Atomic Transition Probabilities of Aluminum. A Critical Compilation

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This compilation is the second in a series of updates to *Atomic Transition Probabilities, Sodium through Calcium,* published in 1969 by Wiese *et al.* [*Atomic Transition Probabilities, Vol. II, Vol. II: Sodium through Calcium*, NSROS-NBS Vol. 2 (U.S. GPO, Washington, D.C., 1969)]. Atomic transition probabilities have been critically evaluated and compiled for about 5000 spectral lines of aluminum (nuclear charge Z=13). The cited values and their estimated uncertainties are based on our consideration of all available theoretical and experimental literature sources. All ionization stages (except for hydrogenic) are covered, and the data are presented in separate tables for each atom and ion. Separate listings are given for "allowed" (electric dipole) and "forbidden" (magnetic dipole plus electric and magnetic quadrupole) transitions. In each spectrum, lines are grouped into multiplets which are arranged in order of ascending lower- and upper-level energies, respectively. For each line, the emission transition probability A_{ki}, the line strength S, and (for allowed lines) the absorption oscillator strength f_{ik} are given, together with the spectroscopic designation, the wavelength, the statistical weights, and the energy levels of the lower and upper states. The estimated relative uncertainties of the line strength are also indicated, as are the source citations. We include only those lines whose transition rates are deemed sufficiently accurate to qualify as reference values. Short introductions precede the tables for each ion. *© 2008 by the U.S. Secretary of Commerce on behalf of the United States. All right reserved.* [DOI: 10.1063/1.2734564]

Key words: aluminum; atomic spectra; energy levels; ions; line strengths; oscillator strengths; relative uncertainties; transition probabilities.

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1. Introduction

This is the second installment of an effort to update, revise, and expand the reference data tables on atomic transition probabilities[c] for all ionization stages of the elements sodium through calcium. The original compilation, *Atomic Transition Probabilities, Vol. II: Sodium through Calcium*, was published in 1969 by Wiese *et al.*[84] These older transition rates, with updated energies and wavelengths, are also available in the current versions of the Atomic Spectra Database (ASD).[53] This new tabulation has been undertaken because a vast amount of new material, referenced in the Bibliographic Database on Atomic Transition Probabilities,[54] has become available in recent years, primarily from sophisticated atomic structure calculations. Since this material is so extensive, the new tables will be published in several parts. This second part contains all nonhydrogenic spectra of the element aluminum ($Z=13$). Subsequent parts will cover Si to Ca ($Z=14-20$). The quality of many of the data has also increased, particularly for transitions between lower-lying levels.

The general introduction to our first compilation of Na and Mg (Kelleher and Podobedova[35]) contains a detailed discus-

[c]Throughout these tables we often use the terms atomic transition probability, oscillator strength (f value), and line strength interchangeably, since they all refer to the same underlying physical phenomenon of radiative transitions. We also use the generic term "transition rate" to refer to any of the above.

sion of the principal criteria for our judgments and method of data selection and evaluation. We have maintained the same layout of the earlier compilations of atomic transition probabilities. In addition to the spectroscopic information given for each spectral line, we list the transition probability for spontaneous emission A_{ki} and several equivalent expressions, the estimated "accuracy' (Acc), and citations to the sources from which the transition rate was derived.

The material for each spectrum is subdivided into a main table for allowed (electric dipole) transitions and a smaller separate table for forbidden lines. Electric dipole intercombination (intersystem) lines are forbidden only in pure LS coupling and are listed under allowed transitions. Forbidden lines include magnetic dipole (M1), electric quadrupole (E2), and magnetic quadrupole (M2) transitions. For these, the columns containing f and log gf are omitted since the oscillator strength is rarely utilized for forbidden lines. When both M1 and E2 transitions occur at the same wavelength, the total line strengths can be obtained by adding the magnetic dipole and electric quadrupole line strengths. Most authors who have carried out recent calculations for S and A_{ki} for E2 transitions follow a definition for S(E2) given by Cowan[12] and others. Since this appears now to be the preferred definition, we follow this convention. This is reflected in the change of the conversion factor from that given in an earlier NIST compilation.[84]

The tables are grouped according to multiplets and arranged in order of increasing lower and upper energy levels. We list all individual lines within each multiplet unless transition rate or energy level data were unavailable. Finally, in order to facilitate finding lines by wavelength in each spectrum, we have provided finding lists ordered by increasing wavelengths.

We present two wavelength columns. The first column lists air wavelengths for lines in the near ultraviolet, visible, and near infrared spectrum (2000 Å $<\lambda<$ 20 000 Å). The second gives the vacuum wavelength (or the vacuum wavenumber for infrared lines above 20 000 Å). Wavelengths are derived from the most recent NIST atomic energy level data for aluminum (Martin and Zalubas[45]). The listed vacuum wavelength is equivalent to the inverse of the difference between the upper and lower level energies ($\times 10^8$). Air wavelengths are derived from these by dividing the vacuum wavelength by the corresponding index of refraction of air (Peck and Reeder[57]). The ASD[53] help file contains a detailed discussion of how the air index of refraction and the number of significant figures are derived for the wavelengths. A "cm^{-1}" in this column indicates that a wavenumber (energy difference in cm^{-1}) rather than a wavelength is listed. Square brackets, [ ], around a wavelength indicate that the energy of either the upper or lower level used to deduce the wavelength is uncertain to an unknown degree because of the following:

(i) One level is part of a system whose absolute energies are not well known with respect to the other levels of the atom or ion. For example, the absolute energy scale for excited ^4P levels is sometimes not experimentally established with respect to the ^2P levels.

(ii) The assignment of one or both of the transition levels in uncertain.

(iii) The energy of one or both of the levels was calculated *ab initio* and its accuracy is uncertain.

Next we list the lower and upper energies and statistical weights ($g=2J+1$, where J is the quantum number for the total orbital angular momentum). We have expressed the atomic transition rates in four different ways because different user communities have different preferences. Thus, in addition to the transition probability for spontaneous emission A_{ki}, we present the (absorption) oscillator strength f_{ik}, as well as the line strength S and log $g_i f_{ik}$. We use a shortened exponential notation for A_{ki}, f_{ik}, and S; for example, 1.23−04 indicates 1.23×10^{-4}. The conversion factors between the tabulated quantities A_{ki}, f_{ik}, and S are listed in Table 2. For the numerical conversions between different transition rates, we have used the vacuum wavelengths listed in the tables, which are usually derived from experimental level energies.

We assign a letter-grade accuracy for each line strength. The cited accuracy can be put on an absolute scale via Table 1. A detailed description of the method for estimating the relative uncertainties is described in Kelleher and Podobedova.[35] Uncertainties for oscillator strengths and especially for transition probabilities can be higher due to uncertainties in the wavelength. Table 2 shows the wavelength dependence of these quantities. It increases for higher multipole transitions. Typically such uncertainties are significant only for wavelengths longer than 10 000 Å. In Table 1 we list our assigned correspondence between the estimated 90% relative standard deviation of the mean (RSDM) and the published letter indicating the accuracy (Acc).

TABLE 1. Correspondence between accuracy and estimated relative uncertainty

Acc	Relative uncertainty of mean line strength at 90% confidence level[a]
AA	≤0.001
A+	≤0.01
A	≤0.03
B+	≤0.06
B	≤0.10
C+	≤0.15
C	≤0.25
D+	≤0.30
D	≤0.50
E+	≤0.70
E	≤1

[a]There is a 90% probability that the relative uncertainty of the *line strength* is equal to or better than the value cited. Uncertainties of oscillator strengths and transition probabilities may be somewhat higher when the uncertainty in the transition wavelength is significant; see Table 2. This correspondence table is somewhat different from compilations by other NIST authors because we use a different approach to estimate uncertainty.

"LS" in the "Source" column indicates that the line data have been approximated by applying LS coupling fractions [using either Eq. (1) of Kelleher and Podobedova[35] or the listed values in Allen[1]] to a published multiplet value. LS′ is used in those special cases where one level in a transition is not designated in LS coupling, but it has a "unique J," such that there is no other level with the same J and configuration with which it can mix via spin-orbit interactions.

Multiplet averages are given only if all the fine-structure members of the multiplet are listed. For the energy levels, the multiplet g value (lower and upper levels) is the sum of g's for all the levels (lower and upper, respectively) involved in the multiplet, with each level counted only once. The cited energy is the g-weighted average of each of the unique levels in the multiplet. The multiplet wavelength is determined from these energies. The multiplet line strength is the sum of the individual fine-structure line strengths. The oscillator strength and transition probability are derived from the line strength according to Table 2.

TABLE 2. Conversion factors for transition rates

$$g_i f_{ik}=(R_\infty/2\pi\alpha^3 c)g_k A_{ki}/\sigma^2=1.499\,193\,8\times10^{-16}g_k A_{ki}\lambda^2;\ g_i f_{ik}=-g_k f_{ki}$$

Type	$g_i f_{ik}$	$g_k A_{ki}$	Parity change?	Selection rules
E1	$\frac{1}{3\alpha}\left(\frac{\alpha\sigma}{R_\infty}\right)S_{\mathrm{E}}^{(1)}$ $303.755\,68S/\lambda$	$\frac{2}{3}\alpha\pi c\sigma\left(\frac{\alpha\sigma}{R_\infty}\right)^2 S_{\mathrm{E}}^{(1)}$ $2.026\,126\,9\times10^{18}S/\lambda^3$	Yes	$\Delta J=0,\pm1$ (no $0\leftrightarrow0$); $\Delta M=0,\pm1$ (no $0\leftrightarrow0$ if $\Delta J=0$)
M1	$\frac{\alpha}{12}\left(\frac{\alpha\sigma}{R_\infty}\right)S_{\mathrm{M}}^{(1)}$ $4.043\,850\,4\times10^{-3}S/\lambda$	$\frac{1}{6}\alpha^3\pi c\sigma\left(\frac{\alpha\sigma}{R_\infty}\right)^2 S_{\mathrm{M}}^{(1)}$ $2.697\,350\,0\times10^{13}S/\lambda^3$	No	Same as E1
E2	$\frac{1}{240\alpha}\left(\frac{\alpha\sigma}{R_\infty}\right)^3 S_{\mathrm{E}}^{(2)}$ $167.902\,21S/\lambda^3$	$\frac{1}{120}\alpha\pi c\sigma\left(\frac{\alpha\sigma}{R_\infty}\right)^4 S_{\mathrm{E}}^{(2)}$ $1.119\,950\,0\times10^{18}S/\lambda^5$	No	$\Delta J=0,\pm1,\pm2$ (no $0\leftrightarrow0$, $0\leftrightarrow1$, or $1/2\leftrightarrow1/2$); $\Delta M=0,\pm1,\pm,2$
M2	$\frac{\alpha}{960}\left(\frac{\alpha\sigma}{R_\infty}\right)^3 S_{\mathrm{M}}^{(2)}$ $2.235\,255\,0\times10^{-3}S/\lambda^3$	$\frac{1}{480}\alpha^3\pi c\sigma\left(\frac{\alpha\sigma}{R_\infty}\right)^4 S_{\mathrm{M}}^{(2)}$ $1.490\,971\,4\times10^{13}S/\lambda^5$	Yes	Same as E2
E3	$\frac{1}{37\,800\alpha}\left(\frac{\alpha\sigma}{R_\infty}\right)^5 S_{\mathrm{E}}^{(3)}$ $47.140\,897S/\lambda^5$	$\frac{1}{18\,900}\alpha\pi c\sigma\left(\frac{\alpha\sigma}{R_\infty}\right)^6 S_{\mathrm{E}}^{(3)}$ $3.144\,416\,5\times10^{17}S/\lambda^7$	Yes	

[a] A_{ki} is the emission transition probability in s^{-1}, f_{ik} is the absorption oscillator strength, and g is the statistical weight. R_∞ is the Rydberg constant, α is the fine-structure constant, c is the speed of light, and σ is the energy difference between the upper (k) and lower (i) levels of the transition (R_∞ and σ are in cm^{-1}; c is in cm/s). The line strength $S_{\mathrm{E,M}}^k$ is the absolute square of the reduced matrix element of the kth multipolar electric and magnetic operator, respectively. The numerical values are based on the 2002 CODATA recommended values of fundamental constants (Mohr and Taylor[52]), with the line strength in a.u. and λ the vacuum wavelength in Ångströms.

2. Acknowledgments and Future Plans

It is a pleasure to acknowledge the assistance and cooperation of many colleagues in this field. We would especially like to acknowledge the support and valuable suggestions of W. L. Wiese, as well as his critical reading of the manuscripts. Also, in some cases different authors have provided us with the results of their calculations prior to publication, as indicated in the references. Partial support for this work was provided by the NASA Office of Space Sciences, Grant No. W-10,215. We plan to continue this critical compilation work with analogous tables for the elements silicon through calcium.

3. References for Sections 1 and 2

[1]C. W. Allen, *Allen's Astrophysical Quantities*, 4th ed. (Springer, New York, 2000).

[12]R. D. Cowan, *The Theory of Atomic Structure and Spectra* (University of California Press, Berkeley, CA, 1981).

[34]V. Kaufman and W. C. Martin, J. Phys. Chem. Ref. Data **20**, 775 (1991).

[35]D. E. Kelleher and L. I. Podobedova, J. Phys. Chem. Ref. Data **37**, 267 (2008).

[45]W. C. Martin and R. Zalubas, J. Phys. Chem. Ref. Data **8**, 817 (1979). More recent improvements, based on Ref. 34, have been incorporated in the NIST Atomic Spectra Database (ASD) (Ref. 53).

[52]P. J. Mohr and B. N. Taylor, Rev. Mod. Phys. **77**, 1 (2005), http://physics.nist.gov/constants

[53]Yu. Ralchenko, F.-C. Jou, D. E. Kelleher, A. E. Kramida, A. Musgrove, J. Reader, W. L. Wiese, and K. Olsen (2007) *NIST Atomic Spectra Database* (version 3.1.3), http://physics.nist.gov/asd3, National Institute of Standards and Technology, Gaithersburg, MD.

[54]J. R. Fuhr, A. E. Kramida, H. R. Felrice, K. Olsen, and S. Kotochigova (2006) *NIST Atomic Transition Probability Bibliographic Database* (version 8.1), http://physics.nist.gov/Fvalbib, National Institute of Standards and Technology, Gaithersburg, MD.
[57]E. R. Peck and K. Reeder, J. Opt. Soc. Am. **62**, 958 (1972).
[83]W. L. Wiese, J. R. Fuhr, and T. M. Deters, *Atomic Transition Probabilities of Carbon, Nitrogen, and Oxygen*, JPCRD Monograph 7 (AIP, New York, 1996).
[84]W. L. Wiese, M. W. Smith, and B. M. Miles, *Atomic Transition Probabilities, Vol. II: Sodium through Calcium* NSRDS-NBS Sci. 22, U.S. GPO, Washington, D.C., 1969. The first updated compilation of this NIST transition probabilities has been published in Ref. 83.

4. Aluminum

4.1. Al I

Ground state: $1s^22s^22p^63s^23p\ ^2P^o_{1/2}$
Ionization energy: 5.985 755 eV (48 278.37 cm^{-1})

4.1.1. Allowed Transitions for Al I

The large majority of the compiled transition rates for this spectrum has been taken from the R-matrix calculations of the Opacity Project[46,47] (OP). Only OP results were available for energy levels above the $3s4p$. Wherever available we have used the data of Tachiev and Froese Fischer,[71] which result from extensive multiconfiguration Hartree-Fock (MCHF) calculations with Breit-Pauli corrections to order α^2. Vujnović *et al.*[81] used measured branching ratios and published lifetimes of energy levels to obtain transition probabilities. Davidson *et al.*[13] measured fluorescence from a laser excitation of an atomic beam and Hannaford[29] measured fluorescence from a laser excitation of a rare-gas discharge to obtain lifetimes.

The appearance of an n in the $nd\ ^2D$ configuration designation indicates that the level is a composite of different basis configurations ($3s^2nd$ and $3s3p^2$) ^2D.

To estimate accuracies, we pooled the RSDM for each of the lines with transition rates published in two or more references,[13,29,46,47,71,81] as described in the introduction to Kelleher and Podobedova.[35] For this purpose the spin-allowed and intercombination data were treated separately. Lines from the OP constituted a third group. Next we isoelectronically averaged the "logarithmic quality factors" observed for lines of Al I and Si II, as described in the introduction to Kelleher and Podobedova.[35] For the higher-lying lines and intercombination lines, we scaled the logarithmic quality factor of the lower-lying lines, as described in Kelleher and Podobedova.[35]

References for Allowed Transitions for Al I

[13]M. D. Davidson, H. Volten, and A. Dönszelmann, Astron. Astrophys. **238**, 452 (1990).
[29]P. Hannaford, Microchem. J. **63**, 43 (1999).
[35]D. E. Kelleher and L. I. Podobedova, J. Phys. Chem. Ref. Data **37**, 267 (2008).
[46]C. Mendoza, W. Eissner, M. Le Dourneuf, and C. J. Zeippen (unpublished).
[47]C. Mendoza, W. Eissner, M. Le Dourneuf, and C. J. Zeippen, http://legacy.gsfc.nasa.gov/topbase, downloaded on July 28, 1995 (Opacity Project).
[71]G. Tachiev and C. Froese Fischer, http://www.vuse.vanderbilt.edu/~cff/mchf_collection/ (MCHF, *ab initio*, downloaded on February 17, 2004).
[81]V. Vujnović, K. Blagoev, C. Fürböck, T. Neger, and H. Jäger, Astron. Astrophys. **388**, 704 (2002).

TABLE 3. Wavelength finding list for allowed lines of Al I

Wavelength (air) (Å)	Mult. No.
2 145.555	10
2 150.699	10
2 150.728	10
2 168.826	9
2 174.071	9
2 174.113	9
2 204.668	8
2 210.060	8
2 210.130	8
2 263.464	7
2 269.096	7
2 269.222	7
2 367.052	6
2 372.070	5
2 373.122	6
2 373.350	6
2 378.394	5
2 567.982	4
2 575.094	4
2 575.396	4
2 652.476	3
2 660.386	3
3 082.151	2
3 092.708	2
3 092.837	2
3 944.006	1
3 961.520	1
5 557.059	13
5 557.944	13
6 696.018	12
6 698.667	12
6 905.64	21
6 906.28	21
7 083.969	20
7 084.643	20
7 327.47	30
7 335.65	30
7 335.98	30
7 361.568	19
7 362.296	19
7 606.162	29
7 614.820	29

TABLE 3. Wavelength finding list for allowed lines of Al I—Continued

Wavelength (air) (Å)	Mult. No.
7 615.335	29
7 835.309	18
7 836.134	18
8 065.969	28
8 075.353	28
8 076.285	28
8 772.871	17
8 773.902	17
8 773.905	17
8 828.903	27
8 841.265	27
8 912.918	26
8 923.565	26
8 925.516	26
10 768.345	25
10 782.039	25
10 786.740	25
10 872.966	24
10 891.720	24
11 253.189	16
11 254.881	16
11 254.891	16
12 747.663	15
12 749.846	15
12 757.268	15
13 122.304	41
13 123.417	11
13 130.155	41
13 150.748	11
13 823.883	33
13 826.983	33
14 107.758	40
14 116.833	40
15 815.10	49
15 828.31	49
15 829.89	49
15 956.650	39
15 968.259	39
16 684.712	38
16 689.227	38
16 697.405	38
16 718.943	23
16 750.533	23
16 763.327	23
17 173.172	48
17 187.985	48
17 190.610	48
17 699.038	32
17 708.020	32
19 280.15	47
19 302.13	47
19 709.98	46
19 727.39	46
19 732.95	46

TABLE 3. Wavelength finding list for allowed lines of Al I—Continued

Wavenumber (cm^{-1})	Mult. No.
4 901.688	37
4 897.137	37
4 897.133	37
4 739.600	22
4 723.768	22
4 713.881	54
4 713.873	54
4 408.476	36
4 405.611	36
4 403.921	36
4 314.200	62
4 310.159	62
4 001.155	45
3 995.250	45
3 902.328	53
3 902.320	53
3 894.420	44
3 890.964	44
3 888.515	44
3 782.032	61
3 777.991	61
3 326.91	70
3 324.04	70
3 258.30	69
3 256.06	69
3 255.43	69
3 006.37	83
3 003.92	83
2 960.939	60
2 956.898	60
2 849.457	52
2 849.449	52
2 848.871	68
2 847.008	52
2 846.006	68
2 776.876	56
2 775.255	56
2 758.400	67
2 756.423	67
2 755.535	67
2 745.98	82
2 743.53	82
2 687.545	59
2 685.924	59
2 683.504	59
2 672.193	77
2 588.476	31
2 582.571	31
2 556.359	51
2 556.351	51
2 389.977	35
2 385.430	35
2 385.422	35
2 381.544	81
2 379.095	81
2 202.170	74
2 202.166	74

TABLE 3. Wavelength finding list for allowed lines of Al I—Continued

Wavenumber (cm^{-1})	Mult. No.
2 140.025	76
2 122.220	66
2 119.355	66
2 009.141	65
2 007.705	65
2 006.276	65
1 961.764	43
1 959.900	43
1 955.859	43
1 872.433	42
1 866.528	42
1 849.376	80
1 846.927	80
1 828.60	100
1 827.18	100
1 690.66	96
1 673.65	89
1 672.66	89
1 672.03	89
1 597.359	58
1 593.322	58
1 593.318	58
1 568.21	99
1 566.79	99
1 514.493	73
1 514.489	73
1 513.064	73
1 399.27	93
1 398.64	93
1 390.617	72
1 390.613	72
1 348.470	34
1 343.915	34
1 342.565	34
1 326.224	95
1 318.932	75
1 264.229	88
1 262.608	88
1 203.777	98
1 202.348	98
1 193.478	55
1 190.613	55
1 173.758	87
1 173.025	87
1 172.137	87
1 104.147	57
1 101.282	57
1 100.106	57
1 079.35	106
1 078.46	106
1 028.283	79
1 025.834	79
938.109	64
935.244	64
918.393	50
918.385	50
914.352	50

TABLE 3. Wavelength finding list for allowed lines of Al I—Continued

Wavenumber (cm^{-1})	Mult. No.
899.631	92
898.743	92
879.11	103
838.59	91
831.374	63
830.958	63
828.509	63
818.96	105
818.07	105
794.056	94
754.889	78
753.268	78
752.440	78
671.609	97
670.180	97
648.154	84
646.533	84
579.45	109
578.82	109
578.18	101
577.55	101
537.578	86
535.957	86
530.186	14
528.843	14
514.671	102
514.354	14
454.518	104
453.630	104
424.499	85
424.307	85
422.878	85
393.61	107
393.03	107
337.746	71
337.742	71
335.297	71
319.06	108
318.43	108
231.80	110
231.22	110
150.913	90
149.484	90

TABLE 4. Transition probabilities of allowed lines for Al I (references in this table are as follows: 1=Mendoza *et al.*,[46,47] 2=Tachiev and Froese Fischer,[71] 3=Vujnović *et al.*,[81] 4=Davidson *et al.*,[13] and 5=Hannaford[29])

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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
1	$3p-4s$	$^2P^\circ-^2S$	*3 955.66*	*3 956.78*	*74.71*–25 347.756	6–2	1.48+08	1.16−01	9.07+00	−0.157	B	2,5
			3 961.520	3 962.641	112.061–25 347.756	4–2	9.85+07	1.16−01	6.05+00	−0.333	B	2
			3 944.006	3 945.122	0.000–25 347.756	2–2	4.99+07	1.16−01	3.02+00	−0.635	B	2,5
2	$3p-3d$	$^2P^\circ-^2D$	*3 089.19*	*3 090.09*	*74.71–32 436.26*	6–10	7.19+07	1.71−01	1.05+01	0.011	B	2,4,5
			3 092.708	3 093.606	112.061–32 436.796	4–6	7.29+07	1.57−01	6.39+00	−0.202	B	2,5
			3 082.151	3 083.046	0.000–32 435.453	2–4	5.87+07	1.67−01	3.40+00	−0.476	B	2,4
			3 092.837	3 093.735	112.061–32 435.453	4–4	1.16+07	1.67−02	6.81−01	−1.175	C+	2
3	$3p-5s$	$^2P^\circ-^2S$	*2 657.74*	*2 658.54*	*74.71*–37 689.407	6–2	4.26+07	1.50−02	7.90−01	−1.046	C+	3
			2 660.386	2 661.178	112.061–37 689.407	4–2	2.84+07	1.51−02	5.28−01	−1.219	C+	3
			2 652.476	2 653.265	0.000–37 689.407	2–2	1.42+07	1.50−02	2.62−01	−1.523	C+	3
4	$3p-nd$	$^2P^\circ-y\ ^2D$	*2 572.74*	*2 573.51*	*74.71–38 932.15*	6–10	3.17+07	5.25−02	2.67+00	−0.502	C+	1,4
			2 575.094	2 575.865	112.061–38 933.968	4–6	3.60+07	5.37−02	1.82+00	−0.668	C	LS
			2 567.982	2 568.752	0.000–38 929.413	2–4	1.92+07	3.80−02	6.43−01	−1.119	C+	4
			2 575.396	2 576.167	112.061–38 929.413	4–4	5.99+06	5.96−03	2.02−01	−1.623	D+	LS
5	$3p-6s$	$^2P^\circ-^2S$	*2 376.28*	*2 377.01*	*74.71–42 144.411*	6–2	1.72+07	4.85−03	2.28−01	−1.536	D+	1
			2 378.394	2 379.120	112.061–42 144.411	4–2	1.14+07	4.84−03	1.52−01	−1.713	D+	LS
			2 372.070	2 372.794	0.000–42 144.411	2–2	5.76+06	4.86−03	7.59−02	−2.012	D	LS
6	$3p-4d$	$^2P^\circ-^2D$	*2 371.11*	*2 371.83*	*74.71–42 236.17*	6–10	9.10+07	1.28−01	5.99+00	−0.115	C+	1
			2 373.122	2 373.847	112.061–42 237.783	4–6	9.07+07	1.15−01	3.59+00	−0.337	C+	LS
			2 367.052	2 367.775	0.000–42 233.742	2–4	7.61+07	1.28−01	2.00+00	−0.592	C	LS
			2 373.350	2 374.074	112.061–42 233.742	4–4	1.51+07	1.28−02	4.00−01	−1.291	D+	LS
7	$3p-5d$	$^2P^\circ-^2D$	*2 267.22*	*2 267.93*	*74.71–44 167.87*	6–10	7.78+07	1.00−01	4.48+00	−0.222	C+	1,4
			2 269.096	2 269.798	112.061–44 168.847	4–6	7.58+07	8.78−02	2.62+00	−0.454	C+	LS
			2 263.464	2 264.165	0.000–44 166.398	2–4	6.83+07	1.05−01	1.57+00	−0.678	C+	4
			2 269.222	2 269.924	112.061–44 166.398	4–4	1.26+07	9.75−03	2.91−01	−1.409	D+	LS
8	$3p-6d$	$^2P^\circ-^2D$	*2 208.26*	*2 208.95*	*74.71–45 345.02*	6–10	5.22+07	6.36−02	2.78+00	−0.418	C	1
			2 210.060	2 210.749	112.061–45 345.594	4–6	5.20+07	5.72−02	1.67+00	−0.641	C	LS
			2 204.668	2 205.355	0.000–45 344.165	2–4	4.37+07	6.37−02	9.25−01	−0.895	C	LS
			2 210.130	2 210.819	112.061–45 344.165	4–4	8.67+06	6.35−03	1.85−01	−1.595	D+	LS
9	$3p-7d$	$^2P^\circ-^2D$	*2 172.32*	*2 173.00*	*74.71–46 093.96*	6–10	3.54+07	4.17−02	1.79+00	−0.602	D	1
			2 174.071	2 174.752	112.061–46 094.312	4–6	3.53+07	3.75−02	1.07+00	−0.824	D	LS
			2 168.826	2 169.507	0.000–46 093.424	2–4	2.96+07	4.18−02	5.97−01	−1.078	D	LS
			2 174.113	2 174.794	112.061–46 093.424	4–4	5.88+06	4.17−03	1.19−01	−1.778	E	LS
10	$3p-8d$	$^2P^\circ-^2D$	*2 148.98*	*2 149.66*	*74.71–46 593.7*	6–10	2.46+07	2.85−02	1.21+00	−0.767	D	1
			2 150.699	2 151.376	112.061–46 593.95	4—6	2.46+07	2.56−02	7.25−01	−0.990	D	LS
			2 145.555	2 146.230	0.000–46 593.32	2—4	2.06+07	2.85−02	4.03−01	−1.244	D	LS
			2 150.728	2 151.405	112.061–46 593.32	4—4	4.09+06	2.84−03	8.05−02	−1.945	E	LS
11	$4s-4p$	$^2S-^2P^\circ$	*13 132.51*	*13 136.11*	25 347.756–*32 960.36*	2–6	1.60+07	1.24+00	1.07+02	0.394	B+	2
			13 123.417	13 127.007	25 347.756–32 965.639	2–4	1.60+07	8.27−01	7.15+01	0.219	B+	2
			13 150.748	13 154.345	25 347.756–32 949.807	2–2	1.59+07	4.13−01	3.58+01	−0.083	B+	2
12	$4s-5p$	$^2S-^2P^\circ$	*6 696.90*	*6 698.75*	25 347.756–*40 275.91*	2–6	1.00+06	2.03−02	8.93−01	−1.391	C	1
			6 696.018	6 697.867	25 347.756–40 277.883	2–4	1.00+06	1.35−02	5.95−01	−1.569	C	LS

TABLE 4. Transition probabilities of allowed lines for Al I (references in this table are as follows: 1=Mendoza *et al.*,[46,47] 2=Tachiev and Froese Fischer,[71] 3=Vujnović *et al.*,[81] 4=Davidson *et al.*,[13] and 5=Hannaford[29])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
			6 698.667	6 700.517	25 347.756–40 271.978	2–2	1.00+06	6.75−03	2.98−01	−1.870	D+	LS
13	$4s-6p$	^{2}S$-^2$P°	*5 557.35*	*5 558.90*	25 347.756–*43 336.93*	2–6	2.30+05	3.19−03	1.17−01	−2.195	D	1
			5 557.059	5 558.603	25 347.756–43 337.889	2–4	2.30+05	2.13−03	7.80−02	−2.371	D	LS
			5 557.944	5 559.488	25 347.756–43 335.024	2–2	2.29+05	1.06−03	3.88−02	−2.674	D	LS
14	$3d-4p$	^{2}D$-^2$P°		*524.10* cm^{-1}	*32 436.26–32 960.36*	10–6	6.86+03	2.25−02	1.41+02	−0.648	B	2
				528.843 cm^{-1}	32 436.796–32 965.639	6–4	6.35+03	2.27−02	8.47+01	−0.866	B	2
				514.354 cm^{-1}	32 435.453–32 949.807	4–2	6.49+03	1.84−02	4.71+01	−1.133	B	2
				530.186 cm^{-1}	32 435.453–32 965.639	4–4	7.10+02	3.79−03	9.40+00	−1.819	B	2
15	$3d-5p$	^{2}D$-^2$P°	*12 752.17*	*12 755.67*	*32 436.26–40 275.91*	10–6	6.30+04	9.22−04	3.87−01	−2.035	D+	1
			12 749.846	12 753.334	32 436.796–40 277.883	6–4	5.67+04	9.22−04	2.32−01	−2.257	D+	LS
			12 757.268	12 760.758	32 435.453–40 271.978	4–2	6.29+04	7.68−04	1.29−01	−2.513	D+	LS
			12 747.663	12 751.150	32 435.453–40 277.883	4–4	6.32+03	1.54−04	2.59−02	−3.210	E+	LS
16	$3d-4f$	^{2}D$-^2$F°	11 254.20	11 257.29	32 436.26–41 319.39	10–14	1.39+07	3.70−01	1.37+02	0.568	B+	1
			11 254.881	11 257.962	32 436.796–41 319.398	6–8	1.39+07	3.52−01	7.83+01	0.325	B+	LS
			11 253.189	11 256.271	32 435.453–41 319.390	4–6	1.30+07	3.70−01	5.48+01	0.170	B+	LS
			11 254.891	11 257.973	32 436.796–41 319.390	6–6	9.26+05	1.76−02	3.91+00	−0.976	C+	LS
17	$3d-5f$	^{2}D$-^2$F°	*8 773.49*	*8 775.90*	*32 436.26–43 831.10*	10–14	6.94+06	1.12−01	3.24+01	0.049	B	1
			8 773.902	8 776.311	32 436.796–43 831.105	6–8	6.95+06	1.07−01	1.85+01	−0.192	B	LS
			8 772.871	8 775.280	32 435.453–43 831.101	4–6	6.47+06	1.12−01	1.29+01	−0.349	B	LS
			8 773.905	8 776.314	32 436.796–43 831.101	6–6	4.62+05	5.33−03	9.24−01	−1.495	C	LS
18	$3d-6f$	^{2}D$-^2$F°	*7 835.80*	*7 837.96*	*32 436.26–45 194.68*	10–14	3.97+06	5.12−02	1.32+01	−0.291	C+	1
			7 836.134	7 838.290	32 436.796–45 194.681	6–8	3.97+06	4.87−02	7.54+00	−0.534	B	LS
			7 835.309	7 837.465	32 435.453–45 194.681	4–6	3.71+06	5.12−02	5.28+00	−0.689	C+	LS
			7 836.134	7 838.290	32 436.796–45 194.681	6–6	2.65+05	2.44−03	3.78−01	−1.834	D+	LS
19	$3d-7f$	^{2}D$-^2$F°	*7 362.01*	*7 364.04*	*32 436.26–46 015.77*	10–14	2.49+06	2.83−02	6.87+00	−0.548	D+	1
			7 362.296	7 364.324	32 436.796–46 015.774	6–8	2.49+06	2.70−02	3.93+00	−0.790	C	LS
			7 361.568	7 363.596	32 435.453–46 015.774	4–6	2.32+06	2.83−02	2.74+00	−0.946	D+	LS
			7 362.296	7 364.324	32 436.796–46 015.774	6–6	1.66+05	1.35−03	1.96−01	−2.092	E+	LS
20	$3d-8f$	^{2}D$-^2$F°	*7 084.37*	*7 086.33*	*32 436.26–46 547.94*	10–14	1.65+06	1.74−02	4.06+00	−0.759	D+	1
			7 084.643	7 086.597	32 436.796–46 547.942	6–8	1.65+06	1.66−02	2.32+00	−1.002	D+	LS
			7 083.969	7 085.922	32 435.453–46 547.942	4–6	1.54+06	1.74−02	1.62+00	−1.157	D+	LS
			7 084.643	7 086.597	32 436.796–46 547.942	6–6	1.10+05	8.31−04	1.16−01	−2.302	E	LS
21	$3d-9f$	^{2}D$-^2$F°	*6 906.0*	*6 907.9*	*32 436.26–46 912.4*	10–14	1.16+06	1.16−02	2.63+00	−0.936	E+	1
			6 906.28	6 908.18	32 436.796–46 912.38	6–8	1.15+06	1.10−02	1.50+00	−1.180	D	LS
			6 905.64	6 907.54	32 435.453–46 912.38	4–6	1.08+06	1.16−02	1.06+00	−1.333	E+	LS
			6 906.28	6 908.18	32 436.796–46 912.38	6–6	7.69+04	5.50−04	7.51−02	−2.481	E	LS
22	$4p-5s$	^{2}P°$-^2$S		*4 729.05* cm^{-1}	*32 960.36–37 689.407*	6–2	9.00+06	2.01−01	8.40+01	0.081	B	3
				4 723.768 cm^{-1}	32 965.639–37 689.407	4–2	6.00+06	2.02−01	5.62+01	−0.093	B	3
				4 739.600 cm^{-1}	32 949.807–37 689.407	2–2	3.00+06	2.00−01	2.78+01	−0.398	B	3
23	$4p-nd$	^{2}P°$-$y ^{2}D	*16 740.84*	*16 745.40*	*32 960.36–38 932.15*	6–10	1.18+07	8.28−01	2.74+02	0.696	B+	1
			16 750.533	16 755.109	32 965.639–38 933.968	4–6	1.18+07	7.45−01	1.64+02	0.474	B+	LS
			16 718.943	16 723.510	32 949.807–38 929.413	2–4	9.89+06	8.29−01	9.13+01	0.220	B+	LS

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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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
			16 763.327	16 767.906	32 965.639–38 929.413	4–4	1.96+06	8.27−02	1.83+01	−0.480	B	LS
24	4*p*−6*s*	^{2}P°−^{2}S	*10 885.46*	*10 888.44*	*32 960.36*–42 144.411	6–2	3.97+06	2.35−02	5.06+00	−0.851	C+	1
			10 891.720	10 894.704	32 965.639–42 144.411	4–2	2.64+06	2.35−02	3.37+00	−1.027	C+	LS
			10 872.966	10 875.944	32 949.807–42 144.411	2–2	1.33+06	2.36−02	1.69+00	−1.326	C	LS
25	4*p*−4*d*	^{2}P°−^{2}D	*10 777.78*	*10 780.73*	*32 960.36–42 236.17*	6–10	1.65+05	4.78−03	1.02+00	−1.542	C	1
			10 782.039	10 784.992	32 965.639–42 237.783	4–6	1.64+05	4.30−03	6.11−01	−1.764	C	LS
			10 768.345	10 771.295	32 949.807–42 233.742	2–4	1.37+05	4.78−03	3.39−01	−2.020	D+	LS
			10 786.740	10 789.695	32 965.639–42 233.742	4–4	2.73+04	4.77−04	6.78−02	−2.719	D	LS
26	4*p*−5*d*	^{2}P°−^{2}D	*8 920.14*	*8 922.59*	*32 960.36–44 167.87*	6–10	2.73+05	5.44−03	9.58−01	−1.486	D+	1
			8 923.565	8 926.015	32 965.639–44 168.847	4–6	2.73+05	4.89−03	5.75−01	−1.709	C	LS
			8 912.918	8 915.365	32 949.807–44 166.398	2–4	2.28+05	5.44−03	3.19−01	−1.963	D+	LS
			8 925.516	8 927.966	32 965.639–44 166.398	4–4	4.54+04	5.43−04	6.38−02	−2.663	D	LS
27	4*p*−7*s*	^{2}P°−^{2}S	*8 837.14*	*8 839.57*	*32 960.36–44 273.133*	6–2	2.01+06	7.85−03	1.37+00	−1.327	D	1
			8 841.265	8 843.693	32 965.639–44 273.133	4–2	1.34+06	7.85−03	9.14−01	−1.503	D	LS
			8 828.903	8 831.327	32 949.807–44 273.133	2–2	6.72+05	7.86−03	4.57−01	−1.804	D	LS
28	4*p*−6*d*	^{2}P°−^{2}D	*8 072.28*	*8 074.51*	*32 960.36–45 345.02*	6–10	5.29+05	8.62−03	1.37+00	−1.286	C	1
			8 075.353	8 077.574	32 965.639–45 345.594	4–6	5.28+05	7.75−03	8.24−01	−1.509	C	LS
			8 065.969	8 068.187	32 949.807–45 344.165	2–4	4.42+05	8.63−03	4.58−01	−1.763	C	LS
			8 076.285	8 078.506	32 965.639–45 344.165	4–4	8.81+04	8.62−04	9.17−02	−2.462	D	LS
29	4*p*−7*d*	^{2}P°−^{2}D	*7 611.97*	*7 614.06*	*32 960.36–46 093.96*	6–10	5.21+05	7.55−03	1.14+00	−1.344	D	1
			7 614.820	7 616.916	32 965.639–46 094.312	4–6	5.20+05	6.79−03	6.81−01	−1.566	D	LS
			7 606.162	7 608.256	32 949.807–46 093.424	2–4	4.36+05	7.56−03	3.79−01	−1.820	E+	LS
			7 615.335	7 617.431	32 965.639–46 093.424	4–4	8.68+04	7.55−04	7.57−02	−2.520	E	LS
30	4*p*−8*d*	^{2}P°−^{2}D	*7 332.9*	*7 335.0*	*32 960.36–46 593.7*	6–10	4.38+05	5.88−03	8.52−01	−1.452	E+	1
			7 335.65	7 337.67	32 965.639–46 593.95	4–6	4.37+05	5.29−03	5.11−01	−1.674	D	LS
			7 327.47	7 329.49	32 949.807–46 593.32	2–4	3.66+05	5.89−03	2.84−01	−1.929	E+	LS
			7 335.98	7 338.01	32 965.639–46 593.32	4–4	7.28+04	5.88−04	5.68−02	−2.629	E	LS
31	5*s*−5*p*	^{2}S−^{2}P°		*2 586.50* cm^{-1}	37 689.407–*40 275.91*	2–6	2.59+06	1.74+00	4.43+02	0.542	B+	1
				2 588.476 cm^{-1}	37 689.407–40 277.883	2–4	2.59+06	1.16+00	2.95+02	0.365	B+	LS
				2 582.571 cm^{-1}	37 689.407–40 271.978	2–2	2.58+06	5.79−01	1.48+02	0.064	B+	LS
32	5*s*−6*p*	^{2}S−^{2}P°	*17 702.03*	*17 706.88*	37 689.407–*43 336.93*	2–6	3.30+05	4.65−02	5.42+00	−1.032	C+	1
			17 699.038	17 703.872	37 689.407–43 337.889	2–4	3.30+05	3.10−02	3.61+00	−1.208	C+	LS
			17 708.020	17 712.856	37 689.407–43 335.024	2–2	3.30+05	1.55−02	1.81+00	−1.509	C	LS
33	5*s*−7*p*	^{2}S−^{2}P°	*13 824.92*	*13 828.69*	37 689.407–*44 920.75*	2–6	1.11+05	9.52−03	8.67−01	−1.720	D	1
			13 823.883	13 827.663	37 689.407–44 921.287	2–4	1.11+05	6.35−03	5.78−01	−1.896	D	LS
			13 826.983	13 830.763	37 689.407–44 919.666	2–2	1.11+05	3.17−03	2.89−01	−2.198	E+	LS
34	*nd*−5*p*	y ^{2}D−^{2}P°		*1 343.76* cm^{-1}	*38 932.15–40 275.91*	10–6	3.88+05	1.93−01	4.73+02	0.286	B+	1
				1 343.915 cm^{-1}	38 933.968–40 277.883	6–4	3.49+05	1.93−01	2.84+02	0.064	B+	LS
				1 342.565 cm^{-1}	38 929.413–40 271.978	4–2	3.87+05	1.61−01	1.58+02	−0.191	B+	LS
				1 348.470 cm^{-1}	38 929.413–40 277.883	4–4	3.93+04	3.24−02	3.16+01	−0.887	B	LS
35	*nd*−4*f*	y ^{2}D−^{2}F°		*2 387.24* cm^{-1}	*38 932.15–41 319.39*	10–14	2.14+06	7.89−01	1.09+03	0.897	B+	1

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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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				2 385.430 cm^{-1}	38 933.968–41 319.398	6–8	2.14+06	7.51−01	6.22+02	0.654	B+	LS
				2 389.977 cm^{-1}	38 929.413–41 319.390	4–6	2.01+06	7.90−01	4.35+02	0.500	B+	LS
				2 385.422 cm^{-1}	38 933.968–41 319.390	6–6	1.43+05	3.76−02	3.11+01	−0.647	B	LS
36	$nd-6p$	y ^{2}D−^{2}P°		*4 404.78* cm^{-1}	*38 932.15–43 336.93*	10–6	1.15+05	5.35−03	4.00+00	−1.272	C	1
				4 403.921 cm^{-1}	38 933.968–43 337.889	6–4	1.04+05	5.35−03	2.40+00	−1.493	C+	LS
				4 405.611 cm^{-1}	38 929.413–43 335.024	4–2	1.15+05	4.46−03	1.33+00	−1.749	C	LS
				4 408.476 cm^{-1}	38 929.413–43 337.889	4–4	1.16+04	8.92−04	2.66−01	−2.448	D+	LS
37	$nd-5f$	y ^{2}D−^{2}F°		*4 898.95* cm^{-1}	*38 932.15–43 831.10*	10–14	1.84+04	1.61−03	1.08+00	−1.793	C	1
				4 897.137 cm^{-1}	38 933.968–43 831.105	6–8	1.84+04	1.53−03	6.17−01	−2.037	C	LS
				4 901.688 cm^{-1}	38 929.413–43 831.101	4–6	1.72+04	1.61−03	4.33−01	−2.191	C	LS
				4 897.133 cm^{-1}	38 933.968–43 831.101	6–6	1.23+03	7.66−05	3.09−02	−3.338	D	LS
38	$nd-7p$	y ^{2}D−^{2}P°	*16 693.83*	*16 698.39*	*38 932.15–44 920.75*	10–6	7.14+04	1.79−03	9.84−01	−1.747	D	1
			16 697.405	16 701.966	38 933.968–44 921.287	6–4	6.42+04	1.79−03	5.91−01	−1.969	D	LS
			16 689.227	16 693.786	38 929.413–44 919.666	4–2	7.13+04	1.49−03	3.28−01	−2.225	E+	LS
			16 684.712	16 689.270	38 929.413–44 921.287	4–4	7.16+03	2.99−04	6.57−02	−2.922	E	LS
39	$nd-6f$	y ^{2}D−^{2}F°	*15 963.61*	*15 967.99*	*38 932.15–45 194.68*	10–14	1.20+05	6.41−03	3.37+00	−1.193	C	1
			15 968.259	15 972.622	38 933.968–45 194.681	6–8	1.20+05	6.10−03	1.92+00	−1.437	C	LS
			15 956.650	15 961.009	38 929.413–45 194.681	4–6	1.12+05	6.41−03	1.35+00	−1.591	C	LS
			15 968.259	15 972.622	38 933.968–45 194.681	6–6	7.97+03	3.05−04	9.62−02	−2.738	D	LS
40	$nd-7f$	y ^{2}D−^{2}F°	*14 113.20*	*14 117.08*	*38 932.15–46 015.77*	10–14	1.31+05	5.46−03	2.54+00	−1.263	D	1
			14 116.833	14 120.692	38 933.968–46 015.774	6–8	1.30+05	5.20−03	1.45+00	−1.506	D+	LS
			14 107.758	14 111.615	38 929.413–46 015.774	4–6	1.22+05	5.46−03	1.01+00	−1.661	D	LS
			14 116.833	14 120.692	38 933.968–46 015.774	6–6	8.70+03	2.60−04	7.25−02	−2.807	E	LS
41	$nd-8f$	y ^{2}D−^{2}F°	*13 127.01*	*13 130.61*	*38 932.15–46 547.94*	10–14	1.12+05	4.06−03	1.75+00	−1.391	D	1
			13 130.155	13 133.746	38 933.968–46 547.942	6–8	1.12+05	3.86−03	1.00+00	−1.635	D	LS
			13 122.304	13 125.893	38 929.413–46 547.942	4–6	1.05+05	4.06−03	7.02−01	−1.789	D	LS
			13 130.155	13 133.746	38 933.968–46 547.942	6–6	7.46+03	1.93−04	5.01−02	−2.936	E	LS
42	$5p-6s$	^{2}P°−^{2}S		*1 868.50* cm^{-1}	*40 275.91–42 144.411*	6–2	2.75+06	3.94−01	4.16+02	0.374	B+	1
				1 866.528 cm^{-1}	40 277.883–42 144.411	4–2	1.83+06	3.93−01	2.77+02	0.196	B+	LS
				1 872.433 cm^{-1}	40 271.978–42 144.411	2–2	9.24+05	3.95−01	1.39+02	−0.102	B+	LS
43	$5p-4d$	^{2}P°−^{2}D		*1 960.26* cm^{-1}	*40 275.91*–42 236.17	6–10	1.93+06	1.25+00	1.26+03	0.875	B+	1
				1 959.900 cm^{-1}	40 277.883–42 237.783	4–6	1.93+06	1.13+00	7.59+02	0.655	B+	LS
				1 961.764 cm^{-1}	40 271.978–42 233.742	2–4	1.60+06	1.25+00	4.20+02	0.398	B+	LS
				1 955.859 cm^{-1}	40 277.883–42 233.742	4–4	3.19+05	1.25−01	8.42+01	−0.301	B+	LS
44	$5p-5d$	^{2}P°−^{2}D		*3 891.96* cm^{-1}	*40 275.91–44 167.87*	6–10	1.65+04	2.73−03	1.38+00	−1.786	C	1
				3 890.964 cm^{-1}	40 277.883–44 168.847	4–6	1.65+04	2.45−03	8.29−01	−2.009	C	LS
				3 894.420 cm^{-1}	40 271.978–44 166.398	2–4	1.38+04	2.73−03	4.62−01	−2.263	C	LS
				3 888.515 cm^{-1}	40 277.883–44 166.398	4–4	2.75+03	2.73−04	9.25−02	−2.962	D	LS
45	$5p-7s$	^{2}P°−^{2}S		*3 997.22* cm^{-1}	*40 275.91*–44 273.133	6–2	1.01+06	3.16−02	1.56+01	−0.722	C	1
				3 995.250 cm^{-1}	40 277.883–44 273.133	4–2	6.73+05	3.16−02	1.04+01	−0.898	C	LS
				4 001.155 cm^{-1}	40 271.978–44 273.133	2–2	3.37+05	3.16−02	5.20+00	−1.199	C	LS
46	$5p-6d$	^{2}P°−^{2}D	*19 722.0*	*19 727.3*	*40 275.91–45 345.02*	6–10	3.51+04	3.41−03	1.33+00	−1.689	C	1

TABLE 4. Transition probabilities of allowed lines for Al I (references in this table are as follows: 1=Mendoza *et al.*,[46,47] 2=Tachiev and Froese Fischer,[71] 3=Vujnović *et al.*,[81] 4=Davidson *et al.*,[13] and 5=Hannaford[29])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
			19 727.39	19 732.77	40 277.883–45 345.594	4–6	3.51+04	3.07−03	7.98−01	−1.911	C	LS
			19 709.98	19 715.36	40 271.978–45 344.165	2–4	2.93+04	3.41−03	4.43−01	−2.166	C	LS
			19 732.95	19 738.34	40 277.883–45 344.165	4–4	5.84+03	3.41−04	8.86−02	−2.865	D	LS
47	$5p-8s$	$^2P^\circ-^2S$	*19 294.8*	*19 300.0*	*40 275.91*–45 457.244	6–2	5.48+05	1.02−02	3.89+00	−1.213	D+	1
			19 302.13	19 307.40	40 277.883–45 457.244	4–2	3.65+05	1.02−02	2.59+00	−1.389	D+	LS
			19 280.15	19 285.41	40 271.978–45 457.244	2–2	1.83+05	1.02−02	1.30+00	−1.690	D+	LS
48	$5p-7d$	$^2P^\circ-^2D$	*17 183.22*	*17 187.89*	*40 275.91–46 093.96*	6–10	7.23+04	5.34−03	1.81+00	−1.494	D	1
			17 187.985	17 192.680	40 277.883–46 094.312	4–6	7.22+04	4.80−03	1.09+00	−1.717	D	LS
			17 173.172	17 177.863	40 271.978–46 093.424	2–4	6.04+04	5.34−03	6.04−01	−1.971	D	LS
			17 190.610	17 195.305	40 277.883–46 093.424	4–4	1.20+04	5.33−04	1.21−01	−2.671	E+	LS
49	$5p-8d$	$^2P^\circ-^2D$	*15 824.0*	*15 828.3*	*40 275.91–46 593.7*	6–10	7.72+04	4.84−03	1.51+00	−1.537	D	1
			15 828.31	15 832.64	40 277.883–46 593.95	4–6	7.72+04	4.35−03	9.07−01	−1.759	D	LS
			15 815.10	15 819.43	40 271.978–46 593.32	2–4	6.45+04	4.84−03	5.04−01	−2.014	D	LS
			15 829.89	15 834.22	40 277.883–46 593.32	4–4	1.28+04	4.83−04	1.01−01	−2.714	E	LS
50	$4f-4d$	$^2F^\circ-^2D$		*916.78* cm^{-1}	*41 319.39–42 236.17*	14–10	1.29+05	1.64−01	8.24+02	0.361	B+	1
				918.385 cm^{-1}	41 319.398–42 237.783	8–6	1.23+05	1.64−01	4.70+02	0.118	B+	LS
				914.352 cm^{-1}	41 319.390–42 233.742	6–4	1.28+05	1.53−01	3.31+02	−0.037	B+	LS
				918.393 cm^{-1}	41 319.390–42 237.783	6–6	6.13+03	1.09−02	2.34+01	−1.184	B	LS
51	$4f-5g$	$^2F^\circ-^2G$		*2 556.36* cm^{-1}	*41 319.39–43 875.75*	14–18	4.44+06	1.31+00	2.36+03	1.263	B+	1
				2 556.351 cm^{-1}	41 319.398–43 875.749	8–10	4.57+06	1.31+00	1.35+03	1.020	B+	LS
				2 556.359 cm^{-1}	41 319.390–43 875.749	6–8	3.99+06	1.22+00	9.43+02	0.865	B+	LS
				2 556.351 cm^{-1}	41 319.398–43 875.749	8–8	2.85+05	6.54−02	6.74+01	−0.281	B+	LS
52	$4f-5d$	$^2F^\circ-^2D$		*2 848.48* cm^{-1}	*41 319.39–44 167.87*	14–10	3.25+03	4.29−04	6.94−01	−2.221	D+	1
				2 849.449 cm^{-1}	41 319.398–44 168.847	8–6	3.10+03	4.29−04	3.97−01	−2.464	D+	LS
				2 847.008 cm^{-1}	41 319.390–44 166.398	6–4	3.24+03	4.00−04	2.78−01	−2.620	D+	LS
				2 849.457 cm^{-1}	41 319.390–44 168.847	6–6	1.55+02	2.86−05	1.98−02	−3.765	E+	LS
53	$4f-6g$	$^2F^\circ-^2G$		*3 902.33* cm^{-1}	*41 319.39–45 221.72*	14–18	1.49+06	1.89−01	2.23+02	0.423	B+	1
				3 902.320 cm^{-1}	41 319.398–45 221.718	8–10	1.54+06	1.89−01	1.28+02	0.180	B+	LS
				3 902.328 cm^{-1}	41 319.390–45 221.718	6–8	1.34+06	1.76−01	8.91+01	0.024	B+	LS
				3 902.320 cm^{-1}	41 319.398–45 221.718	8–8	9.58+04	9.43−03	6.36+00	−1.122	C+	LS
54	$4f-7g$	$^2F^\circ-^2G$		*4 713.88* cm^{-1}	*41 319.39–46 033.27*	14–18	7.11+05	6.17−02	6.03+01	−0.064	C+	1
				4 713.873 cm^{-1}	41 319.398–46 033.271	8–10	7.32+05	6.17−02	3.45+01	−0.307	C+	LS
				4 713.881 cm^{-1}	41 319.390–46 033.271	6–8	6.40+05	5.76−02	2.41+01	−0.461	C+	LS
				4 713.873 cm^{-1}	41 319.398–46 033.271	8–8	4.57+04	3.08−03	1.72+00	−1.608	D+	LS
55	$6s-6p$	$^2S-^2P^\circ$		*1 192.52* cm^{-1}	42 144.411–*43 336.93*	2–6	6.88+05	2.18+00	1.20+03	0.639	B+	1
				1 193.478 cm^{-1}	42 144.411–43 337.889	2–4	6.89+05	1.45+00	8.00+02	0.462	B+	LS
				1 190.613 cm^{-1}	42 144.411–43 335.024	2–2	6.86+05	7.25−01	4.01+02	0.161	B+	LS
56	$6s-7p$	$^2S-^2P^\circ$		*2 776.34* cm^{-1}	42 144.411–*44 920.75*	2–6	1.18+05	6.90−02	1.64+01	−0.860	C	1
				2 776.876 cm^{-1}	42 144.411–44 921.287	2–4	1.18+05	4.60−02	1.09+01	−1.036	C	LS
				2 775.255 cm^{-1}	42 144.411–44 919.666	2–2	1.18+05	2.30−02	5.46+00	−1.337	C	LS
57	$4d-6p$	$^2D-^2P^\circ$		*1 100.76* cm^{-1}	*42 236.17–43 336.93*	10–6	4.76+05	3.53−01	1.06+03	0.548	B+	1
				1 100.106 cm^{-1}	42 237.783–43 337.889	6–4	4.27+05	3.53−01	6.34+02	0.326	B+	LS

TABLE 4. Transition probabilities of allowed lines for Al I (references in this table are as follows: 1=Mendoza *et al.*,[46,47] 2=Tachiev and Froese Fischer,[71] 3=Vujnović *et al.*,[81] 4=Davidson *et al.*,[13] and 5=Hannaford[29])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				1 101.282 cm^{-1}	42 233.742–43 335.024	4–2	4.76+05	2.94−01	3.52+02	0.070	B+	LS
				1 104.147 cm^{-1}	42 233.742–43 337.889	4–4	4.80+04	5.90−02	7.04+01	−0.627	B+	LS
58	$4d-5f$	^{2}D$-^2$F°		*1 594.93* cm^{-1}	*42 236.17–43 831.10*	10–14	1.54+06	1.27+00	2.62+03	1.104	B+	1
				1 593.322 cm^{-1}	42 237.783–43 831.105	6–8	1.54+06	1.21+00	1.50+03	0.861	B+	LS
				1 597.359 cm^{-1}	42 233.742–43 831.101	4–6	1.44+06	1.27+00	1.05+03	0.706	B+	LS
				1 593.318 cm^{-1}	42 237.783–43 831.101	6–6	1.02+05	6.04−02	7.49+01	−0.441	B+	LS
59	$4d-7p$	^{2}D$-^2$P°		*2 684.58* cm^{-1}	*42 236.17–44 920.75*	10–6	1.84+05	2.29−02	2.81+01	−0.640	C	1
				2 683.504 cm^{-1}	42 237.783–44 921.287	6–4	1.65+05	2.29−02	1.69+01	−0.862	C+	LS
				2 685.924 cm^{-1}	42 233.742–44 919.666	4–2	1.84+05	1.91−02	9.36+00	−1.117	C	LS
				2 687.545 cm^{-1}	42 233.742–44 921.287	4–4	1.84+04	3.82−03	1.87+00	−1.816	D+	LS
60	$4d-6f$	^{2}D$-^2$F°		*2 958.51* cm^{-1}	*42 236.17–45 194.68*	10–14	3.10+05	7.43−02	8.27+01	−0.129	B+	1
				2 956.898 cm^{-1}	42 237.783–45 194.681	6–8	3.09+05	7.07−02	4.72+01	−0.372	B+	LS
				2 960.939 cm^{-1}	42 233.742–45 194.681	4–6	2.90+05	7.44−02	3.31+01	−0.526	B+	LS
				2 956.898 cm^{-1}	42 237.783–45 194.681	6–6	2.06+04	3.54−03	2.36+00	−1.673	C+	LS
61	$4d-7f$	^{2}D$-^2$F°		*3 779.60* cm^{-1}	*42 236.17–46 015.77*	10–14	1.05+05	1.54−02	1.34+01	−0.812	C	1
				3 777.991 cm^{-1}	42 237.783–46 015.774	6–8	1.04+05	1.46−02	7.63+00	−1.057	C	LS
				3 782.032 cm^{-1}	42 233.742–46 015.774	4–6	9.80+04	1.54−02	5.36+00	−1.210	C	LS
				3 777.991 cm^{-1}	42 237.783–46 015.774	6–6	6.96+03	7.31−04	3.82−01	−2.358	E+	LS
62	$4d-8f$	^{2}D$-^2$F°		*4 311.77* cm^{-1}	*42 236.17–46 547.94*	10–14	4.51+04	5.10−03	3.89+00	−1.292	D+	1
				4 310.159 cm^{-1}	42 237.783–46 547.942	6–8	4.51+04	4.85−03	2.22+00	−1.536	D+	LS
				4 314.200 cm^{-1}	42 233.742–46 547.942	4–6	4.22+04	5.10−03	1.56+00	−1.690	D+	LS
				4 310.159 cm^{-1}	42 237.783–46 547.942	6–6	3.01+03	2.43−04	1.11−01	−2.836	E	LS
63	$6p-5d$	^{2}P°$-^2$D		*830.94* cm^{-1}	*43 336.93–44 167.87*	6–10	4.26+05	1.54+00	3.67+03	0.966	B+	1
				830.958 cm^{-1}	43 337.889–44 168.847	4–6	4.27+05	1.39+00	2.20+03	0.745	B+	LS
				831.374 cm^{-1}	43 335.024–44 166.398	2–4	3.55+05	1.54+00	1.22+03	0.489	B+	LS
				828.509 cm^{-1}	43 337.889–44 166.398	4–4	7.05+04	1.54−01	2.45+02	−0.210	B+	LS
64	$6p-7s$	^{2}P°$-^2$S		*936.20* cm^{-1}	*43 336.93*–44 273.133	6–2	9.29+05	5.30−01	1.12+03	0.502	B	1
				935.244 cm^{-1}	43 337.889–44 273.133	4–2	6.17+05	5.29−01	7.45+02	0.326	B	LS
				938.109 cm^{-1}	43 335.024–44 273.133	2–2	3.12+05	5.31−01	3.73+02	0.026	B	LS
65	$6p-6d$	^{2}P°$-^2$D		*2 008.09* cm^{-1}	*43 336.93–45 345.02*	6–10	1.61+03	1.00−03	9.84−01	−2.222	C	1
				2 007.705 cm^{-1}	43 337.889–45 345.594	4–6	1.61+03	9.00−04	5.90−01	−2.444	C	LS
				2 009.141 cm^{-1}	43 335.024–45 344.165	2–4	1.35+03	1.00−03	3.28−01	−2.699	D+	LS
				2 006.276 cm^{-1}	43 337.889–45 344.165	4–4	2.68+02	1.00−04	6.56−02	−3.398	D	LS
66	$6p-8s$	^{2}P°$-^2$S		*2 120.31* cm^{-1}	*43 336.93*–45 457.244	6–2	3.57+05	3.96−02	3.69+01	−0.624	C+	1
				2 119.355 cm^{-1}	43 337.889–45 457.244	4–2	2.37+05	3.96−02	2.46+01	−0.800	C+	LS
				2 122.220 cm^{-1}	43 335.024–45 457.244	2–2	1.19+05	3.97−02	1.23+01	−1.100	C	LS
67	$6p-7d$	^{2}P°$-^2$D		*2 757.03* cm^{-1}	*43 336.93–46 093.96*	6–10	9.09+03	2.99−03	2.14+00	−1.746	D	1
				2 756.423 cm^{-1}	43 337.889–46 094.312	4–6	9.09+03	2.69−03	1.29+00	−1.968	D+	LS
				2 758.400 cm^{-1}	43 335.024–46 093.424	2–4	7.59+03	2.99−03	7.14−01	−2.223	D	LS
				2 755.535 cm^{-1}	43 337.889–46 093.424	4–4	1.51+03	2.99−04	1.43−01	−2.922	E+	LS
68	$6p-9s$	^{2}P°$-^2$S		*2 846.96* cm^{-1}	*43 336.93*–46 183.895	6–2	2.04+05	1.26−02	8.74+00	−1.121	D+	1
				2 846.006 cm^{-1}	43 337.889–46 183.895	4–2	1.36+05	1.26−02	5.83+00	−1.298	D+	LS

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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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				2 848.871 cm^{-1}	43 335.024–46 183.895	2–2	6.82+04	1.26−02	2.91+00	−1.599	D	LS
69	$6p-8d$	$^2P^\circ-^2D$		*3 256.8* cm^{-1}	*43 336.93–46 593.7*	6–10	1.78+04	4.20−03	2.55+00	−1.599	D	1
				3 256.06 cm^{-1}	43 337.889–46 593.95	4–6	1.78+04	3.78−03	1.53+00	−1.820	D+	LS
				3 258.30 cm^{-1}	43 335.024–46 593.32	2–4	1.49+04	4.20−03	8.49−01	−2.076	D	LS
				3 255.43 cm^{-1}	43 337.889–46 593.32	4–4	2.96+03	4.19−04	1.69−01	−2.776	E+	LS
70	$6p-10s$	$^2P^\circ-^2S$		*3 325.00* cm^{-1}	*43 336.93–46 661.93*	6–2	1.31+05	5.94−03	3.53+00	−1.448	D	1
				3 324.04 cm^{-1}	43 337.889–46 661.93	4–2	8.76+04	5.94−03	2.35+00	−1.624	D	LS
				3 326.91 cm^{-1}	43 335.024–46 661.93	2–2	4.39+04	5.94−03	1.18+00	−1.925	E+	LS
71	$5f-5d$	$^2F^\circ-^2D$		*336.77* cm^{-1}	*43 831.10–44 167.87*	14–10	3.00+04	2.83−01	3.87+03	0.598	B+	1
				337.742 cm^{-1}	43 831.105–44 168.847	8–6	2.88+04	2.84−01	2.21+03	0.356	B+	LS
				335.297 cm^{-1}	43 831.101–44 166.398	6–4	2.96+04	2.63−01	1.55+03	0.198	B+	LS
				337.746 cm^{-1}	43 831.101–44 168.847	6–6	1.44+03	1.89−02	1.11+02	−0.945	B+	LS
72	$5f-6g$	$^2F^\circ-^2G$		*1 390.62* cm^{-1}	*43 831.10–45 221.72*	14–18	1.12+06	1.12+00	3.70+03	1.195	B+	1
				1 390.613 cm^{-1}	43 831.105–45 221.718	8–10	1.16+06	1.12+00	2.12+03	0.952	B+	LS
				1 390.617 cm^{-1}	43 831.101–45 221.718	6–8	1.01+06	1.04+00	1.48+03	0.795	B+	LS
				1 390.613 cm^{-1}	43 831.105–45 221.718	8–8	7.20+04	5.58−02	1.06+02	−0.350	B+	LS
73	$5f-6d$	$^2F^\circ-^2D$		*1 513.92* cm^{-1}	*43 831.10–45 345.02*	14–10	2.40+02	1.12−04	3.42−01	−2.805	D+	1
				1 514.489 cm^{-1}	43 831.105–45 345.594	8–6	2.28+02	1.12−04	1.95−01	−3.048	D+	LS
				1 513.064 cm^{-1}	43 831.101–45 344.165	6–4	2.41+02	1.05−04	1.37−01	−3.201	D+	LS
				1 514.493 cm^{-1}	43 831.101–45 345.594	6–6	1.14+01	7.48−06	9.76−03	−4.348	E+	LS
74	$5f-7g$	$^2F^\circ-^2G$		*2 202.17* cm^{-1}	*43 831.10–46 033.27*	14–18	5.79+05	2.30−01	4.82+02	0.508	B	1
				2 202.166 cm^{-1}	43 831.105–46 033.271	8–10	5.95+05	2.30−01	2.75+02	0.265	B	LS
				2 202.170 cm^{-1}	43 831.101–46 033.271	6–8	5.22+05	2.15−01	1.93+02	0.111	B	LS
				2 202.166 cm^{-1}	43 831.105–46 033.271	8–8	3.72+04	1.15−02	1.38+01	−1.036	C	LS
75	$5g-6f$	$^2G-^2F^\circ$		*1 318.93* cm^{-1}	*43 875.75–45 194.68*	18–14	1.54+04	1.03−02	4.64+01	−0.732	B	1
				1 318.932 cm^{-1}	43 875.749–45 194.681	10–8	1.54+04	1.06−02	2.65+01	−0.975	B	LS
				1 318.932 cm^{-1}	43 875.749–45 194.681	8–6	1.44+04	9.31−03	1.86+01	−1.128	B	LS
				1 318.932 cm^{-1}	43 875.749–45 194.681	8–8	7.72+02	6.65−04	1.33+00	−2.274	C	LS
76	$5g-7f$	$^2G-^2F^\circ$		*2 140.02* cm^{-1}	*43 875.75–46 015.77*	18–14	6.42+03	1.63−03	4.52+00	−1.533	D+	1
				2 140.025 cm^{-1}	43 875.749–46 015.774	10–8	6.42+03	1.68−03	2.58+00	−1.775	D+	LS
				2 140.025 cm^{-1}	43 875.749–46 015.774	8–6	5.99+03	1.47−03	1.81+00	−1.930	D+	LS
				2 140.025 cm^{-1}	43 875.749–46 015.774	8–8	3.21+02	1.05−04	1.29−01	−3.076	E+	LS
77	$5g-8f$	$^2G-^2F^\circ$		*2 672.19* cm^{-1}	*43 875.75–46 547.94*	18–14	3.34+03	5.46−04	1.21+00	−2.008	D	1
				2 672.193 cm^{-1}	43 875.749–46 547.942	10–8	3.35+03	5.62−04	6.92−01	−2.250	D	LS
				2 672.193 cm^{-1}	43 875.749–46 547.942	8–6	3.12+03	4.91−04	4.84−01	−2.406	D	LS
				2 672.193 cm^{-1}	43 875.749–46 547.942	8–8	1.67+02	3.51−05	3.46−02	−3.552	E	LS
78	$5d-7p$	$^2D-^2P^\circ$		*752.88* cm^{-1}	*44 167.87–44 920.75*	10–6	3.00+05	4.76−01	2.08+03	0.678	B	1
				752.440 cm^{-1}	44 168.847–44 921.287	6–4	2.70+05	4.76−01	1.25+03	0.456	B	LS
				753.268 cm^{-1}	44 166.398–44 919.666	4–2	3.01+05	3.97−01	6.94+02	0.201	B	LS
				754.889 cm^{-1}	44 166.398–44 921.287	4–4	3.02+04	7.95−02	1.39+02	−0.498	B	LS
79	$5d-6f$	$^2D-^2F^\circ$		*1 026.81* cm^{-1}	*44 167.87–45 194.68*	10–14	7.07+05	1.41+00	4.51+03	1.149	B+	1
				1 025.834 cm^{-1}	44 168.847–45 194.681	6–8	7.05+05	1.34+00	2.58+03	0.905	B+	LS

TABLE 4. Transition probabilities of allowed lines for Al I (references in this table are as follows: 1=Mendoza *et al.*,[46,47] 2=Tachiev and Froese Fischer,[71] 3=Vujnović *et al.*,[81] 4=Davidson *et al.*,[13] and 5=Hannaford[29])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				1 028.283 cm^{-1}	44 166.398–45 194.681	4–6	6.63+05	1.41+00	1.81+03	0.751	B+	LS
				1 025.834 cm^{-1}	44 168.847–45 194.681	6–6	4.69+04	6.68−02	1.29+02	−0.397	B+	LS
80	$5d-7f$	$^{2}D-^{2}F^{\circ}$		1 847.90 cm^{-1}	44 167.87–46 015.77	10–14	2.70+05	1.66−01	2.96+02	0.220	B	1
				1 846.927 cm^{-1}	44 168.847–46 015.774	6–8	2.70+05	1.58−01	1.69+02	−0.023	B	LS
				1 849.376 cm^{-1}	44 166.398–46 015.774	4–6	2.52+05	1.66−01	1.18+02	−0.178	B	LS
				1 846.927 cm^{-1}	44 168.847–46 015.774	6–6	1.80+04	7.90−03	8.45+00	−1.324	C	LS
81	$5d-8f$	$^{2}D-^{2}F^{\circ}$		2 380.07 cm^{-1}	44 167.87–46 547.94	10–14	1.38+05	5.13−02	7.09+01	−0.290	C+	1
				2 379.095 cm^{-1}	44 168.847–46 547.942	6–8	1.38+05	4.88−02	4.05+01	−0.533	C+	LS
				2 381.544 cm^{-1}	44 166.398–46 547.942	4–6	1.29+05	5.13−02	2.84+01	−0.688	C+	LS
				2 379.095 cm^{-1}	44 168.847–46 547.942	6–6	9.21+03	2.44−03	2.03+00	−1.834	D+	LS
82	$5d-9f$	$^{2}D-^{2}F^{\circ}$		2 744.5 cm^{-1}	44 167.87–46 912.4	10–14	8.14+04	2.27−02	2.72+01	−0.644	C	1
				2 743.53 cm^{-1}	44 168.847–46 912.38	6–8	8.13+04	2.16−02	1.56+01	−0.887	C	LS
				2 745.98 cm^{-1}	44 166.398–46 912.38	4–6	7.61+04	2.27−02	1.09+01	−1.042	D+	LS
				2 743.53 cm^{-1}	44 168.847–46 912.38	6–6	5.42+03	1.08−03	7.78−01	−2.188	E+	LS
83	$5d-10f$	$^{2}D-^{2}F^{\circ}$		3 004.9 cm^{-1}	44 167.87–47 172.8	10–14	5.29+04	1.23−02	1.35+01	−0.910	D+	1
				3 003.92 cm^{-1}	44 168.847–47 172.77	6–8	5.28+04	1.17−02	7.69+00	−1.154	D+	LS
				3 006.37 cm^{-1}	44 166.398–47 172.77	4–6	4.94+04	1.23−02	5.39+00	−1.308	D+	LS
				3 003.92 cm^{-1}	44 168.847–47 172.77	6–6	3.51+03	5.83−04	3.83−01	−2.456	E	LS
84	$7s-7p$	$^{2}S-^{2}P^{\circ}$		647.62 cm^{-1}	44 273.133–44 920.75	2–6	2.42+05	2.60+00	2.64+03	0.716	B	1
				648.154 cm^{-1}	44 273.133–44 921.287	2–4	2.42+05	1.73+00	1.76+03	0.539	B	LS
				646.533 cm^{-1}	44 273.133–44 919.666	2–2	2.41+05	8.65−01	8.81+02	0.238	B	LS
85	$7p-6d$	$^{2}P^{\circ}-^{2}D$		424.27 cm^{-1}	44 920.75–45 345.02	6–10	1.29+05	1.79+00	8.33+03	1.031	B	1
				424.307 cm^{-1}	44 921.287–45 345.594	4–6	1.29+05	1.61+00	5.00+03	0.809	B	LS
				424.499 cm^{-1}	44 919.666–45 344.165	2–4	1.08+05	1.79+00	2.78+03	0.554	B	LS
				422.878 cm^{-1}	44 921.287–45 344.165	4–4	2.12+04	1.78−01	5.54+02	−0.148	B	LS
86	$7p-8s$	$^{2}P^{\circ}-^{2}S$		536.49 cm^{-1}	44 920.75–45 457.244	6–2	3.84+05	6.67−01	2.45+03	0.602	B	1
				535.957 cm^{-1}	44 921.287–45 457.244	4–2	2.55+05	6.66−01	1.64+03	0.426	B	LS
				537.578 cm^{-1}	44 919.666–45 457.244	2–2	1.29+05	6.68−01	8.18+02	0.126	B	LS
87	$7p-7d$	$^{2}P^{\circ}-^{2}D$		1 173.21 cm^{-1}	44 920.75–46 093.96	6–10	2.56+02	4.65−04	7.83−01	−2.554	E+	1
				1 173.025 cm^{-1}	44 921.287–46 094.312	4–6	2.56+02	4.19−04	4.70−01	−2.776	D	LS
				1 173.758 cm^{-1}	44 919.666–46 093.424	2–4	2.14+02	4.65−04	2.61−01	−3.032	E+	LS
				1 172.137 cm^{-1}	44 921.287–46 093.424	4–4	4.26+01	4.65−05	5.22−02	−3.730	E	LS
88	$7p-9s$	$^{2}P^{\circ}-^{2}S$		1 263.14 cm^{-1}	44 920.75–46 183.895	6–2	1.52+05	4.76−02	7.45+01	−0.544	D+	1
				1 262.608 cm^{-1}	44 921.287–46 183.895	4–2	1.01+05	4.76−02	4.96+01	−0.720	D+	LS
				1 264.229 cm^{-1}	44 919.666–46 183.895	2–2	5.09+04	4.77−02	2.48+01	−1.020	D	LS
89	$7p-8d$	$^{2}P^{\circ}-^{2}D$		1 672.9 cm^{-1}	44 920.75–46 593.7	6–10	2.95+03	2.64−03	3.11+00	−1.800	D+	1
				1 672.66 cm^{-1}	44 921.287–46 593.95	4–6	2.95+03	2.37−03	1.87+00	−2.023	D+	LS
				1 673.65 cm^{-1}	44 919.666–46 593.32	2–4	2.47+03	2.64−03	1.04+00	−2.277	D	LS
				1 672.03 cm^{-1}	44 921.287–46 593.32	4–4	4.92+02	2.64−04	2.08−01	−2.976	E+	LS
90	$6f-6d$	$^{2}F^{\circ}-^{2}D$		150.34 cm^{-1}	45 194.68–45 345.02	14–10	7.31+03	3.46−01	1.06+04	0.685	B+	1
				150.913 cm^{-1}	45 194.681–45 345.594	8–6	7.05+03	3.48−01	6.07+03	0.445	B+	LS
				149.484 cm^{-1}	45 194.681–45 344.165	6–4	7.18+03	3.21−01	4.24+03	0.285	B+	LS

TABLE 4. Transition probabilities of allowed lines for Al I (references in this table are as follows: 1=Mendoza *et al.*,[46,47] 2=Tachiev and Froese Fischer,[71] 3=Vujnović *et al.*,[81] 4=Davidson *et al.*,[13] and 5=Hannaford[29])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				150.913 cm^{-1}	45 194.681–45 345.594	6–6	3.52+02	2.32−02	3.04+02	−0.856	B+	LS
91	$6f-7g$	$^2F^\circ-^2G$		*838.59* cm^{-1}	*45 194.68–46 033.27*	14–18	3.71+05	1.02+00	5.60+03	1.155	B	1
				838.590 cm^{-1}	45 194.681–46 033.271	8–10	3.83+05	1.02+00	3.20+03	0.912	B	LS
				838.590 cm^{-1}	45 194.681–46 033.271	6–8	3.34+05	9.48−01	2.23+03	0.755	B	LS
				838.590 cm^{-1}	45 194.681–46 033.271	8–8	2.38+04	5.08−02	1.60+02	−0.391	B	LS
92	$6f-7d$	$^2F^\circ-^2D$		*899.28* cm^{-1}	*45 194.68–46 093.96*	14–10	1.67+03	2.21−03	1.13+01	−1.509	C	1
				899.631 cm^{-1}	45 194.681–46 094.312	8–6	1.59+03	2.21−03	6.47+00	−1.753	C	LS
				898.743 cm^{-1}	45 194.681–46 093.424	6–4	1.66+03	2.06−03	4.53+00	−1.908	C	LS
				899.631 cm^{-1}	45 194.681–46 094.312	6–6	7.99+01	1.48−04	3.25−01	−3.052	E+	LS
93	$6f-8d$	$^2F^\circ-^2D$		*1 399.0* cm^{-1}	*45 194.68–46 593.7*	14–10	1.64+03	8.96−04	2.95+00	−1.902	D+	1
				1 399.27 cm^{-1}	45 194.681–46 593.95	8–6	1.56+03	8.96−04	1.69+00	−2.145	D+	LS
				1 398.64 cm^{-1}	45 194.681–46 593.32	6–4	1.64+03	8.36−04	1.18+00	−2.300	D	LS
				1 399.27 cm^{-1}	45 194.681–46 593.95	6–6	7.80+01	5.97−05	8.43−02	−3.446	E	LS
94	$6g-7f$	$^2G-^2F^\circ$		*794.05* cm^{-1}	*45 221.72–46 015.77*	18–14	1.48+04	2.73−02	2.04+02	−0.309	B	1
				794.056 cm^{-1}	45 221.718–46 015.774	10–8	1.48+04	2.81−02	1.17+02	−0.551	B	LS
				794.056 cm^{-1}	45 221.718–46 015.774	8–6	1.38+04	2.46−02	8.16+01	−0.706	B	LS
				794.056 cm^{-1}	45 221.718–46 015.774	8–8	7.40+02	1.76−03	5.84+00	−1.851	C	LS
95	$6g-8f$	$^2G-^2F^\circ$		*1 326.22* cm^{-1}	*45 221.72–46 547.94*	18–14	7.04+03	4.67−03	2.09+01	−1.075	C	1
				1 326.224 cm^{-1}	45 221.718–46 547.942	10–8	7.04+03	4.80−03	1.19+01	−1.319	C	LS
				1 326.224 cm^{-1}	45 221.718–46 547.942	8–6	6.57+03	4.20−03	8.34+00	−1.474	C	LS
				1 326.224 cm^{-1}	45 221.718–46 547.942	8–8	3.52+02	3.00−04	5.96−01	−2.620	D	LS
96	$6g-9f$	$^2G-^2F^\circ$		*1 690.7* cm^{-1}	*45 221.72–46 912.4*	18–14	3.96+03	1.62−03	5.67+00	−1.535	D	1
				1 690.66 cm^{-1}	45 221.718–46 912.38	10–8	3.96+03	1.66−03	3.23+00	−1.780	D	LS
				1 690.66 cm^{-1}	45 221.718–46 912.38	8–6	3.71+03	1.46−03	2.27+00	−1.933	D	LS
				1 690.66 cm^{-1}	45 221.718–46 912.38	8–8	1.98+02	1.04−04	1.62−01	−3.080	E	LS
97	$6d-7f$	$^2D-^2F^\circ$		*670.75* cm^{-1}	*45 345.02–46 015.77*	10–14	3.08+05	1.44+00	7.06+03	1.158	B	1
				670.180 cm^{-1}	45 345.594–46 015.774	6–8	3.08+05	1.37+00	4.04+03	0.915	B	LS
				671.609 cm^{-1}	45 344.165–46 015.774	4–6	2.89+05	1.44+00	2.82+03	0.760	B	LS
				670.180 cm^{-1}	45 345.594–46 015.774	6–6	2.05+04	6.84−02	2.02+02	−0.387	B	LS
98	$6d-8f$	$^2D-^2F^\circ$		*1 202.92* cm^{-1}	*45 345.02–46 547.94*	10–14	1.50+05	2.17−01	5.94+02	0.336	B	1
				1 202.348 cm^{-1}	45 345.594–46 547.942	6–8	1.50+05	2.07−01	3.40+02	0.094	B	LS
				1 203.777 cm^{-1}	45 344.165–46 547.942	4–6	1.40+05	2.17−01	2.37+02	−0.061	B	LS
				1 202.348 cm^{-1}	45 345.594–46 547.942	6–6	9.93+03	1.03−02	1.69+01	−1.209	C+	LS
99	$6d-9f$	$^2D-^2F^\circ$		*1 567.4* cm^{-1}	*45 345.02–46 912.4*	10–14	8.89+04	7.59−02	1.60+02	−0.120	C+	1
				1 566.79 cm^{-1}	45 345.594–46 912.38	6–8	8.88+04	7.23−02	9.11+01	−0.363	C+	LS
				1 568.21 cm^{-1}	45 344.165–46 912.38	4–6	8.31+04	7.60−02	6.38+01	−0.517	C	LS
				1 566.79 cm^{-1}	45 345.594–46 912.38	6–6	5.91+03	3.61−03	4.55+00	−1.664	D+	LS
100	$6d-10f$	$^2D-^2F^\circ$		*1 827.8* cm^{-1}	*45 345.02–47 172.8*	10–14	5.79+04	3.64−02	6.55+01	−0.439	C	1
				1 827.18 cm^{-1}	45 345.594–47 172.77	6–8	5.78+04	3.46−02	3.74+01	−0.683	C	LS
				1 828.60 cm^{-1}	45 344.165–47 172.77	4–6	5.41+04	3.64−02	2.62+01	−0.837	C	LS
				1 827.18 cm^{-1}	45 345.594–47 172.77	6–6	3.85+03	1.73−03	1.87+00	−1.984	D	LS
101	$7f-8d$	$^2F^\circ-^2D$		*577.9* cm^{-1}	*46 015.77–46 593.7*	14–10	2.14+03	6.87−03	5.48+01	−1.017	C+	1

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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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				578.18 cm^{-1}	46 015.774–46 593.95	8–6	2.04+03	6.87−03	3.13+01	−1.260	C+	LS
				577.55 cm^{-1}	46 015.774–46 593.32	6–4	2.14+03	6.41−03	2.19+01	−1.415	C+	LS
				578.18 cm^{-1}	46 015.774–46 593.95	6–6	1.02+02	4.58−04	1.56+00	−2.561	D+	LS
102	$7g-8f$	^{2}G–^{2}F°		*514.67* cm^{-1}	*46 033.27–46 547.94*	18–14	1.11+04	4.89−02	5.63+02	−0.055	B	1
				514.671 cm^{-1}	46 033.271–46 547.942	10–8	1.11+04	5.03−02	3.22+02	−0.298	B	LS
				514.671 cm^{-1}	46 033.271–46 547.942	8–6	1.04+04	4.40−02	2.25+02	−0.453	B	LS
				514.671 cm^{-1}	46 033.271–46 547.942	8–8	5.55+02	3.14−03	1.61+01	−1.600	C+	LS
103	$7g-9f$	^{2}G–^{2}F°		*879.1* cm^{-1}	*46 033.27–46 912.4*	18–14	5.82+03	8.78−03	5.92+01	−0.801	D	1
				879.11 cm^{-1}	46 033.271–46 912.38	10–8	5.82+03	9.03−03	3.38+01	−1.044	D	LS
				879.11 cm^{-1}	46 033.271–46 912.38	8–6	5.43+03	7.90−03	2.37+01	−1.199	D	LS
				879.11 cm^{-1}	46 033.271–46 912.38	8–8	2.91+02	5.65−04	1.69+00	−2.345	E	LS
104	$7d-8f$	^{2}D–^{2}F°		*453.98* cm^{-1}	*46 093.96–46 547.94*	10–14	1.42+05	1.45+00	1.05+04	1.161	B	1
				453.630 cm^{-1}	46 094.312–46 547.942	6–8	1.42+05	1.38+00	6.01+03	0.918	B	LS
				454.518 cm^{-1}	46 093.424–46 547.942	4–6	1.33+05	1.45+00	4.20+03	0.763	B	LS
				453.630 cm^{-1}	46 094.312–46 547.942	6–6	9.48+03	6.91−02	3.01+02	−0.382	B	LS
105	$7d-9f$	^{2}D–^{2}F°		*818.4* cm^{-1}	*46 093.96–46 912.4*	10–14	7.91+04	2.48−01	9.97+02	0.394	C	1
				818.07 cm^{-1}	46 094.312–46 912.38	6–8	7.90+04	2.36−01	5.70+02	0.151	C	LS
				818.96 cm^{-1}	46 093.424–46 912.38	4–6	7.40+04	2.48−01	3.99+02	−0.003	C	LS
				818.07 cm^{-1}	46 094.312–46 912.38	6–6	5.27+03	1.18−02	2.85+01	−1.150	D	LS
106	$7d-10f$	^{2}D–^{2}F°		*1 078.8* cm^{-1}	*46 093.96–47 172.8*	10–14	5.08+04	9.17−02	2.80+02	−0.038	D+	1
				1 078.46 cm^{-1}	46 094.312–47 172.77	6–8	5.08+04	8.73−02	1.60+02	−0.281	D+	LS
				1 079.35 cm^{-1}	46 093.424–47 172.77	4–6	4.75+04	9.17−02	1.12+02	−0.436	D+	LS
				1 078.46 cm^{-1}	46 094.312–47 172.77	6–6	3.39+03	4.37−03	8.00+00	−1.581	E+	LS
107	$8f-9d$	^{2}F°–^{2}D		*393.4* cm^{-1}	*46 547.94–46 941.3*	14–10	1.95+03	1.35−02	1.58+02	−0.724	D+	1
				393.61 cm^{-1}	46 547.942–46 941.55	8–6	1.86+03	1.35−02	9.03+01	−0.967	D+	LS
				393.03 cm^{-1}	46 547.942–46 940.97	6–4	1.95+03	1.26−02	6.33+01	−1.121	D+	LS
				393.61 cm^{-1}	46 547.942–46 941.55	6–6	9.33+01	9.03−04	4.53+00	−2.266	E+	LS
108	$8d-9f$	^{2}D–^{2}F°		*318.7* cm^{-1}	*46 593.7–46 912.4*	10–14	7.13+04	1.47+00	1.52+04	1.167	C	1
				318.43 cm^{-1}	46 593.95–46 912.38	6–8	7.10+04	1.40+00	8.68+03	0.924	C	LS
				319.06 cm^{-1}	46 593.32–46 912.38	4–6	6.70+04	1.48+00	6.11+03	0.772	C	LS
				318.43 cm^{-1}	46 593.95–46 912.38	6–6	4.75+03	7.02−02	4.35+02	−0.376	C	LS
109	$8d-10f$	^{2}D–^{2}F°		*579.1* cm^{-1}	*46 593.7–47 172.8*	10–14	4.31+04	2.70−01	1.53+03	0.431	C	1
				578.82 cm^{-1}	46 593.95–47 172.77	6–8	4.31+04	2.57−01	8.77+02	0.188	C	LS
				579.45 cm^{-1}	46 593.32–47 172.77	4–6	4.03+04	2.70−01	6.14+02	0.033	C	LS
				578.82 cm^{-1}	46 593.95–47 172.77	6–6	2.86+03	1.28−02	4.37+01	−1.115	D+	LS
110	$9d-10f$	^{2}D–^{2}F°		*231.5* cm^{-1}	*46 941.3–47 172.8*	10–14	3.84+04	1.51+00	2.14+04	1.179	B	1
				231.22 cm^{-1}	46 941.55–47 172.77	6–8	3.82+04	1.43+00	1.22+04	0.933	B	LS
				231.80 cm^{-1}	46 940.97–47 172.77	4–6	3.61+04	1.51+00	8.58+03	0.781	B	LS
				231.22 cm^{-1}	46 941.55–47 172.77	6–6	2.56+03	7.17−02	6.13+02	−0.366	C+	LS

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

4.1.2. Forbidden Transitions for Al I

Wherever available we have used the data of Tachiev and Froese Fischer,[71] which result from extensive MCHF calculations with Breit-Pauli corrections to order α^2. The calculations only extend to transitions from energy levels up to $3s4p$.

We estimated the accuracies by conservatively scaling the pooling fit parameters of the spin-allowed lines of Al I to yield reduced accuracies, particularly at smaller line strengths. The listed accuracies are therefore less well established than for the allowed lines. Next we isoelectronically averaged the logarithmic quality factors observed for allowed lines from the lower-lying energy levels of Al I and Si II and applied the result to forbidden lines of Al I using the method described in the introduction to Kelleher and Podobedova.[35]

References for Forbidden Transitions for Al I

[35]D. E. Kelleher and L. I. Podobedova, J. Phys. Chem. Ref. Data **37**, 267 (2008).

[71]G. Tachiev and C. Froese Fischer, http://www.vuse.vanderbilt.edu/~cff/mchf_collection/ (MCHF, *ab initio*, downloaded on February 17, 2004).

TABLE 5. Wavelength finding list for forbidden lines of Al I

Wavelength (air) (Å)	Mult. No.
3 032.579	2
3 034.036	2
3 042.923	2
3 044.390	2
14 102.427	4
14 105.099	4
Wavenumber (cm^{-1})	**Mult. No.**
3 795.02	3
3 719.20	3
3 672.65	3
3 416.39	6
3 415.04	6
3 369.84	6
3 368.49	6
3 294.02	6
3 292.67	6
122.37	5
112.061	1
75.82	5
46.55	5
15.832	7

TABLE 6. Transition probabilities of forbidden lines for Al I (reference in this table is as follows: 1=Tachiev and Forese Fischer[71])

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	$3p-3p$	$^2P^\circ-^2P^\circ$									
				112.061 cm^{-1}	0.000–112.061	2–4	M1	1.01−05	1.07+00	C+	1
				112.061 cm^{-1}	0.000–112.061	2–4	E2	5.37−11	1.08+02	B	1
2	$3p-4p$	$^2P^\circ-^2P^\circ$									
			3 042.923	3 043.809	112.061–32 965.639	4–4	M1	3.47−03	1.45−05	D	1
			3 042.923	3 043.809	112.061–32 965.639	4–4	E2	8.24+01	7.69+01	B	1
			3 034.036	3 034.919	0.000–32 949.807	2–2	M1	4.00−02	8.28−05	D	1
			3 044.390	3 045.276	112.061–32 949.807	4–2	M1	2.19−03	4.58−06	E+	1
			3 044.390	3 045.276	112.061–32 949.807	4–2	E2	1.82+02	8.52+01	B	1
			3 032.579	3 033.462	0.000–32 965.639	2–4	M1	4.62−03	1.91−05	D	1
			3 032.579	3 033.462	0.000–32 965.639	2–4	E2	8.04+01	7.37+01	B	1
3	$3s^2(^1S)4s-3s3p^2$	$^2S-^4P$									
				3 795.02 cm^{-1}	25 347.756–29 142.78	2–6	E2	1.28−07	8.75−03	D	1
				3 719.20 cm^{-1}	25 347.756–29 066.96	2–4	M1	8.35−07	2.41−06	E	1
				3 719.20 cm^{-1}	25 347.756–29 066.96	2–4	E2	1.68−08	8.46−04	D	1
				3 672.65 cm^{-1}	25 347.756–29 020.41	2–2	M1	3.24−07	4.85−07	E	1
4	$4s-3d$	$^2S-^2D$									
			14 102.427	14 106.282	25 347.756–32 436.796	2–6	E2	7.15−01	2.14+03	B+	1
			14 105.099	14 108.955	25 347.756–32 435.453	2–4	M1	1.13−10	4.69−11	E	1
			14 105.099	14 108.955	25 347.756–32 435.453	2–4	E2	7.13−01	1.42+03	B+	1
5	$3s3p^2-3s3p^2$	$^4P-^4P$									
				75.82 cm^{-1}	29 066.96–29 142.78	4–6	M1	6.44−06	3.29+00	C+	1
				75.82 cm^{-1}	29 066.96–29 142.78	4–6	E2	6.57−12	1.40+02	B	1

TABLE 6. Transition probabilities of forbidden lines for Al I (reference in this table is as follows: 1=Tachiev and Forese Fischer[71])—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
				46.55 cm^{-1}	29 020.41–29 066.96	2–4	M1	2.38−06	3.50+00	C+	1
				46.55 cm^{-1}	29 020.41–29 066.96	2–4	E2	3.01−14	4.93+00	C+	1
				122.37 cm^{-1}	29 020.41–29 142.78	2–6	E2	1.96−11	3.82+01	B	1
6	$3s3p^2-3s^2(^1S)3d$	^{4}P$-^2$D									
				3 416.39 cm^{-1}	29 020.41–32 436.796	2–6	E2	5.54−05	6.38+00	D+	1
				3 369.84 cm^{-1}	29 066.96–32 436.796	4–6	M1	2.79−05	1.62−04	E	1
				3 369.84 cm^{-1}	29 066.96–32 436.796	4–6	E2	2.74−07	3.38−02	D	1
				3 415.04 cm^{-1}	29 020.41–32 435.453	2–4	M1	1.35−05	5.02−05	D	1
				3 415.04 cm^{-1}	29 020.41–32 435.453	2–4	E2	5.62−05	4.32+00	D+	1
				3 294.02 cm^{-1}	29 142.78–32 436.796	6–6	M1	1.34−04	8.36−04	E+	1
				3 294.02 cm^{-1}	29 142.78–32 436.796	6–6	E2	3.17−06	4.38−01	D	1
				3 368.49 cm^{-1}	29 066.96–32 435.453	4–4	M1	5.12−05	1.99−04	E	1
				3 368.49 cm^{-1}	29 066.96–32 435.453	4–4	E2	2.95−07	2.43−02	D	1
				3 292.67 cm^{-1}	29 142.78–32 435.453	6–4	M1	1.55−05	6.42−05	E	1
				3 292.67 cm^{-1}	29 142.78–32 435.453	6–4	E2	1.27−06	1.17−01	D	1
7	$4p-4p$	^{2}P°$-^2$P°									
				15.832 cm^{-1}	32 949.807–32 965.639	2–4	M1	2.66−08	9.92−01	C+	1
				15.832 cm^{-1}	32 949.807–32 965.639	2–4	E2	1.85−13	6.63+03	C+	1

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

4.2. Al II

Magnesium isoelectronic sequence
Ground state: $1s^22s^22p^63s^2\ ^1S_0$
Ionization energy: 18.828 57 eV (151 862.7 cm^{-1})

4.2.1. Allowed Transitions for Al II

The large majority of the compiled transition rates for this spectrum has been taken from the R-matrix calculations of the OP.[5,6] Only OP results were available for energy levels above the $3s4p$. Wherever available we have used the data of Tachiev and Froese Fischer,[70] which result from extensive MCHF calculations with Breit-Pauli corrections to order α^2. Chang and Fang[9] used a simple configuration interaction (CI) approach with a basis constructed from B splines. Weiss[82] used an extensive CI approach. Chou *et al.*[11] performed a multiconfiguration relativistic random phase approximation. Sen and Puri[64] made a relativistic local spin density functional calculation. Träbert *et al.*[75] measured lifetimes in an ion storage ring to an accuracy of 3%. Johnson *et al.*[31] measured an intersystem transition probability by observing its time-resolved spin-changing emission.

To estimate accuracies, we pooled the RSDM for each of the lines with transition rates published in two or more references,[5,6,9,11,31,64,70,75,82] as described in the introduction to Kelleher and Podobedova.[35] For this purpose the spin-allowed and intercombination data were treated separately, with the former divided into two energy groups above and below 30 000 cm^{-1}. OP lines constituted a fourth group. We then isoelectronically averaged the logarithmic quality factors observed for Mg-like lines of Mg I, Al II, and Si III using the method described in the introduction to Kelleher and Podobedova.[35] For the higher-lying intercombination lines and those from the OP data, we scaled the logarithmic quality factor of the lower-lying lines.

The energy levels labeled $3smd\ ^1D_2$, $m=3,4,5$, are actually admixtures of these basis states, and as a result associated transition rates generally fell outside the cluster of RSDM's for other transitions. The anomalously weak $3s3p\ ^1P^o-3p^2\ ^1D$ transition (at 3900.675 Å) is missing from the following compilation due to its large uncertainty. A large discrepancy for this transition exists between Tachiev and Froese Fischer,[70] Chang and Fang,[9] and Weiss,[82] and between the results of Froese Fischer[70] when using length vs velocity forms.

References for Allowed Transitions for Al II

[5]K. Butler, C. Mendoza, and C. J. Zeippen, J. Phys. B **26**, 4409 (1993). http://legacy.gsfc.nasa.govt/opbase, downloaded on July 28, 1995 (Opacity Project).
[6]K. Butler, C. Mendoza, and C. J. Zeippen, http://legacy.gsfc.nasa.gov/topbase, downloaded on July 28, 1995 (Opacity Project)
[9]T. N. Chang and T. K. Fang, Phys. Rev. A **52**, 2638 (1995).
[11]H.-S. Chou, H.-C. Chi, and K.-N. Huang, J. Phys. B **26**, 4079 (1993).
[31]B. C. Johnson, P. L. Smith, and W. H. Parkinson, Astrophys. J. **308**, 1013 (1986).
[35]D. E. Kelleher and L. I. Podobedova, J. Phys. Chem. Ref. Data **37**, 267 (2008).
[64]K. D. Sen and A. Puri, Chem. Phys. Lett. **156**, 505 (1989).
[70]G. Tachiev and C. Froese Fischer, http://www.vuse.vanderbilt.edu/~cff/mchf_collection/ (MCHF,

energy adjusted, downloaded on February 17, 2004).
[75]E. Träbert, A. Wolf, J. Linkemann, and X. Tordoir, J. Phys. B **32**, 537 (1999).
[82]A. W. Weiss (private communication).

TABLE 7. Wavelength finding list for allowed lines Al II

Wavelength (vac) (Å)	Mult. No.
985.981	17
986.573	17
987.778	17
987.780	17
1 047.889	15
1 048.558	15
1 048.560	15
1 049.922	15
1 049.923	15
1 049.924	15
1 054.602	13
1 055.280	13
1 056.661	13
1 189.185	11
1 190.047	11
1 190.051	11
1 191.804	11
1 191.808	11
1 191.814	11
1 209.191	9
1 210.082	9
1 211.899	9
1 258.857	18
1 350.177	16
1 371.241	14
1 539.833	12
1 625.627	10
1 670.787	2
1 719.442	7
1 721.244	7
1 721.271	7
1 724.922	7
1 724.949	7
1 724.982	7
1 750.618	31
1 760.106	3
1 761.977	3
1 763.869	3
1 763.952	3
1 765.816	3
1 767.732	3
1 772.803	30
1 774.002	30
1 774.770	30
1 776.973	30
1 777.826	30
1 778.596	30
1 818.355	52
1 818.391	52
1 819.249	52
1 819.285	52
1 819.315	52

TABLE 7. Wavelength finding list for allowed lines Al II—Continued

Wavelength (vac) (Å)	Mult. No.
1 820.092	52
1 820.122	52
1 828.587	40
1 832.838	40
1 834.807	40
1 836.965	28
1 855.926	5
1 858.025	5
1 859.979	27
1 862.311	5
1 929.977	32
1 931.050	4
1 932.377	32
1 934.503	32
1 934.713	32
1 936.908	32
1 939.262	32
1 983.650	56
1 983.693	56
1 983.729	56
1 988.697	56
1 988.733	56
1 990.533	8
1 991.052	56
Wavelength (air) (Å)	**Mult. No.**
2 016.052	55
2 016.189	55
2 016.234	55
2 016.288	55
2 016.332	55
2 016.370	55
2 022.082	25
2 074.009	24
2 094.263	53
2 094.741	53
2 094.789	53
2 095.049	53
2 095.097	53
2 095.138	53
2 192.604	51
2 194.191	51
2 194.244	51
2 195.404	51
2 195.457	51
2 195.502	51
2 243.047	39
2 324.20	48
2 325.44	48
2 325.50	48
2 326.38	48
2 326.44	48
2 326.49	48
2 475.254	22
2 526.484	38
2 631.55	21
2 637.691	46

TABLE 7. Wavelength finding list for allowed lines Al II—Continued

Wavelength (air) (Å)	Mult. No.
2 638.178	46
2 638.254	46
2 638.552	46
2 638.628	46
2 638.692	46
2 669.155	1
2 816.185	6
2 994.273	68
2 995.528	68
2 998.149	68
2 998.172	68
3 022.792	67
3 024.070	67
3 026.765	67
3 074.684	54
3 088.518	69
3 275.763	37
3 313.346	44
3 313.465	44
3 313.568	44
3 314.881	44
3 314.983	44
3 315.608	44
3 351.462	50
3 428.894	49
3 534.851	29
3 586.557	42
3 586.931	42
3 587.072	42
3 587.185	42
3 587.325	42
3 587.445	42
3 649.204	65
3 651.067	65
3 651.087	65
3 654.996	65
3 655.004	65
3 655.016	65
3 703.221	66
3 731.955	63
3 733.904	63
3 738.013	63
3 866.161	64
3 995.837	89
3 996.074	89
3 996.141	89
3 996.248	89
3 996.315	89
3 996.363	89
4 026.318	47
4 084.141	88
4 084.212	88
4 084.262	88
4 105.486	88
4 105.537	88
4 115.432	88
4 226.816	87

TABLE 7. Wavelength finding list for allowed lines Al II—Continued

Wavelength (air) (Å)	Mult. No.
4 227.420	87
4 227.495	87
4 227.853	87
4 227.928	87
4 227.981	87
4 293.943	26
4 346.90	102
4 347.28	102
4 347.83	102
4 585.818	85
4 588.110	85
4 588.199	85
4 589.591	85
4 589.680	85
4 589.743	85
4 639.37	101
4 639.79	101
4 640.42	101
4 663.046	19
5 144.42	99
5 144.94	99
5 145.71	99
5 158.23	100
5 278.68	115
5 280.216	115
5 280.27	115
5 283.735	115
5 283.811	115
5 283.86	115
5 285.844	116
5 388.692	74
5 593.300	62
5 613.290	86
5 853.8	82
5 861.6	82
5 861.8	82
5 867.6	82
5 867.8	82
5 867.9	82
5 971.98	114
5 999.87	113
6 001.87	113
6 001.92	113
6 006.41	113
6 006.51	113
6 006.57	113
6 061.13	112
6 066.36	111
6 068.45	111
6 073.20	111
6 181.6	97
6 182.3	97
6 183.4	97
6 201.5	98
6 226.21	61
6 231.63	61
6 231.75	61

TABLE 7. Wavelength finding list for allowed lines Al II—Continued

Wavelength (air) (Å)	Mult. No.
6 243.09	61
6 243.20	61
6 243.37	61
6 319.9	96
6 335.70	45
6 389.62	34
6 493.13	95
6 493.23	95
6 493.96	95
6 494.07	95
6 495.19	95
6 609.81	84
6 696.40	72
6 699.31	72
6 700.4	72
6 816.88	59
6 823.38	59
6 837.11	59
6 917.90	83
6 920.33	60
7 024.63	23
7 042.08	33
7 056.71	33
7 063.68	33
7 132.9	153
7 135.6	153
7 139.2	153
7 259.3	154
7 272.82	122
7 308.15	137
7 308.90	137
7 308.94	137
7 309.48	137
7 309.53	137
7 309.56	137
7 340.56	122
7 372.25	122
7 376.60	73
7 384.18	80
7 384.41	80
7 384.58	80
7 387.96	80
7 388.12	80
7 389.4	80
7 449.45	110
7 471.4	43
7 608.99	136
7 609.04	136
7 609.07	136
7 624.66	109
7 627.97	109
7 635.33	109
7 635.47	109
7 683.16	136
7 683.25	136
7 702.5	152
7 705.7	152

TABLE 7. Wavelength finding list for allowed lines Al II—Continued

Wavelength (air) (Å)	Mult. No.
7 709.9	152
7 717.98	136
7 730.89	108
7 812.33	107
7 815.81	107
7 823.69	107
8 086.89	138
8 119.65	134
8 121.82	134
8 121.88	134
8 123.41	134
8 123.47	134
8 123.51	134
8 354.32	78
8 359.20	78
8 359.49	78
8 362.96	78
8 363.25	78
8 363.46	78
8 640.70	36
8 671.1	151
8 675.1	151
8 680.4	151
8 803.0	170
8 803.08	20
8 828.79	20
8 851.80	20
8 862.77	20
8 922.34	150
8 922.56	150
8 922.7	150
8 924.33	20
8 926.62	150
8 926.84	150
8 932.20	150
8 946.0	171
8 947.84	20
8 947.9	171
8 952.8	171
8 953.1	171
9 198.76	135
9 286.6	93
9 288.3	93
9 290.8	93
9 331.7	94
9 556.82	131
9 566.70	131
9 566.78	131
9 570.5	92
9 573.14	131
9 573.22	131
9 573.28	131
9 818.06	121
9 873.57	81
9 907.20	35
10 076.35	41
10 077.46	41

TABLE 7. Wavelength finding list for allowed lines Al II—Continued

Wavelength (air) (Å)	Mult. No.
10 078.40	41
10 107.44	41
10 108.39	41
10 122.70	41
10 136.30	168
10 382.9	169
10 385.20	169
10 385.4	169
10 391.92	169
10 392.22	169
10 392.4	169
10 508.0	167
10 510.58	167
10 517.76	167
10 619.7	148
10 625.8	148
10 630.33	91
10 630.40	91
10 630.50	91
10 632.62	91
10 632.73	91
10 633.7	148
10 635.92	91
10 902.4	149
11 053.05	133
11 192.6	186
11 197.31	146
11 197.68	146
11 197.86	146
11 198.29	147
11 204.05	146
11 204.41	146
11 212.83	146
11 214.6	186
11 243.5	186
11 248.49	79
11 507.44	132
11 872.7	158
12 015.71	130
12 063.41	130
12 063.54	130
12 100.16	130
12 100.30	130
12 100.38	130
12 179.9	187
12 407.37	201
12 423.04	106
12 662.0	185
12 686.6	119
12 690.1	185
12 692.7	119
12 695.8	119
12 727.1	185
13 000.57	165
13 004.83	199
13 006.91	199
13 007.33	199

TABLE 7. Wavelength finding list for allowed lines Al II—Continued

Wavelength (air) (Å)	Mult. No.
13 008.75	199
13 009.18	199
13 430.58	163
13 597.8	166
13 601.80	166
13 602.07	166
13 613.30	166
13 613.84	166
13 614.11	166
13 745.9	128
13 746.1	128
13 746.2	128
13 753.1	128
13 753.4	128
13 757.0	128
13 944.1	164
13 948.62	164
13 961.28	164
13 988.71	198
13 989.20	198
14 001.19	120
14 041.48	105
14 052.71	105
14 053.00	105
14 078.20	105
14 078.32	105
14 078.50	105
14 241.47	198
14 303.16	200
14 361.25	198
14 365.2	157
14 433.7	157
14 468.58	104
14 486.3	157
15 351.20	103
15 364.62	103
15 395.10	103
15 510.0	184
15 552.2	184
15 607.8	184
15 817.99	195
15 825.82	195
15 826.45	195
15 831.89	195
15 832.52	195
16 246.8	144
16 261.0	144
16 279.5	144
16 654.95	129
16 917.8	145
17 420.2	126
17 489.7	126
17 489.9	126
17 543.4	126
17 543.7	126
17 543.8	126
17 688.18	197

TABLE 7. Wavelength finding list for allowed lines Al II—Continued

Wavelength (air) (Å)	Mult. No.
17 761.05	70
17 801.8	70
17 819.8	70
17 828.8	143
18 055.9	183
18 192.4	196
18 591.2	142
18 592.1	142
18 609.8	142
18 610.7	142
18 634.1	142
18 760.2	127
19 250	204
19 751	156

Wavenumber (cm^{-1})	Mult. No.
4 863.25	210
4 849.4	234
4 737.40	227
4 670.15	174
4 666.87	174
4 665.5	174
4 648.33	57
4 618.90	57
4 552.0	211
4 550.3	211
4 550.1	211
4 546.8	211
4 546.5	211
4 546.3	211
4 502.28	71
4 468.63	191
4 457.99	191
4 457.74	191
4 450.96	191
4 450.71	191
4 437.4	209
4 435.5	209
4 431.6	209
4 383.69	248
4 378.1	155
4 369.75	161
4 355.2	155
4 355.17	193
4 354.92	193
4 351.89	193
4 350.5	193
4 337.7	155
4 330.2	181
4 312.7	181
4 289.8	181
4 238.21	76
4 237.79	76
4 237.49	76
4 224.91	76
4 224.61	76
4 218.92	76

TABLE 7. Wavelength finding list for allowed lines Al II—Continued

Wavenumber (cm^{-1})	Mult. No.
4 187.6	235
4 180.5	235
4 169.6	235
4 160.60	175
4 136.49	225
4 135.30	225
4 135.01	225
4 134.36	225
4 134.21	225
4 133.92	225
4 122.6	249
4 121.2	249
4 119.89	249
4 118.0	249
4 117.06	249
4 116.61	249
3 882.2	215
3 881.20	159
3 857.0	215
3 844.6	179
3 844.3	179
3 844.1	179
3 827.1	179
3 826.8	179
3 824.1	215
3 804.2	179
3 801.5	162
3 799.14	162
3 792.89	162
3 792.64	162
3 778.60	218
3 672.05	194
3 669.43	226
3 651.76	218
3 606.2	182
3 596.00	224
3 595.85	224
3 595.56	224
3 593.21	218
3 557.56	214
3 557.29	214
3 557.1	214
3 532.39	214
3 532.12	214
3 499.40	214
3 486.5	160
3 484.16	160
3 477.66	160
3 469.16	224
3 469.01	224
3 427.1	239
3 410.61	224
3 363.88	180
3 314.90	192
3 314.8	246
3 230.9	244
3 169.27	58

TABLE 7. Wavelength finding list for allowed lines Al II—Continued

Wavenumber (cm^{-1})	Mult. No.
3 151.1	233
3 144.0	233
3 133.1	233
3 023.1	247
3 021.7	247
3 018.9	247
3 018.5	247
3 012.9	203
2 946.7	245
2 945.38	245
2 942.10	245
2 923.1	232
2 922.7	232
2 916.0	232
2 915.6	232
2 905.1	232
2 806.72	117
2 800.22	117
2 797.9	117
2 769.33	222
2 766.24	222
2 765.95	222
2 763.97	222
2 763.82	222
2 763.53	222
2 690.29	207
2 668.9	271
2 626.68	255
2 564.44	265
2 560.44	269
2 488.59	264
2 444.08	205
2 403.79	279
2 349.88	277
2 327.93	190
2 323.9	272
2 321.5	272
2 318.1	272
2 295.19	190
2 294.94	190
2 283.7	238
2 280.3	238
2 277.9	238
2 275.5	208
2 273.8	208
2 273.6	208
2 270.3	208
2 270.02	190
2 270.0	208
2 269.8	208
2 269.77	190
2 199.43	124
2 199.34	124
2 199.28	124
2 192.93	124
2 192.78	124
2 190.4	124

TABLE 7. Wavelength finding list for allowed lines Al II—Continued

Wavenumber (cm^{-1})	Mult. No.
2 178.18	229
2 175.18	223
2 158.5	270
2 157.59	270
2 157.14	270
2 155.17	270
2 154.72	270
2 151.79	270
2 142.2	280
2 140.72	118
2 136.9	280
2 135.59	280
2 128.5	280
2 127.61	280
2 127.16	280
2 092.9	206
2 091.0	206
2 087.61	278
2 087.2	206
2 082.39	278
2 074.75	253
2 073.96	278
2 069.60	253
2 067.50	253
1 960.1	262
1 959.92	262
1 959.65	262
1 955.0	262
1 954.77	262
1 952.9	262
1 939.86	75
1 936.95	75
1 936.53	75
1 934.98	75
1 934.56	75
1 934.26	75
1 932.9	237
1 860.02	260
1 858.81	260
1 858.54	260
1 857.9	260
1 857.72	260
1 857.45	260
1 821.03	242
1 766.7	213
1 741.5	213
1 708.6	213
1 701.3	231
1 694.2	231
1 683.4	231
1 682.94	240
1 655.78	254
1 595.8	172
1 592.0	172
1 590.1	172
1 551.9	202
1 535.4	282

TABLE 7. Wavelength finding list for allowed lines Al II—Continued

Wavenumber (cm^{-1})	Mult. No.
1 533.9	282
1 532.8	282
1 519.0	202
1 517.69	263
1 511.9	286
1 496.47	261
1 493.8	202
1 491.5	266
1 476.6	243
1 475.42	243
1 475.2	243
1 472.41	243
1 472.14	243
1 472.0	243
1 457.30	285
1 453.3	286
1 451.95	286
1 434.19	252
1 398.75	285
1 376.62	230
1 376.35	230
1 376.2	230
1 369.59	230
1 369.32	230
1 362.0	241
1 360.59	241
1 358.70	230
1 357.31	241
1 334.9	275
1 326.5	286
1 325.56	286
1 325.11	286
1 323.6	90
1 319.5	259
1 319.36	259
1 319.09	259
1 307.35	252
1 287.4	268
1 285.0	268
1 281.6	268
1 281.09	212
1 280.8	188
1 280.80	212
1 280.65	212
1 280.6	188
1 277.0	188
1 275.1	188
1 271.91	285
1 255.92	212
1 255.63	212
1 251.0	273
1 248.80	252
1 222.93	212
1 192.7	259
1 192.52	259
1 174.7	296
1 134.1	259
1 118.38	173
1 078.7	289
1 074.91	77
1 070.7	293
1 069.7	177
1 066.19	294
1 059.4	267
1 059.0	267
1 057.0	267
1 056.6	267
1 053.6	267
1 052.2	177
1 044.97	300
1 042.7	276
1 037.4	276
1 029.4	276
1 029.3	177
1 029.0	276
1 003.00	125
994.8	292
991.06	298
987.1	216
983.82	216
982.5	216
966.30	274
961.08	274
953.5	297
952.65	274
952.4	297
950.9	297
917.77	219
907.17	219
906.88	219
900.29	219
900.14	219
899.85	219
804.50	220
804.35	220
804.06	220
801.22	220
801.07	220
799.9	220
788.1	295
787.20	295
786.75	295
786.11	295
785.66	295
784.63	295
746.0	140
740.6	140
733.6	140
693.1	301
691.0	301
689.70	301
685.9	301
685.00	301
684.55	301

TABLE 7. Wavelength finding list for allowed lines Al II—Continued

Wavenumber (cm^{-1})	Mult. No.
638.60	299
636.50	299
632.14	250
631.35	299
629.83	189
627.18	123
623.71	250
620.28	123
620.19	123
618.49	250
614.91	123
614.82	123
614.76	123
598.14	217
517.5	257
517.31	257
517.04	257
509.1	257
508.88	257
503.8	257
501.9	141
492.86	256
489.96	287
489.75	256
489.48	256
487.5	256
487.33	256
487.06	256
484.81	287
482.71	287
432.1	236
421.3	236
414.2	236

TABLE 7. Wavelength finding list for allowed lines Al II—Continued

Wavenumber (cm^{-1})	Mult. No.
413.6	291
413.2	291
412.4	284
408.5	291
406.4	291
353.8	284
351.93	221
345.7	178
335.99	283
313.6	290
312.5	290
312.1	290
311.4	290
311.0	290
296.96	251
293.7	176
293.5	176
277.44	283
276.2	176
276.0	176
253.3	176
247.6	228
234.62	139
227.4	284
227.0	284
168.2	281
164.8	281
162.4	281
158.87	258
150.60	283
107.8	288
106.7	302

TABLE 8. Transition probabilities of allowed lines for Al II (references in this table are as follows: 1=Butler *et al.*,[5,6] 2=Tachiev and Froese Fischer,[70] 3=Chang and Fang,[9] 4=Weiss,[82] 5=Chou *et al.*,[11] 6=Sen and Puri,[64] and 7=Träbert *et al.*[75])

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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
1	$3s^2-3s3p$	$^1S-^3P^\circ$										
			2 669.155	2 669.948	0.00–37 453.91	1–3	3.28+03	1.05−05	9.24−05	−4.979	A	7
2		$^1S-^1P^\circ$		1 670.787	0.00–59 852.02	1–3	1.41+09	1.77+00	9.73+00	0.248	A	2,4,5,6
3	$3s3p-3p^2$	$^3P^\circ-^3P$		*1 763.92*	*37 516.0–94 207.9*	9–9	1.23+09	5.75−01	3.00+01	0.714	B+	2
				1 763.952	37 577.79–94 268.68	5–5	9.21+08	4.29−01	1.25+01	0.331	B+	2
				1 763.869	37 453.91–94 147.46	3–3	3.04+08	1.42−01	2.47+00	−0.371	B+	2
				1 767.732	37 577.79–94 147.46	5–3	5.13+08	1.44−01	4.20+00	−0.143	B+	2
				1 765.816	37 453.91–94 084.96	3–1	1.23+09	1.91−01	3.34+00	−0.242	B+	2
				1 760.106	37 453.91–94 268.68	3–5	3.13+08	2.42−01	4.21+00	−0.139	B+	2
				1 761.977	37 393.03–94 147.46	1–3	4.12+08	5.76−01	3.34+00	−0.240	B+	2
4		$^1P^\circ-^1S$		1 931.050	59 852.02–111 637.33	3–1	1.04+09	1.94−01	3.71+00	−0.235	B+	2,4
5	$3s3p-3s4s$	$^3P^\circ-^3S$		*1 860.17*	*37 516.0*–91 274.50	9–3	7.41+08	1.28−01	7.06+00	0.061	B+	2
				1 862.311	37 577.79–91 274.50	5–3	4.08+08	1.27−01	3.90+00	−0.197	B+	2
				1 858.025	37 453.91–91 274.50	3–3	2.49+08	1.29−01	2.37+00	−0.412	B+	2

TABLE 8. Transition probabilities of allowed lines for Al II (references in this table are as follows: 1=Butler *et al.*,[5,6] 2=Tachiev and Froese Fischer,[70] 3=Chang and Fang,[9] 4=Weiss,[82] 5=Chou *et al.*,[11] 6=Sen and Puri,[64] and 7=Träbert *et al.*[75])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				1 855.926	37 393.03–91 274.50	1–3	8.38+07	1.30−01	7.93−01	−0.886	B	2
6		$^1P^\circ-^1S$	2 816.185	2 817.014	59 852.02–95 350.60	3–1	3.57+08	1.42−01	3.94+00	−0.371	B+	2,4
7	$3s3p-3s3d$	$^3P^\circ-^3D$		*1 723.12*	*37 516.0–95 550.2*	9–15	1.18+09	8.74−01	4.46+01	0.896	B+	2
				1 724.982	37 577.79–95 549.42	5–7	1.18+09	7.34−01	2.08+01	0.565	B+	2
				1 721.271	37 453.91–95 550.51	3–5	8.82+08	6.53−01	1.11+01	0.292	B+	2
				1 719.442	37 393.03–95 551.44	1–3	6.55+08	8.71−01	4.93+00	−0.060	B+	2
				1 724.949	37 577.79–95 550.51	5–5	2.97+08	1.33−01	3.76+00	−0.177	B+	2
				1 721.244	37 453.91–95 551.44	3–3	4.93+08	2.19−01	3.73+00	−0.182	B+	2
				1 724.922	37 577.79–95 551.44	5–3	3.32+07	8.88−03	2.52−01	−1.353	B	2
8		$^1P^\circ-^1D$		1 990.533	59 852.02–110 089.83	3–5	1.38+09	1.37+00	2.68+01	0.614	B+	2,4
9	$3s3p-3s5s$	$^3P^\circ-^3S$		*1 210.99*	*37 516.0*–120 092.95	9–3	2.24+08	1.64−02	5.89−01	−0.831	D+	1
				1 211.899	37 577.79–120 092.95	5–3	1.24+08	1.64−02	3.27−01	−1.086	D+	LS
				1 210.082	37 453.91–120 092.95	3–3	7.47+07	1.64−02	1.96−01	−1.308	D+	LS
				1 209.191	37 393.03–120 092.95	1–3	2.51+07	1.65−02	6.57−02	−1.783	D	LS
10		$^1P^\circ-^1S$		1 625.627	59 852.02–121 366.76	3–1	1.31+08	1.73−02	2.77−01	−1.285	C	3
11	$3s3p-3s4d$	$^3P^\circ-^3D$		*1 190.93*	*37 516.0–121 483.8*	9–15	1.49+08	5.26−02	1.86+00	−0.325	D+	1
				1 191.814	37 577.79–121 483.50	5–7	1.48+08	4.42−02	8.67−01	−0.656	C	LS
				1 190.051	37 453.91–121 483.92	3–5	1.12+08	3.95−02	4.64−01	−0.926	D+	LS
				1 189.185	37 393.03–121 484.22	1–3	8.29+07	5.27−02	2.06−01	−1.278	D+	LS
				1 191.808	37 577.79–121 483.92	5–5	3.70+07	7.88−03	1.55−01	−1.405	D	LS
				1 190.047	37 453.91–121 484.22	3–3	6.22+07	1.32−02	1.55−01	−1.402	D	LS
				1 191.804	37 577.79–121 484.22	5–3	4.12+06	5.26−04	1.03−02	−2.580	E+	LS
12		$^1P^\circ-^1D$		1 539.833	59 852.02–124 794.13	3–5	6.70+08	3.97−01	6.04+00	0.076	B	3
13	$3s3p-3s6s$	$^3P^\circ-^3S$		*1 055.97*	*37 516.0*–132 215.51	9–3	1.06+08	5.89−03	1.84−01	−1.276	D	1
				1 056.661	37 577.79–132 215.51	5–3	5.85+07	5.88−03	1.02−01	−1.532	D	LS
				1 055.280	37 453.91–132 215.51	3–3	3.53+07	5.89−03	6.14−02	−1.753	D	LS
				1 054.602	37 393.03–132 215.51	1–3	1.18+07	5.90−03	2.05−02	−2.229	E+	LS
14		$^1P^\circ-^1S$		1 371.241	59 852.02–132 778.68	3–1	5.83+07	5.48−03	7.42−02	−1.784	D+	3
15	$3s3p-3s5d$	$^3P^\circ-^3D$		*1 049.24*	*37 516.0–132 822.9*	9–15	4.18+07	1.15−02	3.57−01	−0.985	D	1
				1 049.923	37 577.79–132 822.89	5–7	4.17+07	9.65−03	1.67−01	−1.317	D+	LS
				1 048.560	37 453.91–132 822.80	3–5	3.14+07	8.63−03	8.94−02	−1.587	D	LS
				1 047.889	37 393.03–132 822.95	1–3	2.33+07	1.15−02	3.97−02	−1.939	D	LS
				1 049.924	37 577.79–132 822.80	5–5	1.04+07	1.72−03	2.97−02	−2.066	E+	LS
				1 048.558	37 453.91–132 822.95	3–3	1.75+07	2.88−03	2.98−02	−2.063	E+	LS
				1 049.922	37 577.79–132 822.95	5–3	1.16+06	1.15−04	1.99−03	−3.240	E	LS
16		$^1P^\circ-^1D$		1 350.177	59 852.02–133 916.40	3–5	2.37+08	1.08−01	1.44+00	−0.489	C+	3
17	$3s3p-3s6d$	$^3P^\circ-^3D$		*987.18*	*37 516.0–138 815.0*	9–15	1.67+07	4.06−03	1.19−01	−1.437	E+	1
				987.778	37 577.79–138 815.12	5–7	1.67+07	3.41−03	5.54−02	−1.768	D	LS
				986.573	37 453.91–138 814.87	3–5	1.25+07	3.05−03	2.97−02	−2.039	E+	LS
				985.981	37 393.03–138 814.87	1–3	9.29+06	4.06−03	1.32−02	−2.391	E+	LS
				987.780	37 577.79–138 814.87	5–5	4.16+06	6.08−04	9.89−03	−2.517	E+	LS
				986.573	37 453.91–138 814.87	3–3	6.99+06	1.02−03	9.94−03	−2.514	E+	LS
				987.780	37 577.79–138 814.87	5–3	4.63+05	4.06−05	6.60−04	−3.693	E	LS
18		$^1P^\circ-^1D$		1 258.857	59 852.02–139 289.15	3–5	1.02+08	4.03−02	5.01−01	−0.918	C	3

TABLE 8. Transition probabilities of allowed lines for Al II (references in this table are as follows: 1 = Butler *et al.*,[5,6] 2 = Tachiev and Froese Fischer,[70] 3 = Chang and Fang,[9] 4 = Weiss,[82] 5 = Chou *et al.*,[11] 6 = Sen and Puri,[64] and 7 = Träbert *et al.*[75])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
19	$3p^2-3s4p$	^{1}D$-^1$P°	4 663.046	4 664.351	85 481.35–106 920.56	5–3	5.81+07	1.14−01	8.73+00	−0.244	A	2,4
20		^{3}P$-^3$P°	*8 887.7*	*8 890.2*	*94 207.9–105 456.3*	9–9	2.38+03	2.82−05	7.43−03	−3.596	C	2
			8 924.33	8 926.78	94 268.68–105 470.93	5–5	9.09+02	1.09−05	1.60−03	−4.264	C	2
			8 851.80	8 854.23	94 147.46–105 441.50	3–3	5.12+01	6.01−07	5.26−05	−5.744	D+	2
			8 947.84	8 950.29	94 268.68–105 441.50	5–3	1.57+03	1.13−05	1.67−03	−4.248	C	2
			8 862.77	8 865.20	94 147.46–105 427.52	3–1	7.60+02	2.98−06	2.61−04	−5.049	D+	2
			8 828.79	8 831.22	94 147.46–105 470.93	3–5	1.89+03	3.68−05	3.21−03	−3.957	C	2
			8 803.08	8 805.50	94 084.96–105 441.50	1–3	6.39+02	2.23−05	6.46−04	−4.652	C	2
21	$3p^2-3s4f$	^{1}D$-^1$F°	2 631.55	2 632.33	85 481.35–123 470.5	5–7	2.48+08	3.60−01	1.56+01	0.255	B	3
22	$3p^2-3s5p$	^{1}D$-^1$P°	2 475.254	2 476.002	85 481.35–125 869.04	5–3	4.60+07	2.54−02	1.03+00	−0.896	C	3
23		^{1}S$-^1$P°	7 024.63	7 026.56	111 637.33–125 869.04	1–3	2.15+05	4.77−03	1.10−01	−2.321	D+	3
24	$3p^2-3s5f$	^{1}D$-^1$F°	2 074.009	2 074.670	85 481.35–133 681.78	5–7	1.41+08	1.27−01	4.35+00	−0.197	C+	3
25	$3p^2-3s6p$	^{1}D$-^1$P°	2 022.082	2 022.734	85 481.35–134 919.40	5–3	4.05+07	1.49−02	4.97−01	−1.128	C	3
26		^{1}S$-^1$P°	4 293.943	4 295.151	111 637.33–134 919.40	1–3	4.85+05	4.02−03	5.69−02	−2.396	D+	3
27	$3p^2-3s6f$	^{1}D$-^1$F°		1 859.979	85 481.35–139 245.39	5–7	8.68+07	6.30−02	1.93+00	−0.502	C+	3
28	$3p^2-3s7p$	^{1}D$-^1$P°		1 836.965	85 481.35–139 918.98	5–3	4.03+07	1.22−02	3.70−01	−1.215	D	3
29		^{1}S$-^1$P°	3 534.851	3 535.862	111 637.33–139 918.98	1–3	8.11+05	4.56−03	5.31−02	−2.341	D	3
30	$3p^2-3p3d$	^{3}P$-^3$D°		*1 775.66*	*94 207.9–150 524.9*	9–15	1.68+09	1.32+00	6.96+01	1.075	B	1
				1 776.973	94 268.68–150 544.17	5–7	1.67+09	1.11+00	3.25+01	0.744	B	LS
				1 774.002	94 147.46–150 517.17	3–5	1.26+09	9.94−01	1.74+01	0.475	B	LS
				1 772.803	94 084.96–150 492.80	1–3	9.41+08	1.33+00	7.76+00	0.124	C+	LS
				1 777.826	94 268.68–150 517.17	5–5	4.18+08	1.98−01	5.79+00	−0.004	C+	LS
				1 774.770	94 147.46–150 492.80	3–3	7.01+08	3.31−01	5.80+00	−0.003	C+	LS
				1 778.596	94 268.68–150 492.80	5–3	4.64+07	1.32−02	3.86−01	−1.180	D+	LS
31	$3p^2-3s7f$	^{1}D$-^1$F°		1 750.618	85 481.35–142 604.05	5–7	5.73+07	3.69−02	1.06+00	−0.734	D+	3
32	$3p^2-3p4s$	^{3}P$-^3$P°		*1 934.58*	*94 207.9–145 898.7*	9–9	4.58+08	2.57−01	1.47+01	0.364	C+	1
				1 934.503	94 268.68–145 961.54	5–5	3.44+08	1.93−01	6.15+00	−0.015	C+	LS
				1 934.713	94 147.46–145 834.70	3–3	1.14+08	6.42−02	1.23+00	−0.715	C	LS
				1 939.262	94 268.68–145 834.70	5–3	1.89+08	6.40−02	2.04+00	−0.495	C	LS
				1 936.908	94 147.46–145 776.15	3–1	4.56+08	8.55−02	1.64+00	−0.591	C	LS
				1 929.977	94 147.46–145 961.54	3–5	1.15+08	1.07−01	2.04+00	−0.493	C	LS
				1 932.377	94 084.96–145 834.70	1–3	1.53+08	2.57−01	1.63+00	−0.590	C	LS
33	$3s4s-3s4p$	^{3}S$-^3$P°	*7 049.3*	*7 051.3*	91 274.50–*105 456.3*	3–9	5.76+07	1.29+00	8.97+01	0.588	B+	2
			7 042.08	7 044.02	91 274.50–105 470.93	3–5	5.78+07	7.16−01	4.98+01	0.332	A	2
			7 056.71	7 058.66	91 274.50–105 441.50	3–3	5.74+07	4.29−01	2.99+01	0.110	B+	2
			7 063.68	7 065.63	91 274.50–105 427.52	3–1	5.73+07	1.43−01	9.97+00	−0.368	B+	2
34		^{3}S$-^1$P°										
			6 389.62	6 391.39	91 274.50–106 920.56	3–3	1.70+04	1.04−04	6.57−03	−3.506	D	2
35		^{1}S$-^3$P°										
			9 907.20	9 909.92	95 350.60–105 441.50	1–3	4.59+03	2.03−04	6.62−03	−3.693	D	2
36		^{1}S$-^1$P°	8 640.70	8 643.07	95 350.60–106 920.56	1–3	3.00+07	1.01+00	2.87+01	0.004	A	2,4
37	$3s4s-3s5p$	^{1}S$-^1$P°	3 275.763	3 276.707	95 350.60–125 869.04	1–3	7.41+06	3.58−02	3.86−01	−1.446	C	3
38	$3s4s-3s6p$	^{1}S$-^1$P°	2 526.484	2 527.244	95 350.60–134 919.40	1–3	1.94+07	5.58−02	4.64−01	−1.253	C	3

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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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
39	$3s4s-3s7p$	^{1}S$-^1$P°	2 243.047	2 243.743	95 350.60–139 918.98	1–3	3.03+07	6.85−02	5.06−01	−1.164	C	3
40	$3s4s-3p4s$	^{3}S$-^3$P°		*1 830.69*	91 274.50–*145 898.7*	3–9	4.70+08	7.09−01	1.28+01	0.328	C+	1
				1 828.587	91 274.50–145 961.54	3–5	4.72+08	3.94−01	7.12+00	0.073	C+	LS
				1 832.838	91 274.50–145 834.70	3–3	4.69+08	2.36−01	4.27+00	−0.150	C+	LS
				1 834.807	91 274.50–145 776.15	3–1	4.67+08	7.86−02	1.42+00	−0.627	C	LS
41	$3s3d-3s4p$	^{3}D$-^3$P°	*10 092.0*	*10 094.8*	*95 550.2–105 456.3*	15–9	1.61+07	1.48−01	7.37+01	0.346	B+	2
			10 076.35	10 079.11	95 549.42–105 470.93	7–5	1.36+07	1.48−01	3.44+01	0.015	B+	2
			10 107.44	10 110.21	95 550.51–105 441.50	5–3	1.21+07	1.11−01	1.84+01	−0.256	B+	2
			10 122.70	10 125.47	95 551.44–105 427.52	3–1	1.60+07	8.21−02	8.21+00	−0.609	B+	2
			10 077.46	10 080.22	95 550.51–105 470.93	5–5	2.43+06	3.70−02	6.14+00	−0.733	B+	2
			10 108.39	10 111.16	95 551.44–105 441.50	3–3	4.02+06	6.16−02	6.15+00	−0.733	B+	2
			10 078.40	10 081.16	95 551.44–105 470.93	3–5	1.62+05	4.12−03	4.10−01	−1.908	B	2
42	$3s3d-3s4f$	^{3}D$-^3$F°	*3 586.93*	*3 587.96*	*95 550.2–123 421.2*	15–21	2.35+08	6.35−01	1.12+02	0.979	B	1
			3 586.557	3 587.580	95 549.42–123 423.36	7–9	2.35+08	5.83−01	4.82+01	0.611	B+	LS
			3 587.072	3 588.095	95 550.51–123 420.45	5–7	2.09+08	5.64−01	3.33+01	0.450	B	LS
			3 587.445	3 588.469	95 551.44–123 418.48	3–5	1.97+08	6.35−01	2.25+01	0.280	B	LS
			3 586.931	3 587.955	95 549.42–123 420.45	7–7	2.62+07	5.05−02	4.18+00	−0.452	C+	LS
			3 587.325	3 588.349	95 550.51–123 418.48	5–5	3.66+07	7.07−02	4.18+00	−0.452	C+	LS
			3 587.185	3 588.209	95 549.42–123 418.48	7–5	1.03+06	1.42−03	1.17−01	−2.003	D	LS
43		^{1}D$-^1$F°	7 471.4	7 473.5	110 089.83–123 470.5	5–7	5.57+07	6.53−01	8.03+01	0.514	B	1
44	$3s3d-3s5p$	^{3}D$-^3$P°	*3 314.13*	*3 315.08*	*95 550.2–125 715.4*	15–9	1.58+06	1.56−03	2.55−01	−1.631	D	1
			3 313.346	3 314.299	95 549.42–125 721.71	7–5	1.33+06	1.56−03	1.19−01	−1.962	D	LS
			3 314.881	3 315.835	95 550.51–125 708.828	5–3	1.18+06	1.17−03	6.39−02	−2.233	D	LS
			3 315.608	3 316.563	95 551.44–125 703.14	3–1	1.58+06	8.67−04	2.84−02	−2.585	E+	LS
			3 313.465	3 314.419	95 550.51–125 721.71	5–5	2.37+05	3.90−04	2.13−02	−2.710	E+	LS
			3 314.983	3 315.937	95 551.44–125 708.828	3–3	3.94+05	6.50−04	2.13−02	−2.710	E+	LS
			3 313.568	3 314.521	95 551.44–125 721.71	3–5	1.58+04	4.34−05	1.42−03	−3.885	E	LS
45		^{1}D$-^1$P°	6 335.70	6 337.45	110 089.83–125 869.04	5–3	1.53+07	5.51−02	5.75+00	−0.560	C+	3
46	$3s3d-3s5f$	^{3}D$-^3$F°	*2 638.11*	*2 638.90*	*95 550.2–133 444.8*	15–21	2.85+07	4.17−02	5.43+00	−0.204	C	1
			2 637.691	2 638.477	95 549.42–133 450.07	7–9	2.85+07	3.83−02	2.33+00	−0.572	C	LS
			2 638.254	2 639.040	95 550.51–133 443.08	5–7	2.53+07	3.70−02	1.61+00	−0.733	C	LS
			2 638.692	2 639.479	95 551.44–133 437.71	3–5	2.40+07	4.17−02	1.09+00	−0.903	C	LS
			2 638.178	2 638.964	95 549.42–133 443.08	7–7	3.18+06	3.32−03	2.02−01	−1.634	D+	LS
			2 638.628	2 639.414	95 550.51–133 437.71	5–5	4.44+06	4.64−03	2.02−01	−1.635	D+	LS
			2 638.552	2 639.338	95 549.42–133 437.71	7–5	1.25+05	9.35−05	5.69−03	−3.184	E	LS
47	$3s3d-3s6p$	^{1}D$-^1$P°	4 026.318	4 027.456	110 089.83–134 919.40	5–3	1.16+07	1.69−02	1.12+00	−1.073	C	3
48	$3s3d-3s6f$	^{3}D$-^3$F°	*2 325.2*	*2 325.9*	*95 550.2–138 545*	15–21	3.46+07	3.93−02	4.51+00	−0.230	C	1
			2 324.20	2 324.91	95 549.42–138 561.8	7–9	3.46+07	3.61−02	1.93+00	−0.597	C	LS
			2 325.50	2 326.21	95 550.51–138 538.9	5–7	3.07+07	3.49−02	1.34+00	−0.758	C	LS
			2 326.49	2 327.21	95 551.44–138 521.4	3–5	2.90+07	3.92−02	9.01−01	−0.930	C	LS
			2 325.44	2 326.15	95 549.42–138 538.9	7–7	3.85+06	3.12−03	1.67−01	−1.661	D	LS
			2 326.44	2 327.16	95 550.51–138 521.4	5–5	5.38+06	4.37−03	1.67−01	−1.661	D	LS
			2 326.38	2 327.10	95 549.42–138 521.4	7–5	1.52+05	8.81−05	4.72−03	−3.210	E	LS
49		^{1}D$-^1$F°	3 428.894	3 429.878	110 089.83–139 245.39	5–7	5.78+06	1.43−02	8.06−01	−1.146	D+	3
50	$3s3d-3s7p$	^{1}D$-^1$P°	3 351.462	3 352.425	110 089.83–139 918.98	5–3	1.04+07	1.05−02	5.81−01	−1.280	D	3

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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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
51	$3s3d-3p3d$	^{3}D–^{3}F$^\circ$	*2 193.84*	*2 194.52*	*95 550.2–141 118.2*	15–21	2.46+08	2.49−01	2.70+01	0.572	C	1
			2 192.604	2 193.289	95 549.42–141 143.05	7–9	2.47+08	2.29−01	1.16+01	0.205	C	LS
			2 194.244	2 194.929	95 550.51–141 110.06	5–7	2.19+08	2.21−01	7.98+00	0.043	C	LS
			2 195.502	2 196.188	95 551.44–141 084.89	3–5	2.07+08	2.49−01	5.40+00	−0.127	D+	LS
			2 194.191	2 194.877	95 549.42–141 110.06	7–7	2.74+07	1.98−02	1.00+00	−0.858	D	LS
			2 195.457	2 196.143	95 550.51–141 084.89	5–5	3.83+07	2.77−02	1.00+00	−0.859	D	LS
			2 195.404	2 196.090	95 549.42–141 084.89	7–5	1.08+06	5.59−04	2.83−02	−2.407	E	LS
52		^{3}D–^{3}D$^\circ$		*1 819.02*	*95 550.2–150 524.9*	15–15	6.12+08	3.04−01	2.73+01	0.659	C+	1
				1 818.355	95 549.42–150 544.17	7–7	5.45+08	2.70−01	1.13+01	0.276	B	LS
				1 819.285	95 550.51–150 517.17	5–5	4.25+08	2.11−01	6.32+00	0.023	C+	LS
				1 820.122	95 551.44–150 492.80	3–3	4.57+08	2.27−01	4.08+00	−0.167	C+	LS
				1 819.249	95 549.42–150 517.17	7–5	9.54+07	3.38−02	1.42+00	−0.626	C	LS
				1 820.092	95 550.51–150 492.80	5–3	1.53+08	4.55−02	1.36+00	−0.643	C	LS
				1 818.391	95 550.51–150 544.17	5–7	6.82+07	4.73−02	1.42+00	−0.626	C	LS
				1 819.315	95 551.44–150 517.17	3–5	9.17+07	7.58−02	1.36+00	−0.643	C	LS
53	$3s3d-3s7f$	^{3}D–^{3}F$^\circ$	*2 094.64*	*2 095.31*	*95 550.2–143 275.9*	15–21	1.84+08	1.70−01	1.76+01	0.407	D+	1
			2 094.263	2 094.928	95 549.42–143 283.75	7–9	1.84+08	1.56−01	7.53+00	0.038	C	LS
			2 094.789	2 095.454	95 550.51–143 272.86	5–7	1.64+08	1.51−01	5.21+00	−0.122	D+	LS
			2 095.138	2 095.804	95 551.44–143 265.83	3–5	1.55+08	1.70−01	3.52+00	−0.292	D+	LS
			2 094.741	2 095.406	95 549.42–143 272.86	7–7	2.05+07	1.35−02	6.52−01	−1.025	E+	LS
			2 095.097	2 095.763	95 550.51–143 265.83	5–5	2.87+07	1.89−02	6.52−01	−1.025	E+	LS
			2 095.049	2 095.715	95 549.42–143 265.83	7–5	8.10+05	3.81−04	1.84−02	−2.574	E	LS
54		^{1}D–^{1}F$^\circ$	3 074.684	3 075.577	110 089.83–142 604.05	5–7	9.02+06	1.79−02	9.07−01	−1.048	D	3
55	$3s3d-3s8f$	^{3}D–^{3}F$^\circ$	*2 016.19*	*2 016.84*	*95 550.2–145 132.8*	15–21	9.82+07	8.39−02	8.35+00	0.100	D+	1
			2 016.052	2 016.703	95 549.42–145 135.31	7–9	9.82+07	7.70−02	3.58+00	−0.268	D+	LS
			2 016.234	2 016.885	95 550.51–145 131.93	5–7	8.73+07	7.45−02	2.47+00	−0.429	D+	LS
			2 016.370	2 017.021	95 551.44–145 129.51	3–5	8.25+07	8.39−02	1.67+00	−0.599	D	LS
			2 016.189	2 016.840	95 549.42–145 131.93	7–7	1.10+07	6.68−03	3.10−01	−1.330	E+	LS
			2 016.332	2 016.983	95 550.51–145 129.51	5–5	1.53+07	9.35−03	3.10−01	−1.330	E+	LS
			2 016.288	2 016.939	95 549.42–145 129.51	7–5	4.32+05	1.88−04	8.74−03	−2.881	E	LS
56	$3s3d-3p4s$	^{3}D–^{3}P$^\circ$		*1 986.16*	*95 550.2–145 898.7*	15–9	4.81+06	1.71−03	1.67−01	−1.591	D	1
				1 983.650	95 549.42–145 961.54	7–5	4.06+06	1.71−03	7.82−02	−1.922	D	LS
				1 988.697	95 550.51–145 834.70	5–3	3.60+06	1.28−03	4.19−02	−2.194	D	LS
				1 991.052	95 551.44–145 776.15	3–1	4.77+06	9.44−04	1.86−02	−2.548	E+	LS
				1 983.693	95 550.51–145 961.54	5–5	7.24+05	4.27−04	1.39−02	−2.671	E+	LS
				1 988.733	95 551.44–145 834.70	3–3	1.20+06	7.09−04	1.39−02	−2.672	E+	LS
				1 983.729	95 551.44–145 961.54	3–5	4.82+04	4.74−05	9.29−04	−3.847	E	LS
57	$3s4p-3s3d$	^{3}P$^\circ$–^{1}D										
				4 648.33 cm^{-1}	105 441.50–110 089.83	3–5	3.70+02	4.28−05	9.09−03	−3.891	D	2
				4 618.90 cm^{-1}	105 470.93–110 089.83	5–5	2.50−02	1.76−09	6.26−07	−8.056	E	2
58		^{1}P$^\circ$–^{1}D		3 169.27 cm^{-1}	106 920.56–110 089.83	3–5	6.48+05	1.61−01	5.03+01	−0.316	C	2,4
59	$3s4p-3s5s$	^{3}P$^\circ$–^{3}S	*6 830.3*	*6 832.2*	*105 456.3*–120 092.95	9–3	1.07+08	2.50−01	5.07+01	0.352	B	1
			6 837.11	6 839.00	105 470.93–120 092.95	5–3	5.94+07	2.50−01	2.81+01	0.097	B	LS
			6 823.38	6 825.26	105 441.50–120 092.95	3–3	3.59+07	2.51−01	1.69+01	−0.123	B	LS
			6 816.88	6 818.76	105 427.52–120 092.95	1–3	1.20+07	2.51−01	5.63+00	−0.600	C+	LS
60		^{1}P$^\circ$–^{1}S	6 920.33	6 922.24	106 920.56–121 366.76	3–1	1.00+08	2.39−01	1.64+01	−0.144	B+	3
61	$3s4p-3s4d$	^{3}P$^\circ$–^{3}D	*6 237.6*	*6 239.3*	*105 456.3–121 483.8*	9–15	1.12+08	1.09+00	2.01+02	0.992	B	1

TABLE 8. Transition probabilities of allowed lines for Al II (references in this table are as follows: 1=Butler *et al.*,[5,6] 2=Tachiev and Froese Fischer,[70] 3 =Chang and Fang,[9] 4=Weiss,[82] 5=Chou *et al.*,[11] 6=Sen and Puri,[64] and 7=Träbert *et al.*[75])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
			6 243.37	6 245.09	105 470.93–121 483.50	5–7	1.11+08	9.12−01	9.38+01	0.659	B+	LS
			6 231.75	6 233.47	105 441.50–121 483.92	3–5	8.40+07	8.16−01	5.02+01	0.389	B+	LS
			6 226.21	6 227.93	105 427.52–121 484.22	1–3	6.25+07	1.09+00	2.23+01	0.037	B	LS
			6 243.20	6 244.93	105 470.93–121 483.92	5–5	2.79+07	1.63−01	1.68+01	−0.089	B	LS
			6 231.63	6 233.36	105 441.50–121 484.22	3–3	4.67+07	2.72−01	1.67+01	−0.088	B	LS
			6 243.09	6 244.81	105 470.93–121 484.22	5–3	3.11+06	1.09−02	1.12+00	−1.264	C	LS
62		$^1P^\circ-^1D$	5 593.300	5 594.853	106 920.56–124 794.13	3–5	9.26+07	7.24−01	4.00+01	0.337	B+	3
63	$3s4p-3s6s$	$^3P^\circ-^3S$	*3 735.97*	*3 737.03*	*105 456.3–132 215.51*	9–3	4.43+07	3.09−02	3.43+00	−0.556	C	1
			3 738.013	3 739.075	105 470.93–132 215.51	5–3	2.46+07	3.09−02	1.90+00	−0.811	C	LS
			3 733.904	3 734.965	105 441.50–132 215.51	3–3	1.48+07	3.10−02	1.14+00	−1.032	C	LS
			3 731.955	3 733.016	105 427.52–132 215.51	1–3	4.95+06	3.10−02	3.81−01	−1.509	D+	LS
64		$^1P^\circ-^1S$	3 866.161	3 867.257	106 920.56–132 778.68	3–1	4.26+07	3.18−02	1.22+00	−1.020	C+	3
65	$3s4p-3s5d$	$^3P^\circ-^3D$	*3 653.05*	*3 654.09*	*105 456.3–132 822.9*	9–15	2.27+07	7.56−02	8.18+00	−0.167	C	1
			3 655.004	3 656.045	105 470.93–132 822.89	5–7	2.26+07	6.35−02	3.82+00	−0.498	C+	LS
			3 651.087	3 652.128	105 441.50–132 822.80	3–5	1.70+07	5.67−02	2.05+00	−0.769	C	LS
			3 649.204	3 650.244	105 427.52–132 822.95	1–3	1.26+07	7.57−02	9.10−01	−1.121	C	LS
			3 655.016	3 656.057	105 470.93–132 822.80	5–5	5.64+06	1.13−02	6.80−01	−1.248	C	LS
			3 651.067	3 652.108	105 441.50–132 822.95	3–3	9.45+06	1.89−02	6.82−01	−1.246	C	LS
			3 654.996	3 656.037	105 470.93–132 822.95	5–3	6.28+05	7.55−04	4.54−02	−2.423	D	LS
66		$^1P^\circ-^1D$	3 703.221	3 704.274	106 920.56–133 916.40	3–5	3.23+07	1.11−01	4.05+00	−0.478	B	3
67	$3s4p-3s7s$	$^3P^\circ-^3S$	*3 025.42*	*3 026.31*	*105 456.3*–138 499.89	9–3	2.40+07	1.10−02	9.86−01	−1.004	E+	1
			3 026.765	3 027.646	105 470.93–138 499.89	5–3	1.33+07	1.10−02	5.48−01	−1.260	D	LS
			3 024.070	3 024.951	105 441.50–138 499.89	3–3	8.02+06	1.10−02	3.29−01	−1.481	E+	LS
			3 022.792	3 023.672	105 427.52–138 499.89	1–3	2.68+06	1.10−02	1.09−01	−1.959	E	LS
68	$3s4p-3s6d$	$^3P^\circ-^3D$	*2 996.85*	*2 997.72*	*105 456.3–138 815.0*	9–15	7.26+06	1.63−02	1.45+00	−0.834	D+	1
			2 998.149	2 999.023	105 470.93–138 815.12	5–7	7.26+06	1.37−02	6.76−01	−1.164	C	LS
			2 995.528	2 996.401	105 441.50–138 814.87	3–5	5.44+06	1.22−02	3.61−01	−1.437	D+	LS
			2 994.273	2 995.146	105 427.52–138 814.87	1–3	4.04+06	1.63−02	1.61−01	−1.788	D	LS
			2 998.172	2 999.046	105 470.93–138 814.87	5–5	1.81+06	2.44−03	1.20−01	−1.914	D	LS
			2 995.528	2 996.401	105 441.50–138 814.87	3–3	3.03+06	4.08−03	1.21−01	−1.912	D	LS
			2 998.172	2 999.046	105 470.93–138 814.87	5–3	2.01+05	1.63−04	8.05−03	−3.089	E+	LS
69		$^1P^\circ-^1D$	3 088.518	3 089.415	106 920.56–139 289.15	3–5	1.08+07	2.57−02	7.84−01	−1.113	C+	3
70	$3s5s-3s5p$	$^3S-^3P^\circ$	*17 781*	*17 786*	120 092.95–*125 715.4*	3–9	1.26+07	1.79+00	3.14+02	0.730	B+	1
			17 761.05	17 765.90	120 092.95–125 721.71	3–5	1.26+07	9.93−01	1.74+02	0.474	B+	LS
			17 801.8	17 806.7	120 092.95–125 708.828	3–3	1.25+07	5.95−01	1.05+02	0.252	B+	LS
			17 819.8	17 824.7	120 092.95–125 703.14	3–1	1.25+07	1.98−01	3.49+01	−0.226	B	LS
71		$^1S-^1P^\circ$		4 502.28 cm^{-1}	121 366.76–125 869.04	1–3	6.85+06	1.52+00	1.11+02	0.182	B+	3
72	$3s5s-3s6p$	$^3S-^3P^\circ$	*6 697.8*	*6 699.7*	120 092.95–*135 019.1*	3–9	2.74+05	5.52−03	3.66−01	−1.781	D	1
			6 696.40	6 698.25	120 092.95–135 022.23	3–5	2.74+05	3.07−03	2.03−01	−2.036	D+	LS
			6 699.31	6 701.16	120 092.95–135 015.73	3–3	2.73+05	1.84−03	1.22−01	−2.258	D	LS
			6 700.4	6 702.2	120 092.95–135 013.4	3–1	2.74+05	6.14−04	4.06−02	−2.735	D	LS
73		$^1S-^1P^\circ$	7 376.60	7 378.64	121 366.76–134 919.40	1–3	4.80+05	1.18−02	2.86−01	−1.928	C	3
74	$3s5s-3s7p$	$^1S-^1P^\circ$	5 388.692	5 390.191	121 366.76–139 918.98	1–3	1.43+06	1.87−02	3.33−01	−1.728	D+	3
75	$3s4d-3s4f$	$^3D-^3F^\circ$		*1 937.4* cm^{-1}	121 483.8–123 421.2	15–21	3.71+05	2.07−01	5.29+02	0.492	B+	1

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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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				1 939.86 cm^{-1}	121 483.50–123 423.36	7–9	3.73+05	1.91−01	2.27+02	0.126	B+	LS
				1 936.53 cm^{-1}	121 483.92–123 420.45	5–7	3.29+05	1.84−01	1.56+02	−0.036	B+	LS
				1 934.26 cm^{-1}	121 484.22–123 418.48	3–5	3.10+05	2.07−01	1.06+02	−0.207	B+	LS
				1 936.95 cm^{-1}	121 483.50–123 420.45	7–7	4.13+04	1.65−02	1.96+01	−0.937	B	LS
				1 934.56 cm^{-1}	121 483.92–123 418.48	5–5	5.77+04	2.31−02	1.97+01	−0.937	B	LS
				1 934.98 cm^{-1}	121 483.50–123 418.48	7–5	1.63+03	4.66−04	5.55−01	−2.487	C	LS
76	3*s*4*d*−3*s*5*p*	^{3}D−^{3}P°		*4 231.6* cm^{-1}	121 483.8–125 715.4	15–9	6.42+06	3.22−01	3.76+02	0.684	B+	1
				4 238.21 cm^{-1}	121 483.50–125 721.71	7–5	5.42+06	3.23−01	1.76+02	0.354	B+	LS
				4 224.91 cm^{-1}	121 483.92–125 708.828	5–3	4.78+06	2.41−01	9.39+01	0.081	B+	LS
				4 218.92 cm^{-1}	121 484.22–125 703.14	3–1	6.38+06	1.79−01	4.19+01	−0.270	B	LS
				4 237.79 cm^{-1}	121 483.92–125 721.71	5–5	9.67+05	8.07−02	3.13+01	−0.394	B	LS
				4 224.61 cm^{-1}	121 484.22–125 708.828	3–3	1.60+06	1.34−01	3.13+01	−0.396	B	LS
				4 237.49 cm^{-1}	121 484.22–125 721.71	3–5	6.45+04	8.97−03	2.09+00	−1.570	C	LS
77		^{1}D−^{1}P°		1 074.91 cm^{-1}	124 794.13–125 869.04	5–3	9.49+04	7.39−02	1.13+02	−0.432	B+	3
78	3*s*4*d*−3*s*5*f*	^{3}D−^{3}F°	*8 358.2*	*8 360.5*	*121 483.8–133 444.8*	15–21	4.27+07	6.26−01	2.58+02	0.973	B+	1
			8 354.32	8 356.61	121 483.50–133 450.07	7–9	4.27+07	5.75−01	1.11+02	0.605	B+	LS
			8 359.49	8 361.79	121 483.92–133 443.08	5–7	3.79+07	5.56−01	7.65+01	0.444	B+	LS
			8 363.46	8 365.76	121 484.22–133 437.71	3–5	3.58+07	6.26−01	5.17+01	0.274	B+	LS
			8 359.20	8 361.50	121 483.50–133 443.08	7–7	4.75+06	4.98−02	9.60+00	−0.458	B	LS
			8 363.25	8 365.55	121 483.92–133 437.71	5–5	6.64+06	6.97−02	9.60+00	−0.458	B	LS
			8 362.96	8 365.25	121 483.50–133 437.71	7–5	1.87+05	1.40−03	2.70−01	−2.009	D+	LS
79		^{1}D−^{1}F°	11 248.49	11 251.57	124 794.13–133 681.78	5–7	3.41+07	9.07−01	1.68+02	0.657	B+	3
80	3*s*4*d*−3*s*6*p*	^{3}D−^{3}P°	*7 386.1*	*7 388.1*	*121 483.8–135 019.1*	15–9	1.26+06	6.16−03	2.25+00	−1.034	D+	1
			7 384.18	7 386.22	121 483.50–135 022.23	7–5	1.06+06	6.17−03	1.05+00	−1.365	C	LS
			7 387.96	7 389.99	121 483.92–135 015.73	5–3	9.40+05	4.62−03	5.62−01	−1.636	C	LS
			7 389.4	7 391.4	121 484.22–135 013.4	3–1	1.25+06	3.42−03	2.50−01	−1.989	D+	LS
			7 384.41	7 386.45	121 483.92–135 022.23	5–5	1.88+05	1.54−03	1.87−01	−2.114	D+	LS
			7 388.12	7 390.16	121 484.22–135 015.73	3–3	3.14+05	2.57−03	1.88−01	−2.113	D+	LS
			7 384.58	7 386.61	121 484.22–135 022.23	3–5	1.25+04	1.71−04	1.25−02	−3.290	E+	LS
81		^{1}D−^{1}P°	9 873.57	9 876.28	124 794.13–134 919.40	5–3	2.01+06	1.77−02	2.87+00	−1.053	C+	3
82	3*s*4*d*−3*s*6*f*	^{3}D−^{3}F°	*5 860*	*5 861*	*121 483.8–138 545*	15–21	1.28+07	9.24−02	2.67+01	0.142	C+	1
			5 853.8	5 855.4	121 483.50–138 561.8	7–9	1.28+07	8.49−02	1.15+01	−0.226	C+	LS
			5 861.8	5 863.4	121 483.92–138 538.9	5–7	1.14+07	8.21−02	7.92+00	−0.387	C+	LS
			5 867.9	5 869.5	121 484.22–138 521.4	3–5	1.07+07	9.22−02	5.34+00	−0.558	C+	LS
			5 861.6	5 863.2	121 483.50–138 538.9	7–7	1.43+06	7.35−03	9.93−01	−1.289	C	LS
			5 867.8	5 869.4	121 483.92–138 521.4	5–5	1.99+06	1.03−02	9.95−01	−1.288	C	LS
			5 867.6	5 869.3	121 483.50–138 521.4	7–5	5.61+04	2.07−04	2.80−02	−2.839	E+	LS
83		^{1}D−^{1}F°	6 917.90	6 919.81	124 794.13–139 245.39	5–7	9.90+06	9.95−02	1.13+01	−0.303	B	3
84	3*s*4*d*−3*s*7*p*	^{1}D−^{1}P°	6 609.81	6 611.64	124 794.13–139 918.98	5–3	2.20+06	8.66−03	9.43−01	−1.364	D+	3
85	3*s*4*d*−3*s*7*f*	^{3}D−^{3}F°	*4 587.54*	*4 588.82*	*121 483.8–143 275.9*	15–21	1.00+07	4.43−02	1.00+01	−0.178	D+	1
			4 585.818	4 587.103	121 483.50–143 283.75	7–9	1.00+07	4.07−02	4.30+00	−0.545	D+	LS
			4 588.199	4 589.484	121 483.92–143 272.86	5–7	8.91+06	3.94−02	2.98+00	−0.706	D+	LS
			4 589.743	4 591.029	121 484.22–143 265.83	3–5	8.41+06	4.43−02	2.01+00	−0.876	D	LS
			4 588.110	4 589.396	121 483.50–143 272.86	7–7	1.12+06	3.53−03	3.73−01	−1.607	E+	LS
			4 589.680	4 590.966	121 483.92–143 265.83	5–5	1.56+06	4.93−03	3.73−01	−1.608	E+	LS
			4 589.591	4 590.877	121 483.50–143 265.83	7–5	4.40+04	9.94−05	1.05−02	−3.158	E	LS

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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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
86		^{1}D–^{1}F°	5 613.290	5 614.848	124 794.13–142 604.05	5–7	3.43+06	2.27−02	2.10+00	−0.945	C	3
87	3s4d–3s8f	^{3}D–^{3}F°	*4 227.31*	*4 228.51*	*121 483.8–145 132.8*	15–21	9.36+06	3.51−02	7.34+00	−0.279	D+	1
			4 226.816	4 228.006	121 483.50–145 135.31	7–9	9.37+06	3.23−02	3.15+00	−0.646	D+	LS
			4 227.495	4 228.686	121 483.92–145 131.93	5–7	8.31+06	3.12−02	2.17+00	−0.807	D+	LS
			4 227.981	4 229.172	121 484.22–145 129.51	3–5	7.85+06	3.51−02	1.47+00	−0.978	D	LS
			4 227.420	4 228.611	121 483.50–145 131.93	7–7	1.04+06	2.80−03	2.73−01	−1.708	E+	LS
			4 227.928	4 229.118	121 483.92–145 129.51	5–5	1.46+06	3.91−03	2.72−01	−1.709	E+	LS
			4 227.853	4 229.043	121 483.50–145 129.51	7–5	4.11+04	7.88−05	7.68−03	−3.258	E	LS
88	3s4d–3p4s	^{3}D–^{3}P°	*4 094.71*	*4 095.86*	*121 483.8–145 898.7*	15–9	7.13+05	1.08−03	2.18−01	−1.790	D	1
			4 084.141	4 085.294	121 483.50–145 961.54	7–5	6.04+05	1.08−03	1.02−01	−2.121	D	LS
			4 105.486	4 106.645	121 483.92–145 834.70	5–3	5.30+05	8.04−04	5.43−02	−2.396	D	LS
			4 115.432	4 116.593	121 484.22–145 776.15	3–1	7.01+05	5.94−04	2.42−02	−2.749	E+	LS
			4 084.212	4 085.365	121 483.92–145 961.54	5–5	1.08+05	2.69−04	1.81−02	−2.871	E+	LS
			4 105.537	4 106.695	121 484.22–145 834.70	3–3	1.77+05	4.47−04	1.81−02	−2.873	E+	LS
			4 084.262	4 085.415	121 484.22–145 961.54	3–5	7.17+03	2.99−05	1.21−03	−4.047	E	LS
89	3s4d–3s9f	^{3}D–^{3}F°	*3 996.06*	*3 997.19*	*121 483.8–146 501.4*	15–21	7.05+06	2.36−02	4.66+00	−0.451	E+	1
			3 995.837	3 996.967	121 483.50–146 502.47	7–9	7.05+06	2.17−02	2.00+00	−0.818	D	LS
			3 996.141	3 997.271	121 483.92–146 500.99	5–7	6.26+06	2.10−02	1.38+00	−0.979	E+	LS
			3 996.363	3 997.493	121 484.22–146 499.90	3–5	5.91+06	2.36−02	9.32−01	−1.150	E+	LS
			3 996.074	3 997.204	121 483.50–146 500.99	7–7	7.85+05	1.88−03	1.73−01	−1.881	E	LS
			3 996.315	3 997.445	121 483.92–146 499.90	5–5	1.10+06	2.63−03	1.73−01	−1.881	E	LS
			3 996.248	3 997.378	121 483.50–146 499.90	7–5	3.10+04	5.30−05	4.88−03	−3.431	E	LS
90	3s4f–3s4d	^{1}F°–^{1}D		1 323.6 cm^{-1}	123 470.5–124 794.13	7–5	1.79+05	1.09−01	1.90+02	−0.117	B+	3
91	3s4f–3s5d	^{3}F°–^{3}D	*10 633.5*	*10 636.4*	*123 421.2–132 822.9*	21–15	2.25+06	2.73−02	2.01+01	−0.242	C+	1
			10 635.92	10 638.83	123 423.36–132 822.89	9–7	2.07+06	2.73−02	8.61+00	−0.610	C+	LS
			10 632.73	10 635.64	123 420.45–132 822.80	7–5	2.00+06	2.42−02	5.93+00	−0.771	C+	LS
			10 630.33	10 633.24	123 418.48–132 822.95	5–3	2.25+06	2.29−02	4.01+00	−0.941	C+	LS
			10 632.62	10 635.54	123 420.45–132 822.89	7–7	1.79+05	3.04−03	7.45−01	−1.672	C	LS
			10 630.50	10 633.41	123 418.48–132 822.80	5–5	2.51+05	4.25−03	7.44−01	−1.673	C	LS
			10 630.40	10 633.31	123 418.48–132 822.89	5–7	5.06+03	1.20−04	2.10−02	−3.222	E+	LS
92		^{1}F°–^{1}D	9 570.5	9 573.1	123 470.5–133 916.40	7–5	3.87+05	3.80−03	8.38−01	−1.575	C+	3
93	3s4f–3s5g	^{3}F°–^{3}G	*9 289*	*9 291*	*123 421.2–134 184*	21–27	7.03+07	1.17+00	7.52+02	1.390	B+	1
			9 290.8	9 293.4	123 423.36–134 183.7	9–11	7.01+07	1.11+00	3.06+02	1.000	B+	LS
			9 288.3	9 290.9	123 420.45–134 183.7	7–9	6.61+07	1.10+00	2.36+02	0.886	B+	LS
			9 286.6	9 289.2	123 418.48–134 183.7	5–7	6.46+07	1.17+00	1.79+02	0.767	B+	LS
			9 290.8	9 293.4	123 423.36–134 183.7	9–9	4.40+06	5.70−02	1.57+01	−0.290	B	LS
			9 288.3	9 290.9	123 420.45–134 183.7	7–7	5.66+06	7.33−02	1.57+01	−0.290	B	LS
			9 290.8	9 293.4	123 423.36–134 183.7	9–7	8.62+04	8.68−04	2.39−01	−2.107	D+	LS
94		^{1}F°–^{1}G	9 331.7	9 334.3	123 470.5–134 183.7	7–9	7.15+07	1.20+00	2.58+02	0.924	B+	1
95	3s4f–3s6d	^{3}F°–^{3}D	*6 494.3*	*6 496.1*	*123 421.2–138 815.0*	21–15	9.59+05	4.33−03	1.95+00	−1.041	D+	1
			6 495.19	6 496.98	123 423.36–138 815.12	9–7	8.80+05	4.33−03	8.34−01	−1.409	C	LS
			6 494.07	6 495.86	123 420.45–138 814.87	7–5	8.52+05	3.85−03	5.76−01	−1.569	C	LS
			6 493.23	6 495.03	123 418.48–138 814.87	5–3	9.59+05	3.64−03	3.89−01	−1.740	D+	LS
			6 493.96	6 495.75	123 420.45–138 815.12	7–7	7.64+04	4.83−04	7.23−02	−2.471	D	LS
			6 493.23	6 495.03	123 418.48–138 814.87	5–5	1.07+05	6.76−04	7.23−02	−2.471	D	LS
			6 493.13	6 494.92	123 418.48–138 815.12	5–7	2.16+03	1.91−05	2.04−03	−4.020	E	LS

TABLE 8. Transition probabilities of allowed lines for Al II (references in this table are as follows: 1 = Butler *et al.*,[5,6] 2 = Tachiev and Froese Fischer,[70] 3 = Chang and Fang,[9] 4 = Weiss,[82] 5 = Chou *et al.*,[11] 6 = Sen and Puri,[64] and 7 = Träbert *et al.*[75])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
96		$^1F^\circ-^1D$	6 319.9	6 321.7	123 470.5–139 289.15	7–5	2.16+05	9.24−04	1.35−01	−2.189	C	3
97	$3s4f-3s6g$	$^3F^\circ-^3G$	*6 183*	*6 184*	*123 421.2–139 591*	21–27	2.61+07	1.92−01	8.23+01	0.606	B	1
			6 183.4	6 185.2	123 423.36–139 591.1	9–11	2.61+07	1.83−01	3.35+01	0.217	B	LS
			6 182.3	6 184.0	123 420.45–139 591.1	7–9	2.44+07	1.80−01	2.57+01	0.100	B	LS
			6 181.6	6 183.3	123 418.48–139 591.1	5–7	2.41+07	1.93−01	1.96+01	−0.015	B	LS
			6 183.4	6 185.2	123 423.36–139 591.1	9–9	1.63+06	9.37−03	1.72+00	−1.074	C	LS
			6 182.3	6 184.0	123 420.45–139 591.1	7–7	2.09+06	1.20−02	1.71+00	−1.076	C	LS
			6 183.4	6 185.2	123 423.36–139 591.1	9–7	3.21+04	1.43−04	2.62−02	−2.890	E+	LS
98		$^1F^\circ-^1G$	6 201.5	6 203.2	123 470.5–139 591.1	7–9	2.59+07	1.92−01	2.74+01	0.128	B	1
99	$3s4f-3s7g$	$^3F^\circ-^3G$	*5 145.1*	*5 146.5*	*123 421.2–142 852*	21–27	1.27+07	6.50−02	2.31+01	0.135	C	1
			5 145.71	5 147.15	123 423.36–142 851.6	9–11	1.27+07	6.18−02	9.42+00	−0.255	C	LS
			5 144.94	5 146.38	123 420.45–142 851.6	7–9	1.19+07	6.09−02	7.22+00	−0.370	C	LS
			5 144.42	5 145.85	123 418.48–142 851.6	5–7	1.17+07	6.51−02	5.51+00	−0.487	C	LS
			5 145.71	5 147.15	123 423.36–142 851.6	9–9	7.96+05	3.16−03	4.82−01	−1.546	E+	LS
			5 144.94	5 146.38	123 420.45–142 851.6	7–7	1.03+06	4.07−03	4.83−01	−1.545	E+	LS
			5 145.71	5 147.15	123 423.36–142 851.6	9–7	1.56+04	4.82−05	7.35−03	−3.363	E	LS
100		$^1F^\circ-^1G$	5 158.23	5 159.67	123 470.5–142 851.6	7–9	1.26+07	6.45−02	7.67+00	−0.345	C	1
101	$3s4f-3s8g$	$^3F^\circ-^3G$	*4 640.0*	*4 641.3*	*123 421.2–144 967*	21–27	7.25+06	3.01−02	9.65+00	−0.199	D+	1
			4 640.42	4 641.72	123 423.36–144 967.1	9–11	7.24+06	2.86−02	3.93+00	−0.589	D+	LS
			4 639.79	4 641.09	123 420.45–144 967.1	7–9	6.79+06	2.82−02	3.02+00	−0.705	D+	LS
			4 639.37	4 640.67	123 418.48–144 967.1	5–7	6.66+06	3.01−02	2.30+00	−0.822	D+	LS
			4 640.42	4 641.72	123 423.36–144 967.1	9–9	4.52+05	1.46−03	2.01−01	−1.881	E+	LS
			4 639.79	4 641.09	123 420.45–144 967.1	7–7	5.82+05	1.88−03	2.01−01	−1.881	E+	LS
			4 640.42	4 641.72	123 423.36–144 967.1	9–7	8.88+03	2.23−05	3.07−03	−3.697	E	LS
102	$3s4f-3s9g$	$^3F^\circ-^3G$	*4 347.4*	*4 348.6*	*123 421.2–146 417*	21–27	4.56+06	1.66−02	5.00+00	−0.458	E+	1
			4 347.83	4 349.05	123 423.36–146 416.9	9–11	4.56+06	1.58−02	2.04+00	−0.847	D	LS
			4 347.28	4 348.50	123 420.45–146 416.9	7–9	4.28+06	1.56−02	1.56+00	−0.962	E+	LS
			4 346.90	4 348.12	123 418.48–146 416.9	5–7	4.18+06	1.66−02	1.19+00	−1.081	E+	LS
			4 347.83	4 349.05	123 423.36–146 416.9	9–9	2.85+05	8.09−04	1.04−01	−2.138	E	LS
			4 347.28	4 348.50	123 420.45–146 416.9	7–7	3.67+05	1.04−03	1.04−01	−2.138	E	LS
			4 347.83	4 349.05	123 423.36–146 416.9	9–7	5.58+03	1.23−05	1.58−03	−3.956	E	LS
103	$3s5p-3s6s$	$^3P^\circ-^3S$	*15 380.0*	*15 384.4*	*125 715.4–132 215.51*	9–3	3.13+07	3.70−01	1.69+02	0.522	B+	1
			15 395.10	15 399.30	125 721.71–132 215.51	5–3	1.73+07	3.70−01	9.38+01	0.267	B+	LS
			15 364.62	15 368.82	125 708.828–132 215.51	3–3	1.04+07	3.70−01	5.62+01	0.045	B+	LS
			15 351.20	15 355.39	125 703.14–132 215.51	1–3	3.50+06	3.71−01	1.88+01	−0.431	B	LS
104		$^1P^\circ-^1S$	14 468.58	14 472.53	125 869.04–132 778.68	3–1	3.05+07	3.19−01	4.56+01	−0.019	B+	3
105	$3s5p-3s5d$	$^3P^\circ-^3D$	*14 065.8*	*14 069.6*	*125 715.4–132 822.9*	9–15	2.82+07	1.40+00	5.82+02	1.100	B+	1
			14 078.32	14 082.17	125 721.71–132 822.89	5–7	2.81+07	1.17+00	2.71+02	0.767	B+	LS
			14 053.00	14 056.84	125 708.828–132 822.80	3–5	2.13+07	1.05+00	1.46+02	0.498	B+	LS
			14 041.48	14 045.32	125 703.14–132 822.95	1–3	1.58+07	1.40+00	6.47+01	0.146	B+	LS
			14 078.50	14 082.35	125 721.71–132 822.80	5–5	7.03+06	2.09−01	4.84+01	0.019	B+	LS
			14 052.71	14 056.55	125 708.828–132 822.95	3–3	1.18+07	3.50−01	4.86+01	0.021	B+	LS
			14 078.20	14 082.05	125 721.71–132 822.95	5–3	7.85+05	1.40−02	3.25+00	−1.155	C+	LS
106		$^1P^\circ-^1D$	12 423.04	12 426.44	125 869.04–133 916.40	3–5	2.65+07	1.02+00	1.25+02	0.486	B+	3
107	$3s5p-3s7s$	$^3P^\circ-^3S$	*7 819.8*	*7 822.0*	*125 715.4–138 499.89*	9–3	1.39+07	4.24−02	9.84+00	−0.418	D+	1

TABLE 8. Transition probabilities of allowed lines for Al II (references in this table are as follows: 1=Butler *et al.*,[5,6] 2=Tachiev and Froese Fischer,[70] 3=Chang and Fang,[9] 4=Weiss,[82] 5=Chou *et al.*,[11] 6=Sen and Puri,[64] and 7=Träbert *et al.*[75])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
			7 823.69	7 825.84	125 721.71–138 499.89	5–3	7.70+06	4.24−02	5.46+00	−0.674	C	LS
			7 815.81	7 817.96	125 708.828–138 499.89	3–3	4.64+06	4.25−02	3.28+00	−0.894	D+	LS
			7 812.33	7 814.48	125 703.14–138 499.89	1–3	1.55+06	4.25−02	1.09+00	−1.372	D	LS
108		$^1P^\circ-^1S$	7 730.89	7 733.02	125 869.04–138 800.60	3–1	1.43+07	4.28−02	3.27+00	−0.891	D+	1
109	$3s5p-3s6d$	$^3P^\circ-^3D$	*7 631.7*	*7 633.8*	*125 715.4–138 815.0*	9–15	8.26+06	1.20−01	2.72+01	0.033	C+	1
			7 635.33	7 637.43	125 721.71–138 815.12	5–7	8.25+06	1.01−01	1.27+01	−0.297	B	LS
			7 627.97	7 630.07	125 708.828–138 814.87	3–5	6.20+06	9.02−02	6.80+00	−0.568	C+	LS
			7 624.66	7 626.76	125 703.14–138 814.87	1–3	4.59+06	1.20−01	3.01+00	−0.921	C+	LS
			7 635.47	7 637.58	125 721.71–138 814.87	5–5	2.06+06	1.80−02	2.26+00	−1.046	C	LS
			7 627.97	7 630.07	125 708.828–138 814.87	3–3	3.45+06	3.01−02	2.27+00	−1.044	C	LS
			7 635.47	7 637.58	125 721.71–138 814.87	5–3	2.29+05	1.20−03	1.51−01	−2.222	D	LS
110		$^1P^\circ-^1D$	7 449.45	7 451.50	125 869.04–139 289.15	3–5	1.16+07	1.61−01	1.19+01	−0.316	B+	3
111	$3s5p-3s8s$	$^3P^\circ-^3S$	*6 070.9*	*6 072.6*	*125 715.4–142 182.94*	9–3	7.98+06	1.47−02	2.64+00	−0.878	D	1
			6 073.20	6 074.88	125 721.71–142 182.94	5–3	4.43+06	1.47−02	1.47+00	−1.134	D	LS
			6 068.45	6 070.13	125 708.828–142 182.94	3–3	2.66+06	1.47−02	8.81−01	−1.356	D	LS
			6 066.36	6 068.03	125 703.14–142 182.94	1–3	8.88+05	1.47−02	2.94−01	−1.833	E+	LS
112		$^1P^\circ-^1S$	6 061.13	6 062.80	125 869.04–142 363.06	3–1	8.38+06	1.54−02	9.22−01	−1.335	D	1
113	$3s5p-3s7d$	$^3P^\circ-^3D$	*6 004.2*	*6 005.9*	*125 715.4–142 365.8*	9–15	3.71+06	3.35−02	5.96+00	−0.521	D	1
			6 006.41	6 008.07	125 721.71–142 365.98	5–7	3.71+06	2.81−02	2.78+00	−0.852	D+	LS
			6 001.87	6 003.53	125 708.828–142 365.69	3–5	2.79+06	2.51−02	1.49+00	−1.123	D	LS
			5 999.87	6 001.54	125 703.14–142 365.54	1–3	2.07+06	3.35−02	6.62−01	−1.475	D	LS
			6 006.51	6 008.18	125 721.71–142 365.69	5–5	9.28+05	5.02−03	4.96−01	−1.600	E+	LS
			6 001.92	6 003.59	125 708.828–142 365.54	3–3	1.55+06	8.38−03	4.97−01	−1.600	E+	LS
			6 006.57	6 008.23	125 721.71–142 365.54	5–3	1.03+05	3.35−04	3.31−02	−2.776	E	LS
114		$^1P^\circ-^1D$	5 971.98	5 973.63	125 869.04–142 609.27	3–5	5.81+06	5.18−02	3.06+00	−0.809	D+	1
115	$3s5p-3s8d$	$^3P^\circ-^3D$	*5 282.01*	*5 283.49*	*125 715.4–144 642.3*	9–15	1.99+06	1.39−02	2.18+00	−0.903	E+	1
			5 283.735	5 285.206	125 721.71–144 642.45	5–7	2.00+06	1.17−02	1.02+00	−1.233	D	LS
			5 280.216	5 281.685	125 708.828–144 642.18	3–5	1.49+06	1.04−02	5.43−01	−1.506	E+	LS
			5 278.68	5 280.15	125 703.14–144 642.0	1–3	1.11+06	1.39−02	2.42−01	−1.857	E+	LS
			5 283.811	5 285.281	125 721.71–144 642.18	5–5	4.99+05	2.09−03	1.82−01	−1.981	E+	LS
			5 280.27	5 281.74	125 708.828–144 642.0	3–3	8.32+05	3.48−03	1.82−01	−1.981	E+	LS
			5 283.86	5 285.33	125 721.71–144 642.0	5–3	5.53+04	1.39−04	1.21−02	−3.158	E	LS
116		$^1P^\circ-^1D$	5 285.844	5 287.315	125 869.04–144 782.23	3–5	3.28+06	2.29−02	1.20+00	−1.163	D	1
117	$3s6s-3s6p$	$^3S-^3P^\circ$		*2 803.6* cm^{-1}	132 215.51–135 019.1	3–9	3.87+06	2.22+00	7.80+02	0.823	B+	1
				2 806.72 cm^{-1}	132 215.51–135 022.23	3–5	3.88+06	1.23+00	4.33+02	0.567	B+	LS
				2 800.22 cm^{-1}	132 215.51–135 015.73	3–3	3.87+06	7.39−01	2.61+02	0.346	B+	LS
				2 797.9 cm^{-1}	132 215.51–135 013.4	3–1	3.85+06	2.46−01	8.68+01	−0.132	B+	LS
118		$^1S-^1P^\circ$		2 140.72 cm^{-1}	132 778.68–134 919.40	1–3	1.85+06	1.82+00	2.79+02	0.260	B+	3
119	$3s6s-3s7p$	$^3S-^3P^\circ$	*12 690*	*12 693*	132 215.51–140 094	3–9	1.44+05	1.04−02	1.31+00	−1.506	E+	1
			12 686.6	12 690.0	132 215.51–140 095.7	3–5	1.44+05	5.80−03	7.27−01	−1.759	D	LS
			12 692.7	12 696.2	132 215.51–140 091.9	3–3	1.44+05	3.48−03	4.36−01	−1.981	E+	LS
			12 695.8	12 699.2	132 215.51–140 090.0	3–1	1.44+05	1.16−03	1.45−01	−2.458	E	LS
120		$^1S-^1P^\circ$	14 001.19	14 005.01	132 778.68–139 918.98	1–3	2.13+05	1.88−02	8.66−01	−1.726	C	3
121	$3s6s-3s8p$	$^1S-^1P^\circ$	9 818.06	9 820.75	132 778.68–142 961.20	1–3	4.38+05	1.90−02	6.14−01	−1.721	D	1

TABLE 8. Transition probabilities of allowed lines for Al II (references in this table are as follows: 1=Butler *et al.*,[5,6] 2=Tachiev and Froese Fischer,[70] 3=Chang and Fang,[9] 4=Weiss,[82] 5=Chou *et al.*,[11] 6=Sen and Puri,[64] and 7=Träbert *et al.*[75])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
122	$3s6s-3p4s$	^{3}S–^{3}P°	*7 306.2*	*7 308.2*	132 215.51–*145 898.7*	3–9	1.48+05	3.55−03	2.56−01	−1.973	D	1
			7 272.82	7 274.83	132 215.51–*145 961.54*	3–5	1.50+05	1.98−03	1.42−01	−2.226	D	LS
			7 340.56	7 342.58	132 215.51–145 834.70	3–3	1.46+05	1.18−03	8.56−02	−2.451	D	LS
			7 372.25	7 374.28	132 215.51–145 776.15	3–1	1.44+05	3.91−04	2.85−02	−2.931	E+	LS
123	$3s5d-3s5f$	^{3}D–^{3}F°		*621.9* cm^{-1}	*132 822.9–133 444.8*	15–21	3.99+04	2.16−01	1.72+03	0.511	B+	1
				627.18 cm^{-1}	132 822.89–133 450.07	7–9	4.08+04	2.00−01	7.35+02	0.146	B+	LS
				620.28 cm^{-1}	132 822.80–133 443.08	5–7	3.52+04	1.92−01	5.10+02	−0.018	B+	LS
				614.76 cm^{-1}	132 822.95–133 437.71	3–5	3.24+04	2.14−01	3.44+02	−0.192	B+	LS
				620.19 cm^{-1}	132 822.89–133 443.08	7–7	4.41+03	1.72−02	6.39+01	−0.919	B+	LS
				614.91 cm^{-1}	132 822.80–133 437.71	5–5	6.00+03	2.38−02	6.37+01	−0.924	B+	LS
				614.82 cm^{-1}	132 822.89–133 437.71	7–5	1.69+02	4.80−04	1.80+00	−2.474	C	LS
124	$3s5d-3s6p$	^{3}D–^{3}P°		*2 196.2* cm^{-1}	*132 822.9–135 019.1*	15–9	2.59+06	4.82−01	1.08+03	0.859	B+	1
				2 199.34 cm^{-1}	132 822.89–135 022.23	7–5	2.18+06	4.83−01	5.06+02	0.529	B+	LS
				2 192.93 cm^{-1}	132 822.80–135 015.73	5–3	1.93+06	3.61−01	2.71+02	0.256	B+	LS
				2 190.4 cm^{-1}	132 822.95–135 013.4	3–1	2.56+06	2.67−01	1.20+02	−0.096	B+	LS
				2 199.43 cm^{-1}	132 822.80–135 022.23	5–5	3.90+05	1.21−01	9.06+01	−0.218	B+	LS
				2 192.78 cm^{-1}	132 822.95–135 015.73	3–3	6.45+05	2.01−01	9.05+01	−0.220	B+	LS
				2 199.28 cm^{-1}	132 822.95–135 022.23	3–5	2.59+04	1.34−02	6.02+00	−1.396	C+	LS
125		^{1}D–^{1}P°		1 003.00 cm^{-1}	133 916.40–134 919.40	5–3	2.75+05	2.46−01	4.04+02	0.090	B+	3
126	$3s5d-3s6f$	^{3}D–^{3}F°	*17 473*	*17 476*	*132 822.9–138 545*	15–21	1.23+07	7.86−01	6.79+02	1.072	B+	1
			17 420.2	17 424.9	132 822.89–138 561.8	7–9	1.24+07	7.24−01	2.91+02	0.705	B+	LS
			17 489.7	17 494.4	132 822.80–138 538.9	5–7	1.09+07	6.98−01	2.01+02	0.543	B+	LS
			17 543.8	17 548.6	132 822.95–138 521.4	3–5	1.02+07	7.83−01	1.36+02	0.371	B+	LS
			17 489.9	17 494.7	132 822.89–138 538.9	7–7	1.36+06	6.25−02	2.52+01	−0.359	B	LS
			17 543.4	17 548.2	132 822.80–138 521.4	5–5	1.89+06	8.72−02	2.52+01	−0.361	B	LS
			17 543.7	17 548.4	132 822.89–138 521.4	7–5	5.34+04	1.76−03	7.12−01	−1.909	D+	LS
127		^{1}D–^{1}F°	18 760.2	18 765.3	133 916.40–139 245.39	5–7	1.23+07	9.08−01	2.80+02	0.657	B+	3
128	$3s5d-3s7p$	^{3}D–^{3}P°	*13 750*	*13 753*	*132 822.9–140 094*	15–9	4.90+05	8.34−03	5.66+00	−0.903	D	1
			13 746.1	13 749.8	132 822.89–140 095.7	7–5	4.12+05	8.34−03	2.64+00	−1.234	D+	LS
			13 753.1	13 756.9	132 822.80–140 091.9	5–3	3.67+05	6.25−03	1.42+00	−1.505	D	LS
			13 757.0	13 760.7	132 822.95–140 090.0	3–1	4.89+05	4.63−03	6.29−01	−1.857	D	LS
			13 745.9	13 749.7	132 822.80–140 095.7	5–5	7.34+04	2.08−03	4.71−01	−1.983	E+	LS
			13 753.4	13 757.1	132 822.95–140 091.9	3–3	1.22+05	3.47−03	4.71−01	−1.983	E+	LS
			13 746.2	13 750.0	132 822.95–140 095.7	3–5	4.91+03	2.32−04	3.15−02	−3.157	E	LS
129		^{1}D–^{1}P°	16 654.95	16 659.50	133 916.40–139 918.98	5–3	4.36+05	1.09−02	2.98+00	−1.264	C+	3
130	$3s5d-3p3d$	^{3}D–^{3}F°	*12 051.7*	*12 055.0*	*132 822.9–141 118.2*	15–21	5.11+05	1.56−02	9.28+00	−0.631	D+	1
			12 015.71	12 019.00	132 822.89–141 143.05	7–9	5.17+05	1.44−02	3.99+00	−0.997	D+	LS
			12 063.41	12 066.71	132 822.80–141 110.06	5–7	4.52+05	1.38−02	2.74+00	−1.161	D+	LS
			12 100.38	12 103.69	132 822.95–141 084.89	3–5	4.23+05	1.55−02	1.85+00	−1.333	D	LS
			12 063.54	12 066.85	132 822.89–141 110.06	7–7	5.68+04	1.24−03	3.45−01	−2.061	E+	LS
			12 100.16	12 103.48	132 822.80–141 084.89	5–5	7.88+04	1.73−03	3.45−01	−2.063	E+	LS
			12 100.30	12 103.61	132 822.89–141 084.89	7–5	2.22+03	3.48−05	9.71−03	−3.613	E	LS
131	$3s5d-3s7f$	^{3}D–^{3}F°	*9 564.0*	*9 566.6*	*132 822.9–143 275.9*	15–21	1.90+06	3.66−02	1.73+01	−0.260	D+	1
			9 556.82	9 559.44	132 822.89–143 283.75	7–9	1.91+06	3.36−02	7.40+00	−0.629	C	LS
			9 566.70	9 569.32	132 822.80–143 272.86	5–7	1.69+06	3.25−02	5.12+00	−0.789	D+	LS
			9 573.28	9 575.90	132 822.95–143 265.83	3–5	1.60+06	3.66−02	3.46+00	−0.959	D+	LS

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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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
			9 566.78	9 569.41	132 822.89–143 272.86	7–7	2.12+05	2.91−03	6.42−01	−1.691	E+	LS
			9 573.14	9 575.76	132 822.80–143 265.83	5–5	2.96+05	4.07−03	6.42−01	−1.691	E+	LS
			9 573.22	9 575.85	132 822.89–143 265.83	7–5	8.36+03	8.21−05	1.81−02	−3.241	E	LS
132		^{1}D–^{1}F°	11 507.44	11 510.59	133 916.40–142 604.05	5–7	6.20+06	1.72−01	3.27+01	−0.066	B	3
133	3*s*5*d*–3*s*8*p*	^{1}D–^{1}P°	11 053.05	11 056.08	133 916.40–142 961.20	5–3	5.32+05	5.85−03	1.06+00	−1.534	D	1
134	3*s*5*d*–3*s*8*f*	^{3}D–^{3}F°	*8 121.3*	*8 123.5*	*132 822.9–145 132.8*	15–21	2.91+06	4.03−02	1.62+01	−0.219	D+	1
			8 119.65	8 121.88	132 822.89–145 135.31	7–9	2.91+06	3.70−02	6.93+00	−0.587	C	LS
			8 121.82	8 124.05	132 822.80–145 131.93	5–7	2.58+06	3.58−02	4.79+00	−0.747	C	LS
			8 123.51	8 125.75	132 822.95–145 129.51	3–5	2.44+06	4.03−02	3.23+00	−0.918	D+	LS
			8 121.88	8 124.11	132 822.89–145 131.93	7–7	3.24+05	3.21−03	6.01−01	−1.648	D	LS
			8 123.41	8 125.65	132 822.80–145 129.51	5–5	4.54+05	4.49−03	6.01−01	−1.649	D	LS
			8 123.47	8 125.71	132 822.89–145 129.51	7–5	1.28+04	9.05−05	1.69−02	−3.198	E	LS
135		^{1}D–^{1}F°	9 198.76	9 201.28	133 916.40–144 784.45	5–7	3.42+06	6.08−02	9.21+00	−0.517	C	1
136	3*s*5*d*–3*p*4*s*	^{3}D–^{3}P°	*7 645.6*	*7 647.7*	*132 822.9–145 898.7*	15–9	2.02+05	1.07−03	4.02−01	−1.795	D	1
			7 609.04	7 611.13	132 822.89–145 961.54	7–5	1.72+05	1.07−03	1.88−01	−2.126	D+	LS
			7 683.16	7 685.27	132 822.80–145 834.70	5–3	1.50+05	7.95−04	1.01−01	−2.401	D	LS
			7 717.98	7 720.10	132 822.95–145 776.15	3–1	1.97+05	5.86−04	4.47−02	−2.755	D	LS
			7 608.99	7 611.08	132 822.80–145 961.54	5–5	3.09+04	2.68−04	3.36−02	−2.873	E+	LS
			7 683.25	7 685.36	132 822.95–145 834.70	3–3	4.99+04	4.42−04	3.35−02	−2.877	E+	LS
			7 609.07	7 611.17	132 822.95–145 961.54	3–5	2.05+03	2.97−05	2.23−03	−4.050	E	LS
137	3*s*5*d*–3*s*9*f*	^{3}D–^{3}F°	*7 308.7*	*7 310.7*	*132 822.9–146 501.4*	15–21	2.56+06	2.87−02	1.04+01	−0.366	D	1
			7 308.15	7 310.17	132 822.89–146 502.47	7–9	2.56+06	2.64−02	4.45+00	−0.733	D	LS
			7 308.90	7 310.91	132 822.80–146 500.99	5–7	2.27+06	2.55−02	3.07+00	−0.894	D	LS
			7 309.56	7 311.57	132 822.95–146 499.90	3–5	2.15+06	2.87−02	2.07+00	−1.065	D	LS
			7 308.94	7 310.96	132 822.89–146 500.99	7–7	2.85+05	2.28−03	3.84−01	−1.797	E	LS
			7 309.48	7 311.49	132 822.80–146 499.90	5–5	3.99+05	3.20−03	3.85−01	−1.796	E	LS
			7 309.53	7 311.54	132 822.89–146 499.90	7–5	1.12+04	6.44−05	1.09−02	−3.346	E	LS
138		^{1}D–^{1}F°	8 086.89	8 089.11	133 916.40–146 278.70	5–7	2.02+06	2.77−02	3.69+00	−0.859	D	1
139	3*s*5*f*–3*s*5*d*	^{1}F°–^{1}D		234.62 cm^{-1}	133 681.78–133 916.40	7–5	5.59+03	1.09−01	1.07+03	−0.117	A	3
140	3*s*5*f*–3*s*5*g*	^{3}F°–^{3}G		*739* cm^{-1}	*133 444.8–134 184*	21–27	4.66+04	1.65−01	1.54+03	0.540	B+	1
				733.6 cm^{-1}	133 450.07–134 183.7	9–11	4.55+04	1.55−01	6.26+02	0.145	B+	LS
				740.6 cm^{-1}	133 443.08–134 183.7	7–9	4.41+04	1.55−01	4.82+02	0.035	B+	LS
				746.0 cm^{-1}	133 437.71–134 183.7	5–7	4.40+04	1.66−01	3.66+02	−0.081	B+	LS
				733.6 cm^{-1}	133 450.07–134 183.7	9–9	2.85+03	7.95−03	3.21+01	−1.145	B	LS
				740.6 cm^{-1}	133 443.08–134 183.7	7–7	3.77+03	1.03−02	3.20+01	−1.142	B	LS
				733.6 cm^{-1}	133 450.07–134 183.7	9–7	5.59+01	1.21−04	4.89−01	−2.963	D+	LS
141		^{1}F°–^{1}G		501.9 cm^{-1}	133 681.78–134 183.7	7–9	1.52+04	1.16−01	5.33+02	−0.090	B+	1
142	3*s*5*f*–3*s*6*d*	^{3}F°–^{3}D	*18 616*	*18 621*	*133 444.8–138 815.0*	21–15	1.13+06	4.19−02	5.39+01	−0.056	B	1
			18 634.1	18 639.2	133 450.07–138 815.12	9–7	1.03+06	4.18−02	2.31+01	−0.425	B	LS
			18 610.7	18 615.8	133 443.08–138 814.87	7–5	1.00+06	3.72−02	1.60+01	−0.584	B	LS
			18 592.1	18 597.2	133 437.71–138 814.87	5–3	1.13+06	3.52−02	1.08+01	−0.754	B	LS
			18 609.8	18 614.9	133 443.08–138 815.12	7–7	8.99+04	4.67−03	2.00+00	−1.486	C	LS
			18 592.1	18 597.2	133 437.71–138 814.87	5–5	1.26+05	6.54−03	2.00+00	−1.485	C	LS
			18 591.2	18 596.3	133 437.71–138 815.12	5–7	2.55+03	1.85−04	5.66−02	−3.034	D	LS
143		^{1}F°–^{1}D	17 828.8	17 833.7	133 681.78–139 289.15	7–5	5.69+05	1.94−02	7.96+00	−0.867	B	3

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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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
144	$3s5f-3s6g$	$^3F^{\circ}-^3G$	*16 265*	*16 270*	*133 444.8–139 591*	21–27	1.54+07	7.84−01	8.82+02	1.217	B+	1
			16 279.5	16 283.9	133 450.07–139 591.1	9–11	1.53+07	7.45−01	3.59+02	0.826	B+	LS
			16 261.0	16 265.4	133 443.08–139 591.1	7–9	1.44+07	7.35−01	2.76+02	0.711	B+	LS
			16 246.8	16 251.2	133 437.71–139 591.1	5–7	1.42+07	7.85−01	2.10+02	0.594	B+	LS
			16 279.5	16 283.9	133 450.07–139 591.1	9–9	9.58+05	3.81−02	1.84+01	−0.465	B	LS
			16 261.0	16 265.4	133 443.08–139 591.1	7–7	1.24+06	4.91−02	1.84+01	−0.464	B	LS
			16 279.5	16 283.9	133 450.07–139 591.1	9–7	1.88+04	5.81−04	2.80−01	−2.282	D+	LS
145		$^1F^{\circ}-^1G$	16 917.8	16 922.4	133 681.78–139 591.1	7–9	1.71+07	9.42−01	3.67+02	0.819	B+	1
146	$3s5f-3s7d$	$^3F^{\circ}-^3D$	*11 206.4*	*11 209.5*	*133 444.8–142 365.8*	21–15	5.20+05	7.00−03	5.42+00	−0.833	D	1
			11 212.83	11 215.91	133 450.07–142 365.98	9–7	4.77+05	6.99−03	2.32+00	−1.201	D+	LS
			11 204.41	11 207.48	133 443.08–142 365.69	7–5	4.62+05	6.22−03	1.61+00	−1.361	D	LS
			11 197.86	11 200.93	133 437.71–142 365.54	5–3	5.21+05	5.88−03	1.08+00	−1.532	D	LS
			11 204.05	11 207.12	133 443.08–142 365.98	7–7	4.14+04	7.80−04	2.01−01	−2.263	E+	LS
			11 197.68	11 200.74	133 437.71–142 365.69	5–5	5.80+04	1.09−03	2.01−01	−2.264	E+	LS
			11 197.31	11 200.38	133 437.71–142 365.98	5–7	1.17+03	3.08−05	5.68−03	−3.812	E	LS
147		$^1F^{\circ}-^1D$	11 198.29	11 201.36	133 681.78–142 609.27	7–5	3.09+05	4.15−03	1.07+00	−1.537	D	1
148	$3s5f-3s7g$	$^3F^{\circ}-^3G$	*10 628*	*10 630*	*133 444.8–142 852*	21–27	9.51+06	2.07−01	1.52+02	0.638	C+	1
			10 633.7	10 636.6	133 450.07–142 851.6	9–11	9.50+06	1.97−01	6.21+01	0.249	C+	LS
			10 625.8	10 628.7	133 443.08–142 851.6	7–9	8.91+06	1.94−01	4.75+01	0.133	C+	LS
			10 619.7	10 622.6	133 437.71–142 851.6	5–7	8.74+06	2.07−01	3.62+01	0.015	C+	LS
			10 633.7	10 636.6	133 450.07–142 851.6	9–9	5.95+05	1.01−02	3.18+00	−1.041	D+	LS
			10 625.8	10 628.7	133 443.08–142 851.6	7–7	7.62+05	1.29−02	3.16+00	−1.044	D+	LS
			10 633.7	10 636.6	133 450.07–142 851.6	9–7	1.16+04	1.53−04	4.82−02	−2.861	E	LS
149		$^1F^{\circ}-^1G$	10 902.4	10 905.3	133 681.78–142 851.6	7–9	9.82+06	2.25−01	5.65+01	0.197	C+	1
150	$3s5f-3s8d$	$^3F^{\circ}-^3D$	*8 928.1*	*8 930.6*	*133 444.8–144 642.3*	21–15	2.75+05	2.35−03	1.45+00	−1.307	E+	1
			8 932.20	8 934.65	133 450.07–144 642.45	9–7	2.52+05	2.35−03	6.22−01	−1.675	D	LS
			8 926.84	8 929.29	133 443.08–144 642.18	7–5	2.45+05	2.09−03	4.30−01	−1.835	E+	LS
			8 922.7	8 925.2	133 437.71–144 642.0	5–3	2.75+05	1.97−03	2.89−01	−2.007	E+	LS
			8 926.62	8 929.07	133 443.08–144 642.45	7–7	2.19+04	2.62−04	5.39−02	−2.737	E	LS
			8 922.56	8 925.01	133 437.71–144 642.18	5–5	3.07+04	3.67−04	5.39−02	−2.736	E	LS
			8 922.34	8 924.79	133 437.71–144 642.45	5–7	6.16+02	1.03−05	1.51−03	−4.288	E	LS
151	$3s5f-3s8g$	$^3F^{\circ}-^3G$	*8 676*	*8 679*	*133 444.8–144 967*	21–27	6.00+06	8.71−02	5.23+01	0.262	C	1
			8 680.4	8 682.8	133 450.07–144 967.1	9–11	5.99+06	8.28−02	2.13+01	−0.128	C+	LS
			8 675.1	8 677.5	133 443.08–144 967.1	7–9	5.62+06	8.16−02	1.63+01	−0.243	C	LS
			8 671.1	8 673.5	133 437.71–144 967.1	5–7	5.52+06	8.72−02	1.24+01	−0.361	C	LS
			8 680.4	8 682.8	133 450.07–144 967.1	9–9	3.75+05	4.24−03	1.09+00	−1.418	D	LS
			8 675.1	8 677.5	133 443.08–144 967.1	7–7	4.83+05	5.45−03	1.09+00	−1.419	D	LS
			8 680.4	8 682.8	133 450.07–144 967.1	9–7	7.34+03	6.45−05	1.66−02	−3.236	E	LS
152	$3s5f-3s9g$	$^3F^{\circ}-^3G$	*7 707*	*7 709*	*133 444.8–146 417*	21–27	4.00+06	4.59−02	2.44+01	−0.016	D+	1
			7 709.9	7 712.0	133 450.07–146 416.9	9–11	4.00+06	4.36−02	9.96+00	−0.406	D+	LS
			7 705.7	7 707.8	133 443.08–146 416.9	7–9	3.75+06	4.30−02	7.64+00	−0.521	D+	LS
			7 702.5	7 704.6	133 437.71–146 416.9	5–7	3.68+06	4.59−02	5.82+00	−0.639	D+	LS
			7 709.9	7 712.0	133 450.07–146 416.9	9–9	2.50+05	2.23−03	5.10−01	−1.697	E	LS
			7 705.7	7 707.8	133 443.08–146 416.9	7–7	3.22+05	2.87−03	5.10−01	−1.697	E	LS
			7 709.9	7 712.0	133 450.07–146 416.9	9–7	4.90+03	3.40−05	7.77−03	−3.514	E	LS
153	$3s5f-3s10g$	$^3F^{\circ}-^3G$	*7 137*	*7 139*	*133 444.8–147 453*	21–27	2.82+06	2.77−02	1.37+01	−0.235	D	1

TABLE 8. Transition probabilities of allowed lines for Al II (references in this table are as follows: 1=Butler *et al.*,[5,6] 2=Tachiev and Froese Fischer,[70] 3 =Chang and Fang,[9] 4=Weiss,[82] 5=Chou *et al.*,[11] 6=Sen and Puri,[64] and 7=Träbert *et al.*[75])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
			7 139.2	7 141.2	133 450.07–147 453.4	9–11	2.81+06	2.63−02	5.56+00	−0.626	D	LS
			7 135.6	7 137.6	133 443.08–147 453.4	7–9	2.64+06	2.59−02	4.26+00	−0.742	D	LS
			7 132.9	7 134.9	133 437.71–147 453.4	5–7	2.59+06	2.77−02	3.25+00	−0.859	D	LS
			7 139.2	7 141.2	133 450.07–147 453.4	9–9	1.75+05	1.34−03	2.84−01	−1.919	E	LS
			7 135.6	7 137.6	133 443.08–147 453.4	7–7	2.27+05	1.73−03	2.85−01	−1.917	E	LS
			7 139.2	7 141.2	133 450.07–147 453.4	9–7	3.45+03	2.05−05	4.34−03	−3.734	E	LS
154		$^1F^\circ-^1G$	7 259.3	7 261.3	133 681.78–147 453.4	7–9	2.68+06	2.72−02	4.55+00	−0.720	D	1
155	$3s5g-3s6f$	$^3G-^3F^\circ$		*4 361* cm^{-1}	*134 184–138 545*	27–21	8.65+05	5.31−02	1.08+02	0.156	B	1
				4 378.1 cm^{-1}	134 183.7–138 561.8	11–9	8.33+05	5.33−02	4.41+01	−0.232	B	LS
				4 355.2 cm^{-1}	134 183.7–138 538.9	9–7	8.07+05	4.96−02	3.37+01	−0.350	B	LS
				4 337.7 cm^{-1}	134 183.7–138 521.4	7–5	8.52+05	4.85−02	2.58+01	−0.469	B	LS
				4 378.1 cm^{-1}	134 183.7–138 561.8	9–9	4.26+04	3.33−03	2.25+00	−1.523	C	LS
				4 355.2 cm^{-1}	134 183.7–138 538.9	7–7	5.39+04	4.26−03	2.25+00	−1.525	C	LS
				4 378.1 cm^{-1}	134 183.7–138 561.8	7–9	6.48+02	6.52−05	3.43−02	−3.341	E+	LS
156		$^1G-^1F^\circ$	19 751	19 756	134 183.7–139 245.39	9–7	4.70+05	2.14−02	1.25+01	−0.715	B	1
157	$3s5g-3p3d$	$^3G-^3F^\circ$	*14 417*	*14 421*	*134 184–141 118.2*	27–21	2.14+05	5.18−03	6.64+00	−0.854	D	1
			14 365.2	14 369.2	134 183.7–141 143.05	11–9	2.05+05	5.20−03	2.71+00	−1.243	D+	LS
			14 433.7	14 437.6	134 183.7–141 110.06	9–7	2.00+05	4.85−03	2.07+00	−1.360	D	LS
			14 486.3	14 490.3	134 183.7–141 084.89	7–5	2.11+05	4.74−03	1.58+00	−1.479	D	LS
			14 365.2	14 369.2	134 183.7–141 143.05	9–9	1.05+04	3.25−04	1.38−01	−2.534	E	LS
			14 433.7	14 437.6	134 183.7–141 110.06	7–7	1.33+04	4.16−04	1.38−01	−2.536	E	LS
			14 365.2	14 369.2	134 183.7–141 143.05	7–9	1.60+02	6.37−06	2.11−03	−4.351	E	LS
158	$3s5g-3s7f$	$^1G-^1F^\circ$	11 872.7	11 876.0	134 183.7–142 604.05	9–7	2.14+05	3.52−03	1.24+00	−1.499	D	1
159	$3s6p-3s7s$	$^1P^\circ-^1S$		3 881.20 cm^{-1}	134 919.40–138 800.60	3–1	1.21+07	4.01−01	1.02+02	0.080	B	1
160		$^3P^\circ-^3S$		3 480.8 cm^{-1}	135 019.1–138 499.89	9–3	1.19+07	4.89−01	4.17+02	0.644	B	1
				3 477.66 cm^{-1}	135 022.23–138 499.89	5–3	6.57+06	4.89−01	2.31+02	0.388	B	LS
				3 484.16 cm^{-1}	135 015.73–138 499.89	3–3	3.97+06	4.90−01	1.39+02	0.167	B	LS
				3 486.5 cm^{-1}	135 013.4–138 499.89	1–3	1.32+06	4.90−01	4.63+01	−0.310	C+	LS
161	$3s6p-3s6d$	$^1P^\circ-^1D$		4 369.75 cm^{-1}	134 919.40–139 289.15	3–5	9.21+06	1.21+00	2.72+02	0.560	B+	3
162		$^3P^\circ-^3D$		*3 795.9* cm^{-1}	*135 019.1–138 815.0*	9–15	9.61+06	1.67+00	1.30+03	1.177	B+	1
				3 792.89 cm^{-1}	135 022.23–138 815.12	5–7	9.60+06	1.40+00	6.08+02	0.845	B+	LS
				3 799.14 cm^{-1}	135 015.73–138 814.87	3–5	7.22+06	1.25+00	3.25+02	0.574	B+	LS
				3 801.5 cm^{-1}	135 013.4–138 814.87	1–3	5.37+06	1.67+00	1.45+02	0.223	B+	LS
				3 792.64 cm^{-1}	135 022.23–138 814.87	5–5	2.39+06	2.49−01	1.08+02	0.095	B+	LS
				3 799.14 cm^{-1}	135 015.73–138 814.87	3–3	4.01+06	4.16−01	1.08+02	0.096	B+	LS
				3 792.64 cm^{-1}	135 022.23–138 814.87	5–3	2.65+05	1.66−02	7.20+00	−1.081	C+	LS
163	$3s6p-3s8s$	$^1P^\circ-^1S$	13 430.58	13 434.25	134 919.40–142 363.06	3–1	5.99+06	5.40−02	7.16+00	−0.790	C	1
164		$^3P^\circ-^3S$	13 955.1	13 959.0	135 019.1–142 182.94	9–3	5.57+06	5.42−02	2.24+01	−0.312	C	1
			13 961.28	13 965.10	135 022.23–142 182.94	5–3	3.09+06	5.42−02	1.25+01	−0.567	C	LS
			13 948.62	13 952.43	135 015.73–142 182.94	3–3	1.86+06	5.42−02	7.47+00	−0.789	C	LS
			13 944.1	13 947.9	135 013.4–142 182.94	1–3	6.19+05	5.42−02	2.49+00	−1.266	D+	LS
165	$3s6p-3s7d$	$^1P^\circ-^1D$	13 000.57	13 004.12	134 919.40–142 609.27	3–5	4.61+06	1.95−01	2.50+01	−0.233	C+	1
166		$^3P^\circ-^3D$	*13 607.8*	*13 611.6*	*135 019.1–142 365.8*	9–15	3.37+06	1.56−01	6.30+01	0.147	C	1
			13 613.30	13 617.02	135 022.23–142 365.98	5–7	3.37+06	1.31−01	2.94+01	−0.184	C+	LS

TABLE 8. Transition probabilities of allowed lines for Al II (references in this table are as follows: 1=Butler *et al.*,[5,6] 2=Tachiev and Froese Fischer,[70] 3=Chang and Fang,[9] 4=Weiss,[82] 5=Chou *et al.*,[11] 6=Sen and Puri,[64] and 7=Träbert *et al.*[75])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
			13 601.80	13 605.52	135 015.73–142 365.69	3–5	2.53+06	1.17−01	1.57+01	−0.455	C	LS
			13 597.8	13 601.5	135 013.4–142 365.54	1–3	1.89+06	1.57−01	7.03+00	−0.804	C	LS
			13 613.84	13 617.56	135 022.23–142 365.69	5–5	8.45+05	2.35−02	5.27+00	−0.930	C	LS
			13 602.07	13 605.79	135 015.73–142 365.54	3–3	1.41+06	3.92−02	5.27+00	−0.930	C	LS
			13 614.11	13 617.84	135 022.23–142 365.54	5–3	9.35+04	1.56−03	3.50−01	−2.108	E+	LS
167	$3s6p-3s9s$	$^3P^\circ-^3S$	*10 514.3*	*10 517.2*	*135 019.1*–144 527.35	9–3	3.35+06	1.85−02	5.76+00	−0.779	D	1
			10 517.76	10 520.65	135 022.23–144 527.35	5–3	1.86+06	1.85−02	3.20+00	−1.034	D	LS
			10 510.58	10 513.46	135 015.73–144 527.35	3–3	1.12+06	1.85−02	1.92+00	−1.256	E+	LS
			10 508.0	10 510.9	135 013.4–144 527.35	1–3	3.72+05	1.85−02	6.40−01	−1.733	E	LS
168	$3s6p-3s8d$	$^1P^\circ-^1D$	10 136.30	10 139.08	134 919.40–144 782.23	3–5	2.63+06	6.75−02	6.76+00	−0.694	C	1
169		$^3P^\circ-^3D$	*10 388.7*	*10 391.6*	*135 019.1–144 642.3*	9–15	1.71+06	4.62−02	1.42+01	−0.381	D+	1
			10 391.92	10 394.77	135 022.23–144 642.45	5–7	1.71+06	3.88−02	6.64+00	−0.712	C	LS
			10 385.20	10 388.05	135 015.73–144 642.18	3–5	1.29+06	3.47−02	3.56+00	−0.983	D+	LS
			10 382.9	10 385.7	135 013.4–144 642.0	1–3	9.52+05	4.62−02	1.58+00	−1.335	D	LS
			10 392.22	10 395.06	135 022.23–144 642.18	5–5	4.28+05	6.93−03	1.19+00	−1.460	D	LS
			10 385.4	10 388.2	135 015.73–144 642.0	3–3	7.17+05	1.16−02	1.19+00	−1.458	D	LS
			10 392.4	10 395.3	135 022.23–144 642.0	5–3	4.75+04	4.62−04	7.91−02	−2.636	E	LS
170	$3s6p-3s9d$	$^1P^\circ-^1D$	8 803.0	8 805.5	134 919.40–146 276.0	3–5	1.65+06	3.19−02	2.77+00	−1.019	D	1
171		$^3P^\circ-^3D$	*8 950*	*8 953*	*135 019.1–146 189*	9–15	1.00+06	2.01−02	5.34+00	−0.743	E+	1
			8 952.8	8 955.2	135 022.23–146 188.9	5–7	1.00+06	1.69−02	2.49+00	−1.073	D	LS
			8 947.9	8 950.3	135 015.73–146 188.5	3–5	7.54+05	1.51−02	1.33+00	−1.344	E+	LS
			8 946.0	8 948.5	135 013.4–146 188.5	1–3	5.58+05	2.01−02	5.92−01	−1.697	E	LS
			8 953.1	8 955.5	135 022.23–146 188.5	5–5	2.50+05	3.01−03	4.44−01	−1.822	E	LS
			8 947.9	8 950.3	135 015.73–146 188.5	3–3	4.18+05	5.02−03	4.44−01	−1.822	E	LS
			8 953.1	8 955.5	135 022.23–146 188.5	5–3	2.79+04	2.01−04	2.96−02	−2.998	E	LS
172	$3s7s-3s7p$	$^3S-^3P^\circ$		*1 594* cm^{-1}	*138 499.89–140 094*	3–9	1.48+06	2.63+00	1.63+03	0.897	B	1
				1 595.8 cm^{-1}	138 499.89–140 095.7	3–5	1.49+06	1.46+00	9.04+02	0.641	B	LS
				1 592.0 cm^{-1}	138 499.89–140 091.9	3–3	1.48+06	8.75−01	5.43+02	0.419	B	LS
				1 590.1 cm^{-1}	138 499.89–140 090.0	3–1	1.47+06	2.91−01	1.81+02	−0.059	B	LS
173		$^1S-^1P^\circ$		1 118.38 cm^{-1}	138 800.60–139 918.98	1–3	5.65+05	2.03+00	5.98+02	0.307	B	1
174	$3s7s-3s8p$	$^3S-^3P^\circ$		*4 668.5* cm^{-1}	138 499.89–*143 168.4*	3–9	7.06+04	1.46−02	3.08+00	−1.359	D	1
				4 670.15 cm^{-1}	138 499.89–143 170.04	3–5	7.07+04	8.10−03	1.71+00	−1.614	D	LS
				4 666.87 cm^{-1}	138 499.89–143 166.76	3–3	7.05+04	4.85−03	1.03+00	−1.837	D	LS
				4 665.5 cm^{-1}	138 499.89–143 165.4	3–1	7.06+04	1.62−03	3.43−01	−2.313	E+	LS
175		$^1S-^1P^\circ$		4 160.60 cm^{-1}	138 800.60–142 961.20	1–3	1.13+05	2.94−02	2.33+00	−1.532	D+	1
176	$3s6f-3s6d$	$^3F^\circ-^3D$		*270* cm^{-1}	*138 545–138 815.0*	21–15	7.64+03	1.12−01	2.86+03	0.371	B+	1
				253.3 cm^{-1}	138 561.8–138 815.12	9–7	5.78+03	1.05−01	1.23+03	−0.025	B+	LS
				276.0 cm^{-1}	138 538.9–138 814.87	7–5	7.18+03	1.01−01	8.43+02	−0.151	B+	LS
				293.5 cm^{-1}	138 521.4–138 814.87	5–3	9.77+03	1.02−01	5.72+02	−0.292	B+	LS
				276.2 cm^{-1}	138 538.9–138 815.12	7–7	6.46+02	1.27−02	1.06+02	−1.051	B+	LS
				293.5 cm^{-1}	138 521.4–138 814.87	5–5	1.09+03	1.89−02	1.06+02	−1.025	B+	LS
				293.7 cm^{-1}	138 521.4–138 815.12	5–7	2.19+01	5.34−04	2.99+00	−2.573	C	LS
177	$3s6f-3s6g$	$^3F^\circ-^3G$		*1 046* cm^{-1}	*138 545–139 591*	21–27	3.43+05	6.04−01	3.99+03	1.103	B+	1
				1 029.3 cm^{-1}	138 561.8–139 591.1	9–11	3.27+05	5.65−01	1.63+03	0.706	B+	LS
				1 052.2 cm^{-1}	138 538.9–139 591.1	7–9	3.27+05	5.69−01	1.25+03	0.600	B+	LS

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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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				1 069.7 cm^{-1}	138 521.4–139 591.1	5–7	3.37+05	6.18−01	9.51+02	0.490	B+	LS
				1 029.3 cm^{-1}	138 561.8–139 591.1	9–9	2.04+04	2.89−02	8.32+01	−0.585	B+	LS
				1 052.2 cm^{-1}	138 538.9–139 591.1	7–7	2.81+04	3.80−02	8.32+01	−0.575	B+	LS
				1 029.3 cm^{-1}	138 561.8–139 591.1	9–7	4.01+02	4.41−04	1.27+00	−2.401	C	LS
178		$^1F^\circ-^1G$		345.7 cm^{-1}	139 245.39–139 591.1	7–9	1.57+04	2.53−01	1.69+03	0.248	B+	1
179	$3s6f-3s7d$	$^3F^\circ-^3D$		*3 821* cm^{-1}	*138 545–142 365.8*	21–15	1.05+05	7.73−03	1.40+01	−0.790	D+	1
				3 804.2 cm^{-1}	138 561.8–142 365.98	9–7	9.56+04	7.70−03	6.00+00	−1.159	D+	LS
				3 826.8 cm^{-1}	138 538.9–142 365.69	7–5	9.41+04	6.88−03	4.14+00	−1.317	D+	LS
				3 844.1 cm^{-1}	138 521.4–142 365.54	5–3	1.07+05	6.54−03	2.80+00	−1.485	D+	LS
				3 827.1 cm^{-1}	138 538.9–142 365.98	7–7	8.43+03	8.63−04	5.20−01	−2.219	E+	LS
				3 844.3 cm^{-1}	138 521.4–142 365.69	5–5	1.19+04	1.21−03	5.18−01	−2.218	E+	LS
				3 844.6 cm^{-1}	138 521.4–142 365.98	5–7	2.41+02	3.42−05	1.46−02	−3.767	E	LS
180		$^1F^\circ-^1D$		3 363.88 cm^{-1}	139 245.39–142 609.27	7–5	3.97+05	3.76−02	2.58+01	−0.580	C+	1
181	$3s6f-3s7g$	$^3F^\circ-^3G$		*4 307* cm^{-1}	*138 545–142 852*	21–27	2.16+06	2.25−01	3.61+02	0.674	C+	1
				4 289.8 cm^{-1}	138 561.8–142 851.6	9–11	2.14+06	2.13−01	1.47+02	0.283	B	LS
				4 312.7 cm^{-1}	138 538.9–142 851.6	7–9	2.04+06	2.11−01	1.13+02	0.169	C+	LS
				4 330.2 cm^{-1}	138 521.4–142 851.6	5–7	2.02+06	2.26−01	8.59+01	0.053	C+	LS
				4 289.8 cm^{-1}	138 561.8–142 851.6	9–9	1.34+05	1.09−02	7.53+00	−1.008	C	LS
				4 312.7 cm^{-1}	138 538.9–142 851.6	7–7	1.75+05	1.41−02	7.53+00	−1.006	C	LS
				4 289.8 cm^{-1}	138 561.8–142 851.6	9–7	2.62+03	1.66−04	1.15−01	−2.826	E	LS
182		$^1F^\circ-^1G$		3 606.2 cm^{-1}	139 245.39–142 851.6	7–9	5.26+06	7.80−01	4.98+02	0.737	B	1
183	$3s6f-3s8d$	$^1F^\circ-^1D$	18 055.9	18 060.8	139 245.39–144 782.23	7–5	2.39+05	8.36−03	3.48+00	−1.233	D+	1
184	$3s6f-3s8g$	$^3F^\circ-^3G$	*15 566*	*15 571*	*138 545–144 967*	21–27	2.14+06	9.98−02	1.07+02	0.321	C+	1
			15 607.8	15 612.1	138 561.8–144 967.1	9–11	2.12+06	9.47−02	4.38+01	−0.069	C+	LS
			15 552.2	15 556.5	138 538.9–144 967.1	7–9	2.01+06	9.37−02	3.36+01	−0.183	C+	LS
			15 510.0	15 514.2	138 521.4–144 967.1	5–7	1.98+06	1.00−01	2.55+01	−0.301	C	LS
			15 607.8	15 612.1	138 561.8–144 967.1	9–9	1.33+05	4.85−03	2.24+00	−1.360	D+	LS
			15 552.2	15 556.5	138 538.9–144 967.1	7–7	1.72+05	6.25−03	2.24+00	−1.359	D+	LS
			15 607.8	15 612.1	138 561.8–144 967.1	9–7	2.60+03	7.38−05	3.41−02	−3.178	E	LS
185	$3s6f-3s9g$	$^3F^\circ-^3G$	*12 699*	*12 703*	*138 545–146 417*	21–27	1.71+06	5.33−02	4.68+01	0.049	D+	1
			12 727.1	12 730.6	138 561.8–146 416.9	9–11	1.70+06	5.06−02	1.91+01	−0.342	D+	LS
			12 690.1	12 693.6	138 538.9–146 416.9	7–9	1.61+06	5.00−02	1.46+01	−0.456	D+	LS
			12 662.0	12 665.4	138 521.4–146 416.9	5–7	1.59+06	5.35−02	1.12+01	−0.573	D+	LS
			12 727.1	12 730.6	138 561.8–146 416.9	9–9	1.07+05	2.59−03	9.77−01	−1.632	E+	LS
			12 690.1	12 693.6	138 538.9–146 416.9	7–7	1.38+05	3.34−03	9.77−01	−1.631	E+	LS
			12 727.1	12 730.6	138 561.8–146 416.9	9–7	2.09+03	3.95−05	1.49−02	−3.449	E	LS
186	$3s6f-3s10g$	$^3F^\circ-^3G$	*11 222*	*11 226*	*138 545–147 453*	21–27	1.33+06	3.23−02	2.51+01	−0.169	D	1
			11 243.5	11 246.6	138 561.8–147 453.4	9–11	1.32+06	3.07−02	1.02+01	−0.559	D+	LS
			11 214.6	11 217.7	138 538.9–147 453.4	7–9	1.25+06	3.03−02	7.83+00	−0.673	D+	LS
			11 192.6	11 195.7	138 521.4–147 453.4	5–7	1.23+06	3.24−02	5.97+00	−0.790	D	LS
			11 243.5	11 246.6	138 561.8–147 453.4	9–9	8.28+04	1.57−03	5.23−01	−1.850	E	LS
			11 214.6	11 217.7	138 538.9–147 453.4	7–7	1.07+05	2.02−03	5.22−01	−1.850	E	LS
			11 243.5	11 246.6	138 561.8–147 453.4	9–7	1.62+03	2.39−05	7.96−03	−3.667	E	LS
187		$^1F^\circ-^1G$	12 179.9	12 183.2	139 245.39–147 453.4	7–9	1.81+06	5.19−02	1.46+01	−0.440	D+	1
188	$3s6d-3s7p$	$^3D-^3P^\circ$		*1 279* cm^{-1}	*138 815.0–140 094*	15–9	1.16+06	6.40−01	2.47+03	0.982	B	1

TABLE 8. Transition probabilities of allowed lines for Al II (references in this table are as follows: 1=Butler *et al.*,[5,6] 2=Tachiev and Froese Fischer,[70] 3=Chang and Fang,[9] 4=Weiss,[82] 5=Chou *et al.*,[11] 6=Sen and Puri,[64] and 7=Träbert *et al.*[75])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				1 280.6 cm^{-1}	138 815.12–140 095.7	7–5	9.82+05	6.41−01	1.15+03	0.652	B	LS
				1 277.0 cm^{-1}	138 814.87–140 091.9	5–3	8.68+05	4.79−01	6.17+02	0.379	B	LS
				1 275.1 cm^{-1}	138 814.87–140 090.0	3–1	1.16+06	3.55−01	2.75+02	0.027	B	LS
				1 280.8 cm^{-1}	138 814.87–140 095.7	5–5	1.75+05	1.60−01	2.06+02	−0.097	B	LS
				1 277.0 cm^{-1}	138 814.87–140 091.9	3–3	2.89+05	2.66−01	2.06+02	−0.098	B	LS
				1 280.8 cm^{-1}	138 814.87–140 095.7	3–5	1.17+04	1.78−02	1.37+01	−1.272	C	LS
189		$^1D-^1P^\circ$		629.83 cm^{-1}	139 289.15–139 918.98	5–3	1.57+05	3.56−01	9.30+02	0.250	B+	3
190	$3s6d-3p3d$	$^3D-^3F^\circ$		*2 303.2* cm^{-1}	*138 815.0–141 118.2*	15–21	3.11+06	1.23+00	2.63+03	1.266	B	1
				2 327.93 cm^{-1}	138 815.12–141 143.05	7–9	3.21+06	1.14+00	1.13+03	0.902	B	LS
				2 295.19 cm^{-1}	138 814.87–141 110.06	5–7	2.74+06	1.09+00	7.82+02	0.736	B	LS
				2 270.02 cm^{-1}	138 814.87–141 084.89	3–5	2.50+06	1.21+00	5.26+02	0.560	B	LS
				2 294.94 cm^{-1}	138 815.12–141 110.06	7–7	3.41+05	9.72−02	9.76+01	−0.167	C+	LS
				2 270.02 cm^{-1}	138 814.87–141 084.89	5–5	4.64+05	1.35−01	9.79+01	−0.171	C+	LS
				2 269.77 cm^{-1}	138 815.12–141 084.89	7–5	1.30+04	2.71−03	2.75+00	−1.722	D+	LS
191	$3s6d-3s7f$	$^3D-^3F^\circ$		*4 460.9* cm^{-1}	*138 815.0–143 275.9*	15–21	1.88+05	1.99−02	2.20+01	−0.525	D+	1
				4 468.63 cm^{-1}	138 815.12–143 283.75	7–9	1.90+05	1.83−02	9.44+00	−0.892	C	LS
				4 457.99 cm^{-1}	138 814.87–143 272.86	5–7	1.67+05	1.76−02	6.50+00	−1.056	C	LS
				4 450.96 cm^{-1}	138 814.87–143 265.83	3–5	1.57+05	1.98−02	4.39+00	−1.226	D+	LS
				4 457.74 cm^{-1}	138 815.12–143 272.86	7–7	2.09+04	1.58−03	8.17−01	−1.956	D	LS
				4 450.96 cm^{-1}	138 814.87–143 265.83	5–5	2.92+04	2.21−03	8.17−01	−1.957	D	LS
				4 450.71 cm^{-1}	138 815.12–143 265.83	7–5	8.23+02	4.45−05	2.30−02	−3.507	E	LS
192		$^1D-^1F^\circ$		3 314.90 cm^{-1}	139 289.15–142 604.05	5–7	4.60+06	8.79−01	4.36+02	0.643	B+	3
193	$3s6d-3s8p$	$^3D-^3P^\circ$		*4 353.4* cm^{-1}	*138 815.0–143 168.4*	15–9	2.05+05	9.75−03	1.11+01	−0.835	D+	1
				4 354.92 cm^{-1}	138 815.12–143 170.04	7–5	1.73+05	9.76−03	5.16+00	−1.165	C	LS
				4 351.89 cm^{-1}	138 814.87–143 166.76	5–3	1.54+05	7.31−03	2.76+00	−1.437	D+	LS
				4 350.5 cm^{-1}	138 814.87–143 165.4	3–1	2.05+05	5.41−03	1.23+00	−1.790	D	LS
				4 355.17 cm^{-1}	138 814.87–143 170.04	5–5	3.09+04	2.44−03	9.22−01	−1.914	D	LS
				4 351.89 cm^{-1}	138 814.87–143 166.76	3–3	5.13+04	4.06−03	9.21−01	−1.914	D	LS
				4 355.17 cm^{-1}	138 814.87–143 170.04	3–5	2.06+03	2.71−04	6.15−02	−3.090	E	LS
194		$^1D-^1P^\circ$		3 672.05 cm^{-1}	139 289.15–142 961.20	5–3	1.56+05	1.04−02	4.66+00	−1.284	D+	1
195	$3s6d-3s8f$	$^3D-^3F^\circ$	*15 823.9*	*15 828.3*	*138 815.0–145 132.8*	15–21	9.66+05	5.08−02	3.97+01	−0.118	C	1
			15 817.99	15 822.31	138 815.12–145 135.31	7–9	9.68+05	4.67−02	1.70+01	−0.486	C	LS
			15 825.82	15 830.15	138 814.87–145 131.93	5–7	8.57+05	4.51−02	1.18+01	−0.647	C	LS
			15 831.89	15 836.22	138 814.87–145 129.51	3–5	8.11+05	5.08−02	7.95+00	−0.817	C	LS
			15 826.45	15 830.78	138 815.12–145 131.93	7–7	1.08+05	4.04−03	1.47+00	−1.549	D	LS
			15 831.89	15 836.22	138 814.87–145 129.51	5–5	1.51+05	5.66−03	1.48+00	−1.548	D	LS
			15 832.52	15 836.84	138 815.12–145 129.51	7–5	4.24+03	1.14−04	4.16−02	−3.098	E	LS
196		$^1D-^1F^\circ$	18 192.4	18 197.4	139 289.15–144 784.45	5–7	2.91+06	2.02−01	6.05+01	0.004	C+	1
197	$3s6d-3s9p$	$^1D-^1P^\circ$	17 688.18	17 693.01	139 289.15–144 941.10	5–3	2.64+05	7.44−03	2.17+00	−1.429	D	1
198	$3s6d-3p4s$	$^3D-^3P^\circ$	*14 113.1*	*14 116.9*	*138 815.0–145 898.7*	15–9	7.57+04	1.36−03	9.47−01	−1.690	D+	1
			13 989.20	13 993.02	138 815.12–145 961.54	7–5	6.53+04	1.37−03	4.42−01	−2.018	D+	LS
			14 241.47	14 245.36	138 814.87–145 834.70	5–3	5.53+04	1.01−03	2.37−01	−2.297	D+	LS
			14 361.25	14 365.17	138 814.87–145 776.15	3–1	7.19+04	7.41−04	1.05−01	−2.653	D	LS
			13 988.71	13 992.53	138 814.87–145 961.54	5–5	1.17+04	3.42−04	7.88−02	−2.767	D	LS
			14 241.47	14 245.36	138 814.87–145 834.70	3–3	1.84+04	5.60−04	7.88−02	−2.775	D	LS
			13 988.71	13 992.53	138 814.87–145 961.54	3–5	7.77+02	3.80−05	5.25−03	−3.943	E	LS

TABLE 8. Transition probabilities of allowed lines for Al II (references in this table are as follows: 1=Butler *et al.*,[5,6] 2=Tachiev and Froese Fischer,[70] 3=Chang and Fang,[9] 4=Weiss,[82] 5=Chou *et al.*,[11] 6=Sen and Puri,[64] and 7=Träbert *et al.*[75])—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} (s^{-1})	f_{ik}	S (a.u.)	log *gf*	Acc.	Source
199	3s6d−3s9f	^{3}D−^{3}F°	*13 006.5*	*13 010.0*	*138 815.0–146 501.4*	15–21	1.05+06	3.74−02	2.40+01	−0.251	D+	1
			13 004.83	13 008.38	138 815.12–146 502.47	7–9	1.05+06	3.44−02	1.03+01	−0.618	D+	LS
			13 006.91	13 010.47	138 814.87–146 500.99	5–7	9.34+05	3.32−02	7.11+00	−0.780	D+	LS
			13 008.75	13 012.31	138 814.87–146 499.90	3–5	8.84+05	3.74−02	4.81+00	−0.950	D	LS
			13 007.33	13 010.89	138 815.12–146 500.99	7–7	1.17+05	2.98−03	8.94−01	−1.681	E+	LS
			13 008.75	13 012.31	138 814.87–146 499.90	5–5	1.64+05	4.17−03	8.93−01	−1.681	E+	LS
			13 009.18	13 012.73	138 815.12–146 499.90	7–5	4.63+03	8.39−05	2.52−02	−3.231	E	LS
200		^{1}D−^{1}F°	14 303.16	14 307.07	139 289.15–146 278.70	5–7	1.84+06	7.90−02	1.86+01	−0.403	C	1
201	3s6d−3s10f	^{1}D−^{1}F°	12 407.37	12 410.77	139 289.15–147 346.67	5–7	1.22+06	3.96−02	8.09+00	−0.703	D+	1
202	3s6g−3p3d	^{3}G−^{3}F°		*1 527* cm^{-1}	*139 591–141 118.2*	27–21	5.11+05	2.56−01	1.49+03	0.840	B	1
				1 551.9 cm^{-1}	139 591.1–141 143.05	11–9	5.11+05	2.60−01	6.07+02	0.456	B	LS
				1 519.0 cm^{-1}	139 591.1–141 110.06	9–7	4.71+05	2.38−01	4.64+02	0.331	B	LS
				1 493.8 cm^{-1}	139 591.1–141 084.89	7–5	4.79+05	2.30−01	3.55+02	0.207	B	LS
				1 551.9 cm^{-1}	139 591.1–141 143.05	9–9	2.62+04	1.63−02	3.11+01	−0.834	C+	LS
				1 519.0 cm^{-1}	139 591.1–141 110.06	7–7	3.15+04	2.05−02	3.11+01	−0.843	C+	LS
				1 551.9 cm^{-1}	139 591.1–141 143.05	7–9	3.97+02	3.18−04	4.72−01	−2.652	E+	LS
203	3s6g−3s7f	^{1}G−^{1}F°		3 012.9 cm^{-1}	139 591.1–142 604.05	9–7	4.45+05	5.71−02	5.62+01	−0.289	C+	1
204	3s6g−3s8f	^{1}G−^{1}F°	19 250	19 255	139 591.1–144 784.45	9–7	2.23+05	9.63−03	5.49+00	−1.062	C	1
205	3s7p−3s8s	^{1}P°−^{1}S		2 444.08 cm^{-1}	139 918.98–142 363.06	3–1	5.44+06	4.55−01	1.84+02	0.135	B	1
206		^{3}P°−^{3}S		*2 089* cm^{-1}	*140 094*–142 182.94	9–3	5.29+06	6.06−01	8.59+02	0.737	B	1
				2 087.2 cm^{-1}	140 095.7–142 182.94	5–3	2.93+06	6.05−01	4.77+02	0.481	B	LS
				2 091.0 cm^{-1}	140 091.9–142 182.94	3–3	1.77+06	6.07−01	2.87+02	0.260	B	LS
				2 092.9 cm^{-1}	140 090.0–142 182.94	1–3	5.91+05	6.07−01	9.55+01	−0.217	B	LS
207	3s7p−3s7d	^{1}P°−^{1}D		2 690.29 cm^{-1}	139 918.98–142 609.27	3–5	3.94+06	1.36+00	4.99+02	0.611	B	1
208		^{3}P°−^{3}D		*2 272* cm^{-1}	*140 094–142 365.8*	9–15	3.91+06	1.89+00	2.47+03	1.231	B	1
				2 270.3 cm^{-1}	140 095.7–142 365.98	5–7	3.90+06	1.59+00	1.15+03	0.900	B	LS
				2 273.8 cm^{-1}	140 091.9–142 365.69	3–5	2.94+06	1.42+00	6.17+02	0.629	B	LS
				2 275.5 cm^{-1}	140 090.0–142 365.54	1–3	2.19+06	1.90+00	2.75+02	0.279	B	LS
				2 270.0 cm^{-1}	140 095.7–142 365.69	5–5	9.76+05	2.84−01	2.06+02	0.152	B	LS
				2 273.6 cm^{-1}	140 091.9–142 365.54	3–3	1.63+06	4.74−01	2.06+02	0.153	B	LS
				2 269.8 cm^{-1}	140 095.7–142 365.54	5–3	1.08+05	1.89−02	1.37+01	−1.025	C	LS
209	3s7p−3s9s	^{3}P°−^{3}S		*4 433* cm^{-1}	*140 094*–144 527.35	9–3	2.57+06	6.52−02	4.36+01	−0.232	D	1
				4 431.6 cm^{-1}	140 095.7–144 527.35	5–3	1.42+06	6.52−02	2.42+01	−0.487	D	LS
				4 435.5 cm^{-1}	140 091.9–144 527.35	3–3	8.56+05	6.52−02	1.45+01	−0.709	E+	LS
				4 437.4 cm^{-1}	140 090.0–144 527.35	1–3	2.86+05	6.53−02	4.84+00	−1.185	E	LS
210	3s7p−3s8d	^{1}P°−^{1}D		4 863.25 cm^{-1}	139 918.98–144 782.23	3–5	2.10+06	2.22−01	4.51+01	−0.177	C+	1
211		^{3}P°−^{3}D		*4 548* cm^{-1}	*140 094–144 642.3*	9–15	1.53+06	1.85−01	1.20+02	0.221	C+	1
				4 546.8 cm^{-1}	140 095.7–144 642.45	5–7	1.53+06	1.55−01	5.61+01	−0.111	C+	LS
				4 550.3 cm^{-1}	140 091.9–144 642.18	3–5	1.15+06	1.39−01	3.02+01	−0.380	C+	LS
				4 552.0 cm^{-1}	140 090.0–144 642.0	1–3	8.52+05	1.85−01	1.34+01	−0.733	C	LS
				4 546.5 cm^{-1}	140 095.7–144 642.18	5–5	3.82+05	2.77−02	1.00+01	−0.859	C	LS
				4 550.1 cm^{-1}	140 091.9–144 642.0	3–3	6.38+05	4.62−02	1.00+01	−0.858	C	LS
				4 546.3 cm^{-1}	140 095.7–144 642.0	5–3	4.25+04	1.85−03	6.70−01	−2.034	D	LS
212	3p3d−3s7d	^{3}F°−^{3}D		*1 247.6* cm^{-1}	*141 118.2–142 365.8*	21–15	6.23+05	4.29−01	2.37+03	0.955	C	1

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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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				1 222.93 cm^{-1}	141 143.05–142 365.98	9–7	5.39+05	4.20−01	1.02+03	0.577	C	LS
				1 255.63 cm^{-1}	141 110.06–142 365.69	7–5	5.64+05	3.83−01	7.03+02	0.428	C	LS
				1 280.65 cm^{-1}	141 084.89–142 365.54	5–3	6.75+05	3.70−01	4.76+02	0.267	C	LS
				1 255.92 cm^{-1}	141 110.06–142 365.98	7–7	5.06+04	4.81−02	8.83+01	−0.473	C	LS
				1 280.80 cm^{-1}	141 084.89–142 365.69	5–5	7.51+04	6.86−02	8.82+01	−0.465	C	LS
				1 281.09 cm^{-1}	141 084.89–142 365.98	5–7	1.52+03	1.94−03	2.49+00	−2.013	E+	LS
213	$3p3d-3s7g$	$^3F^\circ-^3G$		*1 734* cm^{-1}	*141 118.2–142 852*	21–27	2.03+06	1.30+00	5.20+03	1.436	C	1
				1 708.6 cm^{-1}	141 143.05–142 851.6	9–11	1.94+06	1.22+00	2.12+03	1.041	C	LS
				1 741.5 cm^{-1}	141 110.06–142 851.6	7–9	1.94+06	1.23+00	1.63+03	0.935	C	LS
				1 766.7 cm^{-1}	141 084.89–142 851.6	5–7	1.98+06	1.33+00	1.24+03	0.823	C	LS
				1 708.6 cm^{-1}	141 143.05–142 851.6	9–9	1.22+05	6.25−02	1.08+02	−0.250	C	LS
				1 741.5 cm^{-1}	141 110.06–142 851.6	7–7	1.66+05	8.20−02	1.09+02	−0.241	C	LS
				1 708.6 cm^{-1}	141 143.05–142 851.6	9–7	2.38+03	9.52−04	1.65+00	−2.067	E	LS
214	$3p3d-3s8d$	$^3F^\circ-^3D$		*3 524.1* cm^{-1}	*141 118.2–144 642.3*	21–15	2.34+05	2.02−02	3.96+01	−0.372	D	1
				3 499.40 cm^{-1}	141 143.05–144 642.45	9–7	2.10+05	2.00−02	1.69+01	−0.745	D	LS
				3 532.12 cm^{-1}	141 110.06–144 642.18	7–5	2.10+05	1.80−02	1.17+01	−0.900	D	LS
				3 557.1 cm^{-1}	141 084.89–144 642.0	5–3	2.41+05	1.71−02	7.91+00	−1.068	D	LS
				3 532.39 cm^{-1}	141 110.06–144 642.45	7–7	1.87+04	2.25−03	1.47+00	−1.803	E	LS
				3 557.29 cm^{-1}	141 084.89–144 642.18	5–5	2.68+04	3.17−03	1.47+00	−1.800	E	LS
				3 557.56 cm^{-1}	141 084.89–144 642.45	5–7	5.40+02	8.95−05	4.14−02	−3.349	E	LS
215	$3p3d-3s8g$	$^3F^\circ-^3G$		*3 849* cm^{-1}	*141 118.2–144 967*	21–27	1.96+05	2.55−02	4.58+01	−0.271	D	1
				3 824.1 cm^{-1}	141 143.05–144 967.1	9–11	1.92+05	2.41−02	1.87+01	−0.664	D+	LS
				3 857.0 cm^{-1}	141 110.06–144 967.1	7–9	1.85+05	2.40−02	1.43+01	−0.775	D	LS
				3 882.2 cm^{-1}	141 084.89–144 967.1	5–7	1.85+05	2.57−02	1.09+01	−0.891	D	LS
				3 824.1 cm^{-1}	141 143.05–144 967.1	9–9	1.20+04	1.23−03	9.53−01	−1.956	E	LS
				3 857.0 cm^{-1}	141 110.06–144 967.1	7–7	1.59+04	1.60−03	9.56−01	−1.951	E	LS
				3 824.1 cm^{-1}	141 143.05–144 967.1	9–7	2.36+02	1.88−05	1.46−02	−3.772	E	LS
216	$3s8s-3s8p$	$^3S-^3P^\circ$		*985.5* cm^{-1}	142 182.94–*143 168.4*	3–9	6.51+05	3.01+00	3.02+03	0.956	B	1
				987.10 cm^{-1}	142 182.94–143 170.04	3–5	6.55+05	1.68+00	1.68+03	0.702	B	LS
				983.82 cm^{-1}	142 182.94–143 166.76	3–3	6.46+05	1.00+00	1.00+03	0.477	B	LS
				982.5 cm^{-1}	142 182.94–143 165.4	3–1	6.43+05	3.33−01	3.35+02	−0.000	B	LS
217		$^1S-^1P^\circ$		598.14 cm^{-1}	142 363.06–142 961.20	1–3	1.63+05	2.05+00	1.13+03	0.312	B	1
218	$3s8s-3p4s$	$^3S-^3P^\circ$		*3 715.8* cm^{-1}	142 182.94–145 898.7	3–9	4.75+04	1.55−02	4.11+00	−1.333	D	1
				3 778.60 cm^{-1}	142 182.94–145 961.54	3–5	5.00+04	8.75−03	2.29+00	−1.581	D+	LS
				3 651.76 cm^{-1}	142 182.94–145 834.70	3–3	4.51+04	5.07−03	1.37+00	−1.818	D	LS
				3 593.21 cm^{-1}	142 182.94–145 776.15	3–1	4.29+04	1.66−03	4.56−01	−2.303	E+	LS
219	$3s7d-3s7f$	$^3D-^3F^\circ$		*910.1* cm^{-1}	*142 365.8–143 275.9*	15–21	6.10+05	1.55+00	8.39+03	1.366	B	1
				917.77 cm^{-1}	142 365.98–143 283.75	7–9	6.25+05	1.43+00	3.59+03	1.000	B	LS
				907.17 cm^{-1}	142 365.69–143 272.86	5–7	5.37+05	1.37+00	2.49+03	0.836	B	LS
				900.29 cm^{-1}	142 365.54–143 265.83	3–5	4.96+05	1.53+00	1.68+03	0.662	B	LS
				906.88 cm^{-1}	142 365.98–143 272.86	7–7	6.75+04	1.23−01	3.13+02	−0.065	B	LS
				900.14 cm^{-1}	142 365.69–143 265.83	5–5	9.24+04	1.71−01	3.13+02	−0.068	B	LS
				899.85 cm^{-1}	142 365.98–143 265.83	7–5	2.59+03	3.43−03	8.78+00	−1.620	C	LS
220	$3s7d-3s8p$	$^3D-^3P^\circ$		*802.6* cm^{-1}	*142 365.8–143 168.4*	15–9	5.66+05	7.90−01	4.86+03	1.074	B	1
				804.06 cm^{-1}	142 365.98–143 170.04	7–5	4.78+05	7.91−01	2.27+03	0.743	B	LS
				801.07 cm^{-1}	142 365.69–143 166.76	5–3	4.22+05	5.91−01	1.21+03	0.471	B	LS
				799.9 cm^{-1}	142 365.54–143 165.4	3–1	5.59+05	4.37−01	5.40+02	0.118	B	LS

TABLE 8. Transition probabilities of allowed lines for Al II (references in this table are as follows: 1=Butler *et al.*,[5,6] 2=Tachiev and Froese Fischer,[70] 3=Chang and Fang,[9] 4=Weiss,[82] 5=Chou *et al.*,[11] 6=Sen and Puri,[64] and 7=Träbert *et al.*[75])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				804.35 cm^{-1}	142 365.69–143 170.04	5–5	8.54+04	1.98−01	4.05+02	−0.004	B	LS
				801.22 cm^{-1}	142 365.54–143 166.76	3–3	1.41+05	3.29−01	4.06+02	−0.006	B	LS
				804.50 cm^{-1}	142 365.54–143 170.04	3–5	5.70+03	2.20−02	2.70+01	−1.180	C+	LS
221		^{1}D–^{1}P°		351.93 cm^{-1}	142 609.27–142 961.20	5–3	5.89+04	4.28−01	2.00+03	0.330	B	1
222	3*s*7*d*–3*s*8*f*	^{3}D–^{3}F°		*2 767.0* cm^{-1}	*142 365.8–145 132.8*	15–21	2.89+05	7.92−02	1.41+02	0.075	E+	1
				2 769.33 cm^{-1}	142 365.98–145 135.31	7–9	2.27+05	5.70−02	4.74+01	−0.399	C+	LS
				2 766.24 cm^{-1}	142 365.69–145 131.93	5–7	2.01+05	5.51−02	3.28+01	−0.560	C+	LS
				2 763.97 cm^{-1}	142 365.54–145 129.51	3–5	1.90+05	6.20−02	2.22+01	−0.730	C+	LS
				2 765.95 cm^{-1}	142 365.98–145 131.93	7–7	2.52+04	4.94−03	4.12+00	−1.461	D+	LS
				2 763.82 cm^{-1}	142 365.69–145 129.51	5–5	5.59+05	1.10−01	6.53+01	−0.260	B+	3
				2 763.53 cm^{-1}	142 365.98–145 129.51	7–5	9.91+02	1.39−04	1.16−01	−3.012	E	LS
223		^{1}D–^{1}F°		2 175.18 cm^{-1}	142 609.27–144 784.45	5–7	2.02+06	8.95−01	6.77+02	0.651	B	1
224	3*s*7*d*–3*p*4*s*	^{3}D–^{3}P°		*3 532.9* cm^{-1}	*142 365.8–145 898.7*	15–9	3.52+04	2.54−03	3.55+00	−1.419	D	1
				3 595.56 cm^{-1}	142 365.98–145 961.54	7–5	3.11+04	2.58−03	1.65+00	−1.743	D	LS
				3 469.01 cm^{-1}	142 365.69–145 834.70	5–3	2.50+04	1.87−03	8.87−01	−2.029	D	LS
				3 410.61 cm^{-1}	142 365.54–145 776.15	3–1	3.17+04	1.36−03	3.94−01	−2.389	E+	LS
				3 595.85 cm^{-1}	142 365.69–145 961.54	5–5	5.56+03	6.45−04	2.95−01	−2.491	E+	LS
				3 469.16 cm^{-1}	142 365.54–145 834.70	3–3	8.35+03	1.04−03	2.96−01	−2.506	E+	LS
				3 596.00 cm^{-1}	142 365.54–145 961.54	3–5	3.71+02	7.17−05	1.97−02	−3.667	E	LS
225	3*s*7*d*–3*s*9*f*	^{3}D–^{3}F°		*4 135.6* cm^{-1}	*142 365.8–146 501.4*	15–21	4.37+05	5.37−02	6.41+01	−0.094	D	1
				4 136.49 cm^{-1}	142 365.98–146 502.47	7–9	4.38+05	4.93−02	2.75+01	−0.462	D	LS
				4 135.30 cm^{-1}	142 365.69–146 500.99	5–7	3.89+05	4.77−02	1.90+01	−0.623	D	LS
				4 134.36 cm^{-1}	142 365.54–146 499.90	3–5	3.67+05	5.37−02	1.28+01	−0.793	E+	LS
				4 135.01 cm^{-1}	142 365.98–146 500.99	7–7	4.87+04	4.27−03	2.38+00	−1.524	E	LS
				4 134.21 cm^{-1}	142 365.69–146 499.90	5–5	6.82+04	5.98−03	2.38+00	−1.524	E	LS
				4 133.92 cm^{-1}	142 365.98–146 499.90	7–5	1.92+03	1.20−04	6.69−02	−3.076	E	LS
226		^{1}D–^{1}F°		3 669.43 cm^{-1}	142 609.27–146 278.70	5–7	1.37+06	2.13−01	9.55+01	0.027	D+	1
227	3*s*7*d*–3*s*10*f*	^{1}D–^{1}F°		4 737.40 cm^{-1}	142 609.27–147 346.67	5–7	9.43+05	8.82−02	3.06+01	−0.356	D	1
228	3*s*7*f*–3*s*7*g*	^{1}F°–^{1}G		247.6 cm^{-1}	142 604.05–142 851.6	7–9	1.28+04	4.03−01	3.75+03	0.450	B	1
229	3*s*7*f*–3*s*8*d*	^{1}F°–^{1}D		2 178.18 cm^{-1}	142 604.05–144 782.23	7–5	2.68+05	6.06−02	6.41+01	−0.372	C+	1
230		^{3}F°–^{3}D		*1 366.4* cm^{-1}	*143 275.9–144 642.3*	21–15	8.68+05	4.98−01	2.52+03	1.019	B	1
				1 358.70 cm^{-1}	143 283.75–144 642.45	9–7	7.84+05	4.95−01	1.08+03	0.649	B	LS
				1 369.32 cm^{-1}	143 272.86–144 642.18	7–5	7.77+05	4.44−01	7.47+02	0.492	B	LS
				1 376.2 cm^{-1}	143 265.83–144 642.0	5–3	8.86+05	4.21−01	5.04+02	0.323	B	LS
				1 369.59 cm^{-1}	143 272.86–144 642.45	7–7	6.96+04	5.56−02	9.36+01	−0.410	C+	LS
				1 376.35 cm^{-1}	143 265.83–144 642.18	5–5	9.89+04	7.83−02	9.36+01	−0.407	C+	LS
				1 376.62 cm^{-1}	143 265.83–144 642.45	5–7	2.00+03	2.21−03	2.64+00	−1.957	D+	LS
231	3*s*7*f*–3*s*8*g*	^{3}F°–^{3}G		*1 691* cm^{-1}	*143 275.9–144 967*	21–27	2.34+06	1.57+00	6.43+03	1.518	B	1
				1 683.4 cm^{-1}	143 283.75–144 967.1	9–11	2.30+06	1.49+00	2.62+03	1.127	B	LS
				1 694.2 cm^{-1}	143 272.86–144 967.1	7–9	2.20+06	1.48+00	2.01+03	1.015	B	LS
				1 701.3 cm^{-1}	143 265.83–144 967.1	5–7	2.18+06	1.58+00	1.53+03	0.898	B	LS
				1 683.4 cm^{-1}	143 283.75–144 967.1	9–9	1.44+05	7.62−02	1.34+02	−0.164	B	LS
				1 694.2 cm^{-1}	143 272.86–144 967.1	7–7	1.89+05	9.87−02	1.34+02	−0.161	B	LS
				1 683.4 cm^{-1}	143 283.75–144 967.1	9–7	2.82+03	1.16−03	2.04+00	−1.981	D	LS
232	3*s*7*f*–3*s*9*d*	^{3}F°–^{3}D		*2 913* cm^{-1}	*143 275.9–146 189*	21–15	4.34+05	5.47−02	1.30+02	0.060	D	1

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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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				2 905.1 cm^{-1}	143 283.75–146 188.9	9–7	3.95+05	5.46−02	5.57+01	−0.309	D	LS
				2 915.6 cm^{-1}	143 272.86–146 188.5	7–5	3.87+05	4.87−02	3.85+01	−0.467	D	LS
				2 922.7 cm^{-1}	143 265.83–146 188.5	5–3	4.38+05	4.61−02	2.60+01	−0.637	D	LS
				2 916.0 cm^{-1}	143 272.86–146 188.9	7–7	3.46+04	6.10−03	4.82+00	−1.370	E	LS
				2 922.7 cm^{-1}	143 265.83–146 188.5	5–5	4.88+04	8.56−03	4.82+00	−1.369	E	LS
				2 923.1 cm^{-1}	143 265.83–146 188.9	5–7	9.85+02	2.42−04	1.36−01	−2.917	E	LS
233	$3s7f-3s9g$	$^3F^\circ-^3G$		*3 141* cm^{-1}	*143 275.9–146 417*	21–27	1.08+06	2.11−01	4.64+02	0.647	D+	1
				3 133.1 cm^{-1}	143 283.75–146 416.9	9–11	1.07+06	2.00−01	1.89+02	0.255	D+	LS
				3 144.0 cm^{-1}	143 272.86–146 416.9	7–9	1.02+06	1.98−01	1.45+02	0.142	D+	LS
				3 151.1 cm^{-1}	143 265.83–146 416.9	5–7	1.00+06	2.12−01	1.11+02	0.025	D+	LS
				3 133.1 cm^{-1}	143 283.75–146 416.9	9–9	6.68+04	1.02−02	9.65+00	−1.037	E+	LS
				3 144.0 cm^{-1}	143 272.86–146 416.9	7–7	8.70+04	1.32−02	9.68+00	−1.034	E+	LS
				3 133.1 cm^{-1}	143 283.75–146 416.9	9–7	1.31+03	1.56−04	1.48−01	−2.853	E	LS
234	$3s7f-3s10g$	$^1F^\circ-^1G$		4 849.4 cm^{-1}	142 604.05–147 453.4	7–9	1.16+06	9.48−02	4.51+01	−0.178	D	1
235		$^3F^\circ-^3G$		*4 177* cm^{-1}	*143 275.9–147 453*	21–27	6.15+05	6.79−02	1.12+02	0.154	D	1
				4 169.6 cm^{-1}	143 283.75–147 453.4	9–11	6.12+05	6.45−02	4.58+01	−0.236	D	LS
				4 180.5 cm^{-1}	143 272.86–147 453.4	7–9	5.78+05	6.37−02	3.51+01	−0.351	D	LS
				4 187.6 cm^{-1}	143 265.83–147 453.4	5–7	5.69+05	6.81−02	2.68+01	−0.468	D	LS
				4 169.6 cm^{-1}	143 283.75–147 453.4	9–9	3.83+04	3.30−03	2.34+00	−1.527	E	LS
				4 180.5 cm^{-1}	143 272.86–147 453.4	7–7	4.95+04	4.25−03	2.34+00	−1.527	E	LS
				4 169.6 cm^{-1}	143 283.75–147 453.4	9–7	7.48+02	5.02−05	3.57−02	−3.345	E	LS
236	$3s7g-3s7f$	$^3G-^3F^\circ$		*424* cm^{-1}	*142 852–143 275.9*	27–21	5.73+04	3.71−01	7.77+03	1.001	B	1
				432.1 cm^{-1}	142 851.6–143 283.75	11–9	5.76+04	3.78−01	3.17+03	0.619	B	LS
				421.3 cm^{-1}	142 851.6–143 272.86	9–7	5.25+04	3.45−01	2.43+03	0.492	B	LS
				414.2 cm^{-1}	142 851.6–143 265.83	7–5	5.34+04	3.33−01	1.85+03	0.368	B	LS
				432.1 cm^{-1}	142 851.6–143 283.75	9–9	2.94+03	2.36−02	1.62+02	−0.673	B	LS
				421.3 cm^{-1}	142 851.6–143 272.86	7–7	3.50+03	2.96−02	1.62+02	−0.684	B	LS
				432.1 cm^{-1}	142 851.6–143 283.75	7–9	4.49+01	4.63−04	2.47+00	−2.489	D+	LS
237	$3s7g-3s8f$	$^1G-^1F^\circ$		1 932.9 cm^{-1}	142 851.6–144 784.45	9–7	3.36+05	1.05−01	1.61+02	−0.025	B	1
238		$^3G-^3F^\circ$		*2 281* cm^{-1}	*142 852–145 132.8*	27–21	2.46+04	5.52−03	2.15+01	−0.827	C	1
				2 283.7 cm^{-1}	142 851.6–145 135.31	11–9	2.35+04	5.53−03	8.77+00	−1.216	C	LS
				2 280.3 cm^{-1}	142 851.6–145 131.93	9–7	2.31+04	5.17−03	6.72+00	−1.332	C	LS
				2 277.9 cm^{-1}	142 851.6–145 129.51	7–5	2.45+04	5.06−03	5.12+00	−1.451	C	LS
				2 283.7 cm^{-1}	142 851.6–145 135.31	9–9	1.20+03	3.46−04	4.49−01	−2.507	E+	LS
				2 280.3 cm^{-1}	142 851.6–145 131.93	7–7	1.54+03	4.44−04	4.49−01	−2.508	E+	LS
				2 283.7 cm^{-1}	142 851.6–145 135.31	7–9	1.83+01	6.77−06	6.83−03	−4.324	E	LS
239	$3s7g-3s9f$	$^1G-^1F^\circ$		3 427.1 cm^{-1}	142 851.6–146 278.70	9–7	1.80+05	1.79−02	1.55+01	−0.793	D	1
240	$3s8p-3s9s$	$^1P^\circ-^1S$		1 682.94 cm^{-1}	142 961.20–144 644.14	3–1	2.74+06	4.83−01	2.83+02	0.161	C	1
241		$^3P^\circ-^3S$		*1 359.0* cm^{-1}	*143 168.4*–144 527.35	9–3	2.65+06	7.17−01	1.56+03	0.810	C	1
				1 357.31 cm^{-1}	143 170.04–144 527.35	5–3	1.47+06	7.16−01	8.68+02	0.554	C	LS
				1 360.59 cm^{-1}	143 166.76–144 527.35	3–3	8.85+05	7.17−01	5.20+02	0.333	C	LS
				1 362.0 cm^{-1}	143 165.4–144 527.35	1–3	2.96+05	7.18−01	1.74+02	−0.144	D+	LS
242	$3s8p-3s8d$	$^1P^\circ-^1D$		1 821.03 cm^{-1}	142 961.20–144 782.23	3–5	1.88+06	1.42+00	7.70+02	0.629	B	1
243		$^3P^\circ-^3D$		*1 473.9* cm^{-1}	*143 168.4–144 642.3*	9–15	1.83+06	2.11+00	4.23+03	1.279	B	1
				1 472.41 cm^{-1}	143 170.04–144 642.45	5–7	1.83+06	1.77+00	1.98+03	0.947	B	LS

TABLE 8. Transition probabilities of allowed lines for Al II (references in this table are as follows: 1=Butler *et al.*,[5,6] 2=Tachiev and Froese Fischer,[70] 3=Chang and Fang,[9] 4=Weiss,[82] 5=Chou *et al.*,[11] 6=Sen and Puri,[64] and 7=Träbert *et al.*[75])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				1 475.42 cm^{-1}	143 166.76–144 642.18	3–5	1.38+06	1.58+00	1.06+03	0.676	B	LS
				1 476.6 cm^{-1}	143 165.4–144 642.0	1–3	1.02+06	2.11+00	4.70+02	0.324	B	LS
				1 472.14 cm^{-1}	143 170.04–144 642.18	5–5	4.55+05	3.15−01	3.52+02	0.197	B	LS
				1 475.2 cm^{-1}	143 166.76–144 642.0	3–3	7.64+05	5.26−01	3.52+02	0.198	B	LS
				1 472.0 cm^{-1}	143 170.04–144 642.0	5–3	5.06+04	2.10−02	2.35+01	−0.979	C+	LS
244	$3s8p-3s10s$	$^1P^\circ-^1S$		3 230.9 cm^{-1}	142 961.20–146 192.1	3–1	1.51+06	7.21−02	2.20+01	−0.665	D	1
245		$^3P^\circ-^3S$		*2 943.7* cm^{-1}	*143 168.4*–146 112.14	9–3	1.33+06	7.64−02	7.69+01	−0.163	D	1
				2 942.10 cm^{-1}	143 170.04–146 112.14	5–3	7.35+05	7.64−02	4.27+01	−0.418	D	LS
				2 945.38 cm^{-1}	143 166.76–146 112.14	3–3	4.43+05	7.65−02	2.57+01	−0.639	D	LS
				2 946.7 cm^{-1}	143 165.4–146 112.14	1–3	1.48+05	7.65−02	8.55+00	−1.116	E+	LS
246	$3s8p-3s9d$	$^1P^\circ-^1D$		3 314.8 cm^{-1}	142 961.20–146 276.0	3–5	1.08+06	2.45−01	7.30+01	−0.134	D+	1
247		$^3P^\circ-^3D$		*3 021* cm^{-1}	*143 168.4–146 189*	9–15	7.78+05	2.13−01	2.09+02	0.283	D	1
				3 018.9 cm^{-1}	143 170.04–146 188.9	5–7	7.77+05	1.79−01	9.76+01	−0.048	D+	LS
				3 021.7 cm^{-1}	143 166.76–146 188.5	3–5	5.85+05	1.60−01	5.23+01	−0.319	D+	LS
				3 023.1 cm^{-1}	143 165.4–146 188.5	1–3	4.33+05	2.13−01	2.32+01	−0.672	D	LS
				3 018.5 cm^{-1}	143 170.04–146 188.5	5–5	1.94+05	3.19−02	1.74+01	−0.797	D	LS
				3 021.7 cm^{-1}	143 166.76–146 188.5	3–3	3.25+05	5.33−02	1.74+01	−0.796	D	LS
				3 018.5 cm^{-1}	143 170.04–146 188.5	5–3	2.16+04	2.13−03	1.16+00	−1.973	E	LS
248	$3s8p-3s10d$	$^1P^\circ-^1D$		4 383.69 cm^{-1}	142 961.20–147 344.89	3–5	7.07+05	9.19−02	2.07+01	−0.560	D	1
249		$^3P^\circ-^3D$		*4 118.7* cm^{-1}	*143 168.4–147 287.1*	9–15	4.53+05	6.68−02	4.80+01	−0.221	E+	1
				4 117.06 cm^{-1}	143 170.04–147 287.10	5–7	4.53+05	5.61−02	2.24+01	−0.552	D	LS
				4 119.89 cm^{-1}	143 166.76–147 286.65	3–5	3.40+05	5.01−02	1.20+01	−0.823	E+	LS
				4 122.6 cm^{-1}	143 165.4–147 288.0	1–3	2.53+05	6.69−02	5.34+00	−1.175	E	LS
				4 116.61 cm^{-1}	143 170.04–147 286.65	5–5	1.13+05	1.00−02	4.00+00	−1.301	E	LS
				4 121.2 cm^{-1}	143 166.76–147 288.0	3–3	1.89+05	1.67−02	4.00+00	−1.300	E	LS
				4 118.0 cm^{-1}	143 170.04–147 288.0	5–3	1.26+04	6.68−04	2.67−01	−2.476	E	LS
250	$3s9s-3s9p$	$^3S-^3P^\circ$		*627.9* cm^{-1}	144 527.35–*145 155.2*	3–9	2.85+05	3.26+00	5.12+03	0.990	C+	1
				632.14 cm^{-1}	144 527.35–145 159.49	3–5	2.91+05	1.82+00	2.84+03	0.737	B	LS
				623.71 cm^{-1}	144 527.35–145 151.06	3–3	2.80+05	1.08+00	1.71+03	0.511	C+	LS
				618.49 cm^{-1}	144 527.35–145 145.84	3–1	2.73+05	3.56−01	5.68+02	0.029	C+	LS
251		$^1S-^1P^\circ$		296.96 cm^{-1}	144 644.14–144 941.10	1–3	3.45+04	1.76+00	1.95+03	0.246	C+	1
252	$3s9s-3p4s$	$^3S-^3P^\circ$		*1 371.4* cm^{-1}	144 527.35–*145 898.7*	3–9	1.73+04	4.14−02	2.98+01	−0.906	D+	1
				1 434.19 cm^{-1}	144 527.35–145 961.54	3–5	1.98+04	2.40−02	1.65+01	−1.143	C	LS
				1 307.35 cm^{-1}	144 527.35–145 834.70	3–3	1.50+04	1.32−02	9.97+00	−1.402	D+	LS
				1 248.80 cm^{-1}	144 527.35–145 776.15	3–1	1.31+04	4.19−03	3.31+00	−1.901	D	LS
253	$3s9s-3s10p$	$^3S-^3P^\circ$		*2 072.3* cm^{-1}	144 527.35–*146 599.6*	3–9	6.83+04	7.15−02	3.41+01	−0.669	D+	1
				2 074.75 cm^{-1}	144 527.35–146 602.10	3–5	6.86+04	3.98−02	1.89+01	−0.923	C	LS
				2 069.60 cm^{-1}	144 527.35–146 596.95	3–3	6.80+04	2.38−02	1.14+01	−1.146	D+	LS
				2 067.50 cm^{-1}	144 527.35–146 594.85	3–1	6.78+04	7.93−03	3.79+00	−1.624	D	LS
254		$^1S-^1P^\circ$		1 655.78 cm^{-1}	144 644.14–146 299.92	1–3	1.27+05	2.09−01	4.16+01	−0.680	C	1
255	$3s9s-3s11p$	$^1S-^1P^\circ$		2 626.68 cm^{-1}	144 644.14–147 270.82	1–3	2.04+05	1.33−01	1.67+01	−0.876	C	1
256	$3s8d-3s8f$	$^3D-^3F^\circ$		*490.5* cm^{-1}	*144 642.3–145 132.8*	15–21	1.89+05	1.65+00	1.66+04	1.394	B	1
				492.86 cm^{-1}	144 642.45–145 135.31	7–9	1.92+05	1.52+00	7.11+03	1.027	B	LS

TABLE 8. Transition probabilities of allowed lines for Al II (references in this table are as follows: 1=Butler *et al.*,[5,6] 2=Tachiev and Froese Fischer,[70] 3=Chang and Fang,[9] 4=Weiss,[82] 5=Chou *et al.*,[11] 6=Sen and Puri,[64] and 7=Träbert *et al.*[75])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				489.75 cm^{-1}	144 642.18–145 131.93	5–7	1.67+05	1.46+00	4.91+03	0.863	B	LS
				487.5 cm^{-1}	144 642.0–145 129.51	3–5	1.56+05	1.64+00	3.32+03	0.692	B	LS
				489.48 cm^{-1}	144 642.45–145 131.93	7–7	2.09+04	1.31−01	6.17+02	−0.038	B	LS
				487.33 cm^{-1}	144 642.18–145 129.51	5–5	2.88+04	1.82−01	6.15+02	−0.041	B	LS
				487.06 cm^{-1}	144 642.45–145 129.51	7–5	8.13+02	3.67−03	1.74+01	−1.590	C	LS
257	3s8d–3s9p	^{3}D–^{3}P$^\circ$		*512.9* cm^{-1}	*144 642.3–145 155.2*	15–9	2.61+05	8.92−01	8.59+03	1.126	C	1
				517.04 cm^{-1}	144 642.45–145 159.49	7–5	2.25+05	9.00−01	4.01+03	0.799	C	LS
				508.88 cm^{-1}	144 642.18–145 151.06	5–3	1.91+05	6.64−01	2.15+03	0.521	C	LS
				503.8 cm^{-1}	144 642.0–145 145.84	3–1	2.47+05	4.87−01	9.55+02	0.165	C	LS
				517.31 cm^{-1}	144 642.18–145 159.49	5–5	4.02+04	2.25−01	7.16+02	0.051	C	LS
				509.1 cm^{-1}	144 642.0–145 151.06	3–3	6.38+04	3.69−01	7.16+02	0.044	C	LS
				517.5 cm^{-1}	144 642.0–145 159.49	3–5	2.68+03	2.50−02	4.77+01	−1.125	D	LS
258		^{1}D–^{1}P$^\circ$		158.87 cm^{-1}	144 782.23–144 941.10	5–3	9.65+03	3.44−01	3.56+03	0.236	C	1
259	3s8d–3p4s	^{3}D–^{3}P$^\circ$		*1 256.4* cm^{-1}	*144 642.3–145 898.7*	15–9	1.40+04	7.95−03	3.13+01	−0.924	C	1
				1 319.09 cm^{-1}	144 642.45–145 961.54	7–5	1.36+04	8.35−03	1.46+01	−1.233	C	LS
				1 192.52 cm^{-1}	144 642.18–145 834.70	5–3	8.95+03	5.66−03	7.81+00	−1.548	C	LS
				1 134.1 cm^{-1}	144 642.0–145 776.15	3–1	1.03+04	3.99−03	3.47+00	−1.922	D+	LS
				1 319.36 cm^{-1}	144 642.18–145 961.54	5–5	2.43+03	2.09−03	2.61+00	−1.981	D+	LS
				1 192.7 cm^{-1}	144 642.0–145 834.70	3–3	2.99+03	3.15−03	2.61+00	−2.025	D+	LS
				1 319.5 cm^{-1}	144 642.0–145 961.54	3–5	1.62+02	2.32−04	1.74−01	−3.157	E+	LS
260	3s8d–3s9f	^{3}D–^{3}F$^\circ$		*1 859.1* cm^{-1}	*144 642.3–146 501.4*	15–21	1.34+05	8.11−02	2.15+02	0.085	D+	1
				1 860.02 cm^{-1}	144 642.45–146 502.47	7–9	1.34+05	7.45−02	9.23+01	−0.283	D+	LS
				1 858.81 cm^{-1}	144 642.18–146 500.99	5–7	1.19+05	7.21−02	6.38+01	−0.443	D+	LS
				1 857.9 cm^{-1}	144 642.0–146 499.90	3–5	1.12+05	8.11−02	4.31+01	−0.614	D	LS
				1 858.54 cm^{-1}	144 642.45–146 500.99	7–7	1.49+04	6.45−03	8.00+00	−1.345	E+	LS
				1 857.72 cm^{-1}	144 642.18–146 499.90	5–5	2.08+04	9.03−03	8.00+00	−1.345	E+	LS
				1 857.45 cm^{-1}	144 642.45–146 499.90	7–5	5.86+02	1.82−04	2.26−01	−2.895	E	LS
261		^{1}D–^{1}F$^\circ$		1 496.47 cm^{-1}	144 782.23–146 278.70	5–7	9.52+05	8.92−01	9.81+02	0.649	C	1
262	3s8d–3s10p	^{3}D–^{3}P$^\circ$		*1 957.3* cm^{-1}	*144 642.3–146 599.6*	15–9	1.15+05	2.69−02	6.80+01	−0.394	E+	1
				1 959.65 cm^{-1}	144 642.45–146 602.10	7–5	9.68+04	2.70−02	3.18+01	−0.724	D	LS
				1 954.77 cm^{-1}	144 642.18–146 596.95	5–3	8.58+04	2.02−02	1.70+01	−0.996	D	LS
				1 952.9 cm^{-1}	144 642.0–146 594.85	3–1	1.14+05	1.49−02	7.54+00	−1.350	E+	LS
				1 959.92 cm^{-1}	144 642.18–146 602.10	5–5	1.73+04	6.74−03	5.66+00	−1.472	E	LS
				1 955.0 cm^{-1}	144 642.0–146 596.95	3–3	2.86+04	1.12−02	5.66+00	−1.474	E	LS
				1 960.1 cm^{-1}	144 642.0–146 602.10	3–5	1.15+03	7.49−04	3.77−01	−2.648	E	LS
263		^{1}D–^{1}P$^\circ$		1 517.69 cm^{-1}	144 782.23–146 299.92	5–3	1.36+05	5.30−02	5.75+01	−0.577	D+	1
264	3s8d–3s11p	^{1}D–^{1}P$^\circ$		2 488.59 cm^{-1}	144 782.23–147 270.82	5–3	1.96+05	2.84−02	1.88+01	−0.848	D	1
265	3s8d–3s10f	^{1}D–^{1}F$^\circ$		2 564.44 cm^{-1}	144 782.23–147 346.67	5–7	6.92+05	2.21−01	1.42+02	0.043	D+	1
266	3s8f–3s9d	^{1}F$^\circ$–^{1}D		1 491.5 cm^{-1}	144 784.45–146 276.0	7–5	1.76+05	8.47−02	1.31+02	−0.227	D+	1
267		^{3}F$^\circ$–^{3}D		*1 056* cm^{-1}	*145 132.8–146 189*	21–15	5.52+05	5.30−01	3.47+03	1.046	C	1
				1 053.6 cm^{-1}	145 135.31–146 188.9	9–7	5.04+05	5.29−01	1.49+03	0.678	C	LS
				1 056.6 cm^{-1}	145 131.93–146 188.5	7–5	4.91+05	4.71−01	1.03+03	0.518	C	LS
				1 059.0 cm^{-1}	145 129.51–146 188.5	5–3	5.57+05	4.47−01	6.95+02	0.349	C	LS
				1 057.0 cm^{-1}	145 131.93–146 188.9	7–7	4.41+04	5.92−02	1.29+02	−0.383	D+	LS
				1 059.0 cm^{-1}	145 129.51–146 188.5	5–5	6.21+04	8.30−02	1.29+02	−0.382	D+	LS
				1 059.4 cm^{-1}	145 129.51–146 188.9	5–7	1.25+03	2.34−03	3.64+00	−1.932	E	LS

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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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
268	$3s8f-3s9g$	$^3F^\circ-^3G$		*1 284 cm^{-1}*	*145 132.8–146 417*	21–27	1.27+06	1.48+00	7.99+03	1.492	C	1
				1 281.6 cm^{-1}	145 135.31–146 416.9	9–11	1.26+06	1.41+00	3.26+03	1.103	C	LS
				1 285.0 cm^{-1}	145 131.93–146 416.9	7–9	1.19+06	1.39+00	2.49+03	0.988	C	LS
				1 287.4 cm^{-1}	145 129.51–146 416.9	5–7	1.18+06	1.49+00	1.91+03	0.872	C	LS
				1 281.6 cm^{-1}	145 135.31–146 416.9	9–9	7.90+04	7.21−02	1.67+02	−0.188	D+	LS
				1 285.0 cm^{-1}	145 131.93–146 416.9	7–7	1.02+05	9.29−02	1.67+02	−0.187	D+	LS
				1 281.6 cm^{-1}	145 135.31–146 416.9	9–7	1.55+03	1.10−03	2.54+00	−2.004	E	LS
269	$3s8f-3s10d$	$^1F^\circ-^1D$		2 560.44 cm^{-1}	144 784.45–147 344.89	7–5	1.13+05	1.85−02	1.67+01	−0.888	D	1
270		$^3F^\circ-^3D$		*2 154.3 cm^{-1}*	*145 132.8–147 287.1*	21–15	2.99+05	6.90−02	2.21+02	0.161	D+	1
				2 151.79 cm^{-1}	145 135.31–147 287.10	9–7	2.74+05	6.89−02	9.49+01	−0.208	D+	LS
				2 154.72 cm^{-1}	145 131.93–147 286.65	7–5	2.66+05	6.13−02	6.56+01	−0.367	D+	LS
				2 158.5 cm^{-1}	145 129.51–147 288.0	5–3	3.01+05	5.81−02	4.43+01	−0.537	D	LS
				2 155.17 cm^{-1}	145 131.93–147 287.10	7–7	2.38+04	7.69−03	8.22+00	−1.269	E+	LS
				2 157.14 cm^{-1}	145 129.51–147 286.65	5–5	3.35+04	1.08−02	8.24+00	−1.268	E+	LS
				2 157.59 cm^{-1}	145 129.51–147 287.10	5–7	6.74+02	3.04−04	2.32−01	−2.818	E	LS
271	$3s8f-3s10g$	$^1F^\circ-^1G$		2 668.9 cm^{-1}	144 784.45–147 453.4	7–9	7.10+05	1.92−01	1.66+02	0.128	D+	1
272		$^3F^\circ-^3G$		*2 320 cm^{-1}*	*145 132.8–147 453*	21–27	7.62+05	2.73−01	8.13+02	0.758	D+	1
				2 318.1 cm^{-1}	145 135.31–147 453.4	9–11	7.60+05	2.59−01	3.31+02	0.368	C	LS
				2 321.5 cm^{-1}	145 131.93–147 453.4	7–9	7.16+05	2.56−01	2.54+02	0.253	C	LS
				2 323.9 cm^{-1}	145 129.51–147 453.4	5–7	7.02+05	2.73−01	1.93+02	0.135	D+	LS
				2 318.1 cm^{-1}	145 135.31–147 453.4	9–9	4.77+04	1.33−02	1.70+01	−0.922	D	LS
				2 321.5 cm^{-1}	145 131.93–147 453.4	7–7	6.15+04	1.71−02	1.70+01	−0.922	D	LS
				2 318.1 cm^{-1}	145 135.31–147 453.4	9–7	9.31+02	2.02−04	2.58−01	−2.740	E	LS
273	$3s9p-3s10s$	$^1P^\circ-^1S$		1 251.0 cm^{-1}	144 941.10–146 192.1	3–1	1.46+06	4.67−01	3.69+02	0.146	C+	1
274		$^3P^\circ-^3S$		*956.9 cm^{-1}*	*145 155.2*–146 112.14	9–3	1.48+06	8.05−01	2.49+03	0.860	C+	1
				952.65 cm^{-1}	145 159.49–146 112.14	5–3	8.08+05	8.01−01	1.38+03	0.603	C+	LS
				961.08 cm^{-1}	145 151.06–146 112.14	3–3	4.98+05	8.09−01	8.31+02	0.385	C+	LS
				966.30 cm^{-1}	145 145.84–146 112.14	1–3	1.69+05	8.13−01	2.77+02	−0.090	C+	LS
275	$3s9p-3s9d$	$^1P^\circ-^1D$		1 334.9 cm^{-1}	144 941.10–146 276.0	3–5	9.70+05	1.36+00	1.01+03	0.611	C+	1
276		$^3P^\circ-^3D$		*1 034 cm^{-1}*	*145 155.2–146 189*	9–15	9.66+05	2.26+00	6.48+03	1.308	C+	1
				1 029.4 cm^{-1}	145 159.49–146 188.9	5–7	9.54+05	1.89+00	3.02+03	0.975	B	LS
				1 037.4 cm^{-1}	145 151.06–146 188.5	3–5	7.32+05	1.70+00	1.62+03	0.708	C+	LS
				1 042.7 cm^{-1}	145 145.84–146 188.5	1–3	5.51+05	2.28+00	7.20+02	0.358	C+	LS
				1 029.0 cm^{-1}	145 159.49–146 188.5	5–5	2.39+05	3.38−01	5.41+02	0.228	C+	LS
				1 037.4 cm^{-1}	145 151.06–146 188.5	3–3	4.08+05	5.68−01	5.41+02	0.231	C+	LS
				1 029.0 cm^{-1}	145 159.49–146 188.5	5–3	2.65+04	2.25−02	3.60+01	−0.949	C	LS
277	$3s9p-3s11s$	$^1P^\circ-^1S$		2 349.88 cm^{-1}	144 941.10–147 290.98	3–1	8.42+05	7.62−02	3.20+01	−0.641	C	1
278		$^3P^\circ-^3S$		*2 078.3 cm^{-1}*	*145 155.2*–147 233.45	9–3	7.55+05	8.74−02	1.25+02	−0.104	C	1
				2 073.96 cm^{-1}	145 159.49–147 233.45	5–3	4.17+05	8.72−02	6.92+01	−0.361	C	LS
				2 082.39 cm^{-1}	145 151.06–147 233.45	3–3	2.53+05	8.76−02	4.15+01	−0.580	C	LS
				2 087.61 cm^{-1}	145 145.84–147 233.45	1–3	8.51+04	8.78−02	1.38+01	−1.057	D+	LS
279	$3s9p-3s10d$	$^1P^\circ-^1D$		2 403.79 cm^{-1}	144 941.10–147 344.89	3–5	5.94+05	2.57−01	1.06+02	−0.113	C+	1
280		$^3P^\circ-^3D$		*2 131.9 cm^{-1}*	*145 155.2–147 287.1*	9–15	4.41+05	2.42−01	3.37+02	0.338	C	1
				2 127.61 cm^{-1}	145 159.49–147 287.10	5–7	4.38+05	2.03−01	1.57+02	0.006	C+	LS

TABLE 8. Transition probabilities of allowed lines for Al II (references in this table are as follows: 1=Butler *et al.*,[5,6] 2=Tachiev and Froese Fischer,[70] 3=Chang and Fang,[9] 4=Weiss,[82] 5=Chou *et al.*,[11] 6=Sen and Puri,[64] and 7=Träbert *et al.*[75])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				2 135.59 cm^{-1}	145 151.06–147 286.65	3–5	3.32+05	1.82−01	8.42+01	−0.263	C	LS
				2 142.2 cm^{-1}	145 145.84–147 288.0	1–3	2.48+05	2.43−01	3.73+01	−0.614	C	LS
				2 127.16 cm^{-1}	145 159.49–147 286.65	5–5	1.10+05	3.63−02	2.81+01	−0.741	C	LS
				2 136.9 cm^{-1}	145 151.06–147 288.0	3–3	1.85+05	6.07−02	2.81+01	−0.740	C	LS
				2 128.5 cm^{-1}	145 159.49–147 288.0	5–3	1.22+04	2.42−03	1.87+00	−1.917	E+	LS
281	$3s8g-3s8f$	^{3}G–^{3}F$^\circ$		*166* cm^{-1}	*144 967–145 132.8*	27–21	7.92+03	3.36−01	1.80+04	0.958	B	1
				168.2 cm^{-1}	144 967.1–145 135.31	11–9	7.89+03	3.42−01	7.36+03	0.575	B	LS
				164.8 cm^{-1}	144 967.1–145 131.93	9–7	7.29+03	3.13−01	5.63+03	0.450	B	LS
				162.4 cm^{-1}	144 967.1–145 129.51	7–5	7.46+03	3.03−01	4.30+03	0.327	B	LS
				168.2 cm^{-1}	144 967.1–145 135.31	9–9	4.04+02	2.14−02	3.77+02	−0.715	B	LS
				164.8 cm^{-1}	144 967.1–145 131.93	7–7	4.87+02	2.69−02	3.76+02	−0.725	B	LS
				168.2 cm^{-1}	144 967.1–145 135.31	7–9	6.14+00	4.18−04	5.73+00	−2.534	C	LS
282	$3s8g-3s9f$	^{3}G–^{3}F$^\circ$		*1 534* cm^{-1}	*144 967–146 501.4*	27–21	3.72+04	1.84−02	1.07+02	−0.304	D	1
				1 535.4 cm^{-1}	144 967.1–146 502.47	11–9	3.54+04	1.84−02	4.34+01	−0.694	D	LS
				1 533.9 cm^{-1}	144 967.1–146 500.99	9–7	3.49+04	1.73−02	3.34+01	−0.808	D	LS
				1 532.8 cm^{-1}	144 967.1–146 499.90	7–5	3.71+04	1.69−02	2.54+01	−0.927	D	LS
				1 535.4 cm^{-1}	144 967.1–146 502.47	9–9	1.81+03	1.15−03	2.22+00	−1.985	E	LS
				1 533.9 cm^{-1}	144 967.1–146 500.99	7–7	2.32+03	1.48−03	2.22+00	−1.985	E	LS
				1 535.4 cm^{-1}	144 967.1–146 502.47	7–9	2.76+01	2.26−05	3.39−02	−3.801	E	LS
283	$3p4s-3s10s$	^{3}P$^\circ$–^{3}S		*213.4* cm^{-1}	*145 898.7*–146 112.14	9–3	1.68+04	1.84−01	2.56+03	0.219	C+	1
				150.60 cm^{-1}	145 961.54–146 112.14	5–3	3.28+03	1.30−01	1.42+03	−0.187	C+	LS
				277.44 cm^{-1}	145 834.70–146 112.14	3–3	1.23+04	2.40−01	8.54+02	−0.143	C+	LS
				335.99 cm^{-1}	145 776.15–146 112.14	1–3	7.30+03	2.91−01	2.85+02	−0.536	C+	LS
284	$3p4s-3s9d$	^{3}P$^\circ$–^{3}D		*290* cm^{-1}	*145 898.7–146 189*	9–15	1.56+04	4.63−01	4.73+03	0.620	C+	1
				227.4 cm^{-1}	145 961.54–146 188.9	5–7	7.51+03	3.05−01	2.21+03	0.183	C+	LS
				353.8 cm^{-1}	145 834.70–146 188.5	3–5	2.12+04	4.24−01	1.18+03	0.104	C+	LS
				412.4 cm^{-1}	145 776.15–146 188.5	1–3	2.49+04	6.59−01	5.26+02	−0.181	C+	LS
				227.0 cm^{-1}	145 961.54–146 188.5	5–5	1.87+03	5.44−02	3.95+02	−0.565	C+	LS
				353.8 cm^{-1}	145 834.70–146 188.5	3–3	1.18+04	1.41−01	3.94+02	−0.374	C+	LS
				227.0 cm^{-1}	145 961.54–146 188.5	5–3	2.07+02	3.62−03	2.63+01	−1.742	C	LS
285	$3p4s-3s11s$	^{3}P$^\circ$–^{3}S		*1 334.8* cm^{-1}	*145 898.7*–147 233.45	9–3	5.42+05	1.52−01	3.37+02	0.136	C+	1
				1 271.91 cm^{-1}	145 961.54–147 233.45	5–3	2.61+05	1.45−01	1.88+02	−0.140	C+	LS
				1 398.75 cm^{-1}	145 834.70–147 233.45	3–3	2.08+05	1.59−01	1.12+02	−0.321	C+	LS
				1 457.30 cm^{-1}	145 776.15–147 233.45	1–3	7.84+04	1.66−01	3.75+01	−0.780	C	LS
286	$3p4s-3s10d$	^{3}P$^\circ$–^{3}D		*1 388.4* cm^{-1}	*145 898.7–147 287.1*	9–15	3.57+05	4.63−01	9.87+02	0.620	C+	1
				1 325.56 cm^{-1}	145 961.54–147 287.10	5–7	3.11+05	3.71−01	4.61+02	0.268	C+	LS
				1 451.95 cm^{-1}	145 834.70–147 286.65	3–5	3.06+05	3.63−01	2.47+02	0.037	C+	LS
				1 511.9 cm^{-1}	145 776.15–147 288.0	1–3	2.56+05	5.04−01	1.10+02	−0.298	C+	LS
				1 325.11 cm^{-1}	145 961.54–147 286.65	5–5	7.77+04	6.63−02	8.24+01	−0.480	C	LS
				1 453.3 cm^{-1}	145 834.70–147 288.0	3–3	1.70+05	1.21−01	8.22+01	−0.440	C	LS
				1 326.5 cm^{-1}	145 961.54–147 288.0	5–3	8.65+03	4.42−03	5.48+00	−1.656	D	LS
287	$3s10s-3s10p$	^{3}S–^{3}P$^\circ$		*487.5* cm^{-1}	146 112.14–*146 599.6*	3–9	1.52+05	2.89+00	5.85+03	0.938	C+	1
				489.96 cm^{-1}	146 112.14–146 602.10	3–5	1.55+05	1.61+00	3.25+03	0.684	B	LS
				484.81 cm^{-1}	146 112.14–146 596.95	3–3	1.50+05	9.58−01	1.95+03	0.458	C+	LS
				482.71 cm^{-1}	146 112.14–146 594.85	3–1	1.48+05	3.18−01	6.51+02	−0.020	C+	LS
288		^{1}S–^{1}P$^\circ$		107.8 cm^{-1}	146 192.1–146 299.92	1–3	2.66+03	1.03+00	3.14+03	0.013	B	1

TABLE 8. Transition probabilities of allowed lines for Al II (references in this table are as follows: 1=Butler *et al.*,[5,6] 2=Tachiev and Froese Fischer,[70] 3=Chang and Fang,[9] 4=Weiss,[82] 5=Chou *et al.*,[11] 6=Sen and Puri,[64] and 7=Träbert *et al.*[75])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
289	3*s*10*s*−3*s*11*p*	^{1}S−^{1}P°		1 078.7 cm^{-1}	146 192.1–147 270.82	1–3	1.25+05	4.83−01	1.47+02	−0.316	C+	1
290	3*s*9*d*−3*s*9*f*	^{3}D−^{3}F°		*312* cm^{-1}	*146 189–146 501.4*	15–21	8.21+04	1.76+00	2.79+04	1.422	B	1
				313.6 cm^{-1}	146 188.9–146 502.47	7–9	8.26+04	1.62+00	1.19+04	1.055	B	LS
				312.5 cm^{-1}	146 188.5–146 500.99	5–7	7.30+04	1.57+00	8.27+03	0.895	B	LS
				311.4 cm^{-1}	146 188.5–146 499.90	3–5	6.83+04	1.76+00	5.58+03	0.723	B	LS
				312.1 cm^{-1}	146 188.9–146 500.99	7–7	9.10+03	1.40−01	1.03+03	−0.009	C+	LS
				311.4 cm^{-1}	146 188.5–146 499.90	5–5	1.27+04	1.96−01	1.04+03	−0.009	C+	LS
				311.0 cm^{-1}	146 188.9–146 499.90	7–5	3.56+02	3.94−03	2.92+01	−1.559	C	LS
291	3*s*9*d*−3*s*10*p*	^{3}D−^{3}P°		*411* cm^{-1}	*146 189–146 599.6*	15–9	1.54+05	8.22−01	9.88+03	1.091	C+	1
				413.2 cm^{-1}	146 188.9–146 602.10	7–5	1.32+05	8.27−01	4.61+03	0.763	B	LS
				408.5 cm^{-1}	146 188.5–146 596.95	5–3	1.14+05	6.13−01	2.47+03	0.486	C+	LS
				406.4 cm^{-1}	146 188.5–146 594.85	3–1	1.49+05	4.52−01	1.10+03	0.132	C+	LS
				413.6 cm^{-1}	146 188.5–146 602.10	5–5	2.36+04	2.07−01	8.24+02	0.015	C+	LS
				408.5 cm^{-1}	146 188.5–146 596.95	3–3	3.79+04	3.41−01	8.25+02	0.010	C+	LS
				413.6 cm^{-1}	146 188.5–146 602.10	3–5	1.57+03	2.30−02	5.49+01	−1.161	C	LS
292	3*s*9*d*−3*s*11*p*	^{1}D−^{1}P°		994.8 cm^{-1}	146 276.0–147 270.82	5–3	1.40+05	1.27−01	2.10+02	−0.197	C+	1
293	3*s*9*d*−3*s*10*f*	^{1}D−^{1}F°		1 070.7 cm^{-1}	146 276.0–147 346.67	5–7	4.94+05	9.04−01	1.39+03	0.655	C+	1
294	3*s*9*f*−3*s*10*d*	^{1}F°−^{1}D		1 066.19 cm^{-1}	146 278.70–147 344.89	7–5	1.16+05	1.09−01	2.36+02	−0.117	C+	1
295		^{3}F°−^{3}D		*785.7* cm^{-1}	*146 501.4–147 287.1*	21–15	3.38+05	5.87−01	5.16+03	1.091	C+	1
				784.63 cm^{-1}	146 502.47–147 287.10	9–7	3.09+05	5.86−01	2.21+03	0.722	C+	LS
				785.66 cm^{-1}	146 500.99–147 286.65	7–5	3.00+05	5.21−01	1.53+03	0.562	C+	LS
				788.1 cm^{-1}	146 499.90–147 288.0	5–3	3.41+05	4.94−01	1.03+03	0.393	C+	LS
				786.11 cm^{-1}	146 500.99–147 287.10	7–7	2.70+04	6.54−02	1.92+02	−0.339	C+	LS
				786.75 cm^{-1}	146 499.90–147 286.65	5–5	3.78+04	9.16−02	1.92+02	−0.339	C+	LS
				787.20 cm^{-1}	146 499.90–147 287.10	5–7	7.65+02	2.59−03	5.42+00	−1.888	D	LS
296	3*s*9*f*−3*s*10*g*	^{1}F°−^{1}G		1 174.7 cm^{-1}	146 278.70–147 453.4	7–9	3.81+05	5.32−01	1.04+03	0.571	C+	1
297		^{3}F°−^{3}G		*952* cm^{-1}	*146 501.4–147 453*	21–27	6.65+05	1.42+00	1.03+04	1.475	B	1
				950.9 cm^{-1}	146 502.47–147 453.4	9–11	6.61+05	1.34+00	4.18+03	1.081	B	LS
				952.4 cm^{-1}	146 500.99–147 453.4	7–9	6.26+05	1.33+00	3.22+03	0.969	B	LS
				953.5 cm^{-1}	146 499.90–147 453.4	5–7	6.15+05	1.42+00	2.45+03	0.851	C+	LS
				950.9 cm^{-1}	146 502.47–147 453.4	9–9	4.14+04	6.87−02	2.14+02	−0.209	C+	LS
				952.4 cm^{-1}	146 500.99–147 453.4	7–7	5.35+04	8.85−02	2.14+02	−0.208	C+	LS
				950.9 cm^{-1}	146 502.47–147 453.4	9–7	8.14+02	1.05−03	3.27+00	−2.025	D	LS
298	3*s*10*p*−3*s*11*s*	^{1}P°−^{1}S		991.06 cm^{-1}	146 299.92–147 290.98	3–1	7.82+05	3.98−01	3.97+02	0.077	C+	1
299		^{3}P°−^{3}S		*633.9* cm^{-1}	*146 599.6*–147 233.45	9–3	7.61+05	9.46−01	4.42+03	0.930	C+	1
				631.35 cm^{-1}	146 602.10–147 233.45	5–3	4.17+05	9.42−01	2.46+03	0.673	C+	LS
				636.50 cm^{-1}	146 596.95–147 233.45	3–3	2.57+05	9.50−01	1.47+03	0.455	C+	LS
				638.60 cm^{-1}	146 594.85–147 233.45	1–3	8.64+04	9.53−01	4.91+02	−0.021	C+	LS
300	3*s*10*p*−3*s*10*d*	^{1}P°−^{1}D		1 044.97 cm^{-1}	146 299.92–147 344.89	3–5	5.11+05	1.17+00	1.11+03	0.545	C+	1
301		^{3}P°−^{3}D		*687.5* cm^{-1}	*146 599.6–147 287.1*	9–15	4.65+05	2.46+00	1.06+04	1.345	C+	1
				685.00 cm^{-1}	146 602.10–147 287.10	5–7	4.61+05	2.06+00	4.95+03	1.013	B	LS
				689.70 cm^{-1}	146 596.95–147 286.65	3–5	3.52+05	1.85+00	2.65+03	0.744	C+	LS
				693.1 cm^{-1}	146 594.85–147 288.0	1–3	2.65+05	2.48+00	1.18+03	0.394	C+	LS
				684.55 cm^{-1}	146 602.10–147 286.65	5–5	1.15+05	3.67−01	8.82+02	0.264	C+	LS
				691.0 cm^{-1}	146 596.95–147 288.0	3–3	1.97+05	6.18−01	8.83+02	0.268	C+	LS

TABLE 8. Transition probabilities of allowed lines for Al II (references in this table are as follows: 1=Butler *et al.*,[5,6] 2=Tachiev and Froese Fischer,[70] 3=Chang and Fang,[9] 4=Weiss,[82] 5=Chou *et al.*,[11] 6=Sen and Puri,[64] and 7=Träbert *et al.*[75])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				685.9 cm^{-1}	146 602.10–147 288.0	5–3	1.28+04	2.45−02	5.88+01	−0.912	C	LS
302	$3s10f-3s10g$	$^1F^\circ-{}^1G$		106.7 cm^{-1}	147 346.67–147 453.4	7–9	5.24+03	8.87−01	1.92+04	0.793	B	1

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

4.2.2. Forbidden Transitions for Al II

Wherever available we have used the data of Tachiev and Froese Fischer,[72] which result from extensive MCHF calculations with Breit-Pauli corrections to order α^2. The calculations only extend to transitions from energy levels up to $3s4p$. Ray *et al.*[58,59] computed effective quantum numbers via a complete screening model.

Comparison of results from Tachiev and Froese Fischer[72] with Ray *et al.*[58,59] suggested a large uncertainty in the latter two sources. We therefore estimated the accuracies of Tachiev and Froese Fischer[72] by conservatively scaling the pooling fit parameters of the spin-allowed lines of Al II to yield reduced accuracies, particularly at smaller line strengths. Next we isoelectronically averaged the logarithmic quality factors observed for allowed lines from the lower-lying energy levels of Mg I and Si III and applied the result to forbidden lines of Al II using the method described in the introduction to Kelleher and Podobedova[35]

References for Forbidden Transitions for Al II

[35]D. E. Kelleher and L. I. Podobedova, J. Phys. Chem. Ref. Data **37**, 267 (2008).
[58]D. Ray and P. K. Mukherjee, J. Phys. B **22**, 2103 (1989).
[59]D. Ray, P. K. Mukherjee, and H. P. Roy, Astrophys. J. **346**, 1045 (1989).
[72]G. Tachiev and C. Froese Fischer, http://www.vuse.vanderbilt.edu/~cff/mchf_collection/ (MCHF, *ab initio*, downloaded on February 23, 2005).

TABLE 9. Wavelength finding list for forbidden lines of Al II

Wavelength (vac) (Å)	Mult. No.
717.93	9
746.73	8
801.32	7
908.349	5
948.129	6
1 046.557	4
1 046.567	4
1 060.798	3
1 062.164	3
1 169.846	2
1 350.265	14
1 375.576	21
1 376.729	21
1 379.081	21
1 438.279	25

TABLE 9. Wavelength finding list for forbidden lines of Al II—Continued

Wavelength (vac) (Å)	Mult. No.
1 439.540	25
1 442.111	25
1 468.905	24
1 469.541	24
1 470.220	24
1 470.857	24
1 471.159	24
1 472.903	24
1 473.542	24
1 473.845	24
1 719.469	20
1 721.244	20
1 721.271	20
1 721.303	20
1 724.922	20
1 724.949	20
1 724.982	20
1 730.918	18
1 758.222	13
1 760.106	13
1 763.869	13
1 763.952	13
1 767.732	13
1 769.687	13
1 858.025	17
1 862.311	17
1 990.533	23
Wavelength (air) (Å)	**Mult. No.**
2 078.845	12
2 081.480	12
2 086.863	12
2 191.388	26
2 192.803	26
2 193.476	26
2 660.355	1
2 800.341	22
2 800.414	22
2 800.499	22
2 904.719	16
2 914.986	16
3 181.515	19
3 822.133	28
3 900.675	15
4 062.493	35
4 451.311	11
4 463.410	11

TABLE 9. Wavelength finding list for forbidden lines of Al II—Continued

Wavelength (air) (Å)	Mult. No.
4 488.234	11
4 663.046	39
4 909.538	43
5 001.211	38
5 008.585	38
5 012.096	38
5 313.337	46
5 716.01	30
5 755.90	30
6 214.55	52
6 214.91	52
6 246.37	37
6 270.86	37
6 318.91	37
6 389.62	50
6 782.74	48
6 875.49	54
6 876.00	54
6 876.44	54
7 042.08	49
7 056.71	49
7 826.80	41
7 901.79	41
8 780.33	40
8 791.78	56
8 792.62	56
8 793.34	56
8 828.79	40
8 851.80	40
8 924.33	40
8 947.84	40
8 959.05	40
9 878.39	51
9 927.68	34
9 928.59	34
9 929.67	34
10 076.35	55
10 077.46	55
10 078.40	55
10 106.33	55
10 107.44	55
10 108.39	55
10 121.75	55

TABLE 9. Wavelength finding list for forbidden lines of Al II—Continued

Wavelength (air) (Å)	Mult. No.
10 129.71	32
11 376.91	27
11 536.04	27
11 619.85	27
17 257.05	31
Wavenumber (cm^{-1})	**Mult. No.**
4 662.31	57
4 648.33	57
4 618.90	57
4 276.94	45
4 276.01	45
4 274.92	45
4 076.10	44
3 169.27	58
2 994.18	42
2 872.96	42
2 810.46	42
1 547.50	53
1 493.04	60
1 479.06	60
1 466.48	36
1 465.55	36
1 449.63	60
1 403.98	36
1 403.05	36
1 401.96	36
1 282.76	36
1 281.83	36
1 280.74	36
1 203.14	33
1 081.92	33
200.84	47
199.91	47
184.76	10
183.72	29
123.88	10
121.22	29
62.5	29
60.88	10
43.41	59
29.43	59

TABLE 10. Transition probabilities of forbidden lines for Al II (references in this table are as follows: 1=Tachiev and Froese Fischer[72], and 2=Ray and Mukherjee[58])

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	$3s^2-3s3p$	^{1}S$-^3$P°									
			2 660.355	2 661.146	0.00–37 577.79	1–5	M2	3.35−03	1.50+02	A	1
2	$3s^2-3p^2$	^{1}S$-^1$D									
				1 169.846	0.00–85 481.35	1–5	E2	8.37+03	8.19+01	A	1
3		^{1}S$-^3$P									
				1 060.798	0.00–94 268.68	1–5	E2	1.35+00	8.07−03	B+	1
				1 062.164	0.00–94 147.46	1–3	M1	3.72−03	4.96−07	C	1
4	$3s^2-3s3d$	^{1}S$-^3$D									
				1 046.567	0.00–95 550.51	1–5	E2	6.15−03	3.45−05	C+	1
				1 046.557	0.00–95 551.44	1–3	M1	7.61−09	9.70−13	E	1
5		^{1}S$-^1$D									
				908.349	0.00–110 089.83	1–5	E2	1.16+04	3.20+01	A	1
6	$3s^2-3s4p$	^{1}S$-^3$P°									
				948.129	0.00–105 470.93	1–5	M2	2.09−04	5.37−02	B	1
7	$3s^2-3s4d$	^{1}S$-^1$D									
				801.32	0–124 794.13	1–5	E2	5.09+03	7.51+00	C	2
8	$3s^2-3s5d$	^{1}S$-^1$D									
				746.73	0–133 916.40	1–5	E2	2.54+03	2.63+00	C	2
9	$3s^2-3s6d$	^{1}S$-^1$D									
				717.93	0–139 289.15	1–5	E2	7.76+02	6.61−01	D	2
10	$3s3p-3s3p$	^{3}P°$-^3$P°									
				123.88 cm^{-1}	37 453.91–37 577.79	3–5	M1	2.56−05	2.50+00	A	1
				123.88 cm^{-1}	37 453.91–37 577.79	3–5	E2	5.66−11	8.66+01	A	1
				60.88 cm^{-1}	37 393.03–37 453.91	1–3	M1	4.06−06	2.00+00	A	1
				184.76 cm^{-1}	37 393.03–37 577.79	1–5	E2	1.85−10	3.85+01	A	1
11		^{3}P°$-^1$P°									
			4 463.410	4 464.662	37 453.91–59 852.02	3–3	M1	1.83−03	1.81−05	C+	1
			4 463.410	4 464.662	37 453.91–59 852.02	3–3	E2	4.52−04	2.15−03	B	1
			4 488.234	4 489.493	37 577.79–59 852.02	5–3	M1	3.00−03	3.02−05	C+	1
			4 488.234	4 489.493	37 577.79–59 852.02	5–3	E2	3.14−04	1.53−03	B	1
			4 451.311	4 452.560	37 393.03–59 852.02	1–3	M1	2.46−03	2.41−05	C+	1
12	$3s3p-3p^2$	^{3}P°$-^1$D									
			2 078.845	2 079.507	37 393.03–85 481.35	1–5	M2	6.31−03	8.23+01	B+	1
			2 081.480	2 082.143	37 453.91–85 481.35	3–5	M2	1.40−02	1.83+02	B+	1
			2 086.863	2 087.528	37 577.79–85 481.35	5–5	M2	1.06−02	1.41+02	B+	1
13		^{3}P°$-^3$P									
				1 763.952	37 577.79–94 268.68	5–5	M2	1.98−02	1.13+02	B+	1
				1 763.869	37 453.91–94 147.46	3–3	M2	1.69−02	5.80+01	B+	1
				1 769.687	37 577.79–94 084.96	5–1	M2	1.82−02	2.12+01	B+	1
				1 767.732	37 577.79–94 147.46	5–3	M2	9.42−05	3.27−01	B	1
				1 760.106	37 453.91–94 268.68	3–5	M2	7.33−05	4.15−01	B	1
				1 758.222	37 393.03–94 268.68	1–5	M2	3.64−03	2.05+01	B+	1
14		^{3}P°$-^1$S									
				1 350.265	37 577.79–111 637.33	5–1	M2	8.21−02	2.47+01	B+	1
15		^{1}P°$-^1$D									
			3 900.675	3 901.780	59 852.02–85 481.35	3–5	M2	1.52−04	4.60+01	B+	1
16		^{1}P°$-^3$P									

TABLE 10. Transition probabilities of forbidden lines for Al II (references in this table are as follows: 1=Tachiev and Froese Fischer[72], and 2=Ray and Mukherjee[58])—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
			2 914.986	2 915.840	59 852.02–94 147.46	3–3	M2	9.45−04	4.01+01	B+	1
			2 904.719	2 905.570	59 852.02–94 268.68	3–5	M2	1.75−03	1.22+02	B+	1
17	3s3p−3s4s	^{3}P°−^{3}S									
				1 862.311	37 577.79–91 274.50	5–3	M2	9.01−03	4.06+01	B+	1
				1 858.025	37 453.91–91 274.50	3–3	M2	3.06−03	1.37+01	B+	1
18		^{3}P°−^{1}S									
				1 730.918	37 577.79–95 350.60	5–1	M2	2.32−02	2.42+01	B+	1
19		^{1}P°−^{3}S									
			3 181.515	3 182.435	59 852.02–91 274.50	3–3	M2	5.05−04	3.32+01	B+	1
20	3s3p−3s3d	^{3}P°−^{3}D									
				1 721.303	37 453.91–95 549.42	3–7	M2	8.99−04	6.38+00	B+	1
				1 719.469	37 393.03–95 550.51	1–5	M2	8.66−04	4.37+00	B+	1
				1 724.982	37 577.79–95 549.42	5–7	M2	5.42−02	3.88+02	B+	1
				1 721.271	37 453.91–95 550.51	3–5	M2	1.72−02	8.71+01	B+	1
				1 724.949	37 577.79–95 550.51	5–5	M2	8.04−03	4.12+01	B+	1
				1 721.244	37 453.91–95 551.44	3–3	M2	1.38−03	4.20+00	B+	1
				1 724.922	37 577.79–95 551.44	5–3	M2	6.34−06	1.95−02	C+	1
21		^{3}P°−^{1}D									
				1 375.576	37 393.03–110 089.83	1–5	M2	3.54−06	5.84−03	C+	1
				1 376.729	37 453.91–110 089.83	3–5	M2	3.31−06	5.48−03	C+	1
				1 379.081	37 577.79–110 089.83	5–5	M2	1.27−06	2.12−03	C+	1
22		^{1}P°−^{3}D									
			2 800.499	2 801.324	59 852.02–95 549.42	3–7	M2	2.57−03	2.08+02	B+	1
			2 800.414	2 801.239	59 852.02–95 550.51	3–5	M2	6.54−04	3.78+01	B+	1
			2 800.341	2 801.166	59 852.02–95 551.44	3–3	M2	7.15−05	2.48+00	B+	1
23		^{1}P°−^{1}D									
				1 990.533	59 852.02–110 089.83	3–5	M2	2.08−03	2.18+01	B+	1
24	3s3p−3s4p	^{3}P°−^{3}P°									
				1 472.903	37 577.79–105 470.93	5–5	M1	1.41−10	8.36−14	E	1
				1 472.903	37 577.79–105 470.93	5–5	E2	8.77+02	2.71+01	A	1
				1 470.857	37 453.91–105 441.50	3–3	M1	3.02−07	1.07−10	E+	1
				1 470.857	37 453.91–105 441.50	3–3	E2	6.28+02	1.16+01	A	1
				1 473.845	37 577.79–105 427.52	5–1	E2	2.51+03	1.56+01	A	1
				1 473.542	37 577.79–105 441.50	5–3	M1	5.84−03	2.08−06	C	1
				1 473.542	37 577.79–105 441.50	5–3	E2	1.88+03	3.50+01	A	1
				1 471.159	37 453.91–105 427.52	3–1	M1	3.34−03	3.94−07	C	1
				1 470.220	37 453.91–105 470.93	3–5	M1	3.45−03	2.03−06	C	1
				1 470.220	37 453.91–105 470.93	3–5	E2	1.13+03	3.46+01	A	1
				1 469.541	37 393.03–105 441.50	1–3	M1	1.07−03	3.79−07	C	1
				1 468.905	37 393.03–105 470.93	1–5	E2	5.02+02	1.53+01	A	1
25		^{3}P°−^{1}P°									
				1 439.540	37 453.91–106 920.56	3–3	M1	2.24−03	7.43−07	C	1
				1 439.540	37 453.91–106 920.56	3–3	E2	2.19−01	3.63−03	B	1
				1 442.111	37 577.79–106 920.56	5–3	M1	3.59−03	1.20−06	C	1
				1 442.111	37 577.79–106 920.56	5–3	E2	3.76−01	6.28−03	B	1
				1 438.279	37 393.03–106 920.56	1–3	M1	3.05−03	1.01−06	C	1
26		^{1}P°−^{3}P°									
			2 192.803	2 193.488	59 852.02–105 441.50	3–3	M1	8.10−04	9.50−07	C	1
			2 192.803	2 193.488	59 852.02–105 441.50	3–3	E2	2.78−01	3.78−02	B+	1
			2 193.476	2 194.161	59 852.02–105 427.52	3–1	M1	3.25−03	1.27−06	C	1

TABLE 10. Transition probabilities of forbidden lines for Al II (references in this table are as follows: 1=Tachiev and Froese Fischer[72], and 2=Ray and Mukherjee[58])—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
			2 191.388	2 192.073	59 852.02–105 470.93	3–5	M1	8.03−04	1.57−06	C	1
			2 191.388	2 192.073	59 852.02–105 470.93	3–5	E2	8.53−03	1.93−03	B	1
27	$3p^2-3p^2$	^{1}D−^{3}P									
			11 619.85	11 623.03	85 481.35–94 084.96	5–1	E2	8.13−06	1.54−03	B	1
			11 536.04	11 539.20	85 481.35–94 147.46	5–3	M1	8.92−04	1.52−04	C+	1
			11 536.04	11 539.20	85 481.35–94 147.46	5–3	E2	9.58−06	5.25−03	B	1
			11 376.91	11 380.02	85 481.35–94 268.68	5–5	M1	1.67−03	4.57−04	B	1
			11 376.91	11 380.02	85 481.35–94 268.68	5–5	E2	5.38−05	4.58−02	B+	1
28		^{1}D−^{1}S									
			3 822.133	3 823.217	85 481.35–111 637.33	5–1	E2	8.37+01	6.11+01	A	1
29		^{3}P−^{3}P									
				121.22 cm^{-1}	94 147.46–94 268.68	3–5	M1	2.40−05	2.50+00	A	1
				121.22 cm^{-1}	94 147.46–94 268.68	3–5	E2	4.32−11	7.37+01	A	1
				62.50 cm^{-1}	94 084.96–94 147.46	1–3	M1	4.39−06	2.00+00	A	1
				183.72 cm^{-1}	94 084.96–94 268.68	1–5	E2	1.54−10	3.28+01	A	1
30		^{3}P−^{1}S									
			5 755.90	5 757.50	94 268.68–111 637.33	5–1	E2	1.62−03	9.15−03	B+	1
			5 716.01	5 717.60	94 147.46–111 637.33	3–1	M1	2.33−02	1.61−04	C+	1
31	$3p^2-3s4s$	^{1}D−^{3}S									
			17 257.05	17 261.77	85 481.35–91 274.50	5–3	M1	5.57−09	3.19−09	D	1
			17 257.05	17 261.77	85 481.35–91 274.50	5–3	E2	4.20−08	1.73−04	C+	1
32		^{1}D−^{1}S									
			10 129.71	10 132.48	85 481.35–95 350.60	5–1	E2	2.08+00	1.99+02	A	1
33		^{3}P−^{1}S									
				1 081.92 cm^{-1}	94 268.68–95 350.60	5–1	E2	2.86−09	1.73−02	B+	1
				1 203.14 cm^{-1}	94 147.46–95 350.60	3–1	M1	1.07−05	2.29−04	B	1
34	$3p^2-3s3d$	^{1}D−^{3}D									
			9 928.59	9 931.32	85 481.35–95 550.51	5–5	M1	6.25−07	1.13−07	D+	1
			9 928.59	9 931.32	85 481.35–95 550.51	5–5	E2	2.40−07	1.04−04	C+	1
			9 927.68	9 930.40	85 481.35–95 551.44	5–3	M1	7.08−06	7.71−07	C	1
			9 927.68	9 930.40	85 481.35–95 551.44	5–3	E2	6.11−08	1.58−05	C+	1
			9 929.67	9 932.39	85 481.35–95 549.42	5–7	M1	3.27−06	8.32−07	C	1
			9 929.67	9 932.39	85 481.35–95 549.42	5–7	E2	4.66−07	2.82−04	B	1
35		^{1}D−^{1}D									
			4 062.493	4 063.640	85 481.35–110 089.83	5–5	M1	3.36−07	4.18−09	D	1
36		^{3}P−^{3}D									
				1 401.96 cm^{-1}	94 147.46–95 549.42	3–7	E2	4.62−08	5.33−01	B+	1
				1 465.55 cm^{-1}	94 084.96–95 550.51	1–5	E2	8.32−08	5.49−01	B+	1
				1 280.74 cm^{-1}	94 268.68–95 549.42	5–7	M1	1.95−07	2.41−05	C+	1
				1 280.74 cm^{-1}	94 268.68–95 549.42	5–7	E2	8.75−08	1.59+00	A	1
				1 403.05 cm^{-1}	94 147.46–95 550.51	3–5	M1	3.71−09	2.49−07	C	1
				1 403.05 cm^{-1}	94 147.46–95 550.51	3–5	E2	3.38−08	2.77−01	B+	1
				1 466.48 cm^{-1}	94 084.96–95 551.44	1–3	M1	1.21−07	4.28−06	C	1
				1 281.83 cm^{-1}	94 268.68–95 550.51	5–5	M1	1.97−07	1.73−05	C+	1
				1 281.83 cm^{-1}	94 268.68–95 550.51	5–5	E2	6.51−08	8.40−01	A	1
				1 403.98 cm^{-1}	94 147.46–95 551.44	3–3	M1	3.19−07	1.28−05	C+	1
				1 403.98 cm^{-1}	94 147.46–95 551.44	3–3	E2	1.75−07	8.60−01	A	1
				1 282.76 cm^{-1}	94 268.68–95 551.44	5–3	M1	1.20−07	6.31−06	C	1
				1 282.76 cm^{-1}	94 268.68–95 551.44	5–3	E2	2.51−08	1.94−01	B+	1

TABLE 10. Transition probabilities of forbidden lines for Al II (references in this table are as follows: 1=Tachiev and Froese Fischer[72], and 2=Ray and Mukherjee[58])—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
37		^{3}P$-^1$D									
			6 246.37	6 248.10	94 084.96–110 089.83	1–5	E2	3.59−03	1.53−01	B+	1
			6 270.86	6 272.59	94 147.46–110 089.83	3–5	M1	5.38−04	2.46−05	C+	1
			6 270.86	6 272.59	94 147.46–110 089.83	3–5	E2	8.67−06	3.76−04	B	1
			6 318.91	6 320.65	94 268.68–110 089.83	5–5	M1	1.58−03	7.38−05	C+	1
			6 318.91	6 320.65	94 268.68–110 089.83	5–5	E2	8.78−04	3.96−02	B+	1
38	$3p^2-3s4p$	^{1}D$-^3$P°									
			5 012.096	5 013.494	85 481.35–105 427.52	5–1	M2	6.38−05	1.36+01	B+	1
			5 008.585	5 009.982	85 481.35–105 441.50	5–3	M2	4.68−05	2.97+01	B+	1
			5 001.211	5 002.606	85 481.35–105 470.93	5–5	M2	2.25−05	2.37+01	B+	1
39		^{1}D$-^1$P°									
			4 663.046	4 664.351	85 481.35–106 920.56	5–3	M2	4.07−05	1.81+01	B+	1
40		^{3}P$-^3$P°									
			8 924.33	8 926.78	94 268.68–105 470.93	5–5	M2	1.67−10	3.18−03	C+	1
			8 851.80	8 854.23	94 147.46–105 441.50	3–3	M2	9.09−10	9.95−03	C+	1
			8 959.05	8 961.50	94 268.68–105 427.52	5–1	M2	4.28−09	1.66−02	C+	1
			8 947.84	8 950.29	94 268.68–105 441.50	5–3	M2	8.05−09	9.30−02	B	1
			8 828.79	8 831.22	94 147.46–105 470.93	3–5	M2	7.94−10	1.43−02	C+	1
			8 780.33	8 782.74	94 084.96–105 470.93	1–5	M2	8.15−09	1.43−01	B	1
41		^{3}P$-^1$P°									
			7 826.80	7 828.95	94 147.46–106 920.56	3–3	M2	2.71−07	1.60+00	B+	1
			7 901.79	7 903.96	94 268.68–106 920.56	5–3	M2	8.42−07	5.23+00	B+	1
42	$3s4s-3p^2$	^{3}S$-^3$P									
				2 994.18 cm^{-1}	91 274.50–94 268.68	3–5	M1	7.57−06	5.23−05	C+	1
				2 994.18 cm^{-1}	91 274.50–94 268.68	3–5	E2	5.32−08	9.88−03	B+	1
				2 872.96 cm^{-1}	91 274.50–94 147.46	3–3	M1	6.69−06	3.14−05	C+	1
				2 872.96 cm^{-1}	91 274.50–94 147.46	3–3	E2	2.05−08	2.80−03	B	1
				2 810.46 cm^{-1}	91 274.50–94 084.96	3–1	M1	2.50−05	4.18−05	C+	1
43		^{3}S$-^1$S									
			4 909.538	4 910.909	91 274.50–111 637.33	3–1	M1	7.65−07	3.36−09	D	1
44	$3s4s-3s4s$	^{3}S$-^1$S									
				4 076.10 cm^{-1}	91 274.50–95 350.60	3–1	M1	8.72−09	4.77−09	D	1
45	$3s4s-3s3d$	^{3}S$-^3$D									
				4 274.92 cm^{-1}	91 274.50–95 549.42	3–7	E2	2.11−02	9.24+02	A	1
				4 276.01 cm^{-1}	91 274.50–95 550.51	3–5	M1	1.15−09	2.72−09	D	1
				4 276.01 cm^{-1}	91 274.50–95 550.51	3–5	E2	2.11−02	6.60+02	A	1
				4 276.94 cm^{-1}	91 274.50–95 551.44	3–3	M1	3.45−09	4.91−09	D	1
				4 276.94 cm^{-1}	91 274.50–95 551.44	3–3	E2	2.11−02	3.96+02	A	1
46		^{3}S$-^1$D									
			5 313.337	5 314.815	91 274.50–110 089.83	3–5	M1	1.84−08	5.12−10	D	1
			5 313.337	5 314.815	91 274.50–110 089.83	3–5	E2	1.18−06	2.23−05	C+	1
47		^{1}S$-^3$D									
				199.91 cm^{-1}	95 350.60–95 550.51	1–5	E2	3.09−15	4.33−04	B	1
				200.84 cm^{-1}	95 350.60–95 551.44	1–3	M1	3.56−14	4.89−10	D	1
48		^{1}S$-^1$D									
			6 782.74	6 784.61	95 350.60–110 089.83	1–5	E2	1.70+01	1.09+03	A	1
49	$3s4s-3s4p$	^{3}S$-^3$P°									
			7 042.08	7 044.02	91 274.50–105 470.93	3–5	M2	7.19−05	4.18+02	B+	1
			7 056.71	7 058.66	91 274.50–105 441.50	3–3	M2	3.76−05	1.33+02	B+	1

TABLE 10. Transition probabilities of forbidden lines for Al II (references in this table are as follows: 1=Tachiev and Froese Fischer[72], and 2=Ray and Mukherjee[58])—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
50		^{3}S$-^1$P°									
			6 389.62	6 391.39	91 274.50–106 920.56	3–3	M2	1.72−04	3.68+02	B+	1
51		^{1}S$-^3$P°									
			9 878.39	9 881.10	95 350.60–105 470.93	1–5	M2	1.26−05	3.98+02	B+	1
52	$3s3d-3p^2$	^{3}D$-^1$S									
			6 214.55	6 216.27	95 550.51–111 637.33	5–1	E2	4.96−06	4.11−05	C+	1
			6 214.91	6 216.63	95 551.44–111 637.33	3–1	M1	3.88−08	3.45−10	D	1
53		^{1}D$-^1$S									
				1 547.50 cm^{-1}	110 089.83–111 637.33	5–1	E2	5.31−05	5.35+01	A	1
54	$3s3d-3s3d$	^{3}D$-^1$D									
			6 876.00	6 877.90	95 550.51–110 089.83	5–5	M1	1.01−06	6.07−08	D+	1
			6 876.00	6 877.90	95 550.51–110 089.83	5–5	E2	2.27−06	1.56−04	C+	1
			6 875.49	6 877.39	95 549.42–110 089.83	7–5	M1	6.59−06	3.97−07	C	1
			6 875.49	6 877.39	95 549.42–110 089.83	7–5	E2	9.57−07	6.57−05	C+	1
			6 876.44	6 878.34	95 551.44–110 089.83	3–5	M1	6.19−06	3.73−07	C	1
			6 876.44	6 878.34	95 551.44–110 089.83	3–5	E2	4.18−08	2.87−06	C	1
55	$3s3d-3s4p$	^{3}D$-^3$P°									
			10 106.33	10 109.10	95 549.42–105 441.50	7–3	M2	4.70−07	9.99+00	B+	1
			10 121.75	10 124.52	95 550.51–105 427.52	5–1	M2	8.65−07	6.17+00	B+	1
			10 076.35	10 079.11	95 549.42–105 470.93	7–5	M2	1.60−05	5.58+02	B+	1
			10 107.44	10 110.21	95 550.51–105 441.50	5–3	M2	5.81−06	1.24+02	B+	1
			10 077.46	10 080.22	95 550.51–105 470.93	5–5	M2	1.69−06	5.91+01	B+	1
			10 108.39	10 111.16	95 551.44–105 441.50	3–3	M2	2.92−07	6.21+00	B+	1
			10 078.40	10 081.16	95 551.44–105 470.93	3–5	M2	1.00−09	3.50−02	B	1
56		^{3}D$-^1$P°									
			8 791.78	8 794.19	95 549.42–106 920.56	7–3	M2	1.75−05	1.86+02	B+	1
			8 792.62	8 795.04	95 550.51–106 920.56	5–3	M2	3.33−06	3.52+01	B+	1
			8 793.34	8 795.76	95 551.44–106 920.56	3–3	M2	2.00−07	2.11+00	B+	1
57	$3s4p-3s3d$	^{3}P°$-^1$D									
				4 662.31 cm^{-1}	105 427.52–110 089.83	1–5	M2	7.42−08	1.13+02	B+	1
				4 648.33 cm^{-1}	105 441.50–110 089.83	3–5	M2	1.60−07	2.47+02	B+	1
				4 618.90 cm^{-1}	105 470.93–110 089.83	5–5	M2	1.24−07	1.98+02	B+	1
58		^{1}P°$-^1$D									
				3 169.27 cm^{-1}	106 920.56–110 089.83	3–5	M2	2.26−08	2.37+02	B+	1
59	$3s4p-3s4p$	^{3}P°$-^3$P°									
				29.43 cm^{-1}	105 441.50–105 470.93	3–5	M1	3.44−07	2.50+00	A	1
				29.43 cm^{-1}	105 441.50–105 470.93	3–5	E2	1.22−12	2.47+03	A	1
				13.98 cm^{-1}	105 427.52–105 441.50	1–3	M1	4.91−08	2.00+00	A	1
				43.41 cm^{-1}	105 427.52–105 470.93	1–5	E2	3.78−12	1.10+03	A	1
60		^{3}P°$-^1$P°									
				1 479.06 cm^{-1}	105 441.50–106 920.56	3–3	M1	9.84−06	3.38−04	B	1
				1 479.06 cm^{-1}	105 441.50–106 920.56	3–3	E2	4.30−07	1.63+00	A	1
				1 449.63 cm^{-1}	105 470.93–106 920.56	5–3	M1	1.54−05	5.64−04	B	1
				1 449.63 cm^{-1}	105 470.93–106 920.56	5–3	E2	1.39−07	5.80−01	B+	1
				1 493.04 cm^{-1}	105 427.52–106 920.56	1–3	M1	1.35−05	4.51−04	B	1

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

4.3. Al III

Sodium isoelectronic sequence
Ground state: $1s^2 2s^2 2p^6 3s\ ^2S_{1/2}$
Ionization energy: 28.447 64 eV (229 445.7 cm^{-1})

4.3.1. Allowed Transitions for Al III

Wherever available we have used the data of Froese Fischer,[20] which result from *ab initio* nonorthogonal spline CI calculations. Siegel *et al.*[65] used a semiempirical model potential approach and account for the effects of core polarization. Theodosiou and Curtis[73] used a quantum defect approach. Liaw[40] applied the frozen-core Dirac-Fock approximation using the B-spline method.

To estimate accuracies, we pooled the RSDM for each of the lines with transition rates published in two or more references,[20,40,65,73] as described in the introduction to Kelleher and Podobedova.[35] The line strengths for the $3s$-mp, $m > 3$, transitions are anomalously small due to cancellations and are therefore particularly difficult to compute accurately. We therefore assigned them an accuracy that is relatively low for a line from such a low-lying upper level. We isoelectronically averaged the logarithmic quality factors observed for Na-like lines of Na I, Mg II, Al III, and Si IV using the method described in the introduction to Kelleher and Podobedova.[35] For the lines from higher-lying energy levels, we scaled the logarithmic quality factor of the lower-lying lines.

References for Allowed Transitions for Al III

[20]C. Froese Fischer, http://www.vuse.vanderbilt.edu/~cff/mchf_collection/ (nonorthogonal spline CI, downloaded on February 17, 2004).
[35]D. E. Kelleher and L. I. Podobedova, J. Phys. Chem. Ref. Data **37**, 267 (2008).
[40]S.-S. Liaw, Can. J. Phys. **70**, 644 (1992).
[65]W. Siegel, J. Migdalek, and Y.-K. Kim, At. Data Nucl. Data Tables **68**, 303 (1998).
[73]C. E. Theodosiou and L. J. Curtis, Phys. Rev. A **38**, 4435 (1988).

TABLE 11. Wavelength finding list for allowed lines of Al III

Wavelength (vac) (Å)	Mult. No.
486.884	5
486.912	5
511.138	4
511.191	4
560.317	3
560.433	3
624.787	16
625.701	16
640.258	15
641.218	15
644.334	14
645.306	14
670.068	13
671.118	13
677.082	12
678.155	12
678.156	12
695.829	2
696.217	2
725.683	11
726.915	11
739.671	10
740.951	10
740.955	10
855.034	9
856.746	9
892.024	8
893.887	8
893.897	8
987.332	26
987.354	26
1 019.999	25
1 020.023	25
1 071.730	24
1 071.757	24
1 118.173	23
1 118.202	23
1 118.353	23
1 162.589	22
1 162.620	22
1 254.933	21
1 254.969	21
1 255.284	21
1 262.248	30
1 262.440	30
1 352.810	20
1 352.816	20
1 352.858	20
1 379.670	7
1 384.132	7
1 426.451	39
1 428.083	39
1 439.311	29
1 439.726	29
1 509.741	38
1 511.570	38
1 532.603	37
1 534.488	37
1 599.639	19
1 599.697	19
1 600.642	19
1 605.766	6
1 611.814	6
1 611.873	6
1 686.676	36
1 688.958	36
1 731.836	35
1 734.243	35
1 734.253	35
1 854.716	1

TABLE 11. Wavelength finding list for allowed lines of Al III—Continued

Wavelength (vac) (Å)	Mult. No.
1 862.790	1
1 911.817	28
1 913.166	28
1 935.840	18
1 935.863	18
1 935.949	18
1 943.522	48
1 943.567	48
Wavelength (air) (Å)	**Mult. No.**
2 073.633	47
2 073.684	47
2 089.163	34
2 092.667	34
2 167.356	52
2 167.385	52
2 209.508	33
2 213.428	33
2 213.460	33
2 299.362	46
2 299.425	46
2 422.386	51
2 422.422	51
2 524.401	45
2 524.477	45
2 525.244	45
2 762.772	44
2 762.863	44
2 831.706	62
2 834.669	62
2 876.819	55
2 877.815	55
2 960.974	50
2 961.005	50
2 961.060	50
3 180.100	61
3 183.836	61
3 283.299	60
3 287.282	60
3 348.513	43
3 348.646	43
3 350.894	43
3 524.869	69
3 524.950	69
3 601.630	17
3 601.927	17
3 612.355	17
3 702.106	32
3 713.123	32
3 980.097	68
3 980.200	68
3 998.167	54
4 001.371	54
4 082.452	59
4 088.611	59
4 149.913	42

TABLE 11. Wavelength finding list for allowed lines of Al III—Continued

Wavelength (air) (Å)	Mult. No.
4 149.968	42
4 150.173	42
4 189.699	72
4 189.755	72
4 357.568	58
4 364.587	58
4 364.655	58
4 512.565	31
4 528.945	31
4 529.189	31
4 701.143	49
4 701.287	49
4 701.424	49
4 904.035	67
4 904.191	67
5 260.107	71
5 260.196	71
5 518.535	79
5 524.640	79
5 696.60	27
5 722.73	27
6 055.19	66
6 055.42	66
6 059.84	66
6 301.79	84
6 301.94	84
7 016.51	78
7 026.38	78
7 190.43	74
7 196.66	74
7 539.34	77
7 550.74	77
7 635.22	65
7 635.60	65
7 660.26	57
7 681.97	57
7 881.78	41
7 882.52	41
7 905.51	41
7 921.58	83
7 921.80	83
8 496.53	86
8 693.67	70
8 693.94	70
8 694.19	70
9 571.53	56
9 605.45	56
9 606.05	56
11 956.02	90
11 962.06	93
11 973.24	90
12 673.94	82
12 674.52	82
12 763.06	53
12 823.45	53
13 695.11	76
13 732.77	76

TABLE 11. Wavelength finding list for allowed lines of Al III—Continued

Wavelength (air) (Å)	Mult. No.
14 466.42	85
14 779.74	64
14 781.16	64
14 825.04	64
17 374.95	75
17 435.62	75
17 436.71	75
19 550.2	92

Wavenumber (cm^{-1})	Mult. No.
4 494.15	89
4 482.12	89
4 474.19	94
4 157.51	73
4 137.49	73
4 012.57	81
4 012.21	81
4 000.18	81
3 506.09	88
3 501.87	96
3 494.06	88
2 466.17	87
2 454.14	87
1 827.05	40
1 826.43	40
1 825.24	40
998.85	63
998.53	63
997.88	63
595.96	80
595.60	80
381.42	91
258.04	95

TABLE 12. Transition probabilities of allowed lines for Al III (references in this table are as follows: 1=Froese Fischer[20])

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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
1	$3s-3p$	$^2S-^2P^\circ$		*1 857.40*	0.00–*53 838.7*	2–6	5.41+08	8.40−01	1.03+01	0.225	A	1
				1 854.716	0.00–53 916.60	2–4	5.44+08	5.61−01	6.85+00	0.050	A	1
				1 862.790	0.00–53 682.93	2–2	5.36+08	2.79−01	3.42+00	−0.253	A	1
2	$3s-4p$	$^2S-^2P^\circ$		*695.96*	0.00–*143 686.8*	2–6	6.94+07	1.51−02	6.93−02	−1.520	B+	1
				695.829	0.00–143 713.50	2–4	6.83+07	9.92−03	4.54−02	−1.702	B+	1
				696.217	0.00–143 633.38	2–2	7.17+07	5.21−03	2.39−02	−1.982	B+	1
3	$3s-5p$	$^2S-^2P^\circ$		*560.36*	0.00–*178 458.0*	2–6	6.17+07	8.71−03	3.21−02	−1.759	B	1
				560.317	0.00–178 470.32	2–4	6.10+07	5.74−03	2.12−02	−1.940	B	1
				560.433	0.00–178 433.43	2–2	6.31+07	2.97−03	1.10−02	−2.226	B	1
4	$3s-6p$	$^2S-^2P^\circ$		*511.16*	0.00–*195 635.1*	2–6	4.09+07	4.81−03	1.62−02	−2.017	B	1
				511.138	0.00–195 641.74	2–4	4.05+07	3.17−03	1.07−02	−2.198	B	1
				511.191	0.00–195 621.72	2–2	4.18+07	1.64−03	5.51−03	−2.484	B	1
5	$3s-7p$	$^2S-^2P^\circ$		*486.89*	0.00–*205 383.8*	2–6	2.71+07	2.89−03	9.26−03	−2.238	C+	1
				486.884	0.00–205 387.77	2–4	2.68+07	1.91−03	6.11−03	−2.418	C+	1
				486.912	0.00–205 375.74	2–2	2.76+07	9.81−04	3.14−03	−2.707	C+	1
6	$3p-3d$	$^2P^\circ-^2D$		*1 609.83*	*53 838.7–115 957.1*	6–10	1.38+09	8.97−01	2.85+01	0.731	A	1
				1 611.873	53 916.60–115 956.21	4–6	1.38+09	8.07−01	1.71+01	0.509	A	1
				1 605.766	53 682.93–115 958.50	2–4	1.16+09	8.97−01	9.48+00	0.254	A	1
				1 611.814	53 916.60–115 958.50	4–4	2.30+08	8.97−02	1.90+00	−0.445	A	1
7	$3p-4s$	$^2P^\circ-^2S$		*1 382.64*	*53 838.7*–126 164.05	6–2	1.38+09	1.32−01	3.61+00	−0.101	A	1
				1 384.132	53 916.60–126 164.05	4–2	9.22+08	1.32−01	2.41+00	−0.277	A	1
				1 379.670	53 682.93–126 164.05	2–2	4.61+08	1.31−01	1.19+00	−0.582	A	1
8	$3p-4d$	$^2P^\circ-^2D$		*893.27*	*53 838.7–165 786.8*	6–10	1.16+07	2.32−03	4.10−02	−1.856	B	1
				893.897	53 916.60–165 786.32	4–6	1.13+07	2.03−03	2.39−02	−2.090	B+	1

TABLE 12. Transition probabilities of allowed lines for Al III (references in this table are as follows: 1=Froese Fischer[20])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				892.024	53 682.93–165 787.51	2–4	1.03+07	2.45−03	1.44−02	−2.310	B	1
				893.887	53 916.60–165 787.51	4–4	1.89+06	2.27−04	2.67−03	−3.042	B	1
9	$3p-5s$	$^2P^\circ-^2S$		*856.17*	*53 838.7*–170 637.35	6–2	5.17+08	1.89−02	3.20−01	−0.945	B+	1
				856.746	53 916.60–170 637.35	4–2	3.45+08	1.90−02	2.14−01	−1.119	B+	1
				855.034	53 682.93–170 637.35	2–2	1.72+08	1.89−02	1.06−01	−1.423	B+	1
10	$3p-5d$	$^2P^\circ-^2D$		*740.53*	*53 838.7–188 877.8*	6–10	2.10+06	2.87−04	4.20−03	−2.764	C+	1
				740.955	53 916.60–188 877.57	4–6	2.20+06	2.71−04	2.65−03	−2.965	B	1
				739.671	53 682.93–188 878.22	2–4	1.58+06	2.59−04	1.26−03	−3.286	C+	1
				740.951	53 916.60–188 878.22	4–4	3.63+05	2.99−05	2.92−04	−3.922	C+	1
11	$3p-6s$	$^2P^\circ-^2S$		*726.50*	*53 838.7*–191 484.23	6–2	2.58+08	6.80−03	9.75−02	−1.389	B+	1
				726.915	53 916.60–191 484.23	4–2	1.72+08	6.80−03	6.51−02	−1.565	B+	1
				725.683	53 682.93–191 484.23	2–2	8.59+07	6.78−03	3.24−02	−1.868	B+	1
12	$3p-6d$	$^2P^\circ-^2D$		*677.80*	*53 838.7–201 375.3*	6–10	5.71+06	6.56−04	8.78−03	−2.405	B	1
				678.156	53 916.60–201 375.20	4–6	5.84+06	6.04−04	5.39−03	−2.617	B	1
				677.082	53 682.93–201 375.56	2–4	4.56+06	6.26−04	2.79−03	−2.902	B	1
				678.155	53 916.60–201 375.56	4–4	9.70+05	6.69−05	5.97−04	−3.573	C+	1
13	$3p-7s$	$^2P^\circ-^2S$		*670.77*	*53 838.7*–202 921.60	6–2	1.48+08	3.32−03	4.40−02	−1.701	B	1
				671.118	53 916.60–202 921.60	4–2	9.85+07	3.33−03	2.94−02	−1.875	B	1
				670.068	53 682.93–202 921.60	2–2	4.93+07	3.32−03	1.46−02	−2.178	B	1
14	$3p-7d$	$^2P^\circ-^2D$		*644.98*	*53 838.7–208 881.8*	6–10	5.98+06	6.22−04	7.92−03	−2.428	C+	1
				645.306	53 916.60–208 881.83	4–6	6.08+06	5.69−04	4.84−03	−2.643	C+	1
				644.334	53 682.93–208 881.83	2–4	4.82+06	6.00−04	2.55−03	−2.921	C+	1
				645.306	53 916.60–208 881.83	4–4	1.01+06	6.31−05	5.36−04	−3.598	C	1
15	$3p-8s$	$^2P^\circ-^2S$		*640.90*	*53 838.7*–209 869.89	6–2	9.28+07	1.90−03	2.41−02	−1.943	C+	1
				641.218	53 916.60–209 869.89	4–2	6.18+07	1.91−03	1.61−02	−2.117	B	1
				640.258	53 682.93–209 869.89	2–2	3.09+07	1.90−03	8.02−03	−2.420	C+	1
16	$3p-8d$	$^2P^\circ-^2D$		*625.40*	*53 838.7–213 737.4*	6–10	5.16+06	5.05−04	6.24−03	−2.519	C+	1
				625.701	53 916.60–213 737.44	4–6	5.24+06	4.61−04	3.80−03	−2.734	C+	1
				624.787	53 682.93–213 737.44	2–4	4.18+06	4.89−04	2.01−03	−3.010	C+	1
				625.701	53 916.60–213 737.44	4–4	8.71+05	5.11−05	4.21−04	−3.690	C	1
17	$3d-4p$	$^2D-^2P^\circ$	*3 605.22*	*3 606.24*	*115 957.1–143 686.8*	10–6	1.45+08	1.70−01	2.02+01	0.230	A	1
			3 601.630	3 602.657	115 956.21–143 713.50	6–4	1.31+08	1.70−01	1.21+01	0.009	A	1
			3 612.355	3 613.385	115 958.50–143 633.38	4–2	1.45+08	1.42−01	6.76+00	−0.246	A	1
			3 601.927	3 602.954	115 958.50–143 713.50	4–4	1.46+07	2.83−02	1.35+00	−0.946	A	1
18	$3d-4f$	$^2D-^2F^\circ$		*1 935.88*	*115 957.1–167 613.1*	10–14	1.19+09	9.34−01	5.96+01	0.970	A	1
				1 935.840	115 956.21–167 613.37	6–8	1.19+09	8.90−01	3.40+01	0.728	A	1
				1 935.949	115 958.50–167 612.75	4–6	1.11+09	9.34−01	2.38+01	0.572	A	1
				1 935.863	115 956.21–167 612.75	6–6	7.92+07	4.45−02	1.70+00	−0.573	A	1
19	$3d-5p$	$^2D-^2P^\circ$		*1 599.98*	*115 957.1–178 458.0*	10–6	4.31+07	9.92−03	5.23−01	−1.003	B+	1
				1 599.639	115 956.21–178 470.32	6–4	3.89+07	9.94−03	3.14−01	−1.224	B+	1
				1 600.642	115 958.50–178 433.43	4–2	4.29+07	8.24−03	1.74−01	−1.482	B+	1
				1 599.697	115 958.50–178 470.32	4–4	4.32+06	1.66−03	3.49−02	−2.178	B+	1

TABLE 12. Transition probabilities of allowed lines for Al III (references in this table are as follows: 1=Froese Fischer[20])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
20	$3d-5f$	^{2}D$-^2$F°		*1 352.83*	*115 957.1–189 876.3*	10–14	4.27+08	1.64−01	7.30+00	0.215	A	1
				1 352.810	115 956.21–189 876.42	6–8	4.26+08	1.56−01	4.17+00	−0.029	A	1
				1 352.858	115 958.50–189 876.10	4–6	3.98+08	1.64−01	2.92+00	−0.183	A	1
				1 352.816	115 956.21–189 876.10	6–6	2.84+07	7.80−03	2.08−01	−1.330	B+	1
21	$3d-6p$	^{2}D$-^2$P°		*1 255.05*	*115 957.1–195 635.1*	10–6	2.12+07	3.01−03	1.24−01	−1.521	B+	1
				1 254.933	115 956.21–195 641.74	6–4	1.92+07	3.02−03	7.48−02	−1.742	B+	1
				1 255.284	115 958.50–195 621.72	4–2	2.11+07	2.50−03	4.13−02	−2.000	B+	1
				1 254.969	115 958.50–195 641.74	4–4	2.13+06	5.02−04	8.30−03	−2.697	B	1
22	$3d-6f$	^{2}D$-^2$F°		*1 162.60*	*115 957.1–201 971.2*	10–14	2.09+08	5.93−02	2.27+00	−0.227	A	1
				1 162.589	115 956.21–201 971.16	6–8	2.09+08	5.65−02	1.30+00	−0.470	A	1
				1 162.620	115 958.50–201 971.16	4–6	1.95+08	5.93−02	9.08−01	−0.625	A	1
				1 162.589	115 956.21–201 971.16	6–6	1.39+07	2.83−03	6.49−02	−1.770	B+	1
23	$3d-7p$	^{2}D$-^2$P°		*1 118.24*	*115 957.1–205 383.8*	10–6	1.22+07	1.38−03	5.07−02	−1.860	B	1
				1 118.173	115 956.21–205 387.77	6–4	1.11+07	1.38−03	3.05−02	−2.082	B	1
				1 118.353	115 958.50–205 375.74	4–2	1.22+07	1.14−03	1.68−02	−2.341	B	1
				1 118.202	115 958.50–205 387.77	4–4	1.23+06	2.30−04	3.39−03	−3.036	C+	1
24	$3d-7f$	^{2}D$-^2$F°		*1 071.74*	*115 957.1–209 263.3*	10–14	1.20+08	2.90−02	1.02+00	−0.538	B+	1
				1 071.730	115 956.21–209 263.25	6–8	1.20+08	2.76−02	5.84−01	−0.781	B+	1
				1 071.757	115 958.50–209 263.25	4–6	1.12+08	2.90−02	4.09−01	−0.936	B+	1
				1 071.730	115 956.21–209 263.25	6–6	8.00+06	1.38−03	2.92−02	−2.082	B	1
25	$3d-8f$	^{2}D$-^2$F°		*1 020.01*	*115 957.1–213 995.5*	10–14	7.60+07	1.66−02	5.57−01	−0.780	B+	1
				1 019.999	115 956.21–213 995.48	6–8	7.60+07	1.58−02	3.18−01	−1.023	B+	1
				1 020.023	115 958.50–213 995.48	4–6	7.09+07	1.66−02	2.23−01	−1.178	B+	1
				1 019.999	115 956.21–213 995.48	6–6	5.06+06	7.90−04	1.59−02	−2.324	B	1
26	$3d-9f$	^{2}D$-^2$F°		*987.34*	*115 957.1–217 239.3*	10–14	5.14+07	1.05−02	3.42−01	−0.979	B	1
				987.332	115 956.21–217 239.31	6–8	5.14+07	1.00−02	1.95−01	−1.222	B	1
				987.354	115 958.50–217 239.31	4–6	4.79+07	1.05−02	1.37−01	−1.377	B	1
				987.332	115 956.21–217 239.31	6–6	3.42+06	5.00−04	9.76−03	−2.523	C	1
27	$4s-4p$	^{2}S$-^2$P°	*5 705.3*	*5 706.9*	126 164.05–*143 686.8*	2–6	8.73+07	1.28+00	4.80+01	0.408	A	1
			5 696.60	5 698.18	126 164.05–143 713.50	2–4	8.77+07	8.54−01	3.20+01	0.232	A	1
			5 722.73	5 724.32	126 164.05–143 633.38	2–2	8.65+07	4.25−01	1.60+01	−0.071	A	1
28	$4s-5p$	^{2}S$-^2$P°		*1 912.27*	126 164.05–*178 458.0*	2–6	3.55+06	5.84−03	7.36−02	−1.933	B+	1
				1 911.817	126 164.05–178 470.32	2–4	3.45+06	3.78−03	4.76−02	−2.121	B+	1
				1 913.166	126 164.05–178 433.43	2–2	3.75+06	2.06−03	2.59−02	−2.385	B+	1
29	$4s-6p$	^{2}S$-^2$P°		*1 439.45*	126 164.05–*195 635.1*	2–6	5.77+06	5.37−03	5.09−02	−1.969	B+	1
				1 439.311	126 164.05–195 641.74	2–4	5.67+06	3.52−03	3.34−02	−2.152	B+	1
				1 439.726	126 164.05–195 621.72	2–2	5.95+06	1.85−03	1.75−02	−2.432	B	1
30	$4s-7p$	^{2}S$-^2$P°		*1 262.31*	126 164.05–*205 383.8*	2–6	4.77+06	3.42−03	2.84−02	−2.165	B	1
				1 262.248	126 164.05–205 387.77	2–4	4.71+06	2.25−03	1.87−02	−2.347	B	1
				1 262.440	126 164.05–205 375.74	2–2	4.90+06	1.17−03	9.73−03	−2.631	C+	1
31	$4p-4d$	^{2}P°$-^2$D	*4 523.62*	*4 524.89*	*143 686.8–165 786.8*	6–10	2.50+08	1.28+00	1.14+02	0.885	A	1
			4 529.189	4 530.459	143 713.50–165 786.32	4–6	2.49+08	1.15+00	6.86+01	0.663	A	1

TABLE 12. Transition probabilities of allowed lines for Al III (references in this table are as follows: 1=Froese Fischer[20])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
			4 512.565	4 513.831	143 633.38–165 787.51	2–4	2.09+08	1.28+00	3.80+01	0.408	A	1
			4 528.945	4 530.214	143 713.50–165 787.51	4–4	4.15+07	1.28−01	7.62+00	−0.291	A	1
32	$4p-5s$	$^2P^\circ-^2S$	*3 709.44*	*3 710.50*	*143 686.8*–170 637.35	6–2	3.40+08	2.34−01	1.72+01	0.147	A	1
			3 713.123	3 714.179	143 713.50–170 637.35	4–2	2.27+08	2.35−01	1.15+01	−0.027	A	1
			3 702.106	3 703.159	143 633.38–170 637.35	2–2	1.13+08	2.33−01	5.68+00	−0.332	A	1
33	$4p-5d$	$^2P^\circ-^2D$	*2 212.14*	*2 212.83*	*143 686.8–188 877.8*	6–10	1.71+07	2.09−02	9.15−01	−0.902	B+	1
			2 213.460	2 214.149	143 713.50–188 877.57	4–6	1.69+07	1.87−02	5.44−01	−1.126	B+	1
			2 209.508	2 210.197	143 633.38–188 878.22	2–4	1.46+07	2.13−02	3.11−01	−1.371	B+	1
			2 213.428	2 214.118	143 713.50–188 878.22	4–4	2.82+06	2.07−03	6.04−02	−2.082	B+	1
34	$4p-6s$	$^2P^\circ-^2S$	*2 091.50*	*2 092.16*	*143 686.8*–191 484.23	6–2	1.46+08	3.19−02	1.32+00	−0.718	A	1
			2 092.667	2 093.332	143 713.50–191 484.23	4–2	9.73+07	3.20−02	8.81−01	−0.893	A	1
			2 089.163	2 089.827	143 633.38–191 484.23	2–2	4.87+07	3.19−02	4.39−01	−1.195	B+	1
35	$4p-6d$	$^2P^\circ-^2D$		*1 733.45*	*143 686.8–201 375.3*	6–10	2.32+06	1.74−03	5.97−02	−1.981	B+	1
				1 734.253	143 713.50–201 375.20	4–6	2.27+06	1.54−03	3.51−02	−2.210	B+	1
				1 731.836	143 633.38–201 375.56	2–4	2.03+06	1.82−03	2.08−02	−2.439	B	1
				1 734.243	143 713.50–201 375.56	4–4	3.79+05	1.71−04	3.90−03	−3.165	B	1
36	$4p-7s$	$^2P^\circ-^2S$		*1 688.20*	*143 686.8*–202 921.60	6–2	8.01+07	1.14−02	3.80−01	−1.165	B+	1
				1 688.958	143 713.50–202 921.60	4–2	5.34+07	1.14−02	2.54−01	−1.341	B+	1
				1 686.676	143 633.38–202 921.60	2–2	2.67+07	1.14−02	1.27−01	−1.642	B	1
37	$4p-7d$	$^2P^\circ-^2D$		*1 533.86*	*143 686.8–208 881.8*	6–10	3.51+05	2.06−04	6.26−03	−2.908	C+	1
				1 534.488	143 713.50–208 881.83	4–6	3.34+05	1.77−04	3.58−03	−3.150	C+	1
				1 532.603	143 633.38–208 881.83	2–4	3.21+05	2.26−04	2.28−03	−3.345	C+	1
				1 534.488	143 713.50–208 881.83	4–4	5.58+04	1.97−05	3.98−04	−4.103	C	1
38	$4p-8s$	$^2P^\circ-^2S$		*1 510.96*	*143 686.8*–209 869.89	6–2	4.92+07	5.61−03	1.68−01	−1.473	B	1
				1 511.570	143 713.50–209 869.89	4–2	3.28+07	5.62−03	1.12−01	−1.648	B	1
				1 509.741	143 633.38–209 869.89	2–2	1.64+07	5.61−03	5.58−02	−1.950	B	1
39	$4p-8d$	$^2P^\circ-^2D$		*1 427.54*	*143 686.8–213 737.4*	6–10	3.83+04	1.95−05	5.49−04	−3.932	C	1
				1 428.083	143 713.50–213 737.44	4–6	3.37+04	1.55−05	2.91−04	−4.208	C	1
				1 426.451	143 633.38–213 737.44	2–4	3.95+04	2.41−05	2.26−04	−4.317	C	1
				1 428.083	143 713.50–213 737.44	4–4	5.64+03	1.73−06	3.24−05	−5.160	D+	1
40	$4d-4f$	$^2D-^2F^\circ$		*1 826.3* cm^{-1}	*165 786.8–167 613.1*	10–14	1.53+05	9.65−02	1.74+02	−0.015	A	1
				1 827.05 cm^{-1}	165 786.32–167 613.37	6–8	1.54+05	9.19−02	9.94+01	−0.259	A	1
				1 825.24 cm^{-1}	165 787.51–167 612.75	4–6	1.43+05	9.64−02	6.96+01	−0.414	A	1
				1 826.43 cm^{-1}	165 786.32–167 612.75	6–6	1.02+04	4.59−03	4.97+00	−1.560	A	1
41	$4d-5p$	$^2D-^2P^\circ$	*7 889.7*	*7 891.9*	*165 786.8–178 458.0*	10–6	6.14+07	3.44−01	8.93+01	0.537	A	1
			7 881.78	7 883.95	165 786.32–178 470.32	6–4	5.53+07	3.44−01	5.35+01	0.315	A	1
			7 905.51	7 907.69	165 787.51–178 433.43	4–2	6.12+07	2.87−01	2.99+01	0.060	A	1
			7 882.52	7 884.69	165 787.51–178 470.32	4–4	6.14+06	5.73−02	5.95+00	−0.640	A	1
42	$4d-5f$	$^2D-^2F^\circ$	*4 150.02*	*4 151.19*	*165 786.8–189 876.3*	10–14	2.05+08	7.41−01	1.01+02	0.870	A	1
			4 149.913	4 151.083	165 786.32–189 876.42	6–8	2.05+08	7.05−01	5.78+01	0.626	A	1
			4 150.173	4 151.343	165 787.51–189 876.10	4–6	1.91+08	7.40−01	4.05+01	0.471	A	1
			4 149.968	4 151.138	165 786.32–189 876.10	6–6	1.37+07	3.53−02	2.89+00	−0.674	A	1

TABLE 12. Transition probabilities of allowed lines for Al III (references in this table are as follows: 1=Froese Fischer[20])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
43	4d−6p	^{2}D−^{2}P°	*3 349.32*	*3 350.27*	*165 786.8–195 635.1*	10–6	2.08+07	2.10−02	2.32+00	−0.678	A	1
			3 348.513	3 349.476	165 786.32–195 641.74	6–4	1.88+07	2.10−02	1.39+00	−0.900	A	1
			3 350.894	3 351.857	165 787.51–195 621.72	4–2	2.07+07	1.74−02	7.69−01	−1.157	A	1
			3 348.646	3 349.609	165 787.51–195 641.74	4–4	2.08+06	3.50−03	1.55−01	−1.854	B+	1
44	4d−6f	^{2}D−^{2}F°	*2 762.81*	*2 763.62*	*165 786.8–201 971.2*	10–14	1.12+08	1.80−01	1.63+01	0.255	A	1
			2 762.772	2 763.588	165 786.32–201 971.16	6–8	1.12+08	1.71−01	9.34+00	0.011	A	1
			2 762.863	2 763.679	165 787.51–201 971.16	4–6	1.05+08	1.80−01	6.54+00	−0.143	A	1
			2 762.772	2 763.588	165 786.32–201 971.16	6–6	7.47+06	8.55−03	4.67−01	−1.290	B+	1
45	4d−7p	^{2}D−^{2}P°	*2 524.69*	*2 525.44*	*165 786.8–205 383.8*	10–6	1.12+07	6.44−03	5.35−01	−1.191	B+	1
			2 524.401	2 525.160	165 786.32–205 387.77	6–4	1.01+07	6.45−03	3.22−01	−1.412	B+	1
			2 525.244	2 526.003	165 787.51–205 375.74	4–2	1.12+07	5.34−03	1.77−01	−1.670	B+	1
			2 524.477	2 525.236	165 787.51–205 387.77	4–4	1.12+06	1.08−03	3.58−02	−2.365	B	1
46	4d−7f	^{2}D−^{2}F°	*2 299.39*	*2 300.09*	*165 786.8–209 263.3*	10–14	6.66+07	7.40−02	5.60+00	−0.131	B+	1
			2 299.362	2 300.070	165 786.32–209 263.25	6–8	6.66+07	7.05−02	3.20+00	−0.374	B+	1
			2 299.425	2 300.133	165 787.51–209 263.25	4–6	6.22+07	7.40−02	2.24+00	−0.529	B+	1
			2 299.362	2 300.070	165 786.32–209 263.25	6–6	4.44+06	3.52−03	1.60−01	−1.675	B+	1
47	4d−8f	^{2}D−^{2}F°	*2 073.65*	*2 074.31*	*165 786.8–213 995.5*	10–14	4.28+07	3.87−02	2.64+00	−0.412	B+	1
			2 073.633	2 074.295	165 786.32–213 995.48	6–8	4.28+07	3.69−02	1.51+00	−0.655	B+	1
			2 073.684	2 074.346	165 787.51–213 995.48	4–6	4.00+07	3.87−02	1.06+00	−0.810	B+	1
			2 073.633	2 074.295	165 786.32–213 995.48	6–6	2.86+06	1.84−03	7.55−02	−1.957	B	1
48	4d−9f	^{2}D−^{2}F°		*1 943.54*	*165 786.8–217 239.3*	10–14	2.93+07	2.32−02	1.48+00	−0.635	B	1
				1 943.522	165 786.32–217 239.31	6–8	2.93+07	2.21−02	8.48−01	−0.877	B	1
				1 943.567	165 787.51–217 239.31	4–6	2.73+07	2.32−02	5.94−01	−1.032	B	1
				1 943.522	165 786.32–217 239.31	6–6	1.95+06	1.10−03	4.24−02	−2.180	C+	1
49	4f−5d	^{2}F°−^{2}D	*4 701.31*	*4 702.63*	*167 613.1–188 877.8*	14–10	7.67+06	1.82−02	3.94+00	−0.594	A	1
			4 701.424	4 702.740	167 613.37–188 877.57	8–6	7.31+06	1.82−02	2.25+00	−0.837	A	1
			4 701.143	4 702.459	167 612.75–188 878.22	6–4	7.67+06	1.70−02	1.58+00	−0.991	A	1
			4 701.287	4 702.603	167 612.75–188 877.57	6–6	3.65+05	1.21−03	1.13−01	−2.139	B+	1
50	4f−6d	^{2}F°−^{2}D	*2 961.02*	*2 961.89*	*167 613.1–201 375.3*	14–10	3.33+06	3.13−03	4.27−01	−1.358	B+	1
			2 961.060	2 961.925	167 613.37–201 375.20	8–6	3.17+06	3.13−03	2.44−01	−1.601	B+	1
			2 960.974	2 961.839	167 612.75–201 375.56	6–4	3.33+06	2.92−03	1.71−01	−1.756	B+	1
			2 961.005	2 961.870	167 612.75–201 375.20	6–6	1.58+05	2.08−04	1.22−02	−2.904	B	1
51	4f−7d	^{2}F°−^{2}D	*2 422.41*	*2 423.14*	*167 613.1–208 881.8*	14–10	1.78+06	1.12−03	1.25−01	−1.805	B	1
			2 422.422	2 423.158	167 613.37–208 881.83	8–6	1.70+06	1.12−03	7.15−02	−2.048	B	1
			2 422.386	2 423.122	167 612.75–208 881.83	6–4	1.78+06	1.04−03	5.00−02	−2.205	B	1
			2 422.386	2 423.122	167 612.75–208 881.83	6–6	8.48+04	7.47−05	3.57−03	−3.349	C+	1
52	4f−8d	^{2}F°−^{2}D	*2 167.37*	*2 168.05*	*167 613.1–213 737.4*	14–10	1.08+06	5.43−04	5.43−02	−2.119	B	1
			2 167.385	2 168.065	167 613.37–213 737.44	8–6	1.03+06	5.43−04	3.10−02	−2.362	B	1
			2 167.356	2 168.036	167 612.75–213 737.44	6–4	1.08+06	5.07−04	2.17−02	−2.517	B	1
			2 167.356	2 168.036	167 612.75–213 737.44	6–6	5.14+04	3.62−05	1.55−03	−3.663	C	1
53	5s−5p	^{2}S−^{2}P°	*12 783.1*	*12 786.7*	170 637.35–*178 458.0*	2–6	2.28+07	1.68+00	1.41+02	0.526	A	1
			12 763.06	12 766.55	170 637.35–178 470.32	2–4	2.29+07	1.12+00	9.41+01	0.350	A	1
			12 823.45	12 826.96	170 637.35–178 433.43	2–2	2.26+07	5.58−01	4.71+01	0.048	A	1

TABLE 12. Transition probabilities of allowed lines for Al III (references in this table are as follows: 1=Froese Fischer[20])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
54	$5s-6p$	$^2S-^2P^\circ$	*3 999.23*	*4 000.36*	170 637.35–*195 635.1*	2–6	3.27+05	2.35−03	6.20−02	−2.328	B+	1
			3 998.167	3 999.298	170 637.35–195 641.74	2–4	3.11+05	1.49−03	3.92−02	−2.526	B+	1
			4 001.371	4 002.502	170 637.35–195 621.72	2–2	3.59+05	8.63−04	2.27−02	−2.763	B+	1
55	$5s-7p$	$^2S-^2P^\circ$	*2 877.15*	*2 877.99*	170 637.35–*205 383.8*	2–6	9.83+05	3.66−03	6.94−02	−2.135	B	1
			2 876.819	2 877.663	170 637.35–205 387.77	2–4	9.61+05	2.39−03	4.52−02	−2.321	B	1
			2 877.815	2 878.660	170 637.35–205 375.74	2–2	1.03+06	1.27−03	2.41−02	−2.595	B	1
56	$5p-5d$	$^2P^\circ-^2D$	*9 594.5*	*9 597.1*	*178 458.0–188 877.8*	6–10	6.96+07	1.60+00	3.03+02	0.982	A	1
			9 606.05	9 608.69	178 470.32–188 877.57	4–6	6.94+07	1.44+00	1.82+02	0.760	A	1
			9 571.53	9 574.15	178 433.43–188 878.22	2–4	5.82+07	1.60+00	1.01+02	0.505	A	1
			9 605.45	9 608.09	178 470.32–188 878.22	4–4	1.16+07	1.60−01	2.03+01	−0.194	A	1
57	$5p-6s$	$^2P^\circ-^2S$	*7 674.7*	*7 676.8*	*178 458.0*–191 484.23	6–2	1.14+08	3.36−01	5.09+01	0.304	A	1
			7 681.97	7 684.09	178 470.32–191 484.23	4–2	7.60+07	3.36−01	3.40+01	0.128	A	1
			7 660.26	7 662.37	178 433.43–191 484.23	2–2	3.80+07	3.34−01	1.69+01	−0.175	A	1
58	$5p-6d$	$^2P^\circ-^2D$	*4 362.29*	*4 363.52*	*178 458.0–201 375.3*	6–10	8.74+06	4.16−02	3.58+00	−0.603	A	1
			4 364.655	4 365.882	178 470.32–201 375.20	4–6	8.67+06	3.72−02	2.14+00	−0.827	A	1
			4 357.568	4 358.793	178 433.43–201 375.56	2–4	7.40+06	4.22−02	1.21+00	−1.074	A	1
			4 364.587	4 365.813	178 470.32–201 375.56	4–4	1.44+06	4.13−03	2.37−01	−1.782	B+	1
59	$5p-7s$	$^2P^\circ-^2S$	*4 086.56*	*4 087.71*	*178 458.0*–202 921.60	6–2	5.33+07	4.45−02	3.59+00	−0.573	B+	1
			4 088.611	4 089.765	178 470.32–202 921.60	4–2	3.55+07	4.45−02	2.40+00	−0.750	B+	1
			4 082.452	4 083.604	178 433.43–202 921.60	2–2	1.78+07	4.45−02	1.20+00	−1.051	B+	1
60	$5p-7d$	$^2P^\circ-^2D$	*3 285.95*	*3 286.90*	*178 458.0–208 881.8*	6–10	2.32+06	6.27−03	4.07−01	−1.425	B+	1
			3 287.282	3 288.229	178 470.32–208 881.83	4–6	2.29+06	5.57−03	2.41−01	−1.652	B+	1
			3 283.299	3 284.245	178 433.43–208 881.83	2–4	1.99+06	6.42−03	1.39−01	−1.891	B	1
			3 287.282	3 288.229	178 470.32–208 881.83	4–4	3.82+05	6.19−04	2.68−02	−2.606	B	1
61	$5p-8s$	$^2P^\circ-^2S$	*3 182.59*	*3 183.51*	*178 458.0*–209 869.89	6–2	3.12+07	1.58−02	9.94−01	−1.023	B+	1
			3 183.836	3 184.757	178 470.32–209 869.89	4–2	2.08+07	1.58−02	6.63−01	−1.199	B+	1
			3 180.100	3 181.020	178 433.43–209 869.89	2–2	1.04+07	1.58−02	3.31−01	−1.500	B+	1
62	$5p-8d$	$^2P^\circ-^2D$	*2 833.68*	*2 834.52*	*178 458.0–213 737.4*	6–10	8.28+05	1.66−03	9.31−02	−2.002	B	1
			2 834.669	2 835.502	178 470.32–213 737.44	4–6	8.13+05	1.47−03	5.49−02	−2.231	B	1
			2 831.706	2 832.539	178 433.43–213 737.44	2–4	7.15+05	1.72−03	3.21−02	−2.463	B	1
			2 834.669	2 835.502	178 470.32–213 737.44	4–4	1.35+05	1.63−04	6.10−03	−3.186	C+	1
63	$5d-5f$	$^2D-^2F^\circ$		*998.5* cm^{-1}	188 877.8–189 876.3	10–14	8.88+04	1.87−01	6.17+02	0.272	A	1
				998.85 cm^{-1}	188 877.57–189 876.42	6–8	8.89+04	1.78−01	3.52+02	0.029	A	1
				997.88 cm^{-1}	188 878.22–189 876.10	4–6	8.28+04	1.87−01	2.47+02	−0.126	A	1
				998.53 cm^{-1}	188 877.57–189 876.10	6–6	5.92+03	8.91−03	1.76+01	−1.272	A	1
64	$5d-6p$	$^2D-^2P^\circ$	*14 794.9*	*14 798.8*	*188 877.8–195 635.1*	10–6	2.62+07	5.15−01	2.51+02	0.712	A	1
			14 779.74	14 783.78	188 877.57–195 641.74	6–4	2.36+07	5.15−01	1.50+02	0.490	A	1
			14 825.04	14 829.09	188 878.22–195 621.72	4–2	2.61+07	4.30−01	8.40+01	0.236	A	1
			14 781.16	14 785.20	188 878.22–195 641.74	4–4	2.62+06	8.58−02	1.67+01	−0.464	A	1
65	$5d-6f$	$^2D-^2F^\circ$	*7 635.4*	*7 637.4*	*188 877.8–201 971.2*	10–14	5.33+07	6.52−01	1.64+02	0.814	A	1
			7 635.22	7 637.32	188 877.57–201 971.16	6–8	5.33+07	6.21−01	9.37+01	0.571	A	1
			7 635.60	7 637.70	188 878.22–201 971.16	4–6	4.97+07	6.52−01	6.56+01	0.416	A	1
			7 635.22	7 637.32	188 877.57–201 971.16	6–6	3.55+06	3.11−02	4.68+00	−0.729	A	1

TABLE 12. Transition probabilities of allowed lines for Al III (references in this table are as follows: 1=Froese Fischer[20])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
66	$5d-7p$	^{2}D–^{2}P°	*6 056.8*	*6 058.4*	*188 877.8–205 383.8*	10–6	9.51+06	3.14−02	6.27+00	−0.503	B+	1
			6 055.19	6 056.86	188 877.57–205 387.77	6–4	8.59+06	3.15−02	3.77+00	−0.724	B+	1
			6 059.84	6 061.52	188 878.22–205 375.74	4–2	9.46+06	2.61−02	2.08+00	−0.981	B+	1
			6 055.42	6 057.10	188 878.22–205 387.77	4–4	9.54+05	5.25−03	4.18−01	−1.678	B+	1
67	$5d-7f$	^{2}D–^{2}F°	*4 904.10*	*4 905.45*	*188 877.8–209 263.3*	10–14	3.51+07	1.77−01	2.86+01	0.248	A	1
			4 904.035	4 905.404	188 877.57–209 263.25	6–8	3.51+07	1.69−01	1.64+01	0.006	A	1
			4 904.191	4 905.561	188 878.22–209 263.25	4–6	3.27+07	1.77−01	1.14+01	−0.150	A	1
			4 904.035	4 905.404	188 877.57–209 263.25	6–6	2.34+06	8.44−03	8.17−01	−1.296	B+	1
68	$5d-8f$	^{2}D–^{2}F°	*3 980.14*	*3 981.26*	*188 877.8–213 995.5*	10–14	2.33+07	7.74−02	1.01+01	−0.111	A	1
			3 980.097	3 981.223	188 877.57–213 995.48	6–8	2.33+07	7.37−02	5.80+00	−0.354	A	1
			3 980.200	3 981.326	188 878.22–213 995.48	4–6	2.17+07	7.74−02	4.06+00	−0.509	B+	1
			3 980.097	3 981.223	188 877.57–213 995.48	6–6	1.55+06	3.69−03	2.90−01	−1.655	B+	1
69	$5d-9f$	^{2}D–^{2}F°	*3 524.90*	*3 525.91*	*188 877.8–217 239.3*	10–14	1.61+07	4.20−02	4.88+00	−0.377	B+	1
			3 524.869	3 525.877	188 877.57–217 239.31	6–8	1.61+07	4.00−02	2.79+00	−0.620	B+	1
			3 524.950	3 525.958	188 878.22–217 239.31	4–6	1.50+07	4.20−02	1.95+00	−0.775	B+	1
			3 524.869	3 525.877	188 877.57–217 239.31	6–6	1.07+06	2.00−03	1.39−01	−1.921	B	1
70	$5f-6d$	^{2}F°–^{2}D	*8 694.0*	*8 696.4*	*189 876.3–201 375.3*	14–10	5.66+06	4.58−02	1.84+01	−0.193	A	1
			8 694.19	8 696.57	189 876.42–201 375.20	8–6	5.39+06	4.58−02	1.05+01	−0.436	A	1
			8 693.67	8 696.06	189 876.10–201 375.56	6–4	5.66+06	4.28−02	7.34+00	−0.590	A	1
			8 693.94	8 696.33	189 876.10–201 375.20	6–6	2.69+05	3.05−03	5.25−01	−1.738	B+	1
71	$5f-7d$	^{2}F°–^{2}D	*5 260.16*	*5 261.63*	*189 876.3–208 881.8*	14–10	2.77+06	8.21−03	1.99+00	−0.940	B+	1
			5 260.196	5 261.660	189 876.42–208 881.83	8–6	2.64+06	8.21−03	1.14+00	−1.183	B+	1
			5 260.107	5 261.571	189 876.10–208 881.83	6–4	2.77+06	7.66−03	7.96−01	−1.338	B+	1
			5 260.107	5 261.571	189 876.10–208 881.83	6–6	1.32+05	5.47−04	5.69−02	−2.484	B	1
72	$5f-8d$	^{2}F°–^{2}D	*4 189.73*	*4 190.92*	*189 876.3–213 737.4*	14–10	1.59+06	3.00−03	5.79−01	−1.377	B+	1
			4 189.755	4 190.936	189 876.42–213 737.44	8–6	1.52+06	3.00−03	3.31−01	−1.620	B+	1
			4 189.699	4 190.879	189 876.10–213 737.44	6–4	1.59+06	2.80−03	2.31−01	−1.775	B+	1
			4 189.699	4 190.879	189 876.10–213 737.44	6–6	7.58+04	2.00−04	1.65−02	−2.921	B	1
73	$6s-6p$	^{2}S–^{2}P°		*4 150.9* cm^{-1}	191 484.23–195 635.1	2–6	7.90+06	2.06+00	3.27+02	0.615	A	1
				4 157.51 cm^{-1}	191 484.23–195 641.74	2–4	7.93+06	1.38+00	2.18+02	0.441	A	1
				4 137.49 cm^{-1}	191 484.23–195 621.72	2–2	7.83+06	6.86−01	1.09+02	0.137	A	1
74	$6s-7p$	^{2}S–^{2}P°	*7 192.5*	*7 194.5*	191 484.23–*205 383.8*	2–6	3.73+04	8.67−04	4.11−02	−2.761	B	1
			7 190.43	7 192.41	191 484.23–205 387.77	2–4	3.40+04	5.27−04	2.50−02	−2.977	B	1
			7 196.66	7 198.64	191 484.23–205 375.74	2–2	4.38+04	3.41−04	1.61−02	−3.166	B	1
75	$6p-6d$	^{2}P°–^{2}D	*17 416.0*	*17 421.0*	*195 635.1–201 375.3*	6–10	2.51+07	1.90+00	6.54+02	1.057	A	1
			17 436.71	17 441.48	195 641.74–201 375.20	4–6	2.50+07	1.71+00	3.93+02	0.835	A	1
			17 374.95	17 379.70	195 621.72–201 375.56	2–4	2.10+07	1.90+00	2.18+02	0.580	A	1
			17 435.62	17 440.38	195 641.74–201 375.56	4–4	4.17+06	1.90−01	4.37+01	−0.119	A	1
76	$6p-7s$	^{2}P°–^{2}S	*13 720.2*	*13 724.0*	*195 635.1*–202 921.60	6–2	4.65+07	4.37−01	1.19+02	0.419	A	1
			13 732.77	13 736.53	195 641.74–202 921.60	4–2	3.10+07	4.38−01	7.93+01	0.244	A	1
			13 695.11	13 698.86	195 621.72–202 921.60	2–2	1.55+07	4.35−01	3.93+01	−0.060	A	1
77	$6p-7d$	^{2}P°–^{2}D	*7 546.9*	*7 549.0*	*195 635.1–208 881.8*	6–10	4.29+06	6.11−02	9.11+00	−0.436	B+	1

TABLE 12. Transition probabilities of allowed lines for Al III (references in this table are as follows: 1=Froese Fischer[20])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
			7 550.74	7 552.82	195 641.74–208 881.83	4–6	4.26+06	5.46−02	5.43+00	−0.661	A	1
			7 539.34	7 541.42	195 621.72–208 881.83	2–4	3.63+06	6.18−02	3.07+00	−0.908	B+	1
			7 550.74	7 552.82	195 641.74–208 881.83	4–4	7.10+05	6.07−03	6.04−01	−1.615	B+	1
78	$6p-8s$	$^2P^\circ-^2S$	*7 023.1*	*7 025.0*	*195 635.1*–209 869.89	6–2	2.31+07	5.71−02	7.92+00	−0.465	A	1
			7 026.38	7 028.32	195 641.74–209 869.89	4–2	1.54+07	5.71−02	5.29+00	−0.641	A	1
			7 016.51	7 018.45	195 621.72–209 869.89	2–2	7.72+06	5.70−02	2.63+00	−0.943	B+	1
79	$6p-8d$	$^2P^\circ-^2D$	*5 522.60*	*5 524.16*	*195 635.1–213 737.4*	6–10	1.48+06	1.13−02	1.23+00	−1.169	B+	1
			5 524.640	5 526.175	195 641.74–213 737.44	4–6	1.47+06	1.01−02	7.33−01	−1.394	B+	1
			5 518.535	5 520.068	195 621.72–213 737.44	2–4	1.26+06	1.15−02	4.18−01	−1.638	B+	1
			5 524.640	5 526.175	195 641.74–213 737.44	4–4	2.44+05	1.12−03	8.14−02	−2.349	B	1
80	$6d-6f$	$^2D-^2F^\circ$		*595.9* cm^{-1}	*201 375.3–201 971.2*	10–14	4.56+04	2.70−01	1.49+03	0.431	A	1
				595.96 cm^{-1}	201 375.20–201 971.16	6–8	4.56+04	2.57−01	8.51+02	0.188	A	1
				595.60 cm^{-1}	201 375.56–201 971.16	4–6	4.25+04	2.69−01	5.96+02	0.032	A	1
				595.96 cm^{-1}	201 375.20–201 971.16	6–6	3.04+03	1.28−02	4.25+01	−1.115	A	1
81	$6d-7p$	$^2D-^2P^\circ$		*4 008.5* cm^{-1}	*201 375.3–205 383.8*	10–6	1.22+07	6.85−01	5.63+02	0.836	A	1
				4 012.57 cm^{-1}	201 375.20–205 387.77	6–4	1.10+07	6.85−01	3.37+02	0.614	A	1
				4 000.18 cm^{-1}	201 375.56–205 375.74	4–2	1.22+07	5.72−01	1.88+02	0.359	A	1
				4 012.21 cm^{-1}	201 375.56–205 387.77	4–4	1.23+06	1.14−01	3.75+01	−0.341	A	1
82	$6d-7f$	$^2D-^2F^\circ$	*12 674.2*	*12 677.5*	*201 375.3–209 263.3*	10–14	1.81+07	6.10−01	2.55+02	0.785	A	1
			12 673.94	12 677.40	201 375.20–209 263.25	6–8	1.81+07	5.81−01	1.46+02	0.542	A	1
			12 674.52	12 677.98	201 375.56–209 263.25	4–6	1.69+07	6.10−01	1.02+02	0.387	A	1
			12 673.94	12 677.40	201 375.20–209 263.25	6–6	1.21+06	2.91−02	7.28+00	−0.758	A	1
83	$6d-8f$	$^2D-^2F^\circ$	*7 921.7*	*7 923.8*	*201 375.3–213 995.5*	10–14	1.32+07	1.74−01	4.55+01	0.241	A	1
			7 921.58	7 923.75	201 375.20–213 995.48	6–8	1.32+07	1.66−01	2.60+01	−0.002	A	1
			7 921.80	7 923.98	201 375.56–213 995.48	4–6	1.23+07	1.74−01	1.82+01	−0.157	A	1
			7 921.58	7 923.75	201 375.20–213 995.48	6–6	8.82+05	8.30−03	1.30+00	−1.303	B+	1
84	$6d-9f$	$^2D-^2F^\circ$	*6 301.9*	*6 303.6*	*201 375.3–217 239.3*	10–14	9.42+06	7.86−02	1.63+01	−0.105	B+	1
			6 301.79	6 303.54	201 375.20–217 239.31	6–8	9.42+06	7.48−02	9.31+00	−0.348	B+	1
			6 301.94	6 303.68	201 375.56–217 239.31	4–6	8.79+06	7.86−02	6.52+00	−0.503	B+	1
			6 301.79	6 303.54	201 375.20–217 239.31	6–6	6.28+05	3.74−03	4.66−01	−1.649	B	1
85	$6f-7d$	$^2F^\circ-^2D$	*14 466.4*	*14 470.5*	*201 971.2–208 881.8*	14–10	3.53+06	7.92−02	5.28+01	0.045	A	1
			14 466.42	14 470.38	201 971.16–208 881.83	8–6	3.36+06	7.92−02	3.02+01	−0.198	A	1
			14 466.42	14 470.38	201 971.16–208 881.83	6–4	3.53+06	7.39−02	2.11+01	−0.353	A	1
			14 466.42	14 470.38	201 971.16–208 881.83	6–6	1.68+05	5.28−03	1.51+00	−1.499	B+	1
86	$6f-8d$	$^2F^\circ-^2D$	*8 496.5*	*8 498.9*	*201 971.2–213 737.4*	14–10	1.89+06	1.46−02	5.72+00	−0.690	B+	1
			8 496.53	8 498.86	201 971.16–213 737.44	8–6	1.80+06	1.46−02	3.27+00	−0.933	B+	1
			8 496.53	8 498.86	201 971.16–213 737.44	6–4	1.89+06	1.36−02	2.29+00	−1.088	B+	1
			8 496.53	8 498.86	201 971.16–213 737.44	6–6	8.99+04	9.73−04	1.63−01	−2.234	B+	1
87	$7s-7p$	$^2S-^2P^\circ$		*2 462.2* cm^{-1}	202 921.60–*205 383.8*	2–6	3.29+06	2.44+00	6.52+02	0.688	A	1
				2 466.17 cm^{-1}	202 921.60–205 387.77	2–4	3.30+06	1.63+00	4.35+02	0.513	A	1
				2 454.14 cm^{-1}	202 921.60–205 375.74	2–2	3.26+06	8.11−01	2.18+02	0.210	A	1
88	$7p-7d$	$^2P^\circ-^2D$		*3 498.0* cm^{-1}	*205 383.8–208 881.8*	6–10	1.07+07	2.19+00	1.24+03	1.119	A	1
				3 494.06 cm^{-1}	205 387.77–208 881.83	4–6	1.07+07	1.97+00	7.44+02	0.897	A	1

TABLE 12. Transition probabilities of allowed lines for Al III (references in this table are as follows: 1=Froese Fischer[20])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				3 506.09 cm^{-1}	205 375.74–208 881.83	2–4	8.98+06	2.19+00	4.11+02	0.641	A	1
				3 494.06 cm^{-1}	205 387.77–208 881.83	4–4	1.79+06	2.19−01	8.26+01	−0.057	A	1
89	$7p-8s$	$^2P^\circ-^2S$		*4 486.1* cm^{-1}	*205 383.8–209 869.89*	6–2	2.17+07	5.39−01	2.37+02	0.510	A	1
				4 482.12 cm^{-1}	205 387.77–209 869.89	4–2	1.45+07	5.40−01	1.59+02	0.334	A	1
				4 494.15 cm^{-1}	205 375.74–209 869.89	2–2	7.23+06	5.37−01	7.86+01	0.031	A	1
90	$7p-8d$	$^2P^\circ-^2D$	*11 967.5*	*11 970.9*	*205 383.8–213 737.4*	6–10	2.22+06	7.96−02	1.88+01	−0.321	A	1
			11 973.24	11 976.52	205 387.77–213 737.44	4–6	2.21+06	7.13−02	1.12+01	−0.545	A	1
			11 956.02	11 959.29	205 375.74–213 737.44	2–4	1.88+06	8.05−02	6.34+00	−0.793	A	1
			11 973.24	11 976.52	205 387.77–213 737.44	4–4	3.68+05	7.92−03	1.25+00	−1.499	B+	1
91	$7d-7f$	$^2D-^2F^\circ$		*381.5* cm^{-1}	*208 881.8–209 263.3*	10–14	2.40+04	3.46−01	2.99+03	0.539	A	1
				381.42 cm^{-1}	208 881.83–209 263.25	6–8	2.40+04	3.30−01	1.71+03	0.297	A	1
				381.42 cm^{-1}	208 881.83–209 263.25	4–6	2.24+04	3.46−01	1.20+03	0.141	A	1
				381.42 cm^{-1}	208 881.83–209 263.25	6–6	1.60+03	1.65−02	8.54+01	−1.004	A	1
92	$7d-8f$	$^2D-^2F^\circ$	*19 550*	*19 555*	*208 881.8–213 995.5*	10–14	7.36+06	5.91−01	3.80+02	0.772	A	1
			19 550.2	19 555.5	208 881.83–213 995.48	6–8	7.36+06	5.63−01	2.17+02	0.529	A	1
			19 550.2	19 555.5	208 881.83–213 995.48	4–6	6.87+06	5.91−01	1.52+02	0.374	A	1
			19 550.2	19 555.5	208 881.83–213 995.48	6–6	4.91+05	2.81−02	1.09+01	−0.773	A	1
93	$7d-9f$	$^2D-^2F^\circ$	*11 962.1*	*11 965.3*	*208 881.8–217 239.3*	10–14	5.76+06	1.73−01	6.82+01	0.238	B+	1
			11 962.06	11 965.33	208 881.83–217 239.31	6–8	5.76+06	1.65−01	3.90+01	−0.004	B+	1
			11 962.06	11 965.33	208 881.83–217 239.31	4–6	5.38+06	1.73−01	2.73+01	−0.160	B+	1
			11 962.06	11 965.33	208 881.83–217 239.31	6–6	3.84+05	8.24−03	1.95+00	−1.306	B	1
94	$7f-8d$	$^2F^\circ-^2D$		*4 474.1* cm^{-1}	*209 263.3–213 737.4*	14–10	2.17+06	1.16−01	1.20+02	0.211	A	1
				4 474.19 cm^{-1}	209 263.25–213 737.44	8–6	2.07+06	1.16−01	6.84+01	−0.032	A	1
				4 474.19 cm^{-1}	209 263.25–213 737.44	6–4	2.17+06	1.08−01	4.78+01	−0.188	A	1
				4 474.19 cm^{-1}	209 263.25–213 737.44	6–6	1.03+05	7.74−03	3.42+00	−1.333	B+	1
95	$8d-8f$	$^2D-^2F^\circ$		*258.1* cm^{-1}	*213 737.4–213 995.5*	10–14	1.33+04	4.19−01	5.35+03	0.622	A	1
				258.04 cm^{-1}	213 737.44–213 995.48	6–8	1.33+04	3.99−01	3.06+03	0.379	A	1
				258.04 cm^{-1}	213 737.44–213 995.48	4–6	1.24+04	4.19−01	2.14+03	0.224	A	1
				258.04 cm^{-1}	213 737.44–213 995.48	6–6	8.87+02	2.00−02	1.53+02	−0.921	A	1
96	$8d-9f$	$^2D-^2F^\circ$		*3 501.9* cm^{-1}	*213 737.4–217 239.3*	10–14	3.42+06	5.85−01	5.50+02	0.767	B+	1
				3 501.87 cm^{-1}	213 737.44–217 239.31	6–8	3.42+06	5.57−01	3.14+02	0.524	B+	1
				3 501.87 cm^{-1}	213 737.44–217 239.31	4–6	3.19+06	5.85−01	2.20+02	0.369	B+	1
				3 501.87 cm^{-1}	213 737.44–217 239.31	6–6	2.28+05	2.78−02	1.57+01	−0.778	B+	1

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

4.3.2. Forbidden Transitions for Al III

Kundu and Mukherjee[38] performed computations with a time-dependent coupled Hartree-Fock theory. Godefroid *et al.*[26] performed nonrelativistic multiconfiguration Hartree-Fock calculations. Tull *et al.*[76] utilized a frozen-core Hartree calculation.

To estimate accuracies, we pooled the RSDM for each of the lines with transition rates published in two or more references,[26,38,76] as described in the introduction to Kelleher and Podobedova.[35] Next we isoelectronically averaged the logarithmic quality factors observed for allowed lines from the lower-lying energy levels of Na I, Mg II, Al III, and Si IV and applied the result to forbidden lines of Al III using the method described in the introduction to Kelleher and Podobedova.[35]

References for Forbidden Transitions for Al III

[26]M. Godefroid, C. E. Magnusson, P. O. Zetterberg, and I. Joelsson, Phys. Scr. **32**, 125 (1985).

[35]D. E. Kelleher and L. I. Podobedova, J. Phys. Chem. Ref. Data **37**, 267 (2008).

[38]B. Kundu and P. K. Mukherjee, Phys. Rev. A **35**, 980 (1987).
[76]C. E. Tull, M. Jackson, R. P. McEachran, and M. Cohen, Can. J. Phys. **50**, 1169 (1972).

TABLE 13. Wavelength finding list for forbidden lines of Al III

Wavelength (vac) (Å)	Mult. No.
467.864	6
478.740	5
496.585	4
529.442	3
603.18	2
862.38	1

TABLE 14. Transition probabilities of forbidden lines for Al III (references in this table are as follows: 1=Kundu and Mukherjee,[38] 2=Godefroid *et al.*[26])

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	$3s-3d$	^{2}S$-^2$D									
				862.38	0–115 958.50	2–4	E2	5.55+04	9.46+01	A	1,2
2	$3s-4d$	^{2}S$-^2$D									
				603.18	0–165 787.51	2–4	E2	8.66+01	2.47−02	B	1
3	$3s-5d$	^{2}S$-^2$D									
				529.442	0–188 878.22	2–4	E2	5.37+02	7.97−02	B+	1
4	$3s-6d$	^{2}S$-^2$D									
				496.585	0–201 375.56	2–4	E2	6.72+02	7.25−02	B+	1
5	$3s-7d$	^{2}S$-^2$D									
				478.740	0–208 881.83	2–4	E2	7.71+02	6.93−02	B	1
6	$3s-8d$	^{2}S$-^2$D									
				467.864	0–213 737.44	2–4	E2	8.08+02	6.47−02	B	1

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

4.4. Al IV

Neon isoelectronic sequence
Ground state: $1s^22s^22p^6\ ^1S_0$
Ionization energy: 119.992 eV (967 804 cm^{-1})

4.4.1. Allowed Transitions for Al IV

The sources we used in this compilation are far from comprehensive, resulting in the relatively small number of lines presented below. Wherever available we have used the data of Tachiev and Froese Fischer,[70] which result from extensive MCHF calculations with Breit-Pauli corrections to order α^2, with energy corrections. The calculations only extend to transitions from energy levels up to $2p^54s$. Träbert[74] measured a lifetime using the beam-foil technique. Hibbert *et al.*[30] applied the CIV3 code (CI, version 3).

To estimate accuracies, we pooled the RSDM for each of the lines with transition rates published in two or more references[30,70,74] as described in the introduction to Kelleher and Podobedova.[35] For this purpose the spin-allowed and intercombination data were treated separately, and each of these were in turn divided into two upper-level energy groups below and above 683 000 cm^{-1}. Estimated accuracies were substantially better for the lower energy groups. We then isoelectronically averaged the logarithmic quality factors observed for Ne-like lines of Na II, Mg III, Al IV, and Si V using the method described in the introduction to Kelleher and Podobedova.[35] For the lines from higher-lying energy levels, we scaled the logarithmic quality factor of the lower-lying lines.

References for Allowed Transitions for Al IV

[30]A. Hibbert, M. Le Dourneuf, and M. Mohan, At. Data Nucl. Data Tables **53** 24 (1993).
[35]D. E. Kelleher and L. I. Podobedova, J. Phys. Chem. Ref. Data **37**, 267 (2008).
[70]G. Tachiev and C. Froese Fischer, http://www.vuse.vanderbilt.edu/~cff/mchf_collection/ (MCHF, energy adjusted, downloaded on February 17, 2004).
[74]E. Träbert, Phys. Scr. **53**, 167 (1996).

TABLE 15. Wavelength finding list for allowed lines of Al IV

Wavelength (vac) (Å)	Mult. No.
129.729	5
130.398	4

TABLE 15. Wavelength finding list for allowed lines of Al IV—Continued

131.649	3
160.072	2
161.688	1
767.755	45
817.475	51
826.293	46
831.954	46
841.039	46
844.563	54
844.947	52
847.994	54
850.445	54
853.393	47
857.190	53
860.925	47
862.453	48
870.146	48
876.795	49
883.136	49
1 045.774	11
1 048.183	19
1 118.826	17
1 121.660	25
1 125.622	18
1 125.992	50
1 136.825	18
1 138.238	25
1 142.062	18
1 150.870	23
1 156.261	23
1 160.417	24
1 161.881	23
1 167.376	23
1 171.613	24
1 173.743	23
1 174.968	31
1 179.679	23
1 189.713	24
1 191.909	23
1 192.211	36
1 198.505	22
1 204.726	41
1 208.404	21
1 210.452	22
1 211.720	41
1 216.730	41
1 219.179	29
1 220.550	21
1 225.230	29
1 228.310	21
1 229.899	30
1 232.246	29
1 237.186	21
1 237.754	34
1 240.205	21
1 240.861	21
1 248.804	35
1 251.225	34
1 251.250	39

TABLE 15. Wavelength finding list for allowed lines of Al IV—Continued

1 256.084	20
1 257.624	39
1 262.543	40
1 264.203	39
1 265.017	39
1 269.213	20
1 272.731	39
1 272.768	28
1 275.733	40
1 278.259	39
1 283.475	20
1 283.938	27
1 290.481	20
1 304.555	33
1 305.227	20
1 306.433	27
1 307.761	38
1 312.136	20
1 337.898	26
1 353.755	26
1 360.300	32
1 376.618	37
1 376.696	32
1 384.384	32
1 388.789	10
1 392.314	37
1 393.412	37
1 402.776	37
1 404.765	10
1 409.495	37
1 417.555	37
1 422.174	9
1 424.999	10
1 431.932	10
1 441.824	10
1 447.513	8
1 457.953	10
1 460.169	9
1 486.894	8
1 494.791	9
1 507.441	7
1 537.537	7
1 550.198	7
1 557.254	7
1 564.164	16
1 572.522	16
1 582.043	7
1 584.460	16
1 589.277	7
1 606.643	15
1 639.057	14
1 716.317	13
1 755.439	13
1 762.425	44
1 818.57	6
1 881.16	6
1 894.52	43
1 939.02	6

TABLE 15. Wavelength finding list for allowed lines of Al IV—Continued

Wavelength (air) (Å)	Mult. No.
2 130.84	12
2 197.12	42

TABLE 16. Transition probabilities of allowed lines for Al IV (references in this table are as follows: 1=Tachiev and Froese Fischer,[70] and 2=Träbert[74])

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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
1	$2p^6-2p^5(^2P^\circ)3s$	$^1S-^3P^\circ$										
				161.688	0–618 473.9	1–3	1.46+09	1.72−02	9.14−03	−1.764	C	1
2		$^1S-^1P^\circ$		160.072	0–624 717.5	1–3	2.06+10	2.37−01	1.25−01	−0.625	B+	1,2
3	$2p^6-2p^5(^2P^\circ)3d$	$^1S-^3P^\circ$										
				131.649	0–759 596.8	1–3	3.74+08	2.92−03	1.26−03	−2.535	C	1
4		$^1S-^3D^\circ$										
				130.398	0–766 880.8	1–3	1.77+10	1.35−01	5.80−02	−0.870	C	1
5		$^1S-^1P^\circ$		129.729	0–770 836.9	1–3	9.00+10	6.81−01	2.91−01	−0.167	C	1
6	$2p^5(^2P^\circ)3s-$ $2p^5(^2P^\circ)3p$	$^3P^\circ-^3S$		*1 851.9*	*617 634*–671 632.5	9–3	3.84+08	6.59−02	3.61+00	−0.227	B+	1
				1 818.57	616 644.2–671 632.5	5–3	2.61+08	7.76−02	2.32+00	−0.411	B+	1
				1 881.16	618 473.9–671 632.5	3–3	1.01+08	5.38−02	9.99−01	−0.792	B+	1
				1 939.02	620 060.1–671 632.5	1–3	2.71+07	4.58−02	2.92−01	−1.339	B	1
7		$^3P^\circ-^3D$		*1 564.33*	*617 634–681 559*	9–15	6.59+08	4.03−01	1.87+01	0.560	B+	1
				1 557.254	616 644.2–680 859.8	5–7	6.70+08	3.41−01	8.74+00	0.232	A	1
				1 582.043	618 473.9–681 683.3	3–5	4.01+08	2.51−01	3.92+00	−0.123	B+	1
				1 589.277	620 060.1–682 981.8	1–3	2.18+08	2.48−01	1.30+00	−0.606	B+	1
				1 537.537	616 644.2–681 683.3	5–5	2.53+08	8.96−02	2.27+00	−0.349	B+	1
				1 550.198	618 473.9–682 981.8	3–3	3.89+08	1.40−01	2.14+00	−0.377	B+	1
				1 507.441	616 644.2–682 981.8	5–3	5.83+07	1.19−02	2.96−01	−1.225	B	1
8		$^3P^\circ-^1D$										
				1 486.894	618 473.9–685 728.2	3–5	1.13+08	6.24−02	9.16−01	−0.728	B	1
				1 447.513	616 644.2–685 728.2	5–5	3.16+08	9.93−02	2.37+00	−0.304	B+	1
9		$^3P^\circ-^1P$										
				1 460.169	618 473.9–686 959.1	3–3	5.47+07	1.75−02	2.52−01	−1.280	C+	1
				1 422.174	616 644.2–686 959.1	5–3	6.13+07	1.11−02	2.61−01	−1.256	C+	1
				1 494.791	620 060.1–686 959.1	1–3	2.07+08	2.08−01	1.02+00	−0.682	B+	1
10		$^3P^\circ-^3P$		*1 417.98*	*617 634–688 157*	9–9	5.12+08	1.54−01	6.49+00	0.142	C+	1
				1 404.765	616 644.2–687 830.5	5–5	2.36+08	6.97−02	1.61+00	−0.458	C+	1
				1 424.999	618 473.9–688 649.4	3–3	7.57+07	2.30−02	3.24−01	−1.161	C	1
				1 388.789	616 644.2–688 649.4	5–3	2.05+08	3.55−02	8.12−01	−0.751	C+	1
				1 431.932	618 473.9–688 309.6	3–1	8.25+08	8.45−02	1.20+00	−0.596	B	1
				1 441.824	618 473.9–687 830.5	3–5	1.92+08	9.99−02	1.42+00	−0.523	C+	1
				1 457.953	620 060.1–688 649.4	1–3	2.44+08	2.33−01	1.12+00	−0.633	C+	1
11		$^3P^\circ-^1S$										
				1 045.774	618 473.9–714 096.9	3–1	1.12+08	6.11−03	6.31−02	−1.737	C+	1
12		$^1P^\circ-^3S$										
			2 130.84	2 131.51	624 717.5–671 632.5	3–3	2.21+06	1.50−03	3.16−02	−2.347	C	1
13		$^1P^\circ-^3D$										

TABLE 16. Transition probabilities of allowed lines for Al IV (references in this table are as follows: 1=Tachiev and Froese Fischer,[70] and 2=Träbert[74])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				1 755.439	624 717.5–681 683.3	3–5	5.39+06	4.15−03	7.20−02	−1.905	C+	1
				1 716.317	624 717.5–682 981.8	3–3	1.47+06	6.50−04	1.10−02	−2.710	C	1
14		$^1P^\circ-^1D$		1 639.057	624 717.5–685 728.2	3–5	2.84+08	1.91−01	3.09+00	−0.242	B	1
15		$^1P^\circ-^1P$		1 606.643	624 717.5–686 959.1	3–3	3.68+08	1.42−01	2.26+00	−0.371	B	1
16		$^1P^\circ-^3P$										
				1 564.164	624 717.5–688 649.4	3–3	2.67+08	9.79−02	1.51+00	−0.532	B	1
				1 572.522	624 717.5–688 309.6	3–1	2.84+07	3.51−03	5.45−02	−1.978	C+	1
				1 584.460	624 717.5–687 830.5	3–5	3.34+08	2.09−01	3.28+00	−0.203	B+	1
17		$^1P^\circ-^1S$		1 118.826	624 717.5–714 096.9	3–1	1.90+09	1.19−01	1.31+00	−0.447	B	1
18	$2p^5(^2P^\circ)3p-$ $2p^5(^2P^\circ)3d$	$^3S-^3P^\circ$		*1 131.15*	*671 632.5–760 038*	3–9	1.27+09	7.30−01	8.15+00	0.340	B	1
				1 125.622	671 632.5–760 472.3	3–5	1.18+09	3.72−01	4.14+00	0.048	B+	1
				1 136.825	671 632.5–759 596.8	3–3	1.36+09	2.63−01	2.96+00	−0.103	B	1
				1 142.062	671 632.5–759 193.4	3–1	1.44+09	9.42−02	1.06+00	−0.549	C+	1
19		$^3S-^1D^\circ$										
				1 048.183	671 632.5–767 035.7	3–5	1.64+06	4.49−04	4.65−03	−2.871	D	1
20		$^3D-^3P^\circ$		*1 274.22*	*681 559–760 038*	15–9	7.73+07	1.13−02	7.10−01	−0.771	C	1
				1 256.084	680 859.8–760 472.3	7–5	3.81+07	6.43−03	1.86−01	−1.347	C	1
				1 283.475	681 683.3–759 596.8	5–3	6.40+07	9.48−03	2.00−01	−1.324	C	1
				1 312.136	682 981.8–759 193.4	3–1	9.75+07	8.39−03	1.09−01	−1.599	C	1
				1 269.213	681 683.3–760 472.3	5–5	2.01+07	4.85−03	1.01−01	−1.615	C	1
				1 305.227	682 981.8–759 596.8	3–3	5.16+06	1.32−03	1.70−02	−2.402	D	1
				1 290.481	682 981.8–760 472.3	3–5	1.82+07	7.58−03	9.66−02	−1.643	C	1
21		$^3D-^3F^\circ$		*1 237.89*	*681 559–762 341*	15–21	1.91+09	6.15−01	3.76+01	0.965	B+	1
				1 237.186	680 859.8–761 688.4	7–9	1.96+09	5.79−01	1.65+01	0.608	B+	1
				1 240.861	681 683.3–762 272.5	5–7	1.61+09	5.21−01	1.06+01	0.416	B+	1
				1 240.205	682 981.8–763 613.6	3–5	1.37+09	5.27−01	6.46+00	0.199	B+	1
				1 228.310	680 859.8–762 272.5	7–7	2.21+08	5.00−02	1.42+00	−0.456	B	1
				1 220.550	681 683.3–763 613.6	5–5	5.47+08	1.22−01	2.46+00	−0.215	B	1
				1 208.404	680 859.8–763 613.6	7–5	2.86+07	4.48−03	1.25−01	−1.504	C	1
22		$^3D-^1F^\circ$										
				1 210.452	681 683.3–764 297.1	5–7	2.26+07	6.94−03	1.38−01	−1.460	C	1
				1 198.505	680 859.8–764 297.1	7–7	3.13+08	6.75−02	1.86+00	−0.326	B	1
23		$^3D-^3D^\circ$		*1 165.11*	*681 559–767 388*	15–15	3.99+08	8.11−02	4.67+00	0.085	C+	1
				1 156.261	680 859.8–767 345.5	7–7	1.96+08	3.94−02	1.05+00	−0.559	C+	1
				1 161.881	681 683.3–767 750.6	5–5	1.77+08	3.57−02	6.84−01	−0.748	C	1
				1 191.909	682 981.8–766 880.8	3–3	6.62+08	1.41−01	1.66+00	−0.374	B	1
				1 150.870	680 859.8–767 750.6	7–5	4.50+07	6.39−03	1.69−01	−1.349	C	1
				1 173.743	681 683.3–766 880.8	5–3	1.31+08	1.62−02	3.13−01	−1.092	C	1
				1 167.376	681 683.3–767 345.5	5–7	9.41+07	2.69−02	5.17−01	−0.871	C+	1
				1 179.679	682 981.8–767 750.6	3–5	6.81+07	2.37−02	2.76−01	−1.148	C	1
24		$^3D-^1D^\circ$										
				1 171.613	681 683.3–767 035.7	5–5	5.52+07	1.14−02	2.19−01	−1.244	C	1
				1 160.417	680 859.8–767 035.7	7–5	8.81+06	1.27−03	3.40−02	−2.051	D+	1
				1 189.713	682 981.8–767 035.7	3–5	1.36+08	4.82−02	5.66−01	−0.840	C+	1
25		$^3D-^1P^\circ$										

TABLE 16. Transition probabilities of allowed lines for Al IV (references in this table are as follows: 1=Tachiev and Froese Fischer,[70] and 2=Träbert[74])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				1 121.660	681 683.3–770 836.9	5–3	6.95+06	7.87−04	1.45−02	−2.405	C	1
				1 138.238	682 981.8–770 836.9	3–3	6.34+06	1.23−03	1.38−02	−2.433	C	1
26		$^1D-^3P^\circ$										
				1 353.755	685 728.2–759 596.8	5–3	1.42+08	2.34−02	5.21−01	−0.932	C+	1
				1 337.898	685 728.2–760 472.3	5–5	3.48+08	9.34−02	2.06+00	−0.331	B	1
27		$^1D-^3F^\circ$										
				1 306.433	685 728.2–762 272.5	5–7	8.68+07	3.11−02	6.69−01	−0.808	C+	1
				1 283.938	685 728.2–763 613.6	5–5	9.94+04	2.46−05	5.19−04	−3.910	E+	1
28		$^1D-^1F^\circ$		1 272.768	685 728.2–764 297.1	5–7	1.52+09	5.16−01	1.08+01	0.412	B	1
29		$^1D-^3D^\circ$										
				1 219.179	685 728.2–767 750.6	5–5	3.06+08	6.82−02	1.37+00	−0.467	B	1
				1 232.246	685 728.2–766 880.8	5–3	6.07+06	8.29−04	1.68−02	−2.382	D	1
				1 225.230	685 728.2–767 345.5	5–7	1.38+07	4.35−03	8.78−02	−1.663	C	1
30		$^1D-^1D^\circ$		1 229.899	685 728.2–767 035.7	5–5	5.40+07	1.23−02	2.48−01	−1.211	D	1
31		$^1D-^1P^\circ$		1 174.968	685 728.2–770 836.9	5–3	2.78+07	3.45−03	6.68−02	−1.763	D	1
32		$^1P-^3P^\circ$										
				1 376.696	686 959.1–759 596.8	3–3	3.94+07	1.12−02	1.52−01	−1.474	C+	1
				1 384.384	686 959.1–759 193.4	3–1	1.22+08	1.17−02	1.59−01	−1.455	C+	1
				1 360.300	686 959.1–760 472.3	3–5	5.91+07	2.73−02	3.67−01	−1.087	B	1
33		$^1P-^3F^\circ$										
				1 304.555	686 959.1–763 613.6	3–5	2.83+07	1.20−02	1.55−01	−1.444	C+	1
34		$^1P-^3D^\circ$										
				1 237.754	686 959.1–767 750.6	3–5	9.48+06	3.63−03	4.44−02	−1.963	D+	1
				1 251.225	686 959.1–766 880.8	3–3	2.20+08	5.17−02	6.39−01	−0.809	B	1
35		$^1P-^1D^\circ$		1 248.804	686 959.1–767 035.7	3–5	1.44+09	5.62−01	6.93+00	0.227	C+	1
36		$^1P-^1P^\circ$		1 192.211	686 959.1–770 836.9	3–3	4.86+08	1.04−01	1.22+00	−0.506	C+	1
37		$^3P-^3P^\circ$		*1 391.18*	*688 157–760 038*	9–9	3.33+08	9.66−02	3.98+00	−0.061	C+	1
				1 376.618	687 830.5–760 472.3	5–5	2.81+08	7.98−02	1.81+00	−0.399	C+	1
				1 409.495	688 649.4–759 596.8	3–3	1.13+08	3.36−02	4.67−01	−0.997	C	1
				1 393.412	687 830.5–759 596.8	5–3	1.24+08	2.16−02	4.96−01	−0.967	C	1
				1 417.555	688 649.4–759 193.4	3–1	3.23+08	3.24−02	4.54−01	−1.012	C+	1
				1 392.314	688 649.4–760 472.3	3–5	3.15+07	1.53−02	2.10−01	−1.338	C	1
				1 402.776	688 309.6–759 596.8	1–3	1.34+08	1.18−01	5.47−01	−0.928	C+	1
38		$^3P-^1F^\circ$										
				1 307.761	687 830.5–764 297.1	5–7	4.52+07	1.62−02	3.50−01	−1.092	C+	1
39		$^3P-^3D^\circ$		*1 262.13*	*688 157–767 388*	9–15	1.42+09	5.64−01	2.11+01	0.706	B	1
				1 257.624	687 830.5–767 345.5	5–7	1.68+09	5.58−01	1.16+01	0.446	B	1
				1 264.203	688 649.4–767 750.6	3–5	1.36+09	5.45−01	6.80+00	0.214	B	1
				1 272.731	688 309.6–766 880.8	1–3	7.56+08	5.51−01	2.31+00	−0.259	B	1
				1 251.250	687 830.5–767 750.6	5–5	1.05+07	2.46−03	5.06−02	−1.910	E+	1
				1 278.259	688 649.4–766 880.8	3–3	1.17+08	2.87−02	3.63−01	−1.065	C	1
				1 265.017	687 830.5–766 880.8	5–3	2.30+06	3.32−04	6.90−03	−2.780	E+	1
40		$^3P-^1D^\circ$										
				1 275.733	688 649.4–767 035.7	3–5	9.20+06	3.74−03	4.71−02	−1.950	D+	1
				1 262.543	687 830.5–767 035.7	5–5	2.77+08	6.63−02	1.38+00	−0.480	B	1

TABLE 16. Transition probabilities of allowed lines for Al IV (references in this table are as follows: 1=Tachiev and Froese Fischer,[70] and 2=Träbert[74])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
41		^{3}P$-^1$P$^\circ$										
				1 216.730	688 649.4–770 836.9	3–3	5.05+08	1.12−01	1.35+00	−0.474	B+	1
				1 204.726	687 830.5–770 836.9	5–3	1.42+07	1.85−03	3.66−02	−2.034	C	1
				1 211.720	688 309.6–770 836.9	1–3	1.41+08	9.33−02	3.72−01	−1.030	B	1
42		^{1}S$-^3$P$^\circ$										
			2 197.12	2 197.81	714 096.9–759 596.8	1–3	3.18+05	6.92−04	5.01−03	−3.160	D	1
43		^{1}S$-^3$D$^\circ$										
				1 894.52	714 096.9–766 880.8	1–3	4.46+07	7.20−02	4.49−01	−1.143	C+	1
44		^{1}S$-^1$P$^\circ$		1 762.425	714 096.9–770 836.9	1–3	3.69+08	5.15−01	2.99+00	−0.288	B	1
45	$2p^5(^2P^\circ)3p-$ $2p^5(^2P^\circ_{3/2})4s$	^{3}S$-^2[3/2]^\circ$										1
				767.755	671 632.5–801 882.3	3–5	5.53+08	8.14−02	6.18−01	−0.612	C+	1
46		^{3}D$-^2[3/2]^\circ$										1
				841.039	682 981.8–801 882.3	3–5	5.17+07	9.14−03	7.59−02	−1.562	C	1
				831.954	681 683.3–801 882.3	5–5	4.15+08	4.31−02	5.90−01	−0.667	C+	1
				826.293	680 859.8–801 882.3	7–5	1.66+09	1.21−01	2.31+00	−0.072	B	1
47		^{1}D$-^2[3/2]^\circ$										
				860.925	685 728.2–801 882.3	5–5	3.85+08	4.27−02	6.06−01	−0.671	C	1
				853.393	685 728.2–802 907.5	5–3	6.65+08	4.35−02	6.12−01	−0.663	C	1
48		^{1}P$-^2[3/2]^\circ$										
				870.146	686 959.1–801 882.3	3–5	3.98+07	7.54−03	6.48−02	−1.646	D+	1
				862.453	686 959.1–802 907.5	3–3	2.56+08	2.85−02	2.43−01	−1.068	C	1
49		^{3}P$-^2[3/2]^\circ$										1
				883.136	688 649.4–801 882.3	3–5	1.17+08	2.29−02	2.00−01	−1.163	C	1
				876.795	687 830.5–801 882.3	5–5	2.41+08	2.77−02	4.01−01	−0.859	C	1
50		^{1}S$-^2[3/2]^\circ$										
				1 125.992	714 096.9–802 907.5	1–3	1.19+08	6.77−02	2.51−01	−1.169	C	1
51	$2p^5(^2P^\circ)3p-$ $2p^5(^2P^\circ_{1/2})4s$	^{3}D$-^2[1/2]^\circ$										1
				817.475	682 981.8–805 309.7	3–1	1.27+09	4.24−02	3.43−01	−0.896	D+	1
52		^{1}P$-^2[1/2]^\circ$										
				844.947	686 959.1–805 309.7	3–1	8.87+08	3.16−02	2.64−01	−1.023	D	1
53		^{3}P$-^2[1/2]^\circ$										1
				857.190	688 649.4–805 309.7	3–1	9.24+08	3.39−02	2.87−01	−0.993	D	1
54		^{3}P$-^2[1/2]^\circ$		847.994	688 309.6–806 234.9	1–3	1.05+08	3.40−02	9.49−02	−1.469	E+	1
				850.445	688 649.4–806 234.9	3–3	4.83+08	5.24−02	4.40−01	−0.804	D	1
				844.563	687 830.5-806 234.9	5–3	1.30+09	8.37−02	1.16+00	−0.378	D+	1

[a]Wavelength (Å) is always given unless cm−1 is indicated.

4.4.2. Forbidden Transitions for Al IV

Wherever available we have used the data of Tachiev and Froese Fischer,[70] which result from extensive MCHF calculations with Breit-Pauli corrections to order α^2. The calculations only extend to transitions from energy levels up to $2p^54s$.

To estimate accuracies, we pooled the RSDM for each of the lines with transition rates published in both references,[39,70] as described in the introduction to Kelleher and Podobedova.[35]. Only three lines were available from Tachiev and Froese Fischer.[70] We then isoelectronically averaged the logarithmic quality factors observed for allowed Ne-like lines from the lower-lying energy levels of Na II, Mg III, Al IV, and Si V and applied the result to forbidden lines of Al IV using the method described in the introduction to Kelleher and Podobedova.[35]

References for Forbidden Transitions for Al IV

[35]D. E. Kelleher and L. I. Podobedova, J. Phys. Chem. Ref. Data **37**, 267 (2008).
[39]D. A. Landman, J. Quant. Spectrosc. Radiat. Transfer **34**, 365 (1985).
[70]G. Tachiev and C. Froese Fischer, http://www.vuse.vanderbilt.edu/~cff/mchf_collection/ (MCHF, energy adjusted, downloaded on February 17, 2004).

TABLE 17. Wavelength finding list for forbidden lines of Al IV

Wavelength (vac) (Å)	Mult. No.
162.168	1

TABLE 17. Wavelength finding list for forbidden lines of Al IV—Continued

Wavelength (air) (Å)	Mult. No.
12 383.1	3
16 012.0	3
Wavenumber (cm^{-1})	**Mult. No.**
4 657.4	3
3 415.9	2
1 829.7	2
1 586.2	2

TABLE 18. Transition probabilities of forbidden lines for Al IV (references in this table are as follows: 1=Tachiev and Froese Fischer[70])

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	$2p^6-2p^5(^2P^\circ)3s$	$^1S-^3P^\circ$									
				162.168	0–616 644.2	1–5	M2	3.39+01	1.27+00	B	1
2	$2p^5(^2P^\circ)3s-^3P^\circ-^3P^\circ$	$2p^5(^2P^\circ)3s$									
				3 415.9 cm^{-1}	616 644.2–620 060.1	5–1	E2	1.66−06	3.18−02	C	1
				1 829.7 cm^{-1}	616 644.2–618 473.9	5–3	M1	1.28−01	2.33+00	B+	1
				1 829.7 cm^{-1}	616 644.2–618 473.9	5–3	E2	5.12−08	6.69−02	C	1
				1 586.2 cm^{-1}	618 473.9–620 060.1	3–1	M1	2.00−01	1.86+00	B+	1
3		$^3P^\circ-^1P^\circ$									
			16 012.0	16 016.4	618 473.9–624 717.5	3–3	M1	2.10−01	9.62−02	C	1
			16 012.0	16 016.4	618 473.9–624 717.5	3–3	E2	5.44−06	1.54−02	D	1
			12 383.1	12 386.5	616 644.2–624 717.5	5–3	M1	8.15−01	1.72−01	C	1
			12 383.1	12 386.5	616 644.2–624 717.5	5–3	E2	6.25−06	4.88−03	E+	1
				4 657.4 cm^{-1}	620 060.1–624 717.5	1–3	M1	1.25−01	1.38−01	C	1

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

4.5. Al V

Fluorine isoelectronic sequence
Ground state: $1s^22s^22p^5\ ^2P^o_{3/2}$
Ionization energy: 153.825 2 eV (1 240 684 cm^{-1})

4.5.1. Allowed Transitions for Al V

Only OP (Refs. 7 and 8) results were available for energy levels above the $2p^43d$. Wherever available we have used the data of Tachiev and Froese Fischer,[71] which result from extensive MCHF calculations with Breit-Pauli corrections to order α^2, with energy adjustments. The spin-allowed and intercombination data were treated separately, and each of these were in turn divided into two upper-level energy groups below and above 834 500 cm^{-1}. Lines from the OP and CI calculations of Biémont[3] constituted fifth and sixth groups, respectively.

To estimate accuracies for all but the low-lying spin-allowed group, we conservatively scaled the pooling fit parameters found for F-like Na III by comparing Tachiev and Froese Fischer[71] with McPeake and Hibbert.[43] Thus the accuracies we list for these lines are only approximate. Energy levels labeled $2p^4(^3P)3p$ ($^2S^o_{1/2}$ and $^2P^o_{1/2}$), $2p^4(^1D)3p\ ^2p^o$, and $2p^4(^3P)3p\ ^2P$ actually have heavily mixed character in LS coupling, and therefore transitions from them have been assigned lower accuracies.

References for Allowed Transitions for Al V

[3]E. Biémont, At. Data Nucl. Data Tables **48** 1 (1991).
[7]K. Butler and C. J. Zeippen (unpublished).
[8]K. Butler and C. J. Zeippen, http://legacy.gsfc.nasa.gov/topbase, downloaded on July 28, 1995 (Opacity Project).
[43]D. McPeake and A. Hibbert, J. Phys. B **33**, 2809 (2000).
[71]G. Tachiev and C. Froese Fischer, http://www.vuse.vanderbilt.edu/~cff/mchf_collection/ (MCHF, *ab initio*, downloaded on February 17, 2004).

TABLE 19. Wavelength finding list for allowed lines of Al V

Wavelength (vac) (Å)	Mult. No.
88.367	16
88.425	15
88.547	16
88.636	16
88.817	16
93.653	13
93.755	14
93.856	14
93.882	13
93.956	13
93.981	12
94.016	12
94.160	14
94.186	13
94.321	12
103.808	11
103.882	11
103.989	10
104.073	10
104.122	9
104.180	11
104.363	10
104.447	10
104.496	9
107.711	8
107.946	7
108.004	8
108.058	7
108.112	8
108.316	6
108.407	8
108.444	6
108.461	7
108.529	6
108.616	5
108.707	5
108.851	6
108.936	6
109.024	5
125.525	4
125.530	4
126.070	4
130.413	3
130.847	3
131.001	3
131.439	3
132.409	2
132.628	2
133.007	2
133.015	2
133.236	2
212.870	18
213.120	18
217.323	17
217.713	17
278.694	1
281.394	1
299.312	31
301.269	31
301.607	31
303.594	31
405.375	75
406.033	75
406.647	75
407.309	75
407.406	74
407.922	74
408.683	75
408.691	74
409.209	74
410.074	74
419.651	77
421.896	77
422.381	76
422.610	77
423.702	77
424.097	76
424.421	77
424.655	76
425.416	77
425.922	76
426.271	80
426.485	76
426.924	76
427.926	79
428.371	80
429.670	82
430.061	80
430.974	78
431.300	114
431.412	114
431.598	114
431.719	78
432.198	80
432.741	79
433.214	82
433.977	83
434.524	82
434.848	78
435.402	83
435.441	86
435.606	78
436.369	106
436.750	85
436.853	106
437.413	81
437.593	83
438.150	82
438.955	85
440.310	81
440.427	86
441.087	81
441.689	84
442.470	84

TABLE 19. Wavelength finding list for allowed lines of Al V—Continued

Wavelength (vac) (Å)	Mult. No.
454.916	107
456.661	108
458.325	107
459.050	107
460.096	108
462.522	107
469.239	110
526.491	64
528.789	64
530.715	64
532.897	64
535.251	64
536.732	63
538.903	63
539.120	63
541.153	63
542.856	104
543.580	63
544.300	63
546.296	105
546.595	63
547.717	104
549.750	105
550.627	104
554.736	105
555.630	104
557.144	66
559.394	66
561.400	101
561.416	101
562.57	66
562.73	101
564.32	66
566.85	65
568.50	65
568.62	65
570.35	65
571.78	65
573.59	65
574.51	65
574.75	68
575.47	68
577.86	65
577.90	70
579.53	113
579.73	113
582.39	68
584.33	70
585.11	67
585.63	70
586.76	72
586.98	67
588.39	73
590.08	102
590.10	102
590.26	69
590.96	102

TABLE 19. Wavelength finding list for allowed lines of Al V—Continued

Wavelength (vac) (Å)	Mult. No.
590.98	102
591.47	67
592.23	70
592.27	67
594.73	72
595.61	69
596.40	73
598.79	67
599.51	71
602.45	69
605.03	71
609.20	69
611.84	71
625.25	103
625.27	103
631.71	103
660.96	109
670.48	112
675.42	112
675.69	112
789.86	61
794.69	61
797.56	60
801.92	61
803.12	100
806.90	61
809.58	62
809.86	60
813.81	100
814.66	62
818.12	100
826.83	30
829.21	100
838.16	30
844.58	30
856.41	30
917.24	39
923.77	39
925.35	39
932.00	39
939.23	39
944.623	38
950.16	37
951.557	38
954.491	38
957.18	37
961.571	38
964.23	37
968.250	38
969.263	38
976.050	38
993.73	44
1 006.41	44
1 016.19	44
1 016.75	44
1 020.51	93
1 020.56	93

TABLE 19. Wavelength finding list for allowed lines of Al V—Continued

Wavelength (vac) (Å)	Mult. No.
1 020.93	92
1 024.86	93
1 024.91	93
1 025.95	43
1 026.73	44
1 028.15	92
1 032.49	42
1 032.57	92
1 037.45	50
1 039.477	43
1 046.19	42
1 049.12	42
1 050.507	43
1 051.438	43
1 057.36	42
1 059.153	36
1 059.65	49
1 060.18	50
1 062.20	41
1 062.725	43
1 063.26	42
1 063.531	36
1 064.234	36
1 067.81	41
1 067.877	36
1 068.265	36
1 068.985	43
1 070.50	49
1 070.890	43
1 070.95	54
1 072.949	36
1 073.043	36
1 075.27	41
1 076.70	41
1 077.246	43
1 077.373	36
1 079.45	41
1 083.38	49
1 085.91	41
1 088.54	41
1 088.67	41
1 089.21	50
1 090.13	41
1 093.25	54
1 094.72	49
1 096.376	48
1 100.59	54
1 101.79	58
1 103.85	47
1 106.21	53
1 106.41	91
1 107.54	59
1 109.691	48
1 111.48	91
1 111.53	91
1 112.51	111
1 113.25	111

TABLE 19. Wavelength finding list for allowed lines of Al V—Continued

Wavelength (vac) (Å)	Mult. No.
1 115.04	111
1 117.94	53
1 119.41	96
1 119.91	95
1 121.799	48
1 122.60	96
1 122.66	96
1 122.87	47
1 123.10	95
1 124.14	54
1 126.86	57
1 127.94	46
1 128.60	95
1 129.42	35
1 129.62	47
1 130.01	53
1 131.85	95
1 133.17	58
1 135.743	48
1 137.87	46
1 139.14	57
1 139.26	59
1 141.40	94
1 145.073	48
1 148.112	52
1 150.26	35
1 150.67	35
1 151.52	94
1 152.88	46
1 154.86	46
1 154.90	94
1 157.647	52
1 158.886	52
1 165.28	46
1 165.418	23
1 167.66	51
1 168.484	56
1 168.60	40
1 173.47	40
1 173.772	52
1 175.125	22
1 176.97	55
1 179.871	40
1 183.620	56
1 183.740	52
1 186.181	40
1 188.671	40
1 191.191	40
1 193.756	56
1 194.103	40
1 194.21	51
1 195.362	23
1 196.507	40
1 200.565	40
1 202.011	40
1 205.35	51
1 205.576	22

TABLE 19. Wavelength finding list for allowed lines of Al V—Continued

Wavelength (vac) (Å)	Mult. No.
1 213.463	23
1 215.885	21
1 223.990	22
1 233.901	22
1 247.233	21
1 248.514	21
1 253.197	22
1 253.724	45
1 253.76	99
1 260.850	45
1 264.67	99
1 266.512	45
1 268.274	21
1 280.00	99
1 280.75	98
1 280.771	45
1 281.590	21
1 287.079	45
1 287.702	34
1 288.208	34
1 291.930	34
1 292.439	34
1 293.51	98
1 294.591	45
1 301.13	97
1 308.15	98
1 312.422	20
1 321.46	98
1 329.42	97
1 330.054	20
1 340.544	20
1 350.519	20
1 352.87	20
1 353.777	29
1 359.64	87
1 360.75	87
1 362.476	28
1 363.351	20
1 369.197	20
1 373.670	20
1 375.762	27
1 402.021	29
1 411.353	28
1 412.771	27
1 425.614	27
1 431.961	26
1 443.63	118
1 445.870	33
1 454.620	33

TABLE 19. Wavelength finding list for allowed lines of Al V—Continued

Wavelength (vac) (Å)	Mult. No.
1 455.265	33
1 465.393	27
1 475.640	26
1 477.76	118
1 486.050	26
1 508.382	19
1 526.140	19
1 526.72	118
1 539.122	19
1 554.347	25
1 558.924	19
1 567.774	25
1 569.263	19
1 577.899	19
1 589.853	19
1 593.001	25
1 618.283	25
1 632.842	25
1 827.78	24
1 855.77	24
1 882.73	24
1 909.8	88
1 916.83	24
1 919.1	88
1 945.3	88
1 947.64	24
1 955.0	88
Wavelength (air) (Å)	**Mult. No.**
2 229.0	90
2 313.4	90
2 334.2	89
2 361.4	90
2 387.4	89
2 456.3	90
2 479.72	32
2 481.59	32
2 484.5	89
2 604.72	32
2 818.5	117
2 879.3	116
3 002.1	117
3 013.9	117
3 039.6	115
3 224.9	117
3 254.3	115
3 380.8	115

TABLE 20. Transition probabilities of allowed lines for Al V (references in this table are as follows: 1=Butler and Zeippen,[7,8] 2=Tachiev and Froese Fischer,[71] and 3=Biémont[3])

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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
1	$2s^22p^5-2s2p^6$	$^2P^\circ-^2S$		*279.59*	*1 147–358 816*	6–2	2.14+10	8.35−02	4.61−01	−0.300	B+	2
				278.694	0–358 816	4–2	1.44+10	8.39−02	3.08−01	−0.474	B+	2
				281.394	3 442–358 816	2–2	6.97+09	8.27−02	1.53−01	−0.781	B	2
2	$2p^5-2p^4(^3P)3s$	$^2P^\circ-^4P$										
				132.628	0–753 989.5	4–4	4.09+08	1.08−03	1.88−03	−2.365	C	2
				133.015	3 442–755 237.4	2–2	1.03+08	2.72−04	2.38−04	−3.264	D+	2
				132.409	0–755 237.4	4–2	4.73+06	6.22−06	1.08−05	−4.604	D	2
				133.007	0–751 840.1	4–6	2.59+07	1.03−04	1.81−04	−3.385	D+	2
				133.236	3 442–753 989.5	2–4	3.77+07	2.01−04	1.76−04	−3.396	D+	2
3		$^2P^\circ-^2P$		*130.90*	*1 147–765 098*	6–6	4.65+10	1.19−01	3.09−01	−0.146	B	2
				130.847	0–764 250.4	4–4	3.96+10	1.02−01	1.75−01	−0.389	B+	2
				131.001	3 442–766 792.2	2–2	3.05+10	7.84−02	6.76−02	−0.805	B	2
				130.413	0–766 792.2	4–2	1.63+10	2.08−02	3.57−02	−1.080	B	2
				131.439	3 442–764 250.4	2–4	6.76+09	3.50−02	3.03−02	−1.155	B	2
4	$2p^5-2p^4(^1D)3s$	$^2P^\circ-^2D$		*125.71*	*1 147–796 635*	6–10	1.82+10	7.17−02	1.78−01	−0.366	C+	2
				125.530	0–796 622.4	4–6	1.81+10	6.43−02	1.06−01	−0.590	C+	2
				126.070	3 442–796 652.9	2–4	1.61+10	7.68−02	6.37−02	−0.814	C	2
				125.525	0–796 652.9	4–4	2.07+09	4.88−03	8.07−03	−1.710	C	2
5	$2p^5-2p^4(^3P)3d$	$^2P^\circ-^4F$										
				108.707	0–919 901	4–6	2.09+09	5.56−03	7.96−03	−1.653	D	2
				109.024	3 442–920 675	2–4	1.39+09	4.96−03	3.56−03	−2.003	E+	2
				108.616	0–920 675	4–4	6.04+08	1.07−03	1.53−03	−2.369	E+	2
6		$^2P^\circ-^4P$										
				108.444	0–922 132.8	4–4	1.53+09	2.70−03	3.85−03	−1.967	E+	2
				108.936	3 442–921 415.4	2–2	2.61+07	4.64−05	3.33−05	−4.032	E	2
				108.529	0–921 415.4	4–2	5.18+08	4.58−04	6.54−04	−2.737	E+	2
				108.316	0–923 227.2	4–6	1.05+09	2.78−03	3.96−03	−1.954	D	2
				108.851	3 442–922 132.8	2–4	4.10+08	1.46−03	1.04−03	−2.535	E+	2
7		$^2P^\circ-^2D$		*108.12*	*1 147–926 006*	6–10	1.20+11	3.50−01	7.48−01	0.322	C	2
				107.946	0–926 388	4–6	1.25+11	3.28−01	4.67−01	0.118	C+	2
				108.461	3 442–925 432	2–4	6.17+10	2.18−01	1.55−01	−0.361	C	2
				108.058	0–925 432	4–4	5.06+10	8.86−02	1.26−01	−0.451	C	2
8		$^2P^\circ-^2P$		*107.94*	*1 147–927 570*	6–6	5.98+10	1.05−01	2.23−01	−0.201	D+	2
				107.711	0–928 408	4–4	1.63+10	2.83−02	4.02−02	−0.946	D+	2
				108.407	3 442–925 894	2–2	2.92+10	5.15−02	3.67−02	−0.987	D+	2
				108.004	0–925 894	4–2	1.81+10	1.58−02	2.25−02	−1.199	D+	2
				108.112	3 442–928 408	2–4	4.95+10	1.73−01	1.23−01	−0.461	C	2
9	$2p^5-2p^4(^1D)3d$	$^2P^\circ-^2S$		*104.25*	*1 147–960 415*	6–2	1.83+11	9.92−02	2.04−01	−0.225	D	2
				104.122	0–960 415	4–2	1.53+11	1.24−01	1.71−01	−0.305	D	2
				104.496	3 442–960 415	2–2	2.99+10	4.89−02	3.36−02	−1.010	E+	2
10		$^2P^\circ-^2P$		*104.17*	*1 147–961 125*	6–6	1.54+11	2.51−01	5.17−01	0.178	D	2
				104.073	0–960 868	4–4	1.24+11	2.01−01	2.76−01	−0.095	D	2
				104.363	3 442–961 638	2–2	1.40+11	2.28−01	1.57−01	−0.341	D	2
				103.989	0–961 638	4–2	2.08+10	1.68−02	2.31−02	−1.173	E	2
				104.447	3 442–960 868	2–4	2.70+10	8.85−02	6.08−02	−0.752	E+	2

TABLE 20. Transition probabilities of allowed lines for Al V (references in this table are as follows: 1 = Butler and Zeippen,[7,8] 2 = Tachiev and Froese Fischer,[71] and 3 = Biémont[3])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
11		$^2P^\circ-^2D$		*103.98*	*1 147–962 906*	6–10	8.19+10	2.21−01	4.54−01	0.123	D	2
				103.882	0–962 631	4–6	7.37+10	1.79−01	2.45−01	−0.145	D	2
				104.180	3 442–963 319	2–4	7.79+10	2.54−01	1.74−01	−0.294	D	2
				103.808	0–963 319	4–4	1.61+10	2.61−02	3.56−02	−0.981	E+	2
12	$2p^5-2p^4(^3P)4d$	$^2P^\circ-^4P$										
				94.016	0–1 063 650	4–4	1.22+10	1.61−02	2.00−02	−1.191	D	3
				93.981	0–1 064 050	4–6	2.29+10	4.55−02	5.63−02	−0.740	D	3
				94.321	3 442–1 063 650	2–4	5.41+09	1.44−02	8.96−03	−1.541	E+	3
13		$^2P^\circ-^2P$		*93.83*	*1 147–1 066 903*	6–6	7.24+10	9.55−02	1.77−01	−0.242	D+	3
				93.653	0–1 067 770	4–4	1.04+10	1.37−02	1.69−02	−1.261	D	3
				94.186	3 442–1 065 170	2–2	3.51+10	4.67−02	2.89−02	−1.030	D+	3
				93.882	0–1 065 170	4–2	1.99+10	1.31−02	1.62−02	−1.281	D	3
				93.956	3 442–1 067 770	2–4	7.02+10	1.86−01	1.15−01	−0.429	C	3
14		$^2P^\circ-^2D$		*93.90*	*1 147–1 066 150*	6–10	7.31+10	1.61−01	2.99−01	−0.015	C	3
				93.755	0–1 066 610	4–6	6.95+10	1.37−01	1.70−01	−0.261	C	3
				94.160	3 442–1 065 460	2–4	2.78+10	7.40−02	4.59−02	−0.830	D+	3
				93.856	0–1 065 460	4–4	5.10+10	6.73−02	8.32−02	−0.570	C	3
15	$2p^5-2p^4(^3P)5d$	$^2P^\circ-^2D$		*88.56*	*1 147–1 130 280*	6–10	5.35+10	1.05−01	1.83−01	−0.201	C	3
				88.425	0–1 130 900	4–6	5.53+10	9.73−02	1.13−01	−0.410	C	3
				88.817	3 442–1 129 350	2–4	1.06+10	2.51−02	1.47−02	−1.299	D	3
				88.547	0–1 129 350	4–4	4.05+10	4.76−02	5.55−02	−0.720	D+	3
16		$^2P^\circ-^2P$		*88.52*	*1 147–1 130 883*	6–6	5.88+10	6.91−02	1.21−01	−0.382	D+	3
				88.367	0–1 131 650	4–4	5.49+09	6.43−03	7.48−03	−1.590	D	3
				88.817	3 442–1 129 350	2–2	2.73+10	3.23−02	1.89−02	−1.190	D	3
				88.547	0–1 129 350	4–2	1.51+10	8.87−03	1.03−02	−1.450	D	3
				88.636	3 442–1 131 650	2–4	6.12+10	1.44−01	8.42−02	−0.541	C	3
17	$2s2p^6-2s^22p^4(^3P)3p$	$^2S-^4P^\circ$										
				217.713	358 816–818 136.3	2–4	2.17+05	3.09−06	4.43−06	−5.209	D	2
				217.323	358 816–818 961.6	2–2	1.08+05	7.66−07	1.10−06	−5.815	E+	2
18		$^2S-^4D^\circ$										
				213.120	358 816–828 035.1	2–4	2.10+05	2.87−06	4.02−06	−5.241	D	2
				212.870	358 816–828 586.1	2–2	4.82+05	3.28−06	4.59−06	−5.183	D	2
19	$2p^4(^3P)3s-2p^4(^3P)3p$	$^4P-^4P^\circ$		*1 544.04*	*753 123–817 888*	12–12	5.15+08	1.84−01	1.12+01	0.344	B+	2
				1 526.140	751 840.1–817 364.9	6–6	4.28+08	1.49−01	4.51+00	−0.049	B+	2
				1 558.924	753 989.5–818 136.3	4–4	7.58+07	2.76−02	5.67−01	−0.957	B+	2
				1 569.263	755 237.4–818 961.6	2–2	6.23+07	2.30−02	2.38−01	−1.337	B+	2
				1 508.382	751 840.1–818 136.3	6–4	3.06+08	6.96−02	2.07+00	−0.379	B+	2
				1 539.122	753 989.5–818 961.6	4–2	4.53+08	8.05−02	1.63+00	−0.492	B+	2
				1 577.899	753 989.5–817 364.9	4–6	9.56+07	5.35−02	1.11+00	−0.670	B+	2
				1 589.853	755 237.4–818 136.3	2–4	1.39+08	1.06−01	1.11+00	−0.674	B+	2
20		$^4P-^4D^\circ$		*1 355.87*	*753 123–826 876*	12–20	7.77+08	3.57−01	1.91+01	0.632	B+	2
				1 352.87	751 840.1–825 757	6–8	7.88+08	2.88−01	7.71+00	0.238	B+	2
				1 369.197	753 989.5–827 025.0	4–6	5.99+08	2.52−01	4.55+00	0.003	B+	2
				1 373.670	755 237.4–828 035.1	2–4	3.66+08	2.07−01	1.88+00	−0.383	B+	2

TABLE 20. Transition probabilities of allowed lines for Al V (references in this table are as follows: 1 = Butler and Zeippen,[7,8] 2 = Tachiev and Froese Fischer,[71] and 3 = Biémont[3])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				1 330.054	751 840.1–827 025.0	6–6	1.61+08	4.27−02	1.12+00	−0.591	B+	2
				1 350.519	753 989.5–828 035.1	4–4	3.84+08	1.05−01	1.87+00	−0.377	B+	2
				1 363.351	755 237.4–828 586.1	2–2	6.70+08	1.87−01	1.68+00	−0.427	B+	2
				1 312.422	751 840.1–828 035.1	6–4	1.90+07	3.27−03	8.47−02	−1.707	B	2
				1 340.544	753 989.5–828 586.1	4–2	1.04+08	1.40−02	2.47−01	−1.252	B+	2
21		^{4}P–^{2}D°										
				1 281.590	753 989.5–832 017.6	4–6	1.11+07	4.11−03	6.93−02	−1.784	C+	2
				1 268.274	755 237.4–834 084.7	2–4	2.21+06	1.07−03	8.90−03	−2.670	C	2
				1 247.233	751 840.1–832 017.6	6–6	6.39+06	1.49−03	3.67−02	−2.049	C+	2
				1 248.514	753 989.5–834 084.7	4–4	1.15+06	2.69−04	4.42−03	−2.968	C	2
				1 215.885	751 840.1–834 084.7	6–4	1.06+06	1.56−04	3.75−03	−3.029	C	2
22		^{4}P–^{2}P°										
				1 205.576	753 989.5–836 937.4	4–4	1.12+07	2.44−03	3.87−02	−2.011	D+	2
				1 253.197	755 237.4–835 033.3	2–2	2.34+04	5.50−06	4.54−05	−4.959	E	2
				1 175.125	751 840.1–836 937.4	6–4	1.86+07	2.57−03	5.97−02	−1.812	D+	2
				1 233.901	753 989.5–835 033.3	4–2	8.07+05	9.21−05	1.50−03	−3.434	E+	2
				1 223.990	755 237.4–836 937.4	2–4	1.52+07	6.81−03	5.49−02	−1.866	D+	2
23		^{4}P–^{4}S°		*1 183.10*	*753 123–837 646.2*	12–4	1.14+09	7.95−02	3.72+00	−0.020	B	2
				1 165.418	751 840.1–837 646.2	6–4	5.09+08	6.92−02	1.59+00	−0.382	B	2
				1 195.362	753 989.5–837 646.2	4–4	4.04+08	8.65−02	1.36+00	−0.461	B	2
				1 213.463	755 237.4–837 646.2	2–4	2.17+08	9.57−02	7.65−01	−0.718	C+	2
24		^{2}P–^{4}P°										
				1 855.77	764 250.4–818 136.3	4–4	2.58+04	1.33−05	3.25−04	−4.274	D+	2
				1 916.83	766 792.2–818 961.6	2–2	1.85+05	1.02−04	1.29−03	−3.690	C	2
				1 827.78	764 250.4–818 961.6	4–2	3.74+05	9.36−05	2.25−03	−3.427	C	2
				1 882.73	764 250.4–817 364.9	4–6	1.12+05	8.94−05	2.22−03	−3.447	C	2
				1 947.64	766 792.2–818 136.3	2–4	1.91+03	2.18−06	2.79−05	−5.361	D	2
25		^{2}P–^{4}D°										
				1 593.001	764 250.4–827 025.0	4–6	9.35+06	5.33−03	1.12−01	−1.671	B	2
				1 632.842	766 792.2–828 035.1	2–4	2.54+06	2.03−03	2.18−02	−2.391	C+	2
				1 567.774	764 250.4–828 035.1	4–4	2.74+04	1.01−05	2.08−04	−4.394	D+	2
				1 618.283	766 792.2–828 586.1	2–2	3.02+05	1.19−04	1.27−03	−3.623	C	2
				1 554.347	764 250.4–828 586.1	4–2	9.83+04	1.78−05	3.64−04	−4.148	D+	2
26		^{2}P–^{2}D°		*1 476.09*	*765 098–832 844*	6–10	6.16+08	3.35−01	9.78+00	0.303	B	2
				1 475.640	764 250.4–832 017.6	4–6	6.17+08	3.02−01	5.87+00	0.082	B+	2
				1 486.050	766 792.2–834 084.7	2–4	3.84+08	2.54−01	2.49+00	−0.294	B	2
				1 431.961	764 250.4–834 084.7	4–4	2.44+08	7.50−02	1.42+00	−0.523	B	2
27		^{2}P–^{2}P°		*1 404.40*	*765 098–836 303*	6–6	5.45+08	1.61−01	4.47+00	−0.015	C+	2
				1 375.762	764 250.4–836 937.4	4–4	3.08+08	8.75−02	1.59+00	−0.456	B	2
				1 465.393	766 792.2–835 033.3	2–2	2.02+07	6.51−03	6.28−02	−1.885	D	2
				1 412.771	764 250.4–835 033.3	4–2	5.78+08	8.65−02	1.61+00	−0.461	C+	2
				1 425.614	766 792.2–836 937.4	2–4	2.12+08	1.29−01	1.21+00	−0.588	C+	2
28		^{2}P–^{4}S°										
				1 362.476	764 250.4–837 646.2	4–4	8.30+06	2.31−03	4.15−02	−2.034	D+	2
				1 411.353	766 792.2–837 646.2	2–4	1.08+07	6.48−03	6.02−02	−1.887	D+	2
29		^{2}P–^{2}S°		*1 369.49*	*765 098*–838 117.8	6–2	6.81+08	6.39−02	1.73+00	−0.416	B	2
				1 353.777	764 250.4–838 117.8	4–2	7.95+07	1.09−02	1.95−01	−1.361	C	2
				1 402.021	766 792.2–838 117.8	2–2	5.64+08	1.66−01	1.53+00	−0.479	B	2

TABLE 20. Transition probabilities of allowed lines for Al V (references in this table are as follows: 1 = Butler and Zeippen,[7,8] 2 = Tachiev and Froese Fischer,[71] and 3 = Biémont[3])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
30	$2p^4(^3P)3s$ $-2p^4(^1D)3p$	$^2P-^2P^\circ$		*840.3*	*765 098–884 104*	6–6	1.13+09	1.19−01	1.98+00	−0.146	D+	2
				838.16	764 250.4–883 559	4–4	9.54+08	1.00−01	1.11+00	−0.398	C	2
				844.58	766 792.2–885 194	2–2	7.44+08	7.95−02	4.42−01	−0.799	D+	2
				826.83	764 250.4–885 194	4–2	3.32+08	1.70−02	1.86−01	−1.167	D	2
				856.41	766 792.2–883 559	2–4	1.99+08	4.37−02	2.47−01	−1.058	D	2
31	$2s^22p^4(^3P)3s-$ $2s2p^5(^3P^\circ)3s$	$^2P-^2P^\circ$		*[301.38]*	*765 098–1 096 903*	6–6	7.12+09	9.69−02	5.77−01	−0.236	D	1
				[301.269]	764 250.4–1 096 180	4–4	5.94+09	8.08−02	3.21−01	−0.491	D	LS
				[301.607]	766 792.2–1 098 350	2–2	4.73+09	6.45−02	1.28−01	−0.889	E+	LS
				[299.312]	764 250.4–1 098 350	4–2	2.43+09	1.63−02	6.42−02	−1.186	E+	LS
				[303.594]	766 792.2–1 096 180	2–4	1.16+09	3.21−02	6.42−02	−1.192	E+	LS
32	$2p^4(^1D)3s$ $-2p^4(^3P)3p$	$^2D-^2P^\circ$	*2 520.2*	*2 520.9*	*796 635–836 303*	10–6	2.52+07	1.44−02	1.20+00	−0.842	D	2
			2 479.72	2 480.47	796 622.4–836 937.4	6–4	2.82+07	1.73−02	8.49−01	−0.984	D+	2
			2 604.72	2 605.50	796 652.9–835 033.3	4–2	1.54+07	7.84−03	2.69−01	−1.504	E+	2
			2 481.59	2 482.34	796 652.9–836 937.4	4–4	2.63+06	2.43−03	7.95−02	−2.012	E+	2
33	$2p^4(^1D)3s$ $-2p^4(^1D)3p$	$^2D-^2F^\circ$		*1 449.86*	*796 635–865 607*	10–14	6.50+08	2.87−01	1.37+01	0.458	C+	2
				1 445.870	796 622.4–865 784.9	6–8	6.56+08	2.74−01	7.83+00	0.216	C+	2
				1 455.265	796 652.9–865 368.9	4–6	5.87+08	2.80−01	5.36+00	0.049	C+	2
				1 454.620	796 622.4–865 368.9	6–6	5.53+07	1.75−02	5.04−01	−0.979	D+	2
34		$^2D-^2D^\circ$		*1 289.59*	*796 635–874 178*	10–10	9.13+08	2.28−01	9.67+00	0.358	C+	2
				1 287.702	796 622.4–874 280.1	6–6	8.39+08	2.09−01	5.30+00	0.098	C+	2
				1 292.439	796 652.9–874 026.0	4–4	8.47+08	2.12−01	3.61+00	−0.072	C+	2
				1 291.930	796 622.4–874 026.0	6–4	5.88+07	9.82−03	2.51−01	−1.230	D	2
				1 288.208	796 652.9–874 280.1	4–6	7.96+07	2.97−02	5.04−01	−0.925	D+	2
35		$^2D-^2P^\circ$		*1 143.3*	*796 635–884 104*	10–6	9.85+08	1.16−01	4.36+00	0.064	C	2
				1 150.26	796 622.4–883 559	6–4	9.07+08	1.20−01	2.72+00	−0.143	C	2
				1 129.42	796 652.9–885 194	4–2	1.04+09	9.98−02	1.48+00	−0.399	C	2
				1 150.67	796 652.9–883 559	4–4	5.04+07	1.00−02	1.52−01	−1.398	D	2
36	$2p^4(^3P)3p$ $-2p^4(^3P)3d$	$^4P^\circ-^4D$		*1 069.83*	*817 888–911 361*	12–20	1.49+09	4.27−01	1.80+01	0.710	B	2
				1 068.265	817 364.9–910 974.6	6–8	1.42+09	3.23−01	6.81+00	0.287	B+	2
				1 073.043	818 136.3–911 329.2	4–6	8.67+08	2.24−01	3.17+00	−0.048	B	2
				1 077.373	818 961.6–911 780.0	2–4	4.78+08	1.66−01	1.18+00	−0.479	B	2
				1 064.234	817 364.9–911 329.2	6–6	6.54+08	1.11−01	2.34+00	−0.177	B	2
				1 067.877	818 136.3–911 780.0	4–4	9.37+08	1.60−01	2.25+00	−0.194	B	2
				1 072.949	818 961.6–912 162.7	2–2	1.21+09	2.09−01	1.48+00	−0.379	B	2
				1 059.153	817 364.9–911 780.0	6–4	1.54+08	1.72−02	3.61−01	−0.986	C+	2
				1 063.531	818 136.3–912 162.7	4–2	3.72+08	3.15−02	4.42−01	−0.900	C+	2
37		$^4P^\circ-^2F$										
				964.23	817 364.9–921 075	6–8	1.38+06	2.56−04	4.88−03	−2.814	D	2
				957.18	818 136.3–922 610	4–6	4.60+07	9.48−03	1.20−01	−1.421	C	2
				950.16	817 364.9–922 610	6–6	6.89+07	9.32−03	1.75−01	−1.252	C	2
38		$^4P^\circ-^4P$		*955.36*	*817 888–922 560*	12–12	1.01+09	1.38−01	5.19+00	0.219	C+	2

TABLE 20. Transition probabilities of allowed lines for Al V (references in this table are as follows: 1 = Butler and Zeippen,[7,8] 2 = Tachiev and Froese Fischer,[71] and 3 = Biémont[3])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				944.623	817 364.9–923 227.2	6–6	5.10+08	6.83−02	1.27+00	−0.387	B	2
				961.571	818 136.3–922 132.8	4–4	1.11+08	1.54−02	1.96−01	−1.210	C	2
				976.050	818 961.6–921 415.4	2–2	2.70+08	3.85−02	2.48−01	−1.114	C	2
				954.491	817 364.9–922 132.8	6–4	4.69+08	4.27−02	8.04−01	−0.591	C+	2
				968.250	818 136.3–921 415.4	4–2	1.02+09	7.20−02	9.18−01	−0.541	C+	2
				951.557	818 136.3–923 227.2	4–6	2.93+08	5.97−02	7.48−01	−0.622	C+	2
				969.263	818 961.6–922 132.8	2–4	5.60+08	1.58−01	1.01+00	−0.500	C+	2
39		$^4P^\circ-^2D$										
				923.77	818 136.3–926 388	4–6	6.17+06	1.18−03	1.44−02	−2.326	D	2
				939.23	818 961.6–925 432	2–4	5.80+06	1.53−03	9.48−03	−2.514	D	2
				917.24	817 364.9–926 388	6–6	1.05+07	1.33−03	2.41−02	−2.098	D+	2
				932.00	818 136.3–925 432	4–4	1.11+06	1.44−04	1.77−03	−3.240	E+	2
				925.35	817 364.9–925 432	6–4	2.83+06	2.42−04	4.42−03	−2.838	D	2
40		$^4D^\circ-^4D$		*1 183.6*	*826 876–911 361*	20–20	3.53+08	7.41−02	5.77+00	0.171	C+	2
				1 173.47	825 757–910 974.6	8–8	3.87+08	8.00−02	2.47+00	−0.194	B	2
				1 186.181	827 025.0–911 329.2	6–6	1.83+08	3.85−02	9.03−01	−0.636	C+	2
				1 194.103	828 035.1–911 780.0	4–4	1.08+08	2.30−02	3.62−01	−1.036	C+	2
				1 196.507	828 586.1–912 162.7	2–2	1.25+08	2.69−02	2.12−01	−1.269	C	2
				1 168.60	825 757–911 329.2	8–6	9.35+07	1.44−02	4.42−01	−0.939	C+	2
				1 179.871	827 025.0–911 780.0	6–4	1.24+08	1.73−02	4.03−01	−0.984	C+	2
				1 188.671	828 035.1–912 162.7	4–2	1.49+08	1.58−02	2.47−01	−1.199	C	2
				1 191.191	827 025.0–910 974.6	6–8	3.97+07	1.13−02	2.65−01	−1.169	C	2
				1 200.565	828 035.1–911 329.2	4–6	5.41+07	1.75−02	2.77−01	−1.155	C	2
				1 202.011	828 586.1–911 780.0	2–4	5.59+07	2.42−02	1.92−01	−1.315	C	2
41		$^4D^\circ-^4F$		*1 087.1*	*826 876–918 867*	20–28	1.96+09	4.87−01	3.49+01	0.989	B+	2
				1 088.67	825 757–917 612	8–10	1.99+09	4.42−01	1.27+01	0.549	B+	2
				1 090.13	827 025.0–918 757	6–8	1.73+09	4.10−01	8.83+00	0.391	B+	2
				1 088.54	828 035.1–919 901	4–6	1.52+09	4.05−01	5.81+00	0.210	B+	2
				1 085.91	828 586.1–920 675	2–4	1.42+09	5.03−01	3.60+00	0.003	B	2
				1 075.27	825 757–918 757	8–8	1.87+08	3.24−02	9.16−01	−0.586	C+	2
				1 076.70	827 025.0–919 901	6–6	4.31+08	7.49−02	1.59+00	−0.347	B	2
				1 079.45	828 035.1–920 675	4–4	5.42+08	9.47−02	1.35+00	−0.422	B	2
				1 062.20	825 757–919 901	8–6	7.71+06	9.79−04	2.74−02	−2.106	D+	2
				1 067.81	827 025.0–920 675	6–4	2.67+07	3.04−03	6.41−02	−1.739	D+	2
42		$^4D^\circ-^2F$										
				1 063.26	827 025.0–921 075	6–8	6.37+07	1.44−02	3.02−01	−1.063	C+	2
				1 057.36	828 035.1–922 610	4–6	5.44+07	1.37−02	1.90−01	−1.261	C	2
				1 049.12	825 757–921 075	8–8	2.23+07	3.68−03	1.02−01	−1.531	C	2
				1 046.19	827 025.0–922 610	6–6	1.03+06	1.70−04	3.50−03	−2.991	E+	2
				1 032.49	825 757–922 610	8–6	1.25+07	1.50−03	4.08−02	−1.921	D+	2
43		$^4D^\circ-^4P$		*1 045.10*	*826 876–922 560*	20–12	1.16+08	1.14−02	7.84−01	−0.642	C	2
				1 025.95	825 757–923 227.2	8–6	5.44+07	6.44−03	1.74−01	−1.288	C	2
				1 051.438	827 025.0–922 132.8	6–4	1.86+07	2.05−03	4.26−02	−1.910	D+	2
				1 070.890	828 035.1–921 415.4	4–2	8.14+06	7.00−04	9.87−03	−2.553	D	2
				1 039.477	827 025.0–923 227.2	6–6	6.38+07	1.03−02	2.12−01	−1.209	C	2
				1 062.725	828 035.1–922 132.8	4–4	4.38+07	7.41−03	1.04−01	−1.528	C	2
				1 077.246	828 586.1–921 415.4	2–2	5.08+07	8.84−03	6.27−02	−1.753	D+	2
				1 050.507	828 035.1–923 227.2	4–6	1.56+07	3.86−03	5.34−02	−1.811	D+	2
				1 068.985	828 586.1–922 132.8	2–4	5.21+07	1.79−02	1.26−01	−1.446	C	2
44		$^4D^\circ-^2D$										

TABLE 20. Transition probabilities of allowed lines for Al V (references in this table are as follows: 1=Butler and Zeippen,[7,8] 2=Tachiev and Froese Fischer,[71] and 3=Biémont[3])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				1 006.41	827 025.0–926 388	6–6	1.36+06	2.07−04	4.12−03	−2.906	D	2
				1 026.73	828 035.1–925 432	4–4	1.27+06	2.01−04	2.72−03	−3.095	E+	2
				993.73	825 757–926 388	8–6	1.14+06	1.27−04	3.32−03	−2.993	E+	2
				1 016.19	827 025.0–925 432	6–4	2.71+06	2.80−04	5.61−03	−2.775	D	2
				1 016.75	828 035.1–926 388	4–6	2.72+06	6.32−04	8.46−03	−2.597	D	2
				1 032.57	828 586.1–925 432	2–4	5.04+06	1.61−03	1.10−02	−2.492	D	2
45		$^2D^\circ-^4D$										
				1 260.850	832 017.6–911 329.2	6–6	3.73+06	8.89−04	2.21−02	−2.273	D+	2
				1 287.079	834 084.7–911 780.0	4–4	5.25+05	1.30−04	2.21−03	−3.284	E+	2
				1 253.724	832 017.6–911 780.0	6–4	2.39+06	3.75−04	9.29−03	−2.648	D	2
				1 280.771	834 084.7–912 162.7	4–2	6.84+05	8.41−05	1.42−03	−3.473	E+	2
				1 266.512	832 017.6–910 974.6	6–8	2.28+04	7.32−06	1.83−04	−4.357	E	2
				1 294.591	834 084.7–911 329.2	4–6	3.55+04	1.34−05	2.28−04	−4.271	E	2
46		$^2D^\circ-^4F$										
				1 152.88	832 017.6–918 757	6–8	6.89+07	1.83−02	4.17−01	−0.959	C+	2
				1 165.28	834 084.7–919 901	4–6	2.75+07	8.40−03	1.29−01	−1.474	C	2
				1 137.87	832 017.6–919 901	6–6	4.72+05	9.17−05	2.06−03	−3.259	E+	2
				1 154.86	834 084.7–920 675	4–4	4.14+04	8.27−06	1.26−04	−4.480	E	2
				1 127.94	832 017.6–920 675	6–4	2.60+04	3.31−06	7.38−05	−4.702	E	2
47		$^2D^\circ-^2F$		*1 125.0*	*832 844–921 733*	10–14	1.68+09	4.47−01	1.65+01	0.650	B+	2
				1 122.87	832 017.6–921 075	6–8	1.78+09	4.48−01	9.93+00	0.429	B+	2
				1 129.62	834 084.7–922 610	4–6	1.31+09	3.76−01	5.59+00	0.177	B+	2
				1 103.85	832 017.6–922 610	6–6	2.55+08	4.66−02	1.02+00	−0.553	C+	2
48		$^2D^\circ-^4P$		*1 109.691*	*832 017.6–922 132.8*	6–4	3.16+06	3.89−04	8.54−03	−2.632	D	2
				1 145.073	834 084.7–921 415.4	4–2	1.76+06	1.73−04	2.61−03	−3.160	E+	2
				1 096.376	832 017.6–923 227.2	6–6	2.26+07	4.08−03	8.83−02	−1.611	C	2
				1 135.743	834 084.7–922 132.8	4–4	3.13+06	6.05−04	9.05−03	−2.616	D	2
				1 121.799	834 084.7–923 227.2	4–6	2.11+08	5.98−02	8.83−01	−0.621	B	2
49		$^2D^\circ-^2D$		*1 073.4*	*832 844–926 006*	10–10	4.75+08	8.20−02	2.90+00	−0.086	C+	2
				1 059.65	832 017.6–926 388	6–6	3.11+08	5.24−02	1.10+00	−0.503	B	2
				1 094.72	834 084.7–925 432	4–4	5.10+08	9.17−02	1.32+00	−0.436	B	2
				1 070.50	832 017.6–925 432	6–4	1.02+08	1.16−02	2.46−01	−1.157	C	2
				1 083.38	834 084.7–926 388	4–6	6.21+07	1.64−02	2.34−01	−1.183	C	2
50		$^2D^\circ-^2P$		*1 055.7*	*832 844–927 570*	10–6	1.13+08	1.14−02	3.95−01	−0.943	C	2
				1 037.45	832 017.6–928 408	6–4	2.86+07	3.08−03	6.30−02	−1.733	D+	2
				1 089.21	834 084.7–925 894	4–2	1.69+08	1.50−02	2.15−01	−1.222	C	2
				1 060.18	834 084.7–928 408	4–4	4.95+07	8.34−03	1.16−01	−1.477	C	2
51		$^2P^\circ-^4F$										
				1 205.35	836 937.4–919 901	4–6	7.52+05	2.46−04	3.90−03	−3.007	E+	2
				1 167.66	835 033.3–920 675	2–4	3.32+06	1.36−03	1.04−02	−2.565	D	2
				1 194.21	836 937.4–920 675	4–4	8.95+05	1.91−04	3.01−03	−3.117	E+	2
52		$^2P^\circ-^4P$										
				1 173.772	836 937.4–922 132.8	4–4	2.35+07	4.86−03	7.51−02	−1.711	C	2
				1 157.647	835 033.3–921 415.4	2–2	5.30+05	1.06−04	8.12−04	−3.674	E+	2
				1 183.740	836 937.4–921 415.4	4–2	2.92+07	3.07−03	4.79−02	−1.911	D+	2
				1 158.886	836 937.4–923 227.2	4–6	3.33+06	1.01−03	1.54−02	−2.394	D	2
				1 148.112	835 033.3–922 132.8	2–4	4.67+06	1.85−03	1.40−02	−2.432	D	2

TABLE 20. Transition probabilities of allowed lines for Al V (references in this table are as follows: 1=Butler and Zeippen,[7,8] 2=Tachiev and Froese Fischer,[71] and 3=Biémont[3])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
53		^{2}P°–^{2}D		*1 114.8*	*836 303–926 006*	6–10	1.17+09	3.63−01	7.99+00	0.338	C+	2
				1 117.94	836 937.4–926 388	4–6	1.25+09	3.50−01	5.16+00	0.146	B	2
				1 106.21	835 033.3–925 432	2–4	7.39+08	2.71−01	1.98+00	−0.266	C+	2
				1 130.01	836 937.4–925 432	4–4	3.01+08	5.76−02	8.57−01	−0.638	C	2
54		^{2}P°–^{2}P		*1 095.7*	*836 303–927 570*	6–6	7.66+08	1.38−01	2.98+00	−0.082	C+	2
				1 093.25	836 937.4–928 408	4–4	3.33+08	5.96−02	8.58−01	−0.623	C	2
				1 100.59	835 033.3–925 894	2–2	1.46+09	2.65−01	1.92+00	−0.276	C+	2
				1 124.14	836 937.4–925 894	4–2	1.46+08	1.38−02	2.04−01	−1.258	C	2
				1 070.95	835 033.3–928 408	2–4	1.03+06	3.54−04	2.49−03	−3.150	E	2
55		^{4}S°–^{2}F										
				1 176.97	837 646.2–922 610	4–6	1.06+08	3.31−02	5.13−01	−0.878	C+	2
56		^{4}S°–^{4}P		*1 177.66*	837 646.2–*922 560*	4–12	8.65+08	5.39−01	8.37+00	0.334	B	2
				1 168.484	837 646.2–923 227.2	4–6	9.10+08	2.80−01	4.30+00	0.049	B+	2
				1 183.620	837 646.2–922 132.8	4–4	8.47+08	1.78−01	2.77+00	−0.148	B	2
				1 193.756	837 646.2–921 415.4	4–2	7.70+08	8.23−02	1.29+00	−0.483	B	2
57		^{4}S°–^{2}D										
				1 126.86	837 646.2–926 388	4–6	5.64+06	1.61−03	2.39−02	−2.191	D+	2
				1 139.14	837 646.2–925 432	4–4	2.51+05	4.89−05	7.33−04	−3.709	E+	2
58		^{4}S°–^{2}P										
				1 101.79	837 646.2–928 408	4–4	1.74+07	3.17−03	4.60−02	−1.897	D+	2
				1 133.17	837 646.2–925 894	4–2	2.90+06	2.79−04	4.17−03	−2.952	D	2
59		^{2}S°–^{2}P		*1 117.9*	838 117.8–*927 570*	2–6	9.66+08	5.43−01	3.99+00	0.036	B	2
				1 107.54	838 117.8–928 408	2–4	1.42+09	5.22−01	3.81+00	0.019	B	2
				1 139.26	838 117.8–925 894	2–2	1.27+08	2.48−02	1.86−01	−1.305	C	2
60	$2p^4(^3P)3p$ $-2p^4(^1D)3d$	^{2}P°–^{2}S		*805.7*	*836 303*–960 415	6–2	1.01+09	3.28−02	5.21−01	−0.706	D	2
				809.86	836 937.4–960 415	4–2	8.30+08	4.08−02	4.35−01	−0.787	D	2
				797.56	835 033.3–960 415	2–2	1.72+08	1.64−02	8.63−02	−1.484	E	2
61		^{2}P°–^{2}P		*801.1*	*836 303–961 125*	6–6	4.09+08	3.94−02	6.23−01	−0.626	E+	2
				806.90	836 937.4–960 868	4–4	3.32+08	3.24−02	3.45−01	−0.887	D	2
				789.86	835 033.3–961 638	2–2	5.69+07	5.32−03	2.77−02	−1.973	E	2
				801.92	836 937.4–961 638	4–2	5.16+07	2.49−03	2.63−02	−2.002	E	2
				794.69	835 033.3–960 868	2–4	2.26+08	4.29−02	2.24−01	−1.067	E+	2
62		^{2}S°–^{2}P		*813.0*	838 117.8–*961 125*	2–6	2.18+08	6.47−02	3.46−01	−0.888	D	2
				814.66	838 117.8–960 868	2–4	3.07+07	6.11−03	3.28−02	−1.913	E	2
				809.58	838 117.8–961 638	2–2	5.98+08	5.88−02	3.13−01	−0.930	D	2
63	$2p^4(^3P)3p$ $-2p^4(^3P)4s$	^{4}P°–^{4}P		*542.38*	*817 888–1 002 261*	12–12	1.96+09	8.66−02	1.85+00	0.017	C	3
				544.300	817 364.9–1 001 087	6–6	1.64+09	7.28−02	7.82−01	−0.360	C+	3
				541.153	818 136.3–1 002 927	4–4	2.99+08	1.31−02	9.35−02	−1.281	C	3
				539.120	818 961.6–1 004 449	2–2	2.34+08	1.02−02	3.62−02	−1.690	D+	3
				538.903	817 364.9–1 002 927	6–4	5.12+08	1.49−02	1.58−01	−1.049	C	3
				536.732	818 136.3–1 004 449	4–2	1.13+09	2.44−02	1.73−01	−1.011	C	3

TABLE 20. Transition probabilities of allowed lines for Al V (references in this table are as follows: 1 = Butler and Zeippen,[7,8] 2 = Tachiev and Froese Fischer,[71] and 3 = Biémont[3])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				546.595	818 136.3–1 001 087	4–6	7.42+08	4.99−02	3.59−01	−0.700	C+	3
				543.580	818 961.6–1 002 927	2–4	7.97+08	7.06−02	2.53−01	−0.850	C	3
64		$^4P^\circ - ^2P$										
				532.897	818 136.3–1 005 790	4–4	2.04+07	8.67−04	6.08−03	−2.460	E+	3
				528.789	818 961.6–1 008 073	2–2	9.26+06	3.88−04	1.35−03	−3.110	E	3
				530.715	817 364.9–1 005 790	6–4	5.79+07	1.63−03	1.71−02	−2.010	E+	3
				526.491	818 136.3–1 008 073	4–2	1.29+07	2.68−04	1.86−03	−2.970	E	3
				535.251	818 961.6–1 005 790	2–4	3.85+08	3.30−02	1.16−01	−1.180	D+	3
65		$^4D^\circ - ^4P$		*570.2*	*826 876–1 002 261*	20–12	3.07+09	8.99−02	3.37+00	0.255	C+	3
				570.35	825 757–1 001 087	8–6	2.48+09	9.06−02	1.36+00	−0.140	B	3
				568.50	827 025.0–1 002 927	6–4	2.25+09	7.28−02	8.17−01	−0.360	C+	3
				566.85	828 035.1–1 004 449	4–2	1.89+09	4.55−02	3.40−01	−0.740	C	3
				574.51	827 025.0–1 001 087	6–6	3.45+08	1.71−02	1.94−01	−0.989	C	3
				571.78	828 035.1–1 002 927	4–4	8.27+08	4.05−02	3.05−01	−0.790	C	3
				568.62	828 586.1–1 004 449	2–2	1.63+09	7.92−02	2.97−01	−0.800	C	3
				577.86	828 035.1–1 001 087	4–6	4.19+07	3.15−03	2.39−02	−1.900	D+	3
				573.59	828 586.1–1 002 927	2–4	1.01+08	9.98−03	3.77−02	−1.700	D+	3
66		$^4D^\circ - ^2P$										
				559.394	827 025.0–1 005 790	6–4	5.98+07	1.87−03	2.07−02	−1.950	D	3
				562.57	828 035.1–1 005 790	4–4	6.63+07	3.15−03	2.33−02	−1.900	D	3
				557.144	828 586.1–1 008 073	2–2	2.52+07	1.17−03	4.30−03	−2.631	E+	3
				564.32	828 586.1–1 005 790	2–4	1.09+07	1.04−03	3.88−03	−2.682	E	3
67		$^2D^\circ - ^4P$										
				585.11	832 017.6–1 002 927	6–4	8.86+07	3.03−03	3.51−02	−1.740	D	3
				586.98	834 084.7–1 004 449	4–2	4.85+06	1.25−04	9.68−04	−3.301	E	3
				591.47	832 017.6–1 001 087	6–6	6.49+06	3.40−04	3.98−03	−2.690	E	3
				592.27	834 084.7–1 002 927	4–4	3.69+07	1.94−03	1.51−02	−2.110	E+	3
				598.79	834 084.7–1 001 087	4–6	8.54+05	6.89−05	5.43−04	−3.560	E	3
68		$^2D^\circ - ^2P$		*575.7*	*832 844–1 006 551*	10–6	2.90+09	8.64−02	1.64+00	−0.063	C+	3
				575.47	832 017.6–1 005 790	6–4	2.58+09	8.55−02	9.72−01	−0.290	C+	3
				574.75	834 084.7–1 008 073	4–2	2.26+09	5.60−02	4.24−01	−0.650	C+	3
				582.39	834 084.7–1 005 790	4–4	6.19+08	3.15−02	2.41−01	−0.900	C	3
69		$^2P^\circ - ^4P$										
				602.45	836 937.4–1 002 927	4–4	2.10+08	1.14−02	9.07−02	−1.341	D+	3
				590.26	835 033.3–1 004 449	2–2	2.19+06	1.15−04	4.45−04	−3.638	E	3
				609.20	836 937.4–1 001 087	4–6	2.03+07	1.69−03	1.36−02	−2.170	E+	3
				595.61	835 033.3–1 002 927	2–4	6.20+07	6.59−03	2.58−02	−1.880	D	3
70		$^2P^\circ - ^2P$		*587.4*	*836 303–1 006 551*	6–6	1.46+09	7.53−02	8.74−01	−0.345	C	3
				592.23	836 937.4–1 005 790	4–4	8.65+08	4.55−02	3.55−01	−0.740	C	3
				577.90	835 033.3–1 008 073	2–2	1.17+08	5.87−03	2.24−02	−1.930	D	3
				584.33	836 937.4–1 008 073	4–2	1.20+09	3.08−02	2.37−01	−0.909	C	3
				585.63	835 033.3–1 005 790	2–4	6.56+08	6.74−02	2.60−01	−0.870	C	3
71		$^4S^\circ - ^4P$		*607.5*	837 646.2–*1 002 261*	4–12	5.01+08	8.32−02	6.66−01	−0.478	C	3
				611.84	837 646.2–1 001 087	4–6	4.60+08	3.87−02	3.12−01	−0.810	C	3
				605.03	837 646.2–1 002 927	4–4	4.66+08	2.56−02	2.04−01	−0.990	C	3
				599.51	837 646.2–1 004 449	4–2	7.04+08	1.90−02	1.50−01	−1.119	C	3

TABLE 20. Transition probabilities of allowed lines for Al V (references in this table are as follows: 1 = Butler and Zeippen,[7,8] 2 = Tachiev and Froese Fischer,[71] and 3 = Biémont[3])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
72		$^4S^\circ-^2P$										
				594.73	837 646.2–1 005 790	4–4	1.75+08	9.29−03	7.27−02	−1.430	D+	3
				586.76	837 646.2–1 008 073	4–2	7.02+07	1.81−03	1.40−02	−2.140	E+	3
73		$^2S^\circ-^2P$		*593.7*	838 117.8–*1 006 551*	2–6	4.73+08	7.49−02	2.93−01	−0.824	C	3
				596.40	838 117.8–1 005 790	2–4	1.52+07	1.62−03	6.35−03	−2.489	D	3
				588.39	838 117.8–1 008 073	2–2	1.42+09	7.40−02	2.87−01	−0.830	C	3
74	$2p^4(^3P)3p-2p^4(^3P)4d$	$^4P^\circ-^4D$				12–20						3
				409.209	818 136.3–1 062 510	4–6	8.36+08	3.15−02	1.70−01	−0.900	C	3
				410.074	818 961.6–1 062 820	2–4	3.68+08	1.86−02	5.02−02	−1.429	D+	3
				407.922	817 364.9–1 062 510	6–6	8.61+08	2.15−02	1.73−01	−0.889	C	3
				408.691	818 136.3–1 062 820	4–4	1.15+09	2.87−02	1.54−01	−0.940	C	3
				407.406	817 364.9–1 062 820	6–4	2.58+08	4.28−03	3.45−02	−1.590	D+	3
75		$^4P^\circ-^4P$				12–12						3
				405.375	817 364.9–1 064 050	6–6	6.77+07	1.67−03	1.33−02	−1.999	D	3
				407.309	818 136.3–1 063 650	4–4	1.08+07	2.68−04	1.44−03	−2.970	E+	3
				406.033	817 364.9–1 063 650	6–4	1.57+08	2.58−03	2.07−02	−1.810	D	3
				406.647	818 136.3–1 064 050	4–6	2.28+08	8.47−03	4.54−02	−1.470	D+	3
				408.683	818 961.6–1 063 650	2–4	3.63+08	1.82−02	4.88−02	−1.439	D+	3
76		$^4D^\circ-^4D$				20–20						3
				424.655	827 025.0–1 062 510	6–6	3.71+08	1.00−02	8.42−02	−1.222	C	3
				425.922	828 035.1–1 062 820	4–4	2.06+08	5.60−03	3.14−02	−1.650	D+	3
				422.381	825 757–1 062 510	8–6	1.64+08	3.29−03	3.66−02	−1.580	D+	3
				424.097	827 025.0–1 062 820	6–4	2.12+08	3.82−03	3.20−02	−1.640	D+	3
				426.485	828 035.1–1 062 510	4–6	2.22+07	9.08−04	5.10−03	−2.440	D	3
				426.924	828 586.1–1 062 820	2–4	3.81+07	2.08−03	5.86−03	−2.381	D	3
77		$^4D^\circ-^4P$				20–12						1,3
				419.651	825 757–1 064 050	8–6	6.03+06	1.19−04	1.32−03	−3.021	E+	3
				422.610	827 025.0–1 063 650	6–4	9.55+06	1.71−04	1.42−03	−2.989	E+	3
				421.896	827 025.0–1 064 050	6–6	3.04+06	8.11−05	6.76−04	−3.313	E	LS
				424.421	828 035.1–1 063 650	4–4	2.61+08	7.05−03	3.94−02	−1.550	D+	3
				423.702	828 035.1–1 064 050	4–6	6.48+08	2.62−02	1.46−01	−0.980	C	3
				425.416	828 586.1–1 063 650	2–4	1.19+08	6.44−03	1.80−02	−1.890	D	3
78		$^2D^\circ-^4P$										
				431.719	832 017.6–1 063 650	6–4	4.09+06	7.62−05	6.50−04	−3.340	E	3
				430.974	832 017.6–1 064 050	6–6	9.27+07	2.58−03	2.20−02	−1.810	D	3
				435.606	834 084.7–1 063 650	4–4	3.93+07	1.12−03	6.41−03	−2.349	E+	3
				434.848	834 084.7–1 064 050	4–6	1.09+08	4.66−03	2.67−02	−1.730	D	3
79		$^2D^\circ-^2P$				10–6						3
				432.741	834 084.7–1 065 170	4–2	7.42+07	1.04−03	5.94−03	−2.381	D	3
				427.926	834 084.7–1 067 770	4–4	6.75+07	1.85−03	1.04−02	−2.131	D	3
80		$^2D^\circ-^2D$		*428.62*	*832 844–1 066 150*	10–10	3.68+08	1.01−02	1.43−01	−0.996	C	3
				426.271	832 017.6–1 066 610	6–6	4.54+07	1.24−03	1.04−02	−2.128	D	3
				432.198	834 084.7–1 065 460	4–4	1.07+07	3.01−04	1.71−03	−2.919	E+	3
				428.371	832 017.6–1 065 460	6–4	4.99+07	9.16−04	7.75−03	−2.260	D	3

TABLE 20. Transition probabilities of allowed lines for Al V (references in this table are as follows: 1=Butler and Zeippen,[7,8] 2=Tachiev and Froese Fischer,[71] and 3=Biémont[3])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				430.061	834 084.7–1 066 610	4–6	5.24+08	2.18−02	1.23−01	−1.059	C	3
81		$^2P^\circ-^4P$										
				441.087	836 937.4–1 063 650	4–4	2.06+08	6.00−03	3.48−02	−1.620	D	3
				440.310	836 937.4–1 064 050	4–6	2.94+08	1.28−02	7.43−02	−1.291	D+	3
				437.413	835 033.3–1 063 650	2–4	8.13+07	4.67−03	1.34−02	−2.030	E+	3
82		$^2P^\circ-^2P$		*433.65*	*836 303–1 066 900*	6–6	7.95+08	2.24−02	1.92−01	−0.842		1,3
				433.214	836 937.4–1 067 770	4–4	2.39+08	6.73−03	3.84−02	−1.570	D+	3
				434.524	835 033.3–1 065 170	2–2	1.40+09	3.97−02	1.14−01	−1.100	D+	3
				438.150	836 937.4–1 065 170	4–2	2.24+08	3.22−03	1.86−02	−1.890	D	3
				429.670	835 033.3–1 067 770	2–4	1.31+08	7.25−03	2.05−02	−1.839	E	LS
83		$^2P^\circ-^2D$		*435.07*	*836 303–1 066 150*	6–10	1.03+09	4.88−02	4.19−01	−0.533	C	3
				435.402	836 937.4–1 066 610	4–6	1.02+09	4.34−02	2.49−01	−0.760	C	3
				433.977	835 033.3–1 065 460	2–4	5.85+08	3.30−02	9.44−02	−1.180	D+	3
				437.593	836 937.4–1 065 460	4–4	4.57+08	1.31−02	7.56−02	−1.281	D+	3
84		$^4S^\circ-^4P$				4–12						3
				441.689	837 646.2–1 064 050	4–6	5.08+08	2.23−02	1.30−01	−1.050	C	3
				442.470	837 646.2–1 063 650	4–4	7.08+08	2.08−02	1.21−01	−1.080	C	3
85		$^4S^\circ-^2D$										
				436.750	837 646.2–1 066 610	4–6	2.22+08	9.50−03	5.47−02	−1.420	D	3
				438.955	837 646.2–1 065 460	4–4	1.57+08	4.55−03	2.63−02	−1.740	D	3
86		$^2S^\circ-^2P$		*437.09*	838 117.8–*1 066 903*	2–6	9.06+08	7.79−02	2.24−01	−0.807	C	3
				435.441	838 117.8–1 067 770	2–4	1.36+09	7.74−02	2.22−01	−0.810	C	3
				440.427	838 117.8–1 065 170	2–2	2.54+07	7.40−04	2.14−03	−2.830	E+	3
87	$2p^4(^1S)3s-2p^4(^1S)3p$	$^2S-^2P^\circ$		*1 360.0*	843 914–*917 443*	2–6	7.78+08	6.47−01	5.79+00	0.112	C	2
				1 359.64	843 914–917 463	2–4	7.79+08	4.32−01	3.86+00	−0.063	C+	2
				1 360.75	843 914–917 403	2–2	7.77+08	2.16−01	1.93+00	−0.365	C	2
88	$2p^4(^1D)3p-2p^4(^3P)3d$	$^2D^\circ-^2D$		*1 929*	*874 178–926 006*	10–10	8.08+06	4.51−03	2.86−01	−1.346	E+	2
				1 919.1	874 280.1–926 388	6–6	7.17+06	3.96−03	1.50−01	−1.624	D	2
				1 945.3	874 026.0–925 432	4–4	6.36+06	3.61−03	9.24−02	−1.840	E+	2
				1 955.0	874 280.1–925 432	6–4	2.73+06	1.04−03	4.03−02	−2.205	E+	2
				1 909.8	874 026.0–926 388	4–6	1.73+05	1.42−04	3.57−03	−3.246	E	2
89		$^2P^\circ-^2D$	*2 386*	*2 387*	*884 104–926 006*	6–10	2.82+07	4.01−02	1.89+00	−0.619	D+	2
			2 334.2	2 334.9	883 559–926 388	4–6	3.24+07	3.97−02	1.22+00	−0.799	C	2
			2 484.5	2 485.2	885 194–925 432	2–4	1.42+07	2.63−02	4.30−01	−1.279	D	2
			2 387.4	2 388.2	883 559–925 432	4–4	8.94+06	7.64−03	2.40−01	−1.515	E+	2
90		$^2P^\circ-^2P$	*2 300*	*2 301*	*884 104–927 570*	6–6	1.01+07	7.99−03	3.63−01	−1.319	E+	2
			2 229.0	2 229.7	883 559–928 408	4–4	1.72+06	1.28−03	3.77−02	−2.291	E	2
			2 456.3	2 457.0	885 194–925 894	2–2	2.91+06	2.64−03	4.27−02	−2.277	E	2
			2 361.4	2 362.1	883 559–925 894	4–2	1.97+06	8.26−04	2.57−02	−2.481	E	2
			2 313.4	2 314.1	885 194–928 408	2–4	1.05+07	1.69−02	2.57−01	−1.471	D	2

TABLE 20. Transition probabilities of allowed lines for Al V (references in this table are as follows: 1=Butler and Zeippen,[7,8] 2=Tachiev and Froese Fischer,[71] and 3=Biémont[3])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
91	$2p^4(^1D)3p-2p^4(^1D)3d$	$^2F^\circ-^2G$		*1 109.3*	*865 607–955 753*	14–18	1.85+09	4.40−01	2.25+01	0.790	B	2
				1 111.48	865 784.9–955 755	8–10	1.84+09	4.27−01	1.25+01	0.534	B	2
				1 106.41	865 368.9–955 751	6–8	1.80+09	4.39−01	9.60+00	0.421	B	2
				1 111.53	865 784.9–955 751	8–8	6.93+07	1.28−02	3.76−01	−0.990	D+	2
92		$^2F^\circ-^2D$		*1 027.8*	*865 607–962 906*	14–10	1.30+08	1.47−02	6.97−01	−0.687	D	2
				1 032.57	865 784.9–962 631	8–6	5.04+07	6.04−03	1.64−01	−1.316	E+	2
				1 020.93	865 368.9–963 319	6–4	1.09+08	1.14−02	2.30−01	−1.165	D	2
				1 028.15	865 368.9–962 631	6–6	9.41+07	1.49−02	3.03−01	−1.049	D	2
93		$^2F^\circ-^2F$		*1 023.0*	*865 607–963 356*	14–14	7.94+08	1.25−01	5.88+00	0.243	C	2
				1 024.91	865 784.9–963 354	8–8	7.79+08	1.23−01	3.31+00	−0.007	C+	2
				1 020.51	865 368.9–963 359	6–6	7.08+08	1.11−01	2.23+00	−0.177	C	2
				1 024.86	865 784.9–963 359	8–6	8.08+07	9.54−03	2.58−01	−1.117	D	2
				1 020.56	865 368.9–963 354	6–8	1.88+07	3.90−03	7.87−02	−1.631	E+	2
94		$^2D^\circ-^2P$		*1 150.1*	*874 178–961 125*	10–6	3.91+08	4.65−02	1.76+00	−0.333	D+	2
				1 154.90	874 280.1–960 868	6–4	3.50+08	4.66−02	1.06+00	−0.553	C	2
				1 141.40	874 026.0–961 638	4–2	3.42+08	3.34−02	5.02−01	−0.874	D+	2
				1 151.52	874 026.0–960 868	4–4	6.48+07	1.29−02	1.95−01	−1.287	D	2
95		$^2D^\circ-^2D$		*1 127.0*	*874 178–962 906*	10–10	1.16+09	2.20−01	8.16+00	0.342	C	2
				1 131.85	874 280.1–962 631	6–6	7.78+08	1.49−01	3.34+00	−0.049	C	2
				1 119.91	874 026.0–963 319	4–4	9.81+08	1.84−01	2.72+00	−0.133	C	2
				1 123.10	874 280.1–963 319	6–4	1.02+08	1.29−02	2.86−01	−1.111	D	2
				1 128.60	874 026.0–962 631	4–6	4.27+08	1.22−01	1.82+00	−0.312	C	2
96		$^2D^\circ-^2F$		*1 121.4*	*874 178–963 356*	10–14	1.23+09	3.25−01	1.20+01	0.512	C+	2
				1 122.66	874 280.1–963 354	6–8	1.27+09	3.19−01	7.08+00	0.282	C+	2
				1 119.41	874 026.0–963 359	4–6	8.48+08	2.39−01	3.52+00	−0.020	C	2
				1 122.60	874 280.1–963 359	6–6	3.33+08	6.30−02	1.40+00	−0.423	C	2
97		$^2P^\circ-^2S$		*1 310.4*	*884 104*–960 415	6–2	8.34+08	7.15−02	1.85+00	−0.368	D+	2
				1 301.13	883 559–960 415	4–2	7.23+08	9.17−02	1.57+00	−0.436	C	2
				1 329.42	885 194–960 415	2–2	1.21+08	3.21−02	2.81−01	−1.192	D	2
98		$^2P^\circ-^2P$		*1 298.4*	*884 104–961 125*	6–6	7.67+08	1.94−01	4.97+00	0.066	C	2
				1 293.51	883 559–960 868	4–4	6.26+08	1.57−01	2.67+00	−0.202	C	2
				1 308.15	885 194–961 638	2–2	6.63+08	1.70−01	1.47+00	−0.469	C	2
				1 280.75	883 559–961 638	4–2	1.29+08	1.58−02	2.67−01	−1.199	D	2
				1 321.46	885 194–960 868	2–4	1.24+08	6.50−02	5.65−01	−0.886	D+	2
99		$^2P^\circ-^2D$		*1 269.0*	*884 104–962 906*	6–10	3.75+08	1.51−01	3.78+00	−0.043	D+	2
				1 264.67	883 559–962 631	4–6	3.27+08	1.18−01	1.96+00	−0.326	D+	2
				1 280.00	885 194–963 319	2–4	3.45+08	1.69−01	1.43+00	−0.471	C	2
				1 253.76	883 559–963 319	4–4	1.00+08	2.37−02	3.91−01	−1.023	D+	2
100	$2p^4(^1D)3p-2p^4(^3P)4s$	$^2P^\circ-^2P$		*816.7*	*884 104–1 006 551*	6–6	9.66+08	9.65−02	1.56+00	−0.237	D+	3
				818.12	883 559–1 005 790	4–4	7.70+08	7.73−02	8.32−01	−0.510	C	3
				813.81	885 194–1 008 073	2–2	6.95+08	6.90−02	3.70−01	−0.860	D+	3
				803.12	883 559–1 008 073	4–2	4.01+08	1.94−02	2.05−01	−1.110	D	3

TABLE 20. Transition probabilities of allowed lines for Al V (references in this table are as follows: 1 = Butler and Zeippen,[7,8] 2 = Tachiev and Froese Fischer,[71] and 3 = Biémont[3])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				829.21	885 194–1 005 790	2–4	1.33+08	2.75−02	1.50−01	−1.260	D	3
101	$2p^4(^1D)3p-2p^4(^1D)4s$	$^2F^\circ-^2D$		*562.16*	*865 607–1 043 492*	14–10	2.72+09	9.19−02	2.38+00	0.109	C	3
				562.73	865 784.9–1 043 490	8–6	2.60+09	9.27−02	1.37+00	−0.130	C	3
				561.400	865 368.9–1 043 495	6–4	2.65+09	8.35−02	9.26−01	−0.300	C	3
				561.416	865 368.9–1 043 490	6–6	1.58+08	7.44−03	8.26−02	−1.350	E+	3
102		$^2D^\circ-^2D$		*590.6*	*874 178–1 043 492*	10–10	1.72+09	9.02−02	1.75+00	−0.045	D+	3
				590.98	874 280.1–1 043 490	6–6	1.60+09	8.35−02	9.75−01	−0.300	C	3
				590.08	874 026.0–1 043 495	4–4	1.62+09	8.47−02	6.58−01	−0.470	D+	3
				590.96	874 280.1–1 043 495	6–4	2.13+08	7.44−03	8.69−02	−1.350	E+	3
				590.10	874 026.0–1 043 490	4–6	5.55+07	4.34−03	3.38−02	−1.760	E+	3
103		$^2P^\circ-^2D$		*627.4*	*884 104–1 043 492*	6–10	1.38+09	1.36−01	1.69+00	−0.088	D+	3
				625.27	883 559–1 043 490	4–6	1.46+09	1.28−01	1.06+00	−0.291	C	3
				631.71	885 194–1 043 495	2–4	1.15+09	1.38−01	5.73−01	−0.559	D+	3
				625.25	883 559–1 043 495	4–4	1.20+08	7.05−03	5.80−02	−1.550	E+	3
104	$2p^4(^1D)3p-2p^4(^3P)4d$	$^2P^\circ-^2P$		*547.05*	*884 104–1 066 903*	6–6	4.84+08	2.17−02	2.35−01	−0.885	E+	3
				542.856	883 559–1 067 770	4–4	5.40+07	2.39−03	1.71−02	−2.020	E	3
				555.630	885 194–1 065 170	2–2	1.88+08	8.69−03	3.18−02	−1.760	E	3
				550.627	883 559–1 065 170	4–2	1.07+08	2.44−03	1.77−02	−2.011	E	3
				547.717	885 194–1 067 770	2–4	5.19+08	4.67−02	1.68−01	−1.030	D	3
105		$^2P^\circ-^2D$		*549.31*	*884 104–1 066 150*	6–10	5.59+08	4.21−02	4.57−01	−0.598	D	3
				546.296	883 559–1 066 610	4–6	5.51+08	3.70−02	2.66−01	−0.830	D	3
				554.736	885 194–1 065 460	2–4	2.37+08	2.18−02	7.97−02	−1.361	E+	3
				549.750	883 559–1 065 460	4–4	3.40+08	1.54−02	1.12−01	−1.210	D	3
106	$2p^4(^1D)3p-2p^4(^1D)4d$	$^2D^\circ-^2D$				10–10						3
				436.853	874 280.1–1 103 190	6–6	9.67+08	2.77−02	2.39−01	−0.779	D	3
				436.369	874 026.0–1 103 190	4–6	2.12+08	9.08−03	5.22−02	−1.440	E+	3
107		$^2P^\circ-^2P$		*457.42*	*884 104–1 102 720*	6–6	1.36+09	4.27−02	3.85−01	−0.591	D	3
				454.916	883 559–1 103 380	4–4	1.14+09	3.53−02	2.12−01	−0.850	D	3
				462.522	885 194–1 101 400	2–2	5.28+08	1.69−02	5.16−02	−1.471	E+	3
				459.050	883 559–1 101 400	4–2	7.58+08	1.20−02	7.23−02	−1.319	E+	3
				458.325	885 194–1 103 380	2–4	2.63+08	1.66−02	5.00−02	−1.479	E+	3
108		$^2P^\circ-^2S$		*457.80*	*884 104*–1 102 540	6–2	2.16+09	2.26−02	2.04−01	−0.868	E+	3
				456.661	883 559–1 102 540	4–2	1.13+09	1.77−02	1.06−01	−1.150	D	3
				460.096	885 194–1 102 540	2–2	1.02+09	3.23−02	9.78−02	−1.190	E+	3
109	$2p^4(^3P)3d-2p^4(^3P_2)4f$	$^4F-^2[5]^\circ$										1
				660.96	917 612–1 068 906	10–12	9.70+09	7.62−01	1.66+01	0.882	B	LS′
110	$2p^4(^3P)3d-2p^4(^3P_2)5f$	$^4F-^2[5]^\circ$										1
				469.239	917 612–1 130 723	10–12	3.74+09	1.48−01	2.29+00	0.170	C	LS′

TABLE 20. Transition probabilities of allowed lines for Al V (references in this table are as follows: 1=Butler and Zeippen,[7,8] 2=Tachiev and Froese Fischer,[71] and 3=Biémont[3])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
111	$2p^4(^1S)3p-2p^4(^1S)3d$	$^2P^\circ-^2D$		*1 114.1*	*917 443–1 007 204*	6–10	1.87+09	5.80−01	1.28+01	0.542	C+	2
				1 115.04	917 463–1 007 146	4–6	1.87+09	5.22−01	7.67+00	0.320	C+	2
				1 112.51	917 403–1 007 290	2–4	1.56+09	5.80−01	4.25+00	0.064	C+	2
				1 113.25	917 463–1 007 290	4–4	3.13+08	5.82−02	8.53−01	−0.633	C	2
112	$2p^4(^1S)3p-2p^4(^3P)4d$	$^2P^\circ-^2D$		*672.5*	*917 443–1 066 150*	6–10	3.12+08	3.52−02	4.68−01	−0.675	D+	3
				670.48	917 463–1 066 610	4–6	5.29+06	5.34−04	4.72−03	−2.670	E	3
				675.42	917 403–1 065 460	2–4	7.46+08	1.02−01	4.54−01	−0.690	D+	3
				675.69	917 463–1 065 460	4–4	1.45+07	9.95−04	8.86−03	−2.400	E	3
113	$2p^4(^1S)3p-2p^4(^1S)4s$	$^2P^\circ-^2S$		*579.7*	*917 443*–1 089 957	6–2	5.62+09	9.44−02	1.08+00	−0.247	D+	3
				579.73	917 463–1 089 957	4–2	3.69+09	9.29−02	7.09−01	−0.430	D+	3
				579.53	917 403–1 089 957	2–2	1.94+09	9.75−02	3.72−01	−0.710	D+	3
114	$2p^4(^1S)3p-2p^4(^1S)4d$	$^2P^\circ-^2D$		*431.49*	*917 443–1 149 200*	6–10	2.17+09	1.01−01	8.62−01	−0.218	D+	3
				431.598	917 463–1 149 160	4–6	2.17+09	9.08−02	5.16−01	−0.440	D+	3
				431.300	917 403–1 149 260	2–4	1.83+09	1.02−01	2.90−01	−0.690	D	3
				431.412	917 463–1 149 260	4–4	3.57+08	9.95−03	5.65−02	−1.400	E+	3
115	$2s^22p^4(^3P)4d-2s2p^5(^3P^\circ)3s$	$^2D-^2P^\circ$	*[3 251]*	*[3 252]*	*1 066 150–1 096 903*	10–6	9.42+06	8.96−03	9.60−01	−1.048	D	1
			[3 380.8]	[3 381.8]	1 066 610–1 096 180	6–4	7.54+06	8.62−03	5.76−01	−1.286	D+	LS
			[3 039.6]	[3 040.4]	1 065 460–1 098 350	4–2	1.15+07	7.99−03	3.20−01	−1.495	D	LS
			[3 254.3]	[3 255.2]	1 065 460–1 096 180	4–4	9.38+05	1.49−03	6.39−02	−2.225	E+	LS
116	$2s2p^5(^3P^\circ)3s-2s^22p^4(^3P)5d$	$^2P^\circ-^2D$	*[2 995]*	*[2 996]*	*1 096 903–1 130 280*	6–10	1.02+07	2.29−02	1.35+00	−0.862	D+	1
			[2 879.3]	[2 880.2]	1 096 180–1 130 900	4–6	1.15+07	2.14−02	8.12−01	−1.068	D+	LS
			[3 224.9]	[3 225.8]	1 098 350–1 129 350	2–4	6.83+06	2.13−02	4.52−01	−1.371	D	LS
			[3 013.9]	[3 014.8]	1 096 180–1 129 350	4–4	1.67+06	2.28−03	9.05−02	−2.040	E+	LS
117		$^2P^\circ-^2P$	*[2 942]*	*[2 943]*	*1 096 903–1 130 883*	6–6	4.73+06	6.14−03	3.57−01	−1.434	E+	1
			[2 818.5]	[2 819.3]	1 096 180–1 131 650	4–4	4.48+06	5.34−03	1.98−01	−1.670	D	LS
			[3 224.9]	[3 225.8]	1 098 350–1 129 350	2–2	2.39+06	3.73−03	7.92−02	−2.127	E+	LS
			[3 013.9]	[3 014.8]	1 096 180–1 129 350	4–2	1.47+06	9.99−04	3.97−02	−2.398	E	LS
			[3 002.1]	[3 003.0]	1 098 350–1 131 650	2–4	7.43+05	2.01−03	3.97−02	−2.396	E	LS
118	$2s2p^5(^3P^\circ)3s-2s^22p^4(^3P)6d$	$^2P^\circ-^2D$		*[1 472.6]*	*1 096 903–1 164 810*	6–10	1.28+08	6.93−02	2.02+00	−0.381	D+	1
				[1 443.63]	1 096 180–1 165 450	4–6	1.36+08	6.36−02	1.21+00	−0.594	C	LS
				[1 526.72]	1 098 350–1 163 850	2–4	9.56+07	6.68−02	6.71−01	−0.874	D+	LS
				[1 477.76]	1 096 180–1 163 850	4–4	2.11+07	6.91−03	1.34−01	−1.558	E+	LS

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

4.5.2. Forbidden Transitions for Al V

The only reference quality data are from Tachiev and Froese Fischer,[71] which result from extensive MCHF calculations with Breit-Pauli corrections to order α^2.

To estimate accuracies, we pooled the RSDM for each of the lines with transition rates published in two or more references,[10,71] as described in the introduction to Kelleher and Podobedova.[35]

References for Forbidden Transitions for Al V

[10]K. T. Cheng, Y.-K. Kim, and J. P. Desclaux, At. Data Nucl.

Data Tables **24**, 111 (1979).

[35]D. E. Kelleher and L. I. Podobedova, J. Phys. Chem. Ref. Data **37**, 267 (2008).

[71]G. Tachiev and C. Froese Fischer, http://www.vuse.vanderbilt.edu/~cff/mchf_collection/ (MCHF, *ab initio*, downloaded on February 17, 2004).

TABLE 21. Wavelength finding list for forbidden lines of Al V

Wavelength (vac) (Å)	Mult. No.
228.396	2
228.411	2
1 757.000	28
1 764.879	28
1 781.14	28
1 789.24	28
1 816.06	28
Wavelength (air) (Å)	**Mult. No.**
2 102.5	31
2 113.9	9
2 115.2	9
2 177.4	31
2 230.81	6
2 232.33	6
2 343.21	6
2 344.89	6
2 413.82	6
2 415.60	6
2 497.5	29
2 523.7	29
2 579.21	29
2 607.20	29
2 677.74	29
2 960.58	30
2 997.51	30
3 085.29	7
3 088.19	7
3 195.58	30
3 347.92	7
3 351.34	7
4 929.27	14
5 003.23	15
5 107.79	13
5 124.18	14
5 218.79	15
5 317.36	13
5 350.51	14
5 561.49	13
5 916.6	13
5 979.3	12
6 220.4	13
6 268.5	12
6 610.6	12
6 686.2	4
6 822.8	12
7 202.0	12
7 808.7	4

TABLE 21. Wavelength finding list for forbidden lines of Al V—Continued

Wavelength (air) (Å)	Mult. No.
8 055.6	4
8 652.0	4
8 952	35
9 369.3	11
9 412.5	19
9 566.9	11
9 743.1	4
10 085.6	18
10 099.5	11
10 349.0	11
10 387.3	11
10 401.8	19
10 487	35
10 774	35
11 018.1	11
11 034.4	19
11 092.0	4
11 218.8	33
11 230.0	18
11 247.2	11
11 548.1	33
11 768.1	33
11 913	11
11 970.9	18
14 161.0	17
14 285.5	18
15 506.4	18
15 969	17
16 525.5	17
17 761.6	22
18 181	17
Wavenumber (cm^{-1})	**Mult. No.**
4 992.6	17
4 919.8	21
4 033.1	23
3 982.5	17
3 561.5	22
3 442	1
3 397.3	3
3 084.5	26
2 852.7	21
2 612.9	25
2 541.8	5
2 149.4	3
2 067.1	20
1 904.1	24
1 635	36
1 268	16
1 247.9	3
1 180.4	26
1 010.1	16
948.6	21
825.3	10
771.4	10
708.8	25
551.0	16

TABLE 21. Wavelength finding list for forbidden lines of Al V—Continued

Wavenumber (cm^{-1})	Mult. No.
471.6	27
416.0	32
254.1	34
30.5	8

TABLE 22. Transition probabilities of forbidden lines for Al V (references in this table are as follows: 1=Tachiev and Froese Fischer[71])

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	$2p^5-2p^5$	$^2P^\circ-^2P^\circ$									
				3 442 cm^{-1}	0–3 442	4–2	M1	7.33−01	1.33+00	B+	1
				3 442 cm^{-1}	0–3 442	4–2	E2	3.42−06	1.27−01	B	1
2	$2s2p^6-$ $2s^22p^4(^1D)3s$	$^2S-^2D$									
				228.411	358 816–796 622.4	2–6	E2	2.11+03	7.03−03	D	1
				228.396	358 816–796 652.9	2–4	M1	4.50−05	7.95−11	E	1
				228.396	358 816–796 652.9	2–4	E2	2.12+03	4.71−03	D	1
3	$2p^4(^3P)3s-2p^4(^3P)3s$	$^4P-^4P$									
				3 397.3 cm^{-1}	751 840.1–755 237.4	6–2	E2	1.12−06	4.43−02	C+	1
				2 149.4 cm^{-1}	751 840.1–753 989.5	6–4	M1	2.39−01	3.56+00	B+	1
				2 149.4 cm^{-1}	751 840.1–753 989.5	6–4	E2	7.86−08	6.12−02	C+	1
				1 247.9 cm^{-1}	753 989.5–755 237.4	4–2	M1	8.67−02	3.31+00	B+	1
				1 247.9 cm^{-1}	753 989.5–755 237.4	4–2	E2	8.09−10	4.77−03	C	1
4		$^4P-^2P$									
			9 743.1	9 745.7	753 989.5–764 250.4	4–4	M1	1.70−01	2.34−02	C	1
			9 743.1	9 745.7	753 989.5–764 250.4	4–4	E2	4.69−06	1.47−03	D+	1
			8 652.0	8 654.4	755 237.4–766 792.2	2–2	M1	2.39−01	1.15−02	C	1
			6 686.2	6 688.0	751 840.1–766 792.2	6–2	E2	3.90−06	9.33−05	D	1
			8 055.6	8 057.8	751 840.1–764 250.4	6–4	M1	4.31−01	3.35−02	C+	1
			8 055.6	8 057.8	751 840.1–764 250.4	6–4	E2	5.15−06	6.24−04	D+	1
			7 808.7	7 810.9	753 989.5–766 792.2	4–2	M1	3.15−02	1.11−03	D+	1
			7 808.7	7 810.9	753 989.5–766 792.2	4–2	E2	1.14−05	5.94−04	D+	1
			11 092.0	11 095.1	755 237.4–764 250.4	2–4	M1	8.07−02	1.64−02	C	1
			11 092.0	11 095.1	755 237.4–764 250.4	2–4	E2	4.32−07	2.60−04	D	1
5		$^2P-^2P$									
				2 541.8 cm^{-1}	764 250.4–766 792.2	4–2	M1	2.95−01	1.33+00	B	1
				2 541.8 cm^{-1}	764 250.4–766 792.2	4–2	E2	2.84−07	4.78−02	C+	1
6	$2p^4(^3P)3s-2p^4(^1D)3s$	$^4P-^2D$									
			2 415.60	2 416.33	755 237.4–796 622.4	2–6	E2	5.58−06	2.46−06	E	1
			2 344.89	2 345.61	753 989.5–796 622.4	4–6	M1	5.92−01	1.70−03	E+	1
			2 344.89	2 345.61	753 989.5–796 622.4	4–6	E2	4.79−04	1.82−04	E	1
			2 413.82	2 414.55	755 237.4–796 652.9	2–4	M1	4.45−01	9.29−04	E+	1
			2 413.82	2 414.55	755 237.4–796 652.9	2–4	E2	1.90−04	5.56−05	E	1
			2 232.33	2 233.03	751 840.1–796 622.4	6–6	M1	4.94+00	1.22−02	D	1
			2 232.33	2 233.03	751 840.1–796 622.4	6–6	E2	1.59−03	4.74−04	E	1
			2 343.21	2 343.93	753 989.5–796 652.9	4–4	M1	2.21+00	4.21−03	E+	1
			2 343.21	2 343.93	753 989.5–796 652.9	4–4	E2	5.20−05	1.31−05	E	1
			2 230.81	2 231.51	751 840.1–796 652.9	6–4	M1	5.43−01	8.94−04	E+	1
			2 230.81	2 231.51	751 840.1–796 652.9	6–4	E2	5.95−04	1.18−04	E	1
7		$^2P-^2D$									
			3 351.34	3 352.31	766 792.2–796 622.4	2–6	E2	3.52−05	7.99−05	E	1
			3 088.19	3 089.09	764 250.4–796 622.4	4–6	M1	9.29−01	6.09−03	D	1
			3 088.19	3 089.09	764 250.4–796 622.4	4–6	E2	5.60−05	8.43−05	E	1
			3 347.92	3 348.88	766 792.2–796 652.9	2–4	M1	5.17−01	2.88−03	E+	1

TABLE 22. Transition probabilities of forbidden lines for Al V (references in this table are as follows: 1=Tachiev and Froese Fischer[71])—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
			3 347.92	3 348.88	766 792.2–796 652.9	2–4	E2	1.55−05	2.33−05	E	1
			3 085.29	3 086.18	764 250.4–796 652.9	4–4	M1	1.95+00	8.51−03	D	1
			3 085.29	3 086.18	764 250.4–796 652.9	4–4	E2	5.01−04	5.01−04	E	1
8	$2p^4(^1D)3s-2p^4(^1D)3s$	$^2D-^2D$									
				30.5 cm^{-1}	796 622.4–796 652.9	6–4	M1	4.58−07	2.39+00	C+	1
				30.5 cm^{-1}	796 622.4–796 652.9	6–4	E2	2.85−17	3.85−02	D+	1
9	$2p^4(^1D)3s-2p^4(^1S)3s$	$^2D-^2S$									
			2 113.9	2 114.5	796 622.4–843 914	6–2	E2	1.10+00	8.32−02	D+	1
			2 115.2	2 115.9	796 652.9–843 914	4–2	M1	4.06−04	2.85−07	E	1
			2 115.2	2 115.9	796 652.9–843 914	4–2	E2	7.31−01	5.53−02	D+	1
10	$2p^4(^3P)3p-2p^4(^3P)3p$	$^4P^\circ-^4P^\circ$									
				771.4 cm^{-1}	817 364.9–818 136.3	6–4	M1	1.11−02	3.60+00	B+	1
				825.3 cm^{-1}	818 136.3–818 961.6	4–2	M1	2.50−02	3.30+00	B+	1
11		$^4P^\circ-^4D^\circ$									
			11 913	11 916	817 364.9–825 757	6–8	M1	1.86−01	9.35−02	C+	1
			11 247.2	11 250.2	818 136.3–827 025.0	4–6	M1	1.43−02	4.53−03	C	1
			11 018.1	11 021.1	818 961.6–828 035.1	2–4	M1	1.01−02	2.01−03	D+	1
			10 349.0	10 351.9	817 364.9–827 025.0	6–6	M1	1.21−01	3.00−02	C	1
			10 099.5	10 102.2	818 136.3–828 035.1	4–4	M1	2.64−01	4.04−02	C+	1
			10 387.3	10 390.2	818 961.6–828 586.1	2–2	M1	3.85−01	3.20−02	C	1
			9 369.3	9 371.9	817 364.9–828 035.1	6–4	M1	1.77−01	2.16−02	C	1
			9 566.9	9 569.6	818 136.3–828 586.1	4–2	M1	2.93−01	1.91−02	C	1
12		$^4P^\circ-^2D^\circ$									
			7 202.0	7 203.9	818 136.3–832 017.6	4–6	M1	1.14−02	9.45−04	D+	1
			6 610.6	6 612.4	818 961.6–834 084.7	2–4	M1	1.90−03	8.16−05	D	1
			6 822.8	6 824.7	817 364.9–832 017.6	6–6	M1	1.74−01	1.23−02	C	1
			6 268.5	6 270.2	818 136.3–834 084.7	4–4	M1	2.25−06	8.21−08	E	1
			5 979.3	5 980.9	817 364.9–834 084.7	6–4	M1	2.33−01	7.39−03	C	1
13		$^4P^\circ-^2P^\circ$									
			5 317.36	5 318.84	818 136.3–836 937.4	4–4	M1	2.97−01	6.63−03	C	1
			6 220.4	6 222.1	818 961.6–835 033.3	2–2	M1	7.10−01	1.27−02	C	1
			5 107.79	5 109.21	817 364.9–836 937.4	6–4	M1	1.06+00	2.10−02	C	1
			5 916.6	5 918.2	818 136.3–835 033.3	4–2	M1	2.25−01	3.46−03	C	1
			5 561.49	5 563.03	818 961.6–836 937.4	2–4	M1	3.56−01	9.08−03	C	1
14		$^4P^\circ-^4S^\circ$									
			4 929.27	4 930.65	817 364.9–837 646.2	6–4	M1	8.20−01	1.46−02	C	1
			5 124.18	5 125.60	818 136.3–837 646.2	4–4	M1	5.33−01	1.07−02	C	1
			5 350.51	5 352.00	818 961.6–837 646.2	2–4	M1	7.17−01	1.63−02	C	1
15		$^4P^\circ-^2S^\circ$									
			5 003.23	5 004.63	818 136.3–838 117.8	4–2	M1	2.08−01	1.94−03	D+	1
			5 218.79	5 220.24	818 961.6–838 117.8	2–2	M1	2.62−01	2.77−03	C	1
16		$^4D^\circ-^4D^\circ$									
				1 268 cm^{-1}	825 757–827 025.0	8–6	M1	5.90−02	6.44+00	B+	1
				1 010.1 cm^{-1}	827 025.0–828 035.1	6–4	M1	5.58−02	8.03+00	B+	1
				551.0 cm^{-1}	828 035.1–828 586.1	4–2	M1	1.32−02	5.87+00	B+	1
17		$^4D^\circ-^2D^\circ$									
				4 992.6 cm^{-1}	827 025.0–832 017.6	6–6	M1	4.35−02	7.78−02	C+	1
			16 525.5	16 530.0	828 035.1–834 084.7	4–4	M1	4.90−02	3.28−02	C+	1
			15 969	15 973	825 757–832 017.6	8–6	M1	3.50−01	3.17−01	B	1

TABLE 22. Transition probabilities of forbidden lines for Al V (references in this table are as follows: 1=Tachiev and Froese Fischer[71])—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
			14 161.0	14 164.9	827 025.0–834 084.7	6–4	M1	2.28−03	9.60−04	D+	1
				3 982.5 cm^{-1}	828 035.1–832 017.6	4–6	M1	5.51−02	1.94−01	C+	1
			18 181	18 186	828 586.1–834 084.7	2–4	M1	1.04−01	9.30−02	C+	1
18		$^4D^\circ-^2P^\circ$									
			10 085.6	10 088.4	827 025.0–836 937.4	6–4	M1	2.61−02	3.98−03	C	1
			14 285.5	14 289.4	828 035.1–835 033.3	4–2	M1	5.46−03	1.18−03	D+	1
			11 230.0	11 233.1	828 035.1–836 937.4	4–4	M1	2.16−02	4.54−03	C	1
			15 506.4	15 510.6	828 586.1–835 033.3	2–2	M1	5.61−03	1.55−03	D+	1
			11 970.9	11 974.2	828 586.1–836 937.4	2–4	M1	6.08−03	1.55−03	D+	1
19		$^4D^\circ-^4S^\circ$									
			9 412.5	9 415.1	827 025.0–837 646.2	6–4	M1	1.53−02	1.89−03	D+	1
			10 401.8	10 404.6	828 035.1–837 646.2	4–4	M1	8.95−03	1.50−03	D+	1
			11 034.4	11 037.4	828 586.1–837 646.2	2–4	M1	2.86−04	5.70−05	D	1
20		$^2D^\circ-^2D^\circ$									
				2 067.1 cm^{-1}	832 017.6–834 084.7	6–4	M1	1.39−01	2.33+00	B+	1
21		$^2D^\circ-^2P^\circ$									
				4 919.8 cm^{-1}	832 017.6–836 937.4	6–4	M1	1.17−01	1.46−01	C+	1
				948.6 cm^{-1}	834 084.7–835 033.3	4–2	M1	6.47−04	5.62−02	C+	1
				2 852.7 cm^{-1}	834 084.7–836 937.4	4–4	M1	3.68−02	2.35−01	B	1
22		$^2D^\circ-^4S^\circ$									
			17 761.6	17 766.4	832 017.6–837 646.2	6–4	M1	1.00−02	8.31−03	C	1
				3 561.5 cm^{-1}	834 084.7–837 646.2	4–4	M1	6.16−03	2.02−02	C	1
23		$^2D^\circ-^2S^\circ$									
				4 033.1 cm^{-1}	834 084.7–838 117.8	4–2	M1	3.05−02	3.45−02	C+	1
24		$^2P^\circ-^2P^\circ$									
				1 904.1 cm^{-1}	835 033.3–836 937.4	2–4	M1	3.39−02	7.29−01	B	1
25		$^2P^\circ-^4S^\circ$									
				708.8 cm^{-1}	836 937.4–837 646.2	4–4	M1	8.97−04	3.74−01	B	1
				2 612.9 cm^{-1}	835 033.3–837 646.2	2–4	M1	4.51−03	3.75−02	C+	1
26		$^2P^\circ-^2S^\circ$									
				1 180.4 cm^{-1}	836 937.4–838 117.8	4–2	M1	1.01−02	4.55−01	B	1
				3 084.5 cm^{-1}	835 033.3–838 117.8	2–2	M1	2.50−01	6.31−01	B	1
27		$^4S^\circ-^2S^\circ$									
				471.6 cm^{-1}	837 646.2–838 117.8	4–2	M1	3.67−05	2.60−02	C	1
28	$2p^4(^3P)3p-2p^4(^1D)3p$	$^4P^\circ-^2D^\circ$									
				1 781.14	818 136.3–874 280.1	4–6	M1	8.06−01	1.01−03	E+	1
				1 816.06	818 961.6–874 026.0	2–4	M1	5.06−01	4.49−04	E	1
				1 757.000	817 364.9–874 280.1	6–6	M1	4.72+00	5.69−03	D	1
				1 789.24	818 136.3–874 026.0	4–4	M1	1.92+00	1.63−03	E+	1
				1 764.879	817 364.9–874 026.0	6–4	M1	5.29−01	4.31−04	E	1
29		$^4D^\circ-^2F^\circ$									
			2 579.21	2 579.99	827 025.0–865 784.9	6–8	M1	5.77−01	2.94−03	E+	1
			2 677.74	2 678.54	828 035.1–865 368.9	4–6	M1	1.03+00	4.39−03	E+	1
			2 497.5	2 498.3	825 757–865 784.9	8–8	M1	4.01+00	1.86−02	D	1
			2 607.20	2 607.98	827 025.0–865 368.9	6–6	M1	2.35+00	9.28−03	D	1
			2 523.7	2 524.5	825 757–865 368.9	8–6	M1	1.70−01	6.08−04	E	1
30		$^2D^\circ-^2F^\circ$									
			2 960.58	2 961.44	832 017.6–865 784.9	6–8	M1	1.16+00	8.92−03	D	1

TABLE 22. Transition probabilities of forbidden lines for Al V (references in this table are as follows: 1=Tachiev and Froese Fischer[71])—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
			3 195.58	3 196.50	834 084.7–865 368.9	4–6	M1	4.22−01	3.07−03	E+	1
			2 997.51	2 998.38	832 017.6–865 368.9	6–6	M1	1.32+00	7.91−03	D	1
31		$^4S^\circ-^2P^\circ$									
			2 177.4	2 178.0	837 646.2–883 559	4–4	M1	3.33+00	5.10−03	D	1
			2 102.5	2 103.1	837 646.2–885 194	4–2	M1	1.90+00	1.31−03	E+	1
32	$2p^4(^1D)3p$ $-2p^4(^1D)3p$	$^2F^\circ-^2F^\circ$									
				416.0 cm^{-1}	865 368.9–865 784.9	6–8	M1	8.30−04	3.42+00	C+	1
33		$^2F^\circ-^2D^\circ$									
			11 768.1	11 771.4	865 784.9–874 280.1	8–6	M1	1.08−02	3.92−03	E+	1
			11 548.1	11 551.2	865 368.9–874 026.0	6–4	M1	1.35−02	3.09−03	E+	1
			11 218.8	11 221.8	865 368.9–874 280.1	6–6	M1	2.40−02	7.53−03	D	1
34		$^2D^\circ-^2D^\circ$									
				254.1 cm^{-1}	874 026.0–874 280.1	4–6	M1	1.76−04	2.39+00	C+	1
35		$^2D^\circ-^2P^\circ$									
			10 774	10 777	874 280.1–883 559	6–4	M1	3.85−02	7.14−03	D	1
			8 952	8 954	874 026.0–885 194	4–2	M1	7.10−02	3.78−03	E+	1
			10 487	10 490	874 026.0–883 559	4–4	M1	7.26−02	1.24−02	D	1
36		$^2P^\circ-^2P^\circ$									
				1 635 cm^{-1}	883 559–885 194	4–2	M1	7.81−02	1.33+00	C+	1

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

4.6. Al VI

Oxygen isoelectronic sequence
Ground state: $1s^22s^22p^4\,^3P_2$
Ionization energy: 190.48 eV (1 536 300 cm^{-1})

4.6.1. Allowed Transitions for Al VI

Only OP (Refs. 7 and 8) results were available for transitions from energy levels above the $2p^33d$. Wherever available we have used the data of Tachiev and Froese Fischer,[71] which are the product of extensive MCHF calculations with Breit-Pauli corrections to order α^2. Second-order many-body perturbation theory (MBPT) results from Vilkas *et al.*[80] were also available for some of the lowest transitions. Biémont[3] applied the relativistic version of the COWAN code with scaling of the *ab initio* Slater parameters.

To estimate accuracies, we pooled the RSDM for each of the lines with transition rates published in two or more references,[3,7,8,71,80] as described in the introduction to Kelleher and Podobedova.[35] For this purpose the spin-allowed and intercombination data were treated separately, and each of these was in turn divided into two upper-level energy groups below and above 1 135 000 cm^{-1}. Lines from the OP constituted a fifth group. We then isoelectronically averaged the logarithmic quality factors observed for O-like lines of Na IV, Mg V, and Si VII using the method described in the introduction to Kelleher and Podobedova.[35] For the higher-lying intercombination lines and those from the OP data, we scaled the logarithmic quality factor of the lower-lying lines.

References for Allowed Transitions for Al VI

[3]E. Biémont, At. Data Nucl. Data Tables **48**, 1 (1991).
[7]K. Butler and C. J. Zeippen (unpublished).
[8]K. Butler and C. J. Zeippen, http://legacy.gsfc.nasa.gov/topbase, downloaded on July 28, 1995 (Opacity Project).
[35]D. E. Kelleher and L. I. Podobedova, J. Phys. Chem. Ref. Data **37**, 267 (2008).
[69]G. Tachiev and C. Froese Fischer, Astron. Astrophys. **385**, 716 (2002).
[71]G. Tachiev and C. Froese Fischer, http://www.vuse.vanderbilt.edu/~cff/mchf_collection/ (MCHF, *ab initio*, downloaded on February 17, 2004); see Ref. 69.
[80]M. J. Vilkas, G. Merkelis, R. Kisielius, G. Gaigalas, A. Bernotas, and Z. Rudzikas, Phys. Scr. **49**, 592 (1994).

TABLE 23. Wavelength finding list for allowed lines of Al VI

Wavelength (vac) (Å)	Mult. No.
74.442	39
74.594	39
74.658	38
74.811	38
74.872	38
76.402	35
76.562	35
76.618	41
76.953	40
77.945	34

TABLE 23. Wavelength finding list for allowed lines of Al VI—Continued

Wavelength (vac) (Å)	Mult. No.
78.111	34
78.178	34
78.459	32
78.628	32
78.695	32
78.712	36
79.844	42
80.770	33
81.739	37
82.082	31
82.266	31
82.340	31
85.518	28
85.525	28
85.566	28
85.725	28
85.766	28
85.806	28
85.817	27
85.866	27
86.019	27
86.068	27
86.094	27
86.149	27
87.331	20
87.540	20
87.587	19
87.624	20
87.652	19
87.776	19
87.797	19
87.862	19
87.882	19
88.163	18
88.269	30
88.376	18
88.462	18
88.536	29
90.196	24
90.856	23
91.332	22
91.476	21
91.484	21
92.626	16
92.639	16
92.641	16
92.874	16
92.876	16
92.971	16
95.433	26
95.598	25
96.298	17
96.312	17
96.314	17
96.440	51
96.670	51
96.796	51
100.616	12
100.638	12
100.894	12
100.916	12
100.925	12
101.027	12
103.057	9
103.062	50
103.348	9
103.940	14
104.047	8
104.344	8
104.464	8
104.964	13
104.988	13
107.623	11
108.704	10
109.283	15
109.516	7
109.844	7
109.977	7
113.138	49
113.318	49
113.441	49
113.454	49
113.628	49
113.759	49
134.863	48
135.314	48
135.561	48
141.165	46
141.242	46
141.262	46
141.736	46
141.756	46
142.027	46
150.670	45
150.684	45
151.218	45
151.232	45
151.246	45
151.555	45
172.530	47
172.559	47
221.535	2
222.884	2
223.430	2
232.472	43
243.766	4
272.963	91
273.029	91
273.190	91
275.343	6
283.449	83
283.500	83
283.547	83
301.033	69

TABLE 23. Wavelength finding list for allowed lines of Al VI—Continued

Wavelength (vac) (Å)	Mult. No.
307.249	1
308.563	1
309.596	1
309.850	1
310.340	82
310.401	82
310.907	1
312.237	1
320.090	116
320.190	116
320.590	116
324.115	115
324.217	115
324.628	115
326.083	118
328.697	44
329.920	117
330.181	117
330.453	117
333.983	90
337.476	81
337.548	81
337.615	81
339.181	57
340.405	57
343.161	57
347.334	80
347.410	80
347.482	80
351.739	3
354.818	3
359.761	114
359.887	114
360.393	114
403.817	52
405.121	68
405.476	113
405.871	113
406.281	113
406.868	68
409.204	121
410.438	110
410.602	110
410.813	68
411.260	110
417.415	112
419.791	111
420.214	111
420.654	111
421.486	5
431.673	79
431.790	79
431.900	79
466.677	89
468.801	89
468.997	89
469.470	89

TABLE 23. Wavelength finding list for allowed lines of Al VI—Continued

Wavelength (vac) (Å)	Mult. No.
474.246	89
474.730	89
511.065	129
512.007	129
513.743	129
559.826	78
560.023	78
561.902	78
562.101	78
562.287	78
563.04	78
628.81	126
631.21	77
631.46	77
631.69	77
643.68	76
644.84	76
645.10	76
645.35	76
648.35	76
648.62	76
656.12	127
677.43	75
677.72	75
677.99	75
720.46	134
722.83	106
722.85	106
723.35	106
724.87	106
725.78	106
726.30	106
728.36	106
732.92	134
741.18	133
744.10	109
744.26	105
744.80	105
746.97	105
747.93	105
748.47	105
749.95	105
751.80	107
752.37	107
753.16	107
754.38	133
754.57	107
755.55	107
756.92	107
760.46	133
763.53	108
778.19	122
784.66	122
784.78	122
799.47	122
799.59	122
800.58	122

TABLE 23. Wavelength finding list for allowed lines of Al VI—Continued

Wavelength (vac) (Å)	Mult. No.
900.15	98
902.43	98
903.22	98
907.61	104
908.80	72
908.96	72
909.17	72
909.32	98
910.13	98
910.45	72
910.61	72
912.05	72
913.33	72
913.37	98
958.31	132
967.57	97
968.48	97
972.15	97
979.14	103
980.49	132
992.29	120
997.75	96
998.83	120
1 002.44	120
1 021.20	100
1 023.71	100
1 026.33	100
1 049.67	71
1 049.78	71
1 051.87	71
1 051.98	71
1 052.11	71
1 052.13	99
1 054.90	99
1 055.83	71
1 055.97	71
1 056.00	71
1 056.30	102
1 057.31	102
1 062.10	67
1 076.38	74
1 077.44	74
1 077.66	74
1 078.17	74
1 078.39	74
1 079.07	74
1 082.18	54
1 082.92	54
1 087.65	101
1 272.59	63
1 274.86	131
1 281.30	73
1 281.46	73
1 282.33	73
1 282.50	73
1 282.69	73
1 283.30	73

TABLE 23. Wavelength finding list for allowed lines of Al VI—Continued

Wavelength (vac) (Å)	Mult. No.
1 290.21	119
1 294.88	119
1 309.12	119
1 314.41	131
1 320.57	62
1 321.58	53
1 324.92	62
1 327.67	53
1 329.15	62
1 331.19	53
1 332.98	131
1 357.22	123
1 357.72	56
1 358.81	56
1 359.97	56
1 377.03	123
1 409.98	87
1 411.75	87
1 416.05	87
1 422.58	61
1 423.28	123
1 427.96	130
1 430.51	61
1 432.50	61
1 442.17	66
1 477.76	130
1 501.28	130
1 509.75	65
1 510.12	124
1 515.15	124
1 515.24	65
1 534.68	124
1 541.31	124
1 571.34	124
1 590.58	125
1 592.36	124
1 617.86	125
1 633.24	88
1 637.87	64
1 648.40	64
1 651.04	64
1 682.09	125
1 769.66	55
1 775.92	55
1 958.9	140
1 998.8	139

Wavelength (air) (Å)	Mult. No.
2 056.7	93
2 059.2	93
2 060.0	93
2 063.3	93
2 064.1	93
2 073.4	93
2 080.0	93
2 166.2	138
2 182.4	85

TABLE 23. Wavelength finding list for allowed lines of Al VI—Continued

Wavelength (air) (Å)	Mult. No.
2 310.1	94
2 318.4	94
2 319.4	94
2 323.0	94
2 331.4	94
2 336.6	94
2 503.6	95
2 513.3	95
2 583.9	128
2 617.7	128
2 656.7	128
2 664.4	84
2 676.9	84
2 677.4	84
2 683.8	84
2 692.4	84
2 699.4	84
2 790.1	128
2 834.4	128
2 842.5	128
2 959.4	92
2 960.3	92
2 967.9	92
2 968.8	92

TABLE 23. Wavelength finding list for allowed lines of Al VI—Continued

Wavelength (air) (Å)	Mult. No.
2 969.8	92
3 003.6	92
3 004.7	92
3 004.9	92
3 603.9	86
3 616.5	86
3 895.3	59
3 904.2	59
3 913.9	59
5 334.7	135
6 109	60
6 132	60
6 417	137
9 678	136
11 275	58
11 734	58
12 014	58
13 826	70
13 947	70
14 249	70
14 378	70
14 432	70
14 501	70

TABLE 24. Transition probabilities of allowed lines for Al VI (references in this table are as follows: 1=Butler and Zeippen,[7,8] 2=Tachiev and Froese Fischer,[71] 3=Vilkas *et al.*,[80] and 4=Biémont[3])

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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
1	$2s^22p^4-2s2p^5$	^{3}P$-^3$P°		*309.68*	*1 336–324 248*	9–9	1.01+10	1.45−01	1.33+00	0.116	B+	2,3
				309.596	0–323 002	5–5	7.56+09	1.09−01	5.54−01	−0.264	B+	2,3
				309.850	2 732–325 469	3–3	2.52+09	3.63−02	1.11−01	−0.963	B+	2,3
				307.249	0–325 469	5–3	4.31+09	3.66−02	1.85−01	−0.738	B+	2,3
				308.563	2 732–326 815	3–1	1.02+10	4.86−02	1.48−01	−0.836	B+	2,3
				312.237	2 732–323 002	3–5	2.46+09	5.99−02	1.85−01	−0.745	B+	2,3
				310.907	3 829–325 469	1–3	3.32+09	1.44−01	1.48−01	−0.842	B+	2,3
2		^{3}P$-^1$P°										
				222.884	2 732–451 396	3–3	1.34+06	9.95−06	2.19−05	−4.525	D	2,3
				221.535	0–451 396	5–3	6.46+07	2.85−04	1.04−03	−2.846	C	2,3
				223.430	3 829–451 396	1–3	2.70+06	6.07−05	4.46−05	−4.217	D	2,3
3		^{1}D$-^3$P°										
				351.739	41 167–325 469	5–3	5.65+05	6.28−06	3.64−05	−4.503	D	2,3
				354.818	41 167–323 002	5–5	8.81+06	1.66−04	9.71−04	−3.081	C	2,3
4		^{1}D$-^1$P°		243.766	41 167–451 396	5–3	3.74+10	2.00−01	8.02−01	0.000	B+	2,3
5		^{1}S$-^3$P°										
				421.486	88 213–325 469	1–3	1.31+06	1.05−04	1.45−04	−3.979	D+	2,3
6		^{1}S$-^1$P°		275.343	88 213–451 396	1–3	2.39+09	8.13−02	7.37−02	−1.090	B+	2,3
7	$2p^4-2p^3(^4S°)3s$	^{3}P$-^3$S°		*109.68*	*1 336*–913 112	9–3	8.27+10	4.97−02	1.62−01	−0.349	B	2
				109.516	0–913 112	5–3	4.68+10	5.05−02	9.10−02	−0.598	B	2
				109.844	2 732–913 112	3–3	2.70+10	4.88−02	5.30−02	−0.834	B	2
				109.977	3 829–913 112	1–3	8.95+09	4.87−02	1.76−02	−1.312	B	2

TABLE 24. Transition probabilities of allowed lines for Al VI (references in this table are as follows: 1=Butler and Zeippen,[7,8] 2=Tachiev and Froese Fischer,[71] 3=Vilkas *et al.*,[80] and 4=Biémont[3])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
8	$2p^4-2p^3(^2D^\circ)3s$	$^3P-^3D^\circ$		*104.19*	*1 336–961 100*	9–15	2.67+10	7.24−02	2.24−01	−0.186	B	2
				104.047	0–961 100	5–7	2.68+10	6.08−02	1.04−01	−0.517	B	2
				104.344	2 732–961 100	3–5	1.84+10	4.99−02	5.15−02	−0.825	B	2
				104.464	3 829–961 100	1–3	1.35+10	6.62−02	2.28−02	−1.179	B	2
				104.047	0–961 100	5–5	8.31+09	1.35−02	2.31−02	−1.171	B	2
				104.344	2 732–961 100	3–3	1.21+10	1.97−02	2.03−02	−1.228	B	2
				104.047	0–961 100	5–3	1.00+09	9.77−04	1.67−03	−2.311	C+	2
9		$^3P-^1D^\circ$										
				103.348	2 732–970 340	3–5	5.79+07	1.55−04	1.58−04	−3.333	D	2
				103.057	0–9 703 40	5–5	4.69+08	7.46−04	1.27−03	−2.428	D+	2
10		$^1D-^3D^\circ$										
				108.704	41 167–961 100	5–5	6.93+06	1.23−05	2.20−05	−4.211	E+	2
				108.704	41 167–961 100	5–3	7.20+07	7.65−05	1.37−04	−3.417	D	2
				108.704	41 167–9 611 00	5–7	4.93+07	1.22−04	2.19−04	−3.215	D	2
11		$^1D-^1D^\circ$		107.623	41 167–970 340	5–5	6.72+10	1.17−01	2.07−01	−0.233	B+	2
12	$2p^4-2p^3(^2P^\circ)3s$	$^3P-^3P^\circ$		*100.76*	*1 336–993 769*	9–9	2.70+10	4.10−02	1.23−01	−0.433	B	2
				100.616	0–993 874	5–5	1.83+10	2.78−02	4.60−02	−0.857	B	2
				100.916	2 732–993 659	3–3	6.34+09	9.68−03	9.65−03	−1.537	B	2
				100.638	0–993 659	5–3	1.00+10	9.15−03	1.52−02	−1.340	B	2
				100.925	2 732–993 570	3–1	2.69+10	1.37−02	1.37−02	−1.386	B	2
				100.894	2 732–993 874	3–5	8.58+09	2.18−02	2.17−02	−1.184	B	2
				101.027	3 829–993 659	1–3	1.07+10	4.90−02	1.63−02	−1.310	B	2
13		$^1D-^3P^\circ$										
				104.988	41 167–993 659	5–3	3.79+07	3.76−05	6.49−05	−3.726	E+	2
				104.964	41 167–993 874	5–5	7.58+08	1.25−03	2.16−03	−2.204	D+	2
14		$^1D-^1P^\circ$		103.940	41 167–1 003 265	5–3	3.34+10	3.25−02	5.56−02	−0.789	B	2
15		$^1S-^1P^\circ$		109.283	88 213–1 003 265	1–3	3.12+10	1.68−01	6.04−02	−0.775	B	2
16	$2p^4-2p^3(^4S^\circ)3d$	$^3P-^3D^\circ$		*92.75*	*1 336–1 079 524*	9–15	1.29+11	2.77−01	7.60−01	0.397	B+	2
				92.626	0–1 079 610	5–7	1.30+11	2.35−01	3.58−01	0.070	B+	2
				92.874	2 732–1 079 456	3–5	9.41+10	2.03−01	1.86−01	−0.215	B+	2
				92.971	3 829–1 079 437	1–3	6.97+10	2.71−01	8.30−02	−0.567	B	2
				92.639	0–1 079 456	5–5	3.33+10	4.28−02	6.53−02	−0.670	B	2
				92.876	2 732–1 079 437	3–3	5.32+10	6.88−02	6.31−02	−0.685	B	2
				92.641	0–1 079 437	5–3	3.74+09	2.89−03	4.41−03	−1.840	B	2
17		$^1D-^3D^\circ$										
				96.312	41 167–1 079 456	5–5	3.45+07	4.80−05	7.60−05	−3.620	D	2
				96.314	41 167–1 079 437	5–3	1.28+07	1.06−05	1.69−05	−4.276	E+	2
				96.298	41 167–1 079 610	5–7	6.00+07	1.17−04	1.85−04	−3.233	D	2
18	$2p^4-2p^3(^2D^\circ)3d$	$^3P-^3D^\circ$				9–15						2
				88.163	0–1 134 260	5–7	1.68+11	2.74−01	3.98−01	0.137	B+	2
				88.462	3 829–1 134 260	1–3	8.15+10	2.87−01	8.35−02	−0.542	B	2
				88.376	2 732–1 134 260	3–3	4.80+10	5.62−02	4.90−02	−0.773	B	2
				88.163	0–1 134 260	5–3	1.65+09	1.16−03	1.68−03	−2.237	C+	2
19		$^3P-^3P^\circ$		*87.72*	*1 336–1 141 284*	9–9	2.86+11	3.30−01	8.58−01	0.473	C	2
				87.652	0–1 140 880	5–5	2.32+11	2.68−01	3.86−01	0.127	C+	2
				87.797	2 732–1 141 720	3–3	5.96+10	6.88−02	5.97−02	−0.685	C	2

TABLE 24. Transition probabilities of allowed lines for Al VI (references in this table are as follows: 1=Butler and Zeippen,[7,8] 2=Tachiev and Froese Fischer,[71] 3=Vilkas *et al.*,[80] and 4=Biémont[3])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				87.587	0–1 141 720	5–3	1.38+11	9.54−02	1.38−01	−0.321	C	2
				87.776	2 732–1 142 000	3–1	2.67+11	1.03−01	8.90−02	−0.510	C	2
				87.862	2 732–1 140 880	3–5	6.43+10	1.24−01	1.08−01	−0.429	C	2
				87.882	3 829–1 141 720	1–3	7.74+10	2.69−01	7.78−02	−0.570	C	2
20		^{3}P–^{3}S°		*87.43*	*1 336*–1 145 060	9–3	2.98+11	1.14−01	2.95−01	0.011	C	2
				87.332	0–1 145 060	5–3	1.54+11	1.06−01	1.52−01	−0.276	C	2
				87.541	2 732–1 145 060	3–3	1.06+11	1.22−01	1.05−01	−0.437	C	2
				87.625	3 829–1 145 060	1–3	3.75+10	1.30−01	3.74−02	−0.886	C	2
21		^{1}D–^{3}D°										
				91.476	41 167–1 134 350	5–5	8.67+07	1.09−04	1.64−04	−3.264	D	2
				91.484	41 167–1 134 260	5–3	7.01+09	5.28−03	7.95−03	−1.578	C	2
				91.484	41 167–1 134 260	5–7	6.79+07	1.19−04	1.80−04	−3.225	D	2
22		^{1}D–^{1}P°		91.332	41 167–1 136 070	5–3	1.37+11	1.03−01	1.55−01	−0.288	C	2
23		^{1}D–^{1}D°		90.856	41 167–1 141 810	5–5	1.48+11	1.83−01	2.74−01	−0.039	C+	2
24		^{1}D–^{1}F°		90.196	41 167–1 149 860	5–7	2.50+11	4.27−01	6.34−01	0.329	C+	2
25		^{1}S–^{3}D°										
				95.598	88 213–1 134 260	1–3	1.79+09	7.35−03	2.31−03	−2.134	D+	2
26		^{1}S–^{1}P°		95.433	88 213–1 136 070	1–3	2.16+10	8.87−02	2.79−02	−1.052	D+	2
27	$2p^4-2p^3(^2P°)3d$	^{3}P–^{3}P°		*85.94*	*1 336–1 164 937*	9–9	4.91+10	5.44−02	1.38−01	−0.310	D+	2
				85.817	0–1 165 270	5–5	2.84+10	3.14−02	4.44−02	−0.804	C	2
				86.068	2 732–1 164 610	3–3	2.27+10	2.52−02	2.14−02	−1.121	D+	2
				85.866	0–1 164 610	5–3	1.54+10	1.02−02	1.44−02	−1.292	D+	2
				86.094	2 732–1 164 250	3–1	7.38+10	2.73−02	2.33−02	−1.087	D+	2
				86.019	2 732–1 165 270	3–5	8.05+09	1.49−02	1.26−02	−1.350	D+	2
				86.149	3 829–1 164 610	1–3	2.37+10	7.89−02	2.24−02	−1.103	D+	2
28		^{3}P–^{3}D°		*85.63*	*1 336–1 169 110*	9–15	1.24+11	2.27−01	5.77−01	0.310	C	2
				85.518	0–1 169 350	5–7	1.22+11	1.87−01	2.63−01	−0.029	C+	2
				85.766	2 732–1 168 690	3–5	8.54+10	1.57−01	1.33−01	−0.327	C	2
				85.806	3 829–1 169 250	1–3	9.16+10	3.03−01	8.57−02	−0.519	C	2
				85.566	0–1 168 690	5–5	2.09+10	2.30−02	3.24−02	−0.939	D+	2
				85.725	2 732–1 169 250	3–3	6.37+10	7.02−02	5.94−02	−0.677	C	2
				85.525	0–1 169 250	5–3	3.44+09	2.27−03	3.19−03	−1.945	D	2
29		^{1}D–^{1}D°		88.536	41 167–1 170 650	5–5	1.32+11	1.55−01	2.26−01	−0.111	C	2
30		^{1}D–^{1}F°		88.269	41 167–1 174 070	5–7	2.17+11	3.55−01	5.16−01	0.249	C+	2
31	$2p^4-2p^3(^4S°)4s$	^{3}P–^{3}S°		*82.17*	*1 336*–1 218 300	9–3	2.60+10	8.76−03	2.13−02	−1.103	D+	4
				82.082	0–1 218 300	5–3	1.47+10	8.93−03	1.21−02	−1.350	D+	4
				82.266	2 732–1 218 300	3–3	8.44+09	8.57−03	6.96−03	−1.590	D+	4
				82.340	3 829–1 218 300	1–3	2.79+09	8.51−03	2.31−03	−2.070	D	4
32	$2p^4-2p^3(^2D°)4s$	^{3}P–^{3}D°		*78.54*	*1 336–1 274 550*	9–15	1.65+10	2.54−02	5.91−02	−0.641	D+	4
				78.459	0–1 274 550	5–7	1.70+10	2.19−02	2.83−02	−0.961	D+	4
				78.628	2 732–1 274 550	3–5	1.13+10	1.75−02	1.36−02	−1.280	D+	4
				78.695	3 829–1 274 550	1–3	8.22+09	2.29−02	5.94−03	−1.640	D	4
				78.459	0–1 274 550	5–5	4.85+09	4.48−03	5.78−03	−1.650	D	4
				78.628	2 732–1 274 550	3–3	7.01+09	6.50−03	5.05−03	−1.710	D	4
				78.459	0–1 274 550	5–3	5.47+08	3.03−04	3.91−04	−2.820	E+	4

TABLE 24. Transition probabilities of allowed lines for Al VI (references in this table are as follows: 1=Butler and Zeippen,[7,8] 2=Tachiev and Froese Fischer,[71] 3=Vilkas *et al.*,[80] and 4=Biémont[3])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
33		^{1}D–^{1}D°		[80.770]	41 167–1 279 250	5–5	2.19+10	2.14−02	2.85−02	−0.971	D+	4
34	$2p^4-2p^3(^4S°)4d$	^{3}P–^{3}D°		*78.03*	*1 336–1 282 960*	9–15	1.02+11	1.55−01	3.59−01	0.145	C	4
				77.945	0–1 282 960	5–7	1.04+11	1.32−01	1.70−01	−0.180	C	4
				78.111	2 732–1 282 960	3–5	7.58+10	1.16−01	8.92−02	−0.458	C	4
				78.178	3 829–1 282 960	1–3	5.51+10	1.51−01	3.90−02	−0.821	C	4
				77.945	0–1 282 960	5–5	2.58+10	2.35−02	3.01−02	−0.930	C	4
				78.111	2 732–1 282 960	3–3	4.18+10	3.83−02	2.95−02	−0.940	D+	4
				77.945	0–1 282 960	5–3	2.91+09	1.59−03	2.04−03	−2.100	D	4
35	$2p^4-2p^3(^2P°)4s$	^{3}P–^{3}P°				9–9						4
				[76.402]	0–1 308 870	5–5	5.87+09	5.14−03	6.47−03	−1.590	D+	4
				[76.562]	2 732–1 308 870	3–5	2.67+09	3.92−03	2.96−03	−1.930	D	4
36		^{1}D–^{1}P°		78.712	41 167–1 311 620	5–3	1.33+10	7.43−03	9.63−03	−1.430	D+	4
37		^{1}S–^{1}P°		81.739	88 213–1 311 620	1–3	1.05+10	3.16−02	8.51−03	−1.500	D+	4
38	$2p^4-2p^3(^2D°)4d$	^{3}P–^{3}D°		*74.73*	*1 336–1 339 440*	9–15	3.86+10	5.38−02	1.19−01	−0.315	C	4
				74.658	0–1 339 440	5–7	4.20+10	4.91−02	6.03−02	−0.610	C	4
				74.811	2 732–1 339 440	3–5	3.29+10	4.60−02	3.40−02	−0.860	C	4
				74.872	3 829–1 339 440	1–3	2.13+10	5.37−02	1.32−02	−1.270	D+	4
				74.658	0–1 339 440	5–5	4.36+09	3.64−03	4.47−03	−1.740	D	4
				74.811	2 732–1 339 440	3–3	8.49+09	7.13−03	5.27−03	−1.670	D	4
				74.658	0–1 339 440	5–3	3.10+09	1.55−03	1.91−03	−2.111	D	4
39		^{3}P–^{3}P°				9–9						4
				74.442	0–1 343 320	5–5	1.05+11	8.73−02	1.07−01	−0.360	C	4
				74.594	2 732–1 343 320	3–5	1.35+10	1.87−02	1.38−02	−1.251	D+	4
40		^{1}D–^{1}P°		[76.953]	41 167–1 340 660	5–3	5.82+10	3.10−02	3.92−02	−0.810	C	4
41		^{1}D–^{1}F°		[76.618]	41 167–1 346 350	5–7	1.60+11	1.97−01	2.48−01	−0.007	C	1
42		^{1}S–^{1}P°		[79.844]	88 213–1 340 660	1–3	3.18+09	9.12−03	2.40−03	−2.040	D	4
43	$2s2p^5-2p^6$	^{3}P°–^{1}S										
				232.472	325 469–755 628	3–1	1.62+07	4.36−05	1.00−04	−3.883	D	2
44		^{1}P°–^{1}S		328.697	451 396–755 628	3–1	2.81+10	1.51−01	4.92−01	−0.344	B+	2,3
45	$2s2p^5-2s^22p^3(^4S°)3p$	^{3}P°–^{3}P		*150.96*	*324 248–986 692*	9–9	5.66+07	1.93−04	8.64−04	−2.760	C+	2
				150.670	323 002–986 706	5–5	4.15+07	1.41−04	3.51−04	−3.152	C+	2
				151.246	325 469–986 643	3–3	9.53+06	3.27−05	4.88−05	−4.008	C	2
				150.684	323 002–986 643	5–3	2.91+07	5.95−05	1.48−04	−3.527	C+	2
				151.218	325 469–986 765	3–1	5.19+07	5.94−05	8.87−05	−3.749	C+	2
				151.232	325 469–986 706	3–5	1.66+07	9.46−05	1.41−04	−3.547	C+	2
				151.555	326 815–986 643	1–3	1.70+07	1.75−04	8.74−05	−3.757	C+	2
46	$2s2p^5-2s^22p^3(^2D°)3p$	^{3}P°–^{3}D		*141.46*	*324 248–1 031 168*	9–15	1.21+08	6.05−04	2.54−03	−2.264	C+	2
				141.165	323 002–1 031 395	5–7	1.33+08	5.56−04	1.29−03	−2.556	C+	2
				141.736	325 469–1 031 005	3–5	9.20+07	4.62−04	6.46−04	−2.858	C+	2
				142.027	326 815–1 030 908	1–3	6.10+07	5.54−04	2.59−04	−3.256	C+	2
				141.242	323 002–1 031 005	5–5	2.65+07	7.93−05	1.84−04	−3.402	C+	2
				141.756	325 469–1 030 908	3–3	3.27+07	9.84−05	1.38−04	−3.530	C+	2

TABLE 24. Transition probabilities of allowed lines for Al VI (references in this table are as follows: 1=Butler and Zeippen,[7,8] 2=Tachiev and Froese Fischer,[71] 3=Vilkas *et al.*,[80] and 4=Biémont[3])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				141.262	323 002–1 030 908	5–3	3.86+06	6.93−06	1.61−05	−4.460	C	2
47		$^1P^\circ - {}^3D$										
				172.530	451 396–1 031 005	3–5	1.55+04	1.15−07	1.96−07	−6.462	E	2
				172.559	451 396–1 030 908	3–3	5.56+07	2.48−04	4.23−04	−3.128	D	2
48	$2s2p^5$–$2s^22p^3(^2P^\circ)3p$	$^3P^\circ - {}^3S$		*135.09*	*324 248*–1 064 493	9–3	2.59+09	2.36−03	9.45−03	−1.673	B	2
				134.863	323 002–1 064 493	5–3	8.35+08	1.37−03	3.03−03	−2.164	B	2
				135.314	325 469–1 064 493	3–3	1.20+09	3.29−03	4.39−03	−2.006	B	2
				135.561	326 815–1 064 493	1–3	5.50+08	4.54−03	2.03−03	−2.343	C+	2
49	$2s2p^5$ $-2s2p^4(^4P)3s$	$^3P^\circ - {}^3P$		*113.45*	*324 248–1 205 687*	9–9	5.26+10	1.02−01	3.41−01	−0.037	D+	1
				113.441	323 002–1 204 520	5–5	3.95+10	7.62−02	1.42−01	−0.419	D+	LS
				113.454	325 469–1 206 880	3–3	1.32+10	2.54−02	2.85−02	−1.118	D	LS
				113.138	323 002–1 206 880	5–3	2.21+10	2.55−02	4.75−02	−0.894	D	LS
				113.318	325 469–1 207 940	3–1	5.28+10	3.39−02	3.79−02	−0.993	D	LS
				113.759	325 469–1 204 520	3–5	1.31+10	4.22−02	4.74−02	−0.898	D	LS
				113.628	326 815–1 206 880	1–3	1.74+10	1.01−01	3.78−02	−0.996	D	LS
50	$2s2p^5$ $-2s2p^4(^2D)3s$	$^3P^\circ - {}^3D$				9–15						1
				103.062	323 002–1 293 290	5–7	2.50+10	5.57−02	9.45−02	−0.555	D+	LS
51	$2s2p^5$ $-2s2p^4(^2S)3s$	$^3P^\circ - {}^3S$		*96.56*	*324 248*–1 359 920	9–3	3.37+10	1.57−02	4.49−02	−0.850	E+	1
				96.440	323 002–1 359 920	5–3	1.88+10	1.57−02	2.49−02	−1.105	D	LS
				96.670	325 469–1 359 920	3–3	1.12+10	1.57−02	1.50−02	−1.327	E+	LS
				96.796	326 815–1 359 920	1–3	3.70+09	1.56−02	4.97−03	−1.807	E	LS
52	$2p^6$ $-2s^22p^3(^2P^\circ)3s$	$^1S - {}^1P^\circ$		403.817	755 628–1 003 265	1–3	5.81+03	4.26−07	5.66−07	−6.371	C	2
53	$2p^3(^4S^\circ)3s$–$2p^3(^4S^\circ)3p$	$^5S^\circ - {}^5P$		*1 325.5*	*894 300–969 742*	5–15	6.47+08	5.11−01	1.12+01	0.407	B+	2
				1 321.58	894 300–969 967	5–7	6.53+08	2.39−01	5.21+00	0.077	B+	2
				1 327.67	894 300–969 620	5–5	6.43+08	1.70−01	3.71+00	−0.071	B+	2
				1 331.19	894 300–969 421	5–3	6.38+08	1.02−01	2.23+00	−0.292	B+	2
54		$^5S^\circ - {}^3P$										
				[1 082.18]	894 300–986 706	5–5	1.50+06	2.64−04	4.70−03	−2.879	C	2
				[1 082.92]	894 300–986 643	5–3	7.05+05	7.43−05	1.33−03	−3.430	D+	2
55		$^3S^\circ - {}^5P$										
				[1 769.66]	913 112–969 620	3–5	3.25+05	2.54−04	4.44−03	−3.118	C	2
				[1 775.92]	913 112–969 421	3–3	1.50+05	7.12−05	1.25−03	−3.670	D+	2
56		$^3S^\circ - {}^3P$		*1 359.1*	913 112–*986 692*	3–9	5.81+08	4.83−01	6.48+00	0.161	B+	2
				1 358.81	913 112–986 706	3–5	5.80+08	2.68−01	3.59+00	−0.095	B+	2
				1 359.97	913 112–986 643	3–3	5.82+08	1.61−01	2.17+00	−0.316	B+	2
				1 357.72	913 112–986 765	3–1	5.86+08	5.40−02	7.24−01	−0.790	B+	2
57	$2s^22p^3(^4S^\circ)3s$–$2s2p^4(^4P)3s$	$^3S^\circ - {}^3P$		*341.79*	913 112–*1 205 687*	3–9	2.41+09	1.26−01	4.27−01	−0.423	C	1
				343.161	913 112–1 204 520	3–5	2.38+09	7.00−02	2.37−01	−0.678	C	LS

TABLE 24. Transition probabilities of allowed lines for Al VI (references in this table are as follows: 1=Butler and Zeippen,[7,8] 2=Tachiev and Froese Fischer,[71] 3=Vilkas *et al.*,[80] and 4=Biémont[3])—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} (s^{-1})	f_{ik}	S (a.u.)	log *gf*	Acc.	Source
				340.405	913 112–1 206 880	3–3	2.43+09	4.23−02	1.42−01	−0.897	D+	LS
				339.181	913 112–1 207 940	3–1	2.47+09	1.42−02	4.76−02	−1.371	D	LS
58	$2p^3(^2D^\circ)3s-2p^3(^4S^\circ)3p$	$^3D^\circ-^5P$										
			[11 734]	[11 737]	961 100–969 620	7–5	4.30+01	6.34−07	1.71−04	−5.353	D	2
			[12 014]	[12 018]	961 100–969 421	5–3	1.85+01	2.40−07	4.75−05	−5.921	E+	2
			[11 275]	[11 278]	961 100–969 967	7–7	6.55+00	1.25−07	3.24−05	−6.058	E+	2
			[11 734]	[11 737]	961 100–969 620	5–5	1.94+01	4.00−07	7.73−05	−5.699	D	2
			[12 014]	[12 018]	961 100–969 421	3–3	1.00+01	2.17−07	2.57−05	−6.186	E+	2
			[11 275]	[11 278]	961 100–969 967	5–7	6.59−01	1.76−08	3.27−06	−7.056	E	2
			[11 734]	[11 737]	961 100–969 620	3–5	1.92+00	6.63−08	7.68−06	−6.701	E+	2
59		$^3D^\circ-^3P$	*3 906*	*3 907*	*961 100–986 692*	15–9	1.85+06	2.54−03	4.89−01	−1.419	B	2
			3 904.2	3 905.3	961 100–986 706	7–5	1.54+06	2.52−03	2.27−01	−1.754	B+	2
			3 913.9	3 915.0	961 100–986 643	5–3	1.25+06	1.72−03	1.11−01	−2.066	B	2
			3 895.3	3 896.4	961 100–986 765	3–1	1.74+06	1.32−03	5.08−02	−2.402	B	2
			3 904.2	3 905.3	961 100–986 706	5–5	3.55+05	8.12−04	5.22−02	−2.391	B	2
			3 913.9	3 915.0	961 100–986 643	3–3	5.04+05	1.16−03	4.48−02	−2.458	B	2
			3 904.2	3 905.3	961 100–986 706	3–5	2.76+04	1.05−04	4.06−03	−3.502	B	2
60		$^1D^\circ-^3P$										
			6 132	6 134	970 340–986 643	5–3	2.99+03	1.01−05	1.02−03	−4.297	D+	2
			6 109	6 110	970 340–986 706	5–5	1.18+03	6.60−06	6.64−04	−4.481	D+	2
61	$2p^3(^2D^\circ)3s-2p^3(^2D^\circ)3p$	$^3D^\circ-^3D$		*1 427.2*	*961 100–1 031 168*	15–15	4.86+08	1.48−01	1.05+01	0.346	B+	2
				1 422.58	961 100–1 031 395	7–7	4.82+08	1.46−01	4.79+00	0.009	B+	2
				1 430.51	961 100–1 031 005	5–5	3.72+08	1.14−01	2.69+00	−0.244	B+	2
				1 432.50	961 100–1 030 908	3–3	3.18+08	9.79−02	1.39+00	−0.532	B+	2
				1 430.51	961 100–1 031 005	7–5	8.34+07	1.83−02	6.03−01	−0.892	B+	2
				1 432.50	961 100–1 030 908	5–3	1.12+08	2.06−02	4.86−01	−0.987	B+	2
				1 422.58	961 100–1 031 395	5–7	2.09+07	8.88−03	2.08−01	−1.353	B+	2
				1 430.51	961 100–1 031 005	3–5	3.97+07	2.03−02	2.87−01	−1.215	B+	2
62		$^3D^\circ-^3F$		*1 324.1*	*961 100–1 036 626*	15–21	6.80+08	2.50−01	1.64+01	0.574	B+	2
				1 320.57	961 100–1 036 825	7–9	6.88+08	2.31−01	7.04+00	0.209	B+	2
				1 324.92	961 100–1 036 576	5–7	6.43+08	2.37−01	5.17+00	0.074	B+	2
				1 329.15	961 100–1 036 336	3–5	6.09+08	2.69−01	3.53+00	−0.093	B+	2
				1 324.92	961 100–1 036 576	7–7	3.15+07	8.30−03	2.53−01	−1.236	B+	2
				1 329.15	961 100–1 036 336	5–5	6.34+07	1.68−02	3.67−01	−1.076	B+	2
				1 329.15	961 100–1 036 336	7–5	5.33+05	1.01−04	3.09−03	−3.151	B	2
63		$^3D^\circ-^1F$										
				1 272.59	961 100–1 039 680	5–7	6.67+06	2.27−03	4.75−02	−1.945	C+	2
				1 272.59	961 100–1 039 680	7–7	3.00+04	7.28−06	2.13−04	−4.293	D	2
64		$^1D^\circ-^3D$										
				1 648.40	970 340–1 031 005	5–5	1.77+03	7.23−07	1.96−05	−5.442	E+	2
				1 651.04	970 340–1 030 908	5–3	3.78+07	9.26−03	2.52−01	−1.334	B	2
				1 637.87	970 340–1 031 395	5–7	3.15+05	1.77−04	4.78−03	−3.053	C	2
65		$^1D^\circ-^3F$										
				1 509.75	970 340–1 036 576	5–7	3.76+06	1.80−03	4.47−02	−2.046	C+	2
				1 515.24	970 340–1 036 336	5–5	1.50+05	5.18−05	1.29−03	−3.587	D+	2
66		$^1D^\circ-^1F$		1 442.17	970 340–1 039 680	5–7	5.30+08	2.31−01	5.49+00	0.063	B+	2

TABLE 24. Transition probabilities of allowed lines for Al VI (references in this table are as follows: 1=Butler and Zeippen,[7,8] 2=Tachiev and Froese Fischer,[71] 3=Vilkas *et al.*,[80] and 4=Biémont[3])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
67	$2p^3(^2D^\circ)3s$–$2p^3(^2P^\circ)3p$	$^1D^\circ-^3S$										
				1 062.10	970 340–1 064 493	5–3	9.10+05	9.24−05	1.61−03	−3.335	D+	2
68	$2s^22p^3(^2D^\circ)3s$–$2s2p^4(^4P)3s$	$^3D^\circ-^3P$		*408.85*	*961 100–1 205 687*	15–9	3.38+08	5.08−03	1.03−01	−1.118	D	1
				410.813	961 100–1 204 520	7–5	2.80+08	5.06−03	4.79−02	−1.451	D	LS
				406.868	961 100–1 206 880	5–3	2.57+08	3.83−03	2.57−02	−1.718	D	LS
				405.121	961 100–1 207 940	3–1	3.47+08	2.85−03	1.14−02	−2.068	E+	LS
				410.813	961 100–1 204 520	5–5	4.98+07	1.26−03	8.52−03	−2.201	E+	LS
				406.868	961 100–1 206 880	3–3	8.58+07	2.13−03	8.56−03	−2.194	E+	LS
				410.813	961 100–1 204 520	3–5	3.34+06	1.41−04	5.72−04	−3.374	E	LS
69	$2s^22p^3(^2D^\circ)3s$–$2s2p^4(^2D)3s$	$^3D^\circ-^3D$				15–15						1
				301.033	961 100–1 293 290	7–7	1.18+10	1.60−01	1.11+00	0.049	B	LS
				301.033	961 100–1 293 290	5–7	1.48+09	2.82−02	1.40−01	−0.851	D+	LS
70	$2p^3(^4S^\circ)3p$–$2p^3(^2P^\circ)3s$	$^3P-^3P^\circ$	*14 130*	*14 130*	*986 692–993 769*	9–9	8.79+03	2.63−04	1.10−01	−2.626	B	2
			13 947	13 951	986 706–993 874	5–5	6.38+03	1.86−04	4.28−02	−3.032	B	2
			14 249	14 253	986 643–993 659	3–3	1.87+03	5.71−05	8.03−03	−3.766	B	2
			14 378	14 382	986 706–993 659	5–3	3.43+03	6.37−05	1.51−02	−3.497	B	2
			14 432	14 436	986 643–993 570	3–1	8.14+03	8.48−05	1.21−02	−3.594	B	2
			13 826	13 829	986 643–993 874	3–5	2.84+03	1.36−04	1.85−02	−3.389	B	2
			14 501	14 505	986 765–993 659	1–3	3.03+03	2.87−04	1.37−02	−3.542	B	2
71	$2p^3(^4S^\circ)3p$–$2p^3(^4S^\circ)3d$	$^5P-^5D^\circ$		*1 053.4*	*969 742–1 064 672*	15–25	1.51+09	4.19−01	2.18+01	0.798	B+	2
				1 056.00	969 967–1 064 664	7–9	1.50+09	3.22−01	7.85+00	0.353	B+	2
				1 052.11	969 620–1 064 667	5–7	1.01+09	2.35−01	4.07+00	0.070	B+	2
				1 049.78	969 421–1 064 679	3–5	5.34+08	1.47−01	1.52+00	−0.356	B+	2
				1 055.97	969 967–1 064 667	7–7	5.00+08	8.36−02	2.04+00	−0.233	B+	2
				1 051.98	969 620–1 064 679	5–5	8.84+08	1.47−01	2.54+00	−0.134	B+	2
				1 049.67	969 421–1 064 689	3–3	1.14+09	1.89−01	1.96+00	−0.246	B+	2
				1 055.83	969 967–1 064 679	7–5	1.00+08	1.20−02	2.91−01	−1.076	B+	2
				1 051.87	969 620–1 064 689	5–3	3.79+08	3.77−02	6.53−01	−0.725	B+	2
				1 049.67	969 421–1 064 689	3–1	1.53+09	8.40−02	8.71−01	−0.599	B+	2
72		$^5P-^3D^\circ$										
				[909.17]	969 620–1 079 610	5–7	1.25+06	2.17−04	3.25−03	−2.965	C	2
				[908.80]	969 421–1 079 456	3–5	4.23+05	8.74−05	7.84−04	−3.581	D+	2
				[912.05]	969 967–1 079 610	7–7	1.91+05	2.39−05	5.02−04	−3.777	D	2
				[910.45]	969 620–1 079 456	5–5	1.42+05	1.77−05	2.65−04	−4.053	D	2
				[908.96]	969 421–1 079 437	3–3	1.87+05	2.31−05	2.08−04	−4.159	D	2
				[913.33]	969 967–1 079 456	7–5	2.74+04	2.45−06	5.16−05	−4.766	E+	2
				[910.61]	969 620–1 079 437	5–3	9.04+03	6.74−07	1.01−05	−5.472	E+	2
73		$^3P-^5D^\circ$										
				[1 282.69]	986 706–1 064 667	5–7	1.89+05	6.53−05	1.38−03	−3.486	D+	2
				[1 281.46]	986 643–1 064 679	3–5	1.51+04	6.21−06	7.86−05	−4.730	D	2
				[1 283.30]	986 765–1 064 689	1–3	2.22+04	1.64−05	6.94−05	−4.785	E+	2
				[1 282.50]	986 706–1 064 679	5–5	3.78+05	9.31−05	1.97−03	−3.332	D+	2
				[1 281.30]	986 643–1 064 689	3–3	2.27+05	5.59−05	7.08−04	−3.775	D+	2
				[1 282.33]	986 706–1 064 689	5–3	2.28+05	3.38−05	7.13−04	−3.772	D+	2
				[1 281.30]	986 643–1 064 689	3–1	4.88+05	4.00−05	5.07−04	−3.921	D	2

TABLE 24. Transition probabilities of allowed lines for Al VI (references in this table are as follows: 1=Butler and Zeippen,[7,8] 2=Tachiev and Froese Fischer,[71] 3=Vilkas *et al.*,[80] and 4=Biémont[3])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
74		$^3P-^3D^\circ$		*1 077.2*	*986 692–1 079 524*	9–15	1.42+09	4.11−01	1.31+01	0.568	B+	2
				1 076.38	986 706–1 079 610	5–7	1.42+09	3.45−01	6.12+00	0.237	B+	2
				1 077.44	986 643–1 079 456	3–5	1.06+09	3.09−01	3.28+00	−0.033	B+	2
				1 079.07	986 765–1 079 437	1–3	7.85+08	4.11−01	1.46+00	−0.386	B+	2
				1 078.17	986 706–1 079 456	5–5	3.52+08	6.14−02	1.09+00	−0.513	B+	2
				1 077.66	986 643–1 079 437	3–3	5.89+08	1.03−01	1.09+00	−0.510	B+	2
				1 078.39	986 706–1 079 437	5–3	3.90+07	4.08−03	7.24−02	−1.690	B	2
75	$2p^3(^4S^\circ)3p-2p^3(^2D^\circ)3d$	$^3P-^3D^\circ$				9–15						2
				677.72	986 706–1 134 260	5–7	6.56+06	6.32−04	7.05−03	−2.500	B	2
				677.99	986 765–1 134 260	1–3	1.90+06	3.93−04	8.78−04	−3.406	C+	2
				677.43	986 643–1 134 260	3–3	5.52+06	3.79−04	2.54−03	−2.944	C+	2
				677.72	986 706–1 134 260	5–3	1.09+06	4.49−05	5.00−04	−3.649	C+	2
76		$^3P-^3P^\circ$		*646.9*	*986 692–1 141 284*	9–9	3.74+08	2.35−02	4.50−01	−0.675	C	2
				648.62	986 706–1 140 880	5–5	2.88+08	1.82−02	1.94−01	−1.041	C	2
				644.84	986 643–1 141 720	3–3	6.64+07	4.14−03	2.64−02	−1.906	D+	2
				645.10	986 706–1 141 720	5–3	1.97+08	7.37−03	7.83−02	−1.434	C	2
				643.68	986 643–1 142 000	3–1	3.53+08	7.31−03	4.65−02	−1.659	C	2
				648.35	986 643–1 140 880	3–5	9.54+07	1.00−02	6.42−02	−1.523	C	2
				645.35	986 765–1 141 720	1–3	1.03+08	1.93−02	4.09−02	−1.714	C	2
77		$^3P-^3S^\circ$		*631.4*	*986 692*–1 145 060	9–3	7.72+08	1.54−02	2.88−01	−0.858	C	2
				631.50	986 706–1 145 060	5–3	4.00+08	1.43−02	1.49−01	−1.146	C	2
				631.25	986 643–1 145 060	3–3	2.75+08	1.64−02	1.02−01	−1.308	C	2
				631.73	986 765–1 145 060	1–3	9.76+07	1.75−02	3.64−02	−1.757	C	2
78	$2p^3(^4S^\circ)3p-2p^3(^2P^\circ)3d$	$^3P-^3P^\circ$		*561.03*	*986 692–1 164 937*	9–9	1.15+07	5.44−04	9.05−03	−2.310	D	2
				560.023	986 706–1 165 270	5–5	3.50+06	1.64−04	1.52−03	−3.086	D	2
				561.902	986 643–1 164 610	3–3	9.02+06	4.27−04	2.37−03	−2.892	D	2
				562.101	986 706–1 164 610	5–3	7.66+05	2.18−05	2.01−04	−3.963	E+	2
				563.04	986 643–1 164 250	3–1	2.09+07	3.31−04	1.84−03	−3.003	D	2
				559.826	986 643–1 165 270	3–5	1.73+06	1.35−04	7.47−04	−3.393	E+	2
				562.287	986 765–1 164 610	1–3	9.02+06	1.28−03	2.37−03	−2.893	D	2
79	$2p^3(^4S^\circ)3p-2p^3(^4S^\circ)4s$	$^3P-^3S^\circ$		*431.76*	*986 692*–1 218 300	9–3	7.47+09	6.96−02	8.90−01	−0.203	C+	4
				431.790	986 706–1 218 300	5–3	4.14+09	6.93−02	4.93−01	−0.460	C+	4
				431.673	986 643–1 218 300	3–3	2.49+09	6.96−02	2.97−01	−0.680	C+	4
				431.900	986 765–1 218 300	1–3	8.44+08	7.08−02	1.01−01	−1.150	C	4
80	$2p^3(^4S^\circ)3p-2p^3(^2D^\circ)4s$	$^3P-^3D^\circ$		*347.39*	*986 692–1 274 550*	9–15	7.74+08	2.33−02	2.40−01	−0.678	D	1
				347.410	986 706–1 274 550	5–7	7.74+08	1.96−02	1.12−01	−1.009	D+	LS
				347.334	986 643–1 274 550	3–5	5.81+08	1.75−02	6.00−02	−1.280	D	LS
				347.482	986 765–1 274 550	1–3	4.29+08	2.33−02	2.67−02	−1.633	D	LS
				347.410	986 706–1 274 550	5–5	1.93+08	3.50−03	2.00−02	−1.757	E+	LS
				347.334	986 643–1 274 550	3–3	3.23+08	5.84−03	2.00−02	−1.756	E+	LS
				347.410	986 706–1 274 550	5–3	2.15+07	2.33−04	1.33−03	−2.934	E	LS
81	$2p^3(^4S^\circ)3p-2p^3(^4S^\circ)4d$	$^3P-^3D^\circ$		*337.53*	*986 692–1 282 960*	9–15	2.15+09	6.12−02	6.12−01	−0.259	D+	1
				337.548	986 706–1 282 960	5–7	2.15+09	5.14−02	2.86−01	−0.590	C	LS

TABLE 24. Transition probabilities of allowed lines for Al VI (references in this table are as follows: 1=Butler and Zeippen,[7,8] 2=Tachiev and Froese Fischer,[71] 3=Vilkas *et al.*,[80] and 4=Biémont[3])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				337.476	986 643–1 282 960	3–5	1.61+09	4.59−02	1.53−01	−0.861	C	LS
				337.615	986 765–1 282 960	1–3	1.19+09	6.12−02	6.80−02	−1.213	D+	LS
				337.548	986 706–1 282 960	5–5	5.38+08	9.19−03	5.11−02	−1.338	D	LS
				337.476	986 643–1 282 960	3–3	8.96+08	1.53−02	5.10−02	−1.338	D	LS
				337.548	986 706–1 282 960	5–3	5.97+07	6.12−04	3.40−03	−2.514	E	LS
82	$2p^3(^4S^\circ)3p$– $2p^3(^2P^\circ)4s$	$^3P-^3P^\circ$				9–9						4
				[310.401]	986 706–1 308 870	5–5	8.34+07	1.21−03	6.16−03	−2.218	D+	4
				[310.340]	986 643–1 308 870	3–5	3.56+07	8.57−04	2.63−03	−2.590	D	4
83	$2p^3(^4S^\circ)3p$– $2p^3(^2D^\circ)4d$	$^3P-^3D^\circ$		*283.49*	*986 692–1 339 440*	9–15	4.02+08	8.08−03	6.79−02	−1.138	E+	1
				283.500	986 706–1 339 440	5–7	4.03+08	6.79−03	3.17−02	−1.469	D	LS
				283.449	986 643–1 339 440	3–5	3.02+08	6.06−03	1.70−02	−1.740	E+	LS
				283.547	986 765–1 339 440	1–3	2.23+08	8.08−03	7.54−03	−2.093	E+	LS
				283.500	986 706–1 339 440	5–5	1.00+08	1.21−03	5.65−03	−2.218	E	LS
				283.449	986 643–1 339 440	3–3	1.68+08	2.02−03	5.65−03	−2.218	E	LS
				283.500	986 706–1 339 440	5–3	1.12+07	8.08−05	3.77−04	−3.394	E	LS
84	$2p^3(^2P^\circ)3s$– $2p^3(^2D^\circ)3p$	$^3P^\circ-^3D$	*2 673*	*2 674*	*993 769–1 031 168*	9–15	2.68+06	4.79−03	3.80−01	−1.365	B	2
			2 664.4	2 665.2	993 874–1 031 395	5–7	2.79+06	4.16−03	1.83−01	−1.682	B+	2
			2 676.9	2 677.7	993 659–1 031 005	3–5	2.25+06	4.02−03	1.06−01	−1.919	B	2
			2 677.4	2 678.2	993 570–1 030 908	1–3	1.44+06	4.65−03	4.10−02	−2.333	B	2
			2 692.4	2 693.2	993 874–1 031 005	5–5	4.32+05	4.70−04	2.08−02	−2.629	B	2
			2 683.8	2 684.6	993 659–1 030 908	3–3	9.34+05	1.01−03	2.68−02	−2.519	B	2
			2 699.4	2 700.2	993 874–1 030 908	5–3	7.24+04	4.75−05	2.11−03	−3.624	C+	2
85		$^3P^\circ-^1F$										
			2 182.4	2 183.1	993 874–1 039 680	5–7	7.44+04	7.45−05	2.68−03	−3.429	C	2
86		$^1P^\circ-^3D$										
			3 603.9	3 604.9	1 003 265–1 031 005	3–5	8.64+02	2.80−06	9.98−05	−5.076	D	2
			3 616.5	3 617.6	1 003 265–1 030 908	3–3	5.42+05	1.06−03	3.80−02	−2.498	C+	2
87	$2p^3(^2P^\circ)3s$– $2p^3(^2P^\circ)3p$	$^3P^\circ-^3S$		*1 413.9*	*993 769*–1 064 493	9–3	4.86+08	4.86−02	2.04+00	−0.359	B+	2
				1 416.05	993 874–1 064 493	5–3	2.74+08	4.94−02	1.15+00	−0.607	B+	2
				1 411.75	993 659–1 064 493	3–3	1.59+08	4.76−02	6.64−01	−0.845	B+	2
				1 409.98	993 570–1 064 493	1–3	5.30+07	4.74−02	2.20−01	−1.324	B+	2
88		$^1P^\circ-^3S$										
				1 633.24	1 003 265–1 064 493	3–3	4.61+05	1.84−04	2.97−03	−3.258	C	2
89	$2s^22p^3(^2P^\circ)3s$– $2s2p^4(^4P)3s$	$^3P^\circ-^3P$		*471.88*	*993 769–1 205 687*	9–9	1.74+08	5.80−03	8.11−02	−1.282	E+	1
				474.730	993 874–1 204 520	5–5	1.28+08	4.32−03	3.38−02	−1.666	D	LS
				468.997	993 659–1 206 880	3–3	4.43+07	1.46−03	6.76−03	−2.359	E	LS
				469.470	993 874–1 206 880	5–3	7.36+07	1.46−03	1.13−02	−2.137	E+	LS
				466.677	993 659–1 207 940	3–1	1.80+08	1.96−03	9.03−03	−2.231	E+	LS
				474.246	993 659–1 204 520	3–5	4.29+07	2.41−03	1.13−02	−2.141	E+	LS
				468.801	993 570–1 206 880	1–3	5.91+07	5.84−03	9.01−03	−2.234	E+	LS
90	$2s^22p^3(^2P^\circ)3s$– $2s2p^4(^2D)3s$	$^3P^\circ-^3D$				9–15						1

TABLE 24. Transition probabilities of allowed lines for Al VI (references in this table are as follows: 1=Butler and Zeippen,[7,8] 2=Tachiev and Froese Fischer,[71] 3=Vilkas *et al.*,[80] and 4=Biémont[3])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				333.983	993 874–1 293 290	5–7	1.71+09	4.00−02	2.20−01	−0.699	C	LS
91	$2s^22p^3(^2P^\circ)3s-2s2p^4(^2S)3s$	$^3P^\circ-^3S$		*273.11*	*993 769*–1 359 920	9–3	1.31+10	4.89−02	3.96−01	−0.356	C	1
				273.190	993 874–1 359 920	5–3	7.28+09	4.89−02	2.20−01	−0.612	C	LS
				273.029	993 659–1 359 920	3–3	4.38+09	4.89−02	1.32−01	−0.834	D+	LS
				272.963	993 570–1 359 920	1–3	1.46+09	4.89−02	4.39−02	−1.311	D	LS
92	$2p^3(^2D^\circ)3p-2p^3(^4S^\circ)3d$	$^3D-^5D^\circ$										
			[3 004.7]	[3 005.5]	1 031 395–1 064 667	7–7	1.12+03	1.51−06	1.05−04	−4.976	D	2
			[2 968.8]	[2 969.7]	1 031 005–1 064 679	5–5	6.90+02	9.12−07	4.46−05	−5.341	E+	2
			[2 959.4]	[2 960.2]	1 030 908–1 064 689	3–3	2.03+02	2.67−07	7.80−06	−6.096	E+	2
			[3 003.6]	[3 004.4]	1 031 395–1 064 679	7–5	1.92+02	1.86−07	1.29−05	−5.885	E+	2
			[2 967.9]	[2 968.8]	1 031 005–1 064 689	5–3	2.04+02	1.62−07	7.90−06	−6.092	E+	2
			[2 959.4]	[2 960.2]	1 030 908–1 064 689	3–1	4.23+01	1.85−08	5.42−07	−7.256	E	2
			[3 004.9]	[3 005.8]	1 031 395–1 064 664	7–9	1.32+01	2.30−08	1.59−06	−6.793	E	2
			[2 969.8]	[2 970.7]	1 031 005–1 064 667	5–7	1.18+02	2.19−07	1.07−05	−5.961	E+	2
			[2 960.3]	[2 961.1]	1 030 908–1 064 679	3–5	1.49+02	3.27−07	9.56−06	−6.008	E+	2
93		$^3D-^3D^\circ$	*2 067*	*2 068*	*1 031 168–1 079 524*	15–15	2.64+06	1.69−03	1.73−01	−1.596	B	2
			2 073.4	2 074.0	1 031 395–1 079 610	7–7	2.30+06	1.48−03	7.08−02	−1.985	B	2
			2 063.3	2 063.9	1 031 005–1 079 456	5–5	1.86+06	1.19−03	4.03−02	−2.225	B	2
			2 060.0	2 060.6	1 030 908–1 079 437	3–3	1.78+06	1.14−03	2.31−02	−2.466	B	2
			2 080.0	2 080.7	1 031 395–1 079 456	7–5	5.14+05	2.38−04	1.14−02	−2.778	B	2
			2 064.1	2 064.8	1 031 005–1 079 437	5–3	8.00+05	3.07−04	1.04−02	−2.814	B	2
			2 056.7	2 057.4	1 031 005–1 079 610	5–7	2.67+05	2.38−04	8.05−03	−2.924	B	2
			2 059.2	2 059.8	1 030 908–1 079 456	3–5	4.05+05	4.30−04	8.74−03	−2.889	B	2
94		$^3F-^3D^\circ$	*2 330*	*2 331*	*1 036 626–1 079 524*	21–15	3.53+05	2.05−04	3.31−02	−2.366	B	2
			2 336.6	2 337.3	1 036 825–1 079 610	9–7	2.90+05	1.85−04	1.28−02	−2.779	B	2
			2 331.4	2 332.1	1 036 576–1 079 456	7–5	1.80+05	1.05−04	5.62−03	−3.134	B	2
			2 319.4	2 320.1	1 036 336–1 079 437	5–3	2.05+05	9.94−05	3.80−03	−3.304	B	2
			2 323.0	2 323.7	1 036 576–1 079 610	7–7	1.48+05	1.20−04	6.43−03	−3.076	B	2
			2 318.4	2 319.1	1 036 336–1 079 456	5–5	1.34+05	1.08−04	4.13−03	−3.268	B	2
			2 310.1	2 310.9	1 036 336–1 079 610	5–7	7.57+03	8.49−06	3.23−04	−4.372	C+	2
95		$^1F-^3D^\circ$										
			2 513.3	2 514.1	1 039 680–1 079 456	7–5	2.15+02	1.46−07	8.45−06	−5.991	E+	2
			2 503.6	2 504.4	1 039 680–1 079 610	7–7	1.02+04	9.63−06	5.56−04	−4.171	D+	2
96	$2p^3(^2D^\circ)3p-2p^3(^2D^\circ)3d$	$^3D-^1G^\circ$										
				997.75	1 031 395–1 131 621	7–9	3.78+06	7.26−04	1.67−02	−2.294	C	2
97		$^3D-^3D^\circ$				15–15						2
				972.15	1 031 395–1 134 260	7–7	9.36+08	1.33−01	2.97+00	−0.031	B+	2
				967.57	1 030 908–1 134 260	3–3	5.67+08	7.96−02	7.61−01	−0.622	B+	2
				968.48	1 031 005–1 134 260	5–3	2.81+08	2.37−02	3.78−01	−0.926	B+	2
				968.48	1 031 005–1 134 260	5–7	1.05+08	2.07−02	3.30−01	−0.985	B+	2
98		$^3D-^3P^\circ$		*908.1*	*1 031 168–1 141 284*	15–9	5.09+08	3.77−02	1.69+00	−0.248	C+	2
				913.37	1 031 395–1 140 880	7–5	4.33+08	3.87−02	8.14−01	−0.567	C+	2
				903.22	1 031 005–1 141 720	5–3	4.13+08	3.03−02	4.50−01	−0.820	C+	2
				900.15	1 030 908–1 142 000	3–1	4.94+08	2.00−02	1.78−01	−1.222	C	2
				910.13	1 031 005–1 140 880	5–5	5.48+07	6.81−03	1.02−01	−1.468	C	2

TABLE 24. Transition probabilities of allowed lines for Al VI (references in this table are as follows: 1=Butler and Zeippen,[7,8] 2=Tachiev and Froese Fischer,[71] 3=Vilkas *et al.*,[80] and 4=Biémont[3])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				902.43	1 030 908–1 141 720	3–3	1.35+08	1.65−02	1.47−01	−1.305	C	2
				909.32	1 030 908–1 140 880	3–5	4.04+05	8.34−05	7.49−04	−3.602	E+	2
99		^{3}F−^{1}G°										
				1 052.13	1 036 576–1 131 621	7–9	2.60+06	5.55−04	1.35−02	−2.411	C	2
				1 054.90	1 036 825–1 131 621	9–9	3.04+06	5.07−04	1.59−02	−2.341	C	2
100		^{3}F−^{3}D°				21–15						2
				1 026.33	1 036 825–1 134 260	9–7	9.31+07	1.14−02	3.48−01	−0.989	B+	2
				1 021.20	1 036 336–1 134 260	5–3	7.57+07	7.10−03	1.19−01	−1.450	B	2
				1 023.71	1 036 576–1 134 260	7–7	3.92+07	6.16−03	1.45−01	−1.365	B	2
				1 021.20	1 036 336–1 134 260	5–7	1.13+06	2.48−04	4.17−03	−2.907	B	2
101		^{1}F−^{1}G°		1 087.65	1 039 680–1 131 621	7–9	1.43+09	3.27−01	8.19+00	0.360	B+	2
102		^{1}F−^{3}D°										
				1 056.30	1 039 680–1 134 350	7–5	6.51+03	7.78−07	1.89−05	−5.264	E+	2
				1 057.31	1 039 680–1 134 260	7–7	1.60+06	2.68−04	6.53−03	−2.727	C	2
103		^{1}F−^{1}D°		979.14	1 039 680–1 141 810	7–5	1.01+08	1.03−02	2.33−01	−1.142	C	2
104		^{1}F−^{1}F°		907.61	1 039 680–1 149 860	7–7	8.28+08	1.02−01	2.14+00	−0.146	B	2
105	$2p^3(^2D^\circ)3p-$ $2p^3(^2P^\circ)3d$	^{3}D−^{3}P°		*747.6*	*1 031 168–1 164 937*	15–9	6.02+07	3.03−03	1.12−01	−1.342	D+	2
				746.97	1 031 395–1 165 270	7–5	5.73+07	3.43−03	5.90−02	−1.620	C	2
				748.47	1 031 005–1 164 610	5–3	3.57+07	1.80−03	2.21−02	−2.046	D+	2
				749.95	1 030 908–1 164 250	3–1	3.69+07	1.04−03	7.69−03	−2.506	D+	2
				744.80	1 031 005–1 165 270	5–5	1.37+07	1.14−03	1.40−02	−2.244	D+	2
				747.93	1 030 908–1 164 610	3–3	1.25+07	1.04−03	7.71−03	−2.506	D+	2
				744.26	1 030 908–1 165 270	3–5	1.23+06	1.70−04	1.25−03	−3.292	D	2
106		^{3}D−^{3}D°		*724.9*	*1 031 168–1 169 110*	15–15	3.13+07	2.46−03	8.82−02	−1.433	D+	2
				724.87	1 031 395–1 169 350	7–7	3.11+07	2.45−03	4.09−02	−1.766	C	2
				726.30	1 031 005–1 168 690	5–5	1.34+07	1.06−03	1.26−02	−2.276	D	2
				722.85	1 030 908–1 169 250	3–3	1.90+07	1.49−03	1.06−02	−2.350	D+	2
				728.36	1 031 395–1 168 690	7–5	6.82+06	3.87−04	6.50−03	−2.567	D	2
				723.35	1 031 005–1 169 250	5–3	1.12+07	5.28−04	6.29−03	−2.578	D+	2
				722.83	1 031 005–1 169 350	5–7	5.15+06	5.64−04	6.71−03	−2.550	D+	2
				725.78	1 030 908–1 168 690	3–5	4.84+06	6.37−04	4.56−03	−2.719	D	2
107		^{3}F−^{3}D°		*754.8*	*1 036 626–1 169 110*	21–15	1.94+07	1.18−03	6.18−02	−1.606	D+	2
				754.57	1 036 825–1 169 350	9–7	2.03+07	1.35−03	3.01−02	−1.915	C	2
				756.92	1 036 576–1 168 690	7–5	9.45+06	5.80−04	1.01−02	−2.391	D	2
				752.37	1 036 336–1 169 250	5–3	2.09+07	1.06−03	1.32−02	−2.276	D+	2
				753.16	1 036 576–1 169 350	7–7	4.35+06	3.70−04	6.42−03	−2.587	D+	2
				755.55	1 036 336–1 168 690	5–5	1.49+06	1.27−04	1.58−03	−3.197	E+	2
				751.80	1 036 336–1 169 350	5–7	2.52+05	2.99−05	3.70−04	−3.825	E+	2
108		^{1}F−^{1}D°		763.53	1 039 680–1 170 650	7–5	9.68+07	6.04−03	1.06−01	−1.374	D+	2
109		^{1}F−^{1}F°		744.10	1 039 680–1 174 070	7–7	1.89+07	1.57−03	2.69−02	−1.959	D+	2
110	$2p^3(^2D^\circ)3p-$ $2p^3(^2D^\circ)4s$	^{3}D−^{3}D°		*410.88*	*1 031 168–1 274 550*	15–15	2.63+09	6.66−02	1.35+00	−0.000	C+	4
				411.260	1 031 395–1 274 550	7–7	2.58+09	6.53−02	6.19−01	−0.340	C+	4
				410.602	1 031 005–1 274 550	5–5	2.08+09	5.26−02	3.56−01	−0.580	C+	4
				410.438	1 030 908–1 274 550	3–3	1.91+09	4.82−02	1.95−01	−0.840	C	4

TABLE 24. Transition probabilities of allowed lines for Al VI (references in this table are as follows: 1=Butler and Zeippen,[7,8] 2=Tachiev and Froese Fischer,[71] 3=Vilkas *et al.*,[80] and 4=Biémont[3])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				411.260	1 031 395–1 274 550	7–5	8.65+07	1.57−03	1.48−02	−1.959	D+	4
				410.602	1 031 005–1 274 550	5–3	2.82+08	4.28−03	2.89−02	−1.670	D+	4
				410.602	1 031 005–1 274 550	5–7	3.04+08	1.07−02	7.26−02	−1.272	C	4
				410.438	1 030 908–1 274 550	3–5	3.79+08	1.60−02	6.47−02	−1.319	C	4
111		^{3}F−^{3}D°		*420.30*	*1 036 626–1 274 550*	21–15	3.96+09	7.49−02	2.18+00	0.197	C+	4
				420.654	1 036 825–1 274 550	9–7	3.64+09	7.51−02	9.36−01	−0.170	C+	4
				420.214	1 036 576–1 274 550	7–5	3.79+09	7.16−02	6.93−01	−0.300	C+	4
				419.791	1 036 336–1 274 550	5–3	4.37+09	6.93−02	4.79−01	−0.460	C+	4
				420.214	1 036 576–1 274 550	7–7	9.38+07	2.48−03	2.40−02	−1.760	D+	4
				419.791	1 036 336–1 274 550	5–5	2.34+08	6.18−03	4.27−02	−1.510	C	4
				419.791	1 036 336–1 274 550	5–7	8.00+05	2.96−05	2.04−04	−3.830	E+	4
112		^{1}F−^{1}D°		[417.415]	1 039 680–1 279 250	7–5	3.75+09	7.00−02	6.73−01	−0.310	C+	4
113	$2p^3(^2D°)3p$–$2p^3(^4S°)4d$	^{3}F−^{3}D°		*405.95*	*1 036 626–1 282 960*	21–15	3.07+08	5.42−03	1.52−01	−0.944	D	1
				406.281	1 036 825–1 282 960	9–7	2.82+08	5.42−03	6.52−02	−1.312	D+	LS
				405.871	1 036 576–1 282 960	7–5	2.73+08	4.82−03	4.51−02	−1.472	D	LS
				405.476	1 036 336–1 282 960	5–3	3.08+08	4.56−03	3.04−02	−1.642	D	LS
				405.871	1 036 576–1 282 960	7–7	2.45+07	6.04−04	5.65−03	−2.374	E	LS
				405.476	1 036 336–1 282 960	5–5	3.44+07	8.47−04	5.65−03	−2.373	E	LS
				405.476	1 036 336–1 282 960	5–7	6.93+05	2.39−05	1.60−04	−3.923	E	LS
114	$2p^3(^2D°)3p$–$2p^3(^2P°)4s$	^{3}D−^{3}P°				15–9						4
				[360.393]	1 031 395–1 308 870	7–5	5.03+08	7.00−03	5.81−02	−1.310	C	4
				[359.887]	1 031 005–1 308 870	5–5	5.93+07	1.15−03	6.82−03	−2.240	D+	4
				[359.761]	1 030 908–1 308 870	3–5	3.41+06	1.10−04	3.92−04	−3.481	E+	4
115	$2p^3(^2D°)3p$–$2p^3(^2D°)4d$	^{3}D−^{3}D°		*324.39*	*1 031 168–1 339 440*	15–15	3.96+09	6.25−02	1.00+00	−0.028	C	1
				324.628	1 031 395–1 339 440	7–7	3.51+09	5.55−02	4.15−01	−0.411	C	LS
				324.217	1 031 005–1 339 440	5–5	2.76+09	4.35−02	2.32−01	−0.663	C	LS
				324.115	1 030 908–1 339 440	3–3	2.98+09	4.69−02	1.50−01	−0.852	C	LS
				324.628	1 031 395–1 339 440	7–5	6.17+08	6.96−03	5.21−02	−1.312	D	LS
				324.217	1 031 005–1 339 440	5–3	9.92+08	9.38−03	5.01−02	−1.329	D	LS
				324.217	1 031 005–1 339 440	5–7	4.42+08	9.75−03	5.20−02	−1.312	D	LS
				324.115	1 030 908–1 339 440	3–5	5.94+08	1.56−02	4.99−02	−1.330	D	LS
116		^{3}D−^{3}P°				15–9						1
				320.590	1 031 395–1 343 320	7–5	1.28+09	1.41−02	1.04−01	−1.006	D+	LS
				320.190	1 031 005–1 343 320	5–5	2.29+08	3.52−03	1.86−02	−1.754	E+	LS
				320.090	1 030 908–1 343 320	3–5	1.53+07	3.92−04	1.24−03	−2.930	E	LS
117		^{3}F−^{3}D°		*330.24*	*1 036 626–1 339 440*	21–15	4.35+08	5.08−03	1.16−01	−0.972	D	1
				330.453	1 036 825–1 339 440	9–7	3.99+08	5.08−03	4.97−02	−1.340	D	LS
				330.181	1 036 576–1 339 440	7–5	3.87+08	4.52−03	3.44−02	−1.500	D	LS
				329.920	1 036 336–1 339 440	5–3	4.36+08	4.27−03	2.32−02	−1.671	E+	LS
				330.181	1 036 576–1 339 440	7–7	3.47+07	5.67−04	4.31−03	−2.401	E	LS
				329.920	1 036 336–1 339 440	5–5	4.87+07	7.94−04	4.31−03	−2.401	E	LS
				329.920	1 036 336–1 339 440	5–7	9.80+05	2.24−05	1.22−04	−3.951	E	LS
118		^{1}F−^{1}F°		[326.083]	1 039 680–1 346 350	7–7	2.35+09	3.74−02	2.81−01	−0.582	C	1

TABLE 24. Transition probabilities of allowed lines for Al VI (references in this table are as follows: 1=Butler and Zeippen,[7,8] 2=Tachiev and Froese Fischer,[71] 3=Vilkas *et al.*,[80] and 4=Biémont[3])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
119	$2p^3(^2P^\circ)3p$–$2p^3(^2D^\circ)3d$	$^3S-^3P^\circ$		1 302.2	1 064 493–*1 141 284*	3–9	2.46+07	1.88−02	2.41−01	−1.249	C	2
				1 309.12	1 064 493–1 140 880	3–5	3.67+06	1.57−03	2.03−02	−2.327	D+	2
				1 294.88	1 064 493–1 141 720	3–3	4.10+07	1.03−02	1.32−01	−1.510	C	2
				1 290.21	1 064 493–1 142 000	3–1	8.42+07	7.01−03	8.93−02	−1.677	C	2
120	$2p^3(^2P^\circ)3p$–$2p^3(^2P^\circ)3d$	$^3S-^3P^\circ$		*995.6*	1 064 493–*1 164 937*	3–9	9.45+08	4.21−01	4.14+00	0.101	B	2
				992.29	1 064 493–1 165 270	3–5	9.84+08	2.42−01	2.37+00	−0.139	B	2
				998.83	1 064 493–1 164 610	3–3	9.08+08	1.36−01	1.34+00	−0.389	B	2
				1 002.44	1 064 493–1 164 250	3–1	8.65+08	4.35−02	4.30−01	−0.884	C+	2
121	$2p^3(^2P^\circ)3p$–$2p^3(^2P^\circ)4s$	$^3S-^3P^\circ$				3–9						4
				[409.204]	1 064 493–1 308 870	3–5	2.41+08	1.01−02	4.07−02	−1.519	C	4
122	$2s^22p^3(^4S^\circ)3d$–$2s2p^4(^4P)3s$	$^3D^\circ-^3P$		*792.6*	*1 079 524–1 205 687*	15–9	2.37+07	1.34−03	5.24−02	−1.697	E+	1
				800.58	1 079 610–1 204 520	7–5	1.94+07	1.33−03	2.45−02	−2.031	D	LS
				784.78	1 079 456–1 206 880	5–3	1.82+07	1.01−03	1.30−02	−2.297	E+	LS
				778.19	1 079 437–1 207 940	3–1	2.50+07	7.58−04	5.83−03	−2.643	E	LS
				799.59	1 079 456–1 204 520	5–5	3.46+06	3.32−04	4.37−03	−2.780	E	LS
				784.66	1 079 437–1 206 880	3–3	6.11+06	5.64−04	4.37−03	−2.772	E	LS
				799.47	1 079 437–1 204 520	3–5	2.31+05	3.69−05	2.91−04	−3.956	E	LS
123	$2s^22p^3(^2D^\circ)3d$–$2s2p^4(^4P)3s$	$^3D^\circ-^3P$		*1 400.0*	*1 134 260–1 205 687*	15–9	1.29+07	2.28−03	1.57−01	−1.466	D	1
				1 423.28	1 134 260–1 204 520	7–5	1.03+07	2.24−03	7.35−02	−1.805	D+	LS
				1 377.03	1 134 260–1 206 880	5–3	1.02+07	1.74−03	3.94−02	−2.060	D	LS
				1 357.22	1 134 260–1 207 940	3–1	1.41+07	1.30−03	1.74−02	−2.409	E+	LS
				1 423.28	1 134 260–1 204 520	5–5	1.84+06	5.60−04	1.31−02	−2.553	E+	LS
				1 377.03	1 134 260–1 206 880	3–3	3.39+06	9.64−04	1.31−02	−2.539	E+	LS
				1 423.28	1 134 260–1 204 520	3–5	1.23+05	6.22−05	8.74−04	−3.729	E	LS
124		$^3P^\circ-^3P$		*1 552.7*	*1 141 284–1 205 687*	9–9	1.14+07	4.13−03	1.90−01	−1.430	D	1
				1 571.34	1 140 880–1 204 520	5–5	8.27+06	3.06−03	7.91−02	−1.815	D+	LS
				1 534.68	1 141 720–1 206 880	3–3	2.95+06	1.04−03	1.58−02	−2.506	E+	LS
				1 515.15	1 140 880–1 206 880	5–3	5.13+06	1.06−03	2.64−02	−2.276	D	LS
				1 510.12	1 141 720–1 207 940	3–1	1.24+07	1.41−03	2.10−02	−2.374	E+	LS
				1 592.36	1 141 720–1 204 520	3–5	2.65+06	1.68−03	2.64−02	−2.298	D	LS
				1 541.31	1 142 000–1 206 880	1–3	3.88+06	4.15−03	2.11−02	−2.382	E+	LS
125		$^3S^\circ-^3P$		*1 649.4*	1 145 060–*1 205 687*	3–9	2.68+06	3.28−03	5.34−02	−2.007	E+	1
				1 681.80	1 145 060–1 204 520	3–5	2.53+06	1.79−03	2.97−02	−2.270	D	LS
				1 617.60	1 145 060–1 206 880	3–3	2.83+06	1.11−03	1.77−02	−2.478	E+	LS
				1 590.33	1 145 060–1 207 940	3–1	2.99+06	3.78−04	5.94−03	−2.945	E	LS
126	$2s^22p^3(^2D^\circ)3d$–$2s2p^4(^2D)3s$	$^3D^\circ-^3D$				15–15						1
				628.81	1 134 260–1 293 290	7–7	1.86+08	1.10−02	1.59−01	−1.114	C	LS
				629.17	1 134 350–1 293 290	5–7	2.33+07	1.93−03	2.00−02	−2.015	E+	LS
127		$^3P^\circ-^3D$				9–15						1
				656.12	1 140 880–1 293 290	5–7	4.36+07	3.94−03	4.26−02	−1.706	D	LS

TABLE 24. Transition probabilities of allowed lines for Al VI (references in this table are as follows: 1 = Butler and Zeippen,[7,8] 2 = Tachiev and Froese Fischer,[71] 3 = Vilkas *et al.*,[80] and 4 = Biémont[3])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
128	$2s^22p^3(^2P^\circ)3d$–$2s2p^4(^4P)3s$	$^3D^\circ - ^3P$	*2 733*	*2 734*	*1 169 110–1 205 687*	15–9	1.98+06	1.33−03	1.79−01	−1.700	D	1
			2 842.5	2 843.3	1 169 350–1 204 520	7–5	1.48+06	1.28−03	8.39−02	−2.048	D+	LS
			2 617.7	2 618.5	1 168 690–1 206 880	5–3	1.69+06	1.04−03	4.48−02	−2.284	D	LS
			2 583.9	2 584.6	1 169 250–1 207 940	3–1	2.34+06	7.80−04	1.99−02	−2.631	E+	LS
			2 790.1	2 791.0	1 168 690–1 204 520	5–5	2.78+05	3.25−04	1.49−02	−2.789	E+	LS
			2 656.7	2 657.5	1 169 250–1 206 880	3–3	5.37+05	5.69−04	1.49−02	−2.768	E+	LS
			2 834.4	2 835.3	1 169 250–1 204 520	3–5	1.77+04	3.56−05	9.97−04	−3.971	E	LS
129	$2s^22p^3(^2P^\circ)3d$–$2s2p^4(^2S)3s$	$^3P^\circ - ^3S$		*512.86*	*1 164 937*–1 359 920	9–3	2.13+08	2.80−03	4.26−02	−1.599	E+	1
				513.743	1 165 270–1 359 920	5–3	1.18+08	2.80−03	2.37−02	−1.854	D	LS
				512.007	1 164 610–1 359 920	3–3	7.15+07	2.81−03	1.42−02	−2.074	E+	LS
				511.065	1 164 250–1 359 920	1–3	2.39+07	2.81−03	4.73−03	−2.551	E	LS
130	$2s2p^4(^4P)3s$–$2s^22p^3(^2D^\circ)4s$	$^3P - ^3D^\circ$		*1 452.2*	*1 205 687–1 274 550*	9–15	3.14+06	1.65−03	7.11−02	−1.828	E+	1
				1 427.96	1 204 520–1 274 550	5–7	3.29+06	1.41−03	3.31−02	−2.152	D	LS
				1 477.76	1 206 880–1 274 550	3–5	2.24+06	1.22−03	1.78−02	−2.437	E+	LS
				1 501.28	1 207 940–1 274 550	1–3	1.58+06	1.60−03	7.91−03	−2.796	E+	LS
				1 427.96	1 204 520–1 274 550	5–5	8.24+05	2.52−04	5.92−03	−2.900	E	LS
				1 477.76	1 206 880–1 274 550	3–3	1.24+06	4.06−04	5.93−03	−2.914	E	LS
				1 427.96	1 204 520–1 274 550	5–3	9.16+04	1.68−05	3.95−04	−4.076	E	LS
131	$2s2p^4(^4P)3s$–$2s^22p^3(^4S^\circ)4d$	$^3P - ^3D^\circ$		*1 294.1*	*1 205 687–1 282 960*	9–15	1.56+08	6.53−02	2.50+00	−0.231	C+	1
				1 274.86	1 204 520–1 282 960	5–7	1.63+08	5.57−02	1.17+00	−0.555	B	LS
				1 314.41	1 206 880–1 282 960	3–5	1.12+08	4.82−02	6.26−01	−0.840	C+	LS
				1 332.98	1 207 940–1 282 960	1–3	7.93+07	6.34−02	2.78−01	−1.198	C	LS
				1 274.86	1 204 520–1 282 960	5–5	4.08+07	9.94−03	2.09−01	−1.304	C	LS
				1 314.41	1 206 880–1 282 960	3–3	6.22+07	1.61−02	2.09−01	−1.316	C	LS
				1 274.86	1 204 520–1 282 960	5–3	4.54+06	6.63−04	1.39−02	−2.480	E+	LS
132	$2s2p^4(^4P)3s$–$2s^22p^3(^2P^\circ)4s$	$^3P - ^3P^\circ$				9–9						1
				[958.31]	1 204 520–1 308 870	5–5	1.83+07	2.52−03	3.98−02	−1.900	D	LS
				[980.49]	1 206 880–1 308 870	3–5	5.70+06	1.37−03	1.33−02	−2.386	E+	LS
133	$2s2p^4(^4P)3s$–$2s^22p^3(^2D^\circ)4d$	$^3P - ^3D^\circ$		*747.6*	*1 205 687–1 339 440*	9–15	8.97+07	1.25−02	2.77−01	−0.949	D+	1
				741.18	1 204 520–1 339 440	5–7	9.19+07	1.06−02	1.29−01	−1.276	D+	LS
				754.38	1 206 880–1 339 440	3–5	6.55+07	9.32−03	6.94−02	−1.553	D+	LS
				760.46	1 207 940–1 339 440	1–3	4.73+07	1.23−02	3.08−02	−1.910	D	LS
				741.18	1 204 520–1 339 440	5–5	2.31+07	1.90−03	2.32−02	−2.022	E+	LS
				754.38	1 206 880–1 339 440	3–3	3.65+07	3.11−03	2.32−02	−2.030	E+	LS
				741.18	1 204 520–1 339 440	5–3	2.55+06	1.26−04	1.54−03	−3.201	E	LS
134		$^3P - ^3P^\circ$				9–9						1
				720.46	1 204 520–1 343 320	5–5	1.77+08	1.38−02	1.64−01	−1.161	C	LS
				732.92	1 206 880–1 343 320	3–5	5.61+07	7.53−03	5.45−02	−1.646	D	LS
135	$2s^22p^3(^2D^\circ)4s$–$2s2p^4(^2D)3s$	$^3D^\circ - ^3D$				15–15						1
			5 334.7	5 336.2	1 274 550–1 293 290	7–7	9.32+06	3.98−02	4.89+00	−0.555	B+	LS
			5 334.7	5 336.2	1 274 550–1 293 290	5–7	1.17+06	6.99−03	6.14−01	−1.457	C+	LS

TABLE 24. Transition probabilities of allowed lines for Al VI (references in this table are as follows: 1=Butler and Zeippen,[7,8] 2=Tachiev and Froese Fischer,[71] 3=Vilkas *et al.*,[80] and 4=Biémont[3])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
136	$2s^22p^3(^4S^\circ)4d$–$2s2p^4(^2D)3s$	$^3D^\circ-^3D$				15–15						1
			9 678	9 681	1 282 960–1 293 290	7–7	4.59+04	6.45−04	1.44−01	−2.345	C	LS
			9 678	9 681	1 282 960–1 293 290	5–7	5.75+03	1.13−04	1.80−02	−3.248	E+	LS
137	$2s2p^4(^2D)3s$–$2s^22p^3(^2P^\circ)4s$	$^3D-^3P^\circ$				15–9						1
			[6 417]	[6 418]	1 293 290–1 308 870	7–5	7.93+05	3.50−03	5.18−01	−1.611	C+	LS
138	$2s2p^4(^2D)3s$–$2s^22p^3(^2D^\circ)4d$	$^3D-^3D^\circ$				15–15						1
			2 166.2	2 166.8	1 293 290–1 339 440	7–7	1.15+08	8.13−02	4.06+00	−0.245	B+	LS
			2 166.2	2 166.8	1 293 290–1 339 440	7–5	2.03+07	1.02−02	5.09−01	−1.146	C+	LS
139		$^3D-^3P^\circ$				15–9						1
				1 998.8	1 293 290–1 343 320	7–5	4.11+07	1.76−02	8.11−01	−0.909	C+	LS
140	$2s^22p^3(^2P^\circ)4s$–$2s2p^4(^2S)3s$	$^3P^\circ-^3S$				9–3						1
				[1 958.9]	1 308 870–1 359 920	5–3	4.61+07	1.59−02	5.13−01	−1.100	C+	LS

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

4.6.2. Forbidden Transitions for Al VI

The Tachiev and Froese Fischer[71] results are the product of extensive MCHF calculations with Breit-Pauli corrections to order α^2, with energy corrections. Gaigalas *et al.*[23] used a second-order MBPT to compute transition rates.

To estimate accuracies, we pooled the RSDM of each of the lines for which a transition rate is given by two or more references,[23,71] as discussed in the introduction to Kelleher and Podobedova.[35] However, Ref. 23 contains only data for transitions from energy levels below 1 135 000 cm^{-1}. Next we isoelectronically averaged the logarithmic quality factors observed for allowed O-like lines from the lower-lying levels of Na IV, Mg V, and Si VII and applied the result to forbidden lines of Al VI using the method described in the introduction to Kelleher and Podobedova.[35]

References for Forbidden Transitions for Al VI

[23]G. Gaigalas, J. Kaniauskas, R. Kisielius, G. Merkelis, and M. J. Vilkas, Phys. Scr. **49**, 135 (1994)

[35]D. E. Kelleher and L. I. Podobedova, J. Phys. Chem. Ref. Data **37**, 267 (2008).

[69]G. Tachiev and C. Froese Fischer, Astron. Astrophys. **385**, 716 (2002).

[71]G. Tachiev and C. Froese Fischer, http://www.vuse.vanderbilt.edu/~cff/mchf_collection/ (MCHF, *ab initio*, downloaded on February 17, 2004); see Ref. 69.

TABLE 25. Wavelength finding list for forbidden lines of Al VI

Wavelength (vac) (Å)	Mult. No.
99.675	23
99.947	23
100.616	22
100.638	22
100.647	22
100.894	22
100.916	22
101.006	22
103.057	18
103.348	18
103.465	18
103.940	25
104.047	17
104.344	17
104.464	17
104.964	24
104.988	24
104.998	24
107.623	20
108.704	19
109.516	13
109.844	13
110.417	26
111.819	12
112.162	12
112.300	12
114.562	21
114.686	15
117.215	14
124.056	16
132.340	10
132.820	10
139.966	11
221.535	6
222.884	6
231.147	29
243.766	8
305.984	5
307.249	5
309.596	5
309.850	5
312.237	5
313.310	5
350.081	7
351.739	7
354.818	7
425.914	9
778.85	28
794.11	28
802.69	28
917.73	36
1 004.28	35
1 006.45	35
1 109.23	38
1 133.62	3
1 169.85	3
1 238.21	37
1 241.51	37
1 242.88	50
1 315.10	32
1 497.01	31
1 747.40	34
Wavelength (air) (Å)	**Mult. No.**
2 083.2	33
2 124.9	4
2 370.9	41
2 428.4	2
2 601.0	2
2 677.4	2
3 036.3	43
3 050.3	40
3 070.5	40
3 078.9	40
4 248.0	55
4 287.1	42
5 314.3	30
10 312	45
10 407	45
10 646	45
10 820	39
Wavenumber (cm^{-1})	**Mult. No.**
3 829	1
3 813	27
2 732	1
2 467	27
1 346	27
1 097	1
215	44
89	44

TABLE 26. Transition probabilities of forbidden lines for Al VI (references in this table are as follows: 1=Tachiev and Froese Fischer[71] and 2=Gaigalas *et al.*[23])

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	$2p^4-2p^4$	$^3P-^3P$									
				3 829 cm^{-1}	0–3 829	5–1	E2	4.84−06	5.25−02	B+	1,2
				2 732 cm^{-1}	0–2 732	5–3	M1	4.57−01	2.49+00	A	1,2
				2 732 cm^{-1}	0–2 732	5–3	E2	6.65−07	1.17−01	B+	1,2
				1 097 cm^{-1}	2 732–3 829	3–1	M1	7.16−02	2.01+00	A	1,2
2		$^3P-^1D$									
			2 677.4	2 678.2	3 829–41 167	1–5	E2	1.10−04	6.79−05	C	2
			2 601.0	2 601.8	2 732–41 167	3–5	M1	1.36+00	4.45−03	B	1,2
			2 601.0	2 601.8	2 732–41 167	3–5	E2	3.95−04	2.10−04	C+	1,2
			2 428.4	2 429.1	0–41 167	5–5	M1	5.01+00	1.33−02	B	1,2
			2 428.4	2 429.1	0–41 167	5–5	E2	3.73−03	1.41−03	B	1,2
3		$^3P-^1S$									
				1 133.62	0–88 213	5–1	E2	5.08−02	8.50−05	C+	1,2
				1 169.85	2 732–88 213	3–1	M1	5.75+01	3.41−03	B	1,2
4		$^1D-^1S$									
			2 124.9	2 125.6	41 167–88 213	5–1	E2	4.86+00	1.88−01	B+	1,2
5	$2s^22p^4-2s2p^5$	$^3P-^3P^\circ$									
				309.596	0–323 002	5–5	M2	1.00+01	9.59+00	B	1
				309.850	2 732–325 469	3–3	M2	6.45+00	3.71+00	B	1
				305.984	0–326 815	5–1	M2	6.12+00	1.10+00	B	1
				307.249	0–325 469	5–3	M2	1.76−02	9.70−03	C	1
				312.237	2 732–323 002	3–5	M2	7.35−04	7.31−04	D+	1
				313.310	3 829–323 002	1–5	M2	1.41+00	1.42+00	B	1
6		$^3P-^1P^\circ$									
				222.884	2 732–451 396	3–3	M2	1.62+01	1.79+00	B	1
				221.535	0–451 396	5–3	M2	4.77+01	5.12+00	B	1
7		$^1D-^3P^\circ$									
				350.081	41 167–326 815	5–1	M2	6.69+00	2.36+00	B	1
				351.739	41 167–325 469	5–3	M2	4.60+00	4.98+00	B	1
				354.818	41 167–323 002	5–5	M2	1.80+00	3.40+00	B	1
8		$^1D-^1P^\circ$									
				243.766	41 167–451 396	5–3	M2	5.63−01	9.75−02	C+	1
9		$^1S-^3P^\circ$									
				425.914	88 213–323 002	1–5	M2	8.11−01	3.81+00	B	1
10	$2s^22p^4-2p^6$	$^3P-^1S$									
				132.340	0–755 628	5–1	E2	6.75+02	2.45−05	C	1,2
				132.820	2 732–755 628	3–1	M1	1.42+01	1.26−06	D+	1,2
11		$^1D-^1S$									
				139.966	41 167–755 628	5–1	E2	2.93+05	1.40−02	B	1,2
12	$2p^4-2p^3(^4S^\circ)3s$	$^3P-^5S^\circ$									
				[111.819]	0–894 300	5–5	M2	9.03+01	5.29−01	C+	1
				[112.162]	2 732–894 300	3–5	M2	1.08+02	6.44−01	C+	1
				[112.300]	3 829–894 300	1–5	M2	4.70+01	2.81−01	C+	1
13		$^3P-^3S^\circ$									
				109.516	0–913 112	5–3	M2	4.26+01	1.35−01	C+	1
				109.844	2 732–913 112	3–3	M2	1.32+01	4.24−02	C	1
14		$^1D-^5S^\circ$									

TABLE 26. Transition probabilities of forbidden lines for Al VI (references in this table are as follows: 1=Tachiev and Froese Fischer[71] and 2=Gaigalas *et al.*[23])—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
				[117.215]	41 167–894 300	5–5	M2	3.09−02	2.29−04	D+	1
15		^{1}D−^{3}S°									
				114.686	41 167–913 112	5–3	M2	5.29−03	2.11−05	D	1
16		^{1}S−^{5}S°									
				[124.056]	88 213–894 300	1–5	M2	1.31−03	1.30−05	D	1
17	$2p^4-2p^3(^2D°)3s$	^{3}P−^{3}D°									
				104.344	2 732–961 100	3–7	M2	4.47+01	2.59−01	C+	1
				104.464	3 829–961 100	1–5	M2	4.01+01	1.67−01	C+	1
				104.047	0–961 100	5–7	M2	9.26+01	5.30−01	C+	1
				104.344	2 732–961 100	3–5	M2	5.05+01	2.10−01	C+	1
				104.047	0–961 100	5–5	M2	2.96+00	1.21−02	C	1
				104.344	2 732–961 100	3–3	M2	1.68+01	4.18−02	C	1
				104.047	0–961 100	5–3	M2	2.31+01	5.68−02	C+	1
18		^{3}P−^{1}D°									
				103.465	3 829–970 340	1–5	M2	2.05+01	8.15−02	C+	1
				103.348	2 732–970 340	3–5	M2	5.70+01	2.25−01	C+	1
				103.057	0–970 340	5–5	M2	6.04+01	2.35−01	C+	1
19		^{1}D−^{3}D°									
				108.704	41 167–961 100	5–5	M2	1.44+02	7.31−01	B	1
				108.704	41 167–961 100	5–3	M2	6.11+01	1.87−01	C+	1
				108.704	41 167–961 100	5–7	M2	1.62+02	1.15+00	B	1
20		^{1}D−^{1}D°									
				107.623	41 167–970 340	5–5	M2	1.54+00	7.47−03	C	1
21		^{1}S−^{3}D°									
				114.562	88 213–961 100	1–5	M2	1.47−01	9.75−04	D+	1
22	$2p^4-2p^3(^2P°)3s$	^{3}P−^{3}P°									
				100.616	0–993 874	5–5	M2	1.60+02	5.54−01	C+	1
				100.916	2 732–993 659	3–3	M2	1.38+02	2.90−01	C+	1
				100.647	0–993 570	5–1	M2	1.23+02	8.53−02	C+	1
				100.638	0–993 659	5–3	M2	1.32−01	2.75−04	D+	1
				100.894	2 732–993 874	3–5	M2	3.81−01	1.34−03	D+	1
				101.006	3 829–993 874	1–5	M2	3.52+01	1.24−01	C+	1
23		^{3}P−^{1}P°									
				99.947	2 732–1 003 265	3–3	M2	5.41+01	1.09−01	C+	1
				99.675	0–1 003 265	5–3	M2	1.63+02	3.23−01	C+	1
24		^{1}D−^{3}P°									
				104.998	41 167–993 570	5–1	M2	2.02+02	1.73−01	C+	1
				104.988	41 167–993 659	5–3	M2	1.32+02	3.40−01	C+	1
				104.964	41 167–993 874	5–5	M2	4.43+01	1.89−01	C+	1
25		^{1}D−^{1}P°									
				103.940	41 167–1 003 265	5–3	M2	1.02+01	2.49−02	C	1
26		^{1}S−^{3}P°									
				110.417	88 213–993 874	1–5	M2	8.40+01	4.62−01	C+	1
27	$2s2p^5-2s2p^5$	^{3}P°−^{3}P°									
				3 813 cm^{-1}	323 002–326 815	5–1	M1	3.41−01	2.28−01	B	2
				3 813 cm^{-1}	323 002–326 815	5–1	E2	4.58−06	5.07−02	B	2
				2 467 cm^{-1}	323 002–325 469	5–3	M1	3.37−01	2.50+00	B+	1
				2 467 cm^{-1}	323 002–325 469	5–3	E2	3.94−07	1.15−01	B	2

TABLE 26. Transition probabilities of forbidden lines for Al VI (references in this table are as follows: 1=Tachiev and Froese Fischer[71] and 2=Gaigalas *et al.*[23])—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
				1 346 cm^{-1}	325 469–326 815	3–1	M1	1.31−01	1.99+00	A	1,2
28		$^3P°-^1P°$									
				794.11	325 469–451 396	3–3	M1	5.11+00	2.84−04	C+	1,2
				794.11	325 469–451 396	3–3	E2	8.91−02	7.54−05	C	2
				778.85	323 002–451 396	5–3	M1	9.02+00	4.74−04	C+	1,2
				778.85	323 002–451 396	5–3	E2	2.88−02	2.21−05	C	2
				802.69	326 815–451 396	1–3	M1	6.47+00	3.72−04	C	1
29	$2s2p^5-2p^6$	$^3P°-^1S$									
				231.147	323 002–755 628	5–1	M2	1.36+02	6.00+00	B	1
30	$2p^3(^4S°)3s-$ $2p^3(^4S°)3s$	$^5S°-^3S°$									
			[5 314.3]	[5 315.8]	894 300–913 112	5–3	M1	4.29−05	7.16−07	D+	1
31	$2p^3(^4S°)3s-$ $2p^3(^2D°)3s$	$^5S°-^3D°$									
				[1 497.01]	894 300–961 100	5–7	M1	1.13−02	9.80−06	C	1
				[1 497.01]	894 300–961 100	5–5	M1	2.33−01	1.45−04	C	1
				[1 497.01]	894 300–961 100	5–3	M1	7.77−02	2.90−05	C	1
32		$^5S°-^1D°$									
				[1 315.10]	894 300–970 340	5–5	M1	2.97−01	1.25−04	C	1
33		$^3S°-^3D°$									
			2 083.2	2 083.9	913 112–961 100	3–5	M1	3.67−02	6.16−05	C	1
			2 083.2	2 083.9	913 112–961 100	3–3	M1	2.10−01	2.11−04	C	1
34		$^3S°-^1D°$									
				1 747.40	913 112–970 340	3–5	M1	6.11−03	6.04−06	D+	1
35	$2p^3(^4S°)3s-$ $2p^3(^2P°)3s$	$^5S°-^3P°$									
				[1 004.28]	894 300–993 874	5–5	M1	2.86+01	5.38−03	C+	1
				[1 006.45]	894 300–993 659	5–3	M1	1.62+01	1.84−03	C+	1
36		$^5S°-^1P°$									
				[917.73]	894 300–1 003 265	5–3	M1	6.35−04	5.46−08	D	1
37		$^3S°-^3P°$									
				1 238.21	913 112–993 874	3–5	M1	2.57+00	9.04−04	C+	1
				1 241.51	913 112–993 659	3–3	M1	2.36+00	5.02−04	C+	1
				1 242.88	913 112–993 570	3–1	M1	1.06+01	7.53−04	C+	1
38		$^3S°-^1P°$									
				1 109.23	913 112–1 003 265	3–3	M1	2.34+01	3.56−03	C+	1
39	$2p^3(^2D°)3s-$ $2p^3(^2D°)3s$	$^3D°-^1D°$									
			10 820	10 823	961 100–970 340	5–5	M1	2.11−04	4.96−05	C	1
			10 820	10 823	961 100–970 340	7–5	M1	2.06−03	4.85−04	C+	1
			10 820	10 823	961 100–970 340	3–5	M1	9.07−04	2.13−04	C	1
40	$2p^3(^2D°)3s-$ $2p^3(^2P°)3s$	$^3D°-^3P°$									
			3 050.3	3 051.2	961 100–993 874	7–5	M1	4.59+00	2.42−02	B	1
			3 070.5	3 071.3	961 100–993 659	5–3	M1	1.32−03	4.25−06	D+	1
			3 078.9	3 079.8	961 100–993 570	3–1	M1	5.33+00	5.77−03	C+	1
			3 050.3	3 051.2	961 100–993 874	5–5	M1	3.32+00	1.75−02	B	1
			3 070.5	3 071.3	961 100–993 659	3–3	M1	5.31+00	1.71−02	B	1

TABLE 26. Transition probabilities of forbidden lines for Al VI (references in this table are as follows: 1=Tachiev and Froese Fischer[71] and 2=Gaigalas *et al.*[23])—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
			3 050.3	3 051.2	961 100–993 874	3–5	M1	8.73−01	4.60−03	C+	1
41		$^3D^\circ - ^1P^\circ$									
			2 370.9	2 371.6	961 100–1 003 265	5–3	M1	1.04+01	1.55−02	B	1
			2 370.9	2 371.6	961 100–1 003 265	3–3	M1	3.63+00	5.39−03	C+	1
42		$^1D^\circ - ^3P^\circ$									
			4 287.1	4 288.3	970 340–993 659	5–3	M1	1.94+00	1.70−02	B	1
			4 248.0	4 249.2	970 340–993 874	5–5	M1	3.53+00	5.02−02	B	1
43		$^1D^\circ - ^1P^\circ$									
			3 036.3	3 037.2	970 340–1 003 265	5–3	M1	2.06−03	6.42−06	D+	1
44	$2p^3(^2P^\circ)3s$–$2p^3(^2P^\circ)3s$	$^3P^\circ - ^3P^\circ$									
				215 cm^{-1}	993 659–993 874	3–5	M1	1.33−04	2.48+00	B+	1
				89 cm^{-1}	993 570–993 659	1–3	M1	1.26−05	1.99+00	B+	1
45		$^3P^\circ - ^1P^\circ$									
			10 407	10 410	993 659–1 003 265	3–3	M1	6.57−04	8.24−05	C	1
			10 646	10 648	993 874–1 003 265	5–3	M1	4.37−03	5.87−04	C+	1
			10 312	10 315	993 570–1 003 265	1–3	M1	1.53−03	1.86−04	C	1

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

4.7. Al VII

Nitrogen isoelectronic sequence
Ground state: $1s^2 2s^2 2p^3\ ^4S^o_{3/2}$
Ionization energy: 241.76 eV (1 949 900 cm^{-1})

4.7.1. Allowed Transitions for Al VII

Only OP (Ref. 4) results were available for energy levels above the $2p^2 3d$. Data of Tachiev and Froese Fischer[71] are the product of extensive MCHF calculations with Breit-Pauli corrections to order α^2. We also cite the second-order MBPT results of Merkelis *et al.*[51] Biémont[3] applied the relativistic version of the COWAN code with scaling of the *ab initio* Slater parameters.

To estimate accuracies, we pooled the RSDM for each of the lines with transition rates published in two or more references,[3,4,51,71] as described in the introduction to Kelleher and Podobedova.[35] For this purpose the spin-allowed and intercombination data were treated separately, and the latter of these were in turn divided into two upper-level energy groups below and above 1 250 000 cm^{-1}. Lines from the OP constituted a fifth group. We then isoelectronically averaged the logarithmic quality factors observed for N-like lines of Na V, Mg VI, Al VII, and Si VIII using the method described in the introduction to Kelleher and Podobedova.[35] For the higher-lying intercombination lines and those from the OP data, we scaled the logarithmic quality factor of the lower-lying lines.

To estimate the accuracy of the lines from higher-lying levels for Tachiev and Froese,[71] we conservatively scaled the pooling parameters of the lower transitions to yield reduced accuracies, particularly at smaller line strengths. The listed accuracies for these higher-lying transitions are thus less well established than for those from lower levels.

References for Allowed Transitions for Al VII

[3]E. Biémont, At. Data Nucl. Data Tables **48** 1 (1991).
[4]V. M. Burke and D. L. Lennon, to be published, http://legacy.gsfc.nasa.gov/topbase, downloaded on July 28, 1995 (Opacity Project).
[35]D. E. Kelleher and L. I. Podobedova, J. Phys. Chem. Ref. Data **37**, 267 (2008).
[51]G. Merkelis, M. J. Vilkas, R. Kisielius, G. Gaigalas, and I. Martinson, Phys. Scr. **56**, 41 (1997).
[69]G. Tachiev and C. Froese Fischer, Astron. Astrophys. **385**, 716 (2002).
[71]G. Tachiev and C. Froese Fischer, http://www.vuse.vanderbilt.edu/~cff/mchf_collection/ (MCHF, *ab initio*, downloaded on February 17, 2004); see Ref. 69.

TABLE 27. Wavelength finding list for allowed lines of Al VII

Wavelength (vac) (Å)	Mult. No.
58.751	44
59.824	45
59.911	45
59.913	45
64.480	42
64.482	42
64.510	42
64.513	42

TABLE 27. Wavelength finding list for allowed lines of Al VII—Continued

Wavelength (vac) (Å)	Mult. No.
64.701	40
64.809	38
64.816	40
64.818	40
65.016	39
65.018	39
65.863	43
65.883	43
65.894	43
66.410	41
66.422	41
68.501	55
68.513	55
68.530	55
68.617	55
68.629	55
68.678	55
72.276	35
72.278	35
74.095	36
74.098	36
75.276	22
75.307	22
75.364	22
75.808	54
75.854	32
75.857	32
75.869	53
75.872	21
75.901	32
75.911	37
75.917	21
75.927	37
75.950	54
76.011	53
76.025	54
76.086	53
76.222	52
76.257	52
76.343	52
76.366	52
76.380	31
76.384	31
76.401	52
76.415	31
76.419	52
76.442	52
76.549	30
76.552	30
76.578	30
77.758	34
77.774	34
77.808	34
77.824	34
77.896	26
77.900	26
77.943	26

TABLE 27. Wavelength finding list for allowed lines of Al VII—Continued

Wavelength (vac) (Å)	Mult. No.
77.947	26
78.328	33
78.349	33
78.365	33
79.018	25
79.201	25
79.204	25
79.270	24
79.273	24
79.637	23
79.687	23
79.691	23
79.923	29
79.955	29
79.972	29
81.352	28
81.370	28
81.739	27
81.757	27
81.792	27
81.810	27
83.832	51
84.006	51
84.098	51
85.710	13
85.915	13
86.668	20
86.688	20
86.885	12
87.059	12
87.169	12
88.027	18
88.031	18
90.546	15
90.551	15
90.602	19
90.624	19
90.775	15
91.858	14
91.863	14
92.052	14
92.057	14
92.175	14
93.273	17
93.297	17
93.516	17
93.539	17
94.690	16
94.872	16
94.896	16
95.003	16
95.027	16
95.974	50
96.202	50
96.322	50
147.89	63
148.759	63

TABLE 27. Wavelength finding list for allowed lines of Al VII—Continued

Wavelength (vac) (Å)	Mult. No.
155.065	62
155.263	62
156.021	62
156.221	62
157.282	61
157.431	61
158.416	61
163.848	60
164.055	60
165.125	60
171.745	59
171.978	59
172.918	59
173.154	59
195.053	58
196.568	58
208.047	4
209.341	4
216.179	57
218.041	57
218.804	46
219.428	46
219.515	46
220.712	46
220.721	3
221.180	68
221.347	46
221.695	67
221.892	68
222.410	67
223.030	68
223.554	67
224.548	66
224.744	66
225.281	66
225.479	66
225.780	66
226.655	66
226.958	66
232.035	56
233.541	56
234.181	56
235.716	56
239.036	7
240.263	74
240.414	74
240.622	74
240.745	7
240.778	7
242.049	75
242.201	75
242.412	75
242.630	75
242.783	75
242.960	75
259.029	11
259.128	2

TABLE 27. Wavelength finding list for allowed lines of Al VII—Continued

Wavelength (vac) (Å)	Mult. No.
259.161	2
259.208	11
261.037	11
261.219	11
263.193	79
278.973	10
279.181	10
280.505	84
280.536	84
280.710	84
280.741	84
280.994	84
282.654	47
285.804	47
285.845	47
306.880	65
308.252	65
309.026	6
309.074	6
309.080	6
309.128	6
310.453	65
343.280	9
343.594	9
343.653	9
348.870	48
352.150	1
353.744	48
353.769	1
356.888	1
364.378	70
367.080	73
368.419	73
368.501	72
369.181	73
369.850	72
370.617	72
377.003	71
377.843	71
377.858	71
378.415	71
378.659	71
379.219	71
379.262	71
381.665	49
386.041	49
387.507	49
392.019	49
436.605	86
451.147	5
452.796	78
453.809	5
453.924	5
458.953	5
459.071	5
463.435	83
463.521	83

TABLE 27. Wavelength finding list for allowed lines of Al VII—Continued

Wavelength (vac) (Å)	Mult. No.
465.701	82
465.788	82
478.560	81
479.363	81
479.455	81
480.723	81
480.815	81
507.511	90
508.182	90
509.113	90
528.075	8
528.818	8
531.725	8
532.479	8
539.575	8
571.59	64
576.37	64
584.11	64
684.18	69
688.85	69
691.52	69
904.65	91
909.50	91
963.11	92
972.95	93
1 117.07	80
1 117.57	80
1 429.80	85
1 627.87	77
1 628.93	77
1 775.57	89
1 809.3	88
Wavelength (air) (Å)	**Mult. No.**
2 033.9	87
2 058.6	87
2 635.0	94
2 653.1	94
2 678.7	94
15 869	76
17 417	76

TABLE 28. Transition probabilities of allowed lines for Al VII (references in this table are as follows: 1=Burke and Lennon,[4] 2=Tachiev and Froese,[71] and 3=Merkelis *et al.*,[51])

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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
1	$2s^22p^3-2s2p^4$	$^4S^\circ-^4P$		*355.05*	0–*281 652*	4–12	3.27+09	1.85−01	8.67−01	−0.131	A	2,3
				356.888	0–280 200	4–6	3.22+09	9.22−02	4.34−01	−0.433	A	2,3
				353.769	0–282 670	4–4	3.30+09	6.20−02	2.89−01	−0.606	A	2,3
				352.150	0–283 970	4–2	3.36+09	3.12−02	1.45−01	−0.904	B+	2,3
2		$^4S^\circ-^2D$										
				259.161	0–385 860	4–6	2.05+04	3.09−07	1.05−06	−5.908	D+	2,3
				259.128	0–385 910	4–4	2.85+04	2.87−07	9.79−07	−5.940	E+	2,3
3		$^4S^\circ-^2S$										
				220.721	0–453 060	4–2	4.41+06	1.61−05	4.68−05	−4.191	C+	2,3
4		$^4S^\circ-^2P$										
				209.341	0–477 690	4–4	9.13+06	6.00−05	1.65−04	−3.620	C	2,3
				208.047	0–480 660	4–2	2.71+06	8.80−06	2.41−05	−4.453	C	2,3
5		$^2D^\circ-^4P$										
				453.924	62 369–282 670	6–4	4.13+04	8.50−07	7.62−06	−5.292	D	2,3
				451.147	62 313–283 970	4–2	8.05+04	1.23−06	7.29−06	−5.308	D	2,3
				459.071	62 369–280 200	6–6	6.56+05	2.07−05	1.88−04	−3.906	C	2,3
				453.809	62 313–282 670	4–4	9.18+04	2.84−06	1.69−05	−4.945	D	2,3
				458.953	62 313–280 200	4–6	1.32+05	6.25−06	3.78−05	−4.602	C	2,3
6		$^2D^\circ-^2D$		*309.09*	*62 347–385 880*	10–10	7.67+09	1.10−01	1.12+00	0.041	A	2,3
				309.128	62 369–385 860	6–6	7.16+09	1.03−01	6.27−01	−0.209	A	2,3
				309.026	62 313–385 910	4–4	7.24+09	1.04−01	4.22−01	−0.381	A	2,3
				309.080	62 369–385 910	6–4	6.60+08	6.30−03	3.85−02	−1.423	B+	2,3
				309.074	62 313–385 860	4–6	3.52+08	7.57−03	3.08−02	−1.519	B+	2,3

TABLE 28. Transition probabilities of allowed lines for Al VII (references in this table are as follows: 1=Burke and Lennon,[4] 2=Tachiev and Froese,[71] and 3=Merkelis *et al.*,[51])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
7		$^2D^{\circ}-^2P$		*240.19*	*62 347–478 680*	10–6	2.94+10	1.53−01	1.21+00	0.185	A	2,3
				240.778	62 369–477 690	6–4	2.67+10	1.55−01	7.36−01	−0.032	A	2,3
				239.036	62 313–480 660	4–2	2.73+10	1.17−01	3.69−01	−0.330	A	2,3
				240.745	62 313–477 690	4–4	3.69+09	3.21−02	1.02−01	−0.891	B+	2,3
8		$^2P^{\circ}-^4P$										
				532.479	94 869–282 670	4–4	5.11+05	2.17−05	1.52−04	−4.061	C+	2,3
				528.075	94 603–283 970	2–2	1.94+05	8.13−06	2.83−05	−4.789	C	2,3
				528.818	94 869–283 970	4–2	9.79+03	2.05−07	1.43−06	−6.086	E+	2,3
				539.575	94 869–280 200	4–6	3.09+05	2.02−05	1.44−04	−4.093	C+	2,3
				531.725	94 603–282 670	2–4	3.00+03	2.55−07	8.92−07	−6.292	D	2,3
9		$^2P^{\circ}-^2D$		*343.52*	*94 780–385 880*	6–10	1.12+09	3.29−02	2.23−01	−0.705	B+	2,3
				343.653	94 869–385 860	4–6	1.22+09	3.24−02	1.47−01	−0.887	B+	2,3
				343.280	94 603–385 910	2–4	8.99+08	3.18−02	7.18−02	−1.197	B+	2,3
				343.594	94 869–385 910	4–4	6.02+07	1.07−03	4.82−03	−2.369	B+	2,3
10		$^2P^{\circ}-^2S$		*279.11*	*94 780*–453 060	6–2	1.65+10	6.41−02	3.54−01	−0.415	B+	2,3
				279.181	94 869–453 060	4–2	1.01+10	5.89−02	2.17−01	−0.628	B+	2,3
				278.973	94 603–453 060	2–2	6.39+09	7.46−02	1.37−01	−0.826	B+	2,3
11		$^2P^{\circ}-^2P$		*260.48*	*94 780–478 680*	6–6	8.59+09	8.74−02	4.49−01	−0.280	B+	2,3
				261.219	94 869–477 690	4–4	6.13+09	6.27−02	2.16−01	−0.601	B+	2,3
				259.029	94 603–480 660	2–2	4.76+09	4.79−02	8.16−02	−1.019	B+	2,3
				259.208	94 869–480 660	4–2	5.86+09	2.95−02	1.01−01	−0.928	B+	2,3
				261.037	94 603–477 690	2–4	1.46+09	2.99−02	5.14−02	−1.223	B+	2,3
12	$2p^3-2p^2(^3P)3s$	$^4S^{\circ}-^4P$		*86.99*	0–*1 149 558*	4–12	3.57+10	1.22−01	1.39−01	−0.312	B+	2
				86.885	0–1 150 950	4–6	3.59+10	6.10−02	6.98−02	−0.613	B+	2
				87.059	0–1 148 650	4–4	3.56+10	4.04−02	4.63−02	−0.792	B+	2
				87.169	0–1 147 200	4–2	3.53+10	2.01−02	2.31−02	−1.095	B+	2
13		$^4S^{\circ}-^2P$										
				85.710	0–1 166 720	4–4	2.34+07	2.58−05	2.91−05	−3.986	D	2
				85.915	0–1 163 940	4–2	2.22+07	1.23−05	1.39−05	−4.308	C+	2
14		$^2D^{\circ}-^4P$										
				92.057	62 369–1 148 650	6–4	1.36+08	1.16−04	2.10−04	−3.157	C	2
				92.175	62 313–1 147 200	4–2	1.31+08	8.31−05	1.01−04	−3.478	D+	2
				91.863	62 369–1 150 950	6–6	7.42+07	9.39−05	1.70−04	−3.249	D+	2
				92.052	62 313–1 148 650	4–4	4.59+07	5.83−05	7.07−05	−3.632	D+	2
				91.858	62 313–1 150 950	4–6	3.80+06	7.20−06	8.72−06	−4.541	D	2
15		$^2D^{\circ}-^2P$		*90.63*	*62 347–1 165 793*	10–6	6.14+10	4.53−02	1.35−01	−0.344	B+	2
				90.551	62 369–1 166 720	6–4	5.66+10	4.64−02	8.29−02	−0.555	B+	2
				90.775	62 313–1 163 940	4–2	6.65+10	4.11−02	4.91−02	−0.784	B+	2
				90.546	62 313–1 166 720	4–4	2.17+09	2.67−03	3.19−03	−1.971	B	2
16		$^2P^{\circ}-^4P$										
				94.896	94 869–1 148 650	4–4	4.73+07	6.39−05	7.98−05	−3.592	D+	2
				95.003	94 603–1 147 200	2–2	1.39+07	1.88−05	1.17−05	−4.425	D	2
				95.027	94 869–1 147 200	4–2	2.97+07	2.01−05	2.52−05	−4.095	D	2
				94.690	94 869–1 150 950	4–6	1.01+05	2.03−07	2.53−07	−6.090	E+	2
				94.872	94 603–1 148 650	2–4	8.81+06	2.38−05	1.49−05	−4.322	D	2
17		$^2P^{\circ}-^2P$		*93.37*	*94 780–1 165 793*	6–6	4.51+10	5.90−02	1.09−01	−0.451	B+	2

TABLE 28. Transition probabilities of allowed lines for Al VII (references in this table are as follows: 1=Burke and Lennon,[4] 2=Tachiev and Froese,[71] and 3=Merkelis *et al.*,[51])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				93.297	94 869–1 166 720	4–4	3.88+10	5.06−02	6.22−02	−0.694	B+	2
				93.516	94 603–1 163 940	2–2	2.92+10	3.83−02	2.36−02	−1.116	B+	2
				93.539	94 869–1 163 940	4–2	1.09+10	7.16−03	8.82−03	−1.543	B	2
				93.273	94 603–1 166 720	2–4	8.90+09	2.32−02	1.43−02	−1.333	B	2
18	$2p^3-2p^2(^1D)3s$	$^2D^\circ-^2D$		*88.03*	*62 347–1 198 330*	10–10	4.81+10	5.59−02	1.62−01	−0.253	C+	2
				88.031	62 369–1 198 330	6–6	4.53+10	5.26−02	9.15−02	−0.501	C+	2
				88.027	62 313–1 198 330	4–4	4.23+10	4.92−02	5.70−02	−0.706	C+	2
				88.031	62 369–1 198 330	6–4	2.95+09	2.29−03	3.98−03	−1.862	C	2
				88.027	62 313–1 198 330	4–6	4.75+09	8.28−03	9.59−03	−1.480	C+	2
19		$^2P^\circ-^2D$		*90.62*	*94 780–1 198 330*	6–10	1.76+10	3.62−02	6.48−02	−0.663	C+	2
				90.624	94 869–1 198 330	4–6	1.58+10	2.92−02	3.48−02	−0.933	C+	2
				90.602	94 603–1 198 330	2–4	1.31+10	3.22−02	1.92−02	−1.191	C+	2
				90.624	94 869–1 198 330	4–4	7.34+09	9.04−03	1.08−02	−1.442	C+	2
20	$2p^3-2p^2(^1S)3s$	$^2P^\circ-^2S$		*86.68*	*94 780*–1 248 430	6–2	6.31+10	2.37−02	4.06−02	−0.847	C+	2
				86.688	94 869–1 248 430	4–2	4.05+10	2.28−02	2.61−02	−1.040	C+	2
				86.668	94 603–1 248 430	2–2	2.26+10	2.54−02	1.45−02	−1.294	C+	2
21	$2p^3-2p^2(^3P)3d$	$^4S^\circ-^2P$										
				75.917	0–1 317 220	4–4	4.63+09	4.00−03	4.00−03	−1.796	D	2
				75.872	0–1 318 010	4–2	1.14+08	4.91−05	4.91−05	−3.707	E	2
22		$^4S^\circ-^4P$		*75.33*	0–*1 327 488*	4–12	5.26+11	1.34+00	1.33+00	0.729	B+	2
				75.364	0–1 326 900	4–6	5.19+11	6.63−01	6.58−01	0.424	B+	2
				75.307	0–1 327 890	4–4	5.30+11	4.51−01	4.47−01	0.256	B+	2
				75.276	0–1 328 450	4–2	5.39+11	2.29−01	2.27−01	−0.038	B+	2
23		$^2D^\circ-^2P$		*79.67*	*62 347–1 317 483*	10–6	3.23+10	1.84−02	4.83−02	−0.735	B+	2
				79.691	62 369–1 317 220	6–4	2.66+10	1.69−02	2.66−02	−0.994	B+	2
				79.637	62 313–1 318 010	4–2	2.19+10	1.04−02	1.09−02	−1.381	B	2
				79.687	62 313–1 317 220	4–4	1.08+10	1.03−02	1.08−02	−1.385	B	2
24		$^2D^\circ-^4D$										
				[79.273]	62 369–1 323 830	6–6	3.25+07	3.06−05	4.79−05	−3.736	E	2
				[79.270]	62 313–1 323 830	4–4	5.09+09	4.80−03	5.01−03	−1.717	D	2
				[79.273]	62 369–1 323 830	6–4	7.21+09	4.53−03	7.09−03	−1.566	D	2
				[79.270]	62 313–1 323 830	4–6	1.00+09	1.42−03	1.48−03	−2.246	E+	2
25		$^2D^\circ-^2F$		*79.10*	*62 347–1 326 633*	10–14	1.24+11	1.63−01	4.26−01	0.212	B+	2
				79.018	62 369–1 327 910	6–8	1.25+11	1.57−01	2.44−01	−0.026	B+	2
				79.201	62 313–1 324 930	4–6	1.14+11	1.61−01	1.68−01	−0.191	B+	2
				79.204	62 369–1 324 930	6–6	8.82+09	8.30−03	1.30−02	−1.303	B	2
26		$^2D^\circ-^2D$		*77.92*	*62 347–1 345 762*	10–10	1.59+11	1.44−01	3.70−01	0.158	B+	2
				77.900	62 369–1 346 070	6–6	1.42+11	1.30−01	1.99−01	−0.108	B+	2
				77.943	62 313–1 345 300	4–4	1.05+11	9.59−02	9.85−02	−0.416	B+	2
				77.947	62 369–1 345 300	6–4	1.89+10	1.15−02	1.76−02	−1.161	B+	2
				77.896	62 313–1 346 070	4–6	3.92+10	5.34−02	5.48−02	−0.670	B+	2
27		$^2P^\circ-^2P$		*81.79*	*94 780–1 317 483*	6–6	1.04+11	1.05−01	1.69−01	−0.201	B+	2
				81.810	94 869–1 317 220	4–4	7.86+10	7.89−02	8.50−02	−0.501	B+	2
				81.739	94 603–1 318 010	2–2	7.69+10	7.70−02	4.14−02	−0.812	B+	2
				81.757	94 869–1 318 010	4–2	4.06+10	2.03−02	2.19−02	−1.090	B+	2

TABLE 28. Transition probabilities of allowed lines for Al VII (references in this table are as follows: 1=Burke and Lennon,[4] 2=Tachiev and Froese,[71] and 3=Merkelis *et al.*,[51])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				81.792	94 603–1 317 220	2–4	1.91+10	3.83−02	2.06−02	−1.116	B+	2
28		^{2}P°−^{4}D										
				[81.370]	94 869–1 323 830	4–6	7.62+06	1.13−05	1.22−05	−4.345	E	2
				[81.352]	94 603–1 323 830	2–4	6.69+09	1.33−02	7.11−03	−1.575	D	2
				[81.370]	94 869–1 323 830	4–4	2.55+10	2.53−02	2.71−02	−0.995	D+	2
29		^{2}P°−^{2}D		*79.94*	*94 780–1 345 762*	6–10	1.84+11	2.94−01	4.64−01	0.246	B+	2
				79.923	94 869–1 346 070	4–6	1.70+11	2.44−01	2.57−01	−0.011	B+	2
				79.955	94 603–1 345 300	2–4	1.59+11	3.04−01	1.60−01	−0.216	B+	2
				79.972	94 869–1 345 300	4–4	4.72+10	4.53−02	4.77−02	−0.742	B+	2
30	$2p^3$ $-2p^2(^1D)3d$	^{2}D°−^{2}F		*76.57*	*62 347–1 368 419*	10–14	5.41+11	6.66−01	1.68+00	0.823	B	2
				76.578	62 369–1 368 230	6–8	5.37+11	6.29−01	9.52−01	0.577	B	2
				76.549	62 313–1 368 670	4–6	4.43+11	5.84−01	5.89−01	0.368	B	2
				76.552	62 369–1 368 670	6–6	1.05+11	9.19−02	1.39−01	−0.259	C+	2
31		^{2}D°−^{2}D		*[76.40]*	*62 347–1 371 310*	10–10	2.37+11	2.08−01	5.22−01	0.318	B	2
				76.384	62 369–1 371 550	6–6	1.56+11	1.36−01	2.05−01	−0.088	B	2
				[76.415]	62 313–1 370 950	4–4	2.38+11	2.08−01	2.10−01	−0.080	B	2
				[76.419]	62 369–1 370 950	6–4	2.87+10	1.67−02	2.53−02	−0.999	C+	2
				76.380	62 313–1 371 550	4–6	6.22+10	8.16−02	8.20−02	−0.486	C+	2
32		^{2}D°−^{2}P		*[75.87]*	*62 347–1 380 367*	10–6	9.88+10	5.12−02	1.28−01	−0.291	C+	2
				[75.857]	62 369–1 380 640	6–4	8.38+10	4.82−02	7.22−02	−0.539	C+	2
				[75.901]	62 313–1 379 820	4–2	1.18+11	5.10−02	5.09−02	−0.690	C+	2
				[75.854]	62 313–1 380 640	4–4	5.44+09	4.69−03	4.69−03	−1.727	C	2
33		^{2}P°−^{2}D		*[78.34]*	*94 780–1 371 310*	6–10	1.90+11	2.92−01	4.52−01	0.244	B	2
				78.328	94 869–1 371 550	4–6	2.13+11	2.93−01	3.03−01	0.069	B	2
				[78.349]	94 603–1 370 950	2–4	1.42+11	2.61−01	1.35−01	−0.282	C+	2
				[78.365]	94 869–1 370 950	4–4	1.53+10	1.41−02	1.45−02	−1.249	C+	2
34		^{2}P°−^{2}P		*[77.79]*	*94 780–1 380 367*	6–6	2.40+11	2.18−01	3.35−01	0.117	C+	2
				[77.774]	94 869–1 380 640	4–4	2.14+11	1.94−01	1.99−01	−0.110	B	2
				[77.808]	94 603–1 379 820	2–2	1.60+11	1.45−01	7.44−02	−0.538	C+	2
				[77.824]	94 869–1 379 820	4–2	5.60+10	2.54−02	2.61−02	−0.993	C+	2
				[77.758]	94 603–1 380 640	2–4	3.79+10	6.87−02	3.52−02	−0.862	C+	2
35	$2s^22p^3$– $2s2p^3(^5S°)3p$	^{4}S°−^{4}P				4–12						2
				72.278	0–13 835 40	4–6	7.94+10	9.32−02	8.87−02	−0.429	B+	2
				72.276	0–1 383 580	4–4	7.77+10	6.09−02	5.80−02	−0.613	B+	2
36	$2p^3$ $-2p^2(^1S)3d$?	^{2}D°−^{2}D?		*74.10*	*62 347–1 411 930*	10–10	7.33+09	6.03−03	1.47−02	−1.220	C	2
				74.098	62 369–1 411 930	6–6	6.76+09	5.56−03	8.14−03	−1.477	C+	2
				74.095	62 313–1 411 930	4–4	4.91+09	4.04−03	3.94−03	−1.792	C	2
				74.098	62 369–1 411 930	6–4	7.62+08	4.18−04	6.12−04	−2.601	C	2
				74.095	62 313–1 411 930	4–6	1.67+09	2.06−03	2.01−03	−2.084	C	2
37		^{2}P°−^{2}D?		*75.92*	*94 780–1 411 930*	6–10	2.08+11	3.00−01	4.50−01	0.255	B	2
				75.927	94 869–1 411 930	4–6	2.00+11	2.59−01	2.59−01	0.015	B	2

TABLE 28. Transition probabilities of allowed lines for Al VII (references in this table are as follows: 1=Burke and Lennon,[4] 2=Tachiev and Froese,[71] and 3=Merkelis *et al.*,[51])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				75.911	94 603–1 411 930	2–4	1.84+11	3.19−01	1.59−01	−0.195	B	2
				75.927	94 869–1 411 930	4–4	3.70+10	3.20−02	3.20−02	−0.893	C+	2
38	$2p^3 - 2p^2(^3P)4s$	$^4S^\circ - ^4P$				4–12						1
				[64.809]	0–1 543 000	4–6	1.74+10	1.64−02	1.40−02	−1.183	D+	LS
39	$2p^3 - 2p^2(^3P)4d$	$^2D^\circ - ^2P$				10–6						1
				[65.018]	62 369–1 600 400	6–4	9.96+09	4.21−03	5.41−03	−1.598	D	LS
				[65.016]	62 313–1 600 400	4–4	1.11+09	7.01−04	6.00−04	−2.552	E+	LS
40		$^2D^\circ - ^2F$		*[64.75]*	*62 347–1 606 750*	10–14	1.25+11	1.10−01	2.35−01	0.041	C	1
				[64.701]	62 369–1 607 950	6–8	1.25+11	1.05−01	1.34−01	−0.201	C	LS
				[64.816]	62 313–1 605 150	4–6	1.16+11	1.10−01	9.39−02	−0.357	C	LS
				[64.818]	62 369–1 605 150	6–6	8.29+09	5.22−03	6.68−03	−1.504	D	LS
41		$^2P^\circ - ^2P$				6–6						1
				[66.422]	94 869–1 600 400	4–4	5.43+10	3.59−02	3.14−02	−0.843	D+	LS
				[66.410]	94 603–1 600 400	2–4	1.09+10	1.44−02	6.30−03	−1.541	D	LS
42	$2p^3 - 2p^2(^3P)4d$?	$^2D^\circ - ^2D$?		*64.49*	*62 347–1 612 888*	10–10	4.34+10	2.71−02	5.75−02	−0.567	D+	1
				64.482	62 369–1 613 180	6–6	4.06+10	2.53−02	3.22−02	−0.819	D+	LS
				64.510	62 313–1 612 450	4–4	3.89+10	2.43−02	2.06−02	−1.012	D+	LS
				64.513	62 369–1 612 450	6–4	4.33+09	1.80−03	2.29−03	−1.967	E+	LS
				64.480	62 313–1 613 180	4–6	2.90+09	2.71−03	2.30−03	−1.965	E+	LS
43		$^2P^\circ - ^2D$?		*65.87*	*94 780–1 612 888*	6–10	1.01+11	1.10−01	1.43−01	−0.180	C	1
				65.863	94 869–1 613 180	4–6	1.01+11	9.87−02	8.56−02	−0.404	C	LS
				65.883	94 603–1 612 450	2–4	8.45+10	1.10−01	4.77−02	−0.658	C	LS
				65.894	94 869–1 612 450	4–4	1.69+10	1.10−02	9.55−03	−1.357	D	LS
44	$2p^3 - 2p^2(^3P)5s$	$^4S^\circ - ^4P$				4–12						1
				[58.751]	0–1 702 100	4–6	1.12+10	8.67−03	6.71−03	−1.460	D	LS
45	$2p^3 - 2p^2(^3P)5d$	$^2D^\circ - ^2F$		*[59.86]*	*62 347–1 732 873*	10–14	8.21+10	6.17−02	1.22−01	−0.210	C	1
				[59.824]	62 369–1 733 940	6–8	8.22+10	5.88−02	6.95−02	−0.452	C	LS
				[59.911]	62 313–1 731 450	4–6	7.64+10	6.17−02	4.87−02	−0.608	C	LS
				[59.913]	62 369–1 731 450	6–6	5.46+09	2.94−03	3.48−03	−1.754	D	LS
46	$2s2p^4 - 2p^5$	$^4P - ^2P^\circ$										
				220.712	282 670–735 750	4–4	2.14+06	1.56−05	4.54−05	−4.205	D+	2,3
				219.428	283 970–739 700	2–2	2.45+06	1.77−05	2.56−05	−4.451	D	2,3
				219.515	280 200–735 750	6–4	7.98+06	3.84−05	1.67−04	−3.638	D+	2,3
				218.804	282 670–739 700	4–2	4.28+05	1.54−06	4.43−06	−5.210	D	2,3
				221.347	283 970–735 750	2–4	5.88+05	8.63−06	1.26−05	−4.763	D	2,3
47		$^2D - ^2P^\circ$		*284.75*	*385 880–737 067*	10–6	1.30+10	9.49−02	8.90−01	−0.023	A	2,3
				285.804	385 860–735 750	6–4	1.16+10	9.46−02	5.34−01	−0.246	A	2,3
				282.654	385 910–739 700	4–2	1.29+10	7.75−02	2.88−01	−0.509	A	2,3
				285.845	385 910–735 750	4–4	1.47+09	1.80−02	6.77−02	−1.143	B+	2,3
48		$^2S - ^2P^\circ$		*352.10*	453 060–*737 067*	2–6	6.81+08	3.80−02	8.81−02	−1.119	B+	2,3
				353.744	453 060–735 750	2–4	8.33+08	3.13−02	7.28−02	−1.203	B+	2,3
				348.870	453 060–739 700	2–2	3.65+08	6.67−03	1.53−02	−1.875	B+	2,3

TABLE 28. Transition probabilities of allowed lines for Al VII (references in this table are as follows: 1=Burke and Lennon,[4] 2=Tachiev and Froese,[71] and 3=Merkelis *et al.*,[51])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
49		^{2}P–^{2}P°		*387.02*	*478 680–737 067*	6–6	8.70+09	1.95−01	1.49+00	0.068	A	2,3
				387.507	477 690–735 750	4–4	7.17+09	1.61−01	8.24−01	−0.191	A	2,3
				386.041	480 660–739 700	2–2	6.09+09	1.36−01	3.46−01	−0.565	A	2,3
				381.665	477 690–739 700	4–2	3.18+09	3.48−02	1.75−01	−0.856	B+	2,3
				392.019	480 660–735 750	2–4	1.27+09	5.84−02	1.51−01	−0.933	B+	2,3
50	$2s2p^4$–$2s2p^3(^5S°)3s$	^{4}P–^{4}S°		*96.11*	*281 652*–1 322 150	12–4	7.76+10	3.58−02	1.36−01	−0.367	B+	2
				95.974	280 200–1 322 150	6–4	3.93+10	3.62−02	6.86−02	−0.663	B+	2
				96.202	282 670–1 322 150	4–4	2.56+10	3.56−02	4.51−02	−0.846	B+	2
				96.322	283 970–1 322 150	2–4	1.27+10	3.54−02	2.25−02	−1.150	B+	2
51	$2s2p^4$–$2s2p^3(^5S°)3d$	^{4}P–^{4}D°		*83.93*	*281 652–1 473 060*	12–20	2.09+11	3.69−01	1.22+00	0.646	C+	1
				83.832	280 200–1 473 060	6–8	2.10+11	2.95−01	4.88−01	0.248	C+	LS
				84.006	282 670–1 473 060	4–6	1.46+11	2.32−01	2.57−01	−0.032	C+	LS
				84.098	283 970–1 473 060	2–4	8.68+10	1.84−01	1.02−01	−0.434	C	LS
				83.832	280 200–1 473 060	6–6	6.30+10	6.64−02	1.10−01	−0.400	C	LS
				84.006	282 670–1 473 060	4–4	1.12+11	1.18−01	1.31−01	−0.326	C	LS
				84.098	283 970–1 473 060	2–2	1.74+11	1.84−01	1.02−01	−0.434	C	LS
				83.832	280 200–1 473 060	6–4	1.05+10	7.38−03	1.22−02	−1.354	D	LS
				84.006	282 670–1 473 060	4–2	3.48+10	1.84−02	2.04−02	−1.133	D+	LS
52	$2s2p^4$–$2s2p^3(^3D°)3d$?	^{4}P–^{4}P°?		*[76.32]*	*281 652–1 591 920*	12–12	4.74+11	4.14−01	1.25+00	0.696	C+	1
				76.257	280 200–1 591 560	6–6	3.33+11	2.90−01	4.37−01	0.241	C+	LS
				76.366	282 670–1 592 150	4–4	6.31+10	5.52−02	5.55−02	−0.656	C	LS
				[76.419]	283 970–1 592 540	2–2	7.87+10	6.89−02	3.47−02	−0.861	D+	LS
				76.222	280 200–1 592 150	6–4	2.14+11	1.24−01	1.87−01	−0.128	C	LS
				[76.343]	282 670–1 592 540	4–2	3.94+11	1.72−01	1.73−01	−0.162	C	LS
				76.401	282 670–1 591 560	4–6	1.42+11	1.86−01	1.87−01	−0.128	C	LS
				76.442	283 970–1 592 150	2–4	1.96+11	3.44−01	1.73−01	−0.162	C	LS
53		^{4}P–^{4}D°?				12–20						1
				76.011	282 670–1 598 270	4–6	1.70+11	2.21−01	2.21−01	−0.054	C+	LS
				76.086	283 970–1 598 270	2–4	1.01+11	1.75−01	8.77−02	−0.456	C	LS
				75.869	280 200–1 598 270	6–6	7.34+10	6.33−02	9.49−02	−0.420	C	LS
				76.011	282 670–1 598 270	4–4	1.29+11	1.12−01	1.12−01	−0.349	C	LS
				75.869	280 200–1 598 270	6–4	1.22+10	7.03−03	1.05−02	−1.375	D	LS
54		^{4}P–^{4}S°?		*75.89*	*281 652–1 599 320*	12–4	4.93+11	1.42−01	4.26−01	0.231	C	1
				75.808	280 200–1 599 320	6–4	2.47+11	1.42−01	2.13−01	−0.070	C+	LS
				75.950	282 670–1 599 320	4–4	1.64+11	1.42−01	1.42−01	−0.246	C	LS
				76.025	283 970–1 599 320	2–4	8.19+10	1.42−01	7.11−02	−0.547	C	LS
55	$2s2p^4$–$2s2p^3(^5S°)4d$	^{4}P–^{4}D°				12–20						1
				68.530	280 200–1 739 420	6–8	1.15+11	1.08−01	1.46−01	−0.188	C	LS
				68.629	282 670–1 739 780	4–6	8.02+10	8.49−02	7.67−02	−0.469	C	LS
				[68.678]	283 970–1 740 040	2–4	4.77+10	6.74−02	3.05−02	−0.870	D+	LS
				68.513	280 200–1 739 780	6–6	3.45+10	2.43−02	3.29−02	−0.836	D+	LS
				[68.617]	282 670–1 740 040	4–4	6.11+10	4.31−02	3.89−02	−0.763	D+	LS
				[68.501]	280 200–1 740 040	6–4	5.76+09	2.70−03	3.65−03	−1.790	D	LS

TABLE 28. Transition probabilities of allowed lines for Al VII (references in this table are as follows: 1=Burke and Lennon,[4] 2=Tachiev and Froese,[71] and 3=Merkelis *et al.*,[51])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
56	$2p^5-2s^22p^2(^3P)3s$	$^2P^°-^2P$		*233.25*	*737 067–1 165 793*	6–6	1.08+05	8.81−07	4.06−06	−5.277	C	2
				232.035	735 750–1 166 720	4–4	8.52+04	6.88−07	2.10−06	−5.560	C	2
				235.716	739 700–1 163 940	2–2	8.52+04	7.10−07	1.10−06	−5.848	C	2
				233.541	735 750–1 163 940	4–2	3.83+04	1.57−07	4.81−07	−6.202	C	2
				234.181	739 700–1 166 720	2–4	1.47+04	2.41−07	3.72−07	−6.317	C	2
57	$2p^5-2s^22p^2(^1D)3s$	$^2P^°-^2D$		*216.80*	*737 067–1 198 330*	6–10	1.51+05	1.77−06	7.57−06	−4.974	D	2
				216.179	735 750–1 198 330	4–6	1.51+05	1.58−06	4.51−06	−5.199	D	2
				218.041	739 700–1 198 330	2–4	1.23+05	1.76−06	2.52−06	−5.453	D	2
				216.179	735 750–1 198 330	4–4	2.69+04	1.88−07	5.36−07	−6.124	D	2
58	$2p^5-2s^22p^2(^1S)3s$	$^2P^°-^2S$		*195.56*	*737 067*–1 248 430	6–2	1.40+06	2.68−06	1.03−05	−4.794	D+	2
				195.053	735 750–1 248 430	4–2	9.77+05	2.79−06	7.16−06	−4.952	D+	2
				196.568	739 700–1 248 430	2–2	4.24+05	2.46−06	3.18−06	−5.308	D	2
59	$2p^5-2s^22p^2(^3P)3d$	$^2P^°-^2P$		*172.29*	*737 067–1 317 483*	6–6	2.05+06	9.13−06	3.11−05	−4.261	C+	2
				171.978	735 750–1 317 220	4–4	1.84+06	8.16−06	1.85−05	−4.486	C+	2
				172.918	739 700–1 318 010	2–2	1.19+06	5.35−06	6.09−06	−4.971	C	2
				171.745	735 750–1 318 010	4–2	6.47+05	1.43−06	3.23−06	−5.243	C	2
				173.154	739 700–1 317 220	2–4	3.18+05	2.86−06	3.26−06	−5.243	C	2
60		$^2P^°-^2D$		*164.29*	*737 067–1 345 762*	6–10	2.21+06	1.49−05	4.83−05	−4.049	C+	2
				163.848	735 750–1 346 070	4–6	2.25+06	1.36−05	2.93−05	−4.264	C+	2
				165.125	739 700–1 345 300	2–4	1.91+06	1.56−05	1.70−05	−4.506	C+	2
				164.055	735 750–1 345 300	4–4	2.37+05	9.57−07	2.07−06	−5.417	C	2
61	$2p^5-2s^22p^2(^1D)3d$	$^2P^°-^2D$		*[157.67]*	*737 067–1 371 310*	6–10	2.20+04	1.36−07	4.25−07	−6.088	D	2
				157.282	735 750–1 371 550	4–6	7.29+02	4.06−09	8.40−09	−7.789	E+	2
				[158.416]	739 700–1 370 950	2–4	5.21+04	3.92−07	4.09−07	−6.106	D	2
				[157.431]	735 750–1 370 950	4–4	1.01+03	3.77−09	7.82−09	−7.822	E+	2
62		$^2P^°-^2P$		*[155.45]*	*737 067–1 380 367*	6–6	9.05+06	3.28−05	1.01−04	−3.706	D+	2
				[155.065]	735 750–1 380 640	4–4	7.86+06	2.83−05	5.79−05	−3.946	D+	2
				[156.221]	739 700–1 379 820	2–2	6.03+06	2.21−05	2.27−05	−4.355	D+	2
				[155.263]	735 750–1 379 820	4–2	2.74+06	4.96−06	1.01−05	−4.702	D+	2
				[156.021]	739 700–1 380 640	2–4	1.33+06	9.70−06	9.96−06	−4.712	D+	2
63	$2p^5-2s^22p^2(^1S)3d$?	$^2P^°-^2D$?		*148.18*	*737 067–1 411 930*	6–10	4.59+05	2.52−06	7.37−06	−4.820	D	2
				147.890	735 750–1 411 930	4–6	4.73+05	2.33−06	4.53−06	−5.031	D	2
				148.759	739 700–1 411 930	2–4	3.47+05	2.31−06	2.26−06	−5.335	D	2
				147.890	735 750–1 411 930	4–4	9.07+04	2.97−07	5.79−07	−5.925	D	2
64	$2s^22p^2(^3P)3s-2s2p^3(^5S^°)3s$	$^4P-^4S^°$		*579.4*	*1 149 558*–1 322 150	12–4	7.33+08	1.23−02	2.81−01	−0.831	B+	2
				584.11	1 150 950–1 322 150	6–4	3.57+08	1.22−02	1.41−01	−1.135	B+	2
				576.37	1 148 650–1 322 150	4–4	2.47+08	1.23−02	9.35−02	−1.308	B+	2
				571.59	1 147 200–1 322 150	2–4	1.28+08	1.26−02	4.72−02	−1.599	B+	2

TABLE 28. Transition probabilities of allowed lines for Al VII (references in this table are as follows: 1=Burke and Lennon,[4] 2=Tachiev and Froese,[71] and 3=Merkelis *et al.*,[51])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
65	$2s^22p^2(^3P)3s-2s2p^3(^5S^\circ)3d$	$^4P-^4D^\circ$		*309.12*	*1 149 558–1 473 060*	12–20	7.69+07	1.83−03	2.24−02	−1.658	D	1
				310.453	1 150 950–1 473 060	6–8	7.58+07	1.46−03	8.95−03	−2.057	D	LS
				308.252	1 148 650–1 473 060	4–6	5.43+07	1.16−03	4.71−03	−2.333	D	LS
				306.880	1 147 200–1 473 060	2–4	3.27+07	9.24−04	1.87−03	−2.733	E+	LS
				310.453	1 150 950–1 473 060	6–6	2.28+07	3.29−04	2.02−03	−2.705	E+	LS
				308.252	1 148 650–1 473 060	4–4	4.13+07	5.89−04	2.39−03	−2.628	E+	LS
				306.880	1 147 200–1 473 060	2–2	6.54+07	9.24−04	1.87−03	−2.733	E+	LS
				310.453	1 150 950–1 473 060	6–4	3.79+06	3.65−05	2.24−04	−3.660	E	LS
				308.252	1 148 650–1 473 060	4–2	1.29+07	9.20−05	3.73−04	−3.434	E	LS
66	$2s^22p^2(^3P)3s-2s2p^3(^3D^\circ)3d$?	$^4P-^4P^\circ$?		*[226.06]*	*1 149 558–1 591 920*	12–12	2.15+08	1.65−03	1.47−02	−1.703	E+	1
				226.958	1 150 950–1 591 560	6–6	1.49+08	1.15−03	5.16−03	−2.161	D	LS
				225.479	1 148 650–1 592 150	4–4	2.90+07	2.21−04	6.56−04	−3.054	E+	LS
				[224.548]	1 147 200–1 592 540	2–2	3.66+07	2.77−04	4.10−04	−3.256	E	LS
				226.655	1 150 950–1 592 150	6–4	9.62+07	4.94−04	2.21−03	−2.528	E+	LS
				[225.281]	1 148 650–1 592 540	4–2	1.82+08	6.91−04	2.05−03	−2.558	E+	LS
				225.780	1 148 650–1 591 560	4–6	6.49+07	7.44−04	2.21−03	−2.526	E+	LS
				224.744	1 147 200–1 592 150	2–4	9.11+07	1.38−03	2.04−03	−2.559	E+	LS
67		$^4P-^4D^\circ$?				12–20						1
				222.410	1 148 650–1 598 270	4–6	4.00+08	4.45−03	1.30−02	−1.750	D+	LS
				221.695	1 147 200–1 598 270	2–4	2.40+08	3.54−03	5.17−03	−2.150	D	LS
				223.554	1 150 950–1 598 270	6–6	1.68+08	1.26−03	5.56−03	−2.121	D	LS
				222.410	1 148 650–1 598 270	4–4	3.05+08	2.26−03	6.62−03	−2.044	D	LS
				223.554	1 150 950–1 598 270	6–4	2.80+07	1.40−04	6.18−04	−3.076	E+	LS
68		$^4P-^4S^\circ$?		*222.34*	*1 149 558–1 599 320*	12–4	1.35+09	3.33−03	2.93−02	−1.398	D	1
				223.030	1 150 950–1 599 320	6–4	6.68+08	3.32−03	1.46−02	−1.701	D+	LS
				221.892	1 148 650–1 599 320	4–4	4.52+08	3.34−03	9.76−03	−1.874	D	LS
				221.180	1 147 200–1 599 320	2–4	2.28+08	3.35−03	4.88−03	−2.174	D	LS
69	$2s^22p^2(^3P)3d-2s2p^3(^5S^\circ)3d$	$^4P-^4D^\circ$		*686.9*	*1 327 488–1 473 060*	12–20	1.45+07	1.70−03	4.62−02	−1.690	D	1
				684.18	1 326 900–1 473 060	6–8	1.46+07	1.37−03	1.85−02	−2.085	D+	LS
				688.85	1 327 890–1 473 060	4–6	1.00+07	1.07−03	9.71−03	−2.369	D	LS
				691.52	1 328 450–1 473 060	2–4	5.89+06	8.45−04	3.85−03	−2.772	D	LS
				684.18	1 326 900–1 473 060	6–6	4.39+06	3.08−04	4.16−03	−2.733	D	LS
				688.85	1 327 890–1 473 060	4–4	7.63+06	5.43−04	4.93−03	−2.663	D	LS
				691.52	1 328 450–1 473 060	2–2	1.18+07	8.45−04	3.85−03	−2.772	D	LS
				684.18	1 326 900–1 473 060	6–4	7.31+05	3.42−05	4.62−04	−3.688	E	LS
				688.85	1 327 890–1 473 060	4–2	2.39+06	8.49−05	7.70−04	−3.469	E+	LS
70	$2s^22p^2(^3P)3d-2s2p^3(^3D^\circ)3d$?	$^4D-^4D^\circ$?				20–20						1
				[364.378]	1 323 830–1 598 270	6–6	1.06+09	2.11−02	1.52−01	−0.898	C	LS
				[364.378]	1 323 830–1 598 270	4–4	7.39+08	1.47−02	7.05−02	−1.231	C	LS
				[364.378]	1 323 830–1 598 270	6–4	6.47+08	8.58−03	6.18−02	−1.288	C	LS
				[364.378]	1 323 830–1 598 270	4–6	4.32+08	1.29−02	6.19−02	−1.287	C	LS
71		$^4P-^4P^\circ$?		*[378.17]*	*1 327 488–1 591 920*	12–12	1.36+09	2.91−02	4.35−01	−0.457	C	1
				377.843	1 326 900–1 591 560	6–6	9.53+08	2.04−02	1.52−01	−0.912	C	LS
				378.415	1 327 890–1 592 150	4–4	1.81+08	3.88−03	1.93−02	−1.809	D+	LS

TABLE 28. Transition probabilities of allowed lines for Al VII (references in this table are as follows: 1=Burke and Lennon,[4] 2=Tachiev and Froese,[71] and 3=Merkelis *et al.*,[51])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				[378.659]	1 328 450–1 592 540	2–2	2.25+08	4.84−03	1.21−02	−2.014	D	LS
				377.003	1 326 900–1 592 150	6–4	6.17+08	8.76−03	6.52−02	−1.279	C	LS
				[377.858]	1 327 890–1 592 540	4–2	1.13+09	1.21−02	6.02−02	−1.315	C	LS
				379.262	1 327 890–1 591 560	4–6	4.05+08	1.31−02	6.54−02	−1.281	C	LS
				379.219	1 328 450–1 592 150	2–4	5.61+08	2.42−02	6.04−02	−1.315	C	LS
72		^{4}P$-^4$D$^\circ$?				12–20						1
				369.850	1 327 890–1 598 270	4–6	2.07+08	6.36−03	3.10−02	−1.594	D+	LS
				370.617	1 328 450–1 598 270	2–4	1.22+08	5.04−03	1.23−02	−1.997	D	LS
				368.501	1 326 900–1 598 270	6–6	8.94+07	1.82−03	1.32−02	−1.962	D+	LS
				369.850	1 327 890–1 598 270	4–4	1.58+08	3.23−03	1.57−02	−1.889	D+	LS
				368.501	1 326 900–1 598 270	6–4	1.50+07	2.03−04	1.48−03	−2.914	E+	LS
73		^{4}P$-^4$S$^\circ$?		*367.87*	*1 327 488–1 599 320*	12–4	2.13+09	1.44−02	2.09−01	−0.762	C	1
				367.080	1 326 900–1 599 320	6–4	1.07+09	1.44−02	1.04−01	−1.063	C	LS
				368.419	1 327 890–1 599 320	4–4	7.08+08	1.44−02	6.99−02	−1.240	C	LS
				369.181	1 328 450–1 599 320	2–4	3.50+08	1.43−02	3.48−02	−1.544	D+	LS
74	$2s^22p^2(^3$P$)3d-$ $2s2p^3(^5$S$^\circ)4d$	^{4}D$-^4$D$^\circ$				20–20						1
				[240.414]	1 323 830–1 739 780	6–6	3.01+08	2.61−03	1.24−02	−1.805	D+	LS
				[240.263]	1 323 830–1 740 040	4–4	2.10+08	1.82−03	5.76−03	−2.138	D	LS
				[240.263]	1 323 830–1 740 040	6–4	1.84+08	1.06−03	5.03−03	−2.197	D	LS
				[240.414]	1 323 830–1 739 780	4–6	1.23+08	1.60−03	5.07−03	−2.194	D	LS
75		^{4}P$-^4$D$^\circ$				12–20						1
				242.412	1 326 900–1 739 420	6–8	9.19+07	1.08−03	5.17−03	−2.188	D	LS
				242.783	1 327 890–1 739 780	4–6	6.44+07	8.53−04	2.73−03	−2.467	E+	LS
				[242.960]	1 328 450–1 740 040	2–4	3.82+07	6.76−04	1.08−03	−2.869	E+	LS
				242.201	1 326 900–1 739 780	6–6	2.77+07	2.44−04	1.17−03	−2.834	E+	LS
				[242.630]	1 327 890–1 740 040	4–4	4.91+07	4.33−04	1.38−03	−2.761	E+	LS
				[242.049]	1 326 900–1 740 040	6–4	4.65+06	2.72−05	1.30−04	−3.787	E	LS
76	$2s2p^3(^5$S$^\circ)3s-$ $2s^22p^2(^3$P$)3d$	^{4}S$^\circ-^4$P	*18 730*	*18 734*	1 322 150–*1 327 488*	4–12	1.74+04	2.76−03	6.82−01	−1.957	B+	2
				4 750 cm^{-1}	1 322 150–1 326 900	4–6	1.20+04	1.20−03	3.33−01	−2.319	B+	2
			17 417	17 422	1 322 150–1 327 890	4–4	2.21+04	1.01−03	2.31−01	−2.394	B+	2
			15 869	15 873	1 322 150–1 328 450	4–2	3.00+04	5.67−04	1.18−01	−2.644	B+	2
77	$2s2p^3(^5$S$^\circ)3s-$ $2s2p^3(^5$S$^\circ)3p$	^{4}S$^\circ-^4$P				4–12						2
				1 628.93	1 322 150–1 383 540	4–6	2.76+08	1.65−01	3.54+00	−0.180	A	2
				1 627.87	1 322 150–1 383 580	4–4	2.76+08	1.10−01	2.35+00	−0.357	B+	2
78	$2s2p^3(^5$S$^\circ)3s-$ $2s^22p^2(^3$P$)4s$	^{4}S$^\circ-^4$P				4–12						1
				[452.796]	1 322 150–1 543 000	4–6	7.29+07	3.36−03	2.00−02	−1.872	D+	LS
79	$2s2p^3(^5$S$^\circ)3s-$ $2s^22p^2(^3$P$)5s$	^{4}S$^\circ-^4$P				4–12						1
				[263.193]	1 322 150–1 702 100	4–6	5.51+08	8.58−03	2.97−02	−1.464	D+	LS
80	$2s2p^3(^5$S$^\circ)3p-$ $2s2p^3(^5$S$^\circ)3d$	^{4}P$-^4$D$^\circ$				12–20						1

TABLE 28. Transition probabilities of allowed lines for Al VII (references in this table are as follows: 1=Burke and Lennon,[4] 2=Tachiev and Froese,[71] and 3=Merkelis *et al.*,[51])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				1 117.07	1 383 540–1 473 060	6–8	1.16+09	2.90−01	6.40+00	0.241	B+	LS
				1 117.57	1 383 580–1 473 060	4–6	8.12+08	2.28−01	3.36+00	−0.040	B+	LS
				1 117.07	1 383 540–1 473 060	6–6	3.49+08	6.52−02	1.44+00	−0.408	B	LS
				1 117.57	1 383 580–1 473 060	4–4	6.20+08	1.16−01	1.71+00	−0.333	B	LS
				1 117.07	1 383 540–1 473 060	6–4	5.81+07	7.25−03	1.60−01	−1.362	C	LS
				1 117.57	1 383 580–1 473 060	4–2	1.93+08	1.81−02	2.66−01	−1.140	C+	LS
81	$2s2p^3(^5S^\circ)3p$–$2s2p^3(^3D^\circ)3d$?	$^4P-^4P^\circ$?				12–12						1
				480.723	1 383 540–1 591 560	6–6	1.78+08	6.18−03	5.87−02	−1.431	C	LS
				479.455	1 383 580–1 592 150	4–4	3.42+07	1.18−03	7.45−03	−2.326	D	LS
				479.363	1 383 540–1 592 150	6–4	1.15+08	2.65−03	2.51−02	−1.799	D+	LS
				[478.560]	1 383 580–1 592 540	4–2	2.15+08	3.69−03	2.33−02	−1.831	D+	LS
				480.815	1 383 580–1 591 560	4–6	7.64+07	3.97−03	2.51−02	−1.799	D+	LS
82		$^4P-^4D^\circ$?				12–20						1
				465.788	1 383 580–1 598 270	4–6	1.22+07	5.95−04	3.65−03	−2.623	D	LS
				465.701	1 383 540–1 598 270	6–6	5.23+06	1.70−04	1.56−03	−2.991	E+	LS
				465.788	1 383 580–1 598 270	4–4	9.28+06	3.02−04	1.85−03	−2.918	E+	LS
				465.701	1 383 540–1 598 270	6–4	8.72+05	1.89−05	1.74−04	−3.945	E	LS
83		$^4P-^4S^\circ$?				12–4						1
				463.435	1 383 540–1 599 320	6–4	4.22+08	9.06−03	8.29−02	−1.265	C	LS
				463.521	1 383 580–1 599 320	4–4	2.81+08	9.06−03	5.53−02	−1.441	C	LS
84	$2s2p^3(^5S^\circ)3p$–$2s2p^3(^5S^\circ)4d$	$^4P-^4D^\circ$				12–20						1
				280.994	1 383 540–1 739 420	6–8	1.10+10	1.73−01	9.60−01	0.016	B	LS
				280.741	1 383 580–1 739 780	4–6	7.73+09	1.37−01	5.06−01	−0.261	C+	LS
				280.710	1 383 540–1 739 780	6–6	3.31+09	3.91−02	2.17−01	−0.630	C+	LS
				[280.536]	1 383 580–1 740 040	4–4	5.89+09	6.95−02	2.57−01	−0.556	C+	LS
				[280.505]	1 383 540–1 740 040	6–4	5.52+08	4.34−03	2.40−02	−1.584	D+	LS
85	$2s2p^3(^5S^\circ)3d$–$2s^22p^2(^3P)4s$	$^4D^\circ-^4P$				20–12						1
				[1 429.80]	1 473 060–1 543 000	8–6	3.90+06	8.96−04	3.37−02	−2.145	D+	LS
				[1 429.80]	1 473 060–1 543 000	6–6	8.78+05	2.69−04	7.60−03	−2.792	D	LS
				[1 429.80]	1 473 060–1 543 000	4–6	9.74+04	4.48−05	8.44−04	−3.747	E+	LS
86	$2s2p^3(^5S^\circ)3d$–$2s^22p^2(^3P)5s$	$^4D^\circ-^4P$				20–12						1
				[436.605]	1 473 060–1 702 100	8–6	1.19+08	2.54−03	2.92−02	−1.692	D+	LS
				[436.605]	1 473 060–1 702 100	6–6	2.67+07	7.62−04	6.57−03	−2.340	D	LS
				[436.605]	1 473 060–1 702 100	4–6	2.96+06	1.27−04	7.30−04	−3.294	E+	LS
87	$2s^22p^2(^3P)4s$–$2s2p^3(^3D^\circ)3d$?	$^4P-^4P^\circ$?				12–12						1
			[2 058.6]	[2 059.3]	1 543 000–1 591 560	6–6	5.22+07	3.32−02	1.35+00	−0.701	B	LS
			[2 033.9]	[2 034.6]	1 543 000–1 592 150	6–4	3.48+07	1.44−02	5.79−01	−1.063	C+	LS
88		$^4P-^4D^\circ$?				12–20						1
				[1 809.3]	1 543 000–1 598 270	6–6	3.06+07	1.50−02	5.36−01	−1.046	C+	LS
				[1 809.3]	1 543 000–1 598 270	6–4	5.10+06	1.67−03	5.97−02	−1.999	C	LS
89		$^4P-^4S^\circ$?				12–4						1

TABLE 28. Transition probabilities of allowed lines for Al VII (references in this table are as follows: 1=Burke and Lennon,[4] 2=Tachiev and Froese,[71] and 3=Merkelis *et al.*,[51])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				[1 775.57]	1 543 000–1 599 320	6–4	7.71+07	2.43−02	8.52−01	−0.836	B	LS
90	$2s^22p^2(^3P)4s$– $2s2p^3(^5S^\circ)4d$	$^4P-^4D^\circ$				12–20						1
				[509.113]	1 543 000–1 739 420	6–8	1.04+08	5.39−03	5.42−02	−1.490	C	LS
				[508.182]	1 543 000–1 739 780	6–6	3.13+07	1.21−03	1.21−02	−2.139	D	LS
				[507.511]	1 543 000–1 740 040	6–4	5.24+06	1.35−04	1.35−03	−3.092	E+	LS
91	$2s2p^3(^3D^\circ)3d$? – $2s^22p^2(^3P)5s$	$^4P^\circ$?$-^4P$				12–12						1
				[904.65]	1 591 560–1 702 100	6–6	3.81+07	4.68−03	8.36−02	−1.552	C	LS
				[909.50]	1 592 150–1 702 100	4–6	1.61+07	2.99−03	3.58−02	−1.922	D+	LS
92		$^4D^\circ$?$-^4P$				20–12						1
				[963.11]	1 598 270–1 702 100	6–6	1.93+07	2.68−03	5.10−02	−1.794	C	LS
				[963.11]	1 598 270–1 702 100	4–6	2.14+06	4.47−04	5.67−03	−2.748	D	LS
93		$^4S^\circ$?$-^4P$				4–12						1
				[972.95]	1 599 320–1 702 100	4–6	2.16+07	4.60−03	5.89−02	−1.735	C	LS
94	$2s^22p^2(^3P)5s$– $2s2p^3(^5S^\circ)4d$	$^4P-^4D^\circ$				12–20						1
			[2 678.7]	[2 679.5]	1 702 100–1 739 420	6–8	1.02+07	1.46−02	7.73−01	−1.057	B	LS
			[2 653.1]	[2 653.9]	1 702 100–1 739 780	6–6	3.13+06	3.31−03	1.74−01	−1.702	C	LS
			[2 635.0]	[2 635.7]	1 702 100–1 740 040	6–4	5.33+05	3.70−04	1.93−02	−2.654	D+	LS

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

4.7.2. Forbidden Transitions for Al VII

The results of Tachiev and Froese Fischer[71] are the product of extensive MCHF calculations with Breit-Pauli corrections to order α^2, with energy corrections. The second-order MBPT results of Merkelis *et al.*[49] are also cited.

To estimate accuracies, we pooled the RSDM of each of the lines for which a transition rate is given by two or more references,[49,71] as discussed in the introduction to Kelleher and Podobedova.[35] In this spectrum, the forbidden transitions between different configurations generally are stronger for E2 than for M1 lines. We note that these types of transitions have only been computed by a single source,[71] and that their estimated accuracies are therefore quite uncertain. The same also holds for the M2 transitions. We isoelectronically averaged the logarithmic quality factors observed for allowed N-like lines from the lower-lying levels of Na V, Mg VI, Al VII, and Si VIII and applied the result to forbidden lines of Al VII using the method described in the introduction to Kelleher and Podobedova.[35]

References for Forbidden Transitions for Al VII

[35]D. E. Kelleher and L. I. Podobedova, J. Phys. Chem. Ref. Data **37**, 267 (2008).

[49]G. Merkelis, I. Martinson, R. Kisielius, and M. J. Vilkas, Phys. Scr. **59**, 122 (1999).

[69]G. Tachiev and C. Froese Fischer, Astron. Astrophys. **385**, 716 (2002).

[71]G. Tachiev and C. Froese Fischer, http://www.vuse.vanderbilt.edu/~cff/mchf_collection/ (MCHF, *ab initio*, downloaded on February 17, 2004); see Ref. 69.

TABLE 29. Wavelength finding list for forbidden lines of Al VII

Wavelength (vac) (Å)	Mult. No.
112.801	16
113.116	16
113.155	16
113.282	16
113.473	16
113.640	16
114.844	15
115.148	15
115.170	15
115.340	15
115.343	15
115.476	15
115.650	15
115.670	15
115.844	15
115.933	25

TABLE 29. Wavelength finding list for forbidden lines of Al VII—Continued

Wavelength (vac) (Å)	Mult. No.
115.939	25
123.081	23
123.089	23
128.064	18
128.072	18
128.521	18
128.530	18
130.704	17
130.712	17
131.098	17
131.106	17
131.347	17
131.356	17
134.180	24
140.123	20
140.671	20
143.289	19
143.763	19
144.063	19
145.132	22
145.719	22
145.760	22
146.353	22
148.531	21
149.040	21
149.189	21
149.363	21
149.703	21
150.029	21
498.853	9
505.076	9
506.355	9
508.414	9
512.768	9
516.209	9
578.50	8
586.89	8
591.40	8
945.98	7
946.43	7
968.62	7
969.09	7
980.97	7
981.45	7
987.85	31

TABLE 29. Wavelength finding list for forbidden lines of Al VII—Continued

Wavelength (vac) (Å)	Mult. No.
1 002.20	31
1 054.09	2
1 054.85	12
1 055.41	12
1 057.05	2
1 088.97	12
1 089.56	12
1 183.57	32
1 223.84	32
1 488.10	11
1 489.20	11
1 603.36	1
1 604.80	1
1 955.8	29
Wavelength (air) (Å)	**Mult. No.**
2 012.2	29
2 109.9	29
2 907.0	30
3 070.7	4
3 076.0	4
3 096.0	4
3 101.4	4
3 162.6	30
3 622.2	13
4 058.9	13
5 121.5	27
5 532.5	27
5 972	27
6 339	27
6 538	27
Wavenumber (cm^{-1})	**Mult. No.**
3 770	6
2 970	14
2 780	28
2 470	6
2 300	26
1 450	26
1 300	6
266	5
56	3
50	10

TABLE 30. Transition probabilities of forbidden lines for Al VII (references in this table are as follows: 1 = Tachiev and Froese Fischer[71] and 2 = Merkelis *et al.*[49])

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	$2p^3-2p^3$	$^4S^\circ-^2D^\circ$									
				1 603.36	0–62 369	4–6	M1	1.06−02	9.69−06	C	1,2
				1 603.36	0–62 369	4–6	E2	4.93−03	2.80−04	C+	1,2
				1 604.80	0–62 313	4–4	M1	4.39−01	2.69−04	C+	1,2
				1 604.80	0–62 313	4–4	E2	3.16−03	1.20−04	C+	1,2

TABLE 30. Transition probabilities of forbidden lines for Al VII (references in this table are as follows: 1=Tachiev and Froese Fischer[71] and 2=Merkelis *et al.*[49])—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
2		$^4S^\circ-^2P^\circ$									
				1 054.09	0–94 869	4–4	M1	3.13+01	5.44−03	A	1,2
				1 054.09	0–94 869	4–4	E2	8.24−05	3.83−07	E+	1,2
				1 057.05	0–94 603	4–2	M1	1.28+01	1.12−03	A	1,2
				1 057.05	0–94 603	4–2	E2	5.03−04	1.19−06	D+	1,2
3		$^2D^\circ-^2D^\circ$									
				56 cm^{-1}	62 313–62 369	4–6	M1	1.88−06	2.38+00	A	1,2
				56 cm^{-1}	62 313–62 369	4–6	E2	2.86−17	2.78−03	B	1,2
4		$^2D^\circ-^2P^\circ$									
			3 101.4	3 102.3	62 369–94 603	6–2	E2	1.88−01	9.63−02	B+	1,2
			3 076.0	3 076.9	62 369–94 869	6–4	M1	5.01+00	2.16−02	B+	1,2
			3 076.0	3 076.9	62 369–94 869	6–4	E2	3.39−01	3.34−01	B+	1,2
			3 096.0	3 096.9	62 313–94 603	4–2	M1	5.45+00	1.20−02	B	1,2
			3 096.0	3 096.9	62 313–94 603	4–2	E2	2.84−01	1.44−01	B+	1,2
			3 070.7	3 071.6	62 313–94 869	4–4	M1	8.90+00	3.83−02	B+	1,2
			3 070.7	3 071.6	62 313–94 869	4–4	E2	1.41−01	1.38−01	B+	1,2
5		$^2P^\circ-^2P^\circ$									
				266 cm^{-1}	94 603–94 869	2–4	M1	1.68−04	1.32+00	A	1,2
				266 cm^{-1}	94 603–94 869	2–4	E2	1.55−14	4.16−04	C	1,2
6	$2s2p^4-2s2p^4$	$^4P-^4P$									
				3 770 cm^{-1}	280 200–283 970	6–2	E2	3.18−06	7.45−02	B	1
				2 470 cm^{-1}	280 200–282 670	6–4	M1	3.66−01	3.60+00	A	1
				2 470 cm^{-1}	280 200–282 670	6–4	E2	2.68−07	1.04−01	B+	1
				1 300 cm^{-1}	282 670–283 970	4–2	M1	9.87−02	3.33+00	A	1
				1 300 cm^{-1}	282 670–283 970	4–2	E2	1.73−09	8.30−03	B	1
7		$^4P-^2D$									
				981.45	283 970–385 860	2–6	E2	2.08−03	1.02−05	D+	1
				969.09	282 670–385 860	4–6	M1	2.26+00	4.58−04	C	1
				969.09	282 670–385 860	4–6	E2	1.38−02	6.30−05	C	1
				980.97	283 970–385 910	2–4	M1	1.48+00	2.08−04	C	1
				980.97	283 970–385 910	2–4	E2	1.09−02	3.55−05	C	1
				946.43	280 200–385 860	6–6	M1	1.39+01	2.62−03	C+	1
				946.43	280 200–385 860	6–6	E2	4.55−02	1.85−04	C	1
				968.62	282 670–385 910	4–4	M1	6.00+00	8.09−04	C+	1
				968.62	282 670–385 910	4–4	E2	3.41−04	1.04−06	D	1
				945.98	280 200–385 910	6–4	M1	1.21+00	1.52−04	C	1
				945.98	280 200–385 910	6–4	E2	1.83−02	4.96−05	C	1
8		$^4P-^2S$									
				578.50	280 200–453 060	6–2	E2	1.10−01	1.27−05	D+	1
				586.89	282 670–453 060	4–2	M1	7.55+01	1.13−03	C+	1
				586.89	282 670–453 060	4–2	E2	1.83−02	2.28−06	D	1
				591.40	283 970–453 060	2–2	M1	1.36+01	2.09−04	C	1
9		$^4P-^2P$									
				512.768	282 670–477 690	4–4	M1	3.00+00	5.99−05	C	1
				512.768	282 670–477 690	4–4	E2	7.31−02	9.26−06	D+	1
				508.414	283 970–480 660	2–2	M1	7.30+00	7.11−05	C	1
				498.853	280 200–480 660	6–2	E2	1.53−02	8.42−07	D	1
				506.355	280 200–477 690	6–4	M1	5.57+00	1.07−04	C	1
				506.355	280 200–477 690	6–4	E2	4.45−02	5.29−06	D+	1
				505.076	282 670–480 660	4–2	M1	3.76−01	3.60−06	D+	1
				505.076	282 670–480 660	4–2	E2	4.12−02	2.42−06	D	1
				516.209	283 970–477 690	2–4	M1	1.79+00	3.66−05	C	1

TABLE 30. Transition probabilities of forbidden lines for Al VII (references in this table are as follows: 1=Tachiev and Froese Fischer[71] and 2=Merkelis *et al.*[49])—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
				516.209	283 970–477 690	2–4	E2	1.65−02	2.16−06	D	1
10		^{2}D−^{2}D									
				50 cm^{-1}	385 860–385 910	6–4	M1	2.02−06	2.40+00	A	1
				50 cm^{-1}	385 860–385 910	6–4	E2	6.18−16	7.07−02	B	1
11		^{2}D−^{2}S									
				1 488.10	385 860–453 060	6–2	E2	1.55+01	2.02−01	B+	1
				1 489.20	385 910–453 060	4–2	M1	8.19−03	2.00−06	D	1
				1 489.20	385 910–453 060	4–2	E2	1.02+01	1.33−01	B+	1
12		^{2}D−^{2}P									
				1 054.85	385 860–480 660	6–2	E2	1.64−01	3.82−04	C	1
				1 088.97	385 860–477 690	6–4	M1	4.29+00	8.22−04	C+	1
				1 088.97	385 860–477 690	6–4	E2	1.08−01	5.89−04	C	1
				1 055.41	385 910–480 660	4–2	M1	5.28+00	4.60−04	C	1
				1 055.41	385 910–480 660	4–2	E2	7.61−01	1.78−03	C+	1
				1 089.56	385 910–477 690	4–4	M1	7.74+00	1.48−03	C+	1
				1 089.56	385 910–477 690	4–4	E2	1.94−01	1.06−03	C+	1
13		^{2}S−^{2}P									
			4 058.9	4 060.1	453 060–477 690	2–4	M1	8.19−01	8.13−03	B	1
			4 058.9	4 060.1	453 060–477 690	2–4	E2	7.98−05	3.15−04	C	1
			6 622.2	3 623.2	453 060–480 660	2–2	M1	4.61+00	1.63−02	B	1
14		^{2}P−^{2}P									
				2 970 cm^{-1}	477 690–480 660	4–2	M1	4.68−01	1.33+00	B+	1
				2 970 cm^{-1}	477 690–480 660	4–2	E2	1.23−06	9.48−02	B+	1
15	$2s2p^4$–$2s^22p^2(^3P)3s$	^{4}P−^{4}P									
				114.844	280 200–1 150 950	6–6	M1	4.97+00	1.68−06	D	1
				114.844	280 200–1 150 950	6–6	E2	1.65+04	1.76−03	C+	1
				115.476	282 670–1 148 650	4–4	M1	2.77+00	6.32−07	D	1
				115.476	282 670–1 148 650	4–4	E2	1.82+04	1.34−03	C+	1
				115.844	283 970–1 147 200	2–2	M1	1.41+00	1.62−07	D	1
				115.340	280 200–1 147 200	6–2	E2	5.17+04	1.88−03	C+	1
				115.148	280 200–1 148 650	6–4	M1	8.12−02	1.84−08	E+	1
				115.148	280 200–1 148 650	6–4	E2	3.64+04	2.63−03	C+	1
				115.670	282 670–1 147 200	4–2	M1	2.18−01	2.50−08	E+	1
				115.670	282 670–1 147 200	4–2	E2	5.67+03	2.10−04	C	1
				115.170	282 670–1 150 950	4–6	M1	2.76−01	9.38−08	E+	1
				115.170	282 670–1 150 950	4–6	E2	2.43+04	2.64−03	C+	1
				115.650	283 970–1 148 650	2–4	M1	3.48−01	7.99−08	E+	1
				115.650	283 970–1 148 650	2–4	E2	2.83+03	2.09−04	C	1
				115.343	283 970–1 150 950	2–6	E2	1.72+04	1.89−03	C+	1
16		^{4}P−^{2}P									
				113.116	282 670–1 166 720	4–4	M1	1.21−02	2.59−09	E	1
				113.116	282 670–1 166 720	4–4	E2	5.53+01	3.66−06	D+	1
				113.640	283 970–1 163 940	2–2	M1	7.81−02	8.50−09	E+	1
				113.155	280 200–1 163 940	6–2	E2	1.41+02	4.68−06	D+	1
				112.801	280 200–1 166 720	6–4	M1	7.55−02	1.61−08	E+	1
				112.801	280 200–1 166 720	6–4	E2	1.42+02	9.29−06	D+	1
				113.473	282 670–1 163 940	4–2	M1	6.50−04	7.04−11	E	1
				113.473	282 670–1 163 940	4–2	E2	7.76+00	2.61−07	D	1
				113.282	283 970–1 166 720	2–4	M1	1.39−02	2.99−09	E	1
				113.282	283 970–1 166 720	2–4	E2	8.59+00	5.73−07	D	1

TABLE 30. Transition probabilities of forbidden lines for Al VII (references in this table are as follows: 1=Tachiev and Froese Fischer[71] and 2=Merkelis *et al.*[49])—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
17		^{2}D–^{4}P									
				131.347	385 860–1 147 200	6–2	E2	4.98+00	3.48−07	D	1
				131.098	385 860–1 148 650	6–4	M1	3.72−02	1.24−08	E+	1
				131.098	385 860–1 148 650	6–4	E2	7.41−01	1.03−07	E+	1
				131.356	385 910–1 147 200	4–2	M1	2.71−02	4.55−09	E+	1
				131.356	385 910–1 147 200	4–2	E2	1.70+01	1.19−06	D	1
				130.704	385 860–1 150 950	6–6	M1	3.33−01	1.65−07	D	1
				130.704	385 860–1 150 950	6–6	E2	4.12+01	8.41−06	D+	1
				131.106	385 910–1 148 650	4–4	M1	7.36−02	2.46−08	E+	1
				131.106	385 910–1 148 650	4–4	E2	1.05+01	1.46−06	D	1
				130.712	385 910–1 150 950	4–6	M1	2.71−03	1.35−09	E	1
				130.712	385 910–1 150 950	4–6	E2	9.68+00	1.98−06	D	1
18		^{2}D–^{2}P									
				128.521	385 860–1 163 940	6–2	E2	3.10+00	1.94−07	D	1
				128.064	385 860–1 166 720	6–4	M1	9.41−02	2.93−08	E+	1
				128.064	385 860–1 166 720	6–4	E2	2.25+02	2.77−05	D+	1
				128.530	385 910–1 163 940	4–2	M1	8.30−02	1.31−08	E+	1
				128.530	385 910–1 163 940	4–2	E2	2.03+02	1.27−05	D+	1
				128.072	385 910–1 166 720	4–4	M1	1.01−01	3.14−08	E+	1
				128.072	385 910–1 166 720	4–4	E2	6.77+01	8.34−06	D+	1
19		^{2}S–^{4}P									
				143.289	453 060–1 150 950	2–6	E2	8.88−01	2.87−07	D	1
				143.763	453 060–1 148 650	2–4	M1	1.44−02	6.36−09	E+	1
				143.763	453 060–1 148 650	2–4	E2	4.42−02	9.70−09	E+	1
				144.063	453 060–1 147 200	2–2	M1	5.10−02	1.13−08	E+	1
20		^{2}S–^{2}P									
				140.123	453 060–1 166 720	2–4	M1	2.29−03	9.33−10	E	1
				140.123	453 060–1 166 720	2–4	E2	1.37+02	2.65−05	D+	1
				140.671	453 060–1 163 940	2–2	M1	9.11−02	1.88−08	E+	1
21		^{2}P–^{4}P									
				149.040	477 690–1 148 650	4–4	M1	1.82−01	8.93−08	E+	1
				149.040	477 690–1 148 650	4–4	E2	1.93+01	5.08−06	D+	1
				150.029	480 660–1 147 200	2–2	M1	8.34−02	2.09−08	E+	1
				149.363	477 690–1 147 200	4–2	M1	7.50−02	1.85−08	E+	1
				149.363	477 690–1 147 200	4–2	E2	3.04+01	4.04−06	D+	1
				148.531	477 690–1 150 950	4–6	M1	4.01−02	2.93−08	E+	1
				148.531	477 690–1 150 950	4–6	E2	6.34−01	2.45−07	D	1
				149.703	480 660–1 148 650	2–4	M1	1.15−03	5.74−10	E	1
				149.703	480 660–1 148 650	2–4	E2	2.30+01	6.18−06	D+	1
				149.189	480 660–1 150 950	2–6	E2	8.07−02	3.19−08	E+	1
22		^{2}P–^{2}P									
				145.132	477 690–1 166 720	4–4	M1	1.00+01	4.53−06	D+	1
				145.132	477 690–1 166 720	4–4	E2	9.26+03	2.13−03	C+	1
				146.353	480 660–1 163 940	2–2	M1	4.77−01	1.11−07	E+	1
				145.719	477 690–1 163 940	4–2	M1	1.16+00	2.67−07	D	1
				145.719	477 690–1 163 940	4–2	E2	1.82+04	2.14−03	C+	1
				145.760	480 660–1 166 720	2–4	M1	4.53−01	2.08−07	D	1
				145.760	480 660–1 166 720	2–4	E2	8.95+03	2.10−03	C+	1
23	$2s2p^4$–$2s^22p^2(^1D)3s$	^{2}D–^{2}D									
				123.081	385 860–1 198 330	6–6	M1	6.11+00	2.53−06	E	1
				123.081	385 860–1 198 330	6–6	E2	4.31+04	6.53−03	C	1

TABLE 30. Transition probabilities of forbidden lines for Al VII (references in this table are as follows: 1=Tachiev and Froese Fischer[71] and 2=Merkelis *et al.*[49])—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
				123.089	385 910–1 198 330	4–4	M1	1.24+00	3.44−07	E	1
				123.089	385 910–1 198 330	4–4	E2	3.78+04	3.81−03	D+	1
				123.081	385 860–1 198 330	6–4	M1	2.58−01	7.12−08	E	1
				123.081	385 860–1 198 330	6–4	E2	1.61+04	1.62−03	D+	1
				123.089	385 910–1 198 330	4–6	M1	2.09−01	8.65−08	E	1
				123.089	385 910–1 198 330	4–6	E2	1.07+04	1.62−03	D+	1
24		^{2}S–^{2}D									
				134.180	453 060–1 198 330	2–6	E2	4.04+03	9.42−04	D+	1
				134.180	453 060–1 198 330	2–4	M1	4.60−05	1.65−11	E	1
				134.180	453 060–1 198 330	2–4	E2	3.92+03	6.10−04	D	1
25	$2s2p^4$–$2s^22p^2(^1S)3s$	^{2}D–^{2}S									
				115.933	385 860–1 248 430	6–2	E2	4.53+04	1.69−03	D+	1
				115.939	385 910–1 248 430	4–2	M1	1.62−04	1.87−11	E	1
				115.939	385 910–1 248 430	4–2	E2	2.99+04	1.12−03	D+	1
26	$2p^2(^3P)3s$ $-2p^2(^3P)3s$	^{4}P–^{4}P									
				2 300 cm^{-1}	1 148 650–1 150 950	4–6	M1	1.96−01	3.59+00	A	1
				1 450 cm^{-1}	1 147 200–1 148 650	2–4	M1	6.83−02	3.32+00	A	1
27		^{4}P–^{2}P									
			5 532.5	5 534.0	1 148 650–1 166 720	4–4	M1	2.62−01	6.59−03	C+	1
			5 972	5 974	1 147 200–1 163 940	2–2	M1	8.17−01	1.29−02	B	1
			6 339	6 341	1 150 950–1 166 720	6–4	M1	2.98−01	1.13−02	B	1
			6 538	6 540	1 148 650–1 163 940	4–2	M1	2.49−02	5.16−04	C	1
			5 121.5	5 123.0	1 147 200–1 166 720	2–4	M1	1.01−01	2.01−03	C+	1
28		^{2}P–^{2}P									
				2 780 cm^{-1}	1 163 940–1 166 720	2–4	M1	1.93−01	1.33+00	B+	1
29	$2p^2(^3P)3s$ $-2p^2(^1D)3s$	^{4}P–^{2}D									
			2 012.2	2 012.9	1 148 650–1 198 330	4–6	M1	2.04+00	3.71−03	D+	1
				1 955.8	1 147 200–1 198 330	2–4	M1	8.22−01	9.12−04	D+	1
			2 109.9	2 110.6	1 150 950–1 198 330	6–6	M1	7.90+00	1.65−02	C	1
			2 012.2	2 012.9	1 148 650–1 198 330	4–4	M1	2.91+00	3.52−03	D+	1
			2 109.9	2 110.6	1 150 950–1 198 330	6–4	M1	8.21−01	1.14−03	D+	1
30		^{2}P–^{2}D									
			3 162.6	3 163.6	1 166 720–1 198 330	4–6	M1	1.20+00	8.46−03	C	1
			2 907.0	2 907.8	1 163 940–1 198 330	2–4	M1	1.44+00	5.24−03	C	1
			3 162.6	3 163.6	1 166 720–1 198 330	4–4	M1	3.60+00	1.69−02	C	1
31	$2p^2(^3P)3s$ $-2p^2(^1S)3s$	^{4}P–^{2}S									
				1 002.20	1 148 650–1 248 430	4–2	M1	5.42+01	4.05−03	C	1
				987.85	1 147 200–1 248 430	2–2	M1	9.08+00	6.49−04	D+	1
32		^{2}P–^{2}S									
				1 223.84	1 166 720–1 248 430	4–2	M1	6.46+00	8.78−04	D+	1
				1 183.57	1 163 940–1 248 430	2–2	M1	1.87+01	2.31−03	D+	1

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

4.8. Al VIII

Ionization energy: 284.66 eV (2 295 900 cm^{-1})

Carbon isoelectronic sequence

Ground state: $1s^22s^22p^2\ ^3P_0$

4.8.1. Allowed Transitions for Al VIII

Only OP (Refs. 41 and 42) results were available for energy levels above the $2p3d$. Wherever available we have used the data of Tachiev and Froese Fischer,[71] which are the product of extensive MCHF calculations with Breit-Pauli corrections to order α^2. Aggarwal[2] used the CIV3 code. Fawcett[14] applied the Hartree-Fock relativistic version of the COWAN code with Slater parameter optimization. Mendoza *et al.*[48] applied the SUPERSTRUCTURE code.

To estimate accuracies, we pooled the RSDM for each of the lines with transition rates published in two or more references,[2,14,41,42,48,71] as described in the introduction to Kelleher and Podobedova.[35] For this purpose the spin-allowed and intercombination data were treated separately, and each of these was in turn divided into two upper-level energy groups below and above 800 000 cm^{-1}. Estimated accuracies were substantially better for the lower energy groups. OP lines constituted a fifth group and have been used only when more accurate sources were not available. We then isoelectronically averaged the logarithmic quality factors observed for C-like lines of Na VI, Mg VII, Al VIII, and Si IX using the method described in the introduction to Kelleher and Podobedova.[35] For the higher-lying intercombination lines and those from the OP data, we scaled the logarithmic quality factor of the lower-lying lines.

References for Allowed Transitions for Al VIII

[2]K. M. Aggarwal, Astrophys. J. Suppl. Ser. **118**, 589 (1998).
[14]B. C. Fawcett, At. Data Nucl. Data Tables **37**, 367 (1987).
[35]D. E. Kelleher and L. I. Podobedova, J. Phys. Chem. Ref. Data **37**, 267 (2008).
[41]D. Luo and A. K. Pradhan, J. Phys. B **22**, 3377 (1989).
[42]D. Luo and A. K. Pradhan, http://legacy.gsfc.nasa.gov/topbase, downloaded on July 28, 1995 (Opacity Project).
[48]C. Mendoza, C. J. Zeippen, and P. J. Storey, Astron. Astrophys., Suppl. Ser. **135**, 159 (1999).
[68]G. Tachiev and C. Froese Fischer, Can. J. Phys. **79**, 955 (2001).
[71]G. Tachiev and C. Froese Fischer, http://www.vuse.vanderbilt.edu/~cff/mchf_collection/ (MCHF, *ab initio*, downloaded on February 17, 2004); see Ref. 68.

TABLE 31. Wavelength finding list for allowed lines of Al VIII

Wavelength (vac) (Å)	Mult. No.
53.785	74
53.800	74
53.823	74
54.217	29
54.258	29
54.297	29
57.553	75
57.621	75
57.624	75
61.694	28
62.016	27
63.200	70
63.203	70
63.206	70
63.357	69
63.360	69
63.363	69
63.714	68
63.717	68
63.720	68
63.933	26
63.970	26
64.003	26
64.004	26
64.081	26
64.114	26
64.319	66
64.323	66
64.359	66
64.362	66
64.365	66
65.131	72
65.298	71
66.321	67
66.363	67
66.704	53
66.731	53
66.771	53
67.044	20
67.096	20
67.121	20
67.165	20
67.236	62
67.244	20
67.288	20
67.311	62
67.313	62
67.360	19
67.407	19
67.409	62
67.413	62
67.416	62
67.437	19
67.464	19
67.530	19
67.561	61
67.565	61
67.568	61
67.943	60
67.947	60
67.950	60
68.333	24
68.375	23
68.825	65
69.420	64
69.431	73
69.502	64
69.611	64

TABLE 31. Wavelength finding list for allowed lines of Al VIII—Continued

Wavelength (vac) (Å)	Mult. No.
69.773	63
70.161	22
70.323	21
70.727	25
71.238	56
71.243	56
71.267	56
71.272	56
71.275	56
72.223	55
72.319	55
72.324	55
72.393	55
72.398	55
72.401	55
72.825	54
72.828	54
72.905	54
72.910	54
72.913	54
73.702	58
73.733	58
74.841	46
74.965	46
75.058	46
75.397	57
75.488	57
75.572	49
75.577	49
75.581	49
75.623	16
75.732	16
75.778	16
75.831	16
75.894	16
75.987	16
77.605	17
78.351	50
80.319	47
80.325	47
80.329	47
80.482	47
80.486	47
80.708	18
81.220	59
81.326	59
82.545	51
83.465	48
83.635	48
85.917	52
91.487	45
139.673	76
140.276	76
140.382	76
140.992	76
141.211	76
141.257	76

TABLE 31. Wavelength finding list for allowed lines of Al VIII—Continued

Wavelength (vac) (Å)	Mult. No.
201.804	83
202.893	83
203.289	83
209.494	30
210.013	33
210.855	30
224.936	6
225.805	6
227.195	6
231.006	112
231.102	112
232.105	112
232.894	36
247.402	5
248.453	5
250.138	5
251.351	11
252.966	4
254.712	4
259.653	32
259.713	32
259.754	32
260.960	86
268.947	102
275.505	101
277.855	104
278.373	104
279.501	104
279.736	10
282.566	105
283.350	105
285.470	9
285.567	31
286.607	31
286.656	31
287.101	15
287.191	100
287.985	100
288.077	103
288.634	103
289.084	31
289.159	31
289.210	31
289.847	103
291.223	82
292.158	82
292.937	89
293.893	89
295.037	89
295.281	82
295.683	35
299.141	41
323.509	3
324.739	14
325.309	3
328.202	3
329.598	34

TABLE 31. Wavelength finding list for allowed lines of Al VIII—Continued

Wavelength (vac) (Å)	Mult. No.
331.049	34
334.459	34
340.229	44
366.059	81
368.324	99
369.658	99
370.425	99
375.827	80
376.974	93
377.287	96
377.387	80
379.723	96
380.691	96
381.112	8
381.199	2
382.614	80
383.010	96
383.700	2
383.789	2
383.995	96
386.145	96
387.492	98
387.732	2
387.822	2
387.958	95
388.576	98
388.969	95
390.061	98
390.915	98
391.175	95
392.019	98
393.530	98
397.204	97
398.756	97
399.537	38
399.648	97
400.914	94
401.994	94
404.351	94
411.336	40
463.800	7
463.929	7
464.123	7
466.941	37
469.814	13
473.754	37
480.054	39
483.138	39
490.436	39
493.243	43
535.418	79
539.142	111
539.258	79
542.476	79
544.129	111
546.001	79
546.538	111

TABLE 31. Wavelength finding list for allowed lines of Al VIII—Continued

Wavelength (vac) (Å)	Mult. No.
550.903	111
553.342	79
553.373	111
559.159	111
561.199	110
563.76	110
569.77	110
595.45	42
600.20	42
602.16	12
611.51	42
656.86	123
660.02	123
665.82	123
756.83	1
772.68	1
926.01	85
959.97	107
974.94	107
982.22	115
988.04	109
990.39	109
995.12	115
996.02	109
1 007.66	92
1 009.08	109
1 014.92	109
1 018.02	115
1 111.73	84
1 118.69	84
1 131.09	84
1 207.44	77
1 223.69	77
1 250.16	108
1250.63	108
1 259.60	108
1 272.59	108
1 280.08	108
1 280.41	77
1 303.61	108
1 495.66	78
1 661.96	88
1 677.57	88
1 684.64	88
1 690.90	114
1 691.76	118
1 731.90	88
1 756.54	88
1 811.9	117
1 971.2	113
Wavelength (air) (Å)	**Mult. No.**
3 166.6	116
3 173.7	119
3 266.0	116
3 273.5	119
3 312.5	119

TABLE 31. Wavelength finding list for allowed lines of Al VIII—Continued

Wavelength (air) (Å)	Mult. No.
3 421.3	119
3 776.8	87
4 158.6	87
4 415.7	90
4 550.4	90
4 697.9	106
4 871.9	90
4 883.8	106
4 946.7	90
5 116.3	90
5 374.8	106
6 008	91
6 339	120
6 384	91
6 919	120
7 035	91
7 556	91
7 890	91
14 447	121
17 852	121
Wavenumber (cm^{-1})	**Mult. No.**
3 000	122
1 680	122

TABLE 32. Transition probabilities of allowed lines for Al VIII (references in this table are as follows: 1=Luo and Pradhan,[41,42] 2=Tachiev and Froese Fischer,[71] 3=Aggarwal,[2] 4=Fawcett,[14] and 5=Mendoza *et al.*[48])

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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
1	$2s^22p^2-2s2p^3$	$^3P-^5S^{\circ}$										
				772.68	4 420–133 840	5–5	7.17+04	6.42−06	8.17−05	−4.493	C+	2,3,5
				756.83	1 710–133 840	3–5	3.00+04	4.30−06	3.21−05	−4.889	C+	2,3,5
2		$^3P-^3D^{\circ}$		*385.78*	*3 026–262 240*	9–15	1.97+09	7.33−02	8.38−01	−0.181	A	2,3
				387.958	4 420–262 180	5–7	1.95+09	6.16−02	3.93−01	−0.511	A	2,3
				383.789	1 710–262 270	3–5	1.58+09	5.80−02	2.20−01	−0.759	B+	2,3
				381.199	0–262 330	1–3	1.24+09	8.12−02	1.02−01	−1.090	A	2,3
				387.822	4 420–262 270	5–5	3.80+08	8.56−03	5.46−02	−1.369	A	2,3
				383.700	1 710–262 330	3–3	7.77+08	1.71−02	6.50−02	−1.290	A	2,3
				387.732	4 420–262 330	5–3	3.65+07	4.93−04	3.15−03	−2.608	B+	2,3
3		$^3P-^3P^{\circ}$		*326.71*	*3 026–309 110*	9–9	5.26+09	8.41−02	8.14−01	−0.121	A	2,3
				328.202	4 420–309 110	5–5	4.08+09	6.59−02	3.56−01	−0.482	A	2,3
				325.309	1 710–309 110	3–3	1.54+09	2.44−02	7.84−02	−1.135	A	2,3
				328.202	4 420–309 110	5–3	2.05+09	1.98−02	1.07−01	−1.004	A	2,3
				325.309	1 710–309 110	3–1	5.33+09	2.82−02	9.06−02	−1.073	A	2,3
				325.309	1 710–309 110	3–5	1.14+09	3.00−02	9.65−02	−1.046	A	2,3
				323.509	0–309 110	1–3	1.71+09	8.05−02	8.58−02	−1.094	A	2,3
4		$^3P-^1D^{\circ}$										
				[252.966]	1 710–397 020	3–5	1.48+06	2.37−05	5.91−05	−4.148	D+	2,3
				[254.712]	4 420–397 020	5–5	2.77+07	2.70−04	1.13−03	−2.870	C	2,3
5		$^3P-^3S^{\circ}$		*249.27*	*3 026*–404 200	9–3	3.34+10	1.04−01	7.66−01	−0.029	A	2,3
				250.138	4 420–404 200	5–3	1.85+10	1.04−01	4.28−01	−0.284	A	2,3
				248.453	1 710–404 200	3–3	1.11+10	1.03−01	2.53−01	−0.510	A	2,3
				247.402	0–404 200	1–3	3.80+09	1.05−01	8.52−02	−0.979	B+	2,3
6		$^3P-^1P^{\circ}$										
				[225.805]	1 710–4 445 70	3–3	3.65+07	2.79−04	6.23−04	−3.077	C	2,3
				[227.195]	4 420–444 570	5–3	1.53+06	7.10−06	2.66−05	−4.450	D	2,3
				[224.936]	0–444 570	1–3	2.22+05	5.06−06	3.74−06	−5.296	D	2,3
7		$^1D-^3D^{\circ}$										
				[463.929]	46 720–262 270	5–5	5.03+05	1.62−05	1.24−04	−4.092	D+	2,3
				[463.800]	46 720–262 330	5–3	3.42+05	6.62−06	5.05−05	−4.480	D+	2,3
				[464.123]	46 720–262 180	5–7	2.56+06	1.16−04	8.86−04	−3.237	C	2,3

TABLE 32. Transition probabilities of allowed lines for Al VIII (references in this table are as follows: 1=Luo and Pradhan,[41,42] 2=Tachiev and Froese Fischer,[71] 3=Aggarwal,[2] 4=Fawcett,[14] and 5=Mendoza *et al.*[48])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
8		^{1}D–^{3}P°										
				[381.112]	46 720–309 110	5–3	2.99+06	3.90−05	2.45−04	−3.710	D+	2,3
				[381.112]	46 720–309 110	5–5	3.96+05	8.61−06	5.40−05	−4.366	D+	2,3
9		^{1}D–^{1}D°		285.470	46 720–397 020	5–5	1.56+10	1.91−01	8.97−01	−0.020	A	2,3
10		^{1}D–^{3}S°										
				[279.736]	46 720–404 200	5–3	2.35+06	1.65−05	7.61−05	−4.084	D+	2,3
11		^{1}D–^{1}P°		251.351	46 720–444 570	5–3	2.06+10	1.17−01	4.85−01	−0.233	A	2,3
12		^{1}S–^{3}D°										
				[602.16]	96 260–262 330	1–3	1.84+05	3.00−05	5.95−05	−4.523	D+	2,3
13		^{1}S–^{3}P°										
				[469.814]	96 260–309 110	1–3	9.79+05	9.71−05	1.50−04	−4.013	D+	2,3
14		^{1}S–^{3}S°										
				[324.739]	96 260–404 200	1–3	2.74+06	1.30−04	1.39−04	−3.886	D+	2,3
15		^{1}S–^{1}P°		287.101	96 260–444 570	1–3	5.09+09	1.89−01	1.78−01	−0.724	A	2,3
16	$2p^2-2p3s$	^{3}P–^{3}P°		*[75.80]*	*3 026–1 322 329*	9–9	7.90+10	6.81−02	1.53−01	−0.213	B	2,3
				75.778	4 420–1 324 060	5–5	5.95+10	5.13−02	6.39−02	−0.591	B	2,3
				75.831	1 710–1 320 440	3–3	1.93+10	1.66−02	1.25−02	−1.303	B	2,3
				75.987	4 420–1 320 440	5–3	3.30+10	1.71−02	2.14−02	−1.068	B	2,3
				[75.894]	1 710–1 319 340	3–1	7.87+10	2.27−02	1.70−02	−1.167	B	2,3
				75.623	1 710–1 324 060	3–5	1.99+10	2.85−02	2.13−02	−1.068	B	2,3
				75.732	0–1 320 440	1–3	2.61+10	6.73−02	1.68−02	−1.172	B	2,3
17		^{1}D–^{1}P°		77.605	46 720–1 335 300	5–3	9.53+10	5.16−02	6.59−02	−0.588	C+	2,3
18		^{1}S–^{1}P°		80.708	96 260–1 335 300	1–3	2.85+10	8.34−02	2.21−02	−1.079	C+	2,3
19	$2p^2-2p3d$	^{3}P–^{3}D°		*67.44*	*3 026–1 485 783*	9–15	7.02+11	7.98−01	1.59+00	0.856	B	2,3
				67.464	4 420–1 486 690	5–7	7.18+11	6.86−01	7.62−01	0.535	B+	2,3
				67.407	1 710–1 485 240	3–5	6.36+11	7.22−01	4.81−01	0.336	B	2,3
				67.360	0–1 484 570	1–3	4.92+11	1.00+00	2.22−01	0.000	B	2,3
				67.530	4 420–1 485 240	5–5	4.03+10	2.76−02	3.07−02	−0.860	C	2,3
				67.437	1 710–1 484 570	3–3	2.15+11	1.47−01	9.78−02	−0.356	C+	2,3
				67.561	4 420–1 484 570	5–3	2.17+09	8.90−04	9.90−04	−2.352	E+	2,3
20		^{3}P–^{3}P°		*67.20*	*3 026–1 491 068*	9–9	4.35+11	2.95−01	5.87−01	0.424	C+	2,3
				67.288	4 420–1 490 570	5–5	4.44+11	3.01−01	3.34−01	0.178	B	2,3
				67.121	1 710–1 491 550	3–3	1.91+11	1.29−01	8.53−02	−0.412	C+	2,3
				67.244	4 420–1 491 550	5–3	1.88+11	7.65−02	8.47−02	−0.417	C+	2,3
				67.096	1 710–1 492 110	3–1	4.12+11	9.26−02	6.14−02	−0.556	C	2,3
				67.165	1 710–1 490 570	3–5	9.87+08	1.11−03	7.38−04	−2.478	E+	2,3
				67.044	0–1 491 550	1–3	4.75+10	9.60−02	2.12−02	−1.018	C	2,3
21		^{1}D–^{3}F°										
				70.323	46 720–1 468 730	5–5	9.50+10	7.04−02	8.15−02	−0.453	C	2,3
22		^{1}D–^{1}D°		70.161	46 720–1 472 010	5–5	1.69+11	1.25−01	1.44−01	−0.204	C+	2,3
23		^{1}D–^{1}F°		68.375	46 720–1 509 240	5–7	8.65+11	8.49−01	9.55−01	0.628	B+	2,3
24		^{1}D–^{1}P°		68.333	46 720–1 510 150	5–3	2.51+10	1.05−02	1.19−02	−1.280	D+	2,3
25		^{1}S–^{1}P°		70.727	96 260–1 510 150	1–3	5.18+11	1.17+00	2.71−01	0.068	B	2,3

TABLE 32. Transition probabilities of allowed lines for Al VIII (references in this table are as follows: 1=Luo and Pradhan,[41,42] 2=Tachiev and Froese Fischer,[71] 3=Aggarwal,[2] 4=Fawcett,[14] and 5=Mendoza *et al.*[48])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
26	$2s^22p^2-$ $2s2p^2(^4P)3p$	$^3P-^3D^°$		*[63.99]*	*3 026–1 565 661*	9–15	1.61+11	1.65−01	3.12−01	0.172	C	4
				[64.004]	4 420–1 566 820	5–7	1.61+11	1.38−01	1.46−01	−0.161	C	4
				[63.970]	1 710–1 564 950	3–5	1.30+11	1.33−01	8.42−02	−0.399	C	4
				[63.933]	0–1 564 140	1–3	9.63+10	1.77−01	3.73−02	−0.752	D+	4
				[64.081]	4 420–1 564 950	5–5	3.05+10	1.88−02	1.98−02	−1.027	D+	4
				[64.003]	1 710–1 564 140	3–3	6.19+10	3.80−02	2.40−02	−0.943	D+	4
				[64.114]	4 420–1 564 140	5–3	2.70+09	1.00−03	1.06−03	−2.301	E+	4
27	$2s^22p^2-$ $2s2p^2(^2D)3p$	$^1D-^1F^°$		62.016	46 720–1 659 210	5–7	2.04+11	1.64−01	1.68−01	−0.086	C+	4
28		$^1D-^1D^°$		61.694	46 720–1 667 620	5–5	1.90+11	1.09−01	1.10−01	−0.264	C	4
29	$2p^2-2p4d$	$^3P-^3D^°$				9–15						1
				[54.258]	4 420–1 847 470	5–7	2.49+11	1.54−01	1.38−01	−0.114	D	LS
				[54.217]	1 710–1 846 150	3–5	1.88+11	1.38−01	7.39−02	−0.383	D	LS
				[54.297]	4 420–1 846 150	5–5	6.22+10	2.75−02	2.46−02	−0.862	E+	LS
30	$2s2p^3-2p^4$	$^5S^°-^3P$										
				210.855	133 840–608 100	5–5	2.85+06	1.90−05	6.60−05	−4.022	D+	2,3
				209.494	133 840–611 180	5–3	1.23+06	4.88−06	1.68−05	−4.613	D	2,3
31		$^3D^°-^3P$		*287.87*	*262 240–609 617*	15–9	1.32+10	9.83−02	1.40+00	0.169	A	2,3
				289.084	262 180–608 100	7–5	1.09+10	9.78−02	6.52−01	−0.165	A	2,3
				286.607	262 270–611 180	5–3	9.52+09	7.04−02	3.32−01	−0.453	A	2,3
				285.567	262 330–612 510	3–1	1.29+10	5.24−02	1.48−01	−0.804	A	2,3
				289.159	262 270–608 100	5–5	2.24+09	2.81−02	1.34−01	−0.852	A	2,3
				286.656	262 330–611 180	3–3	3.49+09	4.30−02	1.22−01	−0.889	A	2,3
				289.210	262 330–608 100	3–5	1.67+08	3.50−03	1.00−02	−1.979	B+	2,3
32		$^3D^°-^1D$										
				[259.713]	262 270–647 310	5–5	7.20+06	7.28−05	3.11−04	−3.439	C	2,3
				[259.653]	262 180–647 310	7–5	3.69+07	2.66−04	1.59−03	−2.730	C	2,3
				[259.754]	262 330–647 310	3–5	1.95+05	3.29−06	8.43−06	−5.006	D	2,3
33		$^3D^°-^1S$										
				[210.013]	262 330–738 490	3–1	1.63+06	3.59−06	7.44−06	−4.968	D	2,3
34		$^3P^°-^3P$		*332.77*	*309 110–609 617*	9–9	3.17+09	5.26−02	5.19−01	−0.325	A	2,3
				334.459	309 110–608 100	5–5	2.15+09	3.61−02	1.99−01	−0.744	A	2,3
				331.049	309 110–611 180	3–3	6.26+08	1.03−02	3.37−02	−1.510	B+	2,3
				331.049	309 110–611 180	5–3	1.67+09	1.64−02	8.96−02	−1.086	A	2,3
				329.598	309 110–612 510	3–1	3.52+09	1.91−02	6.22−02	−1.242	A	2,3
				334.459	309 110–608 100	3–5	8.35+08	2.33−02	7.71−02	−1.156	A	2,3
				331.049	309 110–611 180	1–3	1.07+09	5.29−02	5.76−02	−1.277	A	2,3
35		$^3P^°-^1D$										
				[295.683]	309 110–647 310	3–5	3.16+06	6.90−05	2.01−04	−3.684	D+	2,3
				[295.683]	309 110–647 310	5–5	4.15+05	5.45−06	2.65−05	−4.565	D	2,3
36		$^3P^°-^1S$										
				[232.894]	309 110–738 490	3–1	9.83+06	2.66−05	6.13−05	−4.098	D+	2,3
37		$^1D^°-^3P$										
				[466.941]	397 020–611 180	5–3	3.07+05	6.02−06	4.63−05	−4.521	D+	2,3
				[473.754]	397 020–608 100	5–5	8.11+06	2.73−04	2.13−03	−2.865	C	2,3

TABLE 32. Transition probabilities of allowed lines for Al VIII (references in this table are as follows: 1=Luo and Pradhan,[41,42] 2=Tachiev and Froese Fischer,[71] 3=Aggarwal,[2] 4=Fawcett,[14] and 5=Mendoza *et al.*[48])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
38		^{1}D°–^{1}D		399.537	397 020–647 310	5–5	8.33+09	1.99−01	1.31+00	−0.002	A	2,3
39		^{3}S°–^{3}P		*486.82*	404 200–*609 617*	3–9	2.01+09	2.14−01	1.03+00	−0.192	A	2,3
				490.436	404 200–608 100	3–5	1.94+09	1.17−01	5.65−01	−0.455	A	2,3
				483.138	404 200–611 180	3–3	2.08+09	7.28−02	3.47−01	−0.661	A	2,3
				480.054	404 200–612 510	3–1	2.15+09	2.48−02	1.17−01	−1.128	A	2,3
40		^{3}S°–^{1}D										
				[411.336]	404 200–647 310	3–5	2.51+05	1.06−05	4.32−05	−4.498	D	2,3
41		^{3}S°–^{1}S										
				[299.141]	404 200–738 490	3–1	5.19+07	2.32−04	6.85−04	−3.157	C	2,3
42		^{1}P°–^{3}P										
				[600.20]	444 570–611 180	3–3	2.56+06	1.38−04	8.21−04	−3.383	C	2,3
				[595.45]	444 570–612 510	3–1	2.40+05	4.25−06	2.50−05	−4.894	D	2,3
				[611.51]	444 570–608 100	3–5	6.49+05	6.06−05	3.66−04	−3.740	C	2,3
43		^{1}P°–^{1}D		493.243	444 570–647 310	3–5	9.16+08	5.57−02	2.71−01	−0.777	A	2,3
44		^{1}P°–^{1}S		340.229	444 570–738 490	3–1	2.13+10	1.23−01	4.15−01	−0.433	A	2,3
45	$2s2p^3$ $-2s^22p3p$	^{3}P°–^{3}S		*91.49*	*309 110*–1 402 160	9–3	6.44+09	2.69−03	7.30−03	−1.616	D	2,3
				91.487	309 110–1 402 160	5–3	3.99+09	3.01−03	4.53−03	−1.822	D	2,3
				91.487	309 110–1 402 160	3–3	1.93+09	2.42−03	2.19−03	−2.139	D	2,3
				91.487	309 110–1 402 160	1–3	5.15+08	1.94−03	5.84−04	−2.712	E+	2,3
46	$2s2p^3$ $-2s2p^2(^4P)3s$	^{5}S°–^{5}P		*74.93*	133 840–*1 468 499*	5–15	5.48+10	1.38−01	1.71−01	−0.161	C	4
				74.841	133 840–1 470 010	5–7	5.53+10	6.50−02	8.01−02	−0.488	C	4
				74.965	133 840–1 467 800	5–5	5.46+10	4.60−02	5.68−02	−0.638	C	4
				75.058	133 840–1 466 140	5–3	5.41+10	2.74−02	3.39−02	−0.863	D+	4
47		^{3}D°–^{3}P				15–9						4
				80.319	262 180–1 507 210	7–5	4.55+10	3.14−02	5.82−02	−0.658	C	4
				80.482	262 270–1 504 780	5–3	4.33+10	2.52−02	3.34−02	−0.900	D+	4
				80.325	262 270–1 507 210	5–5	5.79+09	5.60−03	7.40−03	−1.553	D	4
				80.486	262 330–1 504 780	3–3	1.17+10	1.13−02	9.01−03	−1.470	D	4
				80.329	262 330–1 507 210	3–5	2.07+08	3.33−04	2.64−04	−3.000	E	4
48		^{3}P°–^{3}P				9–9						4
				83.465	309 110–1 507 210	5–5	3.29+10	3.44−02	4.73−02	−0.764	C	4
				83.635	309 110–1 504 780	3–3	1.11+10	1.17−02	9.64−03	−1.455	D	4
				83.635	309 110–1 504 780	5–3	1.53+10	9.60−03	1.32−02	−1.319	D	4
				83.465	309 110–1 507 210	3–5	1.09+10	1.90−02	1.57−02	−1.244	D	4
				83.635	309 110–1 504 780	1–3	1.40+10	4.40−02	1.21−02	−1.357	D	4
49	$2s2p^3$ $-2s2p^2(^2D)3s$	^{3}D°–^{3}D		*75.58*	*262 240–1 585 420*	15–15	8.73+10	7.47−02	2.79−01	0.049	C	4
				75.572	262 180–1 585 420	7–7	7.74+10	6.63−02	1.15−01	−0.333	C	4
				75.577	262 270–1 585 420	5–5	5.82+10	4.98−02	6.20−02	−0.604	C	4
				75.581	262 330–1 585 420	3–3	6.31+10	5.40−02	4.03−02	−0.790	D+	4
				75.572	262 180–1 585 420	7–5	1.28+10	7.86−03	1.37−02	−1.259	D	4
				75.577	262 270–1 585 420	5–3	2.06+10	1.06−02	1.32−02	−1.276	D	4
				75.577	262 270–1 585 420	5–7	1.22+10	1.46−02	1.82−02	−1.137	D+	4
				75.581	262 330–1 585 420	3–5	1.52+10	2.17−02	1.62−02	−1.186	D+	4

TABLE 32. Transition probabilities of allowed lines for Al VIII (references in this table are as follows: 1=Luo and Pradhan,[41,42] 2=Tachiev and Froese Fischer,[71] 3=Aggarwal,[2] 4=Fawcett,[14] and 5=Mendoza *et al.*[48])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
50		$^3P^\circ-^3D$		*78.35*	*309 110–1 585 420*	9–15	3.25+10	4.99−02	1.16−01	−0.348	D+	4
				78.351	309 110–1 585 420	5–7	3.06+10	3.94−02	5.08−02	−0.706	C	4
				78.351	309 110–1 585 420	3–5	2.30+10	3.53−02	2.73−02	−0.975	D+	4
				78.351	309 110–1 585 420	1–3	1.81+10	5.00−02	1.29−02	−1.301	D	4
				78.351	309 110–1 585 420	5–5	1.04+10	9.60−03	1.24−02	−1.319	D	4
				78.351	309 110–1 585 420	3–3	1.59+10	1.47−02	1.13−02	−1.356	D	4
				78.351	309 110–1 585 420	5–3	1.45+09	8.00−04	1.03−03	−2.398	E	4
51		$^1D^\circ-^1D$		82.545	397 020–1 608 480	5–5	5.80+10	5.92−02	8.04−02	−0.529	C	4
52		$^1P^\circ-^1D$		85.917	444 570–1 608 480	3–5	1.95+10	3.60−02	3.05−02	−0.967	D+	4
53	$2s2p^3$ $-2s2p^2(^4P)3d$	$^5S^\circ-^5P$		*66.74*	133 840–*1 632 097*	5–15	7.86+11	1.58+00	1.73+00	0.898	B	4
				66.771	133 840–1 631 500	5–7	7.82+11	7.32−01	8.04−01	0.563	B	4
				66.731	133 840–1 632 390	5–5	7.86+11	5.25−01	5.76−01	0.419	B	4
				66.704	133 840–1 633 000	5–3	7.97+11	3.19−01	3.50−01	0.203	C+	4
54		$^3D^\circ-^3P$				15–9						4
				[72.905]	262 180–1 633 820	7–5	2.94+10	1.67−02	2.81−02	−0.932	D+	4
				[72.825]	262 270–1 635 420	5–3	2.01+10	9.60−03	1.15−02	−1.319	D	4
				[72.910]	262 270–1 633 820	5–5	1.28+10	1.02−02	1.22−02	−1.292	D	4
				[72.828]	262 330–1 635 420	3–3	1.43+10	1.13−02	8.15−03	−1.470	D	4
				[72.913]	262 330–1 633 820	3–5	1.76+09	2.33−03	1.68−03	−2.156	E+	4
55		$^3D^\circ-^3F$		*[72.30]*	*262 240–1 645 393*	15–21	3.29+11	3.61−01	1.29+00	0.734	C+	4
				[72.223]	262 180–1 646 780	7–9	3.31+11	3.33−01	5.54−01	0.368	B	4
				[72.324]	262 270–1 644 940	5–7	2.97+11	3.26−01	3.88−01	0.212	C+	4
				[72.401]	262 330–1 643 530	3–5	2.78+11	3.64−01	2.60−01	0.038	C+	4
				[72.319]	262 180–1 644 940	7–7	3.21+10	2.51−02	4.19−02	−0.755	D+	4
				[72.398]	262 270–1 643 530	5–5	4.73+10	3.72−02	4.43−02	−0.730	C	4
				[72.393]	262 180–1 643 530	7–5	1.02+09	5.71−04	9.53−04	−2.398	E	4
56		$^3D^\circ-^3D$?				15–15						4
				71.238	262 180–1 665 920	7–7	1.39+11	1.05−01	1.73−01	−0.134	C+	4
				71.272	262 270–1 665 350	5–5	9.06+10	6.90−02	8.09−02	−0.462	C	4
				71.267	262 180–1 665 350	7–5	2.68+10	1.46−02	2.39−02	−0.991	D+	4
				71.243	262 270–1 665 920	5–7	2.29+10	2.44−02	2.86−02	−0.914	D+	4
				71.275	262 330–1 665 350	3–5	2.49+10	3.17−02	2.23−02	−1.022	D+	4
57		$^3P^\circ-^3P$				9–9						4
				[75.488]	309 110–1 633 820	5–5	1.42+11	1.21−01	1.51−01	−0.218	C	4
				[75.397]	309 110–1 635 420	3–3	4.50+10	3.83−02	2.85−02	−0.940	D+	4
				[75.397]	309 110–1 635 420	5–3	8.92+10	4.56−02	5.66−02	−0.642	C	4
				[75.488]	309 110–1 633 820	3–5	6.09+10	8.67−02	6.46−02	−0.585	C	4
				[75.397]	309 110–1 635 420	1–3	7.74+10	1.98−01	4.91−02	−0.703	C	4
58		$^3P^\circ-^3D$?				9–15						4
				73.702	309 110–1 665 920	5–7	2.95+11	3.36−01	4.07−01	0.225	C+	4
				73.733	309 110–1 665 350	3–5	2.11+11	2.86−01	2.09−01	−0.067	C+	4
				73.733	309 110–1 665 350	5–5	9.50+10	7.74−02	9.39−02	−0.412	C	4
59		$^3S^\circ-^3P$				3–9						4
				[81.326]	404 200–1 633 820	3–5	5.08+10	8.40−02	6.75−02	−0.599	C	4
				[81.220]	404 200–1 635 420	3–3	5.46+10	5.40−02	4.33−02	−0.790	D+	4

TABLE 32. Transition probabilities of allowed lines for Al VIII (references in this table are as follows: 1=Luo and Pradhan,[41,42] 2=Tachiev and Froese Fischer,[71] 3=Aggarwal,[2] 4=Fawcett,[14] and 5=Mendoza *et al.*[48])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
60	$2s2p^3-2s2p^2(^2D)3d$	$^3D^\circ-^3F$		*[67.95]*	*262 240–1 734 000*	15–21	7.20+11	6.98−01	2.34+00	1.020	B	4
				[67.943]	262 180–1 734 000	7–9	7.23+11	6.43−01	1.01+00	0.653	B	4
				[67.947]	262 270–1 734 000	5–7	6.25+11	6.06−01	6.77−01	0.481	B	4
				[67.950]	262 330–1 734 000	3–5	5.89+11	6.80−01	4.56−01	0.310	B	4
				[67.943]	262 180–1 734 000	7–7	9.45+10	6.54−02	1.02−01	−0.339	C	4
				[67.947]	262 270–1 734 000	5–5	1.24+11	8.56−02	9.57−02	−0.369	C	4
				[67.943]	262 180–1 734 000	7–5	4.33+09	2.14−03	3.36−03	−1.824	E+	4
61		$^3D^\circ-^3D?$		*67.56*	*262 240–1 742 330*	15–15	3.62+11	2.48−01	8.27−01	0.571	C	4
				67.561	262 180–1 742 330	7–7	3.09+11	2.11−01	3.29−01	0.169	C+	4
				67.565	262 270–1 742 330	5–5	2.55+11	1.75−01	1.94−01	−0.058	C+	4
				67.568	262 330–1 742 330	3–3	2.88+11	1.97−01	1.31−01	−0.228	C	4
				67.561	262 180–1 742 330	7–5	5.73+10	2.80−02	4.36−02	−0.708	D+	4
				67.565	262 270–1 742 330	5–3	9.55+10	3.92−02	4.36−02	−0.708	D+	4
				67.565	262 270–1 742 330	5–7	3.99+10	3.82−02	4.25−02	−0.719	D+	4
				67.568	262 330–1 742 330	3–5	5.67+10	6.47−02	4.32−02	−0.712	D+	4
62		$^3D^\circ-^3P$		*[67.36]*	*262 240–1 746 853*	15–9	1.75+11	7.15−02	2.38−01	0.030	C	4
				[67.409]	262 180–1 745 660	7–5	1.61+11	7.84−02	1.22−01	−0.261	C	4
				[67.311]	262 270–1 747 920	5–3	1.17+11	4.78−02	5.30−02	−0.622	C	4
				[67.236]	262 330–1 749 620	3–1	2.23+11	5.03−02	3.34−02	−0.821	D+	4
				[67.413]	262 270–1 745 660	5–5	1.94+10	1.32−02	1.46−02	−1.180	D	4
				[67.313]	262 330–1 747 920	3–3	3.09+10	2.10−02	1.40−02	−1.201	D	4
				[67.416]	262 330–1 745 660	3–5	1.17+09	1.33−03	8.88−04	−2.399	E	4
63		$^3P^\circ-^3D?$		*69.77*	*309 110–1 742 330*	9–15	2.41+11	2.93−01	6.06−01	0.421	C	4
				69.773	309 110–1 742 330	5–7	2.54+11	2.59−01	2.98−01	0.112	C+	4
				69.773	309 110–1 742 330	3–5	1.88+11	2.29−01	1.58−01	−0.163	C	4
				69.773	309 110–1 742 330	1–3	1.32+11	2.89−01	6.64−02	−0.539	C	4
				69.773	309 110–1 742 330	5–5	4.69+10	3.42−02	3.93−02	−0.767	D+	4
				69.773	309 110–1 742 330	3–3	8.54+10	6.23−02	4.30−02	−0.728	D+	4
				69.773	309 110–1 742 330	5–3	4.11+09	1.80−03	2.07−03	−2.046	E+	4
64		$^3P^\circ-^3P$		*[69.55]*	*309 110–1 746 853*	9–9	3.71+11	2.69−01	5.55−01	0.384	C	4
				[69.611]	309 110–1 745 660	5–5	2.87+11	2.09−01	2.39−01	0.019	C+	4
				[69.502]	309 110–1 747 920	3–3	1.89+11	1.37−01	9.40−02	−0.386	C	4
				[69.502]	309 110–1 747 920	5–3	1.33+10	5.80−03	6.64−03	−1.538	D	4
				[69.420]	309 110–1 749 620	3–1	3.50+11	8.43−02	5.78−02	−0.597	C	4
				[69.611]	309 110–1 745 660	3–5	9.33+10	1.13−01	7.77−02	−0.470	C	4
				[69.502]	309 110–1 747 920	1–3	1.60+11	3.47−01	7.94−02	−0.460	C	4
65		$^3P^\circ-^3S$				9–3						4
				[68.825]	309 110–1 762 070	5–3	3.16+11	1.35−01	1.53−01	−0.171	C	4
				[68.825]	309 110–1 762 070	3–3	1.83+10	1.30−02	8.84−03	−1.409	D	4
				[68.825]	309 110–1 762 070	1–3	3.76+10	8.01−02	1.81−02	−1.096	E+	LS
66	$2s2p^3-2s2p^2(^2S)3d$	$^3D^\circ-^3D$				15–15						4
				[64.319]	262 180–1 816 930	7–7	1.43+10	8.86−03	1.31−02	−1.207	D	4
				[64.362]	262 270–1 815 970	5–5	8.37+09	5.20−03	5.51−03	−1.585	D	4
				[64.359]	262 180–1 815 970	7–5	2.25+09	1.00−03	1.48−03	−2.155	E+	4
				[64.323]	262 270–1 816 930	5–7	5.99+09	5.20−03	5.51−03	−1.585	D	4
				[64.365]	262 330–1 815 970	3–5	5.15+09	5.33−03	3.39−03	−1.796	E+	4

TABLE 32. Transition probabilities of allowed lines for Al VIII (references in this table are as follows: 1=Luo and Pradhan,[41,42] 2=Tachiev and Froese Fischer,[71] 3=Aggarwal,[2] 4=Fawcett,[14] and 5=Mendoza et al.[48])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
67		$^3P^\circ-^3D$				9–15						1
				[66.321]	309 110–1 816 930	5–7	9.65+10	8.91−02	9.73−02	−0.351	D	LS
				[66.363]	309 110–1 815 970	3–5	7.22+10	7.95−02	5.21−02	−0.623	E+	LS
				[66.363]	309 110–1 815 970	5–5	2.41+10	1.59−02	1.74−02	−1.100	E+	LS
68	$2s2p^3-2s2p^2(^2P)3d$	$^3D^\circ-^3F$				15–21						4
				[63.714]	262 180–1 831 700	7–9	1.38+11	1.08−01	1.58−01	−0.121	C	4
				[63.717]	262 270–1 831 700	5–7	1.31+11	1.12−01	1.17−01	−0.252	C	4
				[63.720]	262 330–1 831 700	3–5	1.29+11	1.31−01	8.22−02	−0.406	C	4
				[63.714]	262 180–1 831 700	7–7	1.27+10	7.71−03	1.13−02	−1.268	D	4
				[63.717]	262 270–1 831 700	5–5	2.04+10	1.24−02	1.30−02	−1.208	D	4
				[63.714]	262 180–1 831 700	7–5	4.83+08	2.10−04	3.08−04	−2.833	E	LS
69		$^3D^\circ-^3D$		*[63.36]*	*262 240–1 840 550*	15–15	2.34+10	1.41−02	4.40−02	−0.675	D	4
				[63.357]	262 180–1 840 550	7–7	2.28+10	1.37−02	2.00−02	−1.018	D+	4
				[63.360]	262 270–1 840 550	5–5	1.73+10	1.04−02	1.08−02	−1.284	D	4
				[63.363]	262 330–1 840 550	3–3	1.66+10	1.00−02	6.26−03	−1.523	D	4
				[63.357]	262 180–1 840 550	7–5	4.65+09	2.00−03	2.92−03	−1.854	E+	4
				[63.360]	262 270–1 840 550	5–3	6.09+09	2.20−03	2.29−03	−1.959	E+	4
				[63.360]	262 270–1 840 550	5–7	7.12+08	6.00−04	6.26−04	−2.523	E	4
				[63.363]	262 330–1 840 550	3–5	1.66+09	1.67−03	1.04−03	−2.300	E	4
70		$^3D^\circ-^3P$?				15–9						4
				63.200	262 180–1 844 470	7–5	8.68+09	3.71−03	5.41−03	−1.586	D	4
				63.203	262 270–1 844 470	5–5	1.67+09	1.00−03	1.04−03	−2.301	E	4
				63.206	262 330–1 844 470	3–5	1.44+07	1.44−05	8.99−06	−4.365	E	LS
71		$^3P^\circ-^3D$		*[65.30]*	*309 110–1 840 550*	9–15	1.06+11	1.13−01	2.18−01	0.007	C	4
				[65.298]	309 110–1 840 550	5–7	9.94+10	8.90−02	9.57−02	−0.352	C	4
				[65.298]	309 110–1 840 550	3–5	8.60+10	9.17−02	5.91−02	−0.561	C	4
				[65.298]	309 110–1 840 550	1–3	6.47+10	1.24−01	2.67−02	−0.907	D+	4
				[65.298]	309 110–1 840 550	5–5	2.41+10	1.54−02	1.66−02	−1.114	D+	4
				[65.298]	309 110–1 840 550	3–3	4.69+10	3.00−02	1.93−02	−1.046	D+	4
				[65.298]	309 110–1 840 550	5–3	2.61+09	1.00−03	1.07−03	−2.301	E+	4
72		$^3P^\circ-^3P$?				9–9						4
				65.131	309 110–1 844 470	5–5	5.44+10	3.46−02	3.71−02	−0.762	D+	4
				65.131	309 110–1 844 470	3–5	1.04+10	1.10−02	7.08−03	−1.481	D	4
73		$^3S^\circ-^3P$?				3–9						4
				69.431	404 200–1 844 470	3–5	8.06+11	9.71−01	6.66−01	0.464	B	4
74	$2s2p^3-2s2p^2(^4P)4d$	$^5S^\circ-^5P$		*[53.81]*	133 840–*1 992 309*	5–15	2.88+11	3.75−01	3.32−01	0.273	D	1
				[53.823]	133 840–1 991 780	5–7	2.88+11	1.75−01	1.55−01	−0.058	D	LS
				[53.800]	133 840–1 992 580	5–5	2.88+11	1.25−01	1.11−01	−0.204	D	LS
				[53.785]	133 840–1 993 090	5–3	2.88+11	7.49−02	6.63−02	−0.427	D	LS
75		$^3D^\circ-^3F$				15–21						1
				[57.553]	262 180–1 999 710	7–9	1.80+11	1.15−01	1.53−01	−0.094	D	LS
				[57.624]	262 270–1 997 660	5–7	1.61+11	1.12−01	1.06−01	−0.252	D	LS
				[57.621]	262 180–1 997 660	7–7	2.01+10	1.00−02	1.33−02	−1.155	E	LS

TABLE 32. Transition probabilities of allowed lines for Al VIII (references in this table are as follows: 1=Luo and Pradhan,[41,42] 2=Tachiev and Froese Fischer,[71] 3=Aggarwal,[2] 4=Fawcett,[14] and 5=Mendoza *et al.*[48])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
76	$2p^4-2s^22p3s$	^{3}P–^{3}P°		*[140.31]*	*609 617–1 322 329*	9–9	1.21+06	3.56−06	1.48−05	−4.494	D	2,3
				139.673	608 100–1 324 060	5–5	9.56+05	2.80−06	6.43−06	−4.854	D	2,3
				140.992	611 180–1 320 440	3–3	2.80+05	8.34−07	1.16−06	−5.602	D	2,3
				140.382	608 100–1 320 440	5–3	4.84+05	8.59−07	1.98−06	−5.367	D	2,3
				[141.211]	611 180–1 319 340	3–1	1.11+06	1.11−06	1.55−06	−5.478	D	2,3
				140.276	611 180–1 324 060	3–5	3.17+05	1.56−06	2.16−06	−5.330	D	2,3
				141.257	612 510–1 320 440	1–3	3.63+05	3.26−06	1.51−06	−5.487	D	2,3
77	$2p3s-2p3p$	^{3}P°–^{3}S		*[1 252.6]*	*1 322 329*–1 402 160	9–3	4.62+08	3.62−02	1.34+00	−0.487	B	2,3
				1 280.41	1 324 060–1 402 160	5–3	1.50+08	2.21−02	4.66−01	−0.957	B	2,3
				1 223.69	1 320 440–1 402 160	3–3	2.29+08	5.14−02	6.21−01	−0.812	B+	2,3
				[1 207.44]	1 319 340–1 402 160	1–3	9.86+07	6.47−02	2.57−01	−1.189	B	2,3
78		^{1}P°–^{3}S										
				[1 495.66]	1 335 300–1 402 160	3–3	1.07+07	3.60−03	5.32−02	−1.967	D+	2,3
79	$2s^22p3s$–$2s2p^2(^4$P$)3s$	^{3}P°–^{3}P				9–9						1
				546.001	1 324 060–1 507 210	5–5	3.78+08	1.69−02	1.52−01	−1.073	D	LS
				542.476	1 320 440–1 504 780	3–3	1.29+08	5.68−03	3.04−02	−1.769	E+	LS
				553.342	1 324 060–1 504 780	5–3	2.02+08	5.57−03	5.07−02	−1.555	E+	LS
				535.418	1 320 440–1 507 210	3–5	1.34+08	9.59−03	5.07−02	−1.541	E+	LS
				[539.258]	1 319 340–1 504 780	1–3	1.75+08	2.29−02	4.07−02	−1.640	E+	LS
80	$2s^22p3s$–$2s2p^2(^2$D$)3s$	^{3}P°–^{3}D		*[380.10]*	*1 322 329–1 585 420*	9–15	2.80+09	1.01−01	1.14+00	−0.041	D+	1
				382.614	1 324 060–1 585 420	5–7	2.75+09	8.45−02	5.32−01	−0.374	D+	LS
				377.387	1 320 440–1 585 420	3–5	2.15+09	7.65−02	2.85−01	−0.639	D+	LS
				[375.827]	1 319 340–1 585 420	1–3	1.61+09	1.02−01	1.26−01	−0.991	D	LS
				382.614	1 324 060–1 585 420	5–5	6.88+08	1.51−02	9.51−02	−1.122	D	LS
				377.387	1 320 440–1 585 420	3–3	1.19+09	2.55−02	9.50−02	−1.116	D	LS
				382.614	1 324 060–1 585 420	5–3	7.67+07	1.01−03	6.36−03	−2.297	E	LS
81		^{1}P°–^{1}D		366.059	1 335 300–1 608 480	3–5	1.00+09	3.36−02	1.21−01	−0.997	D	1
82	$2s^22p3s$–$2s2p^2(^2$S$)3s$	^{3}P°–^{3}S?		*[293.78]*	*1 322 329–1 662 720*	9–3	1.12+10	4.84−02	4.22−01	−0.361	D	1
				295.281	1 324 060–1 662 720	5–3	6.15+09	4.82−02	2.34−01	−0.618	D+	LS
				292.158	1 320 440–1 662 720	3–3	3.81+09	4.87−02	1.41−01	−0.835	D	LS
				[291.223]	1 319 340–1 662 720	1–3	1.28+09	4.89−02	4.69−02	−1.311	E+	LS
83	$2s^22p3s$–$2s2p^2(^2$S$)3d$	^{3}P°–^{3}D				9–15						1
				[202.893]	1 324 060–1 816 930	5–7	6.92+09	5.98−02	2.00−01	−0.524	D	LS
				[201.804]	1 320 440–1 815 970	3–5	5.27+09	5.36−02	1.07−01	−0.794	D	LS
				[203.289]	1 324 060–1 815 970	5–5	1.73+09	1.07−02	3.58−02	−1.272	E+	LS
84	$2p3p-2p3d$	^{3}S–^{3}P°		*1 124.8*	1 402 160–*1 491 068*	3–9	3.42+08	1.95−01	2.16+00	−0.233	B+	2,3
				1 131.09	1 402 160–1 490 570	3–5	3.63+08	1.16−01	1.30+00	−0.458	B+	2,3
				1 118.69	1 402 160–1 491 550	3–3	3.18+08	5.97−02	6.60−01	−0.747	B+	2,3
				1 111.73	1 402 160–1 492 110	3–1	3.04+08	1.88−02	2.06−01	−1.249	B	2,3
85		^{3}S–^{1}P°										
				[926.01]	1 402 160–1 510 150	3–3	1.60+07	2.05−03	1.88−02	−2.211	D	2,3
86	$2p3p-2p4s$	^{3}S–^{3}P°				3–9						1

TABLE 32. Transition probabilities of allowed lines for Al VIII (references in this table are as follows: 1=Luo and Pradhan,[41,42] 2=Tachiev and Froese Fischer,[71] 3=Aggarwal,[2] 4=Fawcett,[14] and 5=Mendoza *et al.*[48])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				[260.960]	1 402 160–1 785 360	3–5	2.81+09	4.78−02	1.23−01	−0.843	D	LS
87	$2s2p^2(^4P)3s$–$2s2p^2(^4P)3p$	$^3P-^3S^\circ$?				9–3						1
			4 158.6	4 159.7	1 507 210–1 531 250	5–3	7.52+06	1.17−02	8.01−01	−1.233	C	LS
			3 776.8	3 777.9	1 504 780–1 531 250	3–3	6.03+06	1.29−02	4.81−01	−1.412	D+	LS
88		$^3P-^3D^\circ$				9–15						1
				[1 677.57]	1 507 210–1 566 820	5–7	2.20+08	1.30−01	3.59+00	−0.187	C+	LS
				[1 661.96]	1 504 780–1 564 950	3–5	1.70+08	1.17−01	1.92+00	−0.455	C	LS
				[1 731.90]	1 507 210–1 564 950	5–5	4.98+07	2.24−02	6.39−01	−0.951	C	LS
				[1 684.64]	1 504 780–1 564 140	3–3	9.03+07	3.84−02	6.39−01	−0.939	C	LS
				[1 756.54]	1 507 210–1 564 140	5–3	5.30+06	1.47−03	4.25−02	−2.134	E+	LS
89	$2s2p^2(^4P)3s$–$2s^22p4d$	$^3P-^3D^\circ$				9–15						1
				[293.893]	1 507 210–1 847 470	5–7	1.79+09	3.25−02	1.57−01	−0.789	D	LS
				[292.937]	1 504 780–1 846 150	3–5	1.36+09	2.91−02	8.42−02	−1.059	D	LS
				[295.037]	1 507 210–1 846 150	5–5	4.43+08	5.78−03	2.81−02	−1.539	E+	LS
90	$2s^22p3d$–$2s2p^2(^4P)3s$	$^3D^\circ-^3P$				15–9						1
			4 871.9	4 873.3	1 486 690–1 507 210	7–5	9.75+05	2.48−03	2.79−01	−1.760	D+	LS
			5 116.3	5 117.7	1 485 240–1 504 780	5–3	7.51+05	1.77−03	1.49−01	−2.053	D	LS
			4 550.4	4 551.7	1 485 240–1 507 210	5–5	2.14+05	6.65−04	4.98−02	−2.478	E+	LS
			4 946.7	4 948.0	1 484 570–1 504 780	3–3	2.78+05	1.02−03	4.98−02	−2.514	E+	LS
			4 415.7	4 417.0	1 484 570–1 507 210	3–5	1.56+04	7.62−05	3.32−03	−3.641	E	LS
91		$^3P^\circ-^3P$				9–9						1
			6 008	6 010	1 490 570–1 507 210	5–5	1.44+05	7.78−04	7.70−02	−2.410	D	LS
			7 556	7 559	1 491 550–1 504 780	3–3	2.41+04	2.06−04	1.54−02	−3.209	E+	LS
			7 035	7 037	1 490 570–1 504 780	5–3	4.96+04	2.21−04	2.56−02	−2.957	E+	LS
			6 384	6 386	1 491 550–1 507 210	3–5	3.99+04	4.07−04	2.57−02	−2.913	E+	LS
			7 890	7 893	1 492 110–1 504 780	1–3	2.82+04	7.89−04	2.05−02	−3.103	E+	LS
92	$2s^22p3d$–$2s2p^2(^2D)3s$	$^1F^\circ-^1D$		1 007.66	1 509 240–1 608 480	7–5	3.96+07	4.31−03	1.00−01	−1.520	D	1
93	$2s^22p3d$–$2s2p^2(^2D)3d$	$^3F^\circ-^3F$				21–21						1
				[376.974]	1 468 730–1 734 000	5–5	1.10+09	2.34−02	1.45−01	−0.932	D	LS
				[376.974]	1 468 730–1 734 000	5–7	9.79+07	2.92−03	1.81−02	−1.836	E+	LS
94		$^3D^\circ-^3F$		*[402.87]*	*1 485 783–1 734 000*	15–21	4.16+08	1.42−02	2.82−01	−0.672	D	1
				[404.351]	1 486 690–1 734 000	7–9	4.13+08	1.30−02	1.21−01	−1.041	D	LS
				[401.994]	1 485 240–1 734 000	5–7	3.71+08	1.26−02	8.34−02	−1.201	D	LS
				[400.914]	1 484 570–1 734 000	3–5	3.54+08	1.42−02	5.62−02	−1.371	E+	LS
				[404.351]	1 486 690–1 734 000	7–7	4.57+07	1.12−03	1.04−02	−2.106	E	LS
				[401.994]	1 485 240–1 734 000	5–5	6.52+07	1.58−03	1.05−02	−2.102	E	LS
				[404.351]	1 486 690–1 734 000	7–5	1.81+06	3.17−05	2.95−04	−3.654	E	LS
95		$^3D^\circ-^3D$?		*389.79*	*1 485 783–1 742 330*	15–15	1.67+09	3.80−02	7.31−01	−0.244	D	1
				391.175	1 486 690–1 742 330	7–7	1.46+09	3.36−02	3.03−01	−0.629	D+	LS
				388.969	1 485 240–1 742 330	5–5	1.17+09	2.65−02	1.70−01	−0.878	D	LS
				387.958	1 484 570–1 742 330	3–3	1.27+09	2.86−02	1.10−01	−1.067	D	LS

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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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				391.175	1 486 690–17 423 30	7–5	2.58+08	4.22−03	3.80−02	−1.530	E+	LS
				388.969	1 485 240–1 742 330	5–3	4.20+08	5.71−03	3.66−02	−1.544	E+	LS
				388.969	1 485 240–1 742 330	5–7	1.87+08	5.94−03	3.80−02	−1.527	E+	LS
				387.958	1 484 570–1 742 330	3–5	2.54+08	9.54−03	3.66−02	−1.543	E+	LS
96		$^3D^\circ-{}^3P$		*[383.04]*	*1 485 783–1 746 853*	15–9	6.79+08	8.96−03	1.69−01	−0.872	E+	1
				[386.145]	1 486 690–1 745 660	7–5	5.57+08	8.89−03	7.91−02	−1.206	D	LS
				[380.691]	1 485 240–1 747 920	5–3	5.19+08	6.76−03	4.24−02	−1.471	E+	LS
				[377.287]	1 484 570–1 749 620	3–1	7.10+08	5.05−03	1.88−02	−1.820	E+	LS
				[383.995]	1 485 240–1 745 660	5–5	1.01+08	2.23−03	1.41−02	−1.953	E	LS
				[379.723]	1 484 570–1 747 920	3–3	1.74+08	3.77−03	1.41−02	−1.947	E+	LS
				[383.010]	1 484 570–1 745 660	3–5	6.79+06	2.49−04	9.42−04	−3.127	E	LS
97		$^3P^\circ-{}^3D$?		*397.99*	*1 491 068–1 742 330*	9–15	3.39+08	1.34−02	1.58−01	−0.919	E+	1
				397.204	1 490 570–1 742 330	5–7	3.41+08	1.13−02	7.39−02	−1.248	D	LS
				398.756	1 491 550–1 742 330	3–5	2.52+08	1.00−02	3.94−02	−1.523	E+	LS
				399.648	1 492 110–1 742 330	1–3	1.87+08	1.34−02	1.76−02	−1.873	E+	LS
				397.204	1 490 570–1 742 330	5–5	8.54+07	2.02−03	1.32−02	−1.996	E	LS
				398.756	1 491 550–1 742 330	3–3	1.41+08	3.35−03	1.32−02	−1.998	E	LS
				397.204	1 490 570–1 742 330	5–3	9.44+06	1.34−04	8.76−04	−3.174	E	LS
98		$^3P^\circ-{}^3P$		*[390.95]*	*1 491 068–1 746 853*	9–9	1.82+09	4.17−02	4.83−01	−0.426	D	1
				[392.019]	1 490 570–1 745 660	5–5	1.35+09	3.12−02	2.01−01	−0.807	D	LS
				[390.061]	1 491 550–1 747 920	3–3	4.56+08	1.04−02	4.01−02	−1.506	E+	LS
				[388.576]	1 490 570–1 747 920	5–3	7.73+08	1.05−02	6.72−02	−1.280	D	LS
				[387.492]	1 491 550–1 749 620	3–1	1.87+09	1.40−02	5.36−02	−1.377	E+	LS
				[393.530]	1 491 550–1 745 660	3–5	4.44+08	1.72−02	6.69−02	−1.287	D	LS
				[390.915]	1 492 110–1 747 920	1–3	6.07+08	4.17−02	5.37−02	−1.380	E+	LS
99		$^3P^\circ-{}^3S$		*[369.00]*	*1 491 068*–1 762 070	9–3	3.25+09	2.21−02	2.42−01	−0.701	D	1
				[368.324]	1 490 570–1 762 070	5–3	1.82+09	2.22−02	1.35−01	−0.955	D	LS
				[369.658]	1 491 550–1 762 070	3–3	1.08+09	2.21−02	8.07−02	−1.178	D	LS
				[370.425]	1 492 110–1 762 070	1–3	3.56+08	2.20−02	2.68−02	−1.658	E+	LS
100	$2s^22p3d$–$2s2p^2(^2S)3d$	$^3F^\circ-{}^3D$				21–15						1
				[287.985]	1 468 730–1 815 970	5–5	1.34+09	1.66−02	7.87−02	−1.081	D	LS
				[287.191]	1 468 730–1 816 930	5–7	2.71+07	4.69−04	2.22−03	−2.630	E	LS
101	$2s^22p3d$–$2s2p^2(^2P)3d$	$^3F^\circ-{}^3F$				21–21						1
				[275.505]	1 468 730–1 831 700	5–5	3.53+09	4.02−02	1.82−01	−0.697	D	LS
				[275.505]	1 468 730–1 831 700	5–7	3.14+08	5.01−03	2.27−02	−1.601	E+	LS
102		$^3F^\circ-{}^3D$				21–15						1
				[268.947]	1 468 730–1 840 550	5–3	5.93+09	3.86−02	1.71−01	−0.714	D	LS
				[268.947]	1 468 730–1 840 550	5–5	6.61+08	7.17−03	3.17−02	−1.446	E+	LS
				[268.947]	1 468 730–1 840 550	5–7	1.33+07	2.02−04	8.94−04	−2.996	E	LS
103		$^3D^\circ-{}^3F$		*[289.09]*	*1 485 783–1 831 700*	15–21	1.14+09	1.99−02	2.85−01	−0.525	D	1
				[289.847]	1 486 690–1 831 700	7–9	1.13+09	1.83−02	1.22−01	−0.892	D	LS
				[288.634]	1 485 240–1 831 700	5–7	1.01+09	1.77−02	8.41−02	−1.053	D	LS
				[288.077]	1 484 570–1 831 700	3–5	9.65+08	2.00−02	5.69−02	−1.222	E+	LS
				[289.847]	1 486 690–1 831 700	7–7	1.25+08	1.58−03	1.06−02	−1.956	E	LS
				[288.634]	1 485 240–1 831 700	5–5	1.78+08	2.22−03	1.05−02	−1.955	E	LS

TABLE 32. Transition probabilities of allowed lines for Al VIII (references in this table are as follows: 1=Luo and Pradhan,[41,42] 2=Tachiev and Froese Fischer,[71] 3=Aggarwal,[2] 4=Fawcett,[14] and 5=Mendoza *et al.*[48])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				[289.847]	1 486 690–1 831 700	7–5	4.96+06	4.46−05	2.98−04	−3.506	E	LS
104		^{3}D°−^{3}P?				15–9						1
				279.501	1 486 690–1 844 470	7–5	8.26+09	6.91−02	4.45−01	−0.315	D+	LS
				278.373	1 485 240–1 844 470	5–5	1.50+09	1.74−02	7.97−02	−1.060	D	LS
				277.855	1 484 570–1 844 470	3–5	1.00+08	1.93−03	5.30−03	−2.237	E	LS
105		^{3}P°−^{3}P?				9–9						1
				282.566	1 490 570–1 844 470	5–5	3.20+09	3.83−02	1.78−01	−0.718	D	LS
				283.350	1 491 550–1 844 470	3–5	1.06+09	2.12−02	5.93−02	−1.197	E+	LS
106	$2s2p^2(^4P)3p-$ $2s2p^2(^2D)3s$	^{3}D°−^{3}D	*[5 059]*	*[5 061]*	*1 565 661–1 585 420*	15–15	2.48+05	9.53−04	2.38−01	−1.845	E+	1
			[5 374.8]	[5 376.3]	1 566 820–1 585 420	7–7	1.84+05	7.97−04	9.87−02	−2.253	D	LS
			[4 883.8]	[4 885.2]	1 564 950–1 585 420	5–5	1.92+05	6.87−04	5.52−02	−2.464	E+	LS
			[4 697.9]	[4 699.2]	1 564 140–1 585 420	3–3	2.32+05	7.69−04	3.57−02	−2.637	E+	LS
			[5 374.8]	[5 376.3]	1 566 820–1 585 420	7–5	3.23+04	9.99−05	1.24−02	−3.155	E	LS
			[4 883.8]	[4 885.2]	1 564 950–1 585 420	5–3	6.89+04	1.48−04	1.19−02	−3.131	E	LS
			[4 883.8]	[4 885.2]	1 564 950–1 585 420	5–7	3.07+04	1.54−04	1.24−02	−3.114	E	LS
			[4 697.9]	[4 699.2]	1 564 140–1 585 420	3–5	4.64+04	2.56−04	1.19−02	−3.115	E	LS
107	$2s2p^2(^4P)3p-$ $2s2p^2(^4P)3d$	^{3}S°?−^{3}P				3–9						1
				[974.94]	1 531 250–1 633 820	3–5	6.36+08	1.51−01	1.45+00	−0.344	C	LS
				[959.97]	1 531 250–1 635 420	3–3	6.65+08	9.19−02	8.71−01	−0.560	C	LS
108		^{3}D°−^{3}F		*[1 254.2]*	*1 565 661–1 645 393*	15–21	5.98+08	1.97−01	1.22+01	0.471	C+	1
				[1 250.63]	1 566 820–1 646 780	7–9	6.04+08	1.82−01	5.25+00	0.105	C+	LS
				[1 250.16]	1 564 950–1 644 940	5–7	5.37+08	1.76−01	3.62+00	−0.056	C+	LS
				[1 259.60]	1 564 140–1 643 530	3–5	4.94+08	1.96−01	2.44+00	−0.231	C+	LS
				[1 280.08]	1 566 820–1 644 940	7–7	6.27+07	1.54−02	4.54−01	−0.967	D+	LS
				[1 272.59]	1 564 950–1 643 530	5–5	8.94+07	2.17−02	4.55−01	−0.965	D+	LS
				[1 303.61]	1 566 820–1 643 530	7–5	2.34+06	4.26−04	1.28−02	−2.525	E	LS
109		^{3}D°−^{3}D?				15–15						1
				[1 009.08]	1 566 820–1 665 920	7–7	2.81+08	4.29−02	9.98−01	−0.522	C	LS
				[996.02]	1 564 950–1 665 350	5–5	2.29+08	3.40−02	5.57−01	−0.770	D+	LS
				[1 014.92]	1 566 820–1 665 350	7–5	4.85+07	5.35−03	1.25−01	−1.427	D	LS
				[990.39]	1 564 950–1 665 920	5–7	3.73+07	7.67−03	1.25−01	−1.416	D	LS
				[988.04]	1 564 140–1 665 350	3–5	5.04+07	1.23−02	1.20−01	−1.433	D	LS
110	$2s2p^2(^4P)3p-$ $2s2p^2(^2D)3d$	^{3}D°−^{3}D?		*[566.0]*	*1 565 661–1 742 330*	15–15	1.93+08	9.27−03	2.59−01	−0.857	E+	1
				[569.77]	1 566 820–1 742 330	7–7	1.68+08	8.18−03	1.07−01	−1.242	D	LS
				[563.76]	1 564 950–1 742 330	5–5	1.36+08	6.47−03	6.00−02	−1.490	E+	LS
				[561.199]	1 564 140–1 742 330	3–3	1.48+08	7.01−03	3.89−02	−1.677	E+	LS
				[569.77]	1 566 820–1 742 330	7–5	2.96+07	1.03−03	1.35−02	−2.142	E	LS
				[563.76]	1 564 950–1 742 330	5–3	4.86+07	1.39−03	1.29−02	−2.158	E	LS
				[563.76]	1 564 950–1 742 330	5–7	2.17+07	1.45−03	1.35−02	−2.140	E	LS
				[561.199]	1 564 140–1 742 330	3–5	2.97+07	2.34−03	1.30−02	−2.154	E	LS
111		^{3}D°−^{3}P		*[551.90]*	*1 565 661–1 746 853*	15–9	2.04+08	5.58−03	1.52−01	−1.077	E+	1
				[559.159]	1 566 820–1 745 660	7–5	1.65+08	5.51−03	7.10−02	−1.414	D	LS
				[546.538]	1 564 950–1 747 920	5–3	1.57+08	4.23−03	3.81−02	−1.675	E+	LS

TABLE 32. Transition probabilities of allowed lines for Al VIII (references in this table are as follows: 1=Luo and Pradhan,[41,42] 2=Tachiev and Froese Fischer,[71] 3=Aggarwal,[2] 4=Fawcett,[14] and 5=Mendoza *et al.*[48])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				[539.142]	1 564 140–1 749 620	3–1	2.19+08	3.18−03	1.69−02	−2.020	E+	LS
				[553.373]	1 564 950–1 745 660	5–5	3.03+07	1.39−03	1.27−02	−2.158	E	LS
				[544.129]	1 564 140–1 747 920	3–3	5.32+07	2.36−03	1.27−02	−2.150	E	LS
				[550.903]	1 564 140–1 745 660	3–5	2.04+06	1.55−04	8.43−04	−3.333	E	LS
112	$2s2p^2(^4P)3p-$ $2s2p^2(^4P)4d$	$^3D^\circ-^3F$				15–21						1
				[231.006]	1 566 820–1 999 710	7–9	2.48+10	2.55−01	1.36+00	0.252	C	LS
				[231.102]	1 564 950–1 997 660	5–7	2.20+10	2.47−01	9.40−01	0.092	C	LS
				[232.105]	1 566 820–1 997 660	7–7	2.72+09	2.20−02	1.18−01	−0.812	D	LS
113	$2s2p^2(^2D)3s-$ $2s2p^2(^2D)3p$	$^1D-^1F^\circ$		1 971.2	1 608 480–1 659 210	5–7	1.42+08	1.16−01	3.76+00	−0.237	C+	1
114		$^1D-^1D^\circ$		1 690.90	1 608 480–1 667 620	5–5	2.06+08	8.81−02	2.45+00	−0.356	C+	1
115	$2s2p^2(^2D)3d-$ $2s^22p4d$	$^3P-^3D^\circ$				9–15						1
				[982.22]	1 745 660–1 847 470	5–7	3.42+07	6.93−03	1.12−01	−1.460	D	LS
				[1 018.02]	1 747 920–1 846 150	3–5	2.31+07	5.97−03	6.00−02	−1.747	E+	LS
				[995.12]	1 745 660–1 846 150	5–5	8.22+06	1.22−03	2.00−02	−2.215	E+	LS
116	$2s^22p4s-$ $2s2p^2(^2S)3d$	$^3P^\circ-^3D$				9–15						1
			[3 166.6]	[3 167.6]	1 785 360–1 816 930	5–7	5.65+07	1.19−01	6.20+00	−0.225	B	LS
			[3 266.0]	[3 266.9]	1 785 360–1 815 970	5–5	1.29+07	2.06−02	1.11+00	−0.987	C	LS
117	$2s^22p4s-$ $2s2p^2(^2P)3d$	$^3P^\circ-^3D$				9–15						1
				[1 811.9]	1 785 360–1 840 550	5–7	2.05+08	1.41−01	4.21+00	−0.152	C+	LS
				[1 811.9]	1 785 360–1 840 550	5–5	5.12+07	2.52−02	7.52−01	−0.900	C	LS
				[1 811.9]	1 785 360–1 840 550	5–3	5.69+06	1.68−03	5.01−02	−2.076	E+	LS
118		$^3P^\circ-^3P$?				9–9						1
				[1 691.76]	1 785 360–1 844 470	5–5	7.60+07	3.26−02	9.08−01	−0.788	C	LS
119	$2s2p^2(^2S)3d-$ $2s^22p4d$	$^3D-^3D^\circ$				15–15						1
			[3 273.5]	[3 274.4]	1 816 930–1 847 470	7–7	1.93+07	3.10−02	2.34+00	−0.664	C+	LS
			[3 312.5]	[3 313.5]	1 815 970–1 846 150	5–5	1.46+07	2.40−02	1.31+00	−0.921	C	LS
			[3 421.3]	[3 422.3]	1 816 930–1 846 150	7–5	2.97+06	3.72−03	2.93−01	−1.584	D+	LS
			[3 173.7]	[3 174.6]	1 815 970–1 847 470	5–7	2.65+06	5.61−03	2.93−01	−1.552	D+	LS
120	$2s2p^2(^2P)3d-$ $2s^22p4d$	$^3F-^3D^\circ$				21–15						1
			[6 339]	[6 341]	1 831 700–1 847 470	9–7	1.58+06	7.39−03	1.39+00	−1.177	C	LS
			[6 919]	[6 920]	1 831 700–1 846 150	7–5	1.17+06	6.02−03	9.60−01	−1.375	C	LS
			[6 339]	[6 341]	1 831 700–1 847 470	7–7	1.37+05	8.24−04	1.20−01	−2.239	D	LS
			[6 919]	[6 920]	1 831 700–1 846 150	5–5	1.48+05	1.06−03	1.21−01	−2.276	D	LS
			[6 339]	[6 341]	1 831 700–1 847 470	5–7	3.85+03	3.25−05	3.39−03	−3.789	E	LS
121		$^3D-^3D^\circ$				15–15						1
			[14 447]	[14 451]	1 840 550–1 847 470	7–7	1.35+05	4.22−03	1.41+00	−1.530	C	LS
			[17 852]	[17 857]	1 840 550–1 846 150	5–5	5.59+04	2.67−03	7.85−01	−1.875	C	LS
			[17 852]	[17 857]	1 840 550–1 846 150	7–5	1.25+04	4.28−04	1.76−01	−2.523	D	LS
			[14 447]	[14 451]	1 840 550–1 847 470	5–7	1.69+04	7.41−04	1.76−01	−2.431	D	LS

TABLE 32. Transition probabilities of allowed lines for Al VIII (references in this table are as follows: 1=Luo and Pradhan,[41,42] 2=Tachiev and Froese Fischer,[71] 3=Aggarwal,[2] 4=Fawcett,[14] and 5=Mendoza *et al.*[48])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
			[17 852]	[17 857]	1 840 550–1 846 150	3–5	1.20+04	9.60−04	1.69−01	−2.541	D	LS
122		^{3}P?–^{3}D$^\circ$				9–15						1
				[3 000]	1 844 470–1 847 470	5–7	5.27+03	1.23−03	6.75−01	−2.211	C	LS
				[1 680]	1 844 470–1 846 150	5–5	2.32+02	1.23−04	1.21−01	−3.211	D	LS
123	$2s^22p4d$–$2s2p^2(^4P)4d$	^{3}D$^\circ$–^{3}F				15–21						1
				[656.86]	1 847 470–1 999 710	7–9	7.38+07	6.14−03	9.29−02	−1.367	D	LS
				[660.02]	1 846 150–1 997 660	5–7	6.46+07	5.91−03	6.42−02	−1.529	D	LS
				[665.82]	1 847 470–1 997 660	7–7	7.90+06	5.25−04	8.06−03	−2.435	E	LS

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

4.8.2. Forbidden Transitions for Al VIII

The results of Tachiev and Froese Fischer[71] are the product of extensive MCHF calculations with Breit-Pauli corrections to order α^2. Vilkas *et al.*[79] used a second-order MBPT theory with Breit-Pauli relativistic corrections. Galavís *et al.*[24] applied the SUPERSTRUCTURE code, with CI, relativistic effects, and semiempirical energy corrections, within the context of the Iron Project.

To estimate accuracies, we pooled the RSDM of each of the lines for which a transition rate is given by two or more references,[24,71,79] as discussed in the introduction to Kelleher and Podobedova.[35] We then isoelectronically averaged the logarithmic quality factors observed for C-like lines of Na VI, Mg VII, Al VIII, and Si IX using the method described in the introduction to Kelleher and Podobedova.[35] For the higher-lying intercombination lines and those from the OP data, we scaled the logarithmic quality factor of the lower-lying lines, as described in Kelleher and Podobedova.[35]

References for Forbidden Transitions for Al VIII

[24]M. E. Galavís, C. Mendoza, and C. J. Zeippen, Astron. Astrophys., Suppl. Ser. **123**, 159 (1997).
[35]D. E. Kelleher and L. I. Podobedova, J. Phys. Chem. Ref. Data **37**, 267 (2008).
[68]G. Tachiev and C. Froese Fischer, Can. J. Phys. **79**, 955 (2001).
[71]G. Tachiev and C. Froese Fischer, http://www.vuse.vanderbilt.edu/~cff/mchf_collection/ (MCHF, *ab initio*, downloaded on February 17, 2004); see Ref. 68.
[79]M. J. Vilkas, I. Martinson, G. Merkelis, G. Gaigalas, and R. Kisielius, Phys. Scr. **54**, 281 (1996).

TABLE 33. Wavelength finding list for forbidden lines of Al VIII

Wavelength (vac) (Å)	Mult. No.
135.726	23
136.227	23
144.557	25
154.485	22
154.895	22
163.618	21
163.720	21
164.447	21
164.449	21
164.810	21
164.910	21
176.744	24
177.160	24
194.205	26
195.374	26
225.805	10
227.195	10
248.453	9
250.138	9
251.351	16
251.876	8
252.966	8
254.712	8
279.736	15
285.470	14
323.509	7
325.309	7
328.202	7
332.491	20
369.877	30
379.968	29
381.112	13
381.286	6
383.700	6
383.789	6
383.921	6
387.732	6
387.822	6
387.958	6
463.800	12

TABLE 33. Wavelength finding list for forbidden lines of Al VIII—Continued

Wavelength (vac) (Å)	Mult. No.
463.929	12
464.123	12
469.814	19
548.276	35
548.546	35
548.727	35
570.55	28
602.37	18
704.13	34
704.57	34
704.87	34
738.23	38
741.62	33
742.12	33
742.45	33
747.16	5
756.83	5
772.68	5
778.27	27
778.63	27
779.18	27
1 051.64	37
1 057.64	3
1 088.85	3
1 137.53	36
1 147.84	11
Wavelength (air) (Å)	**Mult. No.**
2 017.9	4
2 102.4	40
2 130.2	32
2 134.3	32
2 137.0	32
2 139.7	2
2 221.0	2
2 363.3	2
2 476.3	41
2 660.2	17
13 924	39
Wavenumber (cm^{-1})	**Mult. No.**
4 420	1
2 710	1
1 710	1
150	31
90	31
60	31

TABLE 34. Transition probabilities of forbidden lines for Al VIII (references in this table are as follows: 1=Tachiev and Froese Fischer,[71] 2=Vilkas *et al.*,[79] and 3=Galavís *et al.*,[24])

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	$2p^2-2p^2$	$^3P-^3P$									
				2 710 cm^{-1}	1 710–4 420	3–5	M1	2.63−01	2.45+00	A	1,2,3
				2 710 cm^{-1}	1 710–4 420	3–5	E2	2.21−07	6.74−02	B+	1,2
				1 710 cm^{-1}	0–1 710	1–3	M1	8.87−02	1.97+00	A	1,2,3
				4 420 cm^{-1}	0–4 420	1–5	E2	1.16−06	3.06−02	B+	1,2,3
2		$^3P-^1D$									
			[2 139.7]	[2 140.4]	0–46 720	1–5	E2	2.68−04	5.38−05	C+	1,2,3
			[2 221.0]	[2 221.7]	1 710–46 720	3–5	M1	3.14+00	6.37−03	B	1,2,3
			[2 221.0]	[2 221.7]	1 710–46 720	3–5	E2	7.36−04	1.78−04	C+	1,2
			[2 363.3]	[2 364.1]	4 420–46 720	5–5	M1	7.59+00	1.86−02	B+	1,2,3
			[2 363.3]	[2 364.1]	4 420–46 720	5–5	E2	3.91−03	1.29−03	B	1,2
3		$^3P-^1S$									
				[1 088.85]	4 420–96 260	5–1	E2	8.05−02	1.10−04	C+	1,2,3
				[1 057.64]	1 710–96 260	3–1	M1	9.05+01	3.97−03	B	1,2,3
4		$^1D-^1S$									
			2 017.9	2 018.6	46 720–96 260	5–1	E2	4.55+00	1.36−01	A	1,2,3
5	$2s^22p^2-2s2p^3$	$^3P-^5S^{\circ}$									
				772.68	4 420–133 840	5–5	M2	4.16−02	3.84+00	B	1
				756.83	1 710–133 840	3–5	M2	6.09−02	5.07+00	B+	1
				747.16	0–133 840	1–5	M2	2.93−02	2.29+00	B	1
6		$^3P-^3D^{\circ}$									
				383.921	1 710–262 180	3–7	M2	6.41−01	2.51+00	B	1

TABLE 34. Transition probabilities of forbidden lines for Al VIII (references in this table are as follows: 1=Tachiev and Froese Fischer,[71] 2=Vilkas et al.,[79] and 3=Galavís et al.,[24])—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
				381.286	0–262 270	1–5	M2	6.96−01	1.88+00	B	1
				387.958	4 420–262 180	5–7	M2	1.52+00	6.26+00	B+	1
				383.789	1 710–262 270	3–5	M2	6.96−01	1.94+00	B	1
				387.822	4 420–262 270	5–5	M2	1.05−02	3.08−02	C+	1
				383.700	1 710–262 330	3–3	M2	2.95−01	4.94−01	B	1
				387.732	4 420–262 330	5–3	M2	1.52−01	2.68−01	B	1
7		$^3P-^3P^\circ$									
				328.202	4 420–309 110	5–5	M2	2.13+00	2.72+00	B	1
				325.309	1 710–309 110	3–3	M2	1.37+00	1.01+00	B	1
				328.202	4 420–309 110	5–1	M2	1.51+00	3.85−01	B	1
				328.202	4 420–309 110	5–3	M2	2.31−02	1.77−02	C+	1
				325.309	1 710–309 110	3–5	M2	4.03−03	4.93−03	C	1
				323.509	0–309 110	1–5	M2	3.11−01	3.69−01	B	1
8		$^3P-^1D^\circ$									
				[251.876]	0–397 020	1–5	M2	3.29+00	1.12+00	B	1
				[252.966]	1 710–397 020	3–5	M2	7.50+00	2.61+00	B	1
				[254.712]	4 420–397 020	5–5	M2	5.90+00	2.12+00	B	1
9		$^3P-^3S^\circ$									
				250.138	4 420–404 200	5–3	M2	6.05+00	1.19+00	B	1
				248.453	1 710–404 200	3–3	M2	2.86+00	5.45−01	B	1
10		$^3P-^1P^\circ$									
				[225.805]	1 710–444 570	3–3	M2	3.84+00	4.54−01	B	1
				[227.195]	4 420–444 570	5–3	M2	1.38+01	1.69+00	B	1
11		$^1D-^5S^\circ$									
				[1 147.84]	46 720–133 840	5–5	M2	1.07−05	7.18−03	C	1
12		$^1D-^3D^\circ$									
				[463.929]	46 720–262 270	5–5	M2	7.79−01	5.61+00	B+	1
				[463.800]	46 720–262 330	5–3	M2	3.41−01	1.47+00	B	1
				[464.123]	46 720–262 180	5–7	M2	8.66−01	8.75+00	B+	1
13		$^1D-^3P^\circ$									
				[381.112]	46 720–309 110	5–1	M2	1.14+00	6.17−01	B	1
				[381.112]	46 720–309 110	5–3	M2	9.93−01	1.61+00	B	1
				[381.112]	46 720–309 110	5–5	M2	6.19−01	1.67+00	B	1
14		$^1D-^1D^\circ$									
				285.470	46 720–397 020	5–5	M2	1.12−01	7.09−02	C+	1
15		$^1D-^3S^\circ$									
				[279.736]	46 720–404 200	5–3	M2	1.77−02	6.09−03	C	1
16		$^1D-^1P^\circ$									
				251.351	46 720–444 570	5–3	M2	3.07−02	6.19−03	C	1
17		$^1S-^5S^\circ$									
			[2 660.2]	[2 661.0]	96 260–133 840	1–5	M2	1.73−08	7.74−04	C	1
18		$^1S-^3D^\circ$									
				[602.37]	96 260–262 270	1–5	M2	1.74−04	4.62−03	C	1
19		$^1S-^3P^\circ$									
				[469.814]	96 260–309 110	1–5	M2	6.86−01	5.27+00	B+	1
20		$^1S-^1D^\circ$									
				332.491	96 260–397 020	1–5	M2	2.40−02	3.27−02	C+	1

TABLE 34. Transition probabilities of forbidden lines for Al VIII (references in this table are as follows: 1=Tachiev and Froese Fischer,[71] 2=Vilkas *et al.*,[79] and 3=Galavís *et al.*,[24])—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
21	$2s^22p^2-2p^4$	^{3}P$-^3$P									
				164.449	4 420–612 510	5–1	E2	3.83+04	4.12−03	B	2
				164.810	4 420–611 180	5–3	M1	5.13+00	2.55−06	C	2
				164.810	4 420–611 180	5–3	E2	2.84+04	9.27−03	B	2
				163.720	1 710–612 510	3–1	M1	3.66+00	5.96−07	D+	2
				164.910	1 710–608 100	3–5	M1	3.56+00	2.96−06	C	2
				164.910	1 710–608 100	3–5	E2	1.70+04	9.26−03	B	2
				163.618	0–611 180	1–3	M1	9.94−01	4.84−07	D+	2
				164.447	0–608 100	1–5	E2	7.66+03	4.11−03	B	2
22		^{3}P$-^1$D									
				[154.485]	0–647 310	1–5	E2	9.77−01	3.84−07	D+	2
				[154.895]	1 710–647 310	3–5	M1	1.53+00	1.06−06	D+	2
				[154.895]	1 710–647 310	3–5	E2	5.66+01	2.25−05	C	2
23		^{3}P$-^1$S									
				[136.227]	4 420–738 490	5–1	E2	3.33+01	1.39−06	D+	2
				[135.726]	1 710–738 490	3–1	M1	8.19+00	7.59−07	D+	2
24		^{1}D$-^3$P									
				[176.744]	46 720–612 510	5–1	E2	8.86+00	1.36−06	D+	2
				[177.160]	46 720–611 180	5–3	M1	2.99+00	1.85−06	D+	2
				[177.160]	46 720–611 180	5–3	E2	5.60+01	2.62−05	C	2
25		^{1}D$-^1$S									
				144.557	46 720–738 490	5–1	E2	6.57+04	3.70−03	B	2
26		^{1}S$-^3$P									
				[195.374]	96 260–608 100	1–5	E2	3.21−02	4.08−08	D	2
				[194.205]	96 260–611 180	1–3	M1	1.45+00	1.18−06	D+	2
27	$2s2p^3-2s2p^3$	^{5}S$^\circ-^3$D$^\circ$									
				779.18	133 840–262 180	5–7	M1	2.33−02	2.86−06	C	1
				779.18	133 840–262 180	5–7	E2	4.52−02	8.11−05	C	1
				778.63	133 840–262 270	5–5	M1	4.35−01	3.80−05	C	1
				778.63	133 840–262 270	5–5	E2	3.98−02	5.09−05	C	1
				778.27	133 840–262 330	5–3	M1	1.47−01	7.73−06	C	1
				778.27	133 840–262 330	5–3	E2	1.70−02	1.30−05	C	1
28		^{5}S$^\circ-^3$P$^\circ$									
				570.55	133 840–309 110	5–5	M1	6.29+01	2.17−03	C+	1
				570.55	133 840–309 110	5–5	E2	1.66−04	4.49−08	D	1
				570.55	133 840–309 110	5–3	M1	3.51+01	7.25−04	C+	1
				570.55	133 840–309 110	5–3	E2	7.69−06	1.25−09	E+	1
				570.55	133 840–309 110	5–1	E2	3.78−05	2.04−09	D	1
29		^{5}S$^\circ-^1$D$^\circ$									
				[379.968]	133 840–397 020	5–5	M1	8.23−03	8.36−08	D	1
				[379.968]	133 840–397 020	5–5	E2	1.51−06	5.33−11	E+	1
30		^{5}S$^\circ-^3$S$^\circ$									
				369.877	133 840–404 200	5–3	M1	4.29−02	2.42−07	D+	1
				369.877	133 840–404 200	5–3	E2	2.49−05	4.62−10	E+	1
31		^{3}D$^\circ-^3$D$^\circ$									
				150 cm^{-1}	262 180–262 330	7–3	E2	9.25−16	3.26−04	C+	1
				90 cm^{-1}	262 180–262 270	7–5	M1	1.83−05	4.65+00	A	1
				90 cm^{-1}	262 180–262 270	7–5	E2	1.81−16	1.36−03	C+	1
				60 cm^{-1}	262 270–262 330	5–3	M1	8.73−06	4.49+00	A	1
				60 cm^{-1}	262 270–262 330	5–3	E2	1.58−20	5.43−07	D+	1

TABLE 34. Transition probabilities of forbidden lines for Al VIII (references in this table are as follows: 1=Tachiev and Froese Fischer,[71] 2=Vilkas *et al.*,[79] and 3=Galavís *et al.*,[24])—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
32		$^3D^\circ-^3P^\circ$									
			2 130.2	2 130.8	262 180–309 110	7–3	E2	1.27+00	1.49−01	B+	1
			2 134.3	2 134.9	262 270–309 110	5–1	E2	2.68+00	1.06−01	B+	1
			2 130.2	2 130.8	262 180–309 110	7–5	M1	8.01+00	1.44−02	B	1
			2 130.2	2 130.8	262 180–309 110	7–5	E2	1.51+00	2.96−01	B+	1
			2 134.3	2 134.9	262 270–309 110	5–3	M1	3.09−05	3.35−08	D	1
			2 134.3	2 134.9	262 270–309 110	5–3	E2	2.21−01	2.63−02	B	1
			2 137.0	2 137.7	262 330–309 110	3–1	M1	9.49+00	3.44−03	B	1
			2 134.3	2 134.9	262 270–309 110	5–5	M1	5.68+00	1.02−02	B	1
			2 134.3	2 134.9	262 270–309 110	5–5	E2	9.32−01	1.85−01	B+	1
			2 137.0	2 137.7	262 330–309 110	3–3	M1	9.48+00	1.03−02	B	1
			2 137.0	2 137.7	262 330–309 110	3–3	E2	1.19+00	1.43−01	B+	1
			2 137.0	2 137.7	262 330–309 110	3–5	M1	1.50+00	2.72−03	B	1
			2 137.0	2 137.7	262 330–309 110	3–5	E2	2.42−01	4.82−02	B	1
33		$^3D^\circ-^1D^\circ$									
				[742.12]	262 270–397 020	5–5	M1	1.07−01	8.08−06	C	1
				[742.12]	262 270–397 020	5–5	E2	1.03−01	1.04−04	C	1
				[741.62]	262 180–397 020	7–5	M1	5.03−02	3.81−06	C	1
				[741.62]	262 180–397 020	7–5	E2	1.81−01	1.82−04	C+	1
				[742.45]	262 330–397 020	3–5	M1	1.46−03	1.11−07	D+	1
				[742.45]	262 330–397 020	3–5	E2	9.26−03	9.33−06	C	1
34		$^3D^\circ-^3S^\circ$									
				704.13	262 180–404 200	7–3	E2	9.09−01	4.22−04	C+	1
				704.57	262 270–404 200	5–3	M1	4.08−01	1.59−05	C	1
				704.57	262 270–404 200	5–3	E2	1.48+00	6.89−04	C+	1
				704.87	262 330–404 200	3–3	M1	2.04−01	7.93−06	C	1
				704.87	262 330–404 200	3–3	E2	1.34+00	6.22−04	C+	1
35		$^3D^\circ-^1P^\circ$									
				[548.276]	262 180–444 570	7–3	E2	1.80−02	2.39−06	C	1
				[548.546]	262 270–444 570	5–3	M1	5.53+01	1.02−03	C+	1
				[548.546]	262 270–444 570	5–3	E2	1.19−02	1.59−06	D+	1
				[548.727]	262 330–444 570	3–3	M1	1.84+01	3.38−04	C+	1
				[548.727]	262 330–444 570	3–3	E2	6.01−03	8.01−07	D+	1
36		$^3P^\circ-^1D^\circ$									
				[1 137.53]	309 110–397 020	1–5	E2	2.59−05	2.20−07	D+	1
				[1 137.53]	309 110–397 020	3–5	M1	5.34+00	1.46−03	C+	1
				[1 137.53]	309 110–397 020	3–5	E2	3.64−05	3.10−07	D+	1
				[1 137.53]	309 110–397 020	5–5	M1	1.60+01	4.36−03	B	1
				[1 137.53]	309 110–397 020	5–5	E2	5.87−04	4.99−06	C	1
37		$^3P^\circ-^3S^\circ$									
				1 051.64	309 110–404 200	5–3	M1	6.28+00	8.12−04	C+	1
				1 051.64	309 110–404 200	5–3	E2	1.67−04	5.77−07	D+	1
				1 051.64	309 110–404 200	3–3	M1	3.78+00	4.89−04	C+	1
				1 051.64	309 110–404 200	3–3	E2	8.44−05	2.91−07	D+	1
				1 051.64	309 110–404 200	1–3	M1	5.09+00	6.58−04	C+	1
38		$^3P^\circ-^1P^\circ$									
				[738.23]	309 110–444 570	3–3	M1	1.06−01	4.76−06	C	1
				[738.23]	309 110–444 570	3–3	E2	5.62−02	3.30−05	C	1
				[738.23]	309 110–444 570	5–3	M1	2.64−01	1.18−05	C	1
				[738.23]	309 110–444 570	5–3	E2	1.83−01	1.08−04	C	1
				[738.23]	309 110–444 570	1–3	M1	4.92−02	2.20−06	C	1
39		$^1D^\circ-^3S^\circ$									

TABLE 34. Transition probabilities of forbidden lines for Al VIII (references in this table are as follows: 1=Tachiev and Froese Fischer,[71] 2=Vilkas *et al.*,[79] and 3=Galavís *et al.*,[24])—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
			[13 924]	[13 928]	397 020–404 200	5–3	M1	1.59−06	4.78−07	D+	1
			[13 924]	[13 928]	397 020–404 200	5–3	E2	8.29−07	1.16−03	C+	1
40		$^1D^\circ - ^1P^\circ$									
			2 102.4	2 103.0	397 020–444 570	5–3	M1	4.60−06	4.76−09	D	1
41		$^3S^\circ - ^1P^\circ$									
			[2 476.3]	[2 477.1]	404 200–444 570	3–3	M1	1.30+01	2.21−02	B	1
			[2 476.3]	[2 477.1]	404 200–444 570	3–3	E2	5.39−06	1.35−06	D+	1

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

4.9. Al IX

Boron isoelectronic sequence
Ground state: $1s^2 2s^2 2p\ ^2P^o_{1/2}$
Ionization energy: 330.127 eV (2 662 650 cm^{-1})

4.9.1. Allowed Transitions for Al IX

In general, the computed transition rates for this boronlike spectrum are in good agreement. For stronger lines, this is the case for lines of the OP.[15,16] Only OP results were available for energy levels above the $2s2p3s$. Most of the data for lines from higher-lying levels have been taken from this source. The high-quality data from the other references were available primarily for transitions from lower-lying levels. Tachiev and Froese Fischer[71] performed extensive MCHF calculations with Breit-Pauli corrections to order α^2. Merkelis *et al.*[50] used a second-order MBPT theory with Breit-Pauli relativistic corrections. As part of the Iron Project, Galavís *et al.*[25] used the SUPERSTRUCTURE code with CI, relativistic effects, and semiempirical energy corrections. Safronova *et al.*[62] used relativistic second-order MBPT calculations.

To estimate accuracies, we pooled the RSDM for each of the lines with transition rates published in two or more references,[15,16,25,50,62,71] as described in the introduction to Kelleher and Podobedova.[35] For this purpose the spin-allowed and intercombination data were treated separately. OP lines constituted a third group; we decreased the accuracies predicted from the good agreement of OP with Tachiev and Froese Fischer[71] for lines from higher-lying levels, because such agreement was not observed in other isoelectronic spectra. We then isoelectronically averaged the logarithmic quality factors observed for B-like lines of Na VII, Mg VIII, Al IX, and Si X using the method described in the introduction to Kelleher and Podobedova.[35] For the higher-lying intercombination lines and those from the OP data, we scaled the logarithmic quality factor of the lower-lying lines, as described in Kelleher and Podobedova.[35]

References for Allowed Transitions for Al IX

[15]J. A. Fernley, A. Hibbert, A. E. Kingston, and M. J. Seaton, J. Phys. B **32**, 5507 (1999).

[16]J. A. Fernley, A. Hibbert, A. E. Kingston, and M. J. Seaton, http://legacy.gsfc.nasa.gov/topbase, downloaded on July 28, 1995 (Opacity Project).

[25]M. E. Galavís, C. Mendoza, and C. J. Zeippen, Astron. Astrophys., Suppl. Ser. **131**, 499 (1998).

[35]D. E. Kelleher and L. I. Podobedova, J. Phys. Chem. Ref. Data **37**, 267 (2008).

[50]G. Merkelis, J. J. Vilkas, G. Gaigalas, and R. Kisielius, Phys. Scr. **51**, 233 (1995).

[62]U. I. Safronova, W. R. Johnson, and A. E. Livingston, Phys. Rev. A **60**, 996 (1999). A complete data listing was made available by private communication.

[67]G. Tachiev and C. Froese Fischer, J. Phys. B **33**, 2419 (2000).

[71]G. Tachiev and C. Froese Fischer, http://www.vuse.vanderbilt.edu/~cff/mchf_collection/ (MCHF, *ab initio*, downloaded on February 17, 2004); see Ref. 67.

TABLE 35. Wavelength finding list for allowed lines of Al IX

Wavelength (vac) (Å)	Mult. No.
41.543	13
43.549	12
44.704	11
44.743	11
44.802	11
47.755	10
47.856	10
47.867	10
49.854	42
49.928	42
49.929	42
56.149	9
56.304	9
56.899	8
56.945	8
57.058	8
58.058	7
58.111	7
58.223	7
58.277	7
59.762	38
59.763	38
60.135	31

TABLE 35. Wavelength finding list for allowed lines of Al IX—Continued

Wavelength (vac) (Å)	Mult. No.
60.160	31
60.197	31
60.222	31
60.260	31
60.312	31
60.350	31
60.447	53
60.504	30
60.541	53
60.551	30
60.555	53
60.567	30
60.588	30
60.642	30
60.658	30
60.896	6
61.069	6
61.078	6
61.651	39
62.296	51
62.327	51
62.369	51
62.474	41
62.586	41
62.912	40
63.026	40
63.186	34
63.259	34
63.260	34
63.509	33
63.631	33
63.632	33
64.885	32
64.887	32
64.902	32
64.903	32
66.036	25
66.092	25
66.144	25
66.163	25
66.167	25
66.239	35
66.271	52
66.275	25
66.276	52
66.292	52
66.321	35
66.621	5
66.839	5
67.190	37
67.274	37
67.320	37
67.405	37
68.531	50
68.637	50
68.681	50
69.136	36

TABLE 35. Wavelength finding list for allowed lines of Al IX—Continued

Wavelength (vac) (Å)	Mult. No.
69.254	36
69.273	36
69.716	27
69.717	27
69.872	27
71.348	26
71.349	26
71.501	26
71.502	26
71.586	26
73.453	28
73.625	28
74.624	29
74.784	29
74.802	29
74.963	29
80.587	47
80.591	47
80.813	47
80.817	47
83.172	46
83.176	46
83.285	46
83.627	49
83.653	49
85.075	48
85.301	48
85.327	48
89.103	44
89.107	44
89.122	44
89.127	44
94.611	45
94.622	45
94.643	45
109.189	43
109.232	43
139.295	74
164.739	73
183.150	72
183.234	72
184.227	72
197.981	81
198.169	81
199.350	81
217.099	91
227.133	16
227.319	16
227.599	88
227.806	88
228.024	16
228.212	16
229.132	88
229.316	16
229.342	88
244.206	70
244.684	70

TABLE 35. Wavelength finding list for allowed lines of Al IX—Continued

Wavelength (vac) (Å)	Mult. No.
244.750	89
245.188	70
245.670	70
246.324	70
246.524	89
246.567	89
247.494	70
248.090	71
248.157	70
249.775	71
250.069	71
250.407	90
252.264	90
253.460	90
266.759	15
267.989	15
268.032	15
269.774	15
269.818	15
280.151	4
282.422	4
284.042	4
286.377	4
292.929	56
294.542	56
300.562	3
305.045	3
306.927	19
306.956	19
307.295	19
316.797	14
318.532	14
319.887	64
320.133	64
321.058	14
326.733	57
331.719	63
331.983	63
343.761	62
344.045	62
372.967	84
374.083	84
374.686	84
375.601	84
376.209	84
378.301	84
379.954	86
380.633	86
381.971	69
382.863	69
384.010	18
384.054	18
384.098	18
384.143	18
384.231	69
384.349	86
384.971	2
385.282	69
386.250	85
386.399	69
386.593	85
386.668	69
387.642	85
387.792	85
387.868	85
388.848	85
389.423	85
389.788	69
392.357	2
392.403	2
393.763	87
394.493	87
395.523	21
396.087	21
397.425	87
432.040	24
432.713	24
437.464	24
438.154	24
497.018	17
497.092	17
507.202	68
515.544	68
517.840	55
521.023	61
526.537	55
528.653	61
529.325	61
584.45	99
593.19	99
594.85	99
602.19	23
612.78	23
613.01	23
619.39	97
621.20	97
629.84	60
630.80	60
631.43	60
632.39	60
635.73	54
642.43	54
680.32	1
688.37	1
691.71	1
703.73	1
712.35	1
715.61	98
718.03	98
779.91	20
819.20	82
822.10	82
822.57	76
832.15	82

TABLE 35. Wavelength finding list for allowed lines of Al IX—Continued

Wavelength (vac) (Å)	Mult. No.
833.40	76
834.59	82
835.42	76
837.59	82
841.11	82
846.60	76
879.89	83
887.94	83
897.67	83
906.04	83
911.83	83
913.74	83
919.62	83
935.89	22
961.72	22
1 110.86	67
1 151.68	67
1 177.86	79
1 204.38	79
1 234.26	93
1 255.02	75
1 256.91	79
1 273.89	75
1 280.41	75
1 291.82	95
1 309.76	95
1 355.01	78
1 363.51	78
1 402.13	92
1 421.87	78
1 423.28	92
1 496.11	66
1 500.38	96
1 502.40	66
1 509.21	94
1 533.74	94
1 578.03	66
1 627.60	80
1 678.70	80
1 923.4	59
1 932.4	59
Wavelength (air) (Å)	**Mult. No.**
2 048.5	59
2 302.9	77
2 324.3	77
2 503.0	77
2 528.3	77
2 593.3	101
2 811.3	101
3 176.7	65
3 344.6	65
3 535.1	65
3 744.3	65
3 888.4	100
3 896.0	100
4 400.2	100
5 212.3	58
5 278.4	58
6 179	58
6 272	58
6 876	58

TABLE 36. Transition probabilities of allowed lines for Al IX (references in this table are as follows: 1=Fernley *et al.*,[15,16] 2=Tachiev and Froese Fischer,[71] 3=Merkelis *et al.*,[50] 4=Galavís *et al.*,[25] and 5=Safronova *et al.*[62])

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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
1	$2s^22p-2s2p^2$	$^2P^\circ-^4P$										
				703.73	4 890–146 990	4–4	3.09+04	2.29−06	2.12−05	−5.038	D+	2,3,4,5
				688.37	0–145 270	2–2	1.52+05	1.08−05	4.90−05	−4.666	D+	2,3,4,5
				712.35	4 890–145 270	4–2	1.25+05	4.74−06	4.44−05	−4.722	C	2,3,4,5
				691.71	4 890–149 460	4–6	1.18+05	1.27−05	1.16−04	−4.294	C	2,3,4,5
				680.32	0–146 990	2–4	3.84+03	5.33−07	2.39−06	−5.972	C	2,3,4,5
2		$^2P^\circ-^2D$		*389.89*	*3 260–259 742*	6–10	1.83+09	6.96−02	5.36−01	−0.379	A	2,3,4,5
				392.403	4 890–259 730	4–6	1.79+09	6.21−02	3.21−01	−0.605	A	2,3,4,5
				384.971	0–259 760	2–4	1.64+09	7.30−02	1.85−01	−0.836	A	2,3,4,5
				392.357	4 890–259 760	4–4	2.52+08	5.82−03	3.01−02	−1.633	B+	2,3,4,5
3		$^2P^\circ-^2S$		*303.54*	*3 260*–332 710	6–2	8.11+09	3.74−02	2.24−01	−0.649	B+	2,3,4,5
				305.045	4 890–332 710	4–2	4.19+09	2.92−02	1.17−01	−0.933	A	2,3,4,5
				300.562	0–332 710	2–2	3.98+09	5.39−02	1.07−01	−0.967	B+	2,3,4,5
4		$^2P^\circ-^2P$		*283.50*	*3 260–355 993*	6–6	1.52+10	1.83−01	1.02+00	0.041	A	2,3,4,5
				284.042	4 890–356 950	4–4	1.27+10	1.54−01	5.76−01	−0.210	A	2,3,4,5

TABLE 36. Transition probabilities of allowed lines for Al IX (references in this table are as follows: 1=Fernley *et al.*,[15,16] 2=Tachiev and Froese Fischer,[71] 3=Merkelis *et al.*,[50] 4=Galavís *et al.*,[25] and 5=Safronova *et al.*[62])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				282.422	0–354 080	2–2	8.80+09	1.05−01	1.96−01	−0.678	A	2,3,4,5
				286.377	4 890–354 080	4–2	6.24+09	3.83−02	1.45−01	−0.815	B+	2,3,4,5
				280.151	0–356 950	2–4	2.49+09	5.87−02	1.08−01	−0.930	A	2,3,4,5
5	$2p-3s$	$^2P^\circ-^2S$		*66.77*	*3 260*–1 501 020	6–2	1.14+11	2.54−02	3.35−02	−0.817	B	2
				66.839	4 890–1 501 020	4–2	7.63+10	2.56−02	2.25−02	−0.990	B+	2
				66.621	0–1 501 020	2–2	3.78+10	2.51−02	1.10−02	−1.299	B	2
6	$2p-3d$	$^2P^\circ-^2D$		*61.01*	*3 260–1 642 284*	6–10	6.60+11	6.14−01	7.40−01	0.566	B+	2
				61.069	4 890–1 642 380	4–6	6.58+11	5.52−01	4.44−01	0.344	A	2
				60.896	0–1 642 140	2–4	5.52+11	6.14−01	2.46−01	0.089	B+	2
				61.078	4 890–1 642 140	4–4	1.10+11	6.15−02	4.95−02	−0.609	B+	2
7	$2s^22p-2s2p(^3P^\circ)3p$	$^2P^\circ-^2P$		*58.19*	*3 260–1 721 883*	6–6	2.49+11	1.26−01	1.45−01	−0.121	C	1
				58.223	4 890–1 722 410	4–4	2.07+11	1.05−01	8.05−02	−0.377	C	LS
				58.111	0–1 720 830	2–2	1.67+11	8.45−02	3.23−02	−0.772	C	LS
				58.277	4 890–1 720 830	4–2	8.29+10	2.11−02	1.62−02	−1.074	D+	LS
				58.058	0–1 722 410	2–4	4.19+10	4.23−02	1.62−02	−1.073	D+	LS
8		$^2P^\circ-^2D$		*56.94*	*3 260–1 759 582*	6–10	2.75+11	2.22−01	2.50−01	0.125	C+	1
				56.945	4 890–1 760 970	4–6	2.74+11	2.00−01	1.50−01	−0.097	C+	LS
				56.899	0–1 757 500	2–4	2.30+11	2.23−01	8.35−02	−0.351	C+	LS
				57.058	4 890–1 757 500	4–4	4.55+10	2.22−02	1.67−02	−1.052	D+	LS
9		$^2P^\circ-^2S$		*56.25*	*3 260*–17 80 960	6–2	2.78+11	4.39−02	4.88−02	−0.579	C	1
				56.304	4 890–1 780 960	4–2	1.85+11	4.39−02	3.25−02	−0.755	C	LS
				56.149	0–1 780 960	2–2	9.31+10	4.40−02	1.63−02	−1.056	D+	LS
10	$2p-4d$	$^2P^\circ-^2D$		*47.82*	*3 260–2 094 302*	6–10	2.41+11	1.38−01	1.30−01	−0.082	C	1
				47.856	4 890–2 094 490	4–6	2.41+11	1.24−01	7.81−02	−0.305	C	LS
				47.755	0–2 094 020	2–4	2.02+11	1.38−01	4.34−02	−0.559	C	LS
				47.867	4 890–2 094 020	4–4	4.02+10	1.38−02	8.70−03	−1.258	D+	LS
11	$2s^22p-2s2p(^3P^\circ)4p$	$^2P^\circ-^2D$		*[44.73]*	*3 260–2 238 704*	6–10	1.16+11	5.82−02	5.14−02	−0.457	C	1
				[44.743]	4 890–2 239 880	4–6	1.16+11	5.24−02	3.09−02	−0.679	C	LS
				[44.704]	0–2 236 940	2–4	9.71+10	5.82−02	1.71−02	−0.934	C	LS
				[44.802]	4 890–2 236 940	4–4	1.93+10	5.81−03	3.43−03	−1.634	D	LS
12	$2p-5d$	$^2P^\circ-^2D$				6–10						1
				43.549	4 890–2 301 150	4–6	1.05+11	4.46−02	2.56−02	−0.749	C	LS
13	$2p-6d$	$^2P^\circ-^2D$				6–10						1
				41.543	4 890–2 412 030	4–6	5.39+10	2.09−02	1.14−02	−1.078	D+	LS
14	$2s2p^2-2p^3$	$^4P-^4S^\circ$		*319.50*	*147 938*–460 930	12–4	1.40+10	7.16−02	9.04−01	−0.066	A	2,3,4,5
				321.058	149 460–460 930	6–4	6.91+09	7.12−02	4.52−01	−0.369	A	2,3,4,5
				318.532	146 990–460 930	4–4	4.72+09	7.18−02	3.01−01	−0.542	A	2,3,4,5
				316.797	145 270–460 930	2–4	2.40+09	7.22−02	1.51−01	−0.840	A	2,3,4,5
15		$^4P-^2D^\circ$										
				268.032	146 990–520 080	4–6	1.26+05	2.03−06	7.16−06	−5.090	B	2,3,4,5
				266.759	145 270–520 140	2–4	5.70+04	1.22−06	2.14−06	−5.613	C	2,3,4,5

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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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				269.818	149 460–520 080	6–6	4.69+06	5.12−05	2.73−04	−3.513	C	2,3,4,5
				267.989	146 990–520 140	4–4	1.69+06	1.82−05	6.44−05	−4.138	C	2,3,4,5
				269.774	149 460–520 140	6–4	1.92+05	1.40−06	7.46−06	−5.076	B	2,3,4,5
16		^{4}P−^{2}P°										
				228.024	146 990–585 540	4–4	2.67+06	2.08−05	6.24−05	−4.080	D+	2,3,4,5
				227.319	145 270–585 180	2–2	1.20+06	9.30−06	1.39−05	−4.730	C+	2,3,4,5
				229.316	149 460–585 540	6–4	9.88+05	5.19−06	2.35−05	−4.507	D+	2,3,4,5
				228.212	146 990–585 180	4–2	2.33+05	9.09−07	2.73−06	−5.439	D+	2,3,4,5
				227.133	145 270–585 540	2–4	3.47+04	5.37−07	8.04−07	−5.969	E+	2,3,4,5
17		^{2}D−^{4}S°										
				497.018	259 730–460 930	6–4	8.91+03	2.20−07	2.16−06	−5.879	D	2,3,4,5
				497.092	259 760–460 930	4–4	3.98+03	1.47−07	9.64−07	−6.231	D	2,3,4,5
18		^{2}D−^{2}D°		*384.08*	*259 742–520 104*	10–10	3.91+09	8.65−02	1.09+00	−0.063	A	2,3,4,5
				384.098	259 730–520 080	6–6	3.65+09	8.07−02	6.12−01	−0.315	A	2,3,4,5
				384.054	259 760–520 140	4–4	3.34+09	7.38−02	3.73−01	−0.530	A	2,3,4,5
				384.010	259 730–520 140	6–4	5.14+08	7.57−03	5.74−02	−1.343	B+	2,3,4,5
				384.143	259 760–520 080	4–6	3.05+08	1.01−02	5.12−02	−1.394	B+	2,3,4,5
19		^{2}D−^{2}P°		*307.05*	*259 742–585 420*	10–6	6.50+09	5.51−02	5.57−01	−0.259	A	2,3,4,5
				306.927	259 730–585 540	6–4	5.63+09	5.30−02	3.21−01	−0.498	A	2,3,4,5
				307.295	259 760–585 180	4–2	6.69+09	4.74−02	1.92−01	−0.722	A	2,3,4,5
				306.956	259 760–585 540	4–4	7.71+08	1.09−02	4.40−02	−1.361	B+	2,3,4,5
20		^{2}S−^{4}S°										
				779.91	332 710–460 930	2–4	5.40+03	9.85−07	5.06−06	−5.706	D	2,3,4,5
21		^{2}S−^{2}P°		*395.71*	332 710–*585 420*	2–6	1.16+09	8.19−02	2.13−01	−0.786	A	2,3,4,5
				395.523	332 710–585 540	2–4	1.38+09	6.48−02	1.69−01	−0.887	A	2,3,4,5
				396.087	332 710–585 180	2–2	7.30+08	1.72−02	4.48−02	−1.463	B+	2,3,4,5
22		^{2}P−^{4}S°										
				961.72	356 950–460 930	4–4	1.33+05	1.84−05	2.34−04	−4.133	C	2,3,4,5
				935.89	354 080–460 930	2–4	3.91+04	1.03−05	6.32−05	−4.686	D+	2,3,4,5
23		^{2}P−^{2}D°		*609.3*	*355 993–520 104*	6–10	9.16+08	8.50−02	1.02+00	−0.292	A	2,3,4,5
				613.01	356 950–520 080	4–6	8.96+08	7.57−02	6.11−01	−0.519	A	2,3,4,5
				602.19	354 080–520 140	2–4	8.25+08	8.97−02	3.56−01	−0.746	A	2,3,4,5
				612.78	356 950–520 140	4–4	1.23+08	6.90−03	5.57−02	−1.559	B+	2,3,4,5
24		^{2}P−^{2}P°		*435.87*	*355 993–585 420*	6–6	3.90+09	1.11−01	9.57−01	−0.177	A	2,3,4,5
				437.464	356 950–585 540	4–4	3.37+09	9.66−02	5.57−01	−0.413	A	2,3,4,5
				432.713	354 080–585 180	2–2	2.99+09	8.38−02	2.39−01	−0.776	A	2,3,4,5
				438.154	356 950–585 180	4–2	1.20+09	1.73−02	9.99−02	−1.160	A	2,3,4,5
				432.040	354 080–585 540	2–4	3.85+08	2.15−02	6.13−02	−1.367	B+	2,3,4,5
25	$2s2p^2$ $-2s2p(^3P°)3s$	^{4}P−^{4}P°		*[66.15]*	*147 938–1 659 547*	12–12	1.37+11	8.99−02	2.35−01	0.033	B+	2
				66.144	149 460–1 661 320	6–6	9.66+10	6.34−02	8.28−02	−0.420	B+	2
				66.167	146 990–1 658 320	4–4	1.82+10	1.19−02	1.04−02	−1.322	B	2
				[66.163]	145 270–1 656 680	2–2	2.26+10	1.48−02	6.46−03	−1.529	B	2
				66.275	149 460–1 658 320	6–4	6.12+10	2.69−02	3.52−02	−0.792	B+	2
				[66.239]	146 990–1 656 680	4–2	1.13+11	3.71−02	3.23−02	−0.829	B+	2
				66.036	146 990–1 661 320	4–6	4.15+10	4.07−02	3.54−02	−0.788	B+	2

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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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				66.092	145 270–1 658 320	2–4	5.68+10	7.45−02	3.24−02	−0.827	B+	2
26		^{2}D–^{4}P°										
				71.501	259 730–1 658 320	6–4	5.89+07	3.01−05	4.25−05	−3.743	D	2
				[71.586]	259 760–1 656 680	4–2	3.23+07	1.24−05	1.17−05	−4.305	D	2
				71.348	259 730–1 661 320	6–6	4.88+07	3.73−05	5.25−05	−3.650	D	2
				71.502	259 760–1 658 320	4–4	3.10+07	2.37−05	2.23−05	−4.023	D	2
				71.349	259 760–1 661 320	4–6	2.94+06	3.36−06	3.16−06	−4.872	E+	2
27		^{2}D–^{2}P°		*[69.77]*	*259 742–1 693 067*	10–6	7.40+10	3.24−02	7.44−02	−0.489	C	1
				69.716	259 730–1 694 130	6–4	6.67+10	3.24−02	4.46−02	−0.711	C	LS
				[69.872]	259 760–1 690 940	4–2	7.38+10	2.70−02	2.48−02	−0.967	C	LS
				69.717	259 760–1 694 130	4–4	7.42+09	5.41−03	4.97−03	−1.665	D	LS
28		^{2}S–^{2}P°		*[73.51]*	332 710–*1 693 067*	2–6	2.37+10	5.76−02	2.79−02	−0.939	D+	1
				73.453	332 710–1 694 130	2–4	2.37+10	3.84−02	1.86−02	−1.115	C	LS
				[73.625]	332 710–1 690 940	2–2	2.36+10	1.92−02	9.31−03	−1.416	D+	LS
29		^{2}P–^{2}P°		*[74.79]*	*355 993–1 693 067*	6–6	6.21+09	5.21−03	7.69−03	−1.505	D	1
				74.784	356 950–1 694 130	4–4	5.18+09	4.34−03	4.27−03	−1.760	D	LS
				[74.802]	354 080–1 690 940	2–2	4.14+09	3.47−03	1.71−03	−2.159	D	LS
				[74.963]	356 950–1 690 940	4–2	2.06+09	8.66−04	8.55−04	−2.460	E+	LS
				74.624	354 080–1 694 130	2–4	1.04+09	1.74−03	8.55−04	−2.458	E+	LS
30	$2s2p^2-2s2p(^3P°)3d$	^{4}P–^{4}D°		*60.57*	*147 938–1 798 939*	12–20	1.02+12	9.34−01	2.24+00	1.050	B	1
				60.588	149 460–1 799 950	6–8	1.02+12	7.47−01	8.94−01	0.651	B	LS
				60.551	146 990–1 798 480	4–6	7.14+11	5.89−01	4.70−01	0.372	B	LS
				60.504	145 270–1 798 050	2–4	4.26+11	4.68−01	1.86−01	−0.029	C+	LS
				60.642	149 460–1 798 480	6–6	3.05+11	1.68−01	2.01−01	0.003	C+	LS
				60.567	146 990–1 798 050	4–4	5.44+11	2.99−01	2.38−01	0.078	C+	LS
				60.504	145 270–1 798 050	2–2	8.53+11	4.68−01	1.86−01	−0.029	C+	LS
				60.658	149 460–1 798 050	6–4	5.09+10	1.87−02	2.24−02	−0.950	C	LS
				60.567	146 990–1 798 050	4–2	1.70+11	4.67−02	3.72−02	−0.729	C	LS
31		^{4}P–^{4}P°		*[60.27]*	*147 938–1 807 102*	12–12	5.46+11	2.97−01	7.08−01	0.552	C+	1
				60.350	149 460–1 806 470	6–6	3.81+11	2.08−01	2.48−01	0.096	B	LS
				60.222	146 990–1 807 500	4–4	7.28+10	3.96−02	3.14−02	−0.800	C	LS
				[60.135]	145 270–1 808 200	2–2	9.15+10	4.96−02	1.96−02	−1.003	C	LS
				60.312	149 460–1 807 500	6–4	2.45+11	8.91−02	1.06−01	−0.272	C+	LS
				[60.197]	146 990–1 808 200	4–2	4.57+11	1.24−01	9.83−02	−0.305	C+	LS
				60.260	146 990–1 806 470	4–6	1.64+11	1.34−01	1.06−01	−0.271	C+	LS
				60.160	145 270–1 807 500	2–4	2.29+11	2.48−01	9.82−02	−0.305	C+	LS
32		^{2}D–^{2}D°		*64.89*	*259 742–1 800 750*	10–10	2.73+11	1.72−01	3.68−01	0.236	C+	1
				64.885	259 730–1 800 910	6–6	2.55+11	1.61−01	2.06−01	−0.015	C+	LS
				64.903	259 760–1 800 510	4–4	2.45+11	1.55−01	1.32−01	−0.208	C+	LS
				64.902	259 730–1 800 510	6–4	2.73+10	1.15−02	1.47−02	−1.161	D+	LS
				64.887	259 760–1 800 910	4–6	1.82+10	1.72−02	1.47−02	−1.162	D+	LS
33		^{2}D–^{2}F°		*63.56*	*259 742–1 833 020*	10–14	6.63+11	5.62−01	1.18+00	0.750	B	1
				63.509	259 730–1 834 310	6–8	6.65+11	5.36−01	6.72−01	0.507	B	LS
				63.632	259 760–1 831 300	4–6	6.16+11	5.61−01	4.70−01	0.351	B	LS
				63.631	259 730–1 831 300	6–6	4.40+10	2.67−02	3.36−02	−0.795	C	LS

TABLE 36. Transition probabilities of allowed lines for Al IX (references in this table are as follows: 1=Fernley *et al.*,[15,16] 2=Tachiev and Froese Fischer,[71] 3=Merkelis *et al.*,[50] 4=Galavís *et al.*,[25] and 5=Safronova *et al.*[62])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
34		$^2D-^2P^\circ$		*63.23*	*259 742–1 841 153*	10–6	1.00+10	3.60−03	7.50−03	−1.444	D	1
				63.259	259 730–1 840 530	6–4	9.00+09	3.60−03	4.50−03	−1.666	D	LS
				63.186	259 760–1 842 400	4–2	1.01+10	3.01−03	2.50−03	−1.919	D	LS
				63.260	259 760–1 840 530	4–4	1.00+09	6.01−04	5.01−04	−2.619	E+	LS
35		$^2S-^2P^\circ$		*66.29*	332 710–*1 841 153*	2–6	3.88+11	7.67−01	3.35−01	0.186	C+	1
				66.321	332 710–1 840 530	2–4	3.87+11	5.11−01	2.23−01	0.009	C+	LS
				66.239	332 710–1 842 400	2–2	3.89+11	2.56−01	1.12−01	−0.291	C+	LS
36		$^2P-^2D^\circ$		*69.22*	*355 993–1 800 750*	6–10	8.09+10	9.69−02	1.32−01	−0.236	C	1
				69.254	356 950–1 800 910	4–6	8.08+10	8.71−02	7.94−02	−0.458	C	LS
				69.136	354 080–1 800 510	2–4	6.77+10	9.70−02	4.42−02	−0.712	C	LS
				69.273	356 950–1 800 510	4–4	1.35+10	9.68−03	8.83−03	−1.412	D+	LS
37		$^2P-^2P^\circ$		*67.33*	*355 993–1 841 153*	6–6	6.31+10	4.29−02	5.71−02	−0.589	C	1
				67.405	356 950–1 840 530	4–4	5.24+10	3.57−02	3.17−02	−0.845	C	LS
				67.190	354 080–1 842 400	2–2	4.24+10	2.87−02	1.27−02	−1.241	D+	LS
				67.320	356 950–1 842 400	4–2	2.11+10	7.16−03	6.35−03	−1.543	D+	LS
				67.274	354 080–1 840 530	2–4	1.05+10	1.43−02	6.33−03	−1.544	D+	LS
38	$2s2p^2$ $-2s2p(^1P^\circ)3d$	$^2D-^2F^\circ$		*[59.76]*	*259 742–1 933 040*	10–14	5.11+11	3.83−01	7.54−01	0.583	D+	1
				[59.762]	259 730–1 933 040	6–8	5.11+11	3.65−01	4.31−01	0.340	C	LS
				[59.763]	259 760–1 933 040	4–6	4.77+11	3.83−01	3.01−01	0.185	D+	LS
				[59.762]	259 730–1 933 040	6–6	3.42+10	1.83−02	2.16−02	−0.959	E+	LS
39		$^2S-^2P^\circ$		*61.65*	332 710–*1 954 750*	2–6	2.13+11	3.64−01	1.48−01	−0.138	D	1
				61.651	332 710–1 954 750	2–4	2.13+11	2.43−01	9.86−02	−0.313	D	LS
				61.651	332 710–1 954 750	2–2	2.12+11	1.21−01	4.91−02	−0.616	E+	LS
40		$^2P-^2D^\circ$		*62.99*	*355 993–1 943 600*	6–10	7.18+11	7.11−01	8.85−01	0.630	D+	1
				63.026	356 950–1 943 600	4–6	7.16+11	6.40−01	5.31−01	0.408	C	LS
				62.912	354 080–1 943 600	2–4	6.00+11	7.12−01	2.95−01	0.154	D+	LS
				63.026	356 950–1 943 600	4–4	1.19+11	7.11−02	5.90−02	−0.546	E+	LS
41		$^2P-^2P^\circ$		*62.55*	*355 993–1 954 750*	6–6	3.65+11	2.14−01	2.64−01	0.109	D	1
				62.586	356 950–1 954 750	4–4	3.03+11	1.78−01	1.47−01	−0.148	D	LS
				62.474	354 080–1 954 750	2–2	2.44+11	1.43−01	5.88−02	−0.544	E+	LS
				62.586	356 950–1 954 750	4–2	1.21+11	3.56−02	2.93−02	−0.846	E+	LS
				62.474	354 080–1 954 750	2–4	6.09+10	7.13−02	2.93−02	−0.846	E+	LS
42	$2s2p^2$ $-2s2p(^3P^\circ)4d$	$^2D-^2F^\circ$		*[49.89]*	*259 742–2 264 309*	10–14	2.93+11	1.53−01	2.52−01	0.185	C+	1
				[49.854]	259 730–2 265 590	6–8	2.94+11	1.46−01	1.44−01	−0.057	C+	LS
				[49.929]	259 760–2 262 600	4–6	2.73+11	1.53−01	1.01−01	−0.213	C+	LS
				[49.928]	259 730–2 262 600	6–6	1.95+10	7.29−03	7.19−03	−1.359	D+	LS
43	$2p^3-2s^23s$	$^2P^\circ-^2S$		*109.22*	*585 420*–1 501 020	6–2	5.69+06	3.39−06	7.32−06	−4.692	D+	2
				109.232	585 540–1 501 020	4–2	3.95+06	3.53−06	5.08−06	−4.850	D+	2
				109.189	585 180–1 501 020	2–2	1.74+06	3.11−06	2.24−06	−5.206	D+	2
44	$2p^3-2s^23d$	$^2D^\circ-^2D$		*89.11*	*520 104–1 642 284*	10–10	4.24+07	5.05−05	1.48−04	−3.297	C	2
				89.103	520 080–1 642 380	6–6	3.80+07	4.52−05	7.95−05	−3.567	C	2

TABLE 36. Transition probabilities of allowed lines for Al IX (references in this table are as follows: 1=Fernley *et al.*,[15,16] 2=Tachiev and Froese Fischer,[71] 3=Merkelis *et al.*,[50] 4=Galavís *et al.*,[25] and 5=Safronova *et al.*[62])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				89.127	520 140–1 642 140	4–4	3.91+07	4.66−05	5.47−05	−3.730	C	2
				89.122	520 080–1 642 140	6–4	3.43+06	2.72−06	4.79−06	−4.787	D+	2
				89.107	520 140–1 642 380	4–6	4.30+06	7.68−06	9.02−06	−4.513	C	2
45		^{2}P°−^{2}D		*94.62*	*585 420–1 642 284*	6–10	2.04+06	4.56−06	8.53−06	−4.563	D+	2
				94.622	585 540–1 642 380	4–6	2.66+06	5.35−06	6.67−06	−4.670	D+	2
				94.611	585 180–1 642 140	2–4	1.00+06	2.70−06	1.68−06	−5.268	D+	2
				94.643	585 540–1 642 140	4–4	1.09+05	1.46−07	1.82−07	−6.234	D	2
46	$2p^3$ $-2s2p(^3$P°$)3p$	^{2}D°−^{2}P		*83.21*	*520 104–1 721 883*	10–6	5.17+09	3.22−03	8.82−03	−1.492	D	1
				83.172	520 080–1 722 410	6–4	4.66+09	3.22−03	5.29−03	−1.714	D+	LS
				83.285	520 140–1 720 830	4–2	5.15+09	2.68−03	2.94−03	−1.970	D	LS
				83.176	520 140–1 722 410	4–4	5.17+08	5.36−04	5.87−04	−2.669	E+	LS
47		^{2}D°−^{2}D		*80.68*	*520 104–1 759 582*	10–10	3.05+09	2.98−03	7.91−03	−1.526	D	1
				80.587	520 080–1 760 970	6–6	2.86+09	2.78−03	4.43−03	−1.778	D	LS
				80.817	520 140–1 757 500	4–4	2.74+09	2.68−03	2.85−03	−1.970	D	LS
				80.813	520 080–1 757 500	6–4	3.03+08	1.98−04	3.16−04	−2.925	E+	LS
				80.591	520 140–1 760 970	4–6	2.04+08	2.98−04	3.16−04	−2.924	E+	LS
48		^{2}P°−^{2}D		*85.17*	*585 420–1 759 582*	6–10	1.87+09	3.39−03	5.70−03	−1.692	D	1
				85.075	585 540–1 760 970	4–6	1.87+09	3.05−03	3.42−03	−1.914	D	LS
				85.301	585 180–1 757 500	2–4	1.55+09	3.38−03	1.90−03	−2.170	D	LS
				85.327	585 540–1 757 500	4–4	3.10+08	3.38−04	3.80−04	−2.869	E+	LS
49		^{2}P°−^{2}S		*83.64*	*585 420*–1 780 960	6–2	1.49+10	5.19−03	8.58−03	−1.507	D	1
				83.653	585 540–1 780 960	4–2	9.89+09	5.19−03	5.72−03	−1.683	D+	LS
				83.627	585 180–1 780 960	2–2	4.96+09	5.20−03	2.86−03	−1.983	D	LS
50	$2p^3$ $-2p^2(^3$P$)3s$	^{4}S°−^{4}P		*68.59*	460 930–*1 918 840*	4–12	7.25+10	1.53−01	1.39−01	−0.213	C	1
				68.531	460 930–1 920 120	4–6	7.27+10	7.68−02	6.93−02	−0.513	C	LS
				68.637	460 930–1 917 870	4–4	7.24+10	5.11−02	4.62−02	−0.690	C	LS
				68.681	460 930–1 916 940	4–2	7.21+10	2.55−02	2.31−02	−0.991	C	LS
51	$2p^3$ $-2p^2(^3$P$)3d$	^{4}S°−^{4}P		*[62.34]*	460 930–*2 064 963*	4–12	9.35+11	1.63+00	1.34+00	0.814	B	1
				[62.369]	460 930–2 064 290	4–6	9.34+11	8.17−01	6.71−01	0.514	B	LS
				[62.327]	460 930–2 065 370	4–4	9.36+11	5.45−01	4.47−01	0.338	B	LS
				[62.296]	460 930–2 066 170	4–2	9.38+11	2.73−01	2.24−01	0.038	C+	LS
52	$2p^3-2s^24d$	^{2}P°−^{2}D		*66.27*	*585 420–2 094 302*	6–10	1.29+10	1.41−02	1.85−02	−1.073	D+	1
				66.271	585 540–2 094 490	4–6	1.29+10	1.27−02	1.11−02	−1.294	D+	LS
				66.276	585 180–2 094 020	2–4	1.07+10	1.41−02	6.15−03	−1.550	D+	LS
				66.292	585 540–2 094 020	4–4	2.14+09	1.41−03	1.23−03	−2.249	D	LS
53	$2p^3$ $-2s2p(^3$P°$)4p$	^{2}P°−^{2}D		*[60.49]*	*585 420–2 238 704*	6–10	1.21+10	1.11−02	1.33−02	−1.177	D+	1
				[60.447]	585 540–2 239 880	4–6	1.22+10	1.00−02	7.96−03	−1.398	D+	LS
				[60.541]	585 180–2 236 940	2–4	1.01+10	1.11−02	4.42−03	−1.654	D	LS
				[60.555]	585 540–2 236 940	4–4	2.02+09	1.11−03	8.85−04	−2.353	E+	LS
54	$2s^23s$ $-2s2p(^3$P°$)3s$	^{2}S−^{4}P°										

TABLE 36. Transition probabilities of allowed lines for Al IX (references in this table are as follows: 1=Fernley *et al.*,[15,16] 2=Tachiev and Froese Fischer,[71] 3=Merkelis *et al.*,[50] 4=Galavís *et al.*,[25] and 5=Safronova *et al.*[62])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				635.73	1 501 020–1 658 320	2–4	1.12+06	1.36−04	5.67−04	−3.565	C	2
				[642.43]	1 501 020–1 656 680	2–2	3.85+05	2.38−05	1.01−04	−4.322	D+	2
55		^{2}S−^{2}P°		*[520.71]*	1 501 020–*1 693 067*	2–6	2.32+08	2.83−02	9.72−02	−1.247	C	1
				517.840	1 501 020–1 694 130	2–4	2.36+08	1.90−02	6.48−02	−1.420	C	LS
				[526.537]	1 501 020–1 690 940	2–2	2.25+08	9.34−03	3.24−02	−1.729	C	LS
56	$2s^23s$ $-2s2p(^3$P°$)3d$	^{2}S−^{2}P°		*294.00*	1 501 020–*1 841 153*	2–6	5.37+08	2.09−02	4.04−02	−1.379	C	1
				294.542	1 501 020–1 840 530	2–4	5.34+08	1.39−02	2.70−02	−1.556	C	LS
				292.929	1 501 020–1 842 400	2–2	5.42+08	6.97−03	1.34−02	−1.856	D+	LS
57	$2s^23s$ $-2s2p(^1$P°$)3s$	^{2}S−^{2}P°		*326.73*	1 501 020–*1 807 080*	2–6	6.25+09	3.00−01	6.45−01	−0.222	D+	1
				326.733	1 501 020–1 807 080	2–4	6.25+09	2.00−01	4.30−01	−0.398	C	LS
				326.733	1 501 020–1 807 080	2–2	6.25+09	1.00−01	2.15−01	−0.699	D+	LS
58	$2s^23d$ $-2s2p(^3$P°$)3s$	^{2}D−^{4}P°										
			6 272	6 274	1 642 380–1 658 320	6–4	6.71+02	2.64−06	3.27−04	−4.800	D+	2
			[6 876]	[6 878]	1 642 140–1 656 680	4–2	2.01+02	7.14−07	6.47−05	−5.544	D	2
			5 278.4	5 279.8	1 642 380–1 661 320	6–6	1.97+00	8.23−09	8.59−07	−7.306	E	2
			6 179	6 180	1 642 140–1 658 320	4–4	6.74+01	3.86−07	3.14−05	−5.811	D	2
			5 212.3	5 213.8	1 642 140–1 661 320	4–6	1.73−01	1.05−09	7.24−08	−8.377	E	2
59		^{2}D−^{2}P°		*[1 969]*	*1 642 284–1 693 067*	10–6	8.44+06	2.95−03	1.91−01	−1.530	C	1
				1 932.4	1 642 380–1 694 130	6–4	8.04+06	3.00−03	1.15−01	−1.745	C+	LS
			[2 048.5]	[2 049.2]	1 642 140–1 690 940	4–2	7.50+06	2.36−03	6.37−02	−2.025	C	LS
				1 923.4	1 642 140–1 694 130	4–4	9.07+05	5.03−04	1.27−02	−2.696	D+	LS
60	$2s^23d$ $-2s2p(^3$P°$)3d$	^{2}D−^{2}D°		*631.1*	*1 642 284–1 800 750*	10–10	8.17+06	4.88−04	1.01−02	−2.312	D	1
				630.80	1 642 380–1 800 910	6–6	7.63+06	4.55−04	5.67−03	−2.564	D+	LS
				631.43	1 642 140–1 800 510	4–4	7.34+06	4.39−04	3.65−03	−2.755	D	LS
				632.39	1 642 380–1 800 510	6–4	8.13+05	3.25−05	4.06−04	−3.710	E+	LS
				629.84	1 642 140–1 800 910	4–6	5.48+05	4.89−05	4.06−04	−3.709	E+	LS
61		^{2}D−^{2}F°		*524.28*	*1 642 284–1 833 020*	10–14	2.17+06	1.25−04	2.16−03	−2.903	E+	1
				521.023	1 642 380–1 834 310	6–8	2.21+06	1.20−04	1.23−03	−3.143	D	LS
				528.653	1 642 140–1 831 300	4–6	1.97+06	1.24−04	8.63−04	−3.305	E+	LS
				529.325	1 642 380–1 831 300	6–6	1.40+05	5.90−06	6.17−05	−4.451	E	LS
62	$2s^23d$ $-2s2p(^1$P°$)3d$	^{2}D−^{2}F°		*[343.93]*	*1 642 284–1 933 040*	10–14	1.42+09	3.53−02	4.00−01	−0.452	D+	1
				[344.045]	1 642 380–1 933 040	6–8	1.42+09	3.36−02	2.28−01	−0.696	D+	LS
				[343.761]	1 642 140–1 933 040	4–6	1.33+09	3.53−02	1.60−01	−0.850	D	LS
				[344.045]	1 642 380–1 933 040	6–6	9.47+07	1.68−03	1.14−02	−1.997	E	LS
63		^{2}D−^{2}D°		*331.88*	*1 642 284–1 943 600*	10–10	6.34+09	1.05−01	1.14+00	0.021	C	1
				331.983	1 642 380–1 943 600	6–6	5.91+09	9.76−02	6.40−01	−0.232	C	LS
				331.719	1 642 140–1 943 600	4–4	5.71+09	9.42−02	4.11−01	−0.424	C	LS
				331.983	1 642 380–1 943 600	6–4	6.33+08	6.97−03	4.57−02	−1.379	E+	LS
				331.719	1 642 140–1 943 600	4–6	4.24+08	1.05−02	4.59−02	−1.377	E+	LS
64		^{2}D−^{2}P°		*320.03*	*1 642 284–1 954 750*	10–6	8.48+09	7.81−02	8.23−01	−0.107	D+	1

TABLE 36. Transition probabilities of allowed lines for Al IX (references in this table are as follows: 1 = Fernley *et al.*,[15,16] 2 = Tachiev and Froese Fischer,[71] 3 = Merkelis *et al.*,[50] 4 = Galavís *et al.*,[25] and 5 = Safronova *et al.*[62])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				320.133	1 642 380–1 954 750	6–4	7.62+09	7.81−02	4.94−01	−0.329	C	LS
				319.887	1 642 140–1 954 750	4–2	8.49+09	6.51−02	2.74−01	−0.584	D+	LS
				319.887	1 642 140–1 954 750	4–4	8.47+08	1.30−02	5.48−02	−1.284	E+	LS
65	$2s2p(^3P^\circ)3s$–$2s2p(^3P^\circ)3p$	$^2P^\circ-{}^2P$	*[3 469]*	*[3 470]*	*1 693 067–1 721 883*	6–6	1.92+07	3.46−02	2.37+00	−0.683	B	1
			3 535.1	3 536.1	1 694 130–1 722 410	4–4	1.51+07	2.83−02	1.32+00	−0.946	B+	LS
			[3 344.6]	[3 345.6]	1 690 940–1 720 830	2–2	1.43+07	2.40−02	5.29−01	−1.319	B	LS
			3 744.3	3 745.3	1 694 130–1 720 830	4–2	5.09+06	5.35−03	2.64−01	−1.670	B	LS
			[3 176.7]	[3 177.6]	1 690 940–1 722 410	2–4	4.16+06	1.26−02	2.64−01	−1.599	B	LS
66		$^2P^\circ-{}^2D$		*[1 503.4]*	*1 693 067–1 759 582*	6–10	2.76+08	1.56−01	4.63+00	−0.029	B+	1
				1 496.11	1 694 130–1 760 970	4–6	2.80+08	1.41−01	2.78+00	−0.249	B+	LS
				[1 502.40]	1 690 940–1 757 500	2–4	2.30+08	1.56−01	1.54+00	−0.506	B+	LS
				1 578.03	1 694 130–1 757 500	4–4	3.96+07	1.48−02	3.08−01	−1.228	B	LS
67		$^2P^\circ-{}^2S$		*[1 137.7]*	*1 693 067*–1 780 960	6–2	7.15+08	4.63−02	1.04+00	−0.556	B	1
				1 151.68	1 694 130–1 780 960	4–2	4.60+08	4.57−02	6.93−01	−0.738	B	LS
				[1 110.86]	1 690 940–1 780 960	2–2	2.56+08	4.74−02	3.47−01	−1.023	B	LS
68	$2s2p(^3P^\circ)3s$–$2s2p(^1P^\circ)3p$	$^2P^\circ-{}^2S$		*[512.73]*	*1 693 067*–1 888 100	6–2	1.28+09	1.69−02	1.71−01	−0.994	D	1
				[515.544]	1 694 130–1 888 100	4–2	8.43+08	1.68−02	1.14−01	−1.173	D	LS
				[507.202]	1 690 940–1 888 100	2–2	4.41+08	1.70−02	5.68−02	−1.469	E+	LS
69	$2s2p(^3P^\circ)3s$–$2p^2(^3P)3s$	$^4P^\circ-{}^4P$		*[385.66]*	*1 659 547–1 918 840*	12–12	4.81+09	1.07−01	1.63+00	0.109	B	1
				386.399	1 661 320–1 920 120	6–6	3.35+09	7.49−02	5.72−01	−0.347	B	LS
				385.282	1 658 320–1 917 870	4–4	6.43+08	1.43−02	7.26−02	−1.243	C	LS
				[384.231]	1 656 680–1 916 940	2–2	8.09+08	1.79−02	4.53−02	−1.446	C	LS
				389.788	1 661 320–1 917 870	6–4	2.09+09	3.18−02	2.45−01	−0.719	C+	LS
				386.668	1 658 320–1 916 940	4–2	3.97+09	4.45−02	2.27−01	−0.750	C+	LS
				381.971	1 658 320–1 920 120	4–6	1.48+09	4.87−02	2.45−01	−0.710	C+	LS
				[382.863]	1 656 680–1 917 870	2–4	2.05+09	9.00−02	2.27−01	−0.745	C+	LS
70	$2s2p(^3P^\circ)3s$–$2p^2(^3P)3d$	$^4P^\circ-{}^4P$		*[246.66]*	*1 659 547–2 064 963*	12–12	5.71+07	5.21−04	5.07−03	−2.204	E+	1
				[248.157]	1 661 320–2 064 290	6–6	3.92+07	3.62−04	1.77−03	−2.663	D	LS
				[245.670]	1 658 320–2 065 370	4–4	7.70+06	6.97−05	2.25−04	−3.555	E+	LS
				[244.206]	1 656 680–2 066 170	2–2	9.81+06	8.77−05	1.41−04	−3.756	E	LS
				[247.494]	1 661 320–2 065 370	6–4	2.55+07	1.56−04	7.63−04	−3.029	E+	LS
				[245.188]	1 658 320–2 066 170	4–2	4.84+07	2.18−04	7.04−04	−3.059	E+	LS
				[246.324]	1 658 320–2 064 290	4–6	1.72+07	2.35−04	7.62−04	−3.027	E+	LS
				[244.684]	1 656 680–2 065 370	2–4	2.43+07	4.37−04	7.04−04	−3.058	E+	LS
71	$2s2p(^3P^\circ)3s$ $-2s^24d$	$^2P^\circ-{}^2D$		*[249.23]*	*1 693 067–2 094 302*	6–10	1.66+09	2.58−02	1.27−01	−0.810	C	1
				249.775	1 694 130–2 094 490	4–6	1.65+09	2.32−02	7.63−02	−1.032	C	LS
				[248.090]	1 690 940–2 094 020	2–4	1.40+09	2.59−02	4.23−02	−1.286	C	LS
				250.069	1 694 130–2 094 020	4–4	2.74+08	2.57−03	8.46−03	−1.988	D+	LS
72	$2s2p(^3P^\circ)3s$–$2s2p(^3P^\circ)4p$	$^2P^\circ-{}^2D$		*[183.27]*	*1 693 067–2 238 704*	6–10	1.68+10	1.41−01	5.12−01	−0.073	C+	1
				[183.234]	1 694 130–2 239 880	4–6	1.68+10	1.27−01	3.06−01	−0.294	B	LS
				[183.150]	1 690 940–2 236 940	2–4	1.41+10	1.42−01	1.71−01	−0.547	C+	LS

TABLE 36. Transition probabilities of allowed lines for Al IX (references in this table are as follows: 1=Fernley *et al.*,[15,16] 2=Tachiev and Froese Fischer,[71] 3=Merkelis *et al.*,[50] 4=Galavís *et al.*,[25] and 5=Safronova *et al.*[62])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				[184.227]	1 694 130–2 236 940	4–4	2.77+09	1.41−02	3.42−02	−1.249	C	LS
73	$2s2p(^3P^\circ)3s-2s^25d$	$^2P^\circ-^2D$				6–10						1
				164.739	1 694 130–2 301 150	4–6	6.82+08	4.16−03	9.02−03	−1.779	D+	LS
74	$2s2p(^3P^\circ)3s-2s^26d$	$^2P^\circ-^2D$				6–10						1
				139.295	1 694 130–2 412 030	4–6	3.67+08	1.60−03	2.93−03	−2.194	D	LS
75	$2s2p(^3P^\circ)3p-2s2p(^3P^\circ)3d$	$^2P-^2D^\circ$		*1 268.0*	*1 721 883–1 800 750*	6–10	3.16+08	1.27−01	3.18+00	−0.118	B+	1
				1 273.89	1 722 410–1 800 910	4–6	3.12+08	1.14−01	1.91+00	−0.341	B+	LS
				1 255.02	1 720 830–1 800 510	2–4	2.71+08	1.28−01	1.06+00	−0.592	B+	LS
				1 280.41	1 722 410–1 800 510	4–4	5.13+07	1.26−02	2.12−01	−1.298	C+	LS
76		$^2P-^2P^\circ$		*838.4*	*1 721 883–1 841 153*	6–6	6.40+08	6.75−02	1.12+00	−0.393	B	1
				846.60	1 722 410–1 840 530	4–4	5.19+08	5.58−02	6.22−01	−0.651	B	LS
				822.57	1 720 830–1 842 400	2–2	4.52+08	4.59−02	2.49−01	−1.037	B	LS
				833.40	1 722 410–1 842 400	4–2	2.17+08	1.13−02	1.24−01	−1.345	C+	LS
				835.42	1 720 830–1 840 530	2–4	1.08+08	2.26−02	1.24−01	−1.345	C+	LS
77		$^2D-^2D^\circ$	*2 428*	*2 429*	*1 759 582–1 800 750*	10–10	1.24+07	1.10−02	8.77−01	−0.959	B	1
			2 503.0	2 503.8	1 760 970–1 800 910	6–6	1.06+07	9.94−03	4.92−01	−1.224	B	LS
			2 324.3	2 325.0	1 757 500–1 800 510	4–4	1.27+07	1.03−02	3.15−01	−1.385	B	LS
			2 528.3	2 529.1	1 760 970–1 800 510	6–4	1.10+06	7.03−04	3.51−02	−2.375	C	LS
			2 302.9	2 303.6	1 757 500–1 800 910	4–6	9.72+05	1.16−03	3.52−02	−2.333	C	LS
78		$^2D-^2F^\circ$		*1 361.7*	*1 759 582–1 833 020*	10–14	3.86+08	1.50−01	6.74+00	0.176	B+	1
				1 363.51	1 760 970–1 834 310	6–8	3.85+08	1.43−01	3.85+00	−0.067	B+	LS
				1 355.01	1 757 500–1 831 300	4–6	3.66+08	1.51−01	2.69+00	−0.219	B+	LS
				1 421.87	1 760 970–1 831 300	6–6	2.26+07	6.85−03	1.92−01	−1.386	C+	LS
79		$^2D-^2P^\circ$		*1 225.9*	*1 759 582–1 841 153*	10–6	4.18+07	5.66−03	2.28−01	−1.247	C+	1
				1 256.91	1 760 970–1 840 530	6–4	3.50+07	5.52−03	1.37−01	−1.480	C+	LS
				1 177.86	1 757 500–1 842 400	4–2	4.72+07	4.91−03	7.62−02	−1.707	C	LS
				1 204.38	1 757 500–1 840 530	4–4	4.42+06	9.61−04	1.52−02	−2.415	D+	LS
80		$^2S-^2P^\circ$		*1 661.3*	1 780 960–*1 841 153*	2–6	1.22+08	1.51−01	1.66+00	−0.520	B	1
				1 678.70	1 780 960–1 840 530	2–4	1.18+08	1.00−01	1.11+00	−0.699	B+	LS
				1 627.60	1 780 960–1 842 400	2–2	1.30+08	5.16−02	5.53−01	−0.986	B	LS
81	$2s2p(^3P^\circ)3p-2s2p(^3P^\circ)4d$	$^2D-^2F^\circ$		*[198.13]*	*1 759 582–2 264 309*	10–14	4.04+10	3.33−01	2.17+00	0.522	B+	1
				[198.169]	1 760 970–2 265 590	6–8	4.04+10	3.17−01	1.24+00	0.279	B+	LS
				[197.981]	1 757 500–2 262 600	4–6	3.78+10	3.33−01	8.68−01	0.125	B	LS
				[199.350]	1 760 970–2 262 600	6–6	2.65+09	1.58−02	6.22−02	−1.023	C	LS
82	$2s2p(^3P^\circ)3d-2p^2(^3P)3s$	$^4D^\circ-^4P$		*834.0*	*1 798 939–1 918 840*	20–12	2.34+07	1.46−03	8.04−02	−1.535	D+	1
				832.15	1 799 950–1 920 120	8–6	1.89+07	1.47−03	3.22−02	−1.930	C	LS
				837.59	1 798 480–1 917 870	6–4	1.45+07	1.02−03	1.69−02	−2.213	C	LS
				841.11	1 798 050–1 916 940	4–2	1.14+07	6.05−04	6.70−03	−2.616	D+	LS
				822.10	1 798 480–1 920 120	6–6	4.39+06	4.45−04	7.23−03	−2.573	D+	LS

TABLE 36. Transition probabilities of allowed lines for Al IX (references in this table are as follows: 1=Fernley *et al.*,[15,16] 2=Tachiev and Froese Fischer,[71] 3=Merkelis *et al.*,[50] 4=Galavís *et al.*,[25] and 5=Safronova *et al.*[62])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				834.59	1 798 050–1 917 870	4–4	7.47+06	7.80−04	8.57−03	−2.506	D+	LS
				841.11	1 798 050–1 916 940	2–2	1.14+07	1.21−03	6.70−03	−2.616	D+	LS
				819.20	1 798 050–1 920 120	4–6	4.94+05	7.45−05	8.04−04	−3.526	E+	LS
				834.59	1 798 050–1 917 870	2–4	1.17+06	2.44−04	1.34−03	−3.312	D	LS
83		$^4P^\circ-^4P$		*[894.9]*	*1 807 102–1 918 840*	12–12	5.12+06	6.15−04	2.17−02	−2.132	D	1
				879.89	1 806 470–1 920 120	6–6	3.77+06	4.38−04	7.61−03	−2.580	D+	LS
				906.04	1 807 500–1 917 870	4–4	6.59+05	8.11−05	9.68−04	−3.489	E+	LS
				[919.62]	1 808 200–1 916 940	2–2	7.87+05	9.98−05	6.04−04	−3.700	E+	LS
				897.67	1 806 470–1 917 870	6–4	2.28+06	1.84−04	3.26−03	−2.957	D	LS
				913.74	1 807 500–1 916 940	4–2	4.01+06	2.51−04	3.02−03	−2.998	D	LS
				887.94	1 807 500–1 920 120	4–6	1.57+06	2.79−04	3.26−03	−2.952	D	LS
				[911.83]	1 808 200–1 917 870	2–4	2.02+06	5.03−04	3.02−03	−2.997	D	LS
84	$2s2p(^3P^\circ)3d$–$2p^2(^3P)3d$	$^4D^\circ-^4P$		*[375.91]*	*1 798 939–2 064 963*	20–12	4.90+09	6.23−02	1.54+00	0.096	B	1
				[378.301]	1 799 950–2 064 290	8–6	3.85+09	6.19−02	6.17−01	−0.305	B	LS
				[374.686]	1 798 480–2 065 370	6–4	3.12+09	4.38−02	3.24−01	−0.580	B	LS
				[372.967]	1 798 050–2 066 170	4–2	2.51+09	2.62−02	1.29−01	−0.980	C+	LS
				[376.209]	1 798 480–2 064 290	6–6	8.81+08	1.87−02	1.39−01	−0.950	C+	LS
				[374.083]	1 798 050–2 065 370	4–4	1.59+09	3.34−02	1.65−01	−0.874	C+	LS
				[372.967]	1 798 050–2 066 170	2–2	2.51+09	5.24−02	1.29−01	−0.980	C+	LS
				[375.601]	1 798 050–2 064 290	4–6	9.83+07	3.12−03	1.54−02	−1.904	D+	LS
				[374.083]	1 798 050–2 065 370	2–4	2.48+08	1.04−02	2.56−02	−1.682	C	LS
85		$^4P^\circ-^4P$		*[387.80]*	*1 807 102–2 064 963*	12–12	1.48+09	3.33−02	5.10−01	−0.398	C+	1
				[387.868]	1 806 470–2 064 290	6–6	1.03+09	2.33−02	1.79−01	−0.854	C+	LS
				[387.792]	1 807 500–2 065 370	4–4	1.97+08	4.45−03	2.27−02	−1.750	C	LS
				[387.642]	1 808 200–2 066 170	2–2	2.47+08	5.56−03	1.42−02	−1.954	D+	LS
				[386.250]	1 806 470–2 065 370	6–4	6.71+08	1.00−02	7.63−02	−1.222	C	LS
				[386.593]	1 807 500–2 066 170	4–2	1.24+09	1.39−02	7.08−02	−1.255	C	LS
				[389.423]	1 807 500–2 064 290	4–6	4.37+08	1.49−02	7.64−02	−1.225	C	LS
				[388.848]	1 808 200–2 065 370	2–4	6.11+08	2.77−02	7.09−02	−1.256	C	LS
86	$2s2p(^3P^\circ)3d$ $-2s^24d$	$^2F^\circ-^2D$		*382.73*	*1 833 020–2 094 302*	14–10	1.08+08	1.70−03	2.99−02	−1.623	D+	1
				384.349	1 834 310–2 094 490	8–6	1.02+08	1.69−03	1.71−02	−1.869	C	LS
				380.633	1 831 300–2 094 020	6–4	1.10+08	1.59−03	1.20−02	−2.020	D+	LS
				379.954	1 831 300–2 094 490	6–6	5.27+06	1.14−04	8.56−04	−3.165	E+	LS
87		$^2P^\circ-^2D$		*395.02*	*1 841 153–2 094 302*	6–10	7.27+06	2.83−04	2.21−03	−2.770	E+	1
				393.763	1 840 530–2 094 490	4–6	7.34+06	2.56−04	1.33−03	−2.990	D	LS
				397.425	1 842 400–2 094 020	2–4	5.93+06	2.81−04	7.35−04	−3.250	E+	LS
				394.493	1 840 530–2 094 020	4–4	1.22+06	2.84−05	1.48−04	−3.945	E	LS
88	$2s2p(^3P^\circ)3d$–$2s2p(^3P^\circ)4p$	$^2D^\circ-^2D$		*[228.33]*	*1 800 750–2 238 704*	10–10	5.13+08	4.01−03	3.01−02	−1.397	D+	1
				[227.806]	1 800 910–2 239 880	6–6	4.82+08	3.75−03	1.69−02	−1.648	C	LS
				[229.132]	1 800 510–2 236 940	4–4	4.56+08	3.59−03	1.08−02	−1.843	D+	LS
				[229.342]	1 800 910–2 236 940	6–4	5.06+07	2.66−04	1.21−03	−2.797	D	LS
				[227.599]	1 800 510–2 239 880	4–6	3.45+07	4.02−04	1.20−03	−2.794	D	LS
89		$^2F^\circ-^2D$		*[246.50]*	*1 833 020–2 238 704*	14–10	3.78+09	2.46−02	2.80−01	−0.463	C+	1
				[246.567]	1 834 310–2 239 880	8–6	3.60+09	2.46−02	1.60−01	−0.706	C+	LS
				[246.524]	1 831 300–2 236 940	6–4	3.79+09	2.30−02	1.12−01	−0.860	C+	LS

TABLE 36. Transition probabilities of allowed lines for Al IX (references in this table are as follows: 1=Fernley *et al.*,[15,16] 2=Tachiev and Froese Fischer,[71] 3=Merkelis *et al.*,[50] 4=Galavís *et al.*,[25] and 5=Safronova *et al.*[62])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				[244.750]	1 831 300–2 239 880	6–6	1.84+08	1.65−03	7.98−03	−2.004	D+	LS
90		$^2P^\circ-^2D$		*[251.54]*	*1 841 153–2 238 704*	6–10	3.62+08	5.72−03	2.84−02	−1.464	D+	1
				[250.407]	1 840 530–2 239 880	4–6	3.67+08	5.17−03	1.70−02	−1.684	C	LS
				[253.460]	1 842 400–2 236 940	2–4	2.94+08	5.67−03	9.46−03	−1.945	D+	LS
				[252.264]	1 840 530–2 236 940	4–4	5.97+07	5.70−04	1.89−03	−2.642	D	LS
91	$2s2p(^3P^\circ)3d-2s^25d$	$^2P^\circ-^2D$				6–10						1
				217.099	1 840 530–2 301 150	4–6	7.75+07	8.21−04	2.35−03	−2.484	D	LS
92	$2s2p(^1P^\circ)3s-2s2p(^1P^\circ)3p$	$^2P^\circ-^2P$		*1 409.1*	*1 807 080–1 878 047*	6–6	3.07+08	9.16−02	2.55+00	−0.260	C	1
				1 402.13	1 807 080–1 878 400	4–4	2.61+08	7.68−02	1.42+00	−0.513	C	LS
				1 423.28	1 807 080–1 877 340	2–2	1.99+08	6.05−02	5.67−01	−0.917	C	LS
				1 423.28	1 807 080–1 877 340	4–2	9.94+07	1.51−02	2.83−01	−1.219	D+	LS
				1 402.13	1 807 080–1 878 400	2–4	5.21+07	3.07−02	2.83−01	−1.212	D+	LS
93		$^2P^\circ-^2S$		*[1 234.3]*	*1 807 080*–1 888 100	6–2	4.31+08	3.28−02	8.00−01	−0.706	C	1
				[1 234.26]	1 807 080–1 888 100	4–2	2.87+08	3.28−02	5.33−01	−0.882	C	LS
				[1 234.26]	1 807 080–1 888 100	2–2	1.44+08	3.28−02	2.67−01	−1.183	D+	LS
94	$2s2p(^1P^\circ)3p-2s2p(^1P^\circ)3d$	$^2P-^2D^\circ$		*1 525.5*	*1 878 047–1 943 600*	6–10	1.45+08	8.42−02	2.53+00	−0.297	C	1
				1 533.74	1 878 400–1 943 600	4–6	1.42+08	7.53−02	1.52+00	−0.521	C+	LS
				1 509.21	1 877 340–1 943 600	2–4	1.24+08	8.50−02	8.45−01	−0.770	C	LS
				1 533.74	1 878 400–1 943 600	4–4	2.37+07	8.36−03	1.69−01	−1.476	D+	LS
95		$^2P-^2P^\circ$		*1 303.7*	*1 878 047–1 954 750*	6–6	1.10+08	2.81−02	7.23−01	−0.773	D+	1
				1 309.76	1 878 400–1 954 750	4–4	9.06+07	2.33−02	4.02−01	−1.031	C	LS
				1 291.82	1 877 340–1 954 750	2–2	7.55+07	1.89−02	1.61−01	−1.423	D	LS
				1 309.76	1 878 400–1 954 750	4–2	3.62+07	4.66−03	8.04−02	−1.730	D	LS
				1 291.82	1 877 340–1 954 750	2–4	1.89+07	9.45−03	8.04−02	−1.724	D	LS
96		$^2S-^2P^\circ$		*[1 500.4]*	1 888 100–*1 954 750*	2–6	1.41+08	1.43−01	1.41+00	−0.544	C	1
				[1 500.38]	1 888 100–1 954 750	2–4	1.41+08	9.53−02	9.41−01	−0.720	C	LS
				[1 500.38]	1 888 100–1 954 750	2–2	1.41+08	4.76−02	4.70−01	−1.021	C	LS
97	$2s2p(^1P^\circ)3d-2s^24d$	$^2F^\circ-^2D$		*[620.1]*	*1 933 040–2 094 302*	14–10	1.01+08	4.15−03	1.19−01	−1.236	E+	1
				[619.39]	1 933 040–2 094 490	8–6	9.64+07	4.16−03	6.79−02	−1.478	D	LS
				[621.20]	*1 933 040–2 094 020*	6–4	1.00+08	3.87−03	4.75−02	−1.634	E+	LS
				[619.39]	1 933 040–2 094 490	6–6	4.82+06	2.77−04	3.39−03	−2.779	E	LS
98		$^2P^\circ-^2D$		*716.6*	*1 954 750–2 094 302*	6–10	1.12+08	1.44−02	2.04−01	−1.063	D	1
				715.61	1 954 750–2 094 490	4–6	1.13+08	1.30−02	1.23−01	−1.284	D	LS
				718.03	1 954 750–2 094 020	2–4	9.25+07	1.43−02	6.76−02	−1.544	D	LS
				718.03	1 954 750–2 094 020	4–4	1.85+07	1.43−03	1.35−02	−2.243	E	LS
99	$2s^24d-2s2p(^3P^\circ)4d$	$^2D-^2F^\circ$		*[588.2]*	*2 094 302–2 264 309*	10–14	2.07+07	1.50−03	2.91−02	−1.824	D+	1
				[584.45]	2 094 490–2 265 590	6–8	2.11+07	1.44−03	1.66−02	−2.063	D+	LS
				[593.19]	2 094 020–2 262 600	4–6	1.88+07	1.49−03	1.16−02	−2.225	D+	LS
				[594.85]	2 094 490–2 262 600	6–6	1.33+06	7.06−05	8.30−04	−3.373	E+	LS

TABLE 36. Transition probabilities of allowed lines for Al IX (references in this table are as follows: 1=Fernley *et al.*,[15,16] 2=Tachiev and Froese Fischer,[71] 3=Merkelis *et al.*,[50] 4=Galavís *et al.*,[25] and 5=Safronova *et al.*[62])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
100	$2s2p(^3P^{\circ})4p-2s2p(^3P^{\circ})4d$	$^2D-^2F^{\circ}$	*[3 904]*	*[3 905]*	*2 238 704–2 264 309*	10–14	7.14+07	2.29−01	2.94+01	0.360	A	1
			[3 888.4]	[3 889.5]	2 239 880–2 265 590	6–8	7.24+07	2.19−01	1.68+01	0.119	A	LS
			[3 896.0]	[3 897.1]	2 236 940–2 262 600	4–6	6.71+07	2.29−01	1.18+01	−0.038	A	LS
			[4 400.2]	[4 401.4]	2 239 880–2 262 600	6–6	3.32+06	9.65−03	8.39−01	−1.237	B	LS
101	$2s2p(^3P^{\circ})4d-2s^25d$	$^2F^{\circ}-^2D$				14–10						1
			[2 811.3]	[2 812.1]	2 265 590–2 301 150	8–6	4.61+05	4.10−04	3.04−02	−2.484	C	LS
			[2 593.3]	[2 594.0]	2 262 600–2 301 150	6–6	2.93+04	2.96−05	1.52−03	−3.751	D	LS

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

4.9.2. Forbidden Transitions for Al IX

The results of Tachiev and Froese Fischer[87] are the product of extensive MCHF calculations with Breit-Pauli corrections to order α^2. As part of the Iron Project, Galavís *et al.*[25] used the SUPERSTRUCTURE code with CI, relativistic effects, and semiempirical energy corrections.

To estimate accuracies, we pooled the RSDM of each of the lines for which a transition rate is given by two or more references,[25,87] as discussed in the introduction to Kelleher and Podobedova.[35] Next we isoelectronically averaged the logarithmic quality factors observed for allowed B-like lines from the lower-lying levels of Na VII, Mg VIII, Al IX, and Si X and applied the result to forbidden lines of Al IX using the method described in the introduction to Kelleher and Podobedova.[35]

References for Forbidden Transitions for Al IX

[25] M. E. Galavís, C. Mendoza, and C. Zeippen, Astron. Astrophys., Suppl. Ser. **131**, 499 (1998).

[35] D. E. Kelleher and L. I. Podobedova, J. Phys. Chem. Ref. Data **37**, 267 (2008).

[67] G. Tachiev and C. Froese Fischer, J. Phys. B **33**, 2419 (2000).

[87] G. Tachiev and C. Froese Fischer, http://www.vuse.vanderbilt.edu/~cff/mchf_collection/MCHF, ab initio downloaded on February 12, 2004); see Ref. 67.

TABLE 37. Wavelength finding list for forbidden lines of Al IX

Wavelength (vac) (Å)	Mult. No.
170.888	5
172.221	5
172.328	5
192.256	4
192.278	4
194.081	4
194.103	4
219.279	3
472.411	9

TABLE 37. Wavelength finding list for forbidden lines of Al IX—Continued

Wavelength (vac) (Å)	Mult. No.
478.904	9
488.711	9
533.504	8
545.703	8
669.08	2
680.32	2
691.71	2
703.73	2
712.35	2
873.44	7
873.67	7
1 059.88	11
1 370.24	10
1 536.10	13
Wavelength (air) (Å)	**Mult. No.**
4 678.1	12
Wavenumber (cm^{-1})	**Mult. No.**
4 890	1
4 190	6
2 470	6
1 720	6

TABLE 38. Transition probabilities of forbidden lines for Al IX (references in this table are as follows: 1=Tachiev and Froese Fischer[87] and 2=Galavís *et al.*[25])

No.	Transition array	Mult.	λ_{air} (Å)	λ_{vac} (Å)[a] or σ (cm^{-1})	E_i-E_k (cm^{-1})	g_i-g_k	Type	A_{ki} (s^{-1})	S (a.u.)	Acc.	Source
1	$2p-2p$	$^2P^\circ-^2P^\circ$									
				4 890 cm^{-1}	0–4 890	2–4	M1	1.05+00	1.33+00	A	1,2
				4 890 cm^{-1}	0–4 890	2–4	E2	4.12−06	5.27−02	B+	1
2	$2s^22p-2s2p^2$	$^2P^\circ-^4P$									
				703.73	4 890–146 990	4–4	M2	6.05−03	2.80−01	B	1
				712.35	4 890–145 270	4–2	M2	2.86−02	7.05−01	B+	1
				691.71	4 890–149 460	4–6	M2	1.40−01	8.94+00	A	1
				680.32	0–146 990	2–4	M2	1.21−01	4.72+00	B+	1
				669.08	0–149 460	2–6	M2	5.19−02	2.80+00	B+	1
3	$2s^22p-2p^3$	$^2P^\circ-^4S^\circ$									
				219.279	4 890–460 930	4–4	M1	2.32+00	3.63−06	D+	2
4		$^2P^\circ-^2D^\circ$									
				192.278	0–520 080	2–6	E2	3.20+03	4.51−03	B	2
				194.103	4 890–520 080	4–6	M1	1.08+04	1.76−02	B	2
				192.256	0–520 140	2–4	M1	7.80+03	8.22−03	B	2
				194.081	4 890–520 140	4–4	M1	6.37+03	6.91−03	B	2
5		$^2P^\circ-^2P^\circ$									
				172.221	4 890–585 540	4–4	M1	7.23+03	5.48−03	B	2
				170.888	0–585 180	2–2	M1	5.08−11	1.88−17	E	2
				172.328	4 890–585 180	4–2	M1	1.26+04	4.79−03	B	2
6	$2s2p^2-2s2p^2$	$^4P-^4P$									
				2 470 cm^{-1}	146 990–149 460	4–6	M1	2.47−01	3.64+00	A	1,2
				2 470 cm^{-1}	146 990–149 460	4–6	E2	1.37−07	8.00−02	B+	1
				1 720 cm^{-1}	145 270–146 990	2–4	M1	1.13−01	3.30+00	A	1,2
				1 720 cm^{-1}	145 270–146 990	2–4	E2	2.67−09	6.35−03	B	1
				4 190 cm^{-1}	145 270–149 460	2–6	E2	1.39−06	5.77−02	B+	1,2
7		$^4P-^2D$									
				873.67	145 270–259 730	2–6	E2	2.68−03	7.31−06	D+	2
				873.44	145 270–259 760	2–4	M1	2.22+00	2.19−04	C+	2
8		$^4P-^2S$									
				545.703	149 460–332 710	6–2	E2	1.09−01	9.43−06	C	2
				533.504	145 270–332 710	2–2	M1	2.82+01	3.17−04	C+	2
9		$^4P-^2P$									
				478.904	145 270–354 080	2–2	M1	7.12+00	5.80−05	C	2
				488.711	149 460–354 080	6–2	E2	2.00−02	9.96−07	D+	2
				472.411	145 270–356 950	2–4	M1	2.17+00	3.39−05	C	2
10		$^2D-^2S$									
				1 370.24	259 730–332 710	6–2	E2	1.70+01	1.47−01	B+	2
11		$^2D-^2P$									
				1 059.88	259 730–354 080	6–2	E2	5.10+07	1.22+05	A+	2
12		$^2S-^2P$									
			4 678.1	4 679.5	332 710–354 080	2–2	M1	5.50+00	4.18−02	B+	2
13	$2p^3-2p^3$	$^2D^\circ-^2P^\circ$									
				1 536.10	520 080–585 180	6–2	E2	4.68+00	7.15−02	B+	2

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

4.10. Al X

Beryllium isoelectronic sequence

Ground state: $1s^22s^2\ ^1S_0$

Ionization energy: 398.75 eV (3 216 100 cm^{-1})

4.10.1. Allowed Transitions for Al X

The different computed transition rates for this beryllium-like spectrum are generally in good agreement, including the results of the OP,[77,78] from which most of the compiled data below have been taken. Froese Fischer[21] applied a modified version of the relativistic GRANT code. Safronova *et al.*[60,63] used relativistic second-order MBPT calculations. Fritzsche and Grant[19] applied the relativistic GRANT code. Granzow *et al.*[27] measured lifetimes using the beam-foil technique. Only OP results were available for energy levels above the $2p3d$.

To estimate accuracies, we pooled the RSDM for each of the lines with transition rates published in two or more references,[19,21,27,60,63,77,78] as described in the introduction to Kelleher and Podobedova.[35] For this purpose the spin-allowed and intercombination data were treated separately. OP lines constituted a third group. The energy levels labeled $2p3p\ ^3D$ appear to be of highly mixed character in LS coupling, and therefore transitions from them were assigned lower accuracies. We then isoelectronically averaged the logarithmic quality factors observed for Be-like lines of Na VIII, Mg IX, and Al X using the method described in the introduction to Kelleher and Podobedova.[35] For the higher-lying lines and lines from the OP, we scaled the logarithmic quality factor of the lower-lying lines.

References for Allowed Transitions for Al X

[19] S. Fritzsche and I. P. Grant, Phys. Scr. **50**, 473 (1994).

[21] C. Froese Fischer, http://www.vuse.vanderbilt.edu/~cff/mchf_collection/ (MCDHF, *ab initio*, downloaded on May 5, 2004).

[27] J. Granzow, P. H. Heckmann, and E. Träbert, Phys. Scr. **49**, 148 (1994).

[35] D. E. Kelleher and L. I. Podobedova, J. Phys. Chem. Ref. Data **37**, 267 (2008).

[60] U. I. Safronova, A. Derevianko, M. S. Safronova, and W. R. Johnson, J. Phys. B **32**, 3527 (1999). A complete data listing was made available by private communication.

[63] U. I. Safronova, W. R. Johnson, M.S. Safronova, and A. Derevianko, Phys. Scr. **59**, 286 (1999).

[77] J. A. Tully, M. J. Seaton, and K. A. Berrington, J. Phys. B **23**, 3811 (1990).

[78] J. A. Tully, M. J. Seaton, and K. A. Berrington, http://legacy.gsfc.nasa.gov/topbase, downloaded on July 28, 1995 (Opacity Project).

TABLE 39. Wavelength finding list for allowed lines of Al X

Wavelength (vac) (Å)	Mult. No.
40.421	25
41.730	24
44.902	23
47.804	4
50.669	17
50.671	17
50.713	17
50.762	17
50.807	17
50.902	16
50.945	16
51.040	16
51.356	15
51.358	15
51.362	15
51.400	15
51.454	15
51.496	15
51.555	14
51.599	14
51.696	14
51.979	3
54.115	22
54.647	21
54.699	21
54.969	20
55.227	12
55.271	12
55.277	12
55.375	12
55.382	12
55.388	12
55.451	19
55.499	19
55.731	18
56.590	36
56.652	36
56.700	36
56.754	36
56.802	36
56.945	35
56.966	35
57.008	35
57.024	35
57.069	35
57.112	35
57.368	39
57.635	34
57.740	34
58.074	38
58.124	38
58.802	10
58.859	10
58.986	10
59.107	37
59.266	30
59.335	30
59.447	30
60.583	29
60.700	29
60.896	32
62.212	31
63.134	11
65.016	33
65.821	26
65.905	26
66.043	26

TABLE 39. Wavelength finding list for allowed lines of Al X—Continued

Wavelength (vac) (Å)	Mult. No.
67.837	27
72.989	28
117.564	51
129.366	50
146.503	66
165.295	65
165.642	49
177.711	58
177.781	58
177.850	58
198.417	77
229.521	64
234.610	74
235.477	74
237.428	74
298.775	76
332.790	2
341.374	6
345.658	6
394.800	9
395.426	5
397.822	5
400.450	5
401.186	5
403.590	5
406.359	5
423.531	43
445.315	48
482.044	44
485.861	55
486.381	55
489.404	55
489.932	55
490.461	55
496.574	42
498.703	57
506.945	54
507.511	54
509.944	54
510.517	54
511.091	54
513.373	54
513.954	54
584.90	47
637.76	1
670.05	8
670.06	56

TABLE 39. Wavelength finding list for allowed lines of Al X—Continued

Wavelength (vac) (Å)	Mult. No.
915.75	7
943.16	7
960.76	7
1 004.72	53
1 095.53	52
1 098.18	52
1 100.84	52
1 364.82	61
1 397.82	61
1 441.96	69
1 460.07	46
1 468.64	40
1 473.62	69
1 475.36	69
1 508.52	69
1 592.36	69
1 598.72	60
1 677.01	68
1 682.37	68
1 714.68	68
1 722.36	68
1 762.11	68
1 768.66	63
1 787.3	68
1 832.5	68
1 923.4	70
1 980.2	70
1 990.0	59
Wavelength (air) (Å)	**Mult. No.**
2 137.9	67
2 212.2	59
2 249.0	73
2 324.9	72
2 367.3	45
2 379.7	45
2 408.3	72
2 422.3	72
2 513.1	72
2 535.4	41
3 003.9	71
3 035.9	71
3 127.0	71
3 168.7	71
3 305.9	71
14 637	75

TABLE 40. Transition probabilities of allowed lines for Al X (references in this table are as follows: 1=Tully *et al.*,[77,78] 2=Froese Fischer.[21] 3=Safronova *et al.*,[63] 4=Safronova *et al.*,[60] 5=Fritzsche and Grant,[19] and 6=Granzow *et al.*[27])

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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
1	$2s^2-2s2p$	^{1}S–^{3}P°										
				637.76	0–156 798	1–3	1.59+05	2.90−05	6.10−05	−4.538	D	2,3
2		^{1}S–^{1}P°		332.790	0–300 490	1–3	5.58+09	2.78−01	3.05−01	−0.556	B	2,3
3	$2s^2-2s3p$	^{1}S–^{1}P°		51.979	0–1 923 850	1–3	4.38+11	5.33−01	9.12−02	−0.273	A	2,4,5,6
4	$2s^2-2p3s$	^{1}S–^{1}P°		[47.804]	0–2 091 870	1–3	2.23+10	2.30−02	3.62−03	−1.638	B+	2,4
5	$2s2p-2p^2$	^{3}P°–^{3}P		*400.91*	*158 632–408 064*	9–9	4.53+09	1.09−01	1.30+00	−0.008	A	2,3
				401.186	160 429–409 690	5–5	3.38+09	8.16−02	5.39−01	−0.389	A	2,3
				400.450	156 798–406 517	3–3	1.14+09	2.73−02	1.08−01	−1.087	A	2,3
				406.359	160 429–406 517	5–3	1.81+09	2.69−02	1.80−01	−0.871	A	2,3
				403.590	156 798–404 574	3–1	4.44+09	3.61−02	1.44−01	−0.965	A	2,3
				395.426	156 798–409 690	3–5	1.18+09	4.63−02	1.81−01	−0.857	A	2,3
				397.822	155 148–406 517	1–3	1.55+09	1.10−01	1.44−01	−0.959	A	2,3
6		^{3}P°–^{1}D										
				341.374	156 798–449 732	3–5	9.52+05	2.77−05	9.35−05	−4.080	D	2,3
				345.658	160 429–449 732	5–5	1.74+07	3.12−04	1.78−03	−2.807	C	2,3
7		^{1}P°–^{3}P										
				943.16	300 490–406 517	3–3	2.21+04	2.94−06	2.74−05	−5.055	E+	2,3
				960.76	300 490–404 574	3–1	1.54+05	7.11−06	6.75−05	−4.671	E	2,3
				915.75	300 490–409 690	3–5	8.25+05	1.73−04	1.56−03	−3.285	C	2,3
8		^{1}P°–^{1}D		670.05	300 490–449 732	3–5	9.24+08	1.04−01	6.86−01	−0.506	A+	2,3
9		^{1}P°–^{1}S		394.800	300 490–553 783	3–1	8.58+09	6.68−02	2.60−01	−0.698	A	2,3
10	$2s2p-2s3s$	^{3}P°–^{3}S		*58.92*	*158 632*–1 855 760	9–3	1.94+11	3.36−02	5.87−02	−0.519	A	2,4
				58.986	160 429–1 855 760	5–3	1.08+11	3.38−02	3.28−02	−0.772	A	2,4
				58.859	156 798–1 855 760	3–3	6.46+10	3.35−02	1.95−02	−0.998	A	2,4
				58.802	155 148–1 855 760	1–3	2.15+10	3.34−02	6.47−03	−1.476	A	2,4
11		^{1}P°–^{1}S		63.134	300 490–1 884 420	3–1	5.79+10	1.15−02	7.19−03	−1.462	C+	2,4
12	$2s2p-2s3d$	^{3}P°–^{3}D		*55.32*	*158 632–1 966 139*	9–15	9.33+11	7.13−01	1.17+00	0.807	A+	2,4
				55.375	160 429–1 966 300	5–7	9.30+11	5.99−01	5.46−01	0.476	A+	2,4
				55.271	156 798–1 966 080	3–5	7.01+11	5.35−01	2.92−01	0.205	A+	2,4
				55.227	155 148–1 965 860	1–3	5.21+11	7.14−01	1.30−01	−0.146	A+	2,4
				55.382	160 429–1 966 080	5–5	2.33+11	1.07−01	9.76−02	−0.272	A+	2,4
				55.277	156 798–1 965 860	3–3	3.90+11	1.79−01	9.75−02	−0.270	A+	2,4
				55.388	160 429–1 965 860	5–3	2.59+10	7.15−03	6.52−03	−1.447	A+	2,4
13		^{1}P°–^{1}D		59.107	300 490–1 992 340	3–5	5.95+11	5.19−01	3.03−01	0.192	A	2,4
14	$2s2p-2p3p$	^{3}P°–^{1}P										
				51.599	156 798–2 094 820	3–3	7.25+09	2.89−03	1.48−03	−2.062	D	4
				51.696	160 429–2 094 820	5–3	2.76+06	6.64−07	5.65−07	−5.479	E	4
				51.555	155 148–2 094 820	1–3	2.25+09	2.69−03	4.56−04	−2.570	D	4
15		^{3}P°–^{3}D		*51.37*	*158 632–2 105 215*	9–15	1.24+11	8.15−02	1.24−01	−0.135	A	4
				51.362	160 429–2 107 390	5–7	1.26+11	6.99−02	5.91−02	−0.457	A	4
				51.358	156 798–2 103 900	3–5	9.93+10	6.55−02	3.32−02	−0.707	A	4
				51.356	155 148–2 102 330	1–3	7.20+10	8.55−02	1.44−02	−1.068	B+	4
				51.454	160 429–2 103 900	5–5	2.53+10	1.00−02	8.51−03	−1.301	B+	4
				51.400	156 798–2 102 330	3–3	4.07+10	1.61−02	8.18−03	−1.316	B+	4

TABLE 40. Transition probabilities of allowed lines for Al X (references in this table are as follows: 1=Tully *et al.*,[77,78] 2=Froese Fischer.[21] 3=Safronova *et al.*,[63] 4=Safronova *et al.*,[60] 5=Fritzsche and Grant,[19] and 6=Granzow *et al.*[27])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				51.496	160 429–2 102 330	5–3	2.90+09	6.91−04	5.86−04	−2.462	B	4
16		^{3}P°–^{3}S		*50.99*	*158 632*–2 119 690	9–3	2.08+11	2.71−02	4.09−02	−0.613	B+	4
				51.040	160 429–2 119 690	5–3	8.05+10	1.89−02	1.58−02	−1.025	B+	4
				50.945	156 798–2 119 690	3–3	9.13+10	3.55−02	1.79−02	−0.973	B+	4
				50.902	155 148–2 119 690	1–3	3.66+10	4.27−02	7.16−03	−1.370	B+	4
17		^{3}P°–^{3}P				9–9						4
				50.762	160 429–2 130 410	5–5	1.77+11	6.85−02	5.72−02	−0.465	A	4
				50.713	156 798–2 128 680	3–3	3.92+10	1.51−02	7.56−03	−1.344	B+	4
				50.807	160 429–2 128 680	5–3	1.33+11	3.09−02	2.58−02	−0.811	B+	4
				50.669	156 798–2 130 410	3–5	5.00+10	3.21−02	1.60−02	−1.016	B+	4
				50.671	155 148–2 128 680	1–3	5.61+10	6.48−02	1.08−02	−1.188	B+	4
18		^{1}P°–^{1}P		55.731	300 490–2 094 820	3–3	2.45+11	1.14−01	6.29−02	−0.466	A	4
19		^{1}P°–^{3}D										
				55.451	300 490–2 103 900	3–5	2.38+08	1.83−04	1.00−04	−3.260	E+	4
				55.499	300 490–2 102 330	3–3	4.51+09	2.08−03	1.14−03	−2.205	D	4
20		^{1}P°–^{3}S										
				54.969	300 490–2 119 690	3–3	1.80+09	8.15−04	4.42−04	−2.612	D	4
21		^{1}P°–^{3}P										
				54.699	300 490–2 128 680	3–3	1.84+08	8.25−05	4.45−05	−3.606	E	4
				54.647	300 490–2 130 410	3–5	1.43+09	1.07−03	5.76−04	−2.493	D	4
22		^{1}P°–^{1}D		54.115	300 490–2 148 410	3–5	3.64+11	2.67−01	1.42−01	−0.096	A	4
23	$2s2p$–$2s4d$	^{1}P°–^{1}D		[44.902]	300 490–2 527 560	3–5	2.30+11	1.16−01	5.14−02	−0.458	D+	1
24	$2s2p$–$2p4p$	^{1}P°–^{1}D		[41.730]	300 490–2 696 850	3–5	1.28+11	5.56−02	2.29−02	−0.778	D	1
25	$2s2p$–$2s5d$	^{1}P°–^{1}D		[40.421]	300 490–2 774 450	3–5	1.15+11	4.71−02	1.88−02	−0.850	D	1
26	$2p^2$–$2s3p$	^{3}P–^{1}P°										
				65.905	406 517–1 923 850	3–3	2.72+07	1.77−05	1.15−05	−4.275	E+	2,4
				66.043	409 690–1 923 850	5–3	2.29+08	9.00−05	9.78−05	−3.347	D	2,4
				65.821	404 574–1 923 850	1–3	2.36+07	4.59−05	9.95−06	−4.338	E+	2,4
27		^{1}D–^{1}P°		67.837	449 732–1 923 850	5–3	2.11+10	8.73−03	9.75−03	−1.360	C	2,4
28		^{1}S–^{1}P°		72.989	553 783–1 923 850	1–3	5.09+08	1.22−03	2.93−04	−2.914	D+	2,4
29	$2p^2$–$2p3s$	^{3}P–^{3}P°				9–9						2,4
				[60.700]	409 690–2 057 140	5–5	1.10+11	6.10−02	6.09−02	−0.516	A	2,4
				[60.583]	406 517–2 057 140	3–5	3.78+10	3.46−02	2.07−02	−0.984	A	2,4
30		^{3}P–^{1}P°										
				[59.335]	406 517–2 091 870	3–3	2.22+08	1.17−04	6.86−05	−3.455	D	2,4
				[59.447]	409 690–2 091 870	5–3	2.12+06	6.75−07	6.60−07	−5.472	E	2,4
				[59.266]	404 574–2 091 870	1–3	1.38+08	2.18−04	4.26−05	−3.662	E+	2,4
31		^{1}D–^{3}P°										
				[62.212]	449 732–2 057 140	5–5	3.10+08	1.80−04	1.84−04	−3.046	D	2,4
32		^{1}D–^{1}P°		[60.896]	449 732–2 091 870	5–3	1.16+11	3.86−02	3.87−02	−0.714	A	2,4
33		^{1}S–^{1}P°		[65.016]	553 783–2 091 870	1–3	3.92+10	7.45−02	1.59−02	−1.128	C+	2,4
34	$2p^2$–$2p3d$	^{3}P–^{1}D°										
				57.635	406 517–2 141 580	3–5	4.72+09	3.92−03	2.23−03	−1.930	D+	4

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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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				57.740	409 690–2 141 580	5–5	1.20+09	6.01−04	5.71−04	−2.522	D	4
35		^{3}P−^{3}D°		*[57.00]*	*408 064–2 162 342*	9–15	1.13+12	9.18−01	1.55+00	0.917	A	4
				57.024	409 690–2 163 340	5–7	1.14+12	7.81−01	7.33−01	0.592	A	4
				56.966	406 517–2 161 960	3–5	9.84+11	7.98−01	4.49−01	0.379	A	4
				[56.945]	404 574–2 160 650	1–3	7.38+11	1.08+00	2.02−01	0.033	A	4
				57.069	409 690–2 161 960	5–5	1.28+11	6.23−02	5.85−02	−0.507	A	4
				[57.008]	406 517–2 160 650	3–3	3.86+11	1.88−01	1.06−01	−0.249	A	4
				[57.112]	409 690–2 160 650	5–3	9.47+09	2.78−03	2.61−03	−1.857	B+	4
36		^{3}P−^{3}P°				9–9						4
				56.802	409 690–2 170 190	5–5	6.06+11	2.93−01	2.74−01	0.166	A	4
				56.652	406 517–2 171 680	3–3	2.44+11	1.17−01	6.57−02	−0.455	A	4
				56.754	409 690–2 171 680	5–3	2.74+11	7.93−02	7.41−02	−0.402	A	4
				56.700	406 517–2 170 190	3–5	2.16+10	1.74−02	9.72−03	−1.282	B+	4
				56.590	404 574–2 171 680	1–3	1.00+11	1.44−01	2.69−02	−0.842	B+	4
37		^{1}D−^{1}D°		59.107	449 732–2 141 580	5–5	3.15+11	1.65−01	1.60−01	−0.084	A	4
38		^{1}D−^{3}P°										
				58.074	449 732–2 171 680	5–3	3.43+08	1.04−04	9.94−05	−3.284	E+	4
				58.124	449 732–2 170 190	5–5	4.85+09	2.45−03	2.35−03	−1.912	D+	4
39		^{1}D−^{1}F°		57.368	449 732–2 192 860	5–7	1.37+12	9.49−01	8.97−01	0.676	A	4
40	$2s3s-2s3p$	^{3}S−^{1}P°										
				1 468.64	1 855 760–1 923 850	3–3	1.20+07	3.89−03	5.64−02	−1.933	C+	2
41		^{1}S−^{1}P°	2 535.4	2 536.1	1 884 420–1 923 850	1–3	3.79+07	1.10−01	9.16−01	−0.959	A	2
42	$2s3s-2p3s$	^{3}S−^{3}P°				3–9						1
				[496.574]	1 855 760–2 057 140	3–5	1.01+09	6.21−02	3.05−01	−0.730	C+	LS
43		^{3}S−^{1}P°										
				[423.531]	1 855 760–2 091 870	3–3	9.89+06	2.66−04	1.11−03	−3.098	D	2
44		^{1}S−^{1}P°		[482.044]	1 884 420–2 091 870	1–3	2.72+09	2.84−01	4.51−01	−0.547	C+	1
45	$2s3p-2s3d$	^{1}P°−^{3}D										
			2 367.3	2 368.0	1 923 850–1 966 080	3–5	1.76+06	2.47−03	5.78−02	−2.130	C+	2
			2 379.7	2 380.4	1 923 850–1 965 860	3–3	8.75+05	7.43−04	1.75−02	−2.652	C	2
46		^{1}P°−^{1}D		1 460.07	1 923 850–1 992 340	3–5	2.18+08	1.16−01	1.67+00	−0.458	B	1
47	$2s3p-2p3p$	^{1}P°−^{1}P		584.90	1 923 850–2 094 820	3–3	1.78+09	9.13−02	5.27−01	−0.562	C+	1
48		^{1}P°−^{1}D		445.315	1 923 850–2 148 410	3–5	2.26+08	1.12−02	4.93−02	−1.474	D+	1
49	$2s3p-2s4d$	^{1}P°−^{1}D		[165.642]	1 923 850–2 527 560	3–5	6.24+10	4.28−01	7.00−01	0.109	B	1
50	$2s3p-2p4p$	^{1}P°−^{1}D		[129.366]	1 923 850–2 696 850	3–5	1.86+09	7.76−03	9.91−03	−1.633	D	1
51	$2s3p-2s5d$	^{1}P°−^{1}D		[117.564]	1 923 850–2 774 450	3–5	3.30+10	1.14−01	1.32−01	−0.466	C	1
52	$2s3d-2p3s$	^{3}D−^{3}P°				15–9						
				[1 100.84]	1 966 300–2 057 140	7–5	1.22+07	1.58−03	4.01−02	−1.956	D+	LS
				[1 098.18]	1 966 080–2 057 140	5–5	2.19+06	3.96−04	7.16−03	−2.703	D	LS
				[1 095.53]	1 965 860–2 057 140	3–5	1.47+05	4.41−05	4.77−04	−3.878	E	LS
53		^{1}D−^{1}P°		[1 004.72]	1 992 340–2 091 870	5–3	3.83+07	3.48−03	5.76−02	−1.759	D+	1
54	$2s3d-2p3d$	^{3}D−^{3}D°		*[509.68]*	*1 966 139–2 162 342*	15–15	1.36+09	5.28−02	1.33+00	−0.101	C+	1

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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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				507.511	1 966 300–2 163 340	7–7	1.22+09	4.71−02	5.51−01	−0.482	C+	LS
				510.517	1 966 080–2 161 960	5–5	9.39+08	3.67−02	3.08−01	−0.736	C+	LS
				[513.373]	1 965 860–2 160 650	3–3	9.95+08	3.93−02	1.99−01	−0.928	C	LS
				511.091	1 966 300–2 161 960	7–5	2.10+08	5.87−03	6.91−02	−1.386	C	LS
				[513.954]	1 966 080–2 160 650	5–3	3.30+08	7.85−03	6.64−02	−1.406	C	LS
				506.945	1 966 080–2 163 340	5–7	1.54+08	8.28−03	6.91−02	−1.383	C	LS
				509.944	1 965 860–2 161 960	3–5	2.03+08	1.32−02	6.65−02	−1.402	C	LS
55		^{3}D–^{3}P°				15–9						1
				490.461	1 966 300–2 170 190	7–5	1.30+09	3.34−02	3.78−01	−0.631	C+	LS
				486.381	1 966 080–2 171 680	5–3	1.19+09	2.53−02	2.03−01	−0.898	C	LS
				489.932	1 966 080–2 170 190	5–5	2.32+08	8.36−03	6.74−02	−1.379	C	LS
				485.861	1 965 860–2 171 680	3–3	3.98+08	1.41−02	6.77−02	−1.374	C	LS
				489.404	1 965 860–2 170 190	3–5	1.55+07	9.30−04	4.50−03	−2.554	E+	LS
56		^{1}D–^{1}D°		670.06	1 992 340–2 141 580	5–5	5.47+08	3.68−02	4.06−01	−0.735	C+	1
57		^{1}D–^{1}F°		498.703	1 992 340–2 192 860	5–7	3.10+08	1.62−02	1.33−01	−1.092	C	1
58	2*s*3*d*–2*s*4*f*	^{3}D–^{3}F°		*177.80*	*1 966 139–2 528 570*	15–21	1.47+11	9.74−01	8.55+00	1.165	B+	1
				177.850	1 966 300–2 528 570	7–9	1.47+11	8.94−01	3.66+00	0.796	B+	LS
				177.781	1 966 080–2 528 570	5–7	1.30+11	8.65−01	2.53+00	0.636	B+	LS
				177.711	1 965 860–2 528 570	3–5	1.23+11	9.74−01	1.71+00	0.466	B	LS
				177.850	1 966 300–2 528 570	7–7	1.63+10	7.75−02	3.18−01	−0.266	C+	LS
				177.781	1 966 080–2 528 570	5–5	2.30+10	1.09−01	3.19−01	−0.264	C+	LS
				177.850	1 966 300–2 528 570	7–5	6.47+08	2.19−03	8.98−03	−1.814	D	LS
59	2*p*3*s*–2*p*3*p*	^{3}P°–^{3}D				9–15						1
				[1 990.0]	2 057 140–2 107 390	5–7	1.20+08	9.97−02	3.27+00	−0.302	B+	LS
			[2 137.9]	[2 138.6]	2 057 140–2 103 900	5–5	2.42+07	1.66−02	5.84−01	−1.081	C+	LS
			[2 212.2]	[2 212.9]	2 057 140–2 102 330	5–3	2.43+06	1.07−03	3.90−02	−2.272	D+	LS
60		^{3}P°–^{3}S				9–3						1
				[1 598.72]	2 057 140–2 119 690	5–3	1.27+08	2.92−02	7.68−01	−0.836	B	LS
61		^{3}P°–^{3}P				9–9						1
				[1 364.82]	2 057 140–2 130 410	5–5	3.12+08	8.71−02	1.96+00	−0.361	B+	LS
				[1 397.82]	2 057 140–2 128 680	5–3	1.61+08	2.83−02	6.51−01	−0.849	B	LS
62		^{1}P°–^{1}P		[2 950]	2 091 870–2 094 820	3–3	1.78+04	3.06−03	1.02+00	−2.037	B	1
63		^{1}P°–^{1}D		[1 768.66]	2 091 870–2 148 410	3–5	2.14+08	1.67−01	2.92+00	−0.300	B+	1
64	2*p*3*s*–2*s*4*d*	^{1}P°–^{1}D		[229.521]	2 091 870–2 527 560	3–5	4.30+09	5.66−02	1.28−01	−0.770	C	1
65	2*p*3*s*–2*p*4*p*	^{1}P°–^{1}D		[165.295]	2 091 870–2 696 850	3–5	2.39+10	1.63−01	2.66−01	−0.311	C+	1
66	2*p*3*s*–2*s*5*d*	^{1}P°–^{1}D		[146.503]	2 091 870–2 774 450	3–5	2.18+09	1.17−02	1.69−02	−1.455	D	1
67	2*p*3*p*–2*p*3*d*	^{1}P–^{1}D°	2 137.9	2 138.6	2 094 820–2 141 580	3–5	6.01+07	6.87−02	1.45+00	−0.686	B	1
68		^{3}D–^{3}D°		*[1 750.5]*	*2 105 215–2 162 342*	15–15	3.06+07	1.40−02	1.21+00	−0.678	C	1
				1 787.3	2 107 390–2 163 340	7–7	2.55+07	1.22−02	5.02−01	−1.069	C+	LS
				1 722.36	2 103 900–2 161 960	5–5	2.23+07	9.93−03	2.82−01	−1.304	C+	LS
				[1 714.68]	2 102 330–2 160 650	3–3	2.45+07	1.08−02	1.83−01	−1.489	C	LS
				1 832.5	2 107 390–2 161 960	7–5	4.14+06	1.49−03	6.29−02	−1.982	D+	LS
				[1 762.11]	2 103 900–2 160 650	5–3	7.48+06	2.09−03	6.06−02	−1.981	D+	LS
				1 682.37	2 103 900–2 163 340	5–7	3.84+06	2.28−03	6.31−02	−1.943	D+	LS
				1 677.01	2 102 330–2 161 960	3–5	5.22+06	3.67−03	6.08−02	−1.958	D+	LS

TABLE 40. Transition probabilities of allowed lines for Al X (references in this table are as follows: 1=Tully *et al.*,[77,78] 2=Froese Fischer.[21] 3=Safronova *et al.*,[63] 4=Safronova *et al.*,[60] 5=Fritzsche and Grant,[19] and 6=Granzow *et al.*[27])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
69		^{3}D–^{3}P°				15–9						1
				1 592.36	2 107 390–2 170 190	7–5	3.26+07	8.86−03	3.25−01	−1.207	C+	LS
				1 475.36	2 103 900–2 171 680	5–3	3.66+07	7.17−03	1.74−01	−1.446	C	LS
				1 508.52	2 103 900–2 170 190	5–5	6.86+06	2.34−03	5.81−02	−1.932	D+	LS
				1 441.96	2 102 330–2 171 680	3–3	1.31+07	4.08−03	5.81−02	−1.912	D+	LS
				1 473.62	2 102 330–2 170 190	3–5	4.90+05	2.66−04	3.87−03	−3.098	E+	LS
70		^{3}S–^{3}P°				3–9						1
				1 980.2	2 119 690–2 170 190	3–5	7.72+07	7.56−02	1.48+00	−0.644	B	LS
				1 923.4	2 119 690–2 171 680	3–3	8.42+07	4.67−02	8.87−01	−0.854	B	LS
71		^{3}P–^{3}D°				9–15						1
			3 035.9	3 036.7	2 130 410–2 163 340	5–7	2.15+07	4.17−02	2.08+00	−0.681	B+	LS
			3 003.9	3 004.8	2 128 680–2 161 960	3–5	1.67+07	3.76−02	1.12+00	−0.948	B	LS
			3 168.7	3 169.6	2 130 410–2 161 960	5–5	4.73+06	7.13−03	3.72−01	−1.448	C+	LS
			[3 127.0]	[3 127.9]	2 128 680–2 160 650	3–3	8.18+06	1.20−02	3.71−01	−1.444	C+	LS
			[3 305.9]	[3 306.9]	2 130 410–2 160 650	5–3	4.64+05	4.56−04	2.48−02	−2.642	D+	LS
72		^{3}P–^{3}P°				9–9						1
			2 513.1	2 513.8	2 130 410–2 170 190	5–5	1.17+07	1.11−02	4.59−01	−1.256	C+	LS
			2 324.9	2 325.6	2 128 680–2 171 680	3–3	4.93+06	4.00−03	9.19−02	−1.921	C	LS
			2 422.3	2 423.1	2 130 410–2 171 680	5–3	7.27+06	3.84−03	1.53−01	−1.717	C	LS
			2 408.3	2 409.1	2 128 680–2 170 190	3–5	4.44+06	6.44−03	1.53−01	−1.714	C	LS
73		^{1}D–^{1}F°	2 249.0	2 249.7	2 148 410–2 192 860	5–7	7.94+07	8.43−02	3.12+00	−0.375	B+	1
74	$2p3p-2s4f$	^{3}D–^{3}F°		*236.21*	*2 105 215–2 528 570*	15–21	1.48+09	1.73−02	2.02−01	−0.586	D+	1
				237.428	2 107 390–2 528 570	7–9	1.45+09	1.58−02	8.64−02	−0.956	C	LS
				235.477	2 103 900–2 528 570	5–7	1.33+09	1.55−02	6.01−02	−1.111	D+	LS
				234.610	2 102 330–2 528 570	3–5	1.27+09	1.75−02	4.05−02	−1.280	D+	LS
				237.428	2 107 390–2 528 570	7–7	1.62+08	1.37−03	7.50−03	−2.018	D	LS
				235.477	2 103 900–2 528 570	5–5	2.33+08	1.94−03	7.52−03	−2.013	D	LS
				237.428	2 107 390–2 528 570	7–5	6.41+06	3.87−05	2.12−04	−3.567	E	LS
75	$2p3d-2p3p$	^{1}D°–^{1}D	14 637	14 641	2 141 580–2 148 410	5–5	5.01+04	1.61−03	3.88−01	−2.094	C+	1
76	$2p3d-2s4d$	^{1}F°–^{1}D		[298.775]	2 192 860–2 527 560	7–5	1.06+08	1.01−03	6.95−03	−2.151	D	1
77	$2p3d-2p4p$	^{1}F°–^{1}D		[198.417]	2 192 860–2 696 850	7–5	5.19+09	2.19−02	1.00−01	−0.814	C	1

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

4.10.2. Forbidden Transitions for Al X

Froese Fischer[21] applied a modified version of the relativistic GRANT code. Kingston and Hibbert[37] used the CIV3 code to perform CI calculations with large basis sets in the Breit-Pauli approximation. Safronova *et al.*[61] used relativistic second-order MBPT calculations. Excellent agreement was found for the cases where two or more sources were available for the same transition.

To estimate accuracies, we pooled the RSDM of each of the lines for which a transition rate is given for two or more of the references[21,37,61] cited below, as discussed in the introduction to Kelleher and Podobedova.[35] Next we isoelectronically averaged the logarithmic quality factors observed for allowed Be-like lines from the lower-lying levels of Na VIII, Mg IX, Al X, and Si XI and applied the result to forbidden lines of Al X using the method described in the introduction to Kelleher and Podobedova.[35]

References for Forbidden Transitions for Al X

[21]C. Froese Fischer, http://www.vuse.vanderbilt.edu/~cff/mchf_collection/ (MCDHF, *ab initio*, downloaded on May 5, 2004).

[35]D. E. Kelleher and L. I. Podobedova, J. Phys. Chem. Ref. Data **37**, 267 (2008).

[37]A. E. Kingston and A. Hibbert, J. Phys. B **34**, 81 (2001).

[61]U. I. Safronova, W. R. Johnson, and A. Derevianko, Phys. Scr. **60**, 46 (1999).

TABLE 41. Wavelength finding list for forbidden lines of Al X

Wavelength (vac) (Å)	Mult. No.
222.355	3
244.087	2
245.992	2
254.224	8
339.462	7
341.374	7
345.658	7
392.862	6
395.426	6
400.450	6
401.186	6
406.359	6
409.593	6
623.33	1
670.05	10
679.04	13
688.03	5
694.00	13
695.93	5
713.97	5
915.75	9
943.16	9
961.07	14
Wavelength (air) (Å)	**Mult. No.**
2 213.8	12
2 313.3	12
2 496.6	12
18 931	4
19 541	11
Wavenumber (cm^{-1})	**Mult. No.**
3 631	4
3 173	11
1 943	11
1 650	4

TABLE 42. Transition probabilities of forbidden lines for Al X (references in this table are as follows: 1=Froese Fischer,[21] 2=Kingston and Hibbert,[37] and 3=Safronova *et al.*[61])

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	$2s^2-2s2p$	$^1S-^3P^\circ$									
				623.33	0–160 429	1–5	M2	1.78−01	5.61+00	B+	1,2
2	$2s^2-2p^2$	$^1S-^3P$									
				244.087	0–409 690	1–5	E2	1.14+01	4.40−05	C	1,2
				245.992	0–406 517	1–3	M1	9.34+00	1.55−05	C	1,2,3
3		$^1S-^1D$									
				222.355	0–449 732	1–5	E2	4.23+03	1.03−02	B	1,2
4	$2s2p-2s2p$	$^3P^\circ-^3P^\circ$									
				3 631 cm^{-1}	156 798–160 429	3–5	M1	6.40−01	2.48+00	A+	1,2,3
				3 631 cm^{-1}	156 798–160 429	3–5	E2	8.66−07	6.13−02	A	1,2
				1 650 cm^{-1}	155 148–156 798	1–3	M1	8.03−02	1.99+00	A	1,2,3
			18 931	18 936	155 148–160 429	1–5	E2	2.51−06	2.72−02	B+	1,2
5		$^3P^\circ-^1P^\circ$									
				695.93	156 798–300 490	3–3	M1	1.23+01	4.60−04	C+	1,2,3
				695.93	156 798–300 490	3–3	E2	8.60−02	3.76−05	E	1,2
				713.97	160 429–300 490	5–3	M1	1.87+01	7.56−04	B	1,2,3
				713.97	160 429–300 490	5–3	E2	4.82−02	2.40−05	C	1,2
				688.03	155 148–300 490	1–3	M1	1.64+01	5.94−04	C+	1,2,3
6	$2s2p-2p^2$	$^3P^\circ-^3P$									
				401.186	160 429–409 690	5–5	M2	1.33+00	4.62+00	A	1,2
				400.450	156 798–406 517	3–3	M2	1.13+00	2.33+00	A	1,2
				409.593	160 429–404 574	5–1	M2	9.60−01	7.42−01	A	1,2
				406.359	160 429–406 517	5–3	M2	2.65−04	5.90−04	C	1,2
				395.426	156 798–409 690	3–5	M2	5.22−03	1.69−02	B	1,2
				392.862	155 148–409 690	1–5	M2	2.91−01	9.13−01	A	1,2
7		$^3P^\circ-^1D$									
				339.462	155 148–449 732	1–5	M2	1.02+00	1.54+00	A	1,2

TABLE 42. Transition probabilities of forbidden lines for Al X (references in this table are as follows: 1=Froese Fischer,[21] 2=Kingston and Hibbert,[37] and 3=Safronova *et al.*[61])—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
				341.374	156 798–449 732	3–5	M2	2.42+00	3.76+00	A	1,2
				345.658	160 429–449 732	5–5	M2	2.08+00	3.45+00	A	1,2
8		^{3}P°–^{1}S									
				254.224	160 429–553 783	5–1	M2	7.95+00	5.66−01	B+	1
9		^{1}P°–^{3}P									
				943.16	300 490–406 517	3–3	M2	7.54−03	1.13+00	A	1,2
				915.75	300 490–409 690	3–5	M2	1.63−02	3.52+00	A	1,2
10		^{1}P°–^{1}D									
				670.05	300 490–449 732	3–5	M2	1.57−03	7.09−02	B	1,2
11	$2p^2-2p^2$	^{3}P–^{3}P									
				3 173 cm^{-1}	406 517–409 690	3–5	M1	4.27−01	2.48+00	A	1,2,3
				3 173 cm^{-1}	406 517–409 690	3–5	E2	4.12−07	5.72−02	B+	1,2
				1 943 cm^{-1}	404 574–406 517	1–3	M1	1.32−01	2.00+00	A+	1,2,3
			19 541	19 547	404 574–409 690	1–5	E2	2.02−06	2.58−02	B+	1,2
12		^{3}P–^{1}D									
			2 213.8	2 214.4	404 574–449 732	1–5	E2	2.38−06	5.66−07	E	1,2
			2 313.3	2 314.0	406 517–449 732	3–5	M1	3.79+00	8.70−03	C	1,2,3
			2 313.3	2 314.0	406 517–449 732	3–5	E2	8.29−04	2.46−04	C+	1,2
			2 496.6	2 497.4	409 690–449 732	5–5	M1	9.14+00	2.64−02	C	1,2,3
			2 496.6	2 497.4	409 690–449 732	5–5	E2	4.04−03	1.75−03	B	1,2
13		^{3}P–^{1}S									
				694.00	409 690–553 783	5–1	E2	1.40+00	2.01−04	C+	1,2
				679.04	406 517–553 783	3–1	M1	1.72+02	1.99−03	B	1,2,3
14		^{1}D–^{1}S									
				961.07	449 732–553 783	5–1	E2	1.39+02	1.02−01	A	1,2

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

4.11. Al XI

Lithium isoelectronic sequence
Ground state: $1s^2 2s\ ^2S_{1/2}$
Ionization energy: 441.999 eV (3 564 960 cm^{-1})

4.11.1. Allowed Transitions for Al XI

In general, the computed transition rates for this Li-like spectrum are in excellent agreement. Most of the compiled data below have been taken from this source. The high-quality data from the other references were available primarily for transitions involving lower-lying levels. Froese Fischer[22] applied a modified version of the relativistic GRANT code. Yan *et al.*[85] used a relativistic fully correlated Hylleraas-type variational method; these state-of-the-art calculations provide uniquely high accuracy. Johnson *et al.*[32] used relativistic second-order MBPT calculations. Stancalie[66] used nonrelativistic R-matrix codes both for the core and the core-valence interactions. Guennou and Sureau[28] used a self-consistent field model developed by Sureau. Zhang *et al.*[86] performed relativistic distorted-wave calculations. Martín *et al.*[44] performed relativistic quantum defect calculations.

To estimate accuracies, we pooled the RSDM of each of the lines for which a transition rate is given by two or more references,[22,28,32,44,55,56,66,85,86] as discussed in the introduction to Kelleher and Podobedova.[35] We then isoelectronically averaged the logarithmic quality factors observed for Li-like lines of Na IX, Mg X, Al XI, and Si XII using the method described in the introduction to Kelleher and Podobedova.[35] For the higher-lying lines and lines from the OP, we scaled the logarithmic quality factor of the lower-lying lines.

References for Allowed Transitions for Al XI

[22]C. Froese Fischer, http://www.vuse.vanderbilt.edu/~cff/mchf_collection/ (MCDHF, *ab initio*, downloaded on May 6, 2004).
[28]H. Guennou and A. Sureau, J. Phys. B **20**, 919 (1987).
[32]W. R. Johnson, Z. W. Liu, and J. Sapirstein, At. Data Nucl. Data Tables Tables **64**, 279 (1996)
[35]D. E. Kelleher and L. I. Podobedova, J. Phys. Chem. Ref. Data **37**, 267 (2008).
[44]I. Martín, J. Karwowski, G. H. F. Diercksen, and C. Barrientos, Astron. Astrophys., Suppl. Ser. **100**, 595 (1993).

[55]G. Peach, H. E. Saraph, and M. J. Seaton, J. Phys. B **21**, 3669 (1988).
[56]G. Peach, H. E. Saraph, and M. J. Seaton, http://legacy.gsfc.nasa.gov/topbase, downloaded on July 28, 1995 (Opacity Project).
[66]V. Stancalie, Phys. Scr. **61**, 459 (2000).
[85]Z.-C. Yan, M. Tambasco, and G. W. F. Drake, Phys. Rev. A **57**, 1652 (1998).
[86]H. L. Zhang, D. H. Sampson, and C. J. Fontes, At. Data Nucl. Data Tables **44**, 31 (1990).

TABLE 43. Wavelength finding list for allowed lines of Al XI

Wavelength (vac) (Å)	Mult. No.
29.416	8
29.793	7
30.376	6
31.313	5
31.426	17
31.483	17
32.069	16
32.129	16
33.007	4
33.108	15
33.172	15
34.998	14
35.067	14
35.069	14
35.166	13
35.237	13
36.672	3
36.682	3
39.092	12
39.175	12
39.180	12
39.531	11
39.621	11
48.297	2
48.338	2
52.299	10
52.446	10
52.458	10
54.217	9
54.388	9
72.514	24
74.847	23
76.254	38
76.279	38
77.560	32
77.665	32
78.638	22
78.839	37
78.866	37
81.597	31
81.714	31
83.056	36
83.086	36
85.241	21
88.682	30

TABLE 43. Wavelength finding list for allowed lines of Al XI—Continued

Wavelength (vac) (Å)	Mult. No.
88.819	30
90.457	35
90.492	35
99.083	20
103.671	29
103.848	29
103.859	29
105.160	28
105.354	28
106.202	34
106.251	34
141.551	19
141.709	19
144.134	44
150.288	55
150.299	27
150.362	55
150.621	27
150.695	27
153.657	43
156.541	33
156.647	33
156.735	33
157.003	26
157.436	26
158.233	50
158.431	50
160.671	54
160.756	54
170.532	42
176.001	49
176.246	49
179.215	53
179.321	53
204.960	41
212.639	48
212.997	48
217.633	52
217.789	52
263.296	60
273.120	68
273.202	68
296.912	59
304.507	64
308.642	40
309.463	67
309.569	67
325.478	47
326.200	47
326.318	47
338.306	51
338.685	51
340.623	46
341.542	46
367.107	58
377.929	63
386.488	66

TABLE 43. Wavelength finding list for allowed lines of Al XI—Continued

Wavelength (vac) (Å)	Mult. No.
386.653	66
492.368	74
550.031	1
568.12	1
575.04	57
599.88	62
607.90	71
624.06	65
624.49	65
624.61	73
950.57	78
993.05	70
1 044.93	72
1 515.15	76
1 607.72	77
1 997.2	18
Wavelength (air) (Å)	**Mult. No.**
2 068.9	18
2 414.7	80
4 713.4	39
4 895.8	39
5 171.9	25
5 550.9	25
5 687	25
9 997	56
12 512	45
13 277	45
13 885	45
Wavenumber (cm^{-1})	**Mult. no.**
3 770	61
3 660	61
2 800	69
2 200	75
1 600	79

TABLE 44. Transition probabilities of allowed lines for Al XI (references in this table are as follows: 1=Peach *et al.*,[55,56] 2=Froese Fischer,[22] 3=Yan *et al.*,[85] 4=Johnson *et al.*,[32] 5=Stancalie,[66] 6=Guennou and Sureau,[28] 7=Zhang *et al.*,[86] and 8=Martin *et al.*[44])

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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
1	$2s-2p$	$^2S-^2P^\circ$		*555.93*	0–*179 878*	2–6	8.22+08	1.14−01	4.18−01	−0.642	AA	3
				550.031	0–181 808	2–4	8.51+08	7.72−02	2.80−01	−0.811	AA	3
				568.12	0–176 019	2–2	7.68+08	3.72−02	1.39−01	−1.128	AA	3
2	$2s-3p$	$^2S-^2P^\circ$		*48.31*	0–*2 069 937*	2–6	3.17+11	3.32−01	1.06−01	−0.178	A+	2,5,6,7,8
				48.297	0–2 070 520	2–4	3.16+11	2.21−01	7.03−02	−0.355	A+	2,5,6,7,8
				48.338	0–2 068 770	2–2	3.18+11	1.11−01	3.54−02	−0.654	A+	2,5,6,7,8
3	$2s-4p$	$^2S-^2P^\circ$		*36.68*	0–*2 726 647*	2–6	1.44+11	8.70−02	2.10−02	−0.759	A	5,6,7,8
				36.672	0–2 726 910	2–4	1.44+11	5.79−02	1.40−02	−0.936	A	5,6,7,8
				36.682	0–2 726 120	2–2	1.45+11	2.92−02	7.04−03	−1.234	A	5,6,7,8
4	$2s-5p$	$^2S-^2P^\circ$		*33.01*	0–*3 029 700*	2–6	7.49+10	3.67−02	7.98−03	−1.134	B+	5,6,7
				33.007	0–3 029 700	2–4	7.49+10	2.45−02	5.32−03	−1.310	B+	5,6,7
				33.007	0–3 029 700	2–2	7.50+10	1.22−02	2.66−03	−1.613	B+	5,6,7
5	$2s-6p$	$^2S-^2P^\circ$		*31.31*	0–*3 193 600*	2–6	4.33+10	1.91−02	3.94−03	−1.418	B+	6
				31.313	0–3 193 600	2–4	4.32+10	1.27−02	2.62−03	−1.595	B+	6
				31.313	0–3 193 600	2–2	4.36+10	6.40−03	1.32−03	−1.893	B+	6
6	$2s-7p$	$^2S-^2P^\circ$		*30.38*	0–*3 292 100*	2–6	2.74+10	1.13−02	2.27−03	−1.646	C+	6
				30.376	0–3 292 100	2–4	2.73+10	7.55−03	1.51−03	−1.821	C+	6
				30.376	0–3 292 100	2–2	2.75+10	3.80−03	7.60−04	−2.119	C+	6
7	$2s-8p$	$^2S-^2P^\circ$		*29.79*	0–*3 356 500*	2–6	1.83+10	7.32−03	1.44−03	−1.834	C+	1
				29.793	0–3 356 500	2–4	1.83+10	4.88−03	9.57−04	−2.011	C+	LS
				29.793	0–3 356 500	2–2	1.83+10	2.44−03	4.79−04	−2.312	C+	LS
8	$2s-9p$	$^2S-^2P^\circ$		*29.42*	0–*3 399 500*	2–6	1.29+10	5.01−03	9.70−04	−1.999	C	1

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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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				29.416	0–3 399 500	2–4	1.29+10	3.34−03	6.47−04	−2.175	C	LS
				29.416	0–3 399 500	2–2	1.29+10	1.67−03	3.23−04	−2.476	C	LS
9	$2p-3s$	$^2P^\circ-^2S$		*54.33*	*179 878*–2 020 450	6–2	1.44+11	2.13−02	2.28−02	−0.893	A	2,4,5,6,7
				54.388	181 808–2 020 450	4–2	9.63+10	2.13−02	1.53−02	−1.070	A	2,4,5,6,7
				54.217	176 019–2 020 450	2–2	4.80+10	2.12−02	7.55−03	−1.373	A	2,4,5,6,7
10	$2p-3d$	$^2P^\circ-^2D$		*52.40*	*179 878–2 088 358*	6–10	9.75+11	6.69−01	6.92−01	0.604	A	2,5,6,7,8
				52.446	181 808–2 088 530	4–6	9.74+11	6.02−01	4.16−01	0.382	A	2,5,6,7,8
				52.299	176 019–2 088 100	2–4	8.15+11	6.69−01	2.30−01	0.126	A	2,5,6,7,8
				52.458	181 808–2 088 100	4–4	1.61+11	6.66−02	4.60−02	−0.574	A	2,5,6,7
11	$2p-4s$	$^2P^\circ-^2S$		*39.59*	*179 878*–2 705 700	6–2	5.83+10	4.57−03	3.57−03	−1.562	B+	2,5,6,7
				39.621	181 808–2 705 700	4–2	3.87+10	4.56−03	2.38−03	−1.739	B+	2,5,6,7
				39.531	176 019–2 705 700	2–2	1.96+10	4.59−03	1.19−03	−2.037	B+	2,5,6,7
12	$2p-4d$	$^2P^\circ-^2D$		*39.15*	*179 878–2 734 308*	6–10	3.22+11	1.23−01	9.55−02	−0.132	A	5,6,7,8
				39.175	181 808–2 734 440	4–6	3.22+11	1.11−01	5.74−02	−0.353	A	5,6,7,8
				39.092	176 019–2 734 110	2–4	2.70+11	1.23−01	3.18−02	−0.609	A	5,6,7,8
				39.180	181 808–2 734 110	4–4	5.31+10	1.22−02	6.31−03	−1.312	A	5,6,7,8
13	$2p-5s$	$^2P^\circ-^2S$		*35.21*	*179 878*–3 019 700	6–2	2.75+10	1.70−03	1.18−03	−1.991	B+	5,6,7
				35.237	181 808–3 019 700	4–2	1.83+10	1.71−03	7.92−04	−2.165	B+	5,6,7
				35.166	176 019–3 019 700	2–2	9.13+09	1.69−03	3.92−04	−2.471	B+	6,7
14	$2p-5d$	$^2P^\circ-^2D$		*35.04*	*179 878–3 033 426*	6–10	1.50+11	4.59−02	3.18−02	−0.560	A	5,6,7
				35.067	181 808–3 033 470	4–6	1.49+11	4.11−02	1.90−02	−0.784	A	5,6,7
				34.998	176 019–3 033 360	2–4	1.27+11	4.65−02	1.07−02	−1.032	A	5,6,7
				35.069	181 808–3 033 360	4–4	2.48+10	4.56−03	2.11−03	−1.739	B+	5,6,7
15	$2p-6d$	$^2P^\circ-^2D$		*33.15*	*179 878–3 196 400*	6–10	8.16+10	2.24−02	1.47−02	−0.872	B+	6
				33.172	181 808–3 196 400	4–6	8.14+10	2.01−02	8.80−03	−1.095	B+	6
				33.108	176 019–3 196 400	2–4	6.82+10	2.24−02	4.89−03	−1.349	B+	6
				33.172	181 808–3 196 400	4–4	1.36+10	2.24−03	9.80−04	−2.048	B	6
16	$2p-7d$	$^2P^\circ-^2D$		*32.11*	*179 878–3 294 300*	6–10	4.97+10	1.28−02	8.12−03	−1.115	B	6
				32.129	181 808–3 294 300	4–6	4.96+10	1.15−02	4.87−03	−1.337	B	6
				32.069	176 019–3 294 300	2–4	4.16+10	1.28−02	2.71−03	−1.592	C+	6
				32.129	181 808–3 294 300	4–4	8.25+09	1.28−03	5.40−04	−2.291	C+	6
17	$2p-8d$	$^2P^\circ-^2D$		*31.46*	*179 878–3 358 100*	6–10	3.24+10	8.01−03	4.98−03	−1.318	C+	1
				31.483	181 808–3 358 100	4–6	3.23+10	7.20−03	2.99−03	−1.541	B	LS
				31.426	176 019–3 358 100	2–4	2.71+10	8.02−03	1.66−03	−1.795	C+	LS
				31.483	181 808–3 358 100	4–4	5.38+09	8.00−04	3.32−04	−2.495	C	LS
18	$3s-3p$	$^2S-^2P^\circ$	*2 020*	*2 021*	2 020 450–*2 069 937*	2–6	1.05+08	1.94−01	2.58+00	−0.411	A+	2,5
				1 997.2	2 020 450–2 070 520	2–4	1.09+08	1.31−01	1.72+00	−0.582	A+	2,5
			2 068.9	2 069.5	2 020 450–2 068 770	2–2	9.82+07	6.30−02	8.59−01	−0.900	A+	2,5
19	$3s-4p$	$^2S-^2P^\circ$		*141.60*	2 020 450–*2 726 647*	2–6	4.02+10	3.62−01	3.38−01	−0.140	A	5,6
				141.551	2 020 450–2 726 910	2–4	4.01+10	2.41−01	2.25−01	−0.317	A	5,6
				141.709	2 020 450–2 726 120	2–2	4.02+10	1.21−01	1.13−01	−0.616	A	5
20	$3s-5p$	$^2S-^2P^\circ$		*99.08*	2 020 450–*3 029 700*	2–6	2.26+10	9.96−02	6.50−02	−0.701	A	5,6

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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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				99.083	2 020 450–3 029 700	2–4	2.25+10	6.63−02	4.33−02	−0.877	A	5,6
				99.083	2 020 450–3 029 700	2–2	2.26+10	3.33−02	2.17−02	−1.177	A	5,6
21	$3s-6p$	$^2S-^2P^{\circ}$		*85.24*	2 020 450–*3 193 600*	2–6	1.34+10	4.37−02	2.45−02	−1.058	B+	6
				85.241	2 020 450–3 193 600	2–4	1.33+10	2.90−02	1.63−02	−1.237	B+	6
				85.241	2 020 450–3 193 600	2–2	1.34+10	1.46−02	8.21−03	−1.535	B+	6
22	$3s-7p$	$^2S-^2P^{\circ}$		*78.64*	2 020 450–*3 292 100*	2–6	8.51+09	2.37−02	1.23−02	−1.324	B	6
				78.638	2 020 450–3 292 100	2–4	8.49+09	1.57−02	8.15−03	−1.503	B	6
				78.638	2 020 450–3 292 100	2–2	8.56+09	7.94−03	4.11−03	−1.799	B	6
23	$3s-8p$	$^2S-^2P^{\circ}$		*74.85*	2 020 450–*3 356 500*	2–6	5.73+09	1.44−02	7.11−03	−1.541	B	1
				74.847	2 020 450–3 356 500	2–4	5.73+09	9.62−03	4.74−03	−1.716	B	LS
				74.847	2 020 450–3 356 500	2–2	5.73+09	4.81−03	2.37−03	−2.017	C+	LS
24	$3s-9p$	$^2S-^2P^{\circ}$		*72.51*	2 020 450–*3 399 500*	2–6	4.02+09	9.51−03	4.54−03	−1.721	C	1
				72.514	2 020 450–3 399 500	2–4	4.02+09	6.34−03	3.03−03	−1.897	C+	LS
				72.514	2 020 450–3 399 500	2–2	4.02+09	3.17−03	1.51−03	−2.198	C	LS
25	$3p-3d$	$^2P^{\circ}-^2D$	*5 427*	*5 429*	*2 069 937–2 088 358*	6–10	4.23+06	3.13−02	3.37+00	−0.726	A+	2,5
			5 550.9	5 552.5	2 070 520–2 088 530	4–6	3.99+06	2.77−02	2.02+00	−0.955	A+	2,5
			5 171.9	5 173.3	2 068 770–2 088 100	2–4	4.11+06	3.30−02	1.12+00	−1.180	A+	2,5
			5 687	5 688	2 070 520–2 088 100	4–4	6.18+05	3.00−03	2.25−01	−1.921	A+	2,5
26	$3p-4s$	$^2P^{\circ}-^2S$		*157.29*	*2 069 937*–2 705 700	6–2	3.97+10	4.90−02	1.52−01	−0.532	A	2,5,6
				157.436	2 070 520–2 705 700	4–2	2.65+10	4.93−02	1.02−01	−0.705	A	2,5,6
				157.003	2 068 770–2 705 700	2–2	1.31+10	4.85−02	5.02−02	−1.013	A	2,6
27	$3p-4d$	$^2P^{\circ}-^2D$		*150.52*	*2 069 937–2 734 308*	6–10	1.03+11	5.81−01	1.73+00	0.542	A+	5,6
				150.621	2 070 520–2 734 440	4–6	1.03+11	5.23−01	1.04+00	0.321	A+	5,6
				150.299	2 068 770–2 734 110	2–4	8.57+10	5.81−01	5.75−01	0.065	A+	5,6
				150.695	2 070 520–2 734 110	4–4	1.71+10	5.82−02	1.15−01	−0.633	A	5,6
28	$3p-5s$	$^2P^{\circ}-^2S$		*105.29*	*2 069 937*–3 019 700	6–2	1.94+10	1.07−02	2.23−02	−1.192	A	5,6
				105.354	2 070 520–3 019 700	4–2	1.29+10	1.08−02	1.49−02	−1.365	A	5,6
				105.160	2 068 770–3 019 700	2–2	6.42+09	1.06−02	7.37−03	−1.674	B+	5,6
29	$3p-5d$	$^2P^{\circ}-^2D$		*103.79*	*2 069 937–3 033 426*	6–10	5.09+10	1.37−01	2.81−01	−0.085	A	5,6
				103.848	2 070 520–3 033 470	4–6	5.09+10	1.23−01	1.69−01	−0.308	A	5,6
				103.671	2 068 770–3 033 360	2–4	4.24+10	1.37−01	9.33−02	−0.562	A	5,6
				103.859	2 070 520–3 033 360	4–4	8.48+09	1.37−02	1.87−02	−1.261	A	5,6
30	$3p-6d$	$^2P^{\circ}-^2D$		*88.77*	*2 069 937–3 196 400*	6–10	2.83+10	5.58−02	9.78−02	−0.475	A	6
				88.819	2 070 520–3 196 400	4–6	2.83+10	5.02−02	5.87−02	−0.697	A	6
				88.682	2 068 770–3 196 400	2–4	2.37+10	5.58−02	3.26−02	−0.952	A	6
				88.819	2 070 520–3 196 400	4–4	4.71+09	5.57−03	6.52−03	−1.652	B+	6
31	$3p-7d$	$^2P^{\circ}-^2D$		*81.68*	*2 069 937–3 294 300*	6–10	1.74+10	2.90−02	4.68−02	−0.759	B	6
				81.714	2 070 520–3 294 300	4–6	1.73+10	2.60−02	2.80−02	−0.983	B+	6
				81.597	2 068 770–3 294 300	2–4	1.46+10	2.91−02	1.56−02	−1.235	B	6
				81.714	2 070 520–3 294 300	4–4	2.90+09	2.90−03	3.12−03	−1.936	B	6
32	$3p-8d$	$^2P^{\circ}-^2D$		*77.63*	*2 069 937–3 358 100*	6–10	1.15+10	1.74−02	2.66−02	−0.981	B	1

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				77.665	2 070 520–3 358 100	4–6	1.15+10	1.56–02	1.60–02	−1.205	B	LS
				77.560	2 068 770–3 358 100	2–4	9.65+09	1.74–02	8.89–03	−1.458	B	LS
				77.665	2 070 520–3 358 100	4–4	1.92+09	1.74–03	1.78–03	−2.157	C+	LS
33	$3d-4p$	$^2D-^2P^\circ$		*156.67*	*2 088 358–2 726 647*	10–6	6.15+09	1.36–02	7.00–02	−0.866	A	5,6
				156.647	2 088 530–2 726 910	6–4	5.52+09	1.35–02	4.19–02	−1.092	A	5,6
				156.735	2 088 100–2 726 120	4–2	6.16+09	1.14–02	2.34–02	−1.341	A	5,6
				156.541	2 088 100–2 726 910	4–4	6.12+08	2.25–03	4.63–03	−2.046	B+	5,6
34	$3d-5p$	$^2D-^2P^\circ$		*106.23*	*2 088 358–3 029 700*	10–6	2.62+09	2.66–03	9.30–03	−1.575	B+	5,6
				106.251	2 088 530–3 029 700	6–4	2.34+09	2.63–03	5.53–03	−1.802	B+	5,6
				106.202	2 088 100–3 029 700	4–2	2.66+09	2.25–03	3.15–03	−2.046	B+	5,6
				106.202	2 088 100–3 029 700	4–4	2.63+08	4.44–04	6.21–04	−2.751	B+	5,6
35	$3d-6p$	$^2D-^2P^\circ$		*90.48*	*2 088 358–3 193 600*	10–6	1.38+09	1.02–03	3.03–03	−1.991	B	6
				90.492	2 088 530–3 193 600	6–4	1.24+09	1.01–03	1.81–03	−2.218	B+	6
				90.457	2 088 100–3 193 600	4–2	1.40+09	8.56–04	1.02–03	−2.465	B	6
				90.457	2 088 100–3 193 600	4–4	1.37+08	1.68–04	2.00–04	−3.173	B	6
36	$3d-7p$	$^2D-^2P^\circ$		*83.07*	*2 088 358–3 292 100*	10–6	8.18+08	5.08–04	1.39–03	−2.294	C+	1
				83.086	2 088 530–3 292 100	6–4	7.36+08	5.08–04	8.34–04	−2.516	C+	LS
				83.056	2 088 100–3 292 100	4–2	8.18+08	4.23–04	4.63–04	−2.772	C+	LS
				83.056	2 088 100–3 292 100	4–4	8.19+07	8.47–05	9.26–05	−3.470	C	LS
37	$3d-8p$	$^2D-^2P^\circ$		*78.86*	*2 088 358–3 356 500*	10–6	5.28+08	2.95–04	7.66–04	−2.530	C	1
				78.866	2 088 530–3 356 500	6–4	4.75+08	2.95–04	4.60–04	−2.752	C+	LS
				78.839	2 088 100–3 356 500	4–2	5.28+08	2.46–04	2.55–04	−3.007	C	LS
				78.839	2 088 100–3 356 500	4–4	5.28+07	4.92–05	5.11–05	−3.706	C	LS
38	$3d-9p$	$^2D-^2P^\circ$		*76.27*	*2 088 358–3 399 500*	10–6	3.61+08	1.89–04	4.74–04	−2.724	D+	1
				76.279	2 088 530–3 399 500	6–4	3.25+08	1.89–04	2.85–04	−2.945	C	LS
				76.254	2 088 100–3 399 500	4–2	3.60+08	1.57–04	1.58–04	−3.202	D+	LS
				76.254	2 088 100–3 399 500	4–4	3.61+07	3.15–05	3.16–05	−3.900	D	LS
39	$4s-4p$	$^2S-^2P^\circ$	*4 773*	*4 774*	2 705 700–*2 726 647*	2–6	2.69+07	2.76–01	8.67+00	−0.258	A+	1
			4 713.4	4 714.8	2 705 700–2 726 910	2–4	2.79+07	1.86–01	5.77+00	−0.429	A+	LS
			4 895.8	4 897.2	2 705 700–2 726 120	2–2	2.49+07	8.97–02	2.89+00	−0.746	A+	LS
40	$4s-5p$	$^2S-^2P^\circ$		*308.64*	2 705 700–*3 029 700*	2–6	9.32+09	3.99–01	8.11–01	−0.098	A	5,6
				308.642	2 705 700–3 029 700	2–4	9.30+09	2.66–01	5.40–01	−0.274	A+	5,6
				308.642	2 705 700–3 029 700	2–2	9.37+09	1.34–01	2.72–01	−0.572	A	5,6
41	$4s-6p$	$^2S-^2P^\circ$		*204.96*	2 705 700–*3 193 600*	2–6	5.88+09	1.11–01	1.50–01	−0.654	A	6
				204.960	2 705 700–3 193 600	2–4	5.86+09	7.38–02	9.96–02	−0.831	A	6
				204.960	2 705 700–3 193 600	2–2	5.92+09	3.73–02	5.03–02	−1.127	A	6
42	$4s-7p$	$^2S-^2P^\circ$		*170.53*	2 705 700–*3 292 100*	2–6	3.81+09	4.99–02	5.60–02	−1.001	B+	6
				170.532	2 705 700–3 292 100	2–4	3.80+09	3.31–02	3.72–02	−1.179	B+	6
				170.532	2 705 700–3 292 100	2–2	3.83+09	1.67–02	1.88–02	−1.476	B	6
43	$4s-8p$	$^2S-^2P^\circ$		*153.66*	2 705 700–*3 356 500*	2–6	2.58+09	2.74–02	2.78–02	−1.261	B	1
				153.657	2 705 700–3 356 500	2–4	2.58+09	1.83–02	1.85–02	−1.437	B	LS
				153.657	2 705 700–3 356 500	2–2	2.58+09	9.14–03	9.25–03	−1.738	B	LS

TABLE 44. Transition probabilities of allowed lines for Al XI (references in this table are as follows: 1=Peach *et al.*,[55,56] 2=Froese Fischer,[22] 3=Yan *et al.*,[85] 4=Johnson *et al.*,[32] 5=Stancalie,[66] 6=Guennou and Sureau,[28] 7=Zhang *et al.*,[86] and 8=Martin *et al.*[44])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
44	4*s*−9*p*	^{2}S−^{2}P°		*144.13*	2 705 700−*3 399 500*	2–6	1.82+09	1.70−02	1.61−02	−1.469	C+	1
				144.134	2 705 700−3 399 500	2–4	1.81+09	1.13−02	1.07−02	−1.646	C+	LS
				144.134	2 705 700−3 399 500	2–2	1.82+09	5.66−03	5.37−03	−1.946	C+	LS
45	4*p*−4*d*	^{2}P°−^{2}D	*13 050*	*13 053*	*2 726 647−2 734 308*	6–10	1.30+06	5.56−02	1.43+01	−0.477	A+	1,5
			13 277	13 280	2 726 910−2 734 440	4–6	1.24+06	4.92−02	8.60+00	−0.706	A+	5
			12 512	12 516	2 726 120−2 734 110	2–4	1.23+06	5.79−02	4.77+00	−0.936	A+	LS
			13 885	13 889	2 726 910−2 734 110	4–4	1.81+05	5.23−03	9.56−01	−1.679	A+	5
46	4*p*−5*s*	^{2}P°−^{2}S		*341.23*	*2 726 647*−3 019 700	6–2	1.35+10	7.87−02	5.30−01	−0.326	A	5,6
				341.542	2 726 910−3 019 700	4–2	9.02+09	7.88−02	3.55−01	−0.501	A	5,6
				340.623	2 726 120−3 019 700	2–2	4.50+09	7.83−02	1.76−01	−0.805	A	5,6
47	4*p*−5*d*	^{2}P°−^{2}D		*325.97*	*2 726 647−3 033 426*	6–10	2.12+10	5.64−01	3.63+00	0.529	A+	6
				326.200	2 726 910−3 033 470	4–6	2.12+10	5.08−01	2.18+00	0.308	A+	6
				325.478	2 726 120−3 033 360	2–4	1.77+10	5.63−01	1.21+00	0.052	A+	5,6
				326.318	2 726 910−3 033 360	4–4	3.54+09	5.66−02	2.43−01	−0.645	A	6
48	4*p*−6*d*	^{2}P°−^{2}D		*212.88*	*2 726 647−3 196 400*	6–10	1.26+10	1.43−01	6.01−01	−0.067	A	6
				212.997	2 726 910−3 196 400	4–6	1.26+10	1.29−01	3.62−01	−0.287	A	6
				212.639	2 726 120−3 196 400	2–4	1.05+10	1.42−01	1.99−01	−0.547	A	6
				212.997	2 726 910−3 196 400	4–4	2.11+09	1.43−02	4.02−02	−1.243	A	6
49	4*p*−7*d*	^{2}P°−^{2}D		*176.16*	*2 726 647−3 294 300*	6–10	7.88+09	6.11−02	2.13−01	−0.436	B+	6
				176.246	2 726 910−3 294 300	4–6	7.86+09	5.49−02	1.27−01	−0.658	B+	6
				176.001	2 726 120−3 294 300	2–4	6.58+09	6.11−02	7.08−02	−0.913	B+	6
				176.246	2 726 910−3 294 300	4–4	1.31+09	6.11−03	1.42−02	−1.612	B	6
50	4*p*−8*d*	^{2}P°−^{2}D		*158.36*	*2 726 647−3 358 100*	6–10	5.22+09	3.27−02	1.02−01	−0.707	B+	1
				158.431	2 726 910−3 358 100	4–6	5.21+09	2.94−02	6.13−02	−0.930	B+	LS
				158.233	2 726 120−3 358 100	2–4	4.37+09	3.28−02	3.42−02	−1.183	B+	LS
				158.431	2 726 910−3 358 100	4–4	8.69+08	3.27−03	6.82−03	−1.883	B	LS
51	4*d*−5*p*	^{2}D−^{2}P°		*338.53*	*2 734 308−3 029 700*	10–6	3.27+09	3.37−02	3.76−01	−0.472	A	5,6
				338.685	2 734 440−3 029 700	6–4	2.93+09	3.36−02	2.25−01	−0.696	A	5,6
				338.306	2 734 110−3 029 700	4–2	3.30+09	2.84−02	1.26−01	−0.945	A	6
				338.306	2 734 110−3 029 700	4–4	3.23+08	5.55−03	2.47−02	−1.654	B+	6
52	4*d*−6*p*	^{2}D−^{2}P°		*217.73*	*2 734 308−3 193 600*	10–6	1.50+09	6.40−03	4.59−02	−1.194	B+	6
				217.789	2 734 440−3 193 600	6–4	1.27+09	6.03−03	2.60−02	−1.442	B+	6
				217.633	2 734 110−3 193 600	4–2	1.64+09	5.81−03	1.66−02	−1.634	B+	6
				217.633	2 734 110−3 193 600	4–4	1.61+08	1.14−03	3.27−03	−2.341	B+	6
53	4*d*−7*p*	^{2}D−^{2}P°		*179.28*	*2 734 308−3 292 100*	10–6	9.24+08	2.67−03	1.58−02	−1.573	B	6
				179.321	2 734 440−3 292 100	6–4	8.28+08	2.66−03	9.43−03	−1.797	B	6
				179.215	2 734 110−3 292 100	4–2	9.33+08	2.25−03	5.30−03	−2.046	B	6
				179.215	2 734 110−3 292 100	4–4	9.15+07	4.41−04	1.04−03	−2.754	C+	6
54	4*d*−8*p*	^{2}D−^{2}P°		*160.72*	*2 734 308*−3 356 500	10–6	5.85+08	1.36−03	7.19−03	−1.866	C+	1
				160.756	2 734 440−3 356 500	6–4	5.27+08	1.36−03	4.32−03	−2.088	B	LS
				160.671	2 734 110−3 356 500	4–2	5.84+08	1.13−03	2.39−03	−2.345	C+	LS
				160.671	2 734 110−3 356 500	4–4	5.87+07	2.27−04	4.80−04	−3.042	C+	LS

TABLE 44. Transition probabilities of allowed lines for Al XI (references in this table are as follows: 1=Peach *et al.*,[55,56] 2=Froese Fischer,[22] 3=Yan *et al.*,[85] 4=Johnson *et al.*,[32] 5=Stancalie,[66] 6=Guennou and Sureau,[28] 7=Zhang *et al.*,[86] and 8=Martin *et al.*[44])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
55	$4d-9p$	^{2}D–^{2}P°		*150.33*	*2 734 308–3 399 500*	10–6	3.93+08	7.98−04	3.95−03	−2.098	C	1
				150.362	2 734 440–3 399 500	6–4	3.53+08	7.98−04	2.37−03	−2.320	C	LS
				150.288	2 734 110–3 399 500	4–2	3.93+08	6.65−04	1.32−03	−2.575	C	LS
				150.288	2 734 110–3 399 500	4–4	3.93+07	1.33−04	2.63−04	−3.274	D+	LS
56	$5s-5p$	^{2}S–^{2}P°	*10 000*	*10 000*	3 019 700–*3 029 700*	2–6	7.37+06	3.32−01	2.18+01	−0.178	A+	5
			9 997	10 000	3 019 700–3 029 700	2–4	7.37+06	2.21−01	1.46+01	−0.355	A+	5
			9 997	10 000	3 019 700–3 029 700	2–2	7.37+06	1.11−01	7.28+00	−0.654	A+	5
57	$5s-6p$	^{2}S–^{2}P°		*575.0*	3 019 700–*3 193 600*	2–6	2.95+09	4.38−01	1.66+00	−0.057	A	1
				575.04	3 019 700–3 193 600	2–4	2.95+09	2.92−01	1.11+00	−0.234	A	LS
				575.04	3 019 700–3 193 600	2–2	2.95+09	1.46−01	5.53−01	−0.535	A	LS
58	$5s-7p$	^{2}S–^{2}P°		*367.11*	3 019 700–*3 292 100*	2–6	2.02+09	1.22−01	2.96−01	−0.613	B+	6
				367.107	3 019 700–3 292 100	2–4	2.01+09	8.13−02	1.97−01	−0.789	B+	6
				367.107	3 019 700–3 292 100	2–2	2.04+09	4.11−02	9.94−02	−1.085	B+	6
59	$5s-8p$	^{2}S–^{2}P°		*296.91*	3 019 700–*3 356 500*	2–6	1.40+09	5.55−02	1.08−01	−0.955	B+	1
				296.912	3 019 700–3 356 500	2–4	1.40+09	3.70−02	7.23−02	−1.131	B+	LS
				296.912	3 019 700–3 356 500	2–2	1.40+09	1.85−02	3.62−02	−1.432	B+	LS
60	$5s-9p$	^{2}S–^{2}P°		*263.30*	3 019 700–*3 399 500*	2–6	9.85+08	3.07−02	5.32−02	−1.212	B	1
				263.296	3 019 700–3 399 500	2–4	9.86+08	2.05−02	3.55−02	−1.387	B	LS
				263.296	3 019 700–3 399 500	2–2	9.81+08	1.02−02	1.77−02	−1.690	B	LS
61	$5p-5d$	^{2}P°–^{2}D		*3 726* cm^{-1}	*3 029 700–3 033 426*	6–10	4.09+05	7.39−02	3.92+01	−0.353	A+	5
				3 770 cm^{-1}	3 029 700–3 033 470	4–6	4.26+05	6.74−02	2.35+01	−0.569	A+	5
				3 660 cm^{-1}	3 029 700–3 033 360	2–4	3.25+05	7.27−02	1.31+01	−0.837	A+	5
				3 660 cm^{-1}	3 029 700–3 033 360	4–4	6.49+04	7.27−03	2.61+00	−1.536	A+	5
62	$5p-6d$	^{2}P°–^{2}D		*599.9*	*3 029 700–3 196 400*	6–10	6.36+09	5.72−01	6.78+00	0.536	A+	1
				599.88	3 029 700–3 196 400	4–6	6.36+09	5.15−01	4.07+00	0.314	A+	LS
				599.88	3 029 700–3 196 400	2–4	5.30+09	5.72−01	2.26+00	0.058	A+	LS
				599.88	3 029 700–3 196 400	4–4	1.06+09	5.72−02	4.52−01	−0.641	A	LS
63	$5p-7d$	^{2}P°–^{2}D		*377.93*	*3 029 700–3 294 300*	6–10	4.19+09	1.49−01	1.12+00	−0.049	A	6
				377.929	3 029 700–3 294 300	4–6	4.19+09	1.35−01	6.70−01	−0.268	A	6
				377.929	3 029 700–3 294 300	2–4	3.48+09	1.49−01	3.71−01	−0.526	B+	6
				377.929	3 029 700–3 294 300	4–4	7.00+08	1.50−02	7.46−02	−1.222	B+	6
64	$5p-8d$	^{2}P°–^{2}D		*304.51*	*3 029 700–3 358 100*	6–10	2.82+09	6.53−02	3.93−01	−0.407	B+	1
				304.507	3 029 700–3 358 100	4–6	2.82+09	5.88−02	2.36−01	−0.629	B+	LS
				304.507	3 029 700–3 358 100	2–4	2.35+09	6.53−02	1.31−01	−0.884	B+	LS
				304.507	3 029 700–3 358 100	4–4	4.70+08	6.53−03	2.62−02	−1.583	B	LS
65	$5d-6p$	^{2}D–^{2}P°		*624.3*	*3 033 426–3 193 600*	10–6	1.64+09	5.74−02	1.18+00	−0.241	A	1
				624.49	3 033 470–3 193 600	6–4	1.47+09	5.74−02	7.08−01	−0.463	A	LS
				624.06	3 033 360–3 193 600	4–2	1.64+09	4.78−02	3.93−01	−0.719	A	LS
				624.06	3 033 360–3 193 600	4–4	1.64+08	9.57−03	7.86−02	−1.417	A	LS
66	$5d-7p$	^{2}D–^{2}P°		*386.59*	*3 033 426–3 292 100*	10–6	5.37+08	7.22−03	9.19−02	−1.141	B+	6
				386.653	3 033 470–3 292 100	6–4	4.80+08	7.17−03	5.48−02	−1.366	B+	6
				386.488	3 033 360–3 292 100	4–2	5.46+08	6.11−03	3.11−02	−1.612	B+	6

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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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				386.488	3 033 360–3 292 100	4–4	5.31+07	1.19−03	6.05−03	−2.322	B	6
67	5*d*−8*p*	^{2}D−^{2}P°		*309.53*	*3 033 426–3 356 500*	10–6	5.50+08	4.74−03	4.83−02	−1.324	B	1
				309.569	3 033 470–3 356 500	6–4	4.95+08	4.74−03	2.90−02	−1.546	B+	LS
				309.463	3 033 360–3 356 500	4–2	5.50+08	3.95−03	1.61−02	−1.801	B	LS
				309.463	3 033 360–3 356 500	4–4	5.51+07	7.91−04	3.22−03	−2.500	B	LS
68	5*d*−9*p*	^{2}D−^{2}P°		*273.17*	*3 033 426–3 399 500*	10–6	3.62+08	2.43−03	2.18−02	−1.614	C+	1
				273.202	3 033 470–3 399 500	6–4	3.26+08	2.43−03	1.31−02	−1.836	C+	LS
				273.120	3 033 360–3 399 500	4–2	3.61+08	2.02−03	7.27−03	−2.093	C+	LS
				273.120	3 033 360–3 399 500	4–4	3.61+07	4.04−04	1.45−03	−2.792	C	LS
69	6*p*−6*d*	^{2}P°−^{2}D		*2 800 cm^{-1}*	*3 193 600–3 196 400*	6–10	3.83+05	1.22−01	8.62+01	−0.135	A+	1
				2 800 cm^{-1}	3 193 600–3 196 400	4–6	3.83+05	1.10−01	5.17+01	−0.357	A+	LS
				2 800 cm^{-1}	3 193 600–3 196 400	2–4	3.19+05	1.22−01	2.87+01	−0.613	A+	LS
				2 800 cm^{-1}	3 193 600–3 196 400	4–4	6.38+04	1.22−02	5.74+00	−1.312	A+	LS
70	6*p*−7*d*	^{2}P°−^{2}D		*993.0*	*3 193 600–3 294 300*	6–10	2.41+09	5.94−01	1.17+01	0.552	A	1
				993.05	3 193 600–3 294 300	4–6	2.41+09	5.35−01	7.00+00	0.330	A	LS
				993.05	3 193 600–3 294 300	2–4	2.01+09	5.94−01	3.88+00	0.075	A	LS
				993.05	3 193 600–3 294 300	4–4	4.02+08	5.94−02	7.77−01	−0.624	A	LS
71	6*p*−8*d*	^{2}P°−^{2}D		*607.9*	*3 193 600–3 358 100*	6–10	1.70+09	1.57−01	1.88+00	−0.026	A	1
				607.90	3 193 600–3 358 100	4–6	1.70+09	1.41−01	1.13+00	−0.249	A	LS
				607.90	3 193 600–3 358 100	2–4	1.42+09	1.57−01	6.28−01	−0.503	A	LS
				607.90	3 193 600–3 358 100	4–4	2.83+08	1.57−02	1.26−01	−1.202	B+	LS
72	6*d*−7*p*	^{2}D−^{2}P°		*1 044.9*	*3 196 400–3 292 100*	10–6	8.41+08	8.26−02	2.84+00	−0.083	A	1
				1 044.93	3 196 400–3 292 100	6–4	7.57+08	8.26−02	1.70+00	−0.305	A	LS
				1 044.93	3 196 400–3 292 100	4–2	8.41+08	6.88−02	9.47−01	−0.560	A	LS
				1 044.93	3 196 400–3 292 100	4–4	8.43+07	1.38−02	1.90−01	−1.258	B+	LS
73	6*d*−8*p*	^{2}D−^{2}P°		*624.6*	*3 196 400–3 356 500*	10–6	5.07+08	1.78−02	3.66−01	−0.750	B+	1
				624.61	3 196 400–3 356 500	6–4	4.56+08	1.78−02	2.20−01	−0.971	B+	LS
				624.61	3 196 400–3 356 500	4–2	5.06+08	1.48−02	1.22−01	−1.228	B+	LS
				624.61	3 196 400–3 356 500	4–4	5.06+07	2.96−03	2.43−02	−1.927	B	LS
74	6*d*−9*p*	^{2}D−^{2}P°		*492.37*	*3 196 400–3 399 500*	10–6	3.21+08	7.01−03	1.14−01	−1.154	B	1
				492.368	3 196 400–3 399 500	6–4	2.89+08	7.01−03	6.82−02	−1.376	B	LS
				492.368	3 196 400–3 399 500	4–2	3.21+08	5.84−03	3.79−02	−1.632	B	LS
				492.368	3 196 400–3 399 500	4–4	3.22+07	1.17−03	7.59−03	−2.330	C+	LS
75	7*p*−7*d*	^{2}P°−^{2}D		*2 200 cm^{-1}*	*3 292 100–3 294 300*	6–10	3.59+05	1.85−01	1.66+02	0.045	A+	1
				2 200 cm^{-1}	3 292 100–3 294 300	4–6	3.59+05	1.67−01	1.00+02	−0.175	A+	LS
				2 200 cm^{-1}	3 292 100–3 294 300	2–4	2.99+05	1.85−01	5.54+01	−0.432	A	LS
				2 200 cm^{-1}	3 292 100–3 294 300	4–4	5.97+04	1.85−02	1.11+01	−1.131	A	LS
76	7*p*−8*d*	^{2}P°−^{2}D		*1 515.2*	*3 292 100–3 358 100*	6–10	1.09+09	6.27−01	1.88+01	0.575	A	1
				1 515.15	3 292 100–3 358 100	4–6	1.09+09	5.64−01	1.13+01	0.353	A	LS
				1 515.15	3 292 100–3 358 100	2–4	9.11+08	6.27−01	6.26+00	0.098	A	LS
				1 515.15	3 292 100–3 358 100	4–4	1.82+08	6.27−02	1.25+00	−0.601	A	LS
77	7*d*−8*p*	^{2}D−^{2}P°		*1 607.7*	*3 294 300–3 356 500*	10–6	4.73+08	1.10−01	5.83+00	0.041	A	1

TABLE 44. Transition probabilities of allowed lines for Al XI (references in this table are as follows: 1=Peach *et al.*,[55,56] 2=Froese Fischer,[22] 3=Yan *et al.*,[85] 4=Johnson *et al.*,[32] 5=Stancalie,[66] 6=Guennou and Sureau,[28] 7=Zhang *et al.*,[86] and 8=Martin *et al.*[44])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				1 607.72	3 294 300–3 356 500	6–4	4.26+08	1.10−01	3.49+00	−0.180	A	LS
				1 607.72	3 294 300–3 356 500	4–2	4.74+08	9.18−02	1.94+00	−0.435	A	LS
				1 607.72	3 294 300–3 356 500	4–4	4.75+07	1.84−02	3.90−01	−1.133	B+	LS
78	$7d-9p$	^{2}D–^{2}P°		*950.6*	*3 294 300–3 399 500*	10–6	2.91+08	2.36−02	7.39−01	−0.627	B	1
				950.57	3 294 300–3 399 500	6–4	2.61+08	2.36−02	4.43−01	−0.849	B	LS
				950.57	3 294 300–3 399 500	4–2	2.91+08	1.97−02	2.47−01	−1.103	C+	LS
				950.57	3 294 300–3 399 500	4–4	2.91+07	3.94−03	4.93−02	−1.802	C	LS
79	$8p-8d$	^{2}P°–^{2}D		*1 600* cm^{-1}	*3 356 500–3 358 100*	6–10	2.37+05	2.31−01	2.85+02	0.142	A+	1
				1 600 cm^{-1}	3 356 500–3 358 100	4–6	2.37+05	2.08−01	1.71+02	−0.080	A+	LS
				1 600 cm^{-1}	3 356 500–3 358 100	2–4	1.97+05	2.31−01	9.51+01	−0.335	A+	LS
				1 600 cm^{-1}	3 356 500–3 358 100	4–4	3.94+04	2.31−02	1.90+01	−1.034	A	LS
80	$8d-9p$	^{2}D–^{2}P°	*2 415*	*2 415*	*3 358 100–3 399 500*	10–6	2.56+08	1.34−01	1.07+01	0.127	B+	1
			2 414.7	2 415.5	3 358 100–3 399 500	6–4	2.30+08	1.34−01	6.39+00	−0.095	B+	LS
			2 414.7	2 415.5	3 358 100–3 399 500	4–2	2.56+08	1.12−01	3.56+00	−0.349	B+	LS
			2 414.7	2 415.5	3 358 100–3 399 500	4–4	2.55+07	2.23−02	7.09−01	−1.050	B	LS

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

4.12. Al XII

Helium isoelectronic sequence
Ground state: $1s^2\ ^1S_0$
Ionization energy: 2085.9756 eV (16 824 529 cm^{-1})

4.12.1. Allowed Transitions for Al XII

Not surprisingly, the computed transition rates for this heliumlike spectrum are very accurate. This includes the results of the OP.[15,16] Most of the compiled data below have been taken from this source. Khan *et al.*[36] started with hydrogenic wave functions and then applied the effective charge technique. Johnson *et al.*[33] applied a relativistic MBPT.

To estimate accuracies, we pooled the RSDM of each of the lines for which a transition rate is given by two or more of the references cited below,[17,18,33,36] as discussed in the introduction to Kelleher and Podobedova.[35] We then isoelectronically averaged the logarithmic quality factors observed for He-like lines of Na X and Mg XI using the method described in the introduction to Kelleher and Podobedova.[35] For the higher-lying lines and lines from the OP, we scaled the logarithmic quality factor of the lower-lying lines.

References for Allowed Transitions for Al XII

[17]J. A. Fernley, K. T. Taylor, and M. J. Seton, J. Phys. B **20**, 6457 (1987).

[18]J. A. Fernley, K. T. Taylor, and M. J. Seton, http://legacy.gsfc.nasa.gov/topbase, downloaded on July 28, 1995 (Opacity Project).

[33]W. R. Johnson, D. R. Plante, and J. Sapirstein, Adv. At., Mol. Opt. Phys. **35**, 255 (1995).

[35]D. E. Kelleher and L. I. Podobedova, J. Phys. Chem. Ref. Data **37**, 267 (2008).

[36]F. Khan, G. S. Khandelwal, and J. W.Wilson, Astrophys. J. **329**, 493 (1988).

TABLE 45. Wavelength finding list for allowed lines of Al XII

Wavelength (vac) (Å)	Mult. No.
6.000	9
6.013	8
6.032	7
6.060	6
6.103	5
6.176	4
6.314	3
6.635	2
7.757	1
25.969	22
26.221	21
26.582	20
27.126	19
28.010	18
28.690	16
28.692	16
28.693	16
29.550	33
29.561	33
29.605	33
29.606	33
29.610	17
29.635	31
29.646	31
29.691	31
30.292	34
30.329	32
31.986	14

TABLE 45. Wavelength finding list for allowed lines of Al XII—Continued

Wavelength (vac) (Å)	Mult. No.
31.992	14
31.994	14
33.023	29
33.037	29
33.087	15
33.090	29
33.093	29
33.234	27
33.248	27
33.305	27
33.950	30
34.039	28
42.588	12
42.615	12
42.622	12
44.265	25
44.288	25
44.289	25
44.319	13
44.378	25
44.389	25
44.390	25
45.195	23
45.221	23
45.326	23
45.929	26
46.314	24
61.869	45
62.571	64
63.321	44
64.055	63
65.467	43
66.253	62
68.873	42
69.743	61
74.872	41
75.902	60
85.604	39
85.628	39
85.635	39
87.511	40
87.512	53
87.541	53
87.542	53
87.648	53
87.658	53
88.263	51
88.294	51
88.412	51
88.920	59
89.155	58
89.159	58
89.181	58
89.185	58
89.188	58
89.204	58
89.278	54

TABLE 45. Wavelength finding list for allowed lines of Al XII—Continued

Wavelength (vac) (Å)	Mult. No.
89.594	52
119.373	73
120.484	86
123.610	37
123.707	37
123.732	37
124.896	72
126.113	85
126.934	38
127.104	49
127.164	49
127.167	49
127.372	49
127.410	49
127.413	49
129.921	57
130.285	47
130.351	47
130.610	47
130.815	50
131.152	56
131.160	56
131.257	56
131.262	56
131.270	56
131.290	56
132.151	48
133.532	71
134.925	84
148.509	70
150.234	83
179.528	69
182.054	82
209.081	93
210.828	100
226.635	92
228.689	99
256.770	91
259.410	98
268.936	67
269.173	67
269.234	67
274.632	68
275.264	77
275.382	77
275.389	77
275.773	77
275.866	77
275.873	77
280.588	81
282.346	78
282.840	75
282.971	75
283.482	75
283.587	80
283.600	80
283.793	80

TABLE 45. Wavelength finding list for allowed lines of Al XII—Continued

Wavelength (vac) (Å)	Mult. No.
283.850	80
283.863	80
283.917	80
285.541	76
318.543	90
322.616	97
506.106	89
516.465	96
899.67	10
943.16	10
954.33	10
1 327.65	11

Wavelength (air) (Å)	Mult. No.
3 257.6	35
3 427.1	35
3 473.5	35
4 568.3	36
5 634	46
5 746	46
5 761	46
6 080	46
6 295	46
6 313	46
7 891	65

TABLE 45. Wavelength finding list for allowed lines of Al XII—Continued

Wavelength (air) (Å)	Mult. No.
8 309	65
8 424	65
10 847	66
13 618	74
13 897	74
13 930	74
14 711	74
15 247	74
15 286	74
15 596	87
16 435	87
16 665	87

Wavenumber (cm^{-1})	Mult. No.
4 694	88
3 770	55
3 731	94
3 656	94
3 647	94
3 451	94
3 329	94
3 320	94
1 487	79
731	95

TABLE 46. Transition probabilities of allowed lines for Al XII (references in this table are as follows: 1=Fernley *et al.*,[17,18] 2=Khan *et al.*,[36] and 3 =Johnson *et al.*[33])

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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
1	$1s^2-1s2p$	$^1S-^1P^\circ$		7.757	0–12 891 081	1–3	2.75+13	7.45−01	1.90−02	−0.128	A+	2,3
2	$1s^2-1s3p$	$^1S-^1P^\circ$		6.635	0–15 072 141	1–3	7.61+12	1.51−01	3.29−03	−0.821	A+	2
3	$1s^2-1s4p$	$^1S-^1P^\circ$		6.314	0–15 838 068	1–3	3.13+12	5.62−02	1.17−03	−1.250	A+	2
4	$1s^2-1s5p$	$^1S-^1P^\circ$		6.176	0–16 192 975	1–3	1.59+12	2.73−02	5.55−04	−1.564	A+	2
5	$1s^2-1s6p$	$^1S-^1P^\circ$		6.103	0–16 385 868	1–3	9.16+11	1.53−02	3.08−04	−1.815	A+	2
6	$1s^2-1s7p$	$^1S-^1P^\circ$		6.060	0–16 502 210	1–3	5.75+11	9.50−03	1.89−04	−2.022	A	2
7	$1s^2-1s8p$	$^1S-^1P^\circ$		6.032	0–16 577 734	1–3	3.84+11	6.29−03	1.25−04	−2.201	A	2
8	$1s^2-1s9p$	$^1S-^1P^\circ$		6.013	0–16 629 519	1–3	2.70+11	4.39−03	8.68−05	−2.358	A	2
9	$1s^2-1s10p$	$^1S-^1P^\circ$		6.000	0–16 666 564	1–3	1.96+11	3.18−03	6.28−05	−2.498	A	2
10	$1s2s-1s2p$	$^3S-^3P^\circ$		*919.7*	12 703 061–*12 811 797*	3–9	1.56+08	5.93−02	5.39−01	−0.750	A+	3
				899.67	12 703 061–12 814 213	3–5	1.67+08	3.38−02	3.00−01	−0.994	A+	3
				943.16	12 703 061–12 809 088	3–3	1.44+08	1.92−02	1.79−01	−1.240	A+	3
				954.33	12 703 061–12 807 847	3–1	1.39+08	6.34−03	5.98−02	−1.721	A+	3
11		$^1S-^1P^\circ$		1 327.65	12 815 760–12 891 081	1–3	5.44+07	4.31−02	1.88−01	−1.366	A	1
12	$1s2s-1s3p$	$^3S-^3P^\circ$		*42.60*	12 703 061–*15 050 434*	3–9	4.71+11	3.85−01	1.62−01	0.063	A	1
				42.588	12 703 061–15 051 152	3–5	4.72+11	2.14−01	9.00−02	−0.192	A	LS

TABLE 46. Transition probabilities of allowed lines for Al XII (references in this table are as follows: 1=Fernley *et al.*,[17,18] 2=Khan *et al.*,[36] and 3 =Johnson *et al.*[33])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				42.615	12 703 061–15 049 634	3–3	4.70+11	1.28−01	5.39−02	−0.416	A	LS
				42.622	12 703 061–15 049 244	3–1	4.70+11	4.27−02	1.80−02	−0.892	B+	LS
13		$^1S-^1P^{\circ}$		44.319	12 815 760–15 072 141	1–3	4.52+11	3.99−01	5.82−02	−0.399	A	1
14	1*s*2*s*−1*s*4*p*	$^3S-^3P^{\circ}$		*31.99*	12 703 061–*15 829 159*	3–9	2.07+11	9.51−02	3.00−02	−0.545	B+	1
				31.986	12 703 061–15 829 460	3–5	2.07+11	5.28−02	1.67−02	−0.800	B+	LS
				31.992	12 703 061–15 828 823	3–3	2.07+11	3.17−02	1.00−02	−1.022	B+	LS
				31.994	12 703 061–15 828 659	3–1	2.07+11	1.06−02	3.35−03	−1.498	B+	LS
15		$^1S-^1P^{\circ}$		33.087	12 815 760–15 838 068	1–3	1.98+11	9.77−02	1.06−02	−1.010	B+	1
16	1*s*2*s*−1*s*5*p*	$^3S-^3P^{\circ}$		*28.69*	12 703 061–*16 188 471*	3–9	1.07+11	3.95−02	1.12−02	−0.926	B+	1
				28.690	12 703 061–16 188 626	3–5	1.06+11	2.19−02	6.21−03	−1.182	B+	LS
				28.692	12 703 061–16 188 299	3–3	1.07+11	1.32−02	3.74−03	−1.402	B+	LS
				28.693	12 703 061–16 188 215	3–1	1.06+11	4.38−03	1.24−03	−1.881	B+	LS
17		$^1S-^1P^{\circ}$		29.610	12 815 760–16 192 975	1–3	1.02+11	4.03−02	3.93−03	−1.395	B+	1
18	1*s*2*s*−1*s*6*p*	$^1S-^1P^{\circ}$		28.010	12 815 760–16 385 868	1–3	5.92+10	2.09−02	1.93−03	−1.680	B+	1
19	1*s*2*s*−1*s*7*p*	$^1S-^1P^{\circ}$		27.126	12 815 760–16 502 210	1–3	3.72+10	1.23−02	1.10−03	−1.910	B	1
20	1*s*2*s*−1*s*8*p*	$^1S-^1P^{\circ}$		26.582	12 815 760–16 577 734	1–3	2.50+10	7.94−03	6.95−04	−2.100	C+	1
21	1*s*2*s*−1*s*9*p*	$^1S-^1P^{\circ}$		26.221	12 815 760–16 629 519	1–3	1.75+10	5.42−03	4.68−04	−2.266	B+	1
22	1*s*2*s*−1*s*10*p*	$^1S-^1P^{\circ}$		25.969	12 815 760–16 666 564	1–3	1.28+10	3.88−03	3.32−04	−2.411	B+	1
23	1*s*2*p*−1*s*3*s*	$^3P^{\circ}-^3S$		*45.28*	*12 811 797*–15 020 463	9–3	1.67+11	1.71−02	2.29−02	−0.813	B+	1
				45.326	12 814 213–15 020 463	5–3	9.25+10	1.71−02	1.28−02	−1.068	B+	LS
				45.221	12 809 088–15 020 463	3–3	5.58+10	1.71−02	7.64−03	−1.290	B+	LS
				45.195	12 807 847–15 020 463	1–3	1.86+10	1.71−02	2.54−03	−1.767	B+	LS
24		$^1P^{\circ}-^1S$		46.314	12 891 081–15 050 257	3–1	1.56+11	1.67−02	7.64−03	−1.300	B+	1
25	1*s*2*p*−1*s*3*d*	$^3P^{\circ}-^3D$		*44.34*	*12 811 797–15 067 287*	9–15	1.38+12	6.79−01	8.92−01	0.786	A	1
				44.378	12 814 213–15 067 596	5–7	1.38+12	5.70−01	4.16−01	0.455	A	LS
				44.288	12 809 088–15 067 034	3–5	1.04+12	5.10−01	2.23−01	0.185	A	LS
				44.265	12 807 847–15 066 988	1–3	7.72+11	6.80−01	9.91−02	−0.167	A	LS
				44.389	12 814 213–15 067 034	5–5	3.45+11	1.02−01	7.45−02	−0.292	A	LS
				44.289	12 809 088–15 066 988	3–3	5.78+11	1.70−01	7.44−02	−0.292	A	LS
				44.390	12 814 213–15 066 988	5–3	3.83+10	6.78−03	4.95−03	−1.470	B+	LS
26		$^1P^{\circ}-^1D$		45.929	12 891 081–15 068 371	3–5	1.33+12	7.01−01	3.18−01	0.323	A	1
27	1*s*2*p*−1*s*4*s*	$^3P^{\circ}-^3S$		*33.28*	*12 811 797*–15 816 791	9–3	6.69+10	3.70−03	3.65−03	−1.478	B+	1
				33.305	12 814 213–15 816 791	5–3	3.71+10	3.70−03	2.03−03	−1.733	B+	LS
				33.248	12 809 088–15 816 791	3–3	2.24+10	3.71−03	1.22−03	−1.954	B+	LS
				33.234	12 807 847–15 816 791	1–3	7.47+09	3.71−03	4.06−04	−2.431	B+	LS
28		$^1P^{\circ}-^1S$		34.039	12 891 081–15 828 851	3–1	6.34+10	3.67−03	1.23−03	−1.958	B+	1
29	1*s*2*p*−1*s*4*d*	$^3P^{\circ}-^3D$		*33.07*	*12 811 797–15 836 125*	9–15	4.49+11	1.23−01	1.20−01	0.044	A	1
				33.090	12 814 213–15 836 256	5–7	4.48+11	1.03−01	5.61−02	−0.288	A	LS
				33.037	12 809 088–15 836 017	3–5	3.37+11	9.19−02	3.00−02	−0.560	A	LS
				33.023	12 807 847–15 836 000	1–3	2.51+11	1.23−01	1.34−02	−0.910	B+	LS
				33.093	12 814 213–15 836 017	5–5	1.11+11	1.83−02	9.97−03	−1.039	B+	LS
				33.037	12 809 088–15 836 000	3–3	1.87+11	3.06−02	9.98−03	−1.037	B+	LS

TABLE 46. Transition probabilities of allowed lines for Al XII (references in this table are as follows: 1=Fernley *et al.*,[17,18] 2=Khan *et al.*,[36] and 3 =Johnson *et al.*[33])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				33.093	12 814 213–15 836 000	5–3	1.24+10	1.22−03	6.65−04	−2.215	B+	LS
30		^{1}P°−^{1}D		33.950	12 891 081–15 836 581	3–5	4.20+11	1.21−01	4.06−02	−0.440	A	1
31	1*s*2*p*−1*s*5*s*	^{3}P°−^{3}S		*29.67*	*12 811 797*–16 182 216	9–3	3.32+10	1.46−03	1.28−03	−1.881	B+	1
				29.691	12 814 213–16 182 216	5–3	1.84+10	1.46−03	7.14−04	−2.137	B+	LS
				29.646	12 809 088–16 182 216	3–3	1.11+10	1.46−03	4.27−04	−2.359	B+	LS
				29.635	12 807 847–16 182 216	1–3	3.70+09	1.46−03	1.42−04	−2.836	B	LS
32		^{1}P°−^{1}S		30.329	12 891 081–16 188 281	3–1	3.18+10	1.46−03	4.37−04	−2.359	B+	1
33	1*s*2*p*−1*s*5*d*	^{3}P°−^{3}D		*29.58*	*12 811 797–16 192 010*	9–15	2.06+11	4.52−02	3.96−02	−0.391	B+	1
				29.605	12 814 213–16 192 077	5–7	2.06+11	3.79−02	1.85−02	−0.722	B+	LS
				29.561	12 809 088–16 191 955	3–5	1.55+11	3.39−02	9.90−03	−0.993	B+	LS
				29.550	12 807 847–16 191 946	1–3	1.15+11	4.52−02	4.40−03	−1.345	B+	LS
				29.606	12 814 213–16 191 955	5–5	5.15+10	6.77−03	3.30−03	−1.470	B+	LS
				29.561	12 809 088–16 191 946	3–3	8.63+10	1.13−02	3.30−03	−1.470	B+	LS
				29.606	12 814 213–16 191 946	5–3	5.72+09	4.51−04	2.20−04	−2.647	B	LS
34		^{1}P°−^{1}D		30.292	12 891 081–16 192 244	3–5	1.91+11	4.37−02	1.31−02	−0.882	B+	1
35	1*s*3*s*−1*s*3*p*	^{3}S−^{3}P°	*3 336*	*3 337*	15 020 463–*15 050 434*	3–9	2.00+07	1.00−01	3.30+00	−0.523	A	1
			3 257.6	3 258.5	15 020 463–15 051 152	3–5	2.14+07	5.69−02	1.83+00	−0.768	A	LS
			3 427.1	3 428.1	15 020 463–15 049 634	3–3	1.84+07	3.24−02	1.10+00	−1.012	A	LS
			3 473.5	3 474.5	15 020 463–15 049 244	3–1	1.77+07	1.07−02	3.67−01	−1.493	A	LS
36		^{1}S−^{1}P°	4 568.3	4 569.5	15 050 257–15 072 141	1–3	7.99+06	7.50−02	1.13+00	−1.125	A	1
37	1*s*3*s*−1*s*4*p*	^{3}S−^{3}P°		*123.66*	15 020 463–*15 829 159*	3–9	6.12+10	4.21−01	5.14−01	0.101	A	1
				123.610	15 020 463–15 829 460	3–5	6.13+10	2.34−01	2.86−01	−0.154	A	LS
				123.707	15 020 463–15 828 823	3–3	6.10+10	1.40−01	1.71−01	−0.377	A	LS
				123.732	15 020 463–15 828 659	3–1	6.12+10	4.68−02	5.72−02	−0.853	A	LS
38		^{1}S−^{1}P°		126.934	15 050 257–15 838 068	1–3	6.06+10	4.39−01	1.83−01	−0.358	A	1
39	1*s*3*s*−1*s*5*p*	^{3}S−^{3}P°		*85.62*	15 020 463–*16 188 471*	3–9	3.35+10	1.10−01	9.34−02	−0.481	A	1
				85.604	15 020 463–16 188 626	3–5	3.35+10	6.13−02	5.18−02	−0.735	A	LS
				85.628	15 020 463–16 188 299	3–3	3.35+10	3.68−02	3.11−02	−0.957	A	LS
				85.635	15 020 463–16 188 215	3–1	3.36+10	1.23−02	1.04−02	−1.433	B+	LS
40		^{1}S−^{1}P°		87.511	15 050 257–16 192 975	1–3	3.28+10	1.13−01	3.26−02	−0.947	A	1
41	1*s*3*s*−1*s*6*p*	^{1}S−^{1}P°		74.872	15 050 257–16 385 868	1–3	1.94+10	4.88−02	1.20−02	−1.312	B+	1
42	1*s*3*s*−1*s*7*p*	^{1}S−^{1}P°		68.873	15 050 257–16 502 210	1–3	1.23+10	2.62−02	5.94−03	−1.582	B	1
43	1*s*3*s*−1*s*8*p*	^{1}S−^{1}P°		65.467	15 050 257–16 577 734	1–3	8.20+09	1.58−02	3.41−03	−1.801	B	1
44	1*s*3*s*−1*s*9*p*	^{1}S−^{1}P°		63.321	15 050 257–16 629 519	1–3	5.77+09	1.04−02	2.17−03	−1.983	B+	1
45	1*s*3*s*−1*s*10*p*	^{1}S−^{1}P°		61.869	15 050 257–16 666 564	1–3	4.23+09	7.28−03	1.48−03	−2.138	B+	1
46	1*s*3*p*−1*s*3*d*	^{3}P°−^{3}D	*5 930*	*5 934*	*15 050 434–15 067 287*	9–15	2.73+06	2.40−02	4.23+00	−0.666	A	1
			6 080	6 081	15 051 152–15 067 596	5–7	2.54+06	1.97−02	1.97+00	−1.007	A	LS
			5 746	5 747	15 049 634–15 067 034	3–5	2.25+06	1.86−02	1.06+00	−1.253	A	LS
			5 634	5 636	15 049 244–15 066 988	1–3	1.77+06	2.53−02	4.69−01	−1.597	A	LS
			6 295	6 296	15 051 152–15 067 034	5–5	5.72+05	3.40−03	3.52−01	−1.770	A	LS
			5 761	5 762	15 049 634–15 066 988	3–3	1.25+06	6.20−03	3.53−01	−1.730	A	LS
			6 313	6 315	15 051 152–15 066 988	5–3	6.30+04	2.26−04	2.35−02	−2.947	B+	LS

TABLE 46. Transition probabilities of allowed lines for Al XII (references in this table are as follows: 1=Fernley *et al.*,[17,18] 2=Khan *et al.*,[36] and 3 =Johnson *et al.*[33])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
47	$1s3p-1s4s$	$^3P^\circ-^3S$		*130.49*	*15 050 434*–15 816 791	9–3	4.69+10	3.99−02	1.54−01	−0.445	A	1
				130.610	15 051 152–15 816 791	5–3	2.60+10	3.99−02	8.58−02	−0.700	A	LS
				130.351	15 049 634–15 816 791	3–3	1.57+10	3.99−02	5.14−02	−0.922	A	LS
				130.285	15 049 244–15 816 791	1–3	5.24+09	4.00−02	1.72−02	−1.398	B+	LS
48		$^1P^\circ-^1S$		132.151	15 072 141–15 828 851	3–1	4.39+10	3.83−02	5.00−02	−0.940	A	1
49	$1s3p-1s4d$	$^3P^\circ-^3D$		*127.28*	*15 050 434–15 836 125*	9–15	1.46+11	5.90−01	2.23+00	0.725	A	1
				127.372	15 051 152–15 836 256	5–7	1.45+11	4.95−01	1.04+00	0.394	A	LS
				127.164	15 049 634–15 836 017	3–5	1.10+11	4.43−01	5.56−01	0.124	A	LS
				127.104	15 049 244–15 836 000	1–3	8.13+10	5.91−01	2.47−01	−0.228	A	LS
				127.410	15 051 152–15 836 017	5–5	3.63+10	8.84−02	1.85−01	−0.355	A	LS
				127.167	15 049 634–15 836 000	3–3	6.10+10	1.48−01	1.86−01	−0.353	A	LS
				127.413	15 051 152–15 836 000	5–3	4.03+09	5.89−03	1.24−02	−1.531	B+	LS
50		$^1P^\circ-^1D$		130.815	15 072 141–15 836 581	3–5	1.47+11	6.28−01	8.11−01	0.275	A	1
51	$1s3p-1s5s$	$^3P^\circ-^3S$		*88.36*	*15 050 434*–16 182 216	9–3	2.27+10	8.86−03	2.32−02	−1.098	B+	1
				88.412	15 051 152–16 182 216	5–3	1.26+10	8.86−03	1.29−02	−1.354	B+	LS
				88.294	15 049 634–16 182 216	3–3	7.59+09	8.87−03	7.73−03	−1.575	B+	LS
				88.263	15 049 244–16 182 216	1–3	2.53+09	8.87−03	2.58−03	−2.052	B+	LS
52		$^1P^\circ-^1S$		89.594	15 072 141–16 188 281	3–1	2.15+10	8.64−03	7.65−03	−1.586	B+	1
53	$1s3p-1s5d$	$^3P^\circ-^3D$		*87.60*	*15 050 434–16 192 010*	9–15	7.15+10	1.37−01	3.56−01	0.091	A	1
				87.648	15 051 152–16 192 077	5–7	7.13+10	1.15−01	1.66−01	−0.240	A	LS
				87.541	15 049 634–16 191 955	3–5	5.38+10	1.03−01	8.91−02	−0.510	A	LS
				87.512	15 049 244–16 191 946	1–3	3.98+10	1.37−01	3.95−02	−0.863	A	LS
				87.658	15 051 152–16 191 955	5–5	1.78+10	2.05−02	2.96−02	−0.989	A	LS
				87.542	15 049 634–16 191 946	3–3	2.98+10	3.42−02	2.96−02	−0.989	A	LS
				87.658	15 051 152–16 191 946	5–3	1.98+09	1.37−03	1.98−03	−2.164	B+	LS
54		$^1P^\circ-^1D$		89.278	15 072 141–16 192 244	3–5	7.03+10	1.40−01	1.23−01	−0.377	A	1
55	$1s3d-1s3p$	$^1D-^1P^\circ$		3 770 cm^{-1}	15 068 371–15 072 141	5–3	5.06+04	3.20−03	1.40+00	−1.796	A	1
56	$1s3d-1s4p$	$^3D-^3P^\circ$		*131.26*	*15 067 287–15 829 159*	15–9	8.33+09	1.29−02	8.37−02	−0.713	B+	1
				131.257	15 067 596–15 829 460	7–5	6.99+09	1.29−02	3.90−02	−1.044	A	LS
				131.270	15 067 034–15 828 823	5–3	6.25+09	9.69−03	2.09−02	−1.315	B+	LS
				131.290	15 066 988–15 828 659	3–1	8.34+09	7.18−03	9.31−03	−1.667	B+	LS
				131.160	15 067 034–15 829 460	5–5	1.25+09	3.23−03	6.97−03	−1.792	B+	LS
				131.262	15 066 988–15 828 823	3–3	2.09+09	5.39−03	6.99−03	−1.791	B+	LS
				131.152	15 066 988–15 829 460	3–5	8.35+07	3.59−04	4.65−04	−2.968	B+	LS
57		$^1D-^1P^\circ$		129.921	15 068 371–15 838 068	5–3	6.85+09	1.04−02	2.22−02	−1.284	B+	1
58	$1s3d-1s5p$	$^3D-^3P^\circ$		*89.19*	*15 067 287–16 188 471*	15–9	3.58+09	2.56−03	1.13−02	−1.416	B+	1
				89.204	15 067 596–16 188 626	7–5	3.00+09	2.56−03	5.26−03	−1.747	B+	LS
				89.185	15 067 034–16 188 299	5–3	2.68+09	1.92−03	2.82−03	−2.018	B+	LS
				89.188	15 066 988–16 188 215	3–1	3.57+09	1.42−03	1.25−03	−2.371	B+	LS
				89.159	15 067 034–16 188 626	5–5	5.37+08	6.40−04	9.39−04	−2.495	B+	LS
				89.181	15 066 988–16 188 299	3–3	8.97+08	1.07−03	9.42−04	−2.493	B+	LS
				89.155	15 066 988–16 188 626	3–5	3.58+07	7.12−05	6.27−05	−3.670	B	LS
59		$^1D-^1P^\circ$		88.920	15 068 371–16 192 975	5–3	2.95+09	2.10−03	3.07−03	−1.979	B+	1
60	$1s3d-1s6p$	$^1D-^1P^\circ$		75.902	15 068 371–16 385 868	5–3	1.55+09	8.04−04	1.00−03	−2.396	B+	1

TABLE 46. Transition probabilities of allowed lines for Al XII (references in this table are as follows: 1=Fernley *et al.*,[17,18] 2=Khan *et al.*,[36] and 3 =Johnson *et al.*[33])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
61	$1s3d-1s7p$	^{1}D–^{1}P°		69.743	15 068 371–16 502 210	5–3	9.19+08	4.02–04	4.61–04	−2.697	C+	1
62	$1s3d-1s8p$	^{1}D–^{1}P°		66.253	15 068 371–16 577 734	5–3	5.93+08	2.34–04	2.55–04	−2.932	C+	1
63	$1s3d-1s9p$	^{1}D–^{1}P°		64.055	15 068 371–16 629 519	5–3	4.04+08	1.49–04	1.57–04	−3.128	B	1
64	$1s3d-1s10p$	^{1}D–^{1}P°		62.571	15 068 371–16 666 564	5–3	2.90+08	1.02–04	1.05–04	−3.292	B	1
65	$1s4s-1s4p$	^{3}S–^{3}P°	*8 083*	*8 085*	15 816 791–*15 829 159*	3–9	4.73+06	1.39–01	1.11+01	−0.380	A	1
			7 891	7 893	15 816 791–15 829 460	3–5	5.08+06	7.91–02	6.17+00	−0.625	A	LS
			8 309	8 311	15 816 791–15 828 823	3–3	4.36+06	4.51–02	3.70+00	−0.869	A	LS
			8 424	8 426	15 816 791–15 828 659	3–1	4.17+06	1.48–02	1.23+00	−1.353	A	LS
66		^{1}S–^{1}P°	10 847	10 850	15 828 851–15 838 068	1–3	2.00+06	1.06–01	3.79+00	−0.975	A	1
67	$1s4s-1s5p$	^{3}S–^{3}P°		*269.05*	15 816 791–*16 188 471*	3–9	1.44+10	4.68–01	1.24+00	0.147	A	1
				268.936	15 816 791–16 188 626	3–5	1.44+10	2.60–01	6.91–01	−0.108	A	LS
				269.173	15 816 791–16 188 299	3–3	1.44+10	1.56–01	4.15–01	−0.330	A	LS
				269.234	15 816 791–16 188 215	3–1	1.44+10	5.20–02	1.38–01	−0.807	A	LS
68		^{1}S–^{1}P°		274.632	15 828 851–16 192 975	1–3	1.44+10	4.90–01	4.43–01	−0.310	A	1
69	$1s4s-1s6p$	^{1}S–^{1}P°		179.528	15 828 851–16 385 868	1–3	8.83+09	1.28–01	7.57–02	−0.893	A	1
70	$1s4s-1s7p$	^{1}S–^{1}P°		148.509	15 828 851–16 502 210	1–3	5.67+09	5.62–02	2.75–02	−1.250	B	1
71	$1s4s-1s8p$	^{1}S–^{1}P°		133.532	15 828 851–16 577 734	1–3	3.83+09	3.07–02	1.35–02	−1.513	B	1
72	$1s4s-1s9p$	^{1}S–^{1}P°		124.896	15 828 851–16 629 519	1–3	2.68+09	1.88–02	7.73–03	−1.726	B+	1
73	$1s4s-1s10p$	^{1}S–^{1}P°		119.373	15 828 851–16 666 564	1–3	1.97+09	1.26–02	4.95–03	−1.900	B+	1
74	$1s4p-1s4d$	^{3}P°–^{3}D	*14 350*	*14 355*	*15 829 159–15 836 125*	9–15	8.33+05	4.29–02	1.82+01	−0.413	A	1
			14 711	14 715	15 829 460–15 836 256	5–7	7.75+05	3.52–02	8.53+00	−0.754	A	LS
			13 897	13 900	15 828 823–15 836 017	3–5	6.88+05	3.32–02	4.56+00	−1.002	A	LS
			13 618	13 622	15 828 659–15 836 000	1–3	5.42+05	4.52–02	2.03+00	−1.345	A	LS
			15 247	15 251	15 829 460–15 836 017	5–5	1.74+05	6.06–03	1.52+00	−1.519	A	LS
			13 930	13 933	15 828 823–15 836 000	3–3	3.78+05	1.10–02	1.51+00	−1.481	A	LS
			15 286	15 291	15 829 460–15 836 000	5–3	1.92+04	4.03–04	1.01–01	−2.696	A	LS
75	$1s4p-1s5s$	^{3}P°–^{3}S		*283.24*	*15 829* 159–16 182 216	9–3	1.62+10	6.48–02	5.43–01	−0.234	A	1
				283.482	15 829 460–16 182 216	5–3	8.95+09	6.47–02	3.02–01	−0.490	A	LS
				282.971	15 828 823–16 182 216	3–3	5.40+09	6.48–02	1.81–01	−0.711	A	LS
				282.840	15 828 659–16 182 216	1–3	1.80+09	6.49–02	6.04–02	−1.188	A	LS
76		^{1}P°–^{1}S		285.541	15 838 068–16 188 281	3–1	1.53+10	6.23–02	1.76–01	−0.728	A	1
77	$1s4p-1s5d$	^{3}P°–^{3}D		*275.59*	*15 829 159–16 192 010*	9–15	3.03+10	5.74–01	4.69+00	0.713	A	1
				275.773	15 829 460–16 192 077	5–7	3.02+10	4.82–01	2.19+00	0.382	A	LS
				275.382	15 828 823–16 191 955	3–5	2.27+10	4.31–01	1.17+00	0.112	A	LS
				275.264	15 828 659–16 191 946	1–3	1.69+10	5.75–01	5.21–01	−0.240	A	LS
				275.866	15 829 460–16 191 955	5–5	7.55+09	8.61–02	3.91–01	−0.366	A	LS
				275.389	15 828 823–16 191 946	3–3	1.27+10	1.44–01	3.92–01	−0.365	A	LS
				275.873	15 829 460–16 191 946	5–3	8.38+08	5.74–03	2.61–02	−1.542	B+	LS
78		^{1}P°–^{1}D		282.346	15 838 068–16 192 244	3–5	3.12+10	6.21–01	1.73+00	0.270	A	1
79	$1s4d-1s4p$	^{1}D–^{1}P°		1 487 cm^{-1}	15 836 581–15 838 068	5–3	1.33+04	5.41–03	5.99+00	−1.568	A	1
80	$1s4d-1s5p$	^{3}D–^{3}P°		*283.81*	*15 836 125–16 188 471*	15–9	4.43+09	3.21–02	4.50–01	−0.317	A	1

TABLE 46. Transition probabilities of allowed lines for Al XII (references in this table are as follows: 1=Fernley *et al.*,[17,18] 2=Khan *et al.*,[36] and 3 =Johnson *et al.*[33])—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} (s^{-1})	f_{ik}	S (a.u.)	log gf	Acc.	Source
				283.793	15 836 256–16 188 626	7–5	3.72+09	3.21−02	2.10−01	−0.648	A	LS
				283.863	15 836 017–16 188 299	5–3	3.32+09	2.41−02	1.13−01	−0.919	A	LS
				283.917	15 836 000–16 188 215	3–1	4.42+09	1.78−02	4.99−02	−1.272	A	LS
				283.600	15 836 017–16 188 626	5–5	6.67+08	8.04−03	3.75−02	−1.396	A	LS
				283.850	15 836 000–16 188 299	3–3	1.11+09	1.34−02	3.76−02	−1.396	A	LS
				283.587	15 836 000–16 188 626	3–5	4.44+07	8.93−04	2.50−03	−2.572	B+	LS
81		^{1}D–^{1}P°		280.588	15 836 581–16 192 975	5–3	3.76+09	2.66−02	1.23−01	−0.876	A	1
82	1*s*4*d*–1*s*6*p*	^{1}D–^{1}P°		182.054	15 836 581–16 385 868	5–3	1.88+09	5.60−03	1.68−02	−1.553	B+	1
83	1*s*4*d*–1*s*7*p*	^{1}D–^{1}P°		150.234	15 836 581–16 502 210	5–3	1.07+09	2.18−03	5.39−03	−1.963	B	1
84	1*s*4*d*–1*s*8*p*	^{1}D–^{1}P°		134.925	15 836 581–16 577 734	5–3	6.78+08	1.11−03	2.47−03	−2.256	B	1
85	1*s*4*d*–1*s*9*p*	^{1}D–^{1}P°		126.113	15 836 581–16 629 519	5–3	4.57+08	6.54−04	1.36−03	−2.485	B+	1
86	1*s*4*d*–1*s*10*p*	^{1}D–^{1}P°		120.484	15 836 581–16 666 564	5–3	3.23+08	4.22−04	8.37−04	−2.676	B+	1
87	1*s*5*s*–1*s*5*p*	^{3}S–^{3}P°	*15 980*	*15 987*	16 182 216–*16 188 471*	3–9	1.53+06	1.76−01	2.77+01	−0.277	A	1
			15 596	15 601	16 182 216–16 188 626	3–5	1.64+06	1.00−01	1.54+01	−0.523	A	LS
			16 435	16 439	16 182 216–16 188 299	3–3	1.40+06	5.69−02	9.24+00	−0.768	A	LS
			16 665	16 669	16 182 216–16 188 215	3–1	1.35+06	1.87−02	3.08+00	−1.251	A	LS
88		^{1}S–^{1}P°		4 694 cm^{-1}	16 188 281–16 192 975	1–3	6.56+05	1.34−01	9.40+00	−0.873	A	1
89	1*s*5*s*–1*s*6*p*	^{1}S–^{1}P°		506.106	16 188 281–16 385 868	1–3	4.71+09	5.43−01	9.05−01	−0.265	A	1
90	1*s*5*s*–1*s*7*p*	^{1}S–^{1}P°		318.543	16 188 281–16 502 210	1–3	3.13+09	1.43−01	1.50−01	−0.845	B+	1
91	1*s*5*s*–1*s*8*p*	^{1}S–^{1}P°		256.770	16 188 281–16 577 734	1–3	2.13+09	6.32−02	5.34−02	−1.199	B+	1
92	1*s*5*s*–1*s*9*p*	^{1}S–^{1}P°		226.635	16 188 281–16 629 519	1–3	1.50+09	3.47−02	2.59−02	−1.460	B+	1
93	1*s*5*s*–1*s*10*p*	^{1}S–^{1}P°		209.081	16 188 281–16 666 564	1–3	1.09+09	2.15−02	1.48−02	−1.668	B+	1
94	1*s*5*p*–1*s*5*d*	^{3}P°–^{3}D		*3 539* cm^{-1}	16 188 471–16 192 010	9–15	2.95+05	5.89−02	4.93+01	−0.276	A	1
				3 451 cm^{-1}	16 188 626–16 192 077	5–7	2.73+05	4.82−02	2.30+01	−0.618	A	LS
				3 656 cm^{-1}	16 188 299–16 191 955	3–5	2.44+05	4.56−02	1.23+01	−0.864	A	LS
				3 731 cm^{-1}	16 188 215–16 191 946	1–3	1.92+05	6.21−02	5.48+00	−1.207	A	LS
				3 329 cm^{-1}	16 188 626–16 191 955	5–5	6.14+04	8.31−03	4.11+00	−1.381	A	LS
				3 647 cm^{-1}	16 188 299–16 191 946	3–3	1.35+05	1.52−02	4.12+00	−1.341	A	LS
				3 320 cm^{-1}	16 188 626–16 191 946	5–3	6.78+03	5.53−04	2.74−01	−2.558	A	LS
95	1*s*5*d*–1*s*5*p*	^{1}D–^{1}P°		731 cm^{-1}	16 192 244–16 192 975	5–3	4.32+03	7.27−03	1.64+01	−1.439	A	1
96	1*s*5*d*–1*s*6*p*	^{1}D–^{1}P°		516.465	16 192 244–16 385 868	5–3	1.92+09	4.60−02	3.91−01	−0.638	A	1
97	1*s*5*d*–1*s*7*p*	^{1}D–^{1}P°		322.616	16 192 244–16 502 210	5–3	1.06+09	9.96−03	5.29−02	−1.303	B+	1
98	1*s*5*d*–1*s*8*p*	^{1}D–^{1}P°		259.410	16 192 244–16 577 734	5–3	6.51+08	3.94−03	1.68−02	−1.706	B	1
99	1*s*5*d*–1*s*9*p*	^{1}D–^{1}P°		228.689	16 192 244–16 629 519	5–3	4.29+08	2.02−03	7.60−03	−1.996	B+	1
100	1*s*5*d*–1*s*10*p*	^{1}D–^{1}P°		210.828	16 192 244–16 666 564	5–3	3.00+08	1.20−03	4.16−03	−2.222	B+	1

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

5. References

[1] C. W. Allen, *Allen's Astrophysical Quantities*, 4th ed. (Springer, New York, 2000).
[2] K. M. Aggarwal, Astrophys. J., Suppl. Ser. **118**, 589 (1998).
[3] E. Biémont, At. Data Nucl. Data Tables **48**, 1 (1991).
[4] V. M. Burke and D. L. Lennon, unpublished, available online at http://legacy.gsfc.nasa.gov/topbase, downloaded on July 28, 1995 (Opacity Project).
[5] K. Butler, C. Mendoza, and C. J. Zeippen, J. Phys. B **26**, 4409 (1993).
[6] K. Butler, C. Mendoza, and C. J. Zeippen, http://legacy.gsfc.nasa.gov/topbase, downloaded on July 28, 1995 (Opacity Project).
[7] K. Butler and C. J. Zeippen (unpublished).
[8] K. Butler and C. J. Zeippen, http://legacy.gsfc.nasa.gov/topbase, downloaded on July 28, 1995 (Opacity Project).
[9] T. N. Chang and T. K. Fang, Phys. Rev. A **52**, 2638 (1995).
[10] K. T. Cheng, Y.-K. Kim, and J. P. Desclaux, At. Data Nucl. Data Tables **24**, 111 (1979).
[11] H.-S. Chou, H.-C. Chi, and K.-N. Huang, J. Phys. B **26**, 4079 (1993).
[12] R. D. Cowan, *The Theory of Atomic Structure and Spectra* (University of California Press, Berkeley, CA, 1981).
[13] M. D. Davidson, H. Volten, and A. Dönszelmann, Astron. Astrophys. **238**, 452 (1990).
[14] B. C. Fawcett, At. Data Nucl. Data Tables **37**, 367 (1987).
[15] J. A. Fernley, A. Hibbert, A. E. Kingston, and M. J. Seaton, J. Phys. B **32**, 5507 (1999).
[16] J. A. Fernley, A. Hibbert, A. E. Kingston, and M. J. Seaton, http://legacy.gsfc.nasa.gov/topbase, downloaded on July 28, 1995 (Opacity Project).
[17] J. A. Fernley, K. T. Taylor, and M. J. Seton, J. Phys. B **20**, 6457 (1987).
[18] J. A. Fernley, K. T. Taylor, and M. J. Seton, http://legacy.gsfc.nasa.gov/topbase, downloaded on July 28, 1995 (Opacity Project).
[19] S. Fritzsche and I. P. Grant, Phys. Scr. **50**, 473 (1994).
[20] C. Froese Fischer, http://www.vuse.vanderbilt.edu/~cff/mchf_collection/ (nonrthogonal spline CI, downloaded on February 17, 2004).
[21] C. Froese Fischer, http://www.vuse.vanderbilt.edu/~cff/mchf_collection/ (MCDHF, *ab initio*, downloaded on May 5, 2004).
[22] C. Froese Fischer, http://www.vuse.vanderbilt.edu/~cff/mchf_collection/ (MCDHF, *ab initio*, downloaded on May 6, 2004).
[23] G. Gaigalas, J. Kaniauskas, R. Kisielius, G. Merkelis, and M. J. Vilkas, Phys. Scr. **49**, 135 (1994).
[24] M. E. Galavís, C. Mendoza, and C. J. Zeippen, Astron. Astrophys. Suppl. Ser. **123**, 159 (1997).
[25] M. E. Galavís, C. Mendoza, and C. J. Zeippen, Astron. Astrophys. Suppl. Ser. **131**, 499 (1998).
[26] M. Godefroid, C. E. Magnusson, P. O. Zetterberg, and I. Joelsson, Phys. Scr. **32**, 125 (1985).
[27] J. Granzow, P. H. Heckmann, and E. Träbert, Phys. Scr. **49**, 148 (1994).
[28] H. Guennou and A. Sureau, J. Phys. B **20**, 919 (1987).
[29] P. Hannaford, Microchem. J. **63**, 43 (1999).
[30] A. Hibbert, M. Le Dourneuf, and M. Mohan, At. Data Nucl. Data Tables **53**, 24 (1993).
[31] B. C. Johnson, P. L. Smith, and W. H. Parkinson, Astrophys. J. **308**, 1013 (1986).
[32] W. R. Johnson, Z. W. Liu, and J. Sapirstein, At. Data Nucl. Data Tables **64**, 279 (1996).
[33] W. R. Johnson, D. R. Plante, and J. Sapirstein, Adv. At., Mol., Opt. Phys. **35**, 255 (1995).
[34] V. Kaufman and W. C. Martin, J. Phys. Chem. Ref. Data **20**, 775 (1991).
[35] D. E. Kelleher and L. I. Podobedova, J. Phys. Chem. Ref. Data **37**, 267 (2008).
[36] F. Khan, G. S. Khandelwal, and J. W. Wilson, Astrophys. J. **329**, 493 (1988).
[37] A. E. Kingston and A. Hibbert, J. Phys. B **34**, 81 (2001).
[38] B. Kundu and P. K. Mukherjee, Phys. Rev. A **35**, 980 (1987).
[39] D. A. Landman, J. Quant. Spectrosc. Radiat. Transf. **34**, 365 (1985).
[40] S.-S. Liaw, Can. J. Phys. **70**, 644 (1992).
[41] D. Luo and A. K. Pradhan, J. Phys. B **22**, 3377 (1989).
[42] D. Luo and A. K. Pradhan, http://legacy.gsfc.nasa.gov/topbase, downloaded on July 28, 1995 (Opacity Project).
[43] D. McPeake and A. Hibbert, J. Phys. B **33**, 2809 (2000).
[44] I. Martín, J. Karwowski, G. H. F. Diercksen, and C. Barrientos, Astron. Astrophys. Suppl. Ser. **100**, 595 (1993).
[45] W. C. Martin and R. Zalubas, J. Phys. Chem. Ref. Data **8**, 817 (1979). More recent improvements, based on Ref. 34, have been incorporated in the NIST Atomic Spectra Database (ASD) (Ref. 53).
[46] C. Mendoza, W. Eissner, M. Le Dourneuf, and C. J. Zeippen (unpublished).
[47] C. Mendoza, W. Eissner, M. Le Dourneuf, and C. J. Zeippen, http://legacy.gsfc.nasa.gov/topbase, downloaded on July 28, 1995 (Opacity Project).
[48] C. Mendoza, C. J. Zeippen, and P. J. Storey, Astron. Astrophys. Suppl. Ser. **135**, 159 (1999).
[49] G. Merkelis, I. Martinson, R. Kisielius, and M. J. Vilkas, Phys. Scr. **59**, 122 (1999).
[50] G. Merkelis, J. J. Vilkas, G. Gaigalas, and R. Kisielius, Phys. Scr. **51**, 233 (1995).
[51] G. Merkelis, M. J. Vilkas, R. Kisielius, G. Gaigalas, and I. Martinson, Phys. Scr. **56**, 41 (1997).
[52] P. J. Mohr and B. N. Taylor, Rev. Mod. Phys. **77**, 1 (2005), http://physics.nist.gov/constants
[53] Yu. Ralchenko, F.-C. Jou, D. E. Kelleher, A. E. Kramida,A. Musgrove, J. Reader, W. L. Wiese, and K. Olsen (2007) *NIST Atomic Spectra Database* (version 3.1.3), http://physics.nist.gov/asd3, National Institute of Standards and Technology, Gaithersburg, MD.
[54] J. R. Fuhr, A. E. Kramida, H. R. Felrice, K. Olsen, and S. Kotochigova (2006) *NIST Atomic Transition Probability Bibliographic Database* (version 8.1), http://physics.nist.gov/Fvalbib, National Institute of Standards and Technology, Gaithersburg, MD.
[55] G. Peach, H. E. Saraph, and M. J. Seaton, J. Phys. B **21**, 3669 (1988).
[56] G. Peach, H. E. Saraph, and M. J. Seaton, http://legacy.gsfc.nasa.gov/topbase, downloaded on July 28, 1995 (Opacity Project).
[57] E. R. Peck and K. Reeder, J. Opt. Soc. Am. **62**, 958 (1972).
[58] D. Ray and P. K. Mukherjee, J. Phys. B **22**, 2103 (1989).
[59] D. Ray, P. K. Mukherjee, and H. P. Roy, Astrophys. J. **346**, 1045 (1989).
[60] U. I. Safronova, A. Derevianko, M. S. Safronova, and W. R. Johnson, J. Phys. B **32**, 3527 (1999). A complete data listing was made available by private communication.
[61] U. I. Safronova, W. R. Johnson, and A. Derevianko, Phys. Scr. **60**, 46 (1999).
[62] U. I. Safronova, W. R. Johnson, and A. E. Livingston, Phys. Rev. A **60**, 996 (1999). A complete data listing was made available by private communication.
[63] U. I. Safronova, W. R. Johnson, M. S. Safronova, and A. Derevianko, Phys. Scr. **59**, 286 (1999).
[64] K. D. Sen and A. Puri, Chem. Phys. Lett. **156**, 505 (1989).
[65] W. Siegel, J. Migdalek, and Y.-K. Kim, At. Data Nucl. Data Tables **68**, 303 (1998).
[66] V. Stancalie, Phys. Scr. **61**, 459 (2000).
[67] G. Tachiev and C. Froese Fischer, J. Phys. B **33**, 2419 (2000).
[68] G. Tachiev and C. Froese Fischer, Can. J. Phys. **79**, 955 (2001).
[69] G. Tachiev and C. Froese Fischer, Astron. Astrophys. **385**, 716 (2002).
[70] G. Tachiev and C. Froese Fischer, http://www.vuse.vanderbilt.edu~cff/mchf_collection/ (MCHF, energy adjusted, downloaded on February 17, 2004).
[71] G. Tachiev and C. Froese Fischer, http://www.vuse.vanderbilt. edu/~cff/mchf_collection/ (MCHF, *ab initio*, downloaded on February 17, 2004).
[72] G. Tachiev and C. Froese Fischer, http://www.vuse.vanderbilt.edu/~cff/mchf_collection/ (MCHF, *ab initio*, downloaded on February 23, 2005).
[73] C. E. Theodosiou and L. J. Curtis, Phys. Rev. A **38**, 4435 (1988).
[74] E. Träbert, Phys. Scr. **53**, 167 (1996).
[75] E. Träbert, A. Wolf, J. Linkemann, and X. Tordoir, J. Phys. B **32**, 537 (1999).
[76] C. E. Tull, M. Jackson, R. P. McEachran, and M. Cohen, Can. J. Phys. **50**, 1169 (1972).
[77] J. A. Tully, M. J. Seaton, and K. A. Berrington, J. Phys. B **23**, 3811 (1990).
[78] J. A. Tully, M. J. Seaton, and K. A. Berrington, http://legacy.gsfc.nasa.gov/topbase, downloaded on July 28, 1995 (Opacity Project).
[79] M. J. Vilkas, I. Martinson, G. Merkelis, G. Gaigalas, and R. Kisielius, Phys. Scr. **54**, 281 (1996).
[80] M. J. Vilkas, G. Merkelis, R. Kisielius, G. Gaigalas, A. Bernotas, and Z. Rudzikas, Phys. Scr. **49**, 592 (1994).

[81] V. Vujnović, K. Blagoev, C. Fürböck, T. Neger, and H. Jäger, Astron. Astrophys. **388**, 704 (2002).
[82] A. W. Weiss (private communication).
[83] W. L. Wiese, J. R. Fuhr, and T. M. Deters, *Atomic Transition Probabilities of Carbon, Nitrogen, and Oxygen*, JPCRD Monograph 7 (AIP, New York, 1996).
[84] W. L. Wiese, M. W. Smith, and B. M. Miles, *Atomic Transition Probabilities, Vol. II: Sodium through Calcium*, NSRDS-NBS Vol. 22 (U.S. GPO, Washington, D.C., 1969). The first updated compilation of NIST transition probabilities has been published in Ref. 83.
[85] Z.-C. Yan, M. Tambasco, and G. W. F. Drake, Phys. Rev. A **57**, 1652 (1998).
[86] H. L. Zhang, D. H. Sampson, and C. J. Fontes, At. Data Nucl. Data Tables **44**, 31 (1990).
[87] G. Tachiev and C. Froese Fischer, http://www.vuse.vanderbilt.edu/~cff/mchf_collection/ (MCHF, ab initio, downloaded on February 12, 2004).