ₃) ₂ OH ³⁺	410	7000	88A493	4.5
	BiCOOH ³⁺	400	3600	88A493	4.6

^aIn Table 4.

TABLE 5A. Spectral properties of cadmium transients

	Species	λ_{\max} (nm)	ϵ (L mol ⁻¹ cm ⁻¹)	Ref.	Entry No. ^a
Cd(0)	Cd ⁰	260	20000	92N098	5.1.7
Cd(I)	Cd ⁺	300	13940	92A182	5.1
		300	11800	88A124	
		301	14000	751153	
		~300 ^b	~16500 ^b	751064	
	Cd [*] 21	310	11500	93A362	5.2
	Cd [*] 22	285	10600	93A362	5.3
	Cd [*] 221	290	6000	88A124	5.4
	Cd [*] 222	240	6200	88A124	5.5
	Cd(cyclam) ⁺	340	11000	80A380	5.6
	Cd ^L ^c	320-330	~8000	701228	5.7-5.10
	CdEDTA ³⁻	320	9700	80A072	5.7
		350	8000	690277	

^aIn Table 5.^bEvaluated from graph.^cL = en, Gly⁻, NTA, EDTA.

TABLE 6A. Spectral properties and pK_a 's of cobalt transients

Species	λ_{\max} (nm)	ϵ (L mol ⁻¹ cm ⁻¹)	Ref.	pK_a	Ref.	Entry No. ^a
Co(I) Co ⁺	315	2400	761136			6.1
	315	2100	751027			
	370	2080				
Co(CN) ₅ ⁴⁻	280	~8000	710097			6.2
CoNTA ²⁻	360	2300	79A255			6.3
<i>N</i> -meso-Co(4,11-dieneN ₄) ⁺	635	~10200 ^b	91A513			6.5
<i>N</i> -meso-Co(4,11-dieneN ₄)(CO ₂) ⁺	470	288	91A513			6.5.3
<i>N</i> -meso-Co(4,11-dieneN ₄)(H) ²⁺	440	445	91A513	13.9	91A513	6.5.5
<i>N</i> -rac-Co(4,11-dieneN ₄) ⁺	630	~10600 ^b	91A513			6.6
<i>prim-N</i> - <i>rac</i> -Co(4,11-dieneN ₄)(H) ²⁺	440	520	91A513	11.8 ^c	91A513	6.8
				11.6 ^d	91A513	
<i>sec-N</i> - <i>rac</i> -Co(4,11-dieneN ₄)(H) ²⁺	440	300	91A513	11.5 ^d	91A513	
				10.3 ^f	91A513	
				9.3 ^g	91A513	
<i>prim-N</i> - <i>rac</i> -Co(4,11-dieneN ₄)(CO) ⁺	860	125	89A098			6.6.3
	400 ^b	700				
<i>prim-N</i> - <i>rac</i> -Co(4,11-dieneN ₄)(CO ₂) ⁺	440 ⁱ	510	91A513			6.6.4
<i>sec-N</i> - <i>rac</i> -Co(4,11-dieneN ₄)(CO ₂) ⁺	470	210	91A513			6.6.4
Co(bpy) _n ⁺	620	5100	79A034			6.10
Co(bpy) ⁺	670	4100	85A034			6.11
Co(bpy) ₂ ⁺	570	5400	85A034			6.12
Co(bpy) ₂ (H) ²⁺				6.9	84A112	6.12.2
Co(bpy) ₃ ⁺	610	6200	85A034			6.13
Co(4,4'-Me ₂ bpy) ⁺	660	4500	85A034			6.14
Co(4,4'-Me ₂ bpy) ₂ ⁺	500	5400	85A034			6.17
Co(4,4'-Me ₂ bpy) ₃ ⁺	610	6300	85A034			6.18
Co(bpy) ₃ ²⁺	300	42000	79A034			6.41
Co(phen) ₃ ²⁺	270	56000	79A034			6.42
CoEDTA(O ₂) ³⁻	290	~13000	84A249			6.60
Co(NTA-H) ⁻	<250	6400 ^j	79A255			6.62
Co(cyclam)(O ₂) ²⁺	360	2600	90A079			6.65
CoCp ₂	360	1750	88A066			6.67
Co(III) [Co(NH ₃) ₅ (mbpy)] ³⁺	380	11000	89A115			6.68
	580	6500				
[Co(NH ₃) ₅ (O ₂ CCH ₂ py-4-CONH ₂)] ²⁺	310	800	83B029			6.70
	410	400				
[Co(NH ₃) ₅ (HO ₂ CCH ₂ py-4-CONH ₂)] ³⁺	313	3200	83B029			6.71
	412	2000				
[Co(NH ₃) ₅ (O ₂ CCH(CH ₃)py-4-CONH ₂)] ²⁺	310	>800	83B029			6.72
	400	>370				
[Co(NH ₃) ₅ (HO ₂ CCH(CH ₃)py-4-CONH ₂)] ³⁺	320	1000	83B029			6.73
	415	500				
[Co(NH ₃) ₅ (O ₂ C(CH ₂) ₃ py-4-CONH ₂)] ²⁺	315	650	83B029			6.74
	400	300				
[Co(NH ₃) ₅ (HO ₂ C(CH ₂) ₃ py-4-CONH ₂)] ³⁺	320	1650	83B029			6.75
	413	1200				
CoEDTA(O ₂) ²⁻	260	10000	84A249			6.81
[Co(NH ₃) ₅ pyOH] ³⁺	325	1700	79A213			6.95
	~330	~1500	76A265			
[Co(NH ₃) ₅ naOH] ³⁺	~380	~2800	76A265			6.96
[Co(NH ₃) ₅ isnOH] ³⁺	~330	~2000	76A265			6.97
CH ₃ CoNTA(H ₂ O) ⁻	245	14000	88A343			6.101
	390	170				
	600	90				

TABLE 6A. Spectral properties and pK_a 's of cobalt transients —Continued

Species	λ_{max} (nm)	ϵ ($\text{L mol}^{-1} \text{cm}^{-1}$)	Ref.	pK_a	Ref.	Entry No. ^a
$\text{HOCH}_2\text{CoNTA}(\text{H}_2\text{O})^-$	256	9300	88A343			6.102
	396	310				
	600	30				
$\text{HOCH}(\text{CH}_3)\text{CoNTA}(\text{H}_2\text{O})^-$	262	9000	88A343			6.103
	410	580				
	570	40				
$\text{O}_2\text{CCH}_2\text{CoNTA}(\text{H}_2\text{O})^{2-}$	266	7000	88A343			6.104
	380 ^b	200				
	610	90				
$\text{C}_2\text{H}_5\text{OCH}(\text{CH}_3)\text{CoNTA}(\text{H}_2\text{O})^{2-}$	275	8700	88A343			6.105
	420	790				
	580	40				
$\text{HOC}(\text{CH}_3)_2\text{CoNTA}(\text{H}_2\text{O})^-$	263	11000	88A343			6.106
	412	530				
	550	80				
$\text{CoNTA}(\text{Br})(\text{H}_2\text{O})^-$	290	12000	88A343			6.107
	410 ^b	200				
	580	150				
$\text{HOCH}_2\text{CoHEDTA}(\text{H}_2\text{O})^-$	270	14000	88A343			6.108
	380	230				

^aIn Table 6.^bEvaluated from graph.^cIn 0.5 mol L⁻¹ phosphate.^dIn 0.1 mol L⁻¹ phosphate.^eAt 25°C.^fAt 45°C.^gAt 65°C.^hShoulder.ⁱSpectrum is temperature dependent, $\lambda_{\text{max}} = 440$ nm at 0°C (six-coordinated), $\lambda_{\text{max}} = 520$ nm ($\epsilon = 1100 \text{ L mol}^{-1} \text{ cm}^{-1}$) at 60°C (five-coordinated).^j ϵ at 250 nm.

TABLE 7A. Spectral properties of chromium transients

	Species	λ_{\max} (nm)	ϵ (L mol ⁻¹ cm ⁻¹)	Ref.	Entry No. ^a
Cr(II)	Cr(bpy) ₃ ²⁺	475 565 465 490 562	4100 3700 3900 3400 4600	87A309 81A060	7.4
	Cr(4,4'-Me ₂ bpy) ₃ ²⁺ (pH ~1)	470 560	4600 4500	81A060	7.6
	Cr(4,4'-Ph ₂ bpy) ₃ ²⁺ ^b	485	4900	81A060	7.7
	Cr(phen) ₃ ²⁺ (pH 2)	475 560 430 ^c 700	4200 3900 3600 2500	87A309 81A060	7.9
	Cr(5-Chphen) ₃ ²⁺ (pH 2)	480	3300	81A060	7.11
	Cr(5-Brphen) ₃ ²⁺ (pH ~1)	485	3900	81A060	7.14
	Cr(5-Mephen) ₃ ²⁺ (pH ~1)	485	3500	81A060	7.15
	Cr(4,7-Me ₂ phen) ₃ ²⁺ ^b	440	3700	81A060	7.16
	Cr(5,6-Me ₂ phen) ₃ ²⁺ (pH ~1)	420 ^c 480	4200 3000	81A060	7.17
	Cr(5-Phphen) ₃ ²⁺ ^b	480	2600	81A060	7.18
	Cr(4,7-Ph ₂ phen) ₃ ²⁺ ^b	430	6800	81A060	7.19
	Cr(bpy) ₂ (C ₂ O ₄)	350 495 580	3200 2400 2000	87A309	7.20
	Cr(bpy)(C ₂ O ₄) ₂ ²⁻	350 485 610	4300 1700 1100	87A309	7.21
	Cr(phen) ₂ (C ₂ O ₄)	340 480 575	2900 2500 1600	87A309	7.22
	Cr(phen)(C ₂ O ₄) ₂ ²⁻	340 470 600	3500 2000 600	87A309	7.23
Cr(III)	CrH ²⁺	380	190	741142	7.27
	CrO ₂ ²⁺	245 290 248 290	7800 3200 6900 3000	751063 751215	7.23
	CrCH ₂ CH ₂ OH ²⁺	390 390	380 450	91A477 82A030	7.29
	CrCH(CH ₃)CH ₂ OH ²⁺	285 390	2100 310	91A477	7.30
	CrClI(CH ₃)ClI(CH ₃)OII ²⁺	280 400	2600 450	91A477	7.31
	CrCH ₂ C(CH ₃) ₂ CH ₂ OH ²⁺	270 ^c 410	>2100 >170	741146	7.32
	CrCOH(CH ₃)CO ₂ H ²⁺	305 385	1500 230	741146	7.34
	CrCH ₂ C(CH ₃) ₂ CO ₂ H ²⁺	<270 410	>2200 >310	741146	7.35
	CrCH ₂ C(CH ₃) ₂ NH ₃ ³⁺	-280 ^d -400 ^d	-1300 ^d ~200 ^d	92A073	7.36

^aIn Table 7.^bIn methanol.^cNot λ_{\max} .^dEvaluated from graph.

TABLE 8A. Spectral properties and pK_a 's of copper transients

	Species	λ_{\max} (nm)	ϵ (L mol ⁻¹ cm ⁻¹)	Ref.	pK_a	Ref.	Entry No. ^a
Cu(0)	Cu ⁰	375	5600	84A439			8.2
Cu(I)	Cu(Me ₂ pyo[14]trieneN ₄) ⁺	-350	~1100	86A210			8.17
	Cu(bpy) ₂ ⁺	430	4800	85A059			8.18
	Cu(phen) ₂ ⁺	430	7800	88A392			8.19
		430	5400	87G275			
		435	6900	83A299			
	Cu(5-Clphen) ₂ ⁺	440	6000	85A059			8.20
	Cu(5-NO ₂ phen) ₂ ⁺	450	7320	85A059			8.21
	Cu(5-CH ₃ phen) ₂ ⁺	430	5960	85A059			8.22
	Cu(2,9-Me ₂ phen) ₂ ⁺	454	7500	85A059			8.23
Cu(II)	CuCH ₃ ⁺	-390 ^b	-2100 ^b	86A115			8.28
	CuCH(CH ₂ NH ₃)CO ₂ ⁺	360	1500	92A134			8.30
	CuCH ₂ C(CH ₃) ₂ OH ⁺	400	1400	88A410			8.32
	CuCH ₂ C(CH ₃) ₂ NH ₃ ²⁺	385	5500	92A073			8.33
	CuCH(CH ₂ NH ₃) ₂ ³⁺	355	2100	93A473			8.34
	CuCH(CH ₂ NMe ₂ H) ₂ ³⁺	370	780	93A473			8.35
	CuCH ₂ C(CH ₃) ₂ CO ₂ H ⁺	380	1850	90A474			8.37
	CuCH ₂ C(CH ₃)(NH ₃)CO ₂ ⁺	355	2100	92A215			8.38
	CuCHCH(OH)(CH ₂) ₄ ⁺	360	880	91A152			8.39.1
	Cu(O ₆ H ₄ -4-O)	425	4300	78A449			8.40
	Cu(acrylamide) ⁺	250	6200	76I186			8.5.21
		315	1400				
	Cu(fumaric acid) ⁺	335	3000	75I092			8.5.26
	Cu(maleic acid) ⁺	345	2800	75I092			8.5.29
Cu(III)	Cu(Me ₂ pyo[14]trieneN ₄)(OH) ²⁺	-350	-2300	86A210			8.44
	Cu(OH) ₂ ⁺	290	3500	78C006	4.0 °	78C006	8.46
	Cu(OH) ₃	280	7400	78C006			
	Cu ^{III} (NH ₃) _n	290	5600	710775			8.48
	Cu ^{III} (en),(pH=8.0)	300	2100	710775			8.49
	Cu ^{III} (en),(pH=11.3)	300	2500				
	Cu(4,11-dieneN ₄) ³⁺	315	5500	79A080			8.52
	Cu ^{III} (Gly) ₂	310	7800	710775			8.57
	Cu ^{III} (Ala) ₂	300	5500	89G017			8.58
		305	4700	710775			
	Cu ^{III} (β-Ala) ₂	310	4700	710775			8.59
	Cu ^{III} (α-aminobutyric acid) ₂	310	3000	710775			8.60
	Cu ^{III} (β-aminobutyric acid) ₂	310	3300	710775			8.61
	Cu ^{III} (γ-aminobutyric acid) ₂	310	3500	710775			8.62
	Cu ^{III} (α-aminoisobutyric acid) ₂	310	3200	710775			8.63
	CuOC ₆ H ₄ -2-OH ²⁺	380	410	78A449			8.76
	CuOC ₆ H ₄ -3-OH ²⁺	420	4500	79A272			8.77
	CuOC ₆ H ₄ -4-O ⁺	425	870	78A449			8.78
	CuOC ₆ H ₃ -5-Me-3-OH ²⁺	450	3500	79A272			8.79
	cis-[HOCH ₂ Cu(NTA)(H ₂ O)] ⁻	430	200	86B151			8.84

^aIn Table 8.^bEvaluated from graph.^cFor Cu(OH)₂(H₂O)⁺ ⇌ Cu(OH)₃ + H⁺.

TABLE 9A. Spectral properties and pK_a 's of iron transients

	Species	λ_{\max} (nm)	ϵ (L mol ⁻¹ cm ⁻¹)	Ref.	pK_a	Ref.	Entry No. ^a
Fe(II/?)	Fe(bpy)(CN) ₄ ³⁻	~365 ^b ~530 ^b 370	~16000 ^b ~7000 ^b 13000	91A067 90A171		9.3	
	Fe(4,4'-Me ₂ bpy)(CN) ₄ ³⁻	~375 ^b ~520 ^b 370	~14000 ^b ~6000 ^b 10000	90A499 90A171		9.4	
	Fe(CN) ₅ N(O)R ^{3- c}	~250 475	~9000 5000	79A134		9.7	
Fe(II)	Fe(tim)(H ₂ O) ₂ ²⁺	650	4400	84A403		9.9	
Fe(II/?)	Fe(bpy) ₂ (bpyOH) ²⁺	350 530	~5000 ~4000	90A015		9.13	
Fe(II,III)	FeHO ₂ Fe ⁴⁺	450 ^d	1240	730038		9.15	
Fe(III)	FeH ²⁺ FeHO ₂ ²⁺	325 450 ^d 430 ^d	650 140 280	690434 730038 690434		9.16 9.17	
	Fe(III)PP(H) HOCH ₂ Fe(III)PP	550 575 680	10000 9000 4800	86A511 85A006		9.20 9.21	
	HOCH(CH ₃) ₂ Fe(III)PP	560 680	13000 4200	85A006		9.22	
	(CH ₃) ₂ C(OH)Fe(III)PP	570 660	11000 5300	85A006		9.23	
	HOCH ₂ CH ₂ Fe(III)PP HOCH ₂ CH(CH ₃) ₂ Fe(III)PP	560 550	7000 8000	86A511 86A511		9.24 9.25	
	CH ₃ FeNTA(H ₂ O) ⁻ CO ₂ FeNTA ²⁻ CO ₂ FeHEDTA ²⁻	~310 ^b 405 420	~8500 ^b 620 950	88A426 88A184 88A184		9.28 9.29 9.30	
Fe(IV)	FeO(OH) _n ²⁻ⁿ	240 420	~5500 520	86A018		9.46	
	FeO(P ₂ O ₇) ₂ ⁶⁻ HOFe ^{IV} SiW ₁₁ O ₃₉ ⁵⁻	420 355	1200 8600	90A373 90A253		9.49 9.50	
Fe(V)	H ₂ FeO ₄ ⁻ HFeO ₄ ²⁻	270 ^d 368	4700 990	91Z208	9.5 10.1	89A354 89A354	9.51 9.52
	FeO ₄ ³⁻	270 ^d 368 390	5300 990 1500	91Z208 86A018		9.53	

^aIn Table 9.^bEvaluated from graph.

^cR = ¹CH₂C(CH₃)₂OH, ¹CH₂C(CH₃)(NH₃⁺)CO₂⁻,
¹CH₂N(CH₃)C(O)CH₃, ¹CH₂C(CH₃)₂NH₃⁺,
¹CH₂C(CH₃)(OH)CO₂⁻, ¹CH₂C(CH₃)₂CO₂⁻

^dNot λ_{\max} .

TABLE 10A. Spectral properties and pK_a 's of mercury transients

	Species	λ_{\max} (nm)	ϵ (L mol ⁻¹ cm ⁻¹)	Ref.	pK_a	Ref.	Entry No. ^a
Hg(0)	Hg ⁰	254	2800	751203			10.1
Hg(0,I)	Hg ₂ ⁺	285 300 ^b	13000 6700	79A063			10.2
Hg(I)	Hg ⁺	250	14000 ^c	731080	5.1 ^d	751044	10.3
	HgOH	233	~10000 ^e	751044			10.4
		260 ^f	5300				
	Hg ₂ O ^g	215	8700 ^h	751044			10.4.1
	HgBr	350	4300	761042			10.6
	HgCl	330	2300	730043			10.8
	HgCN	285	3500	761042			10.10
		285	3800	751203			
	HgI	355	≥3200	761042			10.11
	HgSCN	415	4400	761042			10.12

^aIn Table 10.^b λ at half-height.^c ϵ at 255 nm.^dFor Hg⁺ + H₂O ⇌ HgOH + H⁺.^eEvaluated from graph.^fShoulder.^gOr Hg₂(OH)₂.^h ϵ at 220 nm.TABLE 11A. Spectral properties and pK_a 's of indium transients

	Species	λ_{\max} (nm)	ϵ (L mol ⁻¹ cm ⁻¹)	Ref.	pK_a	Ref.	Entry No. ^a
In(0)	In ⁰	500	≥1800	89A492			11.1
In(I)	In ₂ ⁺	310 460	≥8000 ≥2100	89A492			11.1.1
In(II)	In ²⁺	250 ^b	~20000 ^c	84A008	4.5 ^d	84A008	11.2

^aIn Table 11.^bNot λ_{\max} .^cEvaluated from graph.^dRefers to In(H₂O)²⁺ ⇌ InOH⁺ + H⁺.

TABLE 12A. Spectral properties of iridium transients

	Species	λ_{\max} (nm)	ϵ (L mol ⁻¹ cm ⁻¹)	Ref.	Entry No. ^a
Ir(II)	Ir(II) ^b	280	1740	731066	12.1
Ir(III?)	Ir(bpy) ₂ (C ³ ,N'-Hbpy) ²⁺	395	10600	85A160	12.2

^aIn Table 12.^bFrom IrCl₆³⁻ + e_{aq}⁻.

TABLE 13A. Spectral properties of manganese transients

	Species	λ_{\max} (nm)	ϵ (L mol ⁻¹ cm ⁻¹)	Ref.	Entry No. ^a
Mn(II)	Mn[NTA-H] ⁻	~300 ^b	~3000 ^b	78A436	13.9
	Mn[EDTA-H] ²⁻	290	2800	78A436	13.10
		430	820		
Mn(III)	MnOH ²⁺	310	420	78A041	13.12
		~420 ^b	~200 ^b	761109	
	MnO ₂ ⁺	~420 ^b	~300 ^b	761109	13.13
	MnO ₂ ⁺ -formate	270	3200	84A189	13.14
	Mn(III)-phosphate	~270 ^b	~2800 ^b	84A384	13.17
	MnO ₂ ⁺ -phosphate	270	3100	84A384	13.18
	Mn(III)-pyrophosphate	260	6200	84A189	13.19
	MnO ₂ ⁺ -sulfate	270	2200	84A189	13.21
	MnEDDA(O ₂) ⁻	~445 ^b	~360 ^b	90A116	13.27
Mn(IV)	MnEDDA(OH) ₂ ⁻	~440 ^b	~300 ^b	90A116	13.27
	CH ₃ Mn(NTA)(H ₂ O) ⁻	310	4700	88A426	13.28
	[HO-Mn(cyclam)Cl ₂] ⁺	480	260	87A488	13.33
	[HO- <i>meso</i> -Mn(aneN ₄)Cl ₂] ⁺	320	920	87A488	13.34
		450	190		
[HO- <i>rac</i> -Mn(aneN ₄)Cl ₂] ⁺	260	1700	87A488	13.35	
		450	150		

^aIn Table 13.^bEvaluated from graph.

TABLE 14A. Spectral properties of molybdenum transients

Species	λ_{\max} (nm)	ϵ (L mol ⁻¹ cm ⁻¹)	Ref.	Entry No. ^a
HP ₂ Mo ₈ O ₆₂ ⁶⁻	750	2800	82A107	14.1
[Mo ₂ O ₄ (HNTA)] ³⁻	~520 ^b	~550 ^b	85A363	14.2

^aIn Table 14.^bEvaluated from graph.

TABLE 15A. Spectral properties and pK_a 's of nickel transients

	Species	λ_{\max} (nm)	ϵ ($L \text{ mol}^{-1} \text{ cm}^{-1}$)	Ref.	pK_a	Ref.	Entry No. ^a
Ni(I)	Ni^+	300	4800	751027			15.1
		300	6000	741037			
	$\text{Ni}(\text{CN})_4^{3-}$	270	13300	741072			15.2
	$\text{Ni}([\text{13}]\text{aneN}_4)^+$	$\sim 380^b$	$\sim 3100^b$	85A145			15.4
	$\text{Ni}(\text{MeNO}_2[\text{13}]\text{aneN}_4)^+$	290	3800	88A391			15.5
	$\text{Ni}(\text{cyclam})^+$	375	4500	85A032			15.6
	$\text{Ni}(\text{Me}_4[\text{14}]\text{aneN}_4)^+$	355	3150	85A032			15.7
	$\text{Ni}(\text{aneN}_4)^+$	380	5150	761039			15.8
	$\text{Ni}(\text{Me}_{10}\text{cyclam})^+$	335	3600	85A032			15.9
	$\text{Ni}(4,11\text{-dieneN}_4)^+$	460	3900	761039			15.10
	$\text{Ni}(\text{MeNO}_2[\text{18}]\text{aneN}_6)^+$	290	640	88A391			15.14
	$\text{Ni}(\text{MeNH}_2[\text{18}]\text{aneN}_6)^+$	360	720	88A391			15.15
	$\text{NiL}^+{}^c$	360	540	88A391			15.16
	NiNTA^{2-}	300	1980	80A194			15.17
Ni(II)	NiCH_2OH^+	250 ^d	$\sim 7000^b$	741037			15.19
	NiCO_2	250 ^d	$\sim 500^b$	741037			15.20
	NiCHOHCH_3^+	$\sim 270^b$	$\sim 6500^b$	741037			15.21
	$\text{NiCOH}(\text{CH}_3)_2^+$	250 ^d	$\sim 5000^b$	741037			15.22
	$\text{NiCH}(\text{CH}_3\text{OC}_2\text{H}_5)^+$	$\sim 300^b$	$\sim 6500^b$	741037			15.23
	$\text{Ni}(\text{IDA-H})$	-245	3000	81A023			15.27
	$\text{Ni}(\text{IDA})(\text{IDA-H})^{2-}$	255	5800	81A023			15.28
	$\text{Ni}(\text{NTA-H})^-$	290	2050	80A194			15.29
		290	2050(pH 4)	78A436 ^e			
		290	1600(pH 9)	78A436 ^e			
Ni(III)	$\text{Ni}(\text{NH}_3)_n^{3+}$	295	1400	720460			15.31
	$\text{Ni}(\text{en})_n^{3+}$	295	2000	720461			15.32
	$\text{Ni}(\text{Gly})_n^{(3-n)+}$	285	2800	720461			15.33
	$\text{Ni}([\text{13}]\text{aneN}_4)^{3+}$	$\sim 520^b$	$\sim 2500^b$	86A470			15.35
	$\text{Ni}(\text{MeNO}_2[\text{13}]\text{aneN}_4)^{3+}$	520	3400	88A391			15.36
		360	~ 800				
		310	~ 2400				
	$\text{Ni}(10,13\text{-diene-H})^{2+}$	330	6850	82A060			15.38
		600	2500				
	$\text{Ni}(\text{trifluoro-10,13-dieneN}_4\text{-H})(\text{H}_2\text{O})_2^{2+}$	355	4600	84A277	5.1 ^f	84A277	15.40
		580	1800				
	$\text{CH}_3\text{Ni}(\text{cyclam})(\text{H}_2\text{O})^{2+}$	$\sim 300^b$	$\sim 2000^b$	88A444			15.41
	$\text{Ni}(\text{cyclam})^{3+ g}$	$\sim 525^b$	$\sim 1000(\text{pH } 6)$	80A350			15.42
		$\sim 280^b$	$\sim 2300^b(\text{pH } 6)$				
		$\sim 300^b$	$\sim 5600^b(\text{pH } 3.1)$				
	$\text{Ni}(\text{cyclam})^{3+ h}$	$\sim 300^b$	$\sim 12000^b(\text{pH } 6)$	85A032			
	$\beta\text{-Ni}(\text{aneN}_4)^{3+ g}$	$\sim 550^b$	$\sim 1200^b(\text{pH } 3.2)$	81A285			15.43
	$\text{Ni}(\text{aneN}_4)^{3+}$	$\sim 550^b$	$\sim 2600^b(\text{pH } 3.2)$				
	$\text{Ni}(\text{aneN}_4)\text{SO}_4^+$	$\sim 320^b$	$\sim 9500^b$	79A249			15.44
		$\sim 400^b$	$\sim 5000^b$				
$\text{Ni}(4,11\text{-dieneN}_4)^{3+ h}$		$\sim 320^b$	$\sim 8500^b(\text{pH } 1)$	79A038			15.45
		535	1500	771151			
		$\sim 320^b$	$\sim 8500^b(\text{pH } 0.2)$	79A038			
		$\sim 550^b$	$\sim 3000^b(\text{pH } 5.3)$				

TABLE 15A. Spectral properties and pK_a 's of nickel transients —Continued

Species	λ_{\max} (nm)	ϵ (L mol ⁻¹ cm ⁻¹)	Ref.	pK_a	Ref.	Entry No. ^a
Ni(tetraeneN ₄) ³⁺	~330 ^b	~6000 ^b	79A038			15.50
Ni([16]aneN ₅) ³⁺	290	6900	83A322			15.52
Ni(MeNO ₂ [18]aneN ₆) ³⁺	545 370sh 310	410 ~600 ~1100	88A391			15.53
Ni(MeNH ₂ [18]aneN ₆) ³⁺	545 390sh 340	2900 ~1200 ~1800	88A391			15.54
NiL ^{3+ c}	530 300sh	620 ~400	88A391			15.55
Ni(Me ₂ pyo[14]trieneN ₄)(H ₂ O) ₂ ³⁺				4	81A144	15.60
Ni(Me ₂ pyo[14]hexaeneN ₄)Br ²⁺	265 360	15000 4500	82A087			15.69
NiEDTA ^{- i}	~570 ^b	2600	91A292			15.70
NiEDTA ^{- g}	~290 ^b	~1700 ^b	751135			
NiEDTA(H ₂ O) ⁻	~580 ^b	2010	91A292			15.72
Ni(IV) NiO ₂ ⁺	265	2700	761134	3.2 ^j	761134	15.73

^aIn Table 15.^bEvaluated from graph.^cL = 3,7-Bis(2-aminoethyl)-1,3,5,7-tetraazabicyclo[3.3.1]nonane.^dNot λ_{\max} .^eSpecies suggested to be Ni(III).^fpK_a for L → L-H.^gObtained from OH⁻.^hObtained from Br₂⁻.ⁱObtained from CO₃²⁻.^jFor NiO₂H²⁺ ⇌ NiO₂⁺ + H⁺.

TABLE 17A. Spectral properties of lead transients

Species	λ_{\max} (nm)	ϵ (L mol ⁻¹ cm ⁻¹)	Ref.	Entry No. ^a
Pb(0) Pb ^{0 b}	300 660	12000 970	92A206	17.1
Pb(I) Pb ⁺	320	2500	92A206	17.2
Pb(I) ^c	275 315	6400 11000	78A206	17.3
Pb(III) Pb(III) ^d	430	6500	84A446	17.7
Pb(OH) ₂ ⁺	~370 ^e	~2700 ^e	90A095	17.8
Pb(OH) ₄ ⁻	~275 ^e ~350 ^e	~9700 ^e ~6400 ^e	90A095	17.9

^aIn Table 17.^bSpecies could be Pb₂²⁺.^cIn the presence of Cl⁻.^dIn the presence of 11 mol L⁻¹ HCl.^eEvaluated from graph.

TABLE 18A. Spectral properties of palladium transients

Species	λ_{\max} (nm)	ϵ (L mol ⁻¹ cm ⁻¹)	Ref.	Entry No. ^a
Pd(I) Pd ⁺	290	6400	94A210	18.1
Pd(HypO) ₂ ⁻	260	1800	93A224	18.2
Pd(III) Pd ³⁺	250	4700	94A210	18.1.1

^aIn Table 18.

TABLE 19A. Spectral properties and pK_a 's of platinum transients

	Species	λ_{\max} (nm)	ϵ (L mol ⁻¹ cm ⁻¹)	Ref.	pK_a	Ref.	Entry No. ^a
Pt(I)	cis-Pt(NH ₃) ₂ Cl ⁻	<250	>1200 ^b	85A090			19.2
	PtBr ₄ ³⁻	320	3000	92A259			19.4
	PtCl ₄ ³⁻	310	2900	680169			19.5
	Pt(en) ₂ ⁺	300	1650	751188			19.77
	Pt(dien)Cl	335	2780	751188			19.8
	cis-Pt(Gly) ₂ ⁻	240	~5100	771053			19.9
	trans-Pt(Gly) ₂ ⁻	250	~5500	771053			19.10
Pt(II/?)	Pt(en) ₂ ²⁺ /H	420	220	751188			19.11
	Pt(dien)Cl ⁺ /H	410	520	751188			19.12
	Pt(Et ₄ dien)Cl ⁺ /H	290	2620	751188			19.13
	cis-Pt(Gly) ₂ /H	~250	~4100	771053			19.14
	trans-Pt(Gly) ₂ /H	260	~5800	771053			19.15
Pt(I,II)	Pt ₂ (P ₂ O ₅ H ₂ ²⁻) ₄ ⁵⁻	~420	~13000	84A241			19.16
		~600	~1700				
Pt(III)	Pt(NH ₃) ₄ (H ₂ O)(OH) ²⁺	270	>2900	82A074	9.8	82A074	19.18
	Pt(NH ₃) ₄ (H ₂ O) ₂ ³⁺	270 ^c		86A017	6.4	82A074	19.20
	Pt(NH ₃) ₄ (H ₂ O)Cl ²⁺	270	3300	86A017			19.20.2
	PtCl ₆ ³⁻	440	2800	89A250			19.26
	PtCl ₄ (H ₂ O) ₂ ⁻	410	3500	87A472	3.5	87A472	19.28.1
	PtCl ₄ (OH)(H ₂ O) ²⁻	450	2780	89A250			19.29
		455	3500	89A203	9-10	89A203	
		450	2800	680169			
	PtCl ₄ (OH) ₂ ^{3-d}	410	3960	89A250			19.30
	PtCl ₂ (OH) ₂ ^d	410	4400	89A203			19.31
	PtBr ₄ (OH) ²⁻	530	1420	92A259			19.32
	PtBr ₄ (OH) ₂ ³⁻	420	2260	92A259			19.32.1
	PtBr ₆ ³⁻	540	1650	92A259			19.33
	PtBr ₅ (OH) ³⁻	440	2350	92A259			19.33.1
	Pt(en) ₂ Cl ²⁺	260	8000	80A286			19.35
		265	7120	751188			
	Pt(en) ₂ (H ₂ O)(OH) ²⁺	270	~4500	80A286			19.36
	Pt(en) ₂ (H ₂ O) ₂ ³⁺	<250 ^c		80A286	6.8	82A074	
	Pt(en)(en-H) ²⁺	340	2900	80A286			19.37
		480	1500				
Pt(II,III)	Pt ₂ (P ₂ O ₅ H ₂ ²⁻) ₄ ³⁻	310	7600	86A578			19.47

^aIn Table 19.^bAt 250 nm.^c ϵ value not given.^dThese are probably the same species; the authors have interpreted the structure differently.

TABLE 20A. Spectral properties of rhenium transients

	Species	λ_{\max} (nm)	ϵ (L mol ⁻¹ cm ⁻¹)	Ref.	Entry No. ^a
Re(VI)	ReO ₄ ²⁻	290	1700	85A234	20.1

^aIn Table 20.

TABLE 21A. Spectral properties of rhodium transients

	Species	λ_{\max} (nm)	ϵ (L mol ⁻¹ cm ⁻¹)	Ref.	Entry No. ^a
Rh(I)	Rh(bpy) ₂ ⁺	510	10000	81A134	21.11.2
Rh(I,II)	Rh ₂ (1,3-diisocyanopropane) ₄ ³⁺	438 705	34500 2000	79A167	21.4
Rh(II)	Rh(bpy) ₂ ²⁺	-300 ^b -350 ^b	-23000 ^b -3500 ^b	83A046	21.10
	[Rh(bpy) ₂] ₂ ⁴⁺	350 ^c	-8000 ^b	83A046	21.10.1
	Rh(bpy) ₃ ²⁺	-300 ^b -350 ^b	-30000 ^b -5000 ^b	83A046	21.11

^aIn Table 21.^bEvaluated from graph.^cNot λ_{\max} .

TABLE 22A. Spectral properties and pK_a 's of ruthenium transients

	Species	λ_{\max} (nm)	ϵ (L mol ⁻¹ cm ⁻¹)	Ref.	pK_a	Ref.	Entry No. ^a
Ru(I)	$\text{Ru}(\text{NH}_3)_5\text{N}_2^+$	310	700	710234			22.1
Ru(II/?)	$\text{Ru}(\text{bpy})_2(\text{CN})_2^-$	~350 ^b	~12500 ^b	84A177			22.2
		~590 ^b	~5500 ^b				
	$\text{Ru}(\text{bpy})_3^+$	350	18300	91A198			22.3
		490	13900				
		490	14000	767412			
		510	12000	720381			
	$\text{Ru}(\text{bpy})_2(\text{bpm})^+$	340	21500	91A198			22.6
		460	13400				
		480 ^d	12700				
	$\text{Ru}(\text{bpy})_2(\text{bpmH})^{2+}$	330	18800	91A198	7.7	91A198	22.7
		420	12100				
		440 ^d	11700				
	$\text{Ru}(\text{bpy})_2(\text{bpz})^+$	470	11000	91A198			22.8
	$\text{Ru}(\text{bpy})_2(\text{bpzH})^{2+}$	450	12100	91A198	9.2	91A198	22.9
		530	3700				
	$\text{Ru}(\text{bpy})(\text{bpm})(\text{bpz})^+$	350 ^d	15900	91A198			22.10
		470 ^d	8200				
	$\text{Ru}(\text{bpy})(\text{bpm})(\text{bpzH})^{2+}$	410	10000	91A198	8.8	91A198	22.11
		480 ^d	6400				
	$\text{Ru}(\text{bpm})_3^+$	330	19000	91A198			22.12
		450	11500				
		480	11100				
	$\text{Ru}(\text{bpm})_2(\text{bpmH})^{2+}$	330	18600	91A198	6.3	91A198	22.13
		370 ^d	12200				
		430	9200				
	$\text{Ru}(\text{bpm})_2(\text{bpy})^+$	340	21200	91A198			22.14
		440	13300				
		480 ^d	10600				
	$\text{Ru}(\text{bpm})(\text{bpmH})(\text{bpy})^{2+}$	340	21200	91A198	6.9	91A198	22.15
		390	13000				
	$\text{Ru}(\text{bpm})_2(\text{bpz})^+$	360	18400	91A198			22.16
		460	8900				
		490 ^d	8700				
	$\text{Ru}(\text{bpm})_2(\text{bpzH})^{2+}$	330 ^d	17900	91A198	7.7	91A198	22.17
		450 ^d	7900				
		500 ^d	5200				
	$\text{Ru}(\text{bpz})_3^+$	460	12700	91A198			22.18
	$\text{Ru}(\text{bpz})_2(\text{bpzH})^{2+}$	440	11800	91A198	7.1	91A198	22.19
		470 ^d	10500				
	$\text{Ru}(\text{bpz})_2(\text{bpy})^+$	370	16100	91A198			22.20
		490	9200				
	$\text{Ru}(\text{bpz})(\text{bpzH})(\text{bpy})^{2+}$	400	9100	91A198	8.0	91A198	22.21
		460	8300				
		500	7500				
	$\text{Ru}(\text{bpz})_2(\text{bpm})^+$	360	18100	91A198			22.22
		460	10100				
		490	10000				
	$\text{Ru}(\text{bpz})(\text{bpzH})(\text{bpm})^{2+}$	450	9500	91A198	7.2	91A198	22.23
		480 ^d	7800				
	$\text{Ru}(\text{bpy})_3\text{-OH}^{2+}$	750	1800	86A034			22.24
	$\text{Ru}(\text{bpz})_3\text{-OH}^{2+}$	~440 ^b	~10600	88A091			22.25
		~550	~3400				
		~750	~900				

TABLE 22A. Spectral properties and pK_a 's of ruthenium transients —Continued

Species		λ_{\max} (nm)	ϵ ($L \text{ mol}^{-1} \text{ cm}^{-1}$)	Ref.	pK_a	Ref.	Entry No. ^a
Ru(NH ₃) ₅ NO ²⁺		280	3700	78A110			22.37
		350	750				
Ru(NH ₃) ₅ N(O)CH ₂ C(CH ₃) ₂ OH ²⁺		343	4500	751077			22.37
		740	22				
Ru(NH ₃) ₅ N(O)R ^{2+e}		342	4500	79A134			
		740	22				
Ru(I,II)	[(NH ₃) ₅ RuN ₂ Ru(NH ₃) ₅] ³⁺	500	1460	82A135			22.38
Ru(II,II/?)	[(NH ₃) ₅ RuN ₂ Ru(NH ₃) ₅]-OH ⁴⁺	220 ^c	-15000	82A135			22.39
		235 ^c	-13500				
		250 ^c	-29000				
		260 ^c	-15000				
		435	1870				
Ru(II,III)	[(NH ₃) ₅ RuN ₂ Ru(NH ₃) ₅] ⁵⁺	250	28000	82A135			22.40
Ru(III)	Ru(NH ₃) ₅ N ₂ ³⁺	430	2250	710234			22.45
Ru(III/?)	(NH ₃) ₅ Ru(C ₄ O ₄ -OH)	-460	-400	88A030			22.70

^aIn Table 22.^bEvaluated from graph.^cNot λ_{\max} .^dShoulder.

^eR = *CH₂C(CH₃)₂OH, *CH₂C(CH₃)(NH₃⁺)CO₂⁻,
 *CH₂N(CH₃)C(O)CH₃, *CH₂C(CH₃)₂NH₃⁺, *CH₂C(CH₃)(OH)CO₂⁻,
 *CH₂C(CH₃)₂CO₂⁻.

TABLE 22B. Values of the bimolecular rate constant for the reaction
 $\text{Ru(bpy)}_3^{3+} + \text{MV}^{2+} \rightarrow \text{Ru(bpy)}_3^{2+} + \text{MV}^{2+}$
 in aqueous solution

$k^{\text{a,b}}$	pH	I^{c}	k_N^{ad}	$t(^{\circ}\text{C})$	ϵ^{e}	Ref.
4.0e9	5.5	0.1	4.0e9		13600	91A143
3.8e9		0.015 ^f	3.8e9		13700	91N125
2.6e9		0.0017	2.6e9	23	13700	90A389
2.6e9		0.0032	2.6e9	23	13700	90A389
2.7e9		0.0062	2.7e9	23	13700	90A389
2.8e9		0.012	2.8e9	23	13700	90A389
4.2e9		0.15	4.2e9	23	13700	90A389
4.8e9		0.30	4.8e9	23	13700	90A389
5.5e9		0.57	5.5e9	23	13700	90A389
5.5e9		1.0	5.5e9	23	13700	90A389
1.1e10 ^b		2.4	1.1e10	23	13700	90A389
5.0e9		0.3 ^f	5.0e9		13600	89E329
2.8e9		0.02	3.4e9	20	11300	88A025
3.4e9		0.08 ^c	4.1e9	20	11300	88A025
4.2e9		0.16	5.2e9	20	11300	88A025
4.8e9		0.35	5.8e9	20	11300	88A025
5.3e9		0.80	6.4e9	20	11300	88A025
5.6e9 ^b		1.60	6.8e9	20	11300	88A025
4.3e9	7	0.4	4.9e9		12000	85F435
1.4e10 ^b	0.3	1.5 ^g	1.8e10		11000	82A111
7.1e9 ^b		1.5	8.9e9		11000	82A111
6.6e9 ^b		3.0	8.3e9		11000	82A111
9.8e9 ^b	4.7	3.1	12.3e9		11000	82A111
2.0e9	6.9	0.04	2.4e9		11300	81A042
4.4e9	7-9	0.5	5.5e9	25	11000	81N003
2.4e9		0.03 ^f	2.9e9		11300	78A351

^aAll values obtained from flash photolysis experiments.

^bL mol⁻¹ s⁻¹.

^cmol L⁻¹.

^dNormalized assuming $\epsilon(\text{MV}^{2+}) = 13700 \text{ L mol}^{-1} \text{ cm}^{-1}$ [82B053].

^eMV²⁺ at ~600 nm, L mol⁻¹ cm⁻¹.

^fCalculated from data given by authors.

^gValue of I probably incorrect, 0.5 mol L⁻¹ H₂SO₄.

^bThese values do not appear in Figure 1.

TABLE 24A. Spectral properties of tin transients

Species	λ_{max} (nm)	ϵ (L mol ⁻¹ cm ⁻¹)	Ref.	Entry No. ^a
Sn(III)	Sn(III)	280	5300	86A208 24.1

^aIn Table 24.

TABLE 25A. Spectral properties and pK_a 's of thallium transients

Species	λ_{\max} (nm)	ϵ (L mol ⁻¹ cm ⁻¹)	Ref.	pK_a	Ref.	Entry No. ^a
Tl(0)	Tl ⁰	420	2840	89C001		25.1
	Tl ₂ ⁺	420	11700	89C001		25.2
Tl(II)	Tl ²⁺	270 ^b	~3800 ^c	741017	4.78 ^d	84C015
	TIOH ⁺	360	3160	84C015		25.5
Tl(OH) ₂		360	3000	761192	7.7 ^d	761192
		370	3800	761192		25.6
TlCl ⁺	263	~7700 ^c	741038			25.7
	342	~4300 ^c				
TlCl ₂	280	~6400 ^c	741038			25.8
	342	~7000 ^c				
TlCl ₃ ⁻	304	~10300 ^c	741038			25.9
	362	~9400 ^c				

^aIn Table 25.^bNot λ_{\max} .^cEvaluated from graph.^dRefers to Tl(H₂O)²⁺ ⇌ Tl(OH)⁺ + H⁺ and Tl(OH)(H₂O)⁺ ⇌ Tl(OH)₂ + H⁺.

TABLE 27A. Spectral properties of tungsten transients

Species	λ_{\max} (nm)	ϵ (L mol ⁻¹ cm ⁻¹)	Ref.	Entry No. ^a
H ₂ W ₁₂ O ₄₀ ⁷⁻	680	2100	90A069	27.1

^aIn Table 27.

TABLE 28A. Spectral properties of zinc transients

Species	λ_{\max} (nm)	ϵ (L mol ⁻¹ cm ⁻¹)	Ref.	Entry No. ^a
Zn(I)	Zn ⁺	305	12,800	92A182
		310	13,000	771011
Zn(II)	Zn(cyclam) ⁺	330	7800	80A380
	[ZnTZP] ⁻	438	210000	83C026
	[ZnNTA-H] ⁻ ^b	280	2400(pH 4)	78A436
		290	5200(pH 9)	78A436
	[ZnEDTA-H] ²⁻ ^c	290	2650(pH 4.5)	78A436
		290	5200(pH 9)	78A436
	[Zn(3-TMPyP)] ⁵⁺	700	31000	85A430
				84A264
	[ZnTMpyP] ⁵⁺	700	9000	82N168
		700	7000	81S157
	[ZnTPPS] ³⁻	460	8500	81C041
		600	3100	
	[ZnTZP] ⁺	560	15000	83C026
		605	5000	28.18

^aIn Table 28.^bAlso represented in Table 28 as A or B.^cAlso represented in Table 28 as C or D.

11. Appendix II. List of Metal Transients

Table 1. Silver

- 1.1 Silver atom
- 1.2 Silver(I) ion, complex with Ag(0)
- 1.3 Amminesilver(0)-silver(I) complex
- 1.4 5,10,15,20-Tetrakis(4-sulfonatophenyl)-porphinatoargentate(I) ion
- 1.5 Silver(II) ion
- 1.6 Hydroxysilver(II) ion
- 1.7 Mono- and dihydroxysilver(II)
- 1.8 Dihydroxysilver(II)
- 1.9 Tetraamminesilver(II) ion
- 1.10 Diammine(hydroxy)silver(II)
- 1.11 Triammine(hydroxy)silver(II) ion
- 1.12 Nitrilotriacetatoargentate(II)
- 1.13 Ethylenediaminetetraacetatoargentate(II)
- 1.14 Silver(II)-succinate complex

Table 2. Aluminum

- 2.1 Aluminum(III) sulfophthalocyanine, radical anion

Table 3. Gold

- 3.1 Dicyanoaurate(0) ion
- 3.2 Hydrogen dicyanoaurate(0) ion
- 3.3 Dihydrogen dicyanoaurate(0)
- 3.4 Dicyanohydroxyaurate(II) ion
- 3.5 Dicyano(hydroxy)aurate(II) ion, protonated
- 3.6 Gold(II)

Table 4. Bismuth

- 4.1 Bismuth(II) ion
- 4.2 Hydroxymethylbismuth(IV) ion
- 4.3 1-Hydroxyethylbismuth(IV) ion
- 4.4 1-Hydroxy-1-methylethylbismuth(IV) ion
- 4.5 2-Hydroxy-2-dimethylethylbismuth(IV) ion
- 4.6 Carboxybismuth(IV) ion

Table 5. Cadmium

- 5.1 Cadmium(I) ions
- 5.2 1,4,10-Trioxa-7,13-diazacyclopentadecane-cadmium(I) ion
- 5.3 1,4,10,13-Tetraoxa-7,16-diazacyclooctadecane-cadmium(I) ion
- 5.4 4,7,13,16,21-Pentaoxa-1,10-diazabicyclo[8.8.5]tricosanecadmium(I) ion
- 5.5 4,7,13,16,21,24-Hexaoxa-1,10-diazabicyclo[8.8.8]-hexacosanecadmium(I) ion
- 5.6 1,4,8,11-Tetrazacyclotetradecanecadmium(I) ion
- 5.7 Ethylenediaminetetraacetatocadmiate(I) ion
- 5.8 Ethylenediaminecadmium(I) ion
- 5.9 Glycinatocadmium(I) ion
- 5.10 Nitrilotriacetatocadmium(I) ion
- 5.11 1-Hydroxyethylcadmium(II) ion
- 5.12 1-Hydroxy-1-methylethylcadmium(II) ion
- 5.13 5,10,15,20-Tetrakis(4-sulfonatophenyl)-porphinatocadmite(II) radical anion

Table 6. Cobalt

- 6.1 Cobalt(I) ion
- 6.2 Pentakis(cyano-C)cobaltate(I) ion
- 6.3 Nitritotriacetatocobaltate(I) ion
- 6.4 2,3,9,10-Tetramethyl-1,4,8,11-tetraaza-cyclotetradeca-1,3,8,10-tetraenecobalt(I) ion
- 6.5 *N*-meso-5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecobalt(I) ion
- 6.6 *N*-rac-5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecobalt(I) ion
- 6.7 5,7,7,12,12,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,14-dienecobalt(I) ion
- 6.8 2,2'-Bipyridinecobalt(I) ion
- 6.9 2,2'-Bipyridinecobalt(I) ion
- 6.10 Bis(2,2'-bipyridine)cobalt(I) ion
- 6.11 Tris(2,2'-bipyridine)cobalt(I) ion
- 6.12 4,4'-Dimethyl-2,2'-bipyridinecobalt(I) ion
- 6.13 4,4'-Dimethyl-2,2'-bipyridinecobalt(I) ions
- 6.14 4,4'-Dimethyl-2,2'-bipyridinecobalt(I) ion, protonated
- 6.15 Bis(4,4'-dimethyl-2,2'-bipyridine)cobalt(I) ion
- 6.16 Tris(4,4'-dimethyl-2,2'-bipyridine)cobalt(I) ion
- 6.17 5,10,15,20-Tetrakis(4-sulfonatophenyl)-porphinatocobaltate(I) ion
- 6.18 Cobal(I)amin
- 6.19 3,10,17,24-Tetrasulfophthalocyaninecobaltate(I) ion
- 6.20 3,10,17,24-Tetrasulfophthalocyaninecobaltate(I) ion dimer
- 6.21 *N*-Methyltetrakis(4-sulfonatophenyl)-porphinatocobaltate(II) radical anion
- 6.22 Pentaamminecobalt(II) ion
- 6.23 Tetraamminecobalt(II) ion
- 6.24 Tris(ammine)cobalt(II) ion
- 6.25 Bis(ammine)cobalt(II) ion
- 6.26 Amminecobalt(II) ion
- 6.27 Tris(ethylenediamine)cobalt(II) ion
- 6.28 Bis(ethylenediamine)cobalt(II) ion
- 6.29 Ethylenediaminecobalt(II) ion
- 6.30 Bis(diethylenetriamine)cobalt(II) ion
- 6.31 Diethylenetriaminecobalt(II) ion
- 6.32 Triethylenetetraminecobalt(II) ion
- 6.33 Hydroxytriethylenetetraminecobalt(II) ion
- 6.34 Nitrito(triethylenetetramine)cobalt(II) ion
- 6.35 Tetraethyltriethylenetriaminecobalt(II) ion
- 6.36 Tris(acetylacetato)cobaltate(II) ion
- 6.36 Tris(acetylacetato)cobaltate(II) ion
- 6.37 Bis(acetylacetato)cobalt(II)
- 6.38 Acetylacetatocobalt(II) ion
- 6.39 Tris(2,2'-bipyridine)cobalt(II) ion
- 6.40 Tris(1,10-phenanthroline)cobalt(II) ion
- 6.41 3,10,17,24-Tetrasulfophthalocyaninecobaltate(II) ion
- 6.42 Chloro(pentacyano)cobaltate(II) ion
- 6.43 Pentacyanocobaltate(II) ion
- 6.44 Tetracyanocobaltate(II) ion
- 6.45 Tris(glycinato)cobaltate(II) ion
- 6.46 Bis(glycinato)cobalt(II)
- 6.47 Glycinatocobalt(II) ion
- 6.48 Ethylenediaminetetraacetatocobaltate(II) ion
- 6.49 1,4,8,11-Tetraazacyclotetradecanecobalt(II) ion

- 6.50 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecanecobalt(II) ion
- 6.51 1,8-Diamino-3,6,10,13,16,19-hexaaazabicyclo[6.6.6]eicosanecobalt(II) ion, conjugate diacid
- 6.52 1,8-Diamino-3,6,10,13,16,19-hexaaazabicyclo[6.6.6]eicosanecobalt(II) ion
- 6.53 8-Methyl-1,3,13,16-tetraaza-6,10,19-trithiabicyclo[6.6.6]eicosanecobalt(II) ion
- 6.54 1,3,6,8,10,13,16,19-Octaaazabicyclo[6.6.6]-eicosanecobalt(II) ion
- 6.55 2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraenecobalt(II) ion
- 6.56 2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraenecobalt(II) ion, superoxide adduct
- 6.57 Iminodiacetatocobaltate(II) ion, superoxide adduct
- 6.58 Ethylenediaminetetraacetatocobaltate(II) ion, superoxide adduct
- 6.59 Iminodiacetatocobalt(II), H-abstraction product
- 6.60 Nitrilotriacetatocobaltate(II) ion, H-abstraction product
- 6.61 Ethylenediaminetetraacetatocobaltate(II) ion, H-abstraction product
- 6.62 3,10,17,24-Tetrasulfophthalocyaninecobaltate(II) ion, superoxide adduct
- 6.63 1,4,8,11-Tetraazacyclotetradecanecobalt(II) ion, dioxygen adduct
- 6.64 5,10,15,10-Tetrakis(1-methylpyridyl)porphinato(thiocyanato)cobalt(II) ion
- 6.65 Cobaltocene
- 6.66 Pentaammine(1-methyl-4,4'-bipyridinium)cobalt(III) ion, electron adduct
- 6.67 Pentaammine(4-nitrobenzoato)cobalt(III) ion, electron adduct
- 6.68 Pentaammine[4-(aminocarbonyl)-1-(carboxymethyl)pyridinio]cobalt(III) radical anion
- 6.69 Pentaammine[4-(aminocarbonyl)-1-(carboxymethyl)pyridinio]cobalt(III) radical, protonated
- 6.70 Pentaammine[4-(aminocarbonyl)-1-(1-carboxyethyl)pyridinio]cobalt(III) radical anion
- 6.71 Pentaammine[4-(aminocarbonyl)-1-(1-carboxyethyl)pyridinio]cobalt(III) radical, protonated
- 6.72 Pentaammine[4-(aminocarbonyl)-1-(1-carboxypropyl)pyridinio]cobalt(III) radical anion
- 6.73 Pentaammine[4-(aminocarbonyl)-1-(1-carboxypropyl)pyridinio]cobalt(III) radical, protonated
- 6.74 3,10,17,24-Tetrasulfophthalocyaninecobaltate(III) radical anion (reduced ligand)
- 6.75 3,10,17,24-Tetrasulfophthalocyaninecobaltate(III) radical anion (oxidized ligand)
- 6.76 Dibromo(iminodiacetato)cobaltate(III) ion
- 6.77 Bromo(iminodiacetato)cobalt(III)
- 6.78 Hydroxy(iminodiacetato)cobalt(III)
- 6.79 Ethylenediaminetetraacetatocobaltate(III) ion, superoxide adduct
- 6.80 Hydrido-*N*-rac-5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecobalt(III) ion
- 6.81 Hydrido-*prim*-*N*-rac-5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecobalt(III) ion
- 6.82 Hydroxymethyl(5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene)cobalt(III) ion
- 6.83 1-Hydroxyethyl(5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene)cobalt(III) ion
- 6.84 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene(2,2,2-trifluoro-1-hydroxyethyl)cobalt(III) ion
- 6.85 1,2-Dihydroxyethyl(5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene)cobalt(III) ion
- 6.86 1-Methylethyltetrakis(4-sulfonatophenyl)-porphinatocobaltate(III) ion
- 6.87 Hydroxymethyltetrakis(4-sulfonatophenyl)-porphinatocobaltate(III) ion
- 6.88 1-Hydroxy-1-methylethyltetrakis(4-sulfonatophenyl)porphinatocobaltate(III) ion
- 6.89 (Methyl)-3,10,17,24-tetrasulfophthalocyaninecobaltate(III) ion
- 6.90 (2-Hydroxy-2,2-dimethylethyl)-3,10,17,24-tetrasulfophthalocyaninecobaltate(III) ion
- 6.91 (2-Hydroxy-1-methylpropyl)-3,10,17,24-tetrasulfophthalocyaninecobaltate(III) ion
- 6.92 (2-Hydroxyethyl)-3,10,17,24-tetrasulfophthalocyaninecobaltate(III) ion
- 6.93 (2-Hydroxy-1-methylethyl)-3,10,17,24-tetrasulfophthalocyaninecobaltate(III) ion
- 6.94 Bromocob(III)alamin
- 6.95 Pentaammine(pyridine)cobalt(III) ion, OH adduct
- 6.96 Pentaammine(nicotinamide)cobalt(III) ion, OH adduct
- 6.97 Pentaammine(isonicotinamide)cobalt(III) ion, OH adduct
- 6.98 Tris(2,2'-bipyridine)cobalt(III) ion, OH adduct
- 6.99 Cobalt(III) ion
- 6.100 Chlorocobalt(III) ion
- 6.101 Aqua(methyl)nitrilotriacetatocobaltate(III) ion
- 6.102 Aqua(hydroxymethyl)nitrilotriacetatocobaltate(III) ion
- 6.103 Aqua(1-hydroxyethyl)nitrilotriacetatocobaltate(III) ion
- 6.104 Aqua(carboxymethyl)nitrilotriacetatocobaltate(III) ion
- 6.105 Aqua(1-ethoxyethyl)nitrilotriacetatocobaltate(III) ion
- 6.106 Aqua(1-hydroxy-1-methylethyl)nitrilotriacetatocobaltate(III) ion
- 6.107 Aqua(bromo)nitrilotriacetatocobaltate(III) ion
- 6.108 Aqua(hydroxymethyl)[*N*-(2-hydroxyethyl)-*N,N',N'*-ethylenediaminetriacetato]cobaltate(III) ion
- 6.109 *O*-Sulfito(tetraethylenepentamine)cobalt(III) ion
- 6.110 Decaammine- μ -peroxidodicobalt(III) ion
- 6.111 μ -Amido- μ -peroxidoctakisamminedicobalt(III) ion
- 6.112 μ -Amido- μ -peroxidotetrakis(ethylenediamine)-dicobalt(III) ion
- 6.113 μ -Amido- μ -peroxidotetrakis(2,2'-bipyridine)-

- dicobalt(III) ion
 6.114 μ -Amido- μ -peroxidotetrakis(1,10-phenanthroline)-dicobalt(III) ion
 6.115 5,10,15,20-Tetrakis(4-sulfonatophenyl)-porphinatocobaltate(III), radical cation

Table 7. Chromium

- 7.1 Chromium(I) ion
 7.2 Chromium(II) ion
 7.3 *trans*-Dqua-1,4,8,11-tetraazacyclotetradecane-chromium(II) ion
 7.4 Tris(2,2'-bipyridine)chromium(II) ion
 7.5 Tris(2,2'-bipyridine)chromium(III), EDTA radical addn. product
 7.6 Tris(4,4'-dimethyl-2,2'-bipyridine)chromium(II) ion
 7.7 Tris(4,4'-diphenyl-2,2'-bipyridine)chromium(II) ion
 7.8 Tris(1,10-phenanthroline)chromium(II) ion
 7.9 Tris(1,10-phenanthroline)chromium(III), EDTA radical addn. product
 7.10 Tris(1,10-phenanthroline)chromium(III), carboxyl radical addn. product
 7.11 Tris(5-chloro-1,10-phenanthroline)chromium(II) ion
 7.12 Tris(5-chloro-1,10-phenanthroline)chromium(III), EDTA radical addn. product
 7.13 Tris(5-chloro-1,10-phenanthroline)chromium(III), carboxyl radical addn. product
 7.14 Tris(5-bromo-1,10-phenanthroline)chromium(II) ion
 7.15 Tris(5-methyl-1,10-phenanthroline)chromium(II) ion
 7.16 Tris(4,7-dimethyl-1,10-phenanthroline)chromium(II) ion
 7.17 Tris(5,6-dimethyl-1,10-phenanthroline)chromium(II) ion
 7.18 Tris(5-phenyl-1,10-phenanthroline)chromium(II) ion
 7.19 Tris(4,7-diphenyl-1,10-phenanthroline)chromium(II) ion
 7.20 Bis(2,2'-bipyridine(oxalato)chromate(II)
 7.21 2,2'-Bipyridinebis(oxalato)chromate(II) ion
 7.22 Bis(1,10-phenanthroline)(oxalato)chromate(II)
 7.23 Bis(oxalato)phenanthrolinechromate(II) ion
 7.24 Tris(acetylacetonato)chromate(II) ion
 7.25 Bis(acetylacetonato)chromate(II)
 7.26 Acetonylacetonatochromium(II) ion
 7.27 Hydridochromium(III) ion
 7.27a Hydroxymethylchromium(III) ion
 7.28 Dihydroxymethylchromium(III) ion
 7.28a 1-Hydroxyethylchromium(III) ion
 7.29 2-Hydroxyethylchromium(III) ion
 7.29a 1-Hydroxy-1-methylethylchromium(III) ion
 7.30 2-Hydroxy-1-methylethylchromium(III) ion
 7.31 2-Hydroxy-1,2-dimethylethylchromium(III) ion
 7.32 2-Hydroxy-2,2-dimethylethylchromium(III) ion
 7.33 2-Ethoxyethylchromium(III) ion
 7.34 1-Carboxy-1-hydroxyethylchromium(III) ion
 7.35 2-Carboxy-2,2-dimethylethylchromium(III) ion
 7.36 2-Ammonio-2,2-dimethylethylchromium(III) ion
 7.37 *cis*-Diammine(aqua)(1,4,8,11-tetraazacyclotetradecane)chromium(III) ion
 7.38 *trans*-Dihydroxy-1,4,8,11-tetraazacyclotetradecane-chromium(III), OH reaction product

7.39 Chromate(V)

7.40 Chromate(V) ion

Table 8. Copper

- 8.1 Copper(0) chloride complex
 8.2 Copper atom
 8.3 Copper(I) chloride complex with copper(0)
 8.4 Copper(I) ion complex with copper(0)
 8.5 Copper(I) ion
 8.6 Copper(I) chloride
 8.7 Tetraformatocuprate(I) ion
 8.8 Tetraacetatocuprate(I) ion
 8.9 Ethylenediaminetetraacetatocuprate(I) ion
 8.10 Bis(alaninato)cuprate(I)
 8.11 Bleomycin-copper(I) complex
 8.12 3,6,10,13,16,19-Hexaaazabicyclo[6.6.6]eicosane-copper(I) ion
 8.13 1,4,8,11-Tetraazacyclotetradecane-copper(I) ion
 8.14 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecane-copper(I) ion
 8.15 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecopper(I) ion
 8.16 2,3,9,10-Tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraenecopper(I) ion
 8.17 α -2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]-heptadeca-1(17),2,11,13,15-pentaenecopper(I) ion
 8.18 Bis(2,2'-bipyridine)copper(I) ion
 8.19 Bis(1,10-phenanthroline)copper(I) ion
 8.20 Bis(5-chloro-1,10-phenanthroline)copper(I) ion
 8.21 Bis(5-nitro-1,10-phenanthroline)copper(I) ion
 8.22 Bis(5-methyl-1,10-phenanthroline)copper(I) ion
 8.23 Bis(2,9-dimethyl-1,10-phenanthroline)copper(I) ion
 8.24 5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)-porphinatocopper(II), radical anion
 8.25 5,10,15,20-Tetrakis(4-sulfonatophenyl)-porphinatocuprate(II), radical anion
 8.26 Tetrakis-4-(*N,N,N*-trimethylammonio)-phenylporphinecopper(II), radical anion
 8.27 Hydrocopper(II) ion
 8.28 Methylcopper(II) ion
 8.29 Carboxylatocopper(II)
 8.30 2-Ammonio-1-carboxyethylcopper(II) ion
 8.31 2-Ammonioethylcopper(II) ion
 8.32 2-Hydroxy-2,2-dimethylethylcopper(II) ion
 8.33 2-Ammonio-2,2-dimethylethylcopper(II) ion
 8.34 1,3-Diammonio-2-propylcopper(II) ion
 8.35 2-(Dimethylammonio)-1-(dimethylammoniomethyl)ethylcopper(II) ion
 8.36 2-(Dimethylammonio)ethylcopper(II) ion
 8.37 2-Carboxy-2,2-dimethylethylcopper(II) ion
 8.38 2-Ammonio-2-carboxypropylcopper(II) ion
 8.39 Copper(II) ion, complex with cyclohexene
 8.40 4-Hydroxyphenoxy copper(II) ion, conjugate base
 8.41 (1-Hydroxybutyl)ethylenediamine-tetraacetatocuprate(II) ion
 8.42 Bis(1,10-phenanthroline)(2-hydroxyethyl)copper(II) ion
 8.43 Bis(1,10-phenanthroline)(2-hydroxy-2,2-dimethylethyl)copper(II) ion

8.43a	Aminomethyl(glycinato)copper(II)
8.44	α -2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]-heptadeca-1(17),2,11,13,15-pentaenecopper(II) ion OH-adduct
8.45	Copper(III)
8.46	Dihydroxycopper(III) ion
8.47	Trihydroxycopper(III)
8.48	Amminecopper(III) complex
8.49	Ethylenediaminecopper(III) complex
8.50	5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecane-copper(III) ion
8.51	Chloro-5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecopper(III) ion
8.52	5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-dienecopper(III) ion
8.53	1,4,8,11-Tetraazacyclotetradecane(hydrido)copper(III) ion
8.54	5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradecane(hydrido)copper(III) ion
8.55	5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-4,11-diene(hydrido)copper(III) ion
8.56	2,2,4,11,11,13-Hexamethyl-1,5,10,14-tetraaza-cyclooctadeca-4,13-diene(hydrido)copper(III) ion
8.57	Bis(glycine)copper(III) complex
8.58	Bis(alanine)copper(III) complex
8.59	Bis(β -alanine)copper(III) complex
8.60	Bis(α -aminobutyric acid)copper(III) complex
8.61	Bis(β -aminobutyric acid)copper(III) complex
8.62	Bis(γ -aminobutyric acid)copper(III) complex
8.63	Bis(α -aminoisobutyric acid)copper(III) complex
8.64	Hydroperoxocopper(III) ion
8.65	Methylcopper(III) ion
8.66	Trichloromethylcopper(III) ion
8.67	2-Hydroxyethylcopper(III) ion
8.68	Carboxymethylcopper(III) ion
8.69	1-Carboxyethylcopper(III) ion
8.70	2-Hydroxy-2,2-dimethylethylcopper(III) ion
8.71	1,2-Dicarboxy-2-hydroxyethylcopper(III) ion
8.72	2-Carboxy-2,2-dimethylethylcopper(III) ion
8.73	2-Ammonio-2-carboxypropylcopper(III) ion
8.74	Benzylcopper(III) ion
8.75	(4-Chlorophenyl)methylcopper(III) ion
8.76	2-Hydroxyphenoxy copper(III) ion
8.77	3-Hydroxyphenoxy copper(III) ion
8.78	4-Hydroxyphenoxy copper(III) ion, conjugate base
8.79	3-Hydroxy-5-methylphenoxy copper(III) ion
8.80	(4-Methoxyphenyl)methylcopper(III) ion
8.81	(4-Methylphenyl)methylcopper(III) ion
8.82	Bis(glycinato)methylcopper(III) ion
8.83	β -Alaninato(2-aminoethyl)copper(III)
8.84	cis-Aqua(hydroxymethyl)(nitrilotriacetato)-cuprate(III) ion
8.85	cis-Aqua(1-hydroxyethyl)(nitrilotriacetato)-cuprate(III) ion
8.86	cis-Aqua(1-hydroxy-1-methylethyl)(nitrilo-triacetato)cuprate(III) ion
9.2	adduct Dicyanobis(4,4'-dimethyl-2,2'-bipyridine)ferrate(II), electron adduct
9.3	2,2'-Bipyridinetetracyanoferrate(II) ion, electron adduct
9.4	Tetracyano(4,4'-dimethyl-2,2'-bipyridine)ferrate(II) ion, electron adduct
9.5	Iron(II) oxalate
9.6	Pentacyanoferrate(II) ion
9.7	Pentacyanonitrosylferrate(II) ion
9.8	Acetonitrile(aqua)-2,3,9,10-tetramethyl-1,4,8,11-tetraazacyclotetradeca-1,3,8,10-tetraeneiron(II) ion
9.9	Diaqua(2,3,9,10-tetramethyl-1,4,8,11-tetraaza-cyclotetradeca-1,3,8,10-tetraeneiron(II) ion
9.10	5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphinatoiron(II) ion
9.11	$\alpha,\alpha,\alpha,\beta$ -Tetrakis(<i>N</i> -methylisonicotinamidophenyl)-porphinatoiron(II) ion
9.12	Iron(II) deuteroporphyrin (2-propanol) ₂
9.13	Tris(2,2'-bipyridine)iron(II) ion, OH-adduct
9.14	Bis(2,2'-bipyridine)dicyanoferrate(II), OH reaction product
9.15	Hydroperoxide-iron(III) iron(II) complex
9.16	Hydridoiron(III) ion
9.17	Hydroperoxide-iron(III) complex
9.18	Hydroperoxide-sulfatoiron(III) complex
9.19	Hydroperoxide-sulfatoiron(III) iron(II) complex
9.20	Hydridoiron(III) protoporphyrin
9.21	Hydroxymethyliron(III) protoporphyrin
9.22	1-Hydroxyethyliron(III) protoporphyrin
9.23	1-Hydroxy-1-methylethyliron(III) protoporphyrin
9.24	2-Hydroxyethyliron(III) protoporphyrin
9.25	2-Hydroxy-1-methylethyliron(III) protoporphyrin
9.26	Trifluoromethyliron(III) deuteroporphyrin (2-propoxy)(2-propanol)
9.27	Tris(1,10-phenanthroline)iron(III) ion
9.28	Aqua(methyl)nitrilotriacetatoferate(III) ion
9.29	Carboxylato(nitrilotriacetato)ferrate(III) ion
9.30	Carboxylato(2-hydroxyethylmethylenediamine-triacetato)ferrate(III) ion
9.31	Diethylenetriaminepentaacetatoferate(III), DTPA radical adduct
9.32	Tetracyano(2,2'-bipyridine)ferrate(III) ion
9.33	Sulfatoiron(III) ion
9.34	Ferricyanide ion
9.35	Carboxyferricium
9.36	1,1'-Dicarboxyferricium
9.37	Hydroxymethylferricium
9.38	(Dimethylaminomethyl)ferricium
9.39	Tris(2,2'-bipyridine)iron(III) ion, OH-adduct
9.40	Tris(2,2'-bipyridine)iron(III) ion, H-adduct
9.41	5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)porphineiron(III)-superoxide complex
9.42	Methyliron(IV) deuteroporphyrin (2-propanol) ₂
9.43	Iron(III) deuteroporphyrin (2-propanol) ₂ , $\cdot\text{CHCl}_2$ radical adduct
9.44	Iron(III) deuteroporphyrin (2-propoxy)(2-propanol), $\cdot\text{CF}_3$ reaction product

Table 9. Iron

9.1 Bis(2,2'-bipyridine)dicyanoferrate(II), electron

- 9.45 Iron(III) deuteroporphyrin dimethyl ester (2-propanol)₂, 1-hydroxy-1-methylethylperoxy adduct
 9.46 Ferrate(IV) ion
 9.47 5,10,15,20-Tetrakis(4-sulfonatophenyl)-porphinatoferate(III) radical cation
 9.48 Carbonatoiron(IV)
 9.49 Iron(IV) pyrophosphate
 9.50 Iron(IV) (hydroxo)undecatungstosilicate ion
 9.51 Dihydrogenferrate(V) ion
 9.52 Hydrogenferrate(V) ion
 9.53 Ferrate(V) ion

Table 10. Mercury

- 10.1 Mercury atom
 10.2 Mercury(I) ion, complex with mercury(0)
 10.3 Mercury(I) ion
 10.4 Mercury(I) hydroxide
 10.5 Mercury(I)
 10.6 Mercury(I) bromide
 10.7 Bromomercury(I)peroxy
 10.8 Mercury(I) chloride
 10.9 Chloromercury(I)peroxy
 10.10 Mercury(I) cyanide
 10.11 Mercury(I) iodide
 10.12 Mercury(I) thiocyanate
 10.13 Thiocyanatomercury(I)peroxy

Table 11. Indium

- 11.1 Indium atoms
 11.2 Indium(II) ion
 11.3 Tetrakis(4-N-methylpyridyl)porphineindium(III) radical anion
 11.4 5,10,15,20-Tetrakis(4-sulfonatophenyl)-porphinatoindate(III) radical cation

Table 12. Iridium

- 12.1 Hexachloroiridate(III) ion, electron adduct
 12.2 Bis(2,2'-bipyridine)([2,2'-bipyridin]-3-yl-C,N')-iridium(III) ion, conjugate acid, electron adduct
 12.3 Bis(2,2'-bipyridine)([2,2'-bipyridin]-3-yl-C,N')-iridium(III) ion, electron adduct
 12.4 Bis(2,2'-bipyridine)([2,2'-bipyridin]-3-yl-C,N')-iridium(IV) ion, conjugate monoacid
 12.5 Hexachloroiridate(IV) ion

Table 13. Manganese

- 13.1 5,10,15,20-Tetrakis(4-sulfonatophenyl)-porphinatomanganate(II) radical anion
 13.2 5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)-porphinatomanganate(II) radical anion
 13.3 5,10,15,20-Tetrakis(4-sulfonatophenyl)-porphinatomanganate(II) ion
 13.4 5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)-porphinatomanganate(II) ion
 13.5 5,10,15,20-Tetrakis(4-pyridyl)-porphinatomanganate(II)
 13.6 5,10,15,20-Tetrakis[4-(N,N,N-trimethyl-

- ammonio)phenyl]porphinatomanganate(II) ion
 13.7 $\alpha,\alpha,\alpha,\beta$ -Tetrakis[2-(N-methylisonicotinamido)-phenyl]porphinatomanganate(II) ion
 13.8 5,10,15,20-Tetrakis(4-carboxyphenyl)-porphinatomanganate(II) ion
 13.9 Nitrilotriacetatomanganate(II) ion, H-abstraction product
 13.10 Ethylenediaminetetraacetatomanganate(II) ion, H-abstraction product
 13.11 Manganese(III) ion
 13.12 Hydroxymanganese(III) ion
 13.13 Peroxidomanganese(III) ion
 13.14 Peroxidomanganese(III) formate
 13.15 Hydroperoxidomanganese(III) formate complex
 13.16 Peroxidomanganese(III)-manganese(II) formate complex
 13.17 Manganese(III) phosphate complex
 13.18 Peroxidomanganese(III) phosphate complex
 13.19 Manganese(III) pyrophosphate complex
 13.20 Manganese(III) sulfate complex
 13.21 Peroxidomanganese(III) sulfate complex
 13.22 Hydroperoxidomanganese(III) sulfate complex
 13.23 Peroxidomanganese(III)-manganese(II) sulfate complex
 13.24 Dibromomanganese(III) ion
 13.25 Chloromanganese(III) ion
 13.26 Dichloromanganese(III) ion
 13.27 Peroxido(ethylenediaminediacetato)manganate(III) ion
 13.28 Aqua(methyl)nitrilotriacetatomanganate(III) ion
 13.29 Bromo[5,10,15,20-tetrakis(4-sulfonatophenyl)-porphinatomanganate(III) ion
 13.30 2-Hydroxy-2,2-dimethylethyltetrakis(4-sulfonatophenyl)porphinatomanganate(III) ion
 13.31 Bromo[5,10,15,20-tetrakis(1-methylpyridinium-4-yl)porphinatomanganate(III) ion
 13.32 2-Hydroxy-2,2-dimethylethyl[5,10,15,20-tetrakis(1-methylpyridinium-4-yl)porphinatomanganate(III) ion
 13.33 Dichlorohydroxy(1,4,7,11-tetraazacyclotetradecane)manganese(IV) ion
 13.34 Dichloro-*meso*-5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradecane(hydroxy)-manganese(IV) ion
 13.35 Dichloro-*rac*-5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradecane(hydroxy)-manganese(IV) ion
 13.36 Manganese(V)

Table 14. Molybdenum

- 14.1 18-Molybdodiphosphate ion(7-), conjugate acid
 14.2 Bis(μ -oxo)(ethylenediaminetetraacetato)-bis[oxomolybdate(IV)(V)] ion
 14.3 Bis(μ -oxo)bis[aqua(oxalato)oxomolybdate(IV)(V)] ion
 14.4 Octacyanomolybdate(V) ion
 14.5 *cis*-Octaaqua- μ -oxo-bis(oxo)dimolybdenum(IV) ion
 14.6 Hexaaquadi- μ -oxodioxodimolybdenum(V,VI) ion

Table 15. Nickel

- 15.1 Nickel(I) ion
 15.2 Tetracyanonickelate(I) ion
 15.3 Tris(cyano)nickelate(I) ion
 15.4 1,4,7,10-Tetraazacyclotridecanenickel(I) ion
 15.5 9-Methyl-9-nitro-1,4,7,11-tetraazacyclotridecane-nickel(II) ion, electron adduct
 15.6 1,4,8,11-Tetraazacyclotradecanenickel(I) ion
 15.7 1,4,8,11-Tetramethyl-1,4,8,11-tetraaza-cyclotetradecane-nickel(I) ion
 15.8 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradecane-nickel(I) ion
 15.9 1,4,5,7,7,8,11,12,14,14-Decamethyl-1,4,8,11-tetraazacyclotradecane-nickel(I) ion
 15.10 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-4,11-dienenickel(I) ion
 15.11 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-1,4,8,11-tetraenenickel(I) ion
 15.12 α -2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]-heptadeca-1(17),13,15-trienenickel(I) ion
 15.13 α -2,12-Dimethyl-3,7,11,17-tetraazabicyclo[11.3.1]-heptadeca-1(17),2,11,13,15-pentaenickel(I) ion
 15.14 8-Methyl-8-nitro-1,3,6,10,13,15-hexaaza-tricyclo[13.1.1.1^{13,15}]octadecanenickel(II) ion, electron adduct
 15.15 8-Amino-8-methyl-1,3,6,10,13,15-hexaaza-tricyclo[13.1.1.1^{13,15}]octadecanenickel(I) ion
 15.16 3,7-Bis(2-aminoethyl)-1,3,5,7-tetraaza-bicyclo[3.3.1]nonanenickel(I) ion
 15.17 Nitrilotriacetatonickelate(I) ion
 15.18 *N*-Methyl-5,10,15,20-tetrakis(4-sulfonatophenyl)-porphinatonickelate(II), radical anion
 15.19 Hydroxymethylnickel(II) ion
 15.20 Carboxylatonickel(II)
 15.21 1-Hydroxyethylnickel(II) ion
 15.22 1-Hydroxy-1-methylethylnickel(II) ion
 15.23 1-Ethoxyethylnickel(II) ion
 15.24 Cyclopentylnickel(II) ion
 15.25 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradecanenickel(II) ion, OH reaction product
 15.26 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-4,11-dienenickel(II) ion, OH reaction product
 15.27 Iminodiacetatonickelate(II), H-abstraction product
 15.28 Bis(iminodiacetato)nickelate(II), H-abstraction product
 15.29 Nitrilotriacetatonickelate(II), H-abstraction product
 15.30 Ethylenediaminetetraacetatonickelate(II), H-abstraction product
 15.31 Amminenickel(III) ions
 15.32 Ethylenediaminenickel(III) ions
 15.33 Glycinatonickel(III) ion
 15.34 Bis(1,4,7-triazacyclononane)nickel(III) ion
 15.35 1,4,7,10-Tetraazacyclotidecanenickel(III) ion
 15.36 9-Methyl-9-nitro-1,4,7,11-tetraazacyclotidecane-nickel(III) ion
 15.37 11,13-Dimethyl-1,4,7,10-tetraazacyclotideca-10,13-dienenickel(III) ion
 15.38 11,13-Dimethyl-1,4,7,10-tetraazacyclotideca-10,13-dienenickel(III) ion, conjugate base
 15.39 Aquabromo-11-methyl-13-(trifluoromethyl)-1,4,7,10-tetraazacyclotideca-10,13-dienenickel(III) ion
 15.40 Diaqua-11-methyl-13-(trifluoromethyl)-1,4,7,10-tetraazacyclotideca-10,13-dienenickel(III) ion, conjugate base
 15.41 Aquamethyl(1,4,8,11-tetraazacyclotetradecane)-nickel(III) ion
 15.42 1,4,8,11-Tetraazacyclotetradecanenickel(III) ion
 15.43 β -rac-(5,7,7,12,12,14-Hexamethyl-1,4,8,11-tetraazacyclotetradecane)nickel(III) ion
 15.44 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradecanenickel(III) ion
 15.45 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradecanedi(phosphato)nickel(III) ion
 15.46 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-4,11-dienenickel(III) ion
 15.47 5,7,7,12,14,14-Hexamethyl-1,4,7,11-tetraaza-cyclotetradeca-4,11-diene(hydroxo)nickel(III) ion
 15.48 Bromo(5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene)nickel(III) ion
 15.49 Dichloro(5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene)nickel(III) ion
 15.50 5,7,7,12,14,14-Hexamethyl-1,4,8,11-tetraaza-cyclotetradeca-1,4,8,11-tetraenenickel(III) ion
 15.51 1,4,8,12-Tetraazacyclpentadecanenickel(III) ion
 15.52 1,4,7,10,13-Pentaazacyclohexadecanenickel(III) ion
 15.53 8-Methyl-8-nitro-1,3,6,10,13,15-hexaaza-tricyclo[13.1.1.1^{13,15}]octadecanenickel(III) ion
 15.54 8-Amino-8-methyl-1,3,6,10,13,15-hexaaza-tricyclo[13.1.1.1^{13,15}]octadecanenickel(III) ion
 15.55 3,7-Bis(2-aminoethyl)-1,3,5,7-tetraaza-bicyclo[3.3.1]nonanenickel(III) ion
 15.56 Diaqua- α -2,12-Dimethyl-3,7,11,17-tetraaza-bicyclo[11.3.1]heptadeca-1(17),13,15-trienenickel(III) ion
 15.57 Hydroxy- α -2,12-dimethyl-3,7,11,17-tetraaza-bicyclo[11.3.1]heptadeca-1(17),13,15-trienenickel(III) ion
 15.58 Aquabromo- α -2,12-dimethyl-3,7,11,17-tetraaza-bicyclo[11.3.1]heptadeca-1(17),13,15-trienenickel(III) ion
 15.59 Aqua- α -2,12-dimethyl-3,7,11,17-tetraaza-bicyclo[11.3.1]heptadeca-1(17),13,15-triene(thiocyanato)nickel(III) ion
 15.60 α -2,12-Dimethyl-3,7,11,17-tetraaza-bicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaene(hydroxo)nickel(III) ion
 15.61 α -2,12-Dimethyl-3,7,11,17-tetraaza-bicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaenabis(hydroxo)nickel(III) ion
 15.62 Aquabromo- α -2,12-dimethyl-3,7,11,17-tetraaza-bicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaenickel(III) ion
 15.63 Aqua- α -2,12-dimethyl-3,7,11,17-tetraaza-bicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaene(thiocyanato)nickel(III) ion

- 15.64 α -2,12-Dimethyl-3,7,11,17-tetraaza-bicyclo[11.3.1]heptadeca-1(17),2,11,13,15-pentaenabis(thiocyanato)nickel(III) ion
- 15.65 Aquabromo- α -2,12-dimethyl-3,7,11,17-tetraaza-bicyclo[11.3.1]heptadeca-1(17),2,6,11,13,15-hexaaenеникель(III) ion
- 15.66 Dibromo- α ,2,12-dimethyl-3,7,11,17-tetraaza-bicyclo[11.3.1]heptadeca-1(17),2,6,11,13,15-hexaaenеникель(III) ion
- 15.67 Aqua- α -2,12-dimethyl-3,7,11,17-tetraaza-bicyclo[11.3.1]heptadeca-1(17),2,6,11,13,15-hexaaene(thiocyanato)nickel(III) ion
- 15.68 α -2,12-Dimethyl-3,7,11,17-tetraaza-bicyclo[11.3.1]heptadeca-1(17),2,6,11,13,15-hexaaenabis(thiocyanato)nickel(III) ion
- 15.69 Bromo- α -2,12-dimethyl-3,7,11,17-tetraaza-bicyclo[11.3.1]heptadeca-1(17),2,6,11,13,15-hexaaenеникель(III) ion
- 15.70 Ethylenediaminetetraacetatonickelate(III) ion
- 15.71 Hydroxy(ethylenediaminetetraacetato)nickelate(III) ion
- 15.72 Aqua(ethylenediaminetetraacetato)nickelate(III) ion
- 15.73 Dioxonickel(IV) ion
- 15.74 Dioxonickel(IV) ion, protonated

Table 16. Osmium

- 16.1 Tris(2,2'-bipyridine)osmium(III) ion
- 16.2 Tris(5,5'-dimethyl-2,2'-bipyridine)osmium(III) ion
- 16.3 Tris(1,10-phenanthroline)osmium(III) ion
- 16.4 Tris(5-chloro-1,10-phenanthroline)osmium(III) ion

Table 17. Lead

- 17.1 Lead atom
- 17.2 Lead(I) ion
- 17.3 Lead(I)
- 17.4 Tetrakis(1-methylpyridinium-4-yl)porphinatolead(II) radical cation
- 17.5 Tetrakis(1-methylpyridinium-3-yl)porphinatolead(II) radical cation
- 17.6 5,10,15,20-Tetrakis(4-sulfonatophenyl)-porphinatoplumbate(II) radical cation
- 17.7 Lead(III)
- 17.8 Dihydroxylead(III) ion
- 17.9 Tetrahydroxyplumbate(III) ion
- 17.10 Hydroxy(oxo)lead(IV) ion

Table 18. Palladium

- 18.1 Palladium(I) ion
- 18.2 Bis(hydroxyprolinato)palladate(I) ion
- 18.3 5,10,15,20-Tetrakis(4-sulfonatophenyl)-porphinatopalladate(II) radical anion

Table 19. Platinum

- 19.1 Triammineaquaplatinum(I) ion
- 19.2 *cis*-Diamminedichloroplatinate(I) ion
- 19.3 *trans*-Diamminedichloroplatinate(I) ion
- 19.4 Tetra bromoplatinate(I) ion
- 19.5 Tetrachloroplatinate(I) ion

- 19.6 Tetracyanoplatinate(I) ion
- 19.7 Bis(ethylenediamine)platinum(I) ion
- 19.8 Chloro(diethylenetriamine)platinum(I)
- 19.9 *cis*-Bis(glycinato)platinate(I) ion
- 19.10 *trans*-Bis(glycinato)platinate(I) ion
- 19.11 Bis(ethylenediamine)platinum(II), H reaction product
- 19.12 Chloro(diethylenetriamine)platinum(II), H reaction product
- 19.13 Chloro(tetraethylidethylenetriamine)platinum(II), H reaction product
- 19.14 *cis*-Bis(glycinato)platinum(II), H reaction product
- 19.15 *trans*-Bis(glycinato)platinum(II), H reaction product
- 19.16 Octahydrogen tetrakis(μ -diphosphito)diplatinate(I)(II) ion
- 19.17 Tetraamminehydridoplatinum(III) ion
- 19.18 Tetraammine(aqua)hydroxyplatinum(III) ion
- 19.19 Tetraamminebis(hydroxy)platinum(III) ion
- 19.20 Tetraamminebis(aqua)platinum(III) ion
- 19.21 Tetraammineplatinum(II), Cl_2^{--} reaction product
- 19.22 *cis*-Diamminedichloroplatinum(II), OH reaction product
- 19.23 *trans*-Diamminedichloroplatinum(II), OH reaction product
- 19.24 *cis*-Dichlorobis(isopropylamine)-*trans*-dihydroxyplatinate(III) ion
- 19.25 Tetrachloroplatinate(II), Cl_2^{--} reaction product
- 19.26 Hexachloroplatinate(III) ion
- 19.27 Pentachloroplatinate(III) ion
- 19.28 Aquapentachloroplatinate(III) ion
- 19.29 Aquatetrachlorohydroxyplatinate(III) ion
- 19.30 Tetrachlorohydroxyplatinate(III)
- 19.31 Dichlorobis(hydroxy)platinate(III) ion
- 19.32 Tetrabromo(hydroxy)platinate(III) ion
- 19.33 Hexabromoplatinate(III) ion
- 19.34 Bis(ethylenediamine)platinum(II), Cl_2^{--} reaction product
- 19.35 Chlorobis(ethylenediamine)platinum(III) ion
- 19.36 Aquabis(ethylenediamine)hydroxyplatinate(III) ion
- 19.37 Bis(ethylenediamine)platinum(III) ion, deprotonated
- 19.38 Diaquabis(ethylenediamine)platinum(III) ion
- 19.39 Chloro(diethylenetriamine)platinum(II), Cl_2^{--} reaction product
- 19.40 Chloro(diethylenetriamine)platinum(II), OH reaction product
- 19.41 Diethylenetriamine(pyridine)platinum(II) ion OH- adduct
- 19.42 Chloro(tetraethylidethylenetriamine)platinum(II), Cl_2^{--} reaction product
- 19.43 Chloro(tetraethylidethylenetriamine)platinum(II), OH reaction product
- 19.44 1,8-Diamino-3,6,10,13,16,19-hexazabicyclo[6.6.6]eicosaneplatinum(III) ion
- 19.45 *cis*-Bis(glycinato)platinum(II), OH reaction product
- 19.46 *trans*-Bis(glycinato)platinum(II), OH reaction product
- 19.47 Octahydrogen tetrakis(μ -diphosphito)diplatinate(II)(III) ion
- 19.48 *cis*-[Dichlorobis(1-(2-hydroxyethyl)-2-methyl-5-

- nitroimidazole- N^3)]platinum(III) ion
 19.49 *cis*-Dichlorobis(isopropylamine)-*trans*-dihydroxyplatinum(IV), OH reaction product

Table 20. Rhenium

- 20.1 Rhenate(VI) ion

Table 21. Rhodium

- 21.1 Chlorotris[3-(diphenylphosphino)-benzenesulfonato]rhodate(0) ion
 21.2 η^5 -Pentamethylcyclopentadienyl(2,2'-bipyridine)rhodium(I) ion
 21.3 Tris(2,2'-bipyridine)rhodium(I) ion
 21.4 Tetrakis[μ -(1,3-diisocyanopropane)]dirhodium(I)(II) ion
 21.5 η^5 -Pentamethylcyclopentadienyl(2,2'-bipyridine)(hydroxy)rhodium(II) ion
 21.6 η^5 -Pentamethylcyclopentadienyl(2,2'-bipyridine)(iodo)rhodium(II) ion
 21.7 Aquatriamminerhodium(II) ion
 21.8 Tetraamminerhodium(II) ion
 21.9 1,3,6,8,10,13,16,19-Octaazabicyclo[6.6.6]-eicosanerhodium(II) ion
 21.10 Bis(2,2'-bipyridine)rhodium(II) ion
 21.11 Tris(2,2'-bipyridine)rhodium(II) ion
 21.12 η^5 -Pentamethylcyclopentadienyl(2,2'-bipyridine)hydridorhodium(III) ion
 21.13 Tetraammine(superoxido)rhodium(III) ion

Table 22. Ruthenium

- 22.1 Pentaammine(dinitrogen)ruthenium(I) ion
 22.2 Bis(2,2'-bipyridine)bis(cyano)ruthenate(II) ion, electron adduct
 22.3 Tris(2,2'-bipyridine)ruthenium(II) ion, electron adduct
 22.4 Bis(2,2'-bipyridine)(4-carboxy-4'-methyl-2,2'-bipyridine)ruthenium(II) ion, electron adduct
 22.5 Bis(2,2'-bipyridine)ruthenium(II)(4-carboxy-4'-methyl-2,2'-bipyridine)(prolylprolinato)-pentaamminecobalt(III), electron adduct
 22.6 Bis(2,2'-bipyridine)(2,2'-bipyrimidine)ruthenium(II) ion, electron adduct
 22.7 Bis(2,2'-bipyridine)(2,2'-bipyrimidine)ruthenium(II) ion, electron adduct, protonated
 22.8 (2,2'-Bipyrazine)bis(2,2'-bipyridine)ruthenium(II) ion, electron adduct
 22.9 (2,2'-Bipyrazine)bis(2,2'-bipyridine)ruthenium(II) ion, electron adduct, protonated
 22.10 (2,2'-Bipyrazine)(2,2'-bipyridine)(2,2'-bipyrimidine)ruthenium(II) ion, electron adduct
 22.11 (2,2'-Bipyrazine)(2,2'-bipyridine)(2,2'-bipyrimidine)ruthenium(II) ion, electron adduct, protonated
 22.12 Tris(2,2'-bipyrimidine)ruthenium(II) ion, electron adduct
 22.13 Tris(2,2'-bipyrimidine)ruthenium(II) ion, electron adduct, protonated
 22.14 (2,2'-Bipyridine)bis(2,2'-bipyrimidine)ruthenium(II) ion, electron adduct
 22.15 (2,2'-Bipyridine)bis(2,2'-bipyrimidine)ruthenium(II)

- ion, electron adduct, protonated
 22.16 (2,2'-Bipyrazine)bis(2,2'-bipyrimidine)ruthenium(II) ion, electron adduct
 22.17 (2,2'-Bipyrazine)bis(2,2'-bipyrimidine)ruthenium(II) ion, electron adduct, protonated
 22.18 Tris(2,2'-bipyrazine)ruthenium(II) ion, electron adduct
 22.19 Tris(2,2'-bipyrazine)ruthenium(II) ion, electron adduct, protonated
 22.20 Bis(2,2'-bipyrazine)(2,2'-bipyridine)ruthenium(II) ion, electron adduct
 22.21 Bis(2,2'-bipyrazine)(2,2'-bipyridine)ruthenium(II) ion, electron adduct, protonated
 22.22 Bis(2,2'-bipyrazine)(2,2'-bipyrimidine)ruthenium(II) ion, electron adduct
 22.23 Bis(2,2'-bipyrazine)(2,2'-bipyrimidine)ruthenium(II) ion, electron adduct, protonated
 22.24 Tris(2,2'-bipyridine)ruthenium(II) ion, OH-adduct
 22.25 Tris(2,2'-bipyrazine)ruthenium(II) ion, OH-adduct
 22.26 Bis(2,2'-bipyridine)(dipyrido[3,2-*a*:2',3'-*c*]phenazine)ruthenium(II) ion, electron adduct, diprotonated
 22.27 Bis(2,2'-bipyridine)(dipyrido[3,2-*a*:2',3'-*c*]phenazine)ruthenium(II) ion, electron adduct, protonated
 22.28 Bis(2,2'-bipyridine)(dipyrido[3,2-*a*:2',3'-*c*]phenazine)ruthenium(II) ion, electron adduct
 22.29 Bis(2,2'-bipyridine)(6,7-dihydro-5,8-dimethyl dibenz[b,*j*][1,10]phenanthroline)ruthenium(II) ion, electron adduct
 22.30 Tris(4,4'-dimethyl-2,2'-bipyridine)ruthenium(II) ion, electron adduct
 22.31 Tris(1,10-phenanthroline)ruthenium(II) ion, electron adduct
 22.32 Tris(4,7-dimethyl-1,10-phenanthroline)ruthenium(II) ion, electron adduct
 22.33 Tris(5-chloro-1,10-phenanthroline)ruthenium(II) ion, electron adduct
 22.34 Tris(1,4,5,8-tetraazaphenanthrene)ruthenium(II) ion, electron adduct, protonated
 22.35 Tris(1,4,5,8-tetraazaphenanthrene)ruthenium(II) ion, electron adduct
 22.36 *trans*-Tetraammine(aqua)nitrosylruthenium(II) ion
 22.37 Pentaammine nitrosylruthenium(II) ion
 22.38 Decaammine(dinitrogen)diruthenium(I-II) ion
 22.39 Decaammine(dinitrogen)diruthenium(II) ion, OH-adduct
 22.40 Decaammine(dinitrogen)diruthenium(II-III) ion
 22.41 Tris(acetylacetato)ruthenate(II) ion
 22.42 Pentaammine(chloro)ruthenium(II) ion
 22.43 Pentaammine(aquo)ruthenium(II) ion
 22.44 Tris(2,2'-bipyridine)ruthenium(II) ion, H-adduct
 22.45 Pentaammine(dinitrogen)ruthenium(III) ion
 22.46 Hexacyanoruthenate(III) ion
 22.47 Bis(2,2'-bipyridine)bis(cyano)ruthenium(III) ion
 22.48 2-(Aminomethyl)pyridinebis(2,2'-bipyridine)ruthenium(III) ion
 22.49 2-(Aminomethyl)pyridinebis(2,2'-bipyridine)ruthenium(III) ion, deprotonated

- 22.50 Tris(2,2'-bipyridine)ruthenium(III) ion
 22.51 Tris(4,4'-dimethyl-2,2'-bipyridine)ruthenium(III) ion
 22.52 Tris(5,5'-dimethyl-2,2'-bipyridine)ruthenium(III) ion
 22.53 Ammine(2,2'-bipyridine)(2,2':6',2"-terpyridine)ruthenium(III) ion
 22.54 Tris(4-triethylphosphonio-2,2'-bipyridine)ruthenium(III) ion
 22.55 Tris(1,10-phenanthroline)ruthenium(III) ion
 22.56 Tris(5-bromo-1,10-phenanthroline)ruthenium(III) ion
 22.57 Tris(5-chloro-1,10-phenanthroline)ruthenium(III) ion
 22.58 Tris(5,6-dimethyl-1,10-phenanthroline)ruthenium(III) ion
 22.59 Tris(4,7-dimethyl-1,10-phenanthroline)ruthenium(III) ion
 22.60 Tris(5-methyl-1,10-phenanthroline)ruthenium(III) ion
 22.61 Tris(5-phenyl-1,10-phenanthroline)ruthenium(III) ion
 22.62 Tris(3,4,7,8-tetramethyl-1,10-phenanthroline)ruthenium(III) ion
 22.63 Bis(2,2'-bipyridine)[2-(2-thiazolyl)pyridine]ruthenium(III) ion
 22.64 2,2'-Bipyridinebis[2-(2-thiazolyl)pyridine]ruthenium(III) ion
 22.65 Tris[2-(2-thiazolyl)pyridine]ruthenium(III) ion
 22.66 Tris(2,2'-bithiazole)ruthenium(III) ion
 22.67 Tris[2-(1,2,4-thiadiazol-5-yl)pyridine]ruthenium(III) ion
 22.68 Hexaammineruthenium(III) ion, OH reaction product
 22.69 Pentaammine(chloro)ruthenium(III) ion, OH reaction product
 22.70 Pentaammine(acetylenedicarboxylato)ruthenium(III), OH-adduct

Table 23. Antimony

- 23.1 3,8,13,18-Tetrakis(carboxymethyl)porphine-2,7,12,17-tetrapropanoato(chloro)-oxoantimony(V) radical anion

Table 24. Tin

- 24.1 Tin(III)
 24.2 Dichloro[5,10,15,20-tetrakis(4-sulfonatophenyl)-porphinato]stannate(IV) radical anion
 24.3 5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)-porphinatotin(IV) radical anion

Table 25. Thallium

- 25.1 Thallium(0)
 25.2 Thallium(I) ion, complex with Tl(0)
 25.3 Thallium(0), complex with thallium(I) ion, dimer
 25.4 Thallium(II) ion
 25.5 Hydroxythallium(II) ion
 25.6 Dihydroxythallium(II)
 25.7 Chlorothallium(II) ion
 25.8 Dichlorothallium(II)
 25.9 Trichlorothallate(II) ion
 25.10 Tetrachlorothallate(II) ion
 25.11 Thallium(II) ions

Table 26. Vanadium

- 26.1 Vanadyl(III) ion

Table 27. Tungsten

- 27.1 12-Tungstate ion(7-), dihydrogen

Table 28. Zinc

- 28.1 Zinc(I)
 28.2 Zinc(I) ion
 28.3 1,4,8,11-Tetrazacyclotetradecanezinc(I) ion
 28.4 Tetrakis-4-(*N,N,N*-trimethylammonio)phenylporphinezinc(II) radical anion
 28.5 5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)-porphinezinc(II) radical anion
 28.6 5,10,15,20-Tetrakis(4-sulfonatophenyl)-porphinatozincate(II) radical anion
 28.7 5,10,15,20-Tetrakis[1-(3-sulfonatopropyl)-pyridinium-4-yl]porphinato-zinc(II) radical anion
 28.8 Tetrakis-*N*-methyl-2,3-pyridinoporphyrazinezinc(II) radical anion
 28.9 Trisulfophthalocyaninczincate(II) radical anion
 28.10 Nitrilotriacetatozinc(II), H-abstraction product
 28.11 Ethylenediaminetetraacetatozinc(II), H-abstraction product
 28.12 5,10,15,20-Tetrakis(1-methylpyridinium-3-yl)-porphinatozinc(II), H-adduct
 28.13 5,10,15,20-Tetrakis(1-methylpyridinium-3-yl)-porphinatozinc(II) radical cation
 28.14 5,10,15,20-Tetrakis(1-methylpyridinium-4-yl)-porphinatozinc(II) radical cation
 28.15 5,10,15,20-Tetrakis(4-sulfonatophenyl)-porphinatozincate(II) radical cation
 28.16 Hydroxy(tetrakis(2-hydroxyphenyl)porphinato)-zinc(II) radical cation, deprotonated
 28.17 Hydroxy(tetrakis(3-hydroxyphenyl)porphinato)-zinc(II) radical cation, deprotonated
 28.18 5,10,15,20-Tetrakis[1-(3-sulfonatopropyl)-pyridinium-4-yl]porphinatozinc(II) radical cation
 28.19 5,10,15,20-Tetrakis[1-(3-sulfonatopropyl)-pyridinium-2-yl]porphinatozinc(II) radical cation
 28.20 5,10,15,20-Tetrakis(2-*N*-hexylpyridyl)-porphinatozinc(II) radical cation
 28.21 Tetrakis-4-(*N,N,N*-trimethylammonio)-phenylporphinezinc(II) radical cation
 28.22 5,10,15,20-Tetrakis(2,6-dichloro-3-sulfonatophenyl)porphinatozincate(II) radical cation
 28.23 Zinc(II) uroporphyrin radical cation
 28.24 Zinc(II) hematoporphyrin radical anion