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Weighted oscillator strengths for the Xe IV spectrum

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Abstract

The weighted oscillator strengths, *gf*, of 769 previously reported classified spectral lines, and 49 new observed and also classified lines belonging to the $5s^25p^3$, $5s5p^4$, $5s^25p^2(6p + 4f)$, and $5s^25p^2(5d + 6s)$ transitions array in Xe IV, were determined through a multiconfigurational Hartree–Fock relativistic approach. In this calculation, the electrostatic parameters were optimized by a least-square procedure in order to improve the adjustment to experimental energy levels.

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Contents

1. Introduction . . . 141
2. Calculation . . . 142
3. Experiment . . . 142
4. Results and discussion . . . 142
References . . . 143
Explanation of Tables . . . 145
Tables
1. Weighted oscillator strengths for the known classified spectral lines . . . 146
2. New classified lines in Xe IV . . . 158
3. Comparison between experimental and theoretical gA_{ij} values . . . 159

1. Introduction

The importance of accurate atomic data such as radiative lifetimes and transition probabilities for many fields of physics is well known. For example, the transition probabilities are needed for direct analysis of stellar chemical compositions [1] and for calculating the energy transport through the star in model atmospheres [2]. These data are needed for many chemical elements with several ion stages and for a vast number of transitions. Accurate values of oscillator strengths are also useful for laser physics [3].

To obtain reliable *gf* values for atomic lines, extensive tables of semiempirical values for these data were used [4]. The analysis of the spectrum of planetary nebula NGC 7027 by Péquignot and Baluteau [5] has stimulated the calculation of transition probabilities for a number of forbidden lines of astrophysical interest [6]. In particular, krypton, xenon, and other elements belonging to rows 4, 5, and 6 of the periodic table were found. Calculation of collisional data were also published [7] for detection of collisionally excited lines of krypton, xenon (Xe III, Xe IV and Xe VI), and barium (Ba II, Ba IV) ions in the spectrum of NGC 7027. Recently, emission lines of Kr III, IV, V, Xe III, IV, and V in a sample of planetary nebulae were identified [8].

Three-times ionized xenon, Xe IV, belongs to the antimony isoelectronic sequence. The spectra of ions along this sequence have been the subject of considerable work over many years. All levels of the ground and the first excited configurations were revised and completed by Di Rocco et al. [9]. A study of the $5s^25p^2(5d + 6s)$ configurations in Xe IV was later reported by Reyna Almandos et al. [10], where the $5s5p^4$ configuration was included in the analysis to take into account the strong interaction between this configuration and $5s^25p^25d$. The investigation was supported by Hartree–Fock (HF) calculations, together with Rydberg series configuration-interaction (CI) considering $5s^25p^26d$. All of the CI integrals were held fixed in the least-squares fit calculation at 0.85 of their scaled HF values, except for $5s5p^4$–$5s^25p^25d$, where the value was 0.81. The reported standard deviation in the least-squares fitting for the 31 observed levels was 325 cm^{-1}.

A newly revised and extended analysis of the $5s^25p^3$, $5s5p^4$, $5s^25p^2(5d + 6s)$ configurations of this ion was reported by Tauheed et al. [11], who also used CI calculations for the even parity configurations to interpret the observed spectrum. In the least-squares fitting procedure of that work, the parameters E_{av} and ζ for $5s^25p^26d$ were fixed at 100% of the HF values, and F^k, G^k, and R^k were fixed at 85%. In this calculation the ratios $R^1(5p5p,5s5d)/R^1(5p5p,5s6s)$ and $R^2(5p5d,5p6s)/R^1(5p5d,5p6s)$ were kept at the corresponding HF ratios. The standard deviation for the 42 known levels was 156 cm^{-1}.

Using spectra recorded from 570 to 6900 Å, 45 new energy level values for the $5s^25p^2(6p + 4f)$ configurations of Xe IV were reported by Gallardo et al. [12]. Least squares fitted parametric calculations involving CI were carried out to interpret the observed spectra. All of the CI integrals were held fixed in the calculation at 0.85 of the HF values, except for $5s^25p^3$–$5s^25p^24f$ that was optimized and fixed at 0.74 of its HF value. The reported standard deviation for the 45 observed levels was 244 cm^{-1}.

Experimental and theoretical values of transition probabilities have been published [13–16] for Xe II, Xe III, and Xe IV, respectively. In Ref. [16], the authors report experimental determination of transition probabilities of lines corresponding to the $(6p + 4f)$–$(5d + 6s)$ array of Xe IV, and their composition with the semiempirical calculation by least-squares fitting. In that paper, HF calculations and LS fitting were made, including the $5s^25p^3$, $5s^25p^2(6p + 4f)$ odd parity configurations, and the $5s5p^4$, $5s^25p^2(6s + 7s)$, $5s^25p^2(5d + 6d)$ even configurations, where the 7s and 6d electrons were considered to take into account Rydberg series configuration interactions in the calculation. The authors made different calculations linking

similar free parameters among them, such that the ratios were kept at the corresponding HF ratios. The authors report that the standard deviation was on the order of 250 cm^{-1}. For the odd configurations, they made least-squares fitting calculations starting from the values of Gallardo et al. [12], with final values similar to the initial ones.

Recently, results concerning the spectra of Xe IV were compiled by Saloman [17 and references cited therein] including the $5s^25p^3$, $5s^25p^26p$, $5s^25p^24f$, $5s5p^4$, $5s^25p^25d$, and $5s^25p^26s$ configurations.

The purpose of the present work is to report the weighted oscillator strengths and cancellation factor (CF), as shown in Table 1, calculated from fitted values of the energy parameters of all the 769 dipole electric lines belonging to the Xe IV spectrum reported in the work of Saloman [17], and including in Table 2, 49 new classified lines. Hartree–Fock relativistic (HFR) calculations and parametric fits were used. It is important to note that all sources of lines in the list of Saloman [17], except those from Refs. [11,18], involve the work of our group in La Plata.

2. Calculation

The weighted electric dipole oscillator strengths listed in Table 1 are given by the formula

$$gf = (3.0376 \times 10^{-6})\sigma \mathbf{S} \tag{1}$$

where gf is dimensionless with g the statistical weight of the initial state. σ is the energy of the transition in wave numbers (cm^{-1}) and the total electric dipole line strength is defined as

$$\mathbf{S} = |\langle \gamma \mathbf{J} \| \mathbf{P}^1 \| \gamma' \mathbf{J}' \rangle|^2 \tag{2}$$

$\mathbf{P}^1$ is the reduced radial dipole matrix element in atomic units [19].

To obtain gf, we need to calculate Eq. (2) first, or its square root

$$\mathbf{S}^{1/2}_{\gamma\gamma'} = \langle \gamma \mathbf{J} \| \mathbf{P}^1 \| \gamma' \mathbf{J}' \rangle \tag{3}$$

In a multiconfigurational calculation we have to expand the wavefunction $|\gamma \mathbf{J}\rangle$ in terms of single configuration wavefunctions, $|\beta \mathbf{J}\rangle$, for both upper and lower levels, just as is done by

$$|\gamma \mathbf{J}\rangle = \sum_{\beta} \gamma^{\gamma}_{\beta J} |\beta \mathbf{J}\rangle \tag{4}$$

Therefore, we can have the multiconfigurational expression for $\mathbf{S}^{1/2}_{\gamma\gamma'}$

$$\mathbf{S}^{1/2}_{\gamma\gamma'} = \sum_{\beta} \sum_{\beta'} \gamma^{\gamma}_{\beta J} \langle \beta \mathbf{J} \| \mathbf{P}^1 \| \beta' \mathbf{J}' \rangle \gamma^{\gamma'}_{\beta' J'} \tag{5}$$

Our multiconfigurational approach included the 5s $5p^4$, $5s^25p^2(5d + 6d + 6s + 7s)$ configurations for even parity and the $5s^25p^3$, $5s^25p^2(6p + 4f)$ for odd parity.

In order to obtain the best values for oscillator strengths, we calculated the reduced matrix elements $\mathbf{P}^1$ using optimized values for $\gamma^{\gamma}_{\beta J}$ and $\gamma^{\gamma'}_{\beta' J'}$, which were obtained using as inputs to the matrix calculation Cowan's code, RCG Mod 10 [19], the energy parameters which were adjusted from a least-square calculation (RCE Mod 19 [19]). In this adjustment, the code tries to fit experimental energy values, varying the electrostatic parameters. This procedure also improved σ values used in Eq. (1).

Taking into account that Eq. (5) represents a mixing of amplitudes rather than of line strengths themselves, it is worthwhile evaluating the cancellation factor, which is a measure of the destructive interference effect caused by this mixing of amplitudes of basis functions [19], i.e.,

$$\mathrm{CF} = \left[\left| \sum_{\beta} \sum_{\beta'} \gamma^{\gamma}_{\beta J} \langle \beta \mathbf{J} \| \mathbf{P}^1 \| \beta' \mathbf{J}' \rangle \gamma^{\gamma'}_{\beta' J'} \right| \Big/ \sum_{\beta} \sum_{\beta'} \left| \gamma^{\gamma}_{\beta J} \langle \beta \mathbf{J} \| \mathbf{P}^1 \| \beta' \mathbf{J}' \rangle \gamma^{\gamma'}_{\beta' J'} \right| \right]^2 \tag{6}$$

In Tables 1 and 2, the "*" label refers to lines with cancellation factors less than 0.05, as this fact may reflect errors in the estimation of theoretical f values. We also note that, the gA values shown in Table 3 are calculated through the formula $gA = 0.66702 \times \sigma^2 gf$ (s^{-1}) taken from Ref. [19].

3. Experiment

The 49 new classified lines presented in Table 2 are based on photographic recordings of the spectra of Xe IV between 280 and 6800 Å. The spectra were obtained in La Plata using a capillary pulsed discharge and the experimental procedure was described elsewhere [20,21]. The plates from the capillary tube were measured with a Grant semiautomatic comparator. The uncertainty in the determination of the wavelength of unperturbed lines is estimated to be ±0.01 Å in the first diffraction order for the visible region, and in the order of ±0.02 Å for the VUV region. The intensities of the observed lines are based on visual estimates.

4. Results and discussion

Several *ab initio* calculations were made to obtain the energy parameters for the even and odd configurations. To build the energy matrix, the $5s5p^4 + 5s^25p^2(5d + 6d) + 5s^25p^2(6s + 7s)$ and the $5s^25p^3 + 5s^25p^2(6p + 4f) + 5s^25p^2(7p + 5f) + 5s5p^35d + 5s5p^36s + 5s^05p^5$ configurations for the even and odd parities, respectively, were initially considered. Least-squares calculations were also made for both parities. For the even parity, all of the experimental level values of the $5s^25p^26d$, $5s^25p^27s$ are unknown, and due to this, all parameters of these even configurations were held fixed in the least-squares fit calculations, but the introduction of the Rydberg series CI reduces the discrepancy between observed and calculated level values. To obtain a better estimation for the average energy corresponding to the $5s^25p^26d$ and $5s^25p^27s$ isonuclear and isoelectronic sequences were

used. The results, 253100 and 257000 cm^{-1}, respectively, were in good agreement with the value obtained, adding the experimental average energy belonging to the ground configuration to the *ab initio* HF values for such configurations. In this calculation, the Slater integrals and spin orbital parameters for the known configurations were set free. The configuration interaction integrals were fixed at 0.85 of their HF values, except the $5p^4$–$5s^25p^26s$, $5s^25p^25d$ and $5s^25p^26s$–$5s^25p^25d$ integrals that were set at 0.70 and 0.80, respectively. These scaling factors were adopted because they agree well with the fit to the energy levels. The standard deviation was 151 cm^{-1}. These results were in good agreement with the parameter values published by Tauheed et al. [11] except that they did not consider the $5s^25p^27s$ configuration in their calculation.

For the odd parity calculations, significant interaction values result only between the $5s5p^35d$ and $5s^05p^5$ configurations (this lasts through $5s^25p^3$), and the experimentally known configurations. For this reason, in the preliminary calculation, the last two configurations were considered together with the experimentally known configuration data in the energy matrix.

In our calculations, electrostatic parameters, optimized by a least-square procedure to improve the adjustment to experimental energy levels, were used. This was done to obtain the weighted oscillator strengths for the 769 known and the 49 new classified spectral lines. The calculations were carried out in the LS representation [19] and for this ion the eigenvector composition for the energy levels show that they are very mixed, as can also be seen in the papers of Gallardo et al. [12], Reyna Almandos et al. [10], and Tauheed et al. [11].

To reduce the number of lines with a low CF, a new and final calculation of weighted oscillator strengths considering only the experimentally known configurations for the odd parity was done, as shown in the last column of Table 1. The energy parameters used in the calculation for this parity were in accordance with the parameter values reported in the work of Gallardo et al. [12]. The $\log gf$ values shown in the last column of Table 1 correspond to transitions where the first eigenvector percentage composition value for the energy levels was considered in the calculation. The weighted oscillator strengths that were included in the calculation for the $5s5p^4 + 5s^25p^2(5d + 6d) + 5s^25p^2(6s + 7s)$ and $5s^25p^3 + 5s^25p^2(6p + 4f)$ configurations are presented in Tables 1 and 2.

In order to compare the results presented in this work with those from Bertuccelli et al. [16], we show in Table 3 the measured gA_{ij}(ex.) values (in units of 10^8s) and the $gA_{ij}(ex.)/gA_{ij}$(th.) ratio for experimental (ex.) and theoretical (th.) values from Ref. [16], together with those from our calculation. In an attempt to sort out the huge differences between theory and experiment for some values in column A of Table 3, the mixing in the eigenvector percentage composition for the Xe IV energy levels in the LS coupling [10–12] was considered. For instance, the line with wavelength in 3083.05 Å is classified as $(^3P)5d\ ^4P_{3/2}$–$(^3P)6p\ ^2S_{1/2}$. The $(^3P)6p\ ^2S_{1/2}$ energy level is very mixed with the $(^3P)6p\ ^4P_{1/2}$ and $(^3P)6p\ ^4D_{1/2}$ energy levels [12]. Considering the calculation of the second eigenvector composition for the $(^3P)6p\ ^2S_{1/2}$ level, the gA_{ij}(ex.)/gA_{ij}(th.) value is reduced from 28.70, obtained using the first eigenvector composition, to 14.81, as can be seen in column B of Table 3.

The 3103.23 Å line is classified as $(^3P)5d\ ^4P_{5/2}$–$(^3P)4f\ ^4F_{3/2}$. The later energy level is very mixed with the $(^3P)6p\ ^4D_{3/2}$ and the $(^3P)4f\ ^2D_{3/2}$ energy levels [12], and, considering this mixing, the gA_{ij}(ex.)/gA_{ij}(th.) ratio is reduced from 14.00 to 5.69, as shown in column B of Table 3. The above-mentioned mixing for the $(^3P)4f\ ^4F_{3/2}$ energy level also affects the calculated $\log gf$ value corresponding to the 3285.98 Å line, classified as $(^3P)5d\ ^4P_{3/2}$–$(^3P)4f\ ^4F_{3/2}$. Through the interpretation of this mixing, it is possible to reduce the gA_{ij}(ex.)/gA_{ij}(th.) ratio from 5.90 to 2.76 value shown in column B. It was not possible to reduce some other differences between theory and experiment shown in column A because the inclusion of the second or third eigenvector percentage composition corresponding to the energy level did not significantly affect the resulting value.

To obtain an assessment of the error, the sum of the squared errors defined as $\sum\{gA_{ij}(\text{ex.}) - gA_{ij}(\text{th.})\}^2$ gives 57.71 for column A, and 54.11 for column B. The mean values of the samples taken from columns A and B gives 5.17 and 3.18, respectively. The dispersion for the samples are 9.13 in column A and 3.73 in column B. It is possible to conclude that, in spite of the equivalent results in the sum of squared values, the obtained mean value and dispersion in our calculation are lower and closer to the better fit than the obtained values using data from Ref. [16]. In addition, it is also important to consider that in our calculations, the standard deviation obtained in the least squares fitting for the radial parameters in the even parity configurations was 151 cm^{-1}, compared with the 250 cm^{-1} from Ref. [16], and that our parameter values are in better agreement with the scaled Hartree–Fock values.

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Explanation of Tables

Table 1. **Weighted oscillator strengths for the known classified spectral lines**

λ_{obs}	Observed wavelength in vacuum of the transition, given in Å and taken from Ref. [17]
σ_{obs}	Observed wavenumber of the transition, given in cm^{-1}
Transition	Classification between the lower and upper states
Int. and shapes	The observed lines intensities and shapes taken from Ref. [17] The superscripts corresponds to blended line (b); hazy line (h); double classification (a)
log(*gf*)	Logarithm of the weighted oscillator strengths The superscript d in the last column corresponds to the calculation that includes the $5s5p^4 + 5s^25p^2(5d + 6d) + 5s^25p^2(6s + 7s)$ and the $5s^25p^3 + 5s^25p^2(6p + 4f)$ configurations The superscript * means lines with low cancellation factor

Table 2. **New classified lines in Xe IV**

λ_{obs}	New observed wavelength in air of the transition, given in Å
Transition	Classification between the lower and upper states
σ_{obs}	Observed wavenumber of the transition, given in cm^{-1}
σ_{cal}	Calculated wavenumber of the transition from the level values given in Ref. [17] by means of the Ritz combination principle. Only that part which differs from the observed value is given
Int. and shapes	The observed line intensities from visual estimation and shapes The superscript b corresponds to a blended line
log(*gf*)	Logarithm of the weighted oscillator strengths The superscript d corresponds to the calculation that includes the $5s5p^4 + 5s^25p^2(5d + 6d) + 5s^25p^2(6s + 7s)$ and the $5s^25p^3 + 5s^25p^2(6p + 4f)$ configurations The superscript * means lines with low cancellation factors

Table 3. **Comparison between experimental and theoretical gA_{ij} values**

λ_{obs}	Observed wavelength in air of the transition, given in Å and taken from Ref. [17]
Transition	Classification between the lower and upper states
gAij(ex.)	Taken from Ref. [16]
gA_{ij}(ex.)/gA_{ij}(th.)	Column A: Ratio obtained using the theoretical values from Ref. [16]
gA_{ij}(ex.)/gA_{ij}(th.)	Column B: Ratio obtained using the theoretical values from this work

Table 1
Weighted oscillator strengths for the known classified spectral lines. See page 145 for Explanation of Tables

λ_{obs} in vacuum (Å)	σ_{obs} (cm^{-1})	Transition	Int. and shape	log(gf)[d]
525.305	190365.6	$5s^25p^3\ ^4S_{3/2}$–$5s^25p^2(^1S)5d\ ^2D_{3/2}$	5	−2.699*
558.65	1790003.	$5s^25p^3\ ^4S_{3/2}$–$5s^25p^2(^1D)5d\ ^2D_{5/2}$	0.5	−2.151*
571.421	175002.3	$5s^25p^3\ ^2D_{3/2}$–$5s^25p^2(^1D)5d\ ^2S_{1/2}$	6	−0.978*
574.656	174017.2	$5s^25p^3\ ^2P_{1/2}$–$5s^25p^2(^1S)6s\ ^2S_{1/2}$	30	−0.710
577.295	173222.	$5s^25p^3\ ^4S_{3/2}$–$5s^25p^2(^3P)6s\ ^2P_{3/2}$	−1	−1.408*
578.399	172891.0	$5s^25p^3\ ^4S_{3/2}$–$5s^25p^2(^1D)5d\ ^2P_{1/2}$	5	−1.377*
578.780	172777.2	$5s^25p^3\ ^2D_{3/2}$–$5s^25p^2(^1D)6s\ ^2D_{5/2}$	20	−0.525
579.653	172517.0	$5s^25p^3\ ^2D_{5/2}$–$5s^25p^2(^1S)5d\ ^2D_{5/2}$	6	−1.094*
586.555	170487.0	$5s^25p^3\ ^4S_{3/2}$–$5s^25p^2(^3P)6s\ ^4P_{5/2}$	45	0.078
591.709	169002.0	$5s^25p^3\ ^4S_{3/2}$–$5s^25p^2(^3P)5d\ ^2D_{5/2}$	2	−1.143*
593.349	168534.9	$5s^25p^3\ ^2D_{5/2}$–$5s^25p^2(^1D)6s\ ^2D_{5/2}$	20	−0.583
598.073	167203.7	$5s^25p^3\ ^4S_{3/2}$–$5s^25p^2(^3P)6s\ ^2P_{1/2}$	20	−0.417
600.940	166406.0	$5s^25p^3\ ^2P_{3/2}$–$5s^25p^2(^1S)6s\ ^2S_{1/2}$	20	−1.394*
602.440	165991.6	$5s^25p^3\ ^4S_{3/2}$–$5s5p^4\ ^2P_{3/2}$	25	−0.678
603.38	165733.	$5s^25p^3\ ^2D_{3/2}$–$5s^25p^2(^1D)5d\ ^2D_{5/2}$	8	−0.565
605.042	165277.8	$5s^25p^3\ ^4S_{3/2}$–$5s^25p^2(^3P)6s\ ^4P_{3/2}$	55	−0.204
605.842	165059.5	$5s^25p^3\ ^2D_{5/2}$–$5s^25p^2(^1D)5d\ ^2P_{3/2}$	6	0.259
607.231	164682.0	$5s^25p^3\ ^2D_{3/2}$–$5s5p^4\ ^2P_{1/2}$	2	−0.914
611.274	163592.8	$5s^25p^3\ ^4S_{3/2}$–$5s^25p^2(^3P)5d\ ^2D_{3/2}$	20	−0.678
614.002	162865.9	$5s^25p^3\ ^4S_{3/2}$–$5s^25p^2(^3P)5d\ ^4P_{1/2}$	65	0.439
614.044	162854.8	$5s^25p^3\ ^2D_{3/2}$–$5s^25p^2(^1D)5d\ ^2D_{3/2}$	65	0.700
614.351	162773.4	$5s^25p^3\ ^2D_{3/2}$–$5s^25p^2(^3P)5d\ ^2F_{5/2}$	60	0.713
616.028	162330.3	$5s^25p^3\ ^2P_{1/2}$–$5s^25p^2(^1S)5d\ ^2D_{3/2}$	52	0.619
619.249	161485.9	$5s^25p^3\ ^2D_{5/2}$–$5s^25p^2(^1D)5d\ ^2D_{5/2}$	55	0.401
619.449	161433.8	$5s^25p^3\ ^4S_{3/2}$–$5s^25p^2(^3P)5d\ ^4P_{3/2}$	70	0.766
623.406	160409.1	$5s^25p^3\ ^2D_{5/2}$–$5s^25p^2(^3P)5d\ ^2F_{7/2}$	75	1.176
624.086	160234.3	$5s^25p^3\ ^2P_{1/2}$–$5s^25p^2(^1D)5d\ ^2S_{1/2}$	5	−0.855
625.177	159954.7	$5s^25p^3\ ^2D_{3/2}$–$5s^25p^2(^3P)6s\ ^2P_{3/2}$	40[b]	−0.888*
626.402	159641.9	$5s^25p^3\ ^4S_{3/2}$–$5s^25p^2(^3P)5d\ ^4P_{5/2}$	85	0.973
626.473	159623.8	$5s^25p^3\ ^2D_{3/2}$–$5s^25p^2(^1D)5d\ ^2P_{1/2}$	50	0.442
630.473	158611.1	$5s^25p^3\ ^2D_{5/2}$–$5s^25p^2(^1D)5d\ ^2D_{3/2}$	50	0.012
630.797	158529.6	$5s^25p^3\ ^2D_{5/2}$–$5s^25p^2(^3P)5d\ ^2F_{5/2}$	65	0.725
636.051	157220.1	$5s^25p^3\ ^2D_{3/2}$–$5s^25p^2(^3P)6s\ ^4P_{5/2}$	65	0.199
636.117	157203.8	$5s^25p^3\ ^4S_{3/2}$–$5s^25p^2(^3P)6s\ ^4P_{1/2}$	60	−0.152
642.123	155733.4	$5s^25p^3\ ^2D_{3/2}$–$5s^25p^2(^3P)5d\ ^2D_{5/2}$	75	0.588
642.215	155711.1	$5s^25p^3\ ^2D_{5/2}$–$5s^25p^2(^3P)6s\ ^2P_{3/2}$	60	0.369
646.339	154717.6	$5s^25p^3\ ^2P_{3/2}$–$5s^25p^2(^1S)5d\ ^2D_{3/2}$	50	0.139
647.110	154533.2	$5s^25p^3\ ^2P_{1/2}$–$5s^25p^2(^1D)5d\ ^2P_{3/2}$	60	0.413
647.764	154377.2	$5s^25p^3\ ^2P_{3/2}$–$5s^25p^2(^1S)5d\ ^2D_{5/2}$	75	1.013
649.614	153937.6	$5s^25p^3\ ^2D_{3/2}$–$5s^25p^2(^3P)6s\ ^2P_{1/2}$	50	−0.393
653.695	152976.5	$5s^25p^3\ ^2D_{5/2}$–$5s^25p^2(^3P)6s\ ^4P_{5/2}$	80	0.350
654.765	152726.6	$5s^25p^3\ ^2D_{3/2}$–$5s5p^4\ ^2P_{3/2}$	65	0.306
655.220	152620.5	$5s^25p^3\ ^2P_{3/2}$–$5s^25p^2(^1D)5d\ ^2S_{1/2}$	55	0.576
657.83	152015.	$5s^25p^3\ ^2D_{3/2}$–$5s^25p^2(^3P)6s\ ^4P_{3/2}$	0.5	−1.997*
658.333	151898.8	$5s^25p^3\ ^2P_{3/2}$–$5s^25p^2(^1D)6s\ ^2D_{3/2}$	40	0.557
660.111	151489.7	$5s^25p^3\ ^2D_{5/2}$–$5s^25p^2(^3P)5d\ ^2D_{3/2}$	50	0.254
663.410	150736.3	$5s^25p^3\ ^4S_{3/2}$–$5s5p^4\ ^2S_{1/2}$	20	−1.857*
664.912	150395.8	$5s^25p^3\ ^2P_{3/2}$–$5s^25p^2(^1D)6s\ ^2D_{5/2}$	25	−0.174
665.212	150328.0	$5s^25p^3\ ^2D_{3/2}$–$5s^25p^2(^3P)5d\ ^2D_{3/2}$	70	0.306
667.049	149914.0	$5s^25p^3\ ^2P_{1/2}$–$5s5p^4\ ^2P_{1/2}$	65	−1.408*
668.462	149597.1	$5s^25p^3\ ^2D_{3/2}$–$5s^25p^2(^3P)5d\ ^4P_{1/2}$	25[b]	−1.047
672.565	148684.5	$5s^25p^3\ ^4S_{3/2}$–$5s^25p^2(^3P)5d\ ^4D_{5/2}$	75	−0.207
673.480	148482.5	$5s^25p^3\ ^2D_{5/2}$–$5s5p^4\ ^2P_{3/2}$	70	0.254
674.906	148168.8	$5s^25p^3\ ^2D_{3/2}$–$5s^25p^2(^3P)5d\ ^4P_{3/2}$	30	−3.836*
675.284	148085.8	$5s^25p^3\ ^2P_{1/2}$–$5s^25p^2(^3P)5d\ ^4D_{3/2}$	30	−2.366*
676.742	147766.8	$5s^25p^3\ ^2D_{5/2}$–$5s^25p^2(^3P)6s\ ^4P_{3/2}$	25	−1.758*
680.647	146919.0	$5s^25p^3\ ^2P_{3/2}$–$5s^25p^2(^1D)5d\ ^2P_{3/2}$	35	−1.205*
683.180	146374.3	$5s^25p^3\ ^2D_{3/2}$–$5s^25p^2(^3P)5d\ ^4P_{5/2}$	35	−0.557
683.971	146205.0	$5s^25p^3\ ^4S_{3/2}$–$5s^25p^2(^3P)5d\ ^4D_{3/2}$	70	−0.725
684.543	146082.9	$5s^25p^3\ ^2D_{5/2}$–$5s^25p^2(^3P)5d\ ^2D_{3/2}$	75	0.254
688.784	145183.4	$5s^25p^3\ ^2P_{1/2}$–$5s^25p^2(^3P)6s\ ^2P_{3/2}$	45	−0.611
689.147	145107.	$5s^25p^3\ ^4S_{3/2}$–$5s^25p^2(^3P)5d\ ^4D_{1/2}$	0	−2.531*
690.33	144858.	$5s^25p^3\ ^2P_{1/2}$–$5s^25p^2(^1D)5d\ ^2P_{1/2}$	4	−2.736*

Table 1 (*continued*)

λ_{obs} in vacuum (Å)	σ_{obs} (cm^{-1})	Transition	Int. and shape	log(*gf*)[d]
694.756	143935.4	$5s^25p^3\ ^2D_{3/2}$–$5s^25p^2(^3P)6s\ ^4P_{1/2}$	40	−1.117
697.607	143347.2	$5s^25p^3\ ^2P_{3/2}$–$5s^25p^2(^1D)5d\ ^2D_{5/2}$	50	−0.197
698.552	143153.3	$5s^25p^3\ ^2D_{5/2}$–$5s^25p^2(^1D)5d\ ^2G_{7/2}$	80[b]	−0.284
703.583	142129.6	$5s^25p^3\ ^2D_{5/2}$–$5s^25p^2(^3P)5d\ ^4P_{5/2}$	60	−0.314
705.094	141825.1	$5s^25p^3\ ^4S_{3/2}$–$5s^25p^2(^1D)5d\ ^2F_{5/2}$	65	−0.868
711.896	140470.0	$5s^25p^3\ ^2P_{3/2}$–$5s^25p^2(^1D)5d\ ^2D_{3/2}$	2	−2.393*
718.54	139171.1	$5s^25p^3\ ^2P_{1/2}$–$5s^25p^2(^3P)6s\ ^2P_{1/2}$	8	−2.811*
722.798	138351.2	$5s^25p^3\ ^2D_{5/2}$–$5s^25p^2(^3P)5d\ ^4D_{7/2}$	75	−0.447
724.865	137956.7	$5s^25p^3\ ^2P_{1/2}$–$5s5p^4\ ^2P_{3/2}$	30	−0.388
728.640	137242.0	$5s^25p^3\ ^2P_{3/2}$–$5s^25p^2(^1D)5d\ ^2P_{1/2}$	45	−0.831*
731.028	136793.7	$5s^25p^3\ ^4S_{3/2}$–$5s^25p^2(^3P)5d\ ^2P_{1/2}$	40[b]	−2.291*
732.627	136495.1	$5s^25p^3\ ^4S_{3/2}$–$5s^25p^2(^3P)5d\ ^4F_{5/2}$	75	−0.685
737.685	135559.2	$5s^25p^3\ ^2P_{1/2}$–$5s^25p^2(^3P)5d\ ^2D_{3/2}$	40	−0.388
738.460	135416.9	$5s^25p^3\ ^2D_{3/2}$–$5s^25p^2(^3P)5d\ ^4D_{5/2}$	60	−0.836*
740.849	134980.3	$5s^25p^3\ ^4S_{3/2}$–$5s^25p^2(^3P)5d\ ^4F_{3/2}$	40	−1.939*
741.621	134839.8	$5s^25p^3\ ^2P_{3/2}$–$5s^25p^2(^3P)6s\ ^4P_{5/2}$	0	−1.367*
749.642	133397.0	$5s^25p^3\ ^2P_{1/2}$–$5s^25p^2(^3P)5d\ ^4P_{3/2}$	20	−1.382*
751.727	133027.0	$5s^25p^3\ ^4S_{3/2}$–$5s^25p^2(^3P)5d\ ^2P_{3/2}$	50	−1.837*
752.236	132937.0	$5s^25p^3\ ^2D_{3/2}$–$5s^25p^2(^3P)5d\ ^4D_{3/2}$	60	−1.180
758.495	131840.0	$5s^25p^3\ ^2D_{3/2}$–$5s^25p^2(^3P)5d\ ^4D_{1/2}$	55	−0.935
762.352	131173.0	$5s^25p^3\ ^2D_{5/2}$–$5s^25p^2(^3P)5d\ ^4D_{5/2}$	52	−0.786
767.208	130342.7	$5s^25p^3\ ^2P_{3/2}$–$5s5p^4\ ^2P_{3/2}$	5	−1.252*
774.196	129166.3	$5s^25p^3\ ^2P_{1/2}$–$5s^25p^2(^3P)6s\ ^4P_{1/2}$	1	−2.396*
777.035	128694.3	$5s^25p^3\ ^2D_{5/2}$–$5s^25p^2(^3P)5d\ ^4D_{3/2}$	50	−0.868
777.876	128555.2	$5s^25p^3\ ^2D_{3/2}$–$5s^25p^2(^1D)5d\ ^2F_{5/2}$	15	−1.998
781.58	127946.0	$5s^25p^3\ ^2P_{3/2}$–$5s^25p^2(^3P)5d\ ^2D_{3/2}$	6	−1.252*
784.324	127498.3	$5s^25p^3\ ^2D_{5/2}$–$5s^25p^2(^1D)5d\ ^2F_{7/2}$	45	−2.009*
795.000	125786.2	$5s^25p^3\ ^2P_{3/2}$–$5s^25p^2(^3P)5d\ ^4P_{3/2}$	20	−1.644*
796.974	125474.6	$5s^25p^3\ ^4S_{3/2}$–$5s5p^4\ ^2D_{5/2}$	25	−1.837*
804.410	124314.7	$5s^25p^3\ ^2D_{5/2}$–$5s^25p^2(^1D)5d\ ^2F_{5/2}$	20[b]	0.725
805.695	124116.4	$5s^25p^3\ ^2D_{5/2}$–$5s^25p^2(^3P)5d\ ^4F_{7/2}$	75[b]	−1.389
809.533	123528.0	$5s^25p^3\ ^2D_{3/2}$–$5s^25p^2(^3P)5d\ ^2P_{1/2}$	60	−1.331*
811.504	123228.0	$5s^25p^3\ ^2D_{3/2}$–$5s^25p^2(^3P)5d\ ^4F_{5/2}$	62	−1.505*
814.994	122700.3	$5s^25p^3\ ^2P_{1/2}$–$5s5p^{42}S_{1/2}$	35	−1.046
820.166	121926.5	$5s^25p^3\ ^4S_{3/2}$–$5s5p^4\ ^2D_{3/2}$	4	−2.470*
821.611	121712.1	$5s^25p^3\ ^2D_{3/2}$–$5s^25p^2(^3P)5d\ ^4F_{3/2}$	35	−1.606*
835.005	119759.8	$5s^25p^3\ ^2D_{3/2}$–$5s^25p^2(^3P)5d\ ^2P_{3/2}$	45	−1.606*
840.439	118958.4	$5s^25p^3\ ^2D_{5/2}$–$5s^25p^2(^3P)5d\ ^4F_{5/2}$	25	−1.481
846.23	118171.2	$5s^25p^3\ ^2P_{1/2}$–$5s^25p^2(^3P)5d\ ^4D_{3/2}$	0.5	−2.366*
851.286	117469.3	$5s^25p^3\ ^2D_{5/2}$–$5s^25p^2(^3P)5d\ ^4F_{3/2}$	65	−0.890
854.189	117070.1	$5s^25p^3\ ^2P_{1/2}$–$5s^25p^2(^3P)5d\ ^4D_{1/2}$	25	−1.424
865.673	115517.1	$5s^25p^3\ ^2D_{5/2}$–$5s^25p^2(^3P)5d\ ^2P_{3/2}$	55	−0.890
868.903	115087.6	$5s^25p^3\ ^2P_{3/2}$–$5s5p^4\ ^2S_{1/2}$	35	−1.107
880.04	113631.2	$5s5p^4\ ^2D_{3/2}$–$5s^25p^2(^1S)6p\ ^2P_{3/2}$	11	−3.322*
891.185	112210.1	$5s^25p^3\ ^2D_{3/2}$–$5s5p^4\ ^2D_{5/2}$	40	−3.092*
904.51	110557.1	$5s^25p^3\ ^2P_{3/2}$–$5s^25p^2(^3P)5d\ ^4D_{3/2}$	8	−2.109*
908.38	110086.1	$5s5p^4\ ^2D_{5/2}$–$5s^25p^2(^1S)6p\ ^2P_{3/2}$	3	−1.808*
915.296	109254.3	$5s^25p^3\ ^4S_{3/2}$–$5s5p^4\ ^4P_{1/2}$	80	−0.929
915.60	109218.0	$5s5p^4\ ^4P_{3/2}$–$5s^25p^2(^1D)6p\ ^2D_{3/2}$	9	−3.819*
917.79	108957.4	$5s5p^4\ ^4P_{5/2}$–$5s^25p^2(^3P)4f\ ^2F_{5/2}$	6	−4.425*
919.466	108758.8	$5s^25p^3\ ^2P_{1/2}$–$5s^25p^2(^3P)5d\ ^2P_{1/2}$	30	0.528
920.298	108660.5	$5s^25p^3\ ^2D_{3/2}$–$5s5p^4\ ^2D_{3/2}$	82	−0.492
926.242	107963.1	$5s^25p^3\ ^2D_{5/2}$–$5s5p^4\ ^2D_{5/2}$	82	−0.458
931.17	107391.8	$5s5p^4\ ^4P_{5/2}$–$5s^25p^2(^3P)6p\ ^4P_{5/2}$	8	−1.849
934.15	107049.2	$5s5p^4\ ^4P_{5/2}$–$5s^25p^2(^1D)4f\ ^2G_{7/2}$	9	−2.132
935.253	106922.9	$5s^25p^3\ ^4S_{3/2}$–$5s5p^4\ ^4P_{3/2}$	85	−0.628
939.87	106397.7	$5s5p^4\ ^4P_{5/2}$–$5s^25p^2(^3P)6p\ ^2P_{3/2}$	7	−2.067
952.470	104990.2	$5s5p^3\ ^2P_{1/2}$–$5s^25p^2(^3P)5d\ ^2P_{3/2}$	15	−3.053*
957.707	104416.1	$5s^25p^3\ ^2D_{5/2}$–$5s5p^4\ ^2D_{3/2}$	30	−1.838*
968.18	103296.6	$5s5p^4\ ^4P_{5/2}$–$5s^25p^2(^3P)6p\ ^4D_{7/2}$	7	−2.817*
974.95	102569.4	$5s5p^4\ ^2D_{3/2}$–$5s^25p^2(^1D)6p\ ^2P_{3/2}$	4	−3.199*
983.29	101699.4	$5s5p^4\ ^4P_{3/2}$–$5s^25p^2(^3P)4f\ ^2F_{5/2}$	1	−3.199*
986.55	101363.3	$5s5p^4\ ^4P_{5/2}$–$5s^25p^2(^3P)6p\ ^4S_{3/2}$	9	−1.437
988.673	101145.7	$5s^25p^3\ ^2P_{3/2}$–$5s^25p^2(^3P)5d\ ^2P_{1/2}$	40	−0.445
991.85	100821.7	$5s5p^4\ ^4P_{5/2}$–$5s^25p^2(^3P)6p\ ^2D_{5/2}$	1	−1.918

(*continued on next page*)

Table 1 (*continued*)

λ_{obs} in vacuum (Å)	σ_{obs} (cm^{-1})	Transition	Int. and shape	log(gf)[d]
999.11	100089.1	$5s5p^4\ ^4P_{1/2}$–$5s^25p^2(^3P)6p\ ^2P_{1/2}$	6	−3.109
1002.67	99733.7	$5s5p^4\ ^4P_{5/2}$–$5s^25p^2(^3P)4f\ ^2D_{3/2}$	11	−3.109
1003.380	99663.1	$5s^25p^3\ ^4S_{3/2}$–$5s5p^4\ ^4P_{5/2}$	95	−0.495
1006.731	99331.4	$5s^25p^3\ ^2P_{3/2}$–$5s^25p^2(^3P)5d\ ^4F_{3/2}$	6	−1.915*
1008.68	99139.5	$5s5p^4\ ^4P_{3/2}$–$5s^25p^2(^3P)6p\ ^2P_{3/2}$	6	−3.109*
1009.43	99065.8	$5s^25p^2(^3P)5d\ ^4F_{5/2}$–$5s^25p^2(^1S)6p\ ^2P_{3/2}$	6	−2.827*
1009.86	99023.6	$5s5p^4\ ^2D_{5/2}$–$5s^25p^2(^1D)6p\ ^2P_{3/2}$	2	−0.298
1018.81	98153.7	$5s5p^4\ ^2D_{3/2}$–$5s^25p^2(^1D)6p\ ^2P_{1/2}$	9	−2.466
1026.945	97376.2	$5s^25p^3\ ^2P_{3/2}$–$5s^25p^2(^3P)5d\ ^2P_{3/2}$	6	−1.915*
1028.63	97216.7	$5s5p^4\ ^4P_{3/2}$–$5s^25p^2(^3P)6p\ ^4P_{3/2}$	12	−1.487
1030.28	97061.0	$5s5p^4\ ^4P_{5/2}$–$5s^25p^2(^3P)6p\ ^2D_{3/2}$	10	−1.795
1032.99	96806.4	$5s5p^4\ ^4P_{1/2}$–$5s^25p^2(^3P)6p\ ^2P_{3/2}$	2	−2.644
1034.54	96661.3	$5s5p^4\ ^4P_{5/2}$–$5s^25p^2(^3P)4f\ ^4F_{7/2}$	5	−1.654
1041.813	95986.5	$5s^25p^3\ ^2D_{3/2}$–$5s5p^4\ ^4P_{1/2}$	9	−2.374*
1061.44	94211.6	$5s5p^4\ ^2D_{3/2}$–$5s^25p^2(^1D)6p\ ^2D_{3/2}$	6	−1.127
1062.65	94104.4	$5s5p^4\ ^4P_{3/2}$–$5s^25p^2(^3P)6p\ ^4S_{3/2}$	6	−1.983
1064.11	93975.2	$5s5p^4\ ^4P_{3/2}$–$5s^25p^2(^3P)6p\ ^4P_{1/2}$	6	−2.092
1065.056	93891.8	$5s^25p^3\ ^2P_{1/2}$–$5s5p^4\ ^2D_{3/2}$	20	−1.796*
1067.695	93659.7	$5s^25p^3\ ^2D_{3/2}$–$5s5p^4\ ^4P_{3/2}$	25	−3.684*
1068.81	93562.0	$5s5p^4\ ^4P_{3/2}$–$5s^25p^2(^3P)6p\ ^2D_{5/2}$	5	−2.548*
1069.21	93527.0	$5s5p^4\ ^2D_{5/2}$–$5s^25p^2(^1D)4f\ ^2D_{5/2}$	5	−0.937
1081.39	92473.6	$5s5p^4\ ^4P_{3/2}$–$5s^25p^2(^3P)4f\ ^2D_{3/2}$	8	−1.716
1083.25	92314.8	$5s5p^4\ ^4P_{5/2}$–$5s^25p^2(^3P)4f\ ^4D_{5/2}$	1	−1.332
1084.66	92194.8	$5s5p^4\ ^4P_{5/2}$–$5s^25p^2(^3P)4f\ ^4F_{3/2}$	11	−2.143
1089.65	91772.6	$5s5p^4\ ^4P_{1/2}$–$5s^25p^2(^3P)6p\ ^4S_{3/2}$	6	−1.869
1091.16	91645.6	$5s5p^4\ ^4P_{1/2}$–$5s^25p^2(^3P)6p\ ^4P_{1/2}$	3	−2.615
1097.35	91128.6	$5s5p^4\ ^4P_{5/2}$–$5s^25p^2(^3P)6p\ ^4D_{3/2}$	12	−1.552
1102.95	90665.9	$5s5p^4\ ^2D_{5/2}$–$5s^25p^2(^1D)6p\ ^2D_{3/2}$	4	−1.850*
1108.91	90178.6	$5s5p^4\ ^4P_{5/2}$–$5s^25p^2(^3P)4f\ ^2G_{7/2}$	13	−0.845
1113.291	89823.8	$5s^25p^3\ ^2P_{3/2}$–$5s5p^4\ ^2D_{5/2}$	70	−0.826
1113.57	89801.3	$5s5p^4\ ^4P_{3/2}$–$5s^25p^2(^3P)6p\ ^2D_{3/2}$	3	−1.983
1114.44	89731.2	$5s5p^4\ ^4P_{3/2}$–$5s^25p^2(^3P)4f\ ^4D_{1/2}$	5	−1.866
1116.29	89582.5	$5s5p^4\ ^4P_{3/2}$–$5s^25p^2(^3P)4f\ ^4F_{5/2}$	8	−1.359
1117.09	89518.3	$5s^25p^2(^3P)5d\ ^4F_{3/2}$–$5s^25p^2(^1D)6p\ ^2P_{3/2}$	1	−2.170*
1118.417	89412.1	$5s^25p^3\ ^2D_{5/2}$–$5s5p^4\ ^4P_{3/2}$	35	−1.910
1125.35	88861.2	$5s5p^4\ ^4P_{3/2}$–$5s^25p^2(^3P)4f\ ^4D_{3/2}$	11	−1.229
1138.06	87868.8	$5s5p^4\ ^4P_{5/2}$–$5s^25p^2(^3P)4f\ ^4D_{7/2}$	6	−0.845
1139.44	87762.4	$5s^25p^2(^3P)5d\ ^2P_{3/2}$–$5s^25p^2(^1D)4f\ ^2P_{1/2}$	2	−2.101
1143.25	87469.9	$5s5p^4\ ^4P_{1/2}$–$5s^25p^2(^3P)6p\ ^2D_{3/2}$	4	−1.866
1144.16	87400.4	$5s5p^4\ ^4P_{1/2}$–$5s^25p^2(^3P)4f\ ^4D_{1/2}$	9	−1.149
1148.71	87054.2	$5s^25p^2(^3P)5d\ ^2P_{3/2}$–$5s^25p^2(^1D)6p\ ^2P_{1/2}$	4	−3.110*
1150.26	86936.9	$5s5p^4\ ^4P_{3/2}$–$5s^25p^2(^3P)6p\ ^2S_{1/2}$	5	−2.591*
1151.08	86874.9	$5s^25p^2(^3P)5d\ ^4D_{5/2}$–$5s^25p^2(^1S)6p\ ^2P_{3/2}$	10	−4.098*
1153.51	86691.9	$5s5p^4\ ^2D_{3/2}$–$5s^25p^2(^3P)4f\ ^2F_{5/2}$	6	−0.944
1154.67	86604.8	$5s^25p^2(^3P)5d\ ^4D_{3/2}$–$5s^25p^2(^1S)6p\ ^2P_{1/2}$	3	−3.710*
1155.65	86531.4	$5s5p^4\ ^4P_{1/2}$–$5s^25p^2(^3P)4f\ ^4D_{3/2}$	8	−1.400
1157.468	86395.5	$5s^25p^3\ ^2D_{3/2}$–$5s5p^4\ ^4P_{5/2}$	65	−1.283
1159.046	86277.9	$5s^25p^3\ ^2P_{3/2}$–$5s5p^4\ ^2D_{3/2}$	2	−2.708
1163.14	85974.2	$5s^25p^2(^3P)5d\ ^2P_{3/2}$–$5s^25p^2(^1D)4f\ ^2D_{5/2}$	1	−3.134*
1174.70	85128.1	$5s5p^4\ ^2D_{3/2}$–$5s^25p^2(^3P)6p\ ^4P_{5/2}$	5	−1.776
1175.71	85055.0	$5s5p^4\ ^4P_{3/2}$–$5s^25p^2(^3P)4f\ ^4D_{5/2}$	10	−1.107
1177.37	84935.1	$5s5p^4\ ^4P_{3/2}$–$5s^25p^2(^3P)4f\ ^4F_{3/2}$	10	−1.752
1181.95	84605.9	$5s5p^4\ ^4P_{1/2}$–$5s^25p^2(^3P)6p\ ^2S_{1/2}$	5	−2.047
1188.61	84131.9	$5s5p^4\ ^2D_{3/2}$–$5s^25p^2(^3P)6p\ ^2P_{3/2}$	9	−1.175
1190.18	84020.9	$5s^25p^2(^3P)5d\ ^4F_{3/2}$–$5s^25p^2(^1D)4f\ ^2D_{5/2}$	4	−1.433
1190.57	83993.4	$5s^25p^2(^3P)5d\ ^2P_{1/2}$–$5s^25p^2(^1D)4f\ ^2P_{1/2}$	2	−2.009*
1190.98	83964.5	$5s^25p^2(^1D)5d\ ^2F_{7/2}$–$5s^25p^2(^1S)4f\ ^2F_{7/2}$	3	−1.981
1192.13	83883.5	$5s^25p^2(^3P)5d\ ^2P_{3/2}$–$5s^25p^2(^1D)6p\ ^2D_{5/2}$	3	−2.278
1192.32	83870.1	$5s5p^4\ ^4P_{3/2}$–$5s^25p^2(^3P)6p\ ^4D_{3/2}$	6	−1.916
1200.81	83277.1	$5s5p^4\ ^2D_{3/2}$–$5s^25p^2(^1D)4f\ ^2F_{5/2}$	9	−0.944
1201.63	83220.3	$5s^25p^2(^3P)5d\ ^4F_{5/2}$–$5s^25p^2(^3P)4f\ ^2F_{7/2}$	3	−2.564*
1202.69	83146.9	$5s5p^4\ ^2D_{5/2}$–$5s^25p^2(^3P)4f\ ^2F_{5/2}$	8	−0.985
1203.17	83113.8	$5s^25p^2(^3P)5d\ ^2P_{3/2}$–$5s^25p^2(^1D)6p\ ^2D_{3/2}$	6	−2.442*
1205.07	82982.7	$5s^25p^2(^3P)5d\ ^4F_{9/2}$–$5s^25p^2(^1S)4f\ ^2F_{7/2}$	1	−2.215*

Table 1 (*continued*)

λ_{obs} in vacuum (Å)	σ_{obs} (cm^{-1})	Transition	Int. and shape	log(*gf*)[d]
1210.60	82603.7	$5s5p^4\ ^4P_{1/2}$–$5s^25p^2(^3P)4f\ ^4F_{3/2}$	6	−2.066
1211.30	82555.9	$5s5p^4\ ^4P_{5/2}$–$5s^25p^2(^3P)4f\ ^4G_{7/2}$	9	−1.019
1212.04	82505.5	$5s^25p^2(^3P)5d\ ^4F_{5/2}$–$5s^25p^2(^1D)4f\ ^2D_{5/2}$	5	−2.638*
1217.257	82151.9	$5s^25p^3\ ^2D_{5/2}$–$5s5p^4\ ^4P_{5/2}$	55	−1.431
1220.56	81929.6	$5s^25p^2(^3P)5d\ ^4F_{3/2}$–$5s^25p^2(^1D)6p\ ^2D_{5/2}$	5	−1.978
1222.53	81797.6	$5s5p^4\ ^4P_{3/2}$–$5s^25p^2(^3P)4f\ ^2D_{5/2}$	9	−1.201
1225.76	81582.0	$5s5p^4\ ^2D_{5/2}$–$5s^25p^2(^3P)6p\ ^4P_{5/2}$	2	−1.600
1226.42	81538.1	$5s5p^4\ ^4P_{1/2}$–$5s^25p^2(^3P)6p\ ^4D_{3/2}$	6	−1.773
1230.94	81238.7	$5s5p^4\ ^2D_{5/2}$–$5s^25p^2(^1D)4f\ ^2G_{7/2}$	9	−0.858
1231.263	81217.4	$5s^25p^3\ ^2P_{1/2}$–$5s5p^4\ ^4P_{1/2}$	25	−2.012
1240.90	80586.7	$5s5p^4\ ^2D_{5/2}$–$5s^25p^2(^3P)6p\ ^2P_{3/2}$	8	−1.473
1242.42	80488.1	$5s5p^4\ ^4P_{5/2}$–$5s^25p^2(^3P)4f\ ^4G_{5/2}$	5	−2.480
1243.56	80414.3	$5s^25p^2(^3P)5d\ ^4F_{5/2}$–$5s^25p^2(^1D)6p\ ^2D_{5/2}$	11	−3.218*
1254.22	79730.8	$5s5p^4\ ^2D_{5/2}$–$5s^25p^2(^1D)4f\ ^2F_{5/2}$	3	−2.588*
1255.57	79645.1	$5s^25p^2(^3P)5d\ ^4F_{5/2}$–$5s^25p^2(^1D)6p\ ^2D_{3/2}$	5	−2.165*
1259.57	79392.2	$5s^25p^2(^3P)5d\ ^4D_{1/2}$–$5s^25p^2(^1D)6p\ ^2P_{3/2}$	6	−1.938
1262.85	79186.0	$5s5p^4\ ^4P_{3/2}$–$5s^25p^2(^3P)6p\ ^4D_{1/2}$	5	−1.823
1263.76	79128.9	$5s^25p^2(^3P)5d\ ^4F_{5/2}$–$5s^25p^2(^1D)6p\ ^2F_{5/2}$	3	−1.823*
1266.29	78970.9	$5s5p^4\ ^2D_{3/2}$–$5s^25p^2(^3P)6p\ ^4P_{1/2}$	8	−1.583
1271.21	78665.2	$5s5p^4\ ^2D_{5/2}$–$5s^25p^2(^3P)6p\ ^4P_{3/2}$	7	−1.805
1272.96	78557.1	$5s5p^4\ ^2D_{3/2}$–$5s^25p^2(^3P)6p\ ^2D_{5/2}$	7	−1.776
1280.54	78092.1	$5s^25p^2(^3P)5d\ ^4F_{7/2}$–$5s^25p^2(^3P)4f\ ^2F_{7/2}$	3	−1.481
1283.81	77893.1	$5s^25p^2(^1D)5d\ ^2F_{5/2}$–$5s^25p^2(^3P)4f\ ^2F_{7/2}$	1	−3.821*
1290.72	77476.1	$5s5p^4\ ^2D_{5/2}$–$5s^25p^2(^3P)6p\ ^4D_{7/2}$	10	−2.094
1290.86	77467.7	$5s5p^4\ ^2D_{3/2}$–$5s^25p^2(^3P)4f\ ^2D_{3/2}$	5	−1.707
1298.46	77014.3	$5s5p^4\ ^2D_{3/2}$–$5s^25p^2(^3P)6p\ ^4D_{5/2}$	2	−4.181*
1301.17	76853.9	$5s5p^4\ ^4P_{1/2}$–$5s^25p^2(^3P)6p\ ^4D_{1/2}$	3	−2.954
1321.27	75684.8	$5s^25p^2(^3P)5d\ ^4D_{1/2}$–$5s^25p^2(^1D)4f\ ^2P_{1/2}$	3	−1.578
1322.50	75614.4	$5s^25p^2(^3P)5d\ ^4F_{7/2}$–$5s^25p^2(^1D)6p\ ^2F_{7/2}$	5	−2.339*
1322.87	75593.2	$5s^25p^2(^3P)5d\ ^2P_{3/2}$–$5s^25p^2(^3P)4f\ ^2F_{5/2}$	7	−1.085
1328.27	75285.9	$5s^25p^2(^3P)5d\ ^4F_{7/2}$–$5s^25p^2(^1D)6p\ ^2D_{5/2}$	3	−3.178*
1331.81	75085.8	$5s^25p^2(^1D)5d\ ^2F_{5/2}$–$5s^25p^2(^1D)6p\ ^2D_{5/2}$	3	−2.278*
1333.77	74975.4	$5s^25p^2(^3P)5d\ ^4D_{1/2}$–$5s^25p^2(^1D)6p\ ^2P_{1/2}$	3	−4.816*
1336.98	74795.4	$5s5p^4\ ^2D_{3/2}$–$5s^25p^2(^3P)6p\ ^2D_{3/2}$	8	−1.776
1338.23	74725.6	$5s5p^4\ ^2D_{3/2}$–$5s^25p^2(^3P)4f\ ^4D_{1/2}$	2	−4.684*
1338.57	74706.6	$5s^25p^2(^1D)5d\ ^2F_{7/2}$–$5s^25p^2(^3P)4f\ ^2F_{7/2}$	9	−0.798
1340.90	74576.8	$5s5p^4\ ^2D_{3/2}$-$5s^25p^2(^3P)4f\ ^4F_{5/2}$	8	−1.382
1344.74	74363.8	$5s^25p^2(^3P)5d\ ^4F_{3/2}$–$5s^25p^2(^3P)6p\ ^2P_{1/2}$	7	−2.548*
1345.61	74315.7	$5s^25p^2(^1D)5d\ ^2F_{5/2}$–$5s^25p^2(^1D)6p\ ^2D_{3/2}$	3	−2.548*
1350.82	74029.1	$5s^25p^2(^3P)5d\ ^2P_{3/2}$–$5s^25p^2(^3P)6p\ ^4P_{5/2}$	8	−1.325*
1351.36	73999.5	$5s^25p^2(^3P)5d\ ^4F_{7/2}$–$5s^25p^2(^1D)6p\ ^2F_{5/2}$	3	−2.260*
1351.53	73990.2	$5s^25p^2(^1D)5d\ ^2F_{7/2}$–$5s^25p^2(^1D)4f\ ^2D_{5/2}$	6	−1.374*
1352.78	73921.8	$5s5p^4\ ^2D_{5/2}$–$5s^25p^2(^3P)4f\ ^2D_{3/2}$	5	−2.520
1353.65	73874.3	$5s^25p^2(^3P)5d\ ^4D_{3/2}$–$5s^25p^2(^1D)6p\ ^2P_{1/2}$	2	−2.101
1354.01	73854.7	$5s5p^4\ ^2D_{3/2}$–$5s^25p^2(^3P)4f\ ^4D_{3/2}$	2	−2.445*
1355.74	73760.5	$5s5p^4\ ^2S_{1/2}$–$5s^25p^2(^1D)6p\ ^2P_{3/2}$	9	−0.831
1358.637	73603.2	$5s^25p^3\ ^2P_{3/2}$–$5s5p^4\ ^4P_{1/2}$	10	−2.714*
1361.15	73467.3	$5s5p^4\ ^2D_{5/2}$–$5s^25p^2(^3P)6p\ ^4D_{5/2}$	8	−1.557
1365.61	73227.3	$5s5p^4\ ^4P_{3/2}$–$5s^25p^2(^3P)4f\ ^4G_{5/2}$	9	−1.561
1367.78	73111.2	$5s^25p^2(^3P)5d\ ^4D_{7/2}$–$5s^25p^2(^1S)4f\ ^2F_{7/2}$	1	−1.908
1369.24	73033.2	$5s^25p^2(^3P)5d\ ^2P_{3/2}$–$5s^25p^2(^3P)6p\ ^2P_{3/2}$	4	−0.284
1378.42	72546.8	$5s^25p^2(^3P)5d\ ^2P_{1/2}$–$5s^25p^2(^3P)6p\ ^2P_{1/2}$	9	−0.650
1384.50	72228.2	$5s^25p^2(^1D)5d\ ^2F_{7/2}$–$5s^25p^2(^1D)6p\ ^2F_{7/2}$	1	−1.930*
1385.48	72177.2	$5s^25p^2(^3P)5d\ ^2P_{3/2}$–$5s^25p^2(^1D)4f\ ^2F_{5/2}$	9	−1.990*
1387.43	72075.7	$5s^25p^2(^3P)5d\ ^4F_{3/2}$–$5s^25p^2(^3P)6p\ ^4P_{5/2}$	8	−1.325
1390.22	71931.1	$5s5p^4\ ^2D_{3/2}$–$5s^25p^2(^3P)6p\ ^2S_{1/2}$	6	−2.202*
1390.61	71910.9	$5s^25p^2(^1D)5d\ ^2F_{5/2}$–$5s^25p^2(^1D)4f\ ^2D_{3/2}$	4	−1.392
1390.84	71899.0	$5s^25p^2(^1D)5d\ ^2F_{7/2}$–$5s^25p^2(^1D)6p\ ^2D_{5/2}$	2	−0.090
1401.02	71376.6	$5s^25p^2(^3P)5d\ ^4P_{3/2}$–$5s^25p^2(^1S)6p\ ^2P_{1/2}$	3	−1.773
1403.064	71272.6	$5s^25p^3\ ^2P_{3/2}$–$5s5p^4\ ^4P_{3/2}$	10	−1.958*
1403.54	71248.4	$5s^25p^2(^3P)5d\ ^4F_{9/2}$–$5s^25p^2(^1D)6p\ ^2F_{7/2}$	1	−1.523*
1406.23	71112.1	$5s^25p^2(^3P)5d\ ^2P_{3/2}$–$5s^25p^2(^3P)6p\ ^4P_{3/2}$	6	−1.982*
1406.86	71080.3	$5s^25p^2(^3P)5d\ ^4F_{3/2}$–$5s^25p^2(^3P)6p\ ^2P_{3/2}$	9	−1.473
1407.76	71034.8	$5s^25p^2(^3P)5d\ ^4D_{1/2}$–$5s^25p^2(^1D)6p\ ^2D_{3/2}$	9	−1.549
1407.83	71031.3	$5s^25p^2(^3P)5d\ ^4D_{5/2}$–$5s^25p^2(^3P)4f\ ^2F_{7/2}$	8[a]	−1.372

(*continued on next page*)

Table 1 (*continued*)

λ_{obs} in vacuum (Å)	σ_{obs} (cm^{-1})	Transition	Int. and shape	log(*gf*)[d]
1407.83	71031.3	$5s5p^4\ ^2D_{5/2}$–$5s^25p^2(^3P)4f\ ^4F_{5/2}$	8[a]	−1.455
1411.42	70850.6	$5s5p^4\ ^2D_{5/2}$–$5s^25p^2(^3P)4f\ ^4F_{7/2}$	9	−0.649
1414.34	70704.4	$5s^25p^2(^3P)5d\ ^4D_{3/2}$–$5s^25p^2(^1D)6p\ ^2D_{5/2}$	5	−1.872
1417.24	70559.7	$5s^25p^2(^3P)5d\ ^4F_{5/2}$–$5s^25p^2(^3P)6p\ ^4P_{5/2}$	5	−1.397
1422.14	70316.6	$5s^25p^2(^3P)5d\ ^4D_{5/2}$–$5s^25p^2(^1D)4f\ ^2D_{5/2}$	7	−1.205
1422.27	70310.1	$5s5p^4\ ^2D_{5/2}$–$5s^25p^2(^3P)4f\ ^4D_{3/2}$	7	−2.040
1422.86	70281.0	$5s^25p^2(^3P)6s\ ^4P_{3/2}$–$5s^25p^2(^1S)4f\ ^2P_{3/2}$	5	−1.345
1424.02	70223.7	$5s^25p^2(^3P)5d\ ^4F_{3/2}$–$5s^25p^2(^1D)4f\ ^2F_{5/2}$	1	−1.191
1427.48	70053.5	$5s5p^4\ ^2S_{1/2}$–$5s^25p^2(^1D)4f\ ^2P_{1/2}$	4	−1.256
1429.70	69944.7	$5s^25p^2(^3P)5d\ ^4P_{1/2}$–$5s^25p^2(^1S)4f\ ^2P_{1/2}$	3	−1.510
1430.02	69929.1	$5s5p^4\ ^2D_{3/2}$–$5s^25p^2(^3P)4f\ ^4F_{3/2}$	12	−3.128*
1437.50	69565.2	$5s5p^4\ ^2P_{3/2}$–$5s^25p^2(^1S)6p\ ^2P_{3/2}$	3[a]	−2.466*
1437.50	69565.2	$5s^25p^2(^3P)5d\ ^4F_{5/2}$–$5s^25p^2(^3P)6p\ ^2P_{3/2}$	3[a]	−3.045
1440.54	69418.4	$5s^25p^2(^3P)5d\ ^4D_{3/2}$–$5s^25p^2(^1D)6p\ ^2F_{5/2}$	4	−2.517*
1444.79	69214.2	$5s^25p^2(^3P)5d\ ^4D_{3/2}$–$5s^25p^2(^1S)6p\ ^2P_{1/2}$	5	−3.710*
1445.95	69158.7	$5s^25p^2(^3P)5d\ ^4F_{3/2}$–$5s^25p^2(^3P)6p\ ^4P_{3/2}$	2	−3.342*
1452.15	68863.4	$5s5p^4\ ^2D_{3/2}$–$5s^25p^2(^3P)6p\ ^4D_{3/2}$	7	−1.952
1455.42	68708.7	$5s^25p^2(^3P)5d\ ^4F_{5/2}$–$5s^25p^2(^1D)4f\ ^2F_{5/2}$	7	−1.692
1463.88	68311.6	$5s^25p^2(^1D)5d\ ^2G_{7/2}$–$5s^25p^2(^1S)4f\ ^2F_{7/2}$	1	−1.981
1465.73	68225.4	$5s^25p^2(^3P)5d\ ^4D_{5/2}$–$5s^25p^2(^1D)6p\ ^2D_{5/2}$	9	−1.234
1470.58	68000.4	$5s^25p^2(^3P)5d\ ^2P_{3/2}$–$5s^25p^2(^3P)6p\ ^4S_{3/2}$	5	−2.066*
1478.33	67643.9	$5s^25p^2(^3P)5d\ ^4F_{5/2}$–$5s^25p^2(^3P)6p\ ^4P_{3/2}$	6	−1.813*
1480.78	67532.0	$5s^25p^2(^3P)6s\ ^4P_{3/2}$–$5s^25p^2(^1S)6p\ ^2P_{1/2}$	8	−2.674*
1482.45	67455.9	$5s^25p^2(^3P)5d\ ^4D_{5/2}$–$5s^25p^2(^1D)6p\ ^2D_{3/2}$	9	−1.242
1484.93	67343.2	$5s^25p^2(^3P)5d\ ^2P_{1/2}$–$5s^25p^2(^3P)6p\ ^4P_{3/2}$	9	−1.773
1486.05	67292.5	$5s^25p^2(^3P)6s\ ^4P_{1/2}$–$5s^25p^2(^1D)6p\ ^2P_{3/2}$	3	−4.082*
1493.87	66940.2	$5s^25p^2(^3P)5d\ ^4D_{5/2}$–$5s^25p^2(^1D)6p\ ^2F_{5/2}$	5	−1.674*
1496.65	66815.9	$5s5p^4\ ^2P_{3/2}$–$5s^25p^2(^1S)6p\ ^2P_{1/2}$	5	−1.225
1497.09	66796.3	$5s^25p^2(^1D)5d\ ^2F_{5/2}$–$5s^25p^2(^3P)4f\ ^2F_{5/2}$	9	−0.963
1497.19	66791.8	$5s5p^4\ ^2D_{3/2}$–$5s^25p^2(^3P)4f\ ^2D_{5/2}$	10	−1.077
1506.41	66383.0	$5s5p^4\ ^2D_{5/2}$–$5s^25p^2(^3P)4f\ ^4F_{3/2}$	6	−1.972
1506.72	66369.3	$5s^25p^2(^3P)5d\ ^2P_{3/2}$–$5s^25p^2(^3P)4f\ ^2D_{3/2}$	6	−1.949*
1514.08	66046.7	$5s^25p^2(^3P)5d\ ^4F_{3/2}$–$5s^25p^2(^3P)6p\ ^4S_{3/2}$	1	−2.066*
1517.03	65918.3	$5s^25p^2(^3P)5d\ ^4F_{3/2}$–$5s^25p^2(^3P)6p\ ^4P_{1/2}$	10	−1.219
1524.28	65604.7	$5s^25p^2(^3P)6s\ ^2P_{1/2}$–$5s^25p^2(^{1'}S)6p\ ^2P_{1/2}$	1	−2.141*
1526.46	65511.1	$5s^25p^2(^1D)5d\ ^2G_{9/2}$–$5s^25p^2(^1S)4f\ ^2F_{7/2}$	2	−1.825
1528.97	65403.5	$5s5p^4\ ^2S_{1/2}$–$5s^25p^2(^1D)6p\ ^2D_{3/2}$	3	−2.338*
1530.98	65317.6	$5s^25p^4\ ^2D_{5/2}$–$5s^25p^2(^3P)6p\ ^4D_{3/2}$	7	−2.040
1541.10	64888.7	$5s^25p^2(^1D)5d\ ^2F_{5/2}$–$5s^25p^2(^1D)4f\ ^2G_{7/2}$	10	−2.566*
1541.90	64855.0	$5s^25p^2(^3P)5d\ ^4P_{5/2}$–$5s^25p^2(^1D)6p\ ^2P_{3/2}$	6	−2.182*
1548.20	64591.1	$5s^25p^2(^3P)5d\ ^4F_{7/2}$–$5s^25p^2(^1D)4f\ ^2G_{9/2}$	9	−1.805*
1549.62	64531.9	$5s^25p^2(^3P)5d\ ^4F_{5/2}$–$5s^25p^2(^3P)6p\ ^4S_{3/2}$	7	−2.583*
1552.41	64416.0	$5s^25p^2(^3P)5d\ ^4F_{3/2}$–$5s^25p^2(^3P)4f\ ^2D_{3/2}$	8	−1.949*
1553.58	64367.5	$5s5p^4\ ^2D_{5/2}$–$5s^25p^2(^3P)4f\ ^2G_{7/2}$	5	−0.858
1556.86	64231.9	$5s^25p^2(^3P)5d\ ^2P_{1/2}$–$5s^25p^2(^3P)6p\ ^4S_{3/2}$	9	−1.363
1558.11	64180.3	$5s5p^4\ ^2D_{3/2}$–$5s^25p^2(^3P)6p\ ^4D_{1/2}$	8	−0.965
1562.192	64012.6	$5s^25p^3\ ^2P_{3/2}$–$5s5p^4\ ^4P_{5/2}$	10	−2.604*
1562.73	63990.6	$5s^25p^2(^3P)5d\ ^4F_{5/2}$–$5s^25p^2(^3P)6p\ ^2D_{5/2}$	10	−1.397
1563.41	63962.7	$5s^25p^2(^3P)5d\ ^4F_{3/2}$–$5s^25p^2(^3P)6p\ ^4D_{5/2}$	8	−3.208*
1566.08	63853.7	$5s^25p^2(^3P)5d\ ^4D_{7/2}$–$5s^25p^2(^3P)4f\ ^2F_{7/2}$	10	−0.932
1569.91	63697.9	$5s^25p^2(^3P)5d\ ^2P_{3/2}$–$5s^25p^2(^3P)6p\ ^2D_{3/2}$	5	−2.066*
1571.64	63627.8	$5s^25p^2(^3P)5d\ ^2P_{3/2}$–$5s^25p^2(^3P)4f\ ^4D_{1/2}$	7	−1.913
1572.09	63609.6	$5s^25p^2(^1D)5d\ ^2F_{7/2}$–$5s^25p^2(^3P)4f\ ^2F_{5/2}$	3	−3.383*
1572.52	63592.2	$5s^25p^2(^3P)5d\ ^4F_{7/2}$–$5s^25p^2(^1D)4f\ ^2F_{7/2}$	8	−1.481
1572.82	63580.1	$5s^25p^2(^3P)5d\ ^4F_{7/2}$–$5s^25p^2(^1D)4f\ ^2F_{5/2}$	4	−3.996*
1575.34	63478.4	$5s^25p^2(^3P)5d\ ^2P_{3/2}$–$5s^25p^2(^3P)4f\ ^4F_{5/2}$	10	−0.872
1577.47	63392.6	$5s^25p^2(^1D)5d\ ^2F_{5/2}$–$5s^25p^2(^1D)4f\ ^2F_{7/2}$	3	−2.566*
1577.77	63380.6	$5s^25p^2(^1D)5d\ ^2F_{5/2}$–$5s^25p^2(^1D)4f\ ^2F_{5/2}$	8	−0.941
1581.13	63245.9	$5s5p^4\ ^2D_{5/2}$–$5s^25p^2(^3P)4f\ ^2D_{5/2}$	9	−1.798
1583.85	63137.3	$5s^25p^2(^3P)5d\ ^4D_{7/2}$–$5s^25p^2(^1D)4f\ ^2D_{5/2}$	5[a]	−1.374
1583.85	63137.3	$5s^25p^2(^3P)5d\ ^4D_{3/2}$–$5s^25p^2(^3P)6p\ ^2P_{1/2}$	5[a]	−1.865
1589.78	62901.8	$5s^25p^2(^3P)5d\ ^4F_{5/2}$–$5s^25p^2(^3P)4f\ ^2D_{3/2}$	1	−3.039*
1593.44	62757.3	$5s^25p^2(^3P)5d\ ^2P_{3/2}$–$5s^25p^2(^3P)4f\ ^4D_{3/2}$	5	−0.355
1597.43	62600.6	$5s^25p^2(^3P)5d\ ^2P_{1/2}$–$5s^25p^2(^3P)4f\ ^2D_{3/2}$	3	−0.967

Table 1 (*continued*)

λ_{obs} in vacuum (Å)	σ_{obs} (cm^{-1})	Transition	Int. and shape	log(*gf*)[d]
1601.35	62447.3	$5s^25p^2(^3P)5d\ ^4F_{5/2}$–$5s^25p^2(^3P)6p\ ^4D_{5/2}$	5	−1.091
1602.19	62414.6	$5s^25p^2(^3P)5d\ ^4D_{3/2}$–$5s^25p^2(^3P)4f\ ^2F_{5/2}$	7	−1.610
1604.14	62338.7	$5s^25p^2(^3P)6s\ ^2P_{3/2}$–$5s^25p^2(^1S)6p\ ^2P_{3/2}$	6	−1.624
1619.57	61744.8	$5s^25p^2(^3P)5d\ ^4F_{3/2}$–$5s^25p^2(^3P)6p\ ^2D_{3/2}$	6	−2.837*
1620.70	61701.7	$5s^25p^2(^1D)5d\ ^2F_{7/2}$–$5s^25p^2(^1D)4f\ ^2G_{7/2}$	1	−1.942*
1625.33	61526.0	$5s^25p^2(^3P)5d\ ^4F_{3/2}$–$5s^25p^2(^3P)4f\ ^4F_{5/2}$	1	−3.888*
1630.62	61326.4	$5s^25p^2(^3P)5d\ ^4F_{7/2}$–$5s^25p^2(^3P)6p\ ^4D_{7/2}$	6	−1.319
1635.94	61126.9	$5s^25p^2(^1D)5d\ ^2F_{5/2}$–$5s^25p^2(^3P)6p\ ^4D_{7/2}$	3	−1.558
1638.07	61047.5	$5s^25p^2(^3P)5d\ ^4D_{7/2}$–$5s^25p^2(^1D)6p\ ^2D_{5/2}$	10	−1.854*
1641.99	60901.7	$5s^25p^2(^3P)5d\ ^2D_{3/2}$–$5s^25p^2(^1D)6p\ ^2P_{3/2}$	4	−2.466*
1643.38	60850.2	$5s^25p^2(^3P)5d\ ^4D_{3/2}$–$5s^25p^2(^3P)6p\ ^4P_{5/2}$	6	−1.931*
1643.83	60833.5	$5s^25p^2(^3P)5d\ ^2P_{3/2}$–$5s^25p^2(^3P)6p\ ^2S_{1/2}$	10	−0.355
1644.63	60803.9	$5s^25p^2(^3P)5d\ ^4F_{3/2}$–$5s^25p^2(^3P)4f\ ^4D_{3/2}$	3	−2.837*
1654.22	60451.5	$5s^25p^2(^3P)5d\ ^4F_{7/2}$–$5s^25p^2(^3P)4f\ ^2G_{9/2}$	6	−1.253
1660.32	60229.4	$5s^25p^2(^3P)5d\ ^4F_{5/2}$–$5s^25p^2(^3P)6p\ ^2D_{3/2}$	5	−0.871
1660.46	60224.3	$5s^25p^2(^3P)5d\ ^4F_{9/2}$–$5s^25p^2(^1D)4f\ ^2G_{9/2}$	7	−1.502
1661.00	60204.7	$5s^25p^2(^1D)5d\ ^2F_{7/2}$–$5s^25p^2(^1D)4f\ ^2F_{7/2}$	1	−0.347
1661.29	60194.2	$5s^25p^2(^1D)5d\ ^2F_{7/2}$–$5s^25p^2(^1D)4f\ ^2F_{5/2}$	6	−1.514
1664.59	60074.9	$5s^25p^2(^3P)5d\ ^4P_{5/2}$–$5s^25p^2(^3P)4f\ ^2F_{7/2}$	3	−1.464
1666.37	60010.7	$5s^25p^2(^3P)5d\ ^4F_{5/2}$–$5s^25p^2(^3P)4f\ ^4F_{5/2}$	6	−0.787
1668.43	59936.6	$5s^25p^2(^3P)5d\ ^4D_{5/2}$–$5s^25p^2(^3P)4f\ ^2F_{5/2}$	5	−0.742
1668.65	59928.7	$5s^25p^2(^3P)5d\ ^2P_{1/2}$–$5s^25p^2(^3P)6p\ ^2D_{3/2}$	1	−1.689
1668.90	59919.7	$5s^25p^2(^1D)5d\ ^2P_{1/2}$–$5s^25p^2(^1S)6p\ ^2P_{1/2}$	3	−1.822
1670.60	59858.7	$5s^25p^2(^3P)5d\ ^2P_{1/2}$–$5s^25p^2(^3P)4f\ ^4D_{1/2}$	3	−4.345*
1670.70	59855.2	$5s^25p^2(^3P)5d\ ^4D_{3/2}$–$5s^25p^2(^3P)6p\ ^2P_{3/2}$	6	−1.507
1671.41	59829.7	$5s^25p^2(^3P)5d\ ^4F_{5/2}$–$5s^25p^2(^3P)4f\ ^4F_{7/2}$	5	−0.787
1673.30	59762.1	$5s^25p^2(^3P)5d\ ^4D_{7/2}$–$5s^25p^2(^1D)6p\ ^2F_{5/2}$	7	−2.810*
1680.17	59517.8	$5s^25p^2(^3P)5d\ ^2F_{5/2}$–$5s^25p^2(^1S)6p\ ^2P_{3/2}$	11	−3.975*
1686.65	59289.1	$5s^25p^2(^3P)5d\ ^4F_{5/2}$–$5s^25p^2(^3P)4f\ ^4D_{3/2}$	1	−0.534
1688.44	59226.3	$5s^25p^2(^3P)5d\ ^4F_{9/2}$–$5s^25p^2(^1D)4f\ ^2F_{7/2}$	6	−0.650
1693.40	59052.8	$5s^25p^2(^1D)5d\ ^2G_{7/2}$–$5s^25p^2(^3P)4f\ ^2F_{7/2}$	5	−0.798
1693.92	59034.7	$5s^25p^2(^3P)5d\ ^4D_{1/2}$–$5s^25p^2(^3P)6p\ ^4P_{3/2}$	1	−2.334*
1694.95	58998.8	$5s^25p^2(^3P)5d\ ^4D_{3/2}$–$5s^25p^2(^1D)4f\ ^2F_{5/2}$	7	−0.856
1698.36	58880.3	$5s^25p^2(^3P)5d\ ^4F_{3/2}$–$5s^25p^2(^3P)6p\ ^2S_{1/2}$	11	−0.355
1698.89	58862.0	$5s^25p^2(^3P)5d\ ^4F_{7/2}$–$5s^25p^2(^3P)6p\ ^2D_{5/2}$	10	−1.616
1704.68	58662.0	$5s^25p^2(^1D)5d\ ^2F_{5/2}$–$5s^25p^2(^3P)6p\ ^2D_{5/2}$	12	−0.853
1706.29	58606.7	$5s5p^4\ ^2S_{1/2}$–$5s^25p^2(^3P)6p\ ^2P_{1/2}$	11	−1.240
1709.30	58503.5	$5s5p^4\ ^2P_{3/2}$–$5s^25p^2(^1D)6p\ ^2P_{3/2}$	9	−2.302*
1713.15	58372.0	$5s^25p^2(^3P)5d\ ^4D_{5/2}$–$5s^25p^2(^3P)6p\ ^4P_{5/2}$	15	−0.512
1714.18	58336.9	$5s^25p^2(^1D)5d\ ^2G_{7/2}$–$5s^25p^2(^1D)4f\ ^2D_{5/2}$	12	−0.288
1717.52	58223.5	$5s5p^4\ ^2D_{3/2}$–$5s^25p^2(^3P)4f\ ^4G_{5/2}$	12	−0.612
1723.30	58028.2	$5s^25p^2(^3P)5d\ ^4D_{5/2}$–$5s^25p^2(^1D)4f\ ^2G_{7/2}$	10	−0.795
1725.92	57940.1	$5s^25p^2(^1D)5d\ ^2F_{7/2}$–$5s^25p^2(^3P)6p\ ^4D_{7/2}$	12	−2.439*
1726.11	57933.7	$5s^25p^2(^3P)5d\ ^4D_{3/2}$–$5s^25p^2(^3P)6p\ ^4P_{3/2}$	12	−0.734
1731.15	57765.1	$5s^25p^2(^3P)5d\ ^2P_{3/2}$–$5s^25p^2(^3P)6p\ ^4D_{3/2}$	13	−1.504
1742.89	57376.0	$5s^25p^2(^3P)5d\ ^4D_{5/2}$–$5s^25p^2(^3P)6p\ ^2P_{3/2}$	12	−2.202*
1744.64	57318.4	$5s^25p^2(^3P)5d\ ^4F_{7/2}$–$5s^25p^2(^3P)6p\ ^4D_{5/2}$	15	0.281
1746.17	57268.2	$5s^25p^2(^3P)5d\ ^4P_{5/2}$–$5s^25p^2(^1D)6p\ ^2D_{5/2}$	2	−1.479
1747.78	57215.4	$5s^25p^2(^3P)5d\ ^4P_{1/2}$–$5s^25p^2(^1D)6p\ ^2P_{1/2}$	9	−1.792
1750.73	57119.0	$5s^25p^2(^1D)5d\ ^2F_{5/2}$–$5s^25p^2(^3P)6p\ ^4D_{5/2}$	12	−1.870
1752.40	57064.6	$5s^25p^2(^3P)5d\ ^2P_{1/2}$–$5s^25p^2(^3P)6p\ ^2S_{1/2}$	1	−2.961*
1755.61	56960.3	$5s^25p^2(^3P)5d\ ^4F_{9/2}$–$5s^25p^2(^3P)6p\ ^4D_{7/2}$	14	−0.842
1758.16	56877.6	$5s^25p^2(^3P)5d\ ^4F_{3/2}$–$5s^25p^2(^3P)4f\ ^4F_{3/2}$	12	−2.156*
1762.29	56744.3	$5s5p^4\ ^2D_{5/2}$–$5s^25p^2(^3P)4f\ ^4G_{7/2}$	10	−1.218
1769.29	56519.8	$5s^25p^2(^3P)5d\ ^4D_{5/2}$–$5s^25p^2(^1D)4f\ ^2F_{5/2}$	10	−1.322
1783.00	56085.2	$5s^25p^2(^3P)5d\ ^4F_{9/2}$–$5s^25p^2(^3P)4f\ ^2G_{9/2}$	12	−0.842
1788.21	55921.8	$5s^25p^2(^3P)5d\ ^4D_{1/2}$–$5s^25p^2(^3P)6p\ ^4S_{3/2}$	10	−1.617
1791.73	55812.0	$5s^25p^2(^3P)5d\ ^4F_{3/2}$–$5s^25p^2(^3P)6p\ ^4D_{3/2}$	11	−0.808
1792.32	55793.6	$5s^25p^2(^3P)5d\ ^4D_{1/2}$–$5s^25p^2(^3P)6p\ ^4P_{1/2}$	13	−0.673
1802.41	55481.3	$5s^25p^2(^3P)5d\ ^4F_{5/2}$–$5s^25p^2(^3P)4f\ ^4D_{5/2}$	3	−1.482
1802.61	55475.1	$5s^25p^2(^1D)5d\ ^2F_{7/2}$–$5s^25p^2(^3P)6p\ ^2D_{5/2}$	15	−1.147
1803.26	55455.1	$5s^25p^2(^3P)5d\ ^4D_{5/2}$–$5s^25p^2(^3P)6p\ ^4P_{3/2}$	15	−0.576
1804.90	55404.7	$5s^25p^2(^3P)5d\ ^2D_{3/2}$–$5s^25p^2(^3P)4f\ ^2D_{5/2}$	10	−1.296
1806.29	55362.1	$5s^25p^2(^3P)5d\ ^4F_{5/2}$–$5s^25p^2(^3P)4f\ ^4F_{3/2}$	6	−0.264
1807.55	55323.5	$5s5p^4\ ^2S_{1/2}$–$5s^25p^2(^3P)6p\ ^2P_{3/2}$	1	−2.052

(*continued on next page*)

Table 1 (*continued*)

λ_{obs} in vacuum (Å)	σ_{obs} (cm^{-1})	Transition	Int. and shape	log(*gf*)[d]
1819.49	54960.5	$5s^25p^2(^1D)5d\ ^2G_{7/2}–5s^25p^2(^1D)6p\ ^2F_{5/2}$	12	−0.318
1821.48	54900.4	$5s^25p^2(^1D)5d\ ^2F_{5/2}–5s^25p^2(^3P)6p\ ^2D_{3/2}$	10	−1.907*
1824.12	54821.0	$5s^25p^2(^3P)5d\ ^4D_{3/2}–5s^25p^2(^3P)6p\ ^4S_{3/2}$	12	−0.743
1824.76	54801.7	$5s^25p^2(^3P)6s\ ^4P_{3/2}–5s^25p^2(^1D)6p\ ^2P_{1/2}$	5	−3.263*
1828.39	54692.9	$5s^25p^2(^3P)5d\ ^4D_{3/2}–5s^25p^2(^3P)6p\ ^4P_{1/2}$	12	−0.533
1828.77	54681.6	$5s^25p^2(^1D)5d\ ^2F_{5/2}–5s^25p^2(^3P)4f\ ^4F_{5/2}$	10	−1.987
1834.85	54500.4	$5s^25p^2(^1D)5d\ ^2F_{5/2}–5s^25p^2(^3P)4f\ ^4F_{7/2}$	1	−1.180
1841.73	54296.8	$5s^25p^2(^3P)5d\ ^4F_{5/2}–5s^25p^2(^3P)6p\ ^4D_{3/2}$	11	−0.160
1841.91	54291.5	$5s^25p^2(^3P)5d\ ^4D_{1/2}–5s^25p^2(^3P)4f\ ^2D_{3/2}$	12	−0.510
1842.31	54279.7	$5s^25p^2(^3P)5d\ ^4D_{3/2}–5s^25p^2(^3P)6p\ ^2D_{5/2}$	6	−1.812
1842.77	54266.1	$5s^25p^2(^3P)5d\ ^4D_{5/2}–5s^25p^2(^3P)6p\ ^4D_{7/2}$	10	−1.198
1848.70	54092.1	$5s^25p^2(^3P)5d\ ^4P_{5/2}–5s^25p^2(^1D)4f\ ^2D_{3/2}$	11	−3.095*
1851.99	53996.0	$5s^25p^2(^3P)5d\ ^2P_{1/2}–5s^25p^2(^3P)6p\ ^4D_{3/2}$	2	−1.689
1859.52	53777.3	$5s^25p^2(^1D)5d\ ^2G_{9/2}–5s^25p^2(^1D)6p\ ^2F_{7/2}$	10	0.131
1860.82	53739.7	$5s^25p^2(^3P)5d\ ^4F_{3/2}–5s^25p^2(^3P)4f\ ^2D_{5/2}$	11	−0.122
1872.55	53403.1	$5s5p^4\ ^2S_{1/2}–5s^25p^2(^3P)6p\ ^4P_{3/2}$	31	−2.932*
1874.55	53346.1	$5s^25p^2(^3P)5d\ ^4F_{5/2}–5s^25p^2(^3P)4f\ ^2G_{7/2}$	4	−1.534
1880.05	53190.1	$5s^25p^2(^3P)5d\ ^4D_{3/2}–5s^25p^2(^3P)4f\ ^2D_{3/2}$	3	−1.761*
1883.89	53081.7	$5s^25p^2(^3P)5d\ ^2P_{3/2}–5s^25p^2(^3P)6p\ ^4D_{1/2}$	12	−1.504
1891.24	52875.4	$5s^25p^2(^3P)6s\ ^2P_{1/2}–5s^25p^2(^1D)6p\ ^2P_{1/2}$	6	−1.982*
1895.48	52757.1	$5s^25p^2(^3P)5d\ ^4D_{7/2}–5s^25p^2(^3P)4f\ ^2F_{5/2}$	12	−1.514
1896.21	52736.8	$5s^25p^2(^3P)5d\ ^4D_{3/2}–5s^25p^2(^3P)6p\ ^4D_{5/2}$	7	−1.246
1910.50	52342.3	$5s^25p^2(^3P)5d\ ^4D_{5/2}–5s^25p^2(^3P)6p\ ^4S_{3/2}$	12	−0.425
1914.81	52224.5	$5s^25p^2(^3P)5d\ ^4F_{5/2}–5s^25p^2(^3P)4f\ ^2D_{5/2}$	8	−1.482
1917.95	52139.0	$5s^25p^2(^3P)6s\ ^4P_{1/2}–5s^25p^2(^3P)6p\ ^2P_{1/2}$	4	−2.350*
1922.00	52029.1	$5s^25p^2(^3P)5d\ ^2D_{3/2}–5s^25p^2(^1D)6p\ ^2F_{5/2}$	6	−1.948*
1937.27	51619.0	$5s^25p^2(^3P)5d\ ^4D_{1/2}–5s^25p^2(^3P)6p\ ^2D_{3/2}$	5	−1.668
1937.76	51606.0	$5s^25p^2(^1D)5d\ ^2P_{1/2}–5s^25p^2(^1D)6p\ ^2P_{3/2}$	4	−1.710*
1939.90	51549.0	$5s^25p^2(^3P)5d\ ^4D_{1/2}–5s^25p^2(^3P)4f\ ^4D_{1/2}$	5	−1.401
1941.94	51494.9	$5s^25p^2(^1D)5d\ ^2F_{7/2}–5s^25p^2(^3P)4f\ ^4F_{5/2}$	3	−3.383*
1948.79	51313.9	$5s^25p^2(^1D)5d\ ^2F_{7/2}–5s^25p^2(^3P)4f\ ^4F_{7/2}$	4	−2.011
1950.21	51276.5	$5s^25p^2(^3P)6s\ ^2P_{3/2}–5s^25p^2(^1D)6p\ ^2P_{3/2}$	5	−1.644*
1953.41	51192.5	$5s^25p^2(^3P)5d\ ^4D_{7/2}–5s^25p^2(^3P)6p\ ^4P_{5/2}$	10	0.155
1955.86	51128.4	$5s^25p^2(^3P)5d\ ^4F_{3/2}–5s^25p^2(^3P)6p\ ^4D_{1/2}$	9	−1.129
1958.74	51053.2	$5s^25p^2(^3P)5d\ ^2F_{7/2}–5s^25p^2(^1S)4f\ ^2F_{7/2}$	5	−1.240
1959.37	51036.8	$5s^25p^2(^3P)5d\ ^4F_{5/2}–5s^25p^2(^3P)4f\ ^4D_{7/2}$	6	−1.534
1965.81	50869.6	$5s^25p^2(^3P)5d\ ^4P_{1/2}–5s^25p^2(^1D)4f\ ^2D_{3/2}$	1	−1.258
1966.61	50848.9	$5s^25p^2(^3P)5d\ ^4D_{7/2}–5s^25p^2(^1D)4f\ ^2G_{7/2}$	9	−0.355
1971.76	50716.1	$5s^25p^2(^3P)5d\ ^2D_{5/2}–5s^25p^2(^3P)4f\ ^2F_{7/2}$	10	0.189
1971.93	50711.7	$5s^25p^2(^3P)5d\ ^4D_{5/2}–5s^25p^2(^3P)4f\ ^2D_{3/2}$	11	−0.655
1973.23	50678.3	$5s^25p^2(^3P)5d\ ^4D_{1/2}–5s^25p^2(^3P)4f\ ^4D_{3/2}$	1	−2.246*
1979.48	50518.3	$5s^25p^2(^3P)5d\ ^4D_{3/2}–5s^25p^2(^3P)6p\ ^2D_{3/2}$	11	−0.498
1982.23	50448.2	$5s^25p^2(^3P)5d\ ^4D_{3/2}–5s^25p^2(^3P)4f\ ^4D_{1/2}$	3	−2.415*
1985.97	50353.2	$5s^25p^2(^3P)5d\ ^4D_{7/2}–5s^25p^2(^1D)4f\ ^2G_{9/2}$	10	−2.220*
1986.28	50345.4	$5s^25p^2(^3P)6s\ ^4P_{3/2}–5s^25p^2(^1D)6p\ ^2F_{5/2}$	3	−1.988*
1988.10	50299.3	$5s^25p^2(^3P)5d\ ^4D_{3/2}–5s^25p^2(^3P)4f\ ^4F_{5/2}$	9	−0.461
1988.46	50290.2	$5s5p^4\ ^2S_{1/2}–5s^25p^2(^3P)6p\ ^4S_{3/2}$	1	−1.211
1989.73	50258.1	$5s^25p^2(^3P)5d\ ^4D_{5/2}–5s^25p^2(^3P)6p\ ^4D_{5/2}$	9	−0.687
1990.43	50240.4	$5s^25p^2(^1D)5d\ ^2P_{3/2}–5s^25p^2(^1S)6p\ ^2P_{1/2}$	1	−1.466
1993.55	50161.8	$5s5p^4\ ^2S_{1/2}–5s^25p^2(^3P)6p\ ^4P_{1/2}$	10	−1.428
1998.66	50033.5	$5s^25p^2(^1D)5d\ ^2F_{5/2}–5s^25p^2(^3P)4f\ ^4F_{3/2}$	7	−1.697*
2000.00	50000.0	$5s^25p^2(^3P)5d\ ^2D_{5/2}–5s^25p^2(^1D)4f\ ^2D_{5/2}$	1	−2.011*

λ_{obs} in air (Å)	σ_{obs} (cm^{-1})	Transition	Int. and shape	log(*gf*)[d]
2000.36	49974.8	$5s^25p^2(^1D)5d\ ^2D_{5/2}–5s^25p^2(^1S)4f\ ^2F_{7/2}$	4	−0.069
2014.27	49629.7	$5s5p^4\ ^2P_{3/2}–5s^25p^2(^1D)6p\ ^2F_{5/2}$	6	−1.948*
2026.06	49341.0	$5s^25p^2(^3P)5d\ ^4D_{7/2}–5s^25p^2(^1D)4f\ ^2F_{5/2}$	11	−1.872
2030.81	49225.6	$5s^25p^2(^3P)6s\ ^4P_{5/2}–5s^25p^2(^3P)4f\ ^2F_{7/2}$	1	−2.499
2041.08	48977.9	$5s^25p^2(^3P)5d\ ^4P_{5/2}–5s^25p^2(^3P)4f\ ^2F_{5/2}$	9	−2.373
2041.50	48967.9	$5s^25p^2(^1D)5d\ ^2F_{5/2}–5s^25p^2(^3P)6p\ ^4D_{3/2}$	8	−1.332
2046.16	48856.4	$5s^25p^2(^3P)6s\ ^4P_{1/2}–5s^25p^2(^3P)6p\ ^2P_{3/2}$	10	−1.715
2050.42	48754.9	$5s^25p^2(^3P)5d\ ^4D_{1/2}–5s^25p^2(^3P)6p\ ^2S_{1/2}$	9	−1.188
2054.44	48659.5	$5s5p^4\ ^2S_{1/2}–5s^25p^2(^3P)4f\ ^2D_{3/2}$	9	−0.855
2060.70	48511.7	$5s^25p^2(^3P)6s\ ^4P_{5/2}–5s^25p^2(^1D)4f\ ^2D_{5/2}$	4	−1.520*

Table 1 (*continued*)

λ_{obs} in air (Å)	σ_{obs} (cm^{-1})	Transition	Int. and shape	log(*gf*)[d]
2063.05	48456.4	$5s^25p^2(^3P)5d\ ^2F_{5/2}$–$5s^25p^2(^1D)6p\ ^2P_{3/2}$	1[a]	−2.697*
2063.05	48456.4	$5s^25p^2(^3P)6s\ ^4P_{3/2}$–$5s^25p^2(^1D)4f\ ^2D_{3/2}$	1[a]	−2.805*
2081.93	48017.1	$5s^25p^2(^1D)5d\ ^2F_{5/2}$–$5s^25p^2(^3P)4f\ ^2G_{7/2}$	11	−0.332
2084.60	47955.6	$5s^25p^2(^1D)5d\ ^2G_{7/2}$–$5s^25p^2(^3P)4f\ ^2F_{5/2}$	9	−1.584
2086.63	47908.9	$5s^25p^2(^3P)5d\ ^2D_{5/2}$–$5s^25p^2(^1D)6p\ ^2D_{5/2}$	9[a]	−2.456*
2086.63	47908.9	$5s^25p^2(^3P)5d\ ^4P_{3/2}$–$5s^25p^2(^3P)6p\ ^2P_{1/2}$	9[a]	−1.709
2090.47	47820.9	$5s^25p^2(^3P)5d\ ^4D_{5/2}$–$5s^25p^2(^3P)4f\ ^4F_{5/2}$	7	−1.026
2094.04	47739.4	$5s5p^4\ ^2P_{3/2}$–$5s^25p^2(^1D)4f\ ^2D_{3/2}$	1	−4.554*
2097.78	47654.3	$5s^25p^2(^3P)5d\ ^4D_{3/2}$–$5s^25p^2(^3P)6p\ ^2S_{1/2}$	6	−1.632
2098.40	47640.2	$5s^25p^2(^3P)5d\ ^4D_{5/2}$–$5s^25p^2(^3P)4f\ ^4F_{7/2}$	12	−0.136
2108.42	47413.9	$5s^25p^2(^3P)5d\ ^4P_{5/2}$–$5s^25p^2(^3P)6p\ ^4P_{5/2}$	12	−0.675
2118.45	47189.4	$5s^25p^2(^1D)5d\ ^2P_{1/2}$–$5s^25p^2(^1D)6p\ ^2P_{1/2}$	11	−0.765
2118.58	47186.5	$5s^25p^2(^3P)5d\ ^4P_{3/2}$–$5s^25p^2(^3P)4f\ ^2F_{5/2}$	11	−0.950
2121.38	47124.2	$5s^25p^2(^3P)5d\ ^2P_{3/2}$–$5s^25p^2(^3P)4f\ ^4G_{5/2}$	8	−0.371
2122.50	47099.4	$5s^25p^2(^3P)5d\ ^4D_{5/2}$–$5s^25p^2(^3P)4f\ ^4D_{3/2}$	9	−1.304
2123.05	47087.2	$5s^25p^2(^3P)5d\ ^4D_{7/2}$–$5s^25p^2(^3P)6p\ ^4D_{7/2}$	9	−0.347
2123.82	47070.1	$5s^25p^2(^3P)5d\ ^4P_{5/2}$–$5s^25p^2(^1D)4f\ ^2G_{7/2}$	6	−1.260
2128.48	46967.1	$5s^25p^2(^1D)5d\ ^2F_{7/2}$–$5s^25p^2(^3P)4f\ ^4D_{5/2}$	1	−3.535*
2129.96	46934.4	$5s^25p^2(^3P)6s\ ^4P_{1/2}$–$5s^25p^2(^3P)6p\ ^4P_{3/2}$	1	−3.464*
2131.71	46895.9	$5s^25p^2(^1D)5d\ ^2F_{5/2}$–$5s^25p^2(^3P)4f\ ^2D_{5/2}$	5	−1.579
2133.34	46860.1	$5s^25p^2(^3P)6s\ ^2P_{3/2}$–$5s^25p^2(^1D)6p\ ^2P_{1/2}$	10	−1.417
2144.01	46626.9	$5s^25p^2(^3P)5d\ ^4F_{7/2}$–$5s^25p^2(^3P)4f\ ^4G_{9/2}$	13	0.453
2150.91	46477.3	$5s^25p^2(^3P)5d\ ^4P_{1/2}$–$5s^25p^2(^3P)6p\ ^2P_{1/2}$	8	−1.701
2153.64	46418.4	$5s^25p^2(^3P)5d\ ^4P_{5/2}$–$5s^25p^2(^3P)6p\ ^2P_{3/2}$	9	−1.459
2154.90	46391.3	$5s^25p^2(^1D)5d\ ^2G_{7/2}$–$5s^25p^2(^3P)6p\ ^4P_{5/2}$	12	−1.147
2170.99	46047.5	$5s^25p^2(^1D)5d\ ^2G_{7/2}$–$5s^25p^2(^1D)4f\ ^2G_{7/2}$	3	−2.226*
2173.82	45987.6	$5s5p^4\ ^2S_{1/2}$–$5s^25p^2(^3P)6p\ ^2D_{3/2}$	9	−1.211
2185.26	45746.8	$5s^25p^2(^3P)5d\ ^2D_{3/2}$–$5s^25p^2(^3P)6p\ ^2P_{1/2}$	10	−1.296
2186.41	45722.8	$5s^25p^2(^3P)5d\ ^4F_{5/2}$–$5s^25p^2(^3P)4f\ ^4G_{7/2}$	11	0.280
2187.09	45708.6	$5s^25p^2(^1D)5d\ ^2F_{5/2}$–$5s^25p^2(^3P)4f\ ^4D_{7/2}$	11	−0.332
2188.14	45686.6	$5s^25p^2(^3P)5d\ ^4D_{1/2}$–$5s^25p^2(^3P)6p\ ^4D_{3/2}$	9	−1.668
2189.83	45651.4	$5s^25p^2(^3P)5d\ ^4D_{3/2}$–$5s^25p^2(^3P)4f\ ^4F_{3/2}$	11	−1.092
2191.24	45622.0	$5s^25p^2(^3P)5d\ ^4P_{3/2}$–$5s^25p^2(^3P)6p\ ^4P_{5/2}$	3	−0.893
2194.12	45562.1	$5s^25p^2(^3P)5d\ ^4P_{5/2}$–$5s^25p^2(^1D)4f\ ^2F_{5/2}$	4	−4.696*
2208.56	45264.3	$5s^25p^2(^1D)5d\ ^2D_{3/2}$–$5s^25p^2(^1S)6p\ ^2P_{1/2}$	7	−3.217*
2212.08	45192.2	$5s^25p^2(^1S)5d\ ^2D_{3/2}$–$5s^25p^2(^1S)6p\ ^2P_{3/2}$	3	−0.890
2213.13	45170.8	$5s^25p^2(^3P)5d\ ^4F_{3/2}$–$5s^25p^2(^3P)4f\ ^4G_{5/2}$	9	−0.371
2219.22	45046.9	$5s5p^4\ ^2S_{1/2}$–$5s^25p^2(^3P)4f\ ^4D_{3/2}$	3	−2.189*
2220.34	45024.1	$5s^25p^2(^3P)5d\ ^2D_{3/2}$–$5s^25p^2(^3P)4f\ ^2F_{5/2}$	12	−0.323
2229.91	44830.9	$5s^25p^2(^1D)5d\ ^2F_{7/2}$–$5s^25p^2(^3P)4f\ ^2G_{7/2}$	8	−1.529
2240.12	44626.61	$5s^25p^2(^3P)5d\ ^4P_{3/2}$–$5s^25p^2(^3P)6p\ ^2P_{3/2}$	10	−0.701
2240.34	44662.23	$5s^25p^2(^3P)5d\ ^4D_{7/2}$–$5s^25p^2(^3P)6p\ ^2D_{5/2}$	9	−1.265*
2242.15	44586.21	$5s^25p^2(^3P)5d\ ^4D_{3/2}$–$5s^25p^2(^3P)6p\ ^4D_{3/2}$	8	−1.267
2244.50	44539.54	$5s^25p^2(^1D)5d\ ^2G_{7/2}$–$5s^25p^2(^1D)4f\ ^2F_{5/2}$	10[a]	−1.708
2244.50	44539.54	$5s^25p^2(^1D)5d\ ^2S_{1/2}$–$5s^25p^2(^1S)6p\ ^2P_{1/2}$	10[a]	−1.673
2246.64	44497.11	$5s^25p^2(^3P)5d\ ^4P_{5/2}$–$5s^25p^2(^3P)6p\ ^4P_{3/2}$	1	−0.670
2274.13	43959.28	$5s^25p^2(^1D)5d\ ^2D_{3/2}$–$5s^25p^2(^1D)6p\ ^2P_{1/2}$	5	−2.335*
2279.76	43850.73	$5s^25p^2(^3P)5d\ ^4F_{9/2}$–$5s^25p^2(^3P)4f\ ^2G_{7/2}$	1	−1.857
2281.22	43822.66	$5s^25p^2(^3P)6s\ ^4P_{1/2}$–$5s^25p^2(^3P)6p\ ^4S_{3/2}$	7	−1.344*
2283.96	43770.10	$5s^25p^2(^3P)5d\ ^4P_{3/2}$–$5s^25p^2(^1D)4f\ ^2F_{5/2}$	9	−0.884
2287.13	43709.44	$5s^25p^2(^1D)5d\ ^2F_{7/2}$–$5s^25p^2(^3P)4f\ ^2D_{5/2}$	5	−3.535*
2287.91	43694.54	$5s^25p^2(^3P)6s\ ^4P_{1/2}$–$5s^25p^2(^3P)6p\ ^4P_{1/2}$	9	−1.552
2288.90	43675.64	$5s^25p^2(^3P)5d\ ^2F_{5/2}$–$5s^25p^2(^3P)4f\ ^2F_{7/2}$	12	−2.933*
2289.96	43655.42	$5s^25p^2(^3P)5d\ ^4F_{5/2}$–$5s^25p^2(^3P)4f\ ^4G_{5/2}$	9	−0.990
2306.19	43348.22	$5s5p^4\ ^2P_{3/2}$–$5s^25p^2(^3P)6p\ ^2P_{1/2}$	1	−0.886
2306.58	43340.89	$5s^25p^2(^3P)6s\ ^4P_{3/2}$–$5s^25p^2(^3P)4f\ ^2F_{5/2}$	10	−1.715*
2308.31	43308.41	$5s^25p^2(^3P)5d\ ^4P_{5/2}$–$5s^25p^2(^3P)6p\ ^4D_{7/2}$	7	−2.817*
2311.42	43250.15	$5s^25p^2(^1D)5d\ ^2G_{9/2}$–$5s^25p^2(^1D)4f\ ^2G_{7/2}$	3	−1.302
2311.48	43249.03	$5s^25p^2(^1D)5d\ ^2P_{1/2}$–$5s^25p^2(^1D)6p\ ^2D_{3/2}$	13	−0.737
2314.40	43194.46	$5s^25p^2(^3P)5d\ ^4P_{1/2}$–$5s^25p^2(^3P)6p\ ^2P_{3/2}$	2	−1.165
2315.56	43172.83	$5s^25p^2(^3P)5d\ ^4D_{5/2}$–$5s^25p^2(^3P)4f\ ^4F_{3/2}$	1	−1.789*
2318.22	43123.29	$5s5p^{42}S_{1/2}$–$5s^25p^2(^3P)6p\ ^2S_{1/2}$	1	−2.286
2320.60	43079.07	$5s^25p^2(^3P)5d\ ^4D_{7/2}$–$5s^25p^2(^3P)6p\ ^4D_{5/2}$	1	−3.097*
2327.05	42959.68	$5s^25p^2(^3P)5d\ ^2F_{5/2}$–$5s^25p^2(^1D)4f\ ^2D_{5/2}$	5	−1.666*
2331.40	42879.53	$5s^25p^2(^1D)5d\ ^2D_{3/2}$–$5s^25p^2(^1D)4f\ ^2D_{5/2}$	0	−0.840

(*continued on next page*)

Table 1 (*continued*)

λ_{obs} in air (Å)	σ_{obs} (cm^{-1})	Transition	Int. and shape	log(*gf*)[d]
2338.29	42753.19	$5s^25p^2(^1D)5d\ ^2G_{9/2}–5s^25p^2(^1D)4f\ ^2G_{9/2}$	6	−1.135
2340.92	42705.16	$5s^25p^2(^3P)5d\ ^4P_{3/2}–5s^25p^2(^3P)6p\ ^4P_{3/2}$	11	−0.385
2345.28	42625.78	$5s5p^4\ ^2P_{3/2}–5s^25p^2(^3P)4f\ ^2F_{5/2}$	6	−0.323
2351.44	42514.12	$5s^25p^2(^3P)5d\ ^4D_{3/2}–5s^25p^2(^3P)4f\ ^2D_{5/2}$	6	−0.800
2355.44	42441.93	$5s^25p^2(^1S)5d\ ^2D_{3/2}–5s^25p^2(^1S)6p\ ^2P_{1/2}$	7	−0.159
2364.13	42285.93	$5s^25p^2(^1D)5d\ ^2G_{7/2}–5s^25p^2(^3P)6p\ ^4D_{7/2}$	4	−2.439*
2365.55	42260.55	$5s^25p^2(^3P)5d\ ^4F_{9/2}–5s^25p^2(^3P)4f\ ^4G_{9/2}$	4	−1.080
2369.38	42192.25	$5s^25p^2(^3P)6s\ ^4P_{1/2}–5s^25p^2(^3P)4f\ ^2D_{3/2}$	1	−1.450
2372.47	42137.30	$5s^25p^2(^3P)6s\ ^2P_{1/2}–5s^25p^2(^3P)6p\ ^2P_{1/2}$	6	−0.788
2372.86	42130.37	$5s5p^4\ ^2P_{1/2}–5s^25p^2(^1D)6p\ ^2P_{1/2}$	3	−2.476*
2374.15	42107.48	$5s^25p^2(^3P)5d\ ^4D_{5/2}–5s^25p^2(^3P)6p\ ^4D_{3/2}$	3	−1.789*
2384.37	41927.01	$5s^25p^2(^1D)5d\ ^2P_{3/2}–5s^25p^2(^1D)6p\ ^2P_{3/2}$	2	−1.749*
2391.96	41793.98	$5s^25p^2(^3P)5d\ ^2F_{7/2}–5s^25p^2(^3P)4f\ ^2F_{7/2}$	4	−1.468
2394.31	41752.97	$5s^25p^2(^1D)5d\ ^2G_{9/2}–5s^25p^2(^1D)4f\ ^2F_{7/2}$	5	−1.302
2415.61	41384.83	$5s^25p^2(^3P)5d\ ^4P_{5/2}–5s^25p^2(^3P)6p\ ^4S_{3/2}$	9	−0.525
2422.12	41273.61	$5s^25p^2(^3P)5d\ ^4P_{1/2}–5s^25p^2(^3P)6p\ ^4P_{3/2}$	9	−0.770
2428.97	41157.22	$5s^25p^2(^3P)5d\ ^4D_{5/2}–5s^25p^2(^3P)4f\ ^2G_{7/2}$	10	−0.089
2431.07	41121.67	$5s5p^4\ ^2S_{1/2}–5s^25p^2(^3P)4f\ ^4F_{3/2}$	6	−3.362*
2433.59	41079.09	$5s^25p^2(^3P)5d\ ^2F_{7/2}–5s^25p^2(^1D)4f\ ^2D_{5/2}$	9	−0.661
2438.08	41003.45	$5s^25p^2(^3P)5d\ ^4D_{1/2}–5s^25p^2(^3P)6p\ ^4D_{1/2}$	2	−2.416*
2446.08	40869.35	$5s^25p^2(^3P)5d\ ^2F_{5/2}–5s^25p^2(^1D)6p\ ^2D_{5/2}$	8	−2.278*
2447.64	40843.31	$5s^25p^2(^3P)5d\ ^4P_{5/2}–5s^25p^2(^3P)6p\ ^2D_{5/2}$	9[a]	−0.633
2447.64	40843.31	$5s^25p^2(^1D)5d\ ^2P_{1/2}–5s^25p^2(^1D)4f\ ^2D_{3/2}$	9[a]	−0.432
2450.90	40788.99	$5s^25p^2(^1D)5d\ ^2D_{3/2}–5s^25p^2(^1D)6p^2D_{5/2}$	8	−0.544
2451.37	40781.17	$5s^25p^2(^3P)6s\ ^4P_{3/2}–5s^25p^2(^3P)6p\ ^2P_{3/2}$	9	−2.410*
2459.75	40642.24	$5s^25p^2(^3P)5d\ ^4D_{7/2}–5s^25p^2(^3P)4f\ ^4F_{5/2}$	3	−1.393
2462.66	40594.22	$5s^25p^2(^3P)5d\ ^4F_{7/2}–5s^25p^2(^3P)4f\ ^4G_{7/2}$	5	−0.578
2465.75	40543.35	$5s^25p^2(^3P)5d\ ^2D_{3/2}–5s^25p^2(^3P)6p\ ^4P_{3/2}$	5	−1.848*
2470.74	40461.47	$5s^25p^2(^3P)5d\ ^4D_{7/2}–5s^25p^2(^3P)4f\ ^4F_{7/2}$	3	−1.019
2474.82	40394.77	$5s^25p^2(^1D)5d\ ^2F_{5/2}–5s^25p^2(^3P)4f\ ^4G_{7/2}$	9	−2.752*
2493.05	40099.41	$5s^25p^2(^3P)5d\ ^2F_{5/2}–5s^25p^2(^1D)6p\ ^2D_{3/2}$	9	−0.241
2495.10	40066.47	$5s5p^4\ ^2P_{3/2}–5s^25p^2(^3P)6p\ ^2P_{3/2}$	11	−2.466*
2497.02	40035.67	$5s^25p^2(^3P)5d\ ^4D_{5/2}–5s^25p^2(^3P)4f\ ^2D_{5/2}$	6	−1.698*
2498.06	40019.00	$5s^25p^2(^1D)5d\ ^2D_{3/2}–5s^25p^2(^1D)6p^2D_{3/2}$	2	−0.146
2503.93	39925.19	$5s^25p^2(^3P)6s\ ^4P_{3/2}–5s^25p^2(^1D)4f\ ^2F_{5/2}$	6	−1.453
2505.33	39902.88	$5s^25p^2(^3P)5d\ ^4D_{3/2}–5s^25p^2(^3P)6p\ ^4D_{1/2}$	3	−1.601
2514.69	39754.37	$5s^25p^2(^3P)5d\ ^4P_{5/2}–5s^25p^2(^3P)4f\ ^2D_{3/2}$	6	−1.336
2524.92	39593.31	$5s^25p^2(^3P)5d\ ^4P_{3/2}–5s^25p^2(^3P)6p\ ^4S_{3/2}$	1	−1.485*
2525.51	39584.06	$5s^25p^2(^3P)5d\ ^2F_{5/2}–5s^25p^2(^1D)6p\ ^2F_{5/2}$	3	−0.849
2529.58	39520.37	$5s^25p^2(^3P)6s\ ^4P_{1/2}–5s^25p^2(^3P)6p\ ^2D_{3/2}$	3	−1.528*
2534.18	39448.64	$5s^25p^2(^3P)6s\ ^4P_{1/2}–5s^25p^2(^3P)4f\ ^4D_{1/2}$	1	−2.822
2559.94	39051.71	$5s^25p^2(^3P)5d\ ^4P_{3/2}–5s^25p^2(^3P)6p\ ^2D_{5/2}$	10	−0.893
2564.13	38987.90	$5s^25p^2(^3P)5d\ ^2F_{7/2}–5s^25p^2(^1D)6p\ ^2D_{5/2}$	12	−0.636
2572.93	38854.56	$5s^25p^2(^3P)6s\ ^2P_{1/2}–5s^25p^2(^3P)6p\ ^2P_{3/2}$	10	−0.774
2573.36	38848.06	$5s^25p^2(^3P)5d\ ^4D_{5/2}–5s^25p^2(^3P)4f\ ^4D_{7/2}$	2	−0.089
2589.03	38612.95	$5s^25p^2(^1D)5d\ ^2G_{9/2}–5s^25p^2(^3P)4f\ ^2G_{9/2}$	1	−1.135
2591.24	38580.02	$5s^25p^2(^3P)6s\ ^4P_{1/2}–5s^25p^2(^3P)4f\ ^4D_{3/2}$	6	−1.513*
2594.83	38526.65	$5s^25p^2(^3P)5d\ ^4F_{7/2}–5s^25p^2(^3P)4f\ ^4G_{5/2}$	1	−2.692
2608.33	38327.26	$5s^25p^2(^1D)5d\ ^2F_{5/2}–5s^25p^2(^3P)4f\ ^4G_{5/2}$	2	−2.267*
2619.70	38160.92	$5s^25p^2(^3P)5d\ ^4P_{1/2}–5s^25p^2(^3P)6p\ ^4S_{3/2}$	11	−0.619
2621.78	38130.65	$5s^25p^2(^3P)6s\ ^4P_{5/2}–5s^25p^2(^3P)4f\ ^2F_{5/2}$	11	−0.522
2626.98	38055.17	$5s^25p^2(^3P)5d\ ^2D_{5/2}–5s^25p^2(^3P)6p\ ^4P_{5/2}$	9	−0.217
2633.39	37962.55	$5s^25p^2(^3P)5d\ ^4P_{3/2}–5s^25p^2(^3P)4f\ ^2D_{3/2}$	5	−0.893
2650.91	37711.67	$5s^25p^2(^3P)5d\ ^2D_{5/2}–5s^25p^2(^1D)4f\ ^2G_{7/2}$	3	−0.749
2651.58	37702.14	$5s^25p^2(^3P)5d\ ^2F_{7/2}–5s^25p^2(^1D)6p\ ^2F_{5/2}$	13	−0.140
2652.17	37693.75	$5s^25p^2(^3P)5d\ ^2F_{5/2}–5s^25p^2(^1D)4f\ ^2D_{3/2}$	10	−1.392
2665.13	37510.47	$5s^25p^2(^1D)5d\ ^2P_{3/2}–5s^25p^2(^1D)6p\ ^2P_{1/2}$	10	−2.007*
2670.79	37430.98	$5s^25p^2(^3P)5d\ ^2D_{3/2}–5s^25p^2(^3P)6p\ ^4S_{3/2}$	5	−0.905
2679.99	37302.49	$5s^25p^2(^3P)5d\ ^2D_{3/2}–5s^25p^2(^3P)6p\ ^4P_{1/2}$	11	−0.847
2691.74	37139.67	$5s^25p^2(^1D)5d\ ^2D_{5/2}–5s^25p^2(^1D)6p^2D_{3/2}$	4	−0.519
2695.87	37082.77	$5s^25p^2(^3P)5d\ ^4P_{5/2}–5s^25p^2(^3P)6p\ ^2D_{3/2}$	9	−0.525
2697.51	37060.23	$5s^25p^2(^3P)5d\ ^2D_{5/2}–5s^25p^2(^3P)6p\ ^2P_{3/2}$	13	−0.030
2706.73	36934.00	$5s^25p^2(^3P)6s\ ^2P_{1/2}–5s^25p^2(^3P)6p\ ^4P_{3/2}$	10	−0.357
2709.97	36889.84	$5s^25p^2(^3P)5d\ ^2D_{3/2}–5s^25p^2(^3P)6p\ ^2D_{5/2}$	1	−0.905

Table 1 (*continued*)

λ_{obs} in air (Å)	σ_{obs} (cm^{-1})	Transition	Int. and shape	log(*gf*)[d]
2711.90	36863.59	$5s^25p^2(^3P)5d\ ^4P_{5/2}–5s^25p^2(^3P)4f\ ^4F_{5/2}$	1	−0.636
2725.27	36682.75	$5s^25p^2(^3P)5d\ ^4P_{5/2}–5s^25p^2(^3P)4f\ ^4F_{7/2}$	13	−0.457
2733.92	36566.69	$5s^25p^2(^3P)6s\ ^4P_{5/2}–5s^25p^2(^3P)6p\ ^4P_{5/2}$	2	−1.849
2744.08	36431.31	$5s^25p^2(^1D)5d\ ^2P_{3/2}–5s^25p^2(^1D)4f\ ^2D_{5/2}$	10	−0.063
2759.66	36225.64	$5s^25p^2(^1D)5d\ ^2S_{1/2}–5s^25p^2(^1D)6p\ ^2P_{3/2}$	6	−1.092
2759.86	36223.02	$5s^25p^2(^3P)6s\ ^4P_{5/2}–5s^25p^2(^1D)4f\ ^2G_{7/2}$	0	−1.312
2761.35	36203.47	$5s^25p^2(^3P)5d\ ^2D_{5/2}–5s^25p^2(^1D)4f\ ^2F_{5/2}$	1	−2.610*
2767.58	36121.98	$5s^25p^2(^3P)6s\ ^2P_{3/2}–5s^25p^2(^3P)6p\ ^2P_{1/2}$	15	−0.037
2792.47	35800.03	$5s^25p^2(^3P)5d\ ^2D_{3/2}–5s^25p^2(^3P)4f\ ^2D_{3/2}$	3	−1.057
2796.58	35747.42	$5s^25p^2(^3P)6s\ ^4P_{3/2}–5s^25p^2(^3P)6p\ ^4S_{3/2}$	10	−0.207
2803.46	35659.70	$5s^25p^2(^1D)5d\ ^2G_{7/2}–5s^25p^2(^3P)4f\ ^4F_{7/2}$	2	−2.011
2806.65	35619.17	$5s^25p^2(^3P)6s\ ^4P_{3/2}–5s^25p^2(^3P)6p\ ^4P_{1/2}$	11	−0.307
2810.46	35570.89	$5s^25p^2(^3P)6s\ ^4P_{5/2}–5s^25p^2(^3P)6p\ ^2P_{3/2}$	10	−1.140
2824.10	35399.09	$5s^25p^2(^3P)6s\ ^2P_{3/2}–5s^25p^2(^3P)4f\ ^2F_{5/2}$	11	−0.547
2828.31	35346.40	$5s^25p^2(^3P)5d\ ^2D_{3/2}–5s^25p^2(^3P)6p\ ^4D_{5/2}$	1	−2.107
2838.47	35219.89	$5s^25p^2(^3P)6s\ ^4P_{3/2}–5s^25p^2(^3P)4f\ ^4D_{1/2}$	11	−1.986
2845.06	35138.31	$5s^25p^2(^3P)5d\ ^2D_{5/2}–5s^25p^2(^3P)6p\ ^4P_{3/2}$	10	−0.748
2850.50	35071.26	$5s^25p^2(^3P)5d\ ^4P_{3/2}–5s^25p^2(^3P)4f\ ^4F_{5/2}$	10	−0.526
2864.15	34904.12	$5s5p^4\ ^2P_{3/2}–5s^25p^2(^3P)6p\ ^4P_{1/2}$	10	−0.847
2879.79	34714.57	$5s^25p^2(^3P)6s\ ^4P_{5/2}–5s^25p^2(^1D)4f\ ^2F_{5/2}$	12	−4.425*
2898.48	34490.73	$5s5p^4\ ^2P_{3/2}–5s^25p^2(^3P)6p\ ^2D_{5/2}$	10	−3.272*
2900.44	34467.43	$5s^25p^2(^1S)5d\ ^2D_{5/2}–5s^25p^2(^1D)6p\ ^2P_{3/2}$	13	−0.298
2910.37	34349.83	$5s^25p^2(^3P)5d\ ^4P_{3/2}–5s^25p^2(^3P)4f\ ^4D_{3/2}$	13	−0.412
2929.25	34128.45	$5s^25p^2(^1S)5d\ ^2D_{3/2}–5s^25p^2(^1D)6p\ ^2P_{3/2}$	9	−1.286
2952.61	33858.45	$5s^25p^2(^3P)5d\ ^4P_{1/2}–5s^25p^2(^3P)6p\ ^2D_{3/2}$	3	−3.845*
2954.69	33834.61	$5s^25p^2(^3P)6s\ ^2P_{3/2}–5s^25p^2(^3P)6p\ ^4P_{5/2}$	15	0.121
2955.89	33820.88	$5s^25p^2(^3P)6s\ ^2P_{1/2}–5s^25p^2(^3P)6p\ ^4S_{3/2}$	12	−0.419
2958.72	33788.53	$5s^25p^2(^3P)5d\ ^4P_{1/2}–5s^25p^2(^3P)4f\ ^4D_{1/2}$	9	−0.676
2967.12	33692.88	$5s^25p^2(^3P)6s\ ^2P_{1/2}–5s^25p^2(^3P)6p\ ^4P_{1/2}$	2	−0.445
2970.94	33649.56	$5s^25p^2(^3P)6s\ ^4P_{5/2}–5s^25p^2(^3P)6p\ ^4P_{3/2}$	1	0.152
2976.44	33587.38	$5s^25p^2(^3P)6s\ ^4P_{1/2}–5s^25p^2(^3P)6p\ ^4D_{3/2}$	14	−1.528*
2977.99	33569.90	$5s^25p^2(^1D)5d\ ^2P_{3/2}–5s^25p^2(^1D)6p\ ^2D_{3/2}$	6	−2.668*
3014.02	33168.62	$5s^25p^2(^1D)5d\ ^2P_{1/2}–5s^25p^2(^3P)6p\ ^2P_{3/2}$	1	−1.485
3017.72	33127.95	$5s^25p^2(^3P)5d\ ^2D_{3/2}–5s^25p^2(^3P)6p\ ^2D_{3/2}$	6	−1.677*
3024.43	33054.46	$5s^25p^2(^1D)5d\ ^2P_{3/2}–5s^25p^2(^1D)6p\ ^2F_{5/2}$	6	−1.081
3034.22	32947.81	$5s5p^{42}P_{3/2}–5s^25p^2(^3P)6p\ ^4D_{5/2}$	15	−2.107
3036.97	32917.98	$5s^25p^2(^3P)5d\ ^4P_{1/2}–5s^25p^2(^3P)4f\ ^4D_{3/2}$	12	−0.603
3042.67	32856.31	$5s^25p^2(^3P)5d\ ^4D_{7/2}–5s^25p^2(^3P)4f\ ^2D_{5/2}$	1	−2.480*
3044.26	32839.15	$5s^25p^2(^3P)6s\ ^2P_{3/2}–5s^25p^2(^3P)6p\ ^2P_{3/2}$	16	0.025
3068.57	32579.00	$5s^25p^2(^3P)5d\ ^2F_{5/2}–5s^25p^2(^3P)4f\ ^2F_{5/2}$	9	−0.963
3074.48	32516.38	$5s^25p^2(^1D)5d\ ^2S_{1/2}–5s^25p^2(^1D)4f\ ^2P_{1/2}$	2	−0.858
3076.16	32498.62	$5s^25p^2(^1D)5d\ ^2D_{3/2}–5s^25p^2(^3P)4f\ ^2F_{5/2}$	1	−1.395
3079.72	32461.06	$5s^25p^2(^3P)6s\ ^4P_{5/2}–5s^25p^2(^3P)6p\ ^4D_{7/2}$	14	0.492
3083.05	32426.00	$5s^25p^2(^3P)5d\ ^4P_{3/2}–5s^25p^2(^3P)6p\ ^2S_{1/2}$	6	−1.620
3086.70	32387.65	$5s^25p^2(^3P)5d\ ^4D_{7/2}–5s^25p^2(^3P)4f\ ^4G_{9/2}$	3	0.379
3103.23	32215.14	$5s^25p^2(^3P)5d\ ^4P_{5/2}–5s^25p^2(^3P)4f\ ^4F_{3/2}$	10	−1.713
3105.62	32190.35	$5s^25p^2(^3P)6s\ ^2P_{1/2}–5s^25p^2(^3P)4f\ ^2D_{3/2}$	11	−1.024
3121.57	32025.88	$5s^25p^2(^3P)5d\ ^2D_{5/2}–5s^25p^2(^3P)6p\ ^4S_{3/2}$	3	−1.116
3125.76	31982.95	$5s^25p^2(^3P)6s\ ^2P_{3/2}–5s^25p^2(^1D)4f\ ^2F_{5/2}$	13	−1.056
3142.87	31808.84	$5s^25p^2(^1D)5d\ ^2S_{1/2}–5s^25p^2(^1D)6p\ ^2P_{1/2}$	1	−1.135
3156.77	31668.78	$5s^25p^2(^3P)5d\ ^4D_{7/2}–5s^25p^2(^3P)4f\ ^4D_{7/2}$	1	−2.112*
3175.25	31484.47	$5s^25p^2(^3P)5d\ ^2D_{5/2}–5s^25p^2(^3P)6p\ ^2D_{5/2}$	17	−0.217
3179.27	31444.67	$5s^25p^2(^3P)5d\ ^2D_{5/2}–5s^25p^2(^3P)6p\ ^2D_{5/2}$	15	−0.494
3184.58	31392.24	$5s5p^4\ ^2P_{1/2}–5s^25p^2(^3P)6p\ ^2P_{1/2}$	14	−1.263
3199.32	31247.61	$5s^25p^2(^1D)5d\ ^2P_{1/2}–5s^25p^2(^3P)6p\ ^4P_{3/2}$	1	−1.773
3201.55	31225.85	$5s^25p^2(^3P)6s\ ^4P_{3/2}–5s^25p^2(^3P)4f\ ^4F_{5/2}$	10	−1.321
3207.79	31165.11	$5s^25p^2(^1D)5d\ ^2P_{3/2}–5s^25p^2(^1D)4f\ ^2D_{3/2}$	2	−2.698*
3209.40	31149.47	$5s^25p^2(^3P)5d\ ^4P_{5/2}–5s^25p^2(^3P)6p\ ^4D_{3/2}$	13	−1.054
3223.36	31014.57	$5s^25p^2(^3P)5d\ ^2F_{5/2}–5s^25p^2(^3P)6p\ ^4P_{5/2}$	2	−0.853
3225.49	30994.09	$5s^25p^2(^3P)5d\ ^4P_{1/2}–5s^25p^2(^3P)6p\ ^2S_{1/2}$	9	−1.047
3233.41	30918.18	$5s^25p^2(^3P)6s\ ^2P_{3/2}–5s^25p^2(^3P)6p\ ^4P_{3/2}$	1	−2.938*
3239.30	30861.96	$5s^25p^2(^1D)6s\ ^2D_{5/2}–5s^25p^2(^1D)6p\ ^2D_{5/2}$	16	−0.073
3253.25	30729.63	$5s5p^4\ ^2P_{3/2}–5s^25p^2(^3P)6p\ ^2D_{3/2}$	13	−1.677*
3256.66	30697.45	$5s^25p^2(^3P)5d\ ^2F_{7/2}–5s^25p^2(^3P)4f\ ^2F_{5/2}$	9	−1.079
3259.46	30671.08	$5s^25p^2(^3P)5d\ ^2F_{5/2}–5s^25p^2(^1D)4f\ ^2G_{7/2}$	12	−0.795

(*continued on next page*)

Table 1 (*continued*)

λ_{obs} in air (Å)	σ_{obs} (cm^{-1})	Transition	Int. and shape	log(*gf*)[d]
3260.67	30659.70	$5s5p^4\ ^2P_{3/2}$–$5s^25p^2(^3P)4f\ ^4D_{1/2}$	1	−2.866*
3273.74	30537.30	$5s^25p^2(^3P)6s\ ^4P_{5/2}$–$5s^25p^2(^3P)6p\ ^4S_{3/2}$	13	−0.998
3276.59	30510.74	$5s5p^4\ ^2P_{3/2}$–$5s^25p^2(^3P)4f\ ^4F_{5/2}$	1	−2.204
3277.28	30504.32	$5s^25p^2(^3P)6s\ ^4P_{3/2}$–$5s^25p^2(^3P)4f\ ^4D_{3/2}$	10	−0.742
3285.98	30423.56	$5s^25p^2(^3P)5d\ ^4P_{3/2}$–$5s^25p^2(^3P)4f\ ^4F_{3/2}$	15	−1.777*
3289.03	30395.35	$5s^25p^2(^3P)5d\ ^2D_{5/2}$–$5s^25p^2(^3P)4f\ ^2D_{3/2}$	9	−1.559
3303.32	30263.86	$5s^25p^2(^3P)5d\ ^2D_{3/2}$–$5s^25p^2(^3P)6p\ ^2S_{1/2}$	8	−1.132
3310.40	30199.14	$5s^25p^2(^3P)5d\ ^4P_{5/2}$–$5s^25p^2(^3P)4f\ ^2G_{7/2}$	16	−0.399
3322.19	30091.97	$5s^25p^2(^1D)6s\ ^2D_{5/2}$–$5s^25p^2(^1D)6p\ ^2D_{3/2}$	4	−0.073
3332.83	29995.90	$5s^25p^2(^3P)6s\ ^4P_{5/2}$–$5s^25p^2(^3P)6p\ ^2D_{5/2}$	18	−0.058
3338.86	29941.73	$5s^25p^2(^3P)5d\ ^2D_{5/2}$–$5s^25p^2(^3P)6p\ ^4D_{5/2}$	1	−0.953
3339.19	29938.77	$5s^25p^2(^1D)5d\ ^2D_{3/2}$–$5s^25p^2(^3P)6p\ ^2P_{3/2}$	1	−1.354
3355.96	29789.17	$5s5p^4\ ^2P_{3/2}$–$5s^25p^2(^3P)4f\ ^4D_{3/2}$	11	−2.343*
3364.68	29711.97	$5s^25p^2(^1S)5d\ ^2D_{3/2}$–$5s^25p^2(^1D)6p\ ^2P_{1/2}$	4	−2.466
3367.50	29687.09	$5s^25p^2(^1S)5d\ ^2D_{5/2}$–$5s^25p^2(^3P)4f\ ^2F_{7/2}$	5	−1.470
3380.09	29576.52	$5s^25p^2(^1D)6s\ ^2D_{5/2}$–$5s^25p^2(^1D)6p\ ^2F_{5/2}$	10	−0.310
3386.75	29518.36	$5s^25p^2(^3P)6s\ ^2P_{1/2}$–$5s^25p^2(^3P)6p\ ^2D_{3/2}$	14	−0.384
3394.78	29448.54	$5s^25p^2(^3P)6s\ ^2P_{1/2}$–$5s^25p^2(^3P)4f\ ^4D_{1/2}$	6	−1.201
3426.42	29176.61	$5s^25p^2(^1D)5d\ ^2G_{7/2}$–$5s^25p^2(^3P)4f\ ^2G_{7/2}$	5	−1.529
3428.03	29162.91	$5s^25p^2(^3P)5d\ ^2F_{5/2}$–$5s^25p^2(^1D)4f\ ^2F_{5/2}$	5	−0.941
3431.54	29133.08	$5s^25p^2(^3P)5d\ ^2F_{7/2}$–$5s^25p^2(^3P)6p\ ^4P_{5/2}$	13	−0.399
3437.52	29082.40	$5s^25p^2(^1D)5d\ ^2D_{3/2}$–$5s^25p^2(^1D)4f\ ^2F_{5/2}$	9	−0.701
3450.74	28970.99	$5s^25p^2(^1S)5d\ ^2D_{5/2}$–$5s^25p^2(^1D)4f\ ^2D_{5/2}$	4	−2.869*
3458.74	28903.98	$5s^25p^2(^3P)6s\ ^4P_{1/2}$–$5s^25p^2(^3P)6p\ ^4D_{1/2}$	17	−0.091
3472.48	28789.62	$5s^25p^2(^3P)5d\ ^2F_{7/2}$–$5s^25p^2(^1D)4f\ ^2G_{7/2}$	8	−1.077
3491.55	28632.38	$5s^25p^2(^1S)5d\ ^2D_{3/2}$–$5s^25p^2(^1D)4f\ ^2D_{5/2}$	2	−1.938*
3497.89	28580.49	$5s^25p^2(^3P)6s\ ^4P_{3/2}$–$5s^25p^2(^3P)6p\ ^2S_{1/2}$	15	−0.424
3498.19	28578.04	$5s^25p^2(^3P)6s\ ^2P_{1/2}$–$5s^25p^2(^3P)4f\ ^4D_{3/2}$	6	−1.372
3513.56	28453.02	$5s^25p^2(^3P)6s\ ^4P_{5/2}$–$5s^25p^2(^3P)6p\ ^4D_{5/2}$	12	−0.632
3522.36	28381.94	$5s^25p^2(^3P)5d\ ^2D_{3/2}$–$5s^25p^2(^3P)4f\ ^4D_{5/2}$	1	−0.687
3537.41	28261.19	$5s^25p^2(^3P)5d\ ^2D_{3/2}$–$5s^25p^2(^3P)4f\ ^4F_{3/2}$	12	−2.915*
3553.26	28135.13	$5s^25p^2(^1D)5d\ ^2P_{1/2}$–$5s^25p^2(^3P)6p\ ^4S_{3/2}$	6	−1.363
3556.49	28109.58	$5s5p^4\ ^2P_{1/2}$–$5s^25p^2(^3P)6p\ ^2P_{3/2}$	12	−3.164*
3557.96	28097.97	$5s^25p^2(^3P)5d\ ^2F_{5/2}$–$5s^25p^2(^3P)6p\ ^4P_{3/2}$	9	−1.111
3560.36	28079.03	$5s^25p^2(^1D)6s\ ^2D_{3/2}$–$5s^25p^2(^1D)6p\ ^2F_{5/2}$	1	0.196
3569.53	28006.90	$5s^25p^2(^1D)5d\ ^2P_{1/2}$–$5s^25p^2(^3P)6p\ ^4P_{1/2}$	4	−1.773
3584.50	27889.93	$5s^25p^2(^3P)5d\ ^4P_{5/2}$–$5s^25p^2(^3P)4f\ ^4D_{7/2}$	1	−0.399
3587.29	27868.24	$5s^25p^2(^1D)5d\ ^2S_{1/2}$–$5s^25p^2(^1D)6p\ ^2D_{3/2}$	9	−0.945
3587.67	27865.29	$5s5p^4\ ^2P_{3/2}$–$5s^25p^2(^3P)6p\ ^2S_{1/2}$	11	−1.132
3595.37	27805.62	$5s^25p^2(^3P)6s\ ^2P_{3/2}$–$5s^25p^2(^3P)6p\ ^4S_{3/2}$	1	−0.795
3606.05	27723.27	$5s^25p^2(^3P)5d\ ^2D_{5/2}$–$5s^25p^2(^3P)6p\ ^2D_{3/2}$	3	−0.819
3610.74	27687.26	$5s^25p^2(^1D)6s\ ^2D_{5/2}$–$5s^25p^2(^1D)4f\ ^2D_{3/2}$	2	−1.668
3612.01	27677.52	$5s^25p^2(^3P)6s\ ^2P_{3/2}$–$5s^25p^2(^3P)6p\ ^4P_{1/2}$	5	−1.064
3658.80	27323.58	$5s^25p^2(^3P)5d\ ^2D_{5/2}$–$5s^25p^2(^3P)4f\ ^4F_{7/2}$	5	−1.990
3663.88	27285.70	$5s^25p^2(^3P)5d\ ^4P_{3/2}$–$5s^25p^2(^3P)4f\ ^2D_{5/2}$	13	−1.010
3664.46	27281.38	$5s^25p^2(^3P)5d\ ^2F_{7/2}$–$5s^25p^2(^1D)4f\ ^2F_{5/2}$	10	−1.983
3666.75	27264.34	$5s^25p^2(^3P)6s\ ^2P_{3/2}$–$5s^25p^2(^3P)6p\ ^2D_{5/2}$	16	−0.180
3676.01	27195.66	$5s^25p^2(^3P)5d\ ^2D_{3/2}$–$5s^25p^2(^3P)6p\ ^4D_{3/2}$	6	−1.504
3719.10	26880.58	$5s^25p^2(^1S)5d\ ^2D_{5/2}$–$5s^25p^2(^1D)6p\ ^2D_{5/2}$	3	−1.609
3720.91	26867.50	$5s^25p^2(^1D)5d\ ^2G_{7/2}$–$5s^25p^2(^3P)4f\ ^4D_{7/2}$	1[b]	−1.529
3732.66	26782.93	$5s^25p^2(^3P)5d\ ^2D_{5/2}$–$5s^25p^2(^3P)4f\ ^4D_{3/2}$	12	−1.029
3750.71	26654.04	$5s^25p^2(^3P)6s\ ^2P_{1/2}$–$5s^25p^2(^3P)6p\ ^2S_{1/2}$	13	−0.685
3761.44	26578.01	$5s^25p^2(^3P)6s\ ^4P_{3/2}$–$5s^25p^2(^3P)4f\ ^4F_{3/2}$	4	−1.622
3793.30	26354.79	$5s^25p^2(^3P)5d\ ^4D_{7/2}$–$5s^25p^2(^3P)4f\ ^4G_{7/2}$	6	−1.936*
3810.67	26234.66	$5s^25p^2(^3P)6s\ ^4P_{5/2}$–$5s^25p^2(^3P)6p\ ^2D_{3/2}$	3	−2.580*
3817.38	26188.54	$5s5p^4\ ^2P_{1/2}$–$5s^25p^2(^3P)6p\ ^4P_{3/2}$	6[a]	−1.361
3817.38	26188.54	$5s^25p^2(^1D)6s\ ^2D_{3/2}$–$5s^25p^2(^1D)4f\ ^2D_{3/2}$	6[a]	−1.380
3837.71	26049.82	$5s^25p^2(^1D)5d\ ^2P_{3/2}$–$5s^25p^2(^3P)4f\ ^2F_{5/2}$	10	−0.770
3842.80	26015.31	$5s^25p^2(^1D)5d\ ^2D_{3/2}$–$5s^25p^2(^1D)4f\ ^2F_{5/2}$	1	−0.701
3879.17	25771.41	$5s^25p^2(^1S)5d\ ^2D_{3/2}$–$5s^25p^2(^1D)6p\ ^2D_{3/2}$	9	−2.478*
3886.72	25721.35	$5s^25p^2(^3P)6s\ ^2P_{3/2}$–$5s^25p^2(^3P)6p\ ^4D_{5/2}$	11	−0.856
3905.93	25594.85	$5s^25p^2(^1S)5d\ ^2D_{5/2}$–$5s^25p^2(^1D)6p\ ^2F_{5/2}$	13	−0.731
3918.57	25512.29	$5s^25p^2(^3P)6s\ ^4P_{3/2}$–$5s^25p^2(^3P)6p\ ^4D_{3/2}$	11	−1.120
3958.35	25255.90	$5s^25p^2(^1S)5d\ ^2D_{3/2}$–$5s^25p^2(^1D)6p\ ^2F_{5/2}$	13	−2.874

Table 1 (*continued*)

λ_{obs} in air (Å)	σ_{obs} (cm^{-1})	Transition	Int. and shape	log(*gf*)[d]
3979.31	25123.51	$5s^25p^2(^3P)5d\ ^2D_{3/2}$–$5s^25p^2(^3P)4f\ ^2D_{5/2}$	12	−0.687
3994.42	25027.85	$5s^25p^2(^3P)5d\ ^2F_{7/2}$–$5s^25p^2(^3P)6p\ ^4D_{7/2}$	13	−1.217
4001.18	24985.56	$5s^25p^2(^3P)5d\ ^2F_{5/2}$–$5s^25p^2(^3P)6p\ ^4S_{3/2}$	12	−0.627
4014.09	24905.21	$5s^25p^2(^1D)5d\ ^2D_{3/2}$–$5s^25p^2(^3P)6p\ ^4S_{3/2}$	10	−1.195
4032.91	24788.99	$5s^25p^2(^1D)5d\ ^2G_{9/2}$–$5s^25p^2(^3P)4f\ ^4G_{9/2}$	9	−3.046*
4034.85	24777.07	$5s^25p^2(^1D)5d\ ^2D_{3/2}$–$5s^25p^2(^3P)6p\ ^4P_{1/2}$	6	−1.606
4051.64	24674.39	$5s^25p^2(^3P)5d\ ^4P_{3/2}$–$5s^25p^2(^3P)6p\ ^4D_{1/2}$	12	−1.398
4055.43	24651.33	$5s^25p^2(^3P)6s\ ^2P_{1/2}$–$5s^25p^2(^3P)4f\ ^4F_{3/2}$	5	−1.812*
4082.90	24485.48	$5s^25p^2(^1D)5d\ ^2P_{3/2}$–$5s^25p^2(^3P)6p\ ^4P_{5/2}$	11	−3.272*
4089.81	24444.11	$5s^25p^2(^3P)5d\ ^2F_{5/2}$–$5s^25p^2(^3P)6p\ ^2D_{5/2}$	9	−0.853
4207.08	23762.76	$5s^25p^2(^1D)5d\ ^2P_{1/2}$–$5s^25p^2(^3P)4f\ ^4D_{1/2}$	1	−2.378
4253.57	23503.05	$5s^25p^2(^3P)6s\ ^2P_{3/2}$–$5s^25p^2(^3P)6p\ ^2D_{3/2}$	11	−1.129
4255.92	23490.07	$5s^25p^2(^1D)5d\ ^2P_{3/2}$–$5s^25p^2(^3P)6p\ ^2P_{3/2}$	15	−0.284
4264.96	23440.28	$5s^25p^2(^3P)6s\ ^4P_{3/2}$–$5s^25p^2(^3P)4f\ ^2D_{5/2}$	9	−2.059
4278.51	23366.05	$5s^25p^2(^1S)5d\ ^2D_{3/2}$–$5s^25p^2(^1D)4f\ ^2D_{3/2}$	0	−4.470*
4280.55	23354.91	$5s^25p^2(^3P)5d\ ^2F_{5/2}$–$5s^25p^2(^3P)4f\ ^2D_{3/2}$	12	−1.729
4301.10	23243.33	$5s^25p^2(^3P)5d\ ^4P_{1/2}$–$5s^25p^2(^3P)6p\ ^4D_{1/2}$	0[h]	−2.204
4332.08	23077.11	$5s5p^4\ ^2P_{1/2}$–$5s^25p^2(^3P)6p\ ^4S_{3/2}$	7	−1.230
4356.26	22949.02	$5s5p^4\ ^2P_{1/2}$–$5s^25p^2(^3P)6p\ ^4P_{1/2}$	15	−2.128*
4365.33	22901.34	$5s^25p^2(^3P)5d\ ^2F_{5/2}$–$5s^25p^2(^3P)6p\ ^4D_{5/2}$	16	−0.584
4373.88	22856.57	$5s^25p^2(^3P)5d\ ^2D_{5/2}$–$5s^25p^2(^3P)4f\ ^4F_{3/2}$	1	−2.945*
4380.85	22820.21	$5s^25p^2(^1D)5d\ ^2D_{3/2}$–$5s^25p^2(^3P)6p\ ^4D_{5/2}$	10	−2.098*
4399.17	22725.18	$5s5p^4\ ^2P_{3/2}$–$5s^25p^2(^3P)4f\ ^2D_{5/2}$	6	−1.296
4428.26	22575.89	$5s^25p^2(^3P)5d\ ^4P_{5/2}$–$5s^25p^2(^3P)4f\ ^4G_{7/2}$	10	−0.695
4429.10	22571.61	$5s^25p^2(^1D)6s\ ^2D_{5/2}$–$5s^25p^2(^3P)4f\ ^2F_{5/2}$	3	−2.595*
4430.85	22562.70	$5s^25p^2(^3P)5d\ ^2F_{7/2}$–$5s^25p^2(^3P)6p\ ^2D_{5/2}$	13	−1.066
4587.78	21790.93	$5s^25p^2(^3P)5d\ ^2D_{5/2}$–$5s^25p^2(^3P)6p\ ^4D_{3/2}$	8	−1.887
4638.29	21553.63	$5s^25p^2(^1D)5d\ ^2G_{7/2}$–$5s^25p^2(^3P)4f\ ^4G_{7/2}$	3	−2.043
4652.47	21487.94	$5s^25p^2(^3P)6s\ ^4P_{5/2}$–$5s^25p^2(^3P)4f\ ^4D_{5/2}$	6	−2.029
4678.60	21367.93	$5s^25p^2(^3P)6s\ ^4P_{5/2}$–$5s^25p^2(^3P)4f\ ^4F_{3/2}$	5	−2.783*
4744.55	21070.92	$5s^25p^2(^1D)5d\ ^2S_{1/2}$–$5s^25p^2(^3P)6p\ ^2P_{1/2}$	6	−1.581
4767.76	20968.35	$5s^25p^2(^1D)5d\ ^2P_{1/2}$–$5s^25p^2(^3P)6p\ ^2S_{1/2}$	10	−1.568
4797.05	20840.32	$5s^25p^2(^3P)5d\ ^2D_{5/2}$–$5s^25p^2(^3P)4f\ ^2G_{7/2}$	5	−2.157*
4799.71	20828.77	$5s^25p^2(^3P)6s\ ^4P_{3/2}$–$5s^25p^2(^3P)6p\ ^4D_{1/2}$	1	−1.398
4833.57	20682.86	$5s^25p^2(^3P)5d\ ^2F_{5/2}$–$5s^25p^2(^3P)6p\ ^2D_{3/2}$	10	−0.402
4843.90	20638.76	$5s^25p^2(^3P)6s\ ^2P_{3/2}$–$5s^25p^2(^3P)6p\ ^2S_{1/2}$	5	−1.089
4852.39	20602.65	$5s^25p^2(^1D)5d\ ^2D_{3/2}$–$5s^25p^2(^3P)6p\ ^2D_{3/2}$	6	−2.164*
4868.81	20533.16	$5s^25p^2(^1D)5d\ ^2D_{3/2}$–$5s^25p^2(^3P)4f\ ^4D_{1/2}$	3	−2.978*
4874.67	20508.48	$5s^25p^2(^3P)5d\ ^4P_{5/2}$–$5s^25p^2(^3P)4f\ ^4G_{5/2}$	1	−0.695
4885.17	20464.4	$5s^25p^2(^3P)5d\ ^2F_{5/2}$–$5s^25p^2(^3P)4f\ ^4F_{5/2}$	2	−0.573
4904.69	20383.0	$5s^25p^2(^1D)5d\ ^2D_{3/2}$–$5s^25p^2(^3P)4f\ ^4F_{5/2}$	3	−1.569
4924.24	20302.03	$5s^25p^2(^3P)6s\ ^4P_{5/2}$–$5s^25p^2(^3P)6p\ ^4D_{3/2}$	5	−1.882*
4995.44	20012.7	$5s^25p^2(^1D)6s\ ^2D_{5/2}$–$5s^25p^2(^3P)6p\ ^2P_{3/2}$	1	−2.671*
5268.85	18974.19	$5s^25p^2(^1S)5d\ ^2D_{3/2}$–$5s^25p^2(^3P)6p\ ^2P_{1/2}$	3	−1.296
5288.78	18902.69	$5s^25p^2(^3P)6s\ ^2P_{1/2}$–$5s^25p^2(^3P)6p\ ^4D_{1/2}$	0	−2.064*
5325.12	18773.70	$5s5p^4\ ^2P_{1/2}$–$5s^25p^2(^3P)6p\ ^2D_{3/2}$	12	−2.069*
5330.17	18755.91	$5s^25p^2(^3P)6s\ ^2P_{3/2}$–$5s^25p^2(^3P)4f\ ^4D_{5/2}$	1[a]	−3.432*
5330.17	18755.91	$5s^25p^2(^1D)5d\ ^2G_{9/2}$–$5s^25p^2(^3P)4f\ ^4G_{7/2}$	1[a]	−3.869*
5341.31	18716.79	$5s^25p^2(^3P)5d\ ^4P_{3/2}$–$5s^25p^2(^3P)4f\ ^4G_{5/2}$	5	−2.043
5377.65	18590.31	$5s^25p^2(^1D)5d\ ^2D_{5/2}$–$5s^25p^2(^3P)4f\ ^2F_{5/2}$	1	−2.250
5379.85	18582.71	$5s^25p^2(^3P)5d\ ^2F_{7/2}$–$5s^25p^2(^3P)4f\ ^4F_{5/2}$	6	−2.019
5416.62	18456.57	$5s^25p^2(^1D)5d\ ^2P_{3/2}$–$5s^25p^2(^3P)6p\ ^4S_{3/2}$	6	−2.171*
5432.74	18401.80	$5s^25p^2(^3P)5d\ ^2F_{7/2}$–$5s^25p^2(^3P)4f\ ^4F_{7/2}$	6	−1.460
5483.83	18230.37	$5s^25p^2(^3P)6s\ ^4P_{5/2}$–$5s^25p^2(^3P)4f\ ^2D_{5/2}$	3	−1.627
5580.31	17915.18	$5s^25p^2(^1D)5d\ ^2P_{3/2}$–$5s^25p^2(^3P)6p\ ^2D_{5/2}$	9	−1.279
5606.01	17833.05	$5s5p^4\ ^2P_{1/2}$–$5s^25p^2(^3P)4f\ ^4D_{3/2}$	10	−1.046
5689.64	17570.93	$5s^25p^2(^3P)6s\ ^2P_{3/2}$–$5s^25p^2(^3P)6p\ ^4D_{3/2}$	2	−2.850*
5992.71	16682.32	$5s^25p^2(^1S)5d\ ^2D_{5/2}$–$5s^25p^2(^1D)4f\ ^2G_{7/2}$	3	−1.536
6038.97	16554.53	$5s^25p^2(^3P)5d\ ^2D_{3/2}$–$5s^25p^2(^3P)4f\ ^4G_{5/2}$	1	−2.623*
6371.09	15691.56	$5s^25p^2(^1S)5d\ ^2D_{3/2}$–$5s^25p^2(^3P)6p\ ^2P_{3/2}$	1	−1.888
6450.34	15498.78	$5s^25p^2(^3P)6s\ ^2P_{3/2}$–$5s^25p^2(^3P)4f\ ^2D_{5/2}$	1	−2.399
6588.17	15174.53	$5s^25p^2(^1S)5d\ ^2D_{5/2}$–$5s^25p^2(^1D)4f\ ^2F_{5/2}$	1	−3.106*
6777.57	14750.48	$5s^25p^2(^3P)5d\ ^2F_{5/2}$–$5s^25p^2(^3P)6p\ ^4D_{3/2}$	1	−1.332

Table 2
New classified lines in Xe IV. See page 145 for Explanation of Tables

λ_{obs} in air (Å)	σ_{obs} (cm^{-1})	σ_{cal} (cm^{1})	Transition	Int. and shape	log(gf)[d]
4295.17	23275.40	4.8	$5s^25p^2(^1D)5d\ ^2D_{3/2}$–$5s^25p^2(^3P)4f\ ^2D_{3/2}$	4	−3.601*
4293.31	23285.52	4.3	$5s^25p^2(^3P)\ 6s\ ^2P_{3/2}$–$5s^25p^2(^3P)4f\ ^4F_{5/2}$	10	−2.208
4266.08	23434.15	2.9	$5s^25p^2(^3P)\ 6s\ ^2P_{3/2}$–$5s^25p^2(^3P)4f\ ^4D_{1/2}$	3	−3.630*
4194.74	23832.69	2.7	$5s^25p^2(^1D)5d\ ^2P_{1/2}$–$5s^25p^2(^3P)6p\ ^2D_{3/2}$	4	−1.741
3828.89	26109.84	10.5	$5s^25p^2(^1S)5d\ ^2D_{5/2}$–$5s^25p^2(^1D)6p\ ^2D_{3/2}$	6	−1.647*
3715.25	26908.46	9.2	$5s^25p^2(^3P)5d\ ^2F_{5/2}$–$5s^25p^2(^3P)6p\ ^4D_{7/2}$	2	−1.558
3579.86	27926.11	6.0	$5s^25p^2(^3P)5d\ ^4P_{1/2}$–$5s^25p^2(^3P)6p\ ^4D_{3/2}$	6	−3.845*
3438.13	27077.27	7.8	$5s^25p^2(^3P)5d\ ^4P_{5/2}$–$5s^25p^2(^3P)4f\ ^2D_{5/2}$	9	−1.599
2992.99	33401.70	1.7	$5s5p^{42}P_{3/2}$–$5s^25p^2(^3P)4f\ ^2D_{3/2}$	3	−1.057
2981.21	33533.67	4.1	$5s^25p^2(^3P)5d\ ^4D_{5/2}$–$5s^25p^2(^3P)4f\ ^4G_{7/2}$	1	−1.163
2942.23	33977.92	8.2	$5s^25p^2(^3P)5d\ ^4D_{7/2}$–$5s^25p^2(^3P)4f\ ^2G_{7/2}$	1	−2.112*
2853.68	35032.21	2.3	$5s5p^{42}P_{3/2}$–$5s^25p^2(^3P)6p\ ^4S_{3/2}$	1	−0.905
2839.60	35205.91	6.2	$5s^25p^2(^3P)6s\ ^4P_{3/2}$–$5s^25p^2(^3P)6p\ ^2D_{5/2}$	6	−0.243
2742.55	36451.67	1.5	$5s^25p^2(^1D)5d\ ^2P_{1/2}$–$5s^25p^2(^3P)6p\ ^2P_{1/2}$	6	−1.762
2600.07	38449.05	9.6	$5s^25p^2(^1D)6s\ ^2D_{5/2}$–$5s^25p^2(^1D)6p\ ^2P_{3/2}$	1	−0.060
2177.61	45907.57	8.1	$5s^25p^2(^3P)5d\ ^4F_{7/2}$–$5s^25p^2(^3P)4f\ ^4D_{7/2}$	9	−1.390

λ_{obs} in vacuum (Å)	σ_{obs} (cm^{-1})	σ_{cal} (cm^{-1})	Transition	Int. and shape	log(gf)[d]
2138.96	46751.7	2.5	$5s^25p^2(^3P)5d\ ^4D_{1/2}$–$5s^25p^2(^3P)4f\ ^4F_{3/2}$	2	−0.585
2081.55	48041.1	39.9	$5s^25p^2(^3P)5d\ ^4D_{5/2}$–$5s^25p^2(^3P)6p\ ^2D_{3/2}$	2	−2.546*
2043.52	48935.2	4.6	$5s^25p^2(^3P)6s\ ^2P_{1/2}$–$5s^25p^2(^1D)6p\ ^2D_{3/2}$	8	−1.891*
1964.06	50914.9	5.4	$5s5p^{42}P_{3/2}$–$5s^25p^2(^1D)6p\ ^2D_{5/2}$	9	−1.813
1877.16	53272.0	4.5	$5s^25p^2(^3P)5d\ ^4P_{1/2}$–$5s^25p^2(^1D)6p\ ^2D_{3/2}$	7	−2.234*
1854.27	53929.6	31.9	$5s^25p^2(^1D)5d^2F_{7/2}$–$5s^25p^2(^3P)6p\ ^4D_{5/2}$	8	−3.315*
1848.98	54083.9	6.3	$5s5p^{42}P_{3/2}$–$5s^25p^2(^1D)6p\ ^2P_{1/2}$	8	−1.225
1822.76	54861.9	60.3	$5s5p^{42}P_{1/2}$–$5s^25p^2(^1S)6p\ ^2P_{1/2}$	2	−2.520*
1822.13	54880.8	1.3	$5s^25p^2(^3P)5d\ ^4F_{7/2}$–$5s^25p^2(^3P)4f\ ^4F_{5/2}$	12	−1.021
1795.49	55695.1	3.2	$5s^25p^2(^3P)5d\ ^2P_{3/2}$–$5s^25p^2(^3P)4f\ ^2D_{5/2}$	10	−1.296
1726.41	57923.7	3.3	$5s^25p^2(^3P)5d\ ^4P_{1/2}$–$5s^25p^2(^1D)4f\ ^2P_{1/2}$	3	−1.510
1696.79	58934.8	6.0	$5s^25p^2(^3P)6s\ ^4P_{1/2}$–$5s^25p^2(^1D)6p\ ^2D_{3/2}$	2	−3.246*
1611.72	62045.5	5.4	$5s^25p^2(^1D)5d\ ^2F_{7/2}$–$5s^25p^2(^3P)6p\ ^4P_{5/2}$	10	−1.147
1590.37	62878.4	6.4	$5s^25p^2(^3P)6s\ ^4P_{1/2}$–$5s^25p^2(^1D)6p\ ^2P_{1/2}$	5	−2.350*
1445.94	69159.2	9.4	$5s^25p^2(^3P)5d\ ^4F_{3/2}$–$5s^25p^2(^3P)6p\ ^4P_{3/2}$	1	−3.342*
1443.69	69266.9	4.9	$5s^25p^2(^3P)5d\ ^2P_{1/2}$–$5s^25p^2(^3P)6p\ ^2P_{3/2}$	1	−0.913
1357.99	73638.2	40.5	$5s^25p^2(^3P)5d\ ^4F_{3/2}$–$5s^25p^2(^3P)4f\ ^2F_{5/2}$	2	−3.195*
1356.35	73727.3	6.2	$5s^25p^2(^3P)5d\ ^4F_{9/2}$–$5s^25p^2(^3P)4f\ ^2F_{7/2}$	2	−0.650
1355.02	73799.6	801.1	$5s^25p^2(^1D)5d\ ^2F_{5/2}$–$5s^25p^2(^1D)6p\ ^2F_{5/2}$	2	−0.849
1333.15	75010.3	1.5	$5s5p^4\ ^2D_{5/2}$–$5s^25p^2(^3P)6p\ ^2D_{5/2}$	3	−1.600
1323.59	75552.1	2.9	$5s5p^4\ ^2D_{5/2}$–$5s^25p^2(^3P)6p\ ^4S_{3/2}$	2	−2.031
1294.67	77239.8	9.7	$5s^25p^2(^3P)5d\ ^4F_{5/2}$–$5s^25p^2(^1D)4f\ ^2D_{3/2}$	1	−2.638*
1292.41	77374.8	6.9	$5s^25p^2(^3P)5d\ ^4F_{7/2}$–$5s^25p^2(^1D)4f\ ^2D_{5/2}$	1	−2.743*
1277.30	78290.1	1.7	$5s^25p^2(^3P)5d\ ^4D_{3/2}$–$5s^25p^2(^1D)6p\ ^2P_{3/2}$	2	−3.034*
1267.64	78886.8	6.8	$5s^25p^3\ ^2P_{1/2}$–$5s5p^4\ ^4P_{3/2}$	1	−3.998*
1260.34	79343.7	4.7	$5s^25p^2(^3P)5d\ ^2P_{1/2}$–$5s^25p^2(^1D)6p\ ^2D_{3/2}$	3	−3.238*
1254.10	79738.5	42.0	$5s5p^4\ ^2D_{5/2}$–$5s^25p^2(^1D)4f\ ^2F_{5/2}$	1[b]	−2.588*
1245.46	80291.6	90.4	$5s^25p^2(^3P)5d\ ^4D_{5/2}$–$5s^25p^2(^1S)4f\ ^2F_{7/2}$	1	−5.002*
1232.09	81162.9	60.4	$5s^25p^2(^3P)5d\ ^4F_{3/2}$–$5s^25p^2(^1D)6p\ ^2D_{3/2}$	2	−1.446
1122.86	89058.3	6.8	$5s5p^4\ ^4P_{5/2}$–$5s^25p^2(^3P)4f\ ^2D_{5/2}$	2	−2.126
1093.28	91467.9	70.4	$5s^25p^2(^3P)5d\ ^2P_{3/2}$–$5s^25p^2(^1D)6p\ ^2P_{3/2}$	1	−2.302*
1052.82	94983.0	1.8	$5s5p^4\ ^2D_{3/2}$–$5s^25p^2(^1D)6p\ ^2D_{5/2}$	1	−2.613*
1032.56	96846.7	2.3	$5s5p^4\ ^4P_{5/2}$–$5s^25p^2(^3P)4f\ ^4F_{5/2}$	4[b]	−1.654

Table 3
Comparison between experimental and theoretical gA_{ij} values. See page 145 for Explanation of Tables

λ_{obs} in air (Å)	Transition	gA_{ij}(ex.) from Ref. [16]	gA_{ij}(ex.)/gA_{ij}(th.) Column A: Ref.[16]	gA_{ij}(ex.)/gA_{ij}(th.) Column B: this work
3044.26	$5s^25p^2(^3P)6s\ ^2P_{3/2}$–$5s^25p^2(^3P)6p\ ^2P_{3/2}$	7.52 ± 0.71	0.96	1.01
3079.72	$5s^25p^2(^3P)6s\ ^4P_{5/2}$–$5s^25p^2(^3P)6p\ ^4D_{7/2}$	20.11 ± 2.51	1.03	0.92
3083.05	$5s^25p^2(^3P)5d\ ^4P_{3/2}$–$5s^25p^2(^3P)6p\ ^2S_{1/2}$	4.88 ± 0.77	24.40	14.81
3103.23	$5s^25p^2(^3P)5d\ ^4P_{5/2}$–$5s^25p^2(^3P)4f\ ^4F_{3/2}$	1.82 ± 0.18	36.40	5.69
3105.62	$5s^25p^2(^3P)6s\ ^2P_{1/2}$–$5s^25p^2(^3P)4f\ ^2D_{3/2}$	3.67 ± 0.13	5.32	5.65
3175.25	$5s^25p^2(^3P)5d\ ^2D_{5/2}$–$5s^25p^2(^3P)6p\ ^2D_{5/2}$	5.97 ± 0.47	1.20	1.49
3179.27	$5s^25p^2(^3P)5d\ ^2D_{5/2}$–$5s^25p^2(^3P)6p\ ^2D_{5/2}$	2.27 ± 0.68	0.52	1.08
3285.98	$5s^25p^2(^3P)5d\ ^4P_{3/2}$–$5s^25p^2(^3P)4f\ ^4F_{3/2}$	0.59 ± 0.11	4.54	2.76
3289.03	$5s^25p^2(^3P)5d\ ^2D_{5/2}$–$5s^25p^2(^3P)4f\ ^2D_{3/2}$	1.54 ± 0.12	7.70	9.06
3310.40	$5s^25p^2(^3P)5d\ ^4P_{5/2}$–$5s^25p^2(^3P)4f\ ^2G_{7/2}$	1.70 ± 0.15	0.79	0.70
3322.19	$5s^25p^2(^1D)6s\ ^2D_{5/2}$–$5s^25p^2(^1D)6p\ ^2D_{3/2}$	4.59 ± 0.55	0.82	0.90
3332.83	$5s^25p^2(^3P)6s\ ^4P_{5/2}$–$5s^25p^2(^3P)6p\ ^2D_{5/2}$	7.31 ± 0.95	1.59	1.39
3386.75	$5s^25p^2(^3P)6s\ ^2P_{1/2}$–$5s^25p^2(^3P)6p\ ^2D_{3/2}$	3.14 ± 0.24	1.28	1.31
3497.89	$5s^25p^2(^3P)6s\ ^4P_{3/2}$–$5s^25p^2(^3P)6p\ ^2S_{1/2}$	1.34 ± 0.29	0.64	0.65
3513.56	$5s^25p^2(^3P)6s\ ^4P_{5/2}$–$5s^25p^2(^3P)6p\ ^4D_{5/2}$	0.99 ± 0.19	1.13	0.79
3595.37	$5s^25p^2(^3P)6s\ ^2P_{3/2}$–$5s^25p^2(^3P)6p\ ^4S_{3/2}$	1.27 ± 0.19	1.49	1.53
3606.05	$5s^25p^2(^3P)5d\ ^2D_{5/2}$–$5s^25p^2(^3P)6p\ ^2D_{3/2}$	3.16 ± 0.25	3.90	4.05
3666.75	$5s^25p^2(^3P)6s\ ^2P_{3/2}$–$5s^25p^2(^3P)6p\ ^2D_{5/2}$	3.40 ± 0.17	0.99	1.04
3750.71	$5s^25p^2(^3P)6s\ ^2P_{1/2}$–$5s^25p^2(^3P)6p\ ^2S_{1/2}$	1.02 ± 0.15	1.01	1.04
4051.64	$5s^25p^2(^3P)5d\ ^4P_{3/2}$–$5s^25p^2(^3P)6p\ ^4D_{1/2}$	1.26 ± 0.08	7.88	7.88