Analysis of the Spectrum of the ($5d^5$+$5d^4$6s)–($5d^4$6p+$5d^3$6s6p) System of Triply Ionized Osmium (Os IV)

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Analysis of the Spectrum of the ($5d^5 + 5d^46s$)–($5d^46p + 5d^36s6p$) System of Triply Ionized Osmium (Os IV)

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Abstract

The spectrum of osmium was photographed in the 225–2100 Å region on a 3-m normal incidence spectrograph using a triggered spark light source and on a 10-m normal incidence spectrograph using a sliding spark source.

The ($5d^5 + 5d^46s$)–($5d^46p + 5d^36s6p$) transition arrays of Os IV were investigated and 934 lines were classified between 705 Å and 1995 Å. The analysis has resulted in the determination of 61 levels in the ($5d^5 + 5d^46s$) even system and of 124 levels in the $5d^46p$ configuration. Five levels of the $5d^36s6p$ configuration were also identified.

The energy levels and their eigenvector compositions have been described by means of the orthogonal operator technique.

The 2-particle magnetic operators of the dp-type are compared with values obtained in other spectra.

Accurate weighted transition probabilities (*gA*-values) calculated by means of orthogonal operators are also presented.

1. Introduction and experiment

The spectra of the 5d-elements have not been studied as extensively as those of the 3d-elements. But during the last decade the 5d-elements were more intensively investigated than before and many publications on these elements appeared [1–4]. This recent interest came up from the observation of heavy elements in the spectra of the chemically peculiar stars κ Cancri and χ Lupi. Thanks to observations by the Goddard High Resolution Spectrograph on board of the Hubble Space Telescope the presence of Os, Pt, Tl and Hg in these objects could be proved [5].

A second reason for investigating 5d-elements was the recent refinement of theoretical calculations [6, 7]. Due to these refinements it is possible to determine higher order magnetic and electrostatic effects, that offer the possibility for more reliable predictions for the very complex members of the 5d-sequence. Investigations in Os VI [2] and Os V [8] have provided parameter values to predict the structure of Os IV and Os III quite satisfactorily. The latter ion, which is astrophysically the most interesting, is under investigation by our team.

The ground configuration of triply ionized osmium (Os IV) is $5d^5$, while the first odd excited configuration is $5d^46p$. The $5d^5$ configuration being the lowest even configuration is shown by Hartree–Fock calculations using the Cowan code program [9], but also follows from studying the trend in the first and second spectra of this isoelectronic sequence. In these ions the ground configuration is $5d^36s^2$ and $5d^46s$ respectively [10].

The spectrum of osmium has been observed in the wavelength region from 225 Å to 2100 Å.

In the lower wavelength region up to 1175 Å the 10 m normal incidence spectrograph in Meudon was used. This spectrograph is equipped with a 3600 l/mm grating resulting in a plate factor of 0.26 Å/mm.

The light source used was a sliding spark operating at 8 kV. In the electric circuit a condensor of 10 μF and a coil of 25 μH were applied.

In the wavelength region above 1175 Å we used the 3 m normal incidence spectrograph of the physics department of the St. Francis Xavier University. This spectrograph is equipped with a 2400 l/mm grating giving a first order plate factor of 1.38 Å/mm. The light source was a low inductance triggered spark. The condenser bank consisted of a 14.3 μF capacitance with a few nH internal inductance. The potential was varied between 4 and 6 kV.

The exposures taken under varied experimental conditions showed different intensity behaviour for lines appearing from different stages of ionisation. This and the polarity exhibited by lines of different ions helped in discriminating different ions.

The spectrograms were measured by means of the Grant semi automatic comparator in Fredericton and by means of the automatic comparator of the Institute for spectroscopy in Troitsk. The spectrograms were reduced by means of internal standards from impurity lines like Si, C, O and N [11].

The relative wavelength uncertainty is about .003 Å in the wavelength region below 1175 Å and about 0.01 Å above 1175 Å, but the absolute accuracy might be worse due to the calibration to Si, C, O and N. From different sets of exposures made in Meudon shifts between the impurity lines and osmium lines upto about 0.01 Å have been observed.

2. Analysis and calculations

The ground configuration of Os IV is $5d^5$ and the first excited odd configuration is $5d^46p$. For both systems the configurations with one excited 6s-electron is nearby and even overlaps for the higher energy values. To start the analysis calculations were made of the energy level values, eigenvector compositions and transition probabilities based on estimated values for the orthogonal operators [6, 7]. In these calculations the even system contained

$5d^5 + 5d^46s + 5d^36s^2$ and the odd system was built up as $5d^46p + 5d^36s6p + 5d^26s^26p$.

Ab-initio values were obtained from the Hartree–Fock programs developed by Cowan [9] and the MCDF program of Parpia *et al.* [12]. The Cowan programs were especially useful to establish the mean energies of the configurations involved. From the Parpia code *ab-initio* values for the orthogonal parameter set [6, 7] were obtained. Apart from the strong one-particle magnetic and two-particle electrostatic integrals this code also provides *ab-inito* values for two-particle magnetic operators for the even as well as for the odd system. The relations between the Slater–Condon integrals and the orthogonal parameters used here are given in a recent publication on Os VI [2].

The analysis was supported by the "package IDEN", developed in the Institute for Spectroscopy [13, 14]. This "IDEN program" is a very powerful tool when some intervals between levels are known or when the predicted energy values are close to the actual level values as is the case for calculations using orthogonal operators [6].

Based on the experimental material and the calculated values 934 lines have been classified in the $(5d^5 + 5d^46s)$–$(5d^46p + 5d^36s6p)$ transition array. The lines and transitions are given in Table I. This list contains the wavelengths and wavenumbers of the observed lines and the levels involved in the transitions. For the upper level the energy value and J-values are given, the latter within brackets. For the even levels also the largest LS component is given. For 16 lines the odd upper level is one of the lower levels of the $5d^36s6p$ configuration. These levels could be established due to the good prediction of the E_{av} of the $5d^36s6p$ configuration. For the prediction the scaling factor of the $5d^4$–$5d^36s$ difference of Os V [8] was used and applied to the difference of the total energies of the $5d^46p$ and $5d^36s6p$ configurations of Os IV obtained using the Cowan code [9]. This d-s jump is much smaller than the $5d^5$–$5d^36s6p$ difference and therefore an error in the scaling factor will not affect the value that much. On the other hand the E_{av} of the $5d^46p$ is well known after establishing only a few $5d^46p$ levels. Apart from the measured intensity numbers, on a scale 0-1000, obtained by means of the automatic comparator in Troitsk, that measures microphotometer optical densities on plates, Table I also shows calculated gA-values in units of $10^7\,s^{-1}$. The radial integrals of the electric dipole operator were calculated by means of the MCDF [12] wavefunctions using the length form. They are given in Table II.

On the basis of the classified lines 61 levels of the $(5d^5 + 5d^46s)$ system have been established. Of these, 31 levels have the largest component belonging to the $5d^5$ configuration while 30 are assigned to $5d^46s$. In the odd system 129 levels were established. Five of them belong to the $5d^36s6p$ configuration. Four of these are built up the low lying ^4F in the $5d^3$ core of this configuration. The deviations of the levels belonging to $5d^36s6p$ are larger since only the E_{av} of this configuration was adjusted to the observed experimental values. The experimental and calculated energy level values, given in cm^{-1}, and the eigenvector compositions are collected in Tables III and IV.

Tables V and VI contain the final fitted parameter values and *ab-initio* calculated values for the even and odd system of Os IV respectively. The *ab-initio* values were calculated with the program of Parpia *et al.* [12] except for the E_{av} for which Cowan's program [9] was used. The scaling factor for the E_{av} is given as:

$$(E_{av}\ 5d^46l - E_{av}\ 5d^5)/(E_{tot}\ 5d^46l - E_{tot}\ 5d^5).$$

In this formula E_{av} is the fitted averaged energy value of the configuration, while E_{tot} is the total energy of the system (including the energies of all inner electrons) as given by Cowan.

In these tables for the fitted parameter values the uncertainties (within brackets) are also shown. If no uncertainty is given the parameters were fixed during the fitting procedure. This fixing is the case for all 3-particle electrostatic operators $(T_1 - T_4)$ of the ddd-type which means that they deal with three equivalent d-electrons. The diagonal matrix elements of odd (3) particle operators change sign comparing a configuration to its complementary configuration and therefore they vanish in the half-filled shell (d^5) systems. This makes a reliable fit of these parameters in a d^5 configuration difficult. For the excited configurations the lack of knowledge of the high lying levels was the reason for fixing these T-parameters. E_β was fixed in the excited configurations because of the lack of levels with low seniority number. The parameters were fixed according to values obtained in Os VI [2] and Os V [8], following the trend going from higher to lower stages of ionization.

It was possible to fit the two-particle magnetic interactions. They all agree very well with the *ab-initio* calculated values. In the even system this is true for the two-particle magnetic dd interactions in $5d^5$, and for the two-particle magnetic ds interaction (A_{mso}) in $5d^46s$ as well as in the odd system for the two-particle magnetic dp interactions $Z^k_{ll'}$. For the latter the consistency in Os VI [2], Os V [8] and Os IV is shown in Table VII. These parameters are a mixture of electrostatic and magnetic effects, which means that there is an electrostatic excitation of the type d-d′ or p-p′ up to a virtual level followed by a magnetic interaction down. In all three spectra the largest contribution is the $Z^1_{pp'}$, which is a combination of the electrostatic interaction R^1(dp,p'd) and the magnetic interaction $\zeta_{pp'}$. Most irregularities appearing in this table arise because there are too few levels of $5d^26p$ of Os VI [2] to fit all two-particle magnetic operators. In Os VI only the expected most relevant of these parameters were free to vary. Despite the fact that small higher order magnetic effects are involved the regularity in Table VII shows that these parameters can be established properly using the orthogonal operator technique [6, 7].

Finally we like to discuss the relation between the calculated gA values and the intensity numbers, given in Table I. It is observed from that table that sometimes neighbouring lines with the same intensity number have calculated gA values that differ by a factor of 5. In these cases the calculated stronger line is classified as a transition from a higher lying level. This suggests that the population of the upper level should be taken into account to overcome this discrepancy. Even in the case, that the intensity numbers are measurements of microphotometer optical densities on plates or eye-estimates, close lying lines with moderate intensity numbers give a reasonable figure of the relation between the intensities. To compare measured intensity numbers and calculated gA values properly, the calculated gA values

should be multiplied by a factor that describes the population of the upper level somehow. The easiest way is to add a Boltzmann factor ($e^{-E/kT}$) in which T stands for a 'source temperature'. To determine this 'source temperature', we have plotted the ratio between the calculated gA values and the measured intensity numbers against the energy value of the upper level of the transition. From these curves a 'source temperature' has been calculated [15]. In the wavelength region below 1175 Å a kT value of 23 000 was obtained, resulting in a source temperature of about 33 000 K, while in the wavelength region above 1175 Å the value obtained for kT is about 16 500, resulting in a temperature of 24 000 K. This difference is not that surprising, since the experimental set-up in Meudon and Antigonish was different. In the low wavelength region a sliding spark was used, while in the wavelength region above 1175 Å a low inductance triggered spark was used. Adding a Boltzmann factor (with an assumed source temperature) to the calculated gA values has already shown to be a helpful tool for the analysis of Au V, which is under investigation of our team. The influence of applying a temperature correction to gA is shown in Table VIII.

3. Conclusions

The analysis of the spectrum of Os IV has resulted in the classification of 934 lines and in the determination of 61 levels in the ($5d^5 + 5d^46s$) even system and of 129 levels in the ($5d^46p + 5d^36s6p$) odd system.

Taking into account the population of the upper level by means of a Boltzmann factor improves the relation between calculated gA values and measured intensity numbers. Source temperatures obtained from the ratio between gA and the intensity numbers are 33 000 K in the low wavelength region and 23 000 K in the upper wavelength region.

Higher order two-particle magnetic dp-effects of the type d-d' and p-p' could be established by means of the orthogonal operator technique and show consistancy in relation to other osmium ions.

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Table I. *Classified lines in the* ($5d^5 + 5d^46s$)–($5d^46p + 5d^36s6p$) *transition array of Os IV*

gA	Int	WL (Å)	WN (cm^{-1})	Diff	Even level	*J*-value	Odd level	*J*-value	Remark
38	9	708.999	141043.9	−0.2	$1\|_5{}^6S)$	0.0	(5/2)–141044.1	(7/2)1	
54	13	728.087	137346.3	−0.8	$1\|_5{}^6S)$	0.0	(5/2)–137347.1	(7/2)1	
69	10	729.224	137132.2	0.4	$1\|_5{}^4G)$	21105.1	(11/2)–158236.9	(9/2)1	
61	10	730.480	136896.3	−0.1	$1\|_5{}^6S)$	0.0	(5/2)–136896.4	(7/2)1	
87	10	737.067	135672.9	−1.3	$1\|_5{}^4G)$	21105.1	(11/2)–156779.3	(11/2)1	
84	9	738.374	135432.6	−0.4	$1\|_5{}^4G)$	21105.1	(11/2)–156538.1	(13/2)1	
77	8	740.665	135013.8	−0.9	$1\|_5{}^4G$	21764.6	(9/2)–156779.3	(11/2)1	
75	16	740.714	135005.0	0.0	$1\|_5{}^4G)$	19886.3	(7/2)–154891.3	(7/2)1	
39	10	741.122	134930.5	−0.8	$1\|_5{}^6S)$	0.0	(5/2)–134931.3	(7/2)1	
120	10	742.666	134650.0	−0.6	$1\|_3{}^4F)$	44173.7	(7/2)–178824.3	(9/2)1	
53	14	743.258	134542.8	−0.6	$1\|_5{}^6S)$	0.0	(5/2)–134543.4	(5/2)1	
307	14	745.002	134227.8	0.6	$2\|_4{}^5D)\,{}^6D$	51800.0	(7/2)–186028.0	(7/2)2	
81	21	746.369	133982.0	−0.9	$1\|_5{}^6S)$	0.0	(5/2)–133982.9	(7/2)1	
1039	110	751.781	133017.4	0.0	$1\|_3{}^2H)$	45806.9	(11/2)–178824.3	(9/2)1	
81	9	752.493	132891.6	−0.5	$1\|_5{}^4G)$	19886.3	(7/2)–152778.4	(7/2)1	
123	29	752.765	132843.7	−0.4	$1\|_5{}^4D)$	25587.8	(7/2)–158431.9	(7/2)1	O III
55	7	752.971	132807.2	−0.6	$1\|_5{}^4D$	27067.5	(5/2)–159875.3	(5/2)1	
147	9	753.542	132706.5	−1.0	$1\|_5{}^2G)$	32886.2	(9/2)–165593.7	(9/2)1	
75	13	757.393	132031.8	−0.7	$1\|_5{}^6S)$	0.0	(5/2)–132032.5	(7/2)1	
338	7	757.875	131947.9	0.4	$2\|_4{}^5D)\,{}^6D$	54080.5	(9/2)–186028.0	(7/2)2	
26	5	758.437	131850.1	−0.6	$1\|_3{}^4P)$	22521.8	(1/2)–154372.5	(1/2)1	
70	8	759.126	131730.4	−0.5	$1\|_5{}^4D)$	27067.5	(5/2)–158798.4	(5/2)1	
45	6	759.596	131648.9	−0.5	$1\|_5{}^4G)$	15617.7	(5/2)–147267.1	(5/2)1	
76	6	761.221	131367.9	−0.2	$1\|_5{}^4G)$	21105.1	(11/2)–152473.2	(11/2)1	
73	7	761.567	131308.3	−0.3	$1\|_5{}^4G)$	21105.1	(11/2)–152413.7	(9/2)1	
160	45	763.283	131013.1	−0.7	$1\|_5{}^4G)$	21764.6	(9/2)–152778.4	(7/2)1	Os V
267	14	764.228	130851.0	−0.5	$2\|_4{}^5D)\,{}^6D$	51800.8	(7/2)–182652.3	(9/2)2	
186	15	765.416	130647.9	−1.2	$1\|_5{}^4G)$	21764.6	(9/2)–152413.7	(9/2)1	
348	62	769.347	129980.3	−0.8	$1\|_5{}^4G)$	21105.1	(11/2)–151086.2	(9/2)1	
55	72	770.258	129826.6	−0.9	$1\|_5{}^4D)$	20218.3	(3/2)–150045.8	(5/2)1	
439	45	772.509	129448.4	−0.1	$1\|_5{}^2I)$	30587.5	(11/2)–160036.0	(9/2)1	
211	80	776.223	128828.9	−0.4	$1\|_5{}^6S)$	0.0	(5/2)–128829.3	(5/2)1	
456	44	776.359	128806.4	−0.4	$1\|_5{}^2I)$	30587.5	(11/2)–159394.3	(9/2)1	
81	9	777.280	128653.7	−0.5	$1\|_5{}^4G)$	19886.3	(7/2)–148540.5	(5/2)1	
91	10	777.472	128621.9	−0.8	$1\|_5{}^4G)$	21764.6	(9/2)–150387.3	(7/2)1	
1312	66	777.776	128571.8	−0.0	$2\|_4{}^5D)\,{}^6D$	54080.5	(9/2)–182652.3	(9/2)2	
1238	61	779.270	128325.2	−0.3	$2\|_4{}^5D)\,{}^6D$	51800.8	(7/2)–180126.3	(7/2)2	
61	11	779.294	128321.3	−0.9	$1\|_5{}^4D)$	20218.3	(3/2)–148540.5	(5/2)1	
423	212	779.748	128246.5	−0.6	$1\|_5{}^4G)$	21105.1	(11/2)–149352.2	(11/2)1	O IV
24	7	781.493	127960.2	−0.8	$1\|_5{}^6S)$	0.0	(5/2–127959.4	(3/2)1	
98	7	782.022	127873.6	−1.1	$1\|_3{}^4F)$	32000.6	(7/2)–159875.3	(5/2)1	
286	324	782.814	127744.2	−0.2	$1\|_5{}^6S)$	0.0	(5/2)–127744.4	(7/2)1	
297	87	782.878	127733.9	−0.1	$1\|_5{}^4G)$	19886.3	(7/2)–147620.3	(7/2)1	
591	35	783.395	127649.5	0.1	$1\|_5{}^2I)$	30587.5	(11/2)–158236.9	(9/2)1	
122	5	783.722	127596.2	0.4	$1\|_5{}^4G)$	20944.7	(3/2)–148540.5	(5/2)1	
34	5	783.780	127586.9	−0.7	$1\|_5{}^4G)$	21764.6	(9/2)–149352.2	(11/2)1	
112	12	784.968	127393.7	−0.6	$1\|_5{}^2G)$	21105.1	(11/2)–148499.4	(9/2)1	
96	6	786.208	127192.7	0.9	$1\|_5{}^4G)$	15617.7	(5/2)–142809.5	(3/2)1	
101	11	788.486	126825.3	−0.6	$1\|_5{}^2D)$	25587.8	(7/2)–152413.7	(9/2)1	
285	27	788.662	126797.1	−0.7	$1\|_3{}^4F)$	32000.6	(7/2)–158798.4	(5/2)1	
254	66	789.030	126737.9	−0.8	$1\|_5{}^4G)$	19886.3	(7/2)–146625.0	(7/2)1	
198	33	789.048	126735.0	−0.2	$1\|_5{}^4G)$	21764.6	(9/2)–148499.4	(9/2)1	
43	10	789.872	126602.7	−0.8	$1\|_3{}^2G)$	56048.8	(9/2)–182652.3	(9/2)2	
288	84	790.498	126502.6	−0.1	$1\|_5{}^4D)$	20218.3	(3/2)–146721.0	(3/2)1	
106	15	790.667	126475.4	−0.1	$1\|_5{}^4G)$	21764.6	(9/2)–148240.1	(11/2)1	
121	10	791.319	126371.3	−0.7	$1\|_5{}^4D)$	27067.5	(5/2)–153429.5	(7/2)1	
54	8	791.646	126319.1	−0.3	$1\|_5{}^4G)$	21105.1	(11/2)–147423.9	(13/2)1	
95	6	792.164	126236.5	−0.2	$1\|_3{}^4F)$	32000.6	(7/2)–158236.9	(9/2)1	
64	9	792.443	126192.1	0.3	$1\|_5{}^2I)$	30587.5	(11/2)–156779.3	(11/2)1	
479	12	793.361	126046.0	0.2	$2\|_4{}^5D)\,{}^6D$	54080.5	(9/2)–180126.3	(7/2)2	
87	10	793.811	125974.6	−0.4	$1\|_5{}^4D)$	27067.5	(5/2)–153042.5	(3/2)1	
111	7	793.962	125950.5	−0.1	$1\|_5{}^2I)$	30587.5	(11/2)–156538.1	(13/2)1	
63	16	794.154	125920.1	−0.2	$1\|_5{}^6S)$	0.0	(5/2)–125920.3	(7/21)1	
378	112	794.561	125855.7	0.0	$1\|_5{}^4G)$	21764.6	(9/2)–147620.3	(7/2)1	
312				0.9	$1\|_5{}^4D)$	28512.7	(1/2)–154372.5	(1/2)1	
40	7	795.479	125710.4	−0.5	$1\|_5{}^4D)$	27067.5	(5/2)–152778.4	(7/2)1	
254	12	795.818	125656.9	0.8	$1\|_3{}^2H)$	38754.8	(9/2)–164410.9	(7/2)1	
86	13	796.527	125545.1	−0.6	$1\|_5{}^2G)$	32886.2	(9/2)–158431.9	(7/2)1	
562	378	797.180	125442.2	0.2	$1\|_5{}^4G)$	21105.1	(11/2)–146547.1	(9/2)1	
27	12	797.284	125425.7	−0.7	$1\|_5{}^4G)$	15617.1	(5/2)–141044.1	(7/2)1	
34	8	797.515	125389.6	0.1	$1\|_5{}^4G)$	21105.1	(11/2)–146494.6	(11/2)1	

Table I. *Continued*

gA	Int	WL (Å)	WN (cm^{-1})	Diff	Even level	*J*-value	Odd level	*J*-value	Remark
430	62	797.765	125350.1	−0.6	$1\|_5{}^2$G)	32886.2	(9/2)–158236.9	(9/2)1	
210	265	797.882	125331.9	0.0	$1\|_5{}^6$S)	0.0	(5/2)–125331.9	(5/2)1	
41	6	798.076	125301.3	0.4	$1\|_3{}^4$F)	37763.7	(5/2)–163064.6	(5/2)1	
49	7	798.571	125223.7	−0.3	$1\|_5{}^2$F)	33574.4	(5/2)–158798.4	(5/2)1	
49	7	798.708	125202.2	−0.4	$1\|_5{}^4$G)	15617.7	(5/2)–140820.3	(5/2)1	
24	8	799.225	125121.1	1.1	$1\|_5{}^4$D)	29597.4	(3/2)–154717.5	(3/2)1	
137	13	800.158	124975.4	0.2	$1\|_5{}^2$I)	33560.6	(13/2)–158535.8	(11/2)1	
84	13	800.214	124966.6	−0.2	$1\|_3{}^4$F)	37763.7	(5/2)–162730.5	(7/2)1	
1332	52	800.933	124854.4	0.0	$2\|_4{}^5$D) ^{6}D	51800.8	(7/2)–176655.2	(9/2)2	
288	36	801.289	124798.9	−0.6	$1\|_5{}^4$D)	25587.8	(7/2)–150387.3	(7/2)1	Os V
219	13	801.444	124774.7	−0.4	$1\|_5{}^4$D)	29597.4	(3/2)–154372.5	(1/2)1	
153	8	801.638	124744.6	0.8	$2\|_4{}^5$D) ^{6}D	54080.5	(9/2)–178824.3	(9/2)1	
42	8	803.060	124523.7	−1.1	$1\|_5{}^4$D)	28517.7	(1/2)–153042.5	(3/2)1	
150	17	803.484	124458.1	0.1	$1\|_5{}^4$D)	25587.8	(7/2)–150045.8	(5/2)1	
86	7	803.838	124403.2	−0.9	$1\|_5{}^2$G)	38660.5	(7/2)–163064.6	(5/2)1	
126	42	803.945	124386.6	−0.7	$1\|_5{}^4$G)	15617.7	(5/2)–140005.0	(5/2)1	
208	27	805.157	124199.4	0.2	$1\|_3{}^4$P)	22521.8	(1/2)–146721.0	(3/2)1	
322	28	805.716	124113.3	−0.1	$1\|_5{}^2$I)	33560.6	(13/2)–157674.0	(15/2)1	
194	30	805.799	124100.4	−0.4	$1\|_5{}^4$G)	20944.7	(5/2)–145045.5	(3/2)1	
1516	108	805.865	124090.2	−0.2	$2\|_4{}^5$D) ^{6}D	49146.6	(5/2)–173237.0	(7/2)2	
588	26	806.609	123975.8	0.1	$1\|_3{}^2$H)	38754.8	(9/2)–162730.5	(7/2)1	
143	9	807.157	123891.7	−1.4	$1\|_5{}^2$G)	32886.2	(9/2)–156779.3	(11/2)1	
89	24	808.057	123753.7	−0.5	$1\|_5{}^4$G)	19886.3	(7/2)–143640.5	(5/2)1	
78	8	808.186	123733.9	−0.2	$1\|_5{}^4$D)	25587.8	(7/2)–149321.9	(9/2)1	
150	187	809.844	123480.6	−0.2	$1\|_5{}^6$S)	0.0	(5/2)–123480.8	(7/2)1	
14	11	810.077	123445.1	0.0	$1\|_5{}^4$D)	29597.4	(3/2)–153042.5	(3/2)1	
662	437	810.227	123422.2	−0.2	$1\|_5{}^4$G)	21105.1	(11/2)–144527.5	(13/2)1	Os V
252	332	811.513	123226.7	0.1	$1\|_5{}^6$S)	0.0	(5/2)–123226.6	(3/2)1	
1680	537	811.565	123218.7	0.0	$1\|_5{}^2$I)	33560.6	(13/2)–156779.3	(11/2)1	
143	73	811.834	123177.9	0.0	$1\|_5{}^4$D)	25587.8	(7/2)–148765.7	(7/2)1	
577	623	811.960	123158.9	0.1	$1\|_5{}^6$S)	0.0	(5/2)–123158.8	(5/2)1	
225	65	812.525	123073.1	−0.2	$1\|_5{}^4$G)	15617.7	(5/2)–138691.0	(3/2)1	
560	77	813.159	122977.2	−0.3	$1\|_5{}^2$I)	33560.6	(13/2)–156538.1	(13/2)1	
62	11	813.269	122960.5	0.1	$1\|_5{}^4$G)	19886.3	(7/2)–142846.7	(5/2)1	
386	51	813.322	122952.6	−0.1	$1\|_5{}^4$D)	25587.8	(7/2)–148540.5	(5/2)1	
121	10	813.602	122910.2	−1.4	$1\|_5{}^4$D)	25587.8	(7/2)–148499.4	(9/2)1	
398	127	815.450	122631.8	0.2	$1\|_5{}^4$G)	21764.6	(9/2)–144396.2	(7/2)1	
341	179	815.554	122616.1	−0.1	$1\|_5{}^4$G)	15617.7	(5/2)–138233.9	(5/2)1	
376	56	815.723	122590.6	−0.6	$1\|_5{}^4$D)	20218.3	(3/2)–142809.5	(3/2)1	
1607	180	815.830	122574.5	−0.2	$2\|_4{}^5$D) ^{6}D	54080.5	(9/2)–176655.2	(9/2)2	
114	11	816.747	122436.9	0.7	$1\|_5{}^2$G)	38660.5	(7/2)–161096.7	(7/2)1	
196	15	818.699	122145.0	0.6	$1\|_5{}^4$G)	19886.3	(7/2)–142030.7	(9/2)1	
328	15	818.923	122111.6	0.0	$1\|_3{}^4$F)	37763.7	(5/2)–159875.3	(5/2)1	
53	5	819.024	122096.5	−0.2	$1\|_5{}^4$G)	21105.1	(11/2)–143201.8	(9/2)1	
88	18	819.458	122032.0	−0.5	$1\|_5{}^4$D)	25587.8	(7/2)–147620.3	(7/2)1	
242	19	819.641	122004.7	−0.4	$1\|_5{}^2$G)	32886.2	(9/2)–154891.3	(7/2)1	
88	9	820.125	121932.7	−0.2	$1\|_5{}^4$D)	25587.8	(7/2)–147520.7	(9/2)1	
351	93	820.236	121916.1	−0.1	$1\|_5{}^4$G)	21105.1	(11/2)–143021.3	(11/2)1	
52	8	820.328	121902.4	0.4	$1\|_5{}^4$G)	20944.7	(5/2)–142846.7	(5/2)1	
311	40	820.840	121826.5	0.3	$1\|_5{}^2$I)	30587.5	(11/2)–152413.7	(9/2)1	
156	15	820.945	121810.8	0.0	$1\|_3{}^4$F)	32561.7	(3/2)–154372.5	(1/2)1	
605	21	821.020	121799.7	−0.8	$2\|_4{}^3$H) ^{4}H	64227.5	(7/2)–186028.0	(7/2)2	
45	7	821.298	121758.5	−0.5	$1\|_5{}^4$D)	20218.3	(3/2)–141977.3	(3/2)1	
325	54	821.834	121679.0	−0.3	$1\|_5{}^4$D)	25587.8	(7/2)–147267.1	(5/2)1	
79	7	823.028	121502.5	−0.5	$1\|_5{}^4$D)	27067.5	(5/2)–148570.5	(3/2)1	
76	8	823.193	121478.1	−0.2	$1\|_3{}^4$F)	32000.6	(7/2)–153478.9	(5/2)1	
1587	570	823.471	121437.2	0.0	$1\|_5{}^4$G)	21764.6	(9/2)–143201.8	(9/2)1	
818	116	824.080	121347.4	−0.1	$1\|_3{}^2$F)	41717.1	(7/2)–163064.6	(5/2)1	
135	13	824.291	121316.5	−0.4	$1\|_5{}^2$F)	33574.4	(5/2)–154891.3	(7/2)1	
95	31	824.539	121279.8	1.1	$1\|_5{}^4$G)	15617.7	(5/2)–136896.4	(7/2)1	
263				−1.4	$1\|_3{}^2$H)	38754.8	(9/2)–160036.0	(9/2)1	
429	92	824.669	121260.7	−0.5	$1\|_5{}^2$G)	32886.2	(9/2)–154147.4	(7/2)1	
295	98	824.699	121256.4	−0.3	$1\|_5{}^4$G)	21764.6	(9/2)–143021.3	(11/2)1	
196	20	825.248	121175.7	−0.6	$1\|_5{}^2$G)	32886.2	(9/2)–154062.5	(9/2)1	
340	113	825.371	121157.6	−0.2	$1\|_5{}^4$G)	19886.3	(7/2)–141044.1	(7/2)1	
16	5	825.478	121141.9	−1.4	$1\|_5{}^2$F)	33574.4	(5/2)–154717.5	(3/2)1	
209	83	826.122	121047.5	0.0	$1\|_3{}^4$P)	22521.8	(1/2)–143569.3	(3/2)1	
499	215	826.224	121032.6	0.0	$1\|_5{}^4$G)	20944.7	(5/2)–141977.3	(3/2)1	
344	115	826.898	120933.9	−0.1	$1\|_5{}^4$G)	19886.3	(7/2)–140820.3	(5/2)1	
611	266	826.955	120925.6	0.0	$1\|_5{}^4$G)	21105.1	(11/2)–142030.7	(9/2)1	
95	5	828.263	120734.6	0.8	$1\|_5{}^2$G)	38660.5	(7/2)–159394.3	(9/2)1	

Table I. *Continued*

gA	Int	WL (Å)	WN (cm^{-1})	Diff	Even level	*J*-value	Odd level	*J*-value	Remark
399	39	828.921	120638.8	−0.7	$1\|_3{}^2H)$	38754.8	(9/2)–159394.3	(9/2)1	
124	8	829.142	120606.7	0.3	$1\|_3{}^2G)$	56048.8	(9/2)–176655.2	(9/2)2	
1619	490	829.195	120598.9	−0.3	$1\|_5{}^2I)$	33560.6	(13/2)–154159.8	(13/2)1	
213	323	829.511	120553.0	0.2	$1\|_5{}^4D)$	27067.5	(5/2)–147620.3	(7/2)1	
641				−0.3	$1\|_5{}^2G)$	32886.2	(9/2)–153439.5	(7/2)1	
65	7	829.891	120497.8	−0.9	$1\|_5{}^2I)$	30587.5	(11/2)–151086.2	(9/2)1	
54	8	831.340	120287.7	0.0	$1\|_3{}^4P)$	22521.8	(1/2)–142809.5	(3/2)1	
812	625	831.393	120280.0	0.0	$1\|_5{}^6S)$	0.0	(5/2)–120280.0	(3/2)1	
420	198	831.490	120266.0	−0.1	$1\|_5{}^4G)$	21764.6	(9/2)–142030.7	(9/2)1	
487	15	831.737	120230.3	−0.2	$2\|_4{}^3H)\,{}^4H$	65797.5	(9/2)–186028.0	(7/2)2	
201	57	831.946	120200.1	0.5	$1\|_5{}^4D)$	27067.5	(5/2)–147267.1	(5/2)1	
290	114	832.510	120118.8	0.0	$1\|_5{}^4G)$	19886.3	(7/2)–140005.0	(5/2)1	
262	33	834.080	119892.6	0.4	$1\|_5{}^2G)$	32886.2	(9/2)–152778.4	(7/2)1	
583	265	834.198	119875.6	0.0	$1\|_5{}^4G)$	20944.7	(5/2)–140820.3	(5/2)1	
194	464	834.816	119786.8	0.1	$1\|_5{}^4D)$	20218.3	(3/2)–140005.0	(5/2)1	
1728				0.0	$1\|_3{}^2H)$	45806.9	(11/2)–165593.7	(9/2)1	
86	21	834.936	119769.7	1.4	$1\|_5{}^2G)$	45825.4	(9/2)–165593.7	(9/2)1	
24				−1.7	$1\|_5{}^2G)$	38660.5	(7/2)–158431.9	(3/2)1	
135	63	835.579	119677.4	−0.2	$1\|_5{}^4G)$	21105.1	(11/2)–140782.7	(11/2)1	
210				0.3	$1\|_3{}^2H)$	38754.8	(9/2)–158431.9	(7/2)1	
292	52	835.746	119653.6	0.1	$1\|_5{}^4D)$	27067.5	(5/2)–146721.0	(3/2)1	
366	35	836.946	119482.1	0.0	$1\|_3{}^2H)$	38754.8	(9/2)–158236.9	(9/2)1	
44	6	837.133	119455.4	−0.1	$1\|_3{}^4P)$	22521.8	(1/2)–141977.3	(3/2)1	
1173	381	837.671	119378.6	0.6	$1\|_5{}^4D)$	25587.8	(7/2)–144965.8	(5/2)1	
168	13	837.987	119333.6	0.0	$1\|_5{}^2F)$	33574.4	(5/2)–152908.0	(5/2)1	
31	4	838.122	119314.4	0.8	$1\|_5{}^4G)$	15617.7	(5/2)–134931.3	(7/2)1	
298	89	838.366	119279.7	0.2	$1\|_5{}^4G)$	21764.6	(9/2)–141044.1	(7/2)1	
1425	198	838.437	119269.5	0.0	$1\|_3{}^2G)$	57478.3	(7/2)–176747.8	(7/2)1	
377	159	839.148	119168.5	0.0	$1\|_5{}^4G)$	19886.3	(7/2)–139054.8	(7/2)1	
282	8	839.231	119156.7	0.2	$2\|_4{}^5D)\,{}^6D$	54080.5	(9/2)–173237.0	(7/2)2	
365	154	839.911	119060.3	0.0	$1\|_5{}^4G)$	20944.7	(5/2)–140005.0	(5/2)1	
374	125	840.662	118953.8	−0.1	$1\|_5{}^4G)$	19886.3	(7/2)–138840.2	(5/2)1	
243	12	840.774	118938.0	0.0	$1\|_3{}^4F)$	40937.3	(3/2)–159875.3	(5/2)1	
4872	614	840.949	118913.2	0.6	$1\|_5{}^2I)$	33560.6	(13/2)–152473.2	(11/2)1	
318	86	841.472	118839.4	0.2	$1\|_5{}^4G)$	21105.1	(11/2)–139944.3	(9/2)1	
1700	677	841.744	118801.0	0.3	$1\|_5{}^6S)$	0.0	(5/2)–118800.7	(7/2)1	
1394	330	842.001	118764.7	0.0	$1\|_5{}^2I)$	30587.5	(11/2)–149352.2	(11/2)1	
1630	490	842.511	118692.8	0.4	$1\|_5{}^4G)$	21105.1	(11/2)–139797.5	(11/2)1	
81	9	843.016	118621.7	−0.2	$1\|_5{}^4D)$	20218.3	(3/2)–138840.2	(5/2)1	
409	127	843.908	118496.4	−0.1	$1\|_5{}^4D)$	25587.8	(7/2)–144084.3	(7/2)1	
151	21	844.077	118472.6	−0.1	$1\|_5{}^4D)$	20218.3	(3/2)–138691.0	(3/2)1	
120	8	844.413	118425.5	0.7	$2\|_4{}^3H)\,{}^4H$	64227.5	(7/2)–182652.3	(9/2)2	
170	38	844.847	118364.6	−0.6	$1\|_3{}^4G)$	15617.7	(5/2)–133982.9	(7/2)1	
520	294	844.967	118347.8	0.2	$1\|_5{}^4G)$	19886.3	(7/2)–138233.9	(5/2)1	
95	5	845.175	118318.8	0.2	$1\|_3{}^2F)$	41717.1	(7/2)–160036.0	(9/2)1	
378	73	846.026	118199.7	−0.3	$1\|_5{}^2G)$	32886.2	(9/2)–151086.2	(9/2)1	
704	304	846.169	118179.7	0.0	$1\|_5{}^4G)$	21764.6	(9/2)–139944.3	(9/2)1	
60	8	846.321	118158.5	0.3	$1\|_3{}^2F)$	41717.1	(7/2)–159875.3	(5/2)1	
316	89	846.669	118109.9	−0.2	$1\|_5{}^4G)$	20944.7	(5/2)–139054.8	(7/2)1	
79	9	847.080	118052.7	0.0	$1\|_5{}^4D)$	25587.8	(7/2)–143640.5	(5/2)1	
104	6	847.131	118045.5	0.3	$1\|_3{}^4F)$	32000.6	(7/2)–150045.8	(5/2)1	
192	12	847.284	118024.1	−0.4	$1\|_3{}^2H)$	38754.8	(9/2)–156779.3	(11/2)1	
110	13	847.347	118015.3	−0.3	$1\|_3{}^4D)$	20218.3	(3/2)–138233.9	(5/2)1	
342	213	847.611	117978.7	0.7	$1\|_5{}^4D)$	27067.5	(5/2)–145045.5	(3/2)1	
369				0.3	$1\|_3{}^4F)$	32561.7	(3/2)–150540.1	(3/2)1	
3304	589	848.089	117912.2	0.3	$1\|_5{}^2I)$	30587.5	(11/2)–148499.4	(9/2)1	
111	9	848.204	117896.1	0.6	$1\|_5{}^4G)$	20944.7	(5/2)–138840.2	(5/2)1	
1221	253	848.823	117810.2	−0.3	$1\|_3{}^2H)$	45806.9	(11/2)–163617.4	(9/2)1	
289	35	850.243	117613.5	−0.5	$1\|_5{}^4D)$	25587.8	(7/2)–143201.8	(9/2)1	
23	6	850.539	117572.5	−0.1	$1\|_5{}^4G)$	15617.7	(5/2)–133190.3	(3/2)1	
589	135	851.056	117501.1	0.0	$1\|_5{}^2G)$	32886.2	(9/2)–150387.3	(7/2)1	
1906	305	851.132	117490.6	−0.2	$1\|_3{}^2H)$	45806.9	(11/2)–163297.7	(11/2)1	
255	23	851.177	117484.3	0.2	$1\|_3{}^4F)$	32561.7	(3/2)–150045.8	(5/2)1	
167	42	851.352	117460.3	−0.5	$1\|_5{}^4G)$	19886.3	(7/2)–137347.1	(7/2)1	
103	23	852.031	117366.7	−0.1	$1\|_5{}^4G)$	15617.7	(5/2)–132984.5	(5/2)1	
1797	336	852.316	117327.2	0.0	$1\|_5{}^2G)$	38660.5	(7/2)–155987.7	(5/2)1	
258	37	852.365	117320.7	−0.6	$1\|_3{}^4F)$	32000.6	(7/2)–149321.9	(9/2)1	
273	272	852.589	117289.9	0.7	$1\|_5{}^4G)$	20944.7	(5/2)–138233.9	(5/2)1	
386				−0.3	$1\|_5{}^4G)$	21764.6	(9/2)–139054.8	(7/2)1	
233	11	853.802	117123.2	−0.4	$1\|_5{}^4D)$	29597.4	(3/2)–146721.0	(3/2)1	
672	23	854.108	117081.2	−0.1	$1\|_3{}^2F)$	41717.1	(7/2)–158798.4	(5/2)1	

Table I. *Continued*

gA	Int	WL (Å)	WN (cm^{-1})	Diff	Even level	*J*-value	Odd level	*J*-value	Remark
477	115	854.580	117016.6	−0.2	$1\|_5{}^4$D)	27067.5	(5/2)–144084.3	(7/2)1	
861	329	854.629	117009.8	−0.3	$1\|_5{}^4$G)	19886.3	(7/2)–136896.4	(7/2)1	
127	12	854.952	116965.6	−0.1	$1\|_5{}^2$F)	33574.4	(5/2)–150540.1	(3/2)1	
40	6	855.185	116933.8	0.6	$1\|_5{}^2$I)	30587.5	(11/2)–147520.7	(9/2)1	
551	40	855.263	116923.0	0.0	$1\|_3{}^4$F)	44173.7	(7/2)–161096.7	(7/2)1	
429	36	855.396	116905.0	−0.1	$1\|_5{}^2$G)	45825.4	(9/2)–162730.5	(7/2)1	
218	17	856.420	116765.1	0.0	$1\|_3{}^4$F)	32000.6	(7/2)–148765.7	(7/2)1	
306	449	856.735	116722.1	0.3	$1\|_5{}^4$D)	28517.7	(1/2)–145239.5	(1/2)1	Al III
542	80	856.789	116714.9	0.1	$1\|_3{}^2$F)	41717.1	(7/2)–158431.9	(7/2)1	
305	201	857.831	116573.1	0.1	$1\|_5{}^4$D)	27067.5	(5/2)–143640.5	(5/2)1	S V
68	12	858.073	116540.3	0.4	$1\|_3{}^4$F)	32000.6	(7/2)–148540.5	(5/2)1	
310	20	858.165	116527.6	−0.2	$1\|_5{}^4$D)	28517.7	(1/2)–145045.5	(3/2)1	
121	9	858.224	116519.7	−0.1	$1\|_3{}^2$F)	41717.1	(7/2)–158236.9	(9/2)1	
401	107	858.295	116510.0	−0.3	$1\|_5{}^2$F)	33574.4	(5/2)–150084.7	(7/2)1	
605	231	858.579	116471.5	0.1	$1\|_5{}^2$F)	33574.4	(5/2)–150045.8	(5/2)1	
810	557	858.783	116443.9	0.0	$1\|_5{}^6$S)	0.0	(5/2)–116443.9	(5/2)1	
260	22	858.841	116436.0	0.3	$1\|_5{}^2$G)	32886.2	(9/2)–149321.9	(9/2)1	
102	16	859.091	116402.0	−0.4	$1\|_5{}^4$G)	20944.7	(5/2)–137347.1	(7/2)1	
229	48	859.766	116310.8	−0.2	$1\|_5{}^4$G)	19886.3	(7/2)–136197.3	(9/2)1	
86	9	860.360	116230.4	−0.4	$1\|_5{}^2$G)	38660.5	(7/2)–154891.3	(7/2)1	
302	125	862.371	115959.5	−0.2	$1\|_5{}^5$I)	30587.5	(11/2)–146547.1	(9/2)1	
1880	502	862.759	115907.3	0.2	$1\|_5{}^2$I)	30587.5	(11/2)–146494.6	(11/2)1	
576	196	862.963	115879.8	0.3	$1\|_5{}^2$G	32886.2	(9/2)–148765.7	(7/2)1	
50	9	863.621	115791.5	−0.1	$1\|_5{}^2$I)	33560.6	(13/2)–149352.2	(11/2)1	
1693	510	863.695	115781.6	1.1	$1\|_5{}^4$G)	21105.1	(11/2)–136885.6	(9/2)1	
400	466	863.712	115779.4	0.2	$1\|_5{}^4$D)	27067.5	(5/2)–142846.7	(5/2)1	
1034	194	864.190	115715.3	0.1	$1\|_3{}^4$F)	37763.7	(5/2)–153478.9	(5/2)1	
213	13	864.288	115702.1	0.5	$1\|_3{}^4$F)	44173.7	(7/2)–159875.3	(5/2)1	
515	403	864.474	115677.3	0.1	$1\|_5{}^4$G)	15617.7	(5/2)–131294.9	(5/2)1	
214	18	864.738	115642.0	−0.2	$1\|_5{}^4$D)	29597.4	(3/2)–145239.5	(1/2)1	
761	153	864.908	115619.3	−0.4	$1\|_3{}^4$F)	32000.6	(7/2)–147620.3	(7/2)1	
931	284	865.177	115583.2	0.7	$1\|_5{}^4$G)	21764.6	(9/2)–137347.1	(7/2)1	
1031	236	865.899	115486.9	0.0	$1\|_5{}^2$G)	38660.5	(7/2)–154147.4	(7/2)1	
211	39	866.129	115456.3	0.0	$1\|_5{}^4$D)	25587.8	(7/2)–141044.1	(7/2)1	
87	8	866.187	115448.5	0.4	$1\|_5{}^4$D)	29597.4	(3/2)–145045.5	(3/2)1	
32	6	866.539	115401.7	−0.3	$1\|_5{}^2$G)	38660.5	(7/2)–154062.5	(9/2)1	
221	9	866.789	115368.3	−0.1	$1\|_5{}^4$D)	29597.4	(3/2)–144965.8	(5/2)1	
144	10	866.902	115353.2	−0.7	$1\|_5{}^2$G)	32886.2	(9/2)–148240.1	(11/2)1	
290	24	867.244	115307.8	0.1	$1\|_3{}^2$H)	38754.8	(9/2)–154062.5	(9/2)1	
453	75	867.349	115293.9	−0.6	$1\|_5{}^4$G)	20944.7	(5/2)–136239.2	(3/2)1	
103	8	867.456	115279.6	0.8	$1\|_3{}^4$F)	37763.7	(5/2)–153042.5	(3/2)1	
858	99	867.518	115271.3	0.0	$1\|_5{}^2$G)	45825.4	(9/2)–161096.7	(7/2)1	
139	6	867.896	115221.2	0.6	$1\|_3{}^4$F)	44173.7	(7/2)–159394.3	(9/2)1	
67	5	868.117	115191.8	0.5	$1\|_5{}^2$F)	33574.4	(5/2)–148765.7	(7/2)1	
127	13	868.476	115144.2	−0.1	$1\|_3{}^4$F)	37763.7	(5/2)–152908.0	(5/2)1	
490	215	868.569	115131.9	0.1	$1\|_5{}^4$G)	21764.6	(9/2)–136896.4	(7/2)1	
825	383	868.680	115117.2	0.9	$1\|_5{}^4$G)	15617.7	(5/2)–130734.0	(3/2)1	
783	411	868.870	115092.0	−0.2	$1\|_5{}^4$G)	21105.1	(11/2)–136197.3	(9/2)1	
73	13	869.224	115045.1	0.1	$1\|_5{}^4$G)	19886.3	(7/2)–134931.3	(7/2)1	
580	145	869.595	114996.0	−0.1	$1\|_5{}^2$F)	33574.4	(5/2)–148570.5	(3/2)1	
380	48	869.822	114966.1	0.0	$1\|_5{}^2$F)	33574.4	(5/2)–148540.5	(5/2)1	
155	31	870.182	114918.4	−0.1	$1\|_5{}^4$G)	15617.7	(5/2)–130536.2	(5/2)1	
102	7	870.246	114910.0	0.2	$1\|_5{}^4$D)	27067.5	(5/2)–141977.3	(3/2)1	
237	10	871.245	114778.3	−0.7	$1\|_5{}^2$G)	38660.5	(7/2)–153439.5	(7/2)1	
121	7	871.803	114704.8	−0.6	$1\|_3{}^4$F)	32561.7	(3/2)–147267.1	(5/2)1	
636	75	871.956	114684.7	0.0	$1\|_3{}^2$H)	38754.8	(9/2)–153439.5	(7/2)1	
190	56	872.166	114657.1	0.0	$1\|_5{}^4$G)	19886.3	(7/2)–134543.4	(5/2)1	
449	66	872.335	114634.9	0.4	$1\|_5{}^2$G)	32886.2	(9/2)–147520.7	(9/2)1	
141	7	872.410	114625.0	0.3	$1\|_3{}^4$F)	44173.7	(7/2)–158798.4	(5/2)1	
291	111	873.876	114432.8	0.1	$1\|_5{}^4$G)	21764.6	(9/2)–136197.3	(9/2)1	
892	323	874.459	114356.4	−0.1	$1\|_5{}^4$D)	25587.8	(7/2)–139944.3	(9/2)1	
48	8	874.696	114325.4	0.3	$1\|_5{}^4$D)	20218.3	(3/2)–134543.4	(5/2)1	
233	11	874.884	114300.8	−0.2	$1\|_5{}^2$F)	40416.5	(5/2)–154717.5	(3/2)1	
640	185	875.212	114258.1	−0.1	$1\|_3{}^4$F)	44173.7	(7/2)–158431.9	(7/2)1	
899	181	875.433	114229.2	0.1	$1\|_3{}^2$H)	45806.9	(11/2)–160036.0	(9/2)1	
940	86	875.576	114210.6	0.0	$1\|_5{}^2$G)	45825.4	(9/2)–160036.0	(9/2)1	
339	48	877.006	114024.3	0.7	$1\|_3{}^2$H)	38754.8	(9/2)–152778.4	(7/2)1	
99	32	877.295	113986.7	0.1	$1\|_5{}^4$G)	20944.7	(5/2)–134931.3	(7/2)1	
69	6	877.369	113977.2	0.6	$1\|_5{}^3$D)	27067.5	(5/2)–141044.1	(7/2)1	
146	17	877.654	113940.1	0.1	$1\|_5{}^2$I)	30587.5	(11/2)–144527.5	(13/2)1	
163	6	878.108	113881.2	−0.2	$2\|_4{}^5$D) ^{4}D	66244.9	(5/2)–180126.3	(7/2)2	

Table I. *Continued*

gA	Int	WL (Å)	WN (cm^{-1})	Diff	Even level	*J*-value	Odd level	*J*-value	Remark
2646	443	878.245	113863.4	0.1	$1\|_5{}^2$I)	33560.6	(13/2)–147423.9	(13/2)1	
230	76	879.096	113753.2	0.4	$1\|_5{}^4$D)	27067.5	(5/2)–140820.3	(5/2)1	
126				0.0	$1\|_5{}^2$G)	38660.5	(7/2)–152413.7	(9/2)1	
239	19	879.207	113738.8	0.0	$1\|_5{}^2$G)	32886.2	(9/2)–146625.0	(7/2)1	
215	32	879.368	113718.1	0.7	$1\|_3{}^4$P)	22521.8	(1/2)–136239.2	(3/2)1	
294	38	879.563	113692.8	0.1	$1\|_5{}^2$F)	33574.4	(5/2)–147267.1	(5/2)1	
91	5	880.220	113607.9	−0.5	$1\|_5{}^2$G)	32886.2	(9/2)–146494.6	(11/2)1	
458	45	880.522	113569.0	0.1	$1\|_5{}^2$G)	45825.4	(9/2)–159394.3	(9/2)1	
248	39	881.311	113467.3	0.3	$1\|_5{}^4$D)	25587.8	(7/2)–139054.8	(7/2)1	
245	10	881.374	113459.2	−0.4	$1\|_5{}^4$D)	28517.7	(1/2)–141977.3	(3/2)1	
1424	340	882.127	113362.4	0.4	$1\|_5{}^4$G)	21105.1	(11/2)–134467.1	(11/2)1	
110	19	882.987	113252.0	−0.4	$1\|_5{}^4$D)	25587.8	(7/2)–138840.2	(5/2)1	
103	10	883.007	113249.3	0.0	$1\|_5{}^4$D)	29597.4	(3/2)–142846.7	(5/2)1	
301	114	883.299	113211.9	0.3	$1\|_5{}^4$G)	15617.7	(5/2)–128829.3	(5/2)1	
540				−0.2	$1\|_5{}^4$D)	29597.4	(3/2)–142809.5	(3/2)1	
35	7	883.644	113167.7	1.0	$1\|_5{}^2$G)	21764.6	(9/2)–134931.3	(7/2)1	
231	64	884.185	113098.5	0.3	$1\|_5{}^4$G)	19886.3	(7/2)–132984.6	(5/2)1	
527	40	884.466	113062.6	0.2	$1\|_5{}^2$F)	40416.5	(5/2)–153.478.9	(5/2)1	S V
714	222	884.658	113038.0	−0.2	$1\|_5{}^4$G)	20944.7	(5/2)–133982.9	(7/2)1	
104	19	885.171	112972.5	0.4	$1\|_5{}^4$D)	20218.3	(3/2)–133190.3	(3/2)1	
180	16	885.224	112965.8	0.6	$1\|_3{}^4$F)	32000.6	(7/2)–144965.8	(5/2)1	
77	50	885.471	112934.2	0.2	$1\|_5{}^2$I)	33560.6	(13/2)–146494.6	(11/2)1	
138	461	886.107	112853.2	0.4	$1\|_5{}^4$G)	19886.3	(7/2)–132739.1	(9/2)1	
377	618	886.797	112765.4	−0.8	$1\|_5{}^4$D)	20218.3	(3/2)–132984.5	(5/2)1	S V
1106	680	887.082	112729.2	0.3	$1\|_3{}^2$H)	45806.9	(11/2)–158535.8	(11/2)1	
493	200	887.234	112709.9	−0.5	$1\|_5{}^2$G)	45825.4	(9/2)–158535.8	(11/2)1	
633	600	887.292	112702.5	0.0	$1\|_5{}^4$G)	21764.6	(9/2)–134467.1	(11/2)1	
92	48	887.486	112677.9	0.1	$1\|_3{}^4$F)	32561.7	(3/2)–145239.5	(1/2)1	
37	7	887.737	112646.0	−0.1	$1\|_5{}^4$D)	25587.8	(7/2)–138233.9	(5/2)1	
157	463	889.418	112433.1	−0.7	$1\|_5{}^2$I)	30587.5	(11/2)–143021.3	(11/2)1	
179	59	889.596	112410.6	−0.9	$1\|_5{}^2$G)	45825.4	(9/2)–158236.9	(9/2)1	
756	648	889.716	112395.4	−0.2	$1\|_3{}^4$F)	32000.6	(7/2)–144396.2	(7/2)1	
246	300	889.984	112361.6	−0.3	$1\|_5{}^2$F)	40416.5	(5/2)–152778.4	(7/2)1	
227	654	890.142	112341.7	0.0	$1\|_5{}^4$G)	15617.7	(5/2)–127959.4	(3/2)1	
182	281	890.224	112331.3	−0.1	$1\|_3{}^2$H)	38754.8	(9/2)–151086.2	(9/2)1	
105	27	890.614	112282.1	0.0	$1\|_3{}^4$F)	37763.7	(5/2)–150045.8	(5/2)1	
14	7	891.121	112218.1	−0.2	$1\|_5{}^4$G)	21764.6	(9/2)–133982.9	(7/2)1	
30	24	891.703	112144.9	−1.3	$1\|_5{}^4$G)	19886.3	(7/2)–132032.5	(7/2)1	
299	659	891.849	121126.6	−0.1	$1\|_5{}^2$G)	15617.7	(5/2)–127744.4	(7/2)1	
163	669	892.017	112105.4	0.5	$1\|_5{}^6$S)	0.0	(5/2)–112104.9	(3/2)1	Al III
87	77	892.195	112083.1	−0.6	$1\|_3{}^4$F)	32000.6	(7/2)–144084.3	(7/2)1	
65	153	892.546	112039.0	−0.8	$1\|_5{}^4$G)	20944.7	(5/2)–132984.5	(5/2)1	
63	400	893.050	111975.8	−0.8	$1\|_5{}^4$D)	20218.3	(3/2)–132194.9	(1/2)1	
264	450	893.091	111970.6	−0.1	$1\|_3{}^4$F)	40937.3	(3/2)–152908.0	(5/2)1	
72	431	894.775	111760.0	0.7	$1\|_5{}^4$D)	25587.8	(7/2)–137347.1	(7/2)1	
273	560	895.109	111718.2	0.5	$1\|_5{}^2$I)	30587.5	(11/2)–142305.2	(13/2)1	
395	579	895.799	111632.2	−0.3	$1\|_3{}^2$H)	38754.8	(9/2)–150387.3	(7/2)1	
224	543	895.869	111623.5	0.0	$1\|_5{}^4$D)	27067.5	(5/3)–138691.0	(3/2)1	
141	44	896.485	111546.8	−0.5	$2\|_4{}^5$D) ^{6}D	43170.2	(1/2)–154717.5	(3/2)1	
47	40	897.094	111471.0	−0.1	$1\|_5{}^2$F)	33574.4	(5/2)–145045.5	(3/2)1	
40	39	897.600	111408.2	−0.4	$1\|_5{}^4$G)	19886.3	(7/2)–131294.9	(5/2)1	
30	4	897.737	111391.2	−0.2	$1\|_5{}^2$F)	33574.4	(5/2)–144965.8	(5/2)1	
420	630	898.499	111296.7	1.1	$1\|_5{}^4$D)	20218.3	(3/2)–131513.9	(1/2)1	
278				−1.9	$1\|_5{}^4$D)	25587.8	(7/2)–136885.6	(9/2)1	
114	454	899.092	111223.3	0.4	$1\|_5{}^4$D)	29597.4	(3/2)–140820.3	(5/2)1	
229	342	899.353	111191.0	0.1	$1\|_3{}^2$F)	41717.1	(7/2)–152908.0	(5/2)1	
259	662	900.277	111076.9	0.3	$1\|_5{}^4$D)	20218.3	(3/2)–131294.9	(5/2)1	
98	62	900.399	111061.9	0.6	$1\|_3{}^2$F)	41717.1	(7.2)–152778.4	(7/2)1	
326	578	900.841	111007.4	−0.2	$1\|_3{}^4$F)	32561.7	(3/2)–143569.3	(3/2)1	
373	482	901.273	110954.1	0.2	$1\|_5{}^2$G)	45825.4	(9/2)–156779.3	(11/2)1	
54	391	901.407	110937.6	−0.2	$1\|_5{}^4$G)	15617.7	(5/2)–126555.5	(3/2)1	
99	146	902.157	110845.5	−0.6	$1\|_3{}^4$F)	32000.6	(7/2)–142846.7	(5/2)1	
56	40	902.469	110807.1	0.3	$1\|_3{}^4$F)	37763.7	(5/2)–148570.5	(3/2)1	
60	12	902.720	110776.3	−0.5	$1\|_3{}^4$F)	37763.7	(5/2)–148540.5	(5/2)1	
622	642	903.088	110731.1	−0.1	$1\|_3{}^2$H)	45806.9	(11/2)–156538.1	(13/2)1	
485	565	903.198	110717.7	0.1	$1\|_3{}^4$F)	44173.7	(7/2)–154891.3	(7/2)1	
341	543	903.374	110696.2	−0.4	$1\|_3{}^2$F)	41717.1	(7/2)–152413.7	(9/2)1	
15	29	903.745	110650.7	0.8	$1\|_5{}^4$G)	19886.3	(7/2)–130536.2	(5/2)1	
469	564	904.583	110548.2	0.9	$1\|_5{}^2$S)	44170.2	(1/2)–154717.5	(3/2)1	
246	545	905.735	110407.6	0.0	$1\|_5{}^4$D)	29597.4	(3/2)–140005.0	(5/2)1	
60	337	906.212	110349.4	−0.8	$1\|_5{}^4$G)	20944.7	(5/2)–131294.9	(5/2)1	

Table I. *Continued*

gA	Int	WL (Å)	WN (cm^{-1})	Diff	Even level	*J*-value	Odd level	*J*-value	Remark
283	785	906.598	110302.4	−0.2	$1\|_5{}^4$G)	15617.7	(5/2)–125920.3	(7/2)1	
252	662	906.791	110279.0	−0.6	$1\|_5{}^4$D)	27067.5	(5/2)–137347.1	(7/2)1	
364	705	906.879	110268.3	0.4	$1\|_5{}^4$G)	21764.6	(9/2)–132032.5	(7/2)1	
490	750	907.186	110231.0	−0.1	$1\|_5{}^4$G)	19886.3	(7/2)–130117.4	(9/2)1	
289	631	907.477	110195.6	0.4	$1\|_5{}^2$G)	30587.5	(11/2)–140782.7	(11/2)1	
565	620	907.980	110134.6	−0.5	$1\|_5{}^2$G)	32886.2	(9/2)–143021.3	(11/2)1	
37	11	908.072	110123.5	−0.1	$1\|_5{}^4$F)	40416.5	(5/2)–150540.1	(3/2)1	
99	155	908.224	110105.0	−0.2	$1\|_5{}^2$G)	38660.5	(7/2)–148765.7	(7/2)1	
154	449	908.845	110029.8	−0.3	$1\|_3{}^4$F)	32000.6	(7/2)–142030.7	(9/2)1	
34	12	908.997	110011.4	0.5	$1\|_3{}^2$H)	387.54.8	(9/2)–148765.7	(7/2)1	
56	60	909.132	109995.1	0.2	$1\|_5{}^2$F)	33574.4	(5/2)–143569.3	(3/2)1	
564	725	909.852	109908.0	0.0	$1\|_5{}^4$G)	21105.1	(11/2)–131013.1	(13/2)1	
202	393	910.012	109888.7	−0.1	$1\|_3{}^4$F)	44173.7	(7/2)–154062.5	(9/2)1	
29	4	910.272	109857.3	0.7	$1\|_3{}^4$F)	37763.7	(5/2)–147620.3	(7/2)1	
168	538	910.502	109829.5	0.6	$1\|_5{}^4$D)	27067.5	(5/2)–136896.4	(7/2)1	S II
99	541	910.832	109789.7	0.4	$1\|_5{}^4$G)	20944.7	(5/2)–130734.0	(3/2)1	
335	514	911.208	109744.4	−0.2	$1\|_3{}^2$H)	38754.8	(9/2)–148499.4	(9/2)1	
24	37	911.461	109713.9	−0.3	$1\|_5{}^4$G)	15617.7	(5/2)–125331.9	(5/2)1	
168	541	911.802	109672.9	−0.2	$1\|_3{}^4$P)	22521.8	(1/2)–132194.9	(1/2)1	
97	117	912.171	109628.6	−0.7	$1\|_5{}^2$F)	40416.5	(5/2)–150045.8	(5/2)1	
263	472	912.386	109602.7	−0.1	$1\|_3{}^4$F)	40937.3	(3/2)–150540.1	(3/2)1	
8	11	912.478	109591.7	0.2	$1\|_5{}^4$G)	20944.7	(5/2)–130536.2	(5/2)1	
149	56	912.866	109545.1	0.2	$1\|_3{}^2$G)	56048.8	(9/2)–165593.7	(9/2)1	
203	421	913.366	109485.1	−0.2	$1\|_3{}^2$H)	38754.8	(9/2)–148240.1	(11/2)1	
90	328	913.568	109460.9	0.2	$1\|_5{}^2$I)	33560.6	(13/2)–143021.3	(11/2)1	
84	138	914.340	109368.5	−0.6	$1\|_3{}^2$F)	41717.1	(7/2)–151086.2	(9/2)1	
282	636	914.433	109357.4	0.6	$1\|_5{}^2$I)	30587.5	(11/2)–139944.3	(9/2)1	
54	274	915.389	109243.2	0.4	$1\|_5{}^4$D)	29597.4	(3/2)–138840.2	(5/2)1	
64	184	915.666	109210.1	0.1	$1\|_5{}^2$I)	30587.5	(11/2)–139797.5	(11/2)1	
95	425	915.990	109171.5	−0.2	$1\|_5{}^4$D)	27067.5	(5/2)–136239.2	(3/2)1	N II
253	552	916.217	109144.4	−0.1	$1\|_5{}^2$G)	32886.2	(9/2)–142030.7	(9/2)1	
249	462	916.519	109108.4	−0.1	$1\|_3{}^4$F)	40937.3	(3/2)–150045.8	(5/2)1	
100	482	917.328	109012.3	0.0	$1\|_5{}^4$G)	21105.1	(11/2)–130117.4	(9/2)1	
164	568	917.498	108992.0	−0.1	$1\|_3{}^4$P)	22521.8	(1/2)–131513.9	(1/2)1	
71	497	917.805	108955.6	0.0	$1\|_5{}^4$D)	25587.8	(7/2)–134543.4	(5/2)1	
444	678	917.910	108943.1	0.1	$1\|_5{}^4$G)	19886.3	(7/2)–128829.3	(5/2)1	
116	125	918.513	108871.7	−0.6	$1\|_5{}^2$S)	44170.2	(1/2)–153042.5	(3/2)1	
249	606	918.605	108860.7	−0.6	$1\|_3{}^4$F)	37763.7	(5/2)–146625.0	(7/2)1	
382				0.5	$1\|_5{}^2$G)	38660.5	(7/2)–147520.7	(9/2)1	
57	145	918.952	108819.6	−0.1	$1\|_3{}^4$F)	32000.6	(7/2)–140820.3	(5/2)1	2 order
133	335	919.408	108765.6	−0.3	$1\|_3{}^2$H)	38754.8	(9/2)–147520.7	(9/2)1	
18	3	920.220	108669.6	−0.6	$1\|_3{}^2$F)	41717.1	(7/2)–150287.3	(7/2)1	
69	172	920.500	108636.6	0.1	$1\|_5{}^4$D)	29597.4	(3/2)–138233.9	(5/2)1	
51	304	920.721	108610.5	−0.5	$1\|_5{}^4$D)	20218.3	(3/2)–128829.3	(5/2)1	
474	564	922.835	108361.8	−0.3	$1\|_3{}^2$G)	56048.8	(9/2)–164410.9	(7/2)1	
149	368	923.179	108321.3	−0.7	$1\|_5{}^2$G)	45825.4	(9/2)–154147.4	(7/2)1	
184	417	924.601	108154.8	0.8	$1\|_5{}^2$F)	40416.5	(5/2)–148570.5	(3/2)1	
118	10	924.939	108115.2	−0.2	$1\|_3{}^2$G	57478.3	(7/2)–165593.7	(9/2)1	
245	554	925.887	108004.5	0.1	$1\|_3{}^4$F)	32000.6	(7/2)–140005.0	(5/2)1	
27	22	926.235	107964.0	−0.5	$1\|_5{}^2$G)	38660.5	(7/2)–146625.0	(7/2)1	
63	81	926.410	107943.6	−0.1	$1\|_3{}^4$F)	32000.6	(7/2)–139944.3	(9/2)1	
110	597	926.914	107884.8	0.2	$1\|_5{}^4$G)	20944.7	(5/2)–128829.3	(5/2)1	
319	708	927.100	107863.2	0.1	$1\|_5{}^4$G)	15617.7	(5/2)–123480.8	(7/2)1	
410	578	928.160	107740.0	0.2	$1\|_3{}^2$H)	38754.8	(9/2)–146494.6	(11/2)1	
39	16	929.084	107632.9	−0.4	$1\|_3{}^4$F)	40937.3	(3/2)–148570.5	(3/2)1	
405	461	929.409	107595.3	−0.1	$1\|_3{}^2$D)	53501.3	(5/2)–161096.7	(7/2)1	
129	648	929.508	107583.8	0.7	$1\|_5{}^4$G)	21764.6	(9/2)–129347.7	(11/2)1	
156	419	930.493	107469.9	0.2	$1\|_5{}^2$F)	33574.4	(5/2)–141044.1	(7/2)1	
38	100	931.126	107396.8	0.1	$1\|_5{}^4$D)	25587.8	(7/2)–132984.5	(5/2)1	
96	339	932.800	107204.1	0.3	$1\|_5{}^2$F)	40416.4	(5/2)–147620.3	(7/2)1	
192	536	934.102	107054.7	0.5	$1\|_3{}^4$F)	32000.6	(7/2)–139054.8	(7/2)1	
154	606	934.446	107015.3	0.6	$1\|_5{}^3$G)	20944.7	(5/2)–127959.4	(3/2)1	
28	31	934.987	106953.3	0.3	$1\|_5{}^2$G)	45825.4	(9/2)–152778.4	(7/2)1	
171	563	935.348	106912.0	0.7	$1\|_5{}^2$G)	32886.2	(9/2)–139797.5	(11/2)1	
192				−0.5	$1\|_3{}^4$F)	44173.7	(7/2)–151086.2	(9/2)1	
197	300	935.888	106850.3	−0.3	$1\|_5{}^2$F)	40416.5	(5/2)–147267.1	(5/2)1	
49	164	935.974	106840.6	1.0	$1\|_3{}^4$F)	32000.6	(7/2)–138840.2	(5/2)1	
36	361	936.080	106828.5	0.0	$1\|_5{}^4$G)	21105.1	(11/2)–127933.6	(9/2)1	
197	335	936.484	106782.4	0.1	$1\|_3{}^2$F)	41717.1	(7/2)–148499.4	(9/2)1	
60	16	937.497	106667.0	0.7	$1\|_3{}^2$H)	45806.9	(11/2)–152473.2	(11/2)1	
153	562	939.453	106445.0	0.3	$1\|_5{}^4$D)	25587.8	(7/2)–132032.5	(7/2)1	

Table I. *Continued*

gA	Int	WL (Å)	WN (cm^{-1})	Diff	Even level	*J*-value	Odd level	*J*-value	Remark
147	652	940.407	106336.9	−0.3	$1\|_5{}^4D)$	20218.3	(3/2)–126555.5	(3/2)1	
102	227	940.548	106321.0	0.4	$1\|_3{}^4F)$	37763.7	(5/2)–144084.3	(7/2)1	
48	93	940.676	106306.6	1.3	$1\|_5{}^2G)$	38660.5	(7/2)–144965.8	(5/2)1	
160	564	940.924	106278.5	0.0	$1\|_3{}^4F)$	32561.7	(3/2)–138840.2	(5/2)1	
162	344	941.544	106208.6	0.1	$1\|_5{}^2F)$	40416.5	(5/2)–146625.0	(7/2)1	
60	117	942.241	106129.9	0.6	$1\|_3{}^4F)$	32561.6	(3/2)–138691.0	(3/2)1	
32	67	942.297	106123.7	0.9	$1\|_5{}^4D)$	27067.5	(5/2)–133190.3	(3/2)1	
154	589	942.526	106097.9	0.1	$1\|_5{}^4G)$	21764.6	(9/2)–127862.4	(11/2)1	
81	521	943.572	105980.3	0.5	$1\|_5{}^4G)$	21764.6	(9/2)–127744.4	(7/2)1	
167	549	946.012	105706.9	−0.2	$1\|_5{}^4D)$	25587.8	(7/2)–131294.9	(5/2)1	
44	13	946.318	105672.7	0.5	$1\|_3{}^4F)$	32561.7	(3/2)–138233.9	(5/2)1	
269	345	947.084	105587.3	0.9	$1\|_3{}^2G)$	57478.3	(7/2)–163064.6	(5/2)1	
7	4	948.348	105446.6	1.0	$1\|_5{}^4G)$	19886.3	(7/2)–125331.9	(5/2)1	
31	17	949.253	105346.0	−0.5	$1\|_3{}^4F)$	32000.6	(7/2)–137347.1	(7/2)1	
114	386	949.397	105330.0	0.5	$1\|_3{}^2H)$	38754.8	(9/2)–144084.3	(7/2)1	
29	22	949.973	105266.1	0.3	$1\|_5{}^2F)$	33574.4	(5/2)–138840.2	(5/2)1	
11	12	951.338	105115.1	1.5	$1\|_5{}^4D)$	20218.3	(3/2)–125331.9	(5/2)1	
50	42	951.624	105083.5	0.5	$1\|_3{}^4F)$	37763.7	(5/2)–142846.7	(5/2)1	
205	665	952.702	104964.6	−0.4	$1\|_5{}^4D)$	27067.5	(5/2)–132032.5	(7/2)1	
156	688	952.849	104948.4	0.0	$1\|_5{}^4D)$	25587.8	(7/2)–130536.2	(5/2)1	
77	592	953.092	104921.6	0.1	$1\|_5{}^4D)$	20218.3	(3/2)–125139.8	(1/2)1	
297	630	953.325	104896.0	0.2	$1\|_3{}^4F)$	32000.6	(7/2)–136896.4	(7/2)1	
254	619	953.418	104885.8	0.8	$1\|_3{}^4F)$	32000.6	(7/2)–136885.6	(9/2)1	
116	290	953.919	104830.8	0.8	$1\|_3{}^2F)$	41717.1	(7/2)–146547.1	(9/2)1	
91	494	955.361	104672.5	−0.2	$1\|_5{}^4D)$	28517.7	(1/2)–133190.3	(3/2)1	
105	583	955.445	104663.2	0.9	$1\|_5{}^4G)$	15617.7	(5/2)–120280.0	(3/2)1	
67	30	956.488	104549.1	−0.2	$1\|_5{}^2F)$	40416.5	(5/2)–144965.8	(5/2)1	
66	68	956.559	104541.4	0.1	$1\|_5{}^2G)$	38660.5	(7/2)–143201.8	(9/2)1	
36	234	956.662	104530.1	0.5	$1\|_5{}^4D)$	25587.8	(7/2)–130117.4	(9/2)1	
178	457	957.418	104447.6	0.6	$1\|_3{}^2H)$	38754.8	(9/2)–143201.8	(9/2)1	
14	13	957.966	104387.9	0.7	$1\|_5{}^4G)$	20944.7	(5/2)–125331.9	(5/2)1	
55	40	958.757	104301.7	−0.5	$1\|_3{}^4F)$	40937.3	(3/2)–145239.5	(1/2)1	
85	212	959.076	104267.0	0.5	$1\|_3{}^2H)$	38754.8	(9/2)–143021.3	(11/2)1	
70	119	959.566	104213.8	0.2	$1\|_3{}^4F)$	37763.7	(5/2)–141977.3	(3/2)1	
30	131	961.226	104033.8	0.1	$1\|_3{}^4P)$	22521.8	(1/2)–126555.5	(3/2)1	
204	578	961.439	104010.8	0.6	$1\|_5{}^2G)$	32886.2	(9/2)–136896.4	(7/2)1	
191	76	961.653	103987.6	0.4	$1\|_3{}^2G)$	56048.8	(9/2)–160036.0	(9/2)1	
54	476	962.580	103887.5	−0.1	$1\|_5{}^4G)$	19886.3	(7/2)–123773.9	(9/2)1	
51	64	963.643	103772.9	0.2	$1\|_5{}^2F)$	33574.4	(5/2)–137347.1	(7/2)1	
76	125	964.620	103667.7	−0.1	$1\|_5{}^2F)$	40416.5	(5/2)–144084.3	(7/2)1	
53	11	965.932	103527.0	0.2	$1\|_5{}^2G)$	45825.4	(9/2)–149352.2	(11/2)1	
282	574	966.475	103468.8	0.1	$1\|_5{}^4D)$	27067.5	(5/2)–130536.2	(5/2)1	
71	25	966.669	103448.0	1.4	$1\|_3{}^4F)$	44173.7	(7/2)–147620.3	(7/2)1	
212	496	967.392	103370.7	0.5	$1\|_5{}^2G)$	38660.5	(7/2)–142030.7	(9/2)1	
147	555	967.944	103311.8	0.7	$1\|_5{}^2G)$	32886.2	(9/2)–136197.3	(9/2)1	
58	480	968.310	103272.8	0.3	$1\|_5{}^4G)$	19886.3	(7/2)–123158.8	(5/2)1	
90	586	969.152	103183.0	0.0	$1\|_5{}^4G)$	15617.7	(5/2)–118880.7	(7/2)1	
22	165	970.797	103008.2	−0.1	$1\|_5{}^4D)$	20218.3	(3/2)–123226.6	(3/2)1	
19	128	970.918	102995.3	−0.9	$1\|_5{}^4D)$	28517.7	(1/2)–131513.9	(1/2)1	
34	224	971.430	102941.0	0.5	$1\|_5{}^4D)$	20218.3	(3/2)–123158.8	(5/2)1	
52	478	974.005	102668.8	0.0	$1\|_5{}^4G)$	21105.1	(11/2)–123773.9	(9/2)1	
20	23	975.209	102542.1	−0.7	$1\|_3{}^4F)$	32000.6	(7/2)–134543.4	(5/2)1	
23	177	975.265	102536.2	0.1	$1\|_5{}^4G)$	20944.7	(5/2)–123480.8	(7/2)1	
113	322	976.271	102430.6	0.4	$1\|_5{}^2F)$	40416.5	(5/2)–142846.7	(5/2)1	
50	28	976.421	102414.8	0.1	$1\|_5{}^2G)$	45825.4	(9/2)–148240.1	(11/2)1	
65	60	976.733	102382.1	−1.0	$1\|_3{}^2G)$	56048.8	(9/2)–158431.9	(7/2)1	
121	460	977.611	102290.2	0.9	$1\|_3{}^2H)$	38754.8	(9/2)–141044.1	(7/2)1	
19	32	978.078	102241.3	0.0	$1\|_3{}^4F)$	37763.7	(5/2)–140005.0	(5/2)1	
28	235	978.330	102215.0	0.9	$1\|_5{}^4G)$	20944.7	(5/2)–123158.8	(5/2)1	
101	475	979.953	102045.7	0.6	$1\|_5{}^2G)$	32886.2	(9/2)–134931.3	(7/2)1	
47	152	980.122	102028.1	0.2	$1\|_3{}^2H)$	38754.8	(9/2)–140782.7	(11/2)1	
60	342	980.564	101982.2	−0.1	$1\|_3{}^4F)$	32000.6	(7/2)–133982.9	(7/2)1	
10	20	981.190	101917.0	0.5	$1\|_5{}^4D)$	29597.4	(3/2)–131513.9	(1/2)1	
51	31	981.251	101910.8	1.3	$1\|_3{}^4F)$	40937.3	(3/2)–142846.7	(5/2)1	
82	94	982.356	101796.1	1.2	$1\|_5{}^2G)$	45825.4	(9/2)–147620.3	(7/2)1	
22	32	983.310	101697.3	−0.2	$1\|_5{}^4D)$	29597.4	(3/2)–131294.9	(5/2)1	
85	114	984.082	101617.6	0.6	$1\|_3{}^2H)$	45806.9	(11/2)–147423.9	(13/2)1	
241	600	984.439	101580.7	−0.2	$1\|_5{}^2G)$	32886.2	(9/2)–134467.1	(11/2)1	
36	170	986.613	101356.9	0.0	$1\|_5{}^2F)$	33574.4	(5/2)–134931.3	(7/2)1	
85	221	987.318	101284.5	0.7	$1\|_5{}^2G)$	38660.5	(7/2)–139944.3	(9/2)1	
113	23	987.983	101216.3	0.1	$1\|_3{}^2D)$	53501.3	(5/2)–154717.5	(3/2)1	

Table I. *Continued*

gA	Int	WL (Å)	WN (cm^{-1})	Diff	Even level	*J*-value	Odd level	*J*-value	Remark
165	462	989.685	101042.3	−0.4	$1\|_3{}^2$H)	38754.8	(9/2)–139797.5	(11/2)1	
51	226	990.402	100969.1	0.1	$1\|_5{}^2$F)	33574.4	(5/2)–134543.4	(5/2)1	
18	53	990.499	100959.2	0.3	$1\|_5{}^4$D)	20218.3	(3/2)–121177.2	(1/2)1	
58	156	990.808	100927.7	0.4	$1\|_3{}^4$F)	37763.7	(5/2)–138691.0	(3/2)1	
38	89	991.012	100906.9	0.4	$1\|_5{}^2$I)	33560.6	(13/2)–134467.1	(11/2)1	
18	414	991.797	100827.1	0.9	$1\|_5{}^4$G)	15617.7	(5/2)–116443.9	(5/2)1	
111	23	992.471	100758.6	0.0	$1\|_3{}^2$G)	57478.3	(7/2)–158236.9	(9/2)1	
77	465	992.671	100738.3	−0.2	$1\|_3{}^4$F)	32000.6	(7/2)–132739.1	(9/2)1	
8	5	993.279	100676.6	−0.3	$1\|_5{}^4$D)	27067.5	(5/2)–127744.4	(7/2)1	
28	7	993.589	100645.3	−0.8	$1\|_3{}^2$D)	53501.3	(5/2)–154147.4	(7/2)1	
46	418	993.758	100628.1	−0.5	$1\|_3{}^4$F)	32561.7	(3/2)–133190.3	(3/2)1	
50				0.5	$1\|_5{}^2$F)	40416.5	(5/2)–141044.1	(7/2)1	
21	75	996.687	100332.4	−0.1	$1\|_5{}^4$D)	25587.8	(7/2)–125920.3	(7/2)1	
37	20	997.008	100300.0	0.0	$1\|_3{}^2$H)	38754.8	(9/2)–139054.8	(7/2)1	
52	222	999.681	100031.9	0.0	$1\|_3{}^4$F)	32000.6	(7/2)–132032.5	(7/2)1	
68	404	1003.677	99633.6	0.4	$1\|_3{}^4$F)	32561.7	(3/2)–132194.9	(1/2)1	
18	28	1003.845	99616.9	1.0	$1\|_5{}^2$F)	33574.4	(5/2)–133190.3	(3/2)1	
17	26	1005.143	99488.4	0.4	$1\|_5{}^4$D)	27067.5	(5/2)–126555.5	(3/2)1	
74	402	1007.738	99232.2	0.3	$1\|_5{}^4$D)	29597.4	(3/2)–128829.3	(5/2)1	
14	10	1012.831	98733.2	0.0	$1\|_3{}^4$F)	32561.7	(3/2)–131294.9	(5/2)1	
12	16	1013.631	98655.2	−0.2	$1\|_3{}^4$P)	22521.8	(1/2)–121177.2	(1/2)1	
26	16	1016.011	98424.1	0.4	$1\|_5{}^2$F)	40416.5	(5/2)–138840.2	(5/2)1	
53	356	1016.653	98361.9	−0.1	$1\|_5{}^4$D)	29597.4	(3/2)–127959.4	(3/2)1	
31	254	1018.625	98171.6	−0.7	$1\|_3{}^4$F)	32561.7	(3/2)–130734.0	(3/2)1	
89	247	1018.935	98141.7	0.1	$1\|_3{}^2$H)	38754.8	(9/2)–136896.4	(7/2)1	
85	436	1019.199	98116.3	−0.5	$1\|_3{}^4$F)	32000.6	(7/2)–130117.4	(9/2)1	
71	129	1028.852	97195.7	−0.2	$1\|_5{}^2$G)	45825.4	(9/2)–143021.3	(11/2)1	
53	240	1029.235	97159.5	−0.1	$1\|_5{}^2$F)	33574.4	(5/2)–130734.0	(3/2)1	
27	18	1029.630	97122.2	−0.9	$1\|_3{}^2$F)	41717.1	(7/2)–138840.2	(5/2)1	
32	14	1032.300	96871.0	0.6	$1\|_3{}^4$F)	44173.7	(7/2)–141044.1	(7/2)1	
140	280	1034.452	96669.6	0.5	$1\|_3{}^2$G)	57478.3	(7/2)–154147.4	(7/2)1	
12	8	1034.955	96622.6	0.5	$1\|_5{}^4$D)	28517.7	(1/2)–125139.8	(1/2)1	
18	451	1035.652	96557.5	−0.1	$1\|_5{}^4$G)	19886.3	(7/2)–116443.9	(5/2)1	
100	513	1036.691	96460.8	−0.7	$1\|_5{}^2$G)	32886.2	(9/2)–129347.7	(11/2)1	
135	144	1037.725	96364.6	−0.3	$1\|_3{}^2$G)	56048.8	(9/2)–152413.7	(9/2)1	
44	25	1043.502	95831.2	−0.1	$1\|_3{}^4$F)	44173.7	(7/2)–140005.0	(5/2)1	
82	57	1049.323	95299.5	−0.6	$1\|_3{}^2$G)	57478.3	(7/2)–152778.4	(7/2)1	
57	593	1049.457	95287.3	0.2	$1\|_5{}^4$G)	21105.1	(11/2)–116392.2	(9/2)1	
47	164	1049.704	95265.0	0.6	$1\|_3{}^2$D)	53501.3	(5/2)–148765.7	(7/2)1	
43	79	1051.861	95069.6	0.4	$1\|_3{}^2$D)	53501.3	(5/2)–148570.5	(3/2)1	
61	359	1053.349	94935.3	−0.1	$1\|_3{}^2$G)	57478.3	(7/2)–152413.7	(9/2)1	
24	129	1055.871	94708.5	−0.4	$1\|_5{}^4$D)	28517.7	(1/2)–123226.6	(3/2)1	
21	22	1060.174	94324.1	0.1	$1\|_5{}^2$G)	38660.5	(7/2)–132984.5	(5/2)1	
62	423	1061.914	94169.6	−0.4	$1\|_5{}^2$F)	33574.4	(5/2)–127744.4	(7/2)1	
87	503	1062.940	94078.7	0.1	$1\|_5{}^2$G)	38660.5	(7/2)–132739.1	(9/2)1	
79	22	1066.807	93737.6	0.8	$2\|_4{}^5$D) ^{4}D	65061.6	(3/2)–158798.4	(5/2)1	
32	78	1069.161	93531.2	0.0	$1\|_3{}^4$F)	37763.7	(5/2)–131294.9	(5/2)1	
11	89	1071.421	93334.0	0.1	$1\|_5{}^4$G)	20944.7	(5/2)–114278.6	(7/2)1	
21	39	1071.776	93303.1	−0.3	$1\|_3{}^2$G)	56048.8	(9/2)–149352.2	(11/2)1	
39	109	1072.801	93213.9	−0.3	$1\|_3{}^2$F)	41717.1	(7/2)–134931.3	(7/2)1	
43	567	1080.919	92513.9	−0.1	$1\|_5{}^4$G)	21764.6	(9/2)–114278.6	(7/2)1	
264	583	1084.711	92190.5	−0.9	$1\|_3{}^2$G)	56048.8	(9/2)–148240.1	(11/2)1	Os V
14	229	1085.419	92130.3	0.1	$1\|_5{}^4$G)	15617.7	(5/2)–107747.9	(3/2)1	
32	24	1086.673	92024.0	0.4	$1\|_3{}^4$F)	44173.7	(7/2)–136197.3	(9/2)1	
25	5	1092.039	91571.8	0.3	$1\|_3{}^2$G)	56048.8	(9/2)–147620.3	(7/2)1	
69	366	1093.241	91471.2	−0.7	$1\|_3{}^2$G)	56048.8	(9/2)–147520.7	(9/2)1	
11	6	1095.802	91257.3	−0.3	$1\|_3{}^4$F)	40937.3	(3/2)–132194.9	(1/2)1	
39	566	1096.974	91159.8	−0.4	$1\|_5{}^4$G)	20944.7	(5/2)–112104.9	(3/2)1	
22	9	1098.046	91070.9	−0.1	$1\|_5{}^2$G)	45825.4	(9/2)–136896.4	(7/2)1	
38	92	1100.372	90878.3	−0.1	$1\|_5{}^2$F)	40416.5	(5/2)–131294.9	(5/2)1	
32	336	1100.640	90856.2	0.1	$1\|_5{}^4$D)	25587.8	(7/2)–116443.9	(5/2)1	
51	570	1101.270	90804.2	−0.2	$1\|_5{}^4$D)	25587.8	(7/2)–116392.2	(9/2)1	
18	158	1103.821	90594.4	−0.2	$1\|_5{}^2$G)	32886.2	(9/2)–123480.8	(7/2)1	
58	33	1105.640	90445.4	−0.4	$1\|_3{}^2$G)	56048.8	(9/2)–146494.6	(11/2)1	
6	32	1105.981	90417.4	0.3	$1\|_5{}^4$G)	20944.7	(5/2)–111361.8	(5/2)1	
34	48	1106.576	90368.9	−0.8	$1\|_3{}^4$F)	44173.7	(7/2)–134543.4	(5/2)1	
12	13	1112.270	89906.2	−0.2	$1\|_5{}^2$F)	33574.4	(5/2)–123480.8	(7/2)1	
12	25	1116.278	89583.4	0.3	$1\|_3{}^4$P)	22521.8	(1/2)–112104.9	(3/2)1	
47	508	1118.863	89376.4	0.0	$1\|_5{}^4$D)	27067.5	(5/2)–116443.9	(5/2)1	Os V
30	427	1127.509	88691.1	0.3	$1\|_5{}^4$D)	25587.8	(7/2)–114278.6	(7/2)1	
16	139	1146.641	87211.2	0.1	$1\|_5{}^4$D)	27067.5	(5/2)–114278.6	(7/2)1	

Table I. *Continued*

gA	Int	WL (Å)	WN (cm^{-1})	Diff	Even level	*J*-value	Odd level	*J*-value	Remark
15	51	1149.637	86984.0	0.2	$2\|_4{}^5D)\,{}^6D$	46206.5	(3/2)–133190.3	(3/2)1	
13	88	1153.787	86671.1	−0.3	$1\|_5{}^2G)$	38660.5	(7/2)–125331.9	(5/2)1	
21	522	1158.735	86301.0	−0.1	$1\|_5{}^4D)$	20218.3	(3/2)–106519.4	(1/2)1	
95	91	1159.578	86238.3	0.6	$2\|_4{}^3G)\,{}^4G$	77379.7	(11/2)–163617.4	(9/2)1	
19	38	1162.948	85988.4	0.0	$2\|_4{}^5D)\,{}^6D$	46206.5	(3/2)–132194.9	(1/2)1	
53	14	1165.251	85818.4	0.1	$2\|_4{}^3H)\,{}^4H$	64227.5	(7/2)–150045.8	(5/2)1	
69	202	1168.946	85547.1	0.8	$2\|_4{}^5D)\,{}^6D$	51800.8	(7/2)–137347.1	(7/2)1	
50	126	1170.999	85397.2	0.4	$2\|_4{}^5D)\,{}^6D$	49146.6	(5/2)–134543.4	(5/2)1	
116	150	1171.713	85345.1	−0.5	$2\|_4{}^3H)\,{}^4H$	71433.7	(13/2)–156779.3	(11/2)1	
63	182	1179.395	84789.2	0.0	$2\|_4{}^5D)\,{}^6D$	43170.2	(1/2)–127959.4	(3/2)1	
52	26	1185.825	84329.5	−0.2	$2\|_4{}^5D)\,{}^6D$	46206.5	(3/2)–130536.2	(5/2)1	
29	11	1193.896	83759.4	−0.5	$1\|_3{}^4F)$	44173.7	(7/2)–127933.6	(9/2)1	
33	15	1196.670	83565.2	−0.6	$1\|_3{}^2G)$	57478.3	(7/2)–141044.1	(7/2)1	
16				0.2	$2\|_4{}^3H)\,{}^4H$	69913.9	(7/2)–153478.9	(5/2)1	
42	99	1201.664	83217.9	0.6	$2\|_4{}^3G)\,{}^4G$	76177.0	(9/2)–159394.3	(9/2)1	
74	27	1207.504	82815.5	−0.4	$2\|_4{}^5D)\,{}^6D$	54080.5	(9/2)–136896.4	(7/2)1	
252	66	1207.655	82805.1	0.0	$2\|_4{}^5D)\,{}^6D$	54080.5	(9/2)–136885.6	(9/2)1	
7	20	1208.043	82778.5	0.1	$1\|_5{}^4D)$	20218.3	(3/2)–102996.7	(1/2)1	
216	56	1208.821	82725.2	−0.9	$2\|_4{}^3H)\,{}^4H$	71433.7	(13/2)–154159.8	(13/2)1	
16	20	1212.006	82507.8	0.3	$1\|_5{}^4D)$	29597.4	(3/2)–112104.9	(3/2)1	
141	24	1212.968	82442.4	−0.2	$2\|_4{}^3H)\,{}^4H$	65797.5	(9/2)–148240.1	(11/2)1	
54	51	1216.701	82189.4	0.4	$2\|_4{}^3D)\,{}^4D$	77847.0	(7/2)–160036.0	(9/2)1	
451	321	1217.782	82116.5	−0.3	$2\|_4{}^5D)\,{}^6D$	54080.5	(9/2)–136197.3	(9/2)1	
91	13	1220.452	81936.0	0.4	$2\|_4{}^3H)\,{}^4H$	72954.8	(9/2)–154891.3	(7/2)1	
92	18	1221.979	81834.4	0.1	$2\|_4{}^3H)\,{}^4H$	69251.9	(11/2)–151086.2	(9/2)1	
25	11	1223.206	81752.4	−0.5	$2\|_4{}^5D)\,{}^6D$	46206.5	(3/2)–127959.4	(3/2)1	
120	17	1228.671	81388.8	−0.5	$2\|_4{}^5D)\,{}^4D$	71024.4	(7/2)–152413.7	(9/2)1	
63	61	1230.045	81297.8	−0.5	$1\|_3{}^2G)$	56048.8	(9/2)–137347.1	(7/2)1	
103	10	1231.950	81172.1	−0.2	$2\|_4{}^3H)\,{}^4H$	69913.9	(7/2)–151086.2	(9/2)1	
122	16	1232.929	81107.7	0.0	$2\|_4{}^3H)\,{}^4H$	72954.8	(9/2)–154062.5	(9/2)1	
207	191	1237.202	80827.5	0.0	$2\|_4{}^3H)\,{}^4H$	65797.5	(9/2)–146625.0	(7/2)1	
14	26	1242.624	80474.9	0.0	$1\|_3{}^4P)$	22521.8	(1/2)–102996.7	(1/2)1	
512	382	1246.392	80231.6	−0.1	$2\|_4{}^5D)\,{}^6D$	51800.8	(7/2)–132032.5	(7/2)1	
90	6	1248.432	80100.5	0.2	$2\|_4{}^3H)\,{}^4H$	69251.9	(11/2)–149352.2	(11/2)1	
140	15	1248.914	80069.6	−0.4	$2\|_4{}^3H)\,{}^4H$	69251.9	(11/2)–149321.9	(9/2)1	
152	24	1252.765	79823.4	−0.2	$2\|_4{}^3H)\,{}^4H$	72954.8	(9/2)–152778.4	(7/2)1	
240	163	1254.982	79682.4	−0.3	$2\|_4{}^5D)\,{}^6D$	49146.6	(5/2)–128829.3	(5/2)1	
68	6	1259.239	79413.1	0.1	$2\|_4{}^3H)\,{}^4H$	64227.5	(7/2)–143640.5	(5/2)1	
114	23	1261.876	79247.1	−0.4	$2\|_4{}^3H)\,{}^4H$	69251.9	(11/2)–148499.4	(9/2)1	
278	38	1263.296	79158.0	−0.4	$2\|_4{}^3G)\,{}^4G$	77379.7	(11/2)–156538.1	(13/2)1	
126	89	1263.821	79125.1	−0.3	$2\|_4{}^5D)\,{}^6D$	46206.5	(3/2)–125331.9	(5/2)1	
193	35	1266.236	78974.2	−0.1	$2\|_4{}^3H)\,{}^4H$	64227.5	(7/2)–143201.8	(9/2)1	
126	110	1266.895	78933.2	−0.1	$2\|_4{}^5D)\,{}^6D$	46206.5	(3/2)–125139.8	(1/2)1	
250	196	1268.834	78812.5	−0.3	$2\|_4{}^5D)\,{}^6D$	49146.6	(5/2)–127959.4	(3/2)1	
222	153	1270.076	78735.4	0.0	$2\|_4{}^5D)\,{}^6D$	51800.8	(7/2)–130536.2	(5/2)1	
103	19	1271.179	78667.1	−0.1	$2\|_4{}^5D)\,{}^4D$	69873.3	(5/2)–148540.5	(5/2)1	Os V
170	202	1271.318	78658.5	−0.1	$2\|_4{}^5D)\,{}^6D$	54080.5	(9/2)–132739.1	(9/2)1	
82	14	1271.838	78626.4	−0.2	$2\|_4{}^3H)\,{}^4H$	69913.9	(7/2)–148540.5	(5/2)1	
86	27	1271.954	78619.2	0.0	$2\|_4{}^3H)\,{}^4H$	64227.5	(7/2)–142846.7	(5/2)1	
377	395	1272.298	78597.9	0.1	$2\|_4{}^5D)\,{}^6D$	49146.6	(5/2)–127744.4	(7/2)1	
77	12	1272.594	78579.7	0.4	$2\|_4{}^3G)\,{}^4G$	71960.8	(5/2)–150540.1	(3/2)1	
359	386	1276.864	78316.8	0.3	$2\|_4{}^5D)\,{}^6D$	51800.8	(7/2)–130117.4	(9/2)1	Os V
196	69	1277.343	78287.5	0.7	$2\|_4{}^3H)\,{}^4H$	65797.5	(9/2)–144084.3	(7/2)1	
100	15	1277.654	78268.4	−0.4	$2\|_4{}^3H)\,{}^4H$	69251.9	(11/2)–147520.7	(9/2)1	
141	22	1279.573	78151.1	−0.2	$2\|_4{}^5D)\,{}^4D$	66244.9	(5/2)–144396.2	(7/2)1	
205	24	1281.395	78039.9	−0.7	$2\|_4{}^3G)\,{}^4G$	81353.7	(11/2)–159394.3	(9/2)1	
16	20	1281.952	78006.1	−0.9	$2\|_4{}^5D)\,{}^6D$	43170.2	(1/2)–121177.2	(1/2)1	
33	343	1283.388	77918.8	0.3	$2\|_4{}^3H)\,{}^4H$	71433.7	(13/2)–149352.2	(11/2)1	
51	15	1283.970	77883.4	−0.6	$2\|_4{}^3D)\,{}^4D$	74894.4	(5/2)–152778.4	(7/2)1	
164	27	1285.298	77803.0	−0.2	$2\|_4{}^3H)\,{}^4H$	64227.5	(7/2)–142030.7	(9/2)1	
279	36	1286.869	77708.0	0.3	$2\|_4{}^3H)\,{}^2H$	87886.0	(11/2)–165593.7	(9/2)1	
114	23	1292.062	77395.7	0.1	$2\|_4{}^5D)\,{}^4D$	66244.9	(5/2)–143640.5	(5/2)1	
194	39	1292.768	77353.4	0.2	$2\|_4{}^3H)\,{}^4H$	69913.9	(7/2)–147267.1	(5/2)1	
197	47	1293.251	77324.5	0.1	$2\|_4{}^5D)\,{}^4D$	66244.9	(5/2)–143569.3	(3/2)1	
41	17	1293.749	77294.7	−0.5	$2\|_4{}^3H)\,{}^4H$	69251.9	(11/2)–146547.1	(9/2)1	
12				−0.2	$2\|_4{}^3F)\,{}^4F$	76852.4	(7/2)–154147.4	(7/2)1	
136				0.4	$2\|_4{}^3G)\,{}^2G$	82100.0	(7/2)–159394.3	(9/2)1	
98	32	1294.289	77262.5	0.0	$2\|_4{}^3G)\,{}^4G$	76177.0	(9/2)–153439.5	(7/2)1	
376	84	1294.936	77223.9	0.1	$2\|_4{}^3H)\,{}^4H$	65797.5	(9/2)–143021.3	(11/2)1	
385	375	1296.854	77109.5	−0.1	$2\|_4{}^5D)\,{}^6D$	43170.2	(1/2)–120280.0	(3/2)1	
32	10	1298.227	77028.1	−0.4	$2\|_4{}^5D)\,{}^6D$	51800.8	(7/2)–128829.3	(5/2)1	

Table I. *Continued*

gA	Int	WL (Å)	WN (cm^{-1})	Diff	Even level	*J*-value	Odd level	*J*-value	Remark
178	134	1298.362	77020.1	0.0	$2\|_4{}^5D)\,{}^6D$	46206.5	(3/2)–123226.6	(3/2)1	
28	14	1298.581	77007.1	0.1	$1\|_5{}^2S)$	44170.2	(1/2)–121177.2	(1/2)1	
637	519	1299.506	76952.3	0.0	$2\|_4{}^5D)\,{}^6D$	46206.5	(3/2)–123158.8	(5/2)1	
232	31	1301.801	76816.7	0.1	$2\|_4{}^3H)\,{}^4H$	64227.5	(7/2)–141044.1	(7/2)1	
251	20	1301.974	76806.5	0.1	$2\|_4{}^3H)\,{}^4H$	71433.7	(13/2)–148240.1	(11/2)1	
87	19	1302.426	76779.8	−0.3	$2\|_4{}^3G)\,{}^4G$	77379.7	(11/2)–154159.8	(13/2)1	
773	553	1302.526	76773.9	0.2	$2\|_4{}^5D)\,{}^6D$	49146.6	(5/2)–125920.3	(7/2)1	2 order
327	18	1304.067	76683.2	0.4	$2\|_4{}^3G)\,{}^4G$	77379.7	(11/2)–154062.5	(9/2)1	
207	17	1304.920	76633.1	−0.1	$2\|_4{}^3H)\,{}^4H$	69913.9	(7/2)–146547.1	(9/2)1	
226	29	1305.045	76625.7	−0.8	$2\|_4{}^3F)\,{}^4F$	76852.4	(7/2)–153478.9	(5/2)1	
307	49	1305.598	76593.3	0.5	$2\|_4{}^3H)\,{}^4H$	64227.5	(7/2)–140820.3	(5/2)1	Si II
263	14	1305.700	76587.3	0.2	$2\|_4{}^3F)\,{}^4F$	76852.4	(7/2)–153439.5	(7/2)1	
591	294	1308.950	76397.1	−0.3	$2\|_4{}^3H)\,{}^4H$	72954.8	(9/2)–149352.2	(11/2)1	2 order
90	18	1310.599	76301.0	0.6	$2\|_4{}^3D)\,{}^4D$	77847.0	(7/2)–154147.4	(7/2)1	
468	36	1310.684	76296.0	−0.2	$2\|_4{}^3G)\,{}^4G$	76177.0	(9/2)–152473.2	(11/2)1	
156	15	1311.700	76236.9	0.2	$2\|_4{}^3G)\,{}^4G$	76177.0	(9/2)–152413.7	(9/2)1	
285	17	1312.070	76215.5	0.0	$2\|_4{}^3D)\,{}^4D$	77847.0	(7/2)–154062.5	(9/2)1	
180	204	1312.592	76185.1	−0.2	$2\|_4{}^5D)\,{}^6D$	49146.6	(5/2)–125331.9	(5/2)1	Si III
1159	537	1313.493	76132.9	0.1	$2\|_4{}^5D)\,{}^6D$	51800.8	(7/2)–127933.6	(9/2)1	
61	7	1313.902	76109.2	−0.6	$1\|_5{}^2S)$	44170.2	(1/2)–120280.0	(3/2)1	
182	68	1315.147	76037.1	0.2	$2\|_4{}^5D)\,{}^6D$	54080.5	(9/2)–130117.4	(9/2)1	
180	78	1316.760	75944.0	0.4	$2\|_4{}^5D)\,{}^6D$	51800.8	(7/2)–127744.4	(7/2)1	
236	25	1320.714	75716.6	−0.2	$2\|_4{}^3H)\,{}^4H$	64227.5	(7/2)–139944.3	(9/2)1	
118	8	1323.722	75544.6	0.0	$2\|_4{}^3H)\,{}^4H$	72954.8	(9/2)–148499.4	(9/2)1	
510	23	1325.810	75425.6	0.0	$2\|_4{}^3G)\,{}^4G$	81353.7	(11/2)–156779.3	(11/2)1	
405	45	1326.053	75411.8	0.1	$2\|_4{}^3H)\,{}^2H$	87886.0	(11/2)–163297.7	(11/2)1	
1519	341	1328.451	75275.6	0.0	$2\|_4{}^3H)\,{}^4H$	69251.9	(11/2)–144527.5	(13/2)1	
1477	558	1328.600	75267.2	0.0	$2\|_4{}^5D)\,{}^6D$	54080.5	(9/2)–129347.7	(11/2)1	
106	9	1334.947	74909.3	0.1	$2\|_4{}^3G)\,{}^4G$	76177.0	(9/2)–151086.2	(9/2)1	
98	12	1336.913	74799.2	0.0	$2\|_4{}^5D)\,{}^4D$	66244.9	(5/2)–141044.1	(7/2)1	
56	24	1338.651	74702.0	−0.2	$2\|_4{}^3H)\,{}^2H$	78737.3	(9/2)–153439.5	(7/2)1	
117	20	1339.323	74664.6	0.4	$2\|_4{}^3G)\,{}^4G$	71960.8	(5/2)–146625.0	(7/2)1	
466	164	1341.095	74565.9	0.0	$2\|_4{}^3H)\,{}^4H$	72954.8	(9/2)–147520.7	(9/2)1	
240				−0.8	$2\|_4{}^3D)\,{}^4D$	77847.0	(7/2)–152413.7	(9/2)1	
127	18	1342.590	74482.9	0.6	$2\|_4{}^3H)\,{}^4H$	69913.9	(7/2)–144396.2	(7/2)1	Os V
84	57	1342.821	74470.1	0.2	$2\|_4{}^3P)\,{}^4P$	70769.7	(3/2)–145239.5	(1/2)1	
36	10	1345.278	74334.1	−0.1	$2\|_4{}^5D)\,{}^6D$	49146.6	(5/2)–123480.8	(7/2)1	
180	11	1347.089	74234.1	0.3	$2\|_4{}^3F)\,{}^4F$	76852.4	(7/2)–151086.2	(9/2)1	
162	116	1347.520	74210.4	−0.6	$2\|_4{}^5D)\,{}^4D$	69873.3	(5/2)–144084.3	(7/2)1	2 order
313	180	1347.784	74195.9	−0.2	$2\|_4{}^3P)\,{}^4P$	70769.7	(3/2)–144965.8	(5/2)1	
478	153	1348.671	74147.1	0.3	$2\|_4{}^3H)\,{}^4H$	65797.5	(9/2)–139944.3	(9/2)1	
2932	569	1349.639	74093.9	0.0	$2\|_4{}^3H)\,{}^4H$	71433.7	(13/2)–145527.6	(15/2)1	
103	44	1350.010	74073.5	0.0	$2\|_4{}^5D)\,{}^6D$	46206.5	(3/2)–120280.0	(3/2)1	
73	21	1351.132	74012.0	−0.2	$2\|_4{}^5D)\,{}^6D$	49146.6	(5/2)–123158.8	(5/2)1	
83	18	1351.240	74006.1	−0.3	$2\|_4{}^3H)\,{}^4H$	64227.5	(7/2)–138233.9	(5/2)1	
1003	410	1351.353	73999.9	−0.1	$2\|_4{}^3H)\,{}^4H$	65797.5	(9/2)–139797.5	(11/2)1	
45	127	1352.428	73941.1	−0.3	$2\|_4{}^5D)\,{}^4D$	71024.4	(7/2)–144965.8	(5/2)1	
428	31	1353.706	73871.3	0.0	$2\|_4{}^3D)\,{}^4D$	74894.4	(5/2)–148765.7	(7/2)1	
582	459	1355.344	73782.0	0.1	$2\|_4{}^5D)\,{}^6D$	54080.5	(9/2)–127862.4	(11/2)1	
499	217	1355.574	73769.5	0.1	$2\|_4{}^3H)\,{}^4H$	69251.9	(11/2)–143021.3	(11/2)1	
90	14	1356.178	73736.6	0.7	$2\|_4{}^3H)\,{}^2H$	78737.3	(9/2)–152473.2	(11/2)1	
129	10	1357.841	73646.3	0.2	$2\|_4{}^3D)\,{}^4D$	74894.4	(5/2)–148540.5	(5/2)1	
218	24	1358.834	73592.5	0.2	$2\|_4{}^3H)\,{}^4H$	72954.8	(9/2)–146547.1	(9/2)1	
272	10	1359.019	73582.5	0.0	$2\|_4{}^3G)\,{}^2G$	90828.4	(9/2)–164410.9	(7/2)1	
203	30	1359.814	73539.5	−0.3	$2\|_4{}^3H)\,{}^4H$	72954.8	(9/2)–146494.6	(11/2)1	
69	10	1359.897	73535.0	0.1	$2\|_4{}^3F)\,{}^4F$	76852.4	(7/2)–150387.3	(7/2)1	
229	38	1362.919	73371.9	0.1	$2\|_4{}^5D)\,{}^4D$	71024.4	(7/2)–144396.2	(7/2)1	Os V
45	13	1364.282	73298.6	−0.3	$1\|_3{}^2G)$	56048.8	(9/2)–129347.7	(11/2)1	
106	11	1364.482	73287.0	0.0	$2\|_4{}^3H)\,{}^4H$	69913.9	(7/2)–143201.8	(9/2)1	
667	244	1365.389	73239.2	0.0	$2\|_4{}^3D)\,{}^4D$	77847.0	(7/2)–151086.2	(9/2)1	
555	209	1368.100	73094.0	0.2	$2\|_4{}^3H)\,{}^4H$	71433.7	(13/2)–144527.5	(13/2)1	
685	355	1368.864	73053.3	0.0	$2\|_4{}^3H)\,{}^4H$	69251.9	(11/2)–142305.2	(13/2)1	
2807	619	1369.116	73039.8	0.0	$2\|_4{}^1I)\,{}^2I$	84634.2	(13/2)–157674.0	(15/2)1	
164	131	1369.773	73004.8	−0.2	$2\|_4{}^3G)\,{}^4G$	71960.8	(5/2)–144965.8	(5/2)1	
123	10	1372.289	72870.9	0.1	$2\|_4{}^3P)\,{}^4P$	70769.7	(3/2)–143640.5	(5/2)1	
1885	395	1373.510	72806.2	0.1	$2\|_4{}^3G)\,{}^4G$	81353.7	(11/2)–154159.8	(13/2)1	
294	11	1373.823	72789.6	0.6	$2\|_4{}^3G)\,{}^2G$	90828.4	(9/2)–163617.4	(9/2)1	
213	18	1375.025	72725.9	0.0	$2\|_4{}^3D)\,{}^4D$	74894.4	(5/2)–147620.3	(7/2)1	
257	80	1376.102	72669.0	0.1	$2\|_4{}^3H)\,{}^4H$	64227.5	(7/2)–136896.4	(7/2)1	
204	55	1376.308	72658.2	0.1	$2\|_4{}^3H)\,{}^4H$	64227.5	(7/2)–136885.6	(9/2)1	
362	18	1377.781	72580.5	−0.3	$2\|_4{}^3G)\,{}^2G$	87455.2	(9/2)–160036.0	(9/2)1	

Table I. *Continued*

gA	Int	WL (Å)	WN (cm^{-1})	Diff	Even level	*J*-value	Odd level	*J*-value	Remark
591	112	1379.889	72469.6	0.1	$2\|_4{}^3F)\,{}^4F$	76852.4	(7/2)–149321.9	(9/2)1	
991				0.3	$2\|_4{}^3G)\,{}^2G$	90828.4	(9/2)–163297.7	(11/2)1	
50	6	1380.331	72446.4	0.3	$2\|_4{}^5D)\,{}^4D$	66244.9	(5/2)–138691.0	(3/2)1	
503	135	1385.470	72177.7	0.3	$2\|_4{}^5D)\,{}^4D$	71024.4	(7/2)–143201.8	(9/2)1	
168	21	1386.637	72116.9	0.1	$2\|_4{}^3H)\,{}^4H$	69913.9	(7/2)–142030.7	(9/2)1	
56	5	1386.887	72103.9	−0.1	$2\|_4{}^5D)\,{}^4D$	69873.3	(5/2)–141977.3	(3/2)1	
801	288	1387.670	72063.2	0.1	$2\|_4{}^3G)\,{}^4G$	76177.0	(9/2)–148240.1	(11/2)1	
105	16	1387.959	72048.2	0.7	$2\|_4{}^3G)\,{}^2G$	82099.9	(7/2)–154147.4	(7/2)1	
84	78	1389.405	71973.2	0.1	$2\|_4{}^5D)\,{}^6D$	51800.8	(7/2)–123773.9	(9/2)1	
21				0.7	$2\|_4{}^3G)\,{}^4G$	77379.7	(11/2)–149352.2	(11/2)1	
1048	235	1390.740	71904.2	0.3	$2\|_4{}^1I)\,{}^2I$	84634.2	(13/2)–156538.1	(13/2)1	
68	7	1394.104	71730.7	0.1	$2\|_4{}^3D)\,{}^4D$	74894.4	(5/2)–146625.0	(7/2)1	
40	28	1394.924	71688.5	0.4	$2\|_4{}^3F)\,{}^4F$	76852.4	(7/2)–148540.5	(5/2)1	
34	10	1396.463	71609.5	1.0	$2\|_4{}^3G)\,{}^4G$	71960.8	(5/2)–143569.3	(3/2)1	
170	46	1397.990	71531.3	0.5	$2\|_4{}^3H)\,{}^4H$	69251.9	(11/2)–140782.7	(11/2)1	Os V
97	25	1405.068	71170.9	0.1	$2\|_4{}^5D)\,{}^4D$	69873.3	(5/2)–141044.1	(7/2)1	Os V
529	76	1406.085	71119.5	0.0	$2\|_4{}^3G)\,{}^4G$	81353.7	(11/2)–152473.2	(11/2)1	
66	9	1406.417	71102.6	0.4	$2\|_4{}^5D)\,{}^4D$	66244.9	(5/2)–137347.1	(7/2)1	
138	32	1406.479	71099.5	0.6	$2\|_4{}^3H)\,{}^4H$	65797.5	(9/2)–136896.4	(7/2)1	
94	20	1406.693	71088.6	0.6	$2\|_4{}^3H)\,{}^4H$	65797.5	(9/2)–136885.6	(9/2)1	
369	160	1406.848	71080.9	0.3	$2\|_4{}^3G)\,{}^2G$	87455.2	(9/2)–158535.8	(11/2)1	2 order
37	7	1409.497	70947.3	0.3	$2\|_4{}^5D)\,{}^4D$	69873.3	(5/2)–140820.3	(5/2)1	
55	10	1410.301	70906.9	0.5	$2\|_4{}^3H)\,{}^4H$	69913.9	(7/2)–140820.3	(5/2)1	
88	19	1411.002	70871.6	0.1	$2\|_4{}^3H)\,{}^4H$	71433.7	(13/2)–142305.2	(13/2)1	
324	125	1411.221	70860.6	0.2	$2\|_4{}^3G)\,{}^4G$	77379.7	(11/2)–148240.1	(11/2)1	
117	51	1414.349	70703.9	0.1	$2\|_4{}^3H)\,{}^4H$	64227.5	(7/2)–134931.3	(7/2)1	
184	71	1414.572	70692.8	0.4	$2\|_4{}^3H)\,{}^4H$	69251.9	(11/2)–139944.3	(9/2)1	2 order
38	20	1414.853	70678.7	0.2	$2\|_4{}^3G)\,{}^2G$	82099.9	(7/2)–152778.4	(7/2)1	
144	37	1415.071	70667.8	−0.5	$2\|_4{}^3F)\,{}^4F$	76852.4	(7/2)–147520.7	(9/2)1	2 order
641	193	1415.422	70650.3	0.5	$2\|_4{}^3H)\,{}^2H$	87886.0	(11/2)–158535.8	(11/2)1	
1086	329	1416.128	70615.1	0.2	$2\|_4{}^3H)\,{}^2H$	78737.3	(9/2)–149352.2	(11/2)1	
146	13	1416.733	70584.9	0.3	$2\|_4{}^3H)\,{}^2H$	78737.3	(9/2)–149321.9	(9/2)1	
273	32	1421.437	70351.3	0.4	$2\|_4{}^3H)\,{}^2H$	87886.0	(11/2)–158236.9	(9/2)1	2 order
212	51	1422.122	70317.4	−0.2	$2\|_4{}^3G)\,{}^4G$	76177.0	(9/2)–146494.6	(11/2)1	
34	24	1423.747	70237.2	−0.2	$2\|_4{}^5D)\,{}^6D$	46206.5	(3/2)–116443.9	(5/2)1	
111	41	1425.890	70131.7	0.0	$2\|_4{}^5D)\,{}^4D$	69873.3	(5/2)–140005.0	(5/2)1	
633	366	1427.670	70044.2	0.0	$2\|_4{}^3G)\,{}^4G$	77379.7	(11/2)–147423.9	(13/2)1	
131	56	1428.175	70019.5	−0.2	$2\|_4{}^5D)\,{}^4D$	71024.4	(7/2)–141044.1	(7/2)1	
136	37	1432.741	69796.3	0.4	$2\|_4{}^5D)\,{}^4D$	71024.4	(7/2)–140820.3	(5/2)1	Os V
107	37	1433.448	69761.8	−0.3	$2\|_4{}^3H)\,{}^2H$	78737.3	(9/2)–148499.4	(9/2)1	
71	158	1434.850	69693.7	0.3	$2\|_4{}^5D)\,{}^6D$	54080.5	(9/2)–123773.9	(9/2)1	
21	10	1435.669	69653.9	−0.2	$2\|_4{}^5D)\,{}^6D$	49146.6	(5/2)–118800.7	(7/2)1	
159	24	1438.306	69526.3	0.7	$2\|_4{}^1I)\,{}^2I$	84634.2	(13/2)–154159.8	(13/2)1	
59	77	1440.910	69400.6	0.3	$2\|_4{}^5D)\,{}^6D$	54080.5	(9/2)–123480.8	(7/2)1	
556	115	1442.496	69324.3	0.2	$2\|_4{}^3G)\,{}^2G$	87455.2	(9/2)–156779.3	(11/2)1	
77	19	1445.470	69181.6	0.1	$2\|_4{}^5D)\,{}^4D$	69873.3	(5/2)–139054.8	(7/2)1	
275	92	1446.863	69115.0	0.1	$2\|_4{}^3G)\,{}^4G$	77379.7	(11/2)–146494.6	(11/2)1	
151	16	1447.759	69072.3	0.0	$2\|_4{}^3F)\,{}^2F$	84406.6	(5/2)–153478.9	(5/2)1	
308	166	1448.579	69033.1	0.2	$2\|_4{}^3F)\,{}^2F$	84406.6	(5/2)–153439.5	(7/2)1	2 order
68	30	1449.969	68967.0	0.1	$2\|_4{}^5D)\,{}^4D$	69873.3	(5/2)–138840.2	(5/2)1	
155	58	1453.833	68783.7	0.3	$2\|_4{}^3H)\,{}^2H$	78737.3	(9/2)–147520.7	(9/2)1	Al III
59	490	1453.941	68778.6	0.6	$2\|_4{}^3D)\,{}^4D$	77847.0	(7/2)–146625.0	(7/2)1	
49	37	1454.401	68756.8	−0.2	$2\|_4{}^3H)\,{}^4H$	64227.5	(7/2)–132984.5	(5/2)1	
196	111	1456.248	68669.6	0.0	$2\|_4{}^3H)\,{}^4H$	65797.5	(9/2)–134467.1	(11/2)1	
728	254	1456.619	68652.1	0.0	$2\|_4{}^3H)\,{}^2H$	87886.0	(11/2)–156538.1	(13/2)1	
442	325	1458.444	68566.2	0.3	$2\|_4{}^3G)\,{}^2G$	90828.4	(9/2)–159394.3	(9/2)1	
109	17	1459.823	68501.4	0.0	$2\|_4{}^3F)\,{}^2F$	84406.6	(5/2)–152908.0	(5/2)1	
131	124	1462.757	68364.1	0.3	$2\|_4{}^3H)\,{}^4H$	71433.7	(13/2)–139797.5	(11/2)1	Os V
222	212	1464.157	68298.7	0.2	$2\|_4{}^5D)\,{}^4D$	66244.9	(5/2)–134543.4	(5/2)1	
104	9	1464.386	68288.0	0.6	$2\|_4{}^3G)\,{}^2G$	82099.9	(7/2)–150387.3	(7/2)1	
53	17	1465.861	68219.3	0.1	$2\|_4{}^3G)\,{}^4G$	76177.0	(9/2)–144396.2	(7/2)1	
60	55	1466.584	68185.6	0.2	$2\|_4{}^3H)\,{}^4H$	65797.5	(9/2)–133982.9	(7/2)1	
51	28	1469.919	68030.9	0.5	$2\|_4{}^5D)\,{}^4D$	71024.4	(7/2)–139054.8	(7/2)1	
279	144	1470.913	67985.0	0.2	$2\|_4{}^3G)\,{}^2G$	82099.9	(7/2)–150084.7	(7/2)1	
54	25	1472.611	67906.6	−0.7	$2\|_4{}^3G)\,{}^4G$	76177.0	(9/2)–144084.3	(7/2)1	
144	44	1473.016	67887.9	0.2	$2\|_4{}^3H)\,{}^2H$	78737.3	(9/2)–146625.0	(7/2)1	
233	32	1474.079	67838.9	−0.1	$2\|_4{}^1I)\,{}^2I$	84634.2	(13/2)–152473.2	(11/2)1	
645	627	1474.318	67828.0	0.1	$2\|_4{}^3H)\,{}^4H$	72954.8	(9/2)–140782.7	(11/2)1	
417	274	1474.714	67809.8	0.0	$2\|_4{}^3H)\,{}^2H$	78737.3	(9/2)–146547.1	(9/2)1	
97	24	1476.952	67707.0	−0.4	$2\|_4{}^3G)\,{}^2G$	90828.4	(9/2)–158535.8	(11/2)1	
71	77	1482.061	67473.6	−0.2	$2\|_4{}^5D)\,{}^4D$	69873.3	(5/2)–137347.1	(7/2)1	

Table I. *Continued*

gA	Int	WL (Å)	WN (cm^{-1})	Diff	Even level	*J*-value	Odd level	*J*-value	Remark
202	68	1482.886	67436.1	0.0	$2\|_4{}^3G)\,{}^2G$	87455.2	(9/2)–154891.3	(7/2)1	
166	29	1483.507	67407.8	−0.7	$2\|_4{}^3G)\,{}^2G$	90828.4	(9/2)–158236.9	(9/2)1	
31	42	1485.942	67297.4	0.1	$2\|_4{}^5D)\,{}^6D$	49146.6	(5/2)–116443.9	(5/2)1	
110	41	1489.258	67147.5	−0.3	$2\|_4{}^3G)\,{}^4G$	77379.7	(11/2)–144527.5	(13/2)1	
62	42	1489.567	67133.6	0.3	$2\|_4{}^5D)\,{}^4D$	65061.6	(3/2)–132194.9	(1/2)1	
185	117	1490.443	67094.2	0.2	$2\|_4{}^3G)\,{}^4G$	71960.8	(5/2)–139054.8	(7/2)1	
48	22	1491.022	67068.1	0.7	$2\|_4{}^3H)\,{}^4H$	64227.5	(7/2)–131294.9	(5/2)1	
26	10	1492.004	67024.0	−0.8	$2\|_4{}^3G)\,{}^4G$	76177.0	(9/2)–143201.8	(9/2)1	
59	123	1492.529	67000.4	0.5	$2\|_4{}^5D)\,{}^6D$	51800.8	(7/2)–118800.7	(7/2)1	
102	44	1492.924	66982.6	0.1	$2\|_4{}^3H)\,{}^4H$	69913.9	(7/2)–136896.4	(7/2)1	
152	352	1493.750	66945.6	0.2	$2\|_4{}^5D)\,{}^4D$	66244.9	(5/2)–133190.3	(3/2)1	
118				0.2	$2\|_4{}^3H)\,{}^4H$	69251.9	(11/2)–136197.3	(9/2)1	
35	37	1493.836	66941.7	0.1	$2\|_4{}^3H)\,{}^4H$	65797.5	(9/2)–132739.1	(9/2)1	
25	75	1495.228	66879.5	0.1	$2\|_4{}^3G)\,{}^4G$	71960.8	(5/2)–138840.2	(5/2)1	
124	42	1496.063	66842.1	−0.6	$2\|_4{}^3H)\,{}^4H$	72954.8	(9/2)–139797.5	(11/2)1	
147	51	1501.325	66607.8	0.5	$2\|_4{}^3G)\,{}^2G$	87455.2	(9/2)–154062.5	(9/2)1	
366	193	1506.039	66399.3	−0.2	$2\|_4{}^3G)\,{}^2G$	82099.9	(7/2)–148499.4	(9/2)1	
34	22	1508.096	66308.8	0.1	$2\|_4{}^3H)\,{}^4H$	64227.5	(7/2)–130536.2	(5/2)1	
40	42	1508.402	66295.3	−0.3	$1\|_3{}^2G)$	57478.3	(7/2)–123773.9	(9/2)1	
209	206	1508.676	66283.3	−0.1	$2\|_4{}^3H)\,{}^4H$	69913.9	(7/2)–136197.3	(9/2)1	
52	102	1508.905	66273.2	0.1	$2\|_4{}^3G)\,{}^4G$	71960.8	(5/2)–138233.9	(5/2)1	
62	59	1509.726	66237.2	−0.1	$2\|_4{}^3D)\,{}^4D$	77847.0	(7/2)–144084.3	(7/2)1	
110	341	1511.347	66166.2	−0.8	$2\|_4{}^3G)\,{}^4G$	81353.7	(11/2)–147520.7	(9/2)1	
85	13	1513.549	66069.9	−0.3	$2\|_4{}^3G)\,{}^4G$	81353.7	(11/2)–147423.9	(13/2)1	
6	20	1515.119	66001.4	−1.1	$1\|_3{}^2G)$	57478.3	(7/2)–123480.8	(7/2)1	
68	44	1515.289	65994.0	−0.3	$2\|_4{}^3F)\,{}^4F$	76852.4	(7/2)–142846.7	(5/2)1	
170	17	1516.302	65949.9	−1.0	$2\|_4{}^3G)\,{}^2G$	90828.4	(9/2)–156779.3	(11/2)1	
37	16	1517.689	65889.7	−0.2	$2\|_4{}^3H)\,{}^4H$	64227.5	(7/2)–130117.4	(9/2)1	
33	13	1518.078	65872.8	0.8	$2\|_4{}^5D)\,{}^4D$	71024.4	(7/2)–136896.4	(7/2)1	
137	56	1518.340	65861.4	0.2	$2\|_4{}^5D)\,{}^4D$	71024.4	(7/2)–136885.6	(9/2)1	
113	34	1518.520	65853.6	−0.1	$2\|_4{}^3G)\,{}^4G$	76177.0	(9/2)–142030.7	(9/2)1	
83	71	1520.041	65787.7	0.1	$2\|_4{}^5D)\,{}^4D$	66244.9	(5/2)–132032.5	(7/2)1	
68	10	1526.227	65521.0	0.6	$2\|_4{}^3G)\,{}^2G$	82099.9	(7/2)–147620.3	(7/2)1	
118	72	1529.374	65386.2	−0.1	$2\|_4{}^3G)\,{}^4G$	71960.8	(5/2)–137347.1	(7/2)1	
167	120	1534.379	65172.9	0.0	$2\|_4{}^5D)\,{}^4D$	71024.4	(7/2)–136197.3	(9/2)1	
159	735	1534.796	65155.3	0.0	$2\|_4{}^5D)\,{}^6D$	46206.5	(3/2)–111361.8	(5/2)1	
63	20	1535.138	65140.7	−0.2	$2\|_4{}^3G)\,{}^4G$	81353.7	(11/2)–146494.6	(11/2)1	
184	748	1535.341	65132.1	0.1	$2\|_4{}^5D)\,{}^6D$	49146.6	(5/2)–114278.6	(7/2)1	
87	20	1538.032	65018.2	0.2	$2\|_4{}^3G)\,{}^2G$	87455.2	(9/2)–152473.2	(11/2)1	
126	28	1539.449	64958.3	−0.2	$2\|_4{}^3G)\,{}^2G$	87455.2	(9/2)–152413.7	(9/2)1	
462	725	1540.227	64925.5	0.0	$2\|_4{}^3G)\,{}^4G$	77379.7	(11/2)–142305.2	(13/2)1	
654	829	1545.114	64720.2	0.0	$2\|_4{}^5D)\,{}^6D$	54080.5	(9/2)–118800.7	(7/2)1	
243	162	1546.762	64651.2	0.2	$2\|_4{}^3G)\,{}^4G$	77379.7	(11/2)–142030.7	(9/2)1	
418	812	1546.949	64643.4	0.3	$2\|_4{}^5D)\,{}^6D$	51800.8	(7/2)–116443.9	(5/2)1	
42	48	1547.288	64629.2	−0.3	$2\|_4{}^3H)\,{}^4H$	69913.9	(7/2)–134543.4	(5/2)1	
144	1242	1548.195	64591.3	−0.1	$2\|_4{}^5D)\,{}^6D$	51800.8	(7/2)–116392.2	(9/2)1	C IV
80	427	1548.523	64577.7	0.0	$2\|_4{}^5D)\,{}^6D$	43170.2	(1/2)–107747.9	(3/2)1	
28	20	1551.242	64464.5	0.0	$2\|_4{}^3H)\,{}^2H$	78737.3	(9/2)–143201.8	(9/2)1	
116	32	1560.813	64069.2	0.2	$2\|_4{}^3H)\,{}^4H$	69913.9	(7/2)–133982.9	(7/2)1	
23	23	1563.814	63946.2	0.4	$2\|_4{}^3D)\,{}^4D$	74894.4	(5/2)–138840.2	(5/2)1	
162	156	1564.202	63930.4	−0.4	$2\|_4{}^3H)\,{}^4H$	72954.8	(9/2)–136885.6	(9/2)1	
201	245	1564.784	63906.6	−0.3	$2\|_4{}^5D)\,{}^4D$	71024.4	(7/2)–134931.3	(7/2)1	
106	71	1568.201	63767.3	−0.4	$2\|_4{}^5D)\,{}^4D$	65061.6	(3/2)–128829.3	(5/2)1	
104	29	1571.850	63619.3	−1.2	$2\|_4{}^3G)\,{}^4G$	76177.0	(9/2)–139797.5	(11/2)1	
50	23	1573.576	63549.5	−0.7	$2\|_4{}^3H)\,{}^4H$	65797.5	(9/2)–129347.7	(11/2)1	
98	301	1577.215	63402.9	−0.1	$2\|_4{}^3G)\,{}^4G$	77379.7	(11/2)–140782.7	(11/2)1	
25	79	1585.523	63070.7	0.1	$2\|_4{}^3H)\,{}^4H$	69913.9	(7/2)–132984.5	(5/2)1	
612	498	1586.476	63032.8	−0.6	$2\|_4{}^3H)\,{}^4H$	71433.7	(13/2)–134467.1	(11/2)1	
223	623	1588.351	62958.4	0.1	$2\|_4{}^5D)\,{}^6D$	49146.6	(5/2)–112104.9	(3/2)1	
28	100	1589.017	62932.0	−0.1	$2\|_4{}^3G)\,{}^2G$	87455.2	(9/2)–150387.3	(7/2)1	
57	35	1589.882	62897.7	−0.1	$2\|_4{}^5D)\,{}^4D$	65061.6	(3/2)–127959.4	(3/2)1	
104	169	1590.383	62877.9	0.1	$2\|_4{}^3G)\,{}^4G$	76177.0	(9/2)–139054.8	(7/2)1	
248	457	1591.733	62824.6	−0.6	$2\|_4{}^3H)\,{}^4H$	69913.9	(7/2)–132739.1	(9/2)1	
192	80	1592.635	62789.0	−0.7	$2\|_4{}^1I)\,{}^2I$	84634.2	(13/2)–147423.9	(13/2)1	
86	16	1596.694	62629.4	−0.1	$2\|_4{}^3G)\,{}^2G$	87455.2	(9/2)–150084.7	(7/2)1	
26	17	1598.344	62564.8	0.2	$2\|_4{}^3G)\,{}^4G$	77379.7	(11/2)–139944.3	(9/2)1	
369	765	1600.572	62477.6	−0.2	$2\|_4{}^5D)\,{}^6D$	51800.8	(7/2)–114278.6	(7/2)1	
405	688	1604.834	62311.7	0.0	$2\|_4{}^5D)\,{}^6D$	54080.5	(9/2)–116392.2	(9/2)1	
93	16	1604.957	62307.0	0.2	$2\|_4{}^3H)\,{}^2H$	78737.3	(9/2)–141044.1	(7/2)1	
300	766	1607.327	62215.1	−0.1	$2\|_4{}^5D)\,{}^6D$	49146.6	(5/2)–111361.8	(5/2)1	
150	116	1607.657	62202.3	−0.1	$2\|_4{}^3F)\,{}^4F$	76852.4	(7/2)–139054.8	(7/2)1	

Table I. *Continued*

gA	Int	WL (Å)	WN (cm^{-1})	Diff	Even level	*J*-value	Odd level	*J*-value	Remark
155	407	1608.791	62158.5	−0.7	$2\|_4{}^5D)\,{}^4D$	69873.3	(5/2)–132032.5	(7/2)1	
208				0.5	$2\|_4{}^3D)\,{}^4D$	77847.0	(7/2)–140005.0	(5/2)1	
55	20	1610.388	62096.8	−0.5	$2\|_4{}^3D)\,{}^4D$	77847.0	(7/2)–139944.3	(9/2)1	
202	478	1611.219	62064.8	−0.1	$2\|_4{}^3H)\,{}^4H$	65797.5	(9/2)–127862.4	(11/2)1	2 order
24	42	1612.350	62021.3	−0.8	$2\|_4{}^3G)\,{}^4G$	71960.8	(5/2)–133982.9	(7/2)1	
30	62	1612.856	62001.8	−0.2	$2\|_4{}^3D)\,{}^4D$	74894.4	(5/2)–136896.4	(7/2)1	
45	38	1613.214	61988.1	0.3	$2\|_4{}^3F)\,{}^4F$	76852.4	(7/2)–138840.2	(5/2)1	
66	120	1613.511	61976.7	0.2	$2\|_4{}^3H)\,{}^4H$	72954.8	(9/2)–134931.3	(7/2)1	
207	147	1616.865	61848.1	0.0	$2\|_4{}^3G)\,{}^4G$	81353.7	(11/2)–143201.8	(9/2)1	
198	435	1619.142	61761.1	−0.1	$2\|_4{}^3H)\,{}^4H$	69251.9	(11/2)–131013.1	(13/2)1	
24	102	1620.350	61715.1	0.6	$2\|_4{}^5D)\,{}^4D$	66244.9	(5/2)–127959.4	(3/2)1	
41				0.4	$2\|_4{}^5D)\,{}^4D$	71024.4	(7/2)–132739.1	(9/2)1	
182	117	1621.597	61667.6	0.0	$2\|_4{}^3G)\,{}^4G$	81353.7	(11/2)–143021.3	(11/2)1	
217	713	1624.919	61541.5	0.1	$2\|_4{}^5D)\,{}^6D$	46206.5	(3/2)–107747.9	(3/2)1	
106	600	1629.153	61381.6	0.6	$2\|_4{}^3H)\,{}^4H$	69913.9	(7/2)–131294.9	(5/2)1	
82				0.1	$2\|_4{}^3F)\,{}^4F$	76852.4	(7/2)–138233.9	(5/2)1	
62	30	1630.138	61344.5	−0.3	$2\|_4{}^3D)\,{}^4D$	74894.4	(5/2)–136239.2	(3/2)1	
106	211	1634.791	61169.9	−0.2	$2\|_4{}^3G)\,{}^4G$	76177.0	(9/2)–137347.1	(7/2)1	
122	58	1637.729	61060.1	−0.1	$2\|_4{}^3H)\,{}^2H$	78737.3	(9/2)–139797.5	(11/2)1	
80	12	1638.155	61044.3	0.1	$2\|_4{}^3G)\,{}^2G$	87455.2	(9/2)–148499.4	(9/2)1	
184	382	1638.591	61028.0	−0.1	$2\|_4{}^3H)\,{}^4H$	72954.8	(9/2)–133982.9	(7/2)1	
100	59	1640.650	60951.5	0.0	$2\|_4{}^3G)\,{}^4G$	81353.7	(11/2)–142305.2	(13/2)1	
224	488	1642.957	60865.9	0.4	$2\|_4{}^3H)\,{}^4H$	69251.9	(11/2)–130117.4	(9/2)1	
69	168	1646.250	60744.1	−0.1	$2\|_4{}^3)\,{}^4P$	70769.7	(3/2)–131513.9	(1/2)1	
23	12	1649.554	60622.4	0.1	$2\|_4{}^3H)\,{}^4H$	69913.9	(7/2)–130536.2	(5/2)1	
43	9	1651.268	60559.5	0.3	$2\|_4{}^3F)\,{}^2F$	84406.6	(5/2)–144965.8	(5/2)1	
67	6	1652.228	60524.3	−0.9	$2\|_4{}^3P)\,{}^4P$	70769.7	(3/2)–131294.9	(5/2)1	
110	466	1658.018	60313.0	0.1	$2\|_4{}^5D)\,{}^6D$	46206.5	(3/2)–106519.4	(1/2)1	
12	28	1659.173	60271.0	0.7	$2\|_4{}^5D)\,{}^4D$	65061.6	(3/2)–125331.9	(5/2)1	
21				0.5	$2\|_4{}^5D)\,{}^4D$	71024.4	(7/2)–131294.9	(5/2)1	
54	35	1661.030	60203.5	0.1	$2\|_4{}^3H)\,{}^4H$	69913.9	(7/2)–130117.4	(9/2)1	
60	406	1661.172	60198.4	0.3	$2\|_4{}^5D)\,{}^6D$	54080.5	(9/2)–114278.6	(7/2)1	
65	78	1663.256	60123.0	0.2	$2\|_4{}^3H)\,{}^4H$	65797.5	(9/2)–125920.3	(7/2)1	
123	190	1664.007	60095.9	0.1	$2\|_4{}^3H)\,{}^4H$	69251.9	(11/2)–129347.7	(11/2)1	
114	110	1665.756	60032.8	−0.4	$2\|_4{}^3F)\,{}^4F$	76852.4	(7/2)–136885.6	(9/2)1	
132	97	1666.961	59989.4	−0.2	$2\|_4{}^3F)\,{}^2F$	84406.6	(5/2)–144396.2	(7/2)1	
117	37	1668.594	59930.7	−0.1	$2\|_4{}^3G)\,{}^2G$	82099.9	(7/2)–142030.7	(9/2)1	
115	656	1671.503	59826.4	−0.1	$2\|_4{}^5D)\,{}^6D$	43170.2	(1/2)–102996.7	(1/2)1	
67	75	1672.678	59784.4	0.1	$2\|_4{}^3H)\,{}^4H$	72954.8	(9/2)–132739.1	(9/2)1	
100	227	1675.733	59675.4	0.0	$2\|_4{}^5D)\,{}^4D$	66244.9	(5/2)–125920.3	(7/2)1	2 order
606	688	1678.430	59579.5	0.1	$2\|_4{}^3H)\,{}^4H$	71433.7	(13/2)–131013.1	(13/2)1	
19	14	1679.012	59558.8	−0.1	$2\|_4{}^3G)\,{}^2G$	90828.4	(9/2)–150387.3	(7/2)1	
332	621	1679.366	59546.3	−0.1	$2\|_4{}^3H)\,{}^4H$	64227.5	(7/2)–123773.9	(9/2)1	
513	253	1679.609	59537.7	−0.2	$2\|_4{}^3H)\,{}^2H$	87886.0	(11/2)–147423.9	(13/2)1	
92	112	1682.684	59428.9	−0.1	$2\|_4{}^3G)\,{}^4G$	81353.7	(11/2)–140782.7	(11/2)1	
76	36	1685.365	59334.3	0.2	$2\|_4{}^3G)\,{}^4G$	71960.8	(5/2)–131294.9	(5/2)1	
231	515	1687.673	59253.2	−0.1	$2\|_4{}^3H)\,{}^4H$	64227.5	(7/2)–123480.8	(7/2)1	
58	75	1692.418	59087.0	0.0	$2\|_4{}^5D)\,{}^4D$	66244.9	(5/2)–125331.9	(5/2)1	
40	13	1693.499	59049.3	−0.1	$2\|_4{}^3D)\,{}^4D$	77847.0	(7/2)–136896.4	(7/2)1	
17	66	1699.931	58825.9	−0.6	$1\|_5{}^2S)$	44170.2	(1/2)–102996.7	(1/2)1	
63	52	1701.466	58772.8	−0.4	$2\|_4{}^3G)\,{}^4G$	71960.8	(5/2)–130734.0	(3/2)1	
69	71	1704.104	58681.9	0.2	$2\|_4{}^3H)\,{}^4H$	69251.9	(11/2)–127933.6	(9/2)1	
359	636	1706.193	58610.0	−0.5	$2\|_4{}^3H)\,{}^4H$	69251.9	(11/2)–127862.4	(11/2)1	
101				0.2	$2\|_4{}^3H)\,{}^2H$	78737.3	(9/2)–137347.1	(7/2)1	
29	119	1706.455	58601.0	−0.3	$2\|_4{}^5D)\,{}^6D$	49146.6	(5/2)–107747.9	(3/2)1	
89	33	1706.764	58590.4	−0.2	$2\|_4{}^3G)\,{}^4G$	81353.7	(11/2)–139944.3	(9/2)1	
200	233	1712.699	58387.4	0.3	$2\|_4{}^1I)\,{}^2I$	84634.2	(13/2)–143021.3	(11/2)1	
31	7	1713.796	58350.0	−0.3	$2\|_4{}^3D)\,{}^4D$	77847.0	(7/2)–136197.3	(9/2)1	
36	66	1715.389	58295.8	−0.1	$2\|_4{}^3D)\,{}^4D$	74894.4	(5/2)–133190.3	(3/2)1	
120	76	1721.453	58090.5	0.4	$2\|_4{}^3D)\,{}^4D$	74894.4	(5/2)–132984.5	(5/2)1	
32	43	1721.789	58079.1	0.2	$2\|_4{}^3F)\,{}^4F$	76852.4	(7/2)–134931.3	(7/2)1	
17	12	1723.566	58019.2	−0.5	$2\|_4{}^3H)\,{}^4H$	69913.9	(7/2)–127933.6	(9/2)1	
269	363	1724.841	57976.3	−0.1	$2\|_4{}^3H)\,{}^4H$	65797.5	(9/2)–123773.9	(9/2)1	
91	107	1727.977	57871.2	0.1	$2\|_4{}^5D)\,{}^4D$	69873.3	(5/2)–127744.4	(7/2)1	
41	19	1729.198	57830.3	−0.2	$2\|_4{}^3H)\,{}^4H$	69913.9	(7/2)–127744.4	(7/2)1	
80	131	1729.949	57805.2	0.3	$2\|_4{}^5D)\,{}^4D$	71024.4	(7/2)–128829.3	(5/2)1	
62				−0.7	$2\|_4{}^3G)\,{}^4G$	76177.0	(9/2)–133982.9	(7/2)1	
140	317	1733.602	57683.4	0.1	$2\|_4{}^3H)\,{}^4H$	65797.5	(9/2)–123480.8	(7/2)1	
259	364	1733.978	57670.8	−0.2	$2\|_4{}^1I)\,{}^2I$	84634.2	(13/2)–142305.2	(13/2)1	
73	61	1740.331	57460.3	0.3	$2\|_4{}^3H)\,{}^2H$	78737.3	(9/2)–136197.3	(9/2)1	
68	99	1747.159	57235.8	−0.1	$2\|_4{}^5D)\,{}^4D$	66244.9	(5/2)–123480.8	(7/2)1	

Table I. *Continued*

gA	Int	WL (Å)	WN (cm^{-1})	Diff	Even level	*J*-value	Odd level	*J*-value	Remark
59	31	1749.398	57162.5	−0.1	$2\|_4{}^3H)\,{}^4H$	72954.8	(9/2)–130117.4	(9/2)1	
234	318	1751.702	57087.3	−0.1	$2\|_4{}^3G)\,{}^4G$	77379.7	(11/2)–134467.1	(11/2)1	
48	30	1751.805	57084.0	−0.3	$2\|_4{}^3D)\,{}^4D$	77847.0	(7/2)–134931.3	(7/2)1	
29	18	1757.037	56914.0	0.1	$2\|_4{}^5D)\,{}^4D$	66244.9	(5/2)–123158.8	(5/2)1	
52	30	1757.189	56909.1	−0.1	$2\|_4{}^5D)\,{}^4D$	71024.4	(7/2)–127933.6	(9/2)1	
146	385	1760.817	56791.8	−0.1	$2\|_4{}^3G)\,{}^2G$	90828.4	(9/2)–147620.3	(7/2)1	
49	28	1763.038	56720.3	0.3	$2\|_4{}^5D)\,{}^4D$	71024.4	(7/2)–127744.4	(7/2)1	
91	9	1765.493	56641.4	−0.1	$2\|_4{}^3H)\,{}^2H$	87886.0	(11/2)–144527.5	(13/2)1	
43	16	1773.285	56392.5	−0.4	$2\|_4{}^3H)\,{}^4H$	72954.8	(9/2)–129347.7	(11/2)1	
54	23	1781.398	56135.7	−0.2	$2\|_4{}^3D)\,{}^4D$	77847.0	(7/2)–133982.9	(7/2)1	
56	165	1785.516	56006.2	−0.2	$2\|_4{}^3H)\,{}^4H$	69913.9	(7/2)–125920.3	(7/2)1	
63	33	1789.336	55886.7	0.0	$2\|_4{}^3F)\,{}^4F$	76852.4	(7/2)–132739.1	(9/2)1	
34	9	1790.333	55855.5	0.0	$2\|_4{}^3G)\,{}^4G$	76177.0	(9/2)–132032.5	(7/2)1	
25	5	1790.850	55839.4	−0.2	$2\|_4{}^3D)\,{}^4D$	74894.4	(5/2)–130734.0	(3/2)1	
38	11	1792.639	55783.7	0.1	$2\|_4{}^3G)\,{}^4G$	71960.8	(5/2)–127744.4	(7/2)1	
47	7	1799.655	55566.2	0.1	$2\|_4{}^3G)\,{}^2G$	87455.2	(9/2)–143021.3	(11/2)1	
42	23	1803.147	55458.6	0.0	$2\|_4{}^5D)\,{}^4D$	69873.3	(5/2)–125331.9	(5/2)1	
31	22	1804.470	55417.9	−0.1	$2\|_4{}^3H)\,{}^4H$	69913.9	(7/2)–125331.9	(5/2)1	
26	10	1810.084	55246.1	0.5	$2\|_4{}^3H)\,{}^2H$	78737.3	(9/2)–133982.9	(7/2)1	
42	13	1813.660	55137.1	−0.4	$2\|_4{}^3D)\,{}^4D$	77847.0	(7/2)–132984.5	(5/2)1	
53	28	1818.884	54978.8	0.0	$2\|_4{}^3H)\,{}^4H$	72954.8	(9/2)–127933.6	(9/2)1	
52	30	1821.239	54907.7	0.1	$2\|_4{}^3H)\,{}^4H$	72954.8	(9/2)–127862.4	(11/2)1	
21	19	1825.273	54786.3	0.6	$2\|_4{}^3G)\,{}^2G$	82099.9	(7/2)–136885.6	(9/2)1	
51	14	1829.894	54648.0	−0.2	$2\|_4{}^3F)\,{}^2F$	84406.6	(5/2)–139054.8	(7/2)1	
30	35	1832.409	54573.0	−0.2	$2\|_4{}^3H)\,{}^4H$	64227.5	(7/2)–118800.7	(7/2)1	
94	34	1837.603	54418.7	−0.5	$2\|_4{}^3H)\,{}^2H$	87886.0	(11/2)–142305.2	(13/2)1	
24	10	1841.359	54307.7	0.2	$2\|_4{}^5D)\,{}^4D$	71024.4	(7/2)–125331.9	(5/2)1	
44	37	1856.655	53860.3	0.3	$2\|_4{}^3H)\,{}^4H$	69913.9	(7/2)–123773.9	(9/2)1	
228	295	1864.512	53633.3	−0.1	$2\|_4{}^3G)\,{}^4G$	77379.7	(11/2)–131013.1	(13/2)1	
23	33	1865.404	53607.7	0.2	$2\|_4{}^5D)\,{}^4D$	69873.3	(5/2)–123480.8	(7/2)1	
81	256	1875.231	53326.8	−0.7	$2\|_4{}^3G)\,{}^2G$	87455.2	(9/2)–140782.7	(11/2)1	
40	17	1915.947	52193.5	0.6	$2\|_4{}^3G)\,{}^2G$	90828.4	(9/2)–143021.3	(11/2)1	
91	345	1917.009	52164.6	−0.1	$2\|_4{}^3H)\,{}^4H$	64227.5	(7/2)–116392.2	(9/2)1	
24	13	1934.781	51685.4	0.0	$2\|_4{}^3G)\,{}^4G$	76177.0	(9/2)–127862.4	(11/2)1	
17	17	1941.000	51519.8	−0.2	$2\|_4{}^3G)\,{}^4G$	71960.8	(5/2)–123480.8	(7/2)1	
23	10	1950.615	51265.9	0.1	$2\|_4{}^3G)\,{}^4G$	71960.8	(5/2)–123226.6	(3/2)1	
82	54	1974.754	50639.2	0.0	$2\|_4{}^3G)\,{}^2G$	82099.9	(7/2)–132739.1	(9/2)1	
30	34	1992.078	50198.8	−0.2	$2\|_4{}^5D)\,{}^4D$	66244.9	(5/2)–116443.9	(5/2)1	

The first column gives *gA*-values calculated by means of the orthogonal operator technique.
The second column shows measured intensity numbers.
The column "Diff" gives the difference between the measured wavenumber (WN) and the wavenumber calculated from energy values of the odd and even level.
Even levels are indicated by their largest *LS*-component, their level values and their *J*-values. Odd levels are given by level values and *J*-values. The 1 or 2 in front of the even level indicates the configuration: $1 = 5d^5$, $2 = 5d^46s$. The 1 or 2 following the *J*-value of the odd levels indicates the configuraton: $1 = 5d^46p$, $2 = 5d^36s6p$.
In the last column "Remarks": The ion spectrum that is masking or blending a transition of Os IV is given. Second order contributions are mentioned also.

Table II. *Calculated electric dipole transition integrals in the length form of the* $(5d^5 + 5d^46s + 5d^36s^2)$–$(5d^46p + 5d^36s6p + 5d^26s^26p)$ *transition array of Os IV*

	$5d^46p$	$5d^36s6p$	$5d^26s^26p$
$5d^2$	1.152	—	—
$5d^46s$	−2.573	1.103	—
$5d^36s^2$	—	−2.519	1.059

Table III. *Experimental and calculated energy level values in the* $(5d^5 + 5d^4 6s + 5d^3 6s^2)$ *system of Os IV*

E (obs.)	E (calc.)	Δ	Composition
$J = 1/2$			
—	144920.0	—	69% $3\|_3{}^2\text{P})\ {}^2\text{P}$ + 25% $3\|_3{}^4\text{P})\ {}^4\text{P}$ + 2% $2\|_2{}^3\text{P})\ {}^2\text{P}$
—	137599.8	—	76% $2\|_0{}^1\text{S})\ {}^2\text{S}$ + 15% $2\|_4{}^1\text{S})\ {}^2\text{S}$ + 3% $2\|_2{}^3\text{P})\ {}^4\text{P}$
—	133059.6	—	71% $3\|_3{}^4\text{P})\ {}^4\text{P}$ + 25% $3\|_3{}^2\text{P})\ {}^2\text{P}$ + 2% $2\|_4{}^3\text{P})\ {}^4\text{P}$
—	111545.5	—	55% $2\|_2{}^3\text{P})\ {}^2\text{P}$ + 32% $2\|_4{}^3\text{P})\ {}^2\text{P}$ + 5% $2\|_4{}^1\text{S})\ {}^2\text{S}$
—	101101.7	—	56% $2\|_2{}^3\text{P})\ {}^4\text{P}$ + 22% $2\|_4{}^3\text{P})\ {}^4\text{P}$ + 15% $2\|_4{}^1\text{S})\ {}^2\text{S}$
—	92543.0	—	47% $2\|_4{}^1\text{S})\ {}^2\text{S}$ + 17% $2\|_4{}^3\text{P})\ {}^4\text{P}$ + 16% $2\|_0{}^1\text{S})\ {}^2\text{S}$
—	83848.8	—	59% $2\|_4{}^3\text{D})\ {}^4\text{D}$ + 13% $2\|_4{}^3\text{P})\ {}^2\text{P}$ + 10% $2\|_3{}^2\text{P})\ {}^2\text{P}$
—	76542.0	—	38% $2\|_4{}^3\text{D})\ {}^4\text{D}$ + 29% $2\|_4{}^3\text{P})\ {}^2\text{P}$ + 12% $2\|_4{}^5\text{D})\ {}^4\text{D}$
—	67557.5	—	73% $1\|_3{}^2\text{P})$ + 15% $2\|_4{}^5\text{D})\ {}^4\text{D}$ + 6% $1\|_5{}^2\text{S})$
—	65306.7	—	30% $2\|_4{}^3\text{P})\ {}^4\text{P}$ + 18% $2\|_2{}^3\text{P})\ {}^4\text{P}$ + 17% $2\|_4{}^5\text{D})\ {}^4\text{D}$
—	59284.5	—	44% $2\|_4{}^5\text{D})\ {}^4\text{D}$ + 14% $2\|_2{}^3\text{P})\ {}^2\text{P}$ + 11% $2\|_4{}^3\text{P})\ {}^2\text{P}$
44170.2	44157.7	12.5	67% $1\|_5{}^2\text{S})$ + 17% $2\|_4{}^5\text{D})\ {}^6\text{D}$ + 5% $1\|_3{}^2\text{P})$
43170.2	43184.6	−14.4	62% $2\|_4{}^5\text{D})\ {}^6\text{D}$ + 12% $1\|_5{}^2\text{S})$ + 9% $2\|_2{}^3\text{P})\ {}^4\text{P}$
28517.7	28545.4	−27.7	64% $1\|_5{}^4\text{D})$ + 29% $1\|_3{}^4\text{P})$ + 3% $1\|_5{}^2\text{S})$
22521.8	22536.0	−14.2	59% $1\|_3{}^4\text{P})$ + 32% $1\|_5{}^4\text{D})$ + 5% $1\|_5{}^2\text{S})$
$J = 3/2$			
—	173218.9	—	64% $3\|_1{}^2\text{D})\ {}^2\text{D}$ + 33% $3\|_3{}^2\text{D})\ {}^2\text{D}$ + 1% $2\|_2{}^1\text{D})\ {}^2\text{D}$
—	155524.8	—	55% $3\|_3{}^2\text{P})\ {}^2\text{P}$ + 17% $3\|_3{}^2\text{D})\ {}^2\text{D}$ + 15% $3\|_1{}^2\text{D})\ {}^2\text{D}$
—	143631.6	—	38% $3\|_3{}^4\text{P})\ {}^4\text{P}$ + 33% $3\|_3{}^2\text{D})\ {}^2\text{D}$ + 11% $3\|_1{}^2\text{D})\ {}^2\text{D}$
—	131001.6	—	49% $3\|_3{}^4\text{P})\ {}^4\text{P}$ + 31% $3\|_3{}^2\text{P})\ {}^2\text{P}$ + 6% $3\|_3{}^4\text{F})\ {}^4\text{F}$
—	119648.1	—	69% $2\|_2{}^1\text{D})\ {}^2\text{D}$ + 16% $2\|_4{}^1\text{D})\ {}^2\text{D}$ + 7% $3\|_3{}^4\text{F})\ {}^4\text{F}$
—	116360.4	—	76% $3\|_3{}^4\text{F})\ {}^4\text{F}$ + 7% $3\|_3{}^2\text{D})\ {}^2\text{D}$ + 6% $2\|_2{}^1\text{D})\ {}^2\text{D}$
—	106431.0	—	61% $2\|_2{}^3\text{P})\ {}^2\text{P}$ + 20% $2\|_4{}^3\text{P})\ {}^2\text{P}$ + 4% $1\|_3{}^2\text{P})$
—	100799.9	—	23% $2\|_4{}^3\text{D})\ {}^2\text{D}$ + 21% $2\|_4{}^1\text{D})\ {}^2\text{D}$ + 12% $2\|_2{}^3\text{F})\ {}^4\text{F}$
—	96594.6	—	47% $2\|_2{}^3\text{P})\ {}^4\text{P}$ + 24% $2\|_4{}^3\text{P})\ {}^4\text{P}$ + 10% $2\|_2{}^3\text{F})\ {}^4\text{F}$
—	93493.8	—	35% $2\|_2{}^3\text{F})\ {}^4\text{F}$ + 21% $2\|_4{}^3\text{D})\ {}^2\text{D}$ + 15% $2\|_4{}^3\text{F})\ {}^4\text{F}$
—	88816.0	—	30% $2\|_4{}^3\text{D})\ {}^2\text{D}$ + 20% $2\|_4{}^3\text{P})\ {}^2\text{P}$ + 16% $2\|_4{}^3\text{D})\ {}^4\text{D}$
—	85507.0	—	29% $2\|_4{}^1\text{D})\ {}^2\text{D}$ + 19% $2\|_4{}^3\text{P})\ {}^2\text{P}$ + 16% $2\|_2{}^3\text{P})\ {}^2\text{P}$
—	79438.3	—	62% $2\|_4{}^3\text{D})\ {}^4\text{D}$ + 10% $2\|_4{}^3\text{P})\ {}^2\text{P}$ + 9% $2\|_4{}^3\text{F})\ {}^4\text{F}$
—	74884.2	—	58% $1\|_1{}^2\text{D})$ + 12% $1\|_3{}^2\text{P})$ + 9% $1\|_5{}^2\text{D})$
70769.9	70727.3	42.4	33% $2\|_4{}^3\text{P})\ {}^4\text{P}$ + 25% $2\|_4{}^5\text{D})\ {}^4\text{D}$ + 12% $2\|_2{}^3\text{P})\ {}^4\text{P}$
—	69717.8	—	45% $2\|_4{}^3\text{F})\ {}^4\text{F}$ + 15% $2\|_2{}^3\text{F})\ {}^4\text{F}$ + 13% $2\|_4{}^3\text{P})\ {}^4\text{P}$
65061.6	64993.3	68.3	37% $2\|_4{}^5\text{D})\ {}^4\text{D}$ + 37% $1\|_3{}^2\text{P})$ + 6% $1\|_1{}^2\text{D})$
—	62668.6	—	42% $1\|_3{}^2\text{P})$ + 23% $2\|_4{}^5\text{D})\ {}^4\text{D}$ + 9% $2\|_2{}^3\text{P})\ {}^2\text{P}$
—	50325.2	—	85% $1\|_3{}^2\text{D})$ + 5% $1\|_5{}^4\text{D})$ + 2% $1\|_1{}^2\text{D})$
46206.5	46194.3	12.2	89% $2\|_4{}^5\text{D})\ {}^6\text{D}$ + 6% $2\|_2{}^3\text{P})\ {}^4\text{P}$ + 3% $2\|_4{}^3\text{P})\ {}^4\text{P}$
40937.3	40954.1	−16.8	44% $1\|_3{}^4\text{F})$ + 42% $1\|_5{}^2\text{D})$ + 4% $1\|_3{}^4\text{P})$
32561.7	32549.4	12.3	48% $1\|_3{}^4\text{F})$ + 26% $1\|_5{}^2\text{D})$ + 12% $1\|_3{}^4\text{P})$
29597.4	29630.6	−33.1	42% $1\|_5{}^4\text{D})$ + 37% $1\|_3{}^4\text{P})$ + 10% $1\|_5{}^2\text{D})$
20218.3	20210.9	7.4	46% $1\|_5{}^4\text{D})$ + 43% $1\|_3{}^4\text{P})$ + 4% $1\|_3{}^4\text{F})$
$J = 5/2$			
—	174177.5	—	78% $3\|_1{}^2\text{D})\ {}^2\text{D}$ + 12% $3\|_3{}^2\text{F})\ {}^2\text{F}$ + 6% $3\|_3{}^2\text{D})\ {}^2\text{D}$
—	154349.9	—	84% $3\|_3{}^2\text{F})\ {}^2\text{F}$ + 8% $3\|_1{}^2\text{D})\ {}^2\text{D}$ + 4% $3\|_3{}^2\text{D})\ {}^2\text{D}$
—	150202.3	—	82% $3\|_3{}^2\text{D})\ {}^2\text{D}$ + 6% $3\|_1{}^2\text{D})\ {}^2\text{D}$ + 4% $3\|_3{}^4\text{P})\ {}^4\text{P}$
—	140108.6	—	89% $3\|_3{}^4\text{P})\ {}^4\text{P}$ + 6% $3\|_1{}^2\text{D})\ {}^2\text{D}$ + 2% $2\|_4{}^3\text{P})\ {}^4\text{P}$
—	122381.4	—	89% $3\|_3{}^4\text{F})\ {}^4\text{F}$ + 4% $2\|_2{}^1\text{D})\ {}^2\text{D}$ + 3% $3\|_3{}^2\text{D})\ {}^2\text{D}$
—	119400.6	—	71% $2\|_2{}^1\text{D})\ {}^2\text{D}$ + 13% $2\|_4{}^1\text{D})\ {}^2\text{D}$ + 5% $3\|_3{}^4\text{F})\ {}^4\text{F}$
—	107684.0	—	58% $2\|_2{}^3\text{F})\ {}^2\text{F}$ + 25% $2\|_4{}^3\text{F})\ {}^2\text{F}$ + 7% $2\|_4{}^1\text{D})\ {}^2\text{D}$
—	99432.7	—	34% $2\|_2{}^3\text{F})\ {}^4\text{F}$ + 20% $2\|_4{}^1\text{F})\ {}^2\text{F}$ + 16% $2\|_4{}^1\text{D})\ {}^2\text{D}$
—	95808.7	—	36% $2\|_4{}^3\text{D})\ {}^2\text{D}$ + 34% $2\|_4{}^1\text{F})\ {}^2\text{F}$ + 6% $2\|_2{}^3\text{P})\ {}^4\text{P}$
—	94489.8	—	34% $2\|_2{}^3\text{P})\ {}^4\text{P}$ + 21% $2\|_2{}^3\text{F})\ {}^4\text{F}$ + 14% $2\|_4{}^1\text{D})\ {}^2\text{D}$
—	90675.8	—	24% $2\|_4{}^3\text{P})\ {}^4\text{P}$ + 18% $2\|_4{}^1\text{F})\ {}^2\text{F}$ + 14% $2\|_4{}^3\text{D})\ {}^4\text{D}$
—	86118.0	—	23% $2\|_4{}^3\text{F})\ {}^2\text{F}$ + 12% $2\|_2{}^3\text{P})\ {}^4\text{P}$ + 12% $2\|_2{}^3\text{F})\ {}^4\text{F}$
84406.6	84465.4	−58.8	29% $2\|_4{}^3\text{F})\ {}^2\text{F}$ + 13% $2\|_4{}^3\text{D})\ {}^4\text{D}$ + 10% $2\|_2{}^3\text{F})\ {}^2\text{F}$
—	80436.7	—	19% $2\|_2{}^3\text{P})\ {}^4\text{P}$ + 15% $2\|_4{}^3\text{P})\ {}^4\text{P}$ + 15% $2\|_4{}^3\text{F})\ {}^4\text{F}$
74894.4	74811.3	83.1	36% $2\|_4{}^3\text{D})\ {}^4\text{D}$ + 27% $2\|_4{}^3\text{P})\ {}^4\text{P}$ + 18% $1\|_1{}^2\text{D})$
—	74525.1	—	39% $1\|_1{}^2\text{D})$ + 17% $2\|_4{}^3\text{F})\ {}^4\text{F}$ + 8% $2\|_4{}^3\text{P})\ {}^4\text{P}$
71960.8	71989.3	−28.6	35% $2\|_4{}^3\text{G})\ {}^4\text{G}$ + 12% $2\|_4{}^3\text{F})\ {}^4\text{F}$ + 9% $1\|_1{}^2\text{D})$
69873.3	69896.7	−23.4	36% $2\|_4{}^5\text{D})\ {}^4\text{D}$ + 19% $2\|_4{}^3\text{G})\ {}^4\text{G}$ + 10% $2\|_4{}^3\text{F})\ {}^4\text{F}$
66244.9	66254.1	−9.2	36% $2\|_4{}^5\text{D})\ {}^4\text{D}$ + 26% $2\|_4{}^3\text{G})\ {}^4\text{G}$ + 15% $2\|_4{}^3\text{F})\ {}^4\text{F}$
53501.2	53505.0	−3.7	60% $1\|_3{}^2\text{D})$ + 18% $1\|_5{}^2\text{F})$ + 5% $1\|_5{}^4\text{D})$
—	49982.1	—	35% $1\|_3{}^2\text{F})$ + 31% $1\|_5{}^2\text{D})$ + 11% $1\|_3{}^2\text{D})$
49146.6	49130.0	16.6	93% $2\|_4{}^5\text{D})\ {}^6\text{D}$ + 2% $2\|_2{}^3\text{P})\ {}^4\text{P}$ + 2% $2\|_4{}^3\text{D})\ {}^4\text{D}$
40416.5	40386.5	30.0	45% $1\|_5{}^2\text{F})$ + 17% $1\|_3{}^4\text{F})$ + 11% $1\|_3{}^2\text{D})$
37763.7	37776.8	−13.1	43% $1\|_3{}^4\text{F})$ + 24% $1\|_3{}^2\text{F})$ + 11% $1\|_5{}^4\text{D})$
33574.4	33578.6	−4.2	24% $1\|_5{}^2\text{F})$ + 19% $1\|_3{}^4\text{F})$ + 17% $1\|_3{}^4\text{P})$
27067.5	27058.0	9.5	34% $1\|_5{}^4\text{D})$ + 22% $1\|_5{}^2\text{D})$ + 16% $1\|_3{}^4\text{P})$

Table III. *Continued*

E (obs.)	*E* (calc.)	Δ	Composition
20944.7	20945.6	−0.9	42% $1\|_5{}^4$G) + 27% $1\|_5{}^4$D) + 18% $1\|_3{}^4$P)
15617.7	15626.2	−8.5	30% $1\|_5{}^4$G) + 19% $1\|_3{}^2$F) + 14% $1\|_5{}^4$D)
0.0	−16.9	16.9	87% $1\|_5{}^6$S) + 11% $1\|_3{}^4$P) + 1% $1\|_5{}^4$D)
$J = 7/2$			
—	155092.2	—	93% $3\|_3{}^2$F) ^{2}F + 5% $3\|_3{}^2$G) ^{2}G + 1% $2\|_4{}^1$F) ^{2}F
—	138524.5	—	81% $3\|_3{}^2$G) ^{2}G + 12% $3\|_3{}^4$F) ^{4}F + 3% $3\|_3{}^2$F) ^{2}F
—	126996.5	—	86% $3\|_3{}^4$F) ^{4}F + 10% $3\|_3{}^2$G) ^{2}G + 2% $3\|_3{}^2$F) ^{2}F
—	109089.7	—	65% $2\|_2{}^3$F) ^{2}F + 10% $2\|_4{}^3$F) ^{2}F + 9% $2\|_2{}^1$G) ^{2}G
—	103872.0	—	61% $2\|_2{}^1$G) ^{2}G + 15% $2\|_2{}^3$F) ^{2}F + 12% $2\|_4{}^1$G) ^{2}G
—	99621.7	—	44% $2\|_2{}^3$F) ^{4}F + 22% $2\|_4{}^1$F) ^{2}F + 8% $2\|_4{}^3$F) ^{2}F
—	92957.1	—	32% $2\|_4{}^3$F) ^{2}F + 28% $2\|_4{}^1$G) ^{2}G + 14% $2\|_2{}^3$F) ^{4}F
—	92758.9	—	51% $2\|_4{}^1$F) ^{2}F + 16% $2\|_2{}^3$F) ^{4}F + 14% $2\|_4{}^3$D) ^{4}D
—	84284.5	—	29% $2\|_4{}^1$G) ^{2}G + 16% $2\|_4{}^3$G) ^{2}G + 15% $2\|_4{}^3$F) ^{2}F
82100.0	82098.9	1.1	48% $2\|_4{}^3$G) ^{2}G + 15% $2\|_4{}^5$D) ^{4}D + 11% $2\|_4{}^3$F) ^{2}F
77847.0	77847.6	−0.6	63% $2\|_4{}^3$D) ^{4}D + 8% $2\|_4{}^1$F) ^{2}F + 8% $2\|_4{}^3$G) ^{4}G
76852.4	76860.2	−7.8	45% $2\|_4{}^3$F) ^{4}F + 29% $2\|_4{}^3$G) ^{4}G + 6% $2\|_4{}^1$G) ^{2}G
71024.4	71035.6	−11.2	33% $2\|_4{}^5$D) ^{4}D + 24% $2\|_4{}^3$G) ^{4}G + 9% $2\|_4{}^3$D) ^{4}D
69913.9	69903.9	10.0	31% $2\|_4{}^3$H) ^{4}H + 23% $2\|_4{}^5$D) ^{4}D + 19% $2\|_4{}^3$F) ^{4}F
64227.5	64234.4	−6.9	51% $2\|_4{}^3$H) ^{4}H + 19% $2\|_4{}^3$G) ^{4}G + 6% $2\|_4{}^3$F) ^{4}F
57478.3	57488.2	−9.9	76% $1\|_3{}^2$G) + 9% $1\|_5{}^2$F) + 4% $1\|_5{}^2$G)
51800.8	51796.0	4.8	91% $2\|_4{}^5$D) ^{6}D + 3% $2\|_4{}^3$F) ^{4}F + 3% $2\|_4{}^3$D) ^{4}D
44173.7	44186.5	−12.8	45% $1\|_3{}^4$F) + 33% $1\|_5{}^2$F) + 6% $1\|_3{}^2$G)
41717.1	41737.9	−20.8	54% $1\|_3{}^2$F) + 30% $1\|_5{}^2$G) + 5% $1\|_3{}^2$G)
38660.5	38654.3	6.2	39% $1\|_5{}^2$G) + 32% $1\|_5{}^2$F) + 9% $1\|_3{}^2$F)
32000.6	31972.9	27.7	30% $1\|_3{}^4$F) + 23% $1\|_5{}^2$G) + 19% $1\|_5{}^2$F)
25587.8	25579.9	7.9	67% $1\|_5{}^4$D) + 22% $1\|_5{}^4$G) + 7% $1\|_3{}^4$F)
19886.3	19882.1	4.2	66% $1\|_5{}^4$G) + 13% $1\|_5{}^4$D) + 12% $1\|_3{}^2$F)
$J = 9/2$			
—	151157.0	—	60% $3\|_3{}^2$G) ^{2}G + 29% $3\|_3{}^2$H) ^{2}H + 10% $3\|_3{}^4$F) ^{4}F
—	138566.8	—	59% $3\|_3{}^2$H) ^{2}H + 31% $3\|_3{}^4$F) ^{4}F + 9% $3\|_3{}^2$G) ^{2}G
—	130177.1	—	58% $3\|_3{}^4$F) ^{4}F + 29% $3\|_3{}^2$G) ^{2}G + 11% $3\|_3{}^2$H) ^{2}H
—	105360.4	—	58% $2\|_2{}^1$G) ^{2}G + 26% $2\|_4{}^1$G) ^{2}G + 7% $2\|_2{}^3$F) ^{4}F
—	97707.1	—	58% $2\|_2{}^3$F) ^{4}F + 21% $2\|_2{}^1$G) ^{2}G + 6% $2\|_4{}^3$G) ^{2}G
90828.4	90834.8	−6.4	28% $2\|_4{}^3$G) ^{2}G + 23% $2\|_2{}^3$F) ^{4}F + 18% $2\|_4{}^1$G) ^{2}G
87455.2	87475.0	−19.8	44% $2\|_4{}^3$G) ^{2}G + 28% $2\|_4{}^1$G) ^{2}G + 8% $2\|_4{}^3$G) ^{4}G
78737.3	78725.0	12.3	57% $2\|_4{}^3$H) ^{2}H + 27% $2\|_4{}^3$F) ^{4}F + 9% $2\|_4{}^3$G) ^{2}G
76177.0	76150.7	26.3	57% $2\|_4{}^3$G) ^{4}G + 16% $2\|_4{}^1$G) ^{2}G + 12% $2\|_4{}^3$H) ^{2}H
72954.8	72959.8	−5.0	37% $2\|_4{}^3$H) ^{4}H + 30% $2\|_4{}^3$F) ^{4}F + 7% $2\|_4{}^5$D) ^{6}D
65797.5	65808.4	−10.9	51% $2\|_4{}^3$H) ^{4}H + 23% $2\|_4{}^3$G) ^{4}G + 6% $2\|_4{}^5$D) ^{6}D
56048.8	56072.9	−24.1	85% $1\|_3{}^2$G) + 4% $1\|_5{}^2$G) + 3% $2\|_4{}^1$G) ^{2}G
54080.5	54103.5	−22.9	80% $2\|_4{}^5$D) ^{6}D + 10% $2\|_4{}^3$F) ^{4}F + 4% $2\|_2{}^3$F) ^{4}F
45825.4	45815.8	9.6	39% $1\|_5{}^2$G) + 35% $1\|_3{}^2$H) + 18% $1\|_3{}^4$F)
38754.8	38773.1	−18.3	50% $1\|_3{}^2$H) + 44% $1\|_3{}^4$F) + 4% $1\|_5{}^2$G)
32886.2	32893.2	−7.0	48% $1\|_5{}^2$G) + 29% $1\|_3{}^4$F) + 11% $1\|_5{}^4$G)
21764.6	21765.1	−0.5	86% $1\|_5{}^4$G) + 7% $1\|_3{}^4$F) + 4% $1\|_3{}^2$H)
$J = 11/2$			
—	146026.4	—	99% $3\|_3{}^2$H) ^{2}H + 0% $2\|_4{}^3$H) ^{2}H + 0% $1\|_3{}^2$H)
87886.0	87873.0	13.0	53% $2\|_4{}^3$H) ^{2}H + 44% $2\|_4{}^1$I) ^{2}I + 2% $2\|_4{}^3$H) ^{4}H
81353.7	81355.6	−1.9	45% $2\|_4{}^3$G) ^{4}G + 25% $2\|_4{}^1$I) ^{2}I + 16% $2\|_4{}^3$H) ^{2}H
77379.7	77369.3	10.4	32% $2\|_4{}^3$G) ^{4}G + 30% $2\|_4{}^1$I) ^{2}I + 29% $2\|_4{}^3$H) ^{2}H
69251.9	69258.8	−6.9	76% $2\|_4{}^3$H) ^{4}H + 21% $2\|_4{}^3$G) ^{4}G + 2% $2\|_4{}^1$I) ^{2}I
45806.9	45776.8	30.1	72% $1\|_3{}^2$H) + 21% $1\|_5{}^2$I) + 6% $1\|_5{}^4$G)
30587.5	30598.9	−11.4	74% $1\|_5{}^2$I) + 14% $1\|_3{}^2$H) + 12% $1\|_5{}^4$G)
21105.1	21114.1	−9.0	81% $1\|_5{}^4$G) + 14% $1\|_3{}^2$H) + 4% $1\|_5{}^2$I)
$J = 13/2$			
84634.2	84624.6	9.6	84% $2\|_4{}^1$I) ^{2}I + 16% $2\|_4{}^3$H) ^{4}H + 0% $1\|_5{}^2$I)
71433.7	71441.4	−7.7	84% $2\|_4{}^3$H) ^{4}H + 16% $2\|_4{}^1$I) ^{2}I + 0% $1\|_5{}^2$I)
33560.6	33553.8	6.8	100% $1\|_5{}^2$I) + 0% $2\|_4{}^1$I) ^{2}I + 0% $2\|_4{}^3$H) ^{4}H

All values are given in cm^{-1}.

The number preceding the term name means: 1: no 6s electron involved, 2: one 6s electron included, 3: $6s^2$ included.

In Table IV the calculated level values above 200000 cm^{-1} are omitted except those that belong to $5d^46p$.

Table IV. *Experimental and calculated energy level values in the* $(5d^46p + 5d^36s6p + 5d^26s^26p)$ *system in Os IV*

E (obs.)	E (calc.)	Δ	Composition
$J = 1/2$			
—	200849.8	—	31% $1\|_0{}^1S)\,{}^2P$ + 9% $2\|{}^4P\,{}^3P,\,{}^4P$ + 8% $1\|_2{}^1D)\,{}^2P$
—	200045.0	—	22% $2\|{}^2D\,{}^3D,\,{}^4D$ + 18% $2\|{}^4P\,{}^3P,\,{}^4D$ + 14% $2\|{}^4P\,{}^3P,\,{}^4P$
—	198210.9	—	20% $2\|{}^4P\,{}^3P,\,{}^2P$ + 16% $2\|{}^4P\,{}^3P,\,{}^4D$ + 14% $1\|_0{}^1S)\,{}^2P$
—	196111.4	—	18% $2\|{}^2P\,{}^1P,\,{}^2P$ + 12% $2\|{}^2D\,{}^3D,\,{}^4D$ + 8% $2\|{}^4P\,{}^3P,\,{}^4D$
—	189785.4	—	29% $2\|{}^2P\,{}^3P,\,{}^4D$ + 22% $2\|{}^4F\,{}^5F,\,{}^4D$ + 9% $2\|{}^2P\,{}^3P,\,{}^4P$
—	189225.5	—	29% $2\|{}^2P\,{}^3P,\,{}^4P$ + 19% $2\|{}^4P\,{}^5P,\,{}^6D$ + 18% $2\|{}^2P\,{}^3P,\,{}^2S$
—	186838.7	—	10% $2\|{}^2P\,{}^3P,\,{}^4P$ + 9% $2\|{}^4F\,{}^5F,\,{}^6D$ + 9% $2\|{}^4F\,{}^5F,\,{}^6F$
—	185710.2	—	48% $1\|_2{}^1D)\,{}^2P$ + 13% $1\|_0{}^1S)\,{}^2P$ + 10% $1\|_2{}^3P)\,{}^2P$
—	181919.6	—	20% $2\|{}^2P\,{}^3P,\,{}^4D$ + 17% $2\|{}^4F\,{}^5F,\,{}^4D$ + 9% $2\|{}^4P\,{}^3P,\,{}^4D$
—	178320.9	—	33% $1\|_4{}^3P)\,{}^2S$ + 22% $1\|_2{}^3P)\,{}^2S$ + 14% $1\|_2{}^3P)\,{}^2P$
—	176627.6	—	35% $2\|{}^4F\,{}^5F,\,{}^6D$ + 16% $2\|{}^4P\,{}^5P,\,{}^6D$ + 7% $2\|{}^2P\,{}^3P,\,{}^4D$
—	176122.6	—	18% $1\|_2{}^3F)\,{}^4D$ + 15% $1\|_4{}^3F)\,{}^4D$ + 14% $1\|_4{}^1D)\,{}^2P$
—	173132.9	—	18% $1\|_2{}^3F)\,{}^4D$ + 17% $1\|_2{}^3P)\,{}^2P$ + 9% $1\|_2{}^1D)\,{}^2P$
—	172327.1	—	44% $2\|{}^4P\,{}^5P,\,{}^6D$ + 27% $2\|{}^4F\,{}^5F,\,{}^6D$ + 7% $2\|{}^2P\,{}^3P,\,{}^4P$
—	165675.7	—	22% $1\|_2{}^3P)\,{}^4P$ + 16% $1\|_2{}^3F)\,{}^4D$ + 10% $1\|_2{}^3P)\,{}^4D$
—	164172.7	—	64% $2\|{}^4F\,{}^5F,\,{}^6F$ + 16% $2\|{}^4F\,{}^5F,\,{}^4D$ + 4% $2\|{}^2D\,{}^3D,\,{}^4D$
—	163199.8	—	21% $1\|_2{}^3P)\,{}^4D$ + 16% $1\|_4{}^3P)\,{}^4D$ + 13% $1\|_4{}^3D)\,{}^4P$
—	159609.9	—	36% $1\|_4{}^1D)\,{}^2P$ + 13% $1\|_2{}^3P)\,{}^4P$ + 9% $1\|_2{}^3F)\,{}^4D$
—	157366.0	—	47% $1\|_4{}^3D)\,{}^2P$ + 16% $1\|_4{}^3D)\,{}^4D$ + 13% $1\|_4{}^1S)\,{}^2P$
154372.5	154354.8	17.6	50% $1\|_4{}^3D)\,{}^4P$ + 13% $1\|_4{}^3P)\,{}^4P$ + 11% $1\|_2{}^3P)\,{}^4P$
—	152672.4	—	39% $1\|_4{}^3P)\,{}^2P$ + 16% $1\|_4{}^3P)\,{}^4P$ + 9% $1\|_2{}^3P)\,{}^2S$
—	147544.1	—	32% $1\|_4{}^1S)\,{}^2P$ + 14% $1\|_4{}^3D)\,{}^2P$ + 12% $1\|_4{}^3P)\,{}^2S$
145239.5	145218.5	20.9	42% $1\|_4{}^3F)\,{}^4D$ + 18% $1\|_2{}^3F)\,{}^4D$ + 9% $1\|_4{}^5D)\,{}^4D$
—	142966.2	—	30% $1\|_4{}^3D)\,{}^4D$ + 12% $1\|_4{}^3F)\,{}^4D$ + 8% $1\|_4{}^3P)\,{}^2P$
—	141982.9	—	16% $1\|_4{}^3D)\,{}^4D$ + 11% $1\|_2{}^3P)\,{}^2S$ + 10% $1\|_4{}^3P)\,{}^4P$
132194.9	132198.5	−3.6	61% $1\|_4{}^5D)\,{}^4D$ + 5% $1\|_4{}^3P)\,{}^4D$ + 5% $1\|_4{}^5D)\,{}^6D$
131513.9	131618.7	−104.8	34% $1\|_4{}^5D)\,{}^4P$ + 21% $1\|_4{}^3P)\,{}^4P$ + 12% $1\|_2{}^3P)\,{}^4P$
125139.8	125152.9	−13.1	49% $1\|_4{}^5D)\,{}^6D$ + 16% $1\|_4{}^5D)\,{}^4P$ + 10% $1\|_4{}^3P)\,{}^4D$
121177.2	121160.4	16.7	25% $1\|_4{}^5D)\,{}^6F$ + 19% $1\|_4{}^3P)\,{}^4D$ + 11% $1\|_4{}^5D)\,{}^6D$
106519.4	106516.3	3.0	28% $1\|_4{}^5D)\,{}^6F$ + 27% $1\|_4{}^5D)\,{}^4P$ + 21% $1\|_4{}^5D)\,{}^6D$
102996.7	103027.7	−31.0	37% $1\|_4{}^5D)\,{}^6F$ + 12% $1\|_4{}^5D)\,{}^4P$ + 11% $1\|_2{}^3P)\,{}^4D$
$J = 3/2$			
—	210893.3	—	63% $1\|_0{}^1S)\,{}^2P$ + 13% $1\|_4{}^1S)\,{}^2P$ + 3% $1\|_2{}^1D)\,{}^2P$
—	197024.6	—	25% $2\|{}^2G\,{}^3G,\,{}^4F$ + 11% $2\|{}^4P\,{}^3P,\,{}^2P$ + 8% $2\|{}^4P\,{}^3P,\,{}^4D$
—	194896.8	—	34% $2\|{}^2P\,{}^3P,\,{}^4D$ + 9% $2\|{}^2P\,{}^3P,\,{}^4P$ + 6% $2\|{}^2P\,{}^3P,\,{}^4S$
—	194484.7	—	21% $2\|{}^4P\,{}^3P,\,{}^4P$ + 18% $2\|{}^4P\,{}^5P,\,{}^4P$ + 7% $2\|{}^2P\,{}^3P,\,{}^4D$
—	192313.6	—	16% $1\|_2{}^1D)\,{}^2D$ + 12% $2\|{}^4F\,{}^5F,\,{}^4F$ + 10% $2\|{}^2D\,{}^3D,\,{}^4F$
—	191904.2	—	33% $1\|_2{}^1D)\,{}^2D$ + 11% $1\|_2{}^1D)\,{}^2P$ + 8% $1\|_4{}^1D)\,{}^2D$
—	189470.6	—	10% $2\|{}^2P\,{}^12P,\,{}^2D$ + 10% $2\|{}^4P\,{}^5P,\,{}^6D$ + 10% $2\|{}^4F\,{}^5F,\,{}^4D$
—	188825.3	—	17% $2\|{}^4F\,{}^3F,\,{}^4F$ + 11% $2\|{}^4F\,{}^5F,\,{}^4F$ + 11% $2\|{}^4F\,{}^5F,\,{}^4D$
—	183759.9	—	17% $2\|{}^4P\,{}^5P,\,{}^6D$ + 16% $2\|{}^4F\,{}^5F,\,{}^6D$ + 8% $2\|{}^2D\,{}^3D,\,{}^4F$
—	182581.3	—	25% $1\|_2{}^3F)\,{}^2D$ + 21% $1\|_2{}^3P)\,{}^2D$ + 14% $1\|_4{}^3P)\,{}^2D$
—	179960.6	—	31% $1\|_2{}^1D)\,{}^2P$ + 12% $1\|_4{}^1D)\,{}^2D$ + 8% $1\|_2{}^3P)\,{}^2P$
—	178249.0	—	45% $2\|{}^4P\,{}^5P,\,{}^6P$ + 10% $2\|{}^4F\,{}^5F,\,{}^6D$ + 8% $2\|{}^4F\,{}^3F,\,{}^2D$
—	177674.8	—	14% $2\|{}^4F\,{}^3F,\,{}^2D$ + 11% $2\|{}^4P\,{}^5P,\,{}^6D$ + 9% $2\|{}^4P\,{}^5P,\,{}^6P$
—	176564.5	—	12% $1\|_2{}^3F)\,{}^4D$ + 9% $1\|_2{}^3P)\,{}^4D$ + 7% $1\|_2{}^3P)\,{}^4P$
—	176369.2	—	33% $2\|{}^4F\,{}^5F,\,{}^6D$ + 12% $2\|{}^4F\,{}^5F,\,{}^6F$ + 5% $2\|{}^4F\,{}^5F,\,{}^6G$
—	174199.0	—	16% $1\|_2{}^3F)\,{}^4D$ + 11% $1\|_2{}^3P)\,{}^4S$ + 11% $1\|_2{}^3P)\,{}^4P$
—	172485.6	—	10% $1\|_4{}^1D)\,{}^2P$ + 9% $2\|{}^4P\,{}^5P,\,{}^6D$ + 8% $1\|_2{}^3P)\,{}^2D$
—	172242.2	—	22% $2\|{}^4P\,{}^5P,\,{}^6D$ + 9% $1\|_2{}^3P)\,{}^2P$ + 8% $1\|_2{}^3P)\,{}^2D$
—	171167.5	—	27% $1\|_2{}^3P)\,{}^2P$ + 13% $1\|_2{}^3P)\,{}^4S$ + 7% $1\|_4{}^3P)\,{}^4S$
—	169001.6	—	56% $1\|_4{}^1F)\,{}^2D$ + 6% $1\|_2{}^3P)\,{}^2P$ + 6% $1\|_4{}^3D)\,{}^2P$
—	165591.1	—	16% $1\|_4{}^1S)\,{}^2P$ + 10% $1\|_4{}^3D)\,{}^2D$ + 9% $2\|{}^4F\,{}^5F,\,{}^6F$
—	165459.5	—	42% $2\|{}^4F\,{}^5F,\,{}^6F$ + 11% $2\|{}^4F\,{}^5F,\,{}^4D$ + 9% $2\|{}^4F\,{}^5F,\,{}^6D$
—	164140.1	—	22% $1\|_4{}^1S)\,{}^2P$ + 13% $1\|_4{}^3P)\,{}^2D$ + 10% $1\|_4{}^1F)\,{}^2D$
—	161998.4	—	26% $1\|_2{}^3P)\,{}^4D$ + 19% $1\|_4{}^3P)\,{}^4D$ + 12% $1\|_2{}^3P)\,{}^2D$
—	160990.0	—	21% $1\|_2{}^3F)\,{}^4F$ + 19% $1\|_4{}^3D)\,{}^2D$ + 8% $1\|_4{}^3D)\,{}^4P$
—	158118.8	—	19% $1\|_4{}^3F)\,{}^2D$ + 11% $1\|_4{}^3D)\,{}^2D$ + 11% $1\|_2{}^3F)\,{}^4F$
—	157317.1	—	72% $2\|{}^4F\,{}^5F,\,{}^6G$ + 5% $2\|{}^2D\,{}^3D,\,{}^4F$ + 4% $2\|{}^4F\,{}^5F,\,{}^4F$
—	155853.1	—	15% $1\|_2{}^3P)\,{}^4S$ + 11% $1\|_2{}^3F)\,{}^4F$ + 10% $1\|_4{}^3F)\,{}^4D$
154717.5	154709.8	7.6	38% $1\|_4{}^3D)\,{}^2P$ + 9% $1\|_4{}^1D)\,{}^2P$ + 6% $1\|_4{}^3D)\,{}^4D$
153042.5	153069.7	−27.2	18% $1\|_4{}^3G)\,{}^4F$ + 12% $1\|_4{}^3F)\,{}^4D$ + 10% $1\|_4{}^3D)\,{}^4D$
—	152459.7	—	18% $1\|_4{}^3P)\,{}^4S$ + 10% $1\|_4{}^3P)\,{}^4P$ + 9% $1\|_4{}^3P)\,{}^2P$
150540.2	150541.7	−1.5	18% $1\|_4{}^3D)\,{}^2D$ + 11% $1\|_4{}^3D)\,{}^4P$ + 9% $1\|_2{}^3F)\,{}^4F$
148570.5	148527.8	42.6	22% $1\|_4{}^3P)\,{}^2D$ + 11% $1\|_2{}^3P)\,{}^2D$ + 9% $1\|_4{}^3D)\,{}^2P$
146721.0	146678.1	42.8	26% $1\|_4{}^3D)\,{}^4P$ + 20% $1\|_4{}^3P)\,{}^2P$ + 14% $1\|_4{}^3D)\,{}^4D$
145045.5	145089.2	−43.7	34% $1\|_4{}^3F)\,{}^4F$ + 10% $1\|_4{}^3F)\,{}^4D$ + 10% $1\|_4{}^1D)\,{}^2P$
143569.3	143506.2	63.0	37% $1\|_4{}^3G)\,{}^4F$ + 12% $1\|_4{}^3F)\,{}^4D$ + 8% $1\|_4{}^3F)\,{}^2D$

Table IV. *Continued*

E (obs.)	E (calc.)	Δ	Composition		
142809.5	142731.0	78.4	15% $1\|_4{}^1\mathrm{D})\,{}^2\mathrm{D}$	+ 13% $1\|_2{}^3\mathrm{P})\,{}^4\mathrm{S}$	+ 10% $1\|_4{}^3\mathrm{P})\,{}^4\mathrm{S}$
141977.3	141976.9	0.3	36% $1\|_4{}^3\mathrm{D})\,{}^4\mathrm{F}$	+ 12% $1\|_4{}^3\mathrm{P})\,{}^4\mathrm{P}$	+ 9% $1\|_4{}^3\mathrm{G})\,{}^4\mathrm{F}$
138691.0	138705.1	−14.1	24% $1\|_4{}^5\mathrm{D})\,{}^4\mathrm{D}$	+ 12% $1\|_4{}^3\mathrm{D})\,{}^4\mathrm{F}$	+ 7% $1\|_4{}^3\mathrm{P})\,{}^2\mathrm{D}$
136239.2	136286.0	−46.8	17% $1\|_4{}^3\mathrm{P})\,{}^4\mathrm{P}$	+ 11% $1\|_4{}^3\mathrm{D})\,{}^4\mathrm{F}$	+ 7% $1\|_4{}^5\mathrm{D})\,{}^4\mathrm{D}$
133190.3	133195.6	−5.3	28% $1\|_4{}^5\mathrm{D})\,{}^4\mathrm{D}$	+ 12% $1\|_4{}^3\mathrm{F})\,{}^4\mathrm{F}$	+ 8% $1\|_4{}^5\mathrm{D})\,{}^4\mathrm{P}$
130734.0	130810.4	−76.4	15% $1\|_4{}^5\mathrm{D})\,{}^4\mathrm{F}$	+ 11% $1\|_4{}^3\mathrm{D})\,{}^4\mathrm{D}$	+ 9% $1\|_4{}^3\mathrm{P})\,{}^4\mathrm{D}$
127959.4	127985.0	−25.6	36% $1\|_4{}^5\mathrm{D})\,{}^6\mathrm{D}$	+ 31% $1\|_4{}^5\mathrm{D})\,{}^4\mathrm{P}$	+ 8% $1\|_4{}^5\mathrm{D})\,{}^6\mathrm{P}$
126555.5	126584.8	−29.3	25% $1\|_4{}^3\mathrm{P})\,{}^4\mathrm{D}$	+ 13% $1\|_2{}^3\mathrm{P})\,{}^4\mathrm{D}$	+ 9% $1\|_4{}^5\mathrm{D})\,{}^4\mathrm{F}$
123226.6	123223.9	2.6	27% $1\|_4{}^5\mathrm{D})\,{}^4\mathrm{F}$	+ 20% $1\|_4{}^5\mathrm{D})\,{}^6\mathrm{P}$	+ 8% $1\|_4{}^3\mathrm{F})\,{}^4\mathrm{F}$
120280.0	120283.6	−3.6	45% $1\|_4{}^5\mathrm{D})\,{}^6\mathrm{P}$	+ 10% $1\|_4{}^5\mathrm{D})\,{}^4\mathrm{F}$	+ 7% $1\|_4{}^5\mathrm{D})\,{}^6\mathrm{D}$
112104.9	112050.8	54.0	39% $1\|_4{}^5\mathrm{D})\,{}^6\mathrm{D}$	+ 36% $1\|_4{}^5\mathrm{D})\,{}^4\mathrm{P}$	+ 8% $1\|_4{}^5\mathrm{D})\,{}^6\mathrm{P}$
107747.9	107737.1	10.7	73% $1\|_4{}^5\mathrm{D})\,{}^6\mathrm{F}$	+ 8% $1\|_2{}^3\mathrm{P})\,{}^4\mathrm{D}$	+ 7% $1\|_4{}^5\mathrm{D})\,{}^4\mathrm{D}$
$J = 5/2$					
—	199107.4	—	12% $2\|{}^4\mathrm{F}\,{}^5\mathrm{F}, {}^4\mathrm{G}$	+ 11% $2\|{}^2\mathrm{D}\,{}^3\mathrm{D}, {}^4\mathrm{F}$	+ 9% $2\|{}^4\mathrm{P}\,{}^5\mathrm{P}, {}^6\mathrm{S}$
—	198404.0	—	11% $2\|{}^2\mathrm{D}\,{}^3\mathrm{D}, {}^4\mathrm{P}$	+ 10% $2\|{}^2\mathrm{F}\,{}^3\mathrm{F}, {}^4\mathrm{G}$	+ 9% $2\|{}^4\mathrm{F}\,{}^3\mathrm{F}, {}^2\mathrm{D}$
—	197821.7	—	19% $2\|{}^2\mathrm{F}\,{}^3\mathrm{F}, {}^4\mathrm{F}$	+ 18% $2\|{}^4\mathrm{F}\,{}^5\mathrm{F}, {}^4\mathrm{G}$	+ 8% $2\|{}^2\mathrm{F}\,{}^3\mathrm{F}, {}^4\mathrm{G}$
—	196286.1	—	28% $2\|{}^2\mathrm{D}\,{}^3\mathrm{D}, {}^4\mathrm{D}$	+ 19% $2\|{}^2\mathrm{D}\,{}^3\mathrm{D}, {}^4\mathrm{P}$	+ 6% $2\|{}^4\mathrm{P}\,{}^5\mathrm{P}, {}^6\mathrm{S}$
—	194181.8	—	32% $1\|_2{}^1\mathrm{D})\,{}^2\mathrm{D}$	+ 10% $1\|_4{}^1\mathrm{D})\,{}^2\mathrm{D}$	+ 9% $2\|{}^2\mathrm{G}\,{}^3\mathrm{G}, {}^4\mathrm{F}$
—	193714.5	—	22% $1\|_2{}^1\mathrm{D})\,{}^2\mathrm{D}$	+ 11% $2\|{}^4\mathrm{P}\,{}^5\mathrm{P}, {}^6\mathrm{S}$	+ 7% $2\|{}^2\mathrm{G}\,{}^3\mathrm{G}, {}^4\mathrm{F}$
—	192375.3	—	20% $2\|{}^2\mathrm{D}\,{}^3\mathrm{D}, {}^4\mathrm{F}$	+ 9% $2\|{}^4\mathrm{F}\,{}^5\mathrm{F}, {}^4\mathrm{F}$	+ 9% $2\|{}^4\mathrm{F}\,{}^3\mathrm{F}, {}^2\mathrm{F}$
—	190404.3	—	18% $2\|{}^4\mathrm{P}\,{}^5\mathrm{P}, {}^6\mathrm{D}$	+ 15% $2\|{}^4\mathrm{P}\,{}^5\mathrm{P}, {}^6\mathrm{P}$	+ 12% $2\|{}^2\mathrm{P}\,{}^3\mathrm{P}, {}^4\mathrm{P}$
—	189460.3	—	15% $2\|{}^2\mathrm{G}\,{}^3\mathrm{G}, {}^4\mathrm{G}$	+ 15% $2\|{}^4\mathrm{F}\,{}^5\mathrm{F}, {}^4\mathrm{D}$	+ 11% $2\|{}^4\mathrm{F}\,{}^5\mathrm{F}, {}^6\mathrm{D}$
—	187174.1	—	12% $2\|{}^4\mathrm{F}\,{}^3\mathrm{F}, {}^4\mathrm{F}$	+ 12% $2\|{}^4\mathrm{F}\,{}^5\mathrm{F}, {}^4\mathrm{F}$	+ 10% $2\|{}^2\mathrm{G}\,{}^3\mathrm{G}, {}^4\mathrm{G}$
—	184547.9	—	20% $1\|_2{}^3\mathrm{F})\,{}^2\mathrm{D}$	+ 18% $1\|_2{}^1\mathrm{G})\,{}^2\mathrm{F}$	+ 12% $1\|_2{}^1\mathrm{G})\,{}^2\mathrm{F}$
—	184291.7	—	18% $2\|{}^2\mathrm{G}\,{}^3\mathrm{G}, {}^4\mathrm{G}$	+ 10% $2\|{}^4\mathrm{F}\,{}^3\mathrm{F}, {}^2\mathrm{D}$	+ 8% $2\|{}^4\mathrm{F}\,{}^3\mathrm{F}, {}^4\mathrm{F}$
—	182040.3	—	58% $2\|{}^4\mathrm{P}\,{}^5\mathrm{P}, {}^6\mathrm{P}$	+ 10% $2\|{}^4\mathrm{P}\,{}^5\mathrm{P}, {}^6\mathrm{S}$	+ 5% $2\|{}^4\mathrm{F}\,{}^5\mathrm{F}, {}^6\mathrm{D}$
—	179198.1	—	28% $1\|_2{}^3\mathrm{F})\,{}^2\mathrm{D}$	+ 12% $1\|_2{}^1\mathrm{D})\,{}^2\mathrm{F}$	+ 6% $2\|{}^4\mathrm{F}\,{}^3\mathrm{F}, {}^4\mathrm{G}$
—	178034.5	—	18% $2\|{}^4\mathrm{F}\,{}^5\mathrm{F}, {}^6\mathrm{F}$	+ 18% $2\|{}^4\mathrm{F}\,{}^5\mathrm{F}, {}^6\mathrm{D}$	+ 12% $2\|{}^4\mathrm{F}\,{}^3\mathrm{F}, {}^4\mathrm{G}$
—	177630.5	—	18% $2\|{}^4\mathrm{F}\,{}^5\mathrm{F}, {}^6\mathrm{D}$	+ 15% $2\|{}^4\mathrm{F}\,{}^5\mathrm{F}, {}^6\mathrm{F}$	+ 13% $2\|{}^4\mathrm{P}\,{}^5\mathrm{P}, {}^6\mathrm{D}$
—	177074.3	—	32% $1\|_2{}^1\mathrm{G})\,{}^2\mathrm{F}$	+ 15% $1\|_2{}^1\mathrm{D})\,{}^2\mathrm{F}$	+ 11% $1\|_2{}^3\mathrm{F})\,{}^2\mathrm{F}$
—	175273.4	—	28% $1\|_2{}^3\mathrm{F})\,{}^4\mathrm{D}$	+ 9% $1\|_4{}^3\mathrm{F})\,{}^4\mathrm{D}$	+ 7% $2\|{}^4\mathrm{P}\,{}^5\mathrm{P}, {}^6\mathrm{D}$
—	174301.7	—	12% $2\|{}^4\mathrm{P}\,{}^5\mathrm{P}, {}^6\mathrm{D}$	+ 9% $2\|{}^4\mathrm{F}\,{}^3\mathrm{F}, {}^4\mathrm{G}$	+ 9% $1\|_2{}^3\mathrm{P})\,{}^4\mathrm{P}$
—	173636.8	—	14% $1\|_4{}^1\mathrm{F})\,{}^2\mathrm{D}$	+ 13% $1\|_2{}^3\mathrm{P})\,{}^4\mathrm{D}$	+ 8% $1\|_4{}^3\mathrm{P})\,{}^4\mathrm{D}$
—	171237.9	—	24% $1\|_2{}^3\mathrm{F})\,{}^2\mathrm{F}$	+ 16% $1\|_2{}^3\mathrm{F})\,{}^4\mathrm{G}$	+ 9% $1\|_4{}^1\mathrm{D})\,{}^2\mathrm{D}$
—	168707.9	—	46% $2\|{}^4\mathrm{F}\,{}^5\mathrm{F}, {}^6\mathrm{F}$	+ 18% $2\|{}^4\mathrm{F}\,{}^5\mathrm{F}, {}^6\mathrm{D}$	+ 12% $2\|{}^4\mathrm{F}\,{}^5\mathrm{F}, {}^4\mathrm{D}$
—	167797.3	—	13% $1\|_4{}^3\mathrm{D})\,{}^2\mathrm{D}$	+ 13% $1\|_4{}^1\mathrm{F})\,{}^2\mathrm{D}$	+ 12% $1\|_2{}^3\mathrm{P})\,{}^4\mathrm{P}$
—	166243.1	—	24% $1\|_2{}^3\mathrm{P})\,{}^4\mathrm{P}$	+ 16% $1\|_2{}^3\mathrm{P})\,{}^2\mathrm{D}$	+ 11% $1\|_2{}^3\mathrm{F})\,{}^4\mathrm{F}$
—	165841.3	—	20% $1\|_4{}^1\mathrm{G})\,{}^2\mathrm{F}$	+ 18% $1\|_4{}^3\mathrm{F})\,{}^2\mathrm{D}$	+ 11% $1\|_4{}^1\mathrm{F})\,{}^2\mathrm{D}$
163064.6	163047.7	16.8	24% $1\|_4{}^3\mathrm{D})\,{}^2\mathrm{F}$	+ 13% $1\|_4{}^3\mathrm{F})\,{}^2\mathrm{F}$	+ 9% $1\|_2{}^3\mathrm{P})\,{}^2\mathrm{D}$
—	161464.8	—	24% $2\|{}^4\mathrm{F}\,{}^5\mathrm{F}, {}^6\mathrm{G}$	+ 20% $1\|_2{}^3\mathrm{F})\,{}^4\mathrm{F}$	+ 7% $1\|_4{}^3\mathrm{D})\,{}^4\mathrm{P}$
—	160900.9	—	47% $2\|{}^4\mathrm{F}\,{}^5\mathrm{F}, {}^6\mathrm{G}$	+ 6% $1\|_4{}^3\mathrm{D})\,{}^4\mathrm{D}$	+ 5% $1\|_4{}^3\mathrm{P})\,{}^4\mathrm{P}$
159875.3	159967.6	−92.3	13% $1\|_2{}^3\mathrm{F})\,{}^4\mathrm{F}$	+ 8% $1\|_4{}^1\mathrm{G})\,{}^2\mathrm{F}$	+ 7% $1\|_4{}^3\mathrm{F})\,{}^4\mathrm{D}$
158798.4	158800.2	−1.8	18% $1\|_4{}^3\mathrm{D})\,{}^2\mathrm{D}$	+ 11% $1\|_4{}^3\mathrm{D})\,{}^4\mathrm{F}$	+ 10% $1\|_4{}^1\mathrm{D})\,{}^2\mathrm{D}$
—	157543.5	—	19% $1\|_2{}^3\mathrm{F})\,{}^2\mathrm{F}$	+ 17% $1\|_4{}^3\mathrm{F})\,{}^4\mathrm{G}$	+ 15% $1\|_2{}^3\mathrm{F})\,{}^4\mathrm{G}$
155987.7	156046.3	−58.6	15% $1\|_4{}^3\mathrm{P})\,{}^2\mathrm{D}$	+ 14% $1\|_4{}^3\mathrm{D})\,{}^2\mathrm{D}$	+ 14% $1\|_4{}^1\mathrm{F})\,{}^2\mathrm{D}$
—	155554.2	—	19% $1\|_4{}^1\mathrm{F})\,{}^2\mathrm{F}$	+ 15% $1\|_4{}^3\mathrm{G})\,{}^2\mathrm{F}$	+ 8% $1\|_4{}^3\mathrm{D})\,{}^2\mathrm{F}$
153478.9	153560.1	−81.2	15% $1\|_4{}^3\mathrm{F})\,{}^4\mathrm{D}$	+ 9% $1\|_4{}^3\mathrm{G})\,{}^4\mathrm{F}$	+ 9% $1\|_4{}^3\mathrm{F})\,{}^2\mathrm{F}$
152908.0	152930.3	−22.3	12% $1\|_4{}^3\mathrm{G})\,{}^4\mathrm{G}$	+ 11% $1\|_4{}^3\mathrm{D})\,{}^4\mathrm{D}$	+ 10% $1\|_4{}^1\mathrm{G})\,{}^2\mathrm{F}$
—	151380.6	—	12% $1\|_4{}^3\mathrm{P})\,{}^2\mathrm{D}$	+ 10% $1\|_2{}^3\mathrm{P})\,{}^2\mathrm{D}$	+ 9% $1\|_4{}^3\mathrm{D})\,{}^4\mathrm{F}$
150045.8	150040.5	5.2	22% $1\|_4{}^1\mathrm{F})\,{}^2\mathrm{F}$	+ 13% $1\|_4{}^3\mathrm{D})\,{}^4\mathrm{P}$	+ 7% $1\|_4{}^3\mathrm{F})\,{}^3\mathrm{F}$
148540.5	148550.8	−10.3	16% $1\|_4{}^3\mathrm{F})\,{}^4\mathrm{F}$	+ 12% $1\|_4{}^3\mathrm{D})\,{}^4\mathrm{D}$	+ 11% $1\|_4{}^3\mathrm{G})\,{}^4\mathrm{F}$
147267.1	147241.6	25.4	15% $1\|_4{}^3\mathrm{H})\,{}^4\mathrm{G}$	+ 11% $1\|_4{}^3\mathrm{P})\,{}^4\mathrm{P}$	+ 9% $1\|_4{}^3\mathrm{G})\,{}^4\mathrm{F}$
144965.8	144973.4	−7.6	27% $1\|_4{}^3\mathrm{P})\,{}^4\mathrm{P}$	+ 10% $1\|_4{}^3\mathrm{D})\,{}^4\mathrm{F}$	+ 8% $1\|_4{}^5\mathrm{D})\,{}^4\mathrm{F}$
143640.5	143618.3	22.1	26% $1\|_4{}^3\mathrm{G})\,{}^4\mathrm{G}$	+ 7% $1\|_4{}^3\mathrm{D})\,{}^4\mathrm{D}$	+ 7% $1\|_4{}^3\mathrm{P})\,{}^4\mathrm{D}$
142846.7	142828.7	17.9	12% $1\|_4{}^3\mathrm{P})\,{}^4\mathrm{D}$	+ 8% $1\|_4{}^3\mathrm{D})\,{}^2\mathrm{F}$	+ 7% $1\|_4{}^3\mathrm{F})\,{}^2\mathrm{F}$
140820.3	140765.7	54.5	25% $1\|_4{}^3\mathrm{H})\,{}^4\mathrm{G}$	+ 12% $1\|_4{}^3\mathrm{G})\,{}^4\mathrm{F}$	+ 7% $1\|_4{}^3\mathrm{D})\,{}^4\mathrm{P}$
140005.0	139983.6	21.3	17% $1\|_4{}^3\mathrm{P})\,{}^4\mathrm{D}$	+ 15% $1\|_4{}^3\mathrm{D})\,{}^4\mathrm{P}$	+ 14% $1\|_4{}^5\mathrm{D})\,{}^4\mathrm{D}$
138840.2	138833.5	6.6	14% $1\|_4{}^3\mathrm{D})\,{}^4\mathrm{D}$	+ 11% $1\|_4{}^3\mathrm{F})\,{}^4\mathrm{F}$	+ 8% $1\|_4{}^3\mathrm{F})\,{}^2\mathrm{D}$
138233.9	138300.5	−66.6	9% $1\|_4{}^3\mathrm{D})\,{}^4\mathrm{F}$	+ 9% $1\|_4{}^3\mathrm{F})\,{}^4\mathrm{F}$	+ 8% $1\|_4{}^3\mathrm{G})\,{}^4\mathrm{G}$
134543.4	134548.9	−5.5	36% $1\|_4{}^5\mathrm{D})\,{}^4\mathrm{D}$	+ 8% $1\|_4{}^3\mathrm{F})\,{}^4\mathrm{F}$	+ 4% $1\|_2{}^3\mathrm{P})\,{}^2\mathrm{D}$
132984.5	132995.3	−10.8	16% $1\|_4{}^3\mathrm{D})\,{}^4\mathrm{F}$	+ 10% $1\|_4{}^3\mathrm{P})\,{}^4\mathrm{D}$	+ 10% $1\|_4{}^3\mathrm{F})\,{}^4\mathrm{F}$
131294.9	131229.3	65.5	16% $1\|_4{}^3\mathrm{F})\,{}^4\mathrm{G}$	+ 12% $1\|_4{}^5\mathrm{D})\,{}^4\mathrm{P}$	+ 8% $1\|_4{}^3\mathrm{G})\,{}^2\mathrm{F}$
130536.2	130555.2	−19.0	25% $1\|_4{}^5\mathrm{D})\,{}^4\mathrm{P}$	+ 22% $1\|_4{}^5\mathrm{D})\,{}^6\mathrm{D}$	+ 13% $1\|_4{}^5\mathrm{D})\,{}^4\mathrm{F}$
128829.3	128824.0	5.2	35% $1\|_4{}^5\mathrm{D})\,{}^4\mathrm{F}$	+ 19% $1\|_4{}^5\mathrm{D})\,{}^6\mathrm{P}$	+ 7% $1\|_4{}^5\mathrm{D})\,{}^4\mathrm{P}$
125331.9	125339.7	−7.8	18% $1\|_4{}^5\mathrm{D})\,{}^5\mathrm{D}$	+ 14% $1\|_4{}^3\mathrm{F})\,{}^4\mathrm{G}$	+ 12% $1\|_4{}^3\mathrm{G})\,{}^4\mathrm{G}$
123158.8	123144.8	13.9	23% $1\|_4{}^5\mathrm{D})\,{}^6\mathrm{P}$	+ 17% $1\|_4{}^5\mathrm{D})\,{}^6\mathrm{D}$	+ 13% $1\|_4{}^5\mathrm{D})\,{}^4\mathrm{F}$
116443.9	116416.1	27.7	32% $1\|_4{}^5\mathrm{D})\,{}^6\mathrm{P}$	+ 29% $1\|_4{}^5\mathrm{D})\,{}^6\mathrm{D}$	+ 21% $1\|_4{}^5\mathrm{D})\,{}^4\mathrm{P}$
111361.8	111338.8	22.9	72% $1\|_4{}^5\mathrm{D})\,{}^6\mathrm{F}$	+ 7% $1\|_4{}^5\mathrm{D})\,{}^4\mathrm{F}$	+ 4% $1\|_4{}^5\mathrm{D})\,{}^4\mathrm{D}$

Table IV. *Continued*

E (obs.)	E (calc.)	Δ	Composition
$J = 7/2$			
—	198731.6	—	19% $2\|^2D\,^3D, {}^4D$ + 15% $2\|^2F\,^3F, {}^4D$ + 13% $2\|^2F\,^3F, {}^4F$
—	197909.9	—	13% $2\|^2F\,^3F, {}^4G$ + 11% $2\|^2D\,^3D, {}^4F$ + 11% $2\|^2G\,^3G, {}^4F$
—	195204.2	—	23% $2\|^4F\,^3F, {}^2G$ + 17% $2\|^2G\,^3G, {}^4F$ + 9% $2\|^4F\,^5F, {}^4F$
—	192554.8	—	22% $2\|^2H\,^3H, {}^4H$ + 18% $2\|^4F\,^3F, {}^4D$ + 10% $2\|^4F\,^5F, {}^4D$
—	192139.0	—	15% $1\|_2{}^1D)\,^2F$ + 13% $2\|^4F\,^5F, {}^6D$ + 9% $2\|^4F\,^5F, {}^4F$
—	190747.0	—	43% $1\|_2{}^1D)\,^2F$ + 8% $1\|_4{}^1D)\,^2F$ + 8% $2\|^2G\,^3G, {}^4G$
—	189023.2	—	41% $2\|^4P\,^5P, {}^6P$ + 16% $2\|^2P\,^3P, {}^4D$ + 8% $2\|^4P\,^5P, {}^6D$
—	187896.8	—	19% $2\|^2G\,^3G, {}^4H$ + 15% $2\|^2G\,^3G, {}^4G$ + 12% $2\|^2G\,^3G, {}^4F$
—	187499.7	—	12% $2\|^2G\,^1G, {}^2F$ + 11% $2\|^2G\,^1G, {}^2G$ + 9% $2\|^4F\,^3F, {}^4G$
186028.0	185909.6	118.3	20% $2\|^2H\,^3H, {}^4H$ + 18% $2\|^4F\,^3F, {}^4G$ + 13% $2\|^4P\,^5P, {}^6P$
—	183818.6	—	31% $2\|^4P\,^5P, {}^6D$ + 11% $2\|^4P\,^5P, {}^6P$ + 7% $2\|^4P\,^5P, {}^4D$
180126.3	180239.1	−112.8	35% $2\|^4F\,^5F, {}^6F$ + 19% $2\|^4F\,^5F, {}^6D$ + 15% $2\|^2G\,^3G, {}^4H$
—	178763.9	—	25% $2\|^2G\,^3G, {}^4H$ + 17% $2\|^4F\,^5F, {}^6D$ + 12% $2\|^4F\,^3F, {}^4G$
—	178549.9	—	21% $1\|_2{}^1G)\,^2F$ + 21% $1\|_2{}^3F)\,^2G$ + 8% $1\|_2{}^1G)\,^2G$
176747.8	176678.3	69.4	21% $1\|_2{}^1G)\,^2G$ + 16% $1\|_2{}^3F)\,^2G$ + 11% $1\|_4{}^1G)\,^2G$
—	174880.7	—	40% $1\|_2{}^3F)\,^2F$ + 15% $1\|_2{}^3F)\,^4D$ + 5% $1\|_2{}^3F)\,^4G$
173237.0	173093.2	143.7	35% $2\|^4F\,^5F, {}^6F$ + 32% $2\|^4F\,^5F, {}^6D$ + 6% $2\|^4F\,^5F, {}^4D$
—	172326.8	—	22% $1\|_2{}^3F)\,^4F$ + 16% $1\|_2{}^3F)\,^4D$ + 10% $1\|_2{}^3F)\,^4G$
—	169910.4	—	37% $1\|_2{}^3P)\,^4D$ + 12% $1\|_2{}^3F)\,^2G$ + 10% $1\|_4{}^3P)\,^4D$
—	166051.8	—	14% $1\|_2{}^1G)\,^2G$ + 12% $1\|_2{}^3P)\,^4D$ + 10% $1\|_2{}^3F)\,^4G$
—	165721.5	—	79% $2\|^4F\,^5F, {}^6G$ + 5% $2\|^4F\,^5F, {}^6F$ + 3% $2\|^4F\,^5F, {}^4F$
—	164746.9	—	17% $1\|_4{}^3P)\,^4D$ + 9% $1\|_2{}^3F)\,^4D$ + 9% $1\|_2{}^3F)\,^2G$
164410.9	164411.9	−1.0	24% $1\|_4{}^1G)\,^2G$ + 13% $1\|_4{}^3F)\,^2F$ + 10% $1\|_4{}^3F)\,^4D$
162730.5	162746.0	−15.5	23% $1\|_4{}^1F)\,^2G$ + 10% $1\|_2{}^3F)\,^2F$ + 8% $1\|_2{}^3F)\,^4F$
161096.8	161162.4	−65.6	14% $1\|_4{}^1F)\,^2F$ + 9% $1\|_2{}^1G)\,^2F$ + 8% $1\|_4{}^3G)\,^2F$
158431.9	158437.6	−5.7	13% $1\|_2{}^3F)\,^4D$ + 11% $1\|_2{}^1G)\,^2F$ + 11% $1\|_2{}^3F)\,^4F$
—	156074.2	—	14% $1\|_2{}^3P)\,^4D$ + 10% $1\|_4{}^3D)\,^4F$ + 9% $1\|_4{}^1F)\,^2F$
154891.3	154918.0	−26.7	11% $1\|_4{}^3F)\,^2F$ + 11% $1\|_4{}^3G)\,^4F$ + 8% $1\|_4{}^3H)\,^4G$
154147.4	154125.4	21.9	26% $1\|_4{}^3D)\,^2F$ + 20% $1\|_4{}^3G)\,^2G$ + 14% $1\|_4{}^1F)\,^2F$
153439.5	153381.6	57.8	21% $1\|_4{}^1G)\,^2G$ + 13% $1\|_4{}^3G)\,^4F$ + 10% $1\|_4{}^3G)\,^2G$
152778.4	152776.7	1.6	19% $1\|_4{}^3D)\,^4D$ + 11% $1\|_4{}^3F)\,^4F$ + 11% $1\|_4{}^3F)\,^4D$
150387.3	150383.5	3.7	12% $1\|_4{}^1F)\,^2G$ + 12% $1\|_4{}^3G)\,^2F$ + 10% $1\|_3{}^4D)\,^4D$
150084.7	150064.2	20.4	14% $1\|_4{}^3F)\,^2F$ + 9% $1\|_4{}^3G)\,^2G$ + 9% $1\|_4{}^3G)\,^4G$
148765.7	148737.9	27.7	27% $1\|_4{}^3P)\,^4D$ + 10% $1\|_2{}^3P)\,^4D$ + 7% $1\|_4{}^3D)\,^4F$
147620.3	147645.1	−24.8	17% $1\|_4{}^1G)\,^2F$ + 12% $1\|_4{}^3F)\,^4F$ + 11% $1\|_4{}^3P)\,^4D$
146625.0	146676.4	−51.4	20% $1\|_4{}^3H)\,^4G$ + 19% $1\|_4{}^3H)\,^2G$ + 15% $1\|_4{}^3D)\,^4F$
144396.2	144384.7	11.4	13% $1\|_4{}^3G)\,^4G$ + 12% $1\|_4{}^3F)\,^2G$ + 12% $1\|_4{}^3F)\,^4F$
144084.3	144093.0	−8.7	19% $1\|_4{}^3H)\,^4G$ + 9% $1\|_4{}^3G)\,^4F$ + 8% $1\|_4{}^3F)\,^2G$
141044.1	141035.0	9.0	19% $1\|_4{}^3H)\,^4H$ + 16% $1\|_4{}^5D)\,^4D$ + 14% $1\|_4{}^3H)\,^2G$
139054.8	139041.1	13.6	26% $1\|_4{}^3F)\,^4G$ + 17% $1\|_4{}^3G)\,^4H$ + 9% $1\|_4{}^5D)\,^4F$
137347.1	137373.6	−26.5	14% $1\|_4{}^5D)\,^4F$ + 10% $1\|_4{}^3F)\,^2F$ + 10% $1\|_4{}^1G)\,^2F$
136896.4	136870.2	26.1	29% $1\|_4{}^5D)\,^4D$ + 10% $1\|_4{}^3H)\,^4G$ + 10% $1\|_4{}^3G)\,^4G$
134931.3	134949.4	−18.1	11% $1\|_4{}^3H)\,^4H$ + 10% $1\|_4{}^3D)\,^2F$ + 10% $1\|_4{}^3D)\,^4D$
133982.9	133982.1	0.7	12% $1\|_4{}^3F)\,^4F$ + 12% $1\|_4{}^3F)\,^4G$ + 11% $1\|_4{}^3G)\,^4F$
132032.5	132016.5	15.9	33% $1\|_4{}^5D)\,^6D$ + 31% $1\|_4{}^5D)\,^4F$ + 5% $1\|_4{}^3D)\,^2F$
127744.4	127758.9	−14.5	22% $1\|_4{}^3G)\,^4H$ + 18% $1\|_4{}^5D)\,^6D$ + 13% $1\|_4{}^5D)\,^6P$
125920.3	125928.4	−8.1	27% $1\|_4{}^5D)\,^6F$ + 22% $1\|_4{}^5D)\,^6D$ + 11% $1\|_4{}^5D)\,^4F$
123480.8	123480.1	0.6	27% $1\|_4{}^3H)\,^4H$ + 20% $1\|_4{}^3G)\,^4H$ + 10% $1\|_4{}^3H)\,^2G$
118800.7	118794.2	6.4	50% $1\|_4{}^5D)\,^6P$ + 9% $1\|_4{}^5D)\,^4D$ + 8% $1\|_4{}^3F)\,^4D$
114278.6	114250.7	27.8	54% $1\|_4{}^5D)\,^6F$ + 15% $1\|_4{}^5D)\,^4F$ + 8% $1\|_4{}^5D)\,^6D$
$J = 9/2$			
—	197854.2	—	18% $2\|^2G\,^3G, {}^4H$ + 13% $2\|^2H\,^3H, {}^4H$ + 12% $2\|^2G\,^3G, {}^4G$
—	196871.4	—	24% $2\|^2G\,^3G, {}^4G$ + 23% $2\|^4P\,^5P, {}^6D$ + 14% $2\|^2H\,^3H, {}^4H$
—	196354.3	—	51% $2\|^4P\,^5P, {}^6D$ + 8% $2\|^4F\,^3F, {}^2G$ + 7% $2\|^2G\,^3G, {}^4G$
—	194871.4	—	21% $2\|^4F\,^5F, {}^4G$ + 13% $2\|^2G\,^3G, {}^4F$ + 13% $2\|^4F\,^5F, {}^4F$
—	191279.9	—	26% $2\|^2H\,^3H, {}^4I$ + 12% $2\|^4F\,^3F, {}^4G$ + 7% $2\|^4F\,^3F, {}^4F$
—	189314.3	—	21% $2\|^2G\,^3G, {}^4H$ + 10% $2\|^2H\,^3H, {}^4H$ + 9% $2\|^2H\,^3H, {}^4I$
—	188028.2	—	17% $2\|^2G\,^1G, {}^2H$ + 12% $2\|^2H\,^3H, {}^4H$ + 7% $2\|^4F\,^3F, {}^2G$
182652.3	182773.1	−120.8	50% $2\|^4F\,^5F, {}^6F$ + 8% $2\|^4F\,^5F, {}^6G$ + 7% $2\|^4F\,^5F, {}^6D$
—	180608.3	—	19% $2\|^2G\,^3G, {}^4H$ + 19% $2\|^2H\,^3H, {}^4I$ + 13% $2\|^4F\,^5F, {}^6D$
178824.3	178822.3	1.9	24% $1\|_2{}^1G)\,^2G$ + 18% $1\|_2{}^3F)\,^2G$ + 13% $1\|_2{}^1G)\,^2G$
176655.2	176642.5	12.6	46% $2\|^4F\,^5F, {}^6D$ + 13% $2\|^4F\,^5F, {}^6F$ + 9% $2\|^4F\,^5F, {}^6G$
—	173923.8	—	27% $1\|_2{}^3F)\,^4G$ + 23% $1\|_2{}^3F)\,^2G$ + 10% $1\|_2{}^1G)\,^2G$
—	172519.8	—	31% $1\|_2{}^3F)\,^4F$ + 18% $1\|_4{}^1F)\,^2G$ + 13% $1\|_2{}^1G)\,^2G$
—	170621.7	—	66% $2\|^4F\,^5F, {}^6G$ + 12% $2\|^4F\,^5F, {}^6F$ + 6% $2\|^2G\,^3G, {}^4H$
—	167838.9	—	22% $1\|_2{}^1G)\,^2H$ + 13% $1\|_4{}^1G)\,^2G$ + 11% $1\|_4{}^1I)\,^2H$
165593.7	165605.2	−11.5	38% $1\|_4{}^1F)\,^2G$ + 10% $1\|_4{}^1I)\,^2H$ + 9% $1\|_2{}^3F)\,^4F$
163617.4	163555.5	61.8	14% $1\|_2{}^1G)\,^2G$ + 11% $1\|_4{}^1G)\,^2G$ + 11% $1\|_2{}^3F)\,^2G$
160036.0	160005.8	30.1	15% $1\|_4{}^3G)\,^2G$ + 13% $1\|_4{}^1G)\,^2H$ + 13% $1\|_4{}^3F)\,^2G$

Table IV. *Continued*

E (obs.)	*E* (calc.)	Δ	Composition		
159394.3	159419.6	−25.3	16% $1\|_4{}^3\mathrm{G})\,{}^2\mathrm{G}$	+ 14% $1\|_4{}^1\mathrm{I})\,{}^2\mathrm{H}$	+ 9% $1\|_2{}^3\mathrm{F})\,{}^4\mathrm{G}$
158236.9	158184.0	52.8	26% $1\|_2{}^1\mathrm{G})\,{}^2\mathrm{H}$	+ 21% $1\|_4{}^1\mathrm{I})\,{}^2\mathrm{H}$	+ 8% $1\|_4{}^1\mathrm{G})\,{}^2\mathrm{G}$
154062.5	154069.0	−6.5	19% $1\|_4{}^3\mathrm{F})\,{}^2\mathrm{G}$	+ 11% $1\|_4{}^3\mathrm{D})\,{}^4\mathrm{F}$	+ 10% $1\|_4{}^1\mathrm{G})\,{}^2\mathrm{G}$
152413.7	152419.3	−5.6	23% $1\|_4{}^3\mathrm{D})\,{}^4\mathrm{F}$	+ 13% $1\|_4{}^1\mathrm{I})\,{}^2\mathrm{H}$	+ 10% $1\|_4{}^3\mathrm{G})\,{}^2\mathrm{H}$
151086.2	151163.5	−77.3	27% $1\|_4{}^3\mathrm{D})\,{}^4\mathrm{F}$	+ 21% $1\|_4{}^3\mathrm{F})\,{}^4\mathrm{G}$	+ 10% $1\|_4{}^3\mathrm{H})\,{}^2\mathrm{G}$
149321.9	149323.7	−1.8	20% $1\|_4{}^3\mathrm{G})\,{}^4\mathrm{G}$	+ 12% $1\|_4{}^3\mathrm{G})\,{}^4\mathrm{H}$	+ 12% $1\|_4{}^3\mathrm{H})\,{}^4\mathrm{G}$
148499.4	148450.4	48.9	19% $1\|_4{}^3\mathrm{G})\,{}^2\mathrm{H}$	+ 17% $1\|_4{}^3\mathrm{H})\,{}^2\mathrm{H}$	+ 9% $1\|_4{}^1\mathrm{G})\,{}^2\mathrm{H}$
147520.7	147532.8	−12.1	20% $1\|_4{}^3\mathrm{H})\,{}^2\mathrm{G}$	+ 14% $1\|_4{}^3\mathrm{H})\,{}^2\mathrm{H}$	+ 12% $1\|_4{}^3\mathrm{H})\,{}^4\mathrm{H}$
146547.1	146555.6	−8.5	30% $1\|_4{}^3\mathrm{F})\,{}^4\mathrm{F}$	+ 12% $1\|_4{}^3\mathrm{H})\,{}^4\mathrm{I}$	+ 9% $1\|_4{}^3\mathrm{H})\,{}^2\mathrm{H}$
143201.8	143227.0	−25.2	27% $1\|_4{}^3\mathrm{G})\,{}^4\mathrm{G}$	+ 11% $1\|_4{}^3\mathrm{G})\,{}^4\mathrm{F}$	+ 10% $1\|_4{}^3\mathrm{G})\,{}^4\mathrm{H}$
142030.7	142042.6	−11.9	12% $1\|_4{}^3\mathrm{H})\,{}^4\mathrm{G}$	+ 9% $1\|_4{}^5\mathrm{D})\,{}^4\mathrm{F}$	+ 8% $1\|_2{}^3\mathrm{F})\,{}^4\mathrm{G}$
139944.3	139980.5	−36.2	27% $1\|_4{}^3\mathrm{G})\,{}^4\mathrm{F}$	+ 23% $1\|_4{}^3\mathrm{H})\,{}^4\mathrm{H}$	+ 9% $1\|_4{}^3\mathrm{H})\,{}^4\mathrm{G}$
136885.6	136873.5	12.0	31% $1\|_4{}^5\mathrm{D})\,{}^4\mathrm{F}$	+ 12% $1\|_4{}^3\mathrm{H})\,{}^4\mathrm{I}$	+ 12% $1\|_4{}^3\mathrm{F})\,{}^4\mathrm{F}$
136197.3	136198.2	−0.9	26% $1\|_4{}^5\mathrm{D})\,{}^6\mathrm{D}$	+ 12% $1\|_4{}^5\mathrm{D})\,{}^4\mathrm{F}$	+ 8% $1\|_4{}^3\mathrm{F})\,{}^2\mathrm{G}$
132739.1	132732.1	6.9	26% $1\|_4{}^3\mathrm{G})\,{}^4\mathrm{H}$	+ 17% $1\|_4{}^3\mathrm{H})\,{}^4\mathrm{I}$	+ 12% $1\|_4{}^5\mathrm{D})\,{}^6\mathrm{D}$
130117.4	130092.5	24.8	24% $1\|_4{}^3\mathrm{H})\,{}^4\mathrm{H}$	+ 19% $1\|_4{}^5\mathrm{D})\,{}^6\mathrm{D}$	+ 10% $1\|_4{}^3\mathrm{H})\,{}^2\mathrm{G}$
127933.6	127926.2	7.3	44% $1\|_4{}^5\mathrm{D})\,{}^6\mathrm{F}$	+ 11% $1\|_4{}^5\mathrm{D})\,{}^6\mathrm{D}$	+ 8% $1\|_4{}^5\mathrm{D})\,{}^4\mathrm{F}$
123773.9	123765.9	7.9	37% $1\|_4{}^3\mathrm{H})\,{}^4\mathrm{I}$	+ 16% $1\|_4{}^5\mathrm{D})\,{}^6\mathrm{F}$	+ 11% $1\|_4{}^3\mathrm{G})\,{}^4\mathrm{H}$
116392.2	116383.4	8.7	24% $1\|_4{}^5\mathrm{D})\,{}^6\mathrm{F}$	+ 20% $1\|_4{}^5\mathrm{D})\,{}^4\mathrm{F}$	+ 10% $1\|_4{}^5\mathrm{D})\,{}^6\mathrm{D}$
$J = 11/2$					
—	198942.8	—	31% $2\|{}^2\mathrm{H}\,{}^3\mathrm{H}, {}^4\mathrm{I}$	+ 17% $2\|{}^2\mathrm{G}\,{}^3\mathrm{G}, {}^4\mathrm{H}$	+ 11% $2\|{}^4\mathrm{F}\,{}^5\mathrm{F}, {}^4\mathrm{G}$
—	197593.5	—	22% $2\|{}^2\mathrm{G}\,{}^3\mathrm{G}, {}^4\mathrm{G}$	+ 22% $2\|{}^2\mathrm{H}\,{}^3\mathrm{H}, {}^4\mathrm{I}$	+ 15% $2\|{}^4\mathrm{F}\,{}^5\mathrm{F}, {}^4\mathrm{G}$
—	193714.6	—	32% $2\|{}^2\mathrm{H}\,{}^3\mathrm{H}, {}^4\mathrm{H}$	+ 22% $2\|{}^2\mathrm{H}\,{}^3\mathrm{H}, {}^4\mathrm{G}$	+ 12% $2\|{}^4\mathrm{F}\,{}^5\mathrm{F}, {}^6\mathrm{F}$
—	186899.5	—	36% $2\|{}^4\mathrm{F}\,{}^5\mathrm{F}, {}^6\mathrm{F}$	+ 26% $2\|{}^2\mathrm{H}\,{}^3\mathrm{H}, {}^4\mathrm{I}$	+ 14% $2\|{}^2\mathrm{H}\,{}^3\mathrm{H}, {}^4\mathrm{H}$
—	184217.9	—	52% $2\|{}^4\mathrm{F}\,{}^5\mathrm{F}, {}^6\mathrm{G}$	+ 14% $2\|{}^4\mathrm{F}\,{}^5\mathrm{F}, {}^6\mathrm{F}$	+ 11% $2\|{}^2\mathrm{G}\,{}^3\mathrm{G}, {}^4\mathrm{G}$
—	177454.1	—	50% $1\|_2{}^1\mathrm{G})\,{}^2\mathrm{H}$	+ 20% $1\|_4{}^1\mathrm{G})\,{}^2\mathrm{H}$	+ 12% $1\|_2{}^3\mathrm{F})\,{}^4\mathrm{G}$
—	175427.9	—	41% $2\|{}^4\mathrm{F}\,{}^5\mathrm{F}, {}^6\mathrm{G}$	+ 17% $2\|{}^4\mathrm{F}\,{}^5\mathrm{F}, {}^6\mathrm{F}$	+ 11% $2\|{}^2\mathrm{G}\,{}^3\mathrm{G}, {}^4\mathrm{G}$
—	171325.9	—	65% $1\|_2{}^3\mathrm{F})\,{}^4\mathrm{G}$	+ 22% $1\|_2{}^1\mathrm{G})\,{}^2\mathrm{H}$	+ 3% $1\|_4{}^3\mathrm{G})\,{}^2\mathrm{H}$
163297.7	163218.7	79.0	28% $1\|_4{}^1\mathrm{G})\,{}^2\mathrm{H}$	+ 18% $1\|_4{}^3\mathrm{F})\,{}^4\mathrm{G}$	+ 11% $1\|_4{}^1\mathrm{I})\,{}^2\mathrm{H}$
158535.8	158521.8	13.9	22% $1\|_4{}^1\mathrm{I})\,{}^2\mathrm{I}$	+ 18% $1\|_4{}^1\mathrm{I})\,{}^2\mathrm{H}$	+ 17% $1\|_4{}^1\mathrm{G})\,{}^2\mathrm{H}$
156779.3	156813.8	−34.5	37% $1\|_4{}^3\mathrm{G})\,{}^4\mathrm{G}$	+ 34% $1\|_4{}^3\mathrm{G})\,{}^2\mathrm{H}$	+ 9% $1\|_4{}^3\mathrm{H})\,{}^4\mathrm{H}$
152473.2	152486.4	−13.2	39% $1\|_4{}^3\mathrm{H})\,{}^2\mathrm{H}$	+ 19% $1\|_4{}^1\mathrm{I})\,{}^2\mathrm{H}$	+ 15% $1\|_4{}^3\mathrm{G})\,{}^4\mathrm{G}$
149352.2	149369.2	−17.0	38% $1\|_4{}^3\mathrm{F})\,{}^4\mathrm{G}$	+ 30% $1\|_4{}^3\mathrm{H})\,{}^2\mathrm{I}$	+ 8% $1\|_4{}^5\mathrm{D})\,{}^6\mathrm{F}$
148240.1	148194.6	45.4	25% $1\|_4{}^3\mathrm{G})\,{}^4\mathrm{H}$	+ 17% $1\|_4{}^3\mathrm{H})\,{}^2\mathrm{H}$	+ 11% $1\|_4{}^3\mathrm{G})\,{}^4\mathrm{G}$
146494.6	146530.3	−35.7	41% $1\|_4{}^1\mathrm{I})\,{}^2\mathrm{I}$	+ 21% $1\|_4{}^3\mathrm{H})\,{}^4\mathrm{G}$	+ 10% $1\|_4{}^3\mathrm{G})\,{}^2\mathrm{H}$
143021.3	143025.9	−4.6	46% $1\|_4{}^3\mathrm{H})\,{}^4\mathrm{H}$	+ 19% $1\|_4{}^1\mathrm{I})\,{}^2\mathrm{H}$	+ 13% $1\|_4{}^3\mathrm{G})\,{}^2\mathrm{H}$
140782.7	140760.9	21.7	27% $1\|_4{}^3\mathrm{H})\,{}^4\mathrm{I}$	+ 27% $1\|_4{}^3\mathrm{G})\,{}^4\mathrm{H}$	+ 17% $1\|_4{}^3\mathrm{G})\,{}^4\mathrm{G}$
139797.5	139795.1	2.3	27% $1\|_4{}^3\mathrm{H})\,{}^2\mathrm{I}$	+ 13% $1\|_4{}^3\mathrm{H})\,{}^4\mathrm{I}$	+ 12% $1\|_4{}^3\mathrm{H})\,{}^4\mathrm{G}$
134467.2	134448.6	18.5	35% $1\|_4{}^3\mathrm{H})\,{}^4\mathrm{G}$	+ 15% $1\|_4{}^3\mathrm{H})\,{}^2\mathrm{H}$	+ 11% $1\|_4{}^1\mathrm{I})\,{}^2\mathrm{H}$
129347.7	129320.1	27.5	58% $1\|_4{}^5\mathrm{D})\,{}^6\mathrm{F}$	+ 8% $1\|_4{}^3\mathrm{F})\,{}^4\mathrm{G}$	+ 8% $1\|_4{}^3\mathrm{H})\,{}^4\mathrm{H}$
127862.4	127880.7	−18.3	29% $1\|_4{}^3\mathrm{H})\,{}^4\mathrm{I}$	+ 17% $1\|_4{}^5\mathrm{D})\,{}^6\mathrm{F}$	+ 17% $1\|_4{}^3\mathrm{H})\,{}^4\mathrm{H}$
$J = 13/2$					
—	193996.3	—	48% $2\|{}^2\mathrm{H}\,{}^3\mathrm{H}, {}^4\mathrm{H}$	+ 37% $2\|{}^2\mathrm{H}\,{}^3\mathrm{H}, {}^4\mathrm{I}$	+ 6% $2\|{}^2\mathrm{H}\,{}^3\mathrm{H}, {}^2\mathrm{I}$
—	186412.0	—	80% $2\|{}^4\mathrm{F}\,{}^5\mathrm{F}, {}^6\mathrm{G}$	+ 16% $2\|{}^2\mathrm{G}\,{}^3\mathrm{G}, {}^4\mathrm{H}$	+ 2% $2\|{}^2\mathrm{H}\,{}^3\mathrm{H}, {}^4\mathrm{I}$
156538.1	156534.9	3.1	44% $1\|_4{}^1\mathrm{I})\,{}^2\mathrm{I}$	+ 22% $1\|_4{}^1\mathrm{I})\,{}^2\mathrm{K}$	+ 16% $1\|_4{}^3\mathrm{H})\,{}^4\mathrm{H}$
154159.8	154186.0	−26.2	51% $1\|_4{}^3\mathrm{G})\,{}^4\mathrm{H}$	+ 15% $1\|_4{}^3\mathrm{H})\,{}^2\mathrm{I}$	+ 15% $1\|_4{}^1\mathrm{I})\,{}^2\mathrm{I}$
147423.9	147451.3	−27.4	46% $1\|_4{}^3\mathrm{H})\,{}^2\mathrm{I}$	+ 19% $1\|_4{}^1\mathrm{I})\,{}^2\mathrm{I}$	+ 18% $1\|_4{}^3\mathrm{G})\,{}^4\mathrm{H}$
144527.5	144532.3	−4.8	43% $1\|_4{}^3\mathrm{H})\,{}^4\mathrm{H}$	+ 32% $1\|_4{}^3\mathrm{H})\,{}^4\mathrm{I}$	+ 18% $1\|_4{}^1\mathrm{I})\,{}^2\mathrm{K}$
142305.2	142301.9	3.2	34% $1\|_4{}^1\mathrm{I})\,{}^2\mathrm{K}$	+ 26% $1\|_4{}^3\mathrm{H})\,{}^4\mathrm{I}$	+ 17% $1\|_4{}^3\mathrm{G})\,{}^4\mathrm{H}$
131013.1	131052.8	−39.7	27% $1\|_4{}^3\mathrm{H})\,{}^4\mathrm{H}$	+ 23% $1\|_4{}^3\mathrm{H})\,{}^4\mathrm{I}$	+ 22% $1\|_4{}^3\mathrm{H})\,{}^2\mathrm{I}$
$J = 15/2$					
157674.0	157669.5	4.4	79% $1\|_4{}^1\mathrm{I})\,{}^2\mathrm{K}$	+ 21% $1\|_4{}^3\mathrm{H})\,{}^4\mathrm{I}$	
145527.6	145536.7	−9.1	79% $1\|_4{}^3\mathrm{H})\,{}^4\mathrm{I}$	+ 21% $1\|_4{}^1\mathrm{I})\,{}^2\mathrm{K}$	

All values are given in cm^{-1}.
The number preceding the term name means: 1: no 6s electron involved, 2: one 6s electron included, 3: $6s^2$ included.
The calculated level values above 200000 cm^{-1} are omitted except those that belong to $5d^46p$.

Table V. *Fitted and calculated parameter values* (cm^{-1}) *in the* $5d^5 + 5d^46s + 5d^36s^2$ *system of Os IV.*

Parameter	Fitted value	MCDF	Fitted/MCDF
$5d^5$			
E_{av}	38223.6 (4.6)		
O_2	5975.8 (4.9)	7256.5	0.8235
O'_2	3845.5 (4.8)	4952.4	0.7765
E_α	80.9 (3.3)		
E_β	30.2 (5.1)		
ζ_d	3738.6 (4.0)	3463.3	1.0795
T_1	0.35		
T_2	0.20		
T_3	0.06		
T_4	0.16		
A_c	29.8 (3.7)	36.5	
A_3	4.3 (2.6)	6.6	
A_4	7.1 (2.7)	8.7	
A_5	7.9 (2.5)	10.1	
A_6	16.0 (1.6)	15.5	
A_1	−3.1 (2.0)	−4.5	
A_2	2.9 (2.3)	5.2	
A_0	−3.0	−4.2	
$5d^46s$			
E_{av}	82201.6 (8.2)	46168	0.9526
O_2	6188.5 (6.0)	7472.1	0.8282
O'_2	3971.8 (12.8)	5083.4	0.7813
E_α	71.5 (5.4)		
E_β	41.0		
ζ_d	3962.9 (5.4)	3692.8	1.0731
T_1	0.10		
T_2	0.25		
T_3	−0.06		
T_4	0.06		
A_c	29.8		
A_3	3.4		
A_4	6.9		
A_5	7.8		
A_6	15.0		
A_1	−1.8		
A_2	2.4		
A_0	−3.0		
C_{ds}	3008.6 (5.8)	3759.0	0.8003
T_{dds}	3.9 (9.4)		
A_{mso}	51.6 (3.5)	58.9	
A_{ss}	−1.1	−1.1	
$5d^36s^2$			
E_{av}	142110	112952	
O_2	6380	7670	
O'_2	4075	5203	
E_α	75		
E_β	55		
ζ_d	4265	3928	
T_1			
T_2			
T_3			
T_4			
A_c	29	33.9	
A_3	3	6.2	
A_4	7	8.7	
A_5	7	9.4	
A_6	15	14.2	
A_1	−3	−3.9	
A_2	3	4.5	
A_0	−3	−3.6	
R^2 (dd, ds)	−21904	−26712	0.82
R^2 (dd, ss)	19190	24088	0.80
R^2 (dd, ds)	−21958	−26778	0.82
Mean error	22.3		

Table VI. *Fitted and calculated parameter values* (cm^{-1}) *in the* $5d^46p + 5d^36s6p + 5d^26s^26p$ *system of Os IV*

Parameter	Fitted value	MCDF	Fitted/MCDF
$5d^46p$			
E_{av}	151368.4 (7.1)	112952	1.0017
O_2	6229.6 (7.8)	7534.0	0.8269
O'_2	4018.2 (12.0)	5121.7	0.7845
E_α	76.9 (6.3)		
E_β	55.0		
T_1	0.0		
T_2	0.21		
T_3	−0.07		
T_4	0.08		
ζ_d	4066.1 (7.6)	3817.2	1.0652
A_c	29.9	34.7	
A_3	3.0	4.3	
A_4	6.9	8.1	
A_5	7.7	9.1	
A_6	15.0	13.8	
A_1	−2.0	−4.2	
A_2	2.5	5.0	
A_0	−3.0	−5.2	
C_1 (dp)	2554.0 (13.9)	2929.1	0.8719
C_2 (dp)	2231.0 (13.5)	2893.5	0.7710
C_3 (dp)	1220.6 (14.4)	1540.8	0.7922
S_1 (dp)	185.0 (10.7)		
S_2 (dp)	−110.3 (11.8)		
ζ_p	9289.6 (18.3)	8386.0	1.1078
$S_d \cdot L_p$	−73.6 (11.7)	−126.9	
$S_p \cdot L_d$	−26.8 (12.7)	−21.8	
$Z^2_{pp'}$	−61.7 (16.9)	−40.3	
$Z^2_{dd'}$	41.3 (13.9)	39.1	
$Z^1_{pp'}$	142.6 (8.5)	213.5	
$Z^1_{dd'}$	−25.7 (9.6)	−15.2	
$Z^3_{pp'}$	63.6 (11.5)	52.9	
$Z^3_{dd'}$	−19.4 (10.4)	−12.8	
SS_{02}	−19.7 (12.7)	−20.2	
SS_{20}	−3.2 (11.9)	−7.8	
T_{16}	−28.9 (11.0)		
T_{17}	17.4 (7.1)		
T_{18}	2.9 (10.8)		
T_{19}	−9.9 (8.5)		
T_{20}	−37.3 (11.9)		
T_{21}	−13.0 (6.4)		
T_{22}	−22.7 (13.9)		
T_{23}	−15.7 (9.6)		
T_{24}	−13.1 (7.9)		
T_{25}	8.2 (8.7)		
T_{26}	−25.1 (11.7)		
T_{27}	3.7 (7.4)		
T_{28}	69.6 (13.0)		
T_{29}	−42.0 (10.6)		
T_{30}	1.4 (10.6)		
T_{31}	−1.7 (8.7)		
T_{32}	−8.8 (6.8)		
T_{33}	17.1 (8.2)		
T_{34}	−52.7 (9.0)		
T_{35}	−72.1 (10.3)		
$5d^36s6p$			
E_{av}	207267.5 (20.2)	170458	0.9917
O_2	6410	7725	
O'_2	4134	5235	
E_α	75		
E_β	55		
T_1	−0.3		
T_2	0.1		
T_3	0.0		
T_4	0.0		
ζ_d	4300	4047	
A_c	23	30.0	
A_3	3.5	6.5	
A_4	4	8.7	

Table VI. *Continued*

Parameter	Fitted value	MCDF	Fitted/MCDF
A_5	4.5	9.5	
A_6	12.5	15.3	
A_1	−3	−6.1	
A_2	3	7.3	
A_0	−3	−1.1	
C_{ds}	3036	3755	
T_{dds}	−16		
A_{mso}	53	51	
C_1 (dp)	2686	3112	
C_2 (dp)	2298	2984	
C_3 (dp)	1279	1562	
S_1 (dp)	165		
S_2 (dp)	−100		
ζ_d	10270	9474	
$S_d \cdot L_p$	−100	−134	
$S_p \cdot L_d$	−36	−16	
$Z^2_{pp'}$	−50	−39	
$Z^2_{dd'}$	50	43	
$Z^1_{pp'}$	135	211	
$Z^1_{dd'}$	−16	−12	
$Z^3_{pp'}$	61	54	
$Z^3_{dd'}$	−10	−6	
C_{sp}	9000	13560	
A_{mso} (sp)	−500	−677	
R^2 dd; ds12	−21852	−26649	
R^2 dp; sp12	−18905	−23055	
R^1 dp; ps12	−17207	−20984	
$5d^26s^26p$			
E_{av}	276473	244620	
O_2	6450	7912	
O'_2	4130	5351	
E_α	77		
E_β	52		
ζ_d	4171	4275	
A_c	28		
A_3	3.5		
A_4	4		
A_5	4.5		
A_6	14.5		
A_1	−3		
A_2	3		
A_0	−3		
C_1 (dp)	2206	3291	
C_2 (dp)	1925	3061	
C_3 (dp)	1231	1583	
S_1 (dp)	−120		
S_2 (dp)	−100		
ζ_p	11000	10707	
$S_d \cdot L_p$	−100	−133	
$S_p \cdot L_d$	−36	−26	
$Z^2_{pp'}$	−50	−41	
$Z^2_{dd'}$	50	46	
$Z^1_{pp'}$	135	218	
$Z^1_{dd'}$	−16	−17	
$Z^3_{pp'}$	61	57	
$Z^3_{dd'}$	−10	−14	
SS_{02}	−20	−21	
SS_{20}	−11	−9	
R^2 dd; ss13	19662	23978	0.82
R^2 dd; ds23	−21915	−26726	0.82
R^2 dp; sp23	−19336	−23582	0.82
R^1 dp; ps23	−17605	−21327	0.82
Mean error	46.3 cm^{-1}		

Table VII. *Comparison of the behaviour of the 2-particle magnetic dp-interactions in some $5d^N6p$ system. Within brackets the calculated MCDF values are given*

Parameter	Os IV	Os V	Os VI
$Z^2_{pp'}$	−61.7 (−40)	−51.2 (−37)	(−40)
$Z^2_{dd'}$	41.3 (39)	60.8 (42)	51.9 (45)
$Z^1_{pp'}$	142.6 (214)	142.3 (217)	126.4 (232)
$Z^1_{dd'}$	−25.7 (−15)	−13.9 (−8)	(−9)
$Z^3_{pp'}$	63.6 (53)	61.7 (55)	65.2 (77)
$Z^3_{dd'}$	−19.4 (−20)	−15.5 (−13)	(−16)

Table VIII. *Some classified lines from the first page of Table I show the power of adding a Boltzmann factor ($kT = 23000$) to the calculated gA value*

qA	Int	*qAB*	WL (Å)		Even level	*J*-value	Odd level	*J*-value
120	10	5	742.666	$1\|_3{}^4$F)	44173.7	(7/2)	–178824.3	(9/2)1
53	14	15	743.258	$1\|_5{}^6$S)	0.0	(5/2)	–134543.4	(5/2)1
307	14	9	745.002	$2\|_4{}^5$D) ^{6}D	51800.8	(7/2)	–186028.0	(7/2)2
338	7	10	757.875	$2\|_4{}^5$D) ^{6}D	54080.5	(9/2)	–186028.0	(7/2)2
26	5	3	758.437	$1\|_3{}^4$P)	22521.8	(1/2)	–154372.5	(1/2)1
211	80	78	776.223	$1\|_5{}^6$S)	0.0	(5/2)	–128829.3	(5/2)1
456	44	45	776.359	$1\|_5{}^2$I)	30587.5	(11/2)	–159394.3	(9/2)1
1238	61	49	779.270	$2\|_4{}^5$D) ^{6}D	51800.8	(7/2)	–180126.3	(7/2)2
286	324	110	782.814	$1\|_5{}^6$S)	0.0	(5/2)	–127744.4	(7/2)1
297	87	48	782.878	$1\|_5{}^4$G)	19886.3	(7/2)	–147620.3	(7/2)1

The value *gAB* is the *gA* value multiplied by a Boltzmann factor. The value *gA* is given in units $10^7\,s^{-1}$, while *gAB* is given in units $10^5\,s^{-1}$. The lines are grouped in small wavelength ranges. Comparing lines over a large wavelength region might introduce effects caused by the emulsion and development of the plates.