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The Spectrum of Singly Ionized Atomic Iodine (I II)

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The I II spectrum has been excited in electrodeless lamps and photographed from 655 A to 11084 A. Wavelengths and estimated intensities are given for almost 2,400 lines. A revision and extension of the earlier analyses of this spectrum has increased the number of known even levels from 43 to 124, and the number of odd levels from 55 to 190. New g_J-factors are given for 46 levels, and the previous designations of 40 levels are changed. Improved measurements in the vacuum ultraviolet region give a correction of 7.4 cm^{-1} to be subtracted from the values listed in *Atomic Energy Levels*, Vol. 3 (1958), for all levels above the ground configuration. The approximately 1,800 classified lines now include all of the strongest lines. The $^1S_0$ of the ground configuration $5s^25p^4$ has been found, and this configuration has been fitted to intermediate coupling theory. Magnetic dipole transitions between levels of the ground configuration, $^3P_2$—$^1D_2$ (7282 A) and $^3P_1$—$^1S_0$ (4460 A), have been observed and their nature confirmed by the Zeeman effect. The line $5p^4\,^3P_2$—$^1D_2$ shows hyperfine structure which is in approximate agreement with a theoretical calculation of the expected structure. New levels have been found for almost all higher configurations. All previously known series have been extended and new ones found. From one of the new series, $5p^3(^4S^\circ)5$-$12g\,^5G^\circ_6$, the principal ionization energy for I II (154304 $\pm$1 cm^{-1}) has been derived. The results of the analysis are compared with theoretical expectations in a number of cases.

1. Introduction

One of the purposes served by the systematic compilation of *Atomic Energy Levels* [1] [1] being carried out at NBS is to point out inadequacies in the existing analyses of atomic spectra. The work reported here was partly stimulated by the need revealed under the scrutiny of this program for new observations and analyses of the iodine and bromine spectra. Another reason for our interest in these particular spectra is that iodine and bromine are the halogens most frequently used in the electrodeless metal-halide lamps [2] developed in this laboratory. These lamps have proved to be excellent sources of metallic spectra. We have also found that the electrodeless lamp gives a strong pure iodine spectrum when used as described below. Since the spectrum of the halogen contained in a metal-halide lamp appears along with that of the metal, the user of these lamps needs a complete and accurate knowledge of the iodine and bromine spectra. The present or recently completed work of this laboratory includes new descriptions and analyses of the first and second spectra of both iodine and bromine.

The spectrum of singly ionized iodine has previously been analyzed by P. Lacroute [3] and by K. Murakawa [4]. The results of their work, together with some preliminary revisions and extensions made possible by the new observations reported here, are given in *Atomic Energy Levels* (AEL), Vol. III. Our observations are superior to earlier measurements in being more complete (particularly in the vacuum ultraviolet region) and more accurate. Also important is our ability to distinguish better between the first and second spectrum.

[1] Figures in brackets indicate the literature references on page 452.

2. Observations

The sources for the spectrum in the region 2000 to 11000 A were electrodeless lamps made from 5-mm i.d. quartz or vycor tubing about 10 cm long with a hemispherical window blown at one end and a side arm attached. These were thoroughly evacuated and outgassed, and a few crystals of iodine distilled into them before sealing off. The discharge was excited with the Raytheon Microtherm microwave generator which operates at 2,450 Mc with 125-w output. We made all observations with the lamp end-on except when Zeeman patterns were photographed. The spectra were dispersed with gratings having 30,000, 15,000, and 7,500 lines per inch, each mounted in parallel light to give stigmatic images. From 2000 to 2400 A the plate factor was 2.2 A/mm; from 2400 to 4400 A, 1.0 A/mm; from 4400 to 9000 A, 2.0 A/mm; from 9000 to 10400 A, 5 A/mm; and from 10400 to 11100 A, 10 A/mm.

Most of the wavelength values given in table 10.1, the line list (sec. 10, Appendix), are averages of measurements made on more than one plate. The intensities are visual estimates, meaningful only for lines in the same spectral region. Almost all of the stronger I II lines show hyperfine structure under high resolution. Where the structures were completely or partially resolved, we measured the individual components. With few exceptions, however, only the weighted average of the component wavelengths is given in table 10.1. The intensity given for such a line is the sum of the estimated component intensities. Murakawa [4, 5] has observed interferometrically the hyperfine structure of a number of I II lines.

Because of the line-broadening due to structure, the wavelength measurements here are not as accurate as one might wish. However, the disagreement between the observed wavenumbers and the corresponding differences of the "best" values for the relevant energy levels is usually less than 0.1 cm^{-1} for lines in the region above 2500 A.

When the iodine in the side arm of the discharge tube was kept at 30° C, corresponding to about 1-mm vapor pressure, most lines of the first spectrum appeared in the discharge, with only the strongest lines of I II showing. As the temperature was lowered, the second spectrum increased in intensity until it became stronger than the first spectrum. The discharge ceased at about −28° C, when the pressure was between 10^{-2} and 10^{-3} mm Hg. We were able to assign most lines to the proper spectrum by including on every spectrogram these four spectra in juxtaposition: iron arc, "high" temperature (20 to 30° C) iodine spectrum, "low" temperature (≈−25 °C) iodine spectrum, and iron arc.

This procedure leaves the origin of some of the weaker lines doubtful for two reasons: the weaker I I lines appear in the low pressure discharge but not at the higher pressure, while the I III spectrum is also faintly excited at low pressures. The latter observation was surprising, but a comparison of the intensities in our list with those given by observers [3, 6, 7] of rather high energy discharges in iodine vapor leaves no doubt that our low pressure source gives the strongest I III lines weakly. However, we believe that by this comparison we have eliminated the I III lines from the list. Those unclassified lines above 5000 A which have intensity less than 50 comprise practically all the remaining lines of doubtful origin. These lines may belong to either the first or second spectrum.

We have observed the Zeeman effect in a field of about 37000 gauss for most of the strong I II lines in the region 4000 to 9000 A. The technique is described by Kiess and Corliss [8]. Zeeman patterns obtained from these observations are given in table 10.2.

The spectrum was dispersed in the region 584 to 2000 A by a 2-m radius concave grating of 30,000 lines per inch ruled directly on pyrex. This grating, which was ruled under the direction of R. W. Wood at Johns Hopkins, was originally mounted in a vacuum spectrograph by K. T. Compton and J. C. Boyce [9]. W. R. Bozman has designed a new housing for the grating and plateholder of the old instrument. It consists primarily of a cylindrical section of steel pipe 75 cm in diameter and 210 cm long fitted with aluminum end covers which are sealed to the main tube by means of O-ring flanges. The slit is contained in a side tube. The optical arrangement is essentially that of Compton and Boyce except that the angle of incidence has been decreased slightly to about 13.1° to give the normal spectrum at 1920 A. The plate factor is 4.26 A/mm at the normal and the plateholder covers the range 0 to 2570 A in the first order. The height of the plateholder is adjustable externally so that several different exposures may be made on one plate.

We mounted a glass discharge tube end-on to the slit housing by means of an O-ring seal. After a side tube was charged with iodine, the lamp was evacuated and excited as described above. The slit of the evacuated spectrograph was open directly to the light from the discharge. We used Eastman SWR plates below 1400 A and Ilford Q–2 plates in the region above 1400 A. The first order spectrum was measured from 500 to 2500 A; and from 800 to 1200 A all but the weaker lines were measured in the second order. Most lines were measured three or four times. Calculated wavelengths of lines in the I I spectrum [8] served as the principal standards in the region 1200 to 2060 A. Lines of helium, oxygen, nitrogen, and carbon also were used for standards. Some bands, due principally to carbon monoxide, appeared on the spectrograms.

Lines of bromine were found on all our vacuum region plates. The existing measurements of the bromine spectra were not complete enough for the elimination of these lines from our list. We have excited, photographed, and measured the Br I and Br II spectra in the vacuum ultraviolet. Analyses of these spectra are underway in this laboratory and will be reported later.

We have obtained averaged values of the I II $5p^4$ ground-configuration energy levels relative to the lower odd levels by using the measurements of lines from 1100 to 1300 A. These odd levels are known relative to each other with good accuracy from measurements above 2000 A. We then calculated the wavelengths of all singly-classified lines observed in the vacuum ultraviolet. Since these wavelengths are on a consistent scale and the I II spectrum is fairly rich below the I I limit (1200 A), we have thought it worthwhile to give these calculated wavelengths in table 10.1. Together with the I I wavelengths above 1200 A they comprise a consistent set of wavelengths over a large part of the vacuum region and should prove useful in reducing low- and medium-dispersion plates obtained with metal iodide lamp sources. An estimated uncertainty in the calculated I II wavelengths of ±0.005 A at 1100 A gives ±0.002 A at 665 A, where the first calculated lines occur. The new I II wavelengths in the vacuum ultraviolet region yield, for the energy levels above those of the ground configuration, values which are 7.4 cm^{-1} less than the corresponding values given in AEL.

3. Ground Configuration

The $5s^2\,5p^4$ ground configuration of singly ionized iodine gives the Russell-Saunders terms ^3P, ^1D, and ^1S, as shown in table 1. The energy levels for these terms are listed in table 10.3, which includes all presently known even levels for I II. Lacroute's values for $^3P_1$, $^3P_0$, and $^1D_2$ are about 3 cm^{-1} too high relative to the ground state $^3P_2$. The level he designated $^1S_0$ is not real. In the three atoms for which the configuration $5p^4$ is known (Te I, I II, and Xe III) one finds good agreement with intermediate

TABLE 1. *Predicted terms of* I II

Configuration	Predicted terms				
$5s^2\,5p^4$		^3P	^1D	^1S	
$5s\,5p^5$			$^3P^\circ$	$^1P^\circ$	
	ns $n \geq 6$	*np* $n \geq 6$	*nd* $n \geq 5$	*nf* $n \geq 4$	*ng* $n \geq 5$
$5s^2\,5p^3(^4S^\circ)nx$	$^5S^\circ$ $^3S^\circ$	^5P ^3P	$^5D^\circ$ $^3D^\circ$	^5F ^3F	$^5G^\circ$ $^3G^\circ$
$5s^2\,5p^3(^2D^\circ)nx'$	$^3D^\circ$ $^1D^\circ$	^{3}(PDF) ^{1}(PDF)	^{3}(SPDFG)° ^{1}(SPDFG)°	^{3}(PDFGH) ^{1}(PDFGH)	^{3}(DFGHI)° ^{1}(DFGHI)°
$5s^2\,5p^3(^2P^\circ)nx''$	$^3P^\circ$ $^1P^\circ$	^{3}(SPD) ^{1}(SPD)	^{3}(PDF)° ^{1}(PDF)°	^{3}(DFG) ^{1}(DFG)	^{3}(FGH) ^{1}(FGH)

coupling theory. Robinson and Shortley [10] have calculated the coupling parameters for $5p^4$ in these atoms by making $^3P_1$, $^3P_2$, and ^1D—^3P_c exactly fit the theoretical curves given in Condon and Shortley [11], p. 301, and reproduced in figure 1. This method gives a good fit for all levels except $^1S_0$ which lies too high in all three cases. (The position for I II $5p^4\,^1S_0$ in figure 1 of reference [10] must be corrected since only the incorrect value of Lacroute was available to Robinson and Shortley—this reduces the disagreement to about one third of its former value.) As Robinson and Shortley point out, this does not mean that $^1S_0$ is perturbed—an interaction would push the term *down*. We have

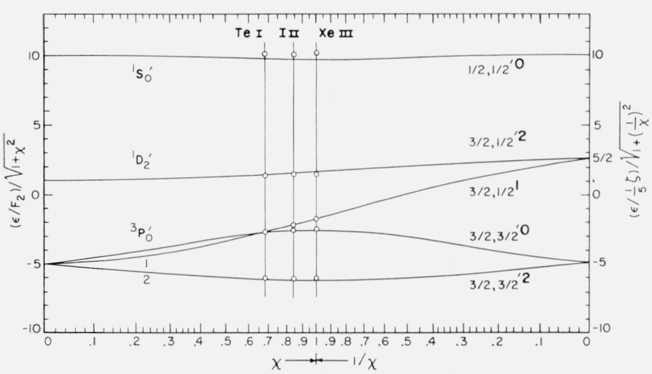

FIGURE 1. *The levels of* 5p⁴ *for three atoms fitted to theoretical intermediate-coupling curves.*

calculated the parameters by the method Condon and Shortley originally used for Te I, i.e., by making $^3P_1$, the mean of $^1D_2$ and $^3P_2$, and the mean of $^1S_0$ and $^3P_0$ fit exactly. This brings $^1S_0$ down to excellent agreement while leaving the value of $\chi = \frac{1}{5}\zeta_p/F_2$ (see Condon and Shortley for notation) essentially unchanged in all cases, but the agreement of the J=2 levels is not as good as in Robinson and Shortley. As a compromise we have averaged the values of the parameters obtained by these two methods. The results are given in table 2 and the corresponding values of the observed energy levels are plotted in figure 1, again making $^3P_1$ fit exactly. Since the Landé, Slater, and coupling ratios all are functions only of the parameter χ the good agreement obtained for them by Robinson and Shortley is retained here. The new ^1S term makes the agreement of the observed Slater ratio (^1S—^1D)/

TABLE 2. *Intermediate-coupling parameters and predicted level positions for the* 5p⁴ *configuration in* Te I, I II, *and* Xe III

	Te I	I II	Xe III
$\chi = \frac{1}{5}\zeta_p/F_2$	0.684	0.844	1.004
	cm^{-1}	cm^{-1}	cm^{-1}
$\zeta(5p)$	4090	5930	8180
$F_2(5p,5p)$	1195	1405	1630
$^3P_2$ pred.	−171	−220	−480
$^3P_2$ obs.	0	0	0
$^3P_1$ pred.	(4751)	(7087)	(9795)
$^3P_1$ obs.	4751	7087	9795
$^3P_0$ pred.	4697	6325	7878
$^3P_0$ obs.	4707	6448	8131
$^1D_2$ pred.	10708	13929	17580
$^1D_2$ obs.	10559	13727	17100
$^1S_0$ pred.	22731	28924	36162
$^1S_0$ obs.	23199	29501	37398

(^1D—^3P_c) in I II (1.481) with the theoretical value (1.365 for $\chi = 0.844$) about the same as in Te I and better than in Xe III.

The eigenvectors of the two second-order energy matrices for p^4 in intermediate coupling, for J=0 and J=2, respectively, are functions of χ only. By calculating these eigenvectors and squaring the elements of each, one obtains the percentage composition of each level of a given J in terms of the pure Russell-Saunders levels of that J. The results of this calculation for $\chi = 0.844$ (I II $5p^4$) are that $^1D_2$ and $^3P_2$ have 90.3 percent Russell-Saunders purity (i.e., they are 9.7% mixed), while the purity for $^1S_0$ and $^3P_0$ is 83.5 percent. Hence the *LS* designations assigned these levels are not without some meaning.

4. Magnetic Dipole Transitions

"Forbidden" transitions between pairs of levels belonging to the p^4 configuration have been observed in laboratory sources of the spectra O I (the aurora line at 5577 A, $^1S_0$—$^1D_2$), Se I [12], Te I [13], Xe III [14], and Po I [15]. We have found two such transitions in I II: $5p^4\,^3P_1$—$^1S_0$ (4460.185 A) and $5p^4\,^3P_2$—$^1D_2$ (7282.83 A). A diagram of the ground configuration levels showing these transitions is given in figure 2. The observed wavenumber of each line is that predicted by the separation of the relevant levels as determined from lines in the vacuum ultraviolet. The transition probabilities as derived from magnetic dipole strengths tabulated against χ by Shortley et al. [16] are 99 sec^{-1} for the line at 4460 A, and 9.1 sec^{-1} for the line 7282 A ($\chi = 0.844$; both lines have zero transition probability in pure Russell-Saunders coupling, where $\chi = 0$). Of course the observed intensities in table 10.1 have no absolute meaning, and for these two lines in different spectral regions do not give even relative experimental intensities. Both transitions appear much stronger

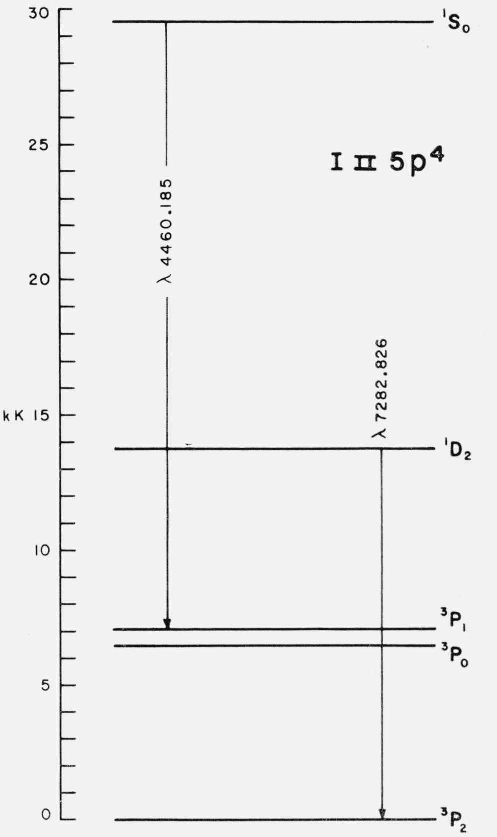

FIGURE 2. *Two magnetic dipole transitions observed in* I II.

in the high pressure (I I) discharge than with low pressure (I II) excitation. This first spectrum character is not surprising since these transitions occur between levels which are series limits for the I I spectrum. The levels lie about 100,000 cm^{-1} above the I I ground state, while the excitation energy for any I II line in this region is almost twice that amount. In his note on the xenon spectra, Edlén [14] mentioned that such lines were at first experimentally referred to the next lower ionization than that to which they actually belonged.

The line at 4460 A is pure magnetic dipole radiation, and its classification was made certain by the transverse Zeeman effect observation shown in figure 3. After the line had been classified, a search through the Zeeman data of Kiess and Corliss yielded this pattern. In a field of about 37,000 gauss the line splits into a triplet with separation of 1.51 Lorentz units (L.U.). But the unshifted perpendicularly polarized component and the symmetrically displaced parallel components form a pattern that is the inverse of the other triplets appearing in the figure, and can arise only from a magnetic dipole transition. The derived g_J-value for $5p^4\ ^3P_1$ is, of course, 1.51. By observing the Zeeman effect for the analogous transition in Pb I, $6p^2\ ^3P_1$—$^1S_0$ at 4618A, H. Niewodniczanski [17] gave the first definite experimental proof for the occurrence of magnetic dipole radiation in atomic spectra.

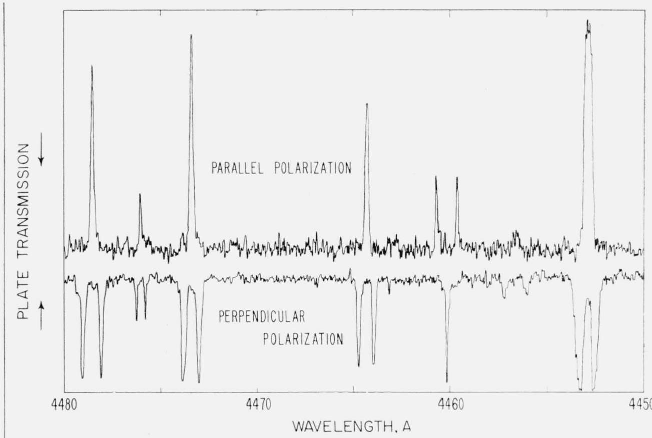

FIGURE 3. *Microphotometer traces of an iodine spectrogram showing the transverse Zeeman effect in the region near 4460 A.*

The "upside-down" Lorentz triplet observed for the I II line at 4460.185 A is definite proof of its magnetic-dipole character.

The resolution obtained in the first order spectrum with a grating of 30,000 lines per inch was sufficient to resolve partly the hyperfine structure of the line $5p^4\ ^3P_2$—$^1D_2$ (7282 A), as shown in figure 4. There seem to be three or four components on our plates, though only one is well resolved from the rest. In order to compare the observed structure of this line with theory, we have calculated the hyperfine splittings of the $5p^4\ ^3P_2$ and $5p^4\ ^1D_2$ levels in I^{127} II. The required constants were taken as follows: nuclear spin=5/2, nuclear magnetic moment=2.81 n.m., nuclear electric quadrupole moment=-0.62×10^{-24} cm^2 [18]. The formulas of Goudsmit [19] and Casimir [20] give the magnetic splitting factors, A(J), and the electric quadrupole factors, B(J), respectively. Trees [21] has published convenient general expressions for evaluating these formulas. We have also taken the effects of intermediate coupling into account. The calculated splittings are $A(^3P_2)=0.033$ cm^{-1}, $B(^3P_2)=-0.00017$ cm^{-1}, $A(^1D_2)$

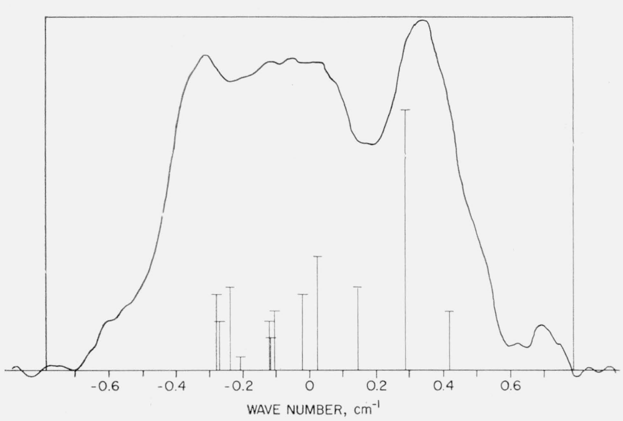

FIGURE 4. *Microphotometer trace showing the hyperfine structure of the forbidden line* $5p^4\ ^3P_2$—$^1D_2$ *at 7282 A.*

The theoretical relative intensities and calculated positions of the components of this pattern are also indicated. The position of the trace with respect to the zero of the wavenumber scale is arbitrary.

$=0.078\ cm^{-1}$, $B(^1D_2)=0.00042\ cm^{-1}$. If it is assumed that $5p^4\ {}^3P_2—{}^1D_2$ is predominately a magnetic dipole transition, the same intensity ratios as for electric dipole radiation should apply to the hyperfine components [22, 23]. The "theoretical" hyperfine pattern in figure 4 is based on this assumption and the calculated splittings. In view of the approximations made in the theory, the agreement of the calculated and observed patterns seems satisfactory and may be regarded as a confirmation of the suggested origin of this line.

Since the Zeeman effect for a forbidden line showing hyperfine structure has rarely been observed, three separate several-hour exposures were made especially to obtain the magnetic splitting of the line 7282 A in a field of 35,500 gauss. A microphotometer tracing of one of the Zeeman patterns obtained is shown in figure 5. Assuming the calculated intermediate coupling g_J-values of 1.451 for $5p^4\ {}^3P_2$ and 1.049 for $5p^4\ {}^1D_2$, one obtains the calculated Zeeman-component positions given in table 3. The observed values, which are averages for

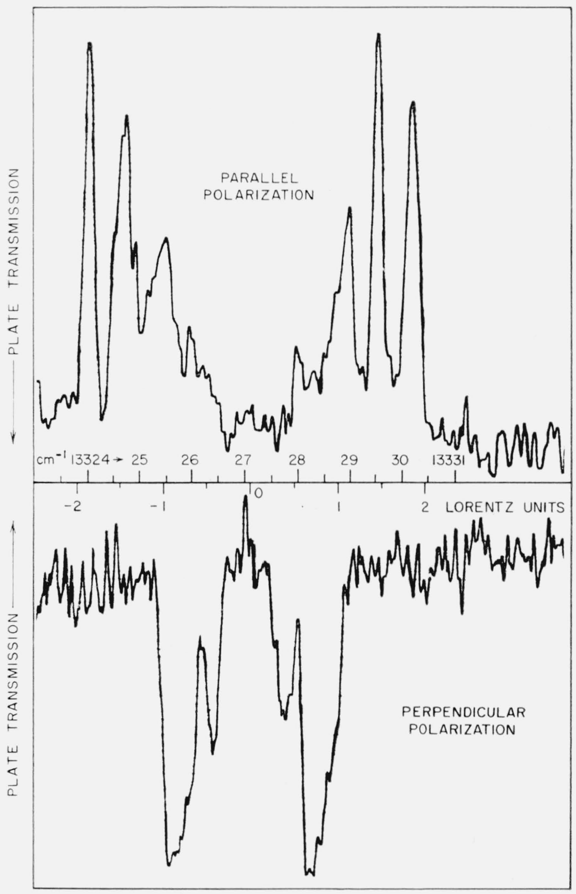

FIGURE 5. *Microphotometer traces of the transverse Zeeman pattern for the line at 7282 A.*

The spectrogram from which these traces have been made was obtained with the source in a field of 35,500 gauss. In order to locate the Zeeman components with respect to the undisplaced hyperfine pattern, an exposure with the source in zero magnetic field was also made on this spectrogram (not shown). The zero of the above Lorentz unit scale is taken at the same position, relative to the observed hyperfine pattern of figure 4, as the zero of the wavenumber scale in figure 4.

TABLE 3. *Zeeman effect for the forbidden line at 7282 A*

The observed component positions are average values from 3 patterns obtained with a magnetic field of about 35,500 gauss. Only half the pattern is given since the centers of gravity of any two corresponding components were, within the errors of observation, located symmetrically with respect to the zero of the magnetic displacement scale in figure 5.

π-components $M_J(^1D_2)\rightarrow M'_J(^3P_2)$	Theoretical relative intensity	Calculated position	Observed position	Calculated total width
$2\rightarrow1$	2	0. 647 L.U.	------------	0. 615 cm^{-1}
$1\rightarrow0$	3	1. 049	1. 042 L.U.	. 390
$0\rightarrow1$	3	1. 451	1. 459	. 165
$1\rightarrow2$	2	1. 853	1. 860	. 060
σ-components				
$1\rightarrow1$	2	0. 402 L.U.	0. 393 L.U.	0. 225 cm^{-1}
$2\rightarrow2$	8	. 804	. 808	. 450

measurements of the three patterns, are also given. The agreement of calculated and observed positions and the reversal of the respective polarizations from those expected for an electric dipole transition are definite proof of the origin of this line. The average values of the g_J-factors derived from the measured patterns are 1.457 for $^3P_2$ and 1.046 for $^1D_2$.

A broadening due to unresolved hyperfine structure is apparent for most of the components in figure 5. Since the splitting of either level by the external magnetic field is here several times larger than the zero-field hyperfine splitting, the formula for the Back-Goudsmit case [24] should give a fair approximation for the total energy of each magnetic-hyperfine state. This formula predicts a splitting of each Zeeman component into $2I+1=6$ equally spaced hyperfine components. The expected overall width of a given Zeeman component due to this structure can be obtained from the previously calculated values of the hyperfine splitting factors for the two levels (see above) and the standard formula for the Back-Goudsmit effect [24]. These calculated widths are given in table 3. Neglecting for a moment the observed asymmetries, one can see that the general features of the pattern are in accord with these widths. In particular, what might at first be taken as large deviations from the predicted relative intensities of table 3 can probably for the most part be explained as effects due to the different widths. For example, the appearance of the distinct and relatively narrow π-components at ±1.85 L.U., as contrasted with the barely observable structures at ±0.65 L.U.—where components with the same total intensities as those at ±1.85 L.U. should occur—is, no doubt, due principally to the fact that the predicted overall width of the innermost components is 10 times that of the outermost components. Since the additional broadening of all components due to Doppler and instrumental effects has not been considered, the calculated widths of table 3 should be taken only as indicative. Previous experience with uncooled electrodeless lamps excited as described above indicates effective gas temperatures of 4,000 to 8,000 °C when the lamp is in a strong magnetic field. At these temperatures the Doppler width of each transition contributing to one of the Zeeman components of 7282 A is comparable to the "total width" of table 3 for the narrowest components (0.06 cm^{-1}).

The asymmetries, with respect to total width and peak intensity, observed between members of the symmetrically positioned pairs of components in figure 5 are confirmed on the other two Zeeman spectrograms of this pattern. The complete Back-Goudsmit effect would divide each Zeeman component into six equally intense components without altering the overall symmetry of the usual Zeeman pattern. It seems likely that the asymmetries are caused more by deviations from the intensity rule for the Back-Goudsmit case than by the remaining asymmetries in the level positions. With the present resolution, no significant asymmetries in the positions of the centers-of-gravity of corresponding components are observed.

The line $^3P_2$—$^1D_2$ is allowed in electric quadrupole radiation as well as in magnetic dipole radiation. Although it is certain that 7282 A is almost pure magnetic dipole in character, it might be possible to deduce from a symmetric Zeeman pattern a slight admixture of electric quadrupole radiation in the line. This was done for a similar transition, $6p^2$ $^3P_1$—$^1D_2$ in Pb I, by Jenkins and Mrozowski [25]. These investigators also were able to confirm an interesting "interference" effect [23] between the magnetic dipole and electric quadrupole radiation in this line. An application of this type of analysis to the pattern in figure 5 does not appear feasible because of the asymmetries due to hyperfine structure. It is possible that a detailed calculation of this pattern by use of the formulas for the "intermediate field" case would be worthwhile.

5. Higher Even Terms

The higher terms of I II are of three types, according to whether the parent term in I III is $5p^3$ $^4S°$, $^2D°$, or $^2P°$. As shown in table 1, these are denoted by affixing to the valence electron no prime, one prime, or two primes, respectively. No meaningful analysis exists for I III, but one can estimate the positions of $5p^3$ ^2D and $5p^3$ ^2P from their positions in Sb I and Te II. The result is that the $^2D_{1½,2½}$ levels should lie about 12,000 and 15,000 cm^{-1}, respectively, above ^4S, and the $^2P_{½,1½}$ at approximately 25,000 and 30,000 cm^{-1}, respectively.

We have indicated in our discussion of $5p^4$ the extent to which Russell-Saunders designations are meaningful for that configuration. For many of the higher levels such designations have considerably less meaning. The overlapping of the "terms" belonging to a given configuration and parentage signifies the usual heavy-atom departure from Russell-Saunders coupling, and makes the L-S naming of some of these higher levels little more than a convenient accounting system. With the reader thus warned we shall, however, use this notation.

Earlier investigators found the levels of the even groups $(^4S°)6p$, $(^2D°)6p'$, and $(^4S°)4f$. Transitions from these levels to lower odd levels are responsible for the strongest I II lines in the air region. The intensities of the $5d$—$4f$ transitions indicate that the strong line at 2993.866 A is due to $5d$ $^3D^°_1$—$4f$ $^3F_2$. This requires that the designations of the levels previously called $5d$ $^3D^°_1$ and $6s'$ $^3D^°_1$ be interchanged, as well as those of $4f$ $^3F_2$ and $6p''$ $^3D_2$. Murakawa [4] noted that the $^3D^°_1$ levels were almost indistinguishable, and Lacroute [3] mentioned "l'analogie" of the J=2 levels involved. Neither of these authors had available a complete line list with a uniform intensity scale. We unfortunately did not notice Murakawa's incorrect designation of the $4f$ levels as $5f$—an error retained by Lacroute—until after the publication of AEL, Vol. III. Our measurement of these strong multiplets has resulted in some designation changes. While some configuration mixing undoubtedly takes place for each of these pairs, the intensities of most of the other combinations of these levels confirm our changes. In the next section it will be shown that the present choice of $6s'$ $^3D^°_1$ is supported by theory. The relative position of the level here designated $4f$ $^3F_2$ is supported by the position of $^3F_2$ in the newly-found $5f$ configuration. Also on the basis of our intensities and g-values, we have reversed Murakawa's designations of the pairs $6p'$ $^3F_3$, $^3D_3$ and $6p'$ $^1P_1$, $^3D_1$.

The $7p$ $^{5,3}P$ levels, all of which have been found, overlap the $4f$ levels but do not make as strong combinations. The level $7p$ $^5P_2$ was previously known.

The terms of $(^2P°)6p''$ are now complete. Lacroute gave five of these levels correctly, although the level he designated $6p''$ y_1 has a J-value of 2. As noted above, his $6p''$ $^3D_2$ fits better in the $4f$ configuration. We assign his $6p''$ $^3P_2$ to $6p''$ $^1D_2$. The $6p''$ group overlaps both the $4f$ and $7p$ levels. From the line intensities it appears that the $4f$ levels and $7p$ $^5P_3$ are relatively pure, while most of the remaining levels of $7p$ and $6p''$ are configuration-mixed.

The analysis has yielded all but two of the levels arising from $4f'$ and $7p'$. Since these groups overlap and mix, any individual assignment to configuration and Russell-Saunders designation at best represents only the principal contribution to a complete description of a given level. Lacroute found five of these levels, assigning them to $7p'$. We have assigned all but one of these to $4f'$. Four other levels listed by Lacroute for $7p'$ are not real.

All the levels of the complete $5f$ configuration are new except $^3F_3$, which was given by Lacroute as $7p'$ $^1P_1$. Most of the levels of nf are now known through n=8. Four levels are assigned to $9f$—three of them tentatively—on the basis of series regularity.

The level given in table 10.3 as $8p$ $^3P_2$ was erroneously assigned a J-value of 3 in the AEL table, while $8p$ $^3P_1$ was given by Lacroute as $7p'$ $^3D_2$. The $8p$ levels fall amongst those of $4f'$ and $7p'$, but the present designations seem most likely on the basis of combination intensities and series considerations.

A group of 13 higher even levels which may belong to any of four configurations, as shown in table 10.3, have been given only numerical designations.

6. Odd-Parity Configurations

Table 10.4 is a complete list of the presently known odd levels in I II. The terms of $5s5p^5$, $5p^3(^4S^\circ)6s$, $(^4S^\circ)5d$, and $(^2D^\circ)6s'$ were previously known. The $5p^5$, $6s$, and $5d$ configurations are probably mixed, but the new intensities leave no doubt that Lacroute's designations for $5p^5\ ^3P^\circ_0$ and $5d\ ^5D^\circ_0$ must be reversed. The resulting new position of $5d\ ^5D^\circ_0$ is confirmed in the $6d$ configuration.

A comparison of the predictions of intermediate coupling theory for p^5s with the experimental results for a number of rare-gas type atoms is made in the book of Condon and Shortley ([11], p. 304). It seems of interest to make this comparison for the known examples of sp^5 which exhibit intermediate coupling to a significant extent. There are only three of these, and the results for them are shown in table 4 and figure 6. The levels for Kr III $4s\,4p^5$ and Xe III $5s\,5p^5$ were fitted to the intermediate coupling formulas in Condon and Shortley by the method used there: the parameter χ is chosen so that the levels J=0,2, and the mean of the two levels of J=1, fit the theory exactly. The value of χ chosen for I II $5s\,5p^5$ gives a somewhat better fit than is obtained by the Condon and Shortley method. Still, the fit for I II is not as good as for the other two atoms. Interaction with either $5d\ ^3D^\circ_1$ or $6s'\ ^3D^\circ_1$, or with both, probably causes the apparent depression of $5p^5\ ^3P^\circ_1$ in I II. In any case this calculation definitely supports the designation change for $5d\ ^5D^\circ_0$ and $5p^5\ ^3P^\circ_0$ mentioned above. The other known cases of sp^5, in Cl II through Sc VI of the S I isoelectronic sequence, are quite close to L–S coupling ($\chi<0.1$).

TABLE 4. *Intermediate-coupling parameters and predicted level positions for the configuration* sp^5 *in three atoms*

	Kr III $4s4p^5$	I II $5s5p^5$	Xe III $5s5p^5$
$\chi=\frac{3}{4}\zeta_p/G_1$	0.236	1.000	1.240
$\zeta(np)$	3741 cm^{-1}	5900 cm^{-1}	9621 cm^{-1}
$G_1(ns,np)$	11890	4425	5819
$^3P^\circ_2$ pred.	(115932) cm^{-1}	81555 cm^{-1}	(98263) cm^{-1}
$^3P^\circ_2$ obs.	115932	81908	98263
$^3P^\circ_1$ pred.	119358	85296	103686
$^3P^\circ_1$ obs.	119381	84222	103569
$^3P^\circ_0$ pred.	(121544)	(90405)	(112694)
$^3P^\circ_0$ obs.	121544	90405	112694
$^1P^\circ_1$ pred.	141899	95514	118909
$^1P^\circ_1$ obs.	141876	95956	119026

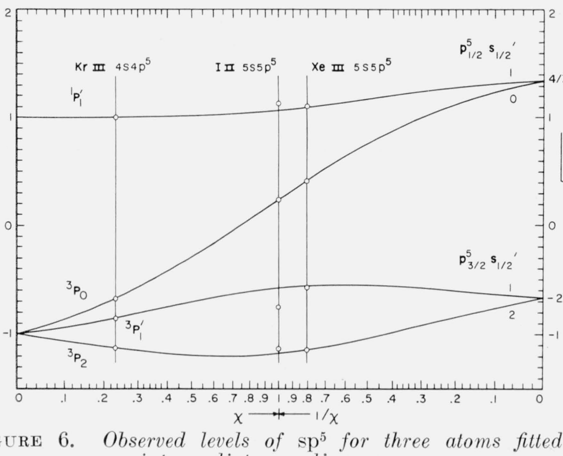

FIGURE 6. *Observed levels of* sp^5 *for three atoms fitted to intermediate-coupling curves.*

The level adopted here for $5p^5\ ^3P^\circ_0$ in Xe III is listed as $5d\ ^5D^\circ_0$ in AEL, Vol. III. The analogy with I II and Kr III leaves little doubt that our change should be made. The three combinations [26] on which the level is based were not sufficient to determine its configuration unambiguously. Humphreys' [26] level for $5p^5\ ^3P^\circ_0$ in Xe III would seem questionable; it is far lower than the expected position of $5d\ ^5D^\circ_0$, the only other possible designation. The known levels $5d\ ^5D^\circ_{3,2,1}$ of Xe III agree with the order found in I II.

A diagonalization of the energy matrix in intermediate coupling for the configuration $5p^3\,6s$ in I II has increased our confidence in the configuration and parentage assignments made here for all the known odd levels based on $5p^3\ ^2D^\circ$ and $5p^3\ ^2P^\circ$ parents. The matrices of the electrostatic and spin-orbit interactions for sp^3 are given on pages 199 and 268, respectively, of Condon and Shortley [11]. The value of $F_2(5p,5p)$ used in our calculation, 1425 cm^{-1}, was obtained from the relation $6F_2={}^3P^\circ_0-{}^3D^\circ_3$ for sp^3. It is supported by the value of F_2 for the $5p^4$ configuration given above, 1405 cm^{-1}. If one knows F_2 and the levels of either J=2 or J=1, the value of $G_1(6s,5p)$ may be obtained from the diagonal-sum rule. At the time the value of G_1 adopted here (1000 cm^{-1}) was chosen, however, it was based on values obtained from the equation $5p^3(^4S^\circ)6s\ \ (^3S^\circ_1-{}^5S^\circ_2)=4G_1$. This gives $G_1=952$ cm^{-1} for I II and $G_1=1035$ cm^{-1} for Xe III. By carrying out the calculation for $G_1=500$, 1000, and 1500 cm^{-1} we have assured ourselves that the intermediate value is very close to the "best" value for fitting the observed levels. The other parameter needed for the calculation, ζ_p, was taken to be 5930 cm^{-1}, as in the $5p^4$ configuration.

The calculated energies and g_J-values for the levels of $5p^36s$ are given in table 5, together with the observed values. An exact fit is assumed for the $^3D^\circ_0$ and $^3P^\circ_0$ levels. The average deviation of the predicted and observed values, 322 cm^{-1}, seems reasonable for a calculation neglecting configuration mixing. Table 6 gives the calculated composition of the levels of J=1 and J=2 in terms of pure Russel-Saunders states.

It will be seen that the aforementioned designation of the level at 94825 cm^{-1} as $6s'\ ^3D^\circ_1$, instead of the level at 92133 cm^{-1}, is supported by this calculation. The indicated perturbation of $6s'\ ^3D^\circ_1$ is in the direction to be expected if it is caused mainly by inter-

TABLE 5. *Predictions of intermediate-coupling calculation for* I II 5p³ 6s *compared with observation*

The parameters were taken as follows: $\zeta(5p)=5930$ cm⁻¹, $F_2(5p,5p)=1425$ cm⁻¹ and $G_1(6s,5p)=1000$ cm⁻¹.

Designation	Predicted position	Observed position	Difference	Predicted g_J	Observed g_J
$6s\ {}^5S_2^\circ$	81176 cm⁻¹	81033 cm⁻¹	143 cm⁻¹	1.954	1.95
$6s\ {}^3S_1^\circ$	84862	84843	19	1.877	1.753
$6s'\ {}^3D_1^\circ$	94096	94825	−729	0.703	0.653
$6s'\ {}^3D_2^\circ$	94103	93691	412	1.235	1.16
$6s'\ {}^3D_3^\circ$	(96651)	96651	0	1.333	1.36
$6s'\ {}^1D_2^\circ$	98035	97701	334	1.048	0.996
$6s''\ {}^3P_0^\circ$	(105201)	105201	0	-----------	-----------
$6s''\ {}^3P_1^\circ$	105749	106103	−354	1.383	-----------
$6s''\ {}^3P_2^\circ$	110015	110459	−444	1.430	1.36
$6s''\ {}^3P_1^\circ$	111173	111962	−789	1.037	-----------

TABLE 6. *Calculated percentage compositions for the levels of* I II 5p³ 6s

The composition of each level is given in the column under its assigned designation.

	$6s\ {}^5S_2^\circ$	$6s'\ {}^3D_2^\circ$	$6s'\ {}^1D_2^\circ$	$6s''\ {}^3P_2^\circ$
	%	%	%	%
$6s\ {}^5S_2^\circ$	91.7	4.5	0.3	3.6
$6s'\ {}^3D_2^\circ$	0.8	65.6	22.5	11.1
$6s'\ {}^1D_2^\circ$	0.4	13.7	75.6	10.2
$6s''\ {}^3P_2^\circ$	7.1	16.2	1.6	75.1

	$6s\ {}^3S_1^\circ$	$6s'\ {}^3D_1^\circ$	$6s''\ {}^3P_1^\circ$	$6s''\ {}^1P_1^\circ$
	%	%	%	%
$6s\ {}^3S_1^\circ$	87.4	7.9	0.2	4.6
$6s'\ {}^3D_1^\circ$	3.0	80.1	0.8	16.0
$6s''\ {}^3P_1^\circ$	3.6	4.9	77.1	14.4
$6s''\ {}^1P_1^\circ$	6.0	7.1	21.9	65.0

action with $5d\ {}^3D_1^\circ$. The other ambiguities resolved by this calculation were between the $5d'$ and $5d''$ levels on the one hand and those belonging to $6s''$ on the other. As between the $5d'$ and $6s''$ groups, the present assignments are in general supported by the relative intensities of combinations of levels belonging to these configurations with levels of the distinct $6p'$ and $6p''$ groups.

The intensities would not have served, however, to distinguish the $6s''$ levels from those of $5d''$. The assignments of the two levels $5d''\ {}^1D_2^\circ$ and $5d''\ {}^3D_3^\circ$ may be considered questionable, since the former is well below a level of J=2 assigned to $5d'$ and the latter is near the level designated $5d'\ {}^1F_3^\circ$. However, these assignements fit in with the other levels of J=2 and J=3 within each parentage group better than any other arrangement. The $5d'$ group is now known except for one level of J=5, and only ${}^3F_4^\circ$ is lacking in the $5d''$ group.

The sorting-out of these lower odd levels, together with an approximate knowledge of the various series limit positions which they approach, have enabled us to assign definite configuration and parentage designations to the complex group of 91 odd levels between 118074 cm⁻¹ ($5d'\ {}^3P_1^\circ$) and 145837 cm⁻¹ ($20_{2,1}^\circ$). Only eight of the levels expected in this region are missing, four of them from $9d\ {}^{5,3}D^\circ$. The levels of $6d\ {}^{5,3}D^\circ$ and $7s\ {}^{5,3}S^\circ$ were previously known and correctly identified. About 15 other previously listed higher odd levels are included in this analysis, usually with a changed designation or a new assignment to a definite configuration.

It is interesting to note that the smallness of the ${}^3D_1^\circ$—${}^3D_2^\circ$ intervals in the $7s'$ and $8s'$ terms (2.37 and 36.12 cm⁻¹, respectively) is in accord with the theoretical predictions for the corresponding levels of $6s'$. In table 5 the predicted positions of $6s'\ {}^3D_1^\circ$ and ${}^3D_2^\circ$ are both very near 94100 cm⁻¹. The large observed separation of these levels, 1134 cm⁻¹, is apparently due to perturbations in opposite directions for the two levels.

We have assigned 15 levels to the $6d'$ group, but there is really no good basis for giving them term designations; hence they are listed numerically. The Russell-Saunders designations given the $5d'$ and $5d''$ levels probably should not be taken as more than suggestive, but the names given here fit the observed combinations better than any other arrangement.

The levels of the newly-found $({}^4S^\circ)ng\ {}^{5,3}G^\circ$ terms in table 10.4 are based on combinations with $4f\ {}^{5,3}F$ and, in the case of the higher series members, with $5f\ {}^{5,3}F$. Although we have assigned multiplicities to the ng levels on the basis of these transitions—intercombinations are definitely weaker than intrasystem transitions—it is clear from figure 7 that these levels

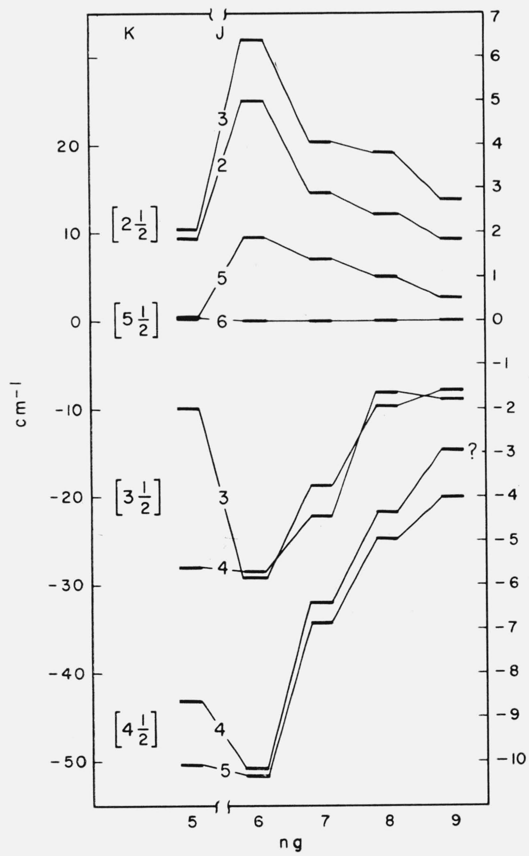

FIGURE 7. *Levels of the* (⁴S°)ng *groups.*

The ordinate scale on the left applies to the 5*g* levels, the higher levels being plotted according to the scale on the right. The Russell-Saunders designations for these levels may be obtained by comparing this figure with the level values given in table 10.4.

do not fall into the triplet-quintet pattern of Russell-Saunders coupling. The numbers under "K" in this figure refer to pair-coupling [27]; they are the four possible results of adding the orbital angular momentum of a *g*-electron to the J of the parent $^4S^{\circ}_{1\frac{1}{2}}$ level. While these levels certainly do not show good pair-coupling, it seems probable that this notation describes the observed structures better than the L-S scheme in table 10.4.

Each *ng* triplet level is paired with a quintet level in the three higher "pairs" of figure 7. In the known I II terms of the type $(^4S^{\circ})nl\ ^5L$, ^3L, where $l=p, d, f$, or g, a characteristic partial inversion of levels occurs except in $np\ ^5P$. (Both of the known terms $6p$, $7p$, ^5P show large deviations from the Landé interval rule in the direction of partial inversion.) However, this deviation from Russell-Saunders structure is compounded by overlapping of the triplet and quintent terms only in the $(^4S^{\circ})ng$ groups. Even the $(^4S^{\circ})nf\ ^3F$ terms are well above the corresponding quintets.

It would seem from figure 7 that some of the *ng* levels are perturbed by amounts comparable to the (small) level separations. The position of the $5g\ [5\frac{1}{2}]_5$ level and the crossing-over behavior of the $[3\frac{1}{2}]_{3,4}$ pair with each increase in n are probably the most obvious examples. Perhaps the best overall description of the grouping observed for these *ng* levels would be "frustrated pair-coupling."

In addition to the identified series members based on the $5p^3(^4S^{\circ})$ parent, the higher group of odd levels beginning with $20^{\circ}_{1,2}$ at 145837.7 cm^{-1} probably contains levels belonging to each of the designations $6d''$, $7d'$, $7s''$, $8s'$, and $5g'$. We have given only numerical designations to these levels, no attempt having been made to assign them to definite parents and configurations.

7. Series and the Ionization Energy

In a singly-ionized atom, the Rydberg denominator n^* for a series member is defined by the equation $4T=R/(n^*)^2$; where 4T is the position of the level measured from the series limit, and R is the Rydberg constant. (The quantity T is the "reduced" absolute term value. For convenience in using the Rydberg Interpolation Table [28], the value of R was taken as 109737.4 cm^{-1} in the series calculations reported here.) Many unperturbed series obey quite closely the Ritz formula $n^*=n+\mu+\alpha T$, where n runs through the successive integers for the series and μ and α are constants for a given series. Since the fraction by which n^* exceeds an integer is a linear function of T for such a series, the position of the series limit is taken as that value which gives the "best" straight line when these successive fractions are plotted against the corresponding values of T.

Figure 8 shows two such plots for the new $(^4S^{\circ})ng\ ^5G^{\circ}_6$ series, $n=5$ through 12. The approximately straight line is obtained by taking the $5p^3\ ^4S^{\circ}$ limit, the ground state of I III, to lie 154304 cm^{-1} above the $5p^4\ ^3P_2$ ground level of I II. The curved line, representing a very unlikely behavior for this series, results from assuming the limit to be only 4 cm^{-1} above the straight-line value. It is seen that the Rydberg denominator fractions for the higher series members become increasingly sensitive to the limit chosen or, equivalently, to the series level values as n increases. The last point on the left in the straight-line plot, for $n=12$, would fall on the straight line if the position of $12g\ ^5G^{\circ}_6$ were raised by 0.2 cm^{-1}. Since this level is based on two weak lines—transitions to $4f\ ^5F_5$ and $5f\ ^5F_5$—the observational uncertainty in its position is about 0.1 cm^{-1}. In any case a series of this regularity leaves small doubt about the reality of any of its members.

Another example of a fairly regular series, $ns\ ^5S^{\circ}$, is shown in figure 9, along with the perturbed $ns\ ^3S^{\circ}$

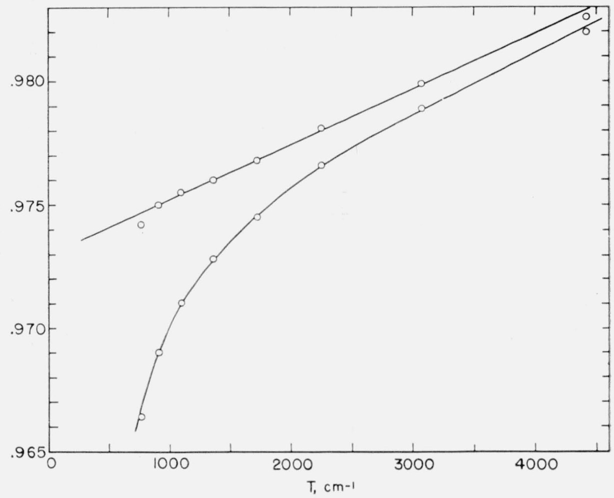

FIGURE 8. *The $(^4S^{\circ})ng\ ^5G^{\circ}_6$ series plotted for two different limit values, 154304 cm^{-1} (straight line) and 154308 cm^{-1} (curved line).*

The series runs from $n=5$, at the right, through $n=12$.

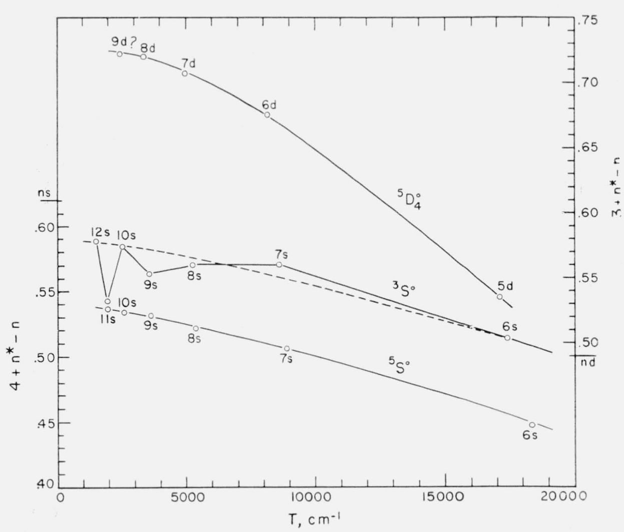

FIGURE 9. *Three series in I II based on the I III $5p^3\ ^4S^{\circ}$ limit at 154304 cm^{-1} above the ground level of I II.*

series. The behavior of the latter series is certainly too irregular to be caused by a single perturbing level. By analogy with the $^5S°$ series, one might guess that the dashed line shown in figure 9 approximates a hypothesized "unperturbed" behavior of the $^3S°$ series. The fact that $9s\ ^3S_1°$ combines strongly with $5p^4\ ^1D_2$, whereas the analogous transition for the other $ns\ ^3S°$ levels does not occur or is quite weak, suggests that the level $6d'\ 15_1°$ is mainly responsible for the depression of $9s\ ^3S_1°$. This $15_1°$ level, only 375 cm^{-1} above $9s\ ^3S_1°$, combines with $5p^4\ ^1D_2$ in a transition just twice as strong as the $5p^4\ ^1D_2$—$9s\ ^3S_1°$ line. Similarly, an interaction probably exists between $11s\ ^3S_1°$ and either or both of the slightly higher levels $25_1°$ and $29_1°$. The perturbations of the $^3S°$ series are actually not very large. For example, the perturbation required to remove the point for $11s\ ^3S°$ from the dashed line to the position shown is only 90 cm^{-1} (a change of 22 cm^{-1} in the reduced term value).

The $nd\ ^5D_4°$ series is shown in figure 9 as an example of an apparently regular series which nevertheless fails to obey the simple Ritz formula. It is clear that a limit position determined by assuming such a series to be Ritzian will be too low. A previous value reported [29] by us for the principal ionization energy of I II, 19.12 ev, corresponds to a limt of 154260 cm^{-1} derived from the $ns\ ^5S_2°$ and $nd\ ^5D_4°$ series.

On the basis of the $ng\ ^5G_6°$ series in figure 8, it seems reasonable to take the position of I III $5p^3\ ^4S°$ as 154304 ±1 cm^{-1} above the ground level of I II. By combining this result with a recent value [30] for the conversion factor, (wavenumber)/(energy in electron-volts)=8066.03 ±0.14 cm^{-1} ev^{-1}, we obtain 19.1301 ±0.0004 ev for the principal ionization energy of I II. If the conversion factor adopted in the AEL volumes is applied to our new limit, the resulting energy is 19.126 ev.

8. Conclusion

The earlier analyses of the I II spectrum, which yielded 43 even and 55 odd levels, have been revised and extended to include 124 even and 190 odd levels. The revisions include changed designations for over 40 levels, improved values for all previously known levels, and new Landé g_J factors for 46 levels. All previously known series have been extended and new ones found. The ionization potential of I II is well determined by one of the new series, $(^4S°)ng\ ^5G_6°$. Wherever feasible, the results of the analysis have been compared with theory and with experimental findings for homologous and isoelectronic atoms.

This improved analysis was made possible by the observation of almost 2400 I II lines excited in an electrodeless lamp. We have measured the Zeeman patterns of 83 lines. About 1800 lines are now classified, as compared to approximately 500 lines classified in previous analyses. None of the remaining unclassified lines is very strong. The present list includes approximately 300 lines in the vacuum ultraviolet region, 655 to 2000 A, and extends to 11085 A in the infrared. The measurement of the vacuum ultraviolet spectrum has yielded an accurate value for the connection between the higher levels and those of the ground configuration.

We have observed two magnetic dipole transitions among levels of the $5p^4$ ground configuration and verified their nature by the Zeeman effect.

This work was begun at the suggestion of Dr. C. C. Kiess, who measured most of the Zeeman patterns in connection with the investigation of the first spectrum of iodine. Charlotte Moore compiled most of the new g_J values and prepared a preliminary line list for the region above 2000 A. Mrs. Ruth Peterson has very accurately carried out the hand calculations needed for a new I II square array. She also punched the input cards used in calculations made at the Bureau IBM 704 installation.

The observed wavelengths in air were reduced to vacuum wavenumbers on the 704 with a code devised by Charles DeW. Coleman and William R. Bozman. In addition, an energy level search program written by Coleman and Bozman for the computer can be credited with finding a good number of the higher levels. Mr. Bozman has generously devoted many hours to assisting us with the computer work.

The numerical computations involved in an intermediate-coupling calculation for the $5p^36s$ configuration were carried out on the 704 by Dr. Richard E. Trees, using a code written by him. Dr. Trees has also been of help in some of the other theoretical calculations.

Together with Mrs. Agnes Rhodes, who typed and proofread the manuscript, each of these colleagues deserves our sincere thanks for assisting in this work.

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10. Appendix

TABLE 10.1. *Observed lines of* I II

λ(vac) observed	λ(vac) calculated	Intensity	Observed wavenumber, cm^{-1}	Classification
655.804		2	152484.6	
657.029		1	152200.3	$5p^4\ ^3P_2$— $51^{\circ}_{1,2,3}$
659.004		6	151744.1	$5p^4\ ^3P_2$— $49^{\circ}_{1,2}$
661.412		1	151191.7	$5p^4\ ^3P_2$—$14d\ ^3D^{\circ}_3$
663.977		8	150607.6	$5p^4\ ^3P_2$—$13d\ ^3D^{\circ}_3$
664.031		3	150595.4	$5p^4\ ^3P_2$— $48^{\circ}_{1,2}$
664.520	.512	8	150484.6	$5p^4\ ^3P_2$— $47^{\circ}_{1,2}$
665.055	.041	8	150363.5	$5p^4\ ^3P_2$— 46°_2
665.135	.132	5	150345.4	$5p^4\ ^3P_2$— $45^{\circ}_{1,2}$
665.699	.695	150	150218.0	$5p^4\ ^3P_2$— $43^{\circ}_{1,2}$
666.660	.653	150	150001.5	$5p^4\ ^3P_2$— 42°_2
667.270		100	149864.4	$5p^4\ ^3P_2$— $41^{\circ}_{1,2,3}$
668.264	.250	15	149641.4	$5p^4\ ^3P_2$—$12d\ ^3D^{\circ}_3$
668.976	.981	25	149482.2	$5p^4\ ^3P_2$— 40°_3
672.505	.491	40	148697.8	$5p^4\ ^3P_2$—$11d\ ^3D^{\circ}_3$
674.063		4	148354.1	$5p^4\ ^3P_2$—$12s\ ^3S^{\circ}_1$
675.748	.732	1	147984.2	$5p^4\ ^3P_2$— 34°_2
676.493	.480	80	147821.2	$5p^4\ ^3P_2$— 33°_3
678.856	.853	200	147306.6	$5p^4\ ^3P_2$—$10d\ ^3D^{\circ}_3$
679.155	.152	5	147241.8	$5p^4\ ^3P_2$— 30°_2
679.618	.616	50	147141.5	$5p^4\ ^3P_2$—$10d\ ^3D^{\circ}_2$
680.971	.967	15	146849.2	$5p^4\ ^3P_2$— 26°_3
681.266	.269	6	146785.5	$5p^4\ ^3P_2$— $25^{\circ}_{1,2}$
682.180	.179	25	146588.9	$5p^4\ ^3P_2$—$11s\ ^3S^{\circ}_1$
682.685	.682	40	146480.4	$5p^4\ ^3P_2$— $24^{\circ}_{1,2}$
683.414		1	146324.2	
683.569	.565	80	146291.0	$5p^4\ ^3P_2$— 21°_1
685.685	.694	1	145839.6	$5p^4\ ^3P_2$— $20^{\circ}_{1,2}$
689.294		15	145076.0	
689.817	.822	250	144966.0	$5p^4\ ^3P_2$— $9d\ ^3D^{\circ}_3$
690.082		5	144910.3	
690.272		3	144870.4	
690.453	.455	80	144832.4	$5p^4\ ^3P_2$— $9d\ ^3D^{\circ}_2$
691.194	.193	15	144677.2	$5p^4\ ^3P_2$— $8s'\ ^3D^{\circ}_2$
691.295		5	144656.0	$5p^4\ ^3P_1$— $49^{\circ}_{1,2}$
693.567	.566	40	144182.2	$5p^4\ ^3P_2$—$10s\ ^3S^{\circ}_1$
696.630		1	143548.2	
696.840		1	143505.0	$5p^4\ ^3P_1$— $48^{\circ}_{1,2}$
697.358	.353	1*h*	143398.4	$5p^4\ ^3P_1$— $47^{\circ}_{1,2}$
697.606		10	143347.4	
697.940	.936	5	143278.8	$5p^4\ ^3P_1$— 46°_2
698.032	.036	3	143259.9	$5p^4\ ^3P_1$— $45^{\circ}_{1,2}$
698.650	.656	8	143133.2	$5p^4\ ^3P_1$— $43^{\circ}_{1,2}$
699.697	.712	1	142919.0	$5p^4\ ^3P_1$— 42°_2

λ(vac) observed	λ(vac) calculated	Intensity	Observed wavenumber, cm^{-1}	Classification
701. 007		1	142651. 9	
701. 909		40	142468. 6	
706. 055	. 044	400	141632. 0	$5p^4\ ^3P_2$— $8d\ ^3D^\circ_3$
706. 319		10	141579. 1	
706. 622	. 611	3	141518. 4	$5p^4\ ^3P_2$— $8d\ ^3D^\circ_1$
706. 901	. 898	150	141462. 5	$5p^4\ ^3P_2$— $8d\ ^3D^\circ_2$
707. 136	. 133	100	141415. 5	$5p^4\ ^3P_0$— 33.5°_1
708. 122	. 113	7	141218. 6	$5p^4\ ^3P_1$— 36°_2
709. 733	. 720	50*w*	140898. 0	$5p^4\ ^3P_1$— 34°_2
709. 856	. 871	1	140873. 6	$5p^4\ ^3P_2$— $8d\ ^5D^\circ_2$
711. 746	. 742	6	140499. 6	$5p^4\ ^3P_2$— $6d'\ 15^\circ_1$
712. 918	. 914	200	140268. 6	$5p^4\ ^3P_1$— 31°_0
713. 152		2	140222. 6	
713. 502	. 493	25	140153. 8	$5p^4\ ^3P_1$— 30°_2
713. 557	. 565	10	140143. 0	$5p^4\ ^3P_0$—$11s\ ^3S^\circ_1$
713. 654	. 645	100	140123. 9	$5p^4\ ^3P_2$— $9s\ ^3S^\circ_1$
715. 832	. 830	150	139697. 6	$5p^4\ ^3P_1$— $25^\circ_{1,2}$
716. 161	. 157	10	139633. 4	$5p^4\ ^3P_2$— $6d'\ 14^\circ_3$
716. 583	. 580	150	139551. 2	$5p^4\ ^3P_2$— $6d'\ 13^\circ_{1,2}$
717. 388	. 390	80	139394. 6	$5p^4\ ^3P_1$— $24^\circ_{1,2}$
718. 360	. 365	1	139206. 0	$5p^4\ ^3P_1$— 21°_1
719. 546	. 539	1000	138976. 5	$5p^4\ ^3P_2$— $6d'\ 12^\circ_1$
722. 169		15	138471. 7	$5p^4\ ^1D_2$— $51^\circ_{1,2,3}$
722. 980	. 980	1000	138316. 4	$5p^4\ ^3P_2$— $6d'\ 10^\circ_2$
724. 550		2	138016. 7	$5p^4\ ^1D_2$— $49^\circ_{1,2}$
725. 432		10	137848. 9	
725. 976	. 979	4	137745. 6	$5p^4\ ^3P_1$— $9d\ ^3D^\circ_2$
726. 019	. 035	2	137737. 4	$5p^4\ ^3P_0$—$10s\ ^3S^\circ_1$
726. 798	. 794	3	137589. 8	$5p^4\ ^3P_1$— $8s'\ ^3D^\circ_2$
726. 987	. 985	10	137554. 0	$5p^4\ ^3P_1$— $8s'\ ^3D^\circ_1$
727. 246	. 246	800	137505. 1	$5p^4\ ^3P_2$— $6d'\ 9^\circ_3$
730. 423		1	136907. 0	
731. 005	. 002	7	136798. 0	$5p^4\ ^3P_0$— $7s''\ ^3P^\circ_1$
731. 169		5	136767. 3	
731. 216	. 213	7	136758. 5	$5p^4\ ^1D_2$— $47^\circ_{1,2}$
731. 860	. 853	20	136638. 2	$5p^4\ ^1D_2$— 46°_2
731. 961	. 964	25	136619. 3	$5p^4\ ^1D_2$— $45^\circ_{1,2}$
732. 092	. 081	50	136594. 9	$5p^4\ ^1D_2$— $44^\circ_{2,3}$
732. 276	. 269	15	136560. 5	$5p^4\ ^3P_2$— $6d'\ 7^\circ_{1,2}$
732. 910	. 905	5	136442. 4	$5p^4\ ^3P_2$— $6d'\ 6^\circ_{1,2}$
734. 430	. 433	1	136160. 0	$5p^4\ ^3P_1$— $7s''\ ^3P^\circ_1$
735. 402	. 401	2	135980. 0	$5p^4\ ^3P_1$— $7s''\ ^3P^\circ_0$
737. 546	. 545	500	135584. 8	$5p^4\ ^3P_2$— $7d\ ^3D^\circ_3$
740. 342	. 343	25	135072. 7	$5p^4\ ^3P_0$— $8d\ ^3D^\circ_1$
740. 950	. 959	300	134961. 9	$5p^4\ ^3P_2$— $7d\ ^3D^\circ_2$
741. 131	. 129	6	134928. 9	$5p^4\ ^1D_2$— 37°_2
741. 207	. 213	6	134915. 1	$5p^4\ ^3P_2$— $6d'\ 5^\circ_1$
743. 054	. 052	20	134579. 7	$5p^4\ ^1D_2$— 36°_2
743. 848		60	134436. 1	{ $5p^4\ ^3P_1$— $8d\ ^3D^\circ_1$ { $5p^4\ ^3P_0$— $8d\ ^5D^\circ_1$
744. 188	. 180	40	134374. 6	$5p^4\ ^3P_1$— $8d\ ^3D^\circ_2$
744. 822	. 821	20	134260. 3	$5p^4\ ^1D_2$— 34°_2
746. 143	. 136	1	134022. 6	$5p^4\ ^3P_2$— $6d'\ 3^\circ_3$
746. 523	. 517	15	133954. 3	$5p^4\ ^3P_2$— $6d'\ 2^\circ_3$
748. 781	. 780	800	133550. 4	$5p^4\ ^3P_2$— $7s'\ ^3D^\circ_3$
748. 978	. 978	7	133515. 3	$5p^4\ ^1D_2$— 30°_2
749. 552	. 550	15	133413. 0	$5p^4\ ^3P_1$— $6d'\ 15^\circ_1$
750. 197		250	133298. 3	{ $5p^4\ ^3P_2$— $8s\ ^3S^\circ_1$ { $5p^4\ ^3P_2$— $6d'\ 1^\circ_2$
751. 187	. 185	25	133122. 6	$5p^4\ ^1D_2$— 26°_3

λ(vac) observed	λ(vac) calculated	Intensity	Observed wavenumber, cm^{-1}	Classification
752.656	.660	6	132862.8	$5p^4\ {}^1D_2 - 11s\ {}^3S^\circ_1$
752.798	.801	7	132837.8	$5p^4\ {}^3P_2 - 8s\ {}^5S^\circ_2$
753.263	.273	40	132755.8	$5p^4\ {}^1D_2 - 24^\circ_{1,\,2}$
753.364	.381	3	132738.0	$5p^4\ {}^3P_2 - 5d''\ {}^3P^\circ_1$
754.342	.348	1	132565.9	$5p^4\ {}^1D_2 - 21^\circ_1$
754.540	.546	8	132531.1	$5p^4\ {}^3P_0 - 6d'\ 12^\circ_1$
754.913	.918	35	132465.6	$5p^4\ {}^3P_1 - 6d'\ 13^\circ_{1,\,2}$
756.935	.942	2	132111.7	$5p^4\ {}^1D_2 - 20^\circ_{1,\,2}$
758.201	.203	25	131891.1	$5p^4\ {}^3P_1 - 6d'\ 12^\circ_1$
761.739	.747	120	131278.6	$5p^4\ {}^3P_1 - 6d'\ 11^\circ_0$
763.644	.649	12	130951.1	$5p^4\ {}^1D_2 - 8s'\ {}^3D^\circ_2$
765.594		600	130617.5	$5p^4\ {}^3P_2 - 7s'\ {}^3D^\circ_2$ $5p^4\ {}^3P_2 - 7s'\ {}^3D^\circ_1$
770.771	.777	300	129740.2	$5p^4\ {}^3P_0 - 7d\ {}^3D^\circ_1$
772.078	.086	1	129520.6	$5p^4\ {}^1D_2 - 7s''\ {}^3P^\circ_1$
772.344	.351	400	129476.0	$5p^4\ {}^3P_1 - 6d'\ 7^\circ_{1,\,2}$
773.055	.058	500	129356.9	$5p^4\ {}^3P_1 - 6d'\ 6^\circ_{1,\,2}$
786.413	.409	15	127159.6	$5p^4\ {}^1D_2 - 8d\ {}^5D^\circ_1$
786.460		20	127152.0	$5p^4\ {}^3P_1 - 6d'\ 4^\circ_0$ $5p^4\ {}^1D_2 - 8d\ {}^5D^\circ_3$
788.329	.338	3	126850.6	$5p^4\ {}^3P_0 - 8s\ {}^3S^\circ_1$
788.815	.811	700	126772.4	$5p^4\ {}^1D_2 - 6d'\ 15^\circ_1$
791.147	.149	350	126398.8	$5p^4\ {}^1D_2 - 9s\ {}^3S^\circ_1$
791.851	.847	7	126286.4	$5p^4\ {}^3P_0 - 5d''\ {}^3P^\circ_1$
791.967		15	126267.9	
792.313		70	126212.7	$5p^4\ {}^3P_1 - 6d'\ 1^\circ_2$ $5p^4\ {}^3P_1 - 8s\ {}^3S^\circ_1$
794.237	.238	500	125907.0	$5p^4\ {}^1D_2 - 6d'\ 14^\circ_3$
794.757	.758	400	125824.6	$5p^4\ {}^1D_2 - 6d'\ 13^\circ_{1,\,2}$
797.819	.836	2	125341.7	$5p^4\ {}^3P_2 - 6d\ {}^3D^\circ_1$
798.158	.159	1000	125288.5	$5p^4\ {}^3P_2 - 6d\ {}^3D^\circ_3$
798.427	.419	400	125246.3	$5p^4\ {}^3P_2 - 6d\ {}^3D^\circ_2$
802.618	.637	1	124592.3	$5p^4\ {}^1D_2 - 6d'\ 10^\circ_2$
805.361	.365	5	124167.9	$5p^4\ {}^3P_0 - 7s'\ {}^3D^\circ_1$
809.188	.192	60	123580.7	$5p^4\ {}^3P_2 - 5d''\ {}^1F^\circ_3$
809.523		150	123529.5	$5p^4\ {}^3P_1 - 7s'\ {}^3D^\circ_2$ $5p^4\ {}^3P_1 - 7s'\ {}^3D^\circ_1$
814.094	.103	50	122835.9	$5p^4\ {}^1D_2 - 6d'\ 7^\circ_{1,\,2}$
814.459	.476	3	122780.9	$5p^4\ {}^3P_2 - 5d''\ {}^3F^\circ_2$
814.880	.888	12	122717.4	$5p^4\ {}^1D_2 - 6d'\ 6^\circ_{1,\,2}$
818.047	.039	700	122242.4	$5p^4\ {}^3P_2 - 6d\ {}^5D^\circ_1$
820.884	.892	150	121819.9	$5p^4\ {}^3P_2 - 6d\ {}^5D^\circ_2$
821.159	.164	30	121779.1	$5p^4\ {}^3P_2 - 6d\ {}^5D^\circ_3$
823.426	.436	170	121443.8	$5p^4\ {}^3P_0 - 5d''\ {}^1P^\circ_1$
824.841	.858	1	121235.5	$5p^4\ {}^1D_2 - 7d\ {}^3D^\circ_2$
825.122	.113	500	121194.2	$5p^4\ {}^3P_2 - 5d''\ {}^3F^\circ_3$
825.934	.929	300	121075.0	$5p^4\ {}^3P_2 - 5d''\ {}^3D^\circ_1$
827.797	.792	400	120802.6	$5p^4\ {}^3P_1 - 5d''\ {}^1P^\circ_1$
828.888	.897	1	120643.6	$5p^4\ {}^1D_2 - 7d\ {}^5D^\circ_2$
831.168	.187	300	120312.6	$5p^4\ {}^1D_2 - 7s'\ {}^1D^\circ_2$
831.270	.278	150	120297.8	$5p^4\ {}^1D_2 - 6d'\ 3^\circ_3$
834.095	.106	1200	119890.4	$5p^4\ {}^3P_2 - 7s\ {}^3S^\circ_1$
838.070	.075	700	119321.8	$5p^4\ {}^3P_2 - 5d''\ {}^3D^\circ_2$
840.259	.282	3	119010.9	$5p^4\ {}^1D_2 - 5d''\ {}^3P^\circ_1$
841.097	.106	700	118892.4	$5p^4\ {}^3P_0 - 6d\ {}^3D^\circ_1$
843.113	.116	600	118608.1	$5p^4\ {}^3P_2 - 7s\ {}^5S^\circ_2$
845.638	.652	25	118253.9	$5p^4\ {}^3P_1 - 6d\ {}^3D^\circ_1$
846.295	.306	900	118162.1	$5p^4\ {}^3P_1 - 6d\ {}^3D^\circ_2$
847.796		600	117952.9	$5p^4\ {}^3P_1 - 5d''\ {}^3P^\circ_0$?
847.926	.922	1000	117934.8	$5p^4\ {}^3P_2 - 5d''\ {}^3P^\circ_2$

TABLE 10.1. *Observed lines of* I II—Continued

λ(vac) observed	λ(vac) calculated	Intensity	Observed wavenumber, cm^{-1}	Classification
855. 494	. 502	400	116891. 5	$5p^4\,{}^1D_2 - 7s'\ {}^3D^\circ_2$
863. 590	. 590	600	115795. 7	$5p^4\,{}^3P_0 - 6d\ {}^5D^\circ_1$
868. 380	. 383	750	115157. 0	$5p^4\,{}^3P_1 - 6d\ {}^5D^\circ_1$
870. 343	. 341	900	114897. 2	$5p^4\,{}^3P_2 - 5d'\ {}^1P^\circ_1$
871. 596	. 599	30	114732. 0	$5p^4\,{}^3P_1 - 6d\ {}^5D^\circ_2$
872. 391	. 388	800	114627. 5	$5p^4\,{}^3P_0 - 5d''\ {}^3D^\circ_1$
873. 489	. 495	1500	114483. 4	$5p^4\,{}^3P_2 - 5d'\ {}^3P^\circ_2$
875. 941	. 940	1000	114162. 9	$5p^4\,{}^1D_2 - 5d''\ {}^1P^\circ_1$
877. 276	. 279	800	113989. 2	$5p^4\,{}^3P_1 - 5d''\ {}^3D^\circ_1$
879. 844	. 847	2000	113656. 5	$5p^4\,{}^3P_2 - 5d''\ {}^3D^\circ_3$
881. 881	. 889	1500	113394. 0	$5p^4\,{}^3P_2 - 5d'\ {}^1F^\circ_3$
886. 492	. 511	30	112804. 2	$5p^4\,{}^3P_1 - 7s\ {}^3S^\circ_1$
890. 995	. 995	1000	112234. 1	$5p^4\,{}^3P_1 - 5d''\ {}^3D^\circ_2$
893. 167	. 163	1000	111961. 1	$5p^4\,{}^3P_2 - 6s''\ {}^1P^\circ_1$
895. 844	. 847	400	111626. 6	$5p^4\,{}^3P_0 - 5d'\ {}^3P^\circ_1$
895. 957	. 963	200	111612. 5	$5p^4\,{}^1D_2 - 6d\ {}^3D^\circ_1$
896. 376	. 370	400	111560. 3	$5p^4\,{}^1D_2 - 6d\ {}^3D^\circ_3$
896. 692		400	111521. 0	{ $5p^4\,{}^1D_2 - 6d\ {}^3D^\circ_2$ $5p^4\,{}^3P_1 - 7s\ {}^5S^\circ_2$
901. 004	. 006	200	110987. 3	$5p^4\,{}^3P_1 - 5d'\ {}^3P^\circ_1$
902. 130	. 133	400	110848. 8	$5p^4\,{}^3P_1 - 5d''\ {}^3P^\circ_2$
905. 313	. 314	100	110459. 0	$5p^4\,{}^3P_2 - 6s''\ {}^3P^\circ_2$
910. 309	. 309	400	109852. 8	$5p^4\,{}^1D_2 - 5d''\ {}^1F^\circ_3$
914. 957	. 951	200	109294. 8	$5p^4\,{}^3P_2 - 5d'\ {}^3S^\circ_1$
917. 007	. 001	300	109050. 4	$5p^4\,{}^1D_2 - 5d''\ {}^3F^\circ_2$
921. 343	. 340	400	108537. 2	$5p^4\,{}^3P_2 - 5d'\ {}^1D^\circ_2$
922. 085	. 088	100	108449. 9	$5p^4\,{}^3P_0 - 5d'\ {}^1P^\circ_1$
925. 119	. 142	1	108094. 2	$5p^4\,{}^1D_2 - 6d\ {}^5D^\circ_2$
925. 477	. 488	15	108052. 4	$5p^4\,{}^1D_2 - 6d\ {}^5D^\circ_3$
929. 143	. 144	800	107626. 0	$5p^4\,{}^3P_2 - 5d'\ {}^3G^\circ_3$
930. 133	. 131	100	107511. 5	$5p^4\,{}^3P_2 - 5d'\ {}^3F^\circ_2$
930. 506	. 506	150	107468. 4	$5p^4\,{}^1D_2 - 5d''\ {}^3F^\circ_3$
931. 139	. 137	100	107395. 4	$5p^4\,{}^3P_1 - 5d'\ {}^3P^\circ_2$
937. 322	. 332	20	106686. 9	$5p^4\,{}^1S_0 - 7d\ {}^3D^\circ_1$
940. 904	. 902	200	106280. 8	$5p^4\,{}^3P_1 - 5d''\ {}^1D^\circ_2$
941. 936	. 960	2	106164. 3	$5p^4\,{}^1D_2 - 7s\ {}^3S^\circ_1$
942. 472	. 478	40	106103. 9	$5p^4\,{}^3P_2 - 6s''\ {}^3P^\circ_1$
947. 023	. 024	100	105594. 0	$5p^4\,{}^1D_2 - 5d''\ {}^3D^\circ_2$
947. 749	. 744	15	105513. 2	$5p^4\,{}^3P_0 - 6s''\ {}^1P^\circ_1$
948. 658	. 653	80	105412. 1	$5p^4\,{}^1S_0 - 6d'\ 5^\circ_1$
953. 199		8	104909. 9	
953. 489		30*d*	104878. 0	{ $5p^4\,{}^3P_1 - 6s''\ {}^1P^\circ_1$ $5p^4\,{}^1D_2 - 7s\ {}^5S^\circ_2$
956. 503	. 515	10	104547. 5	$5p^4\,{}^3P_2 - 5d'\ {}^3D^\circ_1$
958. 333	. 342	25	104347. 9	$5p^4\,{}^1D_2 - 5d'\ {}^3P^\circ_1$
959. 619	. 617	100	104208. 0	$5p^4\,{}^1D_2 - 5d''\ {}^3P^\circ_2$
961. 979	. 982	70	103952. 4	$5p^4\,{}^3P_1 - 5d'\ {}^1S^\circ_0$
963. 415	. 430	4	103797. 4	$5p^4\,{}^1S_0 - 8s\ {}^3S^\circ_1$
967. 378	. 381	700	103372. 2	$5p^4\,{}^3P_1 - 6s''\ {}^3P^\circ_2$
968. 670	. 677	100	103234. 3	$5p^4\,{}^1S_0 - 5d''\ {}^3P^\circ_1$
972. 292	. 313	10	102849. 8	$5p^4\,{}^3P_0 - 5d'\ {}^3S^\circ_1$
978. 394	. 393	300	102208. 3	$5p^4\,{}^3P_1 - 5d'\ {}^3S^\circ_1$
988. 434	. 433	200	101170. 1	$5p^4\,{}^1D_2 - 5d'\ {}^1P^\circ_1$
992. 508	. 503	150	100754. 8	$5p^4\,{}^1D_2 - 5d'\ {}^3P^\circ_2$
995. 768	. 770	700	100425. 0	$5p^4\,{}^3P_1 - 5d'\ {}^3F^\circ_2$
1000. 572	. 569	1200	99942. 8	$5p^4\,{}^3P_2 - 5d'\ {}^3F^\circ_3$
1000. 701	. 711	80	99929. 9	$5p^4\,{}^1D_2 - 5d''\ {}^3D^\circ_3$
1003. 350	. 354	1000	99666. 1	$5p^4\,{}^1D_2 - 5d'\ {}^1F^\circ_3$
1003. 457	. 458	500	99655. 5	$5p^4\,{}^3P_0 - 6s''\ {}^3P^\circ_1$

TABLE 10.1. *Observed lines of* I II—Continued

λ(vac) observed	λ(vac) calculated	Intensity	Observed wavenumber, cm^{-1}	Classification
1003. 612	. 605	300	99640. 1	$5p^4\ {}^1D_2 - 5d''\ {}^1D^\circ_2$
1009. 936	. 935	700	99016. 2	$5p^4\ {}^3P_1 - 6s''\ {}^3P^\circ_1$
1016. 381	. 375	20	98388. 3	$5p^4\ {}^1S_0 - 5d''\ {}^1P^\circ_1$
1017. 977	. 973	200	98234. 0	$5p^4\ {}^1D_2 - 6s''\ {}^1P^\circ_1$
1018. 583	. 581	4000	98175. 6	$5p^4\ {}^3P_2 - 5d'\ {}^3D^\circ_3$
1019. 230	. 223	400	98113. 3	$5p^4\ {}^3P_1 - 6s''\ {}^3P^\circ_0$
1019. 400	. 386	800	98096. 9	$5p^4\ {}^3P_0 - 5d'\ {}^3D^\circ_1$
1023. 544	. 533	200	97699. 8	$5p^4\ {}^3P_2 - 6s'\ {}^1D^\circ_2$
1026. 065	. 070	350	97459. 7	$5p^4\ {}^3P_1 - 5d'\ {}^3D^\circ_1$
1030. 047	. 043	800	97082. 9	$5p^4\ {}^3P_2 - 5d'\ {}^3D^\circ_2$
1033. 801	. 787	400	96730. 4	$5p^4\ {}^1D_2 - 6s''\ {}^3P^\circ_2$
1034. 655	. 655	10000	96650. 6	$5p^4\ {}^3P_2 - 6s'\ {}^3D^\circ_3$
1042. 154	. 146	100	95955. 1	$5p^4\ {}^3P_2 - 5p^5\ {}^1P^\circ_1$
1043. 430	. 431	2	95837. 8	$5p^4\ {}^1S_0 - 6d\ {}^3D^\circ_1$
1046. 373	. 373	200	95568. 2	$5p^4\ {}^1D_2 - 5d'\ {}^3S^\circ_1$
1054. 582	. 571	150	94824. 3	$5p^4\ {}^3P_2 - 6s'\ {}^3D^\circ_1$
1054. 742	. 738	1500	94809. 9	$5p^4\ {}^1D_2 - 5d'\ {}^1D^\circ_2$
1064. 981	. 977	60	93898. 4	$5p^4\ {}^1D_2 - 5d'\ {}^3G^\circ_3$
1066. 273	. 273	250	93784. 6	$5p^4\ {}^1D_2 - 5d'\ {}^3F^\circ_2$
1067. 341	. 334	2000	93690. 8	$5p^4\ {}^3P_2 - 6s'\ {}^3D^\circ_2$
1075. 210	. 200	3000	93005. 1	$5p^4\ {}^3P_2 - 5d\ {}^3D^\circ_3$
1082. 540	. 531	400	92375. 3	$5p^4\ {}^1D_2 - 6s''\ {}^3P^\circ_1$
1085. 405	. 405	700	92131. 5	$5p^4\ {}^3P_2 - 5d\ {}^3D^\circ_1$
1101. 099	. 091	30	90818. 4	$5p^4\ {}^1D_2 - 5d'\ {}^3D^\circ_1$
1101. 239	. 232	400	90806. 8	$5p^4\ {}^3P_1 - 5d'\ {}^3P^\circ_0$
1103. 590	. 584	800	90613. 4	$5p^4\ {}^3P_1 - 6s'\ {}^1D^\circ_2$
1105. 000	4. 993	5000	90497. 7	$5p^4\ {}^3P_2 - 5d\ {}^3D^\circ_2$
1111. 165	. 157	2500	89995. 6	$5p^4\ {}^3P_1 - 5d'\ {}^3D^\circ_2$
1117. 219	. 219	1500	89508. 0	$5p^4\ {}^3P_0 - 5p^5\ {}^1P^\circ_1$
1125. 251	. 254	3500	88869. 1	$5p^4\ {}^3P_1 - 5p^5\ {}^1P^\circ_1$
1131. 504	. 511	2000	88378. 0	$5p^4\ {}^3P_0 - 6s'\ {}^3D^\circ_1$
1139. 752	. 753	1200	87738. 4	$5p^4\ {}^3P_1 - 6s'\ {}^3D^\circ_1$
1139. 805	. 808	10000	87734. 3	$5p^4\ {}^3P_2 - 5d\ {}^5D^\circ_1$
1154. 668	. 676	1500	86605. 0	$5p^4\ {}^3P_1 - 6s'\ {}^3D^\circ_2$
1159. 871	. 879	1000	86216. 5	$5p^4\ {}^1D_2 - 5d'\ {}^3F^\circ_3$
1160. 562	. 565	10000	86165. 2	$5p^4\ {}^3P_2 - 5d\ {}^5D^\circ_2$
1166. 482	. 480	20000	85727. 9	$5p^4\ {}^3P_2 - 5d\ {}^5D^\circ_3$
1167. 054	. 069	1500	85685. 8	$5p^4\ {}^3P_0 - 5d\ {}^3D^\circ_1$
1171. 007	. 014	50	85396. 6	$5p^4\ {}^1S_0 - 5d'\ {}^1P^\circ_1$
1175. 841	. 840	5000	85045. 5	$5p^4\ {}^3P_1 - 5d\ {}^3D^\circ_1$
1178. 650	. 649	10000	84842. 8	$5p^4\ {}^3P_2 - 6s\ {}^3S^\circ_1$
1184. 156	. 153	200	84448. 3	$5p^4\ {}^1D_2 - 5d'\ {}^3D^\circ_3$
1187. 338	. 335	15000	84222. 0	$5p^4\ {}^3P_2 - 5p^5\ {}^3P^\circ_1$
1190. 853	. 850	10000	83973. 4	$5p^4\ {}^1D_2 - 6s'\ {}^1D^\circ_2$
1198. 884	. 878	5000	83410. 9	$5p^4\ {}^3P_1 - 5d\ {}^3D^\circ_2$
1199. 677	. 672	1000	83355. 8	$5p^4\ {}^1D_2 - 5d'\ {}^3D^\circ_2$
1200. 223	. 221	7000	83317. 8	$5p^4\ {}^3P_1 - 5p^5\ {}^3P^\circ_0$
1205. 931	. 933	2000	82923. 5	$5p^4\ {}^1D_2 - 6s'\ {}^3D^\circ_3$
1216. 125	. 121	3000	82228. 4	$5p^4\ {}^1D_2 - 5p^5\ {}^1P^\circ_1$
1220. 887	. 885	20000	81907. 7	$5p^4\ {}^3P_2 - 5p^5\ {}^3P^\circ_2$
1230. 222	. 221	600	81286. 1	$5p^4\ {}^3P_0 - 5d\ {}^5D^\circ_1$
1233. 069	. 074	100	81098. 5	$5p^4\ {}^1D_2 - 6s'\ {}^3D^\circ_1$
1234. 063	. 070	20000	81033. 1	$5p^4\ {}^3P_2 - 6s\ {}^5S^\circ_2$
1239. 969	. 970	80	80647. 2	$5p^4\ {}^3P_1 - 5d\ {}^5D^\circ_1$
1250. 559	. 560	700	79964. 2	$5p^4\ {}^1D_2 - 6s'\ {}^3D^\circ_2$
1264. 580	. 576	20	79077. 6	$5p^4\ {}^3P_1 - 5d\ {}^5D^\circ_2$
1275. 424	. 422	2000	78405. 3	$5p^4\ {}^1D_2 - 5d\ {}^3D^\circ_1$
1275. 596	. 592	1000	78394. 7	$5p^4\ {}^3P_0 - 6s\ {}^3S^\circ_1$
1277. 190	. 186	2500	78296. 9	$5p^4\ {}^3P_1 - 5d\ {}^5D^\circ_0$
1285. 782	. 772	1500	77773. 7	$5p^4\ {}^3P_0 - 5p^5\ {}^3P^\circ_1$

TABLE 10.1. *Observed lines of* I II—Continued

λ(vac) observed	λ(vac) calculated	Intensity	Observed wavenumber, cm^{-1}	Classification
1286. 084	. 076	4000	77755. 4	$5p^4\ {}^3P_1$— $6s\ {}^3S^{\circ}_1$
1296. 416	. 425	3000	77135. 7	$5p^4\ {}^3P_1$— $5p^5\ {}^3P^{\circ}_1$
1302. 580	. 573	150	76770. 7	$5p^4\ {}^1D_2$— $5d\ {}^3D^{\circ}_2$
1332. 533	. 536	12	75045. 0	$5p^4\ {}^1S_0$— $5d'\ {}^3D^{\circ}_1$
1336. 517	. 527	20000	74821. 3	$5p^4\ {}^3P_1$— $5p^5\ {}^3P^{\circ}_2$
1351. 219	. 225	20	74007. 2	$5p^4\ {}^1D_2$— $5d\ {}^5D^{\circ}_1$
1380. 501	. 497	500	72437. 5	$5p^4\ {}^1D_2$— $5d\ {}^5D^{\circ}_2$
1406. 138	. 159	10	71116. 8	$5p^4\ {}^1D_2$— $6s\ {}^3S^{\circ}_1$
1418. 539	. 540	25	70495. 1	$5p^4\ {}^1D_2$— $5p^5\ {}^3P^{\circ}_1$
1466. 673	. 693	1000	68181. 5	$5p^4\ {}^1D_2$— $5p^5\ {}^3P^{\circ}_2$
1485. 734	. 763	30	67306. 8	$5p^4\ {}^1D_2$— $6s\ {}^5S^{\circ}_2$
1504. 761	. 788	10	66455. 7	$5p^4\ {}^1S_0$— $5p^5\ {}^1P^{\circ}_1$
1521. 068		15	65743. 3	
1700. 529		2	58805. 2	
1825. 049	. 059	2	54793. 0	$5p^5\ {}^3P^{\circ}_2$— $8p\ {}^3P_2$
1826. 705		10	54743. 4	
1828. 550		3	54688. 1	
1828. 729		3	54682. 8	
1859. 466		3	53778. 9	
1961. 837	. 839	2	50972. 6	$5d\ {}^5D^{\circ}_3$— $8p\ {}^3P_2$
1964. 631	. 636	3	50900. 1	$5d\ {}^3D^{\circ}_2$— $6f\ {}^3F_2$
1978. 816	. 799	2	50535. 3	$5d\ {}^5D^{\circ}_2$— $8p\ {}^3P_2$
1981. 360		3	50470. 4	
1990. 944		3	50227. 4	

TABLE 10.1. *Observed lines of* I II—Continued

λ(air)	Intensity	Wave number	Classification
2014. 178	1	49632. 00	$5p^5\ {}^3P^{\circ}_0$— $4f'\ {}^3D_1$
2023. 100	8	49413. 17	$5d\ {}^5D^{\circ}_3$— $5f\ {}^5F_4$
2024. 580	2	49377. 05	$5d'\ {}^3D^{\circ}_2$— $1_{2,3}$
2026. 155	1	49338. 67	
2034. 068	15	49146. 76	$5d\ {}^5D^{\circ}_4$— $5f\ {}^5F_5$
2035. 812	1	49104. 66	$5d\ {}^5D^{\circ}_4$— $5f\ {}^5F_4$
2037. 806	2	49056. 62	$5d\ {}^5D^{\circ}_2$— $5f\ {}^5F_2$
2038. 561	1	49038. 46	
2041. 256	4	48973. 72	$5d\ {}^5D^{\circ}_2$— $5f\ {}^5F_3$
2048. 816	1	48793. 04	$5d\ {}^5D^{\circ}_1$— $4f'\ {}^3F_2$
2053. 160	1	48689. 82	
2053. 802	1	48674. 60	$5d\ {}^5D^{\circ}_1$— $8p\ {}^3P_1$
2060. 167	2	48524. 24	
2091. 300	3	47801. 95	
2096. 797	7	47676. 65	{ $5d'\ {}^3F^{\circ}_4$— $8f\ {}^3F_3$ { $6p\ {}^5P_3$— $35^{\circ}_{2,3}$
2103. 562	1*h*	47523. 34	$5p^5\ {}^3P^{\circ}_2$— $6p''\ {}^3D_3$
2105. 120	1	47488. 17	$5d'\ {}^3G^{\circ}_4$— $4_{3,4}$
2114. 745	6	47272. 06	
2116. 970	1	47222. 38	$5p^5\ {}^3P^{\circ}_1$— $6p''\ {}^1D_2$
2117. 767	1	47204. 61	
2118. 690	1*h*	47184. 05	
2119. 858	2*h*	47158. 06	$5d\ {}^3D^{\circ}_3$— $7p'\ {}^1F_3$
2122. 086	8	47108. 55	
2122. 252	1	47104. 87	
2122. 372	1	47102. 20	$5d\ {}^3D^{\circ}_3$— $7p'\ {}^3F_4$

λ(air)	Intensity	Wave number	Classification
2125. 156	1	47040. 50	
2132. 921	1	46869. 27	$6s'\ {}^3D^{\circ}_2$— $4f'\ {}^1P_1$
2140. 992	2	46692. 61	$6s'\ {}^3D^{\circ}_2$— $7p'\ {}^3F_3$
2141. 338	1*h*	46685. 06	$5d\ {}^3D^{\circ}_3$— $4f'\ {}^3G_3$
2143. 876	1	46629. 80	
2150. 143	3	46493. 90	
2171. 863	2	46028. 99	
2172. 223	5	46021. 36	
2177. 480	4	45910. 26	$5d\ {}^3D^{\circ}_2$— $8p\ {}^3P_1$
2203. 313	8*h*	45372. 04	
2208. 736	1	45260. 65	{ $6p\ {}^5P_2$— $9d\ {}^5D^{\circ}_3$ { $5d\ {}^3D^{\circ}_1$— $4f'\ {}^3P_1$
2210. 358	3	45227. 44	$5d\ {}^3D^{\circ}_2$— $5f\ {}^3F_2$
2210. 876	2	45216. 85	
2211. 135	1	45211. 55	$6s'\ {}^3D^{\circ}_1$— $4f'\ {}^3D_1$
2211. 533	1	45203. 42	$6s\ {}^5S^{\circ}_2$— $7p\ {}^3P_1$
2217. 279	2	45086. 28	$6s'\ {}^3D^{\circ}_1$— $7p'\ {}^3F_2$
2227. 385	1	44881. 74	$5d\ {}^3D^{\circ}_1$— $4f'\ {}^3D_2$
2229. 246	30	44844. 28	$5d\ {}^3D^{\circ}_2$— $5f\ {}^3F_3$
2230. 393	2	44821. 22	
2231. 371	1	44801. 58	
2236. 618	1	44696. 48	$6p\ {}^5P_2$—$10s\ {}^5S^{\circ}_2$
2236. 762	1	44693. 60	$6p\ {}^3P_2$—$10d\ {}^3D^{\circ}_3$
2239. 433	3	44640. 30	$5d\ {}^3D^{\circ}_2$— $5f\ {}^5F_3$
2239. 714	1*h*	44634. 70	
2244. 666	5	44536. 24	

λ(air)	Intensity	Wave number	Classification
2246.675	2*h*	44496.42	$5p^5\ {}^3P^\circ_2$— $7p\ {}^3P_2$
2255.206	1*h*	44328.12	$5p^5\ {}^3P^\circ_2$— $7p\ {}^3P_1$
2256.674	3*h*	44299.28	
2260.035	20	44233.41	$5p^5\ {}^1P^\circ_1$— $7p'\ {}^1D_2$
2261.700	4	44200.85	
2262.032	2*h*	44194.36	$6s\ {}^5S^\circ_2$— $4f\ {}^3F_3$
2262.533	1*h*	44184.58	
2267.855	2*h*	44080.90	$5p^5\ {}^1P^\circ_1$— $4f'\ {}^3D_1$
2274.322	3	43955.57	$5p^5\ {}^1P^\circ_1$— $7p'\ {}^3F_2$
2276.270	1*h*	43917.95	
2286.564	4	43720.26	$6s\ {}^3S^\circ_1$— $6p''\ {}^3S_1$
2287.060	1	43710.77	$5d\ {}^5D^\circ_1$— $6p''\ {}^1D_2$
2287.903	15	43694.67	$5d\ {}^3D^\circ_3$— $8p\ {}^3P_2$
2288.569	1	43681.96	
2288.693	2	43679.59	
2291.767	2	43621.01	$6p\ {}^5P_3$— $10s\ {}^5S^\circ_2$
2293.226	25	43593.26	$5d\ {}^3D^\circ_1$— $5f\ {}^3F_2$
2302.945	1	43409.30	
2310.139	5	43274.13	
2310.551	2	43266.41	$5d\ {}^5D^\circ_2$— $6p''\ {}^3D_3$
2311.205	1*h*	43254.17	$5p^5\ {}^3P^\circ_2$— $6p''\ {}^3P_1$
2314.761	2	43187.73	$6p\ {}^3P_1$— $9d\ {}^3D^\circ_2$
2315.638	4	43171.38	
2319.150	1	43106.00	$5d'\ {}^3D^\circ_2$— $7p'\ {}^1D_2$
2319.968	2	43090.81	$5d\ {}^3D^\circ_3$— $4f'\ {}^3F_3$
2320.329	10	43084.10	$5d\ {}^3D^\circ_3$— $4f'\ {}^3G_4$
2322.532	2*c*	43043.24	
2327.395	1	42953.31	$5d'\ {}^3D^\circ_2$— $4f'\ {}^3D_1$
2331.650	3*c*	42874.93	
2333.076	1	42848.73	
2334.203	20	42828.04	$5d'\ {}^3D^\circ_2$— $7p'\ {}^3F_2$
2335.502	10*c*	42804.22	$5p^5\ {}^3P^\circ_2$— $4f\ {}^5F_3$
2336.188	1	42791.66	$6s'\ {}^1D^\circ_2$— $4f'\ {}^1D_2$
2339.831	1	42725.04	
2340.072	1	42720.64	
2340.277	3	42716.90	$6s'\ {}^3D^\circ_2$— $8p\ {}^3P_1$
2340.778	3	42707.75	$5d'\ {}^3F^\circ_2$— $10_{2,3}$
2341.947	1	42686.44	$6s'\ {}^1D^\circ_2$— $4f'\ {}^1F_3$
2342.402	50	42678.15	$5d\ {}^3D^\circ_3$— $5f\ {}^3F_4$
2343.067	3	42666.03	$5d'\ {}^3P^\circ_0$— $4f'\ {}^1P_1$
2344.303	1	42643.54	
2345.301	4	42625.40	$5d'\ {}^3G^\circ_3$— $11_{3,4}$
2346.266	15	42607.86	$5d'\ {}^3D^\circ_2$— $4f'\ {}^3G_3$
2347.044	4	42593.74	$5d'\ {}^3G^\circ_3$— $10_{2,3}$
2348.485	5	42567.61	$6s'\ {}^3D^\circ_1$— $4f'\ {}^3P_1$
2349.180	1	42555.02	
2350.115	1	42538.09	$6p\ {}^3P_1$—$10s\ {}^3S^\circ_1$
2352.860	3	42488.46	$6s'\ {}^1D^\circ_2$— $7p'\ {}^1D_2$
2354.286	8	42462.73	$6s'\ {}^1D^\circ_2$— $7p'\ {}^1F_3$
2357.473	3	42405.33	$6s'\ {}^3D^\circ_2$— $4f'\ {}^3F_3$
2359.965	2	42360.56	$5d'\ {}^3P^\circ_0$— $7p'\ {}^1P_1$
2360.474	7	42351.42	$6p\ {}^3P_2$— $9d\ {}^3D^\circ_3$
2361.174	10	42338.87	$6s\ {}^3S^\circ_1$— $7p\ {}^3P_0$
2361.303	4	42336.56	$5d\ {}^3D^\circ_3$— $5f\ {}^3F_3$
2362.399	4	42316.92	
2362.946	1	42307.12	$6p\ {}^5P_2$— $8d\ {}^3D^\circ_3$
2363.303	1	42300.73	$6p\ {}^5P_1$— $8d\ {}^3D^\circ_1$
2367.224	3	42230.67	$5d\ {}^3D^\circ_1$— $6p''\ {}^1S_0$
2367.930	1	42218.08	
2368.332	7*c*	42210.92	

λ(air)	Intensity	Wave number	Classification
2369.574	20	42188.79	
2369.960	10	42181.92	$5p^5\ {}^3P^\circ_1$— $7p\ {}^3P_2$
2371.622	1	42152.36	$5d'\ {}^3F^\circ_4$— $6f\ {}^3F_4$
2372.192	15	42142.24	$5d'\ {}^3P^\circ_0$— $4f'\ {}^3D_1$
2372.596	3	42135.06	$5d\ {}^3D^\circ_3$— $5f\ {}^5F_4$
2378.034	10	42038.72	$5d\ {}^5D^\circ_1$— $6p''\ {}^3P_2$
2379.463	5	42013.47	$5d'\ {}^3D^\circ_3$— $7p'\ {}^1D_2$
2380.761	1	41990.57	$6s'\ {}^1D^\circ_2$— $4f'\ {}^3G_3$
2380.917	2	41987.82	$5d'\ {}^3D^\circ_3$— $7p'\ {}^1F_3$
2384.069	20	41932.31	$5d'\ {}^3D^\circ_3$— $7p'\ {}^3F_4$
2395.244	25*c*	41736.69	
2397.260	25	41701.59	$6s'\ {}^3D^\circ_1$— $4f'\ {}^3F_2$
2397.753	3	41693.02	$5d'\ {}^3F^\circ_2$— $7_{2,3}$
2398.225	10*d*	41684.81	$5p^5\ {}^1P^\circ_1$— $4f'\ {}^3P_2$
2398.370	4	41682.29	$5d'\ {}^1D^\circ_2$— $10_{2,3}$
2399.209	4	41667.72	$6p\ {}^5P_1$— $8d\ {}^5D^\circ_1$
2400.166	6	41651.11	$6p\ {}^5P_1$— $8d\ {}^5D^\circ_2$
2400.588	3	41643.79	$6p\ {}^5P_1$— $8d\ {}^5D^\circ_0$
2400.974	1	41637.09	$6p\ {}^3P_0$— $8s'\ {}^3D^\circ_1$
2403.863	1	41587.06	$5d'\ {}^3F^\circ_3$— $6f\ {}^3F_4$
2404.090	20	41583.13	$6s'\ {}^3D^\circ_1$— $8p\ {}^3P_1$
2404.926	2	41568.67	$6p\ {}^3P_2$—$10s\ {}^3S^\circ_1$
2405.384	3*d*	41560.76	$6p\ {}^5P_2$— $8d\ {}^5D^\circ_1$
2405.887	20	41552.07	$6p\ {}^5P_2$— $8d\ {}^5D^\circ_3$
2406.393	10	41543.33	{ $5d'\ {}^3D^\circ_3$— $4f'\ {}^1G_4$ $6p\ {}^5P_2$— $8d\ {}^5D^\circ_2$
2408.008	100	41515.48	$5d'\ {}^3D^\circ_3$— $4f'\ {}^3G_3$
2411.967	1	41447.34	$6s'\ {}^3D^\circ_2$— $5f\ {}^5F_3$
2412.570	40*d*	41436.98	
2414.154	1	41409.79	
2415.117	3	41393.28	
2415.732	2	41382.74	
2417.853	3	41346.44	$5d'\ {}^3G^\circ_3$— $6_{2,3,4}$
2419.176	100	41323.83	$5d'\ {}^3D^\circ_3$— $4f'\ {}^3F_4$
2434.830	4	41058.18	
2437.087	1	41020.15	$5d'\ {}^3G^\circ_3$— $4_{3,4}$
2437.710	5	41009.67	$5d'\ {}^2F^\circ_4$— $4f'\ {}^1F_3$
2437.901	20	41006.46	$5d'\ {}^3F^\circ_4$— $7p'\ {}^3F_3$
2438.285	25	41000.00	$5p^5\ {}^3P^\circ_1$— $6p''\ {}^3D_2$
2441.484	3	40946.28	$5d\ {}^3D^\circ_2$— $6p''\ {}^1D_2$
2441.872	2	40939.78	$5p^5\ {}^3P^\circ_1$— $6p''\ {}^3P_1$
2444.220	40	40900.45	$6s'\ {}^3D^\circ_1$— $5f\ {}^3F_2$
2446.516	3	40862.07	$5p^5\ {}^3P^\circ_1$— $7p\ {}^5P_2$
2448.496	30	40829.03	$5d\ {}^5D^\circ_1$— $6p''\ {}^3S_1$
2451.075	4	40786.08	$5d'\ {}^3F^\circ_4$— $7p'\ {}^1F_3$
2451.194	5	40784.10	$5p^5\ {}^3P^\circ_1$— $6p''\ {}^3P_0$
2453.952	5	40738.26	$6p\ {}^5P_1$— $9s\ {}^5S^\circ_2$
2454.434	2	40730.26	
2454.533	30	40728.62	$5p^5\ {}^3P^\circ_1$— $7p\ {}^5P_1$
2454.958	3	40721.57	
2456.046	1*h*	40703.53	
2457.367	2	40681.65	$6s\ {}^3S^\circ_1$— $4f\ {}^2F_2$
2457.703	6	40676.09	$5d\ {}^5D^\circ_3$— $7p\ {}^3P_2$
2458.239	5*h*	40667.22	$5d'\ {}^1D^\circ_2$— $7_{2,3}$
2459.005	2	40654.55	
2460.444	8	40630.78	$6p\ {}^5P_2$— $9s\ {}^5S^\circ_2$
2461.126	30	40619.52	$5p^5\ {}^3P^\circ_1$— $4f\ {}^5F_1$
2464.085	15*c*	40570.74	
2464.684	80	40560.89	$5p^5\ {}^3P^\circ_1$— $4f\ {}^5F_2$
2466.249	1	40535.15	
2469.167	20	40487.25	$6p\ {}^5P_3$— $8d\ {}^5D^\circ_4$

λ(air)	Intensity	Wave number	Classification
2469. 824	6	40476. 48	$6p\ {}^5P_3 - 8d\ {}^5D^\circ_3$
2470. 369	1	40467. 55	$6p\ {}^5P_3 - 8d\ {}^5D^\circ_2$
2471. 295	25*d*	40452. 39	
2471. 664	2	40446. 35	
2473. 272	2	40420. 06	$5p^5\ {}^3P^\circ_0 - 6p''\ {}^1P_1$
2475. 766	1	40379. 34	$6s\ {}^3S^\circ_1 - 6p''\ {}^3D_2$
2476. 213	2	40372. 05	$5d'\ {}^3G^\circ_4 - 6f\ {}^3F_4$
2476. 738	1	40363. 50	
2478. 073	5*c*	40341. 75	$5d'\ {}^3F^\circ_4 - 4f'\ {}^1G_4$
2478. 994	2	40326. 76	$5d\ {}^3D^\circ_2 - 6p''\ {}^1P_1$
2479. 467	3	40319. 07	$6s\ {}^3S^\circ_1 - 6p''\ {}^3P_1$
2479. 797	6	40313. 71	$5d'\ {}^3F^\circ_4 - 4f'\ {}^3G_3$
2480. 029	2	40309. 94	
2480. 486	1	40302. 51	
2481. 103	25	40292. 49	$5d'\ {}^1D^\circ_2 - \quad 5_{2,3}$
2481. 289	1	40289. 47	
2481. 689	2	40282. 98	
2482. 058	25	40276. 98	$5d'\ {}^3D^\circ_2 - 7p'\ {}^3D_3$
2483. 261	1	40257. 48	
2483. 520	3*c*	40253. 28	$5p^5\ {}^1P^\circ_1 - 7p'\ {}^3D_1$
2483. 951	1	40246. 29	$5d'\ {}^3F^\circ_3 - 7p'\ {}^1D_2$
2484. 246	1	40241. 52	$6s\ {}^2S^\circ_1 - 7p\ {}^5P_2$
2484. 387	2	40239. 23	$5d\ {}^5D^\circ_2 - 7p\ {}^5P_2$
2487. 027	10	40196. 52	
2489. 065	10*c*	40163. 61	$6s\ {}^3S^\circ_1 - 6p''\ {}^3P_0$
2491. 638	50	40122. 14	$5d'\ {}^3F^\circ_4 - 4f'\ {}^3F_4$
2492. 514	8	40108. 04	$6s\ {}^3S^\circ_1 - 7p\ {}^5P_1$
2493. 458	3	40092. 86	
2494. 738	100	40072. 29	$5d'\ {}^3F^\circ_4 - 4f'\ {}^3G_5$
2496. 123	2*c*	40050. 05	$6s'\ {}^3D^\circ_3 - 8p\ {}^3P_2$
2497. 984	1	40020. 22	
2499. 316	30	39998. 89	$6s\ {}^3S^\circ_1 - 4f\ {}^5F_1$
2502. 981	70	39940. 32	$6s\ {}^3S^\circ_1 - 4f\ {}^5F_2$
2503. 560	10	39931. 09	$5d'\ {}^3D^\circ_2 - 4f'\ {}^3D_2$ $5d'\ {}^3G^\circ_4 - 6f\ {}^5F_5$
2506. 999	6	39876. 32	$6s'\ {}^3D^\circ_3 - 4f'\ {}^3F_2$ $6p\ {}^3P_1 - 8d\ {}^3D^\circ_1$
2508. 941	1	39845. 45	
2510. 612	8	39818. 94	$6p\ {}^3P_1 - 8d\ {}^3D^\circ_2$
2513. 199	20	39777. 95	$5d\ {}^5D^\circ_0 - 6p''\ {}^3P_1$
2514. 617	10	39755. 52	$5d\ {}^5D^\circ_3 - 7p\ {}^5P_3$
2515. 022	10	39749. 12	$5d\ {}^5D^\circ_3 - 4f\ {}^3F_4$
2519. 494	5	39678. 57	
2519. 898	1	39672. 21	$6s'\ {}^1D^\circ_2 - 7p'\ {}^3P_2$
2521. 989	1	39639. 32	
2525. 206	3	39588. 82	
2525. 988	4	39576. 57	$5d'\ {}^3D^\circ_2 - 7p'\ {}^3P_1$
2526. 612	8	39566. 79	$5d\ {}^5D^\circ_0 - 7p\ {}^5P_1$
2527. 350	10	39555. 24	$6p\ {}^5P_3 - 9s\ {}^5S^\circ_2$
2530. 974	50	39498. 61	$5d'\ {}^3P^\circ_0 - 4f'\ {}^3P_1$
2533. 372	5	39461. 22	$5d'\ {}^3F^\circ_2 - \quad 2_{2,3}$
2533. 605	100	39457. 59	$5d\ {}^5D^\circ_0 - 4f\ {}^5F_1$
2534. 272	200	39447. 21	$5d\ {}^5D^\circ_4 - 7p\ {}^5P_3$
2534. 505	40	39443. 58	$5d'\ {}^3D^\circ_2 - 4f'\ {}^3F_2$
2535. 708	2	39424. 87	
2535. 846	2	39422. 73	$5d'\ {}^3F^\circ_2 - 8f\ {}^5F_3$
2536. 994	4	39404. 89	$5d'\ {}^1D^\circ_2 - \quad 3_{2,3}$
2537. 583	2	39395. 74	
2540. 126	40	39356. 31	$5d\ {}^5D^\circ_3 - 7p\ {}^5P_2$
2542. 140	60*d*	39325. 13	$5d'\ {}^3D^\circ_2 - 8p\ {}^3P_1$
2542. 557	3	39318. 68	$5d\ {}^5D^\circ_2 - 7p\ {}^5P_3$
2542. 976	1	39312. 20	$5d\ {}^3D^\circ_1 - 6p''\ {}^1D_2$
2545. 416	20	39274. 52	$5d\ {}^3D^\circ_2 - 6p''\ {}^3P_2$
2548. 342	15*c*	39229. 43	$5d'\ {}^3G^\circ_4 - 4f'\ {}^1F_3$
2548. 556	25*c*	39226. 13	$5d'\ {}^3G^\circ_4 - 7p'\ {}^3F_3$ $6p\ {}^3P_1 - 8d\ {}^5D^\circ_2$
2550. 426	4	39197. 37	$5d'\ {}^3D^\circ_3 - 7p'\ {}^3P_2$
2551. 258	6	39184. 59	$5d'\ {}^3D^\circ_3 - 7p'\ {}^3D_3$
2552. 448	1	39166. 32	
2557. 699	50	39085. 92	$5d'\ {}^3D^\circ_2 - 4f'\ {}^3D_3$
2559. 258	25	39062. 11	$5d\ {}^5D^\circ_2 - 4f\ {}^3F_3$
2559. 571	10	39057. 34	$5d\ {}^5D^\circ_2 - 6p''\ {}^3D_2$
2559. 708	20	39055. 25	$5d\ {}^5D^\circ_3 - 4f\ {}^5F_2$
2561. 132	5*c*	39033. 53	$6s'\ {}^3D^\circ_3 - 5f\ {}^3F_4$
2561. 977	30	39020. 66	$6p\ {}^3P_2 - 8d\ {}^3D^\circ_3$
2562. 451	300*c*	39013. 44	$5d'\ {}^3D^\circ_2 - 4f'\ {}^3F_3$
2562. 701	2	39009. 64	
2562. 945	2	39005. 92	$5d'\ {}^3G^\circ_4 - 7p'\ {}^1F_3$
2563. 350	10*c*	38999. 76	$6s'\ {}^1D^\circ_2 - 8p\ {}^3P_2$
2563. 518	15	38997. 20	$5d\ {}^5D^\circ_2 - 6p''\ {}^3P_1$
2564. 386	200	38984. 00	$5d\ {}^5D^\circ_3 - 4f\ {}^5F_3$
2566. 242	1000	38955. 81	$5d\ {}^5D^\circ_3 - 4f\ {}^5F_4$
2566. 604	2	38950. 32	$5d'\ {}^3G^\circ_4 - 7p'\ {}^3F_4$
2566. 712	3	38948. 68	$5d'\ {}^3F^\circ_2 - \quad 1_{2,3}$
2567. 529	3	38936. 29	
2568. 642	8	38919. 42	$5d\ {}^5D^\circ_2 - 7p\ {}^5P_2$
2572. 956	5	38854. 16	
2573. 253	5	38849. 68	$6p\ {}^3P_2 - 8d\ {}^3D^\circ_2$
2573. 992	5	38838. 53	$5d'\ {}^3D^\circ_3 - 4f'\ {}^3D_2$
2574. 256	1	38834. 54	$5d'\ {}^3G^\circ_3 - \quad 1_{2,3}$
2574. 817	1	38826. 08	$6s'\ {}^1D^\circ_2 - 4f'\ {}^3F_2$
2577. 473	1	38786. 08	$5d\ {}^5D^\circ_2 - 7p\ {}^5P_1$
2577. 652	2	38783. 38	
2580. 145	5*c*	38745. 91	$6s''\ {}^3P^\circ_2 - \quad 7_{2,3}$
2582. 794	2000	38706. 18	$5d\ {}^5D^\circ_4 - 4f\ {}^5F_5$
2583. 710	2	38692. 46	$5d\ {}^3D^\circ_1 - 6p''\ {}^1P_1$
2584. 746	10	38676. 95	$5d\ {}^5D^\circ_2 - 4f\ {}^5F_1$
2584. 837	8	38675. 59	$5d\ {}^5D^\circ_4 - 4f\ {}^5F_3$
2585. 202	5	38670. 12	$5d\ {}^5D^\circ_1 - 7p\ {}^3P_2$
2585. 407	2*c*	38667. 06	
2586. 721	100	38647. 42	$5d\ {}^5D^\circ_4 - 4f\ {}^5F_4$
2587. 052	4*c*	38642. 48	$5d'\ {}^3D^\circ_2 - 5f\ {}^3F_2$
2588. 132	8*d*	38626. 35	$5d'\ {}^3D^\circ_3 - 4f'\ {}^3H_4$
2588. 670	150	38618. 32	$5d\ {}^5D^\circ_2 - 4f\ {}^5F_2$
2592. 010	2*h*	38568. 56	$6p'\ {}^3F_2 - \quad 41^\circ_{1,2,3}$
2592. 490	3*c*	38561. 42	$5d'\ {}^3G^\circ_4 - 4f'\ {}^1G_4$
2593. 458	300	38547. 03	$5d\ {}^5D^\circ_2 - 4f\ {}^5F_3$
2594. 376	4	38533. 39	$5d'\ {}^3G^\circ_4 - 4f'\ {}^3G_3$
2594. 954	20*c*	38524. 81	$5d'\ {}^3D^\circ_3 - 8p\ {}^3P_2$
2595. 518	8	38516. 44	$6p\ {}^3P_0 - 8d\ {}^3D^\circ_1$
2596. 063	4*h*	38508. 35	$6s'\ {}^1D^\circ_2 - 7p'\ {}^3D_1$
2596. 500	6	38501. 87	$5d\ {}^5D^\circ_1 - 7p\ {}^3P_1$
2597. 878	6	38481. 45	$6p\ {}^3P_1 - 9s\ {}^3S^\circ_1$

TABLE 10.1. *Observed lines of* I II—Continued

λ(air)	Intensity	Wave number	Classification	λ(air)	Intensity	Wave number	Classification
2598. 397	4	38473. 77		2694. 056	25	37107. 74	$5d\ ^5D^\circ_1 — 4f\ ^5F_1$
2598. 765	4	38468. 32	$6s'\ ^1D^\circ_2 — 4f'\ ^3D_3$	2694. 593	1*c*	37100. 35	
2600. 757	1	38438. 86	$5d\ ^3D^\circ_3 — 6p''\ ^1D_2$	2696. 702	6	37071. 33	$5d'\ ^3F^\circ_3 — 4f'\ ^3D_2$
2600. 989	2	38435. 43		2697. 375	2	37062. 08	$5d'\ ^1G^\circ_4 — 7p'\ ^1F_3$
2602. 890	10*c*	38407. 36	$5p^5\ ^1P^\circ_1 — 6p''\ ^1S_0$	2698. 319	50	37049. 12	$5d\ ^5D^\circ_1 — 4f\ ^5F_2$
2603. 658	8*h*	38396. 03	$6s'\ ^1D^\circ_2 — 4f'\ ^3F_3$	2700. 419	3	37020. 31	$6p\ ^3P_2 — 6d'\ 14^\circ_3$
2605. 340	3	38371. 24	$6s''\ ^3P^\circ_2 — 5_{2,3}$	2701. 431	50	37006. 44	$5d'\ ^1G^\circ_4 — 7p'\ ^3F_4$
2606. 703	2	38351. 18	$5d'\ ^3D^\circ_3 — 4f'\ ^3F_2$	2704. 257	1	36967. 77	
2607. 347	30	38341. 71	$5d'\ ^3G^\circ_4 — 4f'\ ^3F_4$	2704. 424	2*c*	36965. 49	
2608. 442	1	38325. 62		2704. 522	20*c*	36964. 15	
2609. 175	1	38314. 85	$5d'\ ^3P^\circ_0 — 7p'\ ^3D_1$	2706. 320	3*c*	36939. 59	
2610. 740	150	38291. 88	$5d'\ ^3G^\circ_4 — 4f'\ ^3G_5$	2707. 400	3	36924. 86	$5d'\ ^3D^\circ_1 — 6f\ ^3F_2$
2612. 524	1	38265. 74	$6p\ ^3P_2 — 8d\ ^5D^\circ_3$	2708. 159	50	36914. 51	
2612. 963	20	38259. 31	$5d'\ ^3D^\circ_2 — 5f\ ^3F_3$	2709. 708	1	36893. 41	
2619. 890	30	38158. 16	$5p^5\ ^3P^\circ_0 — 6p''\ ^3S_1$	2710. 206	1	36886. 63	$5d'\ ^1F^\circ_3 — 12_{1,2}?$
2621. 362	4*c*	38136. 73	$5d\ ^5D^\circ_0 — 6p''\ ^3D_1$	2710. 857	1	36877. 77	
2621. 858	3	38129. 52		2712. 236	150	36859. 02	$5d'\ ^3F^\circ_3 — 4f'\ ^3H_4$
2626. 309	2	38064. 90	$5d\ ^3D^\circ_2 — 6p''\ ^3S_1$	2713. 108	1	36847. 18	$6p'\ ^3F_3 — 39^\circ_4$
2626. 974	8	38055. 26	$5d'\ ^3D^\circ_2 — 5f\ ^5F_3$	2715. 784	4	36810. 87	
2627. 334	8	38050. 05	$6s\ ^5S^\circ_2 — 6p'\ ^1D_2$	2719. 726	20	36757. 52	$5d'\ ^3F^\circ_3 — 8p\ ^3P_2$
2631. 983	15	37982. 84	$5d'\ ^3F^\circ_4 — 7p'\ ^3D_3$	2722. 542	2*c*	36719. 50	$6p'\ ^3D_2 — 38^\circ_1$
2632. 756	1	37971. 69	$5d'\ ^1G^\circ_4 — 6f\ ^5F_4$	2723. 041	40*c*	36712. 77	$5d'\ ^3F^\circ_4 — 4f'\ ^3G_4$
2635. 298	1	37935. 07		2726. 649	2	36664. 20	
2636. 270	20*w*	37921. 08	$5d'\ ^3D^\circ_3 — 4f'\ ^3F_3$	2728. 749	6	36635. 98	
2636. 729	150*w*	37914. 48	$5d'\ ^3D^\circ_3 — 4f'\ ^3G_4$	2730. 124	500	36617. 53	$5d'\ ^1G^\circ_4 — 4f'\ ^1G_4$
2638. 644	1	37886. 96	$6p\ ^3P_2 — 6d'\ 15^\circ_1$	2731. 788	20	36595. 23	{ $6s''\ ^3P^\circ_2 — 8f\ ^3F_3$ { $5d''\ ^3D^\circ_3 — 11_{3,4}$
2641. 302	20	37848. 84					
2645. 375	2	37790. 57	$5d\ ^5D^\circ_1 — 4f\ ^3F_2$	2732. 200	5	36589. 71	$5d'\ ^1G^\circ_4 — 4f'\ ^3G_3$
2651. 301	1	37706. 11		2732. 735	10	36582. 55	$6p'\ ^3D_1 — 11s\ ^3S^\circ_1$
2651. 874	1*h*	37697. 96	$5d'\ ^3F^\circ_3 — 4f'\ ^3P_2$	2734. 137	3	36563. 79	$6p'\ ^3F_4 — 50^\circ_{3,4}$
2652. 636	1*h*	37687. 13	$6p'\ ^3D_2 — 41^\circ_{1,2,3}$	2734. 877	1	36553. 90	$6p'\ ^1P_1 — 46^\circ_2$
2655. 829	10*c*	37641. 82	$6s'\ ^1D^\circ_2 — 5f\ ^3F_3$	2736. 410	1	36533. 42	$6p'\ ^1P_1 — 45^\circ_{1,2}$
2660. 396	1	37577. 21		2736. 938	1	36526. 37	
2665. 014	5	37512. 10	$6p\ ^3P_2 — 9s\ ^3S^\circ_1$	2744. 533	20	36425. 30	$5d\ ^3D^\circ_3 — 6p''\ ^3D_3$
2665. 284	20	37508. 30	$5d'\ ^3D^\circ_3 — 5f\ ^3F_4$	2746. 590	8	36398. 02	$5d'\ ^1G^\circ_4 — 4f'\ ^3F_4$
2666. 141	1	37496. 24	$6p\ ^3P_0 — 6d'\ 15^\circ_1$	2747. 502	4	36385. 94	
2667. 049	3	37483. 48	$6s''\ ^3P^\circ_2 — 3_{2,3}$	2749. 133	1*c*	36364. 35	$6p\ ^3P_2 — 6d'\ 12^\circ_1$
2667. 624	1	37475. 40		2749. 884	2*c*	36354. 42	
2670. 304	4*d*	37437. 79	$6s'\ ^1D^\circ_2 — 5f\ ^5F_3$	2750. 362	2*c*	36348. 10	$5d'\ ^1G^\circ_4 — 4f'\ ^3G_5$
2670. 854	4	37430. 08	$5d'\ ^3F^\circ_3 — 7p'\ ^3P_2$	2753. 502	10*d*	36306. 66	$5d'\ ^3F^\circ_4 — 5f\ ^3F_4$
2671. 008	5	37427. 92	$5d\ ^5D^\circ_1 — 6p''\ ^3P_1$	2754. 745	1	36290. 28	
2671. 239	6	37424. 69	$5d'\ ^3F^\circ_4 — 4f'\ ^3H_4$	2755. 128	5	36285. 23	$6p'\ ^3D_1 — 21^\circ_1$
2671. 770	1	37417. 25	$5d'\ ^3F^\circ_3 — 7p'\ ^3D_3$	2757. 213	7	36257. 79	$6p\ ^5P_2 — 7d\ ^3D^\circ_3$
2674. 795	150	37374. 94	$5d'\ ^3F^\circ_4 — 4f'\ ^3H_5$	2758. 702	1	36238. 22	
2676. 150	3*c*	37356. 01	$5d\ ^5D^\circ_2 — 6p''\ ^3D_1$	2759. 624	8	36226. 12	$5d'\ ^3F^\circ_3 — 4f'\ ^3D_3$
2676. 562	10	37350. 26	$5d\ ^5D^\circ_1 — 7p\ ^5P_2$	2761. 431	15	36202. 41	$5d'\ ^3G^\circ_4 — 7p'\ ^3D_3$
2676. 983	1	37344. 39	$6p\ ^3P_2 — 9s\ ^5S^\circ_2$	2761. 930	1*c*	36195. 87	
2681. 203	10	37285. 62	$5d'\ ^1G^\circ_4 — 4f'\ ^1F_3$	2764. 142	4*c*	36166. 91	$6p'\ ^1F_3 — 44^\circ_{2,3}$
2681. 597	10	37280. 14	$5d''\ ^1D^\circ_2 — 13_{2,3}$	2764. 250	2	36165. 50	$5d'\ ^3P^\circ_2 — 13_{2,3}$
2682. 160	15	37272. 31	$5d\ ^5D^\circ_1 — 6p''\ ^3P_0$	2765. 149	20	36153. 74	$5d'\ ^3F^\circ_3 — 4f'\ ^3F_3$
2683. 392	3	37255. 20	$5d'\ ^1F^\circ_3 — 13_{2,3}$	2765. 660	200	36147. 06	$5d'\ ^3F^\circ_3 — 4f'\ ^3G_4$
2685. 160	2*c*	37230. 67		2769. 734	2*c*	36093. 89	
2686. 154	20	37216. 90	$5d\ ^5D^\circ_1 — 7p\ ^5P_1$	2770. 695	20	36081. 37	$6s'\ ^3D^\circ_2 — 6p''\ ^3P_2$
2687. 164	1*c*	37202. 91		2775. 306	1*h*	36021. 43	
2688. 536	5	37183. 92		2775. 613	1	36017. 45	
2688. 981	200*c*	37177. 77		2775. 856	4	36014. 29	$5d'\ ^3D^\circ_1 — 4f'\ ^1P_1$
2689. 192	30*c*	37174. 85	$5p^5\ ^3P^\circ_2 — 6p'\ ^1D_2$	2776. 241	2	36009. 30	$6p'\ ^3F_2 — 10d\ ^3D^\circ_3$
2689. 722	1*c*	37167. 53		2776. 990	4*c*	35999. 59	$6s'\ ^3D^\circ_1 — 6p''\ ^1P_1$
2691. 652	1	37140. 88		2781. 129	10*d*	35946. 01	$5d'\ ^3D^\circ_1 — 4f'\ ^1D_2$
2693. 040	1*h*	37121. 74	$6p\ ^3P_0 — 9s\ ^3S^\circ_1$	2782. 793	1*h*	35924. 52	

λ(air)	Intensity	Wave number	Classification
2783.290	8c	35918.11	
2784.243	10	35905.81	5d $^3D^\circ_2$— 7p $^3P_2$
2788.236	1c	35854.40	
2788.696	1h	35848.48	
2788.911	5c	35845.72	6p′ $^1F_3$— 42°_2
2789.056	10	35843.85	6p′ $^3F_2$—10d $^3D^\circ_2$
2789.601	30c	35836.85	5d″ $^1D^\circ_2$— $7_{2,3}$
2790.060	10	35830.96	6p′ $^3D_1$— $20^\circ_{1,2}$
2790.573	1c	35824.37	
2790.994	1h	35818.97	
2791.524	2c	35812.17	
2792.724	6	35796.78	5d′ $^3P^\circ_2$— $12_{1,2}$
2793.933	6c	35781.29	
2797.089	10c	35740.92	5d′ $^3F^\circ_3$— 5f $^3F_4$
2797.367	20c	35737.37	
2799.632	6c	35708.46	
2804.766	8	35643.10	5d′ $^3D^\circ_1$— 7p′ $^1D_2$
2805.564	4	35632.96	6p $^5P_2$— 7d $^3D^\circ_2$
2808.594	200	35594.52	5d′ $^3G^\circ_4$— 4f′ $^3H_5$
2809.789	10	35579.38	5d′ $^1F^\circ_3$— $6_{2,3,4}$
2811.927	1c	35552.33	
2812.210	4c	35548.75	5d″ $^3D^\circ_3$— $7_{2,3}$
2812.692	2	35542.66	
2815.118	3	35512.03	
2816.821	15	35490.56	5d′ $^3D^\circ_1$— 4f′ $^3D_1$
2817.090	1c	35487.18	6p′ $^1F_3$—12d $^3D^\circ_3$
2817.909	1	35476.86	
2819.086	25	35462.05	5d″ $^1D^\circ_2$— $5_{2,3}$
2823.629	1c	35405.00	6p′ $^3F_3$— 33°_3
2824.060	10	35399.60	5d′ $^3F^\circ_3$— 5f $^3F_3$
2825.461	4	35382.04	5d′ $^1P^\circ_1$— $12_{1,2}$
2826.004	3	35375.24	
2826.814	30	35365.11	5d′ $^3D^\circ_1$— 7p′ $^3F_2$
2829.338	1	35333.56	
2829.837	8c	35327.33	6p $^5P_1$— 7d $^5D^\circ_1$
2830.110	30	35323.92	6p′ $^1F_3$— 40°_3
2830.735	100	35316.12	5d″ $^3D^\circ_3$— $6_{2,3,4}$
2832.494	1	35294.19	
2832.736	3	35291.18	6p′ $^3F_2$—11s $^3S^\circ_1$
2833.495	20	35281.73	6p $^5P_1$— 7d $^5D^\circ_0$
2836.768	10	35241.02	
2838.482	1h	35219.74	6p $^5P_2$— 7d $^5D^\circ_1$
2840.236	6	35197.99	5d′ $^3F^\circ_3$— 5f $^5F_4$
2840.438	6	35195.49	5d′ $^3F^\circ_3$— 5f $^5F_3$
2840.970	25	35188.90	
2841.444	20	35183.03	6p′ $^3F_2$— $24^\circ_{1,2}$
2841.920	1	35177.14	
2842.175	7	35173.98	5d″ $^3D^\circ_3$— $5_{2,3}$
2844.121	25	35149.92	6p $^5P_1$— 7d $^5D^\circ_2$
2846.986	50	35114.54	6p $^5P_2$— 7d $^5D^\circ_3$
2847.442	20	35108.92	6p′ $^1F_3$— 39°_4
2848.272	1	35098.69	6p′ $^3D_3$— 46°_2
2849.671	10	35081.46	
2851.170	1c	35063.02	6p′ $^3D_2$— 30°_2
2851.723	7	35056.22	6p′ $^3D_3$— $44^\circ_{2,3}$
2852.060	20c	35052.08	6s $^5S^\circ_2$— 6p′ $^3P_1$
2852.290	8	35049.25	5d $^3D^\circ_1$— 7p $^3P_0$
2852.852	25	35042.35	6p $^5P_2$— 7d $^5D^\circ_2$
2854.168	80	35026.19	5d $^3D^\circ_2$— 4f $^3F_2$
2854.964	4	35016.42	6p $^5P_1$— 6d′ 4°_0
2856.798	8	34993.95	6p′ $^3F_2$— 21°_1
2857.132	15c	34989.86	5d″ $^3D^\circ_3$— $4_{3,4}$
2857.515	35	34985.17	5d $^3D^\circ_2$— 7p $^5P_3$
2859.376	20	34962.40	6p′ $^3D_2$—10d $^3D^\circ_2$
2860.602	35	34947.41	6s′ $^3D^\circ_1$— 6p″ $^3P_2$
2861.290	3	34939.01	5d′ $^3G^\circ_4$— 4f′ $^3F_3$
2861.838	40	34932.32	5d′ $^3G^\circ_4$— 4f′ $^3G_4$
2865.184	6	34891.53	6p $^3P_2$— 6d′ 9°_3
2865.458	4	34888.19	6p′ $^3F_3$—10d $^3D^\circ_3$
2865.766	5d	34884.44	5d′ $^3P^\circ_2$— $8_{1,2}$
2867.021	20c	34869.17	$5p^5$ $^1P^\circ_1$— 6p″ $^1P_1$
2867.704	1c	34860.87	
2867.970	2c	34857.64	
2869.767	7	34835.81	6s″ $^3P^\circ_0$— 4f′ $^3D_1$
2870.635	2	34825.28	6p′ $^3D_1$— 9d $^3D^\circ_2$
2871.416	1	34815.80	
2872.788	7	34799.18	6p $^3P_1$— 6d′ $6^\circ_{1,2}$
2873.208	5c	34794.09	6s′ $^3D^\circ_3$— 6p″ $^1D_2$
2873.667	1	34788.53	
2874.281	1	34781.10	
2874.550	1	34777.85	6p′ $^3P_2$— $47^\circ_{1,2}$
2875.738	2	34763.48	
2876.262	5	34757.15	$5p^5$ $^3P^\circ_0$— 6p″ $^3P_1$
2877.212	2c	34745.67	
2878.632	1500	34728.54	5d $^3D^\circ_2$— 4f $^3F_3$
2879.021	30	34723.84	5d $^2D^\circ_2$— 6p″ $^3D_2$
2879.172	8h	34722.02	
2883.019	60	34675.69	6s $^5S^\circ_2$— 6p′ $^3P_2$
2883.440	10	34670.63	{ 6p′ $^3D_1$— 8s′ $^3D^\circ_2$ { 6p′ $^3D_2$— 26°_3
2883.996	1	34663.94	
2885.949	1	34640.49	
2886.446	10	34634.52	6p′ $^3D_1$— 8s′ $^3D^\circ_1$
2886.961	3	34628.35	6p $^5P_2$— 6d′ 2°_3
2888.024	1	34615.60	6p′ $^3P_2$— $44^\circ_{2,3}$
2888.874	2	34605.42	6p′ $^3D_2$— $25^\circ_{1,2}$
2890.137	1	34590.29	
2890.498	10	34585.97	5d $^3D^\circ_2$— 7p $^5P_2$
2891.462	7	34574.44	5d″ $^1D^\circ_2$— $3_{2,3}$
2892.878	3	34557.52	6p $^5P_3$— 7d $^3D^\circ_2$
2893.566	1c	34549.30	
2893.847	7	34545.95	$5p^5$ $^3P^\circ_0$— 7p $^5P_1$
2894.114	10	34542.76	6p $^3P_1$— 7d $^3D^\circ_1$
2894.377	8	34539.62	6p′ $^3F_2$— $20^\circ_{1,2}$
2895.354	3	34527.97	5d′ $^3F^\circ_2$— 7p′ $^3D_2$
2895.498	15	34526.25	5d′ $^3G^\circ_4$— 5f $^3F_4$
2896.813	10	34510.58	6p′ $^3P_2$— $43^\circ_{1,2}$
2897.909	10	34497.53	
2900.253	15c	34469.65	5d′ $^1P^\circ_1$— $8_{1,2}$
2903.015	10	34436.86	$5p^5$ $^3P^\circ_0$— 4f $^5F_1$
2903.488	1	34431.25	6p′ $^3F_3$— 26°_3
2906.004	2	34401.44	6p′ $^3P_1$— $47^\circ_{1,2}$
2909.390	5c	34361.40	5d′ $^3D^\circ_2$— 6p″ $^1D_2$
2910.567	8	34347.51	5d′ $^3P^\circ_2$— $5_{2,3}$
2910.906	1	34343.51	5d $^3D^\circ_2$— 4f $^5F_1$
2914.458	20	34301.65	6p′ $^3D_2$— $24^\circ_{1,2}$
2915.061	15c	34294.56	6p′ $^3P_2$— 42°_2
2915.762	3c	34286.31	5d″ $^3D^\circ_3$— $3_{2,3}$
2915.881	10	34284.91	5d $^3D^\circ_2$— 4f $^5F_2$
2916.146	4	34281.80	6p′ $^3P_1$— 46°_2
2917.740	8	34263.07	6p′ $^3P_0$— 38°_1

TABLE 10.1. *Observed lines of* I II—Continued

λ(air)	Intensity	Wave number	Classification
2917. 911	2	34261. 06	$6p'$ $^3P_1$— $45^\circ_{1,2}$
2919. 715	6*c*	34239. 90	$6s$ $^3S^\circ_1$— $6p'$ $^1D_2$
2920. 122	10	34235. 12	$6s$ $^5S^\circ_2$— $6p'$ $^3D_3$
2921. 134	6*c*	34223. 26	$6p$ $^5P_2$— $7s'$ $^3D^\circ_3$
2921. 686	8*c*	34216. 80	
2921. 982	50	34213. 33	$6p'$ $^3D_3$— 40°_3
2925. 087	80*c*	34177. 02	$5p^5$ $^3P^\circ_2$— $6p'$ $^3P_1$
2926. 769	3*c*	34157. 38	
2927. 388	2*c*	34150. 15	$6p'$ $^1F_3$— 36°_2
2927. 664	1*c*	34146. 93	
2927. 850	30	34144. 76	
2928. 758	4*c*	34134. 18	$6p'$ $^3P_1$— $43^\circ_{1,2}$
2929. 112	60	34130. 05	
2930. 627	2	34112. 41	$6p'$ $^3D_2$— 21°_1
2931. 720	200	34099. 69	$6p$ $^5P_3$— $7d$ $^5D^\circ_4$
2932. 911	10*c*	34085. 85	$6s''$ $^3P^\circ_1$— $7p'$ $^1D_2$
2933. 394	1	34080. 24	$6p$ $^5P_1$— $6d'$ 1°_2
2933. 638	5	34077. 40	$6p$ $^5P_1$— $8s$ $^3S^\circ_1$
2934. 963	25	34062. 02	$6p'$ $^3F_3$— $24^\circ_{1,2}$
2936. 954	40	34038. 93	$6p$ $^5P_3$— $7d$ $^5D^\circ_3$
2938. 155	6	34025. 01	$5d'$ $^3G^\circ_4$— $5f$ $^5F_5$
2940. 471	40	33998. 22	$6p'$ $^3D_3$— 39°_4
2941. 778	4	33983. 11	$5d'$ $^3G^\circ_4$— $5f$ $^5F_4$
2942. 429	60	33975. 59	
2942. 923	10	33969. 89	$6p$ $^5P_2$— $8s$ $^3S^\circ_1$
2943. 192	15	33966. 79	$6p$ $^5P_3$— $7d$ $^5D^\circ_2$
2943. 267	1	33965. 92	
2943. 842	2	33959. 29	$5d'$ $^3F^\circ_2$— $6f$ $^3F_2$
2945. 857	10*c*	33936. 06	$6p'$ $^3P_2$—$12d$ $^3D^\circ_3$
2946. 081	8*c*	33933. 48	$6s''$ $^3P^\circ_1$— $4f'$ $^3D_1$
2947. 055	10	33922. 26	$6p'$ $^1F_3$— $35^\circ_{2,3}$
2947. 927	40	33912. 23	$6p'$ $^3F_4$— 39°_4
2948. 642	25	33904. 01	$5d'$ $^3G^\circ_3$— $6f$ $^3F_4$
2950. 152	6	33886. 66	$5d'$ $^3F^\circ_2$— $6f$ $^3F_3$
2953. 773	5	33845. 12	$5d'$ $^3G^\circ_3$— $6f$ $^3F_2$
2955. 086	20*c*	33830. 08	
2955. 795	1*h*	33821. 96	
2956. 236	100*c*	33816. 92	$5p^5$ $^1P^\circ_1$— $6p''$ $^3P_2$
2957. 008	5*c*	33808. 09	$6s''$ $^3P^\circ_1$— $7p'$ $^3F_2$
2957. 658	200*c*	33800. 66	$5p^5$ $^3P^\circ_2$— $6p'$ $^3P_2$
2959. 796	15	33776. 25	
2960. 113	1	33772. 63	$6p'$ $^3P_2$— 40°_3
2962. 632	10*c*	33743. 92	$6s'$ $^1D^\circ_2$— $6p''$ $^1D_2$
2962. 819	1	33741. 78	$5d'$ $^3D^\circ_2$— $6p''$ $^1P_1$
2967. 350	5	33690. 27	$5d'$ $^3D^\circ_1$— $4f'$ $^3P_0$
2969. 413	25	33666. 86	$6p'$ $^1F_3$— 33°_3
2970. 694	7	33652. 34	
2970. 819	30*c*	33650. 93	$5d'$ $^1G^\circ_4$— $4f'$ $^2H_5$
2971. 895	2	33638. 74	
2973. 766	40	33617. 58	$6p$ $^5P_1$— $8s$ $^5S^\circ_2$
2974. 880	20*c*	33604. 99	$5d''$ $^1D^\circ_2$— $2_{2,3}$
2977. 656	4	33573. 66	$6p$ $^3P_2$— $7d$ $^3D^\circ_1$
2978. 287	4*c*	33566. 55	$5d''$ $^1D^\circ_2$— $8f$ $^5F_3$
2979. 044	25*c*	33558. 02	
2979. 487	2	33553. 03	$6p$ $^5P_3$— $6d'$ 2°_3
2980. 322	7*c*	33543. 63	$6p'$ $^1P_1$— 31°_0
2981. 162	2*c*	33534. 18	
2983. 312	50	33510. 02	$6p$ $^5P_2$— $8s$ $^5S^\circ_2$
2986. 011	4	33479. 73	
2987. 789	6	33459. 80	$5d'$ $^3P^\circ_2$— $3_{2,3}$
2990. 484	20*c*	33429. 65	$6p'$ $^1P_1$— 30°_2
2992. 391	2*c*	33408. 35	
2993. 866	1000	33391. 89	$5d$ $^3D^\circ_1$— $4f$ $^3F_2$
2994. 991	20	33379. 35	$6p'$ $^3F_2$— $8s'$ $^3D^\circ_2$
2996. 734	100*c*	33359. 94	$5p^5$ $^3P^\circ_2$— $6p'$ $^3D_3$
2997. 189	25*c*	33354. 87	$5d$ $^5D^\circ_3$— $6p'$ $^1D_2$
2998. 229	10*d*	33343. 30	$6p'$ $^3F_2$— $8s'$ $^3D^\circ_1$
2999. 498	20*c*	33329. 20	$6p'$ $^1P_1$—$10d$ $^3D^\circ_2$
3000. 694	40	33315. 91	$6p$ $^3P_1$— $7d$ $^3D^\circ_2$
3004. 858	8	33269. 75	$6p$ $^3P_1$— $6d'$ 5°_1
3007. 318	15*c*	33242. 53	
3010. 480	7*c*	33207. 62	$6p'$ $^1P_1$— 29°_1
3012. 712	20	33183. 02	$6p$ $^3P_0$— $7d$ $^3D^\circ_1$
3018. 042	30*c*	33124. 42	$6s$ $^5S^\circ_2$— $6p'$ $^1F_3$
3018. 249	20*c*	33122. 14	$6s'$ $^3D^\circ_3$— $6p''$ $^3P_2$
3018. 826	15*c*	33115. 81	$5p^5$ $^3P^\circ_0$— $6p''$ $^3D_1$
3020. 751	35*c*	33094. 71	$5d'$ $^3D^\circ_1$— $4f'$ $^3P_2$
3020. 950	7*d*	33092. 53	$5d''$ $^1D^\circ_2$— $1_{2,3}$
3021. 214	100	33089. 64	$5d$ $^3D^\circ_1$— $6p''$ $^3D_2$
3023. 211	1*h*	33067. 78	$5d'$ $^1G^\circ_4$— $4f'$ $^3D_3$
3024. 948	15*c*	33048. 80	$5d'$ $^3F^\circ_2$— $4f'$ $^1P_1$
3031. 204	30*c*	32980. 59	$5d'$ $^3F^\circ_2$— $4f'$ $^1D_2$
3032. 039	80*c*	32971. 51	$6p$ $^3P_2$— $7d$ $^3D^\circ_3$
3033. 856	35	32951. 76	$5d$ $^3D^\circ_1$— $7p$ $^5P_2$
3035. 807	40	32930. 59	$5d'$ $^3P^\circ_0$— $6p''$ $^1P_1$
3036. 973	4*c*	32917. 94	$5d$ $^5D^\circ_2$— $6p'$ $^1D_2$
3040. 888	15*c*	32875. 56	$5d'$ $^3F^\circ_2$— $4f'$ $^1F_3$
3041. 207	1*c*	32872. 12	$5d'$ $^3F^\circ_2$— $7p'$ $^3F_3$
3041. 735	15*c*	32866. 41	$5d'$ $^3G^\circ_3$— $4f'$ $^1D_2$
3042. 243	3*d*	32860. 92	$5d'$ $^1D^\circ_2$— $6f$ $^3F_3$
3043. 530	8*d*	32847. 03	
3045. 391	30	32826. 96	$5d'$ $^3D^\circ_1$— $7p'$ $^3P_2$
3049. 691	80*c*	32780. 67	$6s'$ $^3D^\circ_3$— $6p''$ $^3D_3$
3051. 188	2	32764. 59	$6p'$ $^1P_1$—$11s$ $^5S^\circ_2$
3051. 792	40*c*	32758. 11	$5d'$ $^3G^\circ_3$— $7p'$ $^3F_3$
3053. 072	3	32744. 37	$5d'$ $^3S^\circ_1$— $7p'$ $^3D_2$
3053. 177	25	32743. 25	$5d'$ $^3F^\circ_2$— $7p'$ $^1P_1$
3055. 365	50	32719. 80	$6p'$ $^3D_3$— 34°_2
3056. 005	90*c*	32712. 95	$6s'$ $^3D^\circ_2$— $7p$ $^3P_2$
3059. 322	50	32677. 48	$5d'$ $^3F^\circ_2$— $7p'$ $^1D_2$
3061. 716	20	32651. 93	$5d'$ $^3F^\circ_2$— $7p'$ $^1F_3$
3064. 603	2	32621. 17	
3065. 902	60*c*	32607. 35	$5p^5$ $^1P^\circ_1$— $6p''$ $^3S_1$
3067. 346	1	32592. 00	
3070. 042	35	32563. 38	$5d'$ $^3G^\circ_3$— $7p'$ $^1D_2$
3070. 705	30*c*	32556. 35	$6p'$ $^3D_3$— 33°_3
3071. 046	2	32552. 74	
3072. 456	80	32537. 80	$5d'$ $^3G^\circ_3$— $7p'$ $^1F_3$
3073. 658	7*c*	32525. 07	$5d'$ $^3F^\circ_2$— $4f'$ $^3D_1$
3074. 132	3	32520. 06	
3074. 255	8	32518. 76	$5d$ $^3D^\circ_3$— $4f$ $^3F_2$
3075. 678	4	32503. 71	
3076. 210	20	32498. 09	$6p'$ $^3D_2$— $8s'$ $^3D^\circ_2$
3077. 708	40*c*	32482. 28	$5d'$ $^3G^\circ_3$— $7p'$ $^3F_4$
3078. 754	5000	32471. 24	$5d$ $^3D^\circ_3$— $4f$ $^3F_4$
3079. 641	20	32461. 89	$6p'$ $^3D_2$— $8s'$ $^3D^\circ_1$
3082. 229	60	32434. 63	$6p$ $^5P_3$— $8s$ $^5S^\circ_2$
3083. 315	4	32423. 21	
3084. 278	6*c*	32413. 09	$6p'$ $^3F_3$— $9d$ $^3D^\circ_2$
3085. 509	60*c*	32400. 16	

λ(air)	Intensity	Wave number	Classification
3086.446	3	32390.32	
3086.989	4	32384.62	$6p'\ {}^3P_0 -\ 29^\circ_1$
3089.652	20*d*	32356.71	$6s'\ {}^3D^\circ_1 - 7p\ {}^3P_0$
3090.476	10*c*	32348.08	$5d'\ {}^3D^\circ_2 - 6p''\ {}^3D_3$
3090.609	25	32346.69	$6p\ {}^3P_2 - 7d\ {}^3D^\circ_2$
3092.698	15*c*	32324.84	
3094.035	1	32310.88	
3096.384	15*c*	32286.36	
3096.459	10	32285.58	$5d'\ {}^3G^\circ_3 - 7p'\ {}^3F_2$
3097.075	1*h*	32279.16	$6p'\ {}^3P_2 -\ 34^\circ_2$
3099.064	35	32258.45	$6p'\ {}^3F_3 - 8s'\ {}^3D^\circ_2$
3099.925	60*c*	32249.49	$5p^5\ {}^3P^\circ_2 - 6p'\ {}^1F_3$
3101.067	3*c*	32237.61	
3102.663	60	32221.03	$5d\ {}^3D^\circ_3 - 4f\ {}^3F_3$
3104.171	10	32205.38	$5d'\ {}^3P^\circ_1 -\ 12_{1,2}$
3106.665	40	32179.52	$5d'\ {}^3F^\circ_2 - 4f'\ {}^3G_3$
3112.838	30*c*	32115.71	$6p'\ {}^3P_2 -\ 33^\circ_3$
3113.026	10	32113.77	$5d'\ {}^3D^\circ_1 - 7p'\ {}^3P_1$
3116.441	8	32078.58	$5d\ {}^3D^\circ_3 - 7p\ {}^5P_2$
3117.071	30*c*	32072.10	$6s'\ {}^1D^\circ_2 - 6p''\ {}^3P_2$
3117.718	40*c*	32065.44	$5d'\ {}^3G^\circ_3 - 4f'\ {}^3G_3$
3119.878	5	32043.24	
3121.648	15*c*	32025.08	$6p'\ {}^1P_1 -\ 20^\circ_{1,2}$
3125.976	50	31980.74	$5d'\ {}^3D^\circ_1 - 4f'\ {}^3F_2$
3128.507	35*c*	31954.87	$5d'\ {}^1D^\circ_2 - 4f'\ {}^1D_2$
3128.638	10	31953.53	$6p'\ {}^3P_0 - 11s\ {}^3S^\circ_1$
3132.910	25*c*	31909.96	$6p\ {}^3P_0 - 6d'\ 5^\circ_1$
3133.397	50*c*	31905.00	$5p^5\ {}^3P^\circ_2 - 6p'\ {}^1P_1$
3133.618	10*c*	31902.75	$6p'\ {}^3P_1 -\ 34^\circ_2$
3136.473	100*d*	31873.71	$5d'\ {}^3G^\circ_3 - 4f'\ {}^3F_4$
3137.604	60	31862.22	$5d'\ {}^3D^\circ_1 - 8p\ {}^3P_1$
3138.830	90*c*	31849.78	$5d'\ {}^1D^\circ_2 - 4f'\ {}^1F_3$
3140.946	8	31828.32	$6p\ {}^3P_2 - 7d\ {}^5D^\circ_3$
3144.212	1	31795.26	
3144.997	1	31787.33	
3145.346	2	31783.80	
3148.089	8	31756.10	$6p\ {}^3P_2 - 7d\ {}^5D^\circ_2$
3149.636	8	31740.51	
3151.915	2	31717.56	$5d\ {}^1D^\circ_2 - 7p'\ {}^1P_1$
3153.078	5*c*	31705.86	$5d\ {}^3D^\circ_3 - 4f\ {}^5F_3$
3155.573	1	31680.79	$6p'\ {}^1F_3 -\ 20^\circ_{1,2}$
3155.864	10	31677.87	$5d\ {}^3D^\circ_3 - 4f\ {}^5F_4$
3157.337	3	31663.09	$5d'\ {}^3D^\circ_1 - 7p'\ {}^3D_1$
3158.080	20	31655.64	$6p\ {}^3P_1 - 6d'\ 1^\circ_2$
3158.357	20	31652.87	$6p\ {}^3P_1 - 8s\ {}^3S^\circ_1$
3158.466	40	31651.78	$5d'\ {}^1D^\circ_2 - 7p'\ {}^1D_2$
3159.175	1	31644.67	
3161.027	200	31626.13	$5d'\ {}^1D^\circ_2 - 7p'\ {}^1F_3$
3163.935	40*c*	31597.07	$5d'\ {}^3D^\circ_3 - 6p''\ {}^3P_2$
3169.882	15*c*	31537.79	$6s''\ {}^3P^\circ_1 - 4f'\ {}^3P_2$
3173.509	3*c*	31501.75	
3173.752	5*c*	31499.34	$5d'\ {}^1D^\circ_2 - 4f'\ {}^3D_1$
3175.066	1000	31486.30	$5p^5\ {}^3P^\circ_1 - 6p'\ {}^3P_2$
3176.630	15*c*	31470.80	$6s'\ {}^3D^\circ_2 - 6p''\ {}^3P_1$
3177.828	10	31458.94	$6s''\ {}^3P^\circ_0 - 7p'\ {}^3P_1$
3178.064	1	31456.60	$6p'\ {}^3D_1 - 8d\ {}^3D^\circ_2$
3180.575	10*c*	31431.76	$5d''\ {}^3P^\circ_2 -\ 8_{1,2}$
3182.602	2	31411.75	
3182.709	10*d*	31410.69	$6s'\ {}^3D^\circ_1 - 7p\ {}^3P_1$
3184.489	4*c*	31393.13	$6s'\ {}^3D^\circ_2 - 7p\ {}^5P_2$

λ(air)	Intensity	Wave number	Classification
3186.440	20	31373.91	$5d'\ {}^1D^\circ_2 - 7p'\ {}^3F_2$
3189.680	20	31342.05	$6p\ {}^3P_2 - 6d'\ 2^\circ_3$
3194.682	35	31292.98	$5d'\ {}^3P^\circ_1 -\ 8_{1,2}$
3195.610	6*c*	31283.89	$6p'\ {}^1D_2 -\ 46^\circ_2$
3197.074	40*d*	31269.56	$5d''\ {}^3P^\circ_2 -\ 7_{2,3}$
3197.514	2*c*	31265.26	$5d'\ {}^3S^\circ_1 - 4f'\ {}^1P_1$
3197.711	2*c*	31263.33	$6p'\ {}^1D_2 -\ 45^\circ_{1,2}$
3198.069	2*c*	31259.83	
3199.891	60	31242.04	$6s\ {}^3S^\circ_1 - 6p'\ {}^3P_1$
3201.547	3*c*	31225.88	$5p^5\ {}^1P^\circ_1 - 7p\ {}^3P_0$
3204.517	5*c*	31196.94	$5d'\ {}^3S^\circ_1 - 4f'\ {}^1D_2$
3204.894	2	31193.27	$6p\ {}^3P_1 - 8s\ {}^5S^\circ_2$
3208.946	25	31153.88	$5d'\ {}^1D^\circ_2 - 4f'\ {}^3G_3$
3209.664	30*c*	31146.91	$6s\ {}^5S^\circ_2 - 6p'\ {}^3D_2$
3221.493	3	31032.55	$5d'\ {}^3S^\circ_1 - 7p'\ {}^3P_0$
3229.081	4	30959.63	$5d'\ {}^3S^\circ_1 - 7p'\ {}^1P_1$
3231.433	2*c*	30937.09	$6p\ {}^3P_2 - 7s'\ {}^3D^\circ_3$
3235.951	5	30893.90	$5d'\ {}^3S^\circ_1 - 7p'\ {}^1D_2$
3238.909	25*c*	30865.69	$6s\ {}^3S^\circ_1 - 6p'\ {}^3P_2$
3239.245	20*c*	30862.48	$6s'\ {}^1D^\circ_2 - 6p''\ {}^3S_1$
3252.008	3	30741.36	$5d'\ {}^3S^\circ_1 - 4f'\ {}^3D_1$
3256.460	100*c*	30699.34	$6s'\ {}^3D^\circ_1 - 4f\ {}^3F_2$
3257.814	2	30686.58	
3258.125	20	30683.65	$6p\ {}^3P_2 - 8s\ {}^3S^\circ_1$
3265.309	1	30616.15	$5d'\ {}^3S^\circ_1 - 7p'\ {}^3F_2$
3267.320	5*c*	30597.30	$6s''\ {}^3P^\circ_1 - 8p\ {}^3P_2$
3270.440	4	30568.12	
3271.534	1	30557.89	
3276.536	30*c*	30511.24	$5p^5\ {}^3P^\circ_2 - 6p'\ {}^3F_3$
3278.418	1*d*	30493.73	$6p'\ {}^3D_1 - 6d'\ 15^\circ_1$
3279.256	2*c*	30485.94	
3288.860	100*c*	30396.92	$6s'\ {}^3D^\circ_1 - 6p''\ {}^3D_2$
3296.368	3*c*	30327.68	$5d'\ {}^3P^\circ_2 - 7f\ {}^3F_3$
3300.133	10	30293.09	$6p\ {}^3P_0 - 8s\ {}^3S^\circ_1$
3301.538	20*c*	30280.20	$5p^5\ {}^1P^\circ_1 - 7p\ {}^3P_1$
3302.457	150*c*	30271.77	$5p^5\ {}^3P^\circ_2 - 6p'\ {}^3D_2$
3303.841	15	30259.09	$6s'\ {}^3D^\circ_1 - 7p\ {}^5P_2$
3307.701	10	30223.78	$6p\ {}^3P_2 - 8s\ {}^5S^\circ_2$
3309.502	1	30207.33	
3312.374	10*d*	30181.14	$6s'\ {}^3D^\circ_1 - 6p''\ {}^3P_0$
3313.825	1	30167.93	
3314.478	3	30161.98	
3315.326	2*c*	30154.27	
3318.088	40	30129.17	{ $5d'\ {}^3F^\circ_2 - 4f'\ {}^3P_2$ { $6p'\ {}^3P_2 -\ 20^\circ_{1,2}$
3319.210	2	30118.98	$6p'\ {}^3D_1 - 9s\ {}^3S^\circ_1$
3321.099	1	30101.85	
3321.641	1	30096.94	
3323.700	2	30078.30	$6s''\ {}^1P^\circ_1 - 7p'\ {}^3D_2$
3326.405	50*c*	30053.84	$5d'\ {}^3F^\circ_4 - 6p''\ {}^3D_3$
3327.256	1*c*	30046.15	
3330.708	2*c*	30015.01	$5d'\ {}^3G^\circ_3 - 4f'\ {}^3P_2$
3331.585	6	30007.11	$5d''\ {}^3P^\circ_2 -\ 3_{2,3}$
3331.754	8	30005.59	$6p'\ {}^3P_0 - 8s'\ {}^3D^\circ_1$
3334.536	2*c*	29980.56	$5d\ {}^5D^\circ_3 - 6p'\ {}^3P_2$
3340.351	3*c*	29928.37	$6s''\ {}^3P^\circ_2 - 4f'\ {}^1F_3$
3341.289	100	29919.97	$5d\ {}^5D^\circ_2 - 6p'\ {}^3P_1$
3345.342	25*c*	29883.72	$5d''\ {}^3D^\circ_2 -\ 7_{2,3}$
3345.607	3*c*	29881.35	$5d'\ {}^3F^\circ_2 - 4f'\ {}^3P_1$
3346.219	2*c*	29875.89	
3347.857	40*c*	29861.27	$5d'\ {}^3F^\circ_2 - 7p'\ {}^3P_2$

TABLE 10.1. *Observed lines of* I II—Continued

λ(air)	Intensity	Wave number	Classification	λ(air)	Intensity	Wave number	Classification
3349.286	20	29848.53	$5d'\ {}^3F^\circ_2 - 7p'\ {}^3D_3$	3464.540	4c	28855.60	$5d'\ {}^1D^\circ_2 - 4f'\ {}^3P_1$
3351.394	30	29829.76	$5d'\ {}^3F^\circ_3 - 6p''\ {}^3P_2$	3466.953	10	28835.51	$5d'\ {}^1D^\circ_2 - 7p'\ {}^3P_2$
3352.823	10c	29817.04	$5d'\ {}^3D^\circ_1 - 6p''\ {}^1S_0$	3467.261	5c	28832.95	$6s'\ {}^3D^\circ_3 - 7p\ {}^5P_3$
3352.928	2	29816.11	$6p'\ {}^1D_2 - 38^\circ_1$	3468.046	30c	28826.43	$6s'\ {}^3D^\circ_3 - 4f\ {}^3F_4$
3355.531	300	29792.98	$6s\ {}^3S^\circ_1 - 6p'\ {}^3P_0$	3468.486	20	28822.77	$5d'\ {}^1D^\circ_2 - 7p'\ {}^3D_3$
3359.961	150c	29753.70	$6s'\ {}^3D^\circ_3 - 7p\ {}^3P_2$	3469.342	1	28815.66	
3360.699	8c	29747.17	$5d'\ {}^3G^\circ_3 - 7p'\ {}^3P_2$	3470.131	6	28809.11	
3362.137	7	29734.44	$5d'\ {}^3G^\circ_3 - 7p'\ {}^3D_3$	3478.279	3c	28741.62	
3362.598	20c	29730.37	$6s''\ {}^3P^\circ_2 - 7p'\ {}^1D_2$	3481.569	1	28714.46	
3363.367	2	29723.57		3482.917	1	28703.35	$6s'\ {}^1D^\circ_2 - 7p\ {}^3P_2$
3365.500	20c	29704.73	$6s''\ {}^3P^\circ_2 - 7p'\ {}^1F_3$	3483.706	5	28696.85	
3366.575	7d	29695.25		3483.894	60c	28695.30	$6s'\ {}^3D^\circ_1 - 6p''\ {}^3D_1$
3374.457	100c	29625.89	$5d\ {}^5D^\circ_3 - 6p'\ {}^3F_4$	3488.509	15	28657.34	$5d'\ {}^3F^\circ_2 - 4f'\ {}^3D_3$
3378.475	6c	29590.66	$5p^5\ {}^3P^\circ_1 - 6p'\ {}^1P_1$	3489.100	2	28652.49	
3380.983	30c	29568.71	$5p^5\ {}^1P^\circ_1 - 4f\ {}^3F_2$	3489.561	4	28648.70	
3382.711	2	29553.60		3490.488	1	28641.09	
3383.858	80c	29543.58	$5d\ {}^5D^\circ_2 - 6p'\ {}^3P_2$	3491.273	1	28634.65	
3386.377	4c	29521.61	$5d'\ {}^1S^\circ_0 - 4f'\ {}^1P_1$	3492.916	4	28621.18	$5d''\ {}^3D^\circ_2 - 3_{2,3}$
3390.214	15c	29488.20	$5d'\ {}^3F^\circ_3 - 6p''\ {}^3D_3$	3495.624	1c	28599.01	$6s''\ {}^1P^\circ_1 - 4f'\ {}^1P_1$
3391.360	7c	29478.23	$7s\ {}^3S^\circ_1 - 8_{1,2}$	3496.408	5	28592.60	$6p'\ {}^3P_1 - 8s'\ {}^3D^\circ_2$
3394.192	7c	29453.64		3497.406	300c	28584.44	$5d\ {}^3D^\circ_2 - 6p'\ {}^1D_2$
3399.537	8	29407.33		3498.372	2	28576.55	
3400.316	5	29400.59		3498.500	1	28575.50	
3401.500	50c	29390.36	$5p^5\ {}^3P^\circ_2 - 6p'\ {}^3F_2$	3498.985	25c	28571.54	$6s'\ {}^3D^\circ_3 - 6p''\ {}^3D_2$
3402.587	4c	29380.97		3500.824	2	28556.53	$6p'\ {}^3P_1 - 8s'\ {}^3D^\circ_1$
3409.138	2c	29324.52		3502.457	2	28543.22	$5d'\ {}^3G^\circ_3 - 4f'\ {}^3D_3$
3409.692	7c	29319.75		3503.459	35c	28535.06	$6s'\ {}^1D^\circ_2 - 7p\ {}^3P_1$
3409.938	30c	29317.64	$5d\ {}^5D^\circ_4 - 6p'\ {}^3F_4$	3503.996	30c	28530.68	$6s''\ {}^1P^\circ_1 - 4f'\ {}^1D_2$
3411.173	1	29307.02		3504.729	1c	28524.72	
3415.911	30c	29266.37	$5p^5\ {}^1P^\circ_1 - 6p''\ {}^3D_2$	3510.630	10	28476.77	$5d'\ {}^1D^\circ_2 - 4f'\ {}^3D_2$
3416.759	5	29259.11		3511.357	20	28470.88	$5d'\ {}^3G^\circ_3 - 4f'\ {}^3F_3$
3417.606	5	29251.86		3512.177	100	28464.23	$5d'\ {}^3G^\circ_3 - 4f'\ {}^3G_4$
3421.805	7	29215.96	$5d'\ {}^1S^\circ_0 - 7p'\ {}^1P_1$	3513.304	2	28455.10	
3421.987	3	29214.41		3513.971	2	28449.70	
3422.948	20c	29206.21	$5p^5\ {}^1P^\circ_1 - 6p''\ {}^3P_1$	3514.319	1	28446.88	$7s\ {}^5S^\circ_2 - 8f\ {}^3F_3$
3424.993	250c	29188.77	$5d'\ {}^3F^\circ_2 - 8p\ {}^3P_2$	3514.757	2	28443.34	
3426.461	20	29176.26	$5d'\ {}^3G^\circ_3 - 4f'\ {}^3H_4$	3515.021	15	28441.20	$5d'\ {}^3D^\circ_2 - 4f\ {}^3F_2$
3429.784	7d	29148.00	$5d'\ {}^3F^\circ_2 - 7p'\ {}^3P_1$	3515.661	3	28436.02	
3432.080	25c	29128.50	$5p^5\ {}^1P^\circ_1 - 7p\ {}^5P_2$	3516.504	50c	28429.20	$5d\ {}^5D^\circ_3 - 6p'\ {}^1F_3$
3433.277	4c	29118.34	$6s''\ {}^3P^\circ_1 - 5f\ {}^5F_2$	3517.822	3h	28418.55	$5d'\ {}^3G^\circ_3 - 8p\ {}^5P_2$?
3435.093	80c	29102.95	$5d\ {}^5D^\circ_2 - 6p'\ {}^3D_3$	3518.688	1	28411.56	
3436.712	3	29089.24		3519.105	3	28408.19	
3438.434	20w	29074.67	$5d'\ {}^3G^\circ_3 - 8p\ {}^3P_2$	3520.089	5c	28400.25	$5d'\ {}^3D^\circ_2 - 7p\ {}^5P_3$
3438.792	3	29071.65		3522.007	2	28384.79	
3440.510	2	29057.13		3523.646	2	28371.58	
3441.290	25c	29050.54	$5p^5\ {}^1P^\circ_1 - 6p''\ {}^3P_0$	3523.886	1	28369.65	
3442.819	7	29037.64	$5d''\ {}^3P^\circ_2 - 2_{2,3}$	3524.095	2	28367.97	
3444.433	1	29024.04	$5d''\ {}^3F^\circ_3 - 10_{2,3}$	3524.292	15	28366.38	$6s''\ {}^1P^\circ_1 - 7p'\ {}^3P_0$
3446.365	1	29007.77		3525.403	2	28357.44	$6p'\ {}^3D_1 - 6d'\ 11^\circ_0$
3447.683	35c	28996.68	$6p'\ {}^1D_2 - 35^\circ_{2,3}$	3525.798	1	28354.27	
3447.872	10c	28995.09	$5p^5\ {}^1P^\circ_1 - 7p\ {}^5P_1$	3526.223	60d	28350.85	$5d\ {}^5D^\circ_1 - 6p'\ {}^3P_1$
3450.764	8c	28970.79		3526.904	500	28345.38	$5d'\ {}^3S^\circ_1 - 4f'\ {}^3P_2$
3454.191	4	28942.05		3527.385	4	28341.51	$5d'\ {}^3P^\circ_0 - 7p\ {}^3P_1$
3455.886	1	28927.85		3528.062	2	28336.07	$6p'\ {}^3F_2 - 6d'\ 14^\circ_3$
3458.654	20	28904.70	$6p'\ {}^1D_2 - 34^\circ_2$	3528.574	2	28331.96	
3459.108	10	28900.91	$5d'\ {}^3G^\circ_3 - 4f'\ {}^3F_2$	3528.810	1	28330.07	
3459.626	3	28896.58	$5d'\ {}^3F^\circ_2 - 8p\ {}^3P_1$	3529.316	2h	28326.00	
3461.812	1	28878.34		3529.540	1	28324.21	
3462.097	1	28875.96		3531.331	5h	28309.84	$6p'\ {}^3D_1 - 6d'\ 10^\circ_2$
3462.332	2c	28874.00	$6s'\ {}^3D^\circ_3 - 4f\ {}^3F_2$	3533.379	60	28293.43	$6s''\ {}^1P^\circ_1 - 7p'\ {}^1P_1$

λ(air)	Intensity	Wave number	Classification
3533.648	10	28291.28	$5d''\ {}^3D^\circ_1$— $8_{1,2}$
3535.876	70	28273.45	$5d'\ {}^3G^\circ_4$— $6p''\ {}^3D_3$
3537.561	10c	28259.99	$6s''\ {}^3P^\circ_1$— $6p''\ {}^1S_0$
3538.334	1h	28253.81	$6p'\ {}^3F_2$— $6d'\ 13^\circ_{1,2}$
3539.628	1	28243.48	
3541.605	100	28227.72	$6s''\ {}^1P^\circ_1$— $7p'\ {}^1D_2$
3543.319	1	28214.06	$5d'\ {}^3F^\circ_2$— $5f\ {}^3F_2$
3547.170	1	28183.44	
3549.734	2	28163.08	$5d'\ {}^1D^\circ_2$— $8p\ {}^3P_2$
3552.196	100c	28143.56	$5d'\ {}^3D^\circ_2$— $4f\ {}^3F_3$
3552.782	20	28138.92	$5d'\ {}^3D^\circ_2$— $6p''\ {}^3D_2$
3553.034	8c	28136.92	$5d'\ {}^1F^\circ_3$— $6f\ {}^3F_4$
3553.843	1	28130.52	
3554.873	5	28122.37	$5d'\ {}^1D^\circ_2$— $7p'\ {}^3P_1$
3555.039	2c	28121.05	$5d\ {}^5D^\circ_4$— $6p'\ {}^1F_3$
3555.576	2	28116.81	
3558.008	50	28097.59	$5d'\ {}^3S^\circ_1$— $4f'\ {}^3P_1$
3560.542	200	28077.59	$5d'\ {}^3S^\circ_1$— $7p'\ {}^3P_2$
3563.001	5	28058.22	$5d'\ {}^3G^\circ_3$— $5f\ {}^3F_4$
3566.158	2	28033.38	$6s'\ {}^3D^\circ_3$— $4f\ {}^5F_4$
3569.696	1	28005.59	
3569.888	6	28004.09	$6p\ {}^3P_2$— $7s'\ {}^3D^\circ_2$
3570.278	10c	28001.03	$5d'\ {}^3D^\circ_2$— $7p\ {}^5P_2$
3571.386	10c	27992.34	$5d\ {}^5D^\circ_2$— $6p'\ {}^1F_3$
3571.769	10d	27989.34	$5d'\ {}^1D^\circ_2$— $4f'\ {}^3F_2$
3573.680	200c	27974.37	$5d\ {}^5D^\circ_1$— $6p'\ {}^3P_2$
3575.861	70	27957.31	$5p^5\ {}^3P^\circ_1$— $6p'\ {}^3D_2$
3576.826	1	27949.77	$6s''\ {}^1P^\circ_1$— $7p'\ {}^3F_2$
3579.477	1	27929.07	
3586.568	3c	27873.85	$5d''\ {}^3D^\circ_3$— $6f\ {}^3F_4$
3586.946	10	27870.92	$5d'\ {}^1D^\circ_2$— $8p\ {}^3P_1$
3587.105	1	27869.68	$5d''\ {}^3F^\circ_2$— $13_{2,3}$
3587.363	3c	27867.68	$5d'\ {}^3D^\circ_2$— $7p\ {}^5P_1$
3588.505	4	27858.81	
3592.110	15	27830.85	$5d'\ {}^3F^\circ_2$— $5f\ {}^3F_3$
3592.738	4	27825.98	
3593.030	1h	27823.72	$6s'\ {}^1D^\circ_2$— $4f\ {}^3F_2$
3594.691	2	27810.87	
3596.204	1	27799.17	
3597.133	4	27791.99	
3598.012	3	27785.20	
3606.902	1	27716.72	$5d'\ {}^3G^\circ_3$— $5f\ {}^3F_3$
3611.680	8h	27680.05	$5d'\ {}^1F^\circ_3$— $6f\ {}^5F_4$
3612.769	2	27671.71	$5d'\ {}^1D^\circ_2$— $7p'\ {}^3D_1$
3615.372	3	27651.78	$5d''\ {}^3D^\circ_2$— $2_{2,3}$
3615.868	20d	27647.99	$5d\ {}^5D^\circ_2$— $6p'\ {}^1P_1$
3617.136	1	27638.30	
3618.014	6	27631.59	$5d'\ {}^1D^\circ_2$— $4f'\ {}^3D_3$
3618.652	6	27626.72	$5d'\ {}^3F^\circ_2$— $5f\ {}^5F_3$
3620.408	1	27613.32	$5d''\ {}^3D^\circ_2$— $8f\ {}^5F_3$
3620.691	1	27611.16	$6p\ {}^3P_0$— $7s'\ {}^3D^\circ_1$
3626.755	20c	27565.00	$5p^5\ {}^1P^\circ_1$— $6p''\ {}^3D_1$
3627.507	15	27559.28	$5d'\ {}^1D^\circ_2$— $4f'\ {}^3F_3$
3627.785	3	27557.17	$5d'\ {}^3P^\circ_2$— $7p'\ {}^3D_2$
3631.880	6c	27526.10	$6s'\ {}^1D^\circ_2$— $4f\ {}^3F_3$
3632.500	10	27521.40	$6s'\ {}^1D^\circ_2$— $6p''\ {}^3D_2$
3633.665	1	27512.58	$5d'\ {}^3G^\circ_3$— $5f\ {}^5F_3$
3640.432	1c	27461.44	
3641.130	1	27456.18	
3648.812	2h	27398.37	$6p'\ {}^1D_2$— $24^\circ_{1,2}$
3649.144	3h	27395.88	
3650.800	20c	27383.46	$6s'\ {}^1D^\circ_2$— $7p\ {}^5P_2$
3652.299	4	27372.22	$6p'\ {}^3D_2$— $6d'\ 13^\circ_{1,2}$
3653.355	15	27364.30	$5d'\ {}^3S^\circ_1$— $7p'\ {}^3P_1$
3655.423	5h	27348.82	$5d'\ {}^3D^\circ_3$— $4f\ {}^3F_2$
3657.060	100	27336.58	$6s\ {}^3S^\circ_1$— $6p'\ {}^3D_2$
3661.792	50c	27301.26	$5d'\ {}^3D^\circ_3$— $4f\ {}^3F_4$
3662.816	2	27293.62	
3671.889	1	27226.19	
3677.874	3c	27181.88	$6s''\ {}^3P^\circ_2$— $4f'\ {}^3P_2$
3685.694	3c	27124.21	$5d''\ {}^1D^\circ_2$— $4f'\ {}^1D_2$
3692.266	5c	27075.93	$5p^5\ {}^3P^\circ_1$— $6p'\ {}^3F_2$
3695.633	1c	27051.26	$5d'\ {}^3D^\circ_3$— $4f\ {}^3F_3$
3696.292	15c	27046.44	$5d'\ {}^3D^\circ_3$— $6p''\ {}^3D_2$
3700.027	1	27019.14	$5d''\ {}^1D^\circ_2$— $4f'\ {}^1F_3$
3700.703	1	27014.21	
3703.426	5c	26994.34	$5d'\ {}^1F^\circ_3$— $4f'\ {}^1F_3$
3709.498	40c	26950.16	$5d\ {}^3D^\circ_1$— $6p'\ {}^1D_2$
3714.466	1c	26914.11	$6s''\ {}^3P^\circ_2$— $7p'\ {}^3P_2$
3715.233	5c	26908.56	$5d'\ {}^3D^\circ_3$— $7p\ {}^5P_2$
3716.170	50	26901.77	$5d\ {}^5D^\circ_1$— $6p'\ {}^3P_0$
3725.274	1	26836.03	$5d''\ {}^3D^\circ_3$— $4f'\ {}^1D_2$
3727.200	2	26822.16	$5d'\ {}^3P^\circ_1$— $7f\ {}^3F_2$
3727.330	10	26821.23	$5d''\ {}^1D^\circ_2$— $7p'\ {}^1D_2$
3729.580	1	26805.05	$5d'\ {}^1D^\circ_2$— $5f\ {}^3F_3$
3730.890	25	26795.64	$5d''\ {}^1D^\circ_2$— $7p'\ {}^1F_3$
3734.366	60c	26770.70	$5d'\ {}^1F^\circ_3$— $7p'\ {}^1F_3$
3739.327	2	26735.18	$6d\ {}^5D^\circ_3$— $9f\ {}^5F_4$?
3740.358	4c	26727.81	$5d''\ {}^3D^\circ_3$— $7p'\ {}^3F_3$
3740.900	2	26723.94	
3742.138	200	26715.10	$5d'\ {}^1F^\circ_3$— $7p'\ {}^3F_4$
3744.138	1	26700.83	$6d\ {}^5D^\circ_2$— $9f\ {}^5F_3$?
3745.553	6c	26690.74	{ $4f\ {}^3F_3$— $50^\circ_{3,4}$ $6d\ {}^5D^\circ_4$— $9f\ {}^5F_5$?
3746.008	3c	26687.50	{ $6p'\ {}^1P_1$— $6d'\ 15^\circ_1$ $6d\ {}^5D^\circ_4$— $9f\ {}^5F_4$?
3748.299	4c	26671.19	$5d''\ {}^1F^\circ_3$— $11_{3,4}$
3764.694	2	26555.04	$6p'\ {}^3D_1$— $6d'\ 7^\circ_{1,2}$
3766.364	3	26543.26	$5d''\ {}^1D^\circ_2$— $7p'\ {}^3F_2$
3767.804	4c	26533.12	$5d''\ {}^3D^\circ_3$— $7p'\ {}^1D_2$
3769.287	1	26522.68	
3769.891	5	26518.43	$5d'\ {}^1F^\circ_3$— $7p'\ {}^3F_2$
3771.453	10	26507.45	$5d''\ {}^3D^\circ_3$— $7p'\ {}^1F_3$
3772.506	1	26500.05	$4f\ {}^5F_5$—$12g\ {}^5G^\circ_6$
3778.068	2	26461.04	$5d'\ {}^3F^\circ_3$— $7p\ {}^3P_2$
3778.913	10c	26455.12	$6s\ {}^3S^\circ_1$- - $6p'\ {}^3F_2$
3779.374	25	26451.90	$5d''\ {}^3D^\circ_3$— $7p'\ {}^3F_4$
3781.442	20c	26437.43	$5d'\ {}^3D^\circ_2$— $6p''\ {}^3D_1$
3787.772	1	26393.25	$4f\ {}^3F_2$— $50^\circ_{3,4}$
3789.289	5	26382.68	$5d\ {}^5D^\circ_4$— $6p'\ {}^3F_3$
3792.147	1	26362.80	
3793.419	10	26353.96	$5d'\ {}^1S^\circ_0$— $4f'\ {}^3P_1$
3800.176	2	26307.10	
3801.073	2	26300.89	
3801.453	5d?	26298.26	$5d'\ {}^1F^\circ_3$— $4f'\ {}^3G_3$
3804.274	1	26278.76	$5d'\ {}^3D^\circ_1$— $6p''\ {}^1P_1$
3804.720	1	26275.68	
3804.843	6	26274.83	$6s''\ {}^1P^\circ_1$— $4f'\ {}^3P_0$
3807.840	10	26254.16	$5d\ {}^5D^\circ_2$— $6p'\ {}^3F_3$
3809.651	5c	26241.68	$6s''\ {}^3P^\circ_2$— $8p\ {}^3P_2$
3815.519	1c	26200.82	$6s''\ {}^3P^\circ_2$— $7p'\ {}^3P_1$

λ(air)	Intensity	Wave number	Classification	λ(air)	Intensity	Wave number	Classification
3818.597	2	26180.20	$6p'\,{}^3D_1$— $7d\,{}^3D^{\circ}_1$	4086.888	1	24461.59	
3826.022	1	26129.39		4089.598	3	24445.38	$5d\,{}^5D^{\circ}_1$— $6p'\,{}^3D_2$
3829.355	1	26106.65	$5d'\,{}^1F^{\circ}_3$— $4f'\,{}^3F_4$	4094.310	1	24417.25	$6p'\,{}^3P_2$— $9s\,{}^3S^{\circ}_1$
3833.736	35c	26076.82	$5d\,{}^3D^{\circ}_3$— $6p'\,{}^1D_2$	4094.598	5	24415.53	$6p'\,{}^3P_1$— $6d'\ 15^{\circ}_1$
3842.914	25	26014.54	$5d\,{}^5D^{\circ}_2$— $6p'\,{}^3D_2$	4095.232	1c	24411.75	
3848.808	1	25974.70		4100.186	2	24382.26	$6p'\,{}^3D_2$— $6d'\ 7^{\circ}_{1,2}$
3850.818	8	25961.15	$6p\,{}^5P_2$— $6d\,{}^3D^{\circ}_3$	4102.895	6	24366.16	$6p'\,{}^3D_3$— $6d'\ 14^{\circ}_3$
3851.243	1	25958.28		4103.463	1	24362.78	$6p'\,{}^3D_1$— $7d\,{}^5D^{\circ}_2$
3857.334	1	25917.29	$4f\,{}^5F_5$—$11g\,{}^5G^{\circ}_6$	4107.818	3	24336.96	
3870.276	1	25830.63		4109.658	2	24326.06	
3871.878	3	25819.94	$6s'\,{}^1D^{\circ}_2$— $6p''\,{}^3D_1$	4111.646	3	24314.30	$6p'\,{}^3F_3$— $6d'\ 8^{\circ}_4$
3877.198	25	25784.51	$5p^5\,{}^3P^{\circ}_1$— $6p'\,{}^3D_1$	4115.615	3	24290.85	
3879.028	5	25772.35	$5d'\,{}^3P^{\circ}_2$— $7p'\,{}^1P_1$	4116.294	6	24286.84	$6p'\,{}^3F_2$— $7d\,{}^3D^{\circ}_3$
3884.064	4	25738.94	$6p'\,{}^1P_1$— $6d'\ 13^{\circ}_{1,2}$	4116.438	1	24286.00	
3893.000	70c	25679.85	$5p^5\,{}^3P^{\circ}_0$— $6p'\,{}^3P_1$	4116.823	3	24283.72	$6p'\,{}^3D_3$— $6d'\ 13^{\circ}_{1,2}$?
3895.547	10c	25663.06	$5d'\,{}^1P^{\circ}_1$— $4f'\,{}^1P_1$	4117.892	3	24277.42	
3901.118	20c	25626.42	$5d'\,{}^3P^{\circ}_0$— $6p''\,{}^3D_1$	4118.813	1	24271.99	$6p''\,{}^3D_1$— 32°_1
3904.896	1	25601.62		4119.599	1	24267.36	
3905.917	3c	25594.93	$5d'\,{}^1P^{\circ}_1$— $4f'\,{}^1D_2$	4120.190	8	24263.88	$6p'\,{}^3D_2$— $6d'\ 6^{\circ}_{1,2}$
3907.201	100	25586.52	$5d\,{}^3D^{\circ}_2$— $6p'\,{}^3P_1$	4121.281	3c	24257.46	$6s'\,{}^3D^{\circ}_1$— $6p'\,{}^1D_2$
3908.940	1	25575.14	$5d''\,{}^3D^{\circ}_2$— $7f\,{}^3F_2$	4122.931	4	24247.75	$6s''\,{}^1P^{\circ}_1$— $7p'\,{}^3D_1$
3909.708	1	25570.12	$5d\,{}^5D^{\circ}_3$— $6p'\,{}^3F_2$	4124.536	2	24238.31	
3910.678	2	25563.77		4126.093	10	24229.17	$6p'\,{}^3D_1$— $6d'\ 4^{\circ}_0$
3915.234	30	25534.03	$5d'\,{}^3F^{\circ}_3$— $4f\,{}^3F_4$	4135.723	1	24172.75	$4f\,{}^5F_4$— $9g\,{}^3G^{\circ}_5$
3924.018	2c	25476.87	$6p'\,{}^1F_3$— $6d'\ 14^{\circ}_3$	4136.482	2	24168.32	$4f\,{}^5F_4$— $9g\,{}^5G^{\circ}_5$
3931.169	10c	25430.53	$5d'\,{}^1P^{\circ}_1$— $7p'\,{}^3P_0$	4138.030	5c	24159.28	$6p'\,{}^1F_3$— $6d'\ 10^{\circ}_2$
3931.442	15	25428.76	$5d'\,{}^3P^{\circ}_2$— $7p'\,{}^3F_2$	4139.702	1	24149.52	
3937.222	60c	25391.43	$6s'\,{}^3D^{\circ}_2$— $6p'\,{}^1D_2$	4142.014	2	24136.04	
3942.476	20d	25357.59	$5d'\,{}^1P^{\circ}_1$— $7p'\,{}^1P_1$	4145.865	3	24113.62	$4f\,{}^5F_5$— $9g\,{}^5G^{\circ}_6$
3944.019	1	25347.67		4153.136	2	24071.40	$4f\,{}^5F_2$— $9g\,{}^5G^{\circ}_3$
3945.000	2c	25341.37	$6s''\,{}^3P^{\circ}_1$— $6p''\,{}^1D_2$	4158.425	3	24040.79	$6p'\,{}^3P_1$— $9s\,{}^3S^{\circ}_1$
3952.724	2w	25291.85	$5d'\,{}^1P^{\circ}_1$— $7p'\,{}^1D_2$	4160.646	4c	24027.96	$6d\,{}^3D^{\circ}_1$— $8_{1,2}$
3953.978	2	25283.83	$5d'\,{}^3F^{\circ}_3$— $4f\,{}^3F_3$	4162.565	1	24016.88	$5d'\,{}^3D^{\circ}_1$— $6p''\,{}^3S_1$
3960.504	1	25242.17		4162.689	1	24016.16	$4f\,{}^5F_1$— $9g\,{}^5G^{\circ}_2$
3961.538	1	25235.58	$6d\,{}^5D^{\circ}_2$— $8f\,{}^3F_3$	4166.838	2	23992.25	$5d''\,{}^1D^{\circ}_2$— $7p'\,{}^3D_3$
3962.959	15d	25226.53	$5d'\,{}^3D^{\circ}_1$— $6p''\,{}^3P_2$	4171.155	1c	23967.42	$5d'\,{}^1F^{\circ}_3$— $7p'\,{}^3D_3$
3965.544	50c	25210.09	$5d\,{}^3D^{\circ}_2$— $6p'\,{}^3P_2$	4173.810	40c, Z	23952.17	$5d\,{}^3D^{\circ}_1$— $6p'\,{}^3P_1$
3965.772	10	25208.64	$5d'\,{}^3P^{\circ}_2$— $4f'\,{}^3G_3$	4177.179	4	23932.86	$5d'\,{}^3F^{\circ}_2$— $6p''\,{}^1D_2$
3972.839	30	25163.80	$6s\,{}^3S^{\circ}_1$— $6p'\,{}^3D_1$	4178.440	1	23925.63	$6p'\,{}^3P_2$— $6d'\ 14^{\circ}_3$
3973.481	3	25159.73	$6d\,{}^5D^{\circ}_3$— $8f\,{}^5F_4$	4179.928	1	23917.12	
3974.067	1	25156.02	$6d\,{}^5D^{\circ}_3$— $8f\,{}^5F_3$	4183.035	1	23899.35	
3974.953	1	25150.42	$4f\,{}^5F_5$—$10g\,{}^5G^{\circ}_6$	4183.516	2	23896.60	
3977.968	1	25131.35	$6d\,{}^5D^{\circ}_2$— $8f\,{}^5F_2$	4192.862	1	23843.34	$6p'\,{}^3P_2$— $6d'\ 13^{\circ}_{1,2}$
3980.433	2	25115.79	$6d\,{}^5D^{\circ}_2$— $8f\,{}^5F_3$	4197.190	2	23818.75	$5d'\,{}^3G^{\circ}_3$— $6p''\,{}^1D_2$
3981.043	1	25111.94	$6d\,{}^5D^{\circ}_4$— $8f\,{}^5F_4$	4206.534	1	23765.84	
3983.574	4	25095.99	$6d\,{}^5D^{\circ}_4$— $8f\,{}^5F_5$	4217.476	3h	23704.19	$5d''\,{}^3D^{\circ}_3$— $7p'\,{}^3D_3$
3988.076	15	25067.66	$5d'\,{}^3S^{\circ}_1$— $6p''\,{}^1S_0$	4219.138	10	23694.85	$6p\,{}^3P_1$— $6d\,{}^3D^{\circ}_1$
3990.835	1	25050.33		4224.993	10	23662.01	$6p'\,{}^3F_2$— $7d\,{}^3D^{\circ}_2$
3996.642	5	25013.93	$5d'\,{}^1P^{\circ}_1$— $7p'\,{}^3F_2$	4225.542	50c, Z	23658.94	$5d\,{}^3D^{\circ}_2$— $6p'\,{}^1F_3$
4006.349	6	24953.33	$6p'\,{}^3D_1$— $7d\,{}^3D^{\circ}_2$	4231.185	1	23627.39	$4f\,{}^3F_3$— $9g\,{}^3G^{\circ}_4$
4013.765	4	24907.22	$6p'\,{}^3D_1$— $6d'\ 5^{\circ}_1$	4233.249	2	23615.87	$6p'\,{}^3F_2$— $6d'\ 5^{\circ}_1$
4017.235	2c	24885.71	$6p\,{}^5P_3$— $6d\,{}^3D^{\circ}_3$	4235.511	30Z	23603.26	$6p\,{}^3P_1$— $6d\,{}^3D^{\circ}_2$
4019.310	1	24872.86		4240.441	15c	23575.82	$5d\,{}^3D^{\circ}_1$— $6p'\,{}^3P_2$
4036.092	50c	24769.44	$5d\,{}^3D^{\circ}_2$— $6p'\,{}^3D_3$	4242.545	1	23564.12	$5d\,{}^5D^{\circ}_1$— $6p'\,{}^3F_2$
4043.893	20c	24721.66	$6s''\,{}^3P^{\circ}_1$— $6p''\,{}^1P_1$	4248.287	1	23532.27	
4060.184	2	24622.47	$5d\,{}^5D^{\circ}_0$— $6p'\,{}^3D_1$	4249.711	1w	23524.39	
4077.366	1	24518.72		4254.193	1	23499.61	$6p''\,{}^3D_1$— 29°_1
4078.556	1	24511.56		4254.282	1	23499.11	
4079.877	1	24503.62	$6p'\,{}^1P_1$— $6d'\ 10^{\circ}_2$	4256.129	2	23488.92	
4081.378	5	24494.61	$6p'\,{}^3D_1$— $7d\,{}^5D^{\circ}_0$	4257.606	1w	23480.77	

TABLE 10.1. *Observed lines of* I II—Continued

λ(air)	Intensity	Wave number	Classification
4260. 128	3*c*	23466. 87	$6p'\ {}^3P_1\text{—}6d'\ 13^\circ_{1,2}$
4265. 801	2	23435. 66	
4266. 925	1	23429. 49	$4f\ {}^3F_3\text{—}\ 37^\circ_2$
4271. 310	6	23405. 43	$6p'\ {}^3D_2\text{—}7d\ {}^3D^\circ_3$
4276. 015	1	23379. 68	$4f\ {}^3F_4\text{—}9g\ {}^3G^\circ_5$
4279. 188	4*c*	23362. 35	$6s''\ {}^3P^\circ_0\text{—}6p''\ {}^3S_1$
4281. 834	5*c*	23347. 91	$6p'\ {}^1F_3\text{—}6d'\ 9^\circ_3$
4282. 912	4	23342. 03	
4287. 924	2	23314. 75	$5d\ {}^3D^\circ_2\text{—}6p'\ {}^1P_1$
4288. 215	6	23313. 17	$5d'\ {}^3F^\circ_2\text{—}6p''\ {}^1P_1$
4291. 923	30	23293. 03	$6p'\ {}^3D_1\text{—}6d'\ 1^\circ_2$
4296. 286	10	23269. 37	$6p'\ {}^3P_2\text{—}6d'\ 12^\circ_1$
4315. 481	10	23165. 87	$6p'\ {}^3F_3\text{—}7d\ {}^3D^\circ_3$
4316. 897	5*c*	23158. 28	$5d'\ {}^3P^\circ_2\text{—}4f'\ {}^3P_2$
4319. 623	1*w*	23143. 66	$6p'\ {}^3F_2\text{—}7d\ {}^5D^\circ_3$
4322. 756	50	23126. 89	$5p^5\ {}^1P^\circ_1\text{—}6p'\ {}^1D_2$
4333. 159	2*c*	23071. 36	$6p'\ {}^3F_2\text{—}7d\ {}^5D^\circ_2$
4334. 246	2	23065. 58	
4337. 427	2	23048. 66	$6p'\ {}^3D_3\text{—}6d'\ 10^\circ_2$
4338. 224	1*c*	23044. 43	$5d''\ {}^3D^\circ_3\text{—}8p\ {}^3P_2$
4342. 078	20*Z*	23023. 98	$6p\ {}^5P_1\text{—}6d\ {}^5D^\circ_1$
4355. 036	1	22955. 47	
4362. 456	10	22916. 43	$6p\ {}^5P_2\text{—}6d\ {}^5D^\circ_1$
4364. 224	5	22907. 14	$5d'\ {}^1D^\circ_2\text{—}6p''\ {}^1D_2$
4368. 247	2	22886. 05	
4369. 834	2	22877. 74	$5d'\ {}^3P^\circ_2\text{—}7p'\ {}^3D_3$
4371. 722	1*c*	22867. 86	
4373. 686	3	22857. 59	$6p''\ {}^3P_0\text{—}\ 33.5^\circ_1$
4374. 760	3	22851. 98	$6d\ {}^5D^\circ_3\text{—}7f\ {}^5F_3$
4376. 139	100*Z*	22844. 78	
4376. 745	8	22841. 61	$6d\ {}^5D^\circ_3\text{—}7f\ {}^5F_4$
4379. 048	2	22829. 60	
4382. 489	5	22811. 68	$6d\ {}^5D^\circ_2\text{—}7f\ {}^5F_3$
4383. 998	15	22803. 82	$6d\ {}^5D^\circ_4\text{—}7f\ {}^5F_5$
4385. 904	2	22793. 91	$6d\ {}^5D^\circ_4\text{—}7f\ {}^5F_4$
4388. 458	10	22780. 65	$6p'\ {}^3D_2\text{—}7d\ {}^3D^\circ_2$
4390. 278	20*c*	22771. 20	$6p''\ {}^3D_1\text{—}\ 21^\circ_1$
4394. 555	6*c*	22749. 04	$6p'\ {}^1P_1\text{—}6d'\ 7^\circ_{1,2}$
4398. 585	10	22728. 20	$6p'\ {}^3D_1\text{—}5d''\ {}^3P^\circ_1$
4399. 037	60*c*	22725. 86	$6p'\ {}^3F_2\text{—}6d'\ 3^\circ_3$
4399. 592	1	22722. 99	$4f\ {}^5F_4\text{—}8g\ {}^3G^\circ_5$
4400. 741	4*c*	22717. 06	$4f\ {}^5F_4\text{—}8g\ {}^5G^\circ_5$
4403. 566	60*c*, *Z*	22702. 49	$5d\ {}^3D^\circ_3\text{—}6p'\ {}^3P_2$
4404. 580	7*d*	22697. 26	$5d'\ {}^1F^\circ_3\text{—}4f'\ {}^3G_4$
4405. 577	1	22692. 12	$4f\ {}^5F_3\text{—}8g\ {}^3G^\circ_4$
4406. 097	3	22689. 45	$4f\ {}^5F_3\text{—}8g\ {}^5G^\circ_4$
4408. 954	60*Z*	22674. 74	$6p\ {}^3P_2\text{—}6d\ {}^3D^\circ_3$
4411. 198	5	22663. 21	$4f\ {}^5F_5\text{—}8g\ {}^5G^\circ_6$
4412. 333	50*Z*	22657. 38	$6p'\ {}^3F_2\text{—}6d'\ 2^\circ_3$
4416. 569	10	22635. 65	$5d'\ {}^3D^\circ_1\text{—}7p\ {}^3P_0$
4416. 890	10	22634. 00	$6p\ {}^3P_2\text{—}6d\ {}^3D^\circ_2$
4417. 567	10*c*	22630. 54	{ $6p'\ {}^1P_1\text{—}6d'\ 6^\circ_{1,2}$ $6p''\ {}^3P_1\text{—}\ 32^\circ_1$
4419. 496	2	22620. 66	$4f\ {}^5F_2\text{—}8g\ {}^5G^\circ_3$
4421. 965	30*c*	22608. 03	$6p'\ {}^3P_2\text{—}6d'\ 10^\circ_2$
4423. 725	100*c*, *Z*	22599. 03	$6p\ {}^5P_1\text{—}6d\ {}^5D^\circ_2$
4428. 195	50*d*, *Z*	22576. 22	$6p'\ {}^1F_3\text{—}6d'\ 8^\circ_4$
4430. 130	2	22566. 36	$4f\ {}^5F_1\text{—}8g\ {}^5G^\circ_2$
4435. 104	5	22541. 05	{ $6p'\ {}^3F_3\text{—}7d\ {}^3D^\circ_2$ $5d''\ {}^3D^\circ_3\text{—}8p\ {}^5P_3?$
4436. 937	3	22531. 74	$5d'\ {}^3P^\circ_2\text{—}4f'\ {}^3D_2$
4442. 562	200*Z*	22503. 21	$5d\ {}^3D^\circ_1\text{—}6p'\ {}^3P_0$
4444. 873	150*Z*	22491. 51	$6p\ {}^5P_2\text{—}6d\ {}^5D^\circ_2$
4445. 872	3*c*	22486. 46	$5d'\ {}^3P^\circ_1\text{—}4f'\ {}^1P_1$
4446. 742	40*Z*	22482. 06	$6p\ {}^5P_1\text{—}6d\ {}^5D^\circ_0$
4451. 149	25*c*	22459. 80	$6s''\ {}^3P^\circ_1\text{—}6p''\ {}^3S_1$
4452. 858	300*Z*	22451. 18	$6p\ {}^5P_2\text{—}6d\ {}^5D^\circ_3$
4456. 250	10*c*	22434. 10	$5d''\ {}^3D^\circ_3\text{—}4f'\ {}^3G_4$
4456. 625	100*c*, *Z*	22432. 20	$6s'\ {}^3D^\circ_3\text{—}6p'\ {}^1D_2$
4457. 643	5	22427. 08	
4458. 474	20*c*	22422. 90	$6p'\ {}^1F_3\text{—}5g\ {}^5G^\circ_4$
4460. 185	30*Z*	22414. 30	$5p^4\ {}^3P_1\text{—}5p^4\ {}^1S_0$
4461. 928	2	22405. 54	$7p\ {}^5P_1\text{—}\ 31^\circ_0$
4462. 708	100	22401. 63	$6s''\ {}^1P^\circ_1\text{—}6p''\ {}^1S_0$
4464. 338	150*c*, *Z*	22393. 45	$6s'\ {}^3D^\circ_2\text{—}6p'\ {}^3P_1$
4468. 167	3*c*	22374. 26	$6p'\ {}^1P_1\text{—}7d\ {}^3D^\circ_1$
4473. 412	100*c*, *Z*	22348. 03	$5d\ {}^3D^\circ_3\text{—}6p'\ {}^3F_4$
4476. 037	10*Z*	22334. 92	$6p\ {}^3P_0\text{—}6d\ {}^3D^\circ_1$
4479. 656	30	22316. 88	$6p''\ {}^3D_1\text{—}\ 20^\circ_{1,2}$
4483. 730	1	22296. 60	$7p\ {}^3P_2\text{—}11d\ {}^3D^\circ_3$
4484. 829	2*w*	22291. 14	$5d'\ {}^1F^\circ_3\text{—}5f\ {}^3F_4$
4487. 234	7	22279. 19	$6p'\ {}^3P_1\text{—}6d'\ 11^\circ_0$
4488. 552	40*Z*	22272. 65	$5d\ {}^5D^\circ_1\text{—}6p'\ {}^3D_1$
4490. 652	4	22262. 23	$6p'\ {}^3D_2\text{—}7d\ {}^5D^\circ_3$
4490. 912	3	22260. 94	$5d'_3\ {}^3F^\circ_2\text{—}6p''\ {}^3P_2$
4492. 352	3	22253. 81	$5d'\ {}^3P^\circ_1\text{—}7p'\ {}^3P_0$
4492. 649	1*w*	22252. 34	$6p'\ {}^3F_2\text{—}7s'\ {}^3D^\circ_3$
4495. 698	15*c*	22237. 24	$6p'\ {}^3D_3\text{—}6d'\ 9^\circ_3$
4496. 815	1	22231. 72	$6p'\ {}^3P_1\text{—}6d'\ 10^\circ_2$
4497. 535	7	22228. 16	$5d''\ {}^3P^\circ_2\text{—}7p'\ {}^1F_3$
4497. 708	10	22227. 31	
4498. 586	1	22222. 97	$7p\ {}^5P_2\text{—}10d\ {}^3D^\circ_3$
4499. 604	20*c*	22217. 94	$5d'\ {}^3P^\circ_2\text{—}8p\ {}^3P_2$
4504. 375	1	22194. 41	$6p''\ {}^3P_1\text{—}\ 31^\circ_0$
4505. 072	6	22190. 97	$7p\ {}^5P_1\text{—}10d\ {}^3D^\circ_2$
4505. 265	5	22190. 02	$6p'\ {}^3D_2\text{—}7d\ {}^5D^\circ_2$
4506. 772	1	22182. 60	$4f\ {}^3F_3\text{—}8g\ {}^3G^\circ_3$
4507. 129	2	22180. 85	$5d'\ {}^3P^\circ_1\text{—}7p'\ {}^1P_1$
4507. 866	10	22177. 22	{ $5d'\ {}^3P^\circ_2\text{—}7p'\ {}^3P_1$ $4f\ {}^3F_3\text{—}8g\ {}^3G^\circ_4$
4508. 441	1	22174. 39	$4f\ {}^3F_3\text{—}8g\ {}^5G^\circ_4$
4513. 170	8*c*	22151. 16	{ $6p'\ {}^3F_4\text{—}6d'\ 9^\circ_3$ $7s\ {}^3S^\circ_1\text{—}7p'\ {}^3D_2$
4513. 508	8*c*	22149. 50	
4514. 064	20*c*	22146. 77	$5d'\ {}^3G^\circ_3\text{—}6p''\ {}^3P_2$
4519. 910	1	22118. 13	$7p\ {}^3P_1\text{—}12s\ {}^3S^\circ_1?$
4520. 528	4	22115. 10	$5d'\ {}^3P^\circ_1\text{—}7p'\ {}^1D_2$
4526. 672	2	22085. 09	$6p''\ {}^3D_2\text{—}10d\ {}^3D^\circ_3$
4527. 024	10	22083. 37	$6p'\ {}^3F_3\text{—}7d\ {}^5D^\circ_4$
4529. 898	1	22069. 36	$7p\ {}^5P_1\text{—}\ 29^\circ_1$
4532. 296	1	22057. 68	$7p\ {}^5P_2\text{—}10d\ {}^3D^\circ_2$
4535. 046	5	22044. 31	$5d'\ {}^3P^\circ_2\text{—}4f'\ {}^3F_2$
4537. 599	5	22031. 90	$5d''\ {}^3F^\circ_2\text{—}7f\ {}^3F_3$
4538. 411	3*w*	22027. 96	$5d''\ {}^3D^\circ_3\text{—}5f\ {}^3F_4$
4540. 644	40*Z*	22017. 13	$6s'\ {}^3D^\circ_2\text{—}6p'\ {}^3P_2$
4541. 306	8	22013. 92	$6p''\ {}^3P_0\text{—}\ 29^\circ_1$
4543. 833	25	22001. 68	$6p'\ {}^3F_2\text{—}6d'\ 1^\circ_2$
4544. 272	50	21999. 55	$5d'\ {}^3D^\circ_2\text{—}6p'\ {}^1D_2$
4544. 339	20	21999. 23	
4548. 342	7	21979. 87	$6p''\ {}^3P_1\text{—}10d\ {}^3D^\circ_2$
4549. 071	4	21976. 35	
4549. 437	1	21974. 58	$5d''\ {}^1D^\circ_2\text{—}5f\ {}^3F_3$
4556. 012	1*w*	21942. 87	
4558. 758	4	21929. 65	$4f\ {}^3F_4\text{—}8g\ {}^3G^\circ_5$

TABLE 10.1. *Observed lines of* I II—Continued

λ(air)	Intensity	Wave number	Classification
4559. 545	8w	21925. 86	$5d'\ {}^3P^\circ_2$— $8p\ {}^3P_1$
4559. 999	1	21923. 68	$4f\ {}^3F_4$— $8g\ {}^5G^\circ_5$
4560. 612	15Z	21920. 73	$5d\ {}^3D^\circ_2$— $6p'\ {}^3F_3$
4560. 880	10	21919. 45	$5d'\ {}^3F^\circ_2$— $6p''\ {}^3D_3$
4568. 068	3	21884. 95	$4f\ {}^3F_2$— $8g\ {}^3G^\circ_3$
4571. 517	12	21868. 44	$6p\ {}^5P_2$— $5d''\ {}^3F^\circ_3$
4573. 543	2	21858. 76	$6d\ {}^3D^\circ_3$— $8f\ {}^3F_4$
4573. 718	5	21857. 92	$5d'\ {}^3D^\circ_1$— $7p\ {}^3P_2$
4574. 090	20Z	21856. 14	$6p\ {}^5P_1$— $5d''\ {}^3D^\circ_1$
4576. 550	40Z	21844. 39	$6p'\ {}^3D_2$— $6d'\ 3^\circ_3$
4578. 017	1	21837. 39	$5d'\ {}^3P^\circ_1$— $7p'\ {}^3F_2$
4578. 710	7	21834. 09	$7p\ {}^5P_1$— $25^\circ_{1,2}$
4584. 457	1	21806. 72	$6d\ {}^3D^\circ_2$— $8f\ {}^3F_3$
4584. 752	2	21805. 32	$5d'\ {}^3G^\circ_3$— $6p''\ {}^3D_3$
4586. 582	20	21796. 62	$6p'\ {}^3P_2$— $6d'\ 9^\circ_3$
4589. 495	1	21782. 78	$4f\ {}^3F_2$—$10d\ {}^3D^\circ_3$
4590. 764	25	21776. 76	
4590. 930	20Z	21775. 97	$6p'\ {}^3D_2$— $6d'\ 2^\circ_3$
4593. 066	7	21765. 85	$6d\ {}^3D^\circ_3$— $8f\ {}^3F_3$
4596. 720	6	21748. 54	$6p\ {}^5P_2$— $5d''\ {}^3D^\circ_1$
4599. 769	200Z	21734. 13	
4600. 365	1w	21731. 31	
4604. 309	1c	21712. 70	
4605. 924	1	21705. 09	
4609. 191	1	21689. 71	
4611. 224	40c, Z	21680. 14	$5d\ {}^3D^\circ_1$— $6p'\ {}^1P_1$
4612. 265	1	21675. 25	$7p\ {}^3P_2$— $35^\circ_{2,3}$
4614. 102	1	21666. 62	
4621. 854	100Z	21630. 28	
4622. 172	7	21628. 79	
4622. 347	20	21627. 97	$6p''\ {}^3D_2$— 26°_3
4623. 417	8	21622. 96	$6p''\ {}^3P_1$— $25^\circ_{1,2}$
4624. 603	1	21617. 42	$4f\ {}^3F_2$—$10d\ {}^3D^\circ_2$
4625. 288	5	21614. 22	$5d'\ {}^3P^\circ_2$— $4f'\ {}^3F_3$
4627. 292	5	21604. 86	$6p'\ {}^3F_3$— $6d'\ 3^\circ_3$
4632. 446	300c, Z	21580. 82	$6s\ {}^5S^\circ_2$— $6p\ {}^3P_2$
4633. 365	50	21576. 54	$6s'\ {}^3D^\circ_2$— $6p'\ {}^3D_3$
4638. 810	8	21551. 21	$6p'\ {}^3P_0$— $7d\ {}^3D^\circ_1$
4640. 831	150	21541. 83	
4641. 142	7	21540. 38	
4641. 984	30	21536. 48	$6p'\ {}^3F_3$— $6d'\ 2^\circ_3$
4643. 843	1	21527. 86	
4647. 472	1	21511. 05	$5d'\ {}^1P^\circ_1$— $8p\ {}^3P_1$
4649. 114	1	21503. 45	
4651. 324	1	21493. 23	$7p\ {}^5P_2$—$11s\ {}^5S^\circ_2$
4654. 492	3	21478. 60	
4657. 302	30	21465. 65	$6p'\ {}^3D_3$— $6d'\ 8^\circ_4$
4663. 560	1c	21436. 84	$6p'\ {}^3F_2$— $5d''\ {}^3P^\circ_1$
4665. 537	10c	21427. 76	$6p'\ {}^1F_3$— $7d\ {}^3D^\circ_3$
4666. 484	500d?	21423. 41	$6p\ {}^5P_3$— $6d\ {}^5D^\circ_4$
4668. 116	20	21415. 92	$6p\ {}^5P_3$— $6d\ {}^5D^\circ_2$
4672. 280	2	21396. 83	$7p\ {}^5P_2$— $24^\circ_{1,2}$
4675. 530	1000Z	21381. 96	$6s'\ {}^1D^\circ_2$— $6p'\ {}^1D_2$
4676. 080	20	21379. 45	$6p'\ {}^3F_4$— $6d'\ 8^\circ_4$
4676. 902	75	21375. 69	$6p\ {}^5P_3$— $6d\ {}^5D^\circ_3$
4677. 909	20c	21371. 09	$6p'\ {}^3D_2$— $7s'\ {}^3D^\circ_3$
4684. 507	1w	21340. 99	$7p\ {}^5P_1$— 21°_1
4684. 928	2w	21339. 07	$5d''\ {}^1F^\circ_3$— $7f\ {}^3F_4$
4685. 349	1w	21337. 15	
4687. 468	5c	21327. 51	$6p'\ {}^3D_3$— $5g\ {}^3G^\circ_4$
4687. 890	20	21325. 59	$4f\ {}^3F_2$— 26°_3
4702. 468	25	21259. 48	$6s'\ {}^3D^\circ_1$— $6p'\ {}^3P_1$
4702. 594	7	21258. 91	$6p''\ {}^3D_2$— $24^\circ_{1,2}$
4706. 453	1w	21241. 48	$6p'\ {}^3F_4$— $5g\ {}^3G^\circ_4$
4707. 842	40	21235. 21	$5d'\ {}^1D^\circ_2$— $6p''\ {}^3P_2$
4709. 844	20c	21226. 18	$6p'\ {}^3F_4$— $5g\ {}^5G^\circ_4$
4711. 430	25c	21219. 04	$6p'\ {}^3F_4$— $5g\ {}^5G^\circ_5$
4712. 498	1	21214. 23	
4713. 988	1w	21207. 52	$7p\ {}^5P_2$— 21°_1
4722. 102	12c	21171. 08	$5d''\ {}^3D^\circ_2$— $4f'\ {}^1D_2$
4726. 535	20c	21151. 23	$5d\ {}^3D^\circ_3$— $6p'\ {}^1F_3$
4730. 366	25	21134. 10	$6p\ {}^3P_1$— $5d''\ {}^3F^\circ_2$
4730. 958	20c	21131. 45	$6p'\ {}^3F_3$— $7s'\ {}^3D^\circ_3$
4731. 316	8	21129. 85	$6p''\ {}^3P_1$— 21°_1
4733. 414	6	21120. 49	$6p'\ {}^3D_2$— $6d'\ 1^\circ_2$
4737. 544	2	21102. 08	
4737. 691	2	21101. 42	
4737. 828	4	21100. 81	
4739. 388	1	21093. 87	$7p\ {}^5P_3$—$11s\ {}^5S^\circ_2$
4742. 810	50c	21078. 65	$6s''\ {}^3P^\circ_1$— $7p\ {}^3P_0$
4744. 797	3	21069. 82	$6p''\ {}^3D_2$— 21°_1
4748. 978	20	21051. 27	$5d'\ {}^3F^\circ_2$— $6p''\ {}^3S_1$
4750. 846	1c	21042. 99	$6p'\ {}^1D_2$— $9s\ {}^3S^\circ_1$
4751. 798	4	21038. 78	
4752. 676	60	21034. 89	$6s''\ {}^3P^\circ_0$— $7p\ {}^3P_1$
4753. 825	1	21029. 81	
4763. 820	60	20985. 68	$6s''\ {}^3P^\circ_2$— $6p''\ {}^1D_2$
4765. 519	30	20978. 20	$5d'\ {}^3D^\circ_1$— $4f\ {}^3F_2$
4768. 193	15	20966. 44	$6p\ {}^3P_2$— $5d''\ {}^1F^\circ_3$
4770. 456	5	20956. 49	$4f\ {}^3F_2$— $24^\circ_{1,2}$
4770. 857	1	20954. 73	
4772. 841	1	20946. 02	
4775. 674	10	20933. 60	
4782. 000	6	20905. 90	$7p\ {}^3P_1$—$10d\ {}^3D^\circ_2$
4782. 658	5	20903. 03	$7p\ {}^3P_2$—$10d\ {}^3D^\circ_3$
4784. 798	50	20893. 68	$5d'\ {}^1D^\circ_2$— $6p''\ {}^3D_3$
4786. 389	2c	20886. 73	$7p\ {}^5P_1$— $20^\circ_{1,2}$
4787. 228	50c	20883. 07	$6s'\ {}^3D^\circ_1$— $6p'\ {}^3P_2$
4787. 776	3	20880. 68	$6p'\ {}^3F_3$— $6d'\ 1^\circ_2$
4790. 690	30	20867. 98	$5d''\ {}^3D^\circ_2$— $7p'\ {}^1D_2$
4792. 522	1w	20860. 01	$5d'\ {}^3P^\circ_2$— $5f\ {}^3F_3$
4796. 576	25	20842. 38	$5d''\ {}^3D^\circ_2$— $7p'\ {}^1F_3$
4805. 662	4c	20802. 97	$6p'\ {}^1F_3$— $7d\ {}^3D^\circ_2$
4806. 402	75Z	20799. 77	$5d\ {}^3D^\circ_2$— $6p'\ {}^3F_2$
4807. 320	3	20795. 79	
4807. 998	20	20792. 86	$6p\ {}^5P_3$— $5d''\ {}^3F^\circ_3$
4812. 106	1w	20775. 11	
4813. 902	2	20767. 36	$4f\ {}^3F_2$— 21°_1
4825. 452	1	20717. 65	
4828. 252	70c, Z	20705. 64	$5p^5\ {}^3P^\circ_2$— $6p\ {}^3P_2$
4831. 600	1	20691. 29	
4832. 238	5c	20688. 56	$6p'\ {}^1P_1$— $7d\ {}^5D^\circ_0$
4833. 747	3	20682. 10	$7p\ {}^3P_0$— $33.\ 5^\circ_1$
4835. 178	40	20675. 98	$5d'\ {}^3D^\circ_1$— $6p''\ {}^3D_2$
4849. 308	4w	20615. 74	$5d'\ {}^3D^\circ_1$— $6p''\ {}^3P_1$
4850. 303 [a]	60c	20611. 51	$6s\ {}^5S^\circ_2$— $6p\ {}^3P_1$
4851. 017	20	20608. 47	$6p'\ {}^3D_1$— $7s'\ {}^3D^\circ_1$
4851. 292	3	20607. 31	$4f\ {}^5F_4$— $7g\ {}^3G^\circ_5$
4853. 174	15d	20599. 32	{ $6p\ {}^3P_1$— $6d\ {}^5D^\circ_1$ { $4f\ {}^5F_4$— $7g\ {}^5G^\circ_4$
4853. 254	15	20598. 98	$4f\ {}^5F_4$— $7g\ {}^5G^\circ_5$

λ(air)	Intensity	Wave number	Classification
4859. 150	1	20573. 98	$4f\ {}^5F_3$— $7g\ {}^5G^\circ_3$
4859. 341	1	20573. 18	$4f\ {}^5F_3$— $7g\ {}^3G^\circ_4$
4859. 786	15	20571. 29	$4f\ {}^5F_3$— $7g\ {}^5G^\circ_4$
4864. 513	60	20551. 30	$6p'\ {}^1D_2$— $6d'\ 14^\circ_3$ $6p''\ {}^3P_2$— $44^\circ_{2,3}$
4865. 029	2	20549. 12	$7p\ {}^3P_1$— $25^\circ_{1,2}$
4865. 500	20	20547. 13	$4f\ {}^5F_5$— $7g\ {}^5G^\circ_6$
4867. 649	20	20538. 06	$5d'\ {}^3D^\circ_1$— $7p\ {}^5P_2$
4874. 200	2	20510. 45	$4f\ {}^5F_2$— $7g\ {}^3G^\circ_3$
4874. 473	2*d*	20509. 31	$4f\ {}^5F_2$— $7g\ {}^5G^\circ_2$
4876. 051	10*c*	20502. 67	$4f\ {}^5F_2$— $7g\ {}^5G^\circ_3$
4881. 185	4*h*	20481. 10	
4882. 127	40*c*	20477. 15	$5d'\ {}^3S^\circ_1$— $6p''\ {}^3P_2$ $6p'\ {}^3P_1$— $6d'\ 7^\circ_{1,2}$
4884. 083	40*c*	20468. 95	$6p'\ {}^1D_2$— $6d'\ 13^\circ_{1,2}$
4884. 828	80*c*, *Z*	20465. 83	$6s'\ {}^3D^\circ_2$— $6p'\ {}^1F_3$
4886. 182	5	20460. 16	$5d'\ {}^3D^\circ_1$— $6p''\ {}^3P_0$
4888. 423	4	20450. 78	$4f\ {}^5F_1$— $7g\ {}^5G^\circ_2$
4891. 224	2	20439. 07	$7s\ {}^3S^\circ_1$— $7p'\ {}^3P_0$
4895. 037	10*c*	20423. 15	$6p'\ {}^1P_1$— $6d'\ 4^\circ_0$
4899. 465	3	20404. 69	$5d'\ {}^3D^\circ_1$— $7p\ {}^5P_1$
4908. 755	25*c*	20366. 07	$7s\ {}^3S^\circ_1$— $7p'\ {}^1P_1$ $6s''\ {}^3P^\circ_2$— $6p''\ {}^1P_1$
4910. 579	10	20358. 51	$6p'\ {}^3P_1$— $6d'\ 6^\circ_{1,2}$
4911. 454	1	20354. 88	
4920. 587	6*c*	20317. 10	$6p'\ {}^3D_3$— $7d\ {}^3D^\circ_3$
4924. 546	40*c*	20300. 77	$6s''\ {}^3P^\circ_1$— $7p\ {}^3P_2$
4930. 049	6	20278. 11	$6p'\ {}^3P_0$— $6d'\ 5^\circ_1$
4941. 533	3*c*	20230. 98	$6p'\ {}^3F_4$— $7d\ {}^3D^\circ_3$
4943. 163	30*c*	20224. 31	$6p'\ {}^1P_1$— $7s'\ {}^1D^\circ_2$
4957. 756	10	20164. 78	$6p\ {}^3P_2$— $5d''\ {}^3F^\circ_2$
4959. 992	1	20155. 69	
4965. 687	50*c*	20132. 58	$6s''\ {}^3P^\circ_1$— $7p\ {}^3P_1$
4968. 431	80	20121. 46	$6s'\ {}^3D^\circ_2$— $6p'\ {}^1P_1$
4980. 773	1*c*	20071. 60	$6p''\ {}^3D_2$— $7g\ {}^3G^\circ_3$
4981. 960	1	20066. 82	$4f\ {}^3F_3$— $7g\ {}^3G^\circ_3$
4982. 796	3	20063. 45	
4984. 083	15*c*	20058. 27	$4f\ {}^3F_3$— $7g\ {}^3G^\circ_4$
4984. 265	5*c*	20057. 54	$6p\ {}^3P_1$— $6d\ {}^5D^\circ_0$
4984. 562	3*c*	20056. 34	$4f\ {}^3F_3$— $7g\ {}^5G^\circ_4$
4985. 351	2	20053. 17	
4986. 922	1000*Z*	20046. 85	$5d\ {}^3D^\circ_1$— $6p'\ {}^3D_2$
4990. 949	4	20030. 68	$7s'\ {}^3D^\circ_2$— $13_{2,3}$
4992. 223	50	20025. 57	$5d'\ {}^1D^\circ_2$— $6p''\ {}^3S_1$
4994. 976	6*c*	20014. 53	
5000. 12	5	19993. 94	$6p\ {}^5P_2$— $5d''\ {}^3D^\circ_2$
5002. 02	5*c*	19986. 35	
5008. 36	100	19961. 05	$6s''\ {}^3P^\circ_0$— $6p''\ {}^3P_1$
5028. 82	30*c*	19879. 84	$6p'\ {}^1F_3$— $7s'\ {}^1D^\circ_2$
5029. 39	4	19877. 58	$5d''\ {}^3F^\circ_3$— $6f\ {}^5F_4$
5029. 67	15*c*	19876. 48	$6p'\ {}^3P_2$— $7d\ {}^3D^\circ_3$
5032. 15	6*c*	19866. 68	$6p'\ {}^1F_3$— $6d'\ 3^\circ_3$
5040. 23	15*w*	19834. 83	$6p''\ {}^3D_3$— 39°_4
5045. 55	25	19813. 92	$4f\ {}^3F_4$— $7g\ {}^3G^\circ_5$
5046. 43	150*Z*	19810. 47	$6s'\ {}^3D^\circ_1$— $6p'\ {}^3P_0$
5048. 16	10*c*	19803. 68	
5049. 52	5*c*	19798. 34	$6p'\ {}^1F_3$— $6d'\ 2^\circ_3$
5052. 70	6	19785. 88	$5d'\ {}^1S^\circ_0$— $6p''\ {}^1P_1$
5057. 00	3	19769. 06	$4f\ {}^3F_2$— $7g\ {}^3G^\circ_3$
5061. 91	150	19749. 88	$6s''\ {}^3P^\circ_0$— $7p\ {}^5P_1$
5063. 37	15	19744. 19	$6p''\ {}^3S_1$— 36°_2
5065. 37	400*c*, *Z*	19736. 39	$5p^5\ {}^3P^\circ_2$— $6p\ {}^3P_1$
5068. 08	20*c*	19725. 84	$6p''\ {}^3D_1$— $7s''\ {}^3P^\circ_1$
5069. 93	2	19718. 64	
5092. 60	30	19630. 86	$6d\ {}^3D^\circ_3$— $7f\ {}^3F_4$
5100. 16	8	19601. 77	$5p^5\ {}^3P^\circ_0$— $6p'\ {}^3D_1$
5110. 36	8	19562. 64	$6d\ {}^3D^\circ_2$— $7f\ {}^3F_3$
5111. 79	6	19557. 17	$6d\ {}^3D^\circ_1$— $7f\ {}^3F_2$
5114. 56	20*c*	19546. 58	$6p''\ {}^3D_1$— $7s''\ {}^3P^\circ_0$
5115. 89	2	19541. 50	$6p''\ {}^1P_1$— 46°_2
5124. 57	40	19508. 40	$5d\ {}^3D^\circ_2$— $6p'\ {}^3D_1$
5125. 87	5	19503. 45	$7p\ {}^5P_2$— $9d\ {}^5D^\circ_3$
5126. 58	2	19500. 75	
5130. 20	10*c*	19486. 99	$6p'\ {}^1P_1$— $6d'\ 1^\circ_2$
5131. 24	50	19483. 04	$6s''\ {}^1P^\circ_1$— $6p''\ {}^1D_2$
5135. 79	100*d*	19465. 78	$5d'\ {}^1P^\circ_1$— $6p''\ {}^1S_0$
5143. 01	10	19438. 45	
5147. 55	100*c*	19421. 31	$6s''\ {}^3P^\circ_1$— $4f\ {}^3F_2$
5149. 73	200	19413. 09	$5d\ {}^3D^\circ_3$— $6p'\ {}^3F_3$
5154. 97	50	19393. 35	$6p'\ {}^1F_3$— $7s'\ {}^3D^\circ_3$
5156. 41	100*Z*	19387. 94	$6p\ {}^5P_1$— $7s\ {}^5S^\circ_2$
5161. 20	3000*c*, *Z*	19369. 94	$6s\ {}^5S^\circ_2$— $6p\ {}^5P_3$
5174. 70	50	19319. 41	$6p'\ {}^3F_2$— $7s'\ {}^3D^\circ_2$
5175. 32	40*d*	19317. 10	$6p'\ {}^3F_2$— $7s'\ {}^3D^\circ_1$
5176. 19	300	19313. 85	$6s''\ {}^3P^\circ_2$— $6p''\ {}^3P_2$
5179. 22	12	19302. 55	$6d\ {}^5D^\circ_3$— $6f\ {}^5F_3$
5181. 29	30	19294. 84	$6d\ {}^5D^\circ_3$— $6f\ {}^5F_4$
5183. 21	10	19287. 69	
5185. 17	200	19280. 40	$6p\ {}^5P_2$— $7s\ {}^5S^\circ_2$
5188. 62	20	19267. 58	$5d'\ {}^3S^\circ_1$— $6p''\ {}^3S_1$
5189. 90	50	19262. 83	$6d\ {}^5D^\circ_4$— $6f\ {}^5F_5$
5190. 06	20	19262. 24	$6d\ {}^5D^\circ_2$— $6f\ {}^5F_3$
5192. 89	4*c*	19251. 74	$6p'\ {}^3P_2$— $7d\ {}^3D^\circ_2$
5194. 15	8	19247. 07	$6d\ {}^5D^\circ_4$— $6f\ {}^5F_4$
5198. 89	6	19229. 52	$6p''\ {}^3S_1$— 32°_1
5205. 48	20	19205. 18	$6p\ {}^3P_2$— $6d\ {}^5D^\circ_2$
5209. 26	2*c*	19191. 24	
5210. 06	2*c*	19188. 29	$5d''\ {}^3F^\circ_3$— $7p'\ {}^3F_3$
5214. 08	200*Z*	19173. 50	$5d\ {}^3D^\circ_3$— $6p'\ {}^3D_2$
5216. 27	600*Z*	19165. 45	$5d\ {}^3D^\circ_1$— $6p'\ {}^3F_2$
5221. 76	4*d*	19145. 30	
5222. 51	3*c*	19142. 55	$6p'\ {}^1F_3$— $6d'\ 1^\circ_2$
5223. 28	1*c*	19139. 73	$5d'\ {}^3F^\circ_3$— $6p'\ {}^1D_2$
5228. 97	500*d*	19118. 90	$6s''\ {}^3P^\circ_1$— $6p''\ {}^3D_2$
5230. 47	1*c*	19113. 42	$5d''\ {}^3D^\circ_1$— $7p'\ {}^1D_2$
5232. 00	5	19107. 83	$7p\ {}^5P_3$— $9d\ {}^5D^\circ_4$?
5232. 98	3	19104. 25	$7p\ {}^5P_3$— $9d\ {}^5D^\circ_3$
5241. 64	2	19072. 69	$7p\ {}^5P_1$—$10s\ {}^5S^\circ_2$
5242. 01	3	19071. 34	
5243. 50	1*c*	19065. 92	
5245. 71	3000*c*, *Z*	19057. 89	$6s'\ {}^3D^\circ_3$— $6p'\ {}^3P_2$
5256. 19	1*c*	19019. 89	
5259. 34	2	19008. 50	
5261. 27	15*c*	19001. 53	$5d'\ {}^3D^\circ_2$— $6p'\ {}^3P_1$
5263. 47	2	18993. 59	$5d''\ {}^3F^\circ_3$— $7p'\ {}^1D_2$
5265. 16	150*c*, *Z*	18987. 49	$6s'\ {}^3D^\circ_1$— $6p'\ {}^1P_1$
5266. 96	100*c*	18981. 00	$6s''\ {}^3P^\circ_1$— $7p\ {}^5P_2$
5269. 36	500	18972. 36	$6s''\ {}^3P^\circ_2$— $6p''\ {}^3D_3$
5270. 58	2	18967. 97	$5d''\ {}^3F^\circ_3$— $7p'\ {}^1F_3$
5272. 52	5	18960. 99	$5d''\ {}^3D^\circ_1$— $4f'\ {}^3D_1$

TABLE 10.1. *Observed lines of* I II—Continued

λ(air)	Intensity	Wave number	Classification
5278.57	4	18939.25	$7p\ ^5P_2$—$10s\ ^5S^\circ_2$
5286.09	8c	18912.31	$5d''\ ^3F^\circ_3$—$7p'\ ^3F_4$
5288.68	200c	18903.05	$6s''\ ^3P^\circ_1$—$6p''\ ^3P_0$
5291.68	8	18892.33	$5d'\ ^3F^\circ_2$—$7p\ ^3P_2$
5293.65	4	18885.30	
5294.11	10	18883.66	$6p''\ ^3P_2$—37°_2
5296.24	50	18876.07	$6p''\ ^3D_3$—36°_2
5296.45	20	18875.32	$6p'\ ^3P_1$—$7d\ ^3D^\circ_2$
5299.78	400	18863.46	$6s''\ ^1P^\circ_1$—$6p''\ ^1P_1$
5303.42	4	18850.51	$6d\ ^5D^\circ_1$—$6f\ ^5F_2$?
5304.25	60c	18847.56	$6s''\ ^3P^\circ_1$—$7p\ ^5P_1$
5305.87	5c	18841.81	
5306.56	2	18839.36	
5307.63	10c	18835.56	$5d''\ ^3D^\circ_1$—$7p'\ ^3F_2$
5309.44	20	18829.14	$6p'\ ^3P_1$—$6d'\ 5^\circ_1$
5322.80	400Z	18781.88	$5p^5\ ^3P^\circ_1$—$6p\ ^3P_0$
5323.83	80	18778.25	$5d'\ ^3G^\circ_3$—$7p\ ^3P_2$
5326.39	100c	18769.22	$6p'\ ^3D_3$—$7s'\ ^1D^\circ_2$
5327.54	15	18765.17	$5d''\ ^3P^\circ_2$—$8p\ ^3P_2$
5330.13	8c	18756.05	$6p'\ ^3D_3$—$6d'\ 3^\circ_3$
5337.13	15	18731.45	
5338.22	10000Z	18727.63	$6s'\ ^3D^\circ_2$—$6p'\ ^3F_3$
5345.15	5000c, Z	18703.35	$6s'\ ^3D^\circ_3$—$6p'\ ^3F_4$
5349.61	50c	18687.75	$6p'\ ^3D_3$—$6d'\ 2^\circ_3$
5351.85	75c	18679.93	$5p^5\ ^1P^\circ_1$—$6p'\ ^3P_0$ $6p''\ ^3S_1$—30°_2
5354.71	8c	18669.96	
5367.60	150c	18625.12	$5d'\ ^3D^\circ_2$—$6p'\ ^3P_2$
5369.10	15c	18619.92	$5d''\ ^3F^\circ_2$—$6f\ ^3F_3$
5369.86	1000c	18617.28	$6s'\ ^3D^\circ_3$—$6p'\ ^3D_3$
5372.49	30	18608.17	$6p\ ^5P_2$—$5d''\ ^3P^\circ_2$
5373.27	6c	18605.47	$6d\ ^5D^\circ_3$—$7p'\ ^3F_3$
5374.38	30c	18601.63	$6p'\ ^3F_4$—$6d'\ 2^\circ_3$
5376.04	4	18595.88	
5378.99	3	18585.68	$5d'\ ^3P^\circ_1$—$7p'\ ^3P_1$
5380.04	60	18582.06	$6p\ ^3P_2$—$5d''\ ^3F^\circ_3$
5386.23	20	18560.70	$7p\ ^3P_2$—$9d\ ^3D^\circ_3$
5387.56	4c	18556.12	$6p''\ ^3D_3$—34°_2
5392.27	12	18539.91	$7p\ ^5P_3$—$10s\ ^5S^\circ_2$
5393.39	10	18536.06	
5393.86	8	18534.45	$6p''\ ^3P_2$—36°_2
5399.53	3	18514.98	
5405.42	800c, Z	18494.81	$5p^5\ ^3P^\circ_2$—$6p\ ^5P_3$
5407.36	800c	18488.17	$6s'\ ^3D^\circ_2$—$6p'\ ^3D_2$
5414.96	15	18462.23	$6p\ ^3P_2$—$5d''\ ^3D^\circ_1$ $6p'\ ^3P_1$—$7d\ ^5D^\circ_1$
5422.05	100	18438.08	$6p'\ ^3D_2$—$7s'\ ^3D^\circ_2$
5422.74	100	18435.74	$6p'\ ^3D_2$—$7s'\ ^3D^\circ_1$
5425.06	4d	18427.85	$7p\ ^3P_2$—$9d\ ^3D^\circ_2$
5435.83	3000	18391.34	$5p^5\ ^3P^\circ_1$—$6p\ ^3P_2$
5438.00	1000Z	18384.00	$6s'\ ^1D^\circ_2$—$6p'\ ^3P_1$
5448.80	10	18347.57	$7s\ ^3S^\circ_1$—$4f'\ ^3P_0$
5454.43	8d	18328.63	$6p'\ ^3P_2$—$7s'\ ^1D^\circ_2$
5457.06	200c	18319.79	$6s''\ ^3P^\circ_0$—$6p''\ ^3D_1$ $5d''\ ^3D^\circ_2$—$4f'\ ^3P_2$
5458.36	15c	18315.43	$6p'\ ^3P_2$—$6d'\ 3^\circ_3$
5464.62	2000c	18294.45	$6s\ ^5S^\circ_2$—$6p\ ^5P_2$
5467.52	15	18284.75	$6p'\ ^3P_1$—$7d\ ^5D^\circ_2$
5468.12	50	18282.74	$6p'\ ^3D_3$—$7s'\ ^3D^\circ_3$
5478.80	2w	18247.10	$6p'\ ^3P_2$—$6d'\ 2^\circ_3$
5479.56	60	18244.57	$6p\ ^3P_1$—$7s\ ^3S^\circ_1$
5480.84	10c	18240.31	$6p''\ ^3P_0$—$7s''\ ^3P^\circ_1$
5491.50	800Z	18204.90	$6p\ ^5P_3$—$7s\ ^5S^\circ_2$
5492.31	5	18202.22	
5493.43	400	18198.51	$6p'\ ^3F_3$—$7s'\ ^3D^\circ_2$
5494.00	400c	18196.62	$6p'\ ^3F_4$—$7s'\ ^3D^\circ_3$
5496.94	1000c	18186.89	$6s\ ^5S^\circ_2$—$6p\ ^5P_1$
5497.65	300	18184.54	$5d'\ ^3D^\circ_2$—$6p'\ ^3D_3$
5504.72	1000Z	18161.18	$6s\ ^3S^\circ_1$—$6p\ ^3P_0$
5510.50	2	18142.13	
5517.23	2	18120.00	
5518.38	8	18116.23	$7p\ ^5P_1$—$7s''\ ^3P^\circ_0$
5522.06	600c	18104.16	$6s''\ ^3P^\circ_2$—$6p''\ ^3S_1$
5523.60	8	18099.11	$6p'\ ^3P_0$—$5d''\ ^3P^\circ_1$
5525.44	12	18093.08	$7s\ ^5S^\circ_2$—$8p\ ^3P_2$
5525.92	5c	18091.51	
5527.88	6	18085.09	
5528.09	6	18084.41	$6p''\ ^3P_1$—$7s''\ ^3P^\circ_1$
5528.19	2	18084.08	
5531.96	2	18071.76	$6p\ ^3P_0$—$5d''\ ^3D^\circ_1$
5538.08	6c	18051.79	$5d'\ ^1F^\circ_3$—$6p''\ ^1D_2$ $5d''\ ^3D^\circ_2$—$7p'\ ^3P_2$
5541.52	4	18040.58	
5541.96	8	18039.15	$5d''\ ^3D^\circ_2$—$7p'\ ^3D_3$
5544.17	10c	18031.96	$6p'\ ^3D_3$—$6d'\ 1^\circ_2$
5546.55	30w	18024.22	$6p''\ ^3D_2$—$7s''\ ^3P^\circ_1$
5550.08	50	18012.76	$5d'\ ^3F^\circ_2$—$4f\ ^3F_2$
5550.51	2	18011.36	$6d\ ^5D^\circ_1$—$7p'\ ^1P_1$
5551.65	400	18007.66	$6s'\ ^1D^\circ_2$—$6p'\ ^3P_2$
5568.80	20c	17952.21	$6p'\ ^3P_1$—$7s'\ ^1D^\circ_2$
5569.56	6	17949.76	$5d''\ ^1F^\circ_3$—$6f\ ^3F_4$
5570.60	2	17946.40	$7p\ ^3P_1$—$10s\ ^3S^\circ_1$
5575.78	3	17929.73	
5583.44	25	17905.13	$6p''\ ^3P_1$—$7s''\ ^3P^\circ_0$
5584.04	20	17903.21	
5585.48	4	17898.59	$5d'\ ^3G^\circ_3$—$4f\ ^3F_2$
5587.88	4	17890.91	$5d''\ ^1F^\circ_3$—$6f\ ^3F_2$
5589.29	80	17886.39	$5d'\ ^3S^\circ_1$—$7p\ ^3P_0$
5590.20	8	17883.48	$6p'\ ^3D_1$—$5d''\ ^1P^\circ_1$
5593.12	300Z	17874.15	$5d\ ^3D^\circ_1$—$6p'\ ^3D_1$
5595.47	4w	17866.64	$5d'\ ^1D^\circ_2$—$7p\ ^3P_2$
5598.52	600c	17856.91	$5p^5\ ^1P^\circ_1$—$6p'\ ^1P_1$
5600.32	1000	17851.17	$5d'\ ^3G^\circ_3$—$4f\ ^3F_4$
5601.94	4	17846.00	
5603.16	80	17842.12	$6p'\ ^3P_2$—$7s'\ ^3D^\circ_3$
5606.52	15	17831.43	$6p''\ ^1P_1$—37°_2
5608.41	4	17825.42	
5612.89	1500	17811.19	$6s''\ ^1P^\circ_1$—$6p''\ ^3P_2$ $6p''\ ^3D_3$—30°_2
5616.77	10	17798.89	
5618.28	6	17794.10	
5618.57	5	17793.18	$6d\ ^5D^\circ_1$—$4f'\ ^3D_1$
5620.02	10c	17788.59	$5d''\ ^3D^\circ_3$—$6p''\ ^1D_2$
5623.30	12	17778.22	$7p\ ^3P_2$—$10s\ ^3S^\circ_1$
5625.69	10000Z	17770.67	$6s\ ^3S^\circ_1$—$6p\ ^3P_2$
5638.91	1	17729.00	$6p''\ ^3S_1$—21°_1
5639.78	1	17726.27	
5641.10	20c	17722.12	$4f\ ^3F_2$—$7s''\ ^3P^\circ_1$
5643.32	100	17715.15	$5d'\ ^3F^\circ_2$—$4f\ ^3F_3$
5643.67	5c	17714.05	$5d''\ ^3F^\circ_2$—$4f'\ ^1D_2$
5648.66	15c	17698.40	$5d'\ ^1D^\circ_2$—$7p\ ^3P_1$
5649.06	2	17697.15	
5655.10	10	17678.25	
5655.52	5w	17676.93	$6p\ ^3P_1$—$5d''\ ^3D^\circ_2$

λ(air)	Intensity	Wave number	Classification
5658.46	8*c*	17667.75	$6d\ {}^5D^\circ_1 - 7p'\ {}^3F_2$
5663.63	25	17651.62	$5d'\ {}^3P^\circ_1 - 5f\ {}^3F_2$
5665.71	6	17645.14	
5676.70	7	17610.98	
5678.08	1000*Z*	17606.70	$6s'\ {}^3D^\circ_2 - 6p'\ {}^3F_2$
5678.88	1*c*	17604.22	
5679.92	50	17601.00	$5d'\ {}^3G^\circ_3 - 4f\ {}^3F_3$
5682.64	15	17592.57	
5683.83	2	17588.89	$6p'\ {}^3P_2 - 8s\ {}^3S^\circ_1$
5688.21	30	17575.35	
5690.91	2000*c*, *Z*	17567.01	$6s'\ {}^1D^\circ_2 - 6p'\ {}^3D_3$
5692.68	10	17561.55	$7s\ {}^5S^\circ_2 - 4f'\ {}^3D_3$
5698.97	2	17542.16	
5702.05	500*Z*	17532.69	$5d'\ {}^3D^\circ_3 - 6p'\ {}^3P_2$
5704.87	20	17524.02	$5d'\ {}^1S^\circ_0 - 6p''\ {}^3S_1$
5710.53	4000*c*, *Z*	17506.65	$6s'\ {}^3D^\circ_3 - 6p'\ {}^1F_3$
5715.57	40	17491.22	
5716.34	3	17488.86	
5717.58	1*c*	17485.07	
5717.85	5	17484.24	$7s\ {}^3S^\circ_1 - 7p'\ {}^3P_2$
5726.76	15	17457.04	
5733.46	20	17436.64	$7s\ {}^5S^\circ_2 - 8p\ {}^5P_2$?
5735.69	12	17429.86	
5735.87	15	17429.31	
5738.27	1000*Z*	17422.02	$5p^5\ {}^3P^\circ_1 - 6p\ {}^3P_1$
5738.83	40	17420.32	}
5738.89	70	17420.14	}
5739.01	100	17419.78	} $5p^5\ {}^3P^\circ_2 - 6p\ {}^5P_2$
5739.18	150	17419.26	}
5739.40	200	17418.59	}
5739.59	150	17418.02	}
5739.77	200	17417.47	} $6s''\ {}^3P^\circ_1 - 6p''\ {}^3D_1$
5739.88	70	17417.14	}
5739.95	40	17416.92	}
5741.94	3	17410.89	$5d''\ {}^3F^\circ_2 - 7p'\ {}^1D_2$
5743.06	30	17407.49	
5749.04	5	17389.39	
5750.41	50	17385.24	$5d''\ {}^3F^\circ_3 - 7p'\ {}^1F_3$
5752.35	25*c*	17379.38	$5d''\ {}^3D^\circ_2 - 8p\ {}^3P_2$
5757.22	6*c*	17364.68	
5760.72	1000*Z*	17354.13	$6s'\ {}^3D^\circ_1 - 6p'\ {}^3D_2$
5763.14	25	17346.84	$4f\ {}^5F_4 - 6g\ {}^3G^\circ_5$
5765.43	3*c*	17339.95	
5765.68	8	17339.20	{ $4f\ {}^5F_4 - 6g\ {}^3G^\circ_4$ { $4f\ {}^5F_4 - 6g\ {}^5G^\circ_3$
5767.19	100	17334.66	$4f\ {}^5F_4 - 6g\ {}^5G^\circ_5$
5769.01	8	17329.19	
5770.46	3*h*	17324.84	$7s'\ {}^3D^\circ_2 - \quad 3_{2,3}$
5771.02	10	17323.16	$4f\ {}^5F_3 - 6g\ {}^3G^\circ_3$
5774.83	500*c*	17311.73	$5p^5\ {}^3P^\circ_2 - 6p\ {}^5P_1$
5776.54	50	17306.60	$4f\ {}^5F_3 - 6g\ {}^5G^\circ_4$
5783.34	100	17286.25	$4f\ {}^5F_5 - 6g\ {}^5G^\circ_6$
5787.02	500	17275.26	$6p\ {}^3P_2 - 7s\ {}^3S^\circ_1$
5790.26	10	17265.59	
5794.85	25	17251.92	$4f\ {}^5F_2 - 6g\ {}^3G^\circ_3$
5795.30	10	17250.58	$4f\ {}^5F_2 - 6g\ {}^5G^\circ_2$
5797.02	50	17245.46	
5798.95[b]	100	17239.72	$4f\ {}^5F_2 - 6g\ {}^5G^\circ_3$
5807.29	15	17214.96	$6p'\ {}^3P_1 - 6d'\ 1^\circ_2$
5808.21	3	17212.24	$6p'\ {}^3P_1 - 8s\ {}^3S^\circ_1$
5808.38	5	17211.73	$6p''\ {}^1D_2 - \quad 37^\circ_2$
5812.31	4*c*	17200.09	$5d'\ {}^3F^\circ_2 - 4f\ {}^5F_3$
5815.06	40	17191.96	$4f\ {}^5F_1 - 6g\ {}^5G^\circ_2$
5819.71	80*c*	17178.22	$5d'\ {}^3D^\circ_3 - 6p'\ {}^3F_4$
5821.97	30*w*	17171.56	
5823.54	3*c*	17166.93	
5823.71	10	17166.43	
5824.19	20	17165.01	
5825.69	6	17160.59	$5d''\ {}^3D^\circ_1 - 4f'\ {}^3P_0$
5827.74	4	17154.55	
5830.79	4*c*	17145.58	
5832.86	15	17139.50	
5834.78	8*c*	17133.86	
5835.06	10	17133.04	$5d''\ {}^3F^\circ_2 - 7p'\ {}^3F_2$
5838.57	8	17122.74	
5839.88	2	17118.89	
5843.38	50	17108.64	$5d'\ {}^3S^\circ_1 - 7p\ {}^3P_2$
5845.04	6	17103.78	
5849.03	20	17092.11	$5d'\ {}^3D^\circ_3 - 6p'\ {}^3D_3$
5851.76	20	17084.14	
5855.26	10*d*	17073.93	$5d'\ {}^3D^\circ_2 - 6p'\ {}^1F_3$
5863.07	5	17051.19	
5868.64	5	17035.00	
5873.12	3	17022.01	
5893.06	20	16964.41	
5899.47	8*c*	16945.98	$5d'\ {}^1D^\circ_2 - 7p\ {}^5P_3$
5901.41	60	16940.41	$5d'\ {}^3S^\circ_1 - 7p\ {}^3P_1$
5906.04	10	16927.13	
5910.42	20	16914.58	
5911.18	20	16912.41	$5d''\ {}^1F^\circ_3 - 4f'\ {}^1D_2$
5911.78	12	16910.69	
5911.96	60	16910.18	
5913.40	10	16906.06	
5913.67	50	16905.29	
5918.10	12	16892.63	
5920.59	200*Z*	16885.53	$5d\ {}^5D^\circ_3 - 6p\ {}^3P_2$
5920.87	40	16884.73	$6p\ {}^3P_0 - 7s\ {}^3S^\circ_1$
5928.63	20	16862.63	$6p''\ {}^1D_2 - \quad 36^\circ_2$
5934.96	10	16844.65	
5938.35	10	16835.03	
5939.69[c]	100	16831.23	$7p\ {}^3P_1 - 7s''\ {}^3P^\circ_0$
5946.15	15*c*	16812.95	$6p''\ {}^3D_2 - 6g\ {}^3G^\circ_3$
5947.79	5	16808.31	$4f\ {}^3F_3 - 6g\ {}^3G^\circ_3$
5950.25	5000*Z*	16801.36	$6s\ {}^3S^\circ_1 - 6p\ {}^3P_1$
5952.09	50	16796.17	{ $4f\ {}^3F_3 - 6g\ {}^3G^\circ_4$ { $4f\ {}^3F_3 - 6g\ {}^5G^\circ_3$
5953.66	20	16791.74	$4f\ {}^3F_3 - 6g\ {}^5G^\circ_4$
5975.83	25*w*	16729.44	$5d'\ {}^3D^\circ_2 - 6p'\ {}^1P_1$
5983.69	6*c*	16707.47	$6p\ {}^3P_2 - 5d''\ {}^3D^\circ_2$
5986.27	3	16700.27	
5988.23	12	16694.80	
5990.17	20*c*	16689.39	$5d'\ {}^1D^\circ_2 - 4f\ {}^3F_3$
5991.86	30	16684.69	$5d'\ {}^1D^\circ_2 - 6p''\ {}^3D_2$
6008.19	15	16639.34	
6013.55	7*c*	16624.51	$5d'\ {}^1D^\circ_2 - 6p''\ {}^3P_1$
6021.88	50	16601.51	$6s''\ {}^1P^\circ_1 - 6p''\ {}^3S_1$
6028.43	10	16583.47	$5d''\ {}^1F^\circ_3 - 7p'\ {}^1F_3$
6031.41	8*c*	16575.28	$5f\ {}^3F_3 - \quad 50^\circ_{3,4}$
6032.80	20*w*	16571.46	
6033.44	10	16569.70	$7p\ {}^5P_1 - 8d\ {}^3D^\circ_1$
6035.13	20	16565.06	$5d''\ {}^3D^\circ_1 - 4f'\ {}^3P_2$

TABLE 10.1. *Observed lines of* I II—Continued

λ(air)	Intensity	Wave number	Classification
6036.15	3c	16562.27	
6039.32	100	16553.57	$4f\ {}^3F_4$— $6g\ {}^3G^\circ_5$
6041.60	100	16547.33	$5d'\ {}^1P^\circ_1$— $6p''\ {}^1D_2$
6043.79	15	16541.33	$4f\ {}^3F_4$— $6g\ {}^5G^\circ_5$
6048.70	50	16527.90	$5d''\ {}^1F^\circ_3$— $7p'\ {}^3F_4$
6051.82	10c	16519.38	$6p''\ {}^3P_2$— 21°_1
6055.06[d]	50d	16510.54	$4f\ {}^3F_2$— $6g\ {}^3G^\circ_3$
6059.53	8c	16498.36	$4f\ {}^3F_2$— $6g\ {}^5G^\circ_3$
6068.93	500Z	16472.81	$6s'\ {}^3D^\circ_1$— $6p'\ {}^3F_2$
6074.98	2000c, Z	16456.40	$6s'\ {}^1D^\circ_2$— $6p'\ {}^1F_3$
6077.83	150	16448.69	$5d\ {}^5D^\circ_2$— $6p\ {}^3P_2$
6084.78	30	16429.90	$6p\ {}^3P_1$— $5d'\ {}^3P^\circ_1$
6090.90	12c	16413.39	$5d'\ {}^1D^\circ_2$— $7p\ {}^5P_1$
6094.08	20c	16404.83	$5d''\ {}^1D^\circ_2$— $6p''\ {}^3P_2$ $5d''\ {}^3D^\circ_2$— $5f\ {}^3F_2$
6094.33	15	16404.15	
6103.37	150	16379.86	$5d'\ {}^1F^\circ_3$— $6p''\ {}^3P_2$
6103.87	15	16378.52	
6111.35	6	16358.47	$6p''\ {}^3P_1$— $8d\ {}^3D^\circ_1$
6127.49	2000c, Z	16315.38	$6s'\ {}^3D^\circ_2$— $6p'\ {}^3D_1$
6132.86	20	16301.09	$6p''\ {}^3P_1$— $8d\ {}^3D^\circ_2$
6137.39	20	16289.06	$5d'\ {}^3P^\circ_1$— $6p''\ {}^1S_0$
6148.15	40d	16260.56	
6148.34	50Z	16260.05	$5d\ {}^5D^\circ_0$— $6p\ {}^3P_1$
6155.36	200	16241.51	$6d\ {}^3D^\circ_3$— $6f\ {}^3F_4$
6155.97	6	16239.90	
6156.77	12	16237.79	
6157.14	15	16236.81	
6158.18	20	16234.07	
6160.09	15c	16229.04	$5d'\ {}^3S^\circ_1$— $4f\ {}^3F_2$
6162.22	300c	16223.43	$5p^5\ {}^1P^\circ_1$— $6p'\ {}^3D_2$ $6d\ {}^3D^\circ_2$— $6f\ {}^3F_2$
6164.88	8c	16216.43	
6166.44	40c	16212.33	
6172.84	4	16195.52	$6p''\ {}^1P_1$— 29°_1
6182.28	60	16170.79	
6184.62	10	16164.67	$5d''\ {}^3F^\circ_3$— $7p'\ {}^3D_3$
6186.93	3	16158.63	$4f\ {}^5F_3$— $8d\ {}^5D^\circ_2$
6189.94	60	16150.78	$6d\ {}^3D^\circ_2$— $6f\ {}^3F_3$ $7p\ {}^5P_3$— $8d\ {}^3D^\circ_3$
6197.16	50c	16131.96	$6d\ {}^3D^\circ_1$— $6f\ {}^3F_2$
6201.69	2	16120.18	
6203.04	20c	16116.67	$5d''\ {}^3D^\circ_3$— $6p''\ {}^3P_2$
6204.86	1000Z	16111.94	$6s'\ {}^1D^\circ_2$— $6p'\ {}^1P_1$
6205.61	5	16109.99	$6d\ {}^3D^\circ_3$— $6f\ {}^3F_3$
6222.93	3	16065.16	$6p''\ {}^3P_2$— $20^\circ_{1,2}$
6223.15	2	16064.59	$7p\ {}^2P_0$— $7s''\ {}^3P^\circ_1$
6223.66	3	16063.27	$5d''\ {}^1D^\circ_2$— $6p''\ {}^3D_3$
6225.07	1	16059.63	$5f\ {}^5F_5$—$12g\ {}^5G^\circ_6$
6238.58	5c	16024.86	
6239.89	2d	16021.49	$5d''\ {}^3D^\circ_2$— $5f\ {}^3F_3$
6250.59	40	15994.07	$6p\ {}^3P_2$— $7s\ {}^5S^\circ_2$
6255.53	500c	15981.44	$5d'\ {}^3D^\circ_3$— $6p'\ {}^1F_3$
6256.33	40	15979.39	$6p'\ {}^3P_0$— $7s'\ {}^3D^\circ_1$
6257.49	900c	15976.43	$5d'\ {}^3F^\circ_4$— $6p'\ {}^3F_4$
6269.70	1c	15945.32	$6s''\ {}^3P^\circ_2$— $7p\ {}^3P_2$
6272.37	3c	15938.53	$5d''\ {}^3D^\circ_1$— $4f'\ {}^3D_2$
6273.16	15	15936.52	$7p\ {}^5P_1$— $8d\ {}^5D^\circ_1$
6276.65	40c	15927.66	
6277.05	30c	15926.65	$5d'\ {}^3S^\circ_1$— $6p''\ {}^3D_2$
6279.79	12	15919.70	$7p\ {}^5P_1$— $8d\ {}^5D^\circ_2$
6280.36	80c	15918.25	$5d'\ {}^3P^\circ_0$— $6p'\ {}^1P_1$
6282.61	20	15912.55	$7p\ {}^5P_1$— $8d\ {}^5D^\circ_0$
6291.39	500	15890.34	$5d'\ {}^3F^\circ_4$— $6p'\ {}^3D_3$
6300.47	3	15867.44	
6300.84	15	15866.51	$5d'\ {}^3S^\circ_1$— $6p''\ {}^3P_1$
6320.41	3h	15817.38	$5d''\ {}^3D^\circ_2$— $5f\ {}^5F_3$
6326.10	4	15803.16	$7p\ {}^5P_2$— $8d\ {}^5D^\circ_1$
6326.45	2c	15802.28	
6329.38	40	15794.97	$7p\ {}^5P_2$— $8d\ {}^5D^\circ_3$
6331.87	30w	15788.76	$5d'\ {}^3S^\circ_1$— $7p\ {}^5P_2$
6332.84	25	15786.34	$7p\ {}^5P_2$— $8d\ {}^5D^\circ_2$
6336.57	100c	15777.05	$6s''\ {}^3P^\circ_2$— $7p\ {}^3P_1$
6339.97	140c	15768.59	$6s'\ {}^3D^\circ_3$— $6p'\ {}^3F_3$
6341.24	100c	15765.43	$5d'\ {}^3F^\circ_3$— $6p'\ {}^3P_2$
6347.77	4	15749.21	
6357.37	6	15725.43	$6p''\ {}^3P_1$— $8d\ {}^5D^\circ_1$
6363.27	50	15710.85	$6p'\ {}^3D_2$— $5d''\ {}^1P^\circ_1$ $5d'\ {}^3S^\circ_1$— $6p''\ {}^3P_0$
6364.23	8	15708.48	$6p''\ {}^3P_1$— $8d\ {}^5D^\circ_2$
6385.14	5c	15657.04	$6p''\ {}^3D_2$— $8d\ {}^5D^\circ_3$
6385.46	8	15656.25	$6p''\ {}^1P_1$— $24^\circ_{1,2}$
6385.80	30	15655.42	$5d'\ {}^3S^\circ_1$— $7p\ {}^5P_1$
6387.38	5	15651.55	
6388.66	5c	15648.41	$6p''\ {}^3D_2$— $8d\ {}^5D^\circ_2$
6389.60	7	15646.11	
6393.58	3h	15636.37	
6395.33	15	15632.09	
6420.96	10	15569.69	
6421.12	20	15569.30	
6430.42	12	15546.79	
6440.46	400c	15522.55	
6458.41	30	15479.41	$5d\ {}^5D^\circ_2$— $6p\ {}^3P_1$
6459.46	2	15476.89	$5f\ {}^5F_5$—$11g\ {}^5G^\circ_6$
6464.79	30w	15464.13	$6p'\ {}^1D_2$— $7d\ {}^5D^\circ_1$
6466.42	4h	15460.24	$6p''\ {}^3S_1$—$10s\ {}^5S^\circ_2$
6470.25	8	15451.08	$5d''\ {}^3D^\circ_1$— $4f'\ {}^3F_2$
6488.97	50	15406.51	$7p\ {}^5P_3$— $8d\ {}^5D^\circ_4$
6492.86	6	15397.28	$6d\ {}^5D^\circ_1$— $4f'\ {}^3P_2$
6493.49	20	15395.79	$7p\ {}^5P_3$— $8d\ {}^5D^\circ_3$
6497.12	4	15387.18	$7p\ {}^5P_3$— $8d\ {}^5D^\circ_2$
6509.39	3c	15358.18	
6512.98	6c	15349.71	$6p'\ {}^3D_3$— $7s'\ {}^3D^\circ_2$
6516.18	250c, Z	15342.18	$5p^5\ {}^1P^\circ_1$— $6p'\ {}^3F_2$
6518.91	12c	15335.75	
6520.26	5	15332.58	$5d''\ {}^3D^\circ_1$— $8p\ {}^3P_1$
6523.60	20c	15324.73	$5d'\ {}^3F^\circ_3$— $6p'\ {}^3D_3$
6525.93	3	15319.25	$7d\ {}^3D^\circ_2$— $12_{1,2}$
6526.76	10	15317.31	
6538.32	20	15290.23	$5d'\ {}^3P^\circ_2$— $6p''\ {}^3P_2$
6539.96	2	15286.39	
6540.73	12	15284.59	$5p\ {}^3P_1$— $8d\ {}^3D^\circ_1$
6544.01	10c	15276.93	
6545.60	10	15273.22	
6546.97	20c	15270.02	$5d\ {}^5D^\circ_1$— $6p\ {}^3P_0$
6555.68	20	15249.74	
6564.14	40	15230.08	$7p\ {}^3P_2$— $8d\ {}^3D^\circ_3$
6565.37	15	15227.23	$7p\ {}^3P_1$— $8d\ {}^3D^\circ_2$
6567.76	2	15221.69	$6d\ {}^3D^\circ_1$— $4f'\ {}^1P_1$

λ(air)	Intensity	Wave number	Classification
6567.98	2	15221.18	
6576.04	3	15202.52	
6578.50	10	15196.84	$5d'\ {}^1S^\circ_0 - 7p\ {}^3P_1$
6585.21	400	15181.35	$6s'\ {}^3D^\circ_1 - 6p'\ {}^3D_1$
6613.82	4	15115.68	$4f'\ {}^3H_4 - 50^\circ_{3,4}$
6618.51	4	15104.97	$5p^5\ {}^3P^\circ_1 - 6p\ {}^5P_2$
6621.71	12	15097.67	
6622.35	120*c*	15096.21	$5d'\ {}^3D^\circ_2 - 6p'\ {}^3D_2$
6633.86	20	15070.02	$6p\ {}^3P_0 - 5d'\ {}^3P^\circ_1$
6638.72	15	15058.99	$7p\ {}^3P_2 - 8d\ {}^3D^\circ_2$
6646.73	3	15040.84	
6659.49	20	15012.02	
6665.96	600*Z*	14997.45	$5p^5\ {}^3P^\circ_1 - 6p\ {}^5P_1$
6672.27	100*c*	14983.27	$5d'\ {}^1D^\circ_2 - 6p''\ {}^3D_1$
6679.77	6*c*	14966.44	
6685.20	60*c*	14954.29	$6p'\ {}^1D_2 - 7s'\ {}^1D^\circ_2$
6687.71	40	14948.67	$5d'\ {}^3P^\circ_2 - 6p''\ {}^3D_3$
6690.84	6	14941.68	$6d\ {}^3D^\circ_2 - 7p'\ {}^1D_2$
6705.45	10*c*	14909.13	$6p'\ {}^3P_2 - 7s'\ {}^3D^\circ_2$
6708.73	5*c*	14901.84	
6709.12	3*c*	14900.97	$6d\ {}^3D^\circ_3 - 7p'\ {}^1D_2$
6711.79	1	14895.04	
6712.03	8	14894.51	$5d''\ {}^3F^\circ_3 - 4f'\ {}^3G_4$
6717.05	80	14883.38	
6717.74	10	14881.85	$6d\ {}^5D^\circ_2 - 8p\ {}^3P_2$
6718.83	300*Z*	14879.44	$5d\ {}^5D^\circ_1 - 6p\ {}^3P_2$
6720.66	100	14875.30	{ $5d'\ {}^1P^\circ_1 - 6p''\ {}^3P_2$ { $6d\ {}^3D^\circ_3 - 7p'\ {}^1F_3$
6721.43	20	14873.68	$7p\ {}^5P_2 - 9s\ {}^5S^\circ_2$
6725.77	4*c*	14864.03	
6739.92	35	14832.88	
6744.30	5*h*	14823.24	
6745.90	6*c*	14819.73	$6d\ {}^3D^\circ_3 - 7p'\ {}^3F_4$
6756.74	6	14795.95	$6p''\ {}^3P_1 - 9s\ {}^5S^\circ_2$
6764.17	150*c*	14779.70	$5d'\ {}^3F^\circ_4 - 6p'\ {}^1F_3$
6768.30	4*c*	14770.68	$6d\ {}^5D^\circ_1 - 4f'\ {}^3D_2$
6769.53	3*c*	14768.00	$6s''\ {}^3P^\circ_2 - 4f\ {}^3F_3$
6771.69	12*c*	14763.29	$6s''\ {}^3P^\circ_2 - 6p''\ {}^3D_2$
6776.53	2	14752.74	
6777.46	3	14750.72	
6779.17	8*c*	14747.00	
6787.19	2	14729.57	
6796.21	4	14710.02	$5f\ {}^5F_5 - 10g\ {}^5G^\circ_6$
6801.80	2	14697.93	$6d\ {}^3D^\circ_1 - 4f'\ {}^3D_1$
6812.57	4000*Z*	14674.70	$5d\ {}^5D^\circ_3 - 6p\ {}^5P_3$
6816.46	4*c*	14666.32	$7d\ {}^3D^\circ_3 - 11_{3,4}$
6820.93	3	14656.71	
6822.98	2	14652.31	$6d'\ 3^\circ_3 - 9f\ {}^3F_4$
6824.09	2	14649.93	$5d''\ {}^3D^\circ_1 - 5f\ {}^3F_2$
6825.23	150*c*	14647.48	$6s'\ {}^3D^\circ_3 - 6p'\ {}^3F_2$
6825.79	3	14646.28	
6826.83	2	14644.05	
6831.15	3	14634.79	$7p\ {}^3P_1 - 8d\ {}^5D^\circ_2$
6832.89	10	14631.06	
6838.60	3	14618.84	
6855.90	3	14581.95	$5d''\ {}^3F^\circ_2 - 7p'\ {}^3D_3$
6860.47	1*c*	14572.24	$6d\ {}^3D^\circ_1 - 7p'\ {}^3F_2$
6869.78	1	14552.49	
6879.12	10	14532.73	$6p'\ {}^3P_1 - 7s'\ {}^3D^\circ_2$
6880.25	3	14530.35	$6p'\ {}^3P_1 - 7s'\ {}^3D^\circ_1$
6888.84	4	14512.23	
6902.13	200*Z*	14484.29	$6s\ {}^3S^\circ_1 - 6p\ {}^5P_2$
6904.77	10*c*	14478.75	$6s'\ {}^1D^\circ_2 - 6p'\ {}^3D_2$
6906.81	12	14474.47	$7p\ {}^5P_3 - 9s\ {}^5S^\circ_2$
6909.98	2	14467.83	$6p'\ {}^1D_2 - 7s'\ {}^3D^\circ_3$
6956.46	20	14371.16	$6d\ {}^5D^\circ_4 - 8p\ {}^5P_3?$
6958.78	1000*Z*	14366.37	$5d\ {}^5D^\circ_4 - 6p\ {}^5P_3$
6970.13	1	14342.98	$6d\ {}^5D^\circ_4 - 4f'\ {}^3D_3$
6999.29	1	14283.22	$6d\ {}^5D^\circ_1 - 4f'\ {}^3F_2$
7018.91	70*c*	14243.30	$5d'\ {}^3D^\circ_3 - 6p'\ {}^3F_3$
7021.60	20	14237.84	$5d\ {}^5D^\circ_2 - 6p\ {}^5P_3$
7022.54	2*h*	14235.94	$5d''\ {}^3F^\circ_2 - 4f'\ {}^3D_2$
7027.61	5	14225.67	$6d\ {}^5D^\circ_2 - 8p\ {}^5P_2?$
7027.88	3	14225.12	$5d'\ {}^3S^\circ_1 - 6p''\ {}^3D_1$
7028.04	1	14224.80	
7032.99	300*c*	14214.78	$5d'\ {}^3D^\circ_2 - 6p'\ {}^3F_2$
7042.26	100*c*	14196.07	$5d'\ {}^3G^\circ_4 - 6p'\ {}^3F_4$
7057.21	2*h*	14166.00	$5d''\ {}^3D^\circ_1 - 5f\ {}^5F_1$
7057.81	3*h*	14164.80	$6d\ {}^5D^\circ_1 - 8p\ {}^3P_1$
7059.07	1*h*	14162.27	
7078.72	20	14122.95	$5d'\ {}^1S^\circ_0 - 6p''\ {}^3P_1$
7085.21	200*c*	14110.02	$5d'\ {}^3G^\circ_4 - 6p'\ {}^3D_3$
7100.06	15	14080.51	$5d'\ {}^3P^\circ_2 - 6p''\ {}^3S_1$
7101.72	2	14077.22	$6p'\ {}^1P_1 - 5d''\ {}^1P^\circ_1$
7115.08	10*c*	14050.78	$5p^5\ {}^1P^\circ_1 - 6p'\ {}^3D_1$
7133.66	2	14014.19	$7d\ {}^5D^\circ_4 - 9f\ {}^5F_5?$
7138.97	100*c*	14003.76	$5d'\ {}^3D^\circ_3 - 6p'\ {}^3D_2$
7161.45	2	13959.81	
7186.15	20	13911.82	$5d'\ {}^1S^\circ_0 - 7p\ {}^5P_1$
7221.85	10*c*	13843.05	
7225.81	100*Z*	13835.47	$5d\ {}^5D^\circ_0 - 6p\ {}^5P_1$
7248.06	1*c*	13792.99	$5d''\ {}^1F^\circ_3 - 7p'\ {}^3P_2$
7254.78	3*h*	13780.22	$5d''\ {}^1F^\circ_3 - 7p'\ {}^3D_3$
7282.83	40*c*, *Z*	13727.14	$5p^4\ {}^3P_2 - 5p^4\ {}^1D_2$
7289.47	1	13714.64	$5f\ {}^5F_3 - 9g\ {}^5G^\circ_4?$
7291.34	1	13711.12	$5f\ {}^5F_4 - 9g\ {}^5G^\circ_5$
7311.57	2	13673.19	$5f\ {}^5F_5 - 9g\ {}^5G^\circ_6$
7333.13	1	13632.99	$5f\ {}^5F_2 - 9g\ {}^5G^\circ_3$
7342.10	1	13616.33	$5f\ {}^5F_1 - 9g\ {}^5G^\circ_2$
7351.35	500*Z*	13599.20	$5d\ {}^5D^\circ_3 - 6p\ {}^5P_2$
7370.31	3	13564.21	$6d\ {}^5D^\circ_3 - 5f\ {}^3F_3$
7370.83	4*c*	13563.26	$6s''\ {}^1P^\circ_1 - 4f\ {}^3F_2$
7383.49	15	13540.00	$6d\ {}^5D^\circ_0 - 5f\ {}^5F_1$
7392.26	10	13523.94	$6d\ {}^5D^\circ_2 - 5f\ {}^3F_3$
7395.57	5	13517.89	$6d'\ 8^\circ_4 - 11_{3,4}$
7398.91	4*h*	13511.78	{ $5f\ {}^3F_3 - 9g\ {}^3G^\circ_4$ { $5f\ {}^3F_3 - 9g\ {}^5G^\circ_3$
7400.29	20*c*	13509.26	$5d''\ {}^3P^\circ_2 - 6p''\ {}^1D_2$
7407.75	5*c*	13495.66	
7418.52	6	13476.07	$4f'\ {}^3F_2 - 42^\circ_2$
7423.85	15	13466.39	
7435.26	2*c*	13445.73	
7437.64	2	13441.42	
7437.87	4	13441.01	
7438.90	12	13439.15	
7444.29	25	13429.42	$6p''\ {}^1S_0 - 32^\circ_1$
7454.79	3	13410.50	
7454.94	5	13410.23	
7459.00	20	13402.93	$6d\ {}^5D^\circ_2 - 5f\ {}^5F_2$
7461.52	2*d*	13398.41	$7p\ {}^3P_1 - 6d'\ 14^\circ_3$
7477.07	5*c*	13370.54	$5d'\ {}^3P^\circ_1 - 6p''\ {}^1D_2$
7481.52	25	13362.59	$6d\ {}^5D^\circ_3 - 5f\ {}^5F_4$

λ(air)	Intensity	Wave number	Classification
7482.88	10	13360.16	$6d\ {}^5D^\circ_3 — 5f\ {}^5F_3$
7484.77	70	13356.79	$6d\ {}^5D^\circ_4 — 5f\ {}^5F_5$
7488.87	5	13349.47	
7505.54	30	13319.82	$6d\ {}^5D^\circ_2 — 5f\ {}^5F_3$
7506.31	6*h*	13318.46	$5d''\ {}^3F^\circ_2 — 4f'\ {}^3F_3$ $7p\ {}^3P_0 — 6d'\ 15^\circ_1$
7508.34	10	13314.86	$6d\ {}^5D^\circ_4 — 5f\ {}^5F_4$
7535.77	5	13266.39	
7544.05	3	13251.83	
7557.96	25	13227.44	
7563.20	25	13218.28	
7563.66	2*c*	13217.47	
7569.15	25	13207.89	
7573.40	7*d*	13200.48	$6s''\ {}^1P^\circ_1 — 6p''\ {}^3P_1$
7578.96	20	13190.79	
7579.95	4	13189.07	
7585.53	2*c*	13179.37	
7592.03	1	13168.08	$5f\ {}^3F_4 — 9g\ {}^5G^\circ_5$
7595.37	300Z	13162.29	$5d\ {}^5D^\circ_2 — 6p\ {}^5P_2$
7596.33	20	13160.63	$6d'\ 1^\circ_2 — \quad 1_{2,3}$
7612.27	1	13133.07	$5f\ {}^3F_2 — 9g\ {}^3G^\circ_3$?
7617.95	3*h*	13123.28	$6d'\ 3^\circ_3 — 8f\ {}^3F_4$
7618.50	100*c*	13122.33	$5d'\ {}^3D^\circ_3 — 6p'\ {}^3F_2$
7623.23	20	13114.19	
7627.31	4*h*	13107.17	
7636.62	2	13091.20	$7d\ {}^3D^\circ_3 — 9f\ {}^3F_4$
7640.28	7*c*	13084.92	
7654.26	1*c*	13061.03	$7d\ {}^3D^\circ_3 — \quad 4_{3,4}$
7657.94	150*c*, Z	13054.75	$5d\ {}^5D^\circ_2 — 6p\ {}^5P_1$
7665.69	200*c*	13041.55	$5d'\ {}^3F^\circ_4 — 6p'\ {}^3F_3$
7683.47	8*c*	13011.37	$5d'\ {}^1F^\circ_3 — 7p\ {}^3P_2$
7684.82	1*c*	13009.09	
7685.30	3*c*	13008.27	
7690.55	40*c*	12999.39	$5d'\ {}^3G^\circ_4 — 6p'\ {}^1F_3$
7691.29	3	12998.14	$6d\ {}^5D^\circ_1 — 5f\ {}^5F_1$
7703.21	5	12978.03	$6d\ {}^5D^\circ_1 — 5f\ {}^5F_2$
7707.95	3*c*	12970.05	
7713.17	4*h*	12961.27	
7724.21	3	12942.75	
7735.78	75*c*	12923.39	$5d'\ {}^3D^\circ_2 — 6p'\ {}^3D_1$
7756.05	15	12889.61	$5d''\ {}^2P^\circ_2 — 6p''\ {}^1P_1$
7757.58	5	12887.07	
7769.09	1*c*	12867.98	$5d''\ {}^1D^\circ_2 — 7p\ {}^3P_1$
7786.18	2	12839.74	
7787.04	3*c*	12838.32	$6p\ {}^3P_1 — 5d'\ {}^3P^\circ_2$
7798.98	500	12818.66	
7824.91	3	12776.18	
7840.37	2	12750.99	
7840.46	2	12750.85	$5d'\ {}^3P^\circ_1 — 6p''\ {}^1P_1$
7843.31	3*c*	12746.21	$6d'\ 9^\circ_3 — \quad 11_{3,4}$
7862.79	3	12714.63	$6d'\ 9^\circ_3 — \quad 10_{2,3}$
7876.51	1	12692.49	
7881.21	1	12684.92	$7d\ {}^5D^\circ_2 — 8f\ {}^3F_3$
7884.39	10*c*	12679.80	
7886.55	2*c*	12676.33	
7886.82	2	12675.89	
7887.70	3	12674.48	
7905.57	1	12645.83	
7925.58	2*c*	12613.90	
7956.47	1	12564.93	$7d\ {}^5D^\circ_2 — 8f\ {}^5F_3$
7956.89	3*c*	12564.27	$5d''\ {}^3F^\circ_2 — 5f\ {}^3F_3$
7968.61	5	12545.79	
7990.27	2	12511.78	
7991.36	10*c*	12510.07	$5d''\ {}^1F^\circ_3 — 4f'\ {}^3G_4$
7993.29	3	12507.05	
7994.65	2*c*	12504.93	$6d'\ 2^\circ_3 — \quad 1_{2,3}$
8000.09	2	12496.42	$7d\ {}^5D^\circ_3 — 8f\ {}^5F_4$
8008.32	2	12483.58	
8009.28	3	12482.08	
8009.84	1	12481.21	
8014.03	1	12474.69	
8049.51	3	12419.70	$7d\ {}^5D^\circ_4 — 8f\ {}^5F_5$
8055.06	20	12411.14	
8056.54	2	12408.86	
8060.37	1	12402.97	$7d\ {}^5D^\circ_1 — 8f\ {}^5F_2$
8150.57	1	12265.71	$5f\ {}^5F_4 — 8g\ {}^3G^\circ_5$
8152.46	2	12262.87	$5f\ {}^5F_3 — 8g\ {}^5G^\circ_4$
8153.83	30*c*	12260.80	$6p''\ {}^3P_2 — 6g\ {}^5G^\circ_2$
8154.53	3	12259.75	$5f\ {}^5F_4 — 8g\ {}^5G^\circ_5$
8159.49	10	12252.30	$5d'\ {}^1G^\circ_4 — 6p'\ {}^3F_4$
8162.42	1	12247.90	$8p\ {}^3P_1 — \quad 37^\circ_2$
8166.29	1	12242.10	$6p''\ {}^1P_1 — 7s''\ {}^3P^\circ_0$
8170.07	100*c*	12236.43	$5d'\ {}^3F^\circ_3 — 6p'\ {}^3D_2$
8177.60	1*c*	12225.17	
8179.15	4	12222.85	$5f\ {}^5F_5 — 8g\ {}^5G^\circ_6$
8180.76	1*c*	12220.44	
8183.27	30	12216.70	
8185.11	8*c*	12213.95	
8194.84	40	12199.45	
8205.68	2	12183.33	
8206.08	4	12182.74	
8206.49	2	12182.13	$5f\ {}^5F_2 — 8g\ {}^5G^\circ_3$
8217.11[e]	8	12166.38	$5f\ {}^5F_1 — 8g\ {}^5G^\circ_2$
8217.27	30	12166.15	$5d'\ {}^1G^\circ_4 — 6p'\ {}^3D_3$
8235.20	15	12139.66	
8246.21	30	12123.45	$5d''\ {}^3D^\circ_2 — 6p''\ {}^1D_2$
8251.79	100*c*, Z	12115.25	$5d\ {}^3D^\circ_2 — 6p\ {}^3P_2$
8253.84	25	12112.24	$5d'\ {}^3P^\circ_0 — 6p'\ {}^3D_1$
8256.54	1*c*	12108.28	$7p'\ {}^3P_2 — \quad 40^\circ_3$
8272.90	1*c*	12084.34	$5d'\ {}^1F^\circ_3 — 4f\ {}^3F_4$
8286.65	2*c*	12064.29	
8288.55	2	12061.52	$5f\ {}^3F_3 — 8g\ {}^3G^\circ_4$
8296.73	2*c*	12049.63	$4f\ {}^5F_4 — 6d'\ 8^\circ_4$
8307.51	2	12033.99	$6d\ {}^3D^\circ_1 — 7p'\ {}^3P_2$
8316.16	15*c*	12021.48	$4f\ {}^5F_3 — 6d'\ 8^\circ_4$ $7p\ {}^5P_3 — 6d'\ 9^\circ_3$
8321.03	5*c*	12014.44	
8323.23	4	12011.27	
8330.75	1*h*	12000.42	$8p\ {}^3P_2 — 11d\ {}^3D^\circ_3$
8356.90	2*c*	11962.87	$6d'\ 10^\circ_2 — \quad 12_{1,2}$
8366.51	3*c*	11949.13	
8372.94	35	11939.96	$4f\ {}^5F_4 — 5g\ {}^3G^\circ_5$
8380.68	1*c*	11928.93	$6p''\ {}^1S_0 — \quad 21^\circ_1$
8385.74	6*c*	11921.73	$5d'\ {}^3P^\circ_2 — 7p\ {}^3P_2$ $4f\ {}^5F_3 — 5g\ {}^3G^\circ_3$
8398.74	3*h*	11903.28	$6d'\ 10^\circ_2 — \quad 10_{2,3}$
8400.03	15	11901.45	$4f\ {}^5F_3 — 5g\ {}^5G^\circ_3$
8403.62	12*c*	11896.36	$4f\ {}^5F_4 — 5g\ {}^5G^\circ_4$
8408.67	80	11889.22	$4f\ {}^5F_4 — 5g\ {}^5G^\circ_5$
8412.78	6	11883.41	$4f\ {}^5F_3 — 5g\ {}^3G^\circ_4$
8414.32[f]		11881.24	$4f\ {}^5F_5 — 5g\ {}^3G^\circ_5$

λ(air)	Intensity	Wave number	Classification
8414. 60	150Z	11880. 84	$4f\ {}^5F_5 - 5g\ {}^5G^\circ_6$
8417. 50	2	11876. 75	
8418. 93	7	11874. 73	
8421. 01	7	11871. 80	
8423. 60	60*w*, Z	11868. 15	$4f\ {}^5F_3 - 5g\ {}^5G^\circ_4$
8436. 08	20	11850. 59	$4f\ {}^5F_2 - 5g\ {}^3G^\circ_3$
8436. 92	5	11849. 41	$4f\ {}^5F_2 - 5g\ {}^5G^\circ_2$
8445. 31	6*c*	11837. 64	{ $5d''\ {}^3P^\circ_2 - 6p''\ {}^3P_2$ { $4f\ {}^5F_5 - 5g\ {}^5G^\circ_4$
8450. 62	30Z	11830. 20	$4f\ {}^5F_2 - 5g\ {}^5G^\circ_3$
8455. 66	8	11823. 15	
8474. 57	2*h*	11796. 77	
8475. 37	40	11795. 65	
8476. 46	10*c*	11794. 14	$5d''\ {}^1D^\circ_2 - 6p''\ {}^3P_1$
8478. 21	1*h*	11791. 70	
8478. 85	50	11790. 81	$4f\ {}^5F_1 - 5g\ {}^5G^\circ_2$
8479. 80	30	11789. 49	
8497. 89	2	11764. 40	
8505. 90	20	11753. 32	$5d'\ {}^3P^\circ_2 - 7p\ {}^3P_1$
8528. 14	1	11722. 67	$5f\ {}^3F_4 - 8g\ {}^3G^\circ_5$
8556. 54	1	11683. 76	$5f\ {}^3F_2 - 8g\ {}^3G^\circ_3$
8564. 35	3	11673. 10	
8605. 13	10	11617. 78	
8606. 54	2	11615. 88	
8623. 44	1Z	11593. 12	$5d\ {}^5D^\circ_1 - 6p\ {}^5P_2$
8638. 89	3	11572. 38	
8639. 88	3	11571. 06	$5d'\ {}^3F^\circ_2 - 6p'\ {}^1D_2$
8643. 72	3	11565. 92	$5d''\ {}^3D^\circ_3 - 6p''\ {}^3D_2$
8704. 22	10Z	11485. 53	$5d\ {}^5D^\circ_1 - 6p\ {}^5P_1$
8793. 87	10Z	11368. 44	$4f\ {}^3F_3 - 5g\ {}^3G^\circ_4$
8804. 23	10*c*	11355. 06	$5d'\ {}^3F^\circ_3 - 6p'\ {}^3F_2$
8877. 61	20	11261. 20	$5d'\ {}^3G^\circ_4 - 6p'\ {}^3F_3$
8968. 84[g]		11146. 66	$4f\ {}^3F_4 - 5g\ {}^3G^\circ_5$
8969. 42	30Z	11145. 93	$5d\ {}^3D^\circ_2 - 6p\ {}^3P_1$
8999. 07	7	11109. 21	$4f\ {}^3F_2 - 5g\ {}^3G^\circ_3$
9009. 86	10	11095. 91	$4f\ {}^3F_4 - 5g\ {}^5G^\circ_5$
9015. 63	2	11088. 80	$4f\ {}^3F_2 - 5g\ {}^5G^\circ_3$
9036. 92	2	11062. 68	
9042. 76	40	11055. 54	$5d'\ {}^1G^\circ_4 - 6p'\ {}^1F_3$
9063. 59	1	11030. 13	
9185. 41	3	10883. 84	$6s''\ {}^3P^\circ_0 - 6p'\ {}^3P_1$
9195. 87	30	10871. 46	$5d\ {}^3D^\circ_1 - 6p\ {}^3P_0$
9214. 67	2	10849. 28	$6d\ {}^3D^\circ_2 - 4f'\ {}^3F_3$
9236. 12	6	10824. 09	
9244. 02	1	10814. 84	
9255. 17	3	10801. 81	$6d\ {}^3D^\circ_3 - 4f'\ {}^3G_4$
9259. 42	1	10796. 85	$6d\ {}^3D^\circ_2 - 8p\ {}^5P_2$?
9260. 84	2	10795. 19	$4f'\ {}^3G_3 - \quad 47^\circ_{1,2}$
9262. 73	3	10792. 99	
9265. 97	4	10789. 22	
9274. 68	1*h*	10779. 09	
9302. 41	1	10746. 95	
9304. 65	2*c*	10744. 37	$5d'\ {}^3P^\circ_2 - 4f\ {}^3F_3$
9361. 26	1	10679. 39	$5d'\ {}^3P^\circ_2 - 6p''\ {}^3P_1$
9394. 32	1*h*	10641. 81	
9405. 73	2	10628. 90	
9406. 75	1	10627. 75	$5d''\ {}^3P^\circ_2 - 6p''\ {}^3S_1$
9420. 09	1	10612. 70	
9480. 33	10*c*	10545. 26	$5d'\ {}^1D^\circ_2 - 6p'\ {}^1D_2$
9506. 70	1	10516. 01	
9538. 51	3	10480. 94	$5d\ {}^3D^\circ_1 - 6p\ {}^3P_2$
9541. 02	1	10478. 19	$6d\ {}^3D^\circ_2 - 5f\ {}^3F_2$
9616. 67	4	10395. 76	$6d\ {}^3D^\circ_3 - 5f\ {}^3F_4$
9625. 06	4	10386. 70	$6d\ {}^3D^\circ_1 - 5f\ {}^3F_2$
9766. 73	1	10236. 03	
9908. 38	1	10089. 70	$5d'\ {}^3D^\circ_1 - 6p'\ {}^3P_0$
10405. 49	6	9607. 68	$5d\ {}^3D^\circ_3 - 6p\ {}^3P_2$
10418. 15	1	9596. 00	$7p\ {}^5P_1 - 7d\ {}^5D^\circ_1$
10691. 12	1	9351. 00	
11084. 68	1	9018. 99	$7p\ {}^5P_3 - 7d\ {}^5D^\circ_4$

Meanings of the letters following the intensities in this table:

c Complex line, showing resolved or partially resolved structure. Most of the lines having large intensities not followed by this symbol actually have complex structures masked by line width.

d Double line. In the air region this is usually hyperfine structure.

h Hazy line.

w Wide line.

Z Zeeman pattern given in table 10.2.

NOTES:

[a] The wavelength of this line is calculated, since it is partly masked by the I I line at 4850.35 A.

[b] The line at this position belongs partly to I I.

[c] The relative intensities of this line in the high and low pressure discharges indicate that it belongs primarily to the I I spectrum; however, since both $7s''\ {}^3P_0$ and $7s''\ {}^3P_1$ of I II combine with $7p$ levels, it is likely that the transition given here occurs.

[d] Part of this double line is due to an I I transition.

[e] The intensity of this line is given as it appears on the plate. The line at 8217.27 A probably has a component overlapping the weaker line expected at 8217.11 A.

[f] The calculated wavelength of this line is coincident with an I I line of intensity 40.

[g] Line not resolved from the I I line of intensity 300 at 8969.04 A. The wavelength given for the expected I II line is a calculated value.

TABLE 10.2. *Zeeman effect data for* I II

λ	Zeeman patterns
4173.810	(. . .) 0.659, 1.434
4225.542	(0.00*w*) 1.187*w*
4235.511	(. . .) **0.719,** 1.095
4342.078	(0.841) 1.467, 2.304
4376.139	(0.00*w*) 0.795 *A*
4403.566	(0.00*w*) 1.238 *B*
4408.954	(0.00*w*) 0.841 *A*
4412.333	(. . .) 1.747
4423.725	(**0.000,** 0.873) **0.602,** 1.440, 2.301
4428.195	(0.00*w*) 1.33*w*
4442.562	(0.000) 0.687
4444.873	(0.272, **0.550**) 1.187, **1.452, 1.715,** 1.980
4446.742	(0.000) 2.308
4452.858	(**0.000,** 0.264, 0.548) **0.862,** 1.108, 1.432, 1.718
4456.625	(. . .) 1.388, **1.821**
4460.185	(1.512) 0.000
4464.338	(0.00*w*) 1.127*w*
4473.412	(0.00*w*) 1.252 *B*
4476.037	(0.000) 0.674
4488.552	(0.586) 0.908, 1.497
4540.644	(. . .) **1.084,** 1.425
4560.612	(0.00*w*) 1.136*w*
4574.090	(0.841) 1.438, 2.298
4576.550	(0.00*w*) 0.465*w*
4590.930	(0.00*w*) 1.203 *B*
4599.769	(0.00*w*) 0.561 *A*
4611.224	(0.330) **0.671,** 1.083
4621.854	(0.00*w*) 1.084*w*
4632.446	(0.423, **0.814**) 1.160, **1.514, 1.899,** 2.314
4675.530	(0.168*w*) 1.048*w*
4806.402	(0.453*w*) 0.794, **1.105, 1.310***w*
4828.252	(. . .) 1.478*w*
4884.828	(0.00*w*) 1.104*w*
4986.922	(**0.000,** 0.484) 0.686, 1.157, **1.629**
5046.43	(0.000) 0.656
5065.37	(0.00*w*) 1.565*w*
5156.41	(**0.000,** 0.406) **1.507,** 1.891, 2.319
5161.20	(**0.000,** 0.267, 0.589) **1.052,** 1.343, 1.720, 2.045
5214.08	(0.00*w*) 1.590 *B*
5216.27	(**0.000,** 0.218) 0.924, **1.143**
5245.71	(0.00*w*) 1.353*w*
5265.16	(0.351) 0.643, 1.016
5322.80	(0.000) 1.536
5338.22	(0.00*w*) 1.025*w*
5345.15	(0.00*w*) 1.139*w*
5405.42	(0.00*w*) 1.622*w*
5438.00	(**0.000,** 0.380) **0.629,** 1.013, 1.397
5491.50	(**0.000,** 0.262, 0.532) **1.084,** 1.353, 1.623, 1.882
5504.72	(0.000) 1.773
5593.12	(0.224) 0.680, 0.903
5625.69	(**0.000,** 0.253) 1.232, 1.494, 1.743
5678.08	(0.329, **0.659**) 0.567, 0.892, 1.242, 1.584
5690.91	(**0.000,** 0.208, 0.415) 1.196, 1.454, **1.631**
5702.05	(0.00*w*) 1.064*w*
5710.53	(0.362, **0.529**) 1.275*w*
5738.27	(0.000) 1.519
5760.72	(**0.000,** 0.524) 0.649, 1.170, 1.681
5920.59	(0.00*w*) 1.402*w*
5950.25	(0.240) 1.514, 1.760
6068.93	(**0.000,** 0.243) 0.911, **1.145**
6074.98	(**0.000,** 0.139, 0.286) . . . 1.269, **1.393**
6127.49	(**0.000,** 0.309) 0.932, 1.219, **1.548**
6148.34	(0.000) 1.533
6204.86	(0.00*w*) 1.026*w*
6516.18	(0.00*w*) 0.847*w*
6665.96	(0.785) 1.525, 2.316
6718.83	(0.00*w*) 1.518*w*
6812.57	(0.168, 0.341, **0.496**) 1.131, 1,303, **1.462, 1.623,** 1.791, 1.949
6902.13	(0.00*w*) 1.715*w*
6958.78	(**0.000,** 0.151, 0.300, 0.446) **1.028,** 1.173, 1,330, 1.491
7225.81	(0.000) 2.310
7282.83	(. . . 1.042*w*, 1.459, 1.860) 0.393, **0.808***W*
7351.35	(**0.000,** 0.257, 0.527) **0.943,** 1.199, 1.472, 1.730, 1.968
7595.37	(0.309, **0.570**) 1.136, **1.435, 1.737,** 2.047
7657.94	(**0.000,** 0.874) **0.561,** 1.436, 2.316
8251.79	(0.372, **0.759**) 0.751, **1.123, 1.502,** 1.886
8414.60	(0.00*W*) 1.05*w*
8423.60	(0.00*W*) 1.03*w*
8450.62	(0.00*W*) 0.69*w*
8623.44	(**0.009,** 0.304) 1.728, **1.995**
8704.22	(0.823) **1.483,** 2.325
8793.87	(0.00*w*) 0.97*w*
8969.42	(**0.000,** 0.440) **0.713,** 1.134

The magnetic displacements, in Lorentz units, of the Zeeman components with polarization parallel to the field are given in parentheses. The displacements of the perpendicularly-polarized components follow, outside the parentheses. Bold type indicates strongest components.

The letters *A* and *B* in this table indicate the type of shading displayed by the unresolved patterns:

A indicates ⟋| |⟍,

B indicates |⟍ ⟋|,

w Wide line, usually several unresolved components,

W Very wide line.

Unresolved or incomplete patterns were treated as "blend" or "strongest line only" patterns in the calculation of g_J values.

TABLE 10.3. *Even levels of* I II

Designation	Level	g_J
$5p^4$ $^3P_2$	0. 0	1. 457
$5p^4$ $^3P_1$	7087. 0	1. 51
$5p^4$ $^3P_0$	6447. 9	
$5p^4$ $^1D_2$	13727. 2	1. 046
$5p^4$ $^1S_0$	29501. 3	
$6p$ $^5P_1$	99219. 61	2. 309
$6p$ $^5P_2$	99327. 14	1. 714
$6p$ $^5P_3$	100402. 68	1. 638
$6p$ $^3P_2$	102613. 52	1. 501
$6p$ $^3P_1$	101644. 21	1. 520
$6p$ $^3P_0$	103004. 04	
$6p'$ $^3D_1$	110006. 71	0. 915
$6p'$ $^3F_2$	111298. 09	0. 915
$6p'$ $^3D_2$	112179. 49	1. 158
$6p'$ $^3F_3$	112419. 04	1. 12
$6p'$ $^1P_1$	113812. 79	0. 985
$6p'$ $^1F_3$	114157. 21	1. 13
$6p'$ $^3P_0$	114635. 82	
$6p'$ $^3D_3$	115267. 82	1. 212
$6p'$ $^3F_4$	115353. 94	1. 29
$6p'$ $^3P_2$	115708. 45	1. 425
$6p'$ $^3P_1$	116084. 84	1. 39
$6p'$ $^1D_2$	119082. 78	1. 11
$6p''$ $^3D_1$	123520. 74	
$6p''$ $^3P_0$	125006. 38	
$6p''$ $^3P_1$	125162. 00	
$6p''$ $^3D_2$	125222. 20	0. 83 L[a]
$6p''$ $^3S_1$	128563. 14	1. 73 L
$6p''$ $^3D_3$	129431. 27	1. 32 L
$6p''$ $^3P_2$	129772. 76	
$6p''$ $^1P_1$	130824. 99	
$6p''$ $^1D_2$	131444. 69	1. 26 L
$6p''$ $^1S_0$	134363. 21	
$4f$ $^5F_5$	124742. 50	
$4f$ $^5F_4$	124683. 79	
$4f$ $^5F_3$	124711. 93	
$4f$ $^5F_2$	124783. 18	
$4f$ $^5F_1$	124841. 77	
$7p$ $^5P_1$	124950. 92	
$7p$ $^5P_2$	125084. 32	
$7p$ $^5P_3$	125483. 51	

Designation	Level	g_J
$4f$ $^3F_4$	125477. 08	
$4f$ $^3F_3$	125226. 92	
$4f$ $^3F_2$	125524. 56	0. 83 L
$7p$ $^3P_2$	126404. 16	
$7p$ $^3P_1$	126235. 91	
$7p$ $^3P_0$	127181. 90	
$5f$ $^5F_5$	135182. 87	
$5f$ $^5F_4$	135140. 95	
$5f$ $^5F_3$	135138. 51	
$5f$ $^5F_2$	135221. 58	
$5f$ $^5F_1$	135241. 72	
$5f$ $^3F_4$	135684. 08	
$5f$ $^3F_3$	135342. 60	
$5f$ $^3F_2$	135725. 82	
$8p$ $^5P_2$?	136044. 28	
$8p$ $^5P_3$?	136197. 24	
$4f'$ $^3G_4$	136090. 15	
$4f'$ $^3F_3$	136096. 79	
$4f'$ $^3D_3$	136169. 16	
$4f'$ $^3F_2$	136526. 91	
$4f'$ $^3H_5$	136752. 36	
$4f'$ $^3H_4$	136802. 13	
$4f'$ $^3D_2$	137014. 34	
$4f'$ $^3P_1$	137393. 02	
$4f'$ $^3P_2$	137640. 93	
$4f'$ $^3P_0$	138236. 41	
$4f'$ $^3G_5$	139449. 71	
$4f'$ $^3F_4$	139499. 57	
$4f'$ $^3G_3$	139691. 25	
$4f'$ $^1G_4$	139719. 12	
$4f'$ $^3D_1$	140036. 78	
$4f'$ $^1F_3$	140387. 24	
$4f'$ $^1D_2$	140492. 31	
$4f'$ $^1P_1$	140560. 53	
$7p'$ $^3D_1$	136209. 25	
$7p'$ $^3P_1$	136659. 84	
$7p'$ $^3D_3$	137360. 30	
$7p'$ $^3P_2$	137373. 06	
$7p'$ $^3F_2$	139911. 38	
$7p'$ $^3F_4$	140108. 06	
$7p'$ $^1F_3$	140163. 63	
$7p'$ $^1D_2$	140189. 27	
$7p'$ $^1P_1$	140254. 97	

Designation	Level	g_J
$7p'$ $^3P_0$	140327. 95	
$7p'$ $^3F_3$	140383. 95	
$7p'$ $^3D_2$	142039. 80	
$8p$ $^3P_2$	136700. 57	
$8p$ $^3P_1$	136408. 45	
$6f$ $^5F_5$	141088. 90	
$6f$ $^5F_4$	141073. 17	
$6f$ $^5F_3$	141080. 89	
$6f$ $^5F_2$	141094. 09 ?	
$6f$ $^3F_2$	141471. 00	
$6f$ $^3F_3$	141398. 31	
$6f$ $^3F_4$	141529. 89	
$7f$ $^5F_5$	144629. 91	
$7f$ $^5F_4$	144619. 97	
$7f$ $^5F_3$	144630. 32	
$7f$ $^3F_2$	144896. 23	
$7f$ $^3F_3$	144810. 22	
$7f$ $^3F_4$	144919. 15	
$5f'$ { $1_{2,3}$	146460. 44	
$2_{2,3}$	146973. 00	
$4f''$ $3_{2,3}$	147942. 43	
$4_{3,4}$	148646. 01	
$7p''$ $5_{2,3}$	148830. 03	
$6_{2,3,4}$	148972. 30	
$7_{2,3}$	149204. 87	
$8p'$ $8_{1,2}$	149367. 05	
$10_{2,3}$	150219. 69	
$11_{3,4}$	150251. 30	
$12_{1,2}$	150279. 40	
$13_{2,3}$ }	150648. 09	
$8f$ $^5F_5$	146922. 08	
$8f$ $^5F_4$	146938. 07	
$8f$ $^5F_3$	146934. 47	
$8f$ $^5F_2$	146949. 97	
$8f$ $^3F_3$	147054. 27	
$8f$ $^3F_4$	147147. 10	
$9f$ $^5F_5$	148516. 58 ?	
$9f$ $^5F_4$	148513. 52 ?	
$9f$ $^5F_3$	148519. 48 ?	
$9f$ $^3F_4$	148676. 16	

[a] The letter "L" following a g_J value indicates that the value is taken from Lacroute [3].

TABLE 10.4. *Odd levels of* I II

Designation	Level	g_J
$6s$ $^5S^\circ_2$	81032. 70	1. 95
$6s$ $^3S^\circ_1$	84842. 87	1. 753
$5p^5$ $^3P^\circ_2$	81907. 83	1. 54
$5p^5$ $^3P^\circ_1$	84222. 19	1. 530
$5p^5$ $^3P^\circ_0$	90404. 95	
$5d$ $^5D^\circ_0$	85384. 15	
$5d$ $^5D^\circ_1$	87734. 06	1. 472
$5d$ $^5D^\circ_2$	86164. 86	1. 434

Designation	Level	g_J
$5d$ $^5D^\circ_3$	85727. 98	1. 457
$5d$ $^5D^\circ_4$	86036. 32	1. 480
$5d$ $^3D^\circ_1$	92132. 61	0. 685
$5d$ $^3D^\circ_2$	90498. 31	1. 138
$5d$ $^3D^\circ_3$	93005. 95	1. 35
$6s'$ $^3D^\circ_1$	94825. 33	0. 653
$6s'$ $^3D^\circ_2$	93691. 35	1. 16
$6s'$ $^3D^\circ_3$	96650. 55	1. 36
$5p^5$ $^1P^\circ_1$	95955. 85	1. 05

Designation	Level	g_J
$6s'$ $^1D^\circ_2$	97700. 81	0. 996
$5d'$ $^3D^\circ_2$	97083. 30	1. 26 L[a]
$5d'$ $^3P^\circ_0$	97894. 42	
$5d'$ $^3D^\circ_3$	98175. 75	
$5d'$ $^3F^\circ_4$	99377. 47	
$5d'$ $^3F^\circ_3$	99943. 10	
$5d'$ $^3G^\circ_4$	101157. 79	
$5d'$ $^1G^\circ_4$	103101. 57	
$5d'$ $^3D^\circ_1$	104546. 19	
$5d'$ $^3F^\circ_2$	107511. 77	
$5d'$ $^3G^\circ_3$	107625. 89	

TABLE 10.4. *Odd levels of* I II—Continued

Designation	Level	g_J
5d′ $^1D^\circ_2$	108537. 50	1. 45 L
5d′ $^3S^\circ_1$	109295. 45	
5d′ $^1S^\circ_0$	111039. 06	
5d′ $^1F^\circ_3$	113392. 94	
5d′ $^3P^\circ_2$	114482. 59	
5d′ $^1P^\circ_1$	114897. 43	
5d′ $^3P^\circ_1$	118074. 09	
6s″ $^3P^\circ_0$	105200. 97	
6s″ $^3P^\circ_1$	106103. 28	
6s″ $^3P^\circ_2$	110458. 93	
6s″ $^1P^\circ_1$	111961. 58	
5d″ $^1D^\circ_2$	113367. 99	
5d″ $^3D^\circ_3$	113656. 16	
5d″ $^3P^\circ_2$	117935. 41	
5d″ $^3D^\circ_2$	119321. 09	
5d″ $^3D^\circ_1$	121075. 75	1. 443
5d″ $^3F^\circ_3$	121195. 57	1. 17 L
5d″ $^3F^\circ_2$	122778. 31	
5d″ $^1F^\circ_3$	123580. 02	
5d″ $^3P^\circ_0$	125040. ?	
5d″ $^1P^\circ_1$	127890. 23	0. 89 L
5d″ $^3P^\circ_1$	132734. 92	
7s $^5S^\circ_2$	118607. 56	1. 894
7s $^3S^\circ_1$	119888. 77	
6d $^5D^\circ_0$	121701. 69	
6d $^5D^\circ_1$	122243. 58	1. 466
6d $^5D^\circ_2$	121818. 65	1. 453
6d $^5D^\circ_3$	121778. 34	1. 424
6d $^5D^\circ_4$	121826. 09	1. 476
6d $^3D^\circ_3$	125288. 29	1. 28
6d $^3D^\circ_2$	125247. 50	1. 095
6d $^3D^\circ_1$	125339. 01	0. 674
7s′ $^3D^\circ_1$	130615. 21	
7s′ $^3D^\circ_2$	130617. 58	
7s′ $^3D^\circ_3$	133550. 54	1. 23 L
8s $^5S^\circ_2$	132837. 24	
8s $^3S^\circ_1$	133297. 08	
6d′ 1°_2	133299. 80	
6d′ 2°_3	133955. 51	1. 16
6d′ 3°_3	134023. 88	0. 81
6d′ 4°_0	134235. 94	
6d′ 5°_1	134913. 96	
6d′ $6^\circ_{1,2}$	136443. 37	
6d′ $7^\circ_{1,2}$	136561. 79	
6d′ 8°_4	136733. 42	1. 21
6d′ 9°_3	137505. 08	1. 24 L
6d′ 10°_2	138316. 49	1. 27 L
6d′ 11°_0	138364. 08	
6d′ 12°_1	138977. 84	
6d′ $13^\circ_{1,2}$	139551. 74	1. 09 L
6d′ 14°_3	139634. 07	1. 04 L
6d′ 15°_1	140500. 35	
7s′ $^1D^\circ_2$	134037. 06	1. 02 L
7d $^5D^\circ_0$	134501. 34	
7d $^5D^\circ_1$	134546. 93	
7d $^5D^\circ_2$	134369. 52	
7d $^5D^\circ_3$	134441. 71	
7d $^5D^\circ_4$	134502. 39	

Designation	Level	g_J
7d $^3D^\circ_3$	135584. 94	
7d $^3D^\circ_2$	134960. 14	
7d $^3D^\circ_1$	136187. 03	
5g $^5G^\circ_6$	136623. 34	
5g $^5G^\circ_5$	136573. 00	
5g $^5G^\circ_4$	136580. 12	
5g $^5G^\circ_3$	136613. 38	
5g $^5G^\circ_2$	136632. 59	
5g $^3G^\circ_5$	136623. 74	
5g $^3G^\circ_4$	136595. 35	
5g $^3G^\circ_3$	136633. 77	
9s $^5S^\circ_2$	139957. 94	
9s $^3S^\circ_1$	140125. 66	
8d $^5D^\circ_0$	140863. 42	
8d $^5D^\circ_1$	140887. 40	
8d $^5D^\circ_2$	140870. 64	
8d $^5D^\circ_3$	140879. 23	
8d $^5D^\circ_4$	140889. 98	
8d $^3D^\circ_1$	141520. 48	
8d $^3D^\circ_2$	141463. 16	
8d $^3D^\circ_3$	141634. 22	
6g $^5G^\circ_6$	142028. 75	
6g $^5G^\circ_5$	142018. 43	
6g $^5G^\circ_4$	142018. 60	
6g $^5G^\circ_3$	142022. 92	
6g $^5G^\circ_2$	142033. 75	
6g $^3G^\circ_5$	142030. 64	
6g $^3G^\circ_4$	142023. 04	
6g $^3G^\circ_3$	142035. 14	
7s″ $^3P^\circ_0$	143067. 20	
7s″ $^3P^\circ_1$	143246. 49	
10s $^5S^\circ_2$	144023. 57	
10s $^3S^\circ_1$	144182. 29	
9d $^5D^\circ_3$	144587. 78	
9d $^5D^\circ_4$	144591. 35 ?	
9d $^3D^\circ_2$	144832. 02	
9d $^3D^\circ_3$	144964. 91	
8s′ $^3D^\circ_1$	144641. 34	
8s′ $^3D^\circ_2$	144677. 46	
7g $^5G^\circ_6$	145289. 63	
7g $^5G^\circ_5$	145282. 77	
7g $^5G^\circ_4$	145283. 23	
7g $^5G^\circ_3$	145285. 87	
7g $^5G^\circ_2$	145292. 52	
7g $^3G^\circ_5$	145291. 03	
7g $^3G^\circ_4$	145285. 17	
7g $^3G^\circ_3$	145293. 69	
6d″, 7d′ { $20^\circ_{1,2}$	145837. 74	
21°_1	146291. 96	
$24^\circ_{1,2}$	146481. 11	
$25^\circ_{1,2}$	146784. 94	
26°_3	146850. 17	
29°_1	147020. 40	

Designation	Level	g_J
11s $^5S^\circ_2$	146577. 46	
11s $^3S^\circ_1$	146589. 32	
10d $^3D^\circ_2$?	147141. 92	
10d $^3D^\circ_3$	147307. 25	
6d″, 7d′, 7s″, 8s′, 5g′ { 30°_2	147242. 50	
31°_0	147356. 42	
32°_1	147792. 67	
33°_3	147824. 13	
33.5°_1	147863. 97	
34°_2	147987. 56	
$35^\circ_{2,3}$	148079. 42	
36°_2	148307. 35	
37°_2	148656. 42	
38°_1	148898. 91	
39°_4	149266. 12	
40°_3	149481. 13	
8g $^5G^\circ_6$	147405. 72	
8g $^5G^\circ_5$	147400. 79	
8g $^5G^\circ_4$	147401. 38	
8g $^5G^\circ_3$	147403. 79	
8g $^5G^\circ_2$	147408. 13	
8g $^3G^\circ_5$	147406. 74	
8g $^3G^\circ_4$	147404. 11	
8g $^3G^\circ_3$	147409. 54	
12s $^3S^\circ_1$	148354. ?	
11d $^3D^\circ_3$	148700. 85	
9g $^5G^\circ_6$	148856. 10	
9g $^5G^\circ_5$	148852. 11	
9g $^5G^\circ_4$	148853. 15 ?	
9g $^5G^\circ_3$	148854. 55	
9g $^5G^\circ_2$	148857. 98	
9g $^3G^\circ_5$	148856. 65	
9g $^3G^\circ_4$	148854. 34	
9g $^3G^\circ_3$	148858. 89 ?	
12d $^3D^\circ_3$	149644. 47	
10g $^5G^\circ_6$	149892. 90	
6d″, 7d′, 5g′ { $41^\circ_{1,2,3}$	149866. 64 ?	
42°_2	150002. 97	
$43^\circ_{1,2}$	150219. 03	
$44^\circ_{2,3}$	150324. 10	
$45^\circ_{1,2}$	150345. 98	
46°_2	150366. 61	
$47^\circ_{1,2}$	150486. 29	
$48^\circ_{1,2}$	150594.	
$49^\circ_{1,2}$	151744.	
$50^\circ_{3,4}$	151917. 75	
$51^\circ_{1,2,3}$	152199.	
13d $^3D^\circ_3$	150608. ?	
11g $^5G^\circ_6$	150659. 78	
14d $^3D^\circ_3$	151192. ?	
12g $^5G^\circ_6$	151242. 53	

(Paper 64A6–68)

[a] The letter "L" following a g_J value indicates that the value is taken from Lacroute [3].