Tables of Atomic Transition Probabilities for Beryllium and Boron

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We have carried out a comprehensive critical compilation of the atomic transition probabilities for the spectra of beryllium and boron. We tabulated these data for a total of about 1400 allowed and forbidden transitions and covered all stages of ionization. The hydrogenlike ions are included with relations scaled to the data for neutral hydrogen. The tables are arranged in multiplets, and these are ordered in increasing excitation energies. © *2010 U.S. Secretary of Commerce on behalf of the United States. All rights reserved.*. [doi:10.1063/1.3286088]

Key words: allowed and forbidden transitions; atomic transition probabilities; oscillator strengths; *f* values; line strengths; beryllium; boron.

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List of symbols

Symbols for indication of data accuracy:

AAA = uncertainty less than ±0.3%
AA = uncertainty less than ±1%
A = uncertainty less than ±3%
B = uncertainty less than ±10%
C = uncertainty less than ±25%
D = uncertainty less than ±50%
E = uncertainty greater than ±50%, but within factors of 3

Symbols used for the table headings:

λ = Wavelength (Å)
E_i = lower energy level (cm^{-1})
E_k = upper energy level (cm^{-1})
g_i = statistical weight of the lower level
g_k = statistical weight of the upper level
A_{ki} = atomic transition probability for spontaneous emission, in $10^8\ s^{-1}$ for all E1 (allowed: electric dipole) transitions, in s^{-1} for all M1, M2, and E2 transitions
f_{ik} = absorption oscillator strength
S = line strength in atomic units; formulas and values for these quantities in SI units are as follows:

For E1 transitions:
$a_0^2 e^2 = 7.188_3 \times 10^{-59}\ m^2\ C^2$,
For E2 transitions:
$a_0^4 e^2 = 2.012_9 \times 10^{-79}\ m^4\ C^2$,
For M1 transitions:
$\mu_B^2 = (eh/4\pi me)^2 = 8.600_7 \times 10^{-47}\ J^2\ T^{-2}$,
For M2 transitions:
$\mu_B^2 a_0^2 = 2.408_5 \times 10^{-67}\ J^2\ m^2\ T^{-2}$,
where a_0, e, m_e, and h are the Bohr radius, electron charge, electron mass, and Planck constant, respectively, and μ_B is the Bohr magneton.

Note that for E_i and E_k, the customary unit for atomic energy levels, used here, is related to the SI unit for energy (J) by 1 $cm^{-1} = 1.986 \times 10^{-23}$ J.

Abbreviations appearing in the column labeled *Type* (forbidden lines only):

M1: Magnetic dipole transition,
E2: Electric quadrupole transition,
M2: Magnetic quadrupole transition.

Special symbols used in the wavelength and energy level columns:

Numbers in italics indicate multiplet values, i.e., weighted averages of line values.

Notation for exponents:

In all tables, we have shown the power of ten by the exponential notation. For example, 3.88e−03 stands for 3.88×10^{-3}.

1. Introduction

1.1. Overview

In 1966, the first edition of reference data for the atomic transition probabilities of the light elements hydrogen through neon, of atomic numbers 1 to 10, was published by the U. S. National Bureau of Standards (NBS), now the National Institute of Standards and Technology (NIST).[1] Since then, large amounts of much higher quality data have become available for these quantities, most of them from advanced quantum mechanical calculations. This progress was achieved with the development of sophisticated atomic structure codes coupled with the advent of much more powerful computers. Our new edition of reference data for the first ten elements covers the various spectra much more extensively, and thus the data tables are greatly expanded and are published in several parts.

A first part, containing all spectra of carbon, nitrogen and oxygen, was published in 1996,[2] and an update for C I and C II as well as N I and N II, containing still further improved data sets, was published in 2007.[3] A second part, containing the spectra of hydrogen and its isotopes deuterium and tritium, as well as helium and lithium and their ions, is in press and is expected to be published in 2009.[4]

This third part covers all the spectra of beryllium and boron. The tabulated data are the results of advanced, and partly very extensive, atomic structure calculations. In several of these, the results are computed in two ways, the dipole-length and the dipole-velocity formalisms. Ideally, these two results should be identical, but normally they differ due to various approximations in the calculations of the wave functions. The magnitude of the difference is thus utilized as a key indicator for the quality of the result. The dipole-length approximation is considered to be the more accurate one and is often the only one presented. We have always tabulated the dipole-length results.

For the He-like ions Be III and B IV, extensive variational calculations of the wave functions with Hylleraas-type basis sets were carried out by Drake[5] and have produced essentially exact data. This specifically means that all his dipole-length and dipole-velocity results are identical for the five digits that we have tabulated. The same applies to a few persistent lines of the Li-like ions Be II and B III, which were determined with these variational calculations by Drake and co-workers,[6] too.

For the spectra of neutral beryllium and boron, as well as their lower ions, our first choice are the multiconfiguration Hartree–Fock (MCHF) calculations by Tachiev and Froese Fischer[7,8] and by Nam.[9] These authors have presented their results either in both the dipole-length and dipole-velocity formalisms or, equivalently, they presented the dipole-length numbers plus the differences with the dipole velocity results. For the stronger lines, these differences are generally smaller than 1% and rarely more than a few percent, indicating high quality of the data. But for the more numerous lines of moderate to weak strength, the differences increase considerably, getting into the 25%–50% range. This seems to be primarily due to partial cancellation of positive and negative contributions in the transition integral.

For B I, B II, and Be II, the available MCHF data from Refs. 7–9 cover only transitions involving principal quantum numbers 2 and 3. For transitions between higher levels, we applied data from the OPACITY project group.[10–12] Their calculations are not quite as detailed and sophisticated as those from the MCHF calculations, and we therefore estimate larger uncertainties for the weaker lines of B I and B II. This is also borne out by a few available comparisons. But for the relatively simple Li-like Be II ion, the results are of similar accuracy as the MCHF results. This is, for example, seen in the few comparisons given in a table in the introduction to Be II.

For the electric dipole forbidden lines, i.e., magnetic dipole (M1), electric quadrupole (M2), and magnetic quadrupole (E2) transitions—in short, the "forbidden lines"—the same or similar theoretical work as mentioned above is available and has been used for this compilation. In our 1966 edition,[1] data on forbidden lines were only available for a few magnetic dipole lines of Be I, B I, and B II, while this tabulation contains at least a few M1, E2, and/or M2 lines for all spectra of beryllium and boron.

1.2. Useful relations

(A) Statistical weight g: The statistical weight of a level is related to the total angular momentum quantum number J_L (j for one-electron spectra) of that level (initial or final state of a line) by

$$g_L = 2J_L + 1\,.$$

Similarly, the statistical weight of a term (initial or final state of a multiplet) is

$$g_M = (2L+1)(2S+1)\,,$$

where L is the total orbital angular momentum and S is the total spin angular momentum. For the one-electron spectra of hydrogen and hydrogenlike ions, lower case letters l, s, and j are used, and a particular level is denoted either by nl_j or by $nl\,{}^2L_J$, with $L=l$ and $J=j$.

(B) Relations between the strengths of LS-allowed fine structure lines and the total multiplet strength:

(1) Line strength S: The line strength of a multiplet is the sum of the strengths of its component lines, i.e.,

$$S(\text{Multiplet}) = \sum S(\text{line})$$

or

$$S(i,k) = \sum_{J_i,J_k} S(J_i,J_k)\,,$$

where k denotes the upper term and i denotes the lower term.

(2) Absorption oscillator strength f_{ik}:

$$f_{ik}^{\text{multiplet}} = \frac{1}{\bar{\lambda}_{ik}\sum_{J_i}(2J_i+1)}\sum_{J_i,J_k}(2J_i+1)\times\lambda(J_i,J_k) \times f(J_i,J_k)\,.$$

The mean wavelength for the multiplet, $\bar{\lambda}_{ik}$, may be obtained from the *weighted* energy levels. Often the wavelength differences for the lines within a multiplet are small, in which case the wavelength factors may be neglected.

(3) Transition probability A_{ki}:

$$A_{ki}^{\text{multiplet}} = \frac{1}{\bar{\lambda}_{ik}^3\sum_{J_k}(2J_k+1)}\sum_{J_i,J_k}(2J_k+1)\times\lambda(J_i,J_k)^3 \times A(J_i,J_k)\,.$$

(C) Definition of the "average" transition probabilities for hydrogen and hydrogenlike ions (due to the l degeneracy) in terms of $n_il_i - n_kl_k$ multiplet values:

$$A_{n_k,n_i}^{\text{avg}} = \sum_{l_k,l_i}\frac{2l_k+1}{n_k^2}A_{(nl)_k,(nl)_i}\,,$$

$$f_{n_i,n_k}^{\text{avg}} = \sum_{l_k,l_i}\frac{2l_i+1}{n_i^2}f_{(nl)_i,(nl)_k}\,,$$

$$S_{n_i,n_k}^{\text{avg}} = \sum_{l_k,l_i}S_{(nl)_i,(nl)_k}\,.$$

The multiplet values are in turn related to the values for the fine structure lines as shown in (B) above.

(D) Conversions: For electric dipole (E1-allowed) transitions,

$$A_{ki} = \frac{6.670\,251\,7 \times 10^{15} g_i}{g_k \lambda^2} f_{ik} = \frac{2.026\,126\,9 \times 10^{18}}{g_k \lambda^3} S.$$

For magnetic dipole (M1-forbidden) transitions,

$$A_{ki} = \frac{2.697\,350\,0 \times 10^{13}}{g_k \lambda^3} S.$$

For electric quadrupole (E2-forbidden) transitions,

$$A_{ki} = \frac{1.119\,950\,0 \times 10^{18}}{g_k \lambda^5} S.$$

For magnetic quadrupole (M2-forbidden) transitions,

$$A_{ki} = \frac{1.490\,971\,4 \times 10^{13}}{g_k \lambda^5} S.$$

For these conversions, λ is the vacuum wavelength in Å units and g_i and g_k are the statistical weights of the lower and upper levels, respectively. The line strength (S) is given in atomic units, the transition probability (A_{ki}) is in units of s^{-1}, and the f-value is dimensionless. For more detail on these units and conversion factors, we refer the reader to Ref. 2.

2. Beryllium

2.1. Be I

Ground state: $1s^2 2s^2\ ^1S_0$
Ionization energy: 9.3227 eV (75 192.64 cm^{-1})

2.1.1. Be I allowed transitions

We selected the results of two sophisticated MCHF calculations by Tachiev and Froese Fischer[7] and by Nam.[9] These authors obtained very accurate MCHF wavefunctions by expanding them into large numbers of configuration state functions and by including the small relativistic contributions with the Breit–Pauli terms. The numerical results of both calculations are fully listed on the website "The MCHF/MCDF Collection."[9] Line strengths for the lower Be I transitions were treated by Tachiev and Froese Fischer,[7] and Nam carried out an extensive study of the remainder of the neutral beryllium spectrum, including transitions with principal quantum numbers as high as $n=9$ for the upper states. For each transition, the authors calculated the line strengths in the dipole length as well as the dipole velocity representation and the differences (in percentage) are listed on their website in addition to the dipole-length results (which we have always used). These differences are the principal indicators of the accuracy of each transition. While they cannot be considered a fully quantitative measure, they nevertheless indicate the quality of the results. Thus, we have given "A" ratings for all transitions where this difference is smaller than 1.5%.

For a few persistent transitions of Be I, other high-quality theoretical[13–15] and experimental[16,17] data of recent vintage are available, which fully support such ratings. A comparison of this material with the selected data from Refs. 7 and 9 is shown in Table 1. The calculations by Weiss,[13] Jönsson *et al.*,[14] and Fleming *et al.*[15] are all based on extensive multiconfigurational treatments of the wavefunctions done with the superposition-of-configurations approach, and the MCHF and the CIV 3 (configuration interaction, Version 3) codes. The lifetime measurements were done with cascade-corrected beam-foil spectroscopy,[16] using the "arbitrarily normalized decay curves (ANDC)" procedure, and with the laser induced fluorescence method,[17] which is cascade free. The theoretical data were obtained in both the "dipole-length" and the "dipole-velocity" representation which in the ideal case should lead to identical results. The listed "D" values are the small differences (in percentage) between the length and velocity results, indicating the excellent accuracy achieved. For the two lifetime experiments,[16,17] the estimated uncertainties are listed. This comparison thus fully supports the earlier cited uncertainty ratings that we have applied in our tabulation.

A finding list and transition probabilities for the allowed lines of Be I are given in Tables 2 and 3.

TABLE 1. Comparison of dipole-length oscillator strength data (gf-values) for Be I. The D values are the differences in percent between the dipole length and velocity values, an indicator of the achieved accuracy

	Transitions			
	$2s^2\ ^1S-2s2p\ ^1P°$	$2s2p\ ^3P°-2p^2\ ^3P$	$2s2p\ ^1P°-2s3s\ ^1S$	$2s2p\ ^1P°-2s3d\ ^1D$
CALCULATIONS				
Tachiev and Froese Fischer[7]	1.380(D=0.1%)	4.005 (D=0.3%)	0.3452 (D=2.6%)	1.1934 (D=4.5%)
Nam[9]	1.383(D=1.0%)	4.047 (D=1.4%)	0.3633 (D=0.8%)	1.2306 (D=0.0%)
Weiss[13]	1.3755(D=0.14%)	4.0232 (D=0.15%)	0.3559 (D=1.57%)	1.2011 (D=1.89%)
Jönsson *et al.*[14]	1.3711(D=0.12%)	4.0178 (D=0.07%)	–	–
Fleming *et al.*[15]	1.375(D=0.23%)	–	–	–
LIFETIME EXPTS.				
Irving *et al.*[16]	1.40 ± 0.04	–	–	–
Schnabel and Kock[17]	1.34 ± 0.03	–	–	–

TABLE 2. List of tabulated lines for allowed transitions of Be I

Wavelength (Å)	No.
In vacuum	
1 356.68	11
1 364.08	10
1 364.09	9
1 375.48	8
1 393.80	7
1 426.12	6
1 491.76	5
1 661.48	4
1 697.58	3
1 929.60	25
1 929.62	25
1 929.71	25
1 943.59	24
1 943.62	24
1 943.71	24
1 956.56	23
1 956.58	23
1 956.67	23
1 964.54	22
1 964.56	22
1 964.65	22
1 985.06	21
1 985.08	21
1 985.17	21
1 997.95	20
1 997.98	20
1 998.07	20
In air	
2 032.60	19
2 032.63	19
2 032.72	19
2 055.88	18
2 055.90	18
2 056.00	18
2 125.54	17
2 125.57	17
2 125.68	17
2 174.96	16
2 174.99	16
2 175.10	16
2 348.61	2
2 350.66	15
2 350.70	15
2 350.83	15
2 494.54	14
2 494.58	14
2 494.73	14
2 650.45	13
2 650.55	13
2 650.60	13
2 650.62	13
2 650.70	13
2 650.76	13
3 193.83	39
3 220.39	38
3 229.62	37
3 269.04	36

TABLE 2. List of tabulated lines for allowed transitions of Be I—Continued

Wavelength (Å)	No.
3 282.91	35
3 321.01	12
3 321.08	12
3 321.34	12
3 345.43	34
3 367.63	33
3 476.56	32
3 515.54	31
3 736.30	30
3 813.45	29
4 407.94	28
4 548.54	1
4 572.66	27
5 252.81	48
5 365.49	47
5 546.45	46
5 857.01	45
5 941.19	62
6 085.75	61
6 085.96	60
6 229.11	59
6 319.62	58
6 321.41	57
6 473.54	44
6 564.52	56
6 711.74	73
6 711.91	73
6 725.96	55
6 786.56	41
6 884.26	72
6 884.44	72
7 049.72	71
7 049.91	71
7 154.46	70
7 154.65	70
7 209.13	54
7 209.23	53
7 308.29	86
7 434.42	69
7 434.63	69
7 448.87	85
7 498.42	84
7 551.90	52
7 618.66	68
7 618.88	68
7 714.38	83
7 792.05	82
8 090.07	43
8 153.74	81
8 158.98	67
8 159.23	67
8 254.07	26
8 286.90	80
8 547.36	66
8 547.63	66
8 801.37	51
8 801.49	50
8 881.73	98

TABLE 2. List of tabulated lines for allowed transitions of Be I—Continued

Wavelength (Å)	No.
8 882.16	97
8 979.19	79
9 190.45	96
9 243.88	78
9 392.74	95
9 847.31	49
9 895.58	65
9 895.95	65
9 939.78	94
10 331.1	93
10 771.6	110
10 944.1	77
11 066.0	64
11 066.5	64
11 256.4	109
11 257.1	108
11 496.2	92
11 496.4	91
11 633.5	76
11 756.9	107
11 811.4	118
12 083.5	106
12 396.8	117
12 397.7	116
12 478.4	90
13 011.7	105
13 407.5	115
13 661.6	104
13 838.6	112
14 300.8	126
14 633.1	135
14 644.0	40
14 644.8	40
15 107.4	125
15 207.7	134
15 378.6	114
15 415.7	133
15 814.5	103
15 814.9	102
15 927.8	124
16 157.3	89
16 157.7	88
16 357.1	132
16 472.6	123

TABLE 2. List of tabulated lines for allowed transitions of Be I—Continued

Wavelength (Å)	No.
16 710.3	131
17 563.2	101
17 855.5	63
17 856.7	63
17 975.6	145
17 984.1	111
18 036.4	122
18 143.6	42
18 467.0	130
18 623.7	141
18 625.6	140
19 160.6	121
19 164.5	129
19 268.8	144
19 765.3	75
20 034.9	139
20 284.4	150
20 506.5	113
21 010.8	87
21 021.8	138
21 546.4	143
22 074.7	149
22 077.4	148
22 787.4	155
22 989.4	120
23 323.0	128
23 573.1	74
23 974.9	137
24 085.2	147
25 071.5	154
25 075.0	153
25 197.0	127
25 497.1	146
26 219.8	100
26 220.9	99
26 364.9	119
26 385.3	136
26 388.6	142
26 750.7	157
27 114.0	151
28 661.8	158
29 581.2	152
29 719.0	156

TABLE 3. Be I: Allowed transitions

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
1	$1s^22s^2$-$1s^22s2p$	^{1}S-^{3}P°										
			4 548.54	4 549.81	0.000–21 978.925	1–3	4.3e−09	4.0e−09	5.9e−08	−8.40	E	7
2	$1s^22s^2$-$1s^22s2p$	^{1}S-^{1}P°	2 348.61	2 349.33	0.000–42 565.35	1–3	5.54e+00	1.38e+00	1.06e+01	0.139	A	7
3	$1s^22s^2$-$1s^22s3p$	^{1}S-^{3}P°										
				1697.58	0.000–58 907.45	1–3	4.4e−09	5.7e−10	3.2e−09	−9.24	D	7

TABLE 3. Be I: Allowed transitions—Continued

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
4	$1s^22s^2$-$1s^22s3p$	^{1}S-^{1}P°		1661.48	0.000–60 187.34	1–3	7.23e−02	8.98e−03	4.91e−02	−2.047	A	7
5	$1s^22s^2$-$1s^22s4p$	^{1}S-^{1}P°		1491.76	0.000–67 034.70	1–3	1.2e−03	1.2e−04	6.0e−04	−3.91	D	9
6	$1s^22s^2$-$1s^22s5p$	^{1}S-^{1}P°		1426.12	0.000–70 120.49	1–3	7.6e−03	6.9e−04	3.25e−03	−3.160	C	9
7	$1s^22s^2$-$1s^22s6p$	^{1}S-^{1}P°		1393.80	0.000–71 746.09	1–3	7.8e−03	6.8e−04	3.11e−03	−3.169	C	9
8	$1s^22s^2$-$1s^22s7p$	^{1}S-^{1}P°		1375.48	0.000–72 701.8	1–3	6.3e−03	5.4e−04	2.43e−03	−3.271	C	9
9	$1s^22s^2$-$1s^22s8p$	^{1}S-^{3}P°										
				1364.09	0.000–73 309.15	1–3	5.6e−04	4.7e−05	2.1e−04	−4.33	D	9
10	$1s^22s^2$-$1s^22s8p$	^{1}S-^{1}P°		1364.08	0.000–73 309.7	1–3	4.29e−03	3.59e−04	1.61e−03	−3.445	C	9
11	$1s^22s^2$-$1s^22s9p$	^{1}S-^{1}P°		1356.68	0.000–73 709.4	1–3	3.70e−03	3.07e−04	1.37e−03	−3.51	C	9
12	$1s^22s2p$-$1s^22s3s$	^{3}P°-^{3}S	*3 321.2*	*3322.2*	*21 980.16*–52 080.94	9–3	1.53e+00	8.44e−02	8.31e+00	−0.119	B	7
			3 321.34	3322.30	21 981.27–52 080.94	5–3	8.50e−01	8.44e−02	4.62e+00	−0.375	B	7
			3 321.08	3322.04	21 978.925–52 080.94	3–3	5.10e−01	8.44e−02	2.77e+00	−0.597	B	7
			3 321.01	3321.97	21 978.28–52 080.94	1–3	1.70e−01	8.44e−02	9.23e−01	−1.074	B	7
13	$1s^22s2p$-$1s^22p^2$	^{3}P°-^{3}P	*2 650.6*	*2651.4*	*21 980.16–59 696.0*	9–9	4.23e+00	4.45e−01	3.50e+01	0.603	A	7
			2 650.62	2651.41	21 981.27–59 697.08	5–5	3.17e+00	3.34e−01	1.46e+01	0.223	A	7
			2 650.60	2651.38	21 978.925–59 695.07	3–3	1.06e+00	1.11e−01	2.92e+00	−0.476	A	7
			2 650.76	2651.55	21 981.27–59 695.07	5–3	1.76e+00	1.11e−01	4.86e+00	−0.254	A	7
			2 650.70	2651.48	21 978.925–59 693.65	3–1	4.23e+00	1.48e−01	3.89e+00	−0.351	A	7
			2 650.45	2651.24	21 978.925–59 697.08	3–5	1.06e+00	1.86e−01	4.86e+00	−0.254	A	7
			2 650.55	2651.34	21 978.28–59 695.07	1–3	1.41e+00	4.45e−01	3.89e+00	−0.351	A	7
14	$1s^22s2p$-$1s^22s3d$	^{3}P°-^{3}D	*2 494.7*	*2495.4*	*21 980.16–62 053.7*	9–15	1.93e+00	3.00e−01	2.22e+01	0.431	A	7
			2 494.73	2495.48	21 981.27–62 053.72	5–7	1.93e+00	2.52e−01	1.03e+01	0.100	A	7
			2 494.58	2495.33	21 978.925–62 053.72	3–5	1.44e+00	2.25e−01	5.54e+00	−0.171	A	7
			2 494.54	2495.29	21 978.28–62 053.72	1–3	1.07e+00	2.99e−01	2.46e+00	−0.524	A	7
			2 494.73	2495.48	21 981.27–62 053.72	5–5	4.81e−01	4.49e−02	1.85e+00	−0.648	A	7
			2 494.58	2495.33	21 978.925–62 053.72	3–3	8.02e−01	7.49e−02	1.85e+00	−0.649	A	7
			2 494.73	2495.48	21 981.27–62 053.72	5–3	5.35e−02	2.99e−03	1.23e−01	−1.825	A	7
15	$1s^22s2p$-$1s^22s4s$	^{3}P°-^{3}S	*2 350.8*	*2351.5*	*21 980.16*–64 506.45	9–3	4.22e−01	1.17e−02	8.1e−01	−0.98	C	9
			2 350.83	2351.55	21 981.27–64 506.45	5–3	2.35e−01	1.17e−02	4.52e−01	−1.234	C	9
			2 350.70	2351.42	21 978.925–64 506.45	3–3	1.41e−01	1.17e−02	2.71e−01	−1.456	C	9
			2 350.66	2351.38	21 978.28–64 506.45	1–3	4.68e−02	1.16e−02	9.0e−02	−1.93	C	9
16	$1s^22s2p$-$1s^22s4d$	^{3}P°-^{3}D	*2 175.1*	*2175.7*	*21 980.16–67 941.7*	9–15	8.13e−01	9.61e−02	6.20e+00	−0.063	B	9
			2 175.10	2175.79	21 981.27–67 941.66	5–7	8.13e−01	8.08e−02	2.89e+00	−0.394	B	9
			2 174.99	2175.68	21 978.925–67 941.66	3–5	6.09e−01	7.21e−02	1.55e+00	−0.665	B	9
			2 174.96	2175.65	21 978.28–67 941.66	1–3	4.51e−01	9.61e−02	6.88e−01	−1.017	B	9
			2 175.10	2175.79	21 981.27–67 941.66	5–5	2.03e−01	1.44e−02	5.17e−01	−1.142	B	9
			2 174.99	2175.68	21 978.925–67 941.66	3–3	3.39e−01	2.40e−02	5.16e−01	−1.142	B	9
			2 175.10	2175.79	21 981.27–67 941.66	5–3	2.26e−02	9.62e−04	3.45e−02	−2.318	B	9
17	$1s^22s2p$-$1s^22s5s$	^{3}P°-^{3}S	*2 125.6*	*2126.3*	*21 980.16*–69 010.20	9–3	1.82e−01	4.11e−03	2.59e−01	−1.432	C	9
			2 125.68	2126.35	21 981.27–69 010.20	5–3	1.01e−01	4.12e−03	1.44e−01	−1.69	C	9
			2 125.57	2126.24	21 978.925–69 010.20	3–3	6.1e−02	4.10e−03	8.6e−02	−1.91	C	9
			2 125.54	2126.22	21 978.28–69 010.20	1–3	2.02e−02	4.11e−03	2.88e−02	−2.386	C	9
18	$1s^22s2p$-$1s^22s5d$	^{3}P°-^{3}D	*2 056.0*	*2056.6*	*21 980.16–70 603.8*	9–15	4.11e−01	4.34e−02	2.65e+00	−0.408	B	9

TABLE 3. Be I: Allowed transitions—Continued

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
			2 056.00	2056.66	21 981.27–70 603.76	5–7	4.11e−01	3.65e−02	1.24e+00	−0.739	B	9
			2 055.90	2056.56	21 978.925–70 603.76	3–5	3.08e−01	3.26e−02	6.61e−01	−1.010	B	9
			2 055.88	2056.53	21 978.28–70 603.76	1–3	2.28e−01	4.34e−02	2.94e−01	−1.363	B	9
			2 056.00	2056.66	21 981.27–70 603.76	5–5	1.03e−01	6.52e−03	2.21e−01	−1.487	B	9
			2 055.90	2056.56	21 978.925–70 603.76	3–3	1.71e−01	1.09e−02	2.20e−01	−1.487	B	9
			2 056.00	2056.66	21 981.27–70 603.76	5–3	1.14e−02	4.35e−04	1.47e−02	−2.663	B	9
19	$1s^22s2p$-$1s^22s6s$	^{3}P°-^{3}S	*2 032.7*	*2033.3*	*21 980.16–*71 160.52	9–3	9.5e−02	1.97e−03	1.19e−01	−1.75	C	9
			2 032.72	2033.38	21 981.27–71 160.52	5–3	5.3e−02	1.97e−03	6.6e−02	−2.007	C	9
			2 032.63	2033.28	21 978.925–71 160.52	3–3	3.17e−02	1.96e−03	3.95e−02	−2.230	C	9
			2 032.60	2033.25	21 978.28–71 160.52	1–3	1.06e−02	1.97e−03	1.32e−02	−2.71	C	9
20	$1s^22s2p$-$1s^22s6d$	^{3}P°-^{3}D		*1998.0*	*21 980.16–72 029.5*	9–15	2.35e−01	2.35e−02	1.39e+00	−0.676	B	9
				1998.07	21 981.27–72 029.50	5–7	2.35e−01	1.97e−02	6.48e−01	−1.007	B	9
				1997.98	21 978.925–72 029.50	3–5	1.76e−01	1.76e−02	3.47e−01	−1.278	B	9
				1997.95	21 978.28–72 029.50	1–3	1.31e−01	2.34e−02	1.54e−01	−1.630	B	9
				1998.07	21 981.27–72 029.50	5–5	5.88e−02	3.52e−03	1.16e−01	−1.755	B	9
				1997.98	21 978.925–72 029.50	3–3	9.80e−02	5.86e−03	1.16e−01	−1.755	B	9
				1998.07	21 981.27–72 029.50	5–3	6.53e−03	2.35e−04	7.72e−03	−2.931	B	9
21	$1s^22s2p$-$1s^22s7s$	^{3}P°-^{3}S		*1985.1*	*21 980.16*–72 354.7	9–3	5.6e−02	1.10e−03	6.5e−02	−2.003	C	9
				1985.17	21 981.27–72 354.7	5–3	3.12e−02	1.11e−03	3.61e−02	−2.258	C	9
				1985.08	21 978.925–72 354.7	3–3	1.87e−02	1.10e−03	2.16e−02	−2.480	C	9
				1985.06	21 978.28–72 354.7	1–3	6.2e−03	1.10e−03	7.2e−03	−2.96	C	9
22	$1s^22s2p$-$1s^22s7d$	^{3}P°-^{3}D		*1964.6*	*21 980.16–72 880.9*	9–15	1.47e−01	1.42e−02	8.24e−01	−0.895	B	9
				1964.65	21 981.27–72 880.90	5–7	1.47e−01	1.19e−02	3.85e−01	−1.226	B	9
				1964.56	21 978.925–72 880.90	3–5	1.10e−01	1.06e−02	2.06e−01	−1.497	B	9
				1964.54	21 978.28–72 880.90	1–3	8.15e−02	1.42e−02	9.15e−02	−1.849	B	9
				1964.65	21 981.27–72 880.90	5–5	3.67e−02	2.12e−03	6.87e−02	−1.974	B	9
				1964.56	21 978.925–72 880.90	3–3	6.12e−02	3.54e−03	6.87e−02	−1.974	B	9
				1964.65	21 981.27–72 880.90	5–3	4.08e−03	1.42e−04	4.58e−03	−3.150	B	9
23	$1s^22s2p$-$1s^22s8s$	^{3}P°-^{3}S		*1956.6*	*21 980.16*–73 088.5	9–3	3.58e−02	6.8e−04	3.97e−02	−2.210	C	9
				1956.67	21 981.27–73 088.5	5–3	1.99e−02	6.9e−04	2.21e−02	−2.465	C	9
				1956.58	21 978.925–73 088.5	3–3	1.19e−02	6.8e−04	1.32e−02	−2.69	C	9
				1956.56	21 978.28–73 088.5	1–3	3.98e−03	6.8e−04	4.41e−03	−3.165	C	9
24	$1s^22s2p$-$1s^22s8d$	^{3}P°-^{3}D		*1943.7*	*21 980.16–73 429.3*	9–15	9.77e−02	9.22e−03	5.31e−01	−1.081	B	9
				1943.71	21 981.27–73 429.33	5–7	9.77e−02	7.75e−03	2.48e−01	−1.412	B	9
				1943.62	21 978.925–73 429.33	3–5	7.32e−02	6.91e−03	1.33e−01	−1.683	B	9
				1943.59	21 978.28–73 429.33	1–3	5.43e−02	9.22e−03	5.90e−02	−2.035	B	9
				1943.71	21 981.27–73 429.33	5–5	2.44e−02	1.38e−03	4.43e−02	−2.160	B	9
				1943.62	21 978.925–73 429.33	3–3	4.07e−02	2.31e−03	4.43e−02	−2.160	B	9
				1943.71	21 981.27–73 429.33	5–3	2.71e−03	9.23e−05	2.95e−03	−3.336	B	9
25	$1s^22s2p$-$1s^22s9d$	^{3}P°-^{3}D		*1929.7*	*21 980.16–73 802.6*	9–15	6.82e−02	6.35e−03	3.63e−01	−1.243	B	9
				1929.71	21 981.27–73 802.6	5–7	6.82e−02	5.33e−03	1.69e−01	−1.574	B	9
				1929.62	21 978.925–73 802.6	3–5	5.12e−02	4.76e−03	9.08e−02	−1.845	B	9
				1929.60	21 978.28–73 802.6	1–3	3.79e−02	6.35e−03	4.03e−02	−2.197	B	9
				1929.71	21 981.27–73 802.6	5–5	1.71e−02	9.53e−04	3.03e−02	−2.322	B	9
				1929.62	21 978.925–73 802.6	3–3	2.84e−02	1.59e−03	3.03e−02	−2.322	B	9
				1929.71	21 981.27–73 802.6	5–3	1.90e−03	6.35e−05	2.02e−03	−3.498	B	9
26	$1s^22s2p$-$1s^22s3s$	^{1}P°-^{1}S	8 254.07	8256.34	42 565.35–54 677.26	3–1	3.38e−01	1.15e−01	9.38e+00	−0.462	B	7

TABLE 3. Be I: Allowed transitions—Continued

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
27	$1s^22s2p$-$1s^22s3d$	$^1P°$-^1D	4 572.66	4573.95	42 565.35–64 428.31	3–5	7.61e−01	3.98e−01	1.80e+01	0.077	B	7
28	$1s^22s2p$-$1s^22s4s$	$^1P°$-^1S	4 407.94	4409.17	42 565.35–65 245.33	3–1	1.01e−01	9.80e−03	4.27e−01	−1.532	B	9
29	$1s^22s2p$-$1s^22s4d$	$^1P°$-^1D	3 813.45	3814.54	42 565.35–68 780.86	3–5	4.87e−01	1.77e−01	6.67e+00	−0.275	B	9
30	$1s^22s2p$-$1s^22s5s$	$^1P°$-^1S	3 736.30	3737.36	42 565.35–69 322.20	3–1	5.09e−02	3.55e−03	1.31e−01	−1.972	B	9
31	$1s^22s2p$-$1s^22s5d$	$^1P°$-^1D	3 515.54	3516.55	42 565.35–71 002.34	3–5	2.73e−01	8.45e−02	2.94e+00	−0.596	B	9
32	$1s^22s2p$-$1s^22s6s$	$^1P°$-^1S	3 476.56	3477.56	42 565.35–71 321.15	3–1	3.11e−02	1.88e−03	6.45e−02	−2.249	B	9
33	$1s^22s2p$-$1s^22s6d$	$^1P°$-^1D	3 367.63	3368.60	42 565.35–72 251.27	3–5	1.64e−01	4.66e−02	1.55e+00	−0.854	B	9
34	$1s^22s2p$-$1s^22s7s$	$^1P°$-^1S	3 345.43	3346.39	42 565.35–72 448.28	3–1	2.10e−02	1.18e−03	3.89e−02	−2.452	B	9
35	$1s^22s2p$-$1s^22s7d$	$^1P°$-^1D	3 282.91	3283.85	42 565.35–73 017.4	3–5	1.06e−01	2.85e−02	9.23e−01	−1.069	B	9
36	$1s^22s2p$-$1s^22s8s$	$^1P°$-^1S	3 269.04	3269.98	42 565.35–73 146.58	3–1	1.52e−02	8.11e−04	2.62e−02	−2.614	B	9
37	$1s^22s2p$-$1s^22s8d$	$^1P°$-^1D	3 229.62	3230.55	42 565.35–73 519.81	3–5	7.17e−02	1.87e−02	5.96e−01	−1.251	B	9
38	$1s^22s2p$-$1s^22s9s$	$^1P°$-^1S	3 220.39	3221.32	42 565.35–73 608.5	3–1	1.14e−02	5.92e−04	1.88e−02	−2.751	B	9
39	$1s^22s2p$-$1s^22s9d$	$^1P°$-^1D	3 193.83	3194.75	42 565.35–73 866.67	3–5	5.08e−02	1.29e−02	4.09e−01	−1.411	B	9
40	$1s^22s3s$-$1s^22s3p$	^3S-$^3P°$	14 644	6826.7 cm^{-1}	52 080.94–58 907.7	3–9	1.17e−01	1.13e+00	1.63e+02	0.528	B	7
			14 644.0	6826.89 cm^{-1}	52 080.94–58 907.83	3–5	1.17e−01	6.25e−01	9.05e+01	0.273	B	7
			14 644.8	6826.51 cm^{-1}	52 080.94–58 907.45	3–3	1.17e−01	3.75e−01	5.43e+01	0.051	B	7
			14 644.8	6826.51 cm^{-1}	52 080.94–58 907.45	3–1	1.17e−01	1.25e−01	1.81e+01	−0.426	B	7
41	$1s^22s3s$-$1s^22s4p$	^3S-$^3P°$	6 786.6	6788.4	52 080.94–66 811.9	3–9	1.70e−03	3.53e−03	2.37e−01	−1.98	C	9
			6 786.56	6788.43	52 080.94–66 811.88	3–5	1.7e−03	2.0e−03	1.3e−01	−2.229	D	9
			6 786.56	6788.43	52 080.94–66 811.88	3–3	1.7e−03	1.2e−03	7.9e−02	−2.454	D	9
			6 786.56	6788.43	52 080.94–66 811.88	3–1	1.7e−03	3.9e−04	2.6e−02	−2.93	D	9
42	$1s^22s3s$-$1s^22s3p$	^1S-$^1P°$	18 143.6	5510.08 cm^{-1}	54 677.26–60 187.34	1–3	6.46e−02	9.57e−01	5.72e+01	−0.019	B	7
43	$1s^22s3s$-$1s^22s4p$	^1S-$^1P°$	8 090.07	8092.29	54 677.26–67 034.70	1–3	3.29e−03	9.7e−03	2.58e−01	−2.014	C	9
44	$1s^22s3s$-$1s^22s5p$	^1S-$^1P°$	6 473.54	6475.33	54 677.26–70 120.49	1–3	7.7e−03	1.45e−02	3.09e−01	−1.84	C	9
45	$1s^22s3s$-$1s^22s6p$	^1S-$^1P°$	5 857.01	5858.63	54 677.26–71 746.09	1–3	7.0e−03	1.08e−02	2.08e−01	−1.97	C	9
46	$1s^22s3s$-$1s^22s7p$	^1S-$^1P°$	5 546.45	5547.99	54 677.26–72 701.8	1–3	5.4e−03	7.5e−03	1.38e−01	−2.122	C	9
47	$1s^22s3s$-$1s^22s8p$	^1S-$^1P°$	5 365.49	5366.98	54 677.26–73 309.7	1–3	3.65e−03	4.73e−03	8.4e−02	−2.325	C	9
48	$1s^22s3s$-$1s^22s9p$	^1S-$^1P°$	5 252.81	5254.27	54 677.26–73 709.4	1–3	3.12e−03	3.87e−03	6.7e−02	−2.412	C	9
49	$1s^22p^2$-$1s^22s4p$	^1D-$^1P°$	9 847.31	9850.01	56 882.43–67 034.70	5–3	5.2e−03	4.5e−03	7.3e−01	−1.65	D	9
50	$1s^22p^2$-$1s^22s4f$	^1D-$^3F°$										
			8 801.49	8803.91	56 882.43–68 241.02	5–7	5.1e−05	8.3e−05	1.2e−02	−3.38	D	9
51	$1s^22p^2$-$1s^22s4f$	^1D-$^1F°$	8 801.37	8803.79	56 882.43–68 241.18	5–7	9.58e−02	1.56e−01	2.26e+01	−0.108	B	9
52	$1s^22p^2$-$1s^22s5p$	^1D-$^1P°$	7 551.90	7553.98	56 882.43–70 120.49	5–3	4.3e−03	2.2e−03	2.7e−01	−1.96	D	9
53	$1s^22p^2$-$1s^22s5f$	^1D-$^3F°$										
			7 209.23	7211.21	56 882.43–70 749.72	5–7	1.63e−06	1.78e−06	2.11e−04	−5.051	C	9
54	$1s^22p^2$-$1s^22s5f$	^1D-$^1F°$	7 209.13	7211.12	56 882.43–70 749.90	5–7	5.71e−02	6.23e−02	7.39e+00	−0.507	B	9
55	$1s^22p^2$-$1s^22s6p$	^1D-$^1P°$	6 725.96	6727.82	56 882.43–71 746.09	5–3	3.1e−03	1.3e−03	1.4e−01	−2.20	D	9

TABLE 3. Be I: Allowed transitions—Continued

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
56	$1s^22p^2$-$1s^22s6f$	^1D-$^1F^\circ$	6 564.52	6566.34	56 882.43–72 111.62	5–7	3.49e−02	3.16e−02	3.41e+00	−0.802	B	9
57	$1s^22p^2$-$1s^22s7p$	^1D-$^3P^\circ$										
			6 321.41	6323.15	56 882.43–72 697.32	5–3	3.3e−07	1.2e−07	1.3e−05	−6.22	D	9
58	$1s^22p^2$-$1s^22s7p$	^1D-$^1P^\circ$	6 319.62	6321.36	56 882.43–72 701.8	5–3	2.2e−03	8.1e−04	8.4e−02	−2.39	D	9
59	$1s^22p^2$-$1s^22s7f$	^1D-$^1F^\circ$	6 229.11	6230.83	56 882.43–72 931.65	5–7	2.26e−02	1.84e−02	1.89e+00	−1.036	B	9
60	$1s^22p^2$-$1s^22s8p$	^1D-$^3P^\circ$										
			6 085.96	6087.64	56 882.43–73 309.15	5–3	1.9e−04	6.2e−05	6.3e−03	−3.51	D	9
61	$1s^22p^2$-$1s^22s8p$	^1D-$^1P^\circ$	6 085.75	6 087.44	56 882.43–73 309.7	5–3	1.4e−03	4.8e−04	4.8e−02	−2.62	D	9
62	$1s^22p^2$-$1s^22s9p$	^1D-$^1P^\circ$	5 941.19	5942.84	56 882.43–73 709.4	5–3	1.2e−03	3.8e−04	3.7e−02	−2.72	D	9
63	$1s^22s3p$-$1s^22s4s$	$^3P^\circ$-^3S	*17 856*	*5598.8* cm^{-1}	*58 907.7*–64 506.45	9–3	1.37e−01	2.18e−01	1.15e+02	0.292	B	9
			17 856.7	5598.62 cm^{-1}	58 907.83–64 506.45	5–3	7.59e−02	2.18e−01	6.41e+01	0.037	B	9
			17 855.5	5599.00 cm^{-1}	58 907.45–64 506.45	3–3	4.55e−02	2.18e−01	3.84e+01	−0.185	B	9
			17 855.5	5599.00 cm^{-1}	58 907.45–64 506.45	1–3	1.52e−02	2.18e−01	1.28e+01	−0.662	B	9
64	$1s^22s3p$-$1s^22s4d$	$^3P^\circ$-^3D	*11 066*	*9034.0* cm^{-1}	*58 907.7–67 941.7*	9–15	4.35e−02	1.33e−01	4.37e+01	0.079	B	9
			11 066.5	9033.83 cm^{-1}	58 907.83–67 941.66	5–7	4.36e−02	1.12e−01	2.04e+01	−0.252	B	9
			11 066.0	9034.21 cm^{-1}	58 907.45–67 941.66	3–5	3.26e−02	9.99e−02	1.09e+01	−0.523	B	9
			11 066.0	9034.21 cm^{-1}	58 907.45–67 941.66	1–3	2.41e−02	1.33e−01	4.84e+00	−0.877	B	9
			11 066.5	9033.83 cm^{-1}	58 907.83–67 941.66	5–5	1.09e−02	2.00e−02	3.65e+00	−1.000	B	9
			11 066.0	9034.21 cm^{-1}	58 907.45–67 941.66	3–3	1.81e−02	3.33e−02	3.64e+00	−1.001	B	9
			11 066.5	9033.83 cm^{-1}	58 907.83–67 941.66	5–3	1.21e−03	1.33e−03	2.43e−01	−2.177	B	9
65	$1s^22s3p$-$1s^22s5s$	$^3P^\circ$-^3S	*9 895.8*	*9898.5*	*58 907.7*–69 010.20	9–3	4.77e−02	2.33e−02	6.84e+00	−0.678	B	9
			9 895.95	9898.67	58 907.83–69 010.20	5–3	2.65e−02	2.33e−02	3.80e+00	−0.933	B	9
			9 895.58	9898.30	58 907.45–69 010.20	3–3	1.59e−02	2.33e−02	2.28e+00	−1.155	B	9
			9 895.58	9898.30	58 907.45–69 010.20	1–3	5.30e−03	2.33e−02	7.60e−01	−1.632	B	9
66	$1s^22s3p$-$1s^22s5d$	$^3P^\circ$-^3D	*8 547.5*	*8549.9*	*58 907.7–70 603.8*	9–15	3.14e−02	5.74e−02	1.45e+01	−0.287	B	9
			8 547.63	8549.98	58 907.83–70 603.76	5–7	3.14e−02	4.82e−02	6.79e+00	−0.618	B	9
			8 547.36	8549.70	58 907.45–70 603.76	3–5	2.36e−02	4.30e−02	3.63e+00	−0.889	B	9
			8 547.36	8549.70	58 907.45–70 603.76	1–3	1.74e−02	5.73e−02	1.61e+00	−1.242	B	9
			8 547.63	8549.98	58 907.83–70 603.76	5–5	7.86e−03	8.61e−03	1.21e+00	−1.366	B	9
			8 547.36	8549.70	58 907.45–70 603.76	3–3	1.31e−02	1.43e−02	1.21e+00	−1.367	B	9
			8 547.63	8549.98	58 907.83–70 603.76	5–3	8.73e−04	5.74e−04	8.08e−02	−2.542	B	9
67	$1s^22s3p$-$1s^22s6s$	$^3P^\circ$-^3S	*8 159.1*	*8161.4*	*58 907.7*–71 160.52	9–3	2.38e−02	7.92e−03	1.92e+00	−1.147	B	9
			8 159.23	8161.47	58 907.83–71 160.52	5–3	1.32e−02	7.92e−03	1.06e+00	−1.402	B	9
			8 158.98	8161.22	58 907.45–71 160.52	3–3	7.94e−03	7.92e−03	6.39e−01	−1.624	B	9
			8 158.98	8161.22	58 907.45–71 160.52	1–3	2.65e−03	7.92e−03	2.13e−01	−2.101	B	9
68	$1s^22s3p$-$1s^22s6d$	$^3P^\circ$-^3D	*7 618.8*	*7620.9*	*58 907.7–72 029.5*	9–15	2.02e−02	2.93e−02	6.62e+00	−0.579	B	9
			7 618.88	7620.98	58 907.83–72 029.50	5–7	2.02e−02	2.46e−02	3.09e+00	−0.910	B	9
			7 618.66	7620.76	58 907.45–72 029.50	3–5	1.51e−02	2.20e−02	1.65e+00	−1.181	B	9
			7 618.66	7620.76	58 907.45–72 029.50	1–3	1.12e−02	2.93e−02	7.34e−01	−1.534	B	9
			7 618.88	7620.98	58 907.83–72 029.50	5–5	5.05e−03	4.40e−03	5.52e−01	−1.658	B	9
			7 618.66	7620.76	58 907.45–72 029.50	3–3	8.41e−03	7.32e−03	5.51e−01	−1.658	B	9
			7 618.88	7620.98	58 907.83–72 029.50	5–3	5.61e−04	2.93e−04	3.68e−02	−2.834	B	9
69	$1s^22s3p$-$1s^22s7s$	$^3P^\circ$-^3S	*7 434.5*	*7436.6*	*58 907.7–72 354.7*	9–3	1.38e−02	3.80e−03	8.37e−01	−1.466	B	9

TABLE 3. Be I: Allowed transitions—Continued

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
			7 434.63	7436.67	58 907.83–72 354.7	5–3	7.64e−03	3.80e−03	4.65e−01	−1.721	B	9
			7 434.42	7436.46	58 907.45–72 354.7	3–3	4.59e−03	3.80e−03	2.79e−01	−1.943	B	9
			7 434.42	7436.46	58 907.45–72 354.7	1–3	1.53e−03	3.80e−03	9.31e−02	−2.420	B	9
70	$1s^22s3p$-$1s^22s7d$	^{3}P°-^{3}D	*7 154.6*	*7156.5*	*58 907.7–72 880.9*	9–15	1.33e−02	1.70e−02	3.62e+00	−0.814	B	9
			7 154.65	7156.62	58 907.83–72 880.90	5–7	1.33e−02	1.43e−02	1.69e+00	−1.145	B	9
			7 154.46	7156.43	58 907.45–72 880.90	3–5	9.99e−03	1.28e−02	9.04e−01	−1.416	B	9
			7 154.46	7156.43	58 907.45–72 880.90	1–3	7.39e−03	1.70e−02	4.01e−01	−1.769	B	9
			7 154.65	7156.62	58 907.83–72 880.90	5–5	3.33e−03	2.56e−03	3.01e−01	−1.893	B	9
			7 154.46	7156.43	58 907.45–72 880.90	3–3	5.55e−03	4.26e−03	3.01e−01	−1.894	B	9
			7 154.65	7156.62	58 907.83–72 880.90	5–3	3.70e−04	1.70e−04	2.01e−02	−3.069	B	9
71	$1s^22s3p$-$1s^22s8s$	^{3}P°-^{3}S	*7 049.8*	*7051.8*	*58 907.7–73 088.5*	9–3	8.70e−03	2.16e−03	4.51e−01	−1.711	B	9
			7 049.91	7051.85	58 907.83–73 088.5	5–3	4.83e−03	2.16e−03	2.51e−01	−1.966	B	9
			7 049.72	7051.66	58 907.45–73 088.5	3–3	2.90e−03	2.16e−03	1.51e−01	−2.188	B	9
			7 049.72	7051.66	58 907.45–73 088.5	1–3	9.66e−04	2.16e−03	5.02e−02	−2.665	B	9
72	$1s^22s3p$-$1s^22s8d$	^{3}P°-^{3}D	*6 884.4*	*6886.3*	*58 907.7–73 429.3*	9–15	9.15e−03	1.08e−02	2.21e+00	−1.011	B	9
			6 884.44	6886.34	58 907.83–73 429.33	5–7	9.16e−03	9.11e−03	1.03e+00	−1.341	B	9
			6 884.26	6886.16	58 907.45–73 429.33	3–5	6.86e−03	8.13e−03	5.53e−01	−1.613	B	9
			6 884.26	6886.16	58 907.45–73 429.33	1–3	5.08e−03	1.08e−02	2.45e−01	−1.966	B	9
			6 884.44	6886.34	58 907.83–73 429.33	5–5	2.29e−03	1.63e−03	1.84e−01	−2.090	B	9
			6 884.26	6886.16	58 907.45–73 429.33	3–3	3.81e−03	2.71e−03	1.84e−01	−2.090	B	9
			6 884.44	6886.34	58 907.83–73 429.33	5–3	2.54e−04	1.08e−04	1.23e−02	−3.266	B	9
73	$1s^22s3p$-$1s^22s9d$	^{3}P°-^{3}D	*6 711.8*	*6713.7*	*58 907.7–73 802.6*	9–15	6.52e−03	7.34e−03	1.46e+00	−1.180	B	9
			6 711.91	6713.77	58 907.83–73 802.6	5–7	6.52e−03	6.17e−03	6.82e−01	−1.511	B	9
			6 711.74	6713.59	58 907.45–73 802.6	3–5	4.89e−03	5.50e−03	3.65e−01	−1.782	B	9
			6 711.74	6713.59	58 907.45–73 802.6	1–3	3.62e−03	7.33e−03	1.62e−01	−2.135	B	9
			6 711.91	6713.77	58 907.83–73 802.6	5–5	1.63e−03	1.10e−03	1.22e−01	−2.259	B	9
			6 711.74	6713.59	58 907.45–73 802.6	3–3	2.71e−03	1.83e−03	1.22e−01	−2.259	B	9
			6 711.91	6713.77	58 907.83–73 802.6	5–3	1.81e−04	7.34e−05	8.11e−03	−3.435	B	9
74	$1s^22s3p$-$1s^22s3d$	^{1}P°-^{1}D	23 573.1	4240.97 cm^{-1}	60 187.34–64 428.31	3–5	4.89e−02	6.79e−01	1.58e+02	0.309	A	7
75	$1s^22s3p$-$1s^22s4s$	^{1}P°-^{1}S	19 765.3	5057.99 cm^{-1}	60 187.34–65 245.33	3–1	1.08e−01	2.12e−01	4.13e+01	−0.198	B	9
76	$1s^22s3p$-$1s^22s4d$	^{1}P°-^{1}D	11 633.5	8593.52 cm^{-1}	60 187.34–68 780.86	3–5	5.1e−03	1.74e−02	2.00e+00	−1.282	C	9
77	$1s^22s3p$-$1s^22s5s$	^{1}P°-^{1}S	10 944.1	9134.86 cm^{-1}	60 187.34–69 322.20	3–1	4.08e−02	2.44e−02	2.64e+00	−1.135	B	9
78	$1s^22s3p$-$1s^22s5d$	^{1}P°-^{1}D	9 243.88	9246.42	60 187.34–71 002.34	3–5	9.47e−03	2.02e−02	1.85e+00	−1.217	B	9
79	$1s^22s3p$-$1s^22s6s$	^{1}P°-^{1}S	8 979.19	8981.65	60 187.34–71 321.15	3–1	2.13e−02	8.59e−03	7.62e−01	−1.589	B	9
80	$1s^22s3p$-$1s^22s6d$	^{1}P°-^{1}D	8 286.90	8289.17	60 187.34–72 251.27	3–5	8.00e−03	1.37e−02	1.13e+00	−1.385	B	9
81	$1s^22s3p$-$1s^22s7s$	^{1}P°-^{1}S	8 153.74	8155.98	60 187.34–72 448.28	3–1	1.27e−02	4.22e−03	3.40e−01	−1.898	B	9
82	$1s^22s3p$-$1s^22s7d$	^{1}P°-^{1}D	7 792.05	7794.20	60 187.34–73 017.4	3–5	6.02e−03	9.13e−03	7.03e−01	−1.562	B	9
83	$1s^22s3p$-$1s^22s8s$	^{1}P°-^{1}S	7 714.38	7716.50	60 187.34–73 146.58	3–1	8.21e−03	2.44e−03	1.86e−01	−2.135	B	9
84	$1s^22s3p$-$1s^22s8d$	^{1}P°-^{1}D	7 498.42	7500.49	60 187.34–73 519.81	3–5	4.46e−03	6.27e−03	4.64e−01	−1.726	B	9
85	$1s^22s3p$-$1s^22s9s$	^{1}P°-^{1}S	7 448.87	7450.92	60 187.34–73 608.5	3–1	5.63e−03	1.56e−03	1.15e−01	−2.329	B	9
86	$1s^22s3p$-$1s^22s9d$	^{1}P°-^{1}D	7 308.29	7310.30	60 187.34–73 866.67	3–5	3.33e−03	4.45e−03	3.22e−01	−1.874	B	9
87	$1s^22s3d$-$1s^22s4p$	^{3}D-^{3}P°	*21 011*	*4758.2* cm^{-1}	*62 053.7–66 811.9*	15–9	2.03e−02	8.08e−02	8.39e+01	0.084	A	9
			21 010.8	4758.16 cm^{-1}	62 053.72–66 811.88	7–5	1.71e−02	8.08e−02	3.91e+01	−0.248	A	9

TABLE 3. Be I: Allowed transitions—Continued

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
			21 010.8	4758.16 cm^{-1}	62 053.72–66 811.88	5–3	1.53e−02	6.06e−02	2.10e+01	−0.518	A	9
			21 010.8	4758.16 cm^{-1}	62 053.72–66 811.88	3–1	2.04e−02	4.50e−02	9.34e+00	−0.870	A	9
			21 010.8	4758.16 cm^{-1}	62 053.72–66 811.88	5–5	3.05e−03	2.02e−02	6.99e+00	−0.996	A	9
			21 010.8	4758.16 cm^{-1}	62 053.72–66 811.88	3–3	5.09e−03	3.37e−02	7.00e+00	−0.995	A	9
			21 010.8	4758.16 cm^{-1}	62 053.72–66 811.88	3–5	2.04e−04	2.25e−03	4.66e−01	−2.171	A	9
88	$1s^22s3d$-$1s^22s4f$	^{3}D-^{3}F°										
			16 157.7	6187.30 cm^{-1}	62 053.72–68 241.02	5–7	1.42e−01	7.77e−01	2.07e+02	0.589	A	9
			16 157.7	6187.30 cm^{-1}	62 053.72–68 241.02	3–5	1.34e−01	8.75e−01	1.40e+02	0.419	A	9
			16 157.7	6187.30 cm^{-1}	62 053.72–68 241.02	7–7	1.77e−02	6.94e−02	2.58e+01	−0.314	A	9
			16 157.7	6187.30 cm^{-1}	62 053.72–68 241.02	5–5	2.48e−02	9.72e−02	2.59e+01	−0.313	A	9
			16 157.7	6187.30 cm^{-1}	62 053.72–68 241.02	7–5	7.09e−04	1.98e−03	7.39e−01	−1.858	A	9
89	$1s^22s3d$-$1s^22s4f$	^{3}D-^{1}F°										
			16 157.3	6187.46 cm^{-1}	62 053.72–68 241.18	7–7	9.46e−06	3.70e−05	1.38e−02	−3.586	B	9
			16 157.3	6187.46 cm^{-1}	62 053.72–68 241.18	5–7	7.49e−05	4.11e−04	1.09e−01	−2.687	B	9
90	$1s^22s3d$-$1s^22s5p$	^{3}D-^{3}P°	*12 478*	*8011.7* cm^{-1}	*62 053.7–70 065.4*	15–9	8.07e−03	1.13e−02	6.97e+00	−0.771	B	9
			12 478.4	8011.68 cm^{-1}	62 053.72–70 065.40	7–5	6.77e−03	1.13e−02	3.25e+00	−1.102	B	9
			12 478.4	8011.68 cm^{-1}	62 053.72–70 065.40	5–3	6.05e−03	8.48e−03	1.74e+00	−1.373	B	9
			12 478.4	8011.68 cm^{-1}	62 053.72–70 065.40	3–1	8.07e−03	6.29e−03	7.75e−01	−1.725	B	9
			12 478.4	8011.68 cm^{-1}	62 053.72–70 065.40	5–5	1.21e−03	2.82e−03	5.80e−01	−1.850	B	9
			12 478.4	8011.68 cm^{-1}	62 053.72–70 065.40	3–3	2.02e−03	4.71e−03	5.81e−01	−1.850	B	9
			12 478.4	8011.68 cm^{-1}	62 053.72–70 065.40	3–5	8.07e−05	3.14e−04	3.87e−02	−3.026	B	9
91	$1s^22s3d$-$1s^22s5f$	^{3}D-^{3}F°										
			11 496.4	8696.00 cm^{-1}	62 053.72–70 749.72	5–7	5.17e−02	1.43e−01	2.72e+01	−0.144	B	9
			11 496.4	8696.00 cm^{-1}	62 053.72–70 749.72	3–5	4.88e−02	1.61e−01	1.83e+01	−0.315	B	9
			11 496.4	8696.00 cm^{-1}	62 053.72–70 749.72	7–7	6.46e−03	1.28e−02	3.39e+00	−1.047	B	9
			11 496.4	8696.00 cm^{-1}	62 053.72–70 749.72	5–5	9.04e−03	1.79e−02	3.39e+00	−1.047	B	9
			11 496.4	8696.00 cm^{-1}	62 053.72–70 749.72	7–5	2.58e−04	3.66e−04	9.70e−02	−2.591	B	9
92	$1s^22s3d$-$1s^22s5f$	^{3}D-^{1}F°										
			11 496.2	8696.18 cm^{-1}	62 053.72–70 749.90	5–7	1.47e−06	4.08e−06	7.72e−04	−4.691	B	9
93	$1s^22s3d$-$1s^22s6p$	^{3}D-^{3}P°	*10 331*	*9676.9* cm^{-1}	*62 053.7–71 730.6*	15–9	4.18e−03	4.02e−03	2.05e+00	−1.220	B	9
			10 331.1	9676.90 cm^{-1}	62 053.72–71 730.62	7–5	3.51e−03	4.02e−03	9.56e−01	−1.551	B	9
			10 331.1	9676.90 cm^{-1}	62 053.72–71 730.62	5–3	3.14e−03	3.01e−03	5.13e−01	−1.822	B	9
			10 331.1	9676.90 cm^{-1}	62 053.72–71 730.62	3–1	4.19e−03	2.23e−03	2.28e−01	−2.174	B	9
			10 331.1	9676.90 cm^{-1}	62 053.72–71 730.62	5–5	6.27e−04	1.00e−03	1.71e−01	−2.299	B	9
			10 331.1	9676.90 cm^{-1}	62 053.72–71 730.62	3–3	1.05e−03	1.68e−03	1.71e−01	−2.299	B	9
			10 331.1	9676.90 cm^{-1}	62 053.72–71 730.62	3–5	4.18e−05	1.12e−04	1.14e−02	−3.475	B	9
94	$1s^22s3d$-$1s^22s6f$	^{3}D-^{3}F°										
			9 939.78	9942.50	62 053.72–72 111.55	5–7	2.51e−02	5.22e−02	8.54e+00	−0.584	B	9
			9 939.78	9942.50	62 053.72–72 111.55	3–5	2.38e−02	5.87e−02	5.76e+00	−0.754	B	9
			9 939.78	9942.50	62 053.72–72 111.55	7–7	3.14e−03	4.66e−03	1.07e+00	−1.487	B	9
			9 939.78	9942.50	62 053.72–72 111.55	5–5	4.40e−03	6.52e−03	1.07e+00	−1.487	B	9
			9 939.78	9942.50	62 053.72–72 111.55	7–5	1.26e−04	1.33e−04	3.05e−02	−3.031	B	9
95	$1s^22s3d$-$1s^22s7p$	^{3}D-^{3}P°	*9 392.7*	*9395.3*	*62 053.7–72 697.3*	15–9	2.47e−03	1.96e−03	9.11e−01	−1.531	B	9
			9 392.74	9395.32	62 053.72–72 697.32	7–5	2.08e−03	1.96e−03	4.25e−01	−1.862	B	9
			9 392.74	9395.32	62 053.72–72 697.32	5–3	1.86e−03	1.47e−03	2.28e−01	−2.133	B	9
			9 392.74	9395.32	62 053.72–72 697.32	3–1	2.47e−03	1.09e−03	1.01e−01	−2.485	B	9
			9 392.74	9395.32	62 053.72–72 697.32	5–5	3.71e−04	4.91e−04	7.59e−02	−2.610	B	9

TABLE 3. Be I: Allowed transitions—Continued

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
			9 392.74	9395.32	62 053.72–72 697.32	3–3	6.19e−04	8.19e−04	7.60e−02	−2.610	B	9
			9 392.74	9395.32	62 053.72–72 697.32	3–5	2.47e−05	5.46e−05	5.06e−03	−3.786	B	9
96	$1s^22s3d$-$1s^22s7f$	^{3}D-^{3}F°										
			9 190.45	9192.97	62 053.72–72 931.60	5–7	1.43e−02	2.53e−02	3.84e+00	−0.897	A	9
			9 190.45	9192.97	62 053.72–72 931.60	3–5	1.35e−02	2.85e−02	2.59e+00	−1.068	A	9
			9 190.45	9192.97	62 053.72–72 931.60	7–7	1.79e−03	2.26e−03	4.80e−01	−1.800	A	9
			9 190.45	9192.97	62 053.72–72 931.60	5–5	2.50e−03	3.17e−03	4.79e−01	−1.800	A	9
			9 190.45	9192.97	62 053.72–72 931.60	7–5	7.15e−05	6.47e−05	1.37e−02	−3.344	A	9
97	$1s^22s3d$-$1s^22s8p$	^{3}D-^{3}P°	*8 882.2*	*8884.6*	*62 053.7–73 309.2*	15–9	1.53e−03	1.09e−03	4.77e−01	−1.788	B	9
			8 882.16	8884.60	62 053.72–73 309.15	7–5	1.34e−03	1.13e−03	2.31e−01	−2.102	B	9
			8 882.16	8884.60	62 053.72–73 309.15	5–3	1.06e−03	7.50e−04	1.10e−01	−2.426	B	9
			8 882.16	8884.60	62 053.72–73 309.15	3–1	1.59e−03	6.28e−04	5.51e−02	−2.725	B	9
			8 882.16	8884.60	62 053.72–73 309.15	5–5	2.39e−04	2.82e−04	4.13e−02	−2.850	B	9
			8 882.16	8884.60	62 053.72–73 309.15	3–3	3.52e−04	4.17e−04	3.66e−02	−2.903	B	9
			8 882.16	8884.60	62 053.72–73 309.15	3–5	1.59e−05	3.14e−05	2.75e−03	−4.026	B	9
98	$1s^22s3d$-$1s^22s8p$	^{3}D-^{1}P°										
			8 881.73	8884.17	62 053.72–73 309.7	5–3	1.37e−04	9.72e−05	1.42e−02	−3.313	B	9
			8 881.73	8884.17	62 053.72–73 309.7	3–3	4.57e−05	5.41e−05	4.75e−03	−3.790	B	9
99	$1s^22s3d$-$1s^22s4f$	^{1}D-^{3}F°										
			26 220.9	3812.71 cm^{-1}	64 428.31–68 241.02	5–7	3.75e−05	5.42e−04	2.34e−01	−2.567	B	9
100	$1s^22s3d$-$1s^22s4f$	^{1}D-^{1}F°	26 219.8	3812.87 cm^{-1}	64 428.31–68 241.18	5–7	7.09e−02	1.02e+00	4.42e+02	0.709	B	9
101	$1s^22s3d$-$1s^22s5p$	^{1}D-^{1}P°	17 563.2	5692.18 cm^{-1}	64 428.31–70 120.49	5–3	5.5e−03	1.52e−02	4.39e+00	−1.119	C	9
102	$1s^22s3d$-$1s^22s5f$	^{1}D-^{3}F°										
			15 814.9	6321.41 cm^{-1}	64 428.31–70 749.72	5–7	2.09e−07	1.10e−06	2.86e−04	−5.260	B	9
103	$1s^22s3d$-$1s^22s5f$	^{1}D-^{1}F°	15 814.5	6321.59 cm^{-1}	64 428.31–70 749.90	5–7	7.33e−03	3.85e−02	1.00e+01	−0.716	B	9
104	$1s^22s3d$-$1s^22s6p$	^{1}D-^{1}P°	13 661.6	7317.78 cm^{-1}	64 428.31–71 746.09	5–3	3.02e−03	5.07e−03	1.14e+00	−1.60	C	9
105	$1s^22s3d$-$1s^22s6f$	^{1}D-^{1}F°	13 011.7	7683.31 cm^{-1}	64 428.31–72 111.62	5–7	1.48e−03	5.26e−03	1.13e+00	−1.580	B	9
106	$1s^22s3d$-$1s^22s7p$	^{1}D-^{1}P°	12 083.5	8273.5 cm^{-1}	64 428.31–72 701.8	5–3	1.87e−03	2.46e−03	4.90e−01	−1.91	C	9
107	$1s^22s3d$-$1s^22s7f$	^{1}D-^{1}F°	11 756.9	8503.34 cm^{-1}	64 428.31–72 931.65	5–7	4.05e−04	1.17e−03	2.27e−01	−2.231	B	9
108	$1s^22s3d$-$1s^22s8p$	^{1}D-^{3}P°										
			11 257.1	8880.84 cm^{-1}	64 428.31–73 309.15	5–3	1.43e−04	1.63e−04	3.03e−02	−3.088	C	9
109	$1s^22s3d$-$1s^22s8p$	^{1}D-^{1}P°	11 256.4	8881.4 cm^{-1}	64 428.31–73 309.7	5–3	1.10e−03	1.26e−03	2.33e−01	−2.201	C	9
110	$1s^22s3d$-$1s^22s9p$	^{1}D-^{1}P°	10 771.6	9281.1 cm^{-1}	64 428.31–73 709.4	5–3	8.7e−04	9.1e−04	1.61e−01	−2.343	C	9
111	$1s^22s4s$-$1s^22s5p$	^{3}S-^{3}P°	17 984	5559.0 cm^{-1}	64 506.45–70 065.4	3–9	1.0e−03	1.45e−02	2.58e+00	−1.361	C	9
			17 984.1	5558.95 cm^{-1}	64 506.45–70 065.40	3–5	1.00e−03	8.1e−03	1.44e+00	−1.62	C	9
			17 984.1	5558.95 cm^{-1}	64 506.45–70 065.40	3–3	1.0e−03	4.84e−03	8.6e−01	−1.84	C	9
			17 984.1	5558.95 cm^{-1}	64 506.45–70 065.40	3–1	9.9e−04	1.61e−03	2.86e−01	−2.317	C	9
112	$1s^22s4s$-$1s^22s6p$	^{3}S-^{3}P°	13 839	7224.2 cm^{-1}	64 506.45–71 730.6	3–9	1.7e−04	1.5e−03	2.0e−01	−2.36	D	9
			13 838.6	7224.17 cm^{-1}	64 506.45–71 730.62	3–5	1.7e−04	8.1e−04	1.1e−01	−2.61	D	9
			13 838.6	7224.17 cm^{-1}	64 506.45–71 730.62	3–3	1.7e−04	4.8e−04	6.6e−02	−2.84	D	9
			13 838.6	7224.17 cm^{-1}	64 506.45–71 730.62	3–1	1.7e−04	1.6e−04	2.2e−02	−3.32	D	9

TABLE 3. Be I: Allowed transitions—Continued

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
113	$1s^22s4s$-$1s^22s5p$	^{1}S-^{1}P°	20 506.5	4875.16 cm^{-1}	65 245.33–70 120.49	1–3	8.8e−05	1.67e−03	1.13e−01	−2.78	C	9
114	$1s^22s4s$-$1s^22s6p$	^{1}S-^{1}P°	15 378.6	6500.76 cm^{-1}	65 245.33–71 746.09	1–3	4.76e−04	5.1e−03	2.57e−01	−2.295	C	9
115	$1s^22s4s$-$1s^22s7p$	^{1}S-^{1}P°	13 407.5	7456.5 cm^{-1}	65 245.33–72 701.8	1–3	5.1e−04	4.17e−03	1.84e−01	−2.380	C	9
116	$1s^22s4s$-$1s^22s8p$	^{1}S-^{3}P°										
			12 397.7	8063.82 cm^{-1}	65 245.33–73 309.15	1–3	5.1e−05	3.53e−04	1.44e−02	−3.453	C	9
117	$1s^22s4s$-$1s^22s8p$	^{1}S-^{1}P°	12 396.8	8064.4 cm^{-1}	65 245.33–73 309.7	1–3	3.91e−04	2.71e−03	1.11e−01	−2.57	C	9
118	$1s^22s4s$-$1s^22s9p$	^{1}S-^{1}P°	11 811.4	8464.1 cm^{-1}	65 245.33–73 709.4	1–3	3.56e−04	2.23e−03	8.7e−02	−2.65	C	9
119	$1s^22s4p$-$1s^22s5d$	^{3}P°-^{3}D	*26 365*	*3791.9* cm^{-1}	*66 811.9–70 603.8*	9–15	4.84e−03	8.41e−02	6.57e+01	−0.121	B	9
			26 364.9	3791.88 cm^{-1}	66 811.88–70 603.76	5–7	4.85e−03	7.07e−02	3.07e+01	−0.451	B	9
			26 364.9	3791.88 cm^{-1}	66 811.88–70 603.76	3–5	3.63e−03	6.30e−02	1.64e+01	−0.723	B	9
			26 364.9	3791.88 cm^{-1}	66 811.88–70 603.76	1–3	2.68e−03	8.38e−02	7.28e+00	−1.077	B	9
			26 364.9	3791.88 cm^{-1}	66 811.88–70 603.76	5–5	1.21e−03	1.26e−02	5.48e+00	−1.200	B	9
			26 364.9	3791.88 cm^{-1}	66 811.88–70 603.76	3–3	2.01e−03	2.10e−02	5.46e+00	−1.201	B	9
			26 364.9	3791.88 cm^{-1}	66 811.88–70 603.76	5–3	1.34e−04	8.40e−04	3.65e−01	−2.377	B	9
120	$1s^22s4p$-$1s^22s6s$	^{3}P°-^{3}S	*22 989*	*4348.6* cm^{-1}	*66 811.9*–71 160.52	9–3	1.30e−02	3.42e−02	2.33e+01	−0.511	B	9
			22 989.4	4348.64 cm^{-1}	66 811.88–71 160.52	5–3	7.20e−03	3.42e−02	1.30e+01	−0.767	B	9
			22 989.4	4348.64 cm^{-1}	66 811.88–71 160.52	3–3	4.32e−03	3.42e−02	7.78e+00	−0.988	B	9
			22 989.4	4348.64 cm^{-1}	66 811.88–71 160.52	1–3	1.44e−03	3.42e−02	2.59e+00	−1.466	B	9
121	$1s^22s4p$-$1s^22s6d$	^{3}P°-^{3}D	*19 161*	*5217.6* cm^{-1}	*66 811.9–72 029.5*	9–15	4.50e−03	4.13e−02	2.35e+01	−0.430	B	9
			19 160.6	5217.62 cm^{-1}	66 811.88–72 029.50	5–7	4.51e−03	3.47e−02	1.10e+01	−0.760	B	9
			19 160.6	5217.62 cm^{-1}	66 811.88–72 029.50	3–5	3.38e−03	3.10e−02	5.87e+00	−1.032	B	9
			19 160.6	5217.62 cm^{-1}	66 811.88–72 029.50	1–3	2.49e−03	4.12e−02	2.60e+00	−1.385	B	9
			19 160.6	5217.62 cm^{-1}	66 811.88–72 029.50	5–5	1.13e−03	6.20e−03	1.96e+00	−1.508	B	9
			19 160.6	5217.62 cm^{-1}	66 811.88–72 029.50	3–3	1.87e−03	1.03e−02	1.95e+00	−1.510	B	9
			19 160.6	5217.62 cm^{-1}	66 811.88–72 029.50	5–3	1.25e−04	4.13e−04	1.30e−01	−2.685	B	9
122	$1s^22s4p$-$1s^22s7s$	^{3}P°-^{3}S	*18 036*	*5542.8* cm^{-1}	*66 811.9*–72 354.7	9–3	7.04e−03	1.14e−02	6.12e+00	−0.987	B	9
			18 036.4	5542.8 cm^{-1}	66 811.88–72 354.7	5–3	3.91e−03	1.14e−02	3.40e+00	−1.242	B	9
			18 036.4	5542.8 cm^{-1}	66 811.88–72 354.7	3–3	2.35e−03	1.14e−02	2.04e+00	−1.464	B	9
			18 036.4	5542.8 cm^{-1}	66 811.88–72 354.7	1–3	7.82e−04	1.14e−02	6.80e−01	−1.941	B	9
123	$1s^22s4p$-$1s^22s7d$	^{3}P°-^{3}D	*16 473*	*6069.0* cm^{-1}	*66 811.9–72 880.9*	9–15	3.33e−03	2.26e−02	1.10e+01	−0.692	B	9
			16 472.6	6069.02 cm^{-1}	66 811.88–72 880.90	5–7	3.33e−03	1.90e−02	5.15e+00	−1.023	B	9
			16 472.6	6069.02 cm^{-1}	66 811.88–72 880.90	3–5	2.50e−03	1.69e−02	2.76e+00	−1.294	B	9
			16 472.6	6069.02 cm^{-1}	66 811.88–72 880.90	1–3	1.84e−03	2.25e−02	1.22e+00	−1.647	B	9
			16 472.6	6069.02 cm^{-1}	66 811.88–72 880.90	5–5	8.33e−04	3.39e−03	9.19e−01	−1.771	B	9
			16 472.6	6069.02 cm^{-1}	66 811.88–72 880.90	3–3	1.39e−03	5.64e−03	9.18e−01	−1.772	B	9
			16 472.6	6069.02 cm^{-1}	66 811.88–72 880.90	5–3	9.24e−05	2.26e−04	6.12e−02	−2.947	B	9
124	$1s^22s4p$-$1s^22s8s$	^{3}P°-^{3}S	*15 928*	*6276.6* cm^{-1}	*66 811.9*–73 088.5	9–3	4.33e−03	5.49e−03	2.59e+00	−1.306	B	9
			15 927.8	6276.6 cm^{-1}	66 811.88–73 088.5	5–3	2.41e−03	5.49e−03	1.44e+00	−1.561	B	9
			15 927.8	6276.6 cm^{-1}	66 811.88–73 088.5	3–3	1.44e−03	5.49e−03	8.65e−01	−1.783	B	9
			15 927.8	6276.6 cm^{-1}	66 811.88–73 088.5	1–3	4.81e−04	5.49e−03	2.88e−01	−2.260	B	9
125	$1s^22s4p$-$1s^22s8d$	^{3}P°-^{3}D	*15 108*	*3617.4* cm^{-1}	*66 811.9–73 429.3*	9–15	2.41e−03	1.38e−02	6.16e+00	−0.907	B	9
			15 107.4	6617.45 cm^{-1}	66 811.88–73 429.33	5–7	2.41e−03	1.16e−02	2.88e+00	−1.238	B	9
			15 107.4	6617.45 cm^{-1}	66 811.88–73 429.33	3–5	1.81e−03	1.03e−02	1.54e+00	−1.510	B	9
			15 107.4	6617.45 cm^{-1}	66 811.88–73 429.33	1–3	1.34e−03	1.37e−02	6.83e−01	−1.863	B	9

TABLE 3. Be I: Allowed transitions—Continued

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
			15 107.4	6617.45 cm^{-1}	66 811.88–73 429.33	5–5	6.03e−04	2.06e−03	5.13e−01	−1.986	B	9
			15 107.4	6617.45 cm^{-1}	66 811.88–73 429.33	3–3	1.00e−03	3.43e−03	5.13e−01	−1.987	B	9
			15 107.4	6617.45 cm^{-1}	66 811.88–73 429.33	5–3	6.69e−05	1.37e−04	3.42e−02	−3.163	B	9
126	$1s^22s4p$-$1s^22s9d$	$^3P^\circ$-^3D	*14 301*	*6990.7* cm^{-1}	*66 811.9–73 802.6*	9–15	1.77e−03	9.04e−03	3.83e+00	−1.089	B	9
			14 300.8	6990.7 cm^{-1}	66 811.88–73 802.6	5–7	1.77e−03	7.60e−03	1.79e+00	−1.420	B	9
			14 300.8	6990.7 cm^{-1}	66 811.88–73 802.6	3–5	1.33e−03	6.78e−03	9.58e−01	−1.692	B	9
			14 300.8	6990.7 cm^{-1}	66 811.88–73 802.6	1–3	9.81e−04	9.02e−03	4.25e−01	−2.045	B	9
			14 300.8	6990.7 cm^{-1}	66 811.88–73 802.6	5–5	4.42e−04	1.36e−03	3.20e−01	−2.168	B	9
			14 300.8	6990.7 cm^{-1}	66 811.88–73 802.6	3–3	7.36e−04	2.26e−03	3.19e−01	−2.169	B	9
			14 300.8	6990.7 cm^{-1}	66 811.88–73 802.6	5–3	4.91e−05	9.04e−05	2.13e−02	−3.345	B	9
127	$1s^22s4p$-$1s^22s5d$	$^1P^\circ$-^1D	25 197.0	3967.64 cm^{-1}	67 034.70–71 002.34	3–5	4.2e−05	6.7e−04	1.7e−01	−2.70	D	9
128	$1s^22s4p$-$1s^22s6s$	$^1P^\circ$-^1S	23 323.0	4286.45 cm^{-1}	67 034.70–71 321.15	3–1	1.33e−02	3.61e−02	8.32e+00	−0.965	B	9
129	$1s^22s4p$-$1s^22s6d$	$^1P^\circ$-^1D	19 164.5	5216.57 cm^{-1}	67 034.70–72 251.27	3–5	1.9e−04	1.8e−03	3.3e−01	−2.28	D	9
130	$1s^22s4p$-$1s^22s7s$	$^1P^\circ$-^1S	18 467.0	5413.58 cm^{-1}	67 034.70–72 448.28	3–1	7.45e−03	1.27e−02	2.32e+00	−1.419	B	9
131	$1s^22s4p$-$1s^22s7d$	$^1P^\circ$-^1D	16 710.3	5982.7 cm^{-1}	67 034.70–73 017.4	3–5	3.36e−04	2.35e−03	3.88e−01	−2.152	C	9
132	$1s^22s4p$-$1s^22s8s$	$^1P^\circ$-^1S	16 357.1	6111.88 cm^{-1}	67 034.70–73 146.58	3–1	4.67e−03	6.25e−03	1.01e+00	−1.727	B	9
133	$1s^22s4p$-$1s^22s8d$	$^1P^\circ$-^1D	15 415.7	6485.11 cm^{-1}	67 034.70–73 519.81	3–5	3.44e−04	2.04e−03	3.11e−01	−2.213	B	9
134	$1s^22s4p$-$1s^22s9s$	$^1P^\circ$-^1S	15 207.7	6573.8 cm^{-1}	67 034.70–73 608.5	3–1	3.14e−03	3.63e−03	5.46e−01	−1.963	B	9
135	$1s^22s4p$-$1s^22s9d$	$^1P^\circ$-^1D	14 633.1	6831.97 cm^{-1}	67 034.70–73 866.67	3–5	3.04e−04	1.63e−03	2.35e−01	−2.311	B	9
136	$1s^22s4d$-$1s^22s6p$	^3D-$^3P^\circ$	*26 385*	*3789.0* cm^{-1}	*67 941.7–71 730.6*	15–9	3.79e−03	2.38e−02	3.10e+01	−0.448	B	9
			26 385.3	3788.96 cm^{-1}	67 941.66–71 730.62	7–5	3.19e−03	2.38e−02	1.45e+01	−0.779	B	9
			26 385.3	3788.96 cm^{-1}	67 941.66–71 730.62	5–3	2.85e−03	1.78e−02	7.75e+00	−1.050	B	9
			26 385.3	3788.96 cm^{-1}	67 941.66–71 730.62	3–1	3.80e−03	1.32e−02	3.45e+00	−1.402	B	9
			26 385.3	3788.96 cm^{-1}	67 941.66–71 730.62	5–5	5.69e−04	5.94e−03	2.58e+00	−1.527	B	9
			26 385.3	3788.96 cm^{-1}	67 941.66–71 730.62	3–3	9.50e−04	9.92e−03	2.59e+00	−1.526	B	9
			26 385.3	3788.96 cm^{-1}	67 941.66–71 730.62	3–5	3.80e−05	6.61e−04	1.72e−01	−2.703	B	9
137	$1s^22s4d$-$1s^22s6f$	^3D-$^3F^\circ$										
			23 974.9	4169.89 cm^{-1}	67 941.66–72 111.55	5–7	1.29e−02	1.55e−01	6.13e+01	−0.110	B	9
			23 974.9	4169.89 cm^{-1}	67 941.66–72 111.55	3–5	1.22e−02	1.75e−01	4.14e+01	−0.281	B	9
			23 974.9	4169.89 cm^{-1}	67 941.66–72 111.55	7–7	1.61e−03	1.39e−02	7.66e+00	−1.013	B	9
			23 974.9	4169.89 cm^{-1}	67 941.66–72 111.55	5–5	2.25e−03	1.94e−02	7.66e+00	−1.013	B	9
			23 974.9	4169.89 cm^{-1}	67 941.66–72 111.55	7–5	6.43e−05	3.96e−04	2.19e−01	−2.557	B	9
138	$1s^22s4d$-$1s^22s7p$	^3D-$^3P^\circ$	*21 022*	*4755.7* cm^{-1}	*67 941.7–72 697.3*	15–9	2.12e−03	8.44e−03	8.76e+00	−0.898	B	9
			21 021.8	4755.66 cm^{-1}	67 941.66–72 697.32	7–5	1.78e−03	8.43e−03	4.09e+00	−1.229	B	9
			21 021.8	4755.66 cm^{-1}	67 941.66–72 697.32	5–3	1.59e−03	6.33e−03	2.19e+00	−1.500	B	9
			21 021.8	4755.66 cm^{-1}	67 941.66–72 697.32	3–1	2.12e−03	4.69e−03	9.75e−01	−1.851	B	9
			21 021.8	4755.66 cm^{-1}	67 941.66–72 697.32	5–5	3.18e−04	2.11e−03	7.30e−01	−1.977	B	9
			21 021.8	4755.66 cm^{-1}	67 941.66–72 697.32	3–3	5.31e−04	3.52e−03	7.31e−01	−1.977	B	9
			21 021.8	4755.66 cm^{-1}	67 941.66–72 697.32	3–5	2.12e−05	2.34e−04	4.87e−02	−3.153	B	9
139	$1s^22s4d$-$1s^22s7f$	^3D-$^3F^\circ$										
			20 034.9	4989.94 cm^{-1}	67 941.66–72 931.60	5–7	7.68e−03	6.48e−02	2.14e+01	−0.490	B	9
			20 034.9	4989.94 cm^{-1}	67 941.66–72 931.60	3–5	7.26e−03	7.29e−02	1.44e+01	−0.660	B	9
			20 034.9	4989.94 cm^{-1}	67 941.66–72 931.60	7–7	9.60e−04	5.78e−03	2.67e+00	−1.393	B	9
			20 034.9	4989.94 cm^{-1}	67 941.66–72 931.60	5–5	1.34e−03	8.09e−03	2.67e+00	−1.393	B	9
			20 034.9	4989.94 cm^{-1}	67 941.66–72 931.60	7–5	3.84e−05	1.65e−04	7.63e−02	−2.937	B	9

TABLE 3. Be I: Allowed transitions—Continued

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
140	$1s^22s4d$-$1s^22s8p$	^{3}D-^{3}P°	*18 626*	*5367.5* cm^{-1}	*67 941.7–73 309.2*	15–9	1.27e−03	3.98e−03	3.66e+00	−1.224	B	9
			18 625.6	5367.49 cm^{-1}	67 941.66–73 309.15	7–5	1.11e−03	4.13e−03	1.77e+00	−1.539	B	9
			18 625.6	5367.49 cm^{-1}	67 941.66–73 309.15	5–3	8.79e−04	2.75e−03	8.42e−01	−1.862	B	9
			18 625.6	5367.49 cm^{-1}	67 941.66–73 309.15	3–1	1.33e−03	2.30e−03	4.23e−01	−2.161	B	9
			18 625.6	5367.49 cm^{-1}	67 941.66–73 309.15	5–5	1.98e−04	1.03e−03	3.17e−01	−2.287	B	9
			18 625.6	5367.49 cm^{-1}	67 941.66–73 309.15	3–3	2.93e−04	1.53e−03	2.81e−01	−2.339	B	9
			18 625.6	5367.49 cm^{-1}	67 941.66–73 309.15	3–5	1.32e−05	1.15e−04	2.11e−02	−3.463	B	9
141	$1s^22s4d$-$1s^22s8p$	^{3}D-^{1}P°										
			18 623.7	5368.0 cm^{-1}	67 941.66–73 309.7	5–3	1.14e−04	3.56e−04	1.09e−01	−2.749	B	9
			18 623.7	5368.0 cm^{-1}	67 941.66–73 309.7	3–3	3.81e−05	1.98e−04	3.64e−02	−3.226	B	9
142	$1s^22s4f$-$1s^22s6d$	^{3}F°-^{3}D										
			26 388.6	3788.48 cm^{-1}	68 241.02–72 029.50	7–5	4.22e−04	3.14e−03	1.91e+00	−1.657	B	9
			26 388.6	3788.48 cm^{-1}	68 241.02–72 029.50	5–3	4.74e−04	2.97e−03	1.29e+00	−1.828	B	9
			26 388.6	3788.48 cm^{-1}	68 241.02–72 029.50	7–7	3.76e−05	3.93e−04	2.39e−01	−2.561	B	9
			26 388.6	3788.48 cm^{-1}	68 241.02–72 029.50	5–5	5.27e−05	5.51e−04	2.39e−01	−2.560	B	9
			26 388.6	3788.48 cm^{-1}	68 241.02–72 029.50	5–7	1.08e−06	1.57e−05	6.83e−03	−4.104	B	9
143	$1s^22s4f$-$1s^22s7d$	^{3}F°-^{3}D										
			21 546.4	4639.88 cm^{-1}	68 241.02–72 880.90	7–5	2.23e−04	1.11e−03	5.50e−01	−2.111	B	9
			21 546.4	4639.88 cm^{-1}	68 241.02–72 880.90	5–3	2.50e−04	1.04e−03	3.71e−01	−2.282	B	9
			21 546.4	4639.88 cm^{-1}	68 241.02–72 880.90	7–7	1.98e−05	1.38e−04	6.86e−02	−3.014	B	9
			21 546.4	4639.88 cm^{-1}	68 241.02–72 880.90	5–5	2.78e−05	1.94e−04	6.88e−02	−3.014	B	9
			21 546.4	4639.88 cm^{-1}	68 241.02–72 880.90	5–7	5.68e−07	5.53e−06	1.96e−03	−4.558	B	9
144	$1s^22s4f$-$1s^22s8d$	^{3}F°-^{3}D										
			19 268.8	5188.31 cm^{-1}	68 241.02–73 429.33	7–5	1.34e−04	5.32e−04	2.36e−01	−2.429	B	9
			19 268.8	5188.31 cm^{-1}	68 241.02–73 429.33	5–3	1.50e−04	5.02e−04	1.59e−01	−2.601	B	9
			19 268.8	5188.31 cm^{-1}	68 241.02–73 429.33	7–7	1.19e−05	6.63e−05	2.95e−02	−3.333	B	9
			19 268.8	5188.31 cm^{-1}	68 241.02–73 429.33	5–5	1.67e−05	9.31e−05	2.95e−02	−3.332	B	9
			19 268.8	5188.31 cm^{-1}	68 241.02–73 429.33	5–7	3.41e−07	2.66e−06	8.43e−04	−4.877	B	9
145	$1s^22s4f$-$1s^22s9d$	^{3}F°-^{3}D										
			17 975.6	5561.6 cm^{-1}	68 241.02–73 802.6	7–5	8.72e−05	3.02e−04	1.25e−01	−2.675	B	9
			17 975.6	5561.6 cm^{-1}	68 241.02–73 802.6	5–3	9.80e−05	2.85e−04	8.43e−02	−2.846	B	9
			17 975.6	5561.6 cm^{-1}	68 241.02–73 802.6	7–7	7.77e−06	3.77e−05	1.56e−02	−3.579	B	9
			17 975.6	5561.6 cm^{-1}	68 241.02–73 802.6	5–5	1.09e−05	5.29e−05	1.57e−02	−3.578	B	9
			17 975.6	5561.6 cm^{-1}	68 241.02–73 802.6	5–7	2.22e−07	1.51e−06	4.47e−04	−5.122	B	9
146	$1s^22s4d$-$1s^22s7p$	^{1}D-^{1}P°	25 497.1	3920.9 cm^{-1}	68 780.86–72 701.8	5–3	1.46e−03	8.5e−03	3.58e+00	−1.371	C	9
147	$1s^22s4d$-$1s^22s7f$	^{1}D-^{1}F°	24 085.2	4150.79 cm^{-1}	68 780.86–72 931.65	5–7	3.29e−03	4.00e−02	1.59e+01	−0.699	B	9
148	$1s^22s4d$-$1s^22s8p$	^{1}D-^{3}P°										
			22 077.4	4528.29 cm^{-1}	68 780.86–73 309.15	5–3	1.05e−04	4.60e−04	1.67e−01	−2.64	C	9
149	$1s^22s4d$-$1s^22s8p$	^{1}D-^{1}P°	22 074.7	4528.8 cm^{-1}	68 780.86–73 309.7	5–3	8.1e−04	3.55e−03	1.29e+00	−1.75	C	9
150	$1s^22s4d$-$1s^22s9p$	^{1}D-^{1}P°	20 284.4	4928.5 cm^{-1}	68 780.86–73 709.4	5–3	6.1e−04	2.27e−03	7.6e−01	−1.95	C	9
151	$1s^22s5s$-$1s^22s7p$	^{3}S-^{3}P°	27 114	3687.1 cm^{-1}	69 010.20–72 697.3	3–9	1.08e−04	3.58e−03	9.6e−01	−1.97	C	9
			27 114.0	3687.12 cm^{-1}	69 010.20–72 697.32	3–5	1.08e−04	1.99e−03	5.3e−01	−2.223	C	9
			27 114.0	3687.12 cm^{-1}	69 010.20–72 697.32	3–3	1.08e−04	1.19e−03	3.20e−01	−2.446	C	9
			27 114.0	3687.12 cm^{-1}	69 010.20–72 697.32	3–1	1.08e−04	3.97e−04	1.06e−01	−2.92	C	9

TABLE 3. Be I: Allowed transitions—Continued

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	$E_i - E_k$ (cm^{-1})	$g_i - g_k$	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
152	$1s^22s5s$-$1s^22s7p$	^{1}S-^{1}P°	29 581.2	3379.6 cm^{-1}	69 322.20–72 701.8	1–3	8.4e−05	3.32e−03	3.24e−01	−2.479	C	9
153	$1s^22s5s$-$1s^22s8p$	^{1}S-^{3}P°										
			25 075.0	3986.95 cm^{-1}	69 322.20–73 309.15	1–3	1.19e−05	3.38e−04	2.79e−02	−3.472	C	9
154	$1s^22s5s$-$1s^22s8p$	^{1}S-^{1}P°	25 071.5	3987.5 cm^{-1}	69 322.20–73 309.7	1–3	9.1e−05	2.59e−03	2.14e−01	−2.59	C	9
155	$1s^22s5s$-$1s^22s9p$	^{1}S-^{1}P°	22 787.4	4387.2 cm^{-1}	69 322.20–73 709.4	1–3	9.5e−05	2.22e−03	1.67e−01	−2.65	C	9
156	$1s^22s5p$-$1s^22s8d$	^{3}P°-^{3}D	*29 719*	*3363.9* cm^{-1}	*70 065.4–73 429.3*	9–15	8.59e−04	1.90e−02	1.67e+01	−0.768	B	9
			29 719.0	3363.93 cm^{-1}	70 065.40–73 429.33	5–7	8.60e−04	1.60e−02	7.81e+00	−1.098	B	9
			29 719.0	3363.93 cm^{-1}	70 065.40–73 429.33	3–5	6.44e−04	1.42e−02	4.18e+00	−1.370	B	9
			29 719.0	3363.93 cm^{-1}	70 065.40–73 429.33	1–3	4.76e−04	1.89e−02	1.85e+00	−1.723	B	9
			29 719.0	3363.93 cm^{-1}	70 065.40–73 429.33	5–5	2.15e−04	2.85e−03	1.39e+00	−1.847	B	9
			29 719.0	3363.93 cm^{-1}	70 065.40–73 429.33	3–3	3.57e−04	4.73e−03	1.39e+00	−1.848	B	9
			29 719.0	3363.93 cm^{-1}	70 065.40–73 429.33	5–3	2.38e−05	1.90e−04	9.27e−02	−3.023	B	9
157	$1s^22s5p$-$1s^22s9d$	^{3}P°-^{3}D	*26 751*	*3737.2* cm^{-1}	*70 065.4–73 802.6*	9–15	6.64e−04	1.19e−02	9.42e+00	−0.971	B	9
			26 750.7	3737.2 cm^{-1}	70 065.40–73 802.6	5–7	6.65e−04	9.99e−03	4.40e+00	−1.301	B	9
			26 750.7	3737.2 cm^{-1}	70 065.40–73 802.6	3–5	4.98e−04	8.91e−03	2.35e+00	−1.573	B	9
			26 750.7	3737.2 cm^{-1}	70 065.40–73 802.6	1–3	3.68e−04	1.19e−02	1.04e+00	−1.926	B	9
			26 750.7	3737.2 cm^{-1}	70 065.40–73 802.6	5–5	1.66e−04	1.78e−03	7.85e−01	−2.050	B	9
			26 750.7	3737.2 cm^{-1}	70 065.40–73 802.6	3–3	2.76e−04	2.97e−03	7.84e−01	−2.051	B	9
			26 750.7	3737.2 cm^{-1}	70 065.40–73 802.6	5–3	1.84e−05	1.19e−04	5.23e−02	−3.227	B	9
158	$1s^22s5p$-$1s^22s9s$	^{1}P°-^{1}S	28 661.8	3488.0 cm^{-1}	70 120.49–73 608.5	3–1	2.03e−03	8.32e−03	2.36e+00	−1.603	B	9

[a]Wavelengths (Å) are always given unless cm^{-1} is indicated.

2.1.2. Be I forbidden transitions

This is our first, still very small compilation of forbidden, i.e., magnetic dipole (M1) and electric quadrupole (E2), lines of Be I. All data were recently calculated by Froese Fischer and Tachiev with a very extensive MCHF method, and relativistic effects were included through the Breit–Pauli terms.[18,19] The line strengths for the M1 transitions within the $1s^22s2p$ ^{3}P configuration are straight numbers in LS coupling, which in this case is very well fulfilled.

The transition probabilities for the forbidden lines of Be I are given in Table 4.

TABLE 4. Be I: Forbidden transitions

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	$E_i - E_k$ (cm^{-1})	$g_i - g_k$	Type	A_{ki} (s^{-1})	S (a.u.)	Acc.	Source
1	$1s^22s^2$-$1s^22s2p$	^{1}S-^{3}P°									
			4548.05	4549.33	0.000–21 981.27	1–5	M2	1.66e−04	1.08e+02	B	19
2	$1s^22s2p$-$1s^22s2p$	^{3}P°-^{3}P°									
				2.35 cm^{-1}	21 978.925–21 981.27	3–5	E2	1.86e−19	1.17e+02	B	19
				2.35 cm^{-1}	21 978.925–21 981.27	3–5	M1	1.74e−10	2.50e+00	A	19
				0.65 cm^{-1}	21 978.28–21 978.925	1–3	M1	4.83e−12	2.00e+00	A	19
				2.99 cm^{-1}	21 978.28–21 981.27	1–5	E2	2.78e−19	5.19e+01	B	19
3	$1s^22s2p$-$1s^22s2p$	^{3}P°-^{1}P°									
			4856.77	4858.12	21 981.27–42 565.35	5–3	E2	2.42e−07	1.75e−06	B	19
			4856.77	4858.12	21 981.27–42 565.35	5–3	M1	1.28e−06	1.63e−08	B	19
			4856.21	4857.57	21 978.925–42 565.35	3–3	E2	2.74e−07	1.99e−06	B	19
			4856.21	4857.57	21 978.925–42 565.35	3–3	M1	7.68e−07	9.79e−09	B	19
			4856.06	4857.42	21 978.28–42 565.35	1–3	M1	1.02e−06	1.31e−08	B	19

[a]Wavelengths (Å) are always given unless cm^{-1} is indicated.

2.2. Be II

Lithium isoelectronic sequence
Ground state: $1s^2 2s\ ^2S_{1/2}$
Ionization energy: 18.2112 eV (146 882.86 cm^{-1})

2.2.1. Be II allowed transitions

For this Li-like spectrum, we have selected and tabulated data from six precise calculations, carried out with advanced atomic structure codes. Where they overlap, the agreement is usually excellent and indicates high accuracy for all calculations. We have selected their dipole-length results in the following order: First, essentially exact data have been obtained by Yan *et al.*[6] for the resonance transition by applying sophisticated variational wavefunctions of the Hylleraas type. Second, the MCHF method was used by Froese Fischer *et al.*[20] to calculate transition data for sixteen lines between lower energy levels. Third, Qu *et al.*[21–23] applied their full-core-plus-correlation (FCPC) method to calculate oscillator strengths for $1s^2 2s$-$1s^2 np$, $1s^2 2p$-$1s^2 nd$, and $1s^2 3d$-$1s^2 nf$ transitions, where n is a running number from three to ten, or—for d-f transitions—from four to ten. Fourth, close coupling calculations by Peach *et al.*[10] were used for some higher transitions. A comparison for a few key transitions in Table 5 shows the excellent agreement between the selected data. We have included in this table (but not otherwise used) the results of Godefroid *et al.*,[24] which were obtained with a method similar to Ref. 20, but on a nonrelativistic basis, and the result of Chung[25] for the $2s\ ^2S$-$2p\ ^2P°$ transition, which was obtained with the FCPC method, as were Qu's data.

A finding list and transition probabilities for the allowed lines of Be II are given in Tables 6 and 7.

TABLE 5. Comparison of calculated multiplet oscillator strength results (dipole-length values) for a few key transitions of Be II, where the selected sources overlap

	Transitions		
	$2s\ ^2S$-$2p\ ^2P°$	$2s\ ^2S$-$3p\ ^2P°$	$2p\ ^2P°$-$3d\ ^2D$
Author			
Yan *et al.*[6]	0.497 931 746(32)[a]	–	–
Froese Fischer *et al.*[20]	0.498 2	0.083 08	0.632 1
Qu *et al.*[21,22]	–	0.083 16	0.631 97
Peach *et al.*[10]	0.500	0.082 6	0.637
Godefroid *et al.*[24]	0.498 12	0.083 15	0.631 99
Chung[25]	0.498 13	–	–

[a]Result for finite mass.

TABLE 6. List of tabulated lines for allowed transitions of Be II

Wavelength (Å)	No.
In vacuum	
707.197	8
714.601	7
714.602	7
725.710	6
725.711	6
743.574	5
743.575	5
775.362	4
775.364	4
842.025	3
842.031	3
912.972	20
913.027	20
925.139	19
925.196	19
943.481	18
943.540	18
949.757	17
949.817	17
973.213	16
973.276	16
983.984	15
984.047	15
1 026.89	14
1 026.96	14
1 036.30	2
1 036.32	2
1 048.15	13
1 048.22	13
1 142.96	12
1 143.04	12
1 197.09	11
1 197.19	11
1 512.27	10
1 512.41	10
1 512.42	10
1 776.10	9
1 776.31	9
In air	
2 296.81	33
2 296.91	33
2 302.96	41
2 302.98	41
2 381.95	40
2 381.98	40
2 413.34	32
2 413.45	32
2 453.84	23
2 453.86	23
2 454.85	31
2 454.96	31
2 507.41	39
2 507.45	39
2 617.99	30
2 618.13	30
2 697.45	29
2 697.59	29
2 728.85	38
2 728.89	38
3 046.52	28
3 046.69	28
3 046.70	28
3 130.42	1

TABLE 6. List of tabulated lines for allowed transitions of Be II—Continued

Wavelength (Å)	No.
3 131.07	1
3 197.10	37
3 197.15	37
3 197.16	37
3 233.48	36
3 233.53	36
3 233.54	36
3 241.63	27
3 241.83	27
3 274.59	22
3 274.67	22
4 360.66	26
4 360.99	26
4 361.03	26
4 673.33	35
4 673.42	35
4 673.45	35
4 702.34	51
4 702.52	51
4 827.99	34
4 828.12	34
4 828.18	34
5 218.12	50
5 218.34	50
5 270.27	25
5 270.81	25
5 416.12	49
5 416.36	49
6 279.42	48
6 279.74	48
6 756.75	47
6 757.12	47
7 401.20	43
7 401.43	43
9 048.14	59
9 048.49	59
9 476.41	46
9 477.03	46
9 477.14	46
10 467.4	52
10 467.7	52
10 467.9	52
11 173.2	58
11 173.7	58
11 659.1	45
11 660.2	45
12 095.4	21
12 098.2	21
12 122.1	57
12 122.7	57
17 509.8	56
17 511.1	56
21 805.2	55
21 807.2	55
30 323.4	42
30 330.9	42
Wave number (cm^{-1})	**No.**
338.08	54
338.20	54
338.51	54
659.88	44
660.12	44
660.69	44
1 557.28	24
1 557.81	24
1 559.21	24
1 636.50	53
1 636.93	53

TABLE 7. Be II: Allowed transitions

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})^a	E_i-E_k (cm^{-1})	g_i-g_k	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
1	$1s^22s$-$1s^22p$	^{2}S-^{2}P°	*3130.6*	*3131.5*	0.000–*31 933.13*	2–6	1.1289e+00	4.9793e−01	1.0267e+01	−0.001 80	AAA	6
			3130.42	3131.33	0.000–31 935.320	2–4	1.1292e+00	3.3198e−01	6.8445e+00	−0.177 86	AAA	LS
			3131.07	3131.97	0.000–31 928.744	2–2	1.1285e+00	1.6595e−01	3.4223e+00	−0.478 98	AAA	LS
2	$1s^22s$-$1s^23p$	^{2}S-^{2}P°		*1036.3*	0.000–*96 496.65*	2–6	1.720e+00	8.308e−02	5.669e−01	−0.779 5	AA	20
				1036.30	0.000–96 497.288	2–4	1.720e+00	5.540e−02	3.780e−01	−0.955 5	AA	20
				1036.32	0.000–96 495.360	2–2	1.719e+00	2.768e−02	1.889e−01	−1.256 7	AA	20
3	$1s^22s$-$1s^24p$	^{2}S-^{2}P°		*842.03*	0.000–*11 8761.1*	2–6	9.79e−01	3.12e−02	1.73e−01	−1.204	A	21
				842.025	0.000–118 761.32	2–4	9.79e−01	2.08e−02	1.15e−01	−1.380	A	LS
				842.031	0.000–118 760.51	2–2	9.79e−01	1.04e−02	5.77e−02	−1.682	A	LS
4	$1s^22s$-$1s^25p$	^{2}S-^{2}P°		*775.36*	0.000–*128 971.9*	2–6	5.50e−01	1.49e−02	7.59e−02	−1.527	A	21
				775.362	0.000–128 972.05	2–4	5.50e−01	9.91e−03	5.06e−02	−1.703	A	LS
				775.364	0.000–128 971.62	2–2	5.50e−01	4.96e−03	2.53e−02	−2.004	A	LS

TABLE 7. Be II: Allowed transitions—Continued

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
5	$1s^22s$-$1s^26p$	^{2}S-^{2}P°		*743.57*	0.000–*134 485.5*	2–6	3.30e−01	8.20e−03	4.01e−02	−1.785	A	21
				743.574	0.000–134 485.61	2–4	3.30e−01	5.46e−03	2.68e−02	−1.961	A	LS
				743.575	0.000–134 485.37	2–2	3.30e−01	2.73e−03	1.34e−02	−2.262	A	LS
6	$1s^22s$-$1s^27p$	^{2}S-^{2}P°		*725.71*	0.000–*137 796.1*	2–6	2.03e−01	4.80e−03	2.29e−02	−2.018	A	21
				725.710	0.000–137 796.12	2–4	2.03e−01	3.20e−03	1.53e−02	−2.194	A	LS
				725.711	0.000–137 795.97	2–2	2.03e−01	1.60e−03	7.64e−03	−2.495	A	LS
7	$1s^22s$-$1s^28p$	^{2}S-^{2}P°		*714.60*	0.000–*139 938.1*	2–6	1.47e−01	3.37e−03	1.59e−02	−2.171	A	21
				714.601	0.000–139 938.18	2–4	1.47e−01	2.25e−03	1.06e−02	−2.347	A	LS
				714.602	0.000–139 938.08	2–2	1.47e−01	1.12e−03	5.29e−03	−2.648	A	LS
8	$1s^22s$-$1s^29p$	^{2}S-^{2}P°		*707.20*	0.000–*141 403.3*	2–6	8.75e−02	1.97e−03	9.17e−03	−2.405	A	21
				707.197	0.000–141 403.31	2–4	8.75e−02	1.31e−03	6.11e−03	−2.581	A	LS
				707.197	0.000–141 403.24	2–2	8.75e−02	6.56e−04	3.06e−03	−2.882	A	LS
9	$1s^22p$-$1s^23s$	^{2}P°-^{2}S		*1776.2*	*31 933.13*–88 231.915	6–2	4.083e+00	6.438e−02	2.259e+00	−0.413 1	AA	20
				1776.31	31 935.320–88 231.915	4–2	2.722e+00	6.438e−02	1.506e+00	−0.589 2	AA	20
				1776.10	31 928.744–88 231.915	2–2	1.361e+00	6.438e−02	7.529e−01	−0.890 2	AA	20
10	$1s^22p$-$1s^23d$	^{2}P°-^{2}D		*1512.4*	*31 933.13–98 054.9*	6–10	1.106e+01	6.321e−01	1.888e+01	0.578 9	AA	20
				1512.41	31 935.320–98 055.10	4–6	1.106e+01	5.689e−01	1.133e+01	0.357 1	AA	20
				1512.27	31 928.744–98 054.57	2–4	9.217e+00	6.320e−01	6.293e+00	0.101 8	AA	20
				1512.42	31 935.320–98 054.57	4–4	1.843e+00	6.321e−02	1.259e+00	−0.597 1	AA	20
11	$1s^22p$-$1s^24s$	^{2}P°-^{2}S		*1197.2*	*31 933.13*–115 464.44	6–2	1.451e+00	1.039e−02	2.457e−01	−1.205 2	AA	20
				1197.19	31 935.320–115 464.44	4–2	9.671e−01	1.039e−02	1.638e−01	−1.381 3	AA	20
				1197.09	31 928.744–115 464.44	2–2	4.837e−01	1.039e−02	8.191e−02	−1.682 3	AA	20
12	$1s^22p$-$1s^24d$	^{2}P°-^{2}D		*1143.0*	*31 933.13–119 421.3*	6–10	3.76e+00	1.23e−01	2.77e+00	−0.132	AA	22
				1143.04	31 935.320–119 421.44	4–6	3.76e+00	1.11e−01	1.66e+00	−0.354	AA	LS
				1142.96	31 928.744–119 421.20	2–4	3.14e+00	1.23e−01	9.25e−01	−0.610	AA	LS
				1143.04	31 935.320–119 421.20	4–4	6.27e−01	1.23e−02	1.85e−01	−1.309	AA	LS
13	$1s^22p$-$1s^25s$	^{2}P°-^{2}S		*1048.2*	*31 933.13*–127 335.12	6–2	6.78e−01	3.72e−03	7.71e−02	−1.651	A	10
				1048.22	31 935.320–12 7335.12	4–2	4.52e−01	3.72e−03	5.14e−02	−1.827	A	LS
				1048.15	31 928.744–127 335.12	2–2	2.26e−01	3.72e−03	2.57e−02	−2.128	A	LS
14	$1s^22p$-$1s^25d$	^{2}P°-^{2}D		*1026.9*	*31 933.13–129 310.2*	6–10	1.76e+00	4.63e−02	9.39e−01	−0.556	AA	22
				1026.96	31 935.320–129 310.25	4–6	1.76e+00	4.17e−02	5.63e−01	−0.778	AA	LS
				1026.89	31 928.744–129 310.13	2–4	1.46e+00	4.63e−02	3.13e−01	−1.033	AA	LS
				1026.96	31 935.320–129 310.13	4–4	2.93e−01	4.63e−03	6.26e−02	−1.732	AA	LS
15	$1s^22p$-$1s^26s$	^{2}P°-^{2}S		*984.03*	*31 933.13*–133 556.44	6–2	3.72e−01	1.80e−03	3.50e−02	−1.966	A	10
				984.047	31 935.320–133 556.44	4–2	2.48e−01	1.80e−03	2.33e−02	−2.143	A	LS
				983.984	31 928.744–133 556.44	2–2	1.24e−01	1.80e−03	1.17e−02	−2.444	A	LS
16	$1s^22p$-$1s^26d$	^{2}P°-^{2}D		*973.25*	*31 933.13–134 681.15*	6–10	9.69e−01	2.29e−02	4.41e−01	−0.861	AA	22
				973.276	31 935.320–134 681.15	4–6	9.69e−01	2.06e−02	2.65e−01	−1.083	AA	LS
				973.213	31 928.744–134 681.15	2–4	8.08e−01	2.29e−02	1.47e−01	−1.338	AA	LS
				973.276	31 935.320–134 681.15	4–4	1.62e−01	2.29e−03	2.94e−02	−2.037	AA	LS
17	$1s^22p$-$1s^27s$	^{2}P°-^{2}S		*949.80*	*31 933.13*–137 218.78	6–2	2.28e−01	1.03e−03	1.93e−02	−2.210	A	10

TABLE 7. Be II: Allowed transitions—Continued

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
				949.817	31 935.320–137 218.78	4–2	1.52e−01	1.03e−03	1.29e−02	−2.386	A	LS
				949.757	31 928.744–137 218.78	2–2	7.61e−02	1.03e−03	6.43e−03	−2.687	A	LS
18	$1s^22p$-$1s^27d$	$^2P^°$-^2D		*943.52*	*31 933.13–137 919.2*	6–10	5.94e−01	1.32e−02	2.46e−01	−1.101	AA	22
				943.540	31 935.320–137 919.17	4–6	5.94e−01	1.19e−02	1.48e−01	−1.323	AA	LS
				943.481	31 928.744–137 919.17	2–4	4.95e−01	1.32e−02	8.21e−02	−1.578	AA	LS
				943.540	31 935.320–137 919.17	4–4	9.90e−02	1.32e−03	1.64e−02	−2.277	AA	LS
19	$1s^22p$-$1s^28d$	$^2P^°$-^2D		*925.18*	*31 933.13–140 020.6*	6–10	3.91e−01	8.36e−03	1.53e−01	−1.299	AA	22
				925.196	31 935.320–140 020.58	4–6	3.91e−01	7.53e−03	9.17e−02	−1.521	AA	LS
				925.139	31 928.744–140 020.58	2–4	3.26e−01	8.36e−03	5.10e−02	−1.777	AA	LS
				925.196	31 935.320–140 020.58	4–4	6.52e−02	8.36e−04	1.02e−02	−2.476	AA	LS
20	$1s^22p$-$1s^29d$	$^2P^°$-^2D		*913.01*	*31 933.13–141 461.2*	6–10	2.74e−01	5.70e−03	1.03e−01	−1.466	AA	22
				913.027	31 935.320–141 461.15	4–6	2.74e−01	5.13e−03	6.17e−02	−1.688	AA	LS
				912.972	31 928.744–141 461.15	2–4	2.28e−01	5.70e−03	3.43e−02	−1.943	AA	LS
				913.027	31 935.320–141 461.15	4–4	4.56e−02	5.70e−04	6.86e−03	−2.642	AA	LS
21	$1s^23s$-$1s^23p$	^2S-$^2P^°$	*12 096*	8264.7 cm^{-1}	88 231.915–*96 496.65*	2–6	1.261e−01	8.302e−01	6.614e+01	0.220 2	AA	20
			12 095.4	8265.37 cm^{-1}	88 231.915–96 497.288	2–4	1.261e−01	5.535e−01	4.409e+01	0.044 1	AA	20
			12 098.2	8263.45 cm^{-1}	88 231.915–96 495.360	2–2	1.260e−01	2.767e−01	2.205e+01	−0.256 9	AA	20
22	$1s^23s$-$1s^24p$	^2S-$^2P^°$	*3 274.6*	*3275.6*	88 231.915–*118 761.1*	2–6	1.41e−01	6.81e−02	1.47e+00	−0.866	A	10
			3 274.59	3275.53	88 231.915–118 761.32	2–4	1.41e−01	4.54e−02	9.79e−01	−1.042	A	LS
			3 274.67	3275.62	88 231.915–118 760.51	2–2	1.41e−01	2.27e−02	4.89e−01	−1.343	A	LS
23	$1s^23s$-$1s^25p$	^2S-$^2P^°$	*2 453.8*	*2454.6*	88 231.915–*128 971.9*	2–6	1.06e−01	2.87e−02	4.64e−01	−1.241	A	10
			2 453.84	2454.58	88 231.915–12 8972.05	2–4	1.06e−01	1.91e−02	3.09e−01	−1.417	A	LS
			2 453.86	2454.61	88 231.915–128 971.62	2–2	1.06e−01	9.56e−03	1.55e−01	−1.71 8	A	LS
24	$1s^23p$-$1s^23d$	$^2P^°$-^2D		*1558.2* cm^{-1}	*96 496.65–98 054.9*	6–10	7.879e−04	8.107e−02	1.028e+02	−0.3130	AA	20
				1557.81 cm^{-1}	96 497.288–98 055.10	4–6	7.872e−04	7.294e−02	6.166e+01	−0.5350	AA	20
				1559.21 cm^{-1}	96 495.360–98 054.57	2–4	6.578e−04	8.113e−02	3.426e+01	−0.789 8	AA	20
				1557.28 cm^{-1}	96 497.288–98 054.57	4–4	1.311e−04	8.103e−03	6.852e+00	−1.489 3	AA	20
25	$1s^23p$-$1s^24s$	$^2P^°$-^2S	*5 270.6*	*5272.1*	*96 496.65*–115 464.44	6–2	9.700e−01	1.347e−01	1.403e+01	−0.092 4	AA	20
			5 270.81	5272.27	96 497.288–115 464.44	4–2	6.466e−01	1.347e−01	9.354e+00	−0.268 5	AA	20
			5 270.27	5271.74	96 495.360–115 464.44	2–2	3.234e−01	1.347e−01	4.677e+00	−0.569 5	AA	20
26	$1s^23p$-$1s^24d$	$^2P^°$-^2D	*4 360.9*	*4362.1*	*96 496.65–119 421.3*	6–10	1.09e+00	5.20e−01	4.48e+01	0.494	A	10
			4 360.99	4362.21	96 497.288–119 421.44	4–6	1.09e+00	4.68e−01	2.69e+01	0.272	A	LS
			4 360.66	4361.89	96 495.360–119 421.20	2–4	9.12e−01	5.20e−01	1.49e+01	0.017	A	LS
			4 361.03	4362.26	96 497.288–119 421.20	4–4	1.82e−01	5.20e−02	2.99e+00	−0.682	A	LS
27	$1s^23p$-$1s^25s$	$^2P^°$-^2S	*3 241.8*	*3242.7*	*96 496.65*–127 335.12	6–2	4.17e−01	2.19e−02	1.40e+00	−0.882	A	10
			3 241.83	3242.77	96 497.288–127 335.12	4–2	2.78e−01	2.19e−02	9.34e−01	−1.058	A	LS
			3 241.63	3242.57	96 495.360–127 335.12	2–2	1.39e−01	2.19e−02	4.67e−01	−1.359	A	LS
28	$1s^23p$-$1s^25d$	$^2P^°$-^2D	*3 046.6*	*3047.5*	*96 496.65–129 310.2*	6–10	5.60e−01	1.30e−01	7.81e+00	−0.109	A	10
			3 046.69	3047.58	96 497.288–129 310.25	4–6	5.60e−01	1.17e−01	4.69e+00	−0.331	A	LS
			3 046.52	3047.41	96 495.360–129 310.13	2–4	4.66e−01	1.30e−01	2.60e+00	−0.586	A	LS
			3 046.70	3047.59	96 497.288–129 310.13	4–4	9.33e−02	1.30e−02	5.21e−01	−1.285	A	LS
29	$1s^23p$-$1s^26s$	$^2P^°$-^2S	*2 697.5*	*2698.3*	*96 496.65*–133 556.44	6–2	2.21e−01	8.05e−03	4.29e−01	−1.316	A	10

TABLE 7. Be II: Allowed transitions—Continued

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
			2 697.59	2698.39	96 497.288–133 556.44	4–2	1.48e−01	8.05e−03	2.86e−01	−1.492	A	LS
			2 697.45	2698.25	96 495.360–133 556.44	2–2	7.38e−02	8.05e−03	1.43e−01	−1.793	A	LS
30	$1s^23p$-$1s^26d$	^{2}P°-^{2}D	*2 618.1*	*2618.9*	*96 496.65–134 681.15*	6–10	3.18e−01	5.44e−02	2.82e+00	−0.486	A	10
			2 618.13	2618.91	96 497.288–134 681.15	4–6	3.18e−01	4.90e−02	1.69e+00	−0.708	A	LS
			2 617.99	2618.78	96 495.360–134 681.15	2–4	2.65e−01	5.44e−02	9.38e−01	−0.963	A	LS
			2 618.13	2618.91	96 497.288–134 681.15	4–4	5.30e−02	5.44e−03	1.88e−01	−1.662	A	LS
31	$1s^23p$-$1s^27s$	^{2}P°-^{2}S	*2 454.9*	*2455.7*	*96 496.65*–137 218.78	6–2	1.33e−01	4.01e−03	1.94e−01	−1.619	A	10
			2 454.96	2455.71	96 497.288–137 218.78	4–2	8.87e−02	4.01e−03	1.30e−01	−1.795	A	LS
			2 454.85	2455.59	96 495.360–137 218.78	2–2	4.44e−02	4.01e−03	6.48e−02	−2.096	A	LS
32	$1s^23p$-$1s^27d$	^{2}P°-^{2}D	*2 413.4*	*2414.1*	*96 496.65–137 919.2*	6–10	1.97e−01	2.87e−02	1.37e+00	−0.764	A	10
			2 413.45	2414.18	96 497.288–137 919.17	4–6	1.97e−01	2.58e−02	8.21e−01	−0.986	A	LS
			2 413.34	2414.07	96 495.360–137 919.17	2–4	1.64e−01	2.87e−02	4.56e−01	−1.241	A	LS
			2 413.45	2414.18	96 497.288–137 919.17	4–4	3.29e−02	2.87e−03	9.13e−02	−1.940	A	LS
33	$1s^23p$-$1s^28d$	^{2}P°-^{2}D	*2 296.9*	*2297.6*	*96 496.65–140 020.6*	6–10	1.30e−01	1.72e−02	7.80e−01	−0.986	A	10
			2 296.91	2297.62	96 497.288–140 020.58	4–6	1.30e−01	1.55e−02	4.68e−01	−1.208	A	LS
			2 296.81	2297.52	96 495.360–140 020.58	2–4	1.09e−01	1.72e−02	2.60e−01	−1.464	A	LS
			2 296.91	2297.62	96 497.288–140 020.58	4–4	2.17e−02	1.72e−03	5.20e−02	−2.163	A	LS
34	$1s^23d$-$1s^24p$	^{2}D-^{2}P°	*4 828.1*	*4829.5*	*98 054.9–118 761.1*	10–6	8.77e−02	1.84e−02	2.92e+00	−0.735	A	10
			4 828.12	4829.47	98 055.10–118 761.32	6–4	7.89e−02	1.84e−02	1.75e+00	−0.957	A	LS
			4 828.18	4829.53	98 054.57–118 760.51	4–2	8.77e−02	1.53e−02	9.74e−01	−1.213	A	LS
			4 827.99	4829.34	98 054.57–118 761.32	4–4	8.77e−03	3.06e−03	1.95e−01	−1.912	A	LS
35	$1s^23d$-$1s^24f$	^{2}D-^{2}F°	*4673.4*	*4674.7*	*98 054.9–119 446.7*	10–14	2.21e+00	1.01e+00	1.56e+02	1.006	AA	23
			4 673.42	4674.73	98 055.10–119 446.72	6–8	2.21e+00	9.66e−01	8.92e+01	0.763	AA	LS
			4 673.33	4674.64	98 054.57–119 446.59	4–6	2.06e+00	1.01e+00	6.25e+01	0.608	AA	LS
			4 673.45	4674.76	98 055.10–119 446.59	6–6	1.47e−01	4.83e−02	4.46e+00	−0.538	AA	LS
36	$1s^23d$-$1s^25p$	^{2}D-^{2}P°	*3 233.5*	*3234.5*	*98 054.9–128 971.9*	10–6	3.74e−02	3.52e−03	3.75e−01	−1.453	A	10
			3 233.54	3234.47	98 055.10–128 972.05	6–4	3.37e−02	3.52e−03	2.25e−01	−1.675	A	LS
			3 233.53	3234.46	98 054.57–128 971.62	4–2	3.74e−02	2.93e−03	1.25e−01	−1.931	A	LS
			3 233.48	3234.42	98 054.57–128 972.05	4–4	3.74e−03	5.87e−04	2.50e−02	−2.630	A	LS
37	$1s^23d$-$1s^25f$	^{2}D-^{2}F°	*3 197.1*	*3198.1*	*98 054.9–129 323.9*	10–14	7.31e−01	1.57e−01	1.65e+01	0.195	AA	23
			3 197.15	3198.07	98 055.10–129 323.92	6–8	7.31e−01	1.49e−01	9.44e+00	−0.048	AA	LS
			3 197.10	3198.03	98 054.57–129 323.85	4–6	6.82e−01	1.57e−01	6.61e+00	−0.202	AA	LS
			3 197.16	3198.08	98 055.10–129 323.85	6–6	4.87e−02	7.47e−03	4.72e−01	−1.349	AA	LS
38	$1s^23d$-$1s^26f$	^{2}D-^{2}F°	*2 728.9*	*2729.7*	*98 054.9–134 689.2*	10–14	3.46e−01	5.41e−02	4.86e+00	−0.267	AA	23
			2 728.89	2729.69	98 055.10–13 4689.23	6–8	3.46e−01	5.15e−02	2.78e+00	−0.510	AA	LS
			2 728.85	2729.66	98 054.57–134 689.20	4–6	3.23e−01	5.41e−02	1.94e+00	−0.665	AA	LS
			2 728.89	2729.70	98 055.10–134 689.20	6–6	2.30e−02	2.57e−03	1.39e−01	−1.811	AA	LS
39	$1s^23d$-$1s^27f$	^{2}D-^{2}F°	*2 507.4*	*2508.2*	*98 054.9–137 924.3*	10–14	1.94e−01	2.57e−02	2.12e+00	−0.590	AA	23
			2 507.45	2508.20	98 055.10–137 924.31	6–8	1.94e−01	2.45e−02	1.21e+00	−0.833	AA	LS
			2 507.41	2508.17	98 054.57–137 924.31	4–6	1.82e−01	2.57e−02	8.48e−01	−0.988	AA	LS
			2 507.45	2508.20	98 055.10–137 924.31	6–6	1.30e−02	1.22e−03	6.06e−02	−2.134	AA	LS
40	$1s^23d$-$1s^28f$	^{2}D-^{2}F°	*2 382.0*	*2382.7*	*98 054.9–140 024.1*	10–14	1.22e−01	1.45e−02	1.14e+00	−0.839	AA	23
			2 381.98	2382.71	98 055.10–140 024.12	6–8	1.22e−01	1.38e−02	6.49e−01	−1.082	AA	LS

TABLE 7. Be II: Allowed transitions—Continued

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
			2 381.95	2382.68	98 054.57–140 024.12	4–6	1.13e−01	1.45e−02	4.55e−01	−1.237	AA	LS
			2 381.98	2382.71	98 055.10–140 024.12	6–6	8.11e−03	6.90e−04	3.25e−02	−2.383	AA	LS
41	$1s^23d$-$1s^29f$	^{2}D-^{2}F°	*2 303.0*	*2303.7*	*98 054.9–141 463.7*	10–14	7.80e−02	8.69e−03	6.59e−01	−1.061	A	23
			2 302.98	2303.69	98 055.10–141 463.65	6–8	7.80e−02	8.28e−03	3.77e−01	−1.304	A	LS
			2 302.96	2303.67	98 054.57–141 463.65	4–6	7.28e−02	8.69e−03	2.64e−01	−1.459	A	LS
			2 302.98	2303.69	98 055.10–141 463.65	6–6	5.20e−03	4.14e−04	1.88e−02	−2.605	A	LS
42	$1s^24s$-$1s^24p$	^{2}S-^{2}P°	*30 326*	*3296.6* cm^{-1}	115 464.44–*118 761.1*	2–6	2.75e−02	1.14e+00	2.27e+02	0.358	A	10
			30 323.4	3296.88 cm^{-1}	115 464.44–118 761.32	2–4	2.75e−02	7.59e−01	1.52e+02	0.182	A	LS
			30 330.9	3296.07 cm^{-1}	115 464.44–118 760.51	2–2	2.75e−02	3.80e−01	7.58e+01	−0.120	A	LS
43	$1s^24s$-$1s^25p$	^{2}S-^{2}P°	*7 401.3*	*7403.3*	115 464.44–*128 971.9*	2–6	2.54e−02	6.26e−02	3.05e+00	−0.903	A	10
			7 401.20	7403.23	115 464.44–128 972.05	2–4	2.54e−02	4.17e−02	2.03e+00	−1.079	A	LS
			7 401.43	7403.47	115 464.44–128 971.62	2–2	2.54e−02	2.09e−02	1.02e+00	−1.380	A	LS
44	$1s^24p$-$1s^24d$	^{2}P°-^{2}D		*660.3* cm^{-1}	*118 761.1–119 421.3*	6–10	2.54e−04	1.46e−01	4.36e+02	−0.059	A	10
				660.12 cm^{-1}	118 761.32–119 421.44	4–6	2.54e−04	1.31e−01	2.61e+02	−0.280	A	LS
				660.69 cm^{-1}	118 760.51–119 421.20	2–4	2.12e−04	1.46e−01	1.45e+02	−0.535	A	LS
				659.88 cm^{-1}	118 761.32–119 421.20	4–4	4.23e−05	1.46e−02	2.90e+01	−1.235	A	LS
45	$1s^24p$-$1s^25s$	^{2}P°-^{2}S	*11 660*	*8574.1* cm^{-1}	*118 761.1*–127 335.12	6–2	3.05e−01	2.07e−01	4.77e+01	0.094	A	10
			11 660.2	8573.80 cm^{-1}	118 761.32–127 335.12	4–2	2.03e−01	2.07e−01	3.18e+01	−0.082	A	LS
			11 659.1	8574.61 cm^{-1}	118 760.51–127 335.12	2–2	1.02e−01	2.07e−01	1.59e+01	−0.383	A	LS
46	$1s^24p$-$1s^25d$	^{2}P°-^{2}D	*9 476.8*	*9479.4*	*118 761.1–129 310.2*	6–10	2.17e−01	4.88e−01	9.13e+01	0.467	A	10
			9 477.03	9479.63	118 761.32–129 310.25	4–6	2.17e−01	4.39e−01	5.48e+01	0.245	A	LS
			9 476.41	9479.01	118 760.51–129 310.13	2–4	1.81e−01	4.88e−01	3.04e+01	−0.011	A	LS
			9 477.14	9479.74	118 761.32–129 310.13	4–4	3.62e−02	4.88e−02	6.09e+00	−0.710	A	LS
47	$1s^24p$-$1s^26s$	^{2}P°-^{2}S	*6 757.0*	*6758.9*	*118 761.1*–133 556.44	6–2	1.47e−01	3.36e−02	4.48e+00	−0.696	A	10
			6 757.12	6758.99	118 761.32–133 556.44	4–2	9.80e−02	3.36e−02	2.99e+00	−0.872	A	LS
			6 756.75	6758.62	118 760.51–133 556.44	2–2	4.90e−02	3.36e−02	1.49e+00	−1.173	A	LS
48	$1s^24p$-$1s^26d$	^{2}P°-^{2}D	*6 279.6*	*6281.4*	*118 761.1–134 681.15*	6–10	1.34e−01	1.32e−01	1.64e+01	−0.102	A	10
			6 279.74	6281.47	118 761.32–134 681.15	4–6	1.34e−01	1.19e−01	9.82e+00	−0.323	A	LS
			6 279.42	6281.15	118 760.51–134 681.15	2–4	1.12e−01	1.32e−01	5.45e+00	−0.579	A	LS
			6 279.74	6 281.47	118761.32–134 681.15	4–4	2.23e−02	1.32e−02	1.09e+00	−1.278	A	LS
49	$1s^24p$-$1s^27s$	^{2}P°-^{2}S	*5 416.3*	*5417.8*	*118761.1*–137 218.78	6–2	8.53e−02	1.25e−02	1.34e+00	−1.125	A	10
			5 416.36	5417.86	118761.32–137 218.78	4–2	5.68e−02	1.25e−02	8.91e−01	−1.301	A	LS
			5 416.12	5417.63	118 760.51–137 218.78	2–2	2.84e−02	1.25e−02	4.45e−01	−1.602	A	LS
50	$1s^24p$-$1s^27d$	^{2}P°-^{2}D	*5 218.3*	*5219.7*	*118 761.1–137 919.17*	6–10	8.49e−02	5.78e−02	5.95e+00	−0.460	A	10
			5 218.34	5219.79	118 761.32–137 919.17	4–6	8.49e−02	5.20e−02	3.57e+00	−0.682	A	LS
			5 218.12	5219.57	118 760.51–137 919.17	2–4	7.08e−02	5.78e−02	1.98e+00	−0.937	A	LS
			5 218.34	5219.79	118 761.32–137 919.17	4–4	1.41e−02	5.78e−03	3.97e−01	−1.636	A	LS
51	$1s^24p$-$1s^28d$	^{2}P°-^{2}D	*4 702.5*	*4703.8*	*118 761.1–140 020.6*	6–10	5.68e−02	3.14e−02	2.91e+00	−0.725	A	10
			4 702.52	4703.83	118 761.32–140 020.58	4–6	5.68e−02	2.82e−02	1.75e+00	−0.947	A	LS
			4 702.34	4703.65	118 760.51–140 020.58	2–4	4.73e−02	3.14e−02	9.72e−01	−1.202	A	LS
			4 702.52	4703.83	118 761.32–140 020.58	4–4	9.47e−03	3.14e−03	1.94e−01	−1.901	A	LS
52	$1s^24d$-$1s^25p$	^{2}D-^{2}P°	*10 468*	*9550.6* cm^{-1}	*119 421.3–128 971.9*	10–6	4.52e−02	4.46e−02	1.54e+01	−0.351	A	10

TABLE 7. Be II: Allowed transitions—Continued

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
			10 467.7	9550.61 cm^{-1}	119 421.44–128 972.05	6–4	4.07e−02	4.46e−02	9.21e+00	−0.573	A	LS
			10 467.9	9550.42 cm^{-1}	119 421.20–128 971.62	4–2	4.52e−02	3.71e−02	5.12e+00	−0.828	A	LS
			10 467.4	9550.85 cm^{-1}	119 421.20–128 972.05	4–4	4.52e−03	7.43e−03	1.02e+00	−1.527	A	LS
53	$1s^25s$-$1s^25p$	^{2}S-^{2}P°		*1636.8* cm^{-1}	127 335.12–*128 971.9*	2–6	8.54e−03	1.43e+00	5.76e+02	0.457	A	10
				1636.93 cm^{-1}	127 335.12–128 972.05	2–4	8.54e−03	9.55e−01	3.84e+02	0.281	A	LS
				1636.50 cm^{-1}	127 335.12–128 971.62	2–2	8.54e−03	4.78e−01	1.92e+02	−0.020	A	LS
54	$1s^25p$-$1s^25d$	^{2}P°-^{2}D		*338.3* cm^{-1}	*128 971.9–129 310.2*	6–10	9.36e−05	2.04e−01	1.19e+03	0.089	A	10
				338.20 cm^{-1}	128 972.05–129 310.25	4–6	9.37e−05	1.84e−01	7.16e+02	−0.133	A	LS
				338.51 cm^{-1}	128 971.62–129 310.13	2–4	7.80e−05	2.04e−01	3.98e+02	−0.389	A	LS
				338.08 cm^{-1}	128 972.05–129 310.13	4–4	1.56e−05	2.04e−02	7.96e+01	−1.088	A	LS
55	$1s^25p$-$1s^26s$	^{2}P°-^{2}S	*21 807*	*4584.5* cm^{-1}	*128 971.9*–133 556.44	6–2	1.18e−01	2.81e−01	1.21e+02	0.226	A	10
			21 807.2	4584.39 cm^{-1}	128 972.05–133 556.44	4–2	7.87e−02	2.81e−01	8.06e+01	0.050	A	LS
			21 805.2	4584.82 cm^{-1}	128 971.62–133 556.44	2–2	3.93e−02	2.81e−01	4.03e+01	−0.251	A	LS
56	$1s^25p$-$1s^26d$	^{2}P°-^{2}D	*17 511*	*5709.3* cm^{-1}	*128 971.9–134 681.2*	6–10	6.32e−02	4.85e−01	1.68e+02	0.464	A	10
			17 511.1	5709.10 cm^{-1}	128 972.05–134 681.15	4–6	6.32e−02	4.36e−01	1.01e+02	0.242	A	LS
			17 509.8	5709.53 cm^{-1}	128 971.62–134 681.15	2–4	5.27e−02	4.85e−01	5.59e+01	−0.014	A	LS
			17 511.1	5709.10 cm^{-1}	128 972.05–134 681.15	4–4	1.05e−02	4.85e−02	1.12e+01	−0.713	A	LS
57	$1s^25p$-$1s^27s$	^{2}P°-^{2}S	*12 122*	*8246.9* cm^{-1}	*128 971.9*–137 218.78	6–2	6.20e−02	4.54e−02	1.09e+01	−0.564	A	10
			12 122.7	8246.73 cm^{-1}	128 972.05–137 218.78	4–2	4.13e−02	4.54e−02	7.25e+00	−0.741	A	LS
			12 122.1	8247.16 cm^{-1}	128 971.62–137 218.78	2–2	2.07e−02	4.54e−02	3.62e+00	−1.042	A	LS
58	$1s^25p$-$1s^27d$	^{2}P°-^{2}D	*11 174*	*8947.3* cm^{-1}	*128 971.9–137 919.2*	6–10	4.34e−02	1.35e−01	2.98e+01	−0.091	A	10
			11 173.7	8947.12 cm^{-1}	128 972.05–137 919.17	4–6	4.34e−02	1.22e−01	1.79e+01	−0.313	A	LS
			11 173.2	8947.55 cm^{-1}	128 971.62–137 919.17	2–4	3.61e−02	1.35e−01	9.95e+00	−0.568	A	LS
			11173.7	8947.12 cm^{-1}	128 972.05–137 919.17	4–4	7.23e−03	1.35e−02	1.99e+00	−1.267	A	LS
59	$1s^25p$-$1s^28d$	^{2}P°-^{2}D	*9 048.4*	*9050.8*	*128 971.9–140 020.6*	6–10	2.96e−02	6.06e−02	1.08e+01	−0.439	A	10
			9 048.49	9050.98	128 972.05–140 020.58	4–6	2.96e−02	5.45e−02	6.50e+00	−0.661	A	LS
			9 048.14	9050.63	128 971.62–140 020.58	2–4	2.47e−02	6.06e−02	3.61e+00	−0.917	A	LS
			9 048.49	9050.98	128 972.05–140 020.58	4–4	4.94e−03	6.06e−03	7.22e−01	−1.616	A	LS

[a]Wavelengths (Å) are always given unless cm^{-1} is indicated.

2.2.2. Be II forbidden transitions

Garstang[26] developed a general formula for the magnetic dipole (M1) line strengths of hyperfine transitions within a fixed atomic energy level and applied it to the magnetic dipole transition between the two hyperfine levels of the ground term of Be II. This transition is analogous to the astrophysically important 21 cm line of hydrogen. For the transition frequency, he used the experimental result by Vetter *et al.*[27] These data are listed in Table 8.

Sengupta[28] calculated the oscillator strengths for several electric quadrupole (E2) lines. We have tabulated his results for the $2s$ ^{2}S-$3d$ ^{2}D, $2p$ ^{2}P°-$3p$ ^{2}P°, $2p$ ^{2}P°-$4p$ ^{2}P°, and $3p$ ^{2}P°-$4p$ ^{2}P° transitions in Table 9. Comparisons between his analogous data for the isoelectronic neutral lithium and other results available there show close mutual agreement.

TABLE 8. Be II: Hyperfine structure, magnetic dipole transition

Isotope	Transition	Frequency (MHz)	ΔE (cm^{-1})	g_i-g_k	Type	A_{ki} (s^{-1})	S (a.u.)	Accuracy	Source
^{9}Be	$1s^22s$ $^2S_{1/2}(F=2-F=1)$	1250.018	0.04170	5–3	M1	4.89e−15	7.50e+00	A	26

TABLE 9. Be II: Forbidden transitions

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})	E_i-E_k (cm^{-1})	g_i-g_k	Type	A_{ki} (s^{-1})	f_{ik}	S (a.u.)	Acc.	Source
1	$1s^22s$-$1s^23d$	^{2}S-^{2}D		1019.84	0.000–98 054.9	2–10	E2	7.82e+03	6.10e−06	7.70e+01	B	28
2	$1s^22p$-$1s^23p$	^{2}P°-^{2}P°		1548.86	31 933.13–96 496.65	6–6	E2	1.72e+03	6.19e−07	8.22e+01	B	28
3	$1s^22p$-$1s^24p$	^{2}P°-^{2}P°		1151.70	31 933.13–118 761.1	6–6	E2	7.31e+02	1.45e−07	7.94e+00	B	28
4	$1s^23p$-$1s^24p$	^{2}P°-^{2}P°	4490.21	4491.47	96 496.65–118 761.1	6–6	E2	1.80e+02	5.43e−07	1.76e+03	B	28

2.3. Be III

Helium isoelectronic sequence
Ground state: $1s^2\ ^1S_0$
Ionization energy: 153.894 eV (1 241 242 cm^{-1})

2.3.1. Be III allowed transitions

The high-precision variational calculations by Drake[5] have provided the definitive set of data for this heliumlike beryllium ion, which may be considered essentially exact for all practical purposes. From his nonrelativistic calculations, we have tabulated transition probability data for 128 transitions with principal quantum numbers up to 7 and orbital angular momentum quantum numbers up to 3. Drake calculated the transition integrals both in the dipole-length and dipole velocity formulations and achieved agreement in the such-obtained transition integrals to at least five significant figures and often several more.

Drake noted that higher-order effects, such as nuclear mass corrections and relativistic and quantum electrodynamic effects, will only noticeably change the fifth and higher figures in the results, which is of no significance to the vast majority of applications.

Cann and Thakkar[29] and Chen[30] have done precise calculations similar to Drake's work but on a less extensive and slightly less sophisticated basis. Where they overlap, the results are identical within the first four digits. Based on a special relativistic treatment, Drake also provided precise results for several intercombination lines, which are very weak.

A finding list and transition probabilities for the allowed lines of Be III are given in Tables 10 and 11.

TABLE 10. List of tabulated lines for allowed transitions of Be III

Wavelength (Å)	No.
In vacuum	
81.8910	6
82.3770	5
83.2020	4
84.7580	3
88.3088	2
100.255	1
408.901	11
416.741	18
429.640	17
451.117	10
453.071	16
457.987	25
458.010	25
458.018	25
462.332	24
462.355	24
462.364	24
489.366	31
503.393	15
509.954	23
509.983	23
509.993	23
520.996	22
521.026	22
521.037	22
549.327	30
553.860	29
582.079	9
661.323	14
675.188	21
675.256	21
675.548	20
675.598	20
675.616	20
725.537	19
725.595	19
725.616	19
746.224	28
746.664	27
767.748	26
1 070.32	39
1 114.74	56
1 115.16	67
1 115.72	66
1 159.74	38
1 212.58	65
1 213.12	55
1 213.15	54
1 214.28	64
1 214.31	63
1 251.94	34
1 347.91	37
1 362.36	46
1 401.54	45

TABLE 10. List of tabulated lines for allowed transitions of Be III—Continued

Wavelength (Å)	No.
1 419.81	62
1 421.28	53
1 421.52	52
1 422.88	61
1 423.12	60
1 435.19	51
1 440.71	71
1 754.69	33
1 918.47	36
1 953.32	44
1 955.00	43
In air	
2 066.82	59
2 076.96	50
2 077.00	49
2 080.37	58
2 080.42	57
2 122.25	70
2 124.23	69
2 127.21	42
2 136.49	48
2 191.58	68
2 317.86	77
2 400.81	97
2 400.86	88
2 403.40	96
2 441.14	8
2 782.68	76
2 903.09	95
2 909.17	87
2 909.34	86
2 912.90	94
2 913.07	93
3 720.84	7
3 721.40	7
3 722.92	7
3 880.13	73
4 184.85	75
4 231.43	82

TABLE 10. List of tabulated lines for allowed transitions of Be III—Continued

Wavelength (Å)	No.
4 249.06	81
4 463.23	92
4 484.86	85
4 485.86	99
4 486.06	101
4 487.27	84
4 493.73	91
4 496.15	90
4 505.68	98
4 505.88	100
4 550.39	103
4 570.77	102
4 626.41	83
4 635.85	89
4 655.06	80
5 156.39	108
5 170.53	113
5 182.59	112
6 142.32	13
8 175.04	107
8 241.08	111
8 253.32	106
8 254.69	105
8 320.64	110
8 322.03	109
14 049.0	32
21 338.9	35
31 616.9	41
32 427.1	40
34 724.8	72
45 922.3	12

Wave number (cm^{-1})	No.
1 007	47
1 277	78
1 321	79
1 410	104
1 825	74

TABLE 11. Be III: Allowed transitions

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
1	$1s^2$-$1s2p$	^{1}S-^{1}P°		100.255	0–997 454	1–3	1.2201e+03	5.5155e−01	1.8204e−01	−0.258 41	AAA	5
2	$1s^2$-$1s3p$	^{1}S-^{1}P°		88.3088	0–1 132 390	1–3	3.6167e+02	1.2685e−01	3.6879e−02	−0.896 70	AAA	5
3	$1s^2$-$1s4p$	^{1}S-^{1}P°		84.7580	0–1 179 830	1–3	1.5237e+02	4.9231e−02	1.3737e−02	−1.307 76	AAA	5
4	$1s^2$-$1s5p$	^{1}S-^{1}P°		83.2020	0–1 201 894	1–3	7.7965e+01	2.4274e−02	6.6490e−03	−1.614 85	AAA	5
5	$1s^2$-$1s6p$	^{1}S-^{1}P°		82.3770	0–1 213 931	1–3	4.5108e+01	1.3767e−02	3.7336e−03	−1.861 16	AAA	5
6	$1s^2$-$1s7p$	^{1}S-^{1}P°		81.8910	0–1 221 135	1–3	2.8405e+01	8.5673e−03	2.3097e−03	−2.067 15	AAA	5
7	$1s2s$-$1s2p$	^{3}S-^{3}P°	*3 721.5*	*3722.6*	956 502–*983 365*	3–9	3.4085e−01	2.1244e−01	7.8104e+00	−0.195 65	AAA	5
			3 720.84	3721.90	956 502–983 370	3–5	3.4083e−01	1.1797e−01	4.3365e+00	−0.451 11	AAA	5

TABLE 11. Be III: Allowed transitions—Continued

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
			3 722.92	3723.98	956 502–983 355	3–3	3.4083e−01	7.0861e−02	2.6062e+00	−0.672 47	AAA	5
			3 721.40	3722.45	956 502–983 366	3–1	3.4083e−01	2.3601e−02	8.6768e−01	−1.149 95	AAA	5
8	$1s2s$-$1s2p$	^{3}S-^{1}P°										
			2 441.14	2441.88	956 502–997 454	3–3	3.5229e−06	3.1492e−07	7.5950e−06	−6.024 67	AAA	5
9	$1s2s$-$1s3p$	^{3}S-^{3}P°		*582.08*	956 502–*1 128 300*	3–9	1.6565e+01	2.5243e−01	1.4512e+00	−0.120 74	AAA	5
				582.079	956 502–1 128 300	3–5	1.6565e+01	1.4024e−01	8.0619e−01	−0.376 02	AAA	5
				582.079	956 502–1 128 300	3–3	1.6565e+01	8.4142e−02	4.8372e−01	−0.597 87	AAA	5
				582.079	956 502–1 128 300	3–1	1.6565e+01	2.8047e−02	1.6124e−01	−1.074 99	AAA	5
10	$1s2s$-$1s4p$	^{3}S-^{3}P°		*451.12*	956 502–*1 178 174*	3–9	7.8092e+00	7.1477e−02	3.1846e−01	−0.668 71	AAA	5
				451.117	956 502–1 178 174	3–5	7.8092e+00	3.9709e−02	1.7692e−01	−0.923 99	AAA	5
				451.117	956 502–1 178 174	3–3	7.8092e+00	2.3825e−02	1.0615e−01	−1.145 84	AAA	5
				451.117	956 502–1 178 174	3–1	7.8092e+00	7.9418e−03	3.5384e−02	−1.622 96	AAA	5
11	$1s2s$-$1s5p$	^{3}S-^{3}P°		*408.90*	956 502–*1 201 060*	3–9	4.1143e+00	3.0939e−02	1.2495e−01	−1.032 37	AAA	5
				408.901	956 502–1 201 060	3–5	4.1143e+00	1.7188e−02	6.9415e−02	−1.287 64	AAA	5
				408.901	956 502–1 201 060	3–3	4.1143e+00	1.0313e−02	4.1649e−02	−1.509 49	AAA	5
				408.901	956 502–1 201 060	3–1	4.1143e+00	3.4377e−03	1.3883e−02	−1.986 61	AAA	5
12	$1s2s$-$1s2p$	^{1}S-^{3}P°										
			45 922.3	2177 cm^{-1}	981 178–983 355	1–3	6.068e−10	5.758e−08	8.708e−06	−7.239 7	AA	5
13	$1s2s$-$1s2p$	^{1}S-^{1}P°	6 142.32	6144.02	981 178–997 454	1–3	8.7362e−02	1.4832e−01	3.0001e+00	−0.828 79	AAA	5
14	$1s2s$-$1s3p$	^{1}S-^{1}P°		661.323	981 178–1 132 390	1–3	1.5547e+01	3.0581e−01	6.6580e−01	−0.514 55	AAA	5
15	$1s2s$-$1s4p$	^{1}S-^{1}P°		503.393	981 178–1 179 830	1–3	7.2082e+00	8.2152e−02	1.3615e−01	−1.085 38	AAA	5
16	$1s2s$-$1s5p$	^{1}S-^{1}P°		453.071	981 178–1 201 894	1–3	3.7883e+00	3.4975e−02	5.2167e−02	−1.456 25	AAA	5
17	$1s2s$-$1s6p$	^{1}S-^{1}P°		429.640	981 178–1 213 931	1–3	2.2171e+00	1.8407e−02	2.6035e−02	−1.735 03	AAA	5
18	$1s2s$-$1s7p$	^{1}S-^{1}P°		416.741	981 178–1 221 135	1–3	1.4046e+00	1.0971e−02	1.5052e−02	−1.959 74	AAA	5
19	$1s2p$-$1s3s$	^{3}P°-^{3}S		*725.59*	983 365–1 121 184	9–3	1.1240e+01	2.9573e−02	6.3578e−01	−0.574 86	AAA	5
				725.616	983 370–1 121 184	5–3	6.2447e+00	2.9576e−02	3.5325e−01	−0.830 10	AAA	5
				725.537	983 355–1 121 184	3–3	3.7468e+00	2.9569e−02	2.1188e−01	−1.052 04	AAA	5
				725.595	983 366–1 121 184	1–3	1.2489e+00	2.9573e−02	7.0642e−02	−1.529 11	AAA	5
20	$1s2p$-$1s3d$	^{3}P°-^{3}D		*675.59*	*983 365–1 131 383*	9–15	5.6021e+01	6.3889e−01	1.2789e+01	0.759 67	AAA	5
				675.616	983 370–1 131 383	5–7	5.6036e+01	5.3685e−01	5.9703e+00	0.428 82	AAA	5
				675.548	983 355–1 131 383	3–5	4.1996e+01	4.7888e−01	3.1951e+00	0.157 35	AAA	5
				675.598	983 366–1 131 383	1–3	3.1131e+01	6.3907e−01	1.4214e+00	−0.194 45	AAA	5
				675.616	983 370–1 131 383	5–5	1.3997e+01	9.5784e−02	1.0652e+00	−0.319 74	AAA	5
				675.548	983 355–1 131 383	3–3	2.3348e+01	1.5974e−01	1.0658e+00	−0.319 46	AAA	5
				675.616	983 370–1 131 383	5–3	1.5566e+00	6.3912e−03	7.1077e−02	−1.495 44	AAA	5
21	$1s2p$-$1s3d$	^{3}P°-^{1}D										
				675.256	983 370–1 131 462	5–5	1.2239e−02	8.3664e−05	9.2994e−04	−3.378 49	AAA	5
				675.188	983 355–1 131 462	3–5	3.1498e−02	3.5879e−04	2.3925e−03	−2.968 04	AAA	5
22	$1s2p$-$1s4s$	^{3}P°-^{3}S		*521.02*	*983 365*–1 175 295	9–3	4.2582e+00	5.7767e−03	8.9177e−02	−1.284 08	AAA	5
				521.037	983 370–1 175 295	5–3	2.3657e+00	5.7770e−03	4.9547e−02	−1.539 33	AAA	5
				520.996	983 355–1 175 295	3–3	1.4194e+00	5.7760e−03	2.9721e−02	−1.761 25	AAA	5
				521.026	983 366–1 175 295	1–3	4.7314e−01	5.7768e−03	9.9088e−03	−2.238 31	AAA	5
23	$1s2p$-$1s4d$	^{3}P°-^{3}D		*509.98*	*983 365–1 179 451*	9–15	1.8967e+01	1.2326e−01	1.8625e+00	0.045 06	AAA	5

TABLE 11. Be III: Allowed transitions—Continued

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
				509.993	983 370–1 179 451	5–7	1.8970e+01	1.0356e−01	8.6934e−01	−0.285 85	AAA	5
				509.954	983 355–1 179 451	3–5	1.4222e+01	9.2412e−02	4.6543e−01	−0.557 15	AAA	5
				509.983	983 366–1 179 451	1–3	1.0539e+01	1.2328e−01	2.0698e−01	−0.909 11	AAA	5
				509.993	983 370–1 179 451	5–5	4.7401e+00	1.8483e−02	1.5516e−01	−1.034 26	AAA	5
				509.954	983 355–1 179 451	3–3	7.9041e+00	3.0816e−02	1.5520e−01	−1.034 11	AAA	5
				509.993	983 370–1 179 451	5–3	5.2694e−01	1.2328e−03	1.0349e−02	−2.210 13	AAA	5
24	1s2p-1s5s	$^3P^\circ-^3S$		*462.35*	*983 365*–1 199 650	9–3	2.0665e+00	2.2076e−03	3.0243e−02	−1.701 83	AAA	5
				462.364	983 370–1 199 650	5–3	1.1481e+00	2.2078e−03	1.6803e−02	−1.957 08	AAA	5
				462.332	983 355–1 199 650	3–3	6.8884e−01	2.2074e−03	1.0079e−02	−2.179 00	AAA	5
				462.355	983 366–1 199 650	1–3	2.2961e−01	2.2076e−03	3.3603e−03	−2.656 08	AAA	5
25	1s2p-1s5d	$^3P^\circ-^3D$		*458.01*	*983 365–1 201 702*	9–15	8.8608e+00	4.6444e−02	6.3026e−01	−0.378 83	AAA	5
				458.018	983 370–1 201 702	5–7	8.8619e+00	3.9019e−02	2.9417e−01	−0.709 75	AAA	5
				457.987	983 355–1 201 702	3–5	6.6442e+00	3.4822e−02	1.5751e−01	−0.981 03	AAA	5
				458.010	983 366–1 201 702	1–3	4.9233e+00	4.6450e−02	7.0038e−02	−1.333 02	AAA	5
				458.018	983 370–1 201 702	5–5	2.2146e+00	6.9649e−03	5.2510e−02	−1.458 11	AAA	5
				457.987	983 355–1 201 702	3–3	3.6925e+00	1.1611e−02	5.2521e−02	−1.458 00	AAA	5
				458.018	983 370–1 201 702	5–3	2.4616e−01	4.6451e−04	3.5020e−03	−2.634 04	AAA	5
26	1s2p-1s3s	$^1P^\circ-^1S$		767.748	997 454–1 127 705	3–1	8.7556e+00	2.5790e−02	1.9556e−01	−1.111 42	AAA	5
27	1s2p-1s3d	$^1P^\circ-^3D$										
				746.664	997 454–1 131 383	3–5	4.0432e−02	5.6322e−04	4.1534e−03	−2.772 20	AAA	5
28	1s2p-1s3d	$^1P^\circ-^1D$		746.224	997 454–1 131 462	3–5	5.0896e+01	7.0815e−01	5.2191e+00	0.327 25	AAA	5
29	1s2p-1s4s	$^1P^\circ-^1S$		553.860	997 454–1 178 005	3–1	3.4649e+00	5.3116e−03	2.9055e−02	−1.797 65	AAA	5
30	1s2p-1s4d	$^1P^\circ-^1D$		549.327	997 454–1 179 495	3–5	1.5799e+01	1.1912e−01	6.4629e−01	−0.446 88	AAA	5
31	1s2p-1s5d	$^1P^\circ-^1D$		489.366	997 454–1 201 800	3–5	7.1364e+00	4.2702e−02	2.0639e−01	−0.892 43	AAA	5
32	1s3s-1s3p	$^3S-^3P^\circ$	*14 049*	*7116* cm^{-1}	1 121 184–*1 128 300*	3–9	3.991e−02	3.545e−01	4.920e+01	0.026 7	AA	5
			14 049.0	7116 cm^{-1}	1 121 184–1 128 300	3–5	3.991e−02	1.969e−01	2.733e+01	−0.228 6	AA	5
			14 049.0	7116 cm^{-1}	1 121 184–1 128 300	3–3	3.991e−02	1.182e−01	1.640e+01	−0.450 4	AA	5
			14 049.0	7116 cm^{-1}	1 121 184–1 128 300	3–1	3.991e−02	3.939e−02	5.467e+00	−0.927 5	AA	5
33	1s3s-1s4p	$^3S-^3P^\circ$		*1754.7*	1 121 184–*1 178 174*	3–9	1.9062e+00	2.6397e−01	4.5745e+00	−0.101 33	AAA	5
				1754.69	1 121 184–1 178 174	3–5	1.9062e+00	1.4665e−01	2.5414e+00	−0.356 60	AAA	5
				1754.69	1 121 184–1 178 174	3–3	1.9062e+00	8.7989e−02	1.5248e+00	−0.578 45	AAA	5
				1754.69	1 121 184–1 178 174	3–1	1.9062e+00	2.9330e−02	5.0828e−01	−1.055 57	AAA	5
34	1s3s-1s5p	$^3S-^3P^\circ$		*1251.9*	1 121 184–*1 201 060*	3–9	1.1245e+00	7.9269e−02	9.8014e−01	−0.623 77	AAA	5
				1251.94	1 121 184–1 201 060	3–5	1.1245e+00	4.4038e−02	5.4452e−01	−0.879 05	AAA	5
				1251.94	1 121 184–1 201 060	3–3	1.1245e+00	2.6423e−02	3.2671e−01	−1.100 90	AAA	5
				1251.94	1 121 184–1 201 060	3–1	1.1245e+00	8.8077e−03	1.0890e−01	−1.578 02	AAA	5
35	1s3s-1s3p	$^1S-^1P^\circ$	21 338.9	4685 cm^{-1}	1 127 705–1 132 390	1–3	1.249e−02	2.560e−01	1.799e+01	−0.591 8	AA	5
36	1s3s-1s4p	$^1S-^1P^\circ$		1918.47	1 127 705–1 179 830	1–3	1.9561e+00	3.2380e−01	2.0451e+00	−0.489 72	AAA	5
37	1s3s-1s5p	$^1S-^1P^\circ$		1347.91	1 127 705–1 201 894	1–3	1.1269e+00	9.2084e−02	4.0862e−01	−1.035 82	AAA	5
38	1s3s-1s6p	$^1S-^1P^\circ$		1159.74	1 127 705–1 213 931	1–3	6.7642e−01	4.0918e−02	1.5623e−01	−1.388 08	AAA	5
39	1s3s-1s7p	$^1S-^1P^\circ$		1070.32	1 127 705–1 221 135	1–3	4.3319e−01	2.2319e−02	7.8645e−02	−1.651 32	AAA	5
40	1s3p-1s3d	$^3P^\circ-^3D$	*32 427*	*3083* cm^{-1}	*1 128 300–1 131 383*	9–15	2.695e−03	7.084e−02	6.808e+01	−0.195 5	AA	5

TABLE 11. Be III: Allowed transitions—Continued

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	$E_i - E_k$ (cm^{-1})	$g_i - g_k$	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
			32 427.1	3083 cm^{-1}	1 128 300–1 131 383	5–7	2.696e−03	5.952e−02	3.178e+01	−0.526 4	AA	5
			32 427.1	3083 cm^{-1}	1 128 300–1 131 383	3–5	2.020e−03	5.310e−02	1.701e+01	−0.797 7	AA	5
			32 427.1	3083 cm^{-1}	1 128 300–1 131 383	1–3	1.498e−03	7.086e−02	7.567e+00	−1.149 6	AA	5
			32 427.1	3083 cm^{-1}	1 128 300–1 131 383	5–5	6.733e−04	1.062e−02	5.670e+00	−1.274 9	AA	5
			32 427.1	3083 cm^{-1}	1 128 300–1 131 383	3–3	1.123e−03	1.771e−02	5.675e+00	−1.274 6	AA	5
			32 427.1	3083 cm^{-1}	1 128 300–1 131 383	5–3	7.488e−05	7.086e−04	3.783e−01	−2.450 6	AA	5
41	$1s3p$-$1s3d$	^{3}P°-^{1}D										
			31 616.9	3162 cm^{-1}	1 128 300–1 131 462	5–5	6.351e−07	9.523e−06	4.958e−03	−4.322 2	AA	5
			31 616.9	3162 cm^{-1}	1 128 300–1 131 462	3–5	1.661e−06	4.152e−05	1.297e−02	−3.904 6	AA	5
42	$1s3p$-$1s4s$	^{3}P°-^{3}S	*2 127.2*	*2127.9*	*1 128 300*–1 175 295	9–3	2.9092e+00	6.5827e−02	4.1502e+00	−0.227 35	AAA	5
			2 127.21	2127.89	1 128 300–1 175 295	5–3	1.6162e+00	6.5826e−02	2.3057e+00	−0.482 63	AAA	5
			2 127.21	2127.89	1 128 300–1 175 295	3–3	9.6974e−01	6.5828e−02	1.3834e+00	−0.704 47	AAA	5
			2 127.21	2127.89	1 128 300–1 175 295	1–3	3.2325e−01	6.5828e−02	4.6115e−01	−1.181 59	AAA	5
43	$1s3p$-$1s4d$	^{3}P°-^{3}D		*1955.0*	1 128 300–1 179 451	9–15	5.5204e+00	5.2719e−01	3.0537e+01	0.676 21	AAA	5
				1955.00	1 128 300–1 179 451	5–7	5.5212e+00	4.4290e−01	1.4253e+01	0.345 28	AAA	5
				1955.00	1 128 300–1 179 451	3–5	4.1392e+00	3.9529e−01	7.6323e+00	0.074 03	AAA	5
				1955.00	1 128 300–1 179 451	1–3	3.0673e+00	5.2726e−01	3.3935e+00	−0.277 97	AAA	5
				1955.00	1 128 300–1 179 451	5–5	1.3796e+00	7.9050e−02	2.5439e+00	−0.403 13	AAA	5
				1955.00	1 128 300–1 179 451	3–3	2.3005e+00	1.3182e−01	2.5452e+00	−0.402 91	AAA	5
				1955.00	1 128 300–1 179 451	5–3	1.5337e−01	5.2728e−03	1.6968e−01	−1.578 99	AAA	5
44	$1s3p$-$1s4d$	^{3}P°-^{1}D										
				1953.32	1 128 300–1 179 495	5–5	6.9551e−04	3.9784e−05	1.2792e−03	−3.701 33	AAA	5
				1953.32	1 128 300–1 179 495	3–5	1.6832e−03	1.6047e−04	3.0957e−03	−3.317 49	AAA	5
45	$1s3p$-$1s5s$	^{3}P°-^{3}S		*1401.5*	*1 128 300*–1 199 650	9–3	1.3444e+00	1.3197e−02	5.4803e−01	−0.925 27	AAA	5
				1401.54	1 128 300–1 199 650	5–3	7.4690e−01	1.3197e−02	3.0446e−01	−1.180 55	AAA	5
				1401.54	1 128 300–1 199 650	3–3	4.4814e−01	1.3197e−02	1.8268e−01	−1.402 40	AAA	5
				1401.54	1 128 300–1 199 650	1–3	1.4938e−01	1.3197e−02	6.0893e−02	−1.879 52	AAA	5
46	$1s3p$-$1s5d$	^{3}P°-^{3}D		*1362.4*	*1 128 300–1 201 702*	9–15	2.8164e+00	1.3061e−01	5.2723e+00	0.070 23	AAA	5
				1362.36	1 128 300–1 201 702	5–7	2.8167e+00	1.0973e−01	2.4606e+00	−0.260 72	AAA	5
				1362.36	1 128 300–1 201 702	3–5	2.1119e+00	9.7941e−02	1.3178e+00	−0.531 92	AAA	5
				1362.36	1 128 300–1 201 702	1–3	1.5649e+00	1.3063e−01	5.8589e−01	−0.883 95	AAA	5
				1362.36	1 128 300–1 201 702	5–5	7.0390e−01	1.9586e−02	4.3923e−01	−1.009 08	AAA	5
				1362.36	1 128 300–1 201 702	3–3	1.1736e+00	3.2656e−02	4.3939e−01	−1.008 92	AAA	5
				1362.36	1 128 300–1 201 702	5–3	7.8243e−02	1.3063e−03	2.9294e−02	−2.184 99	AAA	5
47	$1s3d$-$1s3p$	^{3}D-^{1}P°										
				1007 cm^{-1}	1 131 383–1 132 390	5–3	1.229e−07	1.090e−05	1.781e−02	−4.263 7	AA	5
				1007 cm^{-1}	1 131 383–1 132 390	3–3	1.174e−10	1.735e−08	1.702e−05	−7.283 5	AA	5
48	$1s3d$-$1s4p$	^{3}D-^{3}P°	*2 136.5*	*2137.2*	*1 131 383–1 178 174*	15–9	4.2780e−01	1.7576e−02	1.8550e+00	−0.578 98	AAA	5
			2 136.49	2137.16	1 131 383–1 178 174	7–5	3.5945e−01	1.7581e−02	8.6587e−01	−0.909 86	AAA	5
			2 136.49	2137.16	1 131 383–1 178 174	5–3	3.2069e−01	1.3176e−02	4.6350e−01	−1.181 26	AAA	5
			2 136.49	2137.16	1 131 383–1 178 174	3–1	4.2792e−01	9.7673e−03	2.0616e−01	−1.533 11	AAA	5
			2 136.49	2137.16	1 131 383–1 178 174	5–5	6.4132e−02	4.3914e−03	1.5449e−01	−1.658 42	AAA	5
			2 136.49	2137.16	1 131 383–1 178 174	3–3	1.0698e−01	7.3255e−03	1.5462e−01	−1.658 04	AAA	5
			2 136.49	2137.16	1 131 383–1 178 174	3–5	4.2792e−03	4.8836e−04	1.0308e−02	−2.834 14	AAA	5
49	$1s3d$-$1s4f$	^{3}D-^{1}F°										
			2 077.00	2077.66	1 131 383–1 179 514	7–7	3.8768e−01	2.5089e−02	1.2012e+00	−0.755 42	AAA	5
			2 077.00	2077.66	1 131 383–1 179 514	5–7	2.8163e+00	2.5516e−01	8.7264e+00	0.105 78	AAA	5
50	$1s3d$-$1s4f$	^{3}D-^{3}F°	*2 077.0*	*2077.6*	*1 131 383–1 179 515*	15–21	1.0129e+01	9.1769e−01	9.4152e+01	1.138 79	AAA	5

TABLE 11. Be III: Allowed transitions—Continued

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
			2 076.96	2077.62	1 131 383–1 179 515	7–9	1.1197e+01	9.3161e−01	4.4604e+01	0.814 33	AAA	5
			2 076.96	2077.62	1 131 383–1 179 515	5–7	7.1381e+00	6.4670e−01	2.2116e+01	0.509 67	AAA	5
			2 076.96	2077.62	1 131 383–1 179 515	3–5	9.4058e+00	1.0145e+00	2.0816e+01	0.483 35	AAA	5
			2 076.96	2077.62	1 131 383–1 179 515	7–7	8.5648e−01	5.5425e−02	2.6537e+00	−0.411 20	AAA	5
			2 076.96	2077.62	1 131 383–1 179 515	5–5	1.7403e+00	1.1262e−01	3.8515e+00	−0.249 42	AAA	5
			2 076.96	2077.62	1 131 383–1 179 515	7–5	4.9766e−02	2.3003e−03	1.1014e−01	−1.793 11	AAA	5
51	1s3d-1s5p	^{3}D-^{3}P°		*1435.2*	*1 131 383–1 201 060*	15–9	1.8167e−01	3.3659e−03	2.3855e−01	−1.296 80	AAA	5
				1435.19	1 131 383–1 201 060	7–5	1.5264e−01	3.3668e−03	1.1135e−01	−1.627 68	AAA	5
				1435.19	1 131 383–1 201 060	5–3	1.3618e−01	2.5231e−03	5.9607e−02	−1.899 09	AAA	5
				1435.19	1 131 383–1 201 060	3–1	1.8172e−01	1.8705e−03	2.6514e−02	−2.250 92	AAA	5
				1435.19	1 131 383–1 201 060	5–5	2.7234e−02	8.4099e−04	1.9868e−02	−2.376 24	AAA	5
				1435.19	1 131 383–1 201 060	3–3	4.5430e−02	1.4029e−03	1.9885e−02	−2.375 86	AAA	5
				1435.19	1 131 383–1 201 060	3–5	1.8172e−03	9.3525e−05	1.3257e−03	−3.551 95	AAA	5
52	1s3d-1s5f	^{3}D-^{3}F°		*1421.5*	*1 131 383–1 201 730*	15–21	3.4293e+00	1.4544e−01	1.0210e+01	0.338 79	AAA	5
				1421.52	1 131 383–1 201 730	7–9	3.6989e+00	1.4407e−01	4.7197e+00	0.003 68	AAA	5
				1421.52	1 131 383–1 201 730	5–7	2.5788e+00	1.0937e−01	2.5592e+00	−0.262 12	AAA	5
				1421.52	1 131 383–1 201 730	3–5	3.1071e+00	1.5688e−01	2.2025e+00	−0.327 31	AAA	5
				1421.52	1 131 383–1 201 730	7–7	3.1150e−01	9.4368e−03	3.0914e−01	−1.180 08	AAA	5
				1421.52	1 131 383–1 201 730	5–5	5.7489e−01	1.7416e−02	4.0752e−01	−1.060 08	AAA	5
				1421.52	1 131 383–1 201 730	7–5	1.6440e−02	3.5575e−04	1.1654e−02	−2.603 76	AAA	5
53	1s3d-1s5f	^{3}D-^{1}F°										
				1421.28	1 131 383–1 201 742	7–7	9.9496e−02	3.0132e−03	9.8691e−02	−1.675 88	AAA	5
				1421.28	1 131 383–1 201 742	5–7	7.0955e−01	3.0084e−02	7.0381e−01	−0.822 70	AAA	5
54	1s3d-1s6f	^{3}D-^{1}F°										
				1213.15	1 131 383–1 213 813	7–7	4.0413e−02	8.9168e−04	2.4929e−02	−2.204 69	AAA	5
				1213.15	1 131 383–1 213 813	5–7	2.8476e−01	8.7962e−03	1.7565e−01	−1.356 74	AAA	5
55	1s3d-1s6f	^{3}D-^{3}F°		*1213.1*	*1 131 383–1 213 815*	15–21	1.6411e+00	5.0691e−02	3.0367e+00	−0.118 98	AAA	5
				1213.12	1 131 383–1 213 815	7–9	1.7495e+00	4.9628e−02	1.3874e+00	−0.459 18	AAA	5
				1213.12	1 131 383–1 213 815	5–7	1.2705e+00	3.9243e−02	7.8364e−01	−0.707 26	AAA	5
				1213.12	1 131 383–1 213 815	3–5	1.4696e+00	5.4040e−02	6.4746e−01	−0.790 17	AAA	5
				1213.12	1 131 383–1 213 815	7–7	1.5398e−01	3.3973e−03	9.4975e−02	−1.623 77	AAA	5
				1213.12	1 131 383–1 213 815	5–5	2.7191e−01	5.9992e−03	1.1980e−01	−1.522 94	AAA	5
				1213.12	1 131 383–1 213 815	7–5	7.7756e−03	1.2254e−04	3.4257e−03	−3.066 63	AAA	5
56	1s3d-1s7f	^{3}D-^{3}F°		*1114.7*	*1 131 383–1 221 090*	15–21	9.2951e−01	2.4243e−02	1.3345e+00	−0.439 32	AAA	5
				1114.74	1 131 383–1 221 090	7–9	9.8456e−01	2.3583e−02	6.0581e−01	−0.782 31	AAA	5
				1114.74	1 131 383–1 221 090	5–7	7.3077e−01	1.9060e−02	3.4973e−01	−1.020 92	AAA	5
				1114.74	1 131 383–1 221 090	3–5	8.2703e−01	2.5679e−02	2.8271e−01	−1.113 30	AAA	5
				1114.74	1 131 383–1 221 090	7–7	8.8726e−02	1.6529e−03	4.2462e−02	−1.936 65	AAA	5
				1114.74	1 131 383–1 221 090	5–5	1.5302e−01	2.8507e−03	5.2308e−02	−1.846 08	AAA	5
				1114.74	1 131 383–1 221 090	7–5	4.3758e−03	5.8228e−05	1.4958e−03	−3.389 77	AAA	5
57	1s3d-1s4f	^{1}D-^{1}F°	2 080.42	2081.08	1 131 462–1 179 514	5–7	7.9806e+00	7.2543e−01	2.4850e+01	0.559 57	AAA	5
58	1s3d-1s4f	^{1}D-^{3}F°										
			2 080.37	2081.04	1 131 462–1 179 515	5–7	3.1990e+00	2.9078e−01	9.9606e+00	0.162 53	AAA	5
			2 080.37	2081.04	1 131 462–1 179 515	5–5	1.5117e−03	9.8148e−05	3.3621e−03	−3.309 15	AAA	5
59	1s3d-1s4p	^{1}D-^{1}P°	2 066.82	2067.48	1 131 462–1 179 830	5–3	2.4214e−01	9.3102e−03	3.1684e−01	−1.332 07	AAA	5
60	1s3d-1s5f	^{1}D-^{3}F°										
				1423.12	1 131 462–1 201 730	5–7	8.0535e−01	3.4234e−02	8.0194e−01	−0.766 58	AAA	5
				1423.12	1 131 462–1 201 730	5–5	5.0016e−04	1.5186e−05	3.5575e−04	−4.119 58	AAA	5

TABLE 11. Be III: Allowed transitions—Continued

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
61	$1s3d$-$1s5f$	^{1}D-^{1}F°		1422.88	1 131 462–1 201 742	5–7	2.8783e+00	1.2231e−01	2.8647e+00	−0.213 57	AAA	5
62	$1s3d$-$1s5p$	^{1}D-^{1}P°		1419.81	1 131 462–1 201 894	5–3	1.0466e−01	1.8978e−03	4.4353e−02	−2.022 78	AAA	5
63	$1s3d$-$1s6f$	^{1}D-^{1}F°		1214.31	1 131 462–1 213 813	5–7	1.4170e+00	4.3855e−02	8.7659e−01	−0.659 01	AAA	5
64	$1s3d$-$1s6f$	^{1}D-^{3}F°										
				1214.28	1 131 462–1 213 815	5–7	3.2321e−01	1.0003e−02	1.9993e−01	−1.300 92	AAA	5
				1214.28	1 131 462–1 213 815	5–5	2.3669e−04	5.2321e−06	1.0458e−04	−4.582 35	AAA	5
65	$1s3d$-$1s6p$	^{1}D-^{1}P°		1212.58	1 131 462–1 213 931	5–3	5.4790e−02	7.2465e−04	1.4464e−02	−2.440 90	AAA	5
66	$1s3d$-$1s7f$	^{1}D-^{3}F°										
				1115.72	1 131 462–1 221 090	5–7	1.6402e−01	4.2854e−03	7.8704e−02	−1.669 04	AAA	5
				1115.72	1 131 462–1 221 090	5–5	1.3323e−04	2.4864e−06	4.5664e−05	−4.905 46	AAA	5
67	$1s3d$-$1s7p$	^{1}D-^{1}P°		1115.16	1 131 462–1 221 135	5–3	3.2466e−02	3.6317e−04	6.6665e−03	−2.740 92	AAA	5
68	$1s3p$-$1s4s$	^{1}P°-^{1}S	2 191.58	2192.26	1 132 390–1 178 005	3–1	2.3511e+00	5.6467e−02	1.2226e+00	−0.771 09	AAA	5
69	$1s3p$-$1s4d$	^{1}P°-^{3}D										
			2 124.23	2124.90	1 132 390–1 179 451	3–5	2.5574e−03	2.8852e−04	6.0551e−03	−3.062 70	AAA	5
70	$1s3p$-$1s4d$	^{1}P°-^{1}D	2 122.25	2122.92	1 132 390–1 179 495	3–5	5.7405e+00	6.4643e−01	1.3554e+01	0.287 64	AAA	5
71	$1s3p$-$1s5d$	^{1}P°-^{1}D		1440.71	1 132 390–1 201 800	3–5	2.7128e+00	1.4070e−01	2.0020e+00	−0.374 60	AAA	5
72	$1s4s$-$1s4p$	^{3}S-^{3}P°	*34 725*	*2 879* cm^{-1}	1 175 295–*1 178 174*	3–9	8.975e−03	4.870e−01	1.671e+02	0.164 7	AA	5
			34 724.8	2879 cm^{-1}	1 175 295–1 178 174	3–5	8.975e−03	2.706e−01	9.281e+01	−0.090 6	AA	5
			34 724.8	2879 cm^{-1}	1 175 295–1 178 174	3–3	8.975e−03	1.623e−01	5.569e+01	−0.312 5	AA	5
			34 724.8	2879 cm^{-1}	1 175 295–1 178 174	3–1	8.975e−03	5.411e−02	1.856e+01	−0.789 6	AA	5
73	$1s4s$-$1s5p$	^{3}S-^{3}P°	*3 880.1*	*3881.2*	1 175 295–*1 201 060*	3–9	4.2060e−01	2.8496e−01	1.0923e+01	−0.068 09	AAA	5
			3 880.13	3881.23	1 175 295–1 201 060	3–5	4.2060e−01	1.5831e−01	6.0685e+00	−0.323 36	AAA	5
			3 880.13	3881.23	1 175 295–1 201 060	3–3	4.2060e−01	9.4987e−02	3.6411e+00	−0.545 21	AAA	5
			3 880.13	3881.23	1 175 295–1 201 060	3–1	4.2060e−01	3.1662e−02	1.2137e+00	−1.022 33	AAA	5
74	$1s4s$-$1s4p$	^{1}S-^{1}P°		1825 cm^{-1}	1 178 005–1 179 830	1–3	3.017e−03	4.074e−01	7.350e+01	−0.389 9	AA	5
75	$1s4s$-$1s5p$	^{1}S-^{1}P°	4 184.85	4186.03	1 178 005–1 201 894	1–3	4.5044e−01	3.5499e−01	4.8921e+00	−0.449 78	AAA	5
76	$1s4s$-$1s6p$	^{1}S-^{1}P°	2 782.68	2783.50	1 178 005–1 213 931	1–3	2.9351e−01	1.0228e−01	9.3724e−01	−0.990 22	AAA	5
77	$1s4s$-$1s7p$	^{1}S-^{1}P°	2 317.86	2318.57	1 178 005–1 221 135	1–3	1.9186e−01	4.6388e−02	3.5408e−01	−1.333 60	AAA	5
78	$1s4p$-$1s4d$	^{3}P°-^{3}D		*1277* cm^{-1}	*1 178 174–1 179 451*	9–15	8.176e−04	1.253e−01	2.907e+02	0.052 1	AA	5
				1277 cm^{-1}	1 178 174–1 179 451	5–7	8.177e−04	1.052e−01	1.357e+02	−0.278 8	AA	5
				1277 cm^{-1}	1 178 174–1 179 451	3–5	6.130e−04	9.393e−02	7.265e+01	−0.550 1	AA	5
				1277 cm^{-1}	1 178 174–1 179 451	1–3	4.543e−04	1.253e−01	3.230e+01	−0.902 1	AA	5
				1277 cm^{-1}	1 178 174–1 179 451	5–5	2.043e−04	1.878e−02	2.421e+01	−1.027 2	AA	5
				1277 cm^{-1}	1 178 174–1 179 451	3–3	3.407e−04	3.132e−02	2.423e+01	−1.027 0	AA	5
				1277 cm^{-1}	1 178 174–1 179 451	5–3	2.272e−05	1.253e−03	1.615e+00	−2.203 1	AA	5
79	$1s4p$-$1s4d$	^{3}P°-^{1}D										
				1321 cm^{-1}	1 178 174–1 179 495	5–5	1.139e−07	9.787e−06	1.220e−02	−4.310 4	AA	5
				1321 cm^{-1}	1 178 174–1 179 495	3–5	2.843e−07	4.070e−05	3.043e−02	−3.913 3	AA	5
80	$1s4p$-$1s5s$	^{3}P°-^{3}S	*4 655.1*	*4656.4*	*1 178 174*–1 199 650	9–3	9.6048e−01	1.0407e−01	1.4358e+01	−0.028 44	AAA	5
			4 655.06	4656.36	1 178 174–1 199 650	5–3	5.3360e−01	1.0407e−01	7.9765e+00	−0.283 71	AAA	5
			4 655.06	4656.36	1 178 174–1 199 650	3–3	3.2016e−01	1.0407e−01	4.7859e+00	−0.505 56	AAA	5
			4 655.06	4656.36	1 178 174–1 199 650	1–3	1.0672e−01	1.0407e−01	1.5953e+00	−0.982 68	AAA	5
81	$1s4p$-$1s5d$	^{3}P°-^{3}D	*4 249.1*	*4250.3*	*1 178 174–1 201 702*	9–15	1.1065e+00	4.9944e−01	6.2894e+01	0.652 72	AAA	5
			4 249.06	4250.26	1 178 174–1 201 702	5–7	1.1066e+00	4.1957e−01	2.9354e+01	0.321 78	AAA	5

TABLE 11. Be III: Allowed transitions—Continued

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	$E_i - E_k$ (cm^{-1})	$g_i - g_k$	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
			4 249.06	4250.26	1 178 174–1 201 702	3–5	8.2969e−01	3.7450e−01	1.5720e+01	0.050 57	AAA	5
			4 249.06	4250.26	1 178 174–1 201 702	1–3	6.1478e−01	4.9949e−01	6.9891e+00	−0.301 47	AAA	5
			4 249.06	4250.26	1 178 174–1 201 702	5–5	2.7654e−01	7.4894e−02	5.2397e+00	−0.426 59	AAA	5
			4 249.06	4250.26	1 178 174–1 201 702	3–3	4.6109e−01	1.2487e−01	5.2419e+00	−0.426 41	AAA	5
			4 249.06	4250.26	1 178 174–1 201 702	5–3	3.0739e−02	4.9949e−03	3.4945e−01	−1.602 50	AAA	5
82	1*s*4*p*-1*s*5*d*	^{3}P°-^{1}D										
			4 231.43	4232.63	1 178 174–1 201 800	5–5	1.1375e−04	3.0551e−05	2.1285e−03	−3.816 00	AAA	5
			4 231.43	4232.63	1 178 174–1 201 800	3–5	2.6686e−04	1.1946e−04	4.9936e−03	−3.445 67	AAA	5
83	1*s*4*d*-1*s*5*p*	^{3}D-^{3}P°	*4 626.4*	*4627.7*	*1 179 451–1 201 060*	15–9	2.2063e−01	4.2501e−02	9.7126e+00	−0.195 51	AAA	5
			4 626.41	4627.70	1 179 451–1 201 060	7–5	1.8536e−01	4.2508e−02	4.5333e+00	−0.526 43	AAA	5
			4 626.41	4627.70	1 179 451–1 201 060	5–3	1.6542e−01	3.1866e−02	2.4274e+00	−0.797 70	AAA	5
			4 626.41	4627.70	1 179 451–1 201 060	3–1	2.2066e−01	2.3615e−02	1.0793e+00	−1.149 69	AAA	5
			4 626.41	4627.70	1 179 451–1 201 060	5–5	3.3083e−02	1.0622e−02	8.0910e−01	−1.274 84	AAA	5
			4 626.41	4627.70	1 179 451–1 201 060	3–3	5.5165e−02	1.7711e−02	8.0949e−01	−1.274 63	AAA	5
			4 626.41	4627.70	1 179 451–1 201 060	3–5	2.2066e−03	1.1808e−03	5.3966e−02	−2.450 72	AAA	5
84	1*s*4*d*-1*s*5*f*	^{3}D-^{3}F°	*4 487.3*	*4488.5*	*1 179 451–1 201 730*	15–21	1.9375e+00	8.1928e−01	1.8160e+02	1.089 53	AAA	5
			4 487.27	4488.53	1 179 451–1 201 730	7–9	2.0940e+00	8.1318e−01	8.4113e+01	0.755 28	AAA	5
			4 487.27	4488.53	1 179 451–1 201 730	5–7	1.4483e+00	6.1242e−01	4.5248e+01	0.486 02	AAA	5
			4 487.27	4488.53	1 179 451–1 201 730	3–5	1.7589e+00	8.8543e−01	3.9252e+01	0.424 28	AAA	5
			4 487.27	4488.53	1 179 451–1 201 730	7–7	1.7634e−01	5.3262e−02	5.5093e+00	−0.428 49	AAA	5
			4 487.27	4488.53	1 179 451–1 201 730	5–5	3.2557e−01	9.8335e−02	7.2654e+00	−0.308 32	AAA	5
			4 487.27	4488.53	1 179 451–1 201 730	7–5	9.3065e−03	2.0078e−03	2.0768e−01	−1.852 18	AAA	5
85	1*s*4*d*-1*s*5*f*	^{3}D-^{1}F°										
			4 484.86	4486.12	1 179 451–1 201 742	7–7	5.6327e−02	1.6995e−02	1.7570e+00	−0.924 58	AAA	5
			4 484.86	4486.12	1 179 451–1 201 742	5–7	4.1316e−01	1.7452e−01	1.2887e+01	−0.059 19	AAA	5
86	1*s*4*d*-1*s*6*f*	^{3}D-^{1}F°										
			2 909.34	2910.19	1 179 451–1 213 813	7–7	2.4164e−02	3.0681e−03	2.0576e−01	−1.668 03	AAA	5
			2 909.34	2910.19	1 179 451–1 213 813	5–7	1.7567e−01	3.1227e−02	1.4959e+00	−0.806 50	AAA	5
87	1*s*4*d*-1*s*6*f*	^{3}D-^{3}F°	*2 909.2*	*2910.0*	*1 179 451–1 213 815*	15–21	9.7941e−01	1.7408e−01	2.5015e+01	0.416 83	AAA	5
			2 909.17	2910.02	1 179 451–1 213 815	7–9	1.0460e+00	1.7074e−01	1.1450e+01	0.077 42	AAA	5
			2 909.17	2910.02	1 179 451–1 213 815	5–7	7.5420e−01	1.3405e−01	6.4211e+00	−0.173 77	AAA	5
			2 909.17	2910.02	1 179 451–1 213 815	3–5	8.7867e−01	1.8592e−01	5.3434e+00	−0.253 55	AAA	5
			2 909.17	2910.02	1 179 451–1 213 815	7–7	9.2064e−02	1.1688e−02	7.8381e−01	−1.087 16	AAA	5
			2 909.17	2910.02	1 179 451–1 213 815	5–5	1.6264e−01	2.0648e−02	9.8905e−01	−0.986 15	AAA	5
			2 909.17	2910.02	1 179 451–1 213 815	7–5	4.6491e−03	4.2159e−04	2.8272e−02	−2.530 01	AAA	5
88	1*s*4*d*-1*s*7*f*	^{3}D-^{3}F°	*2 400.9*	*2401.6*	*1 179 451–1 221 090*	15–21	5.6299e−01	6.8153e−02	8.0826e+00	0.009 57	AAA	5
			2 400.86	2401.59	1 179 451–1 221 090	7–9	5.9738e−01	6.6413e−02	3.6756e+00	−0.332 65	AAA	5
			2 400.86	2401.59	1 179 451–1 221 090	5–7	4.4040e−01	5.3313e−02	2.1075e+00	−0.574 20	AAA	5
			2 400.86	2401.59	1 179 451–1 221 090	3–5	5.0180e−01	7.2316e−02	1.7153e+00	−0.663 64	AAA	5
			2 400.86	2401.59	1 179 451–1 221 090	7–7	5.3834e−02	4.6549e−03	2.5762e−01	−1.486 99	AAA	5
			2 400.86	2401.59	1 179 451–1 221 090	5–5	9.2879e−02	8.0311e−03	3.1748e−01	−1.396 26	AAA	5
			2 400.86	2401.59	1 179 451–1 221 090	7–5	2.6550e−03	1.6398e−04	9.0754e−03	−2.940 11	AAA	5
89	1*s*4*d*-1*s*5*p*	^{1}D-^{3}P°										
			4 635.85	4637.14	1 179 495–1 201 060	5–5	1.6531e−05	5.3291e−06	4.0677e−04	−4.574 37	AAA	5
			4 635.85	4637.14	1 179 495–1 201 060	5–3	7.2178e−05	1.3961e−05	1.0656e−03	−4.156 12	AAA	5
90	1*s*4*d*-1*s*5*f*	^{1}D-^{3}F°										
			4 496.15	4497.41	1 179 495–1 201 730	5–7	4.6974e−01	1.9942e−01	1.4763e+01	−0.001 26	AAA	5
			4 496.15	4497.41	1 179 495–1 201 730	5–5	1.6271e−04	4.9340e−05	3.6526e−03	−3.607 83	AAA	5
91	1*s*4*d*-1*s*5*f*	^{1}D-^{1}F°	4 493.73	4494.99	1 179 495–1 201 742	5–7	1.6248e+00	6.8904e−01	5.0982e+01	0.537 21	AAA	5

TABLE 11. Be III: Allowed transitions—Continued

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	$E_i - E_k$ (cm^{-1})	$g_i - g_k$	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
92	1s4d-1s5p	^{1}D-^{1}P°	4 463.23	4464.49	1 179 495–1 201 894	5–3	1.3409e−01	2.4041e−02	1.7667e+00	−0.920 08	AAA	5
93	1s4d-1s6f	^{1}D-^{1}F°	2 913.07	2913.92	1 179 495–1 213 813	5–7	8.4430e−01	1.5047e−01	7.2171e+00	−0.123 59	AAA	5
94	1s4d-1s6f	^{1}D-^{3}F°										
			2 912.90	2913.75	1 179 495–1 213 815	5–7	1.9936e−01	3.5525e−02	1.7038e+00	−0.750 50	AAA	5
			2 912.90	2913.75	1 179 495–1 213 815	5–5	8.1456e−05	1.0368e−05	4.9726e−04	−4.285 34	AAA	5
95	1s4d-1s6p	^{1}D-^{1}P°	2 903.09	2903.94	1 179 495–1 213 931	5–3	6.7360e−02	5.1096e−03	2.4424e−01	−1.592 65	AAA	5
96	1s4d-1s7f	^{1}D-^{3}F°										
			2 403.40	2404.14	1 179 495–1 221 090	5–7	1.0280e−01	1.2471e−02	4.9352e−01	−1.205 13	AAA	5
			2 403.40	2404.14	1 179 495–1 221 090	5–5	4.6551e−05	4.0337e−06	1.5963e−04	−4.695 33	AAA	5
97	1s4d-1s7p	^{1}D-^{1}P°	2 400.81	2401.54	1 179 495–1 221 135	5–3	3.8595e−02	2.0022e−03	7.9150e−02	−1.999 51	AAA	5
98	1s4f-1s5d	^{1}F°-^{3}D										
			4 505.68	4506.94	1 179 514–1 201 702	7–7	1.0372e−03	3.1585e−04	3.2805e−02	−2.655 42	AAA	5
			4 505.68	4506.94	1 179 514–1 201 702	7–5	1.0891e−02	2.3690e−03	2.4605e−01	−1.780 34	AAA	5
99	1s4f-1s5d	^{1}F°-^{1}D	4 485.86	4487.12	1 179 514–1 201 800	7–5	2.9047e−02	6.2628e−03	6.4760e−01	−1.358 14	AAA	5
100	1s4f-1s5d	^{3}F°-^{3}D	*4 505.9*	*4507.1*	*1 179 515–1 201 702*	21–15	3.7828e−02	8.2291e−03	2.5642e+00	−0.762 43	AAA	5
			4 505.88	4507.14	1 179 515–1 201 702	9–7	3.8519e−02	9.1241e−03	1.2185e+00	−1.085 57	AAA	5
			4 505.88	4507.14	1 179 515–1 201 702	7–5	2.6393e−02	5.7414e−03	5.9634e−01	−1.395 88	AAA	5
			4 505.88	4507.14	1 179 515–1 201 702	5–3	4.1943e−02	7.6643e−03	5.6861e−01	−1.416 56	AAA	5
			4 505.88	4507.14	1 179 515–1 201 702	7–7	2.2916e−03	6.9791e−04	7.2489e−02	−2.311 10	AAA	5
			4 505.88	4507.14	1 179 515–1 201 702	5–5	4.6585e−03	1.4187e−03	1.0526e−01	−2.149 12	AAA	5
			4 505.88	4507.14	1 179 515–1 201 702	5–7	9.5110e−05	4.0552e−05	3.0086e−03	−3.693 02	AAA	5
101	1s4f-1s5d	^{3}F°-^{1}D										
			4 486.06	4487.32	1 179 515–1 201 800	7–5	1.2088e−02	2.6065e−03	2.6954e−01	−1.738 84	AAA	5
102	1s4p-1s5d	^{1}P°-^{3}D										
			4 570.77	4572.06	1 179 830–1 201 702	3–5	4.4183e−04	2.3077e−04	1.0421e−02	−3.159 70	AAA	5
103	1s4p-1s5d	^{1}P°-^{1}D	4 550.39	4551.66	1 179 830–1 201 800	3–5	1.2303e+00	6.3688e−01	2.8630e+01	0.281 18	AAA	5
104	1s5s-1s5p	^{3}S-^{3}P°		*1410* cm^{-1}	1 199 650–*1 201 060*	3–9	2.852e−03	6.451e−01	4.519e+02	0.286 8	AA	5
				1410 cm^{-1}	1 199 650–1 201 060	3–5	2.852e−03	3.584e−01	2.511e+02	0.031 5	AA	5
				1410 cm^{-1}	1 199 650–1 201 060	3–3	2.852e−03	2.150e−01	1.506e+02	−0.190 4	AA	5
				1410 cm^{-1}	1 199 650–1 201 060	3–1	2.852e−03	7.168e−02	5.021e+01	−0.667 5	AA	5
105	1s5d-1s6f	^{3}D-^{1}F°										
			8 254.69	8256.96	1 201 702–1 213 813	7–7	1.3509e−02	1.3808e−02	2.6273e+00	−1.014 78	AAA	5
			8 254.69	8256.96	1 201 702–1 213 813	5–7	9.9126e−02	1.4184e−01	1.9279e+01	−0.149 22	AAA	5
106	1s5d-1s6f	^{3}D-^{3}F°	*8 253.3*	*8255.6*	*1 201 702–1 213 815*	15–21	5.4726e−01	7.8284e−01	3.1915e+02	1.069 76	AAA	5
			8 253.32	8255.59	1 201 702–1 213 815	7–9	5.8480e−01	7.6825e−01	1.4616e+02	0.730 60	AAA	5
			8 253.32	8255.59	1 201 702–1 213 815	5–7	4.2073e−01	6.0185e−01	8.1786e+01	0.478 45	AAA	5
			8 253.32	8255.59	1 201 702–1 213 815	3–5	4.9123e−01	8.3654e−01	6.8208e+01	0.399 61	AAA	5
			8 253.32	8255.59	1 201 702–1 213 815	7–7	5.1469e−02	5.2589e−02	1.0005e+01	−0.434 00	AAA	5
			8 253.32	8255.59	1 201 702–1 213 815	5–5	9.0931e−02	9.2911e−02	1.2626e+01	−0.332 96	AAA	5
			8 253.32	8255.59	1 201 702–1 213 815	7–5	2.5991e−03	1.8969e−03	3.6089e−01	−1.876 85	AAA	5
107	1s5d-1s6p	^{3}D-^{1}P°										
			8 175.04	8177.28	*1 201 702*–1 213 931	5–3	2.3154e−05	1.3927e−05	1.8746e−03	−4.157 18	AAA	5
108	1s5d-1s7f	^{3}D-^{3}F°	*5 156.4*	*5157.8*	1 201 702–1 221 090	15–21	3.3092e−01	1.8477e−01	4.7062e+01	0.442 73	AAA	5
			5 156.39	5157.83	1 201 702–1 221 090	7–9	3.5132e−01	1.8015e−01	2.1413e+01	0.100 74	AAA	5

TABLE 11. Be III: Allowed transitions—Continued

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
			5 156.39	5157.83	1 201 702–1 221 090	5–7	2.5846e−01	1.4432e−01	1.2253e+01	−0.141 72	AAA	5
			5 156.39	5157.83	1 201 702–1 221 090	3–5	2.9511e−01	1.9617e−01	9.9928e+00	−0.230 26	AAA	5
			5 156.39	5157.83	1 201 702–1 221 090	7–7	3.1660e−02	1.2627e−02	1.5009e+00	−1.053 60	AAA	5
			5 156.39	5157.83	1 201 702–1 221 090	5–5	5.4627e−02	2.1787e−02	1.8497e+00	−0.962 83	AAA	5
			5 156.39	5157.83	1 201 702–1 221 090	7–5	1.5614e−03	4.4481e−04	5.2871e−02	−2.506 73	AAA	5
109	1*s*5*d*-1*s*6*f*	^{1}D-^{1}F°	8 322.03	8324.32	1 201 800–1 213 813	5–7	4.7304e−01	6.8799e−01	9.4270e+01	0.536 55	AAA	5
110	1*s*5*d*-1*s*6*f*	^{1}D-^{3}F°										
			8 320.64	8322.93	1 201 800–1 213 815	5–7	1.1290e−01	1.6415e−01	2.2488e+01	−0.085 80	AAA	5
			8 320.64	8322.93	1 201 800–1 213 815	5–5	3.7050e−05	3.8477e−05	5.2713e−03	−3.715 83	AAA	5
111	1*s*5*d*-1*s*6*p*	^{1}D-^{1}P°	8 241.08	8243.34	1 201 800–1 213 931	5–3	6.9070e−02	4.2219e−02	5.7287e+00	−0.675 53	AAA	5
112	1*s*5*d*-1*s*7*f*	^{1}D-^{3}F°										
			5 182.59	5184.03	1 201 800–1 221 090	5–7	6.1181e−02	3.4509e−02	2.9448e+00	−0.763 09	AAA	5
			5 182.59	5184.03	1 201 800–1 221 090	5–5	2.2310e−05	8.9886e−06	7.6702e−04	−4.347 34	AAA	5
113	1*s*5*d*-1*s*7*p*	^{1}D-^{1}P°	5 170.53	5171.97	1 201 800–1 221 135	5–3	3.8439e−02	9.2489e−03	7.8740e−01	−1.334 94	AAA	5

[a]Wavelengths are (Å) always given unless cm^{-1} is indicated.

2.3.2. Be III forbidden transitions

For electric quadrupole (E2) lines, we have tabulated the results of recent extensive variational calculations by Cann and Thakkar.[31] They constructed 100-term explicitly correlated wavefunctions and derived the quadrupole oscillator strengths in both the length and velocity formulations. The two formulations are in excellent agreement, usually within 0.1%.

Cann and Thakkar had already applied the same computational approach to the allowed lines of He I and in this case obtained excellent agreement with the even more sophisticated calculations by Drake,[5] which we tabulated for the allowed (E1) lines.

For the three transitions $1s^2\ ^1$S-$1s3d\ ^1$D, $1s2s\ ^1$S-$1s3d\ ^1$D, and $1s2s\ ^3$S-$1s3d\ ^3$D, electric quadrupole line strengths were also calculated earlier by Godefroid and Verhaegen[32] with a MCHF program developed by Froese Fischer[33] in 1977. The agreement with the Cann and Thakkar results[31] is within 0.15%.

Drake[34] and Johnson and Lin[35] calculated the transition probability of the $1s^2\ ^1$S-$1s2s\ ^3$S relativistic magnetic dipole (M1) transition, using perturbation theory and the Dirac–Fock approximation, respectively, and their results agree within 0.36%. The lifetime of the $1s2s\ ^3$S level has been measured by Träbert *et al.*[36] on a storage ring and was found to differ by only 1.5% from Drake's[34] calculated value.

Drake[37] and Kundu *et al.*[38] calculated the magnetic quadrupole (M2) transition rates for a few $1s^2\ ^1$S-$1snp\ ^3$P° transitions with variational and Hartree–Fock calculations, respectively. Their calculations overlap for the $1s^2\ ^1$S-$1s2p\ ^3$P° transition, where they agree within 0.07%. A finding list and transition probabilities for the forbidden lines of Be III are given in Tables 12 and 13.

TABLE 12. List of tabulated lines for forbidden transitions of Be III

Wavelength (Å)	No.
In vacuum	
83.2085	8
83.2598	7
84.7820	6
84.8771	5
88.3812	4
88.6289	3
101.691	2
104.548	1
407.830	11
448.533	10
453.264	14
459.358	18
461.943	23
489.141	22
504.243	13
509.814	17
513.323	16
548.318	21
549.269	20
571.817	9
665.407	12
689.964	15
741.092	19
1 226.38	37
1 241.96	26
1 349.62	29
1 374.38	31
1 438.77	36
1 464.84	33
1 716.24	25
1 930.87	28
In air	
2 004.40	30

TABLE 12. List of tabulated lines for forbidden transitions of Be III—Continued

Wavelength (Å)	No.
2 107.26	35
2 147.87	34
2 276.58	32
2 931.61	45
3 785.80	39
4 201.38	41
4 368.26	42
4 531.00	44
4 949.36	43
8 305.44	47
9 802.19	24
23 545.2	38
26 609.7	27
48 719.7	46
Wave number (cm^{-1})	No.
1 490	40

TABLE 13. Be III: Forbidden transitions

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	Type	A_{ki} (s^{-1})	f_{ik}	S (a.u.)	Acc.	Source
1	$1s^2$-$1s2s$	^{1}S-^{3}S										
				104.548	0.0–956 502	1–3	M1	5.618e−01	2.762e−12	7.140e−08	AA	34
2	$1s^2$-$1s2p$	^{1}S-^{3}P°										
				101.691	0.0–983 370	1–5	M2	6.17e+02	4.78e−09	2.25e+00	A	37
3	$1s^2$-$1s3p$	^{1}S-^{3}P°										
				88.6289	0.0–1 128 300	1–5	M2	2.15e+02	1.27e−09	3.94e−01	A	38
4	$1s^2$-$1s3d$	^{1}S-^{1}D		88.3812	0.0–1 131 462	1–5	E2	9.2669e+05	5.4261e−06	2.2310e−02	AAA	31
5	$1s^2$-$1s4p$	^{1}S-^{3}P°										
				84.8771	0.0–1 178 174	1–5	M2	9.29e+01	5.02e−10	1.37e−01	A	38
6	$1s^2$-$1s4d$	^{1}S-^{1}D		84.7820	0.0–1 179 495	1–5	E2	5.2196e+05	2.8124e−06	1.0208e−02	AAA	31
7	$1s^2$-$1s5p$	^{1}S-^{3}P°										
				83.2598	0.0–1 201 060	1–5	M2	4.83e+01	2.51e−10	6.47e−02	A	38
8	$1s^2$-$1s5d$	^{1}S-^{1}D		83.2085	0.0–1 201 800	1–5	E2	2.9778e+05	1.5455e−06	5.3029e−03	AAA	31
9	$1s2s$-$1s3d$	^{3}S-^{3}D		571.817	956 502–1 131 383	3–15	E2	7.0930e+04	1.7385e−05	5.8078e+01	AAA	31
10	$1s2s$-$1s4d$	^{3}S-^{3}D		448.533	956 502–1 179 451	3–15	E2	1.5185e+04	2.2900e−06	3.6922e+00	AAA	31
11	$1s2s$-$1s5d$	^{3}S-^{3}D		407.830	956 502–1 201 702	3–15	E2	5.3660e+03	6.6902e−07	8.1085e−01	AAA	31
12	$1s2s$-$1s3d$	^{1}S-^{1}D		665.407	981 178–1 131 462	1–5	E2	4.7852e+04	1.5882e−05	2.7868e+01	AAA	31
13	$1s2s$-$1s4d$	^{1}S-^{1}D		504.243	981 178–1 179 495	1–5	E2	6.899e+03	1.315e−06	1.004e+00	AA	31
14	$1s2s$-$1s5d$	^{1}S-^{1}D		453.264	981 178–1 201 800	1–5	E2	1.8354e+03	2.8266e−07	1.5677e−01	AAA	31
15	$1s2p$-$1s3p$	^{3}P°-^{3}P°		689.964	983 365–1 128 300	9–9	E2	1.9749e+04	1.4095e−06	2.4816e+01	AAA	31
16	$1s2p$-$1s4p$	^{3}P°-^{3}P°		513.323	983 365–1 178 174	9–9	E2	8.384e+03	3.312e−07	2.401e+00	AA	31
17	$1s2p$-$1s4f$	^{3}P°-^{3}F°		509.814	983 365–1 179 515	9–21	E2	4.518e+09	4.107e−01	2.917e+06	AA	32
18	$1s2p$-$1s5p$	^{3}P°-^{3}P°		459.358	983 365–1 201 060	9–9	E2	4.2536e+03	1.3456e−07	6.9914e−01	AAA	31
19	$1s2p$-$1s3p$	^{1}P°-^{1}P°		741.092	997 454–1 132 390	3–3	E2	1.7101e+04	1.4081e−06	1.0240e+01	AAA	31
20	$1s2p$-$1s4f$	^{1}P°-^{1}F°		549.269	997 454–1 179 514	3–7	E2	4.505e+09	4.754e−01	1.408e+06	AA	32
21	$1s2p$-$1s4p$	^{1}P°-^{1}P°		548.318	997 454–1 179 830	3–3	E2	7.3914e+03	3.3316e−07	9.8132e−01	AAA	31

TABLE 13. Be III: Forbidden transitions—Continued

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	Type	A_{ki} (s^{-1})	f_{ik}	S (a.u.)	Acc.	Source
22	$1s2p$-$1s5p$	$^1P^\circ$-$^1P^\circ$		489.141	997 454–1 201 894	3–3	E2	3.785e+03	1.358e−07	2.839e−01	AA	31
23	$1s2p$-$1s6p$	$^1P^\circ$-$^1P^\circ$		461.943	997 454–1 213 931	3–3	E2	2.194e+03	7.019e−08	1.236e−01	AA	31
24	$1s3s$-$1s3d$	^3S-^3D	9 802.19	9804.88	1 121 184–1 131 383	3–15	E2	5.8128e−01	4.1889e−08	7.0549e+02	AAA	31
25	$1s3s$-$1s4d$	^3S-^3D		1716.24	1 121 184–1 179 451	3–15	E2	3.9921e+03	8.8143e−06	7.9612e+02	AAA	31
26	$1s3s$-$1s5d$	^3S-^3D		1241.96	1 121 184–1 201 702	3–15	E2	1.7351e+03	2.0062e−06	6.8668e+01	AAA	31
27	$1s3s$-$1s3d$	^1S-^1D	26 609.7	3757 cm^{-1}	1 127 705–1 131 462	1–5	E2	4.1145e−03	2.1851e−09	2.4540e+02	AAA	31
28	$1s3s$-$1s4d$	^1S-^1D		1930.87	1 127 705–1 179 495	1–5	E2	3.2254e+03	9.0142e−06	3.8648e+02	AAA	31
29	$1s3s$-$1s5d$	^1S-^1D		1349.62	1 127 705–1 201 800	1–5	E2	1.1250e+03	1.5361e−06	2.2490e+01	AAA	31
30	$1s3p$-$1s4p$	$^3P^\circ$-$^3P^\circ$	2 004.40	2005.05	1 128 300–1 178 174	9–9	E2	2.0484e+03	1.2346e−06	5.3344e+02	AAA	31
31	$1s3p$-$1s5p$	$^3P^\circ$-$^3P^\circ$		1374.38	1 128 300–1 201 060	9–9	E2	1.1357e+03	3.2163e−07	4.4757e+01	AAA	31
32	$1s3d$-$1s4s$	^3D-^3S	2 276.58	2277.28	1 131 383–1 175 295	15–3	E2	9.4527e+02	1.4699e−07	1.5508e+02	AAA	31
33	$1s3d$-$1s5s$	^3D-^3S		1464.84	1 131 383–1 199 650	15–3	E2	5.4226e+02	3.4888e−08	9.7966e+00	AAA	31
34	$1s3d$-$1s4s$	^1D-^1S	2 147.87	2148.55	1 131 462–1 178 005	5–1	E2	8.5264e+02	1.1802e−07	3.4857e+01	AAA	31
35	$1s3p$-$1s4p$	$^1P^\circ$-$^1P^\circ$	2 107.26	2107.93	1 132 390–1 179 830	3–3	E2	1.8344e+03	1.2220e−06	2.0450e+02	AAA	31
36	$1s3p$-$1s5p$	$^1P^\circ$-$^1P^\circ$		1438.77	1 132 390–1 201 894	3–3	E2	1.0306e+03	3.1984e−07	1.7020e+01	AAA	31
37	$1s3p$-$1s6p$	$^1P^\circ$-$^1P^\circ$		1226.38	1 132 390–1 213 931	3–3	E2	6.160e+02	1.389e−07	4.577e+00	AA	31
38	$1s4s$-$1s4d$	^3S-^3D	23 545.2	4246 cm^{-1}	1 175 295–1 179 541	3–15	E2	9.7731e−02	4.0635e−08	9.4847e+03	AAA	31
39	$1s4s$-$1s5d$	^3S-^3D	3 785.80	3786.87	1 175 295–1 201 702	3–15	E2	5.0535e+02	5.4323e−06	5.2710e+03	AAA	31
40	$1s4s$-$1s4d$	^1S-^1D		1490 cm^{-1}	1 178 005–1 179 495	1–5	E2	6.764e−04	2.284e−09	4.112e+03	AA	31
41	$1s4s$-$1s5d$	^1S-^1D	4 201.38	4202.56	1 178 005–1 201 800	1–5	E2	4.4245e+02	5.8577e−06	2.5895e+03	AAA	31
42	$1s4p$-$1s5p$	$^3P^\circ$-$^3P^\circ$	4 368.26	4369.48	1 178 174–1 201 060	9–9	E2	3.5848e+02	1.0261e−06	4.5884e+03	AAA	31
43	$1s4d$-$1s5s$	^3D-^3S	4 949.36	4950.74	1 179 451–1 199 650	15–3	E2	2.7861e+02	2.0475e−07	2.2195e+03	AAA	31
44	$1s4p$-$1s5p$	$^1P^\circ$-$^1P^\circ$	4 531.00	4532.27	1 179 830–1 201 894	3–3	E2	3.2991e+02	1.0160e−06	1.6900e+03	AAA	31
45	$1s4p$-$1s6p$	$^1P^\circ$-$^1P^\circ$	2 931.61	2932.47	1 179 830–1 213 931	3–3	E2	2.176e+02	2.806e−07	1.264e+02	AA	31
46	$1s5s$-$1s5d$	^3S-^3D	4 8719.7	2052 cm^{-1}	1 199 650–1 201 702	3–15	E2	1.9945e−02	3.5507e−08	7.3425e+04	AAA	31
47	$1s5p$-$1s6p$	$^1P^\circ$-$^1P^\circ$	8 305.44	8307.72	1 201 894–1 213 931	3–3	E2	8.2900e+01	8.5779e−07	8.7879e+03	AAA	31

[a]Wavelengths (Å) are always given unless cm^{-1} is indicated.

2.4. Be IV

Hydrogen isoelectronic sequence
Ground state: $1s\ ^2S_{1/2}$
Ionization energy: 217.719 eV (1 756 018.824 cm^{-1})

2.4.1. Be IV allowed transitions

We have not tabulated numerical data for the hydrogenlike ion Be IV, since data for this ion of nuclear charge $Z=4$ may be obtained by scaling the tabulated values for hydrogen according to the following relationship:[39]

$S(Z)=Z^{-2}S(H)[\mu(H)/\mu(Z)]^2$, where the quantities for hydrogen are indicated by H and those for the hydrogenlike ions by their nuclear charges Z (4, in this case). This relationship includes a term for the finite masses of H and the H-like ions, expressed by their reduced masses $\mu(Z)=M(Z)/[m_e+M(Z)]$ (m_e is the electron mass and $M(Z)$ is the mass of the nuclide of charge Z). They are valid for hydrogenlike ions of small Z because relativistic effects are negligibly small.

Extensive numerical calculations for H-like ions by Baker,[40] Jitrik and Bunge,[41] and Pal'chikov[42] have shown that the relativistic results are essentially indistinguishable (i.e., identical within a few parts in 10^4) from the nonrelativistic results for hydrogen and hydrogenlike ions of small Z.

Therefore, the above scaling relationships are valid within this level of accuracy, which should be more than sufficient for most applications. If extremely high accuracy is required, we refer the reader to the data tables by Jitrik and Bunge.[41]

Wavelength and energy level data for Be IV may be obtained by consulting the NIST Atomic Energy Levels and Spectra Bibliographic Database.[43]

3. Boron

3.1. B I

Ground state: $1s^2 2s^2 2p\ ^2P^\circ_{1/2}$
Ionization energy: 8.2980 eV (66 928.10 cm^{-1})

3.1.1. B I allowed transitions

For transitions involving principal quantum numbers $n=2$ and 3, we have selected the results of the MCHF calculations by Tachiev and Froese Fischer.[8] But since these sophisticated calculations do not cover transitions between higher states, we have used there the extensive data from the Opacity Project (OP), applying the results from a paper by Fernley *et al.*[11] and from their general database, called "Topbase."[12] In the OP approach, the wave function for each state of an atomic system with $m+1$ electrons is constructed from that of a system consisting of a target of m electrons plus an additional electron in its field, bound to this system. The target wave functions contain, however, a much smaller number of configurations than used in Ref. 8, in order to make this approach practical. The theoretical data have been tested by some accurate lifetime measurements with selective laser excitation by O'Brian and Lawler[44] and Lundberg *et al.*[45] Table 14 shows the comparisons between the calculations and experimental results. The agreement is excellent for the MCHF data and fair to good for the results by Fernley *et al.* Energy level and corresponding wavelength data were taken from a new compilation by Kramida and Ryabtsev.[46]

A finding list and transition probabilities for the allowed lines of B I are given in Tables 15 and 16.

TABLE 14. Comparison of experimental and theoretical lifetime data (in ns) for B I

	Experiments		Calculations	
Atomic level	Lundberg *et al.*[45]	O'Brian and Lawler[44]	Tachiev and Froese Fischer[8]	Fernley *et al.*[11]
$2s2p^2\ ^2D$	–	23.1 ± 1.2	22.9	–
$2s^2 3s\ ^2S$	–	4.0 ± 0.2	4.00	–
$2s^2 3d\ ^2D$	–	4.7 ± 0.2	4.63	–
$2s^2 4s\ ^2S$	–	8.7 ± 0.4	–	9.09
$2s^2 4d\ ^2D$	10.3 ± 0.5	10.0 ± 0.5	–	9.39
$2s^2 5s\ ^2S$	11.0 ± 0.6	–	–	14.66

TABLE 15. List of tabulated lines for allowed transitions of B I

Wavelength (Å)	No.
In vacuum	
1 047.65	17
1 047.70	17
1 047.82	17
1 047.87	17
1 151.21	16
1 151.28	16
1 151.42	16
1 151.49	16
1 378.65	15
1 378.87	15
1 378.94	15
1 379.17	15
1 465.56	20
1 465.66	20
1 465.79	20
1 533.81	14
1 534.17	14
1 543.40	13
1 543.76	13
1 546.42	12
1 546.79	12
1 558.70	11
1 559.07	11
1 566.29	10
1 566.66	10
1 573.30	9
1 573.68	9
1 587.34	19
1 587.38	19
1 587.45	19
1 587.50	19
1 587.59	19
1 587.66	19
1 587.75	19
1 600.37	8
1 600.46	7
1 600.76	8
1 600.85	7
1 662.61	6
1 663.03	6
1 666.85	5
1 667.27	5
1 817.84	4
1 818.35	4
1 825.89	3
1 826.40	3
1 826.40	3
In air	
2 066.38	18
2 066.65	18
2 066.73	18
2 066.93	18
2 067.00	18
2 067.20	18
2 067.20	18
2 088.89	2
2 089.56	2

TABLE 15. List of tabulated lines for allowed transitions of B I—Continued

Wavelength (Å)	No.
2 089.57	2
2 134.27	44
2 134.35	44
2 134.46	44
2 134.54	44
2 388.66	30
2 388.68	30
2 388.85	30
2 388.87	30
2 496.77	1
2 497.72	1
2 613.39	43
2 613.51	43
2 613.75	43
2 613.88	43
2 654.19	63
2 654.23	63
2 654.48	63
2 654.52	63
2 861.14	51
2 861.16	51
2 861.41	51
2 861.43	51
3 364.33	68
3 364.71	68
3 437.99	62
3 438.06	62
3 438.61	62
3 438.69	62
3 672.32	76
3 672.77	76
4 178.96	42
4 179.27	42
4 180.99	42
4 181.30	42
5 633.07	22
5 633.27	22
5 761.90	29
5 762.01	29
5 942.62	28
5 942.73	28
6 027.72	41
6 028.37	41
6 178.67	40
6 179.36	40
6 227.45	39
6 228.15	39
6 244.56	27
6 244.68	27
6 431.51	38
6 432.25	38
6 562.69	37
6 563.45	37
6 778.66	61
6 778.95	61
6 784.01	61
6 784.31	61
6 819.52	26
6 819.66	26

TABLE 15. List of tabulated lines for allowed transitions of B I—Continued

Wavelength (Å)	No.
7 205.93	36
7 206.85	36
7 207.66	35
7 208.59	35
8 211.79	25
8 211.79	25
8 212.00	25
8 667.23	34
8 668.57	34
8 783.71	33
8 785.09	33
9 576.21	50
9 576.34	50
10 067.5	24
10 067.8	24
10 068.4	24
10 086.0	49
10 086.1	49
10 987.7	48
10 987.8	48
11 660.0	21
11 662.5	21
12 901.6	47
12 901.8	47
13 490.0	60
13 491.2	60
14 270.3	59
14 271.6	59
15 624.7	32
15 629.1	32
15 695.3	58
15 696.9	58
16 240.3	31
16 244.7	31
16 245.0	31
16 500.2	57
16 501.9	57
18 994.0	46
18 994.5	46
18 994.5	46
19 174.2	67
19 351.3	72
21 275.0	56
21 277.9	56
21 290.1	55
21 293.0	55
21 333.0	66
21 572.5	71
25 813.6	65
26 210.3	70
26 210.4	70
33 110.4	45
33 112.0	45
33 117.4	45
36 002.4	52
36 010.6	52
36 729.3	75
37 293.1	79
39 622.8	64

TABLE 15. List of tabulated lines for allowed transitions of B I—Continued

Wavelength (Å)	No.
40 731.6	69
40 731.7	69
42 361.7	54
42 373.1	54
45 297.7	53
45 310.7	53
45 561.4	74
46 525.1	78

Wave number (cm^{-1})	No.
517.55	85
542.03	84
754.741	23
756.524	23
756.840	23
799.027	82
834.422	80
1 328.764	77
1 330.96	83
1 362.06	81
1 380.822	73

TABLE 16. B I: Allowed transitions

No	Transition array	Mult	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
1	$2s^22p$-$2s^23s$	$^2P^\circ$-^2S	*2 497.4*	*2498.2*	*10.19–40 039.6907*	6–2	2.51e+00	7.83e−02	3.86e+00	−0.328	A	8
			2 497.72	2498.48	15.287–40 039.6907	4–2	1.67e+00	7.83e−02	2.58e+00	−0.504	A	8
			2 496.77	2497.52	0.0000–40 039.6907	2–2	8.37e−01	7.83e−02	1.29e+00	−0.805	A	8
2	$2s^22p$-$2s2p^2$	$^2P^\circ$-^2D	*2 089.3*	*2090.0*	*10.19–47 856.94*	6–10	4.32e−01	4.71e−02	1.95e+00	−0.548	B+	8
			2 089.57	2090.23	15.287–47 856.809	4–6	4.32e−01	4.24e−02	1.17e+00	−0.771	B+	8
			2 088.89	2089.55	0.0000–47 857.125	2–4	3.61e−01	4.72e−02	6.50e−01	−1.025	B+	8
			2 089.56	2090.22	15.287–47 857.125	4–4	7.16e−02	4.69e−03	1.29e−01	−1.727	B+	8
3	$2s^22p$-$2s^23d$	$^2P^\circ$-^2D		*1826.2*	*10.19–54 767.781*	6–10	2.04e+00	1.70e−01	6.12e+00	0.008	A	8
				1826.40	15.287–54 767.8387	4–6	2.04e+00	1.53e−01	3.68e+00	−0.214	A	8
				1825.89	0.0000–54 767.6944	2–4	1.70e+00	1.70e−01	2.04e+00	−0.469	A	8
				1826.40	15.287–54 767.6944	4–4	3.39e−01	1.70e−02	4.08e−01	−1.168	A	8
4	$2s^22p$-$2s^24s$	$^2P^\circ$-^2S		*1818.2*	*10.19–55 010.2338*	6–2	9.33e−01	1.54e−02	5.54e−01	−1.034	B+	11
				1818.35	15.287–55 010.2338	4–2	6.22e−01	1.54e−02	3.69e−01	−1.210	B+	11
				1817.84	0.0000–55 010.2338	2–2	3.11e−01	1.54e−02	1.85e−01	−1.511	B+	11
5	$2s^22p$-$2s^24d$	$^2P^\circ$-^2D		*1667.1*	*10.19–59 993.45*	6–10	1.04e+00	7.22e−02	2.38e+00	−0.364	B+	11
				1667.27	15.287–59 993.45	4–6	1.04e+00	6.49e−02	1.43e+00	−0.585	B+	11
				1666.85	0.0000–59 993.45	2–4	8.66e−01	7.22e−02	7.92e−01	−0.841	B+	11
				1667.27	15.287–59 993.45	4–4	1.73e−01	7.22e−03	1.58e−01	−1.540	B+	11
6	$2s^22p$-$2s^25s$	$^2P^\circ$-^2S		*1662.9*	*10.19–60 146.414*	6–2	5.9e−01	8.2e−03	2.69e−01	−1.309	C	11
				1663.03	15.287–60 146.414	4–2	3.95e−01	8.2e−03	1.79e−01	−1.485	C	11
				1662.61	0.0000–60 146.414	2–2	1.97e−01	8.2e−03	9.0e−02	−1.79	C	11
7	$2s^22p$-$2s^26s$	$^2P^\circ$-^2S		*1600.7*	*10.19–62 482.167*	6–2	8.4e−01	1.08e−02	3.4e−01	−1.188	D+	12
				1600.85	15.287–62 482.167	4–2	5.6e−01	1.08e−02	2.3e−01	−1.365	D+	12
				1600.46	0.0000–62 482.167	2–2	2.81e−01	1.08e−02	1.1e−01	−1.67	D+	12
8	$2s^22p$-$2s^25d$	$^2P^\circ$-^2D		*1600.6*	*10.19–62 485.504*	6–10	5.60e−01	3.58e−02	1.13e+00	−0.668	B	11
				1600.76	15.287–62 485.504	4–6	5.60e−01	3.22e−02	6.80e−01	−0.889	B	11
				1600.37	0.0000–62 485.504	2–4	4.67e−01	3.58e−02	3.78e−01	−1.145	B	11
				1600.76	15.287–62 485.504	4–4	9.33e−02	3.58e−03	7.55e−02	−1.844	B	11
9	$2s^22p$-$2s2p^2$	$^2P^\circ$-^2S		*1573.6*	*10.19–63 560.638*	6–2	1.32e+00	1.64e−02	5.1e−01	−1.007	C	12

TABLE 16. B I: Allowed transitions—Continued

No	Transition array	Mult	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log *gf*	Accuracy	Source
				1573.68	15.287–63 560.638	4–2	8.8e−01	1.64e−02	3.40e−01	−1.183	C	12
				1573.30	0.0000–63 560.638	2–2	4.42e−01	1.64e−02	1.70e−01	−1.484	C	12
10	$2s^22p$-$2s^26d$	$^2P°$-^2D		*1566.5*	*10.19–63 845.323*	6–10	3.36e−01	2.06e−02	6.4e−01	−0.91	C	12
				1566.66	15.287–63 845.323	4–6	3.36e−01	1.85e−02	3.82e−01	−1.130	C	12
				1566.29	0.0000–63 845.323	2–4	2.80e−01	2.06e−02	2.12e−01	−1.385	C	12
				1566.66	15.287–63 845.323	4–4	5.6e−02	2.06e−03	4.25e−02	−2.084	C	12
11	$2s^22p$-$2s^27s$	$^2P°$-^2S		*1558.9*	*10.19*–64 156.017	6–2	6.1e−01	7.4e−03	2.27e−01	−1.355	C	12
				1559.07	15.287–64 156.017	4–2	4.04e−01	7.4e−03	1.51e−01	−1.53	C	12
				1558.70	0.0000–64 156.017	2–2	2.02e−01	7.4e−03	7.6e−02	−1.83	C	12
12	$2s^22p$-$2s^27d$	$^2P°$-^2D		*1546.7*	*10.19–64 665.353*	6–10	2.13e−01	1.27e−02	3.89e−01	−1.116	C+	12
				1546.79	15.287–64 665.353	4–6	2.13e−01	1.15e−02	2.34e−01	−1.338	C+	12
				1546.42	0.0000–64 665.353	2–4	1.78e−01	1.27e−02	1.30e−01	−1.594	C+	12
				1546.79	15.287–64 665.353	4–4	3.55e−02	1.27e−03	2.60e−02	−2.293	C+	12
13	$2s^22p$-$2s^28s$	$^2P°$-^2S		*1543.6*	*10.19*–64 792.09	6–2	8.4e−01	1.00e−02	3.06e−01	−1.221	C	12
				1543.76	15.287–64 792.09	4–2	5.6e−01	1.00e−02	2.04e−01	−1.397	C	12
				1543.40	0.0000–64 792.09	2–2	2.81e−01	1.00e−02	1.02e−01	−1.70	C	12
14	$2s^22p$-$2s^28d$	$^2P°$-^2D		*1534.0*	*10.19–65 197.29*	6–10	1.44e−01	8.46e−03	2.56e−01	−1.295	C+	12
				1534.17	15.287–65 197.29	4–6	1.44e−01	7.61e−03	1.54e−01	−1.516	C+	12
				1533.81	0.0000–65 197.29	2–4	1.20e−01	8.46e−03	8.54e−02	−1.772	C+	12
				1534.17	15.287–65 197.29	4–4	2.40e−02	8.46e−04	1.71e−02	−2.471	C+	12
15	$2s^22p$-$2s2p^2$	$^2P°$-^2P		*1378.9*	*10.19–72 530.7*	6–6	2.05e+01	5.85e−01	1.59e+01	0.545	C+	12
				1378.94	15.287–72 534.55	4–4	1.71e+01	4.87e−01	8.85e+00	0.290	C+	12
				1378.87	0.0000–72 522.90	2–2	1.37e+01	3.90e−01	3.54e+00	−0.108	C+	12
				1379.17	15.287–72 522.90	4–2	6.84e+00	9.75e−02	1.77e+00	−0.409	C+	12
				1378.65	0.0000–72 534.55	2–4	3.42e+00	1.95e−01	1.77e+00	−0.409	C+	12
16	$2s^22p$-$2s2p(^3P°)3p$	$^2P°$-^2P		*1151.4*	*10.19–86 863*	6–6	2.93e+00	5.8e−02	1.32e+00	−0.457	C	12
				1151.42	15.287–86 864.9	4–4	2.44e+00	4.85e−02	7.3e−01	−0.71	C	12
				1151.28	0.0000–86 859.6	2–2	1.95e+00	3.88e−02	2.94e−01	−1.110	C	12
				1151.49	15.287–86 859.6	4–2	9.8e−01	9.7e−03	1.47e−01	−1.411	C	12
				1151.21	0.0000–86 864.9	2–4	4.88e−01	1.94e−02	1.47e−01	−1.411	C	12
17	$2s^22p$-$2s2p(^3P°)4p$	$^2P°$-^2P		*1047.8*	*10.19–95 450*	6–6	2.1e−01	3.5e−03	7.2e−02	−1.68	D	12
				1047.82	15.287–95 451.5	4–4	1.8e−01	2.9e−03	4.0e−02	−1.94	D	12
				1047.70	0.0000–95 447.4	2–2	1.4e−01	2.3e−03	1.6e−02	−2.33	D	12
				1047.87	15.287–95 447.4	4–2	7.0e−02	5.8e−04	8.0e−03	−2.64	D	12
				1047.65	0.0000–95 451.5	2–4	3.5e−02	1.2e−03	8.0e−03	−2.64	D	12
18	$2s2p^2$-$2s2p(^3P°)3s$	^4P-$^4P°$	*2 066.8*	*2067.5*	*28 654.5–77 023*	12–12	2.3e+00	1.4e−01	1.2e+01	0.24	D	12
			2 066.65	2067.31	28 658.40–77 030.44	6–6	1.6e+00	1.0e−01	4.1e+00	−0.22	D	12
			2 066.93	2067.59	28 652.07–77 017.64	4–4	3.0e−01	1.9e−02	5.3e−01	−1.11	D	12
			2 067.00	2067.66	28 647.43–77 011.2	2–2	3.8e−01	2.4e−02	3.3e−01	−1.32	D	12
			2 067.20	2067.86	28 658.40–77 017.64	6–4	1.0e+00	4.3e−02	1.8e+00	−0.58	D	12
			2 067.20	2067.86	28 652.07–77 011.2	4–2	1.9e+00	6.0e−02	1.6e+00	−0.62	D	12
			2 066.38	2067.04	28 652.07–77 030.44	4–6	6.8e−01	6.5e−02	1.8e+00	−0.58	D	12
			2 066.73	2067.39	28 647.43–77 017.64	2–4	9.4e−01	1.2e−01	1.6e+00	−0.62	D	12
19	$2s2p^2$-$2s2p(^3P°)3d$	^4P-$^4P°$		*1587.6*	*28 654.5–91 643*	12–12	1.7e+00	6.3e−02	3.9e+00	−0.12	D	12
				1587.75	28 658.40–91 640.6	6–6	1.2e+00	4.4e−02	1.4e+00	−0.58	D	12

TABLE 16. B I: Allowed transitions—Continued

No	Transition array	Mult	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
				1587.50	28 652.07–91 644.26	4–4	2.2e−01	8.4e−03	1.8e−01	−1.47	D	12
				1587.34	28 647.43–91 646.02	2–2	2.8e−01	1.0e−02	1.1e−01	−1.68	D	12
				1587.66	28 658.40–91 644.26	6–4	7.5e−01	1.9e−02	5.9e−01	−0.95	D	12
				1587.45	28 652.07–91 646.02	4–2	1.4e+00	2.6e−02	5.5e−01	−0.98	D	12
				1587.59	28 652.07–91 640.6	4–6	5.0e−01	2.8e−02	5.9e−01	−0.95	D	12
				1587.38	28 647.43–91 644.26	2–4	6.9e−01	5.2e−02	5.5e−01	−0.98	D	12
20	$2s2p^2$-$2p^3$	^{4}P-^{4}S°		*1465.7*	*28 654.5–96 880.8*	12–4	2.0e+01	2.1e−01	1.2e+01	0.41	D	12
				1465.79	28 658.40–96 880.8	6–4	9.9e+00	2.1e−01	6.2e+00	0.11	D	12
				1465.66	28 652.07–96 880.8	4–4	6.6e+00	2.1e−01	4.1e+00	−0.07	D	12
				1465.56	28 647.43–96 880.8	2–4	3.3e+00	2.1e−01	2.1e+00	−0.37	D	12
21	$2s^23s$-$2s^23p$	^{2}S-^{2}P°	*11 661*	*8573.364* cm^{-1}	40 039.6907–*48 613.055*	2–6	1.72e−01	1.05e+00	8.09e+01	0.324	B	8
			11 660.0	8573.9579 cm^{-1}	40 039.6907–48 613.6486	2–4	1.72e−01	7.03e−01	5.40e+01	0.148	B	8
			11 662.5	8572.1756 cm^{-1}	40 039.6907–48 611.8663	2–2	1.72e−01	3.51e−01	2.70e+01	−0.153	B	8
22	$2s^23s$-$2s^24p$	^{2}S-^{2}P°	*5 633.1*	*5634.7*	40 039.6907–*57 786.857*	2–6	2.25e−03	3.21e−03	1.19e−01	−2.192	C+	11
			5 633.07	5634.64	40 039.6907–57 787.0683	2–4	2.25e−03	2.14e−03	7.94e−02	−2.369	C+	11
			5 633.27	5634.84	40 039.6907–57 786.4336	2–2	2.25e−03	1.07e−03	3.97e−02	−2.670	C+	11
23	$2s2p^2$-$2s^23p$	^{2}D-^{2}P°		*756.12* cm^{-1}	*47 856.94–48 613.055*	10–6	2.81e−05	4.42e−03	1.93e+01	−1.354	C+	8
				756.840 cm^{-1}	47 856.809–48 613.6486	6–4	2.54e−05	4.43e−03	1.16e+01	−1.576	C+	8
				754.741 cm^{-1}	47 857.125–48 611.8663	4–2	2.79e−05	3.68e−03	6.42e+00	−1.832	C+	8
				756.524 cm^{-1}	47 857.125–48 613.6486	4–4	2.81e−06	7.37e−04	1.28e+00	−2.530	C+	8
24	$2s2p^2$-$2s^24p$	^{2}D-^{2}P°	*10 068*	*9929.92* cm^{-1}	*47 856.94–57 786.857*	10–6	3.5e−05	3.2e−05	1.1e−02	−3.50	D	11
			10 067.5	9930.259 cm^{-1}	47 856.809–57 787.0683	6–4	3.1e−05	3.2e−05	6.3e−03	−3.72	D	11
			10 068.4	9929.309 cm^{-1}	47 857.125–57 786.4336	4–2	3.5e−05	2.6e−05	3.5e−03	−3.97	D	11
			10 067.8	9929.943 cm^{-1}	47 857.125–57 787.0683	4–4	3.5e−06	5.3e−06	7.0e−04	−4.67	D	11
25	$2s2p^2$-$2s^24f$	^{2}D-^{2}F°	*8 211.9*	*8214.1*	*47 856.94–60 031.079*	10–14	3.42e−02	4.84e−02	1.31e+01	−0.315	C	11
			8 211.79	8214.04	47 856.809–60 031.0816	6–8	3.42e−02	4.61e−02	7.5e+00	−0.56	C	11
			8 212.00	8214.26	47 857.125–60 031.0762	4–6	3.19e−02	4.84e−02	5.24e+00	−0.71	C	11
			8 211.79	8214.05	47 856.809–60 031.0762	6–6	2.28e−03	2.30e−03	3.74e−01	−1.86	C	11
26	$2s2p^2$-$2s^25f$	^{2}D-^{2}F°	*6 819.6*	*6821.5*	*47 856.94–62 516.559*	10–14	2.2e−02	2.1e−02	4.7e+00	−0.68	D+	12
			6 819.52	6821.40	47 856.809–62 516.5592	6–8	2.2e−02	2.0e−02	2.7e+00	−0.92	D+	12
			6 819.66	6821.55	47 857.125–62 516.5592	4–6	2.0e−02	2.1e−02	1.9e+00	−1.08	D+	12
			6 819.52	6821.40	47 856.809–62 516.5592	6–6	1.4e−03	1.0e−03	1.3e−01	−2.22	D+	12
27	$2s2p^2$-$2s^26f$	^{2}D-^{2}F°	*6 244.6*	*6246.3*	*47 856.94–63 866.326*	10–14	1.3e−02	1.1e−02	2.2e+00	−0.97	D	12
			6 244.56	6246.28	47 856.809–63 866.326	6–8	1.3e−02	1.0e−02	1.3e+00	−1.21	D	12
			6 244.68	6246.41	47 857.125–63 866.326	4–6	1.2e−02	1.1e−02	8.8e−01	−1.37	D	12
			6 244.56	6246.28	47 856.809–63 866.326	6–6	8.7e−04	5.1e−04	6.3e−02	−2.51	D	12
28	$2s2p^2$-$2s^27f$	^{2}D-^{2}F°	*5 942.7*	*5944.3*	*47 856.94–64 679.745*	10–14	8.4e−03	6.2e−03	1.2e+00	−1.21	D+	12
			5 942.62	5944.27	47 856.809–64 679.745	6–8	8.4e−03	5.9e−03	7.0e−01	−1.45	D+	12
			5 942.73	5944.38	47 857.125–64 679.745	4–6	7.8e−03	6.2e−03	4.9e−01	−1.60	D+	12
			5 942.62	5944.27	47 856.809–64 679.745	6–6	5.6e−04	3.0e−04	3.5e−02	−2.75	D+	12
29	$2s2p^2$-$2s^28f$	^{2}D-^{2}F°	*5 761.9*	*5763.5*	*47 856.94–65 207.38*	10–14	5.7e−03	4.0e−03	7.6e−01	−1.40	D+	12
			5 761.90	5763.50	47 856.809–65 207.38	6–8	5.7e−03	3.8e−03	4.3e−01	−1.64	D+	12
			5 762.01	5763.60	47 857.125–65 207.38	4–6	5.3e−03	4.0e−03	3.0e−01	−1.80	D+	12
			5 761.90	5763.50	47 856.809–65 207.38	6–6	3.8e−04	1.9e−04	2.2e−02	−2.94	D+	12

TABLE 16. B I: Allowed transitions—Continued

No	Transition array	Mult	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
30	$2s2p^2$-$2s2p(^3P^\circ)3d$	^{2}D-^{2}D°	*2 388.7*	*2389.5*	*47 856.94–89 707.2*	10–10	6.4e−02	5.5e−03	4.3e−01	−1.26	D	12
			2 388.66	2389.39	47 856.809–89 708.49	6–6	6.0e−02	5.1e−03	2.4e−01	−1.51	D	12
			2 388.87	2389.60	47 857.125–89 705.19	4–4	5.8e−02	4.9e−03	1.5e−01	−1.71	D	12
			2 388.85	2389.58	47 856.809–89 705.19	6–4	6.4e−03	3.6e−04	1.7e−02	−2.66	D	12
			2 388.68	2389.41	47 857.125–89 708.49	4–6	4.3e−03	5.5e−04	1.7e−02	−2.66	D	12
31	$2s^23p$-$2s^23d$	^{2}P°-^{2}D	*16 243*	*6154.726* cm^{-1}	*48 613.055–54 767.781*	6–10	1.27e−01	8.35e−01	2.68e+02	0.700	B	8
			16 244.7	6154.1901 cm^{-1}	48 613.6486–54 767.8387	4–6	1.27e−01	7.51e−01	1.61e+02	0.478	B	8
			16 240.3	6155.8281 cm^{-1}	48 611.8663–54 767.6944	2–4	1.06e−01	8.35e−01	8.93e+01	0.223	B	8
			16 245.0	6154.0458 cm^{-1}	48 613.6486–54 767.6944	4–4	2.11e−02	8.35e−02	1.79e+01	−0.476	B	8
32	$2s^23p$-$2s^24s$	^{2}P°-^{2}S	*15 628*	*6397.179* cm^{-1}	*48 613.055*–55 010.2338	6–2	1.67e−01	2.03e−01	6.28e+01	0.086	B	11
			15 629.1	6396.5852 cm^{-1}	48 613.6486–55 010.2338	4–2	1.11e−01	2.03e−01	4.19e+01	−0.090	B	11
			15 624.7	6398.3675 cm^{-1}	48 611.8663–55 010.2338	2–2	5.55e−02	2.03e−01	2.09e+01	−0.391	B	11
33	$2s^23p$-$2s^24d$	^{2}P°-^{2}D	*8 784.6*	*8787.0*	*48 613.055–59 993.45*	6–10	3.4e−06	6.6e−06	1.1e−03	−4.40	D	11
			8 785.09	8787.50	48 613.6486–59 993.45	4–6	3.4e−06	5.9e−06	6.8e−04	−4.63	D	11
			8 783.71	8786.12	48 611.8663–59 993.45	2–4	2.8e−06	6.6e−06	3.8e−04	−4.88	D	11
			8 785.09	8787.50	48 613.6486–59 993.45	4–4	5.7e−07	6.6e−07	7.6e−05	−5.58	D	11
34	$2s^23p$-$2s^25s$	^{2}P°-^{2}S	*8 668.1*	*8670.5*	*48 613.055*–60 146.414	6–2	5.50e−02	2.07e−02	3.54e+00	−0.907	B	11
			8 668.57	8670.95	48 613.6486–60 146.414	4–2	3.67e−02	2.07e−02	2.36e+00	−1.083	B	11
			8 667.23	8669.61	48 611.8663–60 146.414	2–2	1.83e−02	2.07e−02	1.18e+00	−1.384	B	11
35	$2s^23p$-$2s^26s$	^{2}P°-^{2}S	*7 208.3*	*7210.3*	*48 613.055*–62 482.167	6–2	2.58e−02	6.71e−03	9.55e−01	−1.395	C+	12
			7 208.59	7210.58	48 613.6486–62 482.167	4–2	1.72e−02	6.71e−03	6.37e−01	−1.571	C+	12
			7 207.66	7209.65	48 611.8663–62 482.167	2–2	8.61e−03	6.71e−03	3.18e−01	−1.872	C+	12
36	$2s^23p$-$2s^25d$	^{2}P°-^{2}D	*7 206.5*	*7208.5*	*48 613.055–62 485.504*	6–10	1.98e−03	2.57e−03	3.65e−01	−1.81	C	11
			7 206.85	7208.84	48 613.6486–62 485.504	4–6	1.98e−03	2.31e−03	2.19e−01	−2.034	C	11
			7 205.93	7207.91	48 611.8663–62 485.504	2–4	1.65e−03	2.57e−03	1.22e−01	−2.290	C	11
			7 206.85	7208.84	48 613.6486–62 485.504	4–4	3.29e−04	2.57e−04	2.44e−02	−2.99	C	11
37	$2s^23p$-$2s^26d$	^{2}P°-^{2}D	*6 563.2*	*6565.0*	*48 613.055–63 845.323*	6–10	2.41e−03	2.60e−03	3.37e−01	−1.81	C	12
			6 563.45	6565.27	48 613.6486–63 845.323	4–6	2.41e−03	2.34e−03	2.02e−01	−2.029	C	12
			6 562.69	6564.50	48 611.8663–63 845.323	2–4	2.01e−03	2.60e−03	1.12e−01	−2.284	C	12
			6 563.45	6565.27	48 613.6486–63 845.323	4–4	4.02e−04	2.60e−04	2.25e−02	−2.98	C	12
38	$2s^23p$-$2s^27s$	^{2}P°-^{2}S	*6 432.0*	*6433.8*	*48 613.055*–64 156.017	6–2	1.55e−02	3.22e−03	4.09e−01	−1.71	C	12
			6 432.25	6434.03	48 613.6486–64 156.017	4–2	1.04e−02	3.22e−03	2.72e−01	−1.89	C	12
			6 431.51	6433.29	48 611.8663–64 156.017	2–2	5.2e−03	3.22e−03	1.36e−01	−2.192	C	12
39	$2s^23p$-$2s^27d$	^{2}P°-^{2}D	*6 227.9*	*6229.6*	*48 613.055–64 665.353*	6–10	2.08e−03	2.01e−03	2.48e−01	−1.92	C	12
			6 228.15	6229.87	48 613.6486–64 665.353	4–6	2.08e−03	1.81e−03	1.49e−01	−2.140	C	12
			6 227.45	6229.18	48 611.8663–64 665.353	2–4	1.73e−03	2.01e−03	8.3e−02	−2.395	C	12
			6 228.15	6229.87	48 613.6486–64 665.353	4–4	3.46e−04	2.01e−04	1.65e−02	−3.094	C	12
40	$2s^23p$-$2s^28s$	^{2}P°-^{2}S	*6 179.1*	*6180.8*	*48 613.055*–64 792.09	6–2	8.2e−03	1.57e−03	1.92e−01	−2.026	C	12
			6 179.36	6181.07	48 613.6486–64 792.09	4–2	5.5e−03	1.57e−03	1.28e−01	−2.202	C	12
			6 178.67	6180.38	48 611.8663–64 792.09	2–2	2.74e−03	1.57e−03	6.4e−02	−2.50	C	12
41	$2s^23p$-$2s^28d$	^{2}P°-^{2}D	*6 028.2*	*6029.8*	*48 613.055–65 197.29*	6–10	1.64e−03	1.49e−03	1.77e−01	−2.049	C	12
			6 028.37	6030.04	48 613.6486–65 197.29	4–6	1.64e−03	1.34e−03	1.06e−01	−2.271	C	12

TABLE 16. B I: Allowed transitions—Continued

No	Transition array	Mult	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
			6 027.72	6029.39	48 611.8663–65 197.29	2–4	1.37e−03	1.49e−03	5.9e−02	−2.53	C	12
			6 028.37	6030.04	48 613.6486–65 197.29	4–4	2.73e−04	1.49e−04	1.18e−02	−3.225	C	12
42	$2s^23p$-$2s2p^2$	^{2}P°-^{2}P	*4 179.8*	*4181.0*	*48 613.055–72 530.7*	6–6	7.3e−03	1.9e−03	1.6e−01	−1.94	D+	12
			4 179.27	4180.44	48 613.6486–72 534.55	4–4	6.1e−03	1.6e−03	8.8e−02	−2.19	D+	12
			4 180.99	4182.17	48 611.8663–72 522.90	2–2	4.9e−03	1.3e−03	3.5e−02	−2.59	D+	12
			4 181.30	4182.48	48 613.6486–72 522.90	4–2	2.4e−03	3.2e−04	1.8e−02	−2.89	D+	12
			4 178.96	4180.13	48 611.8663–72 534.55	2–4	1.2e−03	6.4e−04	1.8e−02	−2.89	D+	12
43	$2s^23p$-$2s2p(^3P°)3p$	^{2}P°-^{2}P	*2 613.6*	*2614.4*	*48 613.055–86 863*	6–6	3.4e−02	3.5e−03	1.8e−01	−1.68	D+	12
			2 613.51	2614.29	48 613.6486–86 864.9	4–4	2.8e−02	2.9e−03	9.9e−02	−1.94	D+	12
			2 613.75	2614.53	48 611.8663–86 859.6	2–2	2.2e−02	2.3e−03	4.0e−02	−2.34	D+	12
			2 613.88	2614.66	48 613.6486–86 859.6	4–2	1.1e−02	5.8e−04	2.0e−02	−2.64	D+	12
			2 613.39	2614.17	48 611.8663–86 864.9	2–4	5.6e−03	1.2e−03	2.0e−02	−2.64	D+	12
44	$2s^23p$-$2s2p(^3P°)4p$	^{2}P°-^{2}P	*2 134.4*	*2135.1*	*48 613.055–95 450*	6–6	2.5e−02	1.7e−03	7.2e−02	−1.99	D+	12
			2 134.35	2135.03	48 613.6486–95 451.5	4–4	2.1e−02	1.4e−03	4.0e−02	−2.24	D+	12
			2 134.46	2135.13	48 611.8663–95 447.4	2–2	1.7e−02	1.1e−03	1.6e−02	−2.64	D+	12
			2 134.54	2135.21	48 613.6486–95 447.4	4–2	8.4e−03	2.9e−04	8.0e−03	−2.94	D+	12
			2 134.27	2134.94	48 611.8663–95 451.5	2–4	4.2e−03	5.7e−04	8.0e−03	−2.94	D+	12
45	$2s^23d$-$2s^24p$	^{2}D-^{2}P°	*33 114*	*3019.076* cm^{-1}	*54 767.781–57 786.857*	10–6	1.78e−02	1.76e−01	1.92e+02	0.246	C+	11
			33 112.0	3019.2296 cm^{-1}	54 767.8387–57 787.0683	6–4	1.61e−02	1.76e−01	1.15e+02	0.024	C+	11
			33 117.4	3018.7392 cm^{-1}	54 767.6944–57 786.4336	4–2	1.78e−02	1.47e−01	6.40e+01	−0.232	C+	11
			33 110.4	3019.3739 cm^{-1}	54 767.6944–57 787.0683	4–4	1.78e−03	2.93e−02	1.28e+01	−0.931	C+	11
46	$2s^23d$-$2s^24f$	^{2}D-^{2}F°	*18 994*	*5263.298* cm^{-1}	*54 767.781–60 031.079*	10–14	1.27e−01	9.60e−01	6.00e+02	0.982	B	11
			18 994.5	5263.2429 cm^{-1}	54 767.8387–60 031.0816	6–8	1.27e−01	9.14e−01	3.43e+02	0.739	B	11
			18 994.0	5263.3818 cm^{-1}	54 767.6944–60 031.0762	4–6	1.18e−01	9.60e−01	2.40e+02	0.584	B	11
			18 994.5	5263.2375 cm^{-1}	54 767.8387–60 031.0762	6–6	8.45e−03	4.57e−02	1.72e+01	−0.562	B	11
47	$2s^23d$-$2s^25f$	^{2}D-^{2}F°	*12 902*	*7748.778* cm^{-1}	*54 767.781–62 516.5592*	10–14	3.73e−02	1.30e−01	5.54e+01	0.115	B	12
			12 901.8	7748.7205 cm^{-1}	54 767.8387–62 516.5592	6–8	3.73e−02	1.24e−01	3.17e+01	−0.128	B	12
			12 901.6	7748.8648 cm^{-1}	54 767.6944–62 516.5592	4–6	3.48e−02	1.30e−01	2.22e+01	−0.283	B	12
			12 901.8	7748.7205 cm^{-1}	54 767.8387–62 516.5592	6–6	2.49e−03	6.21e−03	1.58e+00	−1.429	B	12
48	$2s^23d$-$2s^26f$	^{2}D-^{2}F°	*10 988*	*9098.545* cm^{-1}	*54 767.781–63 866.326*	10–14	1.65e−02	4.18e−02	1.51e+01	−0.379	B	12
			10 987.8	9098.487 cm^{-1}	54 767.8387–63 866.326	6–8	1.65e−02	3.98e−02	8.63e+00	−0.622	B	12
			10 987.7	9098.632 cm^{-1}	54 767.6944–63 866.326	4–6	1.54e−02	4.18e−02	6.04e+00	−0.777	B	12
			10 987.8	9098.487 cm^{-1}	54 767.8387–63 866.326	6–6	1.10e−03	1.99e−03	4.32e−01	−1.923	B	12
49	$2s^23d$-$2s^27f$	^{2}D-^{2}F°	*10 086*	*9911.964* cm^{-1}	*54 767.781–64 679.745*	10–14	8.88e−03	1.90e−02	6.30e+00	−0.722	C+	12
			10 086.1	9911.906 cm^{-1}	54 767.8387–64 679.745	6–8	8.88e−03	1.81e−02	3.60e+00	−0.965	C+	12
			10 086.0	9912.051 cm^{-1}	54 767.6944–64 679.745	4–6	8.29e−03	1.90e−02	2.52e+00	−1.120	C+	12
			10 086.1	9911.906 cm^{-1}	54 767.8387–64 679.745	6–6	5.92e−04	9.04e−04	1.80e−01	−2.266	C+	12
50	$2s^23d$-$2s^28f$	^{2}D-^{2}F°	*9 576.3*	*9578.9*	*54 767.781–65 207.38*	10–14	5.37e−03	1.03e−02	3.26e+00	−0.985	C+	12
			9 576.34	9578.96	54 767.8387–65 207.38	6–8	5.37e−03	9.85e−03	1.86e+00	−1.228	C+	12
			9 576.21	9578.83	54 767.6944–65 207.38	4–6	5.01e−03	1.03e−02	1.30e+00	−1.383	C+	12
			9 576.34	9578.96	54 767.8387–65 207.38	6–6	3.58e−04	4.92e−04	9.32e−02	−2.529	C+	12
51	$2s^23d$-$2s2p(^3P°)3d$	^{2}D-^{2}D°	*2 861.3*	*2862.1*	*54 767.781–89 707.2*	10–10	1.1e−02	1.3e−03	1.2e−01	−1.89	D+	12
			2 861.16	2862.00	54 767.8387–89 708.49	6–6	9.9e−03	1.2e−03	6.9e−02	−2.14	D	12
			2 861.41	2862.25	54 767.6944–89 705.19	4–4	9.5e−03	1.2e−03	4.4e−02	−2.33	D	12

TABLE 16. B I: Allowed transitions—Continued

No	Transition array	Mult	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	$E_i - E_k$ (cm^{-1})	$g_i - g_k$	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
			2 861.43	2862.27	54 767.8387–89 705.19	6–4	1.1e−03	8.7e−05	4.9e−03	−3.28	D	12
			2 861.14	2861.98	54 767.6944–89 708.49	4–6	7.1e−04	1.3e−04	4.9e−03	−3.28	D	12
52	$2s^24s$-$2s^24p$	^{2}S-^{2}P°	*36 005*	*2776.623* cm^{-1}	55 010.2338–*57 786.857*	2–6	2.66e−02	1.55e+00	3.68e+02	0.491	B	11
			36 002.4	2776.8345 cm^{-1}	55 010.2338–57 787.0683	2–4	2.66e−02	1.03e+00	2.45e+02	0.315	B	11
			36 010.6	2776.1998 cm^{-1}	55 010.2338–57 786.4336	2–2	2.66e−02	5.17e−01	1.23e+02	0.014	B	11
53	$2s^24p$-$2s^24d$	^{2}P°-^{2}D	*45 306*	*2206.59* cm^{-1}	*57 786.857–59 993.45*	6–10	2.46e−02	1.26e+00	1.13e+03	0.879	B	11
			45 310.7	2206.38 cm^{-1}	57 787.0683–59 993.45	4–6	2.45e−02	1.13e+00	6.77e+02	0.657	B	11
			45 297.7	2207.02 cm^{-1}	57 786.4336–59 993.45	2–4	2.05e−02	1.26e+00	3.76e+02	0.401	B	11
			45 310.7	2206.38 cm^{-1}	57 787.0683–59 993.45	4–4	4.09e−03	1.26e−01	7.52e+01	−0.298	B	11
54	$2s^24p$-$2s^25s$	^{2}P°-^{2}S	*42 369*	*2359.557* cm^{-1}	*57 786.857*–60 146.414	6–2	3.73e−02	3.35e−01	2.80e+02	0.303	B	11
			42 373.1	2359.346 cm^{-1}	57 787.0683–60 146.414	4–2	2.49e−02	3.35e−01	1.87e+02	0.127	B	11
			42 361.7	2359.980 cm^{-1}	57 786.4336–60 146.414	2–2	1.24e−02	3.35e−01	9.35e+01	−0.174	B	11
55	$2s^24p$-$2s^26s$	^{2}P°-^{2}S	*21 292*	*4695.310* cm^{-1}	*57 786.857*–62 482.167	6–2	1.22e−02	2.77e−02	1.17e+01	−0.779	B	12
			21 293.0	4695.099 cm^{-1}	57 787.0683–62 482.167	4–2	8.15e−03	2.77e−02	7.77e+00	−0.955	B	12
			21 290.1	4695.733 cm^{-1}	57 786.4336–62 482.167	2–2	4.08e−03	2.77e−02	3.89e+00	−1.256	B	12
56	$2s^24p$-$2s^25d$	^{2}P°-^{2}D	*21 277*	*4698.647* cm^{-1}	*57 786.857–62 485.504*	6–10	9.56e−04	1.08e−02	4.55e+00	−1.188	B	11
			21 277.9	4698.436 cm^{-1}	57 787.0683–62 485.504	4–6	9.56e−04	9.73e−03	2.73e+00	−1.410	B	11
			21 275.0	4699.070 cm^{-1}	57 786.4336–62 485.504	2–4	7.97e−04	1.08e−02	1.52e+00	−1.665	B	11
			21 277.9	4698.436 cm^{-1}	57 787.0683–62 485.504	4–4	1.59e−04	1.08e−03	3.03e−01	−2.364	B	11
57	$2s^24p$-$2s^26d$	^{2}P°-^{2}D	*16 501*	*6058.466* cm^{-1}	*57 786.857–63 845.323*	6–10	2.53e−05	1.72e−04	5.62e−02	−2.985	C+	12
			16 501.9	6058.255 cm^{-1}	57 787.0683–63 845.323	4–6	2.53e−05	1.55e−04	3.37e−02	−3.207	C	12
			16 500.2	6058.889 cm^{-1}	57 786.4336–63 845.323	2–4	2.11e−05	1.72e−04	1.87e−02	−3.462	C	12
			16 501.9	6058.255 cm^{-1}	57 787.0683–63 845.323	4–4	4.22e−06	1.72e−05	3.75e−03	−4.161	C	12
58	$2s^24p$-$2s^27s$	^{2}P°-^{2}S	*15 696*	*6369.160* cm^{-1}	*57 786.857*–64 156.017	6–2	7.29e−03	8.98e−03	2.78e+00	−1.269	B	12
			15 696.9	6368.949 cm^{-1}	57 787.0683–64 156.017	4–2	4.86e−03	8.98e−03	1.86e+00	−1.445	C+	12
			15 695.3	6369.583 cm^{-1}	57 786.4336–64 156.017	2–2	2.43e−03	8.98e−03	9.28e−01	−1.746	C+	12
59	$2s^24p$-$2s^28s$	^{2}P°-^{2}S	*14 271*	*7005.23* cm^{-1}	*57 786.857*–64 792.09	6–2	2.98e−03	3.03e−03	8.55e−01	−1.740	C+	12
			14 271.6	7005.02 cm^{-1}	57 787.0683–64 792.09	4–2	1.98e−03	3.03e−03	5.70e−01	−1.916	C+	12
			14 270.3	7005.66 cm^{-1}	57 786.4336–64 792.09	2–2	9.93e−04	3.03e−03	2.85e−01	−2.217	C+	12
60	$2s^24p$-$2s^28d$	^{2}P°-^{2}D	*13 491*	*7410.43* cm^{-1}	*57 786.857–65 197.29*	6–10	3.46e−05	1.57e−04	4.19e−02	−3.025	C+	12
			13 491.2	7410.22 cm^{-1}	57 787.0683–65 197.29	4–6	3.46e−05	1.42e−04	2.51e−02	−3.247	C+	12
			13 490.0	7410.86 cm^{-1}	57 786.4336–65 197.29	2–4	2.88e−05	1.57e−04	1.40e−02	−3.502	C+	12
			13 491.2	7410.22 cm^{-1}	57 787.0683–65 197.29	4–4	5.76e−06	1.57e−05	2.79e−03	−4.201	C+	12
61	$2s^24p$-$2s2p^2$	^{2}P°-^{2}P	*6 780.6*	*6782.5*	*57 786.857–72 530.7*	6–6	9.6e−04	6.6e−04	8.9e−02	−2.400	C	12
			6 778.95	6780.82	57 787.0683–72 534.55	4–4	8.0e−04	5.5e−04	4.93e−02	−2.66	C	12
			6 784.01	6785.89	57 786.4336–72 522.90	2–2	6.4e−04	4.42e−04	1.97e−02	−3.054	C	12
			6 784.31	6786.18	57 787.0683–72 522.90	4–2	3.20e−04	1.10e−04	9.9e−03	−3.355	C	12
			6 778.66	6780.53	57 786.4336–72 534.55	2–4	1.60e−04	2.21e−04	9.9e−03	−3.354	C	12
62	$2s^24p$-$2s2p(^3P^\circ)3p$	^{2}P°-^{2}P	*3 438.2*	*3439.2*	*57 786.857–86 863*	6–6	8.6e−03	1.52e−03	1.03e−01	−2.040	C	12
			3 438.06	3439.05	57 787.0683–86 864.9	4–4	7.1e−03	1.27e−03	5.7e−02	−2.295	C	12
			3 438.61	3439.60	57 786.4336–86 859.6	2–2	5.7e−03	1.01e−03	2.30e−02	−2.69	C	12
			3 438.69	3439.67	57 787.0683–86 859.6	4–2	2.86e−03	2.53e−04	1.15e−02	−2.99	C	12
			3 437.99	3438.97	57 786.4336–86 864.9	2–4	1.43e−03	5.1e−04	1.15e−02	−2.99	C	12

TABLE 16. B I: Allowed transitions—Continued

No	Transition array	Mult	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
63	$2s^24p$-$2s2p(^3P^\circ)4p$	$^2P^\circ$-^2P	*2 654.3*	*2655.1*	*57 786.857–95 450*	6–6	4.85e−03	5.1e−04	2.69e−02	−2.51	C	12
			2 654.23	2655.02	57 787.0683–95 451.5	4–4	4.05e−03	4.28e−04	1.49e−02	−2.77	C	12
			2 654.48	2655.27	57 786.4336–95 447.4	2–2	3.24e−03	3.42e−04	6.0e−03	−3.165	C	12
			2 654.52	2655.31	57 787.0683–95 447.4	4–2	1.62e−03	8.6e−05	2.99e−03	−3.466	C	12
			2 654.19	2654.98	57 786.4336–95 451.5	2–4	8.1e−04	1.71e−04	2.99e−03	−3.466	C	12
64	$2s^24d$-$2s^25f$	^2D-$^2F^\circ$	*39 623*	*2523.11* cm^{-1}	*59 993.45–62 516.5592*	10–14	2.71e−02	8.92e−01	1.16e+03	0.950	B	12
			39 622.8	2523.11 cm^{-1}	59 993.45–62 516.5592	6–8	2.71e−02	8.50e−01	6.65e+02	0.707	B	12
			39 622.8	2523.11 cm^{-1}	59 993.45–62 516.5592	4–6	2.53e−02	8.92e−01	4.66e+02	0.553	B	12
			39 622.8	2523.11 cm^{-1}	59 993.45–62 516.5592	6–6	1.80e−03	4.25e−02	3.33e+01	−0.594	B	12
65	$2s^24d$-$2s^26f$	^2D-$^2F^\circ$	*25 814*	*3872.88* cm^{-1}	*59 993.45–63 866.326*	10–14	1.31e−02	1.84e−01	1.56e+02	0.265	B	12
			25 813.6	3872.88 cm^{-1}	59 993.45–63 866.326	6–8	1.31e−02	1.75e−01	8.94e+01	0.022	B	12
			25 813.6	3872.88 cm^{-1}	59 993.45–63 866.326	4–6	1.23e−02	1.84e−01	6.26e+01	−0.133	B	12
			25 813.6	3872.88 cm^{-1}	59 993.45–63 866.326	6–6	8.76e−04	8.76e−03	4.47e+00	−1.279	B	12
66	$2s^24d$-$2s^27f$	^2D-$^2F^\circ$	*21 333*	*4686.30* cm^{-1}	*59 993.45–64 679.745*	10–14	7.41e−03	7.08e−02	4.98e+01	−0.150	B	12
			21 333.0	4686.30 cm^{-1}	59 993.45–64 679.745	6–8	7.41e−03	6.75e−02	2.84e+01	−0.393	B	12
			21 333.0	4686.30 cm^{-1}	59 993.45–64 679.745	4–6	6.92e−03	7.08e−02	1.99e+01	−0.548	B	12
			21 333.0	4686.30 cm^{-1}	59 993.45–64 679.745	6–6	4.94e−04	3.37e−03	1.42e+00	−1.694	B	12
67	$2s^24d$-$2s^28f$	^2D-$^2F^\circ$	*19 174*	*5213.93* cm^{-1}	*59 993.45–65 207.38*	10–14	4.62e−03	3.57e−02	2.25e+01	−0.447	B	12
			19 174.2	5213.93 cm^{-1}	59 993.45–65 207.38	6–8	4.62e−03	3.40e−02	1.29e+01	−0.690	C+	12
			19 174.2	5213.93 cm^{-1}	59 993.45–65 207.38	4–6	4.31e−03	3.57e−02	9.01e+00	−0.845	C+	12
			19 174.2	5213.93 cm^{-1}	59 993.45–65 207.38	6–6	3.08e−04	1.70e−03	6.44e−01	−1.991	C+	12
68	$2s^24d$-$2s2p(^3P^\circ)3d$	^2D-$^2D^\circ$	*3 364.5*	*3365.4*	*59 993.45–89 707.2*	10–10	2.2e−03	3.7e−04	4.1e−02	−2.44	D	12
			3 364.33	3365.30	59 993.45–89 708.49	6–6	2.0e−03	3.4e−04	2.3e−02	−2.69	D	12
			3 364.71	3365.67	59 993.45–89 705.19	4–4	1.9e−03	3.3e−04	1.5e−02	−2.88	D	12
			3 364.71	3365.67	59 993.45–89 705.19	6–4	2.2e−04	2.4e−05	1.6e−03	−3.83	D	12
			3 364.33	3365.30	59 993.45–89 708.49	4–6	1.4e−04	3.7e−05	1.6e−03	−3.83	D	12
69	$2s^24f$-$2s^25d$	$^2F^\circ$-^2D	*40 732*	*2454.425* cm^{-1}	*60 031.079–62 485.504*	14–10	5.51e−04	9.79e−03	1.84e+01	−0.863	C+	11
			40 731.7	2454.422 cm^{-1}	60 031.0816–62 485.504	8–6	5.24e−04	9.79e−03	1.05e+01	−1.106	C+	11
			40 731.6	2454.428 cm^{-1}	60 031.0762–62 485.504	6–4	5.50e−04	9.13e−03	7.35e+00	−1.261	C+	11
			40 731.6	2454.428 cm^{-1}	60 031.0762–62 485.504	6–6	2.62e−05	6.52e−04	5.25e−01	−2.407	C+	11
70	$2s^24f$-$2s^26d$	$^2F^\circ$-^2D	*26 210*	*3814.244* cm^{-1}	*60 031.079–63 845.323*	14–10	2.47e−04	1.82e−03	2.20e+00	−1.594	C+	12
			26 210.4	3814.241 cm^{-1}	60 031.0816–63 845.323	8–6	2.35e−04	1.82e−03	1.26e+00	−1.837	C+	12
			26 210.3	3814.247 cm^{-1}	60 031.0762–63 845.323	6–4	2.47e−04	1.70e−03	8.80e−01	−1.992	C+	12
			26 210.3	3814.247 cm^{-1}	60 031.0762–63 845.323	6–6	1.18e−05	1.21e−04	6.28e−02	−3.138	C+	12
71	$2s^24f$-$2s^27d$	$^2F^\circ$-^2D	*21 572*	*4634.274* cm^{-1}	*60 031.079–64 665.353*	14–10	1.34e−04	6.7e−04	6.6e−01	−2.029	C	12
			21 572.5	4634.271 cm^{-1}	60 031.0816–64 665.353	8–6	1.28e−04	6.7e−04	3.80e−01	−2.272	C	12
			21 572.5	4634.277 cm^{-1}	60 031.0762–64 665.353	6–4	1.34e−04	6.2e−04	2.66e−01	−2.427	C	12
			21 572.5	4634.277 cm^{-1}	60 031.0762–64 665.353	6–6	6.4e−06	4.45e−05	1.90e−02	−3.57	C	12
72	$2s^24f$-$2s^28d$	$^2F^\circ$-^2D	*19 351*	*5166.21* cm^{-1}	*60 031.079–65 197.29*	14–10	8.2e−05	3.27e−04	2.92e−01	−2.339	C	12
			19 351.3	5166.21 cm^{-1}	60 031.0816–65 197.29	8–6	7.8e−05	3.27e−04	1.67e−01	−2.58	C	12
			19 351.3	5166.21 cm^{-1}	60 031.0762–65 197.29	6–4	8.2e−05	3.06e−04	1.17e−01	−2.74	C	12
			19 351.3	5166.21 cm^{-1}	60 031.0762–65 197.29	6–6	3.89e−06	2.18e−05	8.3e−03	−3.88	C	12
73	$2s^25d$-$2s^26f$	^2D-$^2F^\circ$		*1380.822* cm^{-1}	*62 485.504–63 866.326*	10–14	7.50e−03	8.26e−01	1.97e+03	0.917	C+	12
				1380.822 cm^{-1}	62 485.504–63 866.326	6–8	7.50e−03	7.86e−01	1.13e+03	0.674	C+	12

TABLE 16. B I: Allowed transitions—Continued

No	Transition array	Mult	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
				1380.822 cm^{-1}	62 485.504–63 866.326	4–6	7.00e−03	8.26e−01	7.88e+02	0.519	C+	12
				1380.822 cm^{-1}	62 485.504–63 866.326	6–6	5.00e−04	3.93e−02	5.63e+01	−0.627	C+	12
74	$2s^25d$-$2s^27f$	^{2}D-^{2}F°	*45 561*	*2194.241* cm^{-1}	*62 485.504–64 679.745*	10–14	4.47e−03	1.95e−01	2.92e+02	0.289	C+	12
			45 561.4	2194.241 cm^{-1}	62 485.504–64 679.745	6–8	4.47e−03	1.85e−01	1.67e+02	0.046	C+	12
			45 561.4	2194.241 cm^{-1}	62 485.504–64 679.745	4–6	4.17e−03	1.95e−01	1.17e+02	−0.109	C+	12
			45 561.4	2194.241 cm^{-1}	62 485.504–64 679.745	6–6	2.98e−04	9.27e−03	8.34e+00	−1.255	C+	12
75	$2s^25d$-$2s^28f$	^{2}D-^{2}F°	*36 729*	*2721.88* cm^{-1}	*62 485.504–65 207.38*	10–14	2.84e−03	8.05e−02	9.73e+01	−0.094	C+	12
			36 729.3	2721.88 cm^{-1}	62 485.504–65 207.38	6–8	2.84e−03	7.66e−02	5.56e+01	−0.337	C+	12
			36 729.3	2721.88 cm^{-1}	62 485.504–65 207.38	4–6	2.65e−03	8.05e−02	3.89e+01	−0.492	C+	12
			36 729.3	2721.88 cm^{-1}	62 485.504–65 207.38	6–6	1.89e−04	3.83e−03	2.78e+00	−1.638	C+	12
76	$2s^25d$-$2s2p(^3$P°$)3d$	^{2}D-^{2}D°	*3 672.5*	*3673.5*	*62 485.504–89 707.2*	10–10	8.5e−04	1.7e−04	2.1e−02	−2.76	D	12
			3 672.32	3673.37	62 485.504–89 708.49	6–6	8.0e−04	1.6e−04	1.2e−02	−3.01	D	12
			3 672.77	3673.81	62 485.504–89 705.19	4–4	7.7e−04	1.6e−04	7.5e−03	−3.21	D	12
			3 672.77	3673.81	62 485.504–89 705.19	6–4	8.5e−05	1.2e−05	8.4e−04	−4.16	D	12
			3 672.32	3673.37	62 485.504–89 708.49	4–6	5.7e−05	1.7e−05	8.4e−04	−4.16	D	12
77	$2s^25f$-$2s^26d$	^{2}F°-^{2}D		*1328.764* cm^{-1}	*62 516.5592–63 845.323*	14–10	4.38e−04	2.66e−02	9.2e+01	−0.430	C	12
				1328.764 cm^{-1}	62 516.5592–63 845.323	8–6	4.17e−04	2.66e−02	5.3e+01	−0.67	C	12
				1328.764 cm^{-1}	62 516.5592–63 845.323	6–4	4.38e−04	2.48e−02	3.69e+01	−0.83	C	12
				1328.764 cm^{-1}	62 516.5592–63 845.323	6–6	2.09e−05	1.77e−03	2.63e+00	−1.97	C	12
78	$2s^25f$-$2s^27d$	^{2}F°-^{2}D	*46 525*	*2148.794* cm^{-1}	*62 516.5592–64 665.353*	14–10	2.21e−04	5.1e−03	1.10e+01	−1.143	C	12
			46 525.1	2148.794 cm^{-1}	62 516.5592–64 665.353	8–6	2.11e−04	5.1e−03	6.3e+00	−1.386	C	12
			46 525.1	2148.794 cm^{-1}	62 516.5592–64 665.353	6–4	2.21e−04	4.79e−03	4.41e+00	−1.54	C	12
			46 525.1	2148.794 cm^{-1}	62 516.5592–64 665.353	6–6	1.05e−05	3.42e−04	3.15e−01	−2.69	C	12
79	$2s^25f$-$2s^28d$	^{2}F°-^{2}D	*37 293*	*2680.73* cm^{-1}	*62 516.5592–65 197.29*	14–10	1.28e−04	1.91e−03	3.29e+00	−1.57	C	12
			37 293.1	2680.73 cm^{-1}	62 516.5592–65 197.29	8–6	1.22e−04	1.91e−03	1.88e+00	−1.82	C	12
			37 293.1	2680.73 cm^{-1}	62 516.5592–65 197.29	6–4	1.28e−04	1.79e−03	1.32e+00	−1.97	C	12
			37 293.1	2680.73 cm^{-1}	62 516.5592–65 197.29	6–6	6.1e−06	1.28e−04	9.4e−02	−3.116	C	12
80	$2s^26d$-$2s^27f$	^{2}D-^{2}F°		*834.422* cm^{-1}	*63 845.323–64 679.745*	10–14	2.64e−03	8.0e−01	3.15e+03	0.90	C	12
				834.422 cm^{-1}	63 845.323–64 679.745	6–8	2.64e−03	7.6e−01	1.80e+03	0.66	C	12
				834.422 cm^{-1}	63 845.323–64 679.745	4–6	2.47e−03	8.0e−01	1.26e+03	0.50	C	12
				834.422 cm^{-1}	63 845.323–64 679.745	6–6	1.76e−04	3.80e−02	9.0e+01	−0.64	C	12
81	$2s^26d$-$2s^28f$	^{2}D-^{2}F°		*1362.06* cm^{-1}	*63 845.323–65 207.38*	10–14	1.76e−03	1.99e−01	4.82e+02	0.300	C	12
				1362.06 cm^{-1}	63 845.323–65 207.38	6–8	1.76e−03	1.90e−01	2.75e+02	0.057	C	12
				1362.06 cm^{-1}	63 845.323–65 207.38	4–6	1.65e−03	1.99e−01	1.93e+02	−0.098	C	12
				1362.06 cm^{-1}	63 845.323–65 207.38	6–6	1.18e−04	9.5e−03	1.38e+01	−1.244	C	12
82	$2s^26f$-$2s^27d$	^{2}F°-^{2}D		*799.027* cm^{-1}	*63 866.326–64 665.353*	14–10	2.86e−04	4.79e−02	2.76e+02	−0.173	C	12
				799.027 cm^{-1}	63 866.326–64 665.353	8–6	2.72e−04	4.79e−02	1.58e+02	−0.416	C	12
				799.027 cm^{-1}	63 866.326–64 665.353	6–4	2.86e−04	4.47e−02	1.11e+02	−0.57	C	12
				799.027 cm^{-1}	63 866.326–64 665.353	6–6	1.36e−05	3.20e−03	7.9e+00	−1.72	C	12
83	$2s^26f$-$2s^28d$	^{2}F°-^{2}D		*1330.96* cm^{-1}	*63 866.326–65 197.29*	14–10	1.57e−04	9.5e−03	3.28e+01	−0.88	C	12
				1330.96 cm^{-1}	63 866.326–65 197.29	8–6	1.49e−04	9.5e−03	1.88e+01	−1.120	C	12
				1330.96 cm^{-1}	63 866.326–65 197.29	6–4	1.57e−04	8.9e−03	1.31e+01	−1.275	C	12
				1330.96 cm^{-1}	63 866.326–65 197.29	6–6	7.5e−06	6.3e−04	9.4e−01	−2.42	D	12
84	$2s^27d$-$2s^28f$	^{2}D-^{2}F°		*542.03* cm^{-1}	*64 665.353–65 207.38*	10–14	1.11e−03	7.9e−01	4.80e+03	0.90	C	12

TABLE 16. B I: Allowed transitions—Continued

No	Transition array	Mult	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
				542.03 cm^{-1}	64 665.353–65 207.38	6–8	1.11e−03	7.5e−01	2.74e+03	0.65	C	12
				542.03 cm^{-1}	64 665.353–65 207.38	4–6	1.03e−03	7.9e−01	1.92e+03	0.50	C	12
				542.03 cm^{-1}	64 665.353–65 207.38	6–6	7.4e−05	3.76e−02	1.37e+02	−0.65	C	12
85	$2s^27f$-$2s^28d$	^{2}F°-^{2}D		*517.55* cm^{-1}	*64 679.745–65 197.29*	14–10	1.81e−04	7.2e−02	6.4e+02	0.006	C	12
				517.55 cm^{-1}	64 679.745–65 197.29	8–6	1.73e−04	7.2e−02	3.69e+02	−0.237	C	12
				517.55 cm^{-1}	64 679.745–65 197.29	6–4	1.81e−04	6.8e−02	2.58e+02	−0.392	C	12
				517.55 cm^{-1}	64 679.745–65 197.29	6–6	8.6e−06	4.83e−03	1.84e+01	−1.54	C	12

[a]Wavelengths are (Å) always given unless cm^{-1} is indicated.

3.1.2. B I forbidden transitions

Garstang[26] calculated the transition probability of the magnetic dipole (M1) transition between the two hyperfine levels of the ground state for the two boron isotopes ^{10}B and ^{11}B (their relative abundances are 19.9% and 80.1%, respectively). For the transition frequencies, he used experimental data by Lew and Title.[47] These lines are analogous to the astrophysically important 21 cm line of hydrogen. Garstang estimated that possible errors arising from his neglect of intermediate coupling, from configuration interaction and from relativistic interactions, should be at most of the order of a few percent for boron. These data are listed in Table 17.

Tachiev and Froese Fischer[8] calculated the line strengths for M1, magnetic quadrupole (M2), and electric quadrupole (E2) transitions within the $2s^22p$ and $2s2p^2$ configurations and for transitions between these two configurations. They used an extensive MCHF approach and included relativistic effects through the Breit–Pauli interactions. These data are listed in Table 18.

TABLE 17. B I: Isotopes, hyperfine structure, magnetic dipole transition

Isotope	Transition	Frequency (MHz)	ΔE (cm^{-1})	g_i-g_k	Type	A_{ki} (s^{-1})	S (a.u.)	Accuracy	Source
^{10}B	$2s^22p$ ^{2}P°$_{1/2}$(F=5/2 − F=7/2)	429.048	0.014 31	6–8	M1	1.51e−17	1.53e+00	B	26
^{11}B	$2s^22p$ ^{2}P°$_{1/2}$(F=1 − F=2)	732.153	0.024 42	3–5	M1	6.55e−17	8.34e−01	B	26

TABLE 18. B I: Forbidden transitions

No.	Transition array	Mult.	λ_{air}(Å)	λ_{vac}(Å) or σ(cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	Type	A_{ki} (s^{-1})	S (a.u.)	Acc.	Source
1	$2s^22p$-$2s^22p$	^{2}P°-^{2}P°									
				15.287 cm^{-1}	0.000–15.287	2–4	M1	3.21e−08	1.33e+00	A	8
				15.287 cm^{-1}	0.000–15.287	2–4	E2	6.24e−16	2.67e+01	B	8
2	$2s^22p$-$2s2p^2$	^{2}P°-^{4}P									
			3490.24	3491.24	15.287–28 658.40	4–6	M2	5.65e−04	1.18e+02	B	8
			3489.15	3490.15	0.000–28 652.07	2–4	M2	4.32e−04	6.00e+01	B	8
			3488.38	3489.38	0.000–28 658.40	2–6	M2	1.62e−04	3.38e+01	B	8
			3491.01	3492.01	15.287–28 652.07	4–4	M2	2.69e−05	3.75e+00	B	8
			3491.58	3492.58	15.287–28 647.43	4–2	M2	1.35e−04	9.38e+00	B	8
3	$2s2p^2$-$2s2p^2$	^{4}P-^{4}P									
				6.33 cm^{-1}	28 652.07–28 658.40	4–6	M1	4.10e−09	3.60e+00	A	8
				6.33 cm^{-1}	28 652.07–28 658.40	4–6	E2	6.99e−18	3.69e+01	B	8
				10.97 cm^{-1}	28 647.43–28 658.40	2–6	E2	7.80e−17	2.63e+01	B	8
				4.64 cm^{-1}	28 647.43–28 652.07	2–4	M1	2.25e−09	3.33e+00	A	8
				4.64 cm^{-1}	28 647.43–28 652.07	2–4	E2	1.76e−19	2.92e+00	B	8

[a]Wavelengths (Å) are always given unless cm^{-1} is indicated.

3.2. B II

Beryllium isoelectronic sequence

Ground state: $1s^22s^2$ ^{1}S$_0$

Ionization energy: 25.1548 eV (202 887.4 cm^{-1})

3.2.1. B II allowed transitions

Our tabulated data are selected from the advanced calculations by Tachiev and Froese Fischer[7] and by the Opacity Project team.[12]

Tachiev and Froese Fischer constructed accurate MCHF wave functions by expanding them into large numbers of configuration state functions and by including the dominant part of the small relativistic contributions with the Breit–Pauli terms. Their results are listed in their website "The MCHF/MCDF Collection"[7] in considerable detail, including the numbers from both the dipole length as well as the dipole velocity representations and the relative differences of the two (in percentage). These differences are proposed as indicators of their accuracy. While they cannot be considered as a fully quantitative measure, they nevertheless indicate the quality of the results, especially for the *stronger* lines, while for weaker lines, other factors such as cancellation in the transition integral become more important and render them much less useful. Thus, we have given "A" accuracy ratings for all stronger transitions where these differences are smaller than 1.5%.

Since the Tachiev and Froese Fischer data are limited to transitions involving principal quantum numbers $n=2$ and 3 only, we have selected for all other tabulated transitions the results of the Opacity Project.[12] These extensive calculations were done with the close-coupling method, i.e., essentially a frozen core approximation with limited configuration interaction. For a dozen transitions, where Refs. 7 and 12 overlap, the results agree in seven cases within 1%–2%, in three cases within 10%, but for two lines there is a severe disagreement. For all overlapping lines, we have chosen the data from Ref. 7.

For a few strong LS-allowed transitions, we could compare the selected theoretical data with experimental results from lifetime measurements done with the beam-foil method.[16,48] Table 19 shows the oscillator strengths from the selected calculations compared to data derived from the lifetime measurements (with some contributing very weak transitions being neglected). The beam-foil data were treated with the ANDC analysis method to minimize the effects of cascade repopulation. Clearly, the agreement between the theoretical and experimental data is excellent, which is, however, not too surprising for these LS-allowed lines since they are among the strongest transitions in this spectrum. Also, for the very weak, LS-forbidden intercombination line, $2s^2\ ^1S$-$2s2p\ ^3P$, a lifetime measurement performed with a storage ring[49] and another accurate theoretical result,[50] obtained with the advanced atomic structure code CIV 3, are available and are presented in Table 19, too. These results also show excellent agreement.

A finding list and transition probabilities for the allowed lines of B II are given in Tables 20 and 21.

TABLE 19. Oscillator strengths for B II. Comparison of calculated and measured oscillator strengths for three strong transitions and a weak intercombination line. All experimental data are based on lifetime measurements. The calculated data are dipole-length values and the Tachiev and Froese Fischer data contain, in parentheses, the relative differences (in %) between their dipole length and dipole velocity results, an indicator of their accuracy.

	Calculations			Experiments		
Transition	Tachiev and Froese Fischer[7]	Opacity Project[12]	Fleming *et al.*[50]	Irving *et al.*[16]	Bashkin *et al.*[48]	Träbert *et al.*[49]
$2s^2\ ^1S$-$2s2p\ ^1P^\circ$	1.001(0.4%)	1.014	–	0.98 ± 0.06	0.97 ± 0.08	–
$2s^2\ ^1S$-$2s2p\ ^3P^\circ$	1.049×10^{-7}(64.5%)	–	0.982×10^{-7}	–	–	$(1.024\pm0.05)\times10^{-7}$
$2s2p\ ^1P^\circ$-$2p^2\ ^1S$	0.2259(0.1%)	0.223	–	–	0.24 ± 0.02	–
$2s2p\ ^3P^\circ$-$2p^2\ ^3P$	0.343(0.4%)	0.350	–	–	0.34 ± 0.03	–

TABLE 20. List of tabulated lines for allowed transitions of B II

Wavelength (Å)	No.
In vacuum	
535.820	7
550.159	6
586.196	5
631.802	21
631.821	21
631.845	21
631.867	21
631.871	21
631.910	21
641.474	20
641.499	20
641.566	20
650.594	19
650.606	19
650.621	19
650.647	19

TABLE 20. List of tabulated lines for allowed transitions of B II—Continued

Wavelength (Å)	No.
650.674	19
650.715	19
678.895	18
678.923	18
678.998	18
693.948	4
694.490	3
696.565	17
696.595	17
696.673	17
731.327	16
731.359	16
731.446	16
775.138	15
775.174	15
775.271	15
809.172	34

TABLE 20. List of tabulated lines for allowed transitions of B II—Continued

Wavelength (Å)	No.
852.192	14
852.309	14
864.069	33
882.502	13
882.550	13
882.676	13
893.442	32
924.595	31
978.948	30
984.574	40
984.620	40
984.657	40
984.698	40
984.750	40
984.787	40
997.202	12
1 048.69	49
1 057.77	29
1 081.80	11
1 081.87	11
1 082.06	11
1 107.18	10
1 135.51	48
1 180.53	39
1 180.65	39
1 180.84	39
1 186.70	47
1 208.36	38
1 208.54	38
1 208.55	38
1 208.67	38
1 208.81	38
1 208.86	38
1 210.72	46
1 230.17	28
1 259.40	45
1 294.45	27
1 362.46	2
1 376.75	37
1 376.92	37
1 377.17	37
1 378.19	44
1 465.66	43
1 537.96	9
1 538.34	9
1 557.01	26
1 623.60	8
1 623.79	8
1 623.95	8
1 624.02	8
1 624.17	8
1 624.38	8
1 695.81	54
1 773.76	25

TABLE 20. List of tabulated lines for allowed transitions of B II—Continued

Wavelength (Å)	No.
1 842.82	24
1 848.27	53
1 857.18	59
1 891.19	81
1 926.67	58
1 927.46	58
1 927.82	58
1 936.92	73
1 937.05	73
1 937.30	73
1 937.32	73
1 937.45	73
1 937.57	73
In air	
2 005.87	88
2 006.08	88
2 006.24	88
2 030.36	72
2 030.38	72
2 030.53	72
2 039.84	64
2 123.86	71
2 124.54	71
2 124.70	71
2 124.96	71
2 124.99	71
2 125.15	71
2 212.11	36
2 212.53	36
2 213.18	36
2 217.63	35
2 217.87	35
2 218.05	35
2 218.08	35
2 218.53	35
2 218.71	35
2 220.30	80
2 264.64	63
2 323.03	95
2 328.65	52
2 393.21	57
2 395.04	42
2 401.31	41
2 401.51	41
2 425.26	79
2 459.66	70
2 459.69	70
2 459.91	70
2 519.26	87
2 669.50	78
2 677.18	1
2 708.70	69
2 708.74	69
2 709.00	69

TABLE 20. List of tabulated lines for allowed transitions of B II—Continued

Wavelength (Å)	No.
2 796.93	94
2 918.08	86
3 032.26	85
3 032.26	62
3 129.59	93
3 179.33	77
3 222.06	84
3 224.26	84
3 225.27	84
3 302.42	92
3 323.14	68
3 323.21	68
3 323.60	68
3 451.30	23
3 691.77	91
3 788.49	106
3 914.82	22
3 916.87	22
3 918.17	22
4 121.93	83
4 152.84	111
4 154.71	111
4 155.84	111
4 194.79	76
4 472.03	67
4 472.15	67
4 472.86	67
4 532.29	119
4 611.14	110
4 784.20	82
4 940.37	90
5 347.65	101
5 393.22	105
5 787.47	98
6 080.39	51
6 122.24	50
6 148.91	115
6 186.38	117
6 193.59	117
6 197.35	117
6 285.51	89
6 520.56	97
6 529.59	97
6 533.71	97
6 571.12	131
6 717.65	123
6 786.14	104
6 976.88	56
7 030.27	55
7 032.03	55
7 032.33	55
7 159.55	128
7 160.16	128
7 165.11	128
7 168.46	128
7 170.45	128
7 176.02	128
7 228.46	100

TABLE 20. List of tabulated lines for allowed transitions of B II—Continued

Wavelength (Å)	No.
7 638.62	109
8 064.28	140
8 330.88	135
8 338.40	135
8 342.94	135
8 632.76	127
8 639.96	127
8 655.83	127
9 020.42	122
9 121.00	103
9 226.43	114
9 347.11	66
9 350.21	66
9 446.36	75
9 611.56	118
9 659.49	142
10 274.3	116
10 405.5	134
10 473.3	113
10 582.4	145
10 586.6	145
10 587.3	145
10 593.3	145
10 597.6	145
10 608.4	145
10 614.5	145
10 622.7	121
10 647.8	126
10 648.0	126
10 650.5	126
10 658.9	126
10 671.9	126
10 683.1	126
10 690.9	108
11 635.3	143
13 428.9	133
13 462.9	133
13 480.7	133
13 579.0	130
15 011.5	65
15 012.9	65
15 020.9	65
15 261.8	144
15 270.6	74
15 426.2	61
15 698.5	60
16 076.2	120
16 243.5	137
16 293.3	137
16 319.4	137
17 544.7	136
19 221.6	96
19 579.9	139
20 173.4	102
20 501.3	146
20 512.8	146
20 528.8	146
20 535.7	146

TABLE 20. List of tabulated lines for allowed transitions of B II—Continued

Wavelength (Å)	No.
20 558.5	146
20 574.5	146
28 102.1	129
33 460.1	125
33 568.5	125
33 809.3	125
36 731.9	124
37 640.1	99
39 556.0	107
40 020.2	141
Wave number (cm^{-1})	**No.**
365.0	138
830.00	112
1 014.91	132

TABLE 21. B II: Allowed transitions

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
1	$2s^2$-$2s2p$	^1S-$^3P°$										
			2 677.18	2677.97	0.00–37 341.65	1–3	1.04e−07	3.35e−08	2.95e−07	−7.475	B	7
2	$2s^2$-$2s2p$	^1S-$^1P°$		1362.46	0.00–73 396.510	1–3	1.20e+01	9.99e−01	4.48e+00	−0.001	A	7
3	$2s^2$-$2s3p$	^1S-$^3P°$										
				694.490	0.00–143 990.56	1–3	2.34e−03	5.08e−05	1.16e−04	−4.294	B	7
4	$2s^2$-$2s3p$	^1S-$^1P°$		693.948	0.00–144 102.94	1–3	5.01e+00	1.09e−01	2.48e−01	−0.964	A	7
5	$2s^2$-$2s4p$	^1S-$^1P°$		586.196	0.00–170 591.33	1–3	3.32e+00	5.14e−02	9.91e−02	−1.289	B	12
6	$2s^2$-$2s5p$	^1S-$^1P°$		550.159	0.00–181 765.7	1–3	1.77e+00	2.41e−02	4.36e−02	−1.618	B	12
7	$2s^2$-$2p3s$	^1S-$^1P°$		535.820	0.00–186 629.92	1–3	1.58e−01	2.04e−03	3.60e−03	−2.690	B	12
8	$2s2p$-$2p^2$	$^3P°$-^3P		*1624.0*	*37 349.9–98 926.4*	9–9	8.65e+00	3.42e−01	1.65e+01	0.488	A	7
				1624.02	37 357.80–98 933.26	5–5	6.48e+00	2.56e−01	6.85e+00	0.108	A	7
				1623.95	37 341.65–98 919.87	3–3	2.16e+00	8.55e−02	1.37e+00	−0.591	A	7
				1623.60	37 341.65–98 933.26	3–5	2.16e+00	1.42e−01	2.29e+00	−0.369	A	7
				1623.79	37 335.54–98 919.87	1–3	2.88e+00	3.42e−01	1.83e+00	−0.466	A	7
				1624.38	37 357.80–98 919.87	5–3	3.60e+00	8.54e−02	2.28e+00	−0.369	A	7
				1624.17	37 341.65–98 911.38	3–1	8.64e+00	1.14e−01	1.83e+00	−0.466	A	7
9	$2s2p$-$2p^2$	$^3P°$-^1D										
				1538.34	37 357.80–102 362.770	5–5	9.2e−05	3.27e−06	8.3e−05	−4.79	C	7
				1537.96	37 341.65–102 362.770	3–5	2.13e−05	1.26e−06	1.92e−05	−5.422	C	7
10	$2s2p$-$2p^2$	$^3P°$-^1S										
				1107.18	37 341.65–127 661.19	3–1	2.43e−06	1.49e−08	1.63e−07	−7.349	C	7
11	$2s2p$-$2s3s$	$^3P°$-^3S		*1082.0*	*37 349.9*–129 773.83	9–3	1.09e+01	6.40e−02	2.05e+00	−0.240	A	7
				1082.06	37 357.80–129 773.83	5–3	6.08e+00	6.40e−02	1.14e+00	−0.495	A	7
				1081.87	37 341.65–129 773.83	3–3	3.65e+00	6.40e−02	6.84e−01	−0.717	A	7
				1081.80	37 335.54–129 773.83	1–3	1.22e+00	6.40e−02	2.28e−01	−1.194	A	7
12	$2s2p$-$2s3s$	$^3P°$-^1S										
				997.202	37 341.65–137 622.25	3–1	8.2e−07	4.10e−09	4.04e−08	−7.91	C	7
13	$2s2p$-$2s3d$	$^3P°$-^3D		*882.61*	*37 349.9–150 649.7*	9–15	2.44e+01	4.76e−01	1.24e+01	0.632	A	7
				882.676	37 357.80–150 649.68	5–7	2.44e+01	4.00e−01	5.81e+00	0.301	A	7
				882.550	37 341.65–150 649.68	3–5	1.83e+01	3.57e−01	3.11e+00	0.030	A	7
				882.502	37 335.54–150 649.68	1–3	1.36e+01	4.76e−01	1.38e+00	−0.323	A	7
				882.676	37 357.80–150 649.68	5–5	6.11e+00	7.14e−02	1.04e+00	−0.447	A	7
				882.550	37 341.65–150 649.68	3–3	1.02e+01	1.19e−01	1.04e+00	−0.447	A	7
				882.676	37 357.80–150 649.68	5–3	6.79e−01	4.76e−03	6.91e−02	−1.624	A	7

TABLE 21. B II: Allowed transitions—Continued

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
14	$2s2p$-$2s3d$	^{3}P°-^{1}D										
				852.309	37 357.80–154 686.12	5–5	8.1e−10	8.9e−12	1.2e−10	−10.35	D	7
				852.192	37 341.65–154 686.12	3–5	4.18e−07	7.6e−09	6.4e−08	−7.64	C	7
15	$2s2p$-$2s4s$	^{3}P°-^{3}S		*775.22*	*37 349.9*–166 344.89	9–3	3.83e+00	1.15e−02	2.64e−01	−0.985	B	12
				775.271	37 357.80–166 344.89	5–3	2.13e+00	1.15e−02	1.47e−01	−1.240	B	LS
				775.174	37 341.65–166 344.89	3–3	1.28e+00	1.15e−02	8.81e−02	−1.462	B	LS
				775.138	37 335.54–166 344.89	1–3	4.26e−01	1.15e−02	2.94e−02	−1.939	B	LS
16	$2s2p$-$2s4d$	^{3}P°-^{3}D		*731.40*	*37 349.9–174 073.33*	9–15	9.44e+00	1.26e−01	2.73e+00	0.055	B	12
				731.446	37 357.80–174 073.33	5–7	9.44e+00	1.06e−01	1.28e+00	−0.276	B	LS
				731.359	37 341.65–174 073.33	3–5	7.08e+00	9.47e−02	6.84e−01	−0.547	B	LS
				731.327	37 335.54–174 073.33	1–3	5.25e+00	1.26e−01	3.04e−01	−0.899	B	LS
				731.446	37 357.80–174 073.33	5–5	2.36e+00	1.89e−02	2.28e−01	−1.024	B	LS
				731.359	37 341.65–174 073.33	3–3	3.93e+00	3.16e−02	2.28e−01	−1.024	B	LS
				731.446	37 357.80–174 073.33	5–3	2.62e−01	1.26e−03	1.52e−02	−2.200	B	LS
17	$2s2p$-$2s5s$	^{3}P°-^{3}S		*696.64*	*37 349.9*–180 897.12	9–3	1.94e+00	4.70e−03	9.70e−02	−1.374	B	12
				696.673	37 357.80–180 897.12	5–3	1.08e+00	4.70e−03	5.39e−02	−1.629	B	LS
				696.595	37 341.65–180 897.12	3–3	6.46e−01	4.70e−03	3.23e−02	−1.851	B	LS
				696.565	37 335.54–180 897.12	1–3	2.15e−01	4.70e−03	1.08e−02	−2.328	B	LS
18	$2s2p$-$2s5d$	^{3}P°-^{3}D		*678.96*	*37 349.9–184 633.7*	9–15	4.65e+00	5.36e−02	1.08e+00	−0.317	B	12
				678.998	37 357.80–184 633.72	5–7	4.65e+00	4.50e−02	5.03e−01	−0.648	B	LS
				678.923	37 341.65–184 633.72	3–5	3.49e+00	4.02e−02	2.70e−01	−0.919	B	LS
				678.895	37 335.54–184 633.72	1–3	2.59e+00	5.36e−02	1.20e−01	−1.271	B	LS
				678.998	37 357.80–184 633.72	5–5	1.16e+00	8.04e−03	8.98e−02	−1.396	B	LS
				678.923	37 341.65–184 633.72	3–3	1.94e+00	1.34e−02	8.98e−02	−1.396	B	LS
				678.998	37 357.80–184 633.72	5–3	1.29e−01	5.36e−04	5.99e−03	−2.572	B	LS
19	$2s2p$-$2p3p$	^{3}P°-^{3}D		*650.61*	*37 349.9–191 051.4*	9–15	5.3e−01	5.6e−03	1.08e−01	−1.299	C	12
				650.594	37 357.80–191 063.4	5–7	5.3e−01	4.69e−03	5.0e−02	−1.63	C	LS
				650.606	37 341.65–191 044.6	3–5	3.96e−01	4.19e−03	2.69e−02	−1.90	C	LS
				650.621	37 335.54–191 034.8	1–3	2.93e−01	5.6e−03	1.20e−02	−2.253	C	LS
				650.674	37 357.80–191 044.6	5–5	1.32e−01	8.4e−04	9.0e−03	−2.378	C	LS
				650.647	37 341.65–191 034.8	3–3	2.20e−01	1.40e−03	9.0e−03	−2.378	C	LS
				650.715	37 357.80–191 034.8	5–3	1.47e−02	5.6e−05	6.0e−04	−3.55	C	LS
20	$2s2p$-$2p3p$	^{3}P°-^{3}S		*641.53*	*37 349.9*–193 226.5	9–3	1.94e+00	4.00e−03	7.60e−02	−1.444	B	12
				641.566	37 357.80–193 226.5	5–3	1.08e+00	4.00e−03	4.22e−02	−1.699	B	LS
				641.499	37 341.65–193 226.5	3–3	6.48e−01	4.00e−03	2.53e−02	−1.921	B	LS
				641.474	37 335.54–193 226.5	1–3	2.16e−01	4.00e−03	8.44e−03	−2.398	B	LS
21	$2s2p$-$2p3p$	^{3}P°-^{3}P		*631.86*	*37 349.9–195 613.5*	9–9	1.35e+00	8.08e−03	1.51e−01	−1.138	B	12
				631.867	37 357.80–195 619.05	5–5	1.01e+00	6.06e−03	6.30e−02	−1.518	B	LS
				631.845	37 341.65–195 608.22	3–3	3.38e−01	2.02e−03	1.26e−02	−2.217	B	LS
				631.802	37 341.65–195 619.05	3–5	3.38e−01	3.37e−03	2.10e−02	−1.996	B	LS
				631.821	37 335.54–195 608.22	1–3	4.50e−01	8.08e−03	1.68e−02	−2.092	B	LS
				631.910	37 357.80–195 608.22	5–3	5.6e−01	2.02e−03	2.10e−02	−2.00	C	LS
				631.871	37 341.65–195 601.7	3–1	1.35e+00	2.69e−03	1.68e−02	−2.093	C	LS
22	$2s2p$-$2p^2$	^{1}P°-^{3}P										
			3 914.82	3915.93	73 396.510–98 933.26	3–5	4.04e−06	1.55e−06	6.0e−05	−5.333	C	7
			3 916.87	3917.98	73 396.510–98 919.87	3–3	1.7e−08	3.9e−09	1.5e−07	−7.93	D	7
			3 918.17	3919.28	73 396.510–98 911.38	3–1	4.09e−07	3.14e−08	1.21e−06	−7.026	C	7
23	$2s2p$-$2p^2$	^{1}P°-^{1}D	3 451.30	3452.29	73 396.510–102 362.770	3–5	5.41e−01	1.61e−01	5.50e+00	−0.315	A	7
24	$2s2p$-$2p^2$	^{1}P°-^{1}S		1842.82	73 396.510–127 661.19	3–1	1.33e+01	2.25e−01	4.10e+00	−0.170	A	7

TABLE 21. B II: Allowed transitions—Continued

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})^a	E_i-E_k (cm^{-1})	g_i-g_k	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
25	2s2p-2s3s	^{1}P°-^{3}S										
				1773.76	73 396.510–129 773.83	3–3	3.5e−07	1.7e−08	2.9e−07	−7.30	D	7
26	2s2p-2s3s	^{1}P°-^{1}S		1557.01	73 396.510–137 622.25	3–1	1.58e−02	1.92e−04	2.95e−03	−3.241	C	7
27	2s2p-2s3d	^{1}P°-^{3}D										
				1294.45	73 396.510–150 649.68	3–5	2.7e−07	1.1e−08	1.4e−07	−7.48	D	7
				1294.45	73 396.510–150 649.68	3–3	8.1e−07	2.04e−08	2.61e−07	−7.213	C	7
28	2s2p-2s3d	^{1}P°-^{1}D		1230.17	73 396.510–154 686.12	3–5	1.36e+01	5.16e−01	6.27e+00	0.190	A	7
29	2s2p-2s4s	^{1}P°-^{1}S		1057.77	73 396.510–167 935.31	3–1	6.4e−01	3.57e−03	3.73e−02	−1.97	C	12
30	2s2p-2s4d	^{1}P°-^{1}D		978.948	73 396.510–175 547.01	3–5	6.50e+00	1.56e−01	1.51e+00	−0.330	B	12
31	2s2p-2s5s	^{1}P°-^{1}S		924.595	73 396.510–181 552.03	3–1	3.28e−01	1.40e−03	1.28e−02	−2.376	C	12
32	2s2p-2s5d	^{1}P°-^{1}D		893.442	73 396.510–185 323.18	3–5	3.62e+00	7.22e−02	6.37e−01	−0.664	B	12
33	2s2p-2p3p	^{1}P°-^{1}P		864.069	73 396.510–189 127.98	3–3	3.95e+00	4.42e−02	3.77e−01	−0.878	B	12
34	2s2p-2p3p	^{1}P°-^{1}D		809.172	73 396.510–196 979.6	3–5	2.14e+00	3.49e−02	2.79e−01	−0.980	B	12
35	2p^2-2s3p	^{3}P-^{3}P°	*2 218.3*	*2219.0*	*98 926.4–143 992.5*	9–9	5.4e−04	4.02e−05	2.64e−03	−3.441	C	7
			2 218.53	2219.22	98 933.26–143 994.11	5–5	4.10e−04	3.02e−05	1.11e−03	−3.82	C	7
			2 218.05	2218.74	98 919.87–143 990.56	3–3	1.35e−04	1.0e−05	2.19e−04	−4.52	C	7
			2 218.71	2219.40	98 933.26–143 990.56	5–3	2.27e−04	1.00e−05	3.67e−04	−4.299	C	7
			2 218.08	2218.77	98 919.87–143 989.95	3–1	5.4e−04	1.33e−05	2.91e−04	−4.400	C	7
			2 217.87	2218.56	98 919.87–143 994.11	3–5	1.37e−04	1.69e−05	3.70e−04	−4.296	C	7
			2 217.63	2218.32	98 911.38–143 990.56	1–3	1.81e−04	4.00e−05	2.92e−04	−4.398	C	7
36	2p^2-2s3p	^{3}P-^{1}P°										
			2 213.18	2213.87	98 933.26–144 102.94	5–3	8.6e−06	3.80e−07	1.38e−05	−5.72	C	7
			2 212.53	2213.22	98 919.87–144 102.94	3–3	5.8e−08	4.3e−09	9.3e−08	−7.89	D	7
			2 212.11	2212.80	98 911.38–144 102.94	1–3	3.25e−07	7.2e−08	5.2e−07	−7.145	C	7
37	2p^2-2s4p	^{3}P-^{3}P°		*1377.0*	*98 926.4–171 546.0*	9–9	5.3e−03	1.5e−04	6.2e−03	−2.86	D	12
				1377.17	98 933.26–171 545.96	5–5	4.0e−03	1.1e−04	2.6e−03	−3.24	D	LS
				1376.92	98 919.87–171 545.96	3–3	1.3e−03	3.8e−05	5.2e−04	−3.94	D	LS
				1376.92	98 919.87–171 545.96	3–5	1.3e−03	6.3e−05	8.6e−04	−3.72	D	LS
				1376.75	98 911.38–171 545.96	1–3	1.8e−03	1.5e−04	6.9e−04	−3.82	D	LS
				1377.17	98 933.26–171 545.96	5–3	2.2e−03	3.8e−05	8.6e−04	−3.72	D	LS
				1376.92	98 919.87–171 545.96	3–1	5.3e−03	5.1e−05	6.9e−04	−3.82	D	LS
38	2p^2-2p3s	^{3}P-^{3}P°		*1208.6*	*98 926.4–181 666.3*	9–9	7.4e+00	1.61e−01	5.8e+00	0.162	C	12
				1208.55	98 933.26–181 676.76	5–5	5.5e+00	1.21e−01	2.41e+00	−0.218	C	LS
				1208.67	98 919.87–181 655.55	3–3	1.84e+00	4.03e−02	4.81e−01	−0.92	C	LS
				1208.36	98 919.87–181 676.76	3–5	1.84e+00	6.7e−02	8.0e−01	−0.70	C	LS
				1208.54	98 911.38–181 655.55	1–3	2.46e+00	1.61e−01	6.4e−01	−0.79	C	LS
				1208.86	98 933.26–181 655.55	5–3	3.07e+00	4.03e−02	8.0e−01	−0.70	C	LS
				1208.81	98 919.87–181 645.9	3–1	7.4e+00	5.4e−02	6.4e−01	−0.79	C	LS
39	2p^2-2s5p	^{3}P-^{3}P°		*1180.7*	*98 926.4–183 618.8*	9–9	1.0e−01	2.1e−03	7.5e−02	−1.71	D	12
				1180.84	98 933.26–183 618.81	5–5	7.7e−02	1.6e−03	3.1e−02	−2.09	D	LS
				1180.65	98 919.87–183 618.81	3–3	2.6e−02	5.4e−04	6.3e−03	−2.79	D	LS
				1180.65	98 919.87–183 618.81	3–5	2.6e−02	9.0e−04	1.0e−02	−2.57	D	LS
				1180.53	98 911.38–183 618.81	1–3	3.4e−02	2.1e−03	8.4e−03	−2.67	D	LS
				1180.84	98 933.26–183 618.81	5–3	4.3e−02	5.4e−04	1.0e−02	−2.57	D	LS
				1180.65	98 919.87–183 618.81	3–1	1.0e−01	7.2e−04	8.4e−03	−2.67	D	LS
40	2p^2-2p3d	^{3}P-^{3}D°		*984.67*	*98 926.4–200 483.7*	9–15	2.62e+01	6.35e−01	1.85e+01	0.757	B	12

TABLE 21. B II: Allowed transitions—Continued

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
				984.698	98 933.26–200 487.28	5–7	2.62e+01	5.34e−01	8.65e+00	0.426	B	LS
				984.620	98 919.87–200 481.9	3–5	1.97e+01	4.77e−01	4.63e+00	0.155	B	LS
				984.574	98 911.38–200 478.1	1–3	1.46e+01	6.36e−01	2.06e+00	−0.197	B	LS
				984.750	98 933.26–200 481.9	5–5	6.6e+00	9.5e−02	1.54e+00	−0.322	C	LS
				984.657	98 919.87–200 478.1	3–3	1.09e+01	1.59e−01	1.54e+00	−0.322	C	LS
				984.787	98 933.26–200 478.1	5–3	7.3e−01	6.4e−03	1.03e−01	−1.498	C	LS
41	$2p^2$-$2s3p$	^{1}D-^{3}P°										
			2 401.31	2402.04	102 362.770–143 994.11	5–5	8.9e−10	7.7e−11	3.0e−09	−9.42	D	7
			2 401.51	2402.24	102 362.770–143 990.56	5–3	3.32e−04	1.72e−05	6.82e−04	−4.065	B	7
42	$2p^2$-$2s3p$	^{1}D-^{1}P°	2 395.04	2395.77	102 362.770–144 102.94	5–3	7.56e−01	3.90e−02	1.54e+00	−0.710	B	7
43	$2p^2$-$2s4p$	^{1}D-^{1}P°		1465.66	102 362.770–170 591.33	5–3	1.05e+00	2.03e−02	4.91e−01	−0.993	B	12
44	$2p^2$-$2s4f$	^{1}D-^{1}F°		1378.19	102 362.770–174 921.89	5–7	1.07e+00	4.27e−02	9.69e−01	−0.671	B	12
45	$2p^2$-$2s5p$	^{1}D-^{1}P°		1259.40	102 362.770–181 765.7	5–3	1.91e+00	2.73e−02	5.65e−01	−0.865	B	12
46	$2p^2$-$2s5f$	^{1}D-^{1}F°		1210.72	102 362.770–184 958.2	5–7	1.05e+00	3.22e−02	6.42e−01	−0.793	B	12
47	$2p^2$-$2p3s$	^{1}D-^{1}P°		1186.70	102 362.770–186 629.92	5–3	2.32e+00	2.94e−02	5.74e−01	−0.833	B	12
48	$2p^2$-$2s6f$	^{1}D-^{1}F°		1135.51	102 362.770–190 429.07	5–7	9.33e−01	2.52e−02	4.72e−01	−0.899	B	12
49	$2p^2$-$2p3d$	^{1}D-^{1}D°		1048.69	102 362.770–197 720.14	5–5	1.40e+01	2.30e−01	3.98e+00	0.062	B	12
50	$2p^2$-$2s3p$	^{1}S-^{3}P°										
			6 122.24	6123.93	127 661.19–143 990.56	1–3	5.34e−05	9.01e−05	1.82e−03	−4.045	B	7
51	$2p^2$-$2s3p$	^{1}S-^{1}P°	6 080.39	6082.08	127 661.19–144 102.94	1–3	1.21e−01	2.01e−01	4.03e+00	−0.696	A	7
52	$2p^2$-$2s4p$	^{1}S-^{1}P°	2 328.65	2329.37	127 661.19–170 591.33	1–3	5.68e−01	1.39e−01	1.06e+00	−0.858	B	12
53	$2p^2$-$2s5p$	^{1}S-^{1}P°		1848.27	127 661.19–181 765.7	1–3	1.67e+00	2.57e−01	1.56e+00	−0.590	B	12
54	$2p^2$-$2p3s$	^{1}S-^{1}P°		1695.81	127 661.19–186 629.92	1–3	2.41e+00	3.12e−01	1.74e+00	−0.506	B	12
55	$2s3s$-$2s3p$	^{3}S-^{3}P°	*7 031.1*	*7033.0*	*129 773.83*–143 992.5	3–9	3.97e−01	8.84e−01	6.14e+01	0.424	A	7
			7 030.27	7032.21	129 773.83–143 994.11	3–5	3.97e−01	4.91e−01	3.41e+01	0.168	A	7
			7 032.03	7033.97	129 773.83–143 990.56	3–3	3.97e−01	2.95e−01	2.05e+01	−0.054	A	7
			7 032.33	7034.27	129 773.83–143 989.95	3–1	3.97e−01	9.82e−02	6.82e+00	−0.531	A	7
56	$2s3s$-$2s3p$	^{3}S-^{1}P°										
			6 976.88	6978.80	129 773.83–144 102.94	3–3	1.82e−04	1.33e−04	9.16e−03	−3.400	A	7
57	$2s3s$-$2s4p$	^{3}S-^{3}P°	*2 393.2*	*2393.9*	129 773.83–*171 546.0*	3–9	1.11e−01	2.87e−02	6.8e−01	−1.066	C	12
			2 393.21	2393.94	129 773.83–171 545.96	3–5	1.11e−01	1.59e−02	3.77e−01	−1.321	C	LS
			2 393.21	2393.94	129 773.83–171 545.96	3–3	1.11e−01	9.6e−03	2.26e−01	−1.54	C	LS
			2 393.21	2393.94	129 773.83–171 545.96	3–1	1.11e−01	3.18e−03	7.5e−02	−2.020	C	LS
58	$2s3s$-$2p3s$	^{3}S-^{3}P°		*1927.1*	*129 773.83–181 666.3*	3–9	2.24e+00	3.74e−01	7.11e+00	0.050	B	12
				1926.67	129 773.83–181 676.76	3–5	2.24e+00	2.08e−01	3.95e+00	−0.206	B	LS
				1927.46	129 773.83–181 655.55	3–3	2.24e+00	1.25e−01	2.37e+00	−0.428	B	LS
				1927.82	129 773.83–181 645.9	3–1	2.23e+00	4.15e−02	7.90e−01	−0.905	B	LS
59	$2s3s$-$2s5p$	^{3}S-^{3}P°		*1857.2*	129 773.83–*183 618.8*	3–9	4.5e−02	6.9e−03	1.3e−01	−1.68	D	12
				1857.18	129 773.83–183 618.81	3–5	4.5e−02	3.9e−03	7.1e−02	−1.94	D	LS
				1857.18	129 773.83–183 618.81	3–3	4.5e−02	2.3e−03	4.2e−02	−2.16	D	LS
				1857.18	129 773.83–183 618.81	3–1	4.5e−02	7.7e−04	1.4e−02	−2.64	D	LS
60	$2s3s$-$2s3p$	^{1}S-^{3}P°										
			15 698.5	6368.31 cm^{-1}	137 622.25–143 990.56	1–3	1.19e−05	1.32e−04	6.81e−03	−3.881	B	7

TABLE 21. B II: Allowed transitions—Continued

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
61	2s3s-2s3p	^{1}S-^{1}P°	15 426.2	6480.69 cm^{-1}	137 622.25–144 102.94	1–3	2.79e−02	2.99e−01	1.52e+01	−0.524	B	7
62	2s3s-2s4p	^{1}S-^{1}P°	3 032.26	3033.14	137 622.25–170 591.33	1–3	4.20e−01	1.74e−01	1.73e+00	−0.76	C	12
63	2s3s-2s5p	^{1}S-^{1}P°	2 264.64	2265.34	137 622.25–181 765.7	1–3	3.44e−01	7.9e−02	5.9e−01	−1.100	C	12
64	2s3s-2p3s	^{1}S-^{1}P°	2 039.84	2040.50	137 622.25–186 629.92	1–3	1.90e−01	3.57e−02	2.40e−01	−1.448	C	12
65	2s3p-2s3d	^{3}P°-^{3}D	*15 017*	*6657.2* cm^{-1}	*143 992.5–150 649.7*	9–15	4.76e−02	2.68e−01	1.19e+02	0.383	A	7
			15 020.9	6655.57 cm^{-1}	143 994.11–150 649.68	5–7	4.75e−02	2.25e−01	5.57e+01	0.052	A	7
			15 012.9	6659.12 cm^{-1}	143 990.56–150 649.68	3–5	3.57e−02	2.01e−01	2.98e+01	−0.219	A	7
			15 011.5	6659.73 cm^{-1}	143 989.95–150 649.68	1–3	2.65e−02	2.68e−01	1.33e+01	−0.571	A	7
			15 020.9	6655.57 cm^{-1}	143 994.11–150 649.68	5–5	1.19e−02	4.02e−02	9.95e+00	−0.696	A	7
			15 012.9	6659.12 cm^{-1}	143 990.56–150 649.68	3–3	1.98e−02	6.71e−02	9.95e+00	−0.696	A	7
			15 020.9	6655.57 cm^{-1}	143 994.11–150 649.68	5–3	1.32e−03	2.68e−03	6.63e−01	−1.873	A	7
66	2s3p-2s3d	^{3}P°-^{1}D										
			9 350.21	9352.78	143 994.11–154 686.12	5–5	1.9e−09	2.5e−09	3.8e−07	−7.91	D	7
			9 347.11	9349.67	143 990.56–154 686.12	3–5	9.48e−05	2.07e−04	1.91e−02	−3.207	B	7
67	2s3p-2s4s	^{3}P°-^{3}S	*4 472.5*	*4473.8*	*143 992.5*–166 344.89	9–3	1.63e+00	1.63e−01	2.16e+01	0.167	B	12
			4 472.86	4474.12	143 994.11–166 344.89	5–3	9.07e−01	1.63e−01	1.20e+01	−0.088	B	LS
			4 472.15	4473.41	143 990.56–166 344.89	3–3	5.44e−01	1.63e−01	7.21e+00	−0.310	B	LS
			4 472.03	4473.28	143 989.95–166 344.89	1–3	1.81e−01	1.63e−01	2.40e+00	−0.79	C	LS
68	2s3p-2s4d	^{3}P°-^{3}D	*3 323.4*	*3324.4*	*143 992.5–174 073.3*	9–15	1.15e+00	3.17e−01	3.13e+01	0.456	B	12
			3 323.60	3324.55	143 994.11–174 073.33	5–7	1.15e+00	2.67e−01	1.46e+01	0.125	B	LS
			3 323.21	3324.16	143 990.56–174 073.33	3–5	8.62e−01	2.38e−01	7.81e+00	−0.146	B	LS
			3 323.14	3324.09	143 989.95–174 073.33	1–3	6.39e−01	3.17e−01	3.47e+00	−0.498	B	LS
			3 323.60	3324.55	143 994.11–174 073.33	5–5	2.87e−01	4.76e−02	2.60e+00	−0.62	C	LS
			3 323.21	3324.16	143 990.56–174 073.33	3–3	4.79e−01	7.9e−02	2.60e+00	−0.62	C	LS
			3 323.60	3324.55	143 994.11–174 073.33	5–3	3.19e−02	3.17e−03	1.74e−01	−1.80	C	LS
69	2s3p-2s5s	^{3}P°-^{3}S	*2 708.9*	*2709.7*	*143 992.5*–180 897.12	9–3	7.21e−01	2.65e−02	2.12e+00	−0.623	B	12
			2 709.00	2709.81	143 994.11–180 897.12	5–3	4.00e−01	2.65e−02	1.18e+00	−0.88	C	LS
			2 708.74	2709.55	143 990.56–180 897.12	3–3	2.40e−01	2.65e−02	7.1e−01	−1.100	C	LS
			2 708.70	2709.50	143 989.95–180 897.12	1–3	8.0e−02	2.65e−02	2.36e−01	−1.58	C	LS
70	2s3p-2s5d	^{3}P°-^{3}D	*2 459.8*	*2460.6*	*143 992.5–184 633.7*	9–15	7.19e−01	1.09e−01	7.93e+00	−0.009	B	12
			2 459.91	2460.65	143 994.11–184 633.72	5–7	7.19e−01	9.13e−02	3.70e+00	−0.341	B	LS
			2 459.69	2460.44	143 990.56–184 633.72	3–5	5.39e−01	8.15e−02	1.98e+00	−0.612	B	LS
			2 459.66	2460.40	143 989.95–184 633.72	1–3	3.99e−01	1.09e−01	8.8e−01	−0.96	C	LS
			2 459.91	2460.65	143 994.11–184 633.72	5–5	1.80e−01	1.63e−02	6.6e−01	−1.089	C	LS
			2 459.69	2460.44	143 990.56–184 633.72	3–3	2.99e−01	2.72e−02	6.6e−01	−1.089	C	LS
			2 459.91	2460.65	143 994.11–184 633.72	5–3	2.00e−02	1.09e−03	4.40e−02	−2.265	C	LS
71	2s3p-2p3p	^{3}P°-^{3}D	*2 124.3*	2125.0	*143 992.5–191 051.4*	9–15	1.58e+00	1.79e−01	1.12e+01	0.206	B	12
			2 123.86	2124.53	143 994.11–191 063.4	5–7	1.58e+00	1.50e−01	5.25e+00	−0.125	B	LS
			2 124.54	2125.22	143 990.56–191 044.6	3–5	1.19e+00	1.34e−01	2.81e+00	−0.396	B	LS
			2 124.96	2125.63	143 989.95–191 034.8	1–3	8.78e−01	1.78e−01	1.25e+00	−0.748	B	LS
			2 124.70	2125.38	143 994.11–191 044.6	5–5	3.95e−01	2.68e−02	9.4e−01	−0.87	C	LS
			2 124.99	2125.66	143 990.56–191 034.8	3–3	6.59e−01	4.46e−02	9.37e−01	−0.873	B	LS
			2 125.15	2125.82	143 994.11–191 034.8	5–3	4.39e−02	1.78e−03	6.2e−02	−2.050	C	LS
72	2s3p-2p3p	^{3}P°-^{3}S	*2 030.5*	*2031.1*	*143 992.5*–193 226.5	9–3	1.10e+00	2.26e−02	1.36e+00	−0.691	B	12
			2 030.53	2031.18	143 994.11–193 226.5	5–3	6.09e−01	2.26e−02	7.56e−01	−0.947	B	LS
			2 030.38	2031.04	143 990.56–193 226.5	3–3	3.66e−01	2.26e−02	4.54e−01	−1.168	C	LS
			2 030.36	2031.01	143 989.95–193 226.5	1–3	1.22e−01	2.26e−02	1.51e−01	−1.65	C	LS

TABLE 21. B II: Allowed transitions—Continued

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
73	*2s3p-2p3p*	$^3P°-^3P$		*1937.2*	*143 992.5–195 613.5*	9–9	2.42e+00	1.36e−01	7.81e+00	0.088	B	12
				1937.05	143 994.11–195 619.05	5–5	1.81e+00	1.02e−01	3.25e+00	−0.292	B	LS
				1937.32	143 990.56–195 608.22	3–3	6.04e−01	3.40e−02	6.51e−01	−0.991	B	LS
				1936.92	143 990.56–195 619.05	3–5	6.05e−01	5.67e−02	1.08e+00	−0.769	B	LS
				1937.30	143 989.95–195 608.22	1–3	8.06e−01	1.36e−01	8.67e−01	−0.866	B	LS
				1937.45	143 994.11–195 608.22	5–3	1.01e+00	3.40e−02	1.08e+00	−0.770	B	LS
				1937.57	143 990.56–195 601.7	3–1	2.42e+00	4.53e−02	8.67e−01	−0.867	B	LS
74	*2s3p-2s3d*	$^1P°-^3D$										
			15 270.6	6546.74 cm^{-1}	144 102.94–150 649.68	3–5	1.50e−05	8.7e−05	1.32e−02	−3.58	C	7
			15 270.6	6546.74 cm^{-1}	144 102.94–150 649.68	3–3	8.5e−06	2.97e−05	4.47e−03	−4.051	C	7
75	*2s3p-2s3d*	$^1P°-^1D$	9 446.36	9448.96	144 102.94–154 686.12	3–5	2.08e−01	4.64e−01	4.33e+01	0.144	A	7
76	*2s3p-2s4s*	$^1P°-^1S$	4 194.79	4195.97	144 102.94–167 935.31	3–1	1.34e+00	1.18e−01	4.87e+00	−0.452	B	12
77	*2s3p-2s4d*	$^1P°-^1D$	3 179.33	3180.25	144 102.94–175 547.01	3–5	5.29e−01	1.34e−01	4.20e+00	−0.397	B	12
78	*2s3p-2s5s*	$^1P°-^1S$	2 669.50	2670.29	144 102.94–181 552.03	3–1	6.37e−01	2.27e−02	5.99e−01	−1.167	B	12
79	*2s3p-2s5d*	$^1P°-^1D$	2 425.26	2425.99	144 102.94–185 323.18	3–5	3.79e−01	5.6e−02	1.33e+00	−0.78	C	12
80	*2s3p-2p3p*	$^1P°-^1P$	2 220.30	2220.99	144 102.94–189 127.98	3–3	3.49e+00	2.58e−01	5.66e+00	−0.111	B	12
81	*2s3p-2p3p*	$^1P°-^1D$		1891.19	144 102.94–196 979.6	3–5	2.73e−01	2.44e−02	4.57e−01	−1.135	C	12
82	*2s3d-2s4p*	$^3D-^3P°$	*4 784.2*	*4785.5*	*150 649.7–171 546.0*	15–9	2.31e−01	4.76e−02	1.13e+01	−0.146	C	12
			4 784.20	4785.54	150 649.68–171 545.96	7–5	1.94e−01	4.76e−02	5.3e+00	−0.477	C	LS
			4 784.20	4785.54	150 649.68–171 545.96	5–3	1.73e−01	3.57e−02	2.81e+00	−0.75	C	LS
			4 784.20	4785.54	150 649.68–171 545.96	3–1	2.31e−01	2.65e−02	1.25e+00	−1.100	C	LS
			4 784.20	4785.54	150 649.68–171 545.96	5–5	3.5e−02	1.2e−02	9.4e−01	−1.23	D	LS
			4 784.20	4785.54	150 649.68–171 545.96	3–3	5.8e−02	2.0e−02	9.4e−01	−1.23	D	LS
			4 784.20	4785.54	150 649.68–171 545.96	3–5	2.3e−03	1.3e−03	6.3e−02	−2.40	D	LS
83	*2s3d-2s4f*	$^3D-^3F°$	*4 121.9*	*4123.1*	*150 649.7–174 903.3*	15–21	2.36e+00	8.42e−01	1.71e+02	1.101	B	12
			4 121.93	4123.09	150 649.68–174 903.33	7–9	2.36e+00	7.73e−01	7.34e+01	0.733	B	LS
			4 121.93	4123.09	150 649.68–174 903.33	5–7	2.10e+00	7.48e−01	5.07e+01	0.573	B	LS
			4 121.93	4123.09	150 649.68–174 903.33	3–5	1.98e+00	8.42e−01	3.43e+01	0.402	B	LS
			4 121.93	4123.09	150 649.68–174 903.33	7–7	2.63e−01	6.70e−02	6.4e+00	−0.329	C	LS
			4 121.93	4123.09	150 649.68–174 903.33	5–5	3.68e−01	9.4e−02	6.4e+00	−0.329	C	LS
			4 121.93	4123.09	150 649.68–174 903.33	7–5	1.04e−02	1.89e−03	1.79e−01	−1.88	C	LS
84	*2s3d-2p3s*	$^3D-^3P°$	*3 223.2*	*3224.1*	*150 649.7–181 666.3*	15–9	3.6e−02	3.4e−03	5.4e−01	−1.29	D	12
			3 222.06	3222.99	150 649.68–181 676.76	7–5	3.1e−02	3.4e−03	2.5e−01	−1.62	D	LS
			3 224.26	3225.20	150 649.68–181 655.55	5–3	2.7e−02	2.6e−03	1.4e−01	−1.89	D	LS
			3 225.27	3226.20	150 649.68–181 645.9	3–1	3.6e−02	1.9e−03	6.0e−02	−2.25	D	LS
			3 222.06	3222.99	150 649.68–181 676.76	5–5	5.5e−03	8.5e−04	4.5e−02	−2.37	D	LS
			3 224.26	3225.20	150 649.68–181 655.55	3–3	9.1e−03	1.4e−03	4.5e−02	−2.37	D	LS
			3 222.06	3222.99	150 649.68–181 676.76	3–5	3.6e−04	9.5e−05	3.0e−03	−3.55	D	LS
85	*2s3d-2s5p*	$^3D-^3P°$	*3 032.3*	*3033.1*	*150 649.7–183 618.8*	15–9	1.23e−01	1.02e−02	1.53e+00	−0.815	C	12
			3 032.26	3033.14	150 649.68–183 618.81	7–5	1.04e−01	1.02e−02	7.1e−01	−1.146	C	LS
			3 032.26	3033.14	150 649.68–183 618.81	5–3	9.2e−02	7.7e−03	3.82e−01	−1.417	C	LS
			3 032.26	3033.14	150 649.68–183 618.81	3–1	1.23e−01	5.7e−03	1.70e−01	−1.77	C	LS
			3 032.26	3033.14	150 649.68–183 618.81	5–5	1.8e−02	2.6e−03	1.3e−01	−1.89	D	LS
			3 032.26	3033.14	150 649.68–183 618.81	3–3	3.1e−02	4.3e−03	1.3e−01	−1.89	D	LS
			3 032.26	3033.14	150 649.68–183 618.81	3–5	1.2e−03	2.8e−04	8.5e−03	−3.07	D	LS
86	*2s3d-2s5f*	$^3D-^3F°$	*2 918.1*	*2918.9*	*150 649.7–184 908.8*	15–21	6.57e−01	1.17e−01	1.69e+01	0.246	B	12

TABLE 21. B II: Allowed transitions—Continued

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
			2 918.08	2918.93	150 649.68–184 908.78	7–9	6.57e−01	1.08e−01	7.26e+00	−0.122	B	LS
			2 918.08	2918.93	150 649.68–184 908.78	5–7	5.84e−01	1.04e−01	5.01e+00	−0.282	B	LS
			2 918.08	2918.93	150 649.68–184 908.78	3–5	5.52e−01	1.17e−01	3.39e+00	−0.453	B	LS
			2 918.08	2918.93	150 649.68–184 908.78	7–7	7.3e−02	9.3e−03	6.3e−01	−1.184	C	LS
			2 918.08	2918.93	150 649.68–184 908.78	5–5	1.02e−01	1.31e−02	6.3e−01	−1.184	C	LS
			2 918.08	2918.93	150 649.68–184 908.78	7–5	2.89e−03	2.64e−04	1.77e−02	−2.73	C	LS
87	2*s*3*d*-2*s*6*f*	^{3}D-^{3}F°	*2 519.3*	*2520.0*	*150 649.7–190 331.9*	15–21	1.82e−01	2.43e−02	3.02e+00	−0.438	C	12
			2 519.26	2520.02	150 649.68–190 331.88	7–9	1.82e−01	2.23e−02	1.30e+00	−0.81	C	LS
			2 519.26	2520.02	150 649.68–190 331.88	5–7	1.62e−01	2.16e−02	9.0e−01	−0.97	C	LS
			2 519.26	2520.02	150 649.68–190 331.88	3–5	1.53e−01	2.43e−02	6.0e−01	−1.137	C	LS
			2 519.26	2520.02	150 649.68–190 331.88	7–7	2.0e−02	1.9e−03	1.1e−01	−1.87	D	LS
			2 519.26	2520.02	150 649.68–190 331.88	5–5	2.8e−02	2.7e−03	1.1e−01	−1.87	D	LS
			2 519.26	2520.02	150 649.68–190 331.88	7–5	8.0e−04	5.5e−05	3.2e−03	−3.42	D	LS
88	2*s*3*d*-2*p*3*d*	^{3}D-^{3}D°	*2 006.0*	*2006.7*	*150 649.7–200 483.7*	15–15	2.49e+00	1.50e−01	1.49e+01	0.354	B	12
			2 005.87	2006.52	150 649.68–200 487.28	7–7	2.22e+00	1.34e−01	6.18e+00	−0.029	B	LS
			2 006.08	2006.73	150 649.68–200 481.9	5–5	1.73e+00	1.05e−01	3.46e+00	−0.281	B	LS
			2 006.24	2006.89	150 649.68–200 478.1	3–3	1.87e+00	1.13e−01	2.24e+00	−0.470	B	LS
			2 006.08	2006.73	150 649.68–200 481.9	7–5	3.89e−01	1.68e−02	7.75e−01	−0.931	C	LS
			2 006.24	2006.89	150 649.68–200 478.1	5–3	6.23e−01	2.26e−02	7.45e−01	−0.948	B	LS
			2 005.87	2006.52	150 649.68–200 487.28	5–7	2.78e−01	2.35e−02	7.8e−01	−0.93	C	LS
			2 006.08	2006.73	150 649.68–200 481.9	3–5	3.74e−01	3.76e−02	7.5e−01	−0.95	C	LS
89	2*s*3*d*-2*s*4*p*	^{1}D-^{1}P°	6 285.51	6287.25	154 686.12–170 591.33	5–3	3.30e−01	1.17e−01	1.22e+01	−0.231	C	12
90	2*s*3*d*-2*s*4*f*	^{1}D-^{1}F°	4 940.37	4941.74	154 686.12–174 921.89	5–7	1.88e+00	9.63e−01	7.83e+01	0.683	B	12
91	2*s*3*d*-2*s*5*p*	^{1}D-^{1}P°	3 691.77	3692.82	154 686.12–181 765.7	5–3	1.22e−01	1.50e−02	9.1e−01	−1.125	C	12
92	2*s*3*d*-2*s*5*f*	^{1}D-^{1}F°	3 302.42	3303.37	154 686.12–184 958.2	5–7	3.53e−01	8.1e−02	4.40e+00	−0.393	C	12
93	2*s*3*d*-2*p*3*s*	^{1}D-^{1}P°	3 129.59	3130.50	154 686.12–186 629.92	5–3	6.2e−03	5.4e−04	2.8e−02	−2.57	D	12
94	2*s*3*d*-2*s*6*f*	^{1}D-^{1}F°	2 796.93	2797.75	154 686.12–190 429.07	5–7	8.4e−02	1.37e−02	6.3e−01	−1.163	C	12
95	2*s*3*d*-2*p*3*d*	^{1}D-^{1}D°	2 323.03	2323.74	154 686.12–197 720.14	5–5	9.12e−01	7.38e−02	2.82e+00	−0.433	B	12
96	2*s*4*s*-2*s*4*p*	^{3}S-^{3}P°	*19 222*	*5201.1* cm^{-1}	166 344.89–*171 546.0*	3–9	7.9e−02	1.31e+00	2.48e+02	0.594	C	12
			19 221.6	5201.07 cm^{-1}	166 344.89–171 545.96	3–5	7.9e−02	7.3e−01	1.38e+02	0.339	C	LS
			19 221.6	5201.07 cm^{-1}	166 344.89–171 545.96	3–3	7.9e−02	4.36e−01	8.3e+01	0.117	C	LS
			19 221.6	5201.07 cm^{-1}	166 344.89–171 545.96	3–1	7.9e−02	1.45e−01	2.76e+01	−0.360	C	LS
97	2*s*4*s*-2*p*3*s*	^{3}S-^{3}P°	*6 525.0*	*6526.8*	166 344.89–*181 666.3*	3–9	9.2e−05	1.8e−04	1.1e−02	−3.28	D	12
			6 520.56	6522.36	166 344.89–181 676.76	3–5	9.2e−05	9.8e−05	6.3e−03	−3.53	D	LS
			6 529.59	6531.40	166 344.89–181 655.55	3–3	9.2e−05	5.9e−05	3.8e−03	−3.75	D	LS
			6 533.71	6535.52	166 344.89–181 645.9	3–1	9.2e−05	2.0e−05	1.3e−03	−4.23	D	LS
98	2*s*4*s*-2*s*5*p*	^{3}S-^{3}P°	*5 787.5*	*5789.1*	166 344.89–*183 618.8*	3–9	1.09e−02	1.64e−02	9.4e−01	−1.309	C	12
			5 787.47	5789.07	166 344.89–183 618.81	3–5	1.09e−02	9.1e−03	5.2e−01	−1.56	C	LS
			5 787.47	5789.07	166 344.89–183 618.81	3–3	1.09e−02	5.5e−03	3.12e−01	−1.79	C	LS
			5 787.47	5789.07	166 344.89–183 618.81	3–1	1.09e−02	1.82e−03	1.04e−01	−2.263	C	LS
99	2*s*4*s*-2*s*4*p*	^{1}S-^{1}P°	37 640.1	2656.02 cm^{-1}	167 935.31–170 591.33	1–3	1.04e−02	6.6e−01	8.2e+01	−0.178	C	12
100	2*s*4*s*-2*s*5*p*	^{1}S-^{1}P°	7 228.46	7230.45	167 935.31–181 765.7	1–3	1.39e−01	3.28e−01	7.8e+00	−0.484	C	12
101	2*s*4*s*-2*p*3*s*	^{1}S-^{1}P°	5 347.65	5349.14	167 935.31–186 629.92	1–3	6.0e−02	7.7e−02	1.35e+00	−1.115	C	12
102	2*s*4*p*-2*s*4*d*	^{1}P°-^{1}D	20 173.4	4955.68 cm^{-1}	170 591.33–175 547.01	3–5	8.7e−02	8.9e−01	1.76e+02	0.424	C	12
103	2*s*4*p*-2*s*5*s*	^{1}P°-^{1}S	9 121.00	9123.50	170 591.33–181 552.03	3–1	3.23e−01	1.34e−01	1.21e+01	−0.395	C	12

TABLE 21. B II: Allowed transitions—Continued

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
104	2s4p-2s5d	$^1P°-^1D$	6 786.14	6788.01	170 591.33–185 323.18	3–5	3.92e−02	4.52e−02	3.03e+00	−0.87	C	12
105	2s4p-2p3p	$^1P°-^1P$	5 393.22	5394.72	170 591.33–189 127.98	3–3	6.1e−02	2.65e−02	1.41e+00	−1.100	C	12
106	2s4p-2p3p	$^1P°-^1D$	3 788.49	3789.56	170 591.33–196 979.6	3–5	1.70e−01	6.1e−02	2.28e+00	−0.74	C	12
107	2s4p-2s4d	$^3P°-^3D$	*39 556*	*2527.4* cm^{-1}	*171 546.0–174 073.3*	9–15	1.3e−02	4.9e−01	5.7e+02	0.64	D	12
			39 556.0	2527.37 cm^{-1}	171 545.96–174 073.33	5–7	1.3e−02	4.1e−01	2.7e+02	0.31	D	LS
			39 556.0	2527.37 cm^{-1}	171 545.96–174 073.33	3–5	9.4e−03	3.7e−01	1.4e+02	0.04	D	LS
			39 556.0	2527.37 cm^{-1}	171 545.96–174 073.33	1–3	7.0e−03	4.9e−01	6.4e+01	−0.31	D	LS
			39 556.0	2527.37 cm^{-1}	171 545.96–174 073.33	5–5	3.1e−03	7.3e−02	4.8e+01	−0.44	D	LS
			39 556.0	2527.37 cm^{-1}	171 545.96–174 073.33	3–3	5.2e−03	1.2e−01	4.8e+01	−0.44	D	LS
			39 556.0	2527.37 cm^{-1}	171 545.96–174 073.33	5–3	3.5e−04	4.9e−03	3.2e+00	−1.61	D	LS
108	2s4p-2s5s	$^3P°-^3S$	*10 691*	*9351.2* cm^{-1}	*171 546.0*–180 897.12	9–3	4.44e−01	2.54e−01	8.0e+01	0.359	C	12
			10 690.9	9351.16 cm^{-1}	171 545.96–180 897.12	5–3	2.47e−01	2.54e−01	4.47e+01	0.103	C	LS
			10 690.9	9351.16 cm^{-1}	171 545.96–180 897.12	3–3	1.48e−01	2.54e−01	2.68e+01	−0.119	C	LS
			10 690.9	9351.16 cm^{-1}	171 545.96–180 897.12	1–3	4.93e−02	2.54e−01	8.9e+00	−0.60	C	LS
109	2s4p-2s5d	$^3P°-^3D$	*7 638.6*	*7640.7*	*171 546.0–184 633.7*	9–15	1.71e−01	2.49e−01	5.6e+01	0.351	C	12
			7 638.62	7640.73	171 545.96–184 633.72	5–7	1.71e−01	2.09e−01	2.63e+01	0.020	C	LS
			7 638.62	7640.73	171 545.96–184 633.72	3–5	1.28e−01	1.87e−01	1.41e+01	−0.251	C	LS
			7 638.62	7640.73	171 545.96–184 633.72	1–3	9.5e−02	2.49e−01	6.3e+00	−0.60	C	LS
			7 638.62	7640.73	171 545.96–184 633.72	5–5	4.27e−02	3.74e−02	4.70e+00	−0.73	C	LS
			7 638.62	7640.73	171 545.96–184 633.72	3–3	7.1e−02	6.2e−02	4.70e+00	−0.73	C	LS
			7 638.62	7640.73	171 545.96–184 633.72	5–3	4.74e−03	2.49e−03	3.13e−01	−1.90	C	LS
110	2s4p-2p3p	$^3P°-^3S$	*4 611.1*	*4612.4*	*171 546.0*–193226.5	9–3	4.3e−03	4.5e−04	6.2e−02	−2.39	D	12
			4 611.14	4612.43	171 545.96–193 226.5	5–3	2.4e−03	4.5e−04	3.5e−02	−2.64	D	LS
			4 611.14	4612.43	171 545.96–193 226.5	3–3	1.4e−03	4.5e−04	2.1e−02	−2.87	D	LS
			4 611.14	4612.43	171 545.96–193 226.5	1–3	4.7e−04	4.5e−04	6.9e−03	−3.34	D	LS
111	2s4p-2p3p	$^3P°-^3P$	*4 153.8*	*4155.0*	*171 546.0–195 613.5*	9–9	1.6e−03	4.2e−04	5.2e−02	−2.42	D	12
			4 152.84	4154.02	171 545.96–195 619.05	5–5	1.2e−03	3.2e−04	2.2e−02	−2.80	D	LS
			4 154.71	4155.89	171 545.96–195 608.22	3–3	4.1e−04	1.1e−04	4.3e−03	−3.50	D	LS
			4 152.84	4154.02	171 545.96–195 619.05	3–5	4.1e−04	1.8e−04	7.2e−03	−3.28	D	LS
			4 154.71	4155.89	171 545.96–195 608.22	1–3	5.4e−04	4.2e−04	5.8e−03	−3.37	D	LS
			4 154.71	4155.89	171 545.96–195 608.22	5–3	6.8e−04	1.1e−04	7.2e−03	−3.28	D	LS
			4 155.84	4157.01	171 545.96–195 601.7	3–1	1.6e−03	1.4e−04	5.8e−03	−3.37	D	LS
112	2s4d-2s4f	$^3D-^3F°$		*830.0* cm^{-1}	*174 073.3–174 903.3*	15–21	3.0e−04	9.2e−02	5.5e+02	0.14	D	12
				830.00 cm^{-1}	174 073.33–174 903.33	7–9	3.0e−04	8.4e−02	2.3e+02	−0.23	D	LS
				830.00 cm^{-1}	174 073.33–174 903.33	5–7	2.7e−04	8.2e−02	1.6e+02	−0.39	D	LS
				830.00 cm^{-1}	174 073.33–174 903.33	3–5	2.5e−04	9.2e−02	1.1e+02	−0.56	D	LS
				830.00 cm^{-1}	174 073.33–174 903.33	7–7	3.4e−05	7.3e−03	2.0e+01	−1.29	D	LS
				830.00 cm^{-1}	174 073.33–174 903.33	5–5	4.7e−05	1.0e−02	2.0e+01	−1.29	D	LS
				830.00 cm^{-1}	174 073.33–174 903.33	7–5	1.3e−06	2.1e−04	5.7e−01	−2.84	D	LS
113	2s4d-2s5p	$^3D-^3P°$	*10 473*	*9545.5* cm^{-1}	*174 073.3–183 618.8*	15–9	1.03e−01	1.02e−01	5.3e+01	0.185	C	12
			10 473.3	9545.48 cm^{-1}	174 073.33–183 618.81	7–5	8.7e−02	1.02e−01	2.47e+01	−0.146	C	LS
			10 473.3	9545.48 cm^{-1}	174 073.33–183 618.81	5–3	7.8e−02	7.7e−02	1.32e+01	−0.417	C	LS
			10 473.3	9545.48 cm^{-1}	174 073.33–183 618.81	3–1	1.03e−01	5.7e−02	5.9e+00	−0.77	C	LS
			10 473.3	9545.48 cm^{-1}	174 073.33–183 618.81	5–5	1.6e−02	2.6e−02	4.4e+00	−0.89	D	LS
			10 473.3	9545.48 cm^{-1}	174 073.33–183 618.81	3–3	2.6e−02	4.3e−02	4.4e+00	−0.89	D	LS
			10 473.3	9545.48 cm^{-1}	174 073.33–183 618.81	3–5	1.0e−03	2.8e−03	2.9e−01	−2.07	D	LS
114	2s4d-2s5f	$^3D-^3F°$	*9 226.4*	*9229.0*	*174 073.3–184 908.8*	15–21	4.37e−01	7.8e−01	3.56e+02	1.069	C	12
			9 226.43	9228.97	174 073.33–184 908.78	7–9	4.37e−01	7.2e−01	1.53e+02	0.70	C	LS

TABLE 21. B II: Allowed transitions—Continued

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
			9 226.43	9228.97	174 073.33–184 908.78	5–7	3.88e−01	6.9e−01	1.05e+02	0.54	C	LS
			9 226.43	9228.97	174 073.33–184 908.78	3–5	3.67e−01	7.8e−01	7.1e+01	0.370	C	LS
			9 226.43	9228.97	174 073.33–184 908.78	7–7	4.87e−02	6.2e−02	1.3e+01	−0.36	D	LS
			9 226.43	9228.97	174 073.33–184 908.78	5–5	6.8e−02	8.7e−02	1.32e+01	−0.361	C	LS
			9 226.43	9228.97	174 073.33–184 908.78	7–5	1.9e−03	1.8e−03	3.7e−01	−1.91	D	LS
115	2*s*4*d*-2*s*6*f*	^{3}D-^{3}F°	*6 148.9*	*6150.6*	*174 073.3–190 331.9*	15–21	2.20e−01	1.75e−01	5.3e+01	0.419	C	12
			6 148.91	6150.61	174 073.33–190 331.88	7–9	2.20e−01	1.61e−01	2.28e+01	0.051	C	LS
			6 148.91	6150.61	174 073.33–190 331.88	5–7	1.96e−01	1.55e−01	1.57e+01	−0.110	C	LS
			6 148.91	6150.61	174 073.33–190 331.88	3–5	1.85e−01	1.75e−01	1.06e+01	−0.280	C	LS
			6 148.91	6150.61	174 073.33–190 331.88	7–7	2.5e−02	1.4e−02	2.0e+00	−1.01	D	LS
			6 148.91	6150.61	174 073.33–190 331.88	5–5	3.4e−02	1.9e−02	2.0e+00	−1.01	D	LS
			6 148.91	6150.61	174 073.33–190 331.88	7–5	9.7e−04	3.9e−04	5.6e−02	−2.56	D	LS
116	2*s*4*f*-2*s*5*d*	^{3}F°-^{3}D	*10 274*	*9730.4* cm^{-1}	*174 903.3–184 633.7*	21–15	1.5e−02	1.7e−02	1.2e+01	−0.45	D	12
			10 274.3	9730.39 cm^{-1}	174 903.33–184 633.72	9–7	1.4e−02	1.7e−02	5.1e+00	−0.82	D	LS
			10 274.3	9730.39 cm^{-1}	174 903.33–184 633.72	7–5	1.3e−02	1.5e−02	3.5e+00	−0.98	D	LS
			10 274.3	9730.39 cm^{-1}	174 903.33–184 633.72	5–3	1.5e−02	1.4e−02	2.4e+00	−1.15	D	LS
			10 274.3	9730.39 cm^{-1}	174 903.33–184 633.72	7–7	1.2e−03	1.9e−03	4.4e−01	−1.88	D	LS
			10 274.3	9730.39 cm^{-1}	174 903.33–184 633.72	5–5	1.7e−03	2.6e−03	4.4e−01	−1.88	D	LS
			10 274.3	9730.39 cm^{-1}	174 903.33–184 633.72	5–7	3.3e−05	7.4e−05	1.2e−02	−3.43	D	LS
117	2*s*4*f*-2*p*3*p*	^{3}F°-^{3}D	*6 191.0*	*6192.7*	*174 903.3–191 051.4*	21–15	9.8e−03	4.0e−03	1.7e+00	−1.07	D	12
			6 186.38	6188.09	174 903.33–191 063.4	9–7	9.0e−03	4.0e−03	7.4e−01	−1.44	D	LS
			6 193.59	6195.30	174 903.33–191 044.6	7–5	8.7e−03	3.6e−03	5.1e−01	−1.60	D	LS
			6 197.35	6199.06	174 903.33–191 034.8	5–3	9.8e−03	3.4e−03	3.5e−01	−1.77	D	LS
			6 186.38	6188.09	174 903.33–191 063.4	7–7	7.8e−04	4.5e−04	6.4e−02	−2.50	D	LS
			6 193.59	6195.30	174 903.33–191 044.6	5–5	1.1e−03	6.3e−04	6.4e−02	−2.50	D	LS
			6 186.38	6188.09	174 903.33–191 063.4	5–7	2.2e−05	1.8e−05	1.8e−03	−4.05	D	LS
118	2*s*4*f*-2*s*5*d*	^{1}F°-^{1}D	9 611.56	9614.19	174 921.89–185 323.18	7–5	3.6e−03	3.5e−03	7.8e−01	−1.61	D	12
119	2*s*4*f*-2*p*3*p*	^{1}F°-^{1}D	4 532.29	4533.56	174 921.89–196 979.6	7–5	2.9e−03	6.5e−04	6.8e−02	−2.34	D	12
120	2*s*4*d*-2*s*5*p*	^{1}D-^{1}P°	16 076.2	6218.7 cm^{-1}	175 547.01–181 765.7	5–3	1.10e−01	2.56e−01	6.8e+01	0.107	C	12
121	2*s*4*d*-2*s*5*f*	^{1}D-^{1}F°	10 622.7	9411.2 cm^{-1}	175 547.01–184 958.2	5–7	4.32e−01	1.02e+00	1.79e+02	0.71	C	12
122	2*s*4*d*-2*p*3*s*	^{1}D-^{1}P°	9 020.42	9022.90	175 547.01–186 629.92	5–3	2.8e−03	2.0e−03	3.0e−01	−1.99	D	12
123	2*s*4*d*-2*s*6*f*	^{1}D-^{1}F°	6 717.65	6719.50	175 547.01–190 429.07	5–7	1.71e−01	1.62e−01	1.79e+01	−0.092	C	12
124	2*s*5*s*-2*s*5*p*	^{3}S-^{3}P°	*36 732*	*2721.7* cm^{-1}	*180 897.12–183 618.8*	3–9	3.0e−02	1.8e+00	6.6e+02	0.74	D	12
			36 731.9	2721.69 cm^{-1}	180 897.12–183 618.81	3–5	3.0e−02	1.0e+00	3.7e+02	0.48	D	LS
			36 731.9	2721.69 cm^{-1}	180 897.12–183 618.81	3–3	3.0e−02	6.1e−01	2.2e+02	0.26	D	LS
			36 731.9	2721.69 cm^{-1}	180 897.12–183 618.81	3–1	3.0e−02	2.0e−01	7.4e+01	−0.22	D	LS
125	2*p*3*s*-2*s*5*d*	^{3}P°-^{3}D	*33 690*	*2967.5* cm^{-1}	*181 666.3–184 633.7*	9–15	3.3e−04	9.3e−03	9.3e+00	−1.08	D	12
			33 809.3	2956.96 cm^{-1}	181 676.76–184 633.72	5–7	3.3e−04	7.8e−03	4.4e+00	−1.41	D	LS
			33 568.5	2978.17 cm^{-1}	181 655.55–184 633.72	3–5	2.5e−04	7.0e−03	2.3e+00	−1.68	D	LS
			33 460.1	2987.8 cm^{-1}	181 645.9–184 633.72	1–3	1.9e−04	9.4e−03	1.0e+00	−2.03	D	LS
			33 809.3	2956.96 cm^{-1}	181 676.76–184 633.72	5–5	8.1e−05	1.4e−03	7.8e−01	−2.16	D	LS
			33 568.5	2978.17 cm^{-1}	181 655.55–184 633.72	3–3	1.4e−04	2.3e−03	7.8e−01	−2.15	D	LS
			33 809.3	2956.96 cm^{-1}	181 676.76–184 633.72	5–3	9.0e−06	9.3e−05	5.2e−02	−3.33	D	LS
126	2*p*3*s*-2*p*3*p*	^{3}P°-^{3}D	*10 652*	*9385.2* cm^{-1}	*181 666.3–191 051.4*	9–15	1.23e−01	3.50e−01	1.10e+02	0.498	C	12
			10 650.5	9386.6 cm^{-1}	181 676.76–191 063.4	5–7	1.23e−01	2.94e−01	5.2e+01	0.167	C	LS
			10 647.8	9389.1 cm^{-1}	181 655.55–191 044.6	3–5	9.3e−02	2.62e−01	2.76e+01	−0.104	C	LS
			10 648.0	9388.9 cm^{-1}	181 645.9–191 034.8	1–3	6.9e−02	3.50e−01	1.23e+01	−0.456	C	LS
			10 671.9	9367.8 cm^{-1}	181 676.76–191 044.6	5–5	3.1e−02	5.2e−02	9.2e+00	−0.58	D	LS

TABLE 21. B II: Allowed transitions—Continued

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	$E_i - E_k$ (cm^{-1})	$g_i - g_k$	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
			10 658.9	9379.3 cm^{-1}	181 655.55–191 034.8	3–3	5.13e−02	8.74e−02	9.20e+00	−0.58	C	LS
			10 683.1	9358.0 cm^{-1}	181 676.76–191 034.8	5–3	3.4e−03	3.5e−03	6.1e−01	−1.76	D	LS
127	2*p*3*s*-2*p*3*p*	^{3}P°-^{3}S	*8 648.0*	8650.3	*181 666.3*–193226.5	9–3	1.16e−01	4.34e−02	1.11e+01	−0.408	C	12
			8 655.83	8658.20	181 676.76–193 226.5	5–3	6.4e−02	4.34e−02	6.2e+00	−0.66	C	LS
			8 639.96	8642.33	181 655.55–193 226.5	3–3	3.9e−02	4.3e−02	3.7e+00	−0.88	D	LS
			8 632.76	8635.13	181 645.9–193 226.5	1–3	1.3e−02	4.4e−02	1.2e+00	−1.36	D	LS
128	2*p*3*s*-2*p*3*p*	^{3}P°-^{3}P	*7 167.9*	*7169.9*	181 666.3–*195 613.5*	9–9	4.75e−01	3.66e−01	7.8e+01	0.52	C	12
			7 170.45	7172.42	181 676.76–195 619.05	5–5	3.56e−01	2.74e−01	3.24e+01	0.137	C	LS
			7 165.11	7167.09	181 655.55–195 608.22	3–3	1.19e−01	9.2e−02	6.5e+00	−0.56	C	LS
			7 159.55	7161.53	181 655.55–195 619.05	3–5	1.19e−01	1.53e−01	1.08e+01	−0.339	C	LS
			7 160.16	7162.13	181 645.9–195 608.22	1–3	1.59e−01	3.66e−01	8.6e+00	−0.436	C	LS
			7 176.02	7178.00	181 676.76–195 608.22	5–3	1.97e−01	9.1e−02	1.08e+01	−0.340	C	LS
			7 168.46	7170.44	181 655.55–195 601.7	3–1	4.75e−01	1.22e−01	8.6e+00	−0.436	C	LS
129	2*s*5*p*-2*s*5*d*	^{1}P°-^{1}D	28 102.1	3557.5 cm^{-1}	181 765.7–185 323.18	3–5	6.2e−02	1.2e+00	3.4e+02	0.57	D	12
130	2*s*5*p*-2*p*3*p*	^{1}P°-^{1}P	13 579.0	7362.3 cm^{-1}	181 765.7–189 127.98	3–3	1.2e−02	3.3e−02	4.4e+00	−1.00	D	12
131	2*s*5*p*-2*p*3*p*	^{1}P°-^{1}D	6 571.12	6572.94	181 765.7–196 979.6	3–5	1.14e−01	1.23e−01	8.0e+00	−0.434	C	12
132	2*s*5*p*-2*s*5*d*	^{3}P°-^{3}D		*1014.9* cm^{-1}	*183 618.8–184 633.7*	9–15	2.3e−03	5.5e−01	1.6e+03	0.69	D	12
				1014.91 cm^{-1}	183 618.81–184 633.72	5–7	2.3e−03	4.6e−01	7.5e+02	0.36	D	LS
				1014.91 cm^{-1}	183 618.81–184 633.72	3–5	1.7e−03	4.1e−01	4.0e+02	0.09	D	LS
				1014.91 cm^{-1}	183 618.81–184 633.72	1–3	1.3e−03	5.5e−01	1.8e+02	−0.26	D	LS
				1014.91 cm^{-1}	183 618.81–184 633.72	5–5	5.7e−04	8.2e−02	1.3e+02	−0.39	D	LS
				1014.91 cm^{-1}	183 618.81–184 633.72	3–3	9.4e−04	1.4e−01	1.3e+02	−0.39	D	LS
				1014.91 cm^{-1}	183 618.81–184 633.72	5–3	6.3e−05	5.5e−03	8.9e+00	−1.56	D	LS
133	2*s*5*p*-2*p*3*p*	^{3}P°-^{3}D	*13 451*	*7432.6* cm^{-1}	*183 618.8–191 051.4*	9–15	8.4e−04	3.8e−03	1.5e+00	−1.46	D	12
			13 428.9	7444.6 cm^{-1}	183 618.81–191 063.4	5–7	8.5e−04	3.2e−03	7.1e−01	−1.79	D	LS
			13 462.9	7425.8 cm^{-1}	183 618.81–191 044.6	3–5	6.3e−04	2.9e−03	3.8e−01	−2.07	D	LS
			13 480.7	7416.0 cm^{-1}	183 618.81–191 034.8	1–3	4.7e−04	3.8e−03	1.7e−01	−2.42	D	LS
			13 462.9	7425.8 cm^{-1}	183 618.81–191 044.6	5–5	2.1e−04	5.7e−04	1.3e−01	−2.54	D	LS
			13 480.7	7416.0 cm^{-1}	183 618.81–191 034.8	3–3	3.5e−04	9.5e−04	1.3e−01	−2.54	D	LS
			13 480.7	7416.0 cm^{-1}	183 618.81–191 034.8	5–3	2.3e−05	3.8e−05	8.5e−03	−3.72	D	LS
134	2*s*5*p*-2*p*3*p*	^{3}P°-^{3}S	*10 405*	*9607.7* cm^{-1}	*183 618.8*–193226.5	9–3	7.6e−03	4.1e−03	1.3e+00	−1.43	D	12
			10 405.5	9607.7 cm^{-1}	183 618.81–193 226.5	5–3	4.2e−03	4.1e−03	7.1e−01	−1.69	D	LS
			10 405.5	9607.7 cm^{-1}	183 618.81–193 226.5	3–3	2.5e−03	4.1e−03	4.2e−01	−1.91	D	LS
			10 405.5	9607.7 cm^{-1}	183 618.81–193 226.5	1–3	8.4e−04	4.1e−03	1.4e−01	−2.39	D	LS
135	2*s*5*p*-2*p*3*p*	^{3}P°-^{3}P	*8 334.7*	*8337.0*	*183 618.8–195 613.5*	9–9	2.6e−03	2.7e−03	6.6e−01	−1.62	D	12
			8 330.88	8333.17	183 618.81–195 619.05	5–5	1.9e−03	2.0e−03	2.8e−01	−2.00	D	LS
			8 338.40	8340.69	183 618.81–195 608.22	3–3	6.4e−04	6.7e−04	5.5e−02	−2.70	D	LS
			8 330.88	8333.17	183 618.81–195 619.05	3–5	6.4e−04	1.1e−03	9.2e−02	−2.48	D	LS
			8 338.40	8340.69	183 618.81–195 608.22	1–3	8.6e−04	2.7e−03	7.4e−02	−2.57	D	LS
			8 338.40	8340.69	183 618.81–195 608.22	5–3	1.1e−03	6.7e−04	9.2e−02	−2.48	D	LS
			8 342.94	8345.23	183 618.81–195 601.7	3–1	2.6e−03	8.9e−04	7.4e−02	−2.57	D	LS
136	2*s*5*d*-2*s*6*f*	^{3}D-^{3}F°	*17 545*	*5698.2* cm^{-1}	*184 633.7–190 331.9*	15–21	1.23e−01	7.9e−01	6.9e+02	1.076	C	12
			17 544.7	5698.16 cm^{-1}	184 633.72–190 331.88	7–9	1.23e−01	7.3e−01	2.95e+02	0.71	C	LS
			17 544.7	5698.16 cm^{-1}	184 633.72–190 331.88	5–7	1.09e−01	7.1e−01	2.04e+02	0.55	C	LS
			17 544.7	5698.16 cm^{-1}	184 633.72–190 331.88	3–5	1.03e−01	7.9e−01	1.38e+02	0.377	C	LS
			17 544.7	5698.16 cm^{-1}	184 633.72–190 331.88	7–7	1.4e−02	6.3e−02	2.6e+01	−0.35	D	LS
			17 544.7	5698.16 cm^{-1}	184 633.72–190 331.88	5–5	1.9e−02	8.9e−02	2.6e+01	−0.35	D	LS
			17 544.7	5698.16 cm^{-1}	184 633.72–190 331.88	7–5	5.4e−04	1.8e−03	7.2e−01	−1.90	D	LS

TABLE 21. B II: Allowed transitions—Continued

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
137	*2s5f-2p3p*	^{3}F°-^{3}D	*16 275*	*6142.6* cm^{-1}	*184 908.8–191 051.4*	21–15	1.3e−03	3.8e−03	4.3e+00	−1.10	D	12
			16 243.5	6154.6 cm^{-1}	184 908.78–191 063.4	9–7	1.2e−03	3.8e−03	1.8e+00	−1.47	D	LS
			16 293.3	6135.8 cm^{-1}	184 908.78–191 044.6	7–5	1.2e−03	3.4e−03	1.3e+00	−1.63	D	LS
			16 319.4	6126.0 cm^{-1}	184 908.78–191 034.8	5–3	1.3e−03	3.2e−03	8.5e−01	−1.80	D	LS
			16 243.5	6154.6 cm^{-1}	184 908.78–191 063.4	7–7	1.1e−04	4.2e−04	1.6e−01	−2.53	D	LS
			16 293.3	6135.8 cm^{-1}	184 908.78–191 044.6	5–5	1.5e−04	5.9e−04	1.6e−01	−2.53	D	LS
			16 243.5	6154.6 cm^{-1}	184 908.78–191 063.4	5–7	3.0e−06	1.7e−05	4.5e−03	−4.08	D	LS
138	*2s5f-2s5d*	^{1}F°-^{1}D		365.0 cm^{-1}	184 958.2–185 323.18	7–5	1.2e−04	9.5e−02	6.0e+02	−0.18	D	12
139	*2s5d-2s6f*	^{1}D-^{1}F°	19 579.9	5105.89 cm^{-1}	185 323.18–190 429.07	5–7	1.31e−01	1.05e+00	3.39e+02	0.72	C	12
140	*2s5d-2p3d*	^{1}D-^{1}D°	8 064.28	8066.49	185 323.18–197 720.14	5–5	1.7e−04	1.7e−04	2.3e−02	−3.07	D	12
141	*2p3s-2p3p*	^{1}P°-^{1}P	40 020.2	2498.06 cm^{-1}	186 629.92–189 127.98	3–3	9.6e−04	2.3e−02	9.1e+00	−1.16	D	12
142	*2p3s-2p3p*	^{1}P°-^{1}D	9 659.49	9662.13	186 629.92–196 979.6	3–5	6.3e−02	1.5e−01	1.4e+01	−0.35	D	12
143	*2p3p-2p3d*	^{1}P-^{1}D°	11 635.3	8592.16 cm^{-1}	189 127.98–197 720.14	3–5	8.0e−02	2.7e−01	3.1e+01	−0.09	D	12
144	*2s6f-2p3p*	^{1}F°-^{1}D	15 261.8	6550.5 cm^{-1}	190 429.07–196 979.6	7–5	1.7e−04	4.2e−04	1.5e−01	−2.54	D	12
145	*2p3p-2p3d*	^{3}D-^{3}D°	*10 599*	*9432* cm^{-1}	*191 051–200 483.7*	15–15	3.7e−02	6.2e−02	3.3e+01	−0.03	D	12
			10 608.4	9423.9 cm^{-1}	191 063.4–200 487.28	7–7	3.3e−02	5.5e−02	1.3e+01	−0.41	D	LS
			10 593.3	9437.3 cm^{-1}	191 044.6–200 481.9	5–5	2.6e−02	4.3e−02	7.5e+00	−0.67	D	LS
			10 586.6	9443.3 cm^{-1}	191 034.8–200 478.1	3–3	2.8e−02	4.7e−02	4.9e+00	−0.85	D	LS
			10 614.5	9418.5 cm^{-1}	191 063.4–200 481.9	7–5	5.7e−03	6.9e−03	1.7e+00	−1.32	D	LS
			10 597.6	9433.5 cm^{-1}	191 044.6–200 478.1	5–3	9.2e−03	9.3e−03	1.6e+00	−1.33	D	LS
			10 587.3	9442.7 cm^{-1}	191 044.6–200 487.28	5–7	4.1e−03	9.7e−03	1.7e+00	−1.31	D	LS
			10 582.4	9447.1 cm^{-1}	191 034.8–200 481.9	3–5	5.6e−03	1.6e−02	1.6e+00	−1.33	D	LS
146	*2p3p-2p3d*	^{3}P-^{3}D°	*20 528*	*4870.1* cm^{-1}	*195 613.5–200 483.7*	9–15	1.7e−02	1.8e−01	1.1e+02	0.20	D	12
			20 535.7	4868.23 cm^{-1}	195 619.05–200 487.28	5–7	1.7e−02	1.5e−01	5.0e+01	−0.13	D	LS
			20 512.8	4873.7 cm^{-1}	195 608.22–200 481.9	3–5	1.3e−02	1.3e−01	2.7e+01	−0.40	D	LS
			20 501.3	4876.4 cm^{-1}	195 601.7–200 478.1	1–3	9.4e−03	1.8e−01	1.2e+01	−0.75	D	LS
			20 558.5	4862.9 cm^{-1}	195 619.05–200 481.9	5–5	4.2e−03	2.7e−02	9.0e+00	−0.88	D	LS
			20 528.8	4869.9 cm^{-1}	195 608.22–200 478.1	3–3	7.0e−03	4.4e−02	9.0e+00	−0.88	D	LS
			20 574.5	4859.1 cm^{-1}	195 619.05–200 478.1	5–3	4.6e−04	1.8e−03	6.0e−01	−2.05	D	LS

[a]Wavelengths are (Å) always given unless cm^{-1} is indicated.

3.2.2. B II forbidden transitions

We have tabulated the results of multiconfiguration calculations by Tachiev and Froese Fischer[7] and Kingston and Hibbert,[51,52] in which relativistic interactions were included via the Breit–Pauli terms. Tachiev and Froese Fischer performed very detailed MCHF calculations, while Kingston and Hibbert constructed similarly extensive configuration-interaction wavefunctions with the CIV 3 code, comprising up to 5000 configurations.

The calculations overlap for some transitions, and the results differ over a range from 0.1% to 16%. For these transitions, we have selected the results of Tachiev and Froese Fischer. These authors performed a special test for one of those lines, the $2s^2\ ^1S$-$2s2p\ ^3P°$ magnetic quadrupole (M2) line at 2676.02 Å. In addition to their Breit–Pauli treatment, which includes relativistic effects only to the lowest order, they undertook a full multiconfiguration Dirac Fock relativistic calculation including core correlation, and they achieved consistency within 1%, which provides some extra assurance for the high accuracy of their results.

A finding list and transition probabilities for the forbidden lines of B II are given in Tables 22 and 23.

TABLE 22. List of tabulated lines for forbidden transitions of B II

Wavelength (Å)	No.
In vacuum	
976.918	3
1 010.78	2
1 010.92	2
1 107.38	8
1 537.82	7
1 537.96	7
1 538.34	7
1 623.44	6
1 623.60	6
1 623.95	6

TABLE 22. List of tabulated lines for forbidden transitions of B II—Continued

Wavelength (Å)	No.
1 624.02	6
1 624.38	6
1 624.60	6
In air	
2 676.02	1
2 772.26	5
2 772.73	5
2 773.98	5
3 451.30	10
3 478.32	13
3 479.94	13
3 914.82	9
3 916.87	9
3 951.70	14
28 965.9	12
29 037.4	12
29 150.7	12

Wave number (cm^{-1})	No.
6.11	4
8.49	11
13.39	11
16.15	4
21.88	11
22.26	4

TABLE 23. B II: Forbidden transitions

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	Type	A_{ki} (s^{-1})	S (a.u.)	Acc.	Source
1	$2s^2$-$2s2p$	^1S-$^3P°$									
			2 676.02	2676.82	0.00–37 357.80	1–5	M2	1.69e−03	7.81e+01	B	7
2	$2s^2$-$2p^2$	^1S-^3P									
				1010.92	0.00–98 919.87	1–3	M1	8.50e−05	9.77e−09	B	51
				1010.78	0.00–98 933.26	1–5	E2	1.24e−02	5.84e−05	B	52
3	$2s^2$-$2p^2$	^1S-^1D									
				976.918	0.00–102 362.770	1–5	E2	1.83e+03	7.27e+00	B	52
4	$2s2p$-$2s2p$	$^3P°$-$^3P°$									
				16.15 cm^{-1}	37 341.65–37 357.80	3–5	M1	5.68e−08	2.50e+00	A	7
				16.15 cm^{-1}	37 341.65–37 357.80	3–5	E2	4.02e−16	1.63e+01	B	7
				22.26 cm^{-1}	37 335.54–37 357.80	1–5	E2	8.88e−16	7.25e+00	B	7
				6.11 cm^{-1}	37 335.54–37 341.65	1–3	M1	4.10e−09	2.00e+00	A	7
5	$2s2p$-$2s2p$	$^3P°$-$^1P°$									
			2 773.98	2774.79	37 357.80–73 396.510	5–3	M1	1.19e−04	2.83e−07	B	7
			2 773.98	2774.79	37 357.80–73 396.510	5–3	E2	6.65e−06	2.93e−06	B	7
			2 772.73	2773.55	37 341.65–73 396.510	3–3	M1	7.16e−05	1.70e−07	B	7
			2 772.73	2773.55	37 341.65–73 396.510	3–3	E2	8.46e−06	3.72e−06	B	7
			2 772.26	2773.08	37 335.54–73 396.510	1–3	M1	9.55e−05	2.27e−07	B	7
6	$2s2p$-$2p^2$	$^3P°$-^3P									
				1624.60	37 357.80–98 911.38	5–1	M2	1.39e−02	1.06e+01	B	52
				1624.02	37 357.80–98 933.26	5–5	M2	1.60e−02	6.06e+01	B	52
				1623.95	37 341.65–98 919.87	3–3	M2	1.31e−02	2.98e+01	B	52
				1624.38	37 357.80–98 919.87	5–3	M2	3.88e−05	8.83e−02	B	52
				1623.60	37 341.65–98 933.26	3–5	M2	1.94e−05	7.34e−02	B	52
				1623.44	37 335.54–98 933.26	1–5	M2	2.82e−03	1.07e+01	B	52
7	$2s2p$-$2p^2$	$^3P°$-^1D									
				1538.34	37 357.80–102 362.770	5–5	M2	1.87e−02	5.40e+01	B	52
				1537.96	37 341.65–102 362.770	3–5	M2	2.39e−02	6.90e+01	B	52
				1537.82	37 335.54–102 362.770	1–5	M2	1.06e−02	3.06e+01	B	52
8	$2s2p$-$2p^2$	$^3P°$-^1S									
				1107.38	37 357.80–127 661.19	5–1	M2	3.90e−02	4.36e+00	B	52
9	$2s2p$-$2p^2$	$^1P°$-^3P									
			3 914.82	3915.93	73 396.510–98 933.26	3–5	M2	1.84e−04	5.68e+01	B	52
			3 916.87	3917.98	73 396.510–98 919.87	3–3	M2	1.02e−04	1.89e+01	B	52
10	$2s2p$-$2p^2$	$^1P°$-^1D									
			3 451.30	3452.29	73 396.510–102 362.770	3–5	M2	2.17e−05	3.57e+00	B	52
11	$2p^2$-$2p^2$	^3P-^3P									
				13.39 cm^{-1}	98 919.87–98 933.26	3–5	M1	3.25e−08	2.51e+00	A	51

TABLE 23. B II: Forbidden transitions—Continued

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	Type	A_{ki} (s^{-1})	S (a.u.)	Acc.	Source
				13.39 cm^{-1}	98 919.87–98 933.26	3–5	E2	1.25e−16	1.30e+01	B	52
				21.88 cm^{-1}	98 911.38–98 933.26	1–5	E2	6.61e−16	5.89e+00	B	52
				8.49 cm^{-1}	98 911.38–98 919.87	1–3	M1	1.11e−08	2.01e+00	A	51
12	$2p^2$-$2p^2$	^{3}P-^{1}D									
			29 150.7	3429.51 cm^{-1}	98 933.26–102 362.770	5–5	M1	1.44e−05	6.60e−05	B	51
			29 150.7	3429.51 cm^{-1}	98 933.26–102 362.770	5–5	E2	2.20e−08	2.07e−03	B	52
			29 037.4	3442.90 cm^{-1}	98 919.87–102 362.770	3–5	M1	4.85e−06	2.20e−05	B	51
			29 037.4	3442.90 cm^{-1}	98 919.87–102 362.770	3–5	E2	3.11e−09	2.87e−04	B	52
			28 965.9	3451.39 cm^{-1}	98 911.38–102 362.770	1–5	E2	5.54e−10	5.05e−05	B	52
13	$2p^2$-$2p^2$	^{3}P-^{1}S									
			3 478.32	3479.31	98 919.87–127 661.19	3–1	M1	4.64e−04	7.25e−07	B	51
			3 479.94	3480.93	98 933.26–127 661.19	5–1	E2	3.09e−04	1.41e−04	B	52
14	$2p^2$-$2p^2$	^{1}D-^{1}S									
			3 951.70	3952.82	102 362.770–127 661.19	5–1	E2	2.58e+01	2.22e+01	B	52

[a]Wavelengths (Å) are always given unless cm^{-1} is indicated.

3.3. B III

Lithium isoelectronic sequence
Ground state: $1s^22s\ ^2S_{1/2}$
Ionization energy: 37.9306 eV (305 931.10 cm^{-1})

3.3.1. B III allowed transitions

For this Li-like ion, we have selected and tabulated the results of several calculations that were carried out with sophisticated atomic structure codes. We have selected this material in the following order: For the two resonance lines, we have tabulated the essentially exact results by Yan *et al.*,[6] which were obtained with variational wave functions of the Hylleraas type. For 16 lines between lower energy levels, we selected the results of extensive MCHF calculations by Froese Fischer *et al.*[20] For some lines of the $2s$-np, $2p$-nd, and $3d$-nf series, we used the data from the FCPC method by Qu *et al.*,[21–23] and we applied the results from the Opacity Project[10]—a close coupling calculation—for some other higher transitions.

In Table 24, we present a comparison of these calculations for a few important lines, where there is partial or full overlap. Clearly, the agreement is excellent and indicates high accuracy all around. (We added the results from a recent calculation by Godefroid *et al.*,[24] who used a similar approach as in Ref. 20, but on a nonrelativistic basis. This work totally overlaps with Ref. 20 and was thus not used in the main data table.)

A finding list and transition probabilities for the allowed lines of B III are given in Tables 25 and 26. All energy level data have been taken from a new compilation by Kramida *et al.*[53]

TABLE 24. Comparison of calculated multiplet oscillator strength data for B III

Transition	Yan *et al.*[6]	Froese Fischer *et al.*[20]	Godefroid *et al.*[24a]	Qu *et al.*[21a]	Qu *et al.*[22a]	Opacity[10]
$2s$-$2p$	0.3633	0.363 7	0.363 7	–	–	0.364
$2s$-$3p$	–	0.153 5	0.153 8	0.1538	–	0.153
$2p$-$3s$	–	0.046 37	0.046 31	–	–	0.0466
$2p$-$3d$	–	0.638 0	0.638 1	–	0.6381	0.642

[a]Nonrelativistic calculation.

TABLE 25. List of tabulated lines for allowed transitions of B III

Wavelength (Å)	No.
In vacuum	
340.579	8
344.438	7
350.239	6
359.596	5
376.331	4
376.334	4
411.804	3
411.811	3

TABLE 25. List of tabulated lines for allowed transitions of B III—Continued

Wavelength (Å)	No.
434.559	15
434.624	15
458.646	14
458.716	14
458.718	14
465.546	13
465.619	13
510.769	12

TABLE 25. List of tabulated lines for allowed transitions of B III—Continued

Wavelength (Å)	No.
510.855	12
510.858	12
518.238	2
518.265	2
528.150	11
528.245	11
677.000	10
677.143	10
677.157	10
758.475	9
758.671	9
1 023.87	32
1 023.90	32
1 058.99	31
1 059.02	31
1 114.76	30
1 114.80	30
1 169.25	24
1 169.29	18
1 169.32	18
1 169.38	24
1 213.20	29
1 213.25	29
1 361.65	23
1 361.83	23
1 361.84	23
1 421.38	28
1 421.43	28
1 421.44	28
1 424.32	22
1 424.53	22
1 435.65	27
1 435.69	27
1 435.71	27
1 596.63	17
1 596.74	17
1 953.51	21
1 953.84	21
1 953.89	21
In air	
2 065.78	1
2 067.24	1
2 077.03	26
2 077.13	26
2 077.16	26
2 137.67	25
2 137.81	25
2 137.87	25
2 234.09	20
2 234.59	20
2 804.47	38
2 804.80	38
3 567.19	34
3 567.47	34
4 242.97	37
4 243.60	37
4 243.72	37
4 632.14	39
4 632.41	39
4 632.60	39
4 917.35	36
4 918.36	36
7 835.13	16
7 837.92	42
7 839.23	42
7 841.28	16
19 467.3	33
19 483.1	33
32 069.5	19
32 142.5	19
32 172.7	19
38 998.2	40
39 030.7	40

Wave number (cm^{-1})	No.
667.79	41
668.42	41
669.92	41
1 307.58	35
1 308.82	35
1 311.75	35

TABLE 26. B III: Allowed transitions

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
1	$1s^22s$-$1s^22p$	^{2}S-^{2}P°	*2 066.3*	*2066.9*	0.000–*48 381.07*	2–6	1.8899e+00	3.6314e−01	4.9420e+00	−0.138 90	AAA	6
			2 065.78	2066.44	0.000–48 392.435	2–4	1.8913e+00	2.4215e−01	3.2947e+00	−0.314 89	AAA	LS
			2 067.24	2067.90	0.000–48 358.335	2–2	1.8873e+00	1.2099e−01	1.6473e+00	−0.616 22	AAA	LS
2	$1s^22s$-$1s^23p$	^{2}S-^{2}P°		*518.25*	0.000–*192 958.0*	2–6	1.270e+01	1.534e−01	5.236e−01	−0.513 0	AA	20
				518.238	0.000–192 961.37	2–4	1.271e+01	1.024e−01	3.493e−01	−0.688 8	AA	20
				518.265	0.000–192 951.37	2–2	1.268e+01	5.108e−02	1.743e−01	−0.990 7	AA	20
3	$1s^22s$-$1s^24p$	^{2}S-^{2}P°		*411.81*	0.000–*242 832.4*	2–6	6.53e+00	4.98e−02	1.35e−01	−1.002	A	21
				411.804	0.000–242 833.81	2–4	6.53e+00	3.32e−02	9.00e−02	−1.178	A	LS

TABLE 26. B III: Allowed transitions—Continued

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
				411.811	0.000–242 829.64	2–2	6.53e+00	1.66e−02	4.50e−02	−1.479	A	LS
4	$1s^22s$-$1s^25p$	^{2}S-^{2}P°		*376.33*	0.000–*265 722.9*	2–6	3.54e+00	2.26e−02	5.59e−02	−1.346	A	21
				376.331	0.000–265 723.63	2–4	3.54e+00	1.50e−02	3.73e−02	−1.522	A	LS
				376.334	0.000–265 721.50	2–2	3.54e+00	7.52e−03	1.86e−02	−1.823	A	LS
5	$1s^22s$-$1s^26p$	^{2}S-^{2}P°		*359.60*	0.000–*278 090.2*	2–6	2.10e+00	1.22e−02	2.90e−02	−1.612	A	21
				359.596	0.000–278 090.15	2–4	2.10e+00	8.15e−03	1.93e−02	−1.788	A	LS
				359.596	0.000–278 090.15	2–2	2.10e+00	4.08e−03	9.65e−03	−2.089	A	LS
6	$1s^22s$-$1s^27p$	^{2}S-^{2}P°		*350.24*	0.000–*285 519.3*	2–6	1.33e+00	7.36e−03	1.70e−02	−1.832	A	21
				350.239	0.000–285 519.29	2–4	1.33e+00	4.91e−03	1.13e−02	−2.008	A	LS
				350.239	0.000–285 519.29	2–2	1.33e+00	2.45e−03	5.66e−03	−2.309	A	LS
7	$1s^22s$-$1s^28p$	^{2}S-^{2}P°		*344.44*	0.000–*290 327.9*	2–6	9.00e−01	4.80e−03	1.09e−02	−2.017	A	21
				344.438	0.000–290 327.86	2–4	9.00e−01	3.20e−03	7.26e−03	−2.194	A	LS
				344.438	0.000–290 327.86	2–2	9.00e−01	1.60e−03	3.63e−03	−2.495	A	LS
8	$1s^22s$-$1s^29p$	^{2}S-^{2}P°		*340.58*	0.000–*293 617.7*	2–6	6.18e−01	3.22e−03	7.23e−03	−2.191	A	21
				340.579	0.000–293 617.69	2–4	6.18e−01	2.15e−03	4.82e−03	−2.367	A	LS
				340.579	0.000–293 617.69	2–2	6.18e−01	1.07e−03	2.41e−03	−2.668	A	LS
9	$1s^22p$-$1s^23s$	^{2}P°-^{2}S		*758.61*	*48 381.07*–180 201.85	6–2	1.612e+01	4.636e−02	6.947e−01	−0.555 7	AA	20
				758.671	48 392.435–180 201.85	4–2	1.075e+01	4.636e−02	4.632e−01	−0.731 8	AA	20
				758.475	48 358.335–180 201.85	2–2	5.375e+00	4.636e−02	2.315e−01	−1.032 9	AA	20
10	$1s^22p$-$1s^23d$	^{2}P°-^{2}D		*677.10*	*48 381.07–196 070.5*	6–10	5.570e+01	6.381e−01	8.534e+00	0.583 0	AA	20
				677.143	48 392.435–196 071.67	4–6	5.570e+01	5.743e−01	5.121e+00	0.361 2	AA	20
				677.000	48 358.335–196 068.75	2–4	4.643e+01	6.380e−01	2.844e+00	0.105 9	AA	20
				677.157	48 392.435–196 068.75	4–4	9.282e+00	6.381e−02	5.690e−01	−0.593 1	AA	20
11	$1s^22p$-$1s^24s$	^{2}P°-^{2}S		*528.21*	*48 381.07*–237 698.40	6–2	5.906e+00	8.235e−03	8.592e−02	−1.306 2	AA	20
				528.245	48 392.435–237 698.40	4–2	3.937e+00	8.236e−03	5.729e−02	−1.482 2	AA	20
				528.150	48 358.335–237 698.40	2–2	1.969e+00	8.233e−03	2.863e−02	−1.783 4	AA	20
12	$1s^22p$-$1s^24d$	^{2}P°-^{2}D		*510.83*	*48 381.07–244 142.1*	6–10	1.883e+01	1.228e−01	1.239e+00	−0.132 8	AA	22
				510.855	48 392.435–244 142.63	4–6	1.882e+01	1.105e−01	7.432e−01	−0.354 7	AA	LS
				510.769	48 358.335–244 141.39	2–4	1.570e+01	1.228e−01	4.129e−01	−0.609 9	AA	LS
				510.858	48 392.435–244 141.39	4–4	3.137e+00	1.228e−02	8.258e−02	−1.308 9	AA	LS
13	$1s^22p$-$1s^25s$	^{2}P°-^{2}S		*465.59*	*48 381.07*–263 160.11	6–2	2.83e+00	3.07e−03	2.82e−02	−1.735	A	10
				465.619	48 392.435–263 160.11	4–2	1.89e+00	3.07e−03	1.88e−02	−1.911	A	LS
				465.546	48 358.335–263 160.11	2–2	9.44e−01	3.07e−03	9.40e−03	−2.212	A	LS
14	$1s^22p$-$1s^25d$	^{2}P°-^{2}D		*458.69*	*48 381.07–266 391.8*	6–10	8.773e+00	4.612e−02	4.179e−01	−0.558 0	AA	22
				458.716	48 392.435–266 392.05	4–6	8.771e+00	4.151e−02	2.507e−01	−0.779 8	AA	LS
				458.646	48 358.335–266 391.42	2–4	7.313e+00	4.612e−02	1.393e−01	−1.035 0	AA	LS
				458.718	48 392.435–266 391.42	4–4	1.462e+00	4.612e−03	2.786e−02	−1.734 1	AA	LS
15	$1s^22p$-$1s^26d$	^{2}P°-^{2}D		*434.60*	*48 381.07–278 476.5*	6–10	4.835e+00	2.282e−02	1.959e−01	−0.863 5	AA	22
				434.624	48 392.435–278 476.47	4–6	4.835e+00	2.054e−02	1.175e−01	−1.085 4	AA	LS
				434.559	48 358.335–278 476.47	2–4	4.031e+00	2.282e−02	6.530e−02	−1.340 6	AA	LS
				434.624	48 392.435–278 476.47	4–4	8.058e−01	2.282e−03	1.306e−02	−2.039 6	AA	LS

TABLE 26. B III: Allowed transitions—Continued

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
16	$1s^23s$-$1s^23p$	^{2}S-^{2}P°	7 837.2	7839.3	180 201.85–192 958.0	2–6	2.207e−01	6.099e−01	3.148e+01	0.086 3	AA	20
			7835.13	7837.29	180 201.85–192 961.37	2–4	2.209e−01	4.068e−01	2.099e+01	−0.089 6	AA	20
			7841.28	7843.43	180 201.85–192 951.37	2–2	2.202e−01	2.031e−01	1.049e+01	−0.391 2	AA	20
17	$1s^23s$-$1s^24p$	^{2}S-^{2}P°		1596.7	180 201.85–242 832.4	2–6	1.27e+00	1.46e−01	1.53e+00	−0.536	A	10
				1596.63	180 201.85–242 833.81	2–4	1.27e+00	9.71e−02	1.02e+00	−0.712	A	LS
				1596.74	180 201.85–242 829.64	2–2	1.27e+00	4.85e−02	5.10e−01	−1.013	A	LS
18	$1s^23s$-$1s^25p$	^{2}S-^{2}P°		1169.3	180 201.85–265 722.9	2–6	8.30e−01	5.10e−02	3.93e−01	−0.991	A	10
				1169.29	180 201.85–265 723.63	2–4	8.30e−01	3.40e−02	2.62e−01	−1.167	A	LS
				1169.32	180 201.85–265 721.50	2–2	8.30e−01	1.70e−02	1.31e−01	−1.468	A	LS
19	$1s^23p$-$1s^23d$	^{2}P°-^{2}D	32 120	3112.5 cm^{-1}	192 958.0–196 070.5	6–10	2.786e−03	7.187e−02	4.561e+01	−0.365 3	AA	20
			32 142.5	3110.30 cm^{-1}	192 961.37–196 071.67	4–6	2.781e−03	6.465e−02	2.737e+01	−0.587 4	AA	20
			32 069.5	3117.38 cm^{-1}	192 951.37–196 068.75	2–4	2.332e−03	7.197e−02	1.520e+01	−0.841 8	AA	20
			32 172.7	3107.38 cm^{-1}	192 961.37–196 068.75	4–4	4.622e−04	7.176e−03	3.041e+00	−1.542 1	AA	20
20	$1s^23p$-$1s^24s$	^{2}P°-^{2}S	2 234.4	2235.1	192 958.0–237 698.40	6–2	3.964e+00	9.896e−02	4.369e+00	−0.226 4	AA	20
			2 234.59	2235.28	192 961.37–237 698.40	4–2	2.642e+00	9.896e−02	2.913e+00	−0.402 5	AA	20
			2 234.09	2234.79	192 951.37–237 698.40	2–2	1.322e+00	9.895e−02	1.456e+00	−0.703 5	AA	20
21	$1s^23p$-$1s^24d$	^{2}P°-^{2}D		1953.7	192 958.0–244 142.1	6–10	5.55e+00	5.29e−01	2.04e+01	0.502	A	10
				1953.84	192 961.37–244 142.63	4–6	5.55e+00	4.76e−01	1.23e+01	0.280	A	LS
				1953.51	192 951.37–244 141.39	2–4	4.63e+00	5.29e−01	6.81e+00	0.025	A	LS
				1953.89	192 961.37–244 141.39	4–4	9.25e−01	5.29e−02	1.36e+00	−0.674	A	LS
22	$1s^23p$-$1s^25s$	^{2}P°-^{2}S		1424.5	192 958.0–263 160.11	6–2	1.78e+00	1.80e−02	5.07e−01	−0.966	A	10
				1424.53	192 961.37–263 160.11	4–2	1.18e+00	1.80e−02	3.38e−01	−1.142	A	LS
				1424.32	192 951.37–263 160.11	2–2	5.93e−01	1.80e−02	1.69e−01	−1.443	A	LS
23	$1s^23p$-$1s^25d$	^{2}P°-^{2}D		1361.8	192 958.0–266 391.8	6–10	2.82e+00	1.31e−01	3.52e+00	−0.105	A	10
				1361.83	192 961.37–266 392.05	4–6	2.82e+00	1.18e−01	2.11e+00	−0.327	A	LS
				1361.65	192 951.37–266 391.42	2–4	2.35e+00	1.31e−01	1.17e+00	−0.582	A	LS
				1361.84	192 961.37–266 391.42	4–4	4.71e−01	1.31e−02	2.35e−01	−1.281	A	LS
24	$1s^23p$-$1s^26d$	^{2}P°-^{2}D		1169.3	192 958.0–278 476.5	6–10	1.60e+00	5.46e−02	1.26e+00	−0.485	A	10
				1169.38	192 961.37–278 476.47	4–6	1.60e+00	4.91e−02	7.56e−01	−0.707	A	LS
				1169.25	192 951.37–278 476.47	2–4	1.33e+00	5.46e−02	4.20e−01	−0.962	A	LS
				1169.38	192 961.37–278 476.47	4–4	2.66e−01	5.46e−03	8.40e−02	−1.661	A	LS
25	$1s^23d$-$1s^24p$	^{2}D-^{2}P°	2 137.8	2138.5	196 070.5–242 832.4	10–6	4.25e−01	1.75e−02	1.23e+00	−0.757	A	10
			2 137.81	2138.48	196 071.67–242 833.81	6–4	3.83e−01	1.75e−02	7.39e−01	−0.979	A	LS
			2 137.87	2138.54	196 068.75–242 829.64	4–2	4.25e−01	1.46e−02	4.10e−01	−1.234	A	LS
			2 137.67	2138.35	196 068.75–242 833.81	4–4	4.25e−02	2.91e−03	8.21e−02	−1.933	A	LS
26	$1s^23d$-$1s^24f$	^{2}D-^{2}F°	2 077.1	2077.8	196 070.5–244 199.3	10–14	1.120e+01	1.015e+00	6.939e+01	1.006 3	AA	23
			2 077.13	2077.80	196 071.67–244 199.60	6–8	1.120e+01	9.662e−01	3.965e+01	0.763 2	AA	LS
			2 077.03	2077.70	196 068.75–244 198.99	4–6	1.045e+01	1.015e+00	2.776e+01	0.608 3	AA	LS
			2 077.16	2077.82	196 071.67–244 198.99	6–6	7.464e−01	4.831e−02	1.983e+00	−0.537 8	AA	LS
27	$1s^23d$-$1s^25p$	^{2}D-^{2}P°		1435.7	196 070.5–265 722.9	10–6	1.81e−01	3.36e−03	1.59e−01	−1.474	A	10
				1435.71	196 071.67–265 723.63	6–4	1.63e−01	3.36e−03	9.53e−02	−1.696	A	LS
				1435.69	196 068.75–265 721.50	4–2	1.81e−01	2.80e−03	5.29e−02	−1.951	A	LS

TABLE 26. B III: Allowed transitions—Continued

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
				1435.65	196 068.75–265 723.63	4–4	1.81e−02	5.60e−04	1.06e−02	−2.650	A	LS
28	$1s^23d$-$1s^25f$	^{2}D-^{2}F$^\circ$		*1421.4*	*196 070.5–266 423.0*	10–14	3.698e+00	1.568e−01	7.337e+00	0.195 3	AA	23
				1421.43	196 071.67–266 423.16	6–8	3.697e+00	1.493e−01	4.193e+00	−0.047 7	AA	LS
				1421.38	196 068.75–266 422.84	4–6	3.451e+00	1.568e−01	2.935e+00	−0.202 6	AA	LS
				1421.44	196 071.67–266 422.84	6–6	2.465e−01	7.467e−03	2.096e−01	−1.348 7	AA	LS
29	$1s^23d$-$1s^26f$	^{2}D-^{2}F$^\circ$		*1213.2*	*196 070.5–278 495.2*	10–14	1.748e+00	5.401e−02	2.157e+00	−0.267 5	AA	23
				1213.25	196 071.67–278 495.15	6–8	1.748e+00	5.144e−02	1.233e+00	−0.510 6	AA	LS
				1213.20	196 068.75–278 495.15	4–6	1.632e+00	5.401e−02	8.629e−01	−0.665 5	AA	LS
				1213.25	196 071.67–278 495.15	6–6	1.165e−01	2.572e−03	6.163e−02	−1.811 6	AA	LS
30	$1s^23d$-$1s^27f$	^{2}D-^{2}F$^\circ$		*1114.8*	*196 070.5–285 774.2*	10–14	9.887e−01	2.579e−02	9.465e−01	−0.588 5	AA	23
				1114.80	196 071.67–285 774.21	6–8	9.887e−01	2.456e−02	5.409e−01	−0.831 6	AA	LS
				1114.76	196 068.75–285 774.21	4–6	9.229e−01	2.579e−02	3.786e−01	−0.986 5	AA	LS
				1114.80	196 071.67–285 774.21	6–6	6.591e−02	1.228e−03	2.704e−02	−2.132 6	AA	LS
31	$1s^23d$-$1s^28f$	^{2}D-^{2}F$^\circ$		*1059.0*	*196 070.5–290 498.5*	10–14	6.130e−01	1.443e−02	5.031e−01	−0.840 7	AA	23
				1059.02	196 071.67–290 498.54	6–8	6.130e−01	1.374e−02	2.875e−01	−1.083 8	AA	LS
				1058.99	196 068.75–290 498.54	4–6	5.722e−01	1.443e−02	2.012e−01	−1.238 7	AA	LS
				1059.02	196 071.67–290 498.54	6–6	4.087e−02	6.871e−04	1.437e−02	−2.384 8	AA	LS
32	$1s^23d$-$1s^29f$	^{2}D-^{2}F$^\circ$		*1023.9*	*196 070.5–293 737.5*	10–14	4.11e−01	9.05e−03	3.05e−01	−1.043	A	23
				1023.90	196 071.67–293 737.50	6–8	4.11e−01	8.62e−03	1.74e−01	−1.286	A	LS
				1023.87	196 068.75–293 737.50	4–6	3.84e−01	9.05e−03	1.22e−01	−1.441	A	LS
				1023.90	196 071.67–293 737.50	6–6	2.74e−02	4.31e−04	8.72e−03	−2.587	A	LS
33	$1s^24s$-$1s^24p$	^{2}S-^{2}P$^\circ$	*19 473*	*5134.0* cm^{-1}	237 698.40–*242 832.4*	2–6	4.91e−02	8.39e−01	1.08e+02	0.225	A	10
			19 467.3	5135.41 cm^{-1}	237 698.40–242 833.81	2–4	4.92e−02	5.59e−01	7.17e+01	0.049	A	LS
			19 483.1	5131.24 cm^{-1}	237 698.40–242 829.64	2–2	4.91e−02	2.79e−01	3.59e+01	−0.253	A	LS
34	$1s^24s$-$1s^25p$	^{2}S-^{2}P$^\circ$	*3 567.3*	*3568.3*	237 698.40–*265 722.9*	2–6	2.59e−01	1.49e−01	3.49e+00	−0.527	A	10
			3 567.19	3568.21	237 698.40–265 723.63	2–4	2.59e−01	9.91e−02	2.33e+00	−0.703	A	LS
			3 567.47	3568.48	237 698.40–265 721.50	2–2	2.59e−01	4.95e−02	1.16e+00	−1.004	A	LS
35	$1s^24p$-$1s^24d$	^{2}P$^\circ$-^{2}D		*1309.7* cm^{-1}	*242 832.4–244 142.1*	6–10	8.81e−04	1.28e−01	1.94e+02	−0.113	A	10
				1308.82 cm^{-1}	242 833.81–244 142.63	4–6	8.79e−04	1.15e−01	1.16e+02	−0.336	A	LS
				1311.75 cm^{-1}	242 829.64–244 141.39	2–4	7.38e−04	1.29e−01	6.45e+01	−0.590	A	LS
				1307.58 cm^{-1}	242 833.81–244 141.39	4–4	1.46e−04	1.28e−02	1.29e+01	−1.290	A	LS
36	$1s^24p$-$1s^25s$	^{2}P$^\circ$-^{2}S	*4 918.0*	*4919.4*	*242 832.4*–263 160.11	6–2	1.28e+00	1.55e−01	1.50e+01	−0.032	A	10
			4 918.36	4919.73	242 833.81–263 160.11	4–2	8.53e−01	1.55e−01	1.00e+01	−0.208	A	LS
			4 917.35	4918.73	242 829.64–263 160.11	2–2	4.27e−01	1.55e−01	5.01e+00	−0.509	A	LS
37	$1s^24p$-$1s^25d$	^{2}P$^\circ$-^{2}D	*4 243.4*	*4244.6*	*242 832.4–266 391.8*	6–10	1.11e+00	5.01e−01	4.20e+01	0.478	A	10
			4 243.60	4244.80	242 833.81–266 392.05	4–6	1.11e+00	4.51e−01	2.52e+01	0.256	A	LS
			4 242.97	4244.16	242 829.64–266 391.42	2–4	9.28e−01	5.01e−01	1.40e+01	0.001	A	LS
			4 243.72	4244.91	242 833.81–266 391.42	4–4	1.85e−01	5.01e−02	2.80e+00	−0.698	A	LS
38	$1s^24p$-$1s^26d$	^{2}P$^\circ$-^{2}D	*2 804.7*	*2805.5*	*242 832.4–278 476.5*	6–10	6.81e−01	1.34e−01	7.43e+00	−0.095	A	10
			2 804.80	2805.63	242 833.81–278 476.47	4–6	6.81e−01	1.21e−01	4.46e+00	−0.317	A	LS
			2 804.47	2805.30	242 829.64–278 476.47	2–4	5.68e−01	1.34e−01	2.48e+00	−0.572	A	LS
			2 804.80	2805.63	242 833.81–278 476.47	4–4	1.14e−01	1.34e−02	4.95e−01	−1.271	A	LS

TABLE 26. B III: Allowed transitions—Continued

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
39	$1s^24d$-$1s^25p$	^{2}D-^{2}P°	*4 632.5*	*4633.8*	*244 142.1–265 722.9*	10–6	2.20e−01	4.25e−02	6.48e+00	−0.372	A	10
			4 632.41	4633.71	244 142.63–265 723.63	6–4	1.98e−01	4.25e−02	3.89e+00	−0.594	A	LS
			4 632.60	4633.90	244 141.39–265 721.50	4–2	2.20e−01	3.54e−02	2.16e+00	−0.849	A	LS
			4 632.14	4633.44	244 141.39–265 723.63	4–4	2.20e−02	7.08e−03	4.32e−01	−1.548	A	LS
40	$1s^25s$-$1s^25p$	^{2}S-^{2}P°	*39 009*	*2562.8* cm^{-1}	263 160.11–*265 722.9*	2–6	1.55e−02	1.06e+00	2.72e+02	0.326	A	10
			38 998.2	2563.52 cm^{-1}	263 160.11–265 723.63	2–4	1.55e−02	7.06e−01	1.81e+02	0.150	A	LS
			39 030.7	2561.39 cm^{-1}	263 160.11–265 721.50	2–2	1.54e−02	3.52e−01	9.06e+01	−0.152	A	LS
41	$1s^25p$-$1s^25d$	^{2}P°-^{2}D		*668.9* cm^{-1}	*265 722.9–266 391.8*	6–10	3.20e−04	1.79e−01	5.28e+02	0.031	A	10
				668.42 cm^{-1}	265 723.63–266 392.05	4–6	3.19e−04	1.61e−01	3.17e+02	−0.192	A	LS
				669.92 cm^{-1}	265 721.50–266 391.42	2–4	2.68e−04	1.79e−01	1.76e+02	−0.446	A	LS
				667.79 cm^{-1}	265 723.63–266 391.42	4–4	5.31e−05	1.79e−02	3.52e+01	−1.146	A	LS
42	$1s^25p$-$1s^26d$	^{2}P°-^{2}D	*7 838.8*	*7841.0*	*265 722.9–278 476.5*	6–10	3.26e−01	5.01e−01	7.76e+01	0.478	A	10
			7 839.23	7841.39	265 723.63–278 476.47	4–6	3.26e−01	4.51e−01	4.65e+01	0.256	A	LS
			7 837.92	7840.08	265 721.50–278 476.47	2–4	2.72e−01	5.01e−01	2.59e+01	0.001	A	LS
			7 839.23	7841.39	265 723.63–278 476.47	4–4	5.43e−02	5.01e−02	5.17e+00	−0.698	A	LS

[a]Wavelengths (Å) are always given unless cm^{-1} is indicated.

3.3.2. B III forbidden transitions

We have tabulated data calculated by Sengupta,[28] who determined the oscillator strengths of some electric quadrupole (E2) lines using Hartree–Fock wave functions. We have tabulated his results for the $2s\ ^2$S-$3d\ ^2$D, $2p\ ^2$P°-$3p\ ^2$P°, $2p\ ^2$P°-$4p\ ^2$P°, and $3p\ ^2$P°-$4p\ ^2$P° transitions, since comparisons between his analogous work for the isoelectronic lithium atom and some other data available there show close mutual agreement. The transition probabilities for the forbidden lines of B III are given in Table 27.

TABLE 27. B III: Forbidden transitions

No.	Transition array	Mult.	λ_{air}(Å)	λ_{vac}(Å)	E_i-E_k (cm^{-1})	g_i-g_k	Type	A_{ki} (s^{-1})	f_{ik}	S (a.u.)	Acc.	Source
1	$1s^22s$-$1s^23d$	^{2}S-^{2}D		510.020	0–196 070.6	2–10	E2	6.27e+04	1.22e−05	1.93e+01	B	28
2	$1s^22p$-$1s^23p$	^{2}P°-^{2}P°		691.673	48 381.1–192 958.1	6–6	E2	1.94e+04	1.39e−06	1.65e+01	B	28
3	$1s^22p$-$1s^24p$	^{2}P°-^{2}P°		514.268	48 381.1–242 832.4	6–6	E2	1.53e+04	6.07e−07	2.95e+00	B	28
4	$1s^23p$-$1s^24p$	^{2}P°-^{2}P°	2004.39	2005.04	192 958.1–242 832.4	6–6	E2	3.43e+03	2.07e−06	5.96e+02	B	28

3.4. B IV

Helium isoelectronic sequence
Ground state: $1s^2\ ^1$S$_0$
Ionization energy: 259.3751 eV (2 092 001.4 cm^{-1})

3.4.1. B IV allowed transitions

The high-precision variational calculations by Drake[5] have provided the definitive set of data for this heliumlike boron ion, which may be considered essentially exact for all practical purposes. From his nonrelativistic calculations, we have tabulated transition probability data for 182 transitions with principal quantum numbers up to 6 and orbital angular momentum quantum numbers up to 4. Drake calculated the transition integrals both in the dipole-length and dipole-velocity formulations and achieved agreement in the such-obtained transition integrals to at least five significant figures and often several more.

As Drake has stated, higher-order effects, such as nuclear mass corrections and relativistic and quantum electrodynamic effects will only noticeably change the fifth and higher figures in the results, which is of no significance to the vast majority of applications.

Cann and Thakkar[29] and Chen[30] have done precise calculations similar to Drake's work but on a less extensive and slightly less sophisticated basis. Where they overlap, the results are identical within the first four digits.

Based on a special relativistic treatment, Drake also provided precise results for several intercombination lines, which are very weak.

A finding list and transition probabilities for the allowed lines of B IV are given in Tables 28 and 29.

TABLE 28. List of tabulated lines for allowed transitions of B IV

Wavelength (Å)	No.
In vacuum	
48.939	6
49.455	5
50.435	4
52.685	3
60.314	2
61.090	1
238.558	11
245.314	17
258.850	16
259.890	23
259.901	23
259.926	23
264.027	10
264.031	10
264.033	10
288.150	15
289.680	22
289.689	22
289.702	22
289.717	22
289.725	22
289.733	22
294.553	21
294.566	21
294.599	21
308.414	27
344.019	9
344.033	9
344.040	9
381.180	14
384.743	20
384.821	20
384.944	19
384.974	19
384.978	19
384.997	19
385.023	19
385.052	19
406.805	18
406.832	18
406.893	18
418.662	26
418.901	25
418.936	25
427.698	24
659.761	34
682.482	57
682.687	48
682.827	48
683.321	56
724.690	30
767.731	33
772.254	40
772.290	40

TABLE 28. List of tabulated lines for allowed transitions of B IV—Continued

Wavelength (Å)	No.
772.362	40
798.671	55
799.616	47
799.808	47
800.000	46
800.448	46
800.487	54
800.512	46
800.641	46
800.833	46
801.321	53
801.513	53
806.127	45
806.257	45
806.452	45
1 025.07	29
1 025.14	29
1 025.16	29
1 099.24	32
1 111.05	39
1 111.20	39
1 112.16	38
1 112.19	38
1 112.21	38
1 112.29	38
1 112.31	38
1 112.43	38
1 163.79	52
1 168.57	44
1 168.77	44
1 168.84	44
1 169.04	43
1 169.06	44
1 169.18	44
1 169.25	44
1 169.45	43
1 170.63	51
1 170.70	51
1 170.91	50
1 187.49	37
1 187.58	37
1 187.75	37
1 188.26	59
1 189.53	58
1 189.67	58
1 195.97	42
1 196.06	42
1 196.09	42
1 196.26	42
1 196.34	42
1 196.69	42
1 635.59	75
1 637.47	69
1 638.00	68
1 638.27	68
1 640.42	74
1 771.95	8

TABLE 28. List of tabulated lines for allowed transitions of B IV—Continued

Wavelength (Å)	No.
In air	
2 256.13	61
2 413.91	64
2 414.03	64
2 414.38	64
2 510.29	73
2 522.58	67
2 523.22	67
2 525.13	66
2 528.32	72
2 528.96	77
2 528.96	78
2 529.92	80
2 530.24	80
2 530.24	81
2 530.82	80
2 530.82	81
2 530.88	66
2 531.53	66
2 532.17	66
2 532.81	66
2 533.45	76
2 533.45	66
2 534.41	79
2 534.74	79
2 535.31	79
2 536.66	71
2 538.60	71
2 567.42	82
2 589.23	65
2 589.90	65
2 590.57	65
2 595.95	70
2 821.64	7
2 824.59	7
2 825.86	7
4 491.10	13

TABLE 28. List of tabulated lines for allowed transitions of B IV—Continued

Wavelength (Å)	No.
4 615.51	85
4 647.70	84
4 654.19	83
4 662.87	87
4 662.87	89
4 669.41	88
4 669.41	86
10 537.9	28
10 551.2	28
10 557.9	28
15 937.0	31
21 634.4	36
21 690.8	36
22 201.4	35
22 290.5	35
22 350.3	35
22 360.3	35
22 390.3	35
22 450.6	35
25 806.1	60
25 846.1	60
25 859.5	60
Wave number (cm^{-1})	**No,**
1 202	12
1 227	49
1 363	41
1 383	41
1 826	62
1 832	62
1 834	62
1 836	62
1 842	62
1 846	62
1 926	63
1 932	63

TABLE 29. B IV: Allowed transitions

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
1	$1s^2$-$1s2p$	^{1}S-^{3}P°										
				61.090	0–1 636 922	1–3	3.7105e−02	6.2281e−06	1.2526e−06	−5.205 65	AAA	5
2	$1s^2$-$1s2p$	^{1}S-^{1}P°		60.314	0–1 657 980	1–3	3.7210e+03	6.0881e−01	1.2089e−01	−0.215 52	AAA	5
3	$1s^2$-$1s3p$	^{1}S-^{1}P°		52.685	0–1 898 063	1–3	1.0844e+03	1.3538e−01	2.3481e−02	−0.868 45	AAA	5
4	$1s^2$-$1s4p$	^{1}S-^{1}P°		50.435	0–1 982 762	1–3	4.5421e+02	5.1963e−02	8.6278e−03	−1.284 31	AAA	5
5	$1s^2$-$1s5p$	^{1}S-^{1}P°		49.455	0–2 022 044	1–3	2.3178e+02	2.5496e−02	4.1511e−03	−1.593 53	AAA	5
6	$1s^2$-$1s6p$	^{1}S-^{1}P°		48.939	0–2 043 360	1–3	1.3390e+02	1.4423e−02	2.3238e−03	−1.840 93	AAA	5
7	$1s2s$-$1s2p$	^{3}S-^{3}P°	*2 823.4*	*2824.2*	1 601 545–*1 636 953*	3–9	4.5012e−01	1.6147e−01	4.5039e+00	−0.314 78	AAA	5
			2 821.64	2822.47	1 601 545–1 636 975	3–5	4.5012e−01	8.9597e−02	2.4976e+00	−0.570 59	AAA	5
			2 825.86	2826.70	1 601 545–1 636 922	3–3	4.5012e−01	5.3919e−02	1.5053e+00	−0.791 14	AAA	5

TABLE 29. B IV: Allowed transitions—Continued

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
			2 824.59	2825.42	1 601 545–1 636 938	3–1	4.5012e−01	1.7957e−02	5.0108e−01	−1.268 65	AAA	5
8	1*s*2*s*-1*s*2*p*	^{3}S-^{1}P°										
				1771.95	1 601 545–1 657 980	3–3	1.8969e−05	8.9290e−07	1.5626e−05	−5.572 07	AAA	5
9	1*s*2*s*-1*s*3*p*	^{3}S-^{3}P°		*344.03*	1 601 545–*1 892 221*	3–9	5.4659e+01	2.9095e−01	9.8857e−01	−0.059 06	AAA	5
				344.019	1 601 545–1 892 227	3–5	5.4659e+01	1.6163e−01	5.4917e−01	−0.314 35	AAA	5
				344.033	1 601 545–1 892 215	3–3	5.4658e+01	9.6986e−02	3.2954e−01	−0.536 17	AAA	5
				344.040	1 601 545–1 892 209	3–1	5.4659e+01	3.2331e−02	1.0986e−01	−1.013 26	AAA	5
10	1*s*2*s*-1*s*4*p*	^{3}S-^{3}P°		*264.03*	1 601 545–*1 980 291*	3–9	2.5184e+01	7.8960e−02	2.0590e−01	−0.625 47	AAA	5
				264.027	1 601 545–1 980 294	3–5	2.5184e+01	4.3866e−02	1.1439e−01	−0.880 75	AAA	5
				264.031	1 601 545–1 980 288	3–3	2.5184e+01	2.6320e−02	6.8635e−02	−1.102 59	AAA	5
				264.033	1 601 545–1 980 286	3–1	2.5184e+01	8.7736e−03	2.2879e−02	−1.579 70	AAA	5
11	1*s*2*s*-1*s*5*p*	^{3}S-^{3}P°										
				238.558	1 601 545–2 020 730	3–5	1.3170e+01	1.8727e−02	4.4124e−02	−1.250 40	AAA	5
				238.558	1 601 545–2 020 730	3–3	1.3170e+01	1.1236e−02	2.6474e−02	−1.472 25	AAA	5
12	1*s*2*s*-1*s*2*p*	^{1}S-^{3}P°										
				1202 cm^{-1}	1 635 720–1 636 922	1–3	1.963e−10	6.112e−08	1.674e−05	−7.213 8	AA	5
13	1*s*2*s*-1*s*2*p*	^{1}S-^{1}P°	4 491.10	4492.36	1 635 720–1 657 980	1–3	1.2556e−01	1.1397e−01	1.6855e+00	−0.943 22	AAA	5
14	1*s*2*s*-1*s*3*p*	^{1}S-^{1}P°		381.180	1 635 720–1 898 063	1–3	5.1107e+01	3.3398e−01	4.1911e−01	−0.476 28	AAA	5
15	1*s*2*s*-1*s*4*p*	^{1}S-^{1}P°		288.150	1 635 720–1 982 762	1–3	2.3306e+01	8.7033e−02	8.2561e−02	−1.060 32	AAA	5
16	1*s*2*s*-1*s*5*p*	^{1}S-^{1}P°		258.850	1 635 720–2 022 044	1–3	1.2174e+01	3.6687e−02	3.1263e−02	−1.435 49	AAA	5
17	1*s*2*s*-1*s*6*p*	^{1}S-^{1}P°		245.314	1 635 720–2 043 360	1–3	7.1034e+00	1.9226e−02	1.5527e−02	−1.716 11	AAA	5
18	1*s*2*p*-1*s*3*s*	^{3}P°-^{3}S		*406.86*	*1 636 953*–1 882 740	9–3	3.0406e+01	2.5152e−02	3.0320e−01	−0.645 19	AAA	5
				406.893	1 636 975–1 882 740	5–3	1.6892e+01	2.5156e−02	1.6849e−01	−0.900 38	AAA	5
				406.805	1 636 922–1 882 740	3–3	1.0135e+01	2.5145e−02	1.0103e−01	−1.122 43	AAA	5
				406.832	1 636 938–1 882 740	1–3	3.3785e+00	2.5150e−02	3.3684e−02	−1.599 47	AAA	5
19	1*s*2*p*-1*s*3*d*	^{3}P°-^{3}D		*384.98*	*1 636 953–1 896 710*	9–15	1.7517e+02	6.4869e−01	7.3992e+00	0.766 28	AAA	5
				384.978	1 636 975–1 896 730	5–7	1.7528e+02	5.4524e−01	3.4552e+00	0.435 56	AAA	5
				384.944	1 636 922–1 896 700	3–5	1.3123e+02	4.8589e−01	1.8473e+00	0.163 66	AAA	5
				384.997	1 636 938–1 896 680	1–3	9.7375e+01	6.4914e−01	8.2276e−01	−0.187 66	AAA	5
				385.023	1 636 975–1 896 700	5–5	4.3728e+01	9.7183e−02	6.1592e−01	−0.313 44	AAA	5
				384.974	1 636 922–1 896 680	3–3	7.3031e+01	1.6227e−01	6.1696e−01	−0.312 65	AAA	5
				385.052	1 636 975–1 896 680	5–3	4.8688e+00	6.4934e−03	4.1156e−02	−1.488 56	AAA	5
20	1*s*2*p*-1*s*3*d*	^{3}P°-^{1}D										
				384.821	1 636 975–1 896 836	5–5	9.1034e−02	2.0211e−04	1.2802e−03	−2.995 45	AAA	5
				384.743	1 636 922–1 896 836	3–5	2.2681e−01	8.3890e−04	3.1877e−03	−2.599 17	AAA	5
21	1*s*2*p*-1*s*4*s*	^{3}P°-^{3}S		*294.58*	*1 636 953*–1 976 420	9–3	1.1702e+01	5.0746e−03	4.4292e−02	−1.340 35	AAA	5
				294.599	1 636 975–1 976 420	5–3	6.5012e+00	5.0753e−03	2.4612e−02	−1.595 57	AAA	5
				294.553	1 636 922–1 976 420	3–3	3.9007e+00	5.0737e−03	1.4760e−02	−1.817 55	AAA	5
				294.566	1 636 938–1 976 420	1–3	1.3002e+00	5.0740e−03	4.9206e−03	−2.294 65	AAA	5
22	1*s*2*p*-1*s*4*d*	^{3}P°-^{3}D		*289.70*	*1 636 953–1 982 133*	9–15	5.8727e+01	1.2316e−01	1.0571e+00	0.044 70	AAA	5
				289.717	1 636 975–1 982 140	5–7	5.8747e+01	1.0349e−01	4.9356e−01	−0.286 11	AAA	5

TABLE 29. B IV: Allowed transitions—Continued

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
				289.680	1 636 922–1 982 130	3–5	4.4018e+01	9.2294e−02	2.6405e−01	−0.557 70	AAA	5
				289.702	1 636 938–1 982 120	1–3	3.2637e+01	1.2319e−01	1.1750e−01	−0.909 41	AAA	5
				289.725	1 636 975–1 982 130	5–5	1.4669e+01	1.8460e−02	8.8036e−02	−1.034 80	AAA	5
				289.689	1 636 922–1 982 120	3–3	2.4478e+01	3.0796e−02	8.8110e−02	−1.034 38	AAA	5
				289.733	1 636 975–1 982 120	5–3	1.6319e+00	1.2322e−03	5.8768e−03	−2.210 33	AAA	5
23	1*s*2*p*-1*s*5*d*	^{3}P°-^{3}D		*259.91*	*1 636 953–2 021 700*	9–15	2.7333e+01	4.6137e−02	3.5530e−01	−0.381 71	AAA	5
				259.926	1 636 975–2 021 700	5–7	2.7341e+01	3.8770e−02	1.6588e−01	−0.712 53	AAA	5
				259.890	1 636 922–2 021 700	3–5	2.0490e+01	3.4580e−02	8.8759e−02	−0.984 05	AAA	5
				259.901	1 636 938–2 021 700	1–3	1.5189e+01	4.6145e−02	3.9483e−02	−1.335 88	AAA	5
				259.926	1 636 975–2 021 700	5–5	6.8284e+00	6.9163e−03	2.9592e−02	−1.461 16	AAA	5
				259.890	1 636 922–2 021 700	3–3	1.1392e+01	1.1535e−02	2.9609e−02	−1.460 84	AAA	5
				259.926	1 636 975–2 021 700	5–3	7.5947e−01	4.6155e−04	1.9748e−03	−2.636 81	AAA	5
24	1*s*2*p*-1*s*3*s*	^{1}P°-^{1}S		427.698	1 657 980–1 891 790	3–1	2.4993e+01	2.2847e−02	9.6508e−02	−1.164 05	AAA	5
25	1*s*2*p*-1*s*3*d*	^{1}P°-^{3}D										
				418.901	1 657 980–1 896 700	3–5	2.9731e−01	1.3036e−03	5.3932e−03	−2.407 74	AAA	5
				418.936	1 657 980–1 896 680	3–3	5.8730e−04	1.5453e−06	6.3938e−06	−5.333 87	AAA	
26	1*s*2*p*-1*s*3*d*	^{1}P°-^{1}D		418.662	1 657 980–1 896 836	3–5	1.6094e+02	7.0485e−01	2.9145e+00	0.325 22	AAA	5
27	1*s*2*p*-1*s*4*d*	^{1}P°-^{1}D		308.414	1 657 980–1 982 220	3–5	5.0139e+01	1.1916e−01	3.6298e−01	−0.446 73	AAA	5
28	1*s*3*s*-1*s*3*p*	^{3}S-^{3}P°	*10 545*	*9481* cm^{-1}	1 882 740–*1 892 221*	3–9	5.390e−02	2.697e−01	2.809e+01	−0.092 0	AA	5
			10 537.9	9487 cm^{-1}	1 882 740–1 892 227	3–5	5.390e−02	1.496e−01	1.558e+01	−0.347 9	AA	5
			10 551.2	9475 cm^{-1}	1 882 740–1 892 215	3–3	5.390e−02	9.000e−02	9.382e+00	−0.568 6	AA	5
			10 557.9	9469 cm^{-1}	1 882 740–1 892 209	3–1	5.390e−02	3.004e−02	3.133e+00	−1.045 2	AA	5
29	1*s*3*s*-1*s*4*p*	^{3}S-^{3}P°		*1025.1*	1 882 740–*1 980 291*	3–9	6.5589e+00	3.0999e−01	3.1384e+00	−0.031 54	AAA	5
				1025.07	1 882 740–1 980 294	3–5	6.5589e+00	1.7221e−01	1.7434e+00	−0.286 83	AAA	5
				1025.14	1 882 740–1 980 288	3–3	6.5588e+00	1.0333e−01	1.0462e+00	−0.508 63	AAA	5
				1025.16	1 882 740–1 980 286	3–1	6.5589e+00	3.4447e−02	3.4877e−01	−0.985 73	AAA	5
30	1*s*3*s*-1*s*5*p*	^{3}S-^{3}P°										
				724.690	1 882 740–2 020 730	3–5	3.7705e+00	4.9478e−02	3.5413e−01	−0.828 47	AAA	5
				724.690	1 882 740–2 020 730	3–3	3.7704e+00	2.9686e−02	2.1247e−01	−1.050 33	AAA	5
31	1*s*3*s*-1*s*3*p*	^{1}S-^{1}P°	15 937.0	6273 cm^{-1}	1 891 790–1 898 063	1–3	1.819e−02	2.079e−01	1.091e+01	−0.682 1	AA	5
32	1*s*3*s*-1*s*4*p*	^{1}S-^{1}P°		1099.24	1 891 790–1 982 762	1–3	6.5705e+00	3.5708e−01	1.2922e+00	−0.447 24	AAA	5
33	1*s*3*s*-1*s*5*p*	^{1}S-^{1}P°		767.731	1 891 790–2 022 044	1–3	3.7205e+00	9.8627e−02	2.4928e−01	−1.006 00	AAA	5
34	1*s*3*s*-1*s*6*p*	^{1}S-^{1}P°		659.761	1 891 790–2 043 360	1–3	2.2185e+00	4.3432e−02	9.4335e−02	−1.362 19	AAA	5
35	1*s*3*p*-1*s*3*d*	^{3}P°-^{3}D	*22 271*	*4489* cm^{-1}	*1 892 221–1 896 710*	9–15	4.586e−03	5.687e−02	3.754e+01	−0.290 9	AA	5
			22 201.4	4503 cm^{-1}	1 892 227–1 896 730	5–7	4.589e−03	4.750e−02	1.736e+01	−0.624 3	AA	5
			22 290.5	4485 cm^{-1}	1 892 215–1 896 700	3–5	3.436e−03	4.268e−02	9.398e+00	−0.892 7	AA	5
			22 360.3	4471 cm^{-1}	1 892 209–1 896 680	1–3	2.549e−03	5.736e−02	4.224e+00	−1.241 4	AA	5
			22 350.3	4473 cm^{-1}	1 892 227–1 896 700	5–5	1.145e−03	8.578e−03	3.157e+00	−1.367 6	AA	5
			22 390.3	4465 cm^{-1}	1 892 215–1 896 680	3–3	1.912e−03	1.438e−02	3.180e+00	−1.365 2	AA	5
			22 450.6	4453 cm^{-1}	1 892 227–1 896 680	5–3	1.275e−04	5.782e−04	2.137e−01	−2.538 9	AA	5
36	1*s*3*p*-1*s*3*d*	^{3}P°-^{1}D										
			21 690.8	4609 cm^{-1}	1 892 227–1 896 836	5–5	2.623e−06	1.851e−05	6.612e−03	−4.033 5	AA	5
			21 634.4	4621 cm^{-1}	1 892 215–1 896 836	3–5	6.622e−06	7.748e−05	1.656e−02	−3.633 7	AA	5

TABLE 29. B IV: Allowed transitions—Continued

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	$E_i - E_k$ (cm^{-1})	$g_i - g_k$	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
37	1*s*3*p*-1*s*4*s*	^{3}P°-^{3}S		*1187.7*	*1 892 221*–1 976 420	9–3	8.0497e+00	5.6742e−02	1.9967e+00	−0.291 85	AAA	5
				1187.75	1 892 227–1 976 420	5–3	4.4721e+00	5.6750e−02	1.1095e+00	−0.547 06	AAA	5
				1187.58	1 892 215–1 976 420	3–3	2.6832e+00	5.6733e−02	6.6542e−01	−0.769 04	AAA	5
				1187.49	1 892 209–1 976 420	1–3	8.9442e−01	5.6726e−02	2.2176e−01	−1.246 22	AAA	5
38	1*s*3*p*-1*s*4*d*	^{3}P°-^{3}D		*1112.2*	*1 892 221–1 982 133*	9–15	1.7582e+01	5.4344e−01	1.7908e+01	0.689 39	AAA	5
				1112.19	1 892 227–1 982 140	5–7	1.7588e+01	4.5662e−01	8.3595e+00	0.358 53	AAA	5
				1112.16	1 892 215–1 982 130	3–5	1.3179e+01	4.0731e−01	4.4739e+00	0.087 04	AAA	5
				1112.21	1 892 209–1 982 120	1–3	9.7714e+00	5.4364e−01	1.9905e+00	−0.264 69	AAA	5
				1112.31	1 892 227–1 982 130	5–5	4.3918e+00	8.1461e−02	1.4915e+00	−0.390 08	AAA	5
				1112.29	1 892 215–1 982 120	3–3	7.3285e+00	1.3593e−01	1.4932e+00	−0.389 57	AAA	5
				1112.43	1 892 227–1 982 120	5–3	4.8857e−01	5.4385e−03	9.9587e−02	−1.565 55	AAA	5
39	1*s*3*p*-1*s*4*d*	^{3}P°-^{1}D										
				1111.20	1 892 227–1 982 220	5–5	5.3774e−03	9.9543e−05	1.8207e−03	−3.303 02	AAA	5
				1111.05	1 892 215–1 982 220	3–5	1.2421e−02	3.8311e−04	4.2040e−03	−2.939 55	AAA	5
40	1*s*3*p*-1*s*5*d*	^{3}P°-^{3}D		*772.33*	*1 892 221–2 021 700*	9–15	8.8786e+00	1.3233e−01	3.0281e+00	0.075 89	AAA	5
				772.362	1 892 227–2 021 700	5–7	8.8810e+00	1.1120e−01	1.4137e+00	−0.254 94	AAA	5
				772.290	1 892 215–2 021 700	3–5	6.6557e+00	9.9188e−02	7.5655e−01	−0.526 42	AAA	5
				772.254	1 892 209–2 021 700	1–3	4.9339e+00	1.3234e−01	3.3645e−01	−0.878 31	AAA	5
				772.362	1 892 227–2 021 700	5–5	2.2180e+00	1.9836e−02	2.5219e−01	−1.003 57	AAA	5
				772.290	1 892 215–2 021 700	3–3	3.7004e+00	3.3088e−02	2.5237e−01	−1.003 21	AAA	5
				772.362	1 892 227–2 021 700	5–3	2.4670e−01	1.3238e−03	1.6830e−02	−2.179 21	AAA	5
41	1*s*3*d*-1*s*3*p*	^{3}D-^{1}P°										
				1363 cm^{-1}	1 896 700–1 898 063	5–3	5.738e−07	2.778e−05	3.356e−02	−3.857 2	AA	5
				1383 cm^{-1}	1 896 680–1 898 063	3–3	8.738e−10	6.849e−08	4.891e−05	−6.687 3	AA	5
42	1*s*3*d*-1*s*4*p*	^{3}D-^{3}P°		*1196.4*	*1 896 710–1 980 291*	15–9	1.2604e+00	1.6229e−02	9.5884e−01	−0.613 62	AAA	5
				1196.69	1 896 730–1 980 294	7–5	1.0594e+00	1.6246e−02	4.4803e−01	−0.944 15	AAA	5
				1196.34	1 896 700–1 980 288	5–3	9.4413e−01	1.2155e−02	2.3936e−01	−1.216 28	AAA	5
				1196.09	1 896 680–1 980 286	3–1	1.2611e+00	9.0159e−03	1.0651e−01	−1.567 87	AAA	5
				1196.26	1 896 700–1 980 294	5–5	1.8878e−01	4.0501e−03	7.9751e−02	−1.693 57	AAA	5
				1196.06	1 896 680–1 980 288	3–3	3.1528e−01	6.7617e−03	7.9874e−02	−1.692 82	AAA	5
				1195.97	1 896 680–1 980 294	3–5	1.2611e−02	4.5071e−04	5.3237e−03	−2.868 98	AAA	5
43	1*s*3*d*-1*s*4*f*	^{3}D-^{1}F°										
				1169.45	1 896 730–1 982 240	7–7	1.3365e+00	2.7403e−02	7.3850e−01	−0.717 11	AAA	5
				1169.04	1 896 700–1 982 240	5–7	9.2780e+00	2.6613e−01	5.1213e+00	0.124 07	AAA	5
44	1*s*3*d*-1*s*4*f*	^{3}D-^{3}F°		*1168.9*	*1 896 710–1 982 263*	15–21	3.1838e+01	9.1298e−01	5.2698e+01	1.136 55	AAA	5
				1169.06	1 896 730–1 982 269	7–9	3.5375e+01	9.3190e−01	2.5106e+01	0.814 47	AAA	5
				1168.77	1 896 700–1 982 260	5–7	2.2176e+01	6.3581e−01	1.2232e+01	0.502 30	AAA	5
				1168.57	1 896 680–1 982 255	3–5	2.9715e+01	1.0139e+00	1.1701e+01	0.483 11	AAA	5
				1169.18	1 896 730–1 982 260	7–7	2.5942e+00	5.3165e−02	1.4324e+00	−0.429 28	AAA	5
				1168.84	1 896 700–1 982 255	5–5	5.4914e+00	1.1247e−01	2.1640e+00	−0.249 98	AAA	5
				1169.25	1 896 730–1 982 255	7–5	1.5722e−01	2.3017e−03	6.2020e−02	−1.792 85	AAA	5
45	1*s*3*d*-1*s*5*p*	^{3}D-^{3}P°										
				806.452	1 896 730–2 020 730	7–5	4.5082e−01	3.1397e−03	5.8350e−02	−1.658 01	AAA	5
				806.257	1 896 700–2 020 730	5–3	4.0179e−01	2.3494e−03	3.1180e−02	−1.930 08	AAA	5
				806.257	1 896 700–2 020 730	5–5	8.0337e−02	7.8292e−04	1.0391e−02	−2.407 31	AAA	5
				806.127	1 896 680–2 020 730	3–3	1.3417e−01	1.3071e−03	1.0407e−02	−2.406 56	AAA	5

TABLE 29. B IV: Allowed transitions—Continued

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	$E_i - E_k$ (cm^{-1})	$g_i - g_k$	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
				806.127	1 896 680–2 020 730	3–5	5.3669e−03	8.7144e−05	6.9380e−04	−3.582 64	AAA	5
46	1s3d-1s5f	^{3}D-^{3}F°		*800.28*	*1 896 710–2 021 666*	15–21	1.0727e+01	1.4420e−01	5.6987e+00	0.335 05	AAA	5
				800.000	1 896 730–2 021 730	7–9	1.1681e+01	1.4410e−01	2.6566e+00	0.003 76	AAA	5
				800.448	1 896 700–2 021 630	5–7	7.8930e+00	1.0614e−01	1.3985e+00	−0.275 14	AAA	5
				800.512	1 896 680–2 021 600	3–5	9.8122e+00	1.5711e−01	1.2421e+00	−0.326 67	AAA	5
				800.641	1 896 730–2 021 630	7–7	9.3133e−01	8.9503e−03	1.6514e−01	−1.203 07	AAA	5
				800.641	1 896 700–2 021 600	5–5	1.8133e+00	1.7426e−02	2.2966e−01	−1.059 83	AAA	5
				800.833	1 896 730–2 021 600	7–5	5.1916e−02	3.5654e−04	6.5801e−03	−2.602 79	AAA	5
47	1s3d-1s5f	^{3}D-^{1}F°										
				799.808	1 896 730–2 021 760	7–7	3.6659e−01	3.5157e−03	6.4799e−02	−1.608 89	AAA	5
				799.616	1 896 700–2 021 760	5–7	2.4930e+00	3.3456e−02	4.4035e−01	−0.776 56	AAA	5
48	1s3d-1s6f	^{3}D-^{1}F°										
				682.827	1 896 730–2 043 180	7–7	1.5483e−01	1.0823e−03	1.7030e−02	−2.120 57	AAA	5
				682.687	1 896 700–2 043 180	5–7	1.0390e+00	1.0164e−02	1.1421e−01	−1.293 99	AAA	5
49	1s3d-1s3p	^{1}D-^{1}P°		1227 cm^{-1}	1 896 836–1 898 063	5–3	2.332e−04	1.393e−02	1.869e+01	−1.157 0	AA	5
50	1s3d-1s4f	^{1}D-^{1}F°		1170.91	1 896 836–1 982 240	5–7	2.4718e+01	7.1128e−01	1.3709e+01	0.551 01	AAA	5
51	1s3d-1s4f	^{1}D-^{3}F°										
				1170.63	1 896 836–1 982 260	5–7	1.0594e+01	3.0471e−01	5.8715e+00	0.182 85	AAA	5
				1170.70	1 896 836–1 982 255	5–5	1.1354e−02	2.3329e−04	4.4956e−03	−2.933 13	AAA	5
52	1s3d-1s4p	^{1}D-^{1}P°		1163.79	1 896 836–1 982 762	5–3	7.8436e−01	9.5560e−03	1.8306e−01	−1.320 76	AAA	5
53	1s3d-1s5f	^{1}D-^{3}F°										
				801.321	1 896 836–2 021 630	5–7	2.8446e+00	3.8337e−02	5.0567e−01	−0.717 41	AAA	5
				801.513	1 896 836–2 021 600	5–5	3.7553e−03	3.6168e−05	4.7718e−04	−3.742 71	AAA	5
54	1s3d-1s5f	^{1}D-^{1}F°		800.487	1 896 836–2 021 760	5–7	8.7850e+00	1.1815e−01	1.5568e+00	−0.228 60	AAA	5
55	1s3d-1s5p	^{1}D-^{1}P°		798.671	1 896 836–2 022 044	5–3	3.3902e−01	1.9452e−03	2.5573e−02	−2.012 06	AAA	5
56	1s3d-1s6f	^{1}D-^{1}F°		683.321	1 896 836–2 043 180	5–7	4.3073e+00	4.2212e−02	4.7480e−01	−0.675 59	AAA	5
57	1s3d-1s6p	^{1}D-^{1}P°		682.482	1 896 836–2 043 360	5–3	1.7753e−01	7.4381e−04	8.3560e−03	−2.429 57	AAA	5
58	1s3p-1s4d	^{1}P°-^{3}D										
				1189.53	1 898 063–1 982 130	3–5	1.8950e−02	6.6998e−04	7.8711e−03	−2.696 82	AAA	5
				1189.67	1 898 063–1 982 120	3–3	6.4770e−05	1.3743e−06	1.6148e−05	−5.384 80	AAA	
59	1s3p-1s4d	^{1}P°-^{1}D		1188.26	1 898 063–1 982 220	3–5	1.8103e+01	6.3867e−01	7.4952e+00	0.282 40	AAA	5
60	1s4s-1s4p	^{3}S-^{3}P°	*25 825*	*3871* cm^{-1}	1 976 420–*1 980 291*	3–9	1.225e−02	3.676e−01	9.379e+01	0.042 5	AA	5
			25 806.1	3874 cm^{-1}	1 976 420–1 980 294	3–5	1.225e−02	2.039e−01	5.199e+01	−0.213 4	AA	5
			25 846.1	3868 cm^{-1}	1 976 420–1 980 288	3–3	1.225e−02	1.227e−01	3.134e+01	−0.433 9	AA	5
			25 859.5	3866 cm^{-1}	1 976 420–1 980 286	3–1	1.225e−02	4.096e−02	1.046e+01	−0.910 6	AA	5
61	1s4s-1s5p	^{3}S-^{3}P°										
			2 256.13	2256.83	1 976 420–2 020 730	3–5	1.4791e+00	1.8823e−01	4.1956e+00	−0.248 18	AAA	5
			2 256.13	2256.83	1 976 420–2 020 730	3–3	1.4791e+00	1.1294e−01	2.5174e+00	−0.470 03	AAA	5
62	1s4p-1s4d	^{3}P°-^{3}D		*1842* cm^{-1}	*1 980 291–1 982 133*	9–15	1.379e−03	1.016e−01	1.634e+02	−0.039 0	AA	5
				1846 cm^{-1}	1 980 294–1 982 140	5–7	1.379e−03	8.493e−02	7.574e+01	−0.371 9	AA	5
				1842 cm^{-1}	1 980 288–1 982 130	3–5	1.033e−03	7.609e−02	4.080e+01	−0.641 5	AA	5

TABLE 29. B IV: Allowed transitions—Continued

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
				1834 cm^{-1}	1 980 286–1 982 120	1–3	7.661e−04	1.024e−01	1.839e+01	−0.989 5	AA	5
				1836 cm^{-1}	1 980 294–1 982 130	5–5	3.443e−04	1.531e−02	1.373e+01	−1.115 9	AA	5
				1832 cm^{-1}	1 980 288–1 982 120	3–3	5.746e−04	2.567e−02	1.384e+01	−1.113 5	AA	5
				1826 cm^{-1}	1 980 294–1 982 120	5–3	3.831e−05	1.033e−03	9.316e−01	−2.286 8	AA	5
63	1*s*4*p*-1*s*4*d*	^{3}P°-^{1}D										
				1926 cm^{-1}	1 980 294–1 982 220	5–5	4.786e−07	1.934e−05	1.653e−02	−4.014 5	AA	5
				1932 cm^{-1}	1 980 288–1 982 220	3–5	1.139e−06	7.622e−05	3.896e−02	−3.640 8	AA	5
64	1*s*4*p*-1*s*5*d*	^{3}P°-^{3}D	*2 414.2*	*2414.9*	*1 980 291–2 021 700*	9–15	3.5606e+00	5.1885e−01	3.7125e+01	0.669 28	AAA	5
			2 414.38	2415.11	1 980 294–2 021 700	5–7	3.5615e+00	4.3600e−01	1.7333e+01	0.338 46	AAA	5
			2 414.03	2414.76	1 980 288–2 021 700	3–5	2.6692e+00	3.8890e−01	9.2748e+00	0.066 96	AAA	5
			2 413.91	2414.64	1 980 286–2 021 700	1–3	1.9786e+00	5.1885e−01	4.1245e+00	−0.284 96	AAA	5
			2 414.38	2415.11	1 980 294–2 021 700	5–5	8.8949e−01	7.7781e−02	3.0921e+00	−0.410 16	AAA	5
			2 414.03	2414.76	1 980 288–2 021 700	3–3	1.4840e+00	1.2973e−01	3.0939e+00	−0.409 84	AAA	5
			2 414.38	2415.11	1 980 294–2 021 700	5–3	9.8931e−02	5.1906e−03	2.0635e−01	−1.585 82	AAA	5
65	1*s*4*d*-1*s*5*p*	^{3}D-^{3}P°										
			2 590.57	2591.34	1 982 140–2 020 730	7–5	5.5033e−01	3.9573e−02	2.3632e+00	−0.557 50	AAA	5
			2 589.90	2590.67	1 982 130–2 020 730	5–3	4.9086e−01	2.9634e−02	1.2637e+00	−0.829 24	AAA	5
			2 589.90	2590.67	1 982 130–2 020 730	5–5	9.8153e−02	9.8761e−03	4.2116e−01	−1.306 44	AAA	5
			2 589.23	2590.00	1 982 120–2 020 730	3–3	1.6379e−01	1.6472e−02	4.2135e−01	−1.306 13	AAA	5
			2 589.23	2590.00	1 982 120–2 020 730	3–5	6.5515e−03	1.0981e−03	2.8090e−02	−2.482 23	AAA	5
66	1*s*4*d*-1*s*5*f*	^{3}D-^{3}F°	*2 528.8*	*2529.5*	*1 982 133–2 021 666*	15–21	6.0577e+00	8.1353e−01	1.0162e+02	1.086 47	AAA	5
			2 525.13	2525.89	1 982 140–2 021 730	7–9	6.6179e+00	8.1386e−01	4.7374e+01	0.755 65	AAA	5
			2 530.88	2531.65	1 982 130–2 021 630	5–7	4.4149e+00	5.9390e−01	2.4749e+01	0.472 68	AAA	5
			2 532.17	2532.93	1 982 120–2 021 600	3–5	5.5590e+00	8.9114e−01	2.2293e+01	0.427 07	AAA	5
			2 531.53	2532.29	1 982 140–2 021 630	7–7	5.2763e−01	5.0724e−02	2.9600e+00	−0.449 69	AAA	5
			2 532.81	2533.57	1 982 130–2 021 600	5–5	1.0282e+00	9.8946e−02	4.1265e+00	−0.305 63	AAA	5
			2 533.45	2534.21	1 982 140–2 021 600	7–5	2.9413e−02	2.0228e−03	1.1813e−01	−1.848 95	AAA	5
67	1*s*4*d*-1*s*5*f*	^{3}D-^{1}F°										
			2 523.22	2523.98	1 982 140–2 021 760	7–7	2.0769e−01	1.9836e−02	1.1537e+00	−0.857 46	AAA	5
			2 522.58	2523.34	1 982 130–2 021 760	5–7	1.4686e+00	1.9626e−01	8.1520e+00	−0.008 19	AAA	5
68	1*s*4*d*-1*s*6*f*	^{3}D-^{1}F°										
				1638.27	1 982 140–2 043 180	7–7	9.2624e−02	3.7269e−03	1.4071e−01	−1.583 55	AAA	5
				1638.00	1 982 130–2 043 180	5–7	6.4857e−01	3.6523e−02	9.8476e−01	−0.738 46	AAA	5
69	1*s*4*d*-1*s*6*f*	^{3}D-^{3}F°										
				1637.47	1 982 140–2 043 210	7–9	3.3046e+00	1.7079e−01	6.4448e+00	0.077 56	AAA	5
70	1*s*4*d*-1*s*5*p*	^{1}D-^{3}P°										
			2 595.95	2596.73	1 982 220–2 020 730	5–5	1.1910e−04	1.2040e−05	5.1463e−04	−4.220 41	AAA	5
			2 595.95	2596.73	1 982 220–2 020 730	5–3	4.9731e−04	3.0164e−05	1.2893e−03	−3.821 54	AAA	5
71	1*s*4*d*-1*s*5*f*	^{1}D-^{3}F°										
			2 536.66	2537.43	1 982 220–2 021 630	5–7	1.6771e+00	2.2664e−01	9.4661e+00	0.054 30	AAA	5
			2 538.60	2539.36	1 982 220–2 021 600	5–5	1.2478e−03	1.2063e−04	5.0422e−03	−3.219 58	AAA	5
72	1*s*4*d*-1*s*5*f*	^{1}D-^{1}F°	2 528.32	2529.08	1 982 220–2 021 760	5–7	4.9421e+00	6.6347e−01	2.7621e+01	0.520 79	AAA	5
73	1*s*4*d*-1*s*5*p*	^{1}D-^{1}P°	2 510.29	2511.05	1 982 220–2 022 044	5–3	4.3342e−01	2.4583e−02	1.0161e+00	−0.910 40	AAA	5
74	1*s*4*d*-1*s*6*f*	^{1}D-^{1}F°		1640.42	1 982 220–2 043 180	5–7	2.5574e+00	1.4444e−01	3.9003e+00	−0.141 34	AAA	5

TABLE 29. B IV: Allowed transitions—Continued

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
75	1*s*4*d*-1*s*6*p*	^{1}D-^{1}P°		1635.59	1 982 220–2 043 360	5–3	2.1761e−01	5.2364e−03	1.4098e−01	−1.581 99	AAA	5
76	1*s*4*f*-1*s*5*d*	^{1}F°-^{3}D										
			2 533.45	2534.21	1 982 240–2 021 700	7–7	3.5661e−03	3.4335e−04	2.0052e−02	−2.619 17	AAA	5
			2 533.45	2534.21	1 982 240–2 021 700	7–5	3.6292e−02	2.4959e−03	1.4576e−01	−1.757 68	AAA	5
77	1*s*4*f*-1*s*5*g*	^{1}F°-^{3}G										
			2 528.96	2529.72	1 982 240–2 021 770	7–9	2.0649e−01	2.5471e−02	1.4849e+00	−0.748 86	AAA	5
			2 528.96	2529.72	1 982 240–2 021 770	7–7	2.9773e−01	2.8564e−02	1.6652e+00	−0.699 08	AAA	5
78	1*s*4*f*-1*s*5*g*	^{1}F°-^{1}G	2 528.96	2529.72	1 982 240–2 021 770	7–9	1.0459e+01	1.2901e+00	7.5212e+01	0.955 74	AAA	5
79	1*s*4*f*-1*s*5*d*	^{3}F°-^{3}D	*2 534.9*	*2535.7*	*1 982 263–2 021 700*	21–15	1.1840e−01	8.1520e−03	1.4291e+00	−0.766 52	AAA	5
			2 535.31	2536.08	1 982 269–2 021 700	9–7	1.2137e−01	9.1022e−03	6.8396e−01	−1.086 61	AAA	5
			2 534.74	2535.50	1 982 260–2 021 700	7–5	8.1194e−02	5.5896e−03	3.2660e−01	−1.407 52	AAA	5
			2 534.41	2535.18	1 982 255–2 021 700	5–3	1.3216e−01	7.6405e−03	3.1884e−01	−1.417 91	AAA	5
			2 534.74	2535.50	1 982 260–2 021 700	7–7	6.9226e−03	6.6719e−04	3.8984e−02	−2.330 65	AAA	5
			2 534.41	2535.18	1 982 255–2 021 700	5–5	1.4670e−02	1.4135e−03	5.8987e−02	−2.150 73	AAA	5
			2 534.41	2535.18	1 982 255–2 021 700	5–7	2.9968e−04	4.0426e−05	1.6870e−03	−3.694 37	AAA	5
80	1*s*4*f*-1*s*5*g*	^{3}F°-^{3}G										
			2 530.82	2531.58	1 982 269–2 021 770	9–11	1.0898e+01	1.2798e+00	9.5995e+01	1.061 38	AAA	5
			2 530.24	2531.00	1 982 260–2 021 770	7–9	1.0325e+01	1.2749e+00	7.4361e+01	0.950 58	AAA	5
			2 529.92	2530.68	1 982 255–2 021 770	5–7	1.0008e+01	1.3453e+00	5.6039e+01	0.827 78	AAA	5
			2 530.82	2531.58	1 982 269–2 021 770	9–9	3.6674e−01	3.5237e−02	2.6431e+00	−0.498 76	AAA	5
			2 530.24	2531.00	1 982 260–2 021 770	7–7	5.7796e−01	5.5506e−02	3.2375e+00	−0.410 56	AAA	5
			2 530.82	2531.58	1 982 269–2 021 770	9–7	1.3900e−02	1.0387e−03	7.7915e−02	−2.029 25	AAA	5
81	1*s*4*f*-1*s*5*g*	^{3}F°-^{1}G										
			2 530.82	2531.58	1 982 269–2 021 770	9–9	3.1437e−01	3.0205e−02	2.2656e+00	−0.565 68	AAA	5
			2 530.24	2531.00	1 982 260–2 021 770	7–9	1.2366e−01	1.5269e−02	8.9060e−01	−0.971 09	AAA	5
82	1*s*4*p*-1*s*5*d*	^{1}P°-^{3}D										
			2 567.42	2568.19	1 982 762–2 021 700	3–5	3.2799e−03	5.4053e−04	1.3710e−02	−2.790 06	AAA	5
			2 567.42	2568.19	1 982 762–2 021 700	3–3	1.3692e−05	1.3539e−06	3.4340e−05	−5.391 30	AAA	5
83	1*s*5*d*-1*s*6*f*	^{3}D-^{1}F°										
			4 654.19	4655.49	2 021 700–2 043 180	7–7	5.1818e−02	1.6837e−02	1.8064e+00	−0.928 63	AAA	5
			4 654.19	4655.49	2 021 700–2 043 180	5–7	3.6740e−01	1.6713e−01	1.2808e+01	−0.077 97	AAA	5
84	1*s*5*d*-1*s*6*f*	^{3}D-^{3}F°										
			4 647.70	4649.00	2 021 700–2 043 210	7–9	1.8487e+00	7.7017e−01	8.2513e+01	0.731 68	AAA	5
85	1*s*5*d*-1*s*6*p*	^{3}D-^{1}P°										
			4 615.51	4616.81	2 021 700–2 043 360	5–3	1.7583e−04	3.3712e−05	2.5620e−03	−3.773 25	AAA	5
86	1*s*5*g*-1*s*6*f*	^{3}G-^{1}F°										
			4 669.41	4670.71	2 021 770–2 043 180	9–7	1.5509e−03	3.9451e−04	5.4596e−02	−2.449 69	AAA	5
			4 669.41	4670.71	2 021 770–2 043 180	7–7	4.6009e−04	1.5048e−04	1.6197e−02	−2.977 44	AAA	5
87	1*s*5*g*-1*s*6*f*	^{3}G-^{3}F°										
			4 662.87	4664.18	2 021 770–2 043 210	11–9	2.7740e−02	7.4022e−03	1.2503e+00	−1.089 24	AAA	5
			4 662.87	4664.18	2 021 770–2 043 210	9–9	7.6380e−04	2.4911e−04	3.4426e−02	−2.649 37	AAA	5
			4 662.87	4664.18	2 021 770–2 043 210	7–9	2.2516e−05	9.4415e−06	1.0148e−03	−4.179 86	AAA	5

TABLE 29. B IV: Allowed transitions—Continued

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	$E_i - E_k$ (cm^{-1})	$g_i - g_k$	A_{ki} (10^8 s^{-1})	f_{ik}	S (a.u.)	log gf	Accuracy	Source
88	$1s5g$-$1s6f$	^{1}G-^{1}F°	4 669.41	4670.71	2 021 770–2 043 180	9–7	2.7164e−02	6.9099e−03	9.5626e−01	−1.206 28	AAA	5
89	$1s5g$-$1s6f$	^{1}G-^{3}F°										
			4 662.87	4664.18	2 021 770–2 043 210	9–9	6.5473e−04	2.1354e−04	2.9510e−02	−2.716 29	AAA	5

[a]Wavelengths (Å) are always given unless cm^{-1} is indicated.

3.4.2. B IV forbidden transitions

For the electric quadrupole (E2) lines, we have tabulated the results of recent extensive variational calculations by Cann and Thakkar.[31] They constructed very accurate, 100-term explicitly correlated wavefunctions and derived the quadrupole oscillator strengths in both the length and velocity formulations. The two formulations are in excellent agreement, usually within 0.1%.

Cann and Thakkar had already applied the same computational approach to the allowed lines of He I and in this case obtained almost perfect agreement with the even more sophisticated calculations by Drake,[5] which are tabulated for the allowed electric dipole (E1) lines.

For the three transitions $1s^2\ ^1$S-$1s3d\ ^1$D, $1s2s\ ^1$S-$1s3d\ ^1$D, and $1s2s\ ^3$S-$1s3d\ ^3$D, electric quadrupole line strengths were also calculated by Godefroid and Verhaegen[32] with a MCHF program developed by Froese Fischer[33] in 1977. As Table 30 shows, the agreement with the Cann and Thakkar results[31] is excellent.

Drake[34] and Johnson and Lin[35] calculated the transition probability of the

$1s^2\ ^1$S-$1s2s\ ^3$S relativistic magnetic dipole (M1) transition, using perturbation theory and the Dirac–Fock approximation, respectively, and their results differ by only 0.5%.

Drake[37] calculated the magnetic quadrupole (M2) transition rate for the $1s^2\ ^1$S-$1s2p\ ^3$P° transition with variational wave functions and Kundu *et al.*[38] used the Hartree–Fock self-consistent field approximation to compute several more $1s^2\ ^1$S-$1snp\ ^3$P° transition rates. Their calculations overlap for the $1s^2\ ^1$S-$1s2p\ ^3$P° transition, where they agree within 0.2%.

A finding list and transition probabilities for the forbidden lines of B IV are given in Tables 31 and 32.

TABLE 30. Comparison of oscillator strength results for some electric quadrupole (E2) transitions of B IV from the calculations of Cann and Thakkar (Ref. 31) and Godefroid and Verhagen (Ref. 32)

	f-values		
Transition	Cann and Thakkar[31]	Godefroid and Verhagen[32]	Difference in %
$1s^2\ ^1$S-$1s3d\ ^1$D	1.0721×10^{-5}	1.0706×10^{-5}	0.14
$1s2s\ ^1$S-$1s3d\ ^1$D	2.7757×10^{-5}	2.7752×10^{-5}	0.018
$1s2s\ ^3$S-$1s3d\ ^3$D	3.0129×10^{-5}	3.0128×10^{-5}	0.003

TABLE 31. List of tabulated lines for forbidden transitions of B IV

Wavelength (Å)	No.
In vacuum	
49.4871	7
50.4485	6
50.4976	5
52.7194	4
52.8478	3
61.0883	2
62.4397	1
238.007	10
259.484	21
260.568	16
262.751	9
274.677	20
288.600	12
289.595	15
291.258	14
307.899	19
308.394	18
338.794	8
382.972	11
391.745	13
416.523	17
688.245	32
719.632	24
778.156	28
806.575	31
1 006.11	23
1 105.83	26
1 135.46	27
1 180.65	30
1 254.55	29
1 650.22	37
In air	
2 207.79	34
2 472.12	35
2 544.93	36
4 690.00	38
7 156.22	22
17 499.2	33
19 812.3	25

TABLE 32. B IV: Forbidden transitions

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	Type	A_{ki} (s^{-1})	f_{ik}	S (a.u.)	Acc.	Source
1	$1s^2$-$1s2s$	^{1}S-^{3}S										
				62.4397	0–1 601 545	1–3	M1	6.695e+00	1.174e−11	1.813e−07	AA	34
2	$1s^2$-$1s2p$	^{1}S-^{3}P°										
				61.0883	0–1 636 975	1–5	M2	5.01e+03	1.40e−08	1.43e+00	A	37
3	$1s^2$-$1s3p$	^{1}S-^{3}P°										
				52.8478	0–1 892 227	1–5	M2	1.76e+03	3.68e−09	2.43e−01	B	38
4	$1s^2$-$1s3d$	^{1}S-^{1}D		52.7194	0–1 896 836	1–5	E2	5.1459e+06	1.0721e−05	9.3559e−03	AAA	31
5	$1s^2$-$1s4p$	^{1}S-^{3}P°										
				50.4976	0–1 980 294	1–5	M2	7.85e+02	1.50e−09	8.64e−02	B	38
6	$1s^2$-$1s4d$	^{1}S-^{1}D		50.4485	0–1 982 220	1–5	E2	2.8842e+06	5.5025e−06	4.2077e−03	AAA	31
7	$1s^2$-$1s5p$	^{1}S-^{3}P°										
				49.4871	0–2 020 730	1–5	M2	3.98e+02	7.31e−10	3.96e−02	B	38
8	$1s2s$-$1s3d$	^{3}S-^{3}D		338.794	1 601 545–1 896 710	3–15	E2	3.5017e+05	3.0129e−05	2.0934e+01	AAA	31
9	$1s2s$-$1s4d$	^{3}S-^{3}D		262.751	1 601 545–1 982 133	3–15	E2	6.6634e+04	3.4484e−06	1.1177e+00	AAA	31
10	$1s2s$-$1s5d$	^{3}S-^{3}D		238.007	1 601 545–2 021 700	3–15	E2	2.1827e+04	9.2683e−07	2.2327e−01	AAA	31
11	$1s2s$-$1s3d$	^{1}S-^{1}D		382.972	1 635 720–1 896 836	1–5	E2	2.5247e+05	2.7757e−05	9.2856e+00	AAA	31
12	$1s2s$-$1s4d$	^{1}S-^{1}D		288.600	1 635 720–1 982 220	1–5	E2	3.3613e+04	2.099e−06	3.0044e−01	AA	31
13	$1s2p$-$1s3p$	^{3}P°-^{3}P°		391.745	1 636 953–1 892 221	9–9	E2	1.0890e+05	2.5056e−06	8.0743e+00	AAA	31
14	$1s2p$-$1s4p$	^{3}P°-^{3}P°		291.258	1 636 953–1 980 291	9–9	E2	4.6367e+04	5.897e−07	7.8100e−01	AA	31
15	$1s2p$-$1s4f$	^{3}P°-^{3}F°		289.595	1 636 953–1 982 263	9–21	E2	2.5408e+10	7.454e−01	9.7039e+05	AA	32
16	$1s2p$-$1s5p$	^{3}P°-^{3}P°		260.568	1 636 953–2 020 730	9–9	E2	2.3616e+04	2.4039e−07	2.2796e−01	AAA	31
17	$1s2p$-$1s3p$	^{1}P°-^{1}P°		416.523	1 657 980–1 898 063	3–3	E2	9.6202e+04	2.5022e−06	3.2307e+00	AAA	31
18	$1s2p$-$1s4f$	^{1}P°-^{1}F°		308.394	1 657 980–1 982 240	3–7	E2	2.5283e+10	8.412e−01	4.4082e+05	AA	32
19	$1s2p$-$1s4p$	^{1}P°-^{1}P°		307.899	1 657 980–1 982 762	3–3	E2	4.1599e+04	5.9124e−07	3.0835e−01	AAA	31
20	$1s2p$-$1s5p$	^{1}P°-^{1}P°		274.677	1 657 980–2 022 044	3–3	E2	2.1346e+04	2.415e−07	8.9404e−02	AA	31
21	$1s2p$-$1s6p$	^{1}P°-^{1}P°		259.484	1 657 980–2 043 360	3–3	E2	1.2325e+04	1.244e−07	3.8837e−02	AA	31
22	$1s3s$-$1s3d$	^{3}S-^{3}D	7 156.22	7158.20	1 882 740–1 896 710	3–15	E2	8.9334e−01	3.4313e−08	2.2487e+02	AAA	31
23	$1s3s$-$1s4d$	^{3}S-^{3}D		1006.11	1 882 740–1 982 133	3–15	E2	2.0956e+04	1.5901e−05	2.8935e+02	AAA	31
24	$1s3s$-$1s5d$	^{3}S-^{3}D		719.632	1 882 740–2 021 700	3–15	E2	8.4738e+03	3.2895e−06	2.1904e+01	AAA	31
25	$1s3s$-$1s3d$	^{1}S-^{1}D	19 812.3	5046 cm^{-1}	1 891 790–1 896 836	1–5	E2	5.6672e−03	1.6684e−09	7.7340e+01	AAA	31
26	$1s3s$-$1s4d$	^{1}S-^{1}D		1105.83	1 891 790–1 982 220	1–5	E2	1.7465e+04	1.6009e−05	1.2893e+02	AAA	31
27	$1s3p$-$1s4p$	^{3}P°-^{3}P°		1135.46	1 892 221–1 980 291	9–9	E2	1.1339e+04	2.1916e−06	1.7197e+02	AAA	31
28	$1s3p$-$1s5p$	^{3}P°-^{3}P°		778.156	1 892 221–2 020 730	9–9	E2	6.2970e+03	5.7165e−07	1.4438e+01	AAA	31
29	$1s3d$-$1s4s$	^{3}D-^{3}S		1254.55	1 896 710–1 976 420	15–3	E2	5.1676e+03	2.4387e−07	4.3018e+01	AAA	31
30	$1s3p$-$1s4p$	^{1}P°-^{1}P°		1180.65	1 898 063–1 982 762	3–3	E2	1.0398e+04	2.1730e−06	6.3898e+01	AAA	31

TABLE 32. B IV: Forbidden transitions—Continued

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å) or σ (cm^{-1})[a]	E_i-E_k (cm^{-1})	g_i-g_k	Type	A_{ki} (s^{-1})	f_{ik}	S (a.u.)	Acc.	Source
31	$1s3p$-$1s5p$	^{1}P°-^{1}P°		806.575	1 898 063–2 022 044	3–3	E2	5.8316e+03	5.6877e−07	5.3325e+00	AAA	31
32	$1s3p$-$1s6p$	^{1}P°-^{1}P°		688.245	1 898 063–2 043 360	3–3	E2	3.4760e+03	2.469e−07	1.4379e+00	AA	31
33	$1s4s$-$1s4d$	^{3}S-^{3}D	17 499.2	5713 cm^{-1}	1 976 420–1 982 133	3–15	E2	1.4582e−01	3.3491e−08	3.2092e+03	AAA	31
34	$1s4s$-$1s5d$	^{3}S-^{3}D	2 207.79	2208.48	1 976 420–2 021 700	3–15	E2	2.7343e+03	9.9968e−06	1.9240e+03	AAA	31
35	$1s4p$-$1s5p$	^{3}P°-^{3}P°	2 472.12	2472.87	1 980 291–2 020 730	9–9	E2	1.9868e+03	1.8214e−06	1.4764e+03	AAA	31
36	$1s4p$-$1s5p$	^{1}P°-^{1}P°	2 544.93	2545.70	1 982 762–2 022 044	3–3	E2	1.8598e+03	1.8069e−06	5.3262e+02	AAA	31
37	$1s4p$-$1s6p$	^{1}P°-^{1}P°		1650.22	1 982 762–2 043 360	3–3	E2	1.2227e+03	4.992e−07	4.0081e+01	AA	31
38	$1s5p$-$1s6p$	^{1}P°-^{1}P°	4 690.00	4691.31	2 022 044–2 043 360	3–3	E2	4.6231e+02	1.5254e−06	2.8140e+03	AAA	31

[a]Wavelengths (Å) are always given unless cm^{-1} is indicated.

3.5. B V

Hydrogen isoelectronic sequence
Ground state: $1s\ ^2S_{1/2}$
Ionization energy: 340.2260 eV (2 744 107.87 cm^{-1})

3.5.1. B V allowed transitions

We have not tabulated numerical data for the hydrogenlike ion B V, since data for this ion of nuclear charge $Z=5$ may be obtained by scaling the corresponding line strength values for hydrogen according to the following relationship:[39]

$S(Z)=Z^{-2}S(H)[\mu(H)/\mu(Z)]^2$, where the quantities for hydrogen are indicated by H and those for the hydrogenlike ions by their nuclear charges Z (5, in this case). This relationship includes a term for the finite masses of H and the H-like ions, expressed by their reduced masses $\mu(Z)=M(Z)/[m_e+M(Z)]$ [m_e is the electron mass and $M(Z)$ is the mass of the nuclide of charge Z]. They are valid for hydrogenlike ions of small Z because relativistic effects are negligibly small.

Extensive numerical calculations for H-like ions by Baker,[40] Jitrik and Bunge,[41] and Pal'chikov[42] have shown that the relativistic results are essentially indistinguishable (i.e., identical within a few parts in 10^4) from the nonrelativistic results for hydrogen and hydrogenlike ions of small Z. Therefore, the above scaling relationships are valid within this level of accuracy, which should be more than sufficient for most applications. If extremely high accuracy is required, we refer the reader to the data tables by Jitrik and Bunge.[41]

Wavelength and energy level data for B V may be obtained by consulting the NIST Atomic Energy Levels and Spectra Bibliographic Database.[43]

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5. References

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