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First Spectra of Neon, Argon, and Xenon 136 in the 1.2–4.0 μm Region

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Descriptions of the first spectra of neon, argon, and xenon 136, comprising calculated wavelengths, calculated wave numbers, relative intensities, and classifications, are presented. The calculated values are derived from currently best established energy levels, obtained mostly from interferometric observations and adopted as standards by the International Astronomical Union. All listed lines have actually been observed. This paper makes available a compilation of all results previously presented in fragmentary or relatively inaccessible reports with intensities normalized to as nearly a uniform scale as the various observations permit.

Key words: Argon; extraphotographic region; infrared emission spectra; intensities; neon; wavelengths; wavelength standards; wave numbers; xenon.

1. Experimental Background

The wavelength limits of the coverage specified in the title represent at the lower end the practical upper limit of photographic response,[1] and at the upper end the long wavelength limit of response of lead sulfide detectors cooled to the temperature of liquid nitrogen. Both of these limits have been set somewhat arbitrarily. Abundant photographic observations at wavelengths short of 1.2 μm have not been significantly augmented by radiometric methods. At the upper end of the scale the dearth of energetic transitions at greater wavelengths than the $4f$–$5g$ transitions, which have been reported in a previous publication, [1] [2] do not appear to justify the use of detectors responsive to wavelengths greater than 4 μm.

Very complete descriptions of the noble-gas spectra in the photographic infrared region became available in a series of three NBS publications that appeared about forty years ago. The first by Humphreys and Meggers [2] described Xe I, the second by Meggers and Humphreys [3] covered Ne I, Ar I, and Kr I, and the third by Meggers [4] extended the descriptions of all four of these together with helium to the limit of response of sensitized photographic emulsions, around 13 000 Å.

The investigation of these spectra in the extraphotographic infrared was carried out mostly as a program started in the Radiometry section at the National Bureau of Standards and continued in the Research Department of the former Naval Weapons Center, Corona, California. All lines or unresolved features reported in this article were actually observed in connection with the program. A significant number of these features has been observed independently in other laboratories. Such work is referenced and notes are introduced into the tables to indicate prior or improved observations.

During 1949, taking advantage of the then newly-available lead sulfide detectors developed and constructed by Cashman [5], Sittner and Peck [6] observed the spectra of argon, krypton, and xenon between about 1.2 and 1.8 μm. They excited the spectra in flash tubes. A short time later Humphreys and Kostkowski [7] at the National Bureau of Standards reobserved these spectra over the same region, making significant extensions and including helium and neon in the program. Geissler tubes were employed as sources.

Additional results, permitted by use of microwave-excited electrodeless tubes were reported by Humphreys and Paul in 1958 [8]. During the same period Hepner reported observations of Ne I and Ar I [9], also a little earlier Xe I [10]. Wavelength measurements on Ne I by Rao are included in the book *Wavelength Standards in the Infrared* [11]. During the period 1960 to 1965 increments to the descriptions resulting from refinements of observing techniques were reported at meetings of the Optical Society of America [12], [13]. In 1965 Séguier [14] reported the observation of several resolved complex features of Ar I between 1.2 and 1.8 μm by use of a grille spectrometer as designed by Girard [15].

Use of liquid-nitrogen cooling of PbS detectors begun by the author about 1961 permitted extension of descriptions of noble-gas spectra to 4.0 μm and interpretation of the $4f$–$5g$ transitions that represented the first observed examples in atomic spectra of essentially pure pair coupling. The results were presented at several meetings [16], [17] and reported in final form in an article published jointly with Paul, Cowan, and Andrew in 1967 [1] and are not included in this article.

Reobservation of the $3d$–$4f$ transitions in Ne I by Johansson [18] in 1964, and of the $3d$–$5f$ transitions by Litzén [19] in 1968, has led to wavelength values considered somewhat more precise than those previously reported.

An essentially complete description of Kr I including the infrared region is provided by the article by Kaufman and Humphreys [20]. Data pertaining to that spectrum

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[1] The description of Ne I is started with λ 11 143 Å because several very intense lines of the category $3p$–$4s$ that are very precisely measured and therefore promising as wave length standards are located between this point and 12 000 Å.

[2] Figures in brackets indicate the literature references.

are omitted therefore from this paper. The article on krypton does not include transitions involving f-levels, since those levels had not been determined precisely by interferometric methods. Essentially all the missing transitions are described in the paper by Humphreys and Kostkowski [7].

The most extensive available descriptions of noble-gas spectra that include coverage of the infrared region as far as 2.5 μm are to be found in the book by Striganov and Sventitskii [21]. Those authors have utilized the data contained in articles referenced here to prepare the compilations. *Wavelength Standards in the Infrared* [11] contains wavelengths, wave numbers, and intensities of the stronger lines of neon, argon, krypton, and xenon. The wavelength entries are in most instances derived from interferometric determinations of the energy levels involved. A list of calculated vacuum wavelengths of Ar I in the infrared was given by Humphreys [22] in an article describing a new interferometric method of wavelength determination. A similar compilation of argon wavelengths is to be found in the report of Commission 14 of the International Astronomical Union [23] covering the meeting of 1964. A compilation of wavelengths of ^{136}Xe I in the infrared is included in a recent article by Humphreys and Paul [24] reporting interferometric measurements. The list of infrared lines in that article is brief, restricted to only the very intense transitions observable interferometrically.

About 1955 a unique radiometric technique for infrared wavelength determination was developed by Humphreys and Paul and first reported to the OSA [25] and later in the referenced article [22]. These investigations will be discussed in the following sections pertaining specifically to individual spectra only as necessary to explain the origin of the energy-level tables included.

An important consideration prompting the assembly of this material has been the need to achieve a consistent representation of relative intensities. The spectra were reported in small increments covering groups of observed features that had been produced under varying conditions. In each instance relative intensities were estimated within the groups, but there was no direct relationship between the scales applicable to different groups. Following the transfer of the infrared equipment from the Corona Laboratories to Purdue, the amplifying system was modified by the addition of a module to yield a logarithmic output. This modification was designed and built principally by Duane Saufley. Recordings were made of the three spectra under discussion using the modified output. These recordings have provided the principal basis for the estimates of relative intensities reported here. These intensities regarded as reliable over several hundred angstroms are not claimed to be absolutely accurate for the entire interval covered, since the spectral reponse of the detectors has not been taken into account and the properties of the gratings for different spectral regions only to a limited extent.

The presentation in the form of calculated wavelengths and wave numbers has been chosen because the use of officially adopted level values achieves a precision better by at least one significant figure over that obtainable by direct scanning except in the instance of features observed interferometrically. Such features are indicated where they appear in the tables.

2. Discussion of Individual Spectra

2.1. Ne I

Neon has been used for a very long time as a source of wavelength standards mainly because of the very intense red lines arising from $3s-3p$ transitions whose wavelengths have been known with high precision for half a century. Most of the energy of the infrared spectrum is in the photographic region. The region between 1.2 and 4.0 μm is however fairly well populated and many of the lines are particularly useful as internal standards in instances where neon is employed as a carrier gas in the construction of sources.

Most observations of Ne I have utilized the naturally occurring mixture of the isotopes of mass numbers 20 and 22 in the proportions of about 10 to 1. It is now possible to obtain essentially pure isotopes. However a refinement of observing techniques greater than is usually available is necessary to distinguish between the wavelengths of lines originating respectively in natural neon and neon of mass number 20 or to display the isotope effect in the former. This is because the natural line widths preclude the use of very long interference paths.

In common with all noble-gas spectra Ne I exhibits well-developed jK coupling. This is shown to an increasing extent for levels of large l-value. The f-level pairs are unresolvable. Owing to small electrostatic interaction and consequent small values of the F-parameters the levels of given l-value tend to form very compact groups. This situation also affects the distribution of the transitions so that the pattern of lines is one of relatively isolated groups. Abundance of overlapping transitions makes it difficult to find single lines among the $p-d$ and $d-f$ groups. Many of the $s-p$ transitions are however sufficiently isolated to offer promise of usefulness as standards.

The description of Ne I appears in table 1. It contains 221 entries of which a considerable number are components of multiple features unresolved on the records. The calculated wavelengths and wave numbers are derived from the set of energy levels recently reported by Kaufman and Minnhagen [26]. No table of neon energy levels is therefore included here. The relative values of most of these levels have been approved by

Commission 14 of the I.A.U.[3] The 3s (not considered in this description), 3p, and 4p levels were adopted by I.A.U. at the 1955 General Assembly [27]. Values of 4s and 3d levels were recommended at the 1958 Assembly [28]. A revised set of 4s levels, determined by interferometric observations in the infrared by Humphreys and Paul, NAVWEPS Report 7190, was reported at the 1964 Assembly. These 4s levels were utilized in combination with the previously adopted 3p and 4p levels to prepare a new set of calculated wavelengths of the 3p–4s and 4s–4p transitions, that are reported along with the 4s levels [23]. These transitions covering the range from 8865 to 33 511 Å appear promising as wavelength standards for the infrared region. Values of the 4d levels have not been adopted by the I.A.U.

Kaufman and Minnhagen [26] have discussed the selection of level values other than I.A.U. adoptions. In particular these selections include the values of 4f levels reported by Johannson [18] and the 5f by Litzén [19]. The absolute scale of the level system has been established by setting the value of the ground level $s^2p^6\,{}^1S_0$ equal to zero. This is the same practice used by Moore-Sitterly in A.E.L. [29]. However a new measurement of the wave number of the transition $2p^6\,{}^1S_0$–$2p^5\,({}^2P_{1\frac{1}{2}})3s[1\frac{1}{2}]^{\circ}_{1}$ by Kaufman and Minnhagen [26] giving 134 459.28 cm^{-1} and superseding the result reported by Petersson [30] has led to a shift of the scale relative to A.E.L. amounting to 1.950 cm^{-1}.

The precision of the calculated wave numbers and wavelengths depends upon the uncertainties of the energy-level values entered into the computations. Most of the levels have been adopted by the I.A.U. The rest were selected on the basis of the best experimental evidence available. In some cases these had not been adopted by the I.A.U. because of an insufficient number of independent concordant observations. In all cases the values of the levels were carried to 10^{-4} or 10^{-3} cm^{-1}. Accordingly where both levels involved in a transition are carried to four or three decimal places, the same number of places are retained in the wave numbers. For the sake of uniformity and following the practice of the I.A.U. in recent reports the same number of places is retained for the wavelengths. At a little beyond 22 000 Å an uncertainty of 0.001 cm^{-1} in the wave number is equivalent to 0.005 Å in the wavelength. It is therefore probably not advantageous to express wavelengths to more than two decimal places beyond that point. The actual location of an unresolved feature involving a transition between a single level and two others that are pair coupled depends on the relative intensities of the two resulting component lines. Such features should not be selected as wavelength standards.

[3] Commission 14 has always designated noble-gas levels in the Paschen notation. In this article the particular category of levels is indicated by the l-value of the valence electron preceded by its n-value.

2.2 Ar I

Naturally occurring argon is a mixture of three isotopes of even mass number, of which 99.6 percent is the isotope of mass number 40. The spectrum is therefore entirely free of hyperfine structure, and for practical purposes, of isotope effect. It has been used extensively as a source material for producing wavelength standards because of the homogeneity of the lines, the abundance of the element, and ease of operation of sources of simple design. Values of the energy levels, 4s, 4p, and 5p were adopted by Commission 14 of the I.A.U. at the 1955 Assembly [27]. These adopted values were based mainly on interferometric measurements by Burns and Adams [31], by Littlefield and Turnbull [32], and by Humphreys [33]. Following the first submission of interferometrically measured infrared wavelengths in the extraphotographic region to the I.A.U. Assembly in 1958, Commission 14 provisionally adopted the values of the 5s and 3d levels. Confirmatory concordant results obtained independently were reported at the 1961 Assembly [34]. Following subsequent new interferometric observations in the 1.0 to 2.0 μm region by Humphreys and Paul, Commission 14 adopted improved values of the 5s and 3d levels at the 1964 Assembly [23]. Further interferometric observations in the same region led to a determination of the 4f levels [35], and in one instance to a direct observation of a resolved f-pair. The foregoing explains the selection of most of the levels used in preparing the description. The 4d and 6s levels have been based mostly on the measurements of Burns and Adams [31] and the entries in A.E.L. [29], where the values have not been discussed specifically in this article.

Table 2, comprising 325 entries, displays the description of the Ar I spectrum in the infrared region. These entries are associated with individual transitions. In many instances recorded features represent unresolved related pairs or juxtaposed lines where there is a probable energy contribution from each. Table 3 contains the energy levels entered in the calculation of the description.

The Ar I results were assembled prior to some new interferometric observations in the photographic region. Norlén [36] has published a set of wavelengths between 5152 and 6953 Å. Observations by Li are now in progress at Purdue. The justification for the recent observations is that although the spectrum has been extensively investigated there have not been a sufficient number of concordant observations to permit final adoption of some of the energy levels. The new determinations are not expected to change the values of many of the levels by as much as 0.001 cm^{-1}. It has not been regarded as justifiable to await new energy-level values that might supersede some of those used in the reported calculated wavelengths.

2.3. ^{136}Xe I

Interest in xenon as a source material for the production of wavelength standards was aroused only when the techniques of isotope separation made available the isotope of mass number 136. Owing to small Doppler broadening the lines of xenon isotopes of even mass number should be sharper than those of any of the other noble gases. A further special advantage for infrared intercomparisons is the large number of very intense $6p$–$5d$ transitions between 2.0 and 4.0 μm and beyond, the spectrum being unique in this respect. Interferometric observations covering both the photographic and radiometric regions were reported recently by Humphreys and Paul [24]. These latter include only 15 lines. The present description is intended to supplement that of the referenced article by including all observed infrared lines. The background of the observations on ^{136}Xe I and the determination of level values are to be found in the previous article. No table of levels has therefore been included here. The calculated wavelengths and other descriptive data are compiled in table 4 comprising 148 entries. The same comments regarding multiple features apply here as in the instances of tables 1 and 2.

In addition to bringing together the descriptions of the infrared spectra of neon, argon, and xenon 136, in a single compilation, this article should provide a list of wavelengths of sufficient precision and adequate distribution to be useful as a set of wavelength standards for the region covered.

The assistance of Mr. Duane Saufley in making recordings with the logarithmic output is gratefully acknowledged. We are also indebted to Dr. Hui Li for several computer runs by which energy level differences were converted to wavelengths in air. The contributions of Edward Paul Jr. whose unflagging assistance over a period of many years led to the accumulation of a large part of the experimental data are also acknowledged with thanks and appreciation.

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TABLE 1. Description of Ne I, region 1.1–4.0 μm

Relative intensity	Calculated wavelength Air (Å)	Calculated wave number (cm⁻¹)	Classification
3000 [a]	11 143.0201	8971.7709	$3p[2\frac{1}{2}]_2-4s[1\frac{1}{2}]^\circ_1$
15	11 160.219	8957.945	$4s[1\frac{1}{2}]^\circ_2-5p[2\frac{1}{2}]_3$
3500 [a]	11 177.5276	8944.0731	$3p[2\frac{1}{2}]_3-4s[1\frac{1}{2}]^\circ_2$
5	11 292.964	8852.648	$4s[1\frac{1}{2}]^\circ_1-5p[1\frac{1}{2}]_2$
2	11 298.450	8848.349	$4s[1\frac{1}{2}]^\circ_2-5p[\frac{1}{2}]_1$
50	11 303.85	8844.12	$4s'[\frac{1}{2}]^\circ_1-5p'[1\frac{1}{2}]_2$
20	11 304.557	8843.569	$4s[1\frac{1}{2}]^\circ_1-5p[1\frac{1}{2}]_1$
10	11 329.613	8824.010	$4s'[\frac{1}{2}]^\circ_1-5p'[\frac{1}{2}]_1$
20	11 333.621	8820.890	$4s'[\frac{1}{2}]^\circ_1-5p'[1\frac{1}{2}]_1$
10	11 366.673	8795.241	$4s[1\frac{1}{2}]^\circ_1-5p[2\frac{1}{2}]_2$
1600 [a]	11 390.4340	8776.8937	$3p[2\frac{1}{2}]_2-4s[1\frac{1}{2}]^\circ_2$
1100 [a]	11 409.1344	8762.5078	$3p'[1\frac{1}{2}]_1-4s'[\frac{1}{2}]^\circ_1$
3000	11 522.7460	8676.1117	$3p'[1\frac{1}{2}]_2-4s'[\frac{1}{2}]^\circ_1$
1500	11 525.0195	8674.4002	$3p[1\frac{1}{2}]_1-4s[1\frac{1}{2}]^\circ_1$
950	11 536.3445	8665.8847	$3p'[\frac{1}{2}]_0-3d[1\frac{1}{2}]^\circ_1$
500	11 601.5367	8617.1889	$3p[\frac{1}{2}]_0-4s'[\frac{1}{2}]^\circ_1$
1200 [a]	11 614.0807	8607.8817	$3p'[1\frac{1}{2}]_1-4s'[\frac{1}{2}]^\circ_0$
300	11 688.0018	8553.4411	$3p'[\frac{1}{2}]_0-3d[\frac{1}{2}]^\circ_1$
2000 [a]	11 766.7924	8496.1672	$3p'[\frac{1}{2}]_1-4s'[\frac{1}{2}]^\circ_1$
1500	11 789.0436	8480.1312	$3p'[1\frac{1}{2}]_2-4s[1\frac{1}{2}]^\circ_1$
500	11 789.8892	8479.5230	$3p[1\frac{1}{2}]_1-4s[1\frac{1}{2}]^\circ_2$
1000	11 984.9125	8341.5411	$3p'[\frac{1}{2}]_1-4s'[\frac{1}{2}]^\circ_0$
3000 [a]	12 066.3339	8285.2540	$3p[1\frac{1}{2}]_2-4s[1\frac{1}{2}]^\circ_2$
800	12 459.3888	8023.8806	$3p'[1\frac{1}{2}]_1-4s[1\frac{1}{2}]^\circ_1$
20 [d]	12 464.080	8020.860	$3d[\frac{1}{2}]^\circ_0-5f[1\frac{1}{2}]_1$
70 [d]	12 486.721	8006.317	$3d[\frac{1}{2}]^\circ_1-5f[1\frac{1}{2}]_1$
	12 486.727	8006.313	$3d[\frac{1}{2}]^\circ_1-5f[1\frac{1}{2}]_2$
10	12 570.923	7952.690	$3d[3\frac{1}{2}]^\circ_4-5f[3\frac{1}{2}]_4$
	12 570.934	7952.683	$3d[3\frac{1}{2}]^\circ_4-5f[3\frac{1}{2}]_3$
10	12 573.727	7950.916	$3d[3\frac{1}{2}]^\circ_3-5f[3\frac{1}{2}]_4$
	12 573.738	7950.909	$3d[3\frac{1}{2}]^\circ_3-5f[3\frac{1}{2}]_3$
5	12 577.386	7948.603	$3d[3\frac{1}{2}]^\circ_4-5f[2\frac{1}{2}]_3$
250 [d]	12 584.630	7944.028	$3d[3\frac{1}{2}]^\circ_4-5f[4\frac{1}{2}]_5$
	12 584.646	7944.018	$3d[3\frac{1}{2}]^\circ_4-5f[4\frac{1}{2}]_4$
180 [d]	12 587.456	7942.244	$3d[3\frac{1}{2}]^\circ_3-5f[4\frac{1}{2}]_4$
300	12 595.0042	7937.4845	$3p'[1\frac{1}{2}]_2-4s[1\frac{1}{2}]^\circ_1$
100 [d]	12 604.197	7931.695	$3d[1\frac{1}{2}]^\circ_2-5f[2\frac{1}{2}]_2$
	12 604.208	7931.688	$3d[1\frac{1}{2}]^\circ_2-5f[2\frac{1}{2}]_3$
20	12 617.663	7923.230	$3d[1\frac{1}{2}]^\circ_2-5f[1\frac{1}{2}]_1$
	12 617.670	7923.226	$3d[1\frac{1}{2}]^\circ_2-5f[1\frac{1}{2}]_2$
120 [d]	12 640.223	7909.089	$3d'[2\frac{1}{2}]^\circ_2-5f'[2\frac{1}{2}]_2$
	12 640.255	7909.069	$3d'[2\frac{1}{2}]^\circ_2-5f'[2\frac{1}{2}]_3$
150 [d]	12 642.654	7907.568	$3d'[2\frac{1}{2}]^\circ_3-5f'[2\frac{1}{2}]_2$
	12 642.686	7907.548	$3d'[2\frac{1}{2}]^\circ_3-5f'[2\frac{1}{2}]_3$
60 [d]	12 651.021	7902.338	$3d[1\frac{1}{2}]^\circ_1-5f[2\frac{1}{2}]_2$
120 [d]	12 658.355	7897.760	$3d'[1\frac{1}{2}]^\circ_2-5f'[2\frac{1}{2}]_2$
	12 658.387	7897.740	$3d'[1\frac{1}{2}]^\circ_2-5f'[2\frac{1}{2}]_3$
25	12 664.587	7893.874	$3d[1\frac{1}{2}]^\circ_1-5f[1\frac{1}{2}]_1$
	12 664.594	7893.870	$3d[1\frac{1}{2}]^\circ_1-5f[1\frac{1}{2}]_2$
40 [d]	12 683.562	7882.064	$3d'[1\frac{1}{2}]^\circ_1-5f'[2\frac{1}{2}]_2$
1000	12 689.2008	7878.5617	$3p[\frac{1}{2}]_0-4s[1\frac{1}{2}]^\circ_1$
120 [d]	12 746.139	7843.368	$3d[2\frac{1}{2}]^\circ_2-5f[3\frac{1}{2}]_3$
160 [d]	12 749.036	7841.585	$3d[2\frac{1}{2}]^\circ_3-5f[3\frac{1}{2}]_4$
	12 749.047	7841.578	$3d[2\frac{1}{2}]^\circ_3-5f[3\frac{1}{2}]_3$
10 [d]	12 752.761	7839.295	$3d[2\frac{1}{2}]^\circ_2-5f[2\frac{1}{2}]_2$
	12 752.772	7839.288	$3d[2\frac{1}{2}]^\circ_2-5f[2\frac{1}{2}]_3$
13 [d]	12 755.673	7837.505	$3d[2\frac{1}{2}]^\circ_3-5f[2\frac{1}{2}]_2$
	12 755.684	7837.498	$3d[2\frac{1}{2}]^\circ_3\ 5f[2\frac{1}{2}]_3$
250	12 769.5248	7829.0034	$3p'[1\frac{1}{2}]_1-4s[1\frac{1}{2}]^\circ_2$
?	12 887.1594	7757.5400	$3p'[\frac{1}{2}]_1-4s[1\frac{1}{2}]^\circ_1$
1100	12 912.0141	7742.6073	$3p'[1\frac{1}{2}]_2-4s[1\frac{1}{2}]^\circ_2$
700	13 219.2406	7562.6628	$3p'[\frac{1}{2}]_1-4s[1\frac{1}{2}]^\circ_2$
20	14 300.830	6990.690	$4p[\frac{1}{2}]_1-5d[1\frac{1}{2}]^\circ_2$
18	14 342.163	6970.543	$4p[\frac{1}{2}]_1-5d[\frac{1}{2}]^\circ_1$
4	14 353.371	6965.100	$4p[\frac{1}{2}]_1-5d[\frac{1}{2}]^\circ_0$
4	14 499.925	6894.703	$4p[\frac{1}{2}]_0-5d'[1\frac{1}{2}]^\circ_1$
20	14 929.803	6696.182	$4p[2\frac{1}{2}]_3-5d[2\frac{1}{2}]^\circ_3$
	14 931.179	6695.565	$4p[2\frac{1}{2}]_3-5d[2\frac{1}{2}]^\circ_2$
100	14 984.856	6671.581	$4p[2\frac{1}{2}]_3-5d[3\frac{1}{2}]^\circ_3$
	14 986.312	6670.933	$4p[2\frac{1}{2}]_3-5d[3\frac{1}{2}]^\circ_4$
?	15 058.992	6638.736	$4p'[1\frac{1}{2}]_1-5d'[1\frac{1}{2}]^\circ_1$
40	15 074.171	6632.052	$4p'[1\frac{1}{2}]_1-5d'[2\frac{1}{2}]^\circ_2$
	15 074.990	6631.692	$4p'[1\frac{1}{2}]_1-5d'[1\frac{1}{2}]^\circ_2$
20	15 083.904	6627.772	$4p[2\frac{1}{2}]_2-5d[2\frac{1}{2}]^\circ_3$
	15 085.308	6627.155	$4p[2\frac{1}{2}]_2-5d[2\frac{1}{2}]^\circ_2$
50	15 140.101	6603.171	$4p[2\frac{1}{2}]_2-5d[3\frac{1}{2}]^\circ_3$
4	15 174.314	6588.283	$4p'[\frac{1}{2}]_1-5d'[1\frac{1}{2}]^\circ_1$
70	15 189.727	6581.598	$4p'[\frac{1}{2}]_1-5d'[2\frac{1}{2}]^\circ_2$
	15 190.558	6581.238	$4p'[\frac{1}{2}]_1-5d'[1\frac{1}{2}]^\circ_2$
	15 190.928	6581.078	$4p'[1\frac{1}{2}]_2-5d'[2\frac{1}{2}]^\circ_3$
	15 191.754	6580.720	$4p'[1\frac{1}{2}]_2-5d'[2\frac{1}{2}]^\circ_2$
	15 192.585	6580.360	$4p'[1\frac{1}{2}]_2-5d'[1\frac{1}{2}]^\circ_2$
800	15 230.7138	6563.8868	$3p'[\frac{1}{2}]_0-4s'[\frac{1}{2}]^\circ_1$
50	15 348.188	6513.647	$4p[1\frac{1}{2}]_1-5d[2\frac{1}{2}]^\circ_2$
30	15 370.081	6504.369	$4p[1\frac{1}{2}]_1-5d[1\frac{1}{2}]^\circ_1$
100	15 407.592	6488.534	$4p[1\frac{1}{2}]_2-5d[2\frac{1}{2}]^\circ_3$
	15 409.057	6487.917	$4p[1\frac{1}{2}]_2-5d[2\frac{1}{2}]^\circ_2$
40	15 450.890	6470.351	$4p[1\frac{1}{2}]_1-5d[\frac{1}{2}]^\circ_0$
	15 451.225	6470.211	$4p[1\frac{1}{2}]_2-5d[1\frac{1}{2}]^\circ_2$
10	15 466.232	6463.933	$4p[1\frac{1}{2}]_2-5d[3\frac{1}{2}]^\circ_3$
20	15 499.487	6450.064	$4p[1\frac{1}{2}]_2-5d[\frac{1}{2}]^\circ_1$
	15 500.887	6449.481	$4p[\frac{1}{2}]_1-6s[1\frac{1}{2}]^\circ_1$
30	15 604.203	6406.779	$4p[\frac{1}{2}]_1-6s[1\frac{1}{2}]^\circ_2$
50	16 022.732	6239.428	$3d[1\frac{1}{2}]_2-4f'[2\frac{1}{2}]^\circ_2$
	16 022.763	6239.416	$3d[1\frac{1}{2}]_2-4f'[2\frac{1}{2}]^\circ_3$
15	16 098.476	6210.072	$3d[1\frac{1}{2}]^\circ_1-4f'[2\frac{1}{2}]_2$
20	16 346.923	6115.689	$4p[\frac{1}{2}]_0-5d[1\frac{1}{2}]^\circ_1$
	16 347.729	6115.387	$3d[\frac{1}{2}]^\circ_1-5p[1\frac{1}{2}]_1$
80	16 405.242	6093.948	$4p[2\frac{1}{2}]_3-6s[1\frac{1}{2}]^\circ_2$
12	16 468.982	6070.362	$4p'[1\frac{1}{2}]_1-6s'[\frac{1}{2}]^\circ_1$
40	16 474.742	6068.240	$4p[2\frac{1}{2}]_2-6s[1\frac{1}{2}]^\circ_1$
20	16 528.079	6048.658	$4p'[1\frac{1}{2}]_1-6s'[\frac{1}{2}]^\circ_0$
60	16 607.009	6019.909	$4p'[\frac{1}{2}]_1-6s'[\frac{1}{2}]^\circ_1$
	16 609.433	6019.031	$4p'[1\frac{1}{2}]_2-6s'[\frac{1}{2}]^\circ_1$
25	16 634.054	6010.122	$4p'[\frac{1}{2}]_0-5d'[1\frac{1}{2}]^\circ_1$
40	16 788.711	5954.732	$4p[1\frac{1}{2}]_1-6s[1\frac{1}{2}]^\circ_1$
	16 789.110	5954.615	$3d[1\frac{1}{2}]^\circ_1-5p[2\frac{1}{2}]_2$
15	16 834.25	5938.65	$3d'[1\frac{1}{2}]^\circ_2-5p'[\frac{1}{2}]_1$
20	16 861.640	5929.002	$4p[1\frac{1}{2}]_2-6s[1\frac{1}{2}]^\circ_1$
10	17 144.601	5831.148	$4p'[1\frac{1}{2}]_1-5d[\frac{1}{2}]^\circ_1$
400	17 161.9296	5825.2596	$3p'[\frac{1}{2}]_0-4s[1\frac{1}{2}]^\circ_1$
150	17 181.727	5818.547	$4p'[\frac{1}{2}]_1-5d[2\frac{1}{2}]^\circ_2$
	17 182.499	5818.286	$4p'[1\frac{1}{2}]_2-5d[2\frac{1}{2}]^\circ_3$
	17 184.321	5817.669	$4p'[1\frac{1}{2}]_2-5d[2\frac{1}{2}]^\circ_2$
4	17 198.578	5812.846	$3d[1\frac{1}{2}]^\circ_1-5p[\frac{1}{2}]_1$
15	18 029.657	5544.903	$3d[\frac{1}{2}]^\circ_1-4f[2\frac{1}{2}]_2$
400 [c]	18 035.800	5543.015	$3d[\frac{1}{2}]^\circ_0-4f[1\frac{1}{2}]_1$
1000 [c]	18 083.206	5528.483	$3d[\frac{1}{2}]^\circ_1-4f[1\frac{1}{2}]_2$
	18 083.245	5528.471	$3d[\frac{1}{2}]^\circ_1-4f[1\frac{1}{2}]_1$
5	18 210.3300	5489.8896	$4s[1\frac{1}{2}]^\circ_1-4p'[\frac{1}{2}]_0$
350 [c]	18 221.100	5486.645	$3d[3\frac{1}{2}]^\circ_4-4f[3\frac{1}{2}]_4$
	18 221.129	5486.636	$3d[3\frac{1}{2}]^\circ_4-4f[3\frac{1}{2}]_3$

TABLE 1. Description of Ne I, region 1.1–4.0 μm—Continued

Relative intensity	Calculated wavelength Air (Å)	Calculated wave number (cm^{-1})	Classification
250 [c]	18 226.992	5484.871	$3d[3\frac{1}{2}]^{\circ}_{3}-4f[3\frac{1}{2}]_{4}$
	18 227.022	5484.862	$3d[3\frac{1}{2}]^{\circ}_{3}-4f[3\frac{1}{2}]_{3}$
10	18 247.463	5478.718	$3d[3\frac{1}{2}]^{\circ}_{4}-4f[2\frac{1}{2}]_{3}$
6	18 253.330	5476.957	$3d[3\frac{1}{2}]^{\circ}_{3}-4f[2\frac{1}{2}]_{2}$
	18 253.373	5476.944	$3d[3\frac{1}{2}]^{\circ}_{3}-4f[2\frac{1}{2}]_{3}$
2500 [c]	18 276.676	5469.961	$3d[3\frac{1}{2}]^{\circ}_{4}-4f[4\frac{1}{2}]_{5}$
	18 276.696	5469.955	$3d[3\frac{1}{2}]^{\circ}_{4}-4f[4\frac{1}{2}]_{4}$
2000 [c]	18 282.625	5468.181	$3d[3\frac{1}{2}]^{\circ}_{3}-4f[4\frac{1}{2}]_{4}$
1200 [c]	18 303.930	5461.816	$3d[1\frac{1}{2}]^{\circ}_{2}-4f[2\frac{1}{2}]_{2}$
	18 303.974	5461.803	$3d[1\frac{1}{2}]^{\circ}_{2}-4f[2\frac{1}{2}]_{3}$
250 [c]	18 359.124	5445.396	$3d[1\frac{1}{2}]^{\circ}_{2}-4f[1\frac{1}{2}]_{2}$
	18 359.164	5445.384	$3d[1\frac{1}{2}]^{\circ}_{2}-4f[1\frac{1}{2}]_{1}$
1200 [c]	18 383.972	5438.036	$3d'[2\frac{1}{2}]^{\circ}_{2}-4f'[2\frac{1}{2}]_{2}$
	18 384.013	5438.024	$3d'[2\frac{1}{2}]^{\circ}_{2}-4f'[2\frac{1}{2}]_{3}$
	18 384.848	5437.777	$3d'[2\frac{1}{2}]^{\circ}_{2}-4f'[3\frac{1}{2}]_{3}$
2000 [c]	18 389.114	5436.515	$3d'[2\frac{1}{2}]^{\circ}_{3}-4f'[2\frac{1}{2}]_{2}$
	18 389.155	5436.503	$3d'[2\frac{1}{2}]^{\circ}_{3}-4f'[2\frac{1}{2}]_{3}$
	18 389.943	5436.270	$3d'[2\frac{1}{2}]^{\circ}_{3}-4f'[3\frac{1}{2}]_{4}$
	18 389.990	5436.256	$3d'[2\frac{1}{2}]^{\circ}_{3}-4f'[3\frac{1}{2}]_{3}$
1000 [c]	18 402.844	5432.460	$3d[1\frac{1}{2}]^{\circ}_{1}-4f[2\frac{1}{2}]_{2}$
1200 [c]	18 422.350	5426.707	$3d'[1\frac{1}{2}]^{\circ}_{2}-4f'[2\frac{1}{2}]_{2}$
	18 422.391	5426.695	$3d'[1\frac{1}{2}]^{\circ}_{2}-4f'[2\frac{1}{2}]_{3}$
	18 423.230	5426.448	$3d'[1\frac{1}{2}]^{\circ}_{2}-4f'[3\frac{1}{2}]_{3}$
300 [c]	18 458.636	5416.040	$3d[1\frac{1}{2}]^{\circ}_{1}-4f[1\frac{1}{2}]_{2}$
	18 458.677	5416.028	$3d[1\frac{1}{2}]^{\circ}_{1}-4f[1\frac{1}{2}]_{1}$
400 [c]	18 475.790	5411.011	$3d'[1\frac{1}{2}]^{\circ}_{1}-4f'[2\frac{1}{2}]_{2}$
900 [c]	18 591.546	5377.321	$3d[2\frac{1}{2}]^{\circ}_{2}-4f[3\frac{1}{2}]_{3}$
1600 [c]	18 597.703	5375.540	$3d[2\frac{1}{2}]^{\circ}_{3}-4f[3\frac{1}{2}]_{4}$
	18 597.734	5375.531	$3d[2\frac{1}{2}]^{\circ}_{3}-4f[3\frac{1}{2}]_{3}$
350 [c]	18 618.917	5369.416	$3d[2\frac{1}{2}]^{\circ}_{2}-4f[2\frac{1}{2}]_{2}$
	18 618.962	5369.403	$3d[2\frac{1}{2}]^{\circ}_{2}-4f[2\frac{1}{2}]_{3}$
550 [c]	18 625.124	5367.626	$3d[2\frac{1}{2}]^{\circ}_{3}-4f[2\frac{1}{2}]_{2}$
	18 625.169	5367.613	$3d[2\frac{1}{2}]^{\circ}_{3}-4f[2\frac{1}{2}]_{3}$
20	18 682.274	5351.206	$3d[2\frac{1}{2}]^{\circ}_{3}-4f[1\frac{1}{2}]_{2}$
15	18 937.551	5279.072	$4p[\frac{1}{2}]_{1}-4d'[1\frac{1}{2}]^{\circ}_{2}$
50 [b]	19 573.7692	5107.4837	$4s[1\frac{1}{2}]^{\circ}_{2}-4p'[1\frac{1}{2}]_{2}$
170	19 577.1358	5106.6054	$4s[1\frac{1}{2}]^{\circ}_{2}-4p'[\frac{1}{2}]_{1}$
120 [b]	20 350.2378	4912.6065	$4s[1\frac{1}{2}]^{\circ}_{1}-4p'[1\frac{1}{2}]_{2}$
20	20 565.1211	4861.2751	$4s[1\frac{1}{2}]^{\circ}_{1}-4p'[1\frac{1}{2}]_{1}$
1200 [b]	21 041.2948	4751.2624	$4s'[\frac{1}{2}]^{\circ}_{1}-4p'[\frac{1}{2}]_{0}$
750 [b]	21 708.1449	4605.3090	$4s[1\frac{1}{2}]^{\circ}_{1}-4p[\frac{1}{2}]_{0}$
300 [b]	22 247.348	4493.691	$4p[\frac{1}{2}]_{1}-4d[1\frac{1}{2}]^{\circ}_{2}$
350 [b]	22 428.133	4457.469	$4p[\frac{1}{2}]_{1}-4d[\frac{1}{2}]^{\circ}_{1}$
130 [b]	22 466.802	4449.797	$4p[\frac{1}{2}]_{1}-4d[\frac{1}{2}]^{\circ}_{0}$
2250 [b]	22 530.404	4437.2359	$4s[1\frac{1}{2}]^{\circ}_{2}-4p[1\frac{1}{2}]_{2}$
400 [b]	22 661.813	4411.5057	$4s[1\frac{1}{2}]^{\circ}_{2}-4p[1\frac{1}{2}]_{1}$
50	22 687.775	4406.458	$4p[\frac{1}{2}]_{0}-4d'[1\frac{1}{2}]^{\circ}_{1}$
600 [b]	23 100.514	4327.7271	$4s'[\frac{1}{2}]^{\circ}_{0}-4p'[\frac{1}{2}]_{1}$
1000 [b]	23 260.302	4297.9975	$4s[1\frac{1}{2}]^{\circ}_{2}-4p[2\frac{1}{2}]_{2}$
1050 [b]	23 372.999	4277.2740	$4s'[1\frac{1}{2}]^{\circ}_{0}-4p'[1\frac{1}{2}]_{1}$
850 [b]	23 565.362	4242.3587	$4s[1\frac{1}{2}]^{\circ}_{1}-4p[1\frac{1}{2}]_{2}$
3500 [b]	23 636.515	4229.5880	$4s[1\frac{1}{2}]^{\circ}_{2}-4p[2\frac{1}{2}]_{3}$
300	23 701.643	4217.966	$4p[2\frac{1}{2}]_{3}-4d[2\frac{1}{2}]^{\circ}_{3}$
1100 [b]	23 707.601	4216.906	$4p[2\frac{1}{2}]_{3}-4d[2\frac{1}{2}]^{\circ}_{2}$
	23 709.160	4216.6285	$4s[1\frac{1}{2}]^{\circ}_{1}-4p[1\frac{1}{2}]_{1}$
1800 [b]	23 951.417	4173.9793	$4s'[\frac{1}{2}]^{\circ}_{1}-4p'[1\frac{1}{2}]_{2}$
600 [b]	23 956.458	4173.1010	$4s'[\frac{1}{2}]^{\circ}_{1}-4p'[\frac{1}{2}]_{1}$
10	23 971.820	4170.427	$4p[2\frac{1}{2}]_{3}-4d[3\frac{1}{2}]^{\circ}_{3}$
1000	23 978.122	4169.331	$4p[2\frac{1}{2}]_{3}-4d[3\frac{1}{2}]^{\circ}_{4}$
50	24 086.960	4150.492	$4p'[1\frac{1}{2}]_{1}-4d'[1\frac{1}{2}]^{\circ}_{1}$
	24 092.388	4149.556	$4p[2\frac{1}{2}]_{2}-4d[2\frac{1}{2}]^{\circ}_{3}$
200 [b]	24 098.544	4148.496	$4p[2\frac{1}{2}]_{2}-4d[2\frac{1}{2}]^{\circ}_{2}$
15	24 149.887	4139.676	$4p'[1\frac{1}{2}]_{1}-4d'[1\frac{1}{2}]^{\circ}_{2}$
	24 155.956	4138.636	$4p[\frac{1}{2}]_{1}-5s'[\frac{1}{2}]^{\circ}_{1}$
500 [b]	24 161.420	4137.700	$4p'[1\frac{1}{2}]_{1}-4d'[2\frac{1}{2}]^{\circ}_{2}$
40	24 218.930	4127.875	$4p[2\frac{1}{2}]_{2}-4p'[1\frac{1}{2}]_{1}$
600 [b]	24 249.638	4122.6479	$4s'[\frac{1}{2}]^{\circ}_{1}-4p'[1\frac{1}{2}]_{1}$
1500 [b]	24 365.048	4103.1203	$4s[1\frac{1}{2}]^{\circ}_{1}-4p[2\frac{1}{2}]_{2}$
800	24 371.599	4102.017	$4p[2\frac{1}{2}]_{2}-4d[3\frac{1}{2}]^{\circ}_{3}$
90	24 383.362	4100.038	$4p'[\frac{1}{2}]_{1}-4d'[1\frac{1}{2}]^{\circ}_{1}$
400 [b]	24 447.850	4089.223	$4p'[\frac{1}{2}]_{1}-4d'[1\frac{1}{2}]^{\circ}_{2}$
14	24 453.102	4088.345	$4p'[1\frac{1}{2}]_{2}-4d'[1\frac{1}{2}]^{\circ}_{2}$
700 [b]	24 459.366	4087.298	$4p'[1\frac{1}{2}]_{2}-4d'[2\frac{1}{2}]^{\circ}_{3}$
	24 459.670	4087.247	$4p'[\frac{1}{2}]_{1}-4d'[2\frac{1}{2}]^{\circ}_{2}$
25	24 464.927	4086.369	$4p'[1\frac{1}{2}]_{2}-4d'[2\frac{1}{2}]^{\circ}_{2}$
10	24 525.791	4076.228	$4p[2\frac{1}{2}]_{2}-4d[\frac{1}{2}]^{\circ}_{1}$
350 [b]	24 776.460	4034.988	$4p[1\frac{1}{2}]_{1}-4d[2\frac{1}{2}]^{\circ}_{2}$
180	24 903.732	4014.367	$4p[1\frac{1}{2}]_{1}-4d[1\frac{1}{2}]^{\circ}_{1}$
550	24 928.877	4010.318	$4p[1\frac{1}{2}]_{2}-4d[2\frac{1}{2}]^{\circ}_{3}$
5 [b]	24 935.468	4009.258	$4p[1\frac{1}{2}]_{2}-4d[2\frac{1}{2}]^{\circ}_{2}$
30	24 999.792	3998.942	$4p[1\frac{1}{2}]_{1}-4d[1\frac{1}{2}]^{\circ}_{2}$
5	25 064.383	3988.637	$4p[1\frac{1}{2}]_{2}-4d[1\frac{1}{2}]^{\circ}_{1}$
250	25 161.689	3973.212	$4p[1\frac{1}{2}]_{2}-4d[1\frac{1}{2}]^{\circ}_{2}$
70	25 227.934	3962.779	$4p[1\frac{1}{2}]_{2}-4d[3\frac{1}{2}]^{\circ}_{3}$
	25 228.308	3962.720	$4p[1\frac{1}{2}]_{1}-4d[\frac{1}{2}]^{\circ}_{1}$
10	25 277.246	3955.048	$4p[1\frac{1}{2}]_{1}-4d[\frac{1}{2}]^{\circ}_{0}$
50	25 393.188	3936.990	$4p[1\frac{1}{2}]_{2}-4d[\frac{1}{2}]^{\circ}_{1}$
650	25 524.366	3916.7564	$4s[1\frac{1}{2}]^{\circ}_{2}-4p[\frac{1}{2}]_{1}$
35	25 854.914	3866.6818	$4s'[\frac{1}{2}]^{\circ}_{1}-4p[\frac{1}{2}]_{0}$
100	27 573.461	3625.687	$4p[\frac{1}{2}]_{0}-4d[1\frac{1}{2}]^{\circ}_{1}$
40	27 971.914	3574.040	$4p[\frac{1}{2}]_{0}-4d[\frac{1}{2}]^{\circ}_{1}$
125	28 386.207	3521.877	$4p'[\frac{1}{2}]_{0}-4d'[1\frac{1}{2}]^{\circ}_{1}$
85	28 533.216	3503.7315	$4s'[\frac{1}{2}]^{\circ}_{1}-4p[1\frac{1}{2}]_{2}$
40	28 744.305	3478.0013	$4s'[\frac{1}{2}]^{\circ}_{1}-4p[1\frac{1}{2}]_{1}$
50	29 447.826	3394.910	$4p[\frac{1}{2}]_{1}-5s[1\frac{1}{2}]^{\circ}_{1}$
15	29 714.054	3364.4931	$4s'[\frac{1}{2}]^{\circ}_{1}-4p[2\frac{1}{2}]_{2}$
150	30 199.579	3310.401	$4p'[1\frac{1}{2}]_{1}-4d[\frac{1}{2}]^{\circ}_{0}$
	30 200.474	3310.303	$4p[\frac{1}{2}]_{1}-5s[1\frac{1}{2}]^{\circ}_{2}$
10	30 259.534	3303.842	$4p'[\frac{1}{2}]_{1}-4d[1\frac{1}{2}]^{\circ}_{2}$
20	30 594.965	3267.620	$4p'[\frac{1}{2}]_{1}-4d[\frac{1}{2}]^{\circ}_{1}$
20	30 711.639	3255.207	$4p[\frac{1}{2}]_{0}-5s'[\frac{1}{2}]^{\circ}_{1}$
40	31 859.980	3137.8781	$4s'[\frac{1}{2}]^{\circ}_{0}-4p[\frac{1}{2}]_{1}$
250	33 173.094	3013.669	$4p[2\frac{1}{2}]_{2}-5s[1\frac{1}{2}]^{\circ}_{1}$
80	33 332.683	2999.240	$4p'[1\frac{1}{2}]_{1}-5s'[\frac{1}{2}]^{\circ}_{1}$
450	33 352.352	2997.472	$4p[2\frac{1}{2}]_{3}-5s[1\frac{1}{2}]^{\circ}_{2}$
30	33 511.327	2983.2520	$4s'[\frac{1}{2}]^{\circ}_{1}-4p[\frac{1}{2}]_{1}$
1300	33 899.801	2949.065	$4p'[1\frac{1}{2}]_{1}-5s'[\frac{1}{2}]^{\circ}_{0}$
	33 902.998	2948.787	$4p'[\frac{1}{2}]_{1}-5s'[\frac{1}{2}]^{\circ}_{1}$
2200	33 912.099	2947.909	$4p'[1\frac{1}{2}]_{2}-5s'[\frac{1}{2}]^{\circ}_{1}$
600	34 131.310	2929.062	$4p[2\frac{1}{2}]_{2}-5s[1\frac{1}{2}]^{\circ}_{2}$
100	34 471.442	2900.161	$4p[1\frac{1}{2}]_{1}-5s[1\frac{1}{2}]^{\circ}_{1}$
40	34 489.860	2898.612	$4p'[\frac{1}{2}]_{1}-5s'[\frac{1}{2}]^{\circ}_{0}$
80	34 780.010	2874.431	$4p[1\frac{1}{2}]_{2}-5s[1\frac{1}{2}]^{\circ}_{1}$
20	35 507.304	2815.554	$4p[1\frac{1}{2}]_{1}-5s[1\frac{1}{2}]^{\circ}_{2}$
120	35 834.784	2789.824	$4p[1\frac{1}{2}]_{2}-5s[1\frac{1}{2}]^{\circ}_{2}$
18	36 199.603	2761.708	$3d[\frac{1}{2}]^{\circ}_{1}-4p'[\frac{1}{2}]_{0}$
20	36 471.678	2741.106	$4p'[\frac{1}{2}]_{0}-4d[1\frac{1}{2}]^{\circ}_{1}$
15	37 172.062	2689.459	$4p'[\frac{1}{2}]_{0}-4d[\frac{1}{2}]^{\circ}_{1}$
30	37 736.035	2649.264	$3d[1\frac{1}{2}]^{\circ}_{1}-4p'[\frac{1}{2}]_{0}$

[a] Observed interferometrically. [b] Reported also by Hepner. [c] Most recent observation by Johansson. [d] Most recent observation by Litzén.

TABLE 2. Description of Ar I, region 1.2–4.0 μm

Relative intensity	Calculated wavelength Air (Å)	Calculated wave number (cm^{-1})	Classification
80	12 026.648	8312.594	$4p[\frac12]_0-3d'[1\frac12]^{\circ}_1$
1300 [a, b]	12 112.324	8253.795	$4p[2\frac12]_3-3d[2\frac12]^{\circ}_3$
700	12 139.737	8235.157	$4p'[1\frac12]_1-3d'[1\frac12]^{\circ}_1$
80	12 151.369	8227.274	$3d[2\frac12]^{\circ}_2-4f'[3\frac12]_3$
30	12 234.397	8171.440	$3d[3\frac12]^{\circ}_3-6p[2\frac12]_2$
900 [a, b]	12 343.392	8099.285	$4p[2\frac12]_2-3d[2\frac12]^{\circ}_3$
450 [a, b]	12 356.296	8090.826	$3d[1\frac12]^{\circ}_2-4f[2\frac12]_3$
22	12 377.194	8077.166	$4p'[1\frac12]_2-3d'[1\frac12]^{\circ}_1$
2000	12 402.828	8060.472	$4p[1\frac12]_1-3d[1\frac12]^{\circ}_1$
150	12 419.414	8049.707	$3d[1\frac12]^{\circ}_2-4f[1\frac12]_2$
60	12 420.030	8049.308	$3d[1\frac12]^{\circ}_2-4f[1\frac12]_1$
5000 [a, b]	12 439.321	8036.825	$4p[\frac12]_1-3d[1\frac12]^{\circ}_2$
2000 [b]	12 456.114	8025.990	$4p[2\frac12]_2-5s[1\frac12]^{\circ}_1$
2500 [a, b]	12 487.663	8005.713	$4p[2\frac12]_3-5s[1\frac12]^{\circ}_2$
75	12 554.324	7963.204	$4p[2\frac12]_3-3d[2\frac12]^{\circ}_2$
40 [b]	12 596.209	7936.725	$3d[2\frac12]^{\circ}_3-4f'[3\frac12]_4$
	12 596.276	7936.683	$3d[2\frac12]^{\circ}_3-4f'[3\frac12]_3$
90 [b]	12 621.619	7920.747	$4p[\frac12]_0-5s'[\frac12]^{\circ}_1$
25 [b]	12 638.480	7910.180	$4p[1\frac12]_2-3d[1\frac12]^{\circ}_1$
20	12 649.96	7903.004	$3d'[1\frac12]^{\circ}_2-5f[2\frac12]_2$
	12 650.34	7902.764	$3d'[1\frac12]^{\circ}_2-5f[2\frac12]_3$
15	12 661.31	7895.920	$3d'[2\frac12]^{\circ}_3-5f[3\frac12]_{3,4}$
9	12 684.91	7881.224	$3d'[1\frac12]^{\circ}_2-5f[1\frac12]_2$
	12 685.24	7881.024	$3d'[1\frac12]^{\circ}_2-5f[1\frac12]_1$
8	12 697.00	7873.720	$3d'[2\frac12]^{\circ}_3-5f[4\frac12]_4$
1250 [b]	12 702.280	7870.449	$4p'[\frac12]_1-3d'[1\frac12]^{\circ}_1$
600 [b]	12 733.418	7851.203	$4p[2\frac12]_2-5s[1\frac12]^{\circ}_2$
400 [b]	12 746.232	7843.310	$4p'[1\frac12]_1-5s'[\frac12]^{\circ}_1$
12	12 765.954	7831.193	$3d[2\frac12]^{\circ}_2-6p[1\frac12]_1$
2500 [a, b]	12 802.737	7808.694	$4p[2\frac12]_2-3d[2\frac12]^{\circ}_2$
15	12 813.484	7802.144	$5s[1\frac12]^{\circ}_2-6p[1\frac12]_2$
12	12 873.400	7765.831	$3d[2\frac12]^{\circ}_2-6p[2\frac12]_2$
9	12 903.024	7748.002	$5s'[\frac12]^{\circ}_0-6p'[1\frac12]_1$
750 [b]	12 933.196	7729.926	$4p'[1\frac12]_1-5s'[\frac12]^{\circ}_0$
4000 [b]	12 956.658	7715.929	$4p[\frac12]_1-3d[\frac12]^{\circ}_1$
25	12 988.701	7696.894	$5s[1\frac12]^{\circ}_2-6p[2\frac12]_3$
2500 [b]	13 008.264	7685.319	$4p'[1\frac12]_2-5s'[\frac12]^{\circ}_1$
90 [b]	13 028.425	7673.426	$4p'[1\frac12]_1-3d'[1\frac12]^{\circ}_2$
12	13 051.206	7660.032	$5s'[\frac12]^{\circ}_1-6p'[1\frac12]_2$
2	13 107.116	7627.357	$5s[1\frac12]^{\circ}_1-6p[1\frac12]_2$
1	13 109.113	7626.195	$5s'[\frac12]^{\circ}_1-6p'[\frac12]_1$
6	13 130.287	7613.897	$5s[1\frac12]^{\circ}_1-6p[1\frac12]_1$
4	13 153.847	7600.260	$5s[1\frac12[^{\circ}_2-6p[\frac12]_1$
3000 [b]	13 213.991	7565.997	$4p[\frac12]_1-3d[\frac12]^{\circ}_0$
2500 [a, b]	13 228.104	7557.595	$4p[2\frac12]_3-3d[3\frac12]^{\circ}_3$
1200	13 230.897	7556.000	$4p[1\frac12]_1-5s[1\frac12]^{\circ}_1$
12	13 243.981	7548.535	$5s[1\frac12]^{\circ}_1-6p[2\frac12]_2$
6000 [a, b]	13 272.635	7532.239	$4p'[1\frac12]_2-3d'[2\frac12]^{\circ}_3$
225	13 302.312	7515.435	$4p'[1\frac12]_2-3d'[1\frac12]^{\circ}_2$
5500 [a, b]	13 313.209	7509.283	$4p'[1\frac12]_1-3d'[2\frac12]^{\circ}_2$
20	13 317.528	7506.848	$3d[1\frac12]^{\circ}_1-4f'[2\frac12]_2$
25 [b]	13 330.112	7499.761	$3d[3\frac12]^{\circ}_4-4f[3\frac12]_4$
	13 330.180	7499.723	$3d[3\frac12]^{\circ}_4-4f[3\frac12]_3$
8500 [a, b]	13 367.110	7479.003	$4p[1\frac12]_2-3d[2\frac12]^{\circ}_3$
	13 367.827 [e]	7478.602	$4p'[\frac12]_1-5s'[\frac12]^{\circ}_1$
2500 [a, b]	13 406.513	7457.022	$3d[3\frac12]^{\circ}_4-4f[4\frac12]_4$
	13 406.586	7456.981	$3d[3\frac12]^{\circ}_4-4f[4\frac12]_5$
2	13 421.289	7448.812	$3d[2\frac12]^{\circ}_3-6p[2\frac12]_2$
1200	13 499.406	7405.708	$4p[1\frac12]_2-5s[1\frac12]^{\circ}_1$
9500 [a, b]	13 504.190	7403.085	$4p[2\frac12]_2-3d[3\frac12]^{\circ}_3$
500	13 544.205	7381.213	$4p[1\frac12]_1-5s[1\frac12]^{\circ}_2$
750	13 573.618	7365.218	$4p'[\frac12]_1-5s'[\frac12]^{\circ}_0$
1500 [a, b]	13 599.333	7351.292	$4p'[1\frac12]_2-3d'[2\frac12]^{\circ}_2$
7500 [a, b]	13 622.659	7338.704	$4p[1\frac12]_1-3d[2\frac12]^{\circ}_2$
6	13 652.795	7322.505	$3d[1\frac12]^{\circ}_1-6p[\frac12]_0$
8	13 658.41	7319.493	$3d'[1\frac12]^{\circ}_1-5f[1\frac12]_2$
	13 658.78	7319.293	$3d'[1\frac12]^{\circ}_1-5f[1\frac12]_1$
5000 [a, b]	13 678.549	7308.718	$4p'[\frac12]_1-3d'[1\frac12]^{\circ}_2$
10000 [a, b]	13 718.577	7287.393	$4p[2\frac12]_3-3d[3\frac12]^{\circ}_4$
300	13 825.717	7230.921	$4p[1\frac12]_2-5s[1\frac12]^{\circ}_2$
200 [b]	13 828.321	7229.559	$3d[3\frac12]^{\circ}_3-4f[3\frac12]_4$
	13 828.394	7229.521	$3d[3\frac12]^{\circ}_3-4f[3\frac12]_3$
50 [b]	13 866.396	7209.708	$3d[3\frac12]^{\circ}_3-4f[2\frac12]_2$
	13 866.998	7209.395	$3d[3\frac12]^{\circ}_3-4f[2\frac12]_3$
100 [b]	13 907.476	7188.412	$4p[1\frac12]_2-3d[2\frac12]^{\circ}_2$
1200 [a, b]	13 910.556	7186.820	$3d[3\frac12]^{\circ}_3-4f[4\frac12]_4$
30 [b]	13 992.808	7144.575	$4p'[\frac12]_1-3d'[2\frac12]^{\circ}_2$
2	14 061.991	7109.425	$3d[1\frac12]^{\circ}_1-6p[1\frac12]_1$
2000 [b]	14 093.640	7093.460	$4p[\frac12]_0-3d[1\frac12]^{\circ}_1$
8	14 174.712	7052.889	$3d[\frac12]^{\circ}_1-5p'[\frac12]_0$
1	14 192.472	7044.063	$3d[1\frac12]^{\circ}_1-6p[2\frac12]_2$
120 [h]	14 249.193	7016.023	$4p'[1\frac12]_1-3d[1\frac12]^{\circ}_1$
450	14 254.140	7013.588	$3d'[2\frac12]^{\circ}_2-4f'[2\frac12]_2$
	14 254.844	7013.242	$3d'[2\frac12]^{\circ}_2-4f'[2\frac12]_3$
	14 256.868 [a, b]	7012.246	$3d'[2\frac12]^{\circ}_2-4f'[3\frac12]_3$
4	14 444.828	6921.001	$3d[1\frac12]^{\circ}_1-6p[\frac12]_1$
15	14 577.458	6858.032	$4p'[1\frac12]_2-3d[1\frac12]^{\circ}_1$
300	14 595.733	6849.445	$3d'[1\frac12]^{\circ}_2-4f'[2\frac12]_2$
	14 596.471 [a, b]	6849.099	$3d'[1\frac12]^{\circ}_2-4f'[2\frac12]_3$
500	14 634.414 [a, b]	6831.341	$3d'[2\frac12]^{\circ}_3-4f'[3\frac12]_4$
	14 634.504	6831.299	$3d'[2\frac12]^{\circ}_3-4f'[3\frac12]_3$
450 [b]	14 650.346	6823.912	$3d[2\frac12]^{\circ}_2-4f[3\frac12]3$
2	14 666.866	6816.226	$5p[2\frac12]_2-5d'[1\frac12]^{\circ}_1$
2	14 682.028	6809.187	$5p[2\frac12]_2-6d[1\frac12]^{\circ}_2$
	14 684.646	6807.973	$5p[\frac12]_1-6d[\frac12]^{\circ}_1$
90 [b]	14 693.007	6804.099	$3d[2\frac12]^{\circ}_2-4f[2\frac12]_2$
	14 693.683	6803.786	$3d[2\frac12]^{\circ}_2-4f[2\frac12]_3$
6	14 719.546	6791.832	$3d[\frac12]^{\circ}_0-5p'[\frac12]_1$
75 [b]	14 739.139	6782.803	$4p[1\frac12]_2-3d[3\frac12]^{\circ}_3$
8	14 783.025 [d]	6762.667	$3d[2\frac12]^{\circ}_2-4f[1\frac12]_2$
	14 783.897 [d]	6762.268	$3d[2\frac12]^{\circ}_2-4f[1\frac12]_1$
40	14 785.380 [d]	6761.590	$5s[1\frac12]^{\circ}_2-4f[2\frac12]_2$
	14 786.064 [d, b]	6761.277	$5s[1\frac12]^{\circ}_2-4f[2\frac12]_3$
5	14 833.480	6739.664	$3d[\frac12]^{\circ}_0-5p'[1\frac12]_1$
11 [b]	14 876.537 [d]	6720.158	$5s[1\frac12]^{\circ}_2-4f[1\frac12]_2$
	14 877.420 [d]	6719.759	$5s[1\frac12]^{\circ}_2-4f[1\frac12]_1$
2	14 898.136	6710.415	$5p[2\frac12]_3-6d[3\frac12]^{\circ}_4$
6	14 966.953	6679.561	$5s'[\frac12]^{\circ}_1-4f'[2\frac12]_2$
3	14 974.568	6676.164	$4p[2\frac12]_3-3d[1\frac12]^{\circ}_2$
30	15 030.513	6651.315	$4p'[\frac12]_1-3d[1\frac12]^{\circ}_1$
	15 031.174	6651.023	$3d[\frac12]^{\circ}_1-5p'[1\frac12]_2$
700 [b]	15 046.503	6644.247	$4p'[\frac12]_0-3d'[1\frac12]^{\circ}_1$
12	15 052.567	6641.570	$3d[\frac12]^{\circ}_1-5p'[\frac12]_1$
300 [b]	15 172.691	6588.988	$4p[\frac12]_0-5s[1\frac12]^{\circ}_1$
4	15 177.724	6586.803	$5s[1\frac12]^{\circ}_1-4f[2\frac12]_2$
3	15 273.799	6545.371	$5s[1\frac12]^{\circ}_1-4f[1\frac12]_2$
	15 274.730	6544.972	$5s[1\frac12]^{\circ}_1-4f[1\frac12]_1$
500 [b]	15 301.881 [a]	6533.359	$3d[2\frac12]^{\circ}_3-4f[3\frac12]_4$
	15 301.970	6533.321	$3d[2\frac12]^{\circ}_3-4f[3\frac12]_3$
150 [b]	15 329.344	6521.654	$4p[2\frac12]_2-3d[1\frac12]^{\circ}_2$
120	15 348.516	6513.508	$3d[2\frac12]^{\circ}_3-4f[2\frac12]_2$
	15 349.253 [b]	6513.195	$3d[2\frac12]^{\circ}_3-4f[2\frac12]_3$
60 [b]	15 353.128	6511.551	$4p'[1\frac12]_1-5s[1\frac12]^{\circ}_1$
120 [b]	15 402.640	6490.620	$3d[2\frac12]^{\circ}_3-4f[4\frac12]_4$

TABLE 2. Description of Ar I, region 1.2–4.0 μm—Continued

Relative intensity	Calculated wavelength Air (Å)	Calculated wave number (cm⁻¹)	Classification
10	15 446.772	6472.076	$3d[2\frac{1}{2}]^{\circ}_{3}-4f[1\frac{1}{2}]_{2}$
6	15 555.460	6426.855	$4p'[1\frac{1}{2}]_{2}-3d[2\frac{1}{2}]^{\circ}_{3}$
8	15 734.909	6353.560	$4p'[1\frac{1}{2}]_{2}-5s[1\frac{1}{2}]^{\circ}_{1}$
2	15 776.614	6336.764	$4p'[1\frac{1}{2}]_{1}-5s[1\frac{1}{2}]^{\circ}_{2}$
5	15 793.157	6330.127	$3d[1\frac{1}{2}]^{\circ}_{2}-5p'[1\frac{1}{2}]_{2}$
18	15 816.777	6320.674	$3d[1\frac{1}{2}]^{\circ}_{2}-5p'[\frac{1}{2}]_{1}$
40	15 883.164	6294.255	$4p'[1\frac{1}{2}]_{1}-3d[2\frac{1}{2}]^{\circ}_{2}$
240 [a, b]	15 899.687	6287.714	$3d'[1\frac{1}{2}]^{\circ}_{1}-4f'[2\frac{1}{2}]_{2}$
2	15 913.799	6282.138	$5s'[\frac{1}{2}]^{\circ}_{1}-6p[1\frac{1}{2}]_{1}$
400 [b]	15 989.491	6252.400	$4p'[\frac{1}{2}]_{0}-5s'[\frac{1}{2}]^{\circ}_{1}$
12	16 122.656	6200.758	$4p[2\frac{1}{2}]_{2}-3d[\frac{1}{2}]^{\circ}_{1}$
90 [b]	16 180.023	6178.773	$4p'[1\frac{1}{2}]_{2}-5s[1\frac{1}{2}]^{\circ}_{2}$
16	16 264.070	6146.843	$4p'[\frac{1}{2}]_{1}-5s[1\frac{1}{2}]^{\circ}_{1}$
400 [a, b]	16 436.575	6082.331	$3d[1\frac{1}{2}]^{\circ}_{1}-4f[2\frac{1}{2}]_{2}$
500 [b]	16 519.867	6051.664	$4p[1\frac{1}{2}]_{1}-3d[1\frac{1}{2}]^{\circ}_{2}$
250	16 549.306 [b, d]	6040.899	$3d[1\frac{1}{2}]^{\circ}_{1}-4f[1\frac{1}{2}]_{2}$
	16 550.400 [d]	6040.500	$3d[1\frac{1}{2}]^{\circ}_{1}-4f[1\frac{1}{2}]_{1}$
300 [b]	16 740.078	5972.056	$4p'[\frac{1}{2}]_{1}-5s[1\frac{1}{2}]^{\circ}_{2}$
14	16 860.088	5929.547	$4p'[\frac{1}{2}]_{1}-3d[2\frac{1}{2}]^{\circ}_{2}$
5000 [a, b]	16 940.584	5901.372	$4p[1\frac{1}{2}]_{2}-3d[1\frac{1}{2}]^{\circ}_{2}$
8	17 296.104	5780.070	$5p[\frac{1}{2}]_{1}-7s[1\frac{1}{2}]^{\circ}_{2}$
22	17 401.908	5744.927	$3d[\frac{1}{2}]^{\circ}_{1}-5p[\frac{1}{2}]_{0}$
300	17 444.903	5730.768	$4p[1\frac{1}{2}]_{1}-3d[\frac{1}{2}]^{\circ}_{1}$
	17 445.248	5730.655	$4p'[1\frac{1}{2}]_{2}-3d[3\frac{1}{2}]^{\circ}_{3}$
150	17 823.991	5608.884	$3d'[2\frac{1}{2}]^{\circ}_{2}-4f[3\frac{1}{2}]_{3}$
35	17 887.176 [d]	5589.071	$3d'[2\frac{1}{2}]^{\circ}_{2}-4f[2\frac{1}{2}]_{2}$
	17 888.178 [d]	5588.7583	$3d'[2\frac{1}{2}]^{\circ}_{2}-4f[2\frac{1}{2}]_{3}$
1500 [b]	17 914.629	5580.506	$4p[1\frac{1}{2}]_{1}-3d[\frac{1}{2}]^{\circ}_{0}$
	17 914.726	5580.476	$4p[1\frac{1}{2}]_{2}-3d[\frac{1}{2}]^{\circ}_{1}$
6	18 020.765	5547.639	$3d'[2\frac{1}{2}]^{\circ}_{2}-4f[1\frac{1}{2}]_{2}$
	18 022.061	5547.240	$3d'[2\frac{1}{2}]^{\circ}_{2}-4f[1\frac{1}{2}]_{1}$
18	18 185.749	5497.310	$5p[2\frac{1}{2}]_{3}-7s[1\frac{1}{2}]^{\circ}_{2}$
15	18 231.349	5483.560	$3d[\frac{1}{2}]^{\circ}_{0}-5p[1\frac{1}{2}]_{1}$
14	18 348.006	5448.696	$3d[3\frac{1}{2}]^{\circ}_{3}-5p'[1\frac{1}{2}]_{2}$
9	18 361.332	5444.741	$3d'[1\frac{1}{2}]^{\circ}_{2}-4f[3\frac{1}{2}]_{3}$
90	18 418.047	5427.975	$3d'[2\frac{1}{2}]^{\circ}_{3}-4f[3\frac{1}{2}]_{4}$
	18 418.176	5427.937	$3d'[2\frac{1}{2}]^{\circ}_{3}-4f[3\frac{1}{2}]_{3}$
120	18 427.765	5425.113	$4p'[\frac{1}{2}]_{0}-3d[1\frac{1}{2}]^{\circ}_{1}$
200	18 428.392	5424.928	$3d'[1\frac{1}{2}]^{\circ}_{2}-4f[2\frac{1}{2}]_{2}$
	18 429.455	5424.615	$3d'[1\frac{1}{2}]^{\circ}_{2}-4f[2\frac{1}{2}]_{3}$
22	18 485.653	5408.124	$3d'[2\frac{1}{2}]^{\circ}_{3}-4f[2\frac{1}{2}]_{2}$
	18 485.663	5408.121	$5p'[1\frac{1}{2}]_{1}-5d'[1\frac{1}{2}]^{\circ}_{1}$
	18 486.723	5407.811	$3d'[2\frac{1}{2}]^{\circ}_{3}-4f[2\frac{1}{2}]_{3}$
26	18 564.219	5385.236	$3d'[2\frac{1}{2}]^{\circ}_{3}-4f[4\frac{1}{2}]_{4}$
24	18 570.219	5383.496	$3d'[1\frac{1}{2}]^{\circ}_{2}-4f[1\frac{1}{2}]_{2}$
	18 571.596	5383.097	$3d'[1\frac{1}{2}]^{\circ}_{2}-4f[1\frac{1}{2}]_{1}$
60	18 632.289	5365.562	$3d[\frac{1}{2}]^{\circ}_{1}-5p[1\frac{1}{2}]_{2}$
40	18 745.005	5333.298	$3d[\frac{1}{2}]^{\circ}_{1}-5p[1\frac{1}{2}]_{1}$
6	19 024.142	5255.044	$5s'[\frac{1}{2}]^{\circ}_{1}-4f[2\frac{1}{2}]_{2}$
5	19 123.807	5227.657	$5s[1\frac{1}{2}]^{\circ}_{1}-5p'[\frac{1}{2}]_{0}$
12	19 175.325	5213.612	$5s'[\frac{1}{2}]^{\circ}_{1}-4f[1\frac{1}{2}]_{2}$
	19 175.332	5213.610	$4d[2\frac{1}{2}]^{\circ}_{2}-7p'[1\frac{1}{2}]_{2}$
	19 176.793	5213.213	$5s'[\frac{1}{2}]^{\circ}_{1}-4f[1\frac{1}{2}]_{1}$
25	19 294.916	5181.298	$3d[\frac{1}{2}]^{\circ}_{1}-5p[2\frac{1}{2}]_{2}$
30	19 426.959	5146.081	$5p[1\frac{1}{2}]_{2}-5d[2\frac{1}{2}]^{\circ}_{3}$
2	19 469.90	5134.732	$4d[1\frac{1}{2}]^{\circ}_{2}-6f[1\frac{1}{2}]_{2}$
	19 470.58	5134.552	$4d[1\frac{1}{2}]^{\circ}_{2}-6f[1\frac{1}{2}]_{1}$
5	19 628.228	5093.313	$5p[2\frac{1}{2}]_{3}-5d[3\frac{1}{2}]^{\circ}_{4}$
550	19 817.508	5044.666	$3d[1\frac{1}{2}]^{\circ}_{2}-5p[1\frac{1}{2}]_{2}$
1	19 860.943	5033.634	$3d[2\frac{1}{2}]^{\circ}_{2}-5p'[\frac{1}{2}]_{1}$
12	19 903.18	5022.952	$4d[3\frac{1}{2}]^{\circ}_{4}-6f[4\frac{1}{2}]_{4,5}$
25	19 945.068	5012.402	$3d[1\frac{1}{2}]^{\circ}_{2}-5p[1\frac{1}{2}]_{1}$
160	19 965.730	5007.215	$4p'[1\frac{1}{2}]_{1}-3d[1\frac{1}{2}]^{\circ}_{2}$
4	19 992.232	5000.578	$5s[1\frac{1}{2}]^{\circ}_{2}-5p'[1\frac{1}{2}]_{2}$
60	20 025.672	4992.227	$3d[\frac{1}{2}]^{\circ}_{0}-5p[\frac{1}{2}]_{1}$
30	20 030.097	4991.125	$5s[1\frac{1}{2}]^{\circ}_{2}-5p'[\frac{1}{2}]_{1}$
25 [c]	20 068.932	4981.466	$3d[2\frac{1}{2}]^{\circ}_{2}-5p'[1\frac{1}{2}]_{1}$
160	20 317.011	4920.641	$4p'[\frac{1}{2}]_{0}-5s[1\frac{1}{2}]^{\circ}_{1}$
1	20 556.994	4863.197	$3d'[1\frac{1}{2}]^{\circ}_{1}-4f[2\frac{1}{2}]_{2}$
75 [c]	20 568.816	4860.402	$3d[1\frac{1}{2}]^{\circ}_{2}-5p[2\frac{1}{2}]_{2}$
2500	20 616.229	4849.224	$4p'[1\frac{1}{2}]_{2}-3d[1\frac{1}{2}]^{\circ}_{2}$
150	20 647.135	4841.965	$3d[\frac{1}{2}]^{\circ}_{1}-5p[\frac{1}{2}]_{1}$
25	20 682.40	4833.710	$4d[3\frac{1}{2}]^{\circ}_{3}-6f[4\frac{1}{2}]_{4}$
22	20 716.338	4825.791	$5s[1\frac{1}{2}]^{\circ}_{1}-5p'[1\frac{1}{2}]_{2}$
120	20 733.634	4821.765	$3d'[1\frac{1}{2}]^{\circ}_{1}-4f[1\frac{1}{2}]_{2}$
	20 735.350	4821.366	$3d'[1\frac{1}{2}]^{\circ}_{1}-4f[1\frac{1}{2}]_{1}$
110	20 811.042	4803.830	$3d[1\frac{1}{2}]^{\circ}_{2}-5p[2\frac{1}{2}]_{3}$
	20 984.286 [e]	4764.170	$5s[1\frac{1}{2}]^{\circ}_{1}-5p'[1\frac{1}{2}]_{1}$
1200	20 986.111	4763.756	$4p[\frac{1}{2}]_{0}-3d[\frac{1}{2}]^{\circ}_{1}$
44	21 035.834	4752.496	$3d[2\frac{1}{2}]^{\circ}_{3}-5p'[1\frac{1}{2}]_{2}$
120	21 332.885	4686.319	$4p'[1\frac{1}{2}]_{1}-3d[\frac{1}{2}]^{\circ}_{1}$
12	21 454.661	4659.720	$4d[\frac{1}{2}]^{\circ}_{0}-7p[\frac{1}{2}]_{1}$
750	21 534.207	4642.507	$4p'[\frac{1}{2}]_{1}-3d[1\frac{1}{2}]^{\circ}_{2}$
15	21 669.70	4613.480	$4d[2\frac{1}{2}]^{\circ}_{2}-6f[3\frac{1}{2}]_{3}$
250	22 039.561	4536.057	$4p'[1\frac{1}{2}]_{1}-3d[\frac{1}{2}]^{\circ}_{0}$
900	22 077.181	4528.328	$4p'[1\frac{1}{2}]_{2}-3d[\frac{1}{2}]^{\circ}_{1}$
100 [c]	22 112.626	4521.069	$3d[1\frac{1}{2}]^{\circ}_{2}-5p[\frac{1}{2}]_{1}$
5	22 209.669	4501.315	$5p[\frac{1}{2}]_{1}-6s'[\frac{1}{2}]^{\circ}_{1}$
30	22 254.14	4492.320	$4d[2\frac{1}{2}]^{\circ}_{3}-6f[3\frac{1}{2}]_{3,4}$
8	22 533.597	4436.607	$5p[\frac{1}{2}]_{1}-6s'[\frac{1}{2}]^{\circ}_{0}$
6	22 938.69	4358.258	$6s[1\frac{1}{2}]^{\circ}_{2}-6f[1\frac{1}{2}]_{2}$
	22 939.64	4358.078	$6s[1\frac{1}{2}]^{\circ}_{2}-6f[1\frac{1}{2}]_{1}$
40	22 956.264	4354.921	$4d[1\frac{1}{2}]^{\circ}_{2}-7p[1\frac{1}{2}]_{2}$
1000	23 133.204	4321.611	$4p'[\frac{1}{2}]_{1}-3d[\frac{1}{2}]^{\circ}_{1}$
2000	23 845.035	4192.601	$3d[3\frac{1}{2}]^{\circ}_{4}-5p[2\frac{1}{2}]_{3}$
20	23 904.766	4182.125	$4d[3\frac{1}{2}]^{\circ}_{4}-7p[2\frac{1}{2}]_{3}$
12	23 951.49	4173.966	$4d[\frac{1}{2}]^{\circ}_{0}-5f[1\frac{1}{2}]_{1}$
900	23 966.518	4171.349	$4p'[\frac{1}{2}]_{1}-3d[\frac{1}{2}]^{\circ}_{0}$
15	24 013.230	4163.235	$3d[3\frac{1}{2}]^{\circ}_{3}-5p[1\frac{1}{2}]_{2}$
12	24 776.62	4034.962	$4d[\frac{1}{2}]^{\circ}_{1}-5f[1\frac{1}{2}]_{2}$
	24 777.85	4034.762	$4d[\frac{1}{2}]^{\circ}_{1}-5f[1\frac{1}{2}]_{1}$
900	25 125.271	3978.971	$3d[3\frac{1}{2}]^{\circ}_{3}-5p[2\frac{1}{2}]_{2}$
120	25 487.646	3922.399	$3d[3\frac{1}{2}]^{\circ}_{3}-5p[2\frac{1}{2}]_{3}$
400 [c]	25 505.228	3919.695	$5s[1\frac{1}{2}]^{\circ}_{1}-5p[\frac{1}{2}]_{0}$
450 [c]	25 661.022	3895.898	$5s'[\frac{1}{2}]^{\circ}_{1}-5p'[\frac{1}{2}]_{0}$
50	26 218.593 [f]	3813.047	$5p'[1\frac{1}{2}]_{2}-5d[2\frac{1}{2}]^{\circ}_{2}$
30	26 234.637	3810.715	$5p[2\frac{1}{2}]_{3}-4d'[2\frac{1}{2}]^{\circ}_{3}$
200	26 543.041	3766.438	$3d'[2\frac{1}{2}]^{\circ}_{2}-5p'[1\frac{1}{2}]_{1}$
75	26 605.288	3757.626	$3d[2\frac{1}{2}]^{\circ}_{2}-5p[1\frac{1}{2}]_{2}$
200	26 835.705	3725.362	$3d[2\frac{1}{2}]^{\circ}_{2}-5p[1\frac{1}{2}]_{1}$
1000	26 909.711	3715.117	$5s[1\frac{1}{2}]^{\circ}_{2}-5p[1\frac{1}{2}]_{2}$
100	27 145.454	3682.853	$5s[1\frac{1}{2}]^{\circ}_{2}-5p[1\frac{1}{2}]_{1}$
50	27 225.60	3672.012	$4d[3\frac{1}{2}]^{\circ}_{4}-5f[4\frac{1}{2}]_{4,5}$
30	27 285.760	3663.916	$3d'[1\frac{1}{2}]^{\circ}_{2}-5p'[1\frac{1}{2}]_{2}$
150	27 356.342	3654.462	$3d'[1\frac{1}{2}]^{\circ}_{2}-5p'[\frac{1}{2}]_{1}$
75	27 785.928	3597.962	$5s'[\frac{1}{2}]^{\circ}_{0}-5p'[\frac{1}{2}]_{1}$
15	27 934.995	3578.763	$6d[1\frac{1}{2}]^{\circ}_{2}-4f[2\frac{1}{2}]_{3}$
	27 937.439	3578.450	$6d[1\frac{1}{2}]^{\circ}_{2}-4f[2\frac{1}{2}]_{2}$
150	27 977.219	3573.362	$3d[2\frac{1}{2}]^{\circ}_{2}-5p[2\frac{1}{2}]_{2}$
11	28 004.514	3569.879	$5p[1\frac{1}{2}]_{2}-4d'[2\frac{1}{2}]^{\circ}_{3}$
300	28 194.726	3545.795	$5s'[\frac{1}{2}]^{\circ}_{0}-5p'[1\frac{1}{2}]_{1}$
400	28 238.250	3540.330	$5s[1\frac{1}{2}]^{\circ}_{1}-5p[1\frac{1}{2}]_{2}$
12	28 268.69	3536.518	$4d'[1\frac{1}{2}]^{\circ}_{2}-5f'[2\frac{1}{2}]_{2}$
	28 269.97	3536.358	$4d'[1\frac{1}{2}]^{\circ}_{2}-5f'[2\frac{1}{2}]_{3}$
6	28 282.36	3534.808	$4d'[1\frac{1}{2}]^{\circ}_{2}-5f'[3\frac{1}{2}]_{3}$

TABLE 2. Description of Ar I, region 1.2–4.0 μm—Continued

Relative intensity	Calculated wavelength Air (Å)	Calculated wave number (cm^{-1})	Classification	Relative intensity	Calculated wavelength Air (Å)	Calculated wave number (cm^{-1})	Classification
300	28 314.045	3530.853	$5s[1\frac{1}{2}]^{\circ}_{2}-5p[2\frac{1}{2}]_{2}$	40	32 879.664	3040.564	$3d'[1\frac{1}{2}]^{\circ}_{1}-5p'[1\frac{1}{2}]_{1}$
12	28 414.30	3518.395	$4d'[2\frac{1}{2}]^{\circ}_{2}-5f'[2\frac{1}{2}]_{2}$	8	32 930.634	3035.858	$3d[1\frac{1}{2}]^{\circ}_{1}-5p[1\frac{1}{2}]_{2}$
	28 415.59	3518.235	$4d'[2\frac{1}{2}]^{\circ}_{2}-5f'[2\frac{1}{2}]_{3}$	90	33 069.750	3023.087	$5p[\frac{1}{2}]_{1}-6s[1\frac{1}{2}]^{\circ}_{2}$
45	28 427.265	3516.790	$3d[2\frac{1}{2}]^{\circ}_{2}-5p[2\frac{1}{2}]_{3}$	95	33 139.400	3016.733	$5s[1\frac{1}{2}]^{\circ}_{1}-5p[\frac{1}{2}]_{1}$
900	28 497.958	3508.066	$5s[1\frac{1}{2}]^{\circ}_{1}-5p[1\frac{1}{2}]_{1}$	80	33 204.366	3003.594	$3d[1\frac{1}{2}]^{\circ}_{1}$ $5p[1\frac{1}{2}]_{1}$
30	28 523.13	3504.970	$4d[3\frac{1}{2}]^{\circ}_{3}-5f[3\frac{1}{2}]_{3,4}$	8	33 591.86	2976.100	$6s'[\frac{1}{2}]^{\circ}_{1}-5f'[2\frac{1}{2}]_{2}$
55	28 530.615	3504.051	$3d'[1\frac{1}{2}]^{\circ}_{1}-5p'[\frac{1}{2}]_{0}$	3	33 912.38	2947.972	$6s[1\frac{1}{2}]^{\circ}_{1}-5f[2\frac{1}{2}]_{2}$
1000	28 612.427	3494.032	$5s'[\frac{1}{2}]^{\circ}_{1}-5p'[1\frac{1}{2}]_{2}$	30	34 950.98	2860.370	$4d[1\frac{1}{2}]^{\circ}_{1}-5f[2\frac{1}{2}]_{2}$
300	28 690.049	3484.578	$5s'[\frac{1}{2}]^{\circ}_{1}-5p'[\frac{1}{2}]_{1}$	2	35 058.546	2851.594	$3d\ [1\frac{1}{2}]^{\circ}_{1}-5p[2\frac{1}{2}]_{2}$
60	28 704.95	3482.770	$4d[3\frac{1}{2}]^{\circ}_{3}-5f[4\frac{1}{2}]_{4}$	2	35 097.327	2848.443	$5p[2\frac{1}{2}]_{2}-4d[1\frac{1}{2}]^{\circ}_{1}$
2500 [a]	28 775.083	3474.281	$5s[1\frac{1}{2}]^{\circ}_{2}-5p[2\frac{1}{2}]_{3}$	15	35 219.15	2838.590	$4d[1\frac{1}{2}]^{\circ}_{1}-5f[1\frac{1}{2}]_{2}$
450	28 835.223	3467.035	$3d[2\frac{1}{2}]^{\circ}_{3}-5p[1\frac{1}{2}]_{2}$		35 221.64	2838.390	$4d[1\frac{1}{2}]^{\circ}_{1}-5f[1\frac{1}{2}]_{1}$
12	28 981.265	3449.564	$5p[1\frac{1}{2}]_{1}-4d'[1\frac{1}{2}]^{\circ}_{2}$	10	35 465.914	2818.840	$4d[\frac{1}{2}]^{\circ}_{1}-6p[\frac{1}{2}]_{0}$
40	29 100.550	3435.424	$5p[1\frac{1}{2}]_{2}-4d'[2\frac{1}{2}]^{\circ}_{2}$	25	36 210.972	2760.841	$5p[2\frac{1}{2}]_{2}-6s[1\frac{1}{2}]^{\circ}_{1}$
300	29 126.092	3432.411	$5s'[\frac{1}{2}]^{\circ}_{1}-5p'[1\frac{1}{2}]_{1}$	15	36 302.529	2753.878	$5p'[1\frac{1}{2}]_{1}-6s'[\frac{1}{2}]^{\circ}_{1}$
60	29 254.880	3417.301	$5p[1\frac{1}{2}]_{2}-4d'[1\frac{1}{2}]^{\circ}_{2}$	10	36 380.538	2747.973	$4d[1\frac{1}{2}]^{\circ}_{2}-4f'[2\frac{1}{2}]_{2}$
90	29 272.677	3415.223	$3d[1\frac{1}{2}]^{\circ}_{1}-5p[\frac{1}{2}]_{0}$		36 385.119	2747.627	$4d[1\frac{1}{2}]^{\circ}_{2}-4f'[2\frac{1}{2}]_{3}$
40	29 558.23	3382.230	$4d'[2\frac{1}{2}]^{\circ}_{3}-5f'[3\frac{1}{2}]_{3,4}$	5	36 420.419	2744.964	$4d[\frac{1}{2}]^{\circ}_{0}-6p[1\frac{1}{2}]_{1}$
1200 [a]	29 788.667	3356.066	$5s[1\frac{1}{2}]^{\circ}_{1}-5p[2\frac{1}{2}]_{2}$	30	36 482.046	2740.327	$5p[2\frac{1}{2}]_{3}-6s[1\frac{1}{2}]^{\circ}_{2}$
11	30 042.871	3327.669	$5d'[2\frac{1}{2}]^{\circ}_{3}-4f[2\frac{1}{2}]_{3}$	9	37 003.491	2701.711	$5p'[\frac{1}{2}]_{1}-6s'[\frac{1}{2}]^{\circ}_{1}$
5	30 045.697	3327.356	$5d'[2\frac{1}{2}]^{\circ}_{3}-4f[2\frac{1}{2}]_{2}$	14	37 075.797	2696.442	$5p[1\frac{1}{2}]_{1}-4d[1\frac{1}{2}]^{\circ}_{1}$
60	30 453.764	3282.771	$3d[2\frac{1}{2}]^{\circ}_{3}-5p[2\frac{1}{2}]_{2}$	9	37 133.416	2692.258	$5p'[1\frac{1}{2}]_{2}-6s'[\frac{1}{2}]^{\circ}_{1}$
55	30 544.49	3273.020	$4d[2\frac{1}{2}]^{\circ}_{2}-5f[3\frac{1}{2}]_{3}$	6	37 176.057	2689.170	$5p'[1\frac{1}{2}]_{1}-6s'[\frac{1}{2}]^{\circ}_{0}$
20	30 635.47	3263.300	$4d[2\frac{1}{2}]^{\circ}_{2}-5f[2\frac{1}{2}]_{2}$	8	37 251.067	2683.755	$5p[2\frac{1}{2}]_{2}-6s[1\frac{1}{2}]^{\circ}_{2}$
	30 637.72	3263.060	$4d[2\frac{1}{2}]^{\circ}_{2}-5f[2\frac{1}{2}]_{3}$	1	37 911.499	2637.003	$5p'[\frac{1}{2}]_{1}-6s'[\frac{1}{2}]^{\circ}_{0}$
80	30 987.774	3226.199	$3d[2\frac{1}{2}]^{\circ}_{3}-5p[2\frac{1}{2}]_{3}$	9	38 110.332	2623.245	$5p[2\frac{1}{2}]_{3}-4d[2\frac{1}{2}]^{\circ}_{3}$
800 [a]	31 324.485	3191.520	$5s[1\frac{1}{2}]^{\circ}_{2}-5p[\frac{1}{2}]_{1}$	2	38 320.762	2608.840	$5p[1\frac{1}{2}]_{1}-6s[1\frac{1}{2}]^{\circ}_{1}$
50	31 718.65	3151.860	$4d[2\frac{1}{2}]^{\circ}_{3}-5f[3\frac{1}{2}]_{3,4}$	1	38 384.869	2604.483	$5p'[1\frac{1}{2}]_{1}$ $4d'[1\frac{1}{2}]^{\circ}_{1}$
18	31 816.76	3142.140	$4d[2\frac{1}{2}]^{\circ}_{3}-5f[2\frac{1}{2}]_{2}$	2	38 630.293	2587.936	$5s'[\frac{1}{2}]^{\circ}_{1}-5p[\frac{1}{2}]_{0}$
	31 819.20	3141.900	$4d[2\frac{1}{2}]^{\circ}_{3}-5f[2\frac{1}{2}]_{3}$	4	38 800.601	2576.577	$5p[1\frac{1}{2}]_{2}-6s[1\frac{1}{2}]^{\circ}_{1}$
20	31 943.64	3129.660	$4d[2\frac{1}{2}]^{\circ}_{3}-5f[4\frac{1}{2}]_{4}$	4	38 950.321	2566.673	$5p[2\frac{1}{2}]_{2}-4d[2\frac{1}{2}]^{\circ}_{3}$
25	31 986.21	3125.495	$4d'[1\frac{1}{2}]^{\circ}_{1}-5f'[2\frac{1}{2}]_{2}$	1	39 169.420	2552.316	$5p'[\frac{1}{2}]_{1}-4d'[1\frac{1}{2}]^{\circ}_{1}$
9	32 038.85	3120.360	$4d[2\frac{1}{2}]^{\circ}_{3}-5f[1\frac{1}{2}]_{2}$	2	39 319.127	2542.598	$3d'[2\frac{1}{2}]^{\circ}_{2}-5p[1\frac{1}{2}]_{2}$
20	32 226.556	3102.185	$3d'[1\frac{1}{2}]^{\circ}_{1}-5p'[1\frac{1}{2}]_{2}$	1	39 487.540	2531.754	$5p[1\frac{1}{2}]_{1}-6s[1\frac{1}{2}]^{\circ}_{2}$
30	32 247.469	3100.173	$5p[\frac{1}{2}]_{1}-6s[1\frac{1}{2}]^{\circ}_{1}$	1	39 824.470	2510.334	$3d'[2\frac{1}{2}]^{\circ}_{2}-5p[1\frac{1}{2}]_{1}$
12	32 297.104	3095.409	$4p'[\frac{1}{2}]_{0}-3d[\frac{1}{2}]^{\circ}_{1}$	4	39 997.240	2499.491	$5p[1\frac{1}{2}]_{2}-6s[1\frac{1}{2}]^{\circ}_{2}$
50	32 325.060	3092.732	$3d'[1\frac{1}{2}]^{\circ}_{1}-5p'[\frac{1}{2}]_{1}$	4	40 880.069	2445.513	$5p[2\frac{1}{2}]_{2}-4d[2\frac{1}{2}]^{\circ}_{2}$
11	32 650.266	3061.927	$5p'[\frac{1}{2}]_{0}-5d[\frac{1}{2}]^{\circ}_{1}$				

[a] Observed interferometrically.
[b] First reported by Sittner and Peck.
[c] Reported also by Hepner.
[d] Observed resolved by Séguier.
[e] Unobserved expected transition, probably obscured by adjacent strong line.
[f] Does not appear on all records.

TABLE 3. Energy levels of Ar I, partial list

Designation	E/hc (cm^{-1})	Designation	E/hc (cm^{-1})	Designation	E/hc (cm^{-1})	Designation	E/hc (cm^{-1})
Even levels				Odd levels			
$4p[\frac{1}{2}]_1$	104 102.140	$5p[\frac{1}{2}]_1$	116 660.035	$3d[\frac{1}{2}]^{\circ}_{0}$	111 667.807	$4d[\frac{1}{2}]^{\circ}_{0}$	118 512.234
$4p[2\frac{1}{2}]_3$	105 462.801	$5p[2\frac{1}{2}]_3$	116 942.795	$3d[\frac{1}{2}]^{\circ}_{1}$	111 818.069	$4d[\frac{1}{2}]^{\circ}_{1}$	118 651.438
$4p[2\frac{1}{2}]_2$	105 617.311	$5p[2\frac{1}{2}]_2$	116 999.367	$3d[3\frac{1}{2}]^{\circ}_{4}$	112 750.194	$4d[3\frac{1}{2}]^{\circ}_{4}$	119 023.688
$4p[1\frac{1}{2}]_1$	106 087.301	$5p[1\frac{1}{2}]_1$	117 151.368	$3d[3\frac{1}{2}]^{\circ}_{3}$	113 020.396	$4d[3\frac{1}{2}]^{\circ}_{3}$	119 212.930
$4p[1\frac{1}{2}]_2$	106 237.593	$5p[1\frac{1}{2}]_2$	117 183.631	$3d[1\frac{1}{2}]^{\circ}_{2}$	112 138.965	$4d[1\frac{1}{2}]^{\circ}_{2}$	118 906.648
$4p[\frac{1}{2}]_0$	107 054.313	$5p[\frac{1}{2}]_0$	117 562.996	$3d[1\frac{1}{2}]^{\circ}_{1}$	114 147.773	$4d[1\frac{1}{2}]^{\circ}_{1}$	119 847.810
$4p'[1\frac{1}{2}]_1$	107 131.750	$5p'[1\frac{1}{2}]_1$	118 407.472	$3d[2\frac{1}{2}]^{\circ}_{2}$	113 426.005	$4d[2\frac{1}{2}]^{\circ}_{2}$	119 444.880
$4p'[1\frac{1}{2}]_2$	107 289.741	$5p'[1\frac{1}{2}]_2$	118 469.092	$3d[2\frac{1}{2}]^{\circ}_{3}$	113 716.596	$4d[2\frac{1}{2}]^{\circ}_{3}$	119 566.040
$4p'[\frac{1}{2}]_1$	107 496.458	$5p'[\frac{1}{2}]_1$	118 459.639	$3d'[2\frac{1}{2}]^{\circ}_{2}$	114 641.033	$4d'[2\frac{1}{2}]^{\circ}_{2}$	120 619.055
$4p'[\frac{1}{2}]_0$	108 722.661	$5p'[\frac{1}{2}]_0$	118 870.958	$3d'[2\frac{1}{2}]^{\circ}_{3}$	114 821.980	$4d'[2\frac{1}{2}]^{\circ}_{3}$	120 753.510
				$3d'[1\frac{1}{2}]^{\circ}_{2}$	114 805.176	$4d'[1\frac{1}{2}]^{\circ}_{2}$	120 600.932
$4f[1\frac{1}{2}]_1$	120 188.273			$3d'[1\frac{1}{2}]^{\circ}_{1}$	115 366.907	$4d'[1\frac{1}{2}]^{\circ}_{1}$	121 011.955
$4f[1\frac{1}{2}]_2$	120 188.672						
$4f[4\frac{1}{2}]_5$	120 207.175			$5s[1\frac{1}{2}]^{\circ}_{2}$	113 468.514	$6s[1\frac{1}{2}]^{\circ}_{2}$	119 683.122
$4f[4\frac{1}{2}]_4$	120 207.216			$5s[1\frac{1}{2}]^{\circ}_{1}$	113 643.301	$6s[1\frac{1}{2}]^{\circ}_{1}$	119 760.208
$4f[2\frac{1}{2}]_3$	120 229.791			$5s'[\frac{1}{2}]^{\circ}_{0}$	114 861.676	$6s'[\frac{1}{2}]^{\circ}_{0}$	121 096.642
$4f[2\frac{1}{2}]_2$	120 230.104			$5s'[\frac{1}{2}]^{\circ}_{1}$	114 975.060	$6s'[\frac{1}{2}]^{\circ}_{1}$	121 161,350
$4f[3\frac{1}{2}]_3$	120 249.917						
$4f[3\frac{1}{2}]_4$	120 249.955			$5d[\frac{1}{2}]^{\circ}_{0}$	121 794.137	$6d[\frac{1}{2}]^{\circ}_{0}$	123 508.953
$4f'[2\frac{1}{2}]_3$	121 654.275			$5d[\frac{1}{2}]^{\circ}_{1}$	121 932.885	$6d[\frac{1}{2}]^{\circ}_{1}$	123 468.008
$4f'[2\frac{1}{2}]_2$	121 654.621			$5d[3\frac{1}{2}]^{\circ}_{4}$	122 036.134	$6d[3\frac{1}{2}]^{\circ}_{4}$	123 653.210
$4f'[3\frac{1}{2}]_3$	121 653.279			$5d[3\frac{1}{2}]^{\circ}_{3}$	122 160.184	$6d[3\frac{1}{2}]^{\circ}_{3}$	123 773.892
$4f'[3\frac{1}{2}]_4$	121 653.321			$5d[1\frac{1}{2}]^{\circ}_{2}$	122 086.955	$6d[1\frac{1}{2}]^{\circ}_{2}$	123 808.554
				$5d[1\frac{1}{2}]^{\circ}_{1}$	122 514.232	$6d[1\frac{1}{2}]^{\circ}_{1}$	
$6p[\frac{1}{2}]_1$	121 068.774	$7p[\frac{1}{2}]_1$	123 171.954	$5d[2\frac{1}{2}]^{\circ}_{2}$	122 282.139	$6d[2\frac{1}{2}]^{\circ}_{2}$	123 826.789
$6p[2\frac{1}{2}]_3$	121 165.408	$7p[2\frac{1}{2}]_3$	123 205.813	$5d[2\frac{1}{2}]^{\circ}_{3}$	122 329.712	$6d[2\frac{1}{2}]^{\circ}_{3}$	123 832.452
$6p[2\frac{1}{2}]_2$	121 191.836	$7p[2\frac{1}{2}]_2$	123 220.730	$5d'[2\frac{1}{2}]^{\circ}_{2}$	123 505.530	$6d'[2\frac{1}{2}]^{\circ}_{2}$	125 113.417
$6p[1\frac{1}{2}]_1$	121 257.198	$7p[1\frac{1}{2}]_1$	123 254.920	$5d'[2\frac{1}{2}]^{\circ}_{3}$	123 557.460	$6d'[2\frac{1}{2}]^{\circ}_{3}$	125 149.968
$6p[1\frac{1}{2}]_2$	121 270.658	$7p[1\frac{1}{2}]_2$	123 261.569	$5d'[1\frac{1}{2}]^{\circ}_{2}$	123 372.959	$6d'[1\frac{1}{2}]^{\circ}_{2}$	125 066.459
$6p[\frac{1}{2}]_0$	121 470.278	$7p[\frac{1}{2}]_0$	123 385.088	$5d'[1\frac{1}{2}]^{\circ}_{1}$	123 815.593	$6d'[1\frac{1}{2}]^{\circ}_{1}$	125 286.280
$6p'[1\frac{1}{2}]_1$	122 609.678	$7p'[1\frac{1}{2}]_1$	124 643.540				
$6p'[1\frac{1}{2}]_2$	122 635.092	$7p'[1\frac{1}{2}]_2$	124 658.490	$7s[1\frac{1}{2}]^{\circ}_{2}$	122 440.105	$8s[1\frac{1}{2}]^{\circ}_{2}$	123 903.255
$6p'[\frac{1}{2}]_1$	122 601.255	$7p'[\frac{1}{2}]_1$	124 650.990	$7s[1\frac{1}{2}]^{\circ}_{1}$	122 479.422	$8s[1\frac{1}{2}]^{\circ}_{1}$	123 935.910
$6p'[\frac{1}{2}]_0$	122 790.586	$7p'[\frac{1}{2}]_0$	124 749.845	$7s'[\frac{1}{2}]^{\circ}_{0}$	123 873.033	$8s'[\frac{1}{2}]^{\circ}_{0}$	125 334.750
				$7s'[\frac{1}{2}]^{\circ}_{1}$	123 882.236	$8s'[\frac{1}{2}]^{\circ}_{1}$	125 353.310

TABLE 4. Description of ^{136}Xe I, region 1.2–4.0 μm

Relative intensity	Calculated wavelength Air (Å)	Calculated wave number (cm^{-1})	Classification	Relative intensity	Calculated wavelength Air (Å)	Calculated wave number (cm^{-1})	Classification
50[b]	12 203.818	8191.915	$5d[3\frac{1}{2}]^{\circ}_{3}-6p'[1\frac{1}{2}]_2$	375[b]	14 364.987	6959.468	$5d[1\frac{1}{2}]^{\circ}_{1}-4f[1\frac{1}{2}]_2$
375[b]	12 235.243	8170.875	$6p[\frac{1}{2}]_1-7s[1\frac{1}{2}]^{\circ}_{1}$	35[b]	14 384.961	6949.805	$5d[1\frac{1}{2}]^{\circ}_{1}-4f[1\frac{1}{2}]_1$
100[b]	12 257.765	8155.862	$5d[\frac{1}{2}]^{\circ}_{0}-7p[\frac{1}{2}]_1$	15	14 424.187	6930.905	$7s[1\frac{1}{2}]^{\circ}_{1}-8p[1\frac{1}{2}]_2$
50[b]	12 271.904	8146.466	$5d[1\frac{1}{2}]^{\circ}_{2}-7p[2\frac{1}{2}]_3$	10	14 503.404	6893.049	$7s[1\frac{1}{2}]^{\circ}_{1}-8p[1\frac{1}{2}]_1$
20	12 409.131	8056.378	$5d[1\frac{1}{2}]^{\circ}_{2}-6p'[1\frac{1}{2}]_1$	140 [b]	14 660.806	6819.044	$5d[2\frac{1}{2}]^{\circ}_{2}-7p[1\frac{1}{2}]_1$
75[b]	12 451.547	8028.934	$5d[1\frac{1}{2}]^{\circ}_{2}-7p[2\frac{1}{2}]_2$	3000 [a, b]	14 732.8055	6785.7189	$6p[2\frac{1}{2}]_3-7s[1\frac{1}{2}]^{\circ}_{2}$
300[b]	12 590.203	7940.511	$5d[\frac{1}{2}]^{\circ}_{1}-7p[\frac{1}{2}]_1$	25	14 742.310	6781.344	$7s[1\frac{1}{2}]^{\circ}_{1}-8p[2\frac{1}{2}]_2$
2500[a, b]	12 623.3912	7919.6350	$6p[\frac{1}{2}]_1-7s[1\frac{1}{2}]^{\circ}_{2}$	10	14 811.534	6749.650	$6p'[1\frac{1}{2}]_2-10d[3\frac{1}{2}]^{\circ}_{3}$
75	13 331.868	7498.774	$5d[3\frac{1}{2}]^{\circ}_{3}-7p[2\frac{1}{2}]_3$	20	14 850.038	6732.150	$5d[2\frac{1}{2}]^{\circ}_{3}-6p'[1\frac{1}{2}]_2$
5	13 470.781 [d]	7421.445	$6p'[1\frac{1}{2}]_1-7s'[\frac{1}{2}]^{\circ}_{1}$	10	15 060.181	6638.212	$6p'[1\frac{1}{2}]_2-7s'[\frac{1}{2}]^{\circ}_{1}$
250	13 544.152	7381.242	$5d[3\frac{1}{2}]^{\circ}_{3}-7p[2\frac{1}{2}]_2$	100	15 099.725	6620.828	$6p[\frac{1}{2}]_1-5d[1\frac{1}{2}]^{\circ}_{1}$
2000[a, b]	13 657.0548	7320.2214	$6p[2\frac{1}{2}]_2-7s[1\frac{1}{2}]^{\circ}_{1}$	5	15 291.827	6537.654	$6d[3\frac{1}{2}]^{\circ}_{3}-7f[1\frac{1}{2}]_2$
10	13 814.410	7236.839	$5d[2\frac{1}{2}]^{\circ}_{2}-6p'[1\frac{1}{2}]_2$	2500 [a, b]	15 418.3935	6483.9883	$6p[1\frac{1}{2}]_1-7s[1\frac{1}{2}]^{\circ}_{1}$
15	13 919.611	7182.145	$7s[1\frac{1}{2}]^{\circ}_{2}-8p[1\frac{1}{2}]_2$	45	15 490.971	6453.610	$5d[2\frac{1}{2}]^{\circ}_{2}-6p'[1\frac{1}{2}]_1$
5	14 050.741	7115.117	$7s[1\frac{1}{2}]^{\circ}_{1}-8p[\frac{1}{2}]_0$	10	15 518.342 [d]	6442.227	$6p'[\frac{1}{2}]_1-7s'[\frac{1}{2}]^{\circ}_{0}$
50	14 128.073	7076.172	$7s[1\frac{1}{2}]^{\circ}_{2}-8p[2\frac{1}{2}]_3$	150	15 557.128	6426.166	$5d[2\frac{1}{2}]^{\circ}_{2}-7p[2\frac{1}{2}]_2$
1250[a, b]	14 142.4436	7068.9814	$6p[2\frac{1}{2}]_2-7s[1\frac{1}{2}]^{\circ}_{2}$	5	15 722.628	6358.523	$7p[\frac{1}{2}]_1-8d[1\frac{1}{2}]^{\circ}_{2}$
?	14 215.639	7032.584	$7s[1\frac{1}{2}]^{\circ}_{2}-8p[2\frac{1}{2}]_2$	5	15 866.476	6300.875	$7p[\frac{1}{2}]_1-8d[\frac{1}{2}]^{\circ}_{1}$
800[b]	14 240.959	7020.080	$5d[1\frac{1}{2}]^{\circ}_{1}-4f[2\frac{1}{2}]_2$	250	15 979.536	6256.295	$5d[2\frac{1}{2}]^{\circ}_{3}-7p[1\frac{1}{2}]_2$

TABLE 4. Description of ^{136}Xe I, region 1.2–4.0 μm—Continued

Relative intensity	Calculated wavelength Air (Å)	Calculated wave number (cm^{-1})	Classification
100	16 039.905	6232.748	$6p[1\frac{1}{2}]_{1}-7s[1\frac{1}{2}]^{\circ}_{2}$
1000 [b]	16 053.281	6227.555	$6p[1\frac{1}{2}]_{2}-7s[1\frac{1}{2}]^{\circ}_{1}$
125	16 554.489	6039.008	$5d[2\frac{1}{2}]^{\circ}_{3}-7p[2\frac{1}{2}]_{3}$
1500 [b]	16 728.150	5976.315	$6p[1\frac{1}{2}]_{2}-7s[1\frac{1}{2}]^{\circ}_{2}$
50	16 745.724	5970.043	$5d[1\frac{1}{2}]^{\circ}_{1}-6p[\frac{1}{2}]_{0}$
15	16 834.541	5938.546	$7p[2\frac{1}{2}]_{2}-8d[3\frac{1}{2}]^{\circ}_{3}$
40	16 883.069	5921.476	$5d[2\frac{1}{2}]^{\circ}_{3}-7p[2\frac{1}{2}]_{2}$
5	17 139.084	5833.024	$6d[3\frac{1}{2}]^{\circ}_{4}-6f[4\frac{1}{2}]_{4}$
	17 140.611	5832.505	$6d[3\frac{1}{2}]^{\circ}_{4}-6f[4\frac{1}{2}]_{5}$
1500 [b]	17 325.767	5770.174	$6p[2\frac{1}{2}]_{2}-5d[1\frac{1}{2}]^{\circ}_{1}$
50	17 365.086	5757.109	$7p[2\frac{1}{2}]_{3}-8d[3\frac{1}{2}]^{\circ}_{4}$
350 [b]	18 788.128	5321.057	$6p[\frac{1}{2}]_{0}-7s[1\frac{1}{2}]^{\circ}_{1}$
150	20 187.190	4952.285	$5d[1\frac{1}{2}]^{\circ}_{1}-7p[\frac{1}{2}]_{0}$
3000 [a, b]	20 262.2419	4933.9412	$6p[1\frac{1}{2}]_{1}-5d[1\frac{1}{2}]^{\circ}_{1}$
50	21 373.073	4677.508	$6p[1\frac{1}{2}]_{2}-5d[1\frac{1}{2}]^{\circ}_{1}$
250 [c]	21 470.089	4656.372	$6p[\frac{1}{2}]_{1}-5d[2\frac{1}{2}]^{\circ}_{2}$
60	22 269.836	4489.154	$5d[1\frac{1}{2}]^{\circ}_{1}-6p'[1\frac{1}{2}]_{1}$
40	22 382.762	4466.505	$6d[3\frac{1}{2}]^{\circ}_{4}-5f[4\frac{1}{2}]_{4}$
	22 386.390	4465.781	$6d[3\frac{1}{2}]^{\circ}_{4}-5f[4\frac{1}{2}]_{5}$
75	22 406.818	4461.710	$5d[1\frac{1}{2}]^{\circ}_{1}-7p[2\frac{1}{2}]_{2}$
90	22 618.283	4419.996	$7s[1\frac{1}{2}]^{\circ}_{1}-6p'[\frac{1}{2}]_{0}$
5	22 741.699	4396.009	$6d[3\frac{1}{2}]^{\circ}_{3}-5f[3\frac{1}{2}]_{4}$
	22 742.102	4395.931	$6d[3\frac{1}{2}]^{\circ}_{3}-5f[3\frac{1}{2}]_{3}$
40	22 964.776	4353.307	$6d[3\frac{1}{2}]^{\circ}_{3}-5f[4\frac{1}{2}]_{4}$
10	23 022.418	4342.407	$6p'[1\frac{1}{2}]_{1}-7d[1\frac{1}{2}]^{\circ}_{2}$
45	23 073.456	4332.802	$7p[\frac{1}{2}]_{1}-7d[\frac{1}{2}]^{\circ}_{0}$
8	23 105.265	4326.837	$7p[2\frac{1}{2}]_{2}-7d[2\frac{1}{2}]^{\circ}_{2}$
1250 [a, c]	23 193.332	4310.4078	$6p[2\frac{1}{2}]_{2}-5d[2\frac{1}{2}]^{\circ}_{3}$
35	23 252.750	4299.393	$6p'[1\frac{1}{2}]_{1}-7d[2\frac{1}{2}]^{\circ}_{2}$
110	23 279.541	4294.445	$7p[2\frac{1}{2}]_{2}-7d[3\frac{1}{2}]^{\circ}_{3}$
35	23 443.639	4264.386	$7p[2\frac{1}{2}]_{3}-7d[2\frac{1}{2}]^{\circ}_{3}$
60	23 796.466	4201.158	$7p[\frac{1}{2}]_{1}-7d[\frac{1}{2}]^{\circ}_{1}$
30	23 934.491	4176.914	$7p[2\frac{1}{2}]_{3}-7d[3\frac{1}{2}]^{\circ}_{3}$
70	24 443.648	4089.926	$7s[1\frac{1}{2}]^{\circ}_{2}-6p'[\frac{1}{2}]_{1}$
60	24 702.317	4047.099	$7p[1\frac{1}{2}]_{2}-7d[2\frac{1}{2}]^{\circ}_{3}$
30	24 776.187	4035.033	$7p[1\frac{1}{2}]_{2}-7d[1\frac{1}{2}]^{\circ}_{2}$
1800 [a, c]	24 824.712	4027.1453	$6p[2\frac{1}{2}]_{3}-5d[2\frac{1}{2}]^{\circ}_{3}$
175	25 145.842	3975.716	$7p[2\frac{1}{2}]_{3}-7d[3\frac{1}{2}]^{\circ}_{4}$
60	25 159.384	3973.576	$7s[1\frac{1}{2}]^{\circ}_{2}-6p'[1\frac{1}{2}]_{2}$
45	25 412.748	3933.960	$7p[1\frac{1}{2}]_{1}-7d[2\frac{1}{2}]^{\circ}_{2}$
30	25 820.844	3871.784	$7p[\frac{1}{2}]_{0}-7d[1\frac{1}{2}]^{\circ}_{1}$
50	26 020.700	3842.046	$6d[\frac{1}{2}]^{\circ}_{0}-8p[1\frac{1}{2}]_{1}$
10	26 043.472	3838.686	$7s[1\frac{1}{2}]^{\circ}_{1}-6p'[\frac{1}{2}]_{1}$
2000 [a, c]	26 269.084	3805.7180	$6p[2\frac{1}{2}]_{2}-5d[2\frac{1}{2}]^{\circ}_{2}$
8	26 471.568	3776.608	$7p[2\frac{1}{2}]_{2}-7d[\frac{1}{2}]^{\circ}_{1}$
2500 [a, c]	26 510.861	3771.0102	$6p[\frac{1}{2}]_{0}-5d[1\frac{1}{2}]^{\circ}_{1}$
8	26 601.140 [d]	3758.212	$6p'[\frac{1}{2}]_{0}-5d'[1\frac{1}{2}]^{\circ}_{1}$
30	27 296.636	3662.456	$6d[1\frac{1}{2}]^{\circ}_{2}-8p[1\frac{1}{2}]_{2}$
	27 298.111	3662.258	$6d[\frac{1}{2}]^{\circ}_{0}-8p[\frac{1}{2}]_{1}$
15	27 743.212	3603.502	$6d[\frac{1}{2}]^{\circ}_{1}-8p[\frac{1}{2}]_{1}$
15	28 088.713	3559.178	$6p'[1\frac{1}{2}]_{2}-7d[1\frac{1}{2}]^{\circ}_{2}$
50	28 115.553	3555.780	$7s[1\frac{1}{2}]^{\circ}_{2}-7p[1\frac{1}{2}]_{1}$
250	28 381.545	3522.455	$6p[2\frac{1}{2}]_{3}-5d[2\frac{1}{2}]^{\circ}_{2}$
8	28 458.790	3512.895	$6d[1\frac{1}{2}]^{\circ}_{2}-8p[2\frac{1}{2}]_{2}$
750	28 582.246	3497.721	$7s[1\frac{1}{2}]^{\circ}_{2}-7p[1\frac{1}{2}]_{2}$

Relative intensity	Calculated wavelength Air (Å)	Calculated wave number (cm^{-1})	Classification
15	28 696.690	3483.772	$6p'[1\frac{1}{2}]_{2}-7d[3\frac{1}{2}]^{\circ}_{3}$
8	29 021.247	3444.812	$6d[1\frac{1}{2}]^{\circ}_{2}-8p[\frac{1}{2}]_{1}$
75	29 046.734	3441.789	$7p[1\frac{1}{2}]_{2}-7d[\frac{1}{2}]^{\circ}_{1}$
300	29 384.406	3402.238	$7s[1\frac{1}{2}]^{\circ}_{1}-7p[\frac{1}{2}]_{0}$
150	29 448.055	3394.884	$7p[2\frac{1}{2}]_{2}-5d'[2\frac{1}{2}]^{\circ}_{3}$
20	29 545.127	3383.730	$7p[1\frac{1}{2}]_{1}-7d[\frac{1}{2}]^{\circ}_{1}$
100	29 649.585	3371.809	$6d[1\frac{1}{2}]^{\circ}_{1}-5f[2\frac{1}{2}]_{2}$
100	29 813.622	3353.257	$6d[3\frac{1}{2}]^{\circ}_{4}-8p[2\frac{1}{2}]_{3}$
75	29 985.025	3334.089	$6d[1\frac{1}{2}]^{\circ}_{1}-5f[1\frac{1}{2}]_{2}$
12	30 021.886 [d]	3329.995	$8s[1\frac{1}{2}]^{\circ}_{2}-9p[2\frac{1}{2}]_{3}$
600	30 253.143	3304.540	$7s[1\frac{1}{2}]^{\circ}_{1}-7p[1\frac{1}{2}]_{1}$
60	30 423.535	3286.033	$7p[\frac{1}{2}]_{0}-7d[\frac{1}{2}]^{\circ}_{1}$
1500 [a]	30 475.455	3280.4344	$7s[1\frac{1}{2}]^{\circ}_{2}-7p[2\frac{1}{2}]_{3}$
100	30 504.116	3277.352	$7p[2\frac{1}{2}]_{3}-5d'[2\frac{1}{2}]^{\circ}_{3}$
500	30 794.182	3246.481	$7s[1\frac{1}{2}]^{\circ}_{1}-7p[1\frac{1}{2}]_{2}$
15	30 855.221	3240.059	$6d[3\frac{1}{2}]^{\circ}_{3}-8p[2\frac{1}{2}]_{3}$
6000 [a]	31 069.227	3217.7412	$6p[1\frac{1}{2}]_{2}-5d[2\frac{1}{2}]^{\circ}_{3}$
80	31 275.972	3196.471	$6d[3\frac{1}{2}]^{\circ}_{3}-8p[2\frac{1}{2}]_{2}$
125	31 336.011	3190.346	$7s[1\frac{1}{2}]^{\circ}_{2}-6p'[1\frac{1}{2}]_{1}$
550	31 607.907	3162.903	$7s[1\frac{1}{2}]^{\circ}_{2}-7p[2\frac{1}{2}]_{2}$
100	32 293.081	3095.794	$7p[2\frac{1}{2}]_{2}-5d'[1\frac{1}{2}]^{\circ}_{2}$
70	32 355.650	3089.808	$6d[2\frac{1}{2}]^{\circ}_{2}-8p[1\frac{1}{2}]_{1}$
12	32 581.916	3068.350	$6p'[1\frac{1}{2}]_{1}-5d'[1\frac{1}{2}]^{\circ}_{2}$
1800 [a]	32 739.262	3053.6037	$6p[\frac{1}{2}]_{1}-5d[1\frac{1}{2}]^{\circ}_{2}$
75	33 265.433	3005.304	$7p[\frac{1}{2}]_{1}-8s[1\frac{1}{2}]^{\circ}_{1}$
22	33 526.746 [d]	2981.880	$5d'[2\frac{1}{2}]^{\circ}_{2}-9p[2\frac{1}{2}]_{3}$
50	33 567.470	2978.262	$7p[2\frac{1}{2}]_{3}-5d'[1\frac{1}{2}]^{\circ}_{2}$
3500 [a]	33 666.692	2969.4849	$6p[1\frac{1}{2}]_{1}-5d[2\frac{1}{2}]^{\circ}_{2}$
150	34 014.669	2939.106	$7s[1\frac{1}{2}]^{\circ}_{1}-6p'[1\frac{1}{2}]_{1}$
90	34 074.837	2933.917	$6s'[\frac{1}{2}]^{\circ}_{1}-6p[\frac{1}{2}]_{0}$
450	34 335.274	2911.663	$7s[1\frac{1}{2}]^{\circ}_{1}-7p[2\frac{1}{2}]_{2}$
170	34 744.002	2877.410	$7p[\frac{1}{2}]_{1}-8s[1\frac{1}{2}]^{\circ}_{2}$
75	35 028.676	2854.025	$6p'[\frac{1}{2}]_{0}-7d[1\frac{1}{2}]^{\circ}_{1}$
5000 [a]	35 070.253	2850.642	$6p[2\frac{1}{2}]_{2}-5d[3\frac{1}{2}]^{\circ}_{3}$
?	35 083.277	2849.584	$6p'[\frac{1}{2}]_{1}-7d[\frac{1}{2}]^{\circ}_{1}$
110	35 246.924	2836.354	$6d[2\frac{1}{2}]^{\circ}_{3}-8p[1\frac{1}{2}]_{2}$
30	35 691.926	2800.990	$7p[2\frac{1}{2}]_{2}-5d'[2\frac{1}{2}]^{\circ}_{2}$
20	36 045.094	2773.546	$6p'[1\frac{1}{2}]_{1}-5d'[2\frac{1}{2}]^{\circ}_{2}$
250	36 209.206	2760.976	$7p[1\frac{1}{2}]_{2}-5d'[1\frac{1}{2}]^{\circ}_{2}$
150	36 231.741	2759.258	$6s'[\frac{1}{2}]^{\circ}_{0}-6p[1\frac{1}{2}]_{1}$
450	36 508.360	2738.352	$7s[1\frac{1}{2}]^{\circ}_{2}-7p[\frac{1}{2}]_{1}$
20	36 614.952	2730.380	$6d[2\frac{1}{2}]^{\circ}_{3}-8p[2\frac{1}{2}]_{3}$
850	36 788.827	2717.475	$6p[\frac{1}{2}]_{1}-5d[\frac{1}{2}]^{\circ}_{1}$
190	36 848.818	2713.051	$6p[1\frac{1}{2}]_{2}-5d[2\frac{1}{2}]^{\circ}_{2}$
25	37 255.184	2683.458	$7p[2\frac{1}{2}]_{3}-5d'[2\frac{1}{2}]^{\circ}_{2}$
10	38 496.568	2596.926	$8s[1\frac{1}{2}]^{\circ}_{2}-5f[2\frac{1}{2}]_{3}$
140	38 685.985	2584.211	$6p'[1\frac{1}{2}]_{2}-5d'[2\frac{1}{2}]^{\circ}_{3}$
175	38 737.815	2580.753	$7p[2\frac{1}{2}]_{2}-8s[1\frac{1}{2}]^{\circ}_{1}$
270	38 939.602	2567.380	$6p[2\frac{1}{2}]_{3}-5d[3\frac{1}{2}]^{\circ}_{3}$
20	39 154.184	2553.309	$6p'[1\frac{1}{2}]_{1}-8s[1\frac{1}{2}]^{\circ}_{1}$
8	39 624.876	2522.979	$6d[1\frac{1}{2}]^{\circ}_{1}-8p[\frac{1}{2}]_{0}$
120	39 955.140	2502.125	$6p[\frac{1}{2}]_{1}-5d[\frac{1}{2}]^{\circ}_{0}$
25	40 196.317	2487.112	$7s[1\frac{1}{2}]^{\circ}_{1}-7p[\frac{1}{2}]_{1}$
12	40 757.634	2452.859	$7p[2\frac{1}{2}]_{2}-8s[1\frac{1}{2}]^{\circ}_{2}$
15	41 514.978	2408.112	$7p[1\frac{1}{2}]_{1}-5d'[2\frac{1}{2}]^{\circ}_{2}$

[a] Observed Interferometrically.
[b] First reported by Sittner and Peck.
[c] First reported by Hepner.
[d] Calculated from AEL levels.