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An Internally Consistent set of Oscillator Strengths for Fe I Lines

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Abstract. We present here an extensive list of internally consistent oscillator strengths for Fe I lines. We have compiled and critically reviewed the oscillator strengths existing in literature. An attempt has been made to scale the oscillator strengths derived by different workers to that of Blackwell and his collaborators and prepare a single consistent set of oscillator strengths.

We have calibrated a log gf–log λ–E_1–log I relationship that can be used for calculating gf values for Fe I lines with no gf values available. We demonstrate that standard error of such a calibration can be considerably reduced by binning the data in 0.5 eV range in excitation potential.

We also tabulate systematic corrections to be applied to the oscillator strengths of Kurucz & Peytremann (1975) for lines belonging to different multiplets.

Key words: oscillator strengths—elemental abundances—synthetic spectra

1. Introduction

Quantitative spectroscopy which leads us towards better understanding of the physical conditions, velocity fields and elemental abundances in the stellar atmospheres depends heavily upon the availability of accurate atomic data. The oscillator strength is one of the most important parameters needed in the calculation of line absorption. The oscillator strength data is essential for two types of astrophysical calculations: (1) *Model atmosphere calculations*: Absorption coefficients are essential parameters describing the interaction of radiation with matter and therefore are crucial quantities in the calculations of model atmosphere. One requires atomic data for all the stellar lines that would contribute to total absorption coefficient in the calculation of line-blanketed model atmosphere. This total absorption coefficient in turn would determine the atmospheric stratification in the model atmosphere. Atmospheric models for the sun and stars can also be tested and improved using the lines of neutral and ionized species of the same elements. The element iron which has numerous lines in the spectra of F-K spectral type objects is a very suitable element.

Normally our preliminary estimate for atmospheric parameters like temperature, gravities and turbulence are improved by using a set of unblended Fe I and Fe II lines with good *gf* values. (2) *Stellar abundances*: Spectroscopic determinations of stellar abundances use a well-known relationship between the line strength (referred to as equivalent width) and the number of absorbing atoms; this is known as curve of growth. To employ this relation for the determination of stellar abundances, one requires the equivalent width and line parameters for a large number of lines and a suitable model to represent the atmosphere of the star. Spectrum synthesis technique which has been developed over last decade, does not require equivalent width data but it does require oscillator strengths for all lines falling into the spectral region being synthesized.

With the aid of fast digital computers it is now possible to do detailed theoretical calculations of line spectra taking into consideration the depth dependence of various physical quantities in the stellar atmospheres. Besides, there has been considerable development towards instrumentation; spectrographs giving a resolution of $\sim 10^5$ to $\sim 10^6$ are available now for stellar work. The equivalent widths can be measured very precisely in photographic spectrophotometry using computer-controlled micro-densitometers. Modern solid-state detectors like the CCD, reticon and digicon enable us to measure precise equivalent widths even for faint objects.

Now it appears that the accuracy of abundance determination is limited mostly by the inaccuracies in the oscillator strength data of the lines and there is growing need for a complete list of precise, internally consistent oscillator strengths. We discuss the oscillator strengths derived from different approaches in Sections 2–5. The calibration of log *gf*–log λ–E_l–log I relation will be described in Section 6.

2. Oscillator strengths

2.1 *Theoretical Oscillator Strengths*

It is possible to calculate reasonably good oscillator strengths for light atoms with simple structures from quantum mechanical considerations. The oscillator strengths are related to Einstein transition probabilities through

$$B_{n'n} = \frac{\pi e^2}{mc}\frac{4\pi}{h\nu} f_{n'n}$$

$$A_{n'n} = \frac{g_{n'}}{g_n}\frac{8\pi^2 e^2 \nu^2}{mc^3} f_{n'n}$$

for a transition between upper level n and lower level n' (Aller 1963, p. 176). The g_n and $g_{n'}$ are the statistical weights of levels n and n'. One needs to calculate the line strength parameter S and radial quantum integral σ for the calculation of transition probability. The former can be easily calculated for atoms in LS coupling and Coulomb approximation can be applied in the calculation of σ for single valance electron system. The calculation becomes very complex for a heavy element like iron. Some attempts have been made over last few years: *e.g.* Froese Fischer (1979) used Hartree-Fock approximation, whereas Shorer (1979) used relativistic random phase approximation for the calculation of Fe I *gf* values. None of the theoretical attempts give *gf* values of

desired accuracy. Oscillator strengths for heavy elements are better calculated using semiempirical methods.

A good account of earlier theoretical attempts to derive *gf* values can be found in Crossley (1984) and Führ *et al.* (1981).

2.2 *Semi-empirical Oscillator Strengths*

The most extensive work on the semi-empirical oscillator strengths is by Kurucz & Peytremann (1975; hereinafter KP). These authors have calculated oscillator strengths for all allowed transitions between the observed levels of the neutral and first four ionized states for all elements between boron ($Z=5$) and Nickel ($Z=28$). The transitions for heavier elements are also included but only two ionization states are considered. The computer code developed by KP first calculates scaled Thomas-Fermi-Dirac wave functions and then performs the least square fits to energy levels to determine Slater parameter and eigenvectors. Another program calculates electrostatic and spin orbit *gf* matrices, eigenvalues, LS transition arrays and finally *gf* using Slater parameter radial integral as input. Kurucz (1973) has compiled almost all energy levels and line strength information available in literature. This information is input in the calculation of scaled Thomas-Fermi-Dirac wave functions for a large number of elements and all possible transition integrals. The Slater parameters calculated using observed energy levels are used to predict unobserved energy levels and wavelengths to calculate *gf* values for all possible lines between configurations for which observed energy levels were available. The *gf* value table of KP running in three volumes contains 1.6×10^5 lines and is perhaps the largest set of *gf* values in literature. However, these *gf* values, when compared to the best determined ones, show systematic differences. We will defer the discussion of errors of KP to a later section.

2.3 *Empirical Oscillator Strengths*

Experimental data on Fe I oscillator strengths is rather extensive. Many experiments, involving lifetime measurements, absorption or emission technique, or absorption and anomalous dispersion measurement technique (called as hook method) have been employed. Relative oscillator strengths are measured in experiments involving emission, absorption, or hook method. However absolute scale for oscillator strengths can be derived only through the experiments concerning lifetime measurements of certain excited levels. The typical example of this technique are beam foil experiments. This technique is used by many workers like Wiese (1970), Whaling, King & Martinez-Garcia (1969), Hilborn & de Zafra (1969), Brozowski *et al.* (1976) with different kinds of experimental set-ups.

This method though quite simple in concept and has added advantage of being insensitive to temperature, suffers due to cascading effects caused by the simultaneous excitation to even higher excitation states (than the one being examined). The radiative de-excitation to the level considered would cause uncertainty in the lifetime measures through additional humps in decay curves.

The accuracy of experiments involving absorption or emission methods strongly depends upon the temperature control and precision in temperature measurements.

Besides, these methods assume that local thermo-dynamic equilibrium is maintained. Also, very high photometric accuracy is required in measuring line strengths. Hook method also requires very good temperature and pressure control and hooks could be measured accurately only for strong lines. Corliss & Bozman (1962), Corliss & Warner (1964), Wolnik, Berthel & Wares (1970) are amongst the several earlier attempts using spark, arc, shock tube absorption or emission methods. Though Corliss & Bozman (1962) derived oscillator strengths for a very large number of lines and these oscillator strengths were used in abundance work, soon it became apparent that the accuracy of these oscillator strengths was far below the described accuracy. Not only is there large internal scatter, but also the solar abundance of iron derived using solar coronal lines differed from the photospheric iron abundance by a factor of 10. However, these differences became very small when the *gf* values derived by Bridges & Kornblith (1974; hereinafter BK) and May Richter & Wichelmann (1974; hereinafter MRW) were used. BK measure Fe I oscillator strengths for over 500 lines using a wall stabilized arc operated in argon with an $FeCl_3$ admixture. Line intensities were measured with good accuracy using a scanning Ebert spectrometer giving a linear dispersion of 2.5 Å mm^{-1}. The temperature errors were also minimized by BK, since their absolute scale is based on lifetime data for 40 Fe I lines covering a large range in excitation potential. May derived oscillator strengths for 1001 Fe I lines from similar experiments using stabilized arc but line strengths were measured using photographic method. The difference log *gf* (BK)–log *gf* (MRW) for most of the cases is very small, always in the second decimal place. Also this difference does not show any dependence on excitation potential of the lines or on line intensities. The accuracy of these *gf* values are between 10 and 25 per cent.

An accuracy of a few per cent for absolute *gf* values is attained by Blackwell and his collaborators using Oxford furnace (absorption) method. An accuracy of 1% has been obtained for relative oscillator strengths by the same group. The experimental set up is described in detail by Blackwell & Collins (1972). Here the temperature inside the furnace is very precisely stabilized and measured. Very good photometric accuracy is achieved in measuring the line strength using a couple of low noise electron spectrometers. A continuous check and required correction for the continuum level variations is also made. These measurements have attained a new level of sophistication in experimental determination of *gf* values and therefore can be used as reference values to estimate the accuracy of other *gf* estimates. The *gf* values are published by Blackwell and his collaborators in a series of papers (Blackwell & Collins 1972; Blackwell *et al.* 1976, 1979, 1980, 1982, 1986; Blackwell, Petford & Shallis 1979; Blackwell, Petford & Simmons 1982; Simmons & Blackwell 1982). We will refer to them as OXF *gf* values.

2.4 *Solar gf Values*

Our understanding of solar atmosphere, its velocity fields, and therefore of solar spectrum has improved considerably over last decade. Besides, solar lines are measured with much better precision now. It is therefore possible to use solar lines of moderate strength to derive accurate *gf* values. Rutten & Van der Zalm (1984; hereinafter RZ), Gurtovenko & Kostik (1981; hereinafter GK) have derived solar *gf* values for very large number of Fe I lines.

GK used the solar photospheric model of Holweger & Müller (1974) and the line strengths of unblended solar lines measured on Liège solar atlas. The factors normally affecting the accuracy of solar *gf* values are inadequate formulations of collisional damping and atmospheric turbulence and also the departure from LTE assumption. As the damping process plays more significant role in the formation of stronger lines, it is better to deal with lines of moderate strengths. We have taken from the list of GK the *gf* values for solar lines weaker than 200 mÅ. Solar photospheric model of Holweger & Müller (1974) used by GK gives fairly good representation of solar atmosphere. We believe that the accuracy of chosen *gf* value of GK is better than 10 per cent.

RZ have done more detailed analysis of solar lines. They have considered non-LTE effects in their calculations and use full profile of the lines for matching the computed lines with observed solar spectrum. They have choosen unblended weak lines and therefore the line strength calculation does not depend upon the damping parameter. They have achieved an accuracy of 2–3 per cent for the derived *gf* values. But the *gf* value list of RZ is not as extensive as that of GK. Also not many lines of RZ have good laboratory intensity values and therefore do not help much in the proposed calibration of log *gf*–log λ–E_l–log I relation. We, therefore, have retained *gf* values of RZ as well as GK although we have preferred RZ *gf* values over GK.

3. Calibration of log *gf*–log λ–E_l–log *I* relationship

It is well known that the strength of a line is a function of its oscillator strength, excitation potential and wavelength of the line. Considerable improvement has been achieved now in the measurement of line intensities. An accuracy of 13 per cent is attained by Meggers, Corliss & Seribner (1975) in their laboratory line intensity measurements. Oscillator strengths, excitation potentials and central wavelengths of the line are known with sufficient accuracy for a large number of lines. It is therefore possible to calibrate a relation between the oscillator strengths and line intensities. Cowley (1983) made an attempt to calibrate a relation that would predict good *gf* values from the line data consisting of wavelength, excitation potential and line intensity. Cowley (1983) used Fe I lines with good *gf* values derived by Oxford workers and the line intensities of Meggers, Corliss & Seribner (1975) to calibrate an equation of form

$$\log gf = A + B \log \lambda + cEu + D \log I.$$

The standard error of the fit was 0.15 dex for the sample considered.

One shortcoming of the work of Cowley (1983) is that the excitation potential range covered in their sample is rather limited (0.0–2.5 eV). Besides, all calibrating lines have been piled into a single set and coefficients are calculated for entire set.

Our compilation of *gf* values presented in Appendix is rather extensive. We have included, in addition to the *gf* values of Oxford group, solar *gf* values of GK & RZ, and experimental *gf* values of BK and MRW. However, for the calibration of log *gf*–log λ–E_l–log *I* relationship we have only used the lines for which laboratory line intensities of Meggers, Corliss & Seribner (1975) were available.

Unfortunately, the laboratory intensities are not available for most of the lines included in the investigation of RZ. We could gather from the various sources only 361 lines with good *gf* values as well as laboratory line intensities. The *gf* values of GK are

normalized to that of OXF *gf* values and they also cover a good range in excitation potential (0.0–4.6 eV). There is sufficient overlap between GK, BK and MRW. As we have stated earlier, there is no systematic trend between *gf* values of BK and MRW as a function of excitation potential or line intensities. Besides, the differences log *gf* (BK)–log *gf*(MRW) seldom exceed 0.1. On the other hand, the *gf* values from these two investigations show a systematic difference when compared with *gf* values GK or OXF. Since one of the major source of error in laboratory *gf* values is the temperature and it manifests itself through the dependence of error on excitation potential (*cf.* Fig. 2 on p. 258 of Blackwell & Collins 1972), we decided to look for the possible dependence of log *gf* (BK, MRW) − log *gf* (GK, OXF) on the excitation potentials. Since the available data is rather clumped in excitation potential ranges like 0.0–0.1 eV, 0.8–1.01 eV, 1.48–1.60 eV etc. we decided to calculate the coefficients for the equation of type

$$\log gf(\text{OXF, GK}) = A + B \log gf(\text{BK, MRW})$$

for the group of lines falling into excitation potential range mentioned earlier. Our results are presented in Table 1. The *gf* values of BK and MRW were brought to the scales of OXF *gf* values using the coefficients in Table 1.

With this, we have now a sufficient number of lines covering 0.0–4.5 eV in excitation potential range to calibrate the log *gf*–log λ–E_l–log I relationship. Initially, we used all 361 lines as a single set and calculated coefficients for relation.

$$\log gf = A + B \log \lambda + CE_l + D \log I$$

such a fit gave large residuals and the standard error of the fit was 0.25 dex. With all our reference *gf* values being the empirical ones which, besides other things are sensitive to temperature errors, one could not rule out the dependence of errors in excitation potentials of the lines. We, therefore, felt it was worthwhile calculating the coefficients for groups of lines confined to a small range in excitation potential, say 0.5 eV. We, therefore, decided to bin our data into small ranges, in excitation potential. The coefficients were then calculated for each data bin. This approach results in considerable reduction in the standard error of the fit.

We have used the algorithm proposed by Banachiewicz (1938) using the cracovian calculus. The advantage of this method as described by Köpal (1959) is remarkably less number of mathematical operations required and consequent gain in accuracy compared to the older Gauss elimination method.

Table 1. The coefficients to calculate correction for log *gf* values of MRW + BK.

Excitation potential range (eV)	A	B	Standard error	No. of points
0.0–1.0	-0.0104 ± 0.0111	1.0449 ± 0.0071	0.0486	40
1.0–2.0	-0.0278 ± 0.0090	$1.0478 + 0.0069$	0.0375	21
2.0–3.0	-0.0614 ± 0.0424	1.0042 ± 0.0143	0.0490	32
3.0–4.0	-0.0851 ± 0.0194	1.0096 ± 0.0095	0.0587	67
4.0–5.0	-0.0564 ± 0.0152	1.0014 ± 0.0106	0.0716	104
0.0–5.0	-0.0678 ± 0.0748	1.0039 ± 0.0454	0.0869	264

The coefficients derived for the binned data, the standard errors of the coefficients and the standard error of the fit are given in Table 2. The table also contains in the last column, the number of lines used in calculating the coefficients. One can use these coefficients to derive *gf* value for any Fe I lines in excitation potential range 0.0–4.6 eV, provided line intensity measure is available for it.

4. Discussion

4.1 *Errors of Kurucz & Peytremann gf Values*

Irwin (1983) and Blackwell *et al.* (1983) have earlier examined the nature of errors in *gf* values of KP. Both the papers mention that the systematic errors of *gf* values of KP vary from multiplet to multiplet, but for many multiplets the systematic errors of KP *gf* values are nearly constant for all the lines belonging to a given multiplet. Blackwell *et al.* (1983) have illustrated this point through the histograms of KP *gf* value errors for many multiplets. They have mentioned that average systematic corrections could be applied to KP *gf* values for the line belonging to a given multiplet, provided precise *gf* values are known for a few lines of the multiplet and KP *gf* value error is found nearly the same for these lines. We have demonstrated the near constancy of KP *gf* value error for a few multiplets through Figs 1 and 2.

Table 2. The coefficients and the standard errors for $\log gf - \log \lambda - E_l - \log I$ relationship.

Excitation potential range (eV)	*A*	*B*	*C*	*D*	Standard error	No. of points
0.0–0.5	13.5270	−5.0667	0.6161	1.1088	0.0589	40
	±0.3822	±0.5476	±0.2557	±0.1584		
0.5–1.0	−0.3734	−1.3477	0.6990	1.0977	0.0829	46
	±0.5974	±0.1310	±0.2539	±0.2360		
1.0–1.5	0.9693	−1.6096	0.8408	1.1614	0.0559	17
	±0.6393	±0.1770	±0.1231	±0.0541		
1.5–2.0	0.5691	−1.2736	0.1757	1.2539	0.0465	14
	±0.3762	±0.1498	±0.3587	±0.3551		
2.0–2.5	2.2453	−1.8705	1.0035	0.7334	0.0769	49
	±0.3762	±0.1498	±0.1319	±0.0853		
2.5–3.0	−2.4273	−0.6709	0.9918	0.8729	0.0599	41
	±0.4410	±0.1402	±0.0913	±0.0709		
3.0–3.5	+1.8242	−1.6238	0.7605	0.8252	0.0932	40
	±0.7683	±0.2511	±0.1947	±0.1423		
3.5–4.0	−2.3344	−1.2880	1.7214	0.4723	0.0341	7
	±1.2652	±0.2635	±0.2692	±0.1317		
4.0–4.5	2.1243	−2.1269	1.0417	1.4729	0.0721	11
	±1.1317	±0.2358	±0.1786	±0.1950		
0.0–4.5	−0.9131	−0.9687	0.7554	1.0449	0.2674	361
	±0.4241	±0.2001	±0.1799	±0.1380		

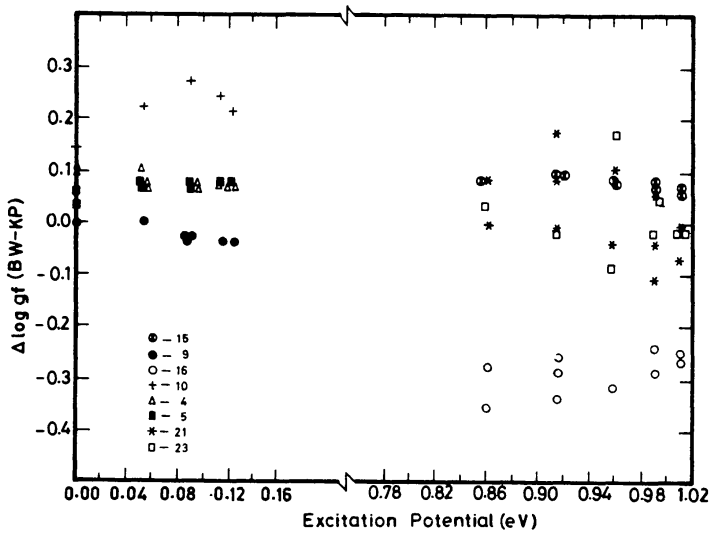

Figure 1. Errors of KP *gf* values plotted as a function of excitation potentials for the excitation potential range 0.00–1.02 eV. The lines belonging to different multiplets are shown by the different symbols.

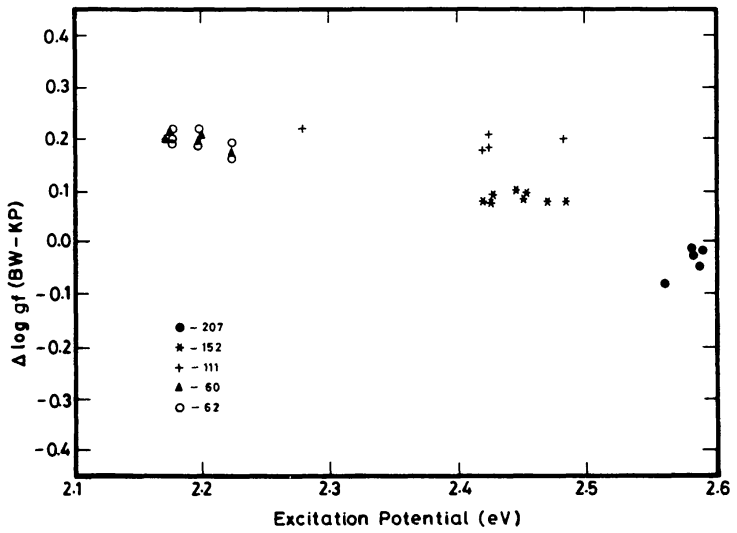

Figure 2. Errors of KP *gf* values plotted as a function of excitation potentials for the excitation potential range 2.1–2.6 eV. The lines belonging to different multiplets are shown by different symbols.

An interesting feature seen in these figures is that even over a small range in excitation potential the KP *gf* value errors vary considerably from multiplet to multiplet. Binning of the lines in small excitation potential ranges, a procedure found quite useful with empirical *gf* values does not seem to help in the case of KP *gf* values.

The KP *gf* values are calculated using scaled Thomas-Fermi-Dirac approximation with very limited configuration interaction considered. The comparison with well-determined experimental *gf* values shows that KP *gf* values are more accurate for the transitions involving well studied energy levels and very small configuration interactions. For other transitions there are errors and the size of the errors depends upon

the type of transition. This probably accounts for the KP *gf* value error being nearly constant for lines belonging to a given multiplet.

Our compilation covers a large number of multiplets and for many multiplets we have more than three lines. We have listed in Table 3 for these multiplets, the error for KP log *gf* values averaged over the lines of each multiplet. Though the KP log *gf* value errors were nearly constant for most of the multiplets, the exceptions are multiplet numbers 20 and 21. In both cases, there are indications of the errors being dependent on the line intensities. We have plotted KP log *gf* value errors for the lines of these two multiplets as a function of log *gf* value itself in Fig. 3.

The corrections tabulated in Table 3 for different multiplets can be used to correct KP log *gf* value for other lines belonging to these multiplets provided there is no drastic difference in the line intensities.

4.2 *Present Compilation of gf Values and Future Prospects*

Our compilation of log *gf* values for 1287 Fe I lines is presented in Appendix. Columns 1 and 2 show the wavelength (in Å) and excitation potential of lower level (in eV). Columns 3–7 show the log *gf* values of KP, OXF, solar, BK + MRW and the values adopted by us. Whenever OXF *gf* values were available, they were adopted even if there were *gf* measures by other workers. In the absence of OXF *gf* values, values of other workers normalized to OXF were used. Corrections for the log *gf* values of MRW + BK have been described earlier. Solar log *gf* column contains values of RZ or GK. The log *gf* values of GK are followed by an asterisk. For the lines with no OXF *gf* values but solar as well MRW + BK values were available, we took the mean of solar and corrected MRW + BK log *gf* values. Column 8 gives the line intensities measured by Meggers, Corliss & Seribner (1975). Note that many lines in our compilation do not have good intensity measures and column 8 is left blank. Only 361 lines of our compilation had intensity measures of Meggers, Corliss & Seribner (1975) and there were the ones used in the calibration of log *gf*–log λ–E_l–log I relation. Besides, we dropped from our compilation the OXF *gf* value measures for four lines which are possibly affected by blending.

We believe that the compilation presented here will help attaining an accuracy of 0.15 dex in the Fe I abundance calculations. We are very hopeful of presenting a similar compilation for Fe II lines in near future.

Laboratory line intensity measures of good accuracy are badly needed for many more lines. Laboratory spectroscopists are requested to make extensive line intensity measures for all observable lines of astrophysical interest.

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Table 3. The average correction to be applied to log *gf* values of KP for different multiplets.

Multiplet Number	KP Corr.	*n*	Multiplet Number	KP Corr.	*n*	Multiplet Number	KP Corr.	*n*	Multiplet Number	KP Corr.	*n*
1	-0.01 ± 0.10	11	42	-0.23 ± 0.08	5	326	-0.24 ± 0.09	3	1042	$+0.74\pm0.04$	3
2	$+0.08\pm0.07$	10	43′	-0.01 ± 0.03	5	342	$+0.06\pm0.04$	6	1061	$+0.36\pm0.15$	5
3	$+0.06\pm0.02$	3	45	-0.04 ± 0.03	5	383	$+0.16\pm0.02$	4	1062	$+0.28\pm0.11$	6
4	$+0.07\pm0.03$	12	60	$+0.19\pm0.02$	5	384	$+0.16\pm0.10$	4	1066	$+0.24\pm0.10$	6
5	$+0.07\pm0.02$	10	62	$+0.19\pm0.04$	9	496	-0.08 ± 0.07	3	1077	-0.03 ± 0.11	8
6	$+0.27\pm0.05$	4	66	$+0.13\pm0.03$	4	552	$+0.40\pm0.08$	3	1086	$+0.43\pm0.15$	5
9	-0.02 ± 0.02	9	68	-0.07 ± 0.01	5	553	$+0.33\pm0.11$	10	1087	$+0.43\pm0.11$	10
10	$+0.14\pm0.09$	8	73	-0.27 ± 0.12	4	554	$+0.32\pm0.07$	6	1090	$+0.69\pm0.27$	3
11	$+0.61\pm0.20$	7	81	$+0.34\pm0.20$	4	604	$+0.18\pm0.08$	3	1183	$+0.24\pm0.02$	3
13	-0.11 ± 0.14	7	91	$+0.47\pm0.10$	3	608	-0.12 ± 0.04	3	1258	$+0.62\pm0.30$	6
15	$+0.17\pm0.20$	12	111	$+0.21\pm0.03$	6	686	$+0.25\pm0.13$	9	1259	$+0.30\pm0.16$	4
16	$+0.29\pm0.03$	10	114	$+0.11\pm0.06$	4	687	$+0.13\pm0.09$	3	1314	-0.47 ± 0.07	5
22	$+0.60\pm0.20$	5	124	-0.10 ± 0.07	3	816	$+0.45\pm0.11$	7	1092	$+0.28\pm0.15$	3
23	-0.20 ± 0.10	9	152	$+0.11\pm0.06$	10	959	-0.07 ± 0.06	7	1107	$+0.23\pm0.04$	3
24	$+0.31\pm0.15$	4	168	$+0.39\pm0.07$	5	965	$+0.23\pm0.06$	4	1137	$+0.70\pm0.03$	3
28	-0.08 ± 0.03	6	169	-0.16 ± 0.13	5	982	$+0.14\pm0.07$	5	1145	$+0.56\pm0.16$	4
30	$+0.09\pm0.06$	10	206	-0.28 ± 0.04	5	1001	-0.38 ± 0.07	4	1154	$+0.06\pm0.02$	3
36	$+0.26\pm0.21$	6	207	-0.03 ± 0.02	5	1015	-0.35 ± 0.05	3	1163	$+0.41\pm0.15$	4
39	-0.17 ± 0.06	7	209	-0.25 ± 0.04	3	1018	-0.44 ± 0.13	3	1165	$+0.46\pm0.09$	3
41	$+0.66\pm0.30$	5	318	$+0.16\pm0.07$	12	1031	-0.14 ± 0.08	3	1180	$+0.24\pm0.08$	3
									1182	$+0.16\pm0.05$	3

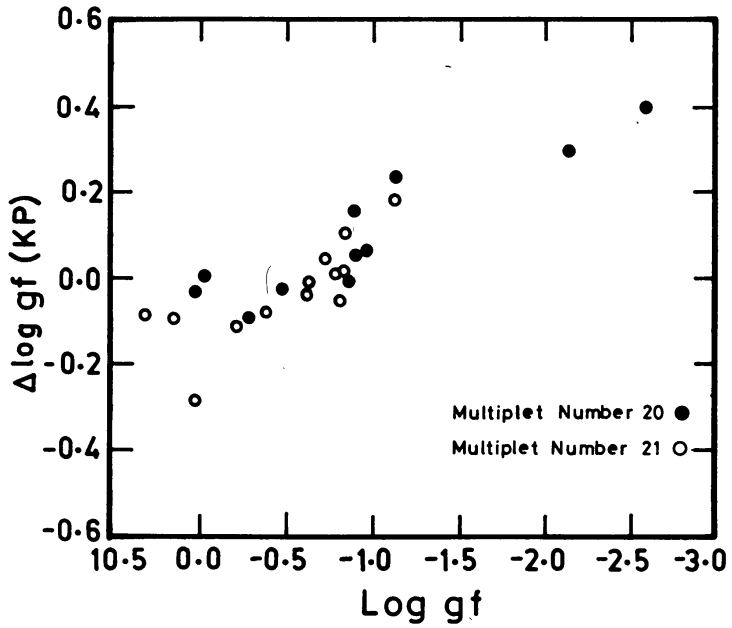

Figure 3. Errors of KP *gf* estimates plotted against the OXF *gf* values for the lines belonging to multiplet numbers 20 and 21.

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Appendix

Compilation of *gf* values for Fe I lines.

Wave-length	*E*(low)	Log *gf*					Int.	Mult. No.
		KP	BW	Solar†	MRW+GK	Adopted		
2894.50	2.28	−0.56	—	—	−0.43	−0.43	80	134
2899.41	2.28	−0.61	—	—	−0.68	−0.68	40	133
2912.15	0.00	−1.50	—	—	−1.53	−1.53	200	1
2920.69	1.61	−1.46	—	—	−1.47	−1.47	50	55
2923.28	3.27	0.37	—	—	0.32	0.32	80	182
2929.01	0.05	−1.40	—	−1.46	—	−1.46	200	10
2936.90	0.00	−0.75	—	—	−0.78	−0.78	800	1
2941.34	0.09	−1.62	—	—	−1.73	−1.73	130	1
2953.94	0.09	−0.95	−0.908	—	—	−0.91	600	10
2957.37	0.11	−1.23	−1.157	—	—	−1.16	320	10
2965.26	0.12	−1.55	−1.337	—	—	−1.34	180	10
2966.90	0.00	−0.54	−0.404	—	—	−0.40	1700	10
2969.36	0.11	−2.63	−2.315	—	—	−2.31	40	11
2970.10	0.11	−1.39	−1.147	—	—	−1.15	340	10
2970.12	0.09	−2.42	−1.866	—	—	−1.87	600	11
2973.13	0.09	−1.17	−0.901	—	—	−0.90	600	10
2973.24	0.05	−0.88	−0.660	—	—	−0.66	1200	10
2980.53	2.76	−1.68	—	—	−0.71	−0.71	10	317
2981.45	0.05	−2.11	−1.261	—	—	−1.26	280	11
2983.57	0.00	−0.58	−0.583	—	—	−0.58	1400	9
2986.46	0.11	−3.78	−3.057	—	—	−3.06	12	11
2987.29	0.92	−1.38	—	—	−1.26	−1.26	120	30
2990.39	2.73	−0.35	—	—	−0.26	−0.26	50	316
2994.50	0.12	−2.54	−2.211	—	—	−2.21	1200	11
2996.38	2.42	−1.01	—	—	−0.94	−0.94	10	148
2999.51	0.86	−0.53	—	—	−0.55	−0.55	360	30
3000.94	0.09	−0.54	−0.585	—	−0.68	−0.58	1100	9
3007.28	0.09	−2.56	−1.732	—	—	−1.73	100	11
3008.14	0.11	−0.79	−0.837	—	—	−0.84	900	9
3009.57	0.92	−0.70	—	—	−0.76	−0.76	280	30
3011.48	2.76	−0.33	—	—	−0.26	−0.26	50	316

Appendix Continued

Wavelength	*E*(low)	Log *gf*					Int.	Mult. No.
		KP	BW	Solar†	MRW+GK	Adopted		
3016.18	0.99	−1.49	—	—	−1.53	−1.53	80	30
3017.63	0.11	−1.52	−1.554	—	—	−1.55	200	9
3018.98	0.96	−0.90	—	—	−0.96	−0.96	180	30
3021.07	0.05	−0.36	−0.360	—	—	−0.36	1600	9
3024.03	0.11	−2.18	−1.476	—	−1.56	−1.48	260	11
3025.84	0.12	−0.80	−0.844	—	—	−0.84	380	9
3026.46	0.99	−1.08	—	—	−1.16	−1.16	180	30
3031.63	1.11	−1.16	—	—	−1.18	−1.18	190	30
3037.39	0.11	−0.58	—	—	−0.75	−0.75	950	9
3040.42	0.92	−1.32	—	—	−1.40	−1.40	170	30
3042.02	1.01	−1.40	—	—	−1.46	−1.46	60	30
3042.66	0.99	−1.21	—	—	−1.32	−1.32	190	30
3047.61	0.09	−0.52	−0.558	—	—	−0.56	1300	9
3057.44	0.86	−0.14	—	—	−0.33	−0.33	650	28
3059.08	0.05	−0.66	—	—	−0.77	−0.77	1000	9
3067.24	0.92	−0.31	—	—	−0.55	−0.55	400	28
3075.72	0.96	−0.49	—	—	−0.77	−0.77	340	28
3083.74	0.99	−0.70	—	—	−0.93	−0.93	240	28
3091.57	1.01	−0.97	—	—	−1.09	−1.09	200	28
3100.66	0.96	−0.73	—	—	−0.90	−0.90	260	28
3166.44	2.56	−1.32	−0.921	—	—	−0.92	—	259
3175.44	2.40	−0.22	—	—	−0.69	−0.69	70	155
3199.53	2.43	−0.11	—	—	−0.46	−0.46	140	156
3205.40	2.48	−0.33	—	—	−0.29	−0.29	110	155
3215.94	2.47	−3.63	—	—	−0.23	−0.23	70	156
3217.38	2.40	—	—	—	−0.53	−0.53	50	157
3225.78	2.40	0.46	—	—	0.23	0.23	500	155
3230.96	2.46	−3.61	—	—	−0.54	−0.54	70	157
3233.96	2.43	−0.96	—	—	−0.57	−0.57	70	158
3239.43	2.43	−3.11	—	—	−0.18	−0.18	300	157
3265.61	2.17	−1.10	—	—	−0.54	−0.54	130	91
3271.00	2.20	−0.82	—	—	−0.52	−0.52	150	91
3305.97	2.20	−0.66	—	—	−0.29	−0.29	280	91
3317.12	2.28	−2.03	−1.812	—	—	−1.81	—	139
3355.22	3.30	−0.82	—	—	−0.36	−0.36	60	617
3369.54	2.73	−0.51	—	—	−0.45	−0.45	80	304
3370.78	2.69	−0.36	—	—	−0.23	−0.23	120	304
3383.98	2.18	−0.81	—	—	−0.92	−0.92	80	83
3392.65	2.18	−0.61	—	—	−0.53	−0.53	150	85
3399.33	2.20	−0.32	—	—	−0.50	−0.50	220	85
3407.46	2.18	0.15	—	—	—	—	300	83
3413.13	2.20	−0.12	—	—	−0.38	−0.38	230	85
3417.84	2.22	−0.32	—	—	−0.59	−0.59	150	81
3418.50	2.23	−0.63	—	—	−0.66	−0.66	150	81
3424.28	2.18	−2.64	—	—	−0.62	−0.62	160	81
3427.12	2.18	−0.09	—	—	−0.08	−0.08	320	81
3428.19	2.20	−1.59	—	—	−0.75	−0.75	80	81
3440.99	0.05	−1.22	—	—	−1.18	−1.18	800	6
3442.36	2.28	−1.86	−1.393	—	—	−1.39	—	134
3443.87	0.09	−1.64	—	—	−1.55	−1.55	400	6
3445.15	2.20	−1.32	—	—	−0.48	−0.48	160	81

Appendix Continued

Wavelength	E(low)	Log gf					Int.	Mult. No.
		KP	BW	Solar†	MRW+GK	Adopted		
3447.28	2.20	−2.15	—	—	−1.06	−1.06	50	82
3450.23	2.22	−1.94	—	—	−0.93	−0.93	80	82
3476.70	0.12	−1.76	—	—	−1.60	−1.60	320	6
3495.29	2.56	−2.24	−0.916	—	−1.06	−0.92	60	238
3497.11	2.18	−0.75	—	—	−0.76	−0.76	80	78
3497.84	0.11	−1.82	—	—	−1.69	−1.69	240	6
3506.60	2.27	−2.27	—	—	−1.24	−1.24	60	130
3513.82	0.86	−1.30	−1.159	—	—	−1.16	400	24
3521.26	0.91	−1.32	—	−0.81	—	−0.81	360	24
3536.55	2.87	0.09	—	—	−0.01	−0.01	200	326
3540.12	2.87	—	—	—	−0.72	−0.72	240	329
3541.08	2.85	0.41	—	—	0.09	0.09	240	326
3542.07	2.87	0.26	—	—	0.08	0.08	220	326
3553.74	3.57	—	—	—	0.10	0.10	60	810
3565.38	0.96	−0.57	—	−0.19	−0.26	−0.23	1600	24
3570.10	0.91	−0.04	0.153	—	—	0.15	4000	24
3581.20	0.86	0.51	0.406	—	—	0.41	6000	23
3585.32	0.96	−0.74	—	−0.78	—	−0.78	360	23
3585.71	0.91	−0.99	−1.187	—	—	−1.19	300	23
3586.98	0.99	−0.77	—	−0.82	−0.95	−0.89	400	23
3589.11	0.86	−1.75	−2.115	—	—	−2.12	70	23
3594.63	2.85	−1.07	—	—	−0.34	−0.34	80	322
3596.20	2.43	−1.73	−2.035	—	−1.97	−2.04	—	181
3603.20	2.69	0.15	—	—	−0.27	−0.27	160	295
3605.45	2.73	−1.34	—	—	0.03	0.03	240	294
3606.68	2.69	0.31	—	—	0.30	0.30	320	294
3608.86	1.01	0.02	−0.100	—	—	−0.10	2000	23
3610.15	2.81	0.07	—	—	0.07	0.07	200	321
3617.78	3.02	0.17	—	—	−0.10	−0.10	130	496
3618.77	0.99	0.16	—	−0.09	—	−0.09	2000	23
3621.46	2.73	0.22	—	—	0.02	0.02	240	294
3622.00	2.76	−0.08	—	—	−0.17	−0.17	160	295
3623.18	2.40	−1.26	—	—	−0.74	−0.74	80	180
3631.46	0.96	0.25	−0.036	—	—	−0.04	2000	23
3632.04	3.07	−0.21	—	—	−0.37	−0.37	80	496
3638.30	2.76	0.16	—	—	−0.35	−0.35	130	294
3640.39	2.73	−1.61	—	—	−0.10	−0.10	220	295
3645.80	3.10	−0.43	—	—	−0.52	−0.52	60	496
3647.84	0.91	0.24	−0.194	—	—	−0.19	1600	23
3649.50	2.69	−0.16	—	—	−0.14	−0.14	160	291
3651.47	2.76	−2.78	—	—	0.03	0.03	300	295
3659.51	2.45	−1.15	—	—	−0.95	−0.95	80	180
3669.52	2.73	−0.13	—	—	−0.40	−0.40	160	291
3676.31	2.56	−1.97	−0.986	—	−0.90	−0.99	—	228
3677.63	2.76	−0.17	—	—	−0.11	−0.11	200	291
3679.92	—	−1.63	−1.599	—	—	−1.60	650	5
3682.22	3.55	−0.03	—	—	0.20	0.20	160	772
3683.05	0.05	−2.61	—	−2.51	−2.70	−2.60	110	5
3684.11	2.73	−1.56	—	—	−0.34	−0.34	110	292
3687.46	0.86	−0.84	−0.833	—	—	−0.83	800	21
3694.00	3.00	−0.31	—	—	−0.05	−0.05	240	394

Appendix Continued

Wavelength	E(low)	Log *gf*					Int.	Mult. No.
		KP	BW	Solar†	MRW+GK	Adopted		
3701.08	2.99	—	—	—	−0.07	−0.07	300	385
3704.46	2.69	−0.69	—	—	−0.63	−0.63	80	290
3705.57	0.05	−1.39	−1.334	—	—	−1.33	800	5
3709.25	0.91	−0.63	−0.646	—	—	−0.65	850	21
3715.91	2.28	−1.36	−1.569	—	−1.46	−1.57	—	124
3719.94	—	−0.49	−0.430	—	—	−0.43	6000	5
3722.56	0.09	−1.35	−1.287	—	—	−1.29	800	5
3724.38	2.28	−0.67	—	—	−0.76	−0.76	80	124
3726.90	3.03	−2.97	—	—	−0.37	−0.37	30	385
3727.62	0.96	−0.59	−0.631	—	—	−0.63	750	21
3731.37	2.61	−1.20	−1.453	—	−1.31	−1.45	—	225
3732.39	2.20	−0.55	—	—	−0.56	−0.56	120	76
3733.31	0.11	−1.47	—	—	−1.53	−1.53	700	5
3734.87	0.86	0.40	0.317	—	—	0.32	7000	21
3737.13	0.05	−0.64	−0.574	—	—	−0.57	3400	5
3738.30	3.27	−0.15	—	—	−0.03	−0.03	70	609
3743.36	0.99	−0.73	−0.785	−0.77	—	−0.79	600	21
3745.56	0.09	−0.84	−0.771	—	—	−0.77	2400	5
3745.90	0.12	−1.41	−1.335	—	—	−1.33	600	5
3748.26	0.11	−1.08	−1.016	—	—	−1.02	1400	5
3749.49	0.91	0.25	0.161	—	0.07	0.16	4000	21
3753.60	2.17	−0.63	—	—	−0.97	−0.97	70	73
3758.24	0.96	0.27	−0.027	—	—	−0.03	3000	21
3760.05	2.40	−0.79	−0.847	—	−0.75	−0.85	60	177
3760.50	2.21	−2.43	—	—	−1.26	−1.26	16	76
3763.79	0.99	−0.13	−0.238	—	−0.30	−0.24	1700	21
3765.54	3.24	0.56	—	—	0.45	0.45	140	608
3767.19	1.01	−0.31	−0.389	—	−0.38	−0.39	1200	21
3774.80	2.21	−1.07	—	—	−1.46	−1.46	10	73
3776.50	2.17	−0.96	—	—	−1.52	−1.52	10	74
3777.45	2.56	−1.80	−1.782	—	−1.59	−1.78	—	223
3785.90	2.42	−0.91	—	—	−0.89	−0.89	30	177
3786.68	1.01	−2.47	−2.225	—	−2.22	−2.22	30	22
3787.86	1.01	−0.87	−0.859	—	−0.86	−0.86	460	21
3790.10	0.99	−1.98	−1.761	—	−1.74	−1.76	60	22
3794.30	2.44	−1.02	—	—	−1.01	−1.01	30	177
3795.00	0.99	−0.81	−0.761	—	−0.80	−0.76	650	21
3798.51	0.91	−1.30	−1.114	—	−1.15	−1.11	320	21
3799.55	0.96	−0.95	−0.846	—	−0.88	−0.85	480	21
3805.34	3.30	0.40	—	—	0.33	0.33	120	608
3806.69	3.27	0.12	—	—	0.07	0.07	60	609
3807.50	2.21	−0.89	—	—	−1.03	−1.03	30	73
3808.73	2.56	−1.22	−1.159	—	−1.03	−1.16	—	222
3812.93	0.96	−1.67	−1.064	—	−1.00	−1.06	320	22
3814.53	1.01	−3.21	−2.239	—	−2.39	−2.24	—	22
3815.84	1.49	0.21	—	—	0.23	0.23	1600	45
3820.43	0.86	0.15	0.119	—	0.03	0.12	5000	20
3821.18	3.27	0.36	—	—	0.19	0.19	70	608
3824.45	—	−1.47	−1.362	—	—	−1.36	800	4
3825.88	0.91	—	−0.037	—	—	−0.04	3200	20
3827.83	1.56	0.07	0.620	—	0.10	0.62	1300	45

Appendix Continued

Wavelength	E(low)	Log gf					Int.	Mult. No.
		KP	BW	Solar†	MRW+GK	Adopted		
3833.31	2.56	−0.90	−1.032	—	−0.99	−1.03	30	221
3834.23	0.96	−0.21	−0.302	—	−0.39	−0.30	1300	20
3839.25	3.05	−0.29	—	—	−0.30	−0.30	35	529
3840.44	0.99	−0.48	−0.506	—	−0.58	−0.51	800	20
3841.05	1.61	−0.05	—	−0.05	−0.04	−0.04	800	45
3843.26	3.05	−0.29	—	—	−0.19	−0.19	60	528
3846.80	3.25	0.16	—	—	−0.03	−0.03	60	664
3849.97	1.01	−0.86	−0.871	—	−0.86	−0.87	500	20
3850.82	0.99	−2.71	−1.734	—	−1.71	−1.73	70	22
3852.57	2.17	−0.72	—	—	−1.21	−1.21	20	73
3856.37	0.05	−1.38	−1.286	—	−1.45	−1.29	850	4
3859.91	—	−0.79	−0.710	—	−0.75	−0.71	4200	4
3865.53	1.01	−1.04	−0.982	—	−0.95	−0.98	340	20
3867.21	3.02	−0.67	—	—	−0.47	−0.47	20	488
3872.58	0.99	−0.98	−0.928	—	−1.01	−0.93	340	20
3873.76	2.43	−0.95	—	—	−0.81	−0.81	35	175
3878.02	0.95	−1.08	−0.914	—	−0.96	−0.91	500	20
3885.50	2.41	−1.01	—	—	−1.17	−1.17	25	124
3886.28	0.05	−1.14	−1.076	—	−1.22	−1.08	1800	4
3887.05	0.91	−1.38	−1.144	—	−1.18	−1.14	350	20
3888.51	1.61	−0.51	—	−0.54	−0.54	−0.54	350	45
3893.34	2.94	−0.46	—	—	−0.54	−0.54	35	430
3895.66	0.11	−1.75	—	—	−1.79	−1.79	350	4
3899.71	0.09	−1.59	−1.531	—	−1.67	−1.53	550	4
3902.95	1.56	−0.37	−0.466	—	−0.44	−0.47	550	45
3903.90	2.98	−3.03	—	—	−0.73	−0.73	18	429
3906.48	0.11	−2.29	−2.243	—	−2.32	−2.24	140	4
3913.64	2.28	−1.59	−1.663	—	−1.61	−1.66	—	120
3916.70	3.22	−0.44	—	—	−0.59	−0.59	20	606
3917.19	0.99	−2.45	−2.155	—	−2.20	−2.15	40	20
3920.26	0.12	−1.81	−1.746	—	−1.89	−1.75	360	4
3922.91	0.05	−1.70	−1.651	—	−1.78	−1.65	550	4
3927.92	0.11	−1.60	—	—	−1.66	−1.66	700	4
3930.29	0.09	−1.57	—	—	−1.66	−1.66	750	4
3935.80	2.82	−1.76	—	—	−0.88	−0.88	20	362
3940.88	0.96	−3.00	−2.600	—	−2.65	−2.60	16	20
3942.44	2.84	−1.48	—	—	−0.95	−0.95	14	364
3948.80	3.25	−0.38	—	—	−0.39	−0.39	35	604
3951.20	2.83	—	—	—	−0.41	−0.41	30	661
3952.60	2.68	−0.96	—	—	−0.93	−0.93	20	278
3956.50	3.22	−0.51	—	—	−0.31	−0.31	35	604
3966.10	1.60	−1.55	—	—	−1.70	−1.70	40	45
3967.40	3.29	−0.54	—	—	−0.45	−0.45	30	604
3969.26	1.48	−0.36	—	—	−0.41	−0.41	550	43
3971.30	2.68	−0.98	—	—	−0.85	−0.85	25	277
3977.74	2.20	−0.96	—	—	−1.05	−1.05	60	72
3981.80	2.72	−0.93	—	—	−1.05	−1.05	20	278
3984.00	2.72	−1.02	—	—	−0.86	−0.86	40	277
3997.39	2.73	−0.34	—	—	−0.41	−0.41	80	278
3998.10	2.68	−0.73	—	—	−0.82	−0.82	30	276
4005.25	1.56	−0.54	−0.610	—	−0.59	−0.61	400	43

Appendix Continued

Wavelength	E(low)	Log gf					Int.	Mult. No.
		KP	BW	Solar†	MRW+GK	Adopted		
4009.71	2.22	−0.96	—	—	−1.17	−1.17	35	277
4010.17	3.63	−3.46	—	−2.15*	−1.79	−1.97	—	915
4011.41	2.55	−2.36	—	−2.15*	−2.37	−2.26	—	218
4011.71	2.44	−2.86	—	−2.82*	−2.66	−2.74	—	153
4014.53	3.57	−2.40	—	—	−0.25	−0.25	40	802
4016.42	3.27	−2.78	—	−1.60*	—	−1.60	—	560
4021.87	2.76	−0.58	—	—	−0.68	−0.68	40	278
4022.44	2.39	−3.86	—	−3.58*	—	−3.58	—	173
4031.24	3.00	−1.33	—	−2.57*	—	−2.57	—	486
4032.46	2.87	−2.67	—	−2.67*	—	−2.67	—	320
4036.37	2.75	−3.13	—	−3.17*	−2.86	−3.02	—	279
4041.91	3.29	−2.36	—	−3.09	—	−3.09	—	556
4042.75	3.28	−4.25	—	−3.27*	—	−3.27	—	556
4045.82	1.49	0.25	0.280	—	0.23	0.28	3000	43
4049.33	2.55	−2.45	—	−2.49*	−2.30	−2.40	—	218
4059.72	3.53	−1.29	—	−1.39*	−1.23	−1.31	—	767
4062.44	2.85	−0.68	—	—	−0.80	−0.80	30	359
4063.59	1.56	0.01	—	—	0.09	0.09	1200	43
4067.28	2.56	−1.37	−1.419	—	—	−1.42	—	217
4067.49	2.95	−4.06	—	−3.13*	—	−3.13	—	422
4067.60	3.30	−2.41	—	−2.79*	—	−2.79	—	655
4071.74	1.61	−0.03	−0.022	—	—	−0.02	1000	43
4078.82	3.23	—	—	−2.39*	−0.78	−1.59	—	558
4080.86	3.28	−4.02	—	−1.85*	—	−1.85	—	557
4082.11	3.40	−1.47	—	−1.61*	−1.54	−1.57	—	698
4087.10	3.32	−3.84	—	−1.43*	−1.39	−1.41	—	594
4088.56	3.62	−1.39	—	−1.61*	−1.53	−1.57	—	906
4089.22	2.94	−1.98	—	−2.10*	−1.92	−2.01	—	422
4090.95	3.35	−1.09	—	−1.86*	−1.76	−1.81	—	695
4091.55	2.82	−1.69	—	−2.27*	−2.13	−2.20	—	357
4100.75	0.86	−3.24	−3.179	—	−3.27	−3.18	—	18
4106.26	2.58	−2.45	—	−2.52*	−2.27	−2.40	—	217
4106.43	3.38	−1.53	—	−1.64*	−1.51	−1.57	—	697
4107.49	2.83	−2.95	—	—	−0.75	−0.75	40	354
4108.13	3.24	−4.20	—	−2.46*	−2.14	−2.30	—	559
4109.06	3.29	−1.05	—	−1.63*	−1.50	−1.56	—	558
4109.80	2.85	−1.16	—	—	−0.87	−0.87	30	357
4112.32	3.38	−1.12	—	−1.76*	−1.75	−1.76	—	695
4114.94	3.36	−0.51	—	−1.69*	−1.64	−1.66	—	695
4116.95	3.23	−3.62	—	−2.61*	—	−2.61	—	558
4125.88	2.83	−2.09	—	−2.11*	−1.91	−2.01	—	354
4127.61	2.86	−0.89	—	—	−0.96	−0.96	20	357
4134.68	2.83	−1.46	—	—	−0.51	−0.51	40	357
4136.52	2.35	−2.67	—	−1.61*	−1.50	−1.55	—	694
4139.95	0.99	−3.93	−3.629	—	−3.74	−3.63	—	18
4141.87	3.00	−2.22	—	−2.03*	−1.80	−1.91	—	422
4143.87	1.56	−0.41	—	—	−0.46	−0.46	400	43
4145.20	2.68	−2.91	—	−2.97*	−2.77	−2.87	—	274
4147.68	1.49	−1.84	−2.104	—	−2.06	−2.10	20	42
4152.17	0.96	−3.59	−3.232	—	−3.25	−3.23	—	18
4156.80	2.83	−1.08	—	—	−0.64	−0.64	40	354

Appendix Continued

Wavelength	*E*(low)	Log *gf*					Int.	Mult. No.
		KP	BW	Solar†	MRW+GK	Adopted		
4160.55	2.94	−4.30	—	−2.88*	—	−2.88	—	419
4168.62	3.35	−3.18	—	−1.99*	−1.94	−1.97	—	689
4168.95	3.40	−3.14	—	−1.72*	−1.65	−1.69	—	694
4172.75	0.96	−3.44	−3.074	—	−3.05	−3.07	—	19
4174.92	0.91	−3.35	−2.969	—	—	−2.97	—	19
4175.64	2.85	−0.42	—	—	−0.69	−0.69	35	354
4177.60	0.91	−3.53	−3.058	—	—	−3.06	—	18
4180.40	2.78	−3.03	—	−2.91*	—	−2.91	—	274
4183.00	3.38	−2.38	—	−2.27*	−2.18	−2.22	—	697
4184.89	2.83	−0.29	—	—	−0.82	−0.82	30	355
4187.04	2.45	−0.63	−0.548	—	−0.55	−0.55	130	152
4187.80	2.43	−0.63	−0.554	—	−0.55	−0.55	130	152
4189.56	3.68	−0.76	—	−1.55*	−1.33	−1.44	—	940
4194.49	2.73	−2.49	—	−3.36	—	−3.36	—	274
4198.31	2.40	−0.80	−0.719	—	—	−0.72	110	152
4202.03	1.49	−0.43	−0.708	—	—	−0.71	340	42
4210.35	2.48	−1.05	—	—	−0.83	−0.83	40	152
4216.19	—	−3.44	−3.356	—	−3.14	−3.36	16	3
4219.36	3.57	−0.13	—	—	0.05	0.05	70	800
4222.22	2.45	−1.04	−0.967	—	−0.97	−0.97	40	152
4223.73	2.95	−4.66	—	−2.91*	—	−2.91	—	417
4227.43	3.33	0.34	—	—	0.18	0.18	130	693
4227.76	1.49	0.19	−0.164	—	—	−0.16	130	42
4228.72	3.37	−3.82	—	−2.54*	—	−2.54	—	690
4229.76	1.49	−5.98	−3.427	—	−3.41	−3.43	—	41
4232.72	0.11	−4.96	−4.928	−4.88	—	−4.93	—	3
4233.61	2.48	−0.68	−0.604	—	−0.59	−0.60	110	152
4235.94	2.43	−0.43	−0.341	—	—	−0.34	170	152
4237.09	0.96	−5.28	−4.379	—	—	−4.38	—	19
4238.82	3.40	0.08	—	—	−0.33	−0.33	30	693
4241.12	2.82	−1.62	—	−2.63*	−2.48	−2.56	—	351
4243.81	3.87	−1.46	—	−1.55*	−1.50	−1.52	—	994
4247.43	3.37	0.21	—	—	−0.28	−0.28	30	693
4250.13	2.47	−0.48	−0.405	—	−0.40	−0.41	120	152
4256.81	4.24	−3.17	—	−1.56*	—	−1.56	—	1102
4258.32	0.09	−4.38	−4.316	—	−4.58	−4.32	—	3
4271.16	2.45	−0.44	−0.349	—	—	−0.35	120	152
4281.59	2.45	−3.48	—	−4.12	—	−4.12	—	171
4282.40	2.18	−0.69	—	—	−0.84	−0.84	80	71
4284.41	2.98	−2.80	—	−2.80*	−2.65	−2.73	—	417
4294.13	1.49	−1.84	—	—	−1.09	−1.09	140	41
4299.24	2.43	−0.56	—	—	−0.46	−0.46	120	152
4307.90	1.56	0.11	—	—	−0.06	−0.06	1000	42
4315.09	2.20	−0.96	—	—	−0.94	−0.94	60	71
4319.45	2.61	−3.55	—	−3.61	—	−3.61	—	214
4325.76	1.61	0.06	—	—	—	—	950	42
4337.05	1.56	−2.97	−1.695	—	−1.68	−1.70	40	41
4347.24	—	−5.69	−5.503	−5.52	−5.32	−5.50	—	2
4348.94	2.98	−2.22	—	−2.34*	−2.10	−2.22	—	414
4352.74	2.22	−1.32	—	—	−1.23	−1.23	40	71
4360.79	3.63	−2.17	—	−2.03*	−1.87	−1.95	—	903

Appendix Continued

Wavelength	E(low)	Log gf					Int.	Mult. No.
		KP	BW	Solar†	MRW+GK	Adopted		
4365.90	2.98	−1.83	—	−2.34*	−2.11	−2.23	—	415
4369.77	3.05	−1.23	—	—	−0.78	−0.78	14	518
4375.93	0.00	−3.12	−3.031	—	—	−3.03	60	2
4383.55	1.49	−0.09	0.200	—	0.17	0.20	1700	41
4387.89	3.06	−1.30	—	−1.61	−1.47	−1.54	—	47
4389.24	0.05	−4.57	−4.583	−4.65	—	−4.58	—	2
4392.30	3.55	−4.49	—	−2.98	—	−2.98	—	757
4392.58	3.86	−1.99	—	−1.92*	−2.00	−1.96	—	973
4404.75	1.56	−0.57	−0.142	—	−0.19	−0.14	850	41
4413.39	4.08	−2.17	—	−2.55	—	−2.55	—	1046
4415.13	1.61	−1.12	−0.615	—	−0.60	−0.62	480	41
4423.84	3.64	−1.26	—	−1.69	−1.61	−1.65	—	830
4427.31	0.05	−3.11	−3.044	—	−2.72	−3.04	60	2
4430.62	2.22	−1.59	−1.659	—	—	−1.66	—	68
4432.57	3.56	−1.77	—	−1.78*	−1.60	−1.69	—	797
4433.23	3.64	−0.60	—	−0.74*	−0.75	−0.75	—	830
4435.15	0.09	−4.37	−4.379	—	−4.49	−4.38	—	2
4438.34	3.67	−1.85	—	−1.75*	−1.63	−1.69	—	828
4439.64	3.05	−3.31	—	−3.05	−2.85	−2.95	—	515
4439.88	2.28	−2.87	−3.002	—	−2.91	−3.00	—	116
4440.82	3.94	−3.53	—	−1.72*	−1.60	−1.66	—	992
4442.34	2.20	−1.16	−1.255	—	−1.20	−1.25	50	68
4442.84	2.20	−3.26	−2.792	—	−2.59	−2.79	—	69
4443.20	2.86	−0.95	—	—	−0.99	−0.99	20	350
4445.48	0.09	−5.65	−5.441	—	−5.57	−5.44	—	2
4447.13	2.19	−3.40	—	−2.79*	−2.56	−2.68	—	69
4447.72	2.22	−1.27	−1.342	—	−1.29	−1.34	50	68
4450.32	3.10	−1.94	—	−2.16*	−2.05	−2.11	—	476
4450.76	3.88	−2.75	—	−2.23*	−2.25	−2.24	—	972
4458.08	3.87	−4.81	—	−1.26*	—	−1.26	—	992
4459.12	2.18	−1.22	−1.279	—	−1.27	−1.28	50	68
4461.65	0.09	−3.27	−3.210	—	—	−3.21	30	2
4466.55	2.83	−0.40	—	—	−0.61	−0.61	60	350
4471.68	0.11	−6.20	−5.995	—	−5.98	−6.00	—	2
4476.02	2.85	−0.67	—	—	−0.60	−0.60	60	350
4478.02	2.19	−3.61	—	−3.90*	−3.68	−3.79	—	69
4480.14	3.03	−2.05	—	−2.04*	—	−2.04	—	515
4481.61	3.67	−2.11	—	−1.66*	−1.42	−1.54	—	827
4482.17	0.11	−3.54	−3.501	—	—	−3.50	30	2
4483.78	3.64	−2.49	—	−2.66*	−2.48	−2.57	—	898
4485.68	3.67	−1.08	—	−1.13*	−1.01	−1.07	—	830
4485.97	3.65	−4.31	—	−2.52	−2.36	−2.44	—	825
4489.74	0.12	−3.98	−3.966	—	−4.49	−3.97	—	2
4492.68	3.97	−2.16	—	−1.82*	−1.65	−1.74	—	969
4494.57	2.20	−1.07	−1.136	—	−1.11	−1.14	60	68
4495.57	3.59	−2.50	—	−2.38*	−2.12	−2.25	—	827
4495.96	3.64	−3.28	—	−1.83*	−1.72	−1.78	—	825
4502.60	3.56	−2.33	—	−2.39*	−2.36	−2.37	—	796
4504.22	3.96	−3.68	—	−3.35	—	−3.35	—	396
4515.17	2.87	−3.38	—	−3.30*	−3.20	−3.25	—	319
4523.40	3.64	−4.64	—	−2.00*	−1.99	−2.00	—	829

Appendix Continued

Wavelength	E(low)	Log gf					Int.	Mult. No.
		KP	BW	Solar†	MRW+GK	Adopted		
4525.86	2.87	−3.41	—	−3.28*	−3.17	−3.23	—	319
4527.78	3.24	−2.86	—	−2.69*	−2.75	−2.72	—	641
4528.62	2.18	−0.78	−1.450	—	−0.79	−1.45	100	68
4531.15	1.49	−2.04	−2.155	—	−2.18	−2.15	20	39
4537.67	3.25	−2.52	—	−2.95*	−3.04	−3.00	—	594
4541.94	3.25	−3.93	—	−3.23*	−3.14	−3.19	—	593
4542.43	3.62	−1.75	—	−2.04*	−2.05	−2.05	—	894
4543.22	3.65	—	—	−3.39	—	−3.39	—	893
4546.47	4.17	−2.87	—	−2.57*	—	−2.57	—	1047
4546.67	3.94	−3.10	—	−2.61*	—	−2.61	—	989
4551.63	3.93	−2.10	—	−2.07	−2.06	−2.07	—	972
4554.46	2.85	−3.09	—	−2.99*	−3.02	−3.01	—	319
4556.93	3.24	−1.41	—	−2.67	−2.72	−2.70	—	638
4560.09	3.59	−4.91	—	−1.93*	−1.92	−1.93	—	823
4566.03	4.47	—	—	−3.03	−2.21	−2.62	—	1169
4566.52	3.29	−2.31	—	−2.28*	−2.26	−2.27	—	641
4568.60	3.91	−2.75	—	−2.42*	—	−2.42	—	989
4571.44	2.86	−3.43	—	−3.28*	−3.24	−3.26	—	319
4574.22	3.20	−2.88	—	−2.51*	−2.51	−2.51	—	554
4574.72	2.27	−2.64	—	−2.93*	−2.94	−2.94	—	115
4587.13	3.56	−1.49	—	−1.79*	−1.78	−1.79	—	795
4587.72	3.97	−3.15	—	−2.40*	−2.15	−2.28	—	971
4592.66	1.56	−2.34	−2.449	—	—	−2.45	—	39
4593.53	3.93	−2.63	—	−2.00	−2.06	−2.03	—	971
4595.36	3.29	−2.12	—	−1.82*	−1.81	−1.82	—	594
4596.41	3.64	—	—	−2.27*	−2.33	−2.30	—	823
4598.12	3.27	−1.85	—	−1.57*	—	−1.57	—	554
4598.78	3.64	—	—	−2.66*	—	−2.66	—	819
4602.00	1.60	−2.97	−3.154	−3.19*	−3.34	−3.15	—	39
4602.94	1.49	−1.99	−2.220	—	−2.04	−2.22	25	39
4604.23	2.82	−2.29	—	−3.94*	—	−3.94	—	348
4607.08	3.40	−2.86	—	−3.59	—	−3.59	—	724
4612.61	2.82	−3.11	—	−3.78*	—	−3.78	—	349
4619.29	3.59	−1.94	—	−1.02*	−1.11	−1.07	—	821
4620.13	3.06	−2.63	—	−3.75*	—	−3.75	—	468
4625.05	3.23	−1.65	—	−1.26*	—	−1.26	—	554
4626.14	2.99	−3.10	—	−3.23*	—	−3.23	—	384
4626.79	2.98	−3.95	—	−3.76*	—	−3.76	—	410
4630.12	2.27	−2.40	—	−2.60*	−2.57	−2.59	—	115
4630.78	3.94	−2.56	—	−3.17	—	−3.17	—	969
4632.92	1.61	−2.83	−2.913	—	−2.96	−2.91	—	39
4633.76	3.00	−2.54	—	−3.26*	−2.93	−3.09	—	410
4635.85	2.83	−2.51	—	−2.44*	−2.39	−2.42	—	349
4636.67	3.03	−3.14	—	−3.76*	—	−3.76	—	513
4637.51	3.27	−1.58	—	−1.25*	−1.39	−1.32	—	554
4638.01	3.59	−4.91	—	−1.05	−1.11	−1.08	—	822
4643.20	1.48	−4.55	—	−5.06*	—	−5.06	—	38
4643.47	3.64	—	—	−1.29*	−1.29	−1.29	—	820
4647.44	2.94	−1.17	—	−1.30*	—	−1.30	—	409
4649.81	3.22	−3.15	—	−2.92	−2.70	−2.81	—	592
4654.50	1.56	−2.56	−2.783	—	—	−2.78	—	39

Appendix Continued

Wavelength	*E*(low)	Log *gf*					Int.	Mult. No.
		KP	BW	Solar†	MRW+GK	Adopted		
4657.59	2.83	−3.13	—	−3.00*	−2.87	−2.94	—	346
4658.30	3.25	−2.67	—	−3.00*	−3.05	−3.03	—	591
4661.32	2.82	−3.19	—	−4.07*	—	−4.07	—	347
4661.53	4.54	—	—	−1.26*	−1.23	−1.24	—	1207
4661.97	2.98	−2.41	—	−2.56*	−2.43	−2.50	—	409
4669.17	3.64	−1.51	—	−1.30*	−1.41	−1.35	—	821
4672.83	1.60	−4.83	—	−4.24*	—	−4.24	—	40
4677.59	4.14	−2.40	—	−2.28*	—	−2.28	—	1072
4678.85	3.59	−0.31	—	−0.60*	—	−0.60	—	821
4680.30	1.60	−3.50	−3.774	−3.82*	−3.96	−3.77	—	39
4682.57	2.93	−3.33	—	−3.15*	−3.10	−3.13	—	384
4683.56	2.82	−2.50	—	−2.53*	−2.50	−2.52	—	346
4685.03	2.83	−2.37	—	−3.41*	−3.32	−3.36	—	347
4687.67	2.85	−3.65	—	−3.78*	—	−3.78	—	347
4690.14	3.67	—	—	−1.63*	−1.68	−1.66	—	820
4690.37	1.01	−4.87	—	−5.23*	—	−5.23	—	17
4700.16	3.68	−3.12	—	−1.65*	−1.68	−1.67	—	935
4701.05	3.67	—	—	−1.99*	−1.96	−1.98	—	820
4704.95	3.67	−1.33	—	−1.49*	−1.57	−1.53	—	821
4705.47	3.53	−3.11	—	−2.30*	−2.32	−2.31	—	752
4706.30	3.63	−2.87	—	−3.03	—	−3.03	—	890
4707.28	3.23	−1.16	—	−0.88*	—	−0.88	—	554
4707.49	2.83	−2.37	—	−2.34*	—	−2.34	—	346
4716.83	3.41	−2.83	—	−3.49	—	−3.49	—	634
4726.14	3.00	−3.35	—	−3.23	−3.13	−3.18	—	384
4727.00	3.26	−4.44	—	−3.33*	—	−3.33	—	635
4728.53	3.64	−4.35	—	−1.18*	—	−1.18	—	822
4729.02	4.06	−2.34	—	−1.68*	−1.62	−1.65	—	1043
4729.68	3.38	−2.98	—	−2.49*	−2.47	−2.48	—	688
4733.59	1.48	−2.71	−2.987	−3.03*	—	−2.99	—	38
4735.84	4.06	−0.43	—	−1.17*	−1.18	−1.17	—	1042
4736.80	3.20	−0.90	—	—	−0.77	−0.77	16	554
4737.63	3.25	−3.19	—	−2.61*	−2.55	−2.58	—	590
4741.53	2.82	−1.85	—	−2.05*	—	−2.05	—	346
4745.13	2.21	−3.89	—	−4.17*	−4.15	−4.16	—	67
4749.95	4.54	−1.12	—	−1.36	−1.30	−1.33	—	1206
4760.07	3.03	−3.71	—	−3.70	—	−3.70	—	384
4765.47	1.60	−4.56	—	−3.91*	−4.12	−4.02	—	40
4776.07	3.29	−3.41	—	−2.74*	−2.71	−2.73	—	635
4779.44	3.40	−2.27	—	−2.25*	−2.32	−2.28	—	720
4780.81	3.24	−3.36	—	−3.36	—	−3.36	—	633
4782.80	3.22	−4.30	—	−3.68*	—	−3.68	—	588
4785.96	4.12	−2.46	—	−1.94*	−1.89	−1.91	—	1044
4786.81	3.00	−1.58	—	−1.62*	—	−1.62	—	467
4787.49	3.02	−4.17	—	−4.24	—	−4.24	—	408
4787.83	2.99	−2.85	—	−2.72*	−2.74	−2.73	—	384
4789.65	3.53	—	—	−1.01*	—	−1.01	—	753
4790.56	4.15	−3.53	—	−2.53*	−2.60	−2.56	—	1068
4790.74	3.24	−3.43	—	−3.34	−3.26	−3.30	—	632
4793.96	3.03	−3.89	—	−3.56	−3.55	−3.55	—	512
4794.35	2.41	−3.91	—	−3.96	−4.03	−3.99	—	115

Appendix Continued

Wavelength	E(low)	Log gf					Int.	Mult. No.
		KP	BW	Solar†	MRW+GK	Adopted		
4798.27	4.17	−0.68	—	−1.50*	−1.51	−1.50	—	1042
4798.73	1.60	−3.86	—	−4.22*	−4.38	−4.30	—	38
4799.07	4.26	−3.12	—	−2.81	—	−2.81	—	1098
4799.41	3.62	−2.67	—	−2.20*	−2.24	−2.22	—	888
4800.13	3.03	−3.34	—	−3.26*	−2.75	−.01	—	384
4800.65	4.12	−0.49	—	−1.23*	−1.22	−1.22	—	1042
4801.61	4.27	—	—	−2.65*	—	−2.65	—	1115
4802.52	4.59	−1.03	—	−1.77	—	−1.77	—	1206
4804.52	3.56	−2.84	—	−2.59*	−2.79	−2.69	—	794
4807.71	3.35	−2.30	—	−2.17*	−2.21	−2.19	—	688
4808.15	3.24	−3.66	—	−2.69	−2.80	−2.75	—	633
4809.94	3.56	−2.67	—	−2.64	−2.73	−2.69	—	793
4813.11	3.26	−4.45	—	−2.87	−2.90	−2.89	—	630
4813.71	4.56	−2.56	—	−2.43*	—	−2.43	—	1243
4818.66	3.40	−4.15	—	−3.76*	—	−3.76	—	719
4835.87	4.09	−1.91	—	−1.47*	−1.46	−1.46	—	1068
4839.52	3.25	−2.05	—	−1.92*	−1.82	−1.87	—	588
4841.79	4.17	−2.64	—	−1.88*	−1.84	−1.86	—	1070
4848.88	2.27	−3.27	—	−3.42*	−3.38	−3.40	—	114
4859.70	2.86	−0.93	—	—	−0.90	−0.90	20	318
4867.53	1.60	−4.73	—	−4.70*	—	−4.70	—	38
4869.46	3.53	−2.25	—	−2.54*	—	−2.54	—	751
4871.32	2.87	−0.54	—	—	−0.43	−0.43	60	318
4872.14	2.88	−0.75	—	—	−0.62	−0.62	35	318
4872.59	4.20	−2.81	—	−2.30*	—	−2.30	—	1047
4873.75	3.29	−3.72	—	−3.06*	—	−3.06	—	633
4874.36	3.06	−3.39	—	−3.03*	—	−3.03	—	467
4875.88	3.32	−2.06	—	−2.01*	—	−2.01	—	687
4877.59	2.99	−3.11	—	−3.09*	−3.12	−3.11	—	384
4878.22	2.89	−1.07	—	—	−0.98	−0.98	12	318
4882.14	3.40	−1.76	—	−1.64*	—	−1.64	—	687
4885.43	3.86	−1.12	—	−1.12*	—	−1.12	—	966
4886.33	4.14	−0.88	—	−0.84*	—	−0.84	—	1066
4887.36	4.06	—	—	−2.24*	—	−2.24	—	1037
4890.76	2.88	−0.59	—	—	−0.45	−0.45	35	318
4891.50	2.85	−0.29	—	—	−0.16	−0.16	80	318
4892.86	4.20	−1.10	—	−1.36*	—	−1.36	—	1070
4896.44	3.87	−1.64	—	−2.07*	−2.05	−2.06	—	984
4903.30	2.87	−1.11	—	—	−1.10	−1.10	10	318
4905.13	3.91	−4.06	—	−2.03*	−2.05	−2.04	—	986
4907.73	3.42	−1.97	—	−1.89*	—	−1.89	—	687
4908.61	2.47	−4.26	—	−4.19	—	−4.19	—	115
4909.38	3.91	−1.27	—	−1.35	—	−1.35	—	985
4910.02	3.38	−1.55	—	−1.38*	—	−1.38	—	687
4910.33	4.17	−0.92	—	−0.82*	—	−0.82	—	1068
4910.57	4.20	−0.84	—	−0.84*	—	−0.84	—	1068
4911.53	4.24	−2.04	—	−1.86*	—	−1.86	—	1098
4911.78	3.91	−1.57	—	−1.75*	−1.79	−1.77	—	984
4912.49	4.12	−1.07	—	−2.42*	—	−2.42	—	1040
4916.67	3.91	−3.83	—	−2.96*	—	−2.96	—	986
4917.23	4.17	−1.15	—	−1.11*	−1.14	−1.12	—	1066

Appendix Continued

Wave-length	*E*(low)	Log *gf*					Int.	Mult. No.
		KP	BW	Solar†	MRW+GK	Adopted		
4918.01	4.21	−0.95	—	−1.28*	−1.31	−1.29	—	1070
4919.00	2.87	−0.55	—	—	−0.39	−0.39	50	318
4920.51	2.83	−0.10	—	—	.04	.04	120	318
4924.77	2.27	−2.10	—	−2.28*	—	−2.28	—	114
4925.27	4.09	−1.21	—	−2.12*	—	−2.12	—	1065
4930.31	3.94	−1.35	—	−1.34*	−1.35	−1.34	—	985
4935.41	3.63	−3.14	—	−3.43*	—	−3.43	—	886
4938.82	2.86	−1.28	—	−0.92*	—	−0.92	10	318
4939.69	0.86	−3.06	−3.340	−3.39*	—	−3.34	—	16
4945.64	4.19	−2.56	—	−1.55*	−1.47	−1.51	—	1113
4946.39	3.35	−1.31	—	−1.17*	—	−1.17	—	687
4950.11	3.40	−1.72	—	−1.67*	—	−1.67	—	687
4954.30	4.16	−4.72	—	−3.19	—	−3.19	—	1093
4961.92	3.62	−3.52	—	−2.42*	−2.30	−2.36	—	845
4962.57	4.16	−1.92	—	−1.31*	−1.25	−1.28	—	1097
4966.09	3.32	−0.98	—	−0.61*	—	−0.61	—	687
4969.92	4.20	−1.14	—	−0.79*	—	−0.79	—	1066
4970.50	3.62	−1.79	—	−1.79*	−1.70	−1.75	—	883
4973.10	3.94	−0.91	—	−0.79*	—	−0.79	—	984
4979.59	3.62	−2.64	—	−2.58*	—	−2.58	—	883
4982.50	4.09	−0.31	—	0.24*	—	0.24	—	1067
4983.26	4.14	−0.58	—	−0.21*	—	−0.21	—	1067
4983.85	4.09	−0.39	—	0.08*	—	0.08	—	1066
4985.25	3.91	−0.65	—	−0.50*	—	−0.50	—	984
4985.55	2.85	−1.59	—	−1.45*	—	−1.45	—	318
4985.98	4.24	−2.69	—	−1.90*	—	−1.90	—	1094
4986.22	4.20	−1.79	—	−1.41*	−1.35	−1.38	—	1070
4986.90	4.24	−1.95	—	−2.49*	—	−2.49	—	1092
4987.65	4.16	−2.11	—	−2.94	—	−2.94	—	1094
4988.95	4.14	−0.85	—	−0.63	—	−0.63	—	1066
4991.27	4.17	−1.36	—	−0.65*	—	−0.65	—	1065
4991.86	4.20	−3.29	—	−2.15*	−1 87	−2.01	—	1094
4992.77	4.24	—	—	−2.32	—	−2.32	—	1110
4994.13	0.91	−2.82	−3.080	−3.31*	—	−3.08	—	16
4995.40	4.24	−2.68	—	−2.16	−1.85	−2.00	—	1113
4999.11	4.17	−1.44	—	−1.81*	−1.69	−1.75	—	1040
5001.87	3.86	−0.19	—	0.13*	—	0.13	12	965
5002.79	3.38	−1.63	—	−1.61*	−1.58	−1.59	—	687
5004.04	4.19	−2.28	—	−1.46*	−1.36	−1.41	—	1112
5012.07	0.86	−2.28	−2.642	—*	—	−2.64	12	16
5014.95	3.93	−0.37	—	−0.14*	—	−0.14	10	965
5016.48	4.24	−1.67	—	−1.67	—	−1.67	—	1089
5019.17	4.56	−2.19	—	−2.08*	—	−2.08	—	1242
5022.24	3.97	−0.58	—	−0.44*	—	−0.44	—	965
5023.18	4.26	−1.84	—	−1.58*	—	−1.58	—	1095
5023.49	4.29	−1.95	—	−1.74*	−1.67	−1.70	—	1150
5027.76	4.19	−2.73	—	−1.26*	−1.21	−1.23	—	1110
5028.13	3.56	−1.34	—	−1.16*	—	−1.16	—	791
5029.62	3.40	−1.90	—	−2.10*	−2.05	−2.08	—	718
5030.78	3.22	−2.66	—	−2.90*	−2.96	−2.93	—	585
5031.91	4.35	−2.38	—	−1.78*	−1.63	−1.70	—	1150

Appendix Continued

Wavelength	E(low)	Log gf					Int.	Mult. No.
		KP	BW	Solar†	MRW+GK	Adopted		
5044.21	2.84	−2.19	—	−2.15*	—	−2.15	—	318
5047.12	4.56	−2.14	—	−2.44	—	−2.44	—	1242
5048.43	3.94	−1.28	—	−1.20*	—	−1.20	—	984
5049.82	2.28	−1.32	—	—	−1.39	−1.39	20	114
5051.64	0.91	−2.45	−2.795	—	—	−2.79	10	16
5054.64	3.62	−2.91	—	−2.14*	−2.14	−2.14	—	884
5057.98	3.93	—	—	−2.10	−2.54	−2.32	—	967
5058.49	3.63	−4.13	—	−2.82*	—	−2.82	—	884
5067.15	4.20	−1.02	—	−0.96*	—	−0.96	—	1092
5068.77	2.93	−1.31	—	−1.11*	−1.25	−1.18	10	383
5072.08	4.26	−1.29	—	−0.74*	—	−0.74	—	1089
5072.67	4.20	−1.23	—	−1.13*	—	−1.13	—	1095
5074.75	4.20	−3.00	—	—	−0.25	−0.25	10	1094
5079.23	2.20	−2.20	−2.067	−2.08*	—	−2.07	—	66
5079.74	0.99	−2.98	−3.220	−3.25*	—	−3.22	—	16
5083.34	0.96	−2.64	−2.958	−2.99*	−3.05	−2.96	8	16
5085.67	4.16	−3.14	—	−2.16*	—	−2.16	—	1093
5088.15	4.14	−2.05	—	−1.75*	−1.74	−1.74	—	1066
5090.78	4.24	−1.50	—	−0.42*	—	−0.42	—	1090
5104.03	3.00	−3.00	—	−2.91*	−2.77	−2.84	—	465
5104.19	4.16	−2.28	—	−1.88*	−1.93	−1.90	—	1092
5104.44	4.26	−2.17	—	−1.62*	−1.65	−1.63	—	1090
5107.45	0.99	−2.79	−3.087	−3.03*	—	−3.09	—	16
5107.65	1.55	−2.83	−2.418	−2.40*	—	−2.42	—	36
5109.65	4.28	−0.66	—	−0.78*	—	−0.78	—	1089
5110.41	0.00	−3.74	−3.760	—	—	−3.76	20	1
5115.79	3.56	−2.91	—	−2.53*	−2.75	−2.64	—	789
5119.90	3.86	—	—	−3.03	—	−3.03	—	960
5123.72	1.01	−2.81	−3.068	−3.09*	—	−3.07	—	16
5124.61	3.29	−3.06	—	−2.94*	—	−2.94	—	585
5127.36	0.91	−3.02	−3.307	−3.32*	—	−3.31	—	16
5127.68	0.05	−7.68	−6.125	−6.08*	—	−6.12	—	1
5129.63	3.93	−1.56	—	−1.82*	−1.85	−1.84	—	965
5131.47	2.21	−2.65	—	−2.56*	—	−2.56	—	66
5136.09	4.17	−1.12	—	−2.05*	−2.08	−2.06	—	1036
5137.39	4.16	−0.42	—	0.03*	—	0.03	—	1090
5141.74	2.41	−2.14	—	−2.15*	—	−2.15	—	114
5143.72	2.19	−3.57	—	−3.85*	−3.77	−3.81	—	65
5145.10	2.19	−3.35	—	−3.21*	−3.20	−3.21	—	66
5145.73	3.68	−2.22	—	−3.09	—	−3.09	—	931
5151.92	1.01	−3.07	−3.322	−3.33*	—	−3.32	—	16
5159.06	4.26	−1.00	—	−0.85*	—	−0.85	—	1091
5159.96	4.28	−2.10	—	−2.68	—	−2.68	—	1095
5162.28	4.16	−0.10	—	0.59*	—	0.59	10	1089
5166.29	—	−3.97	−4.195	—	—	−4.20	—	1
5167.49	1.49	−1.29	—	—	−1.24	−1.24	130	37
5168.90	0.05	−3.91	−3.969	—	—	−3.97	—	1
5171.60	1.49	−2.02	−1.793	—	−1.87	−1.79	60	36
5178.80	4.37	−1.46	—	−1.73*	−1.80	−1.76	—	1166
5180.06	4.45	−1.21	—	−1.19*	—	−1.19	—	1116
5187.91	4.12	−0.79	—	−1.35*	−1.28	−1.31	—	1032

Appendix Continued

Wave-length	*E*(low)	Log *gf*					Int.	Mult. No.
		KP	BW	Solar†	MRW+GK	Adopted		
5194.94	1.55	−2.19	−2.090	−2.06*	—	−2.09	30	36
5195.48	4.20	−0.45	—	−0.07*	—	−0.07	—	1092
5196.06	4.24	−0.89	—	−0.79*	—	−0.79	—	1091
5197.94	4.28	−1.92	—	−1.59*	−1.60	−1.59	—	1091
5198.71	2.22	−2.29	−2.135	−2.14*	—	−2.13	—	66
5202.34	2.18	−2.00	−1.838	—	−1.60	−1.84	25	66
5204.58	0.09	−4.23	−3.902	—	—	−3.90	—	1
5205.29	4.24	—	—	−3.05	—	−3.05	—	1112
5206.81	4.26	−2.06	—	−2.55	—	−2.55	—	1059
5209.89	3.22	−3.15	—	−3.26*	—	−3.26	—	584
5213.35	4.37	−2.03	—	−2.24*	—	−2.24	—	1165
5213.81	3.93	−2.41	—	−2.82	—	−2.82	—	962
5215.18	3.25	−1.14	—	−0.75*	—	−0.75	—	553
5216.28	1.60	−2.25	−2.150	−2.14*	—	−2.15	25	36
5217.39	3.20	−1.30	—	−0.99*	—	−0.99	—	553
5218.51	4.56	−2.83	—	−2.60*	—	−2.60	—	1240
5223.19	3.62	−2.33	—	−2.35	−2.40	−2.37	—	880
5225.53	0.11	−4.63	−4.789	−4.80*	—	−4.79	—	1
5228.38	4.20	−0.89	—	−1.16*	−1.25	−1.20	—	1091
5232.95	2.93	−0.32	—	—*	−0.25	−0.25	110	383
5236.20	4.17	−1.50	—	−1.73*	−1.68	−1.70	—	1034
5236.37	4.29	−2.18	—	−2.43*	—	−2.43	—	1146
5238.24	3.97	−2.86	—	−3.14	—	−3.14	—	962
5241.90	4.40	−3.66	—	—	−1.63	−1.63	—	1150
5242.50	3.62	−1.06	—	−0.97*	—	−0.97	—	843
5243.78	4.24	−1.04	—	−1.08*	−1.11	−1.09	—	1089
5247.06	0.09	−5.12	−4.946	−4.96*	—	−4.95	—	1
5249.11	4.45	−1.86	—	−1.53*	−1.44	−1.48	—	1166
5250.21	0.12	−4.84	−4.983	−4.94*	—	−4.98	—	1
5250.65	2.19	−2.23	—	−2.05*	—	−2.05	—	66
5253.03	2.27	−3.97	—	−3.90	−3.92	−3.91	—	113
5253.46	3.27	−1.82	—	−1.58*	—	−1.58	—	553
5254.96	0.11	−4.76	−4.764	—	—	−4.76	—	1
5262.62	4.30	−2.38	—	−2.26	—	−2.26	—	1149
5262.88	3.24	−2.68	—	−3.03*	—	−3.03	—	628
5263.31	3.25	−1.13	—	−0.79*	—	−0.79	—	553
5266.56	3.00	−0.63	—	—	−0.51	−0.51	50	383
5267.27	4.35	−1.89	—	−1.77*	—	−1.77	—	1146
5269.54	0.86	−1.41	−1.321	—	−1.53	−1.32	220	15
5270.36	1.61	−1.55	—	—	−1.51	−1.51	80	37
5273.17	3.28	−1.27	—	−0.99*	—	−0.99	—	553
5273.38	2.47	−2.03	—	−2.18*	—	−2.18	—	114
5279.67	3.29	−3.64	—	−3.59	−3.46	−3.52	—	584
5280.36	3.63	−2.01	—	—	−2.03	−2.03	—	880
5281.80	3.04	−1.09	—	—	−1.01	−1.01	20	383
5288.53	3.68	−1.92	—	−1.68*	—	−1.68	—	929
5293.96	4.12	−1.58	—	−1.88*	−1.83	−1.85	—	1031
5294.55	3.62	−4.31	—	−2.76	−2.87	−2.82	—	875
5295.32	4.40	−1.63	—	−1.61	−1.65	−1.63	—	1146
5298.79	3.63	−2.50	—	—	−2.16	−2.16	—	875
5300.40	4.57	−2.85	—	−2.41	−1.71	−2.06	—	1240

Appendix Continued

Wavelength	E(low)	Log gf					Int.	Mult. No.
		KP	BW	Solar†	MRW+GK	Adopted		
5301.31	4.37	—	—	−2.81	—	−2.81	—	1162
5302.30	3.27	−0.99	—	−0.59*	−0.87	−0.73	25	553
5307.37	1.61	−3.12	−2.987	−3.08*	—	−2.99	—	36
5308.69	4.24	−2.16	—	−2.60	—	−2.60	—	1091
5315.07	4.35	−1.34	—	−1.59*	−1.51	−1.55	—	1147
5320.04	3.63	−2.02	—	−2.60*	−2.55	−2.57	—	877
5321.11	4.42	−1.73	—	−1.37*	−1.40	−1.38	—	1165
5322.04	2.27	−2.66	—	−2.97*	—	−2.97	—	112
5324.19	3.20	−0.37	—	—	−0.31	−0.31	30	553
5326.82	4.40	−3.36	—	−2.09	—	−2.09	—	1147
5328.04	0.91	−1.55	−1.466	—	−1.64	−1.47	180	15
5329.99	4.06	−0.84	—	−1.32*	−1.26	−1.29	—	1028
5332.90	1.55	−3.07	—	−2.94*	−2.11	−2.53	—	36
5339.93	3.25	−0.91	—	−0.49*	−0.73	−0.61	14	553
5349.74	4.37	−1.38	—	—	−1.26	−1.26	—	1163
5358.11	3.30	−2.95	—	—	−3.39	−3.39	—	628
5361.63	4.40	−1.96	—	—	−1.39	−1.39	—	1143
5364.88	4.43	−0.22	—	0.46*	—	0.46	12	1146
5365.40	3.56	−1.81	—	−1.27*	—	−1.27	—	786
5367.47	4.40	—	—	0.61*	0.33	0.47	14	1146
5369.97	4.35	0.08	—	0.73*	0.33	0.53	20	1146
5371.49	0.96	−1.72	−1.645	—	−1.75	−1.64	120	15
5373.71	4.45	−0.94	—	−0.86*	−0.82	−0.84	—	1166
5376.83	4.28	−2.54	—	−2.13*	−2.27	−2.20	—	1132
5379.58	3.68	−1.50	—	−1.63*	−1.63	−1.63	—	928
5383.38	4.29	0.16	—	1.08*	0.46	0.77	30	553
5385.58	3.68	−3.70	—	−3.15*	−2.98	−3.07	—	927
5386.34	4.14	−2.09	—	−1.79	−1.73	−1.76	—	1064
5387.51	4.12	−2.06	—	—	−2.10	−2.10	—	1031
5389.48	4.40	−0.83	—	−0.39*	—	−0.39	—	1145
5393.17	3.23	−1.01	—	−0.56*	−0.90	−0.73	20	553
5395.22	4.43	−2.37	—	−1.81	−2.13	−1.97	—	1143
5397.13	0.91	−2.07	−1.993	—	−2.17	−1.99	70	15
5397.62	3.62	−3.27	—	−2.48*	—	−2.48	—	841
5398.28	4.43	−1.34	—	−0.65*	−0.69	−0.67	—	1145
5401.27	4.30	−2.65	—	−1.83*	−1.88	−1.85	—	1146
5404.14	0.99	0.02	—	—	0.49	0.49	70	15
5405.78	0.99	−1.92	−1.844	—*	−1.98	−1.84	70	15
5406.77	4.35	−1.41	—	−1.53*	−1.68	−1.60	—	1148
5409.13	4.35	−1.61	—	−1.17*	−1.26	−1.21	—	1147
5410.91	4.45	−0.08	—	0.50*	0.26	0.38	18	1165
5412.79	4.42	−2.36	—	−1.87*	—	−1.87	—	1162
5415.21	4.37	0.15	—	0.97*	0.51	0.74	30	1165
5417.04	4.40	−1.69	—	−1.55*	−1.64	−1.59	—	1148
5421.84	4.53	−2.59	—	−2.00*	−1.74	−1.87	—	1183
5422.16	4.30	−3.39	—	−2.27	—	−2.27	—	1145
5429.70	0.96	−1.94	−1.879	—	−1.96	−1.88	80	15
5432.96	4.43	−0.92	—	−0.78*	−1.00	−0.89	—	1143
5434.53	1.01	−2.19	−2.122	—	−2.20	−2.12	50	15
5435.18	4.42	−3.40	—	−2.19*	—	−2.19	—	116
5436.30	4.37	−1.77	—	−1.44*	−1.50	−1.47	—	1161

Appendix Continued

Wave-length	*E*(low)	Log *gf*					Int.	Mult. No.
		KP	BW	Solar†	MRW+GK	Adopted		
5436.59	2.27	−3.30	—	−3.38*	−3.37	−3.37	—	113
5438.05	4.57	−2.53	—	−2.69	—	−2.69	—	1237
5441.34	4.29	−1.82	—	−1.72*	−1.74	−1.73	—	1144
5443.42	4.09	−2.06	—	−2.97	—	−2.97	—	1059
5445.05	4.37	−0.32	—	0.29*	—	0.29	10	1163
5446.92	0.99	−1.98	—	—	−2.02	−2.02	60	15
5452.10	3.62	−3.02	—	−2.86*	—	−2.86	—	870
5460.88	3.06	−3.88	—	−3.58*	—	−3.58	—	464
5461.55	4.43	−2.12	—	−1.71*	−1.86	−1.78	—	1145
5463.28	4.42	−0.42	—	—	0.09	0.09	10	1163
5464.28	4.12	−1.55	—	−1.69*	−1.68	−1.68	—	1030
5470.09	4.43	−1.93	—	−1.66*	−1.77	−1.71	—	1144
5472.72	4.19	−2.30	—	*	−1.68	−1.68	—	1108
5473.16	4.17	−2.50	—	−2.12*	−2.10	−2.11	—	1064
5473.91	4.14	−1.15	—	−0.76*	—	−0.76	—	1062
5478.48	4.17	−1.80	—	—	−1.81	−1.81	—	1062
5480.87	4.20	−1.54	—	—	−1.22	−1.22	—	1062
5481.45	4.17	−1.79	—	—	−1.41	−1.41	—	1061
5482.26	3.62	−2.88	—	−3.54*	—	−3.54	—	873
5483.10	4.14	−1.85	—	−1.53*	−1.54	−1.53	—	1061
5487.15	4.40	−0.92	—	−1.51*	−1.49	−1.50	—	1143
5487.75	4.12	−0.83	—	−0.60*	—	−0.60	—	1025
5489.86	4.43	−2.00	—	−2.05*	−2.20	−2.12	—	1148
5491.84	4.17	−2.12	—	−2.30	−2.36	−2.33	—	1031
5493.50	4.09	−2.06	—	−1.75	−1.80	−1.77	—	1061
5494.47	4.06	−1.66	—	−2.02	−2.05	−2.03	—	1024
5497.52	1.01	−2.91	−2.849	—	−2.89	−2.85	16	15
5499.59	4.45	−3.86	—	−2.75	—	−2.75	—	1159
5501.47	0.95	−3.10	—	−3.03*	−3.08	−3.06	10	15
5506.78	0.99	−2.86	−2.797	−2.83*	—	−2.80	20	15
5512.28	4.35	−1.84	—	—	−1.38	−1.38	—	1143
5517.07	4.19	—	—	−2.12*	−2.33	−2.22	—	1109
5521.30	4.42	−1.43	—	−2.57	—	−2.57	—	1162
5522.45	4.19	−1.75	—	−1.54*	−1.51	−1.52	—	1108
5524.26	4.14	−1.89	—	−2.90	—	−2.90	—	1059
5525.55	4.21	−1.59	—	−1.28*	−1.29	−1.28	—	1062
5529.17	3.63	−4.30	—	−2.71*	−2.74	−2.73	—	872
5531.95	4.89	−0.61	—	−1.53*	−1.57	−1.55	—	1281
5534.26	4.14	−2.48	—	−2.83*	—	−2.83	—	1059
5536.59	2.82	−3.83	—	−3.87*	—	−3.87	—	345
5539.29	3.63	—	—	−2.66	−2.67	−2.66	—	871
5543.19	3.68	—	—	−1.69*	−1.57	−1.63	—	926
5543.94	4.20	−1.32	—	−1.14*	−1.10	−1.12	—	1062
5546.51	4.35	−1.95	—	−1.21*	−1.27	−1.24	—	1145
5546.99	4.22	−1.98	—	−1.90	−1.87	−1.88	—	1061
5549.65	4.97	−0.92	—	−1.66*	—	−1.66	—	1314
5549.95	3.68	−3.23	—	−2.87*	−2.91	−2.89	—	926
5552.70	4.93	−1.20	—	−1.83	−1.95	−1.89	—	1281
5553.59	4.42	—	—	—	−1.37	−1.37	—	1161
5557.95	4.45	−1.56	—	—	−1.24	−1.24	—	1163
5560.22	4.24	−1.59	—	−1.13*	−1.15	−1.14	—	1164

Appendix Continued

Wavelength	E(low)	Log gf					Int.	Mult. No.
		KP	BW	Solar†	MRW+GK	Adopted		
5563.60	4.17	−1.23	—	—	−0.95	−0.95	—	1062
5565.71	4.59	−0.45	—	−0.23*	—	−0.23	—	1183
5567.40	2.60	−2.44	—	—	−2.77	−2.77	—	209
5568.87	3.62	−3.00	—	−2.98	−2.96	−2.97	—	869
5569.63	3.40	−0.77	—	−0.14*	−0.59	−0.36	20	686
5572.85	3.84	−0.53	—	0.19*	−0.36	−0.08	30	686
5576.09	3.42	−1.08	—	−0.64*	−0.99	−0.82	7	686
5577.02	5.01	−0.78	—	−1.55	—	−1.55	—	1314
5579.35	4.21	−2.60	—	−2.40*	—	−2.40	—	1061
5584.77	3.56	−2.42	—	—	−2.33	−2.33	—	782
5586.76	3.40	−0.36	—	—	−0.36	−0.36	40	686
5587.58	4.12	−1.86	—	−1.76	−1.81	−1.78	—	1026
5594.66	4.53	−0.90	—	—	−0.86	−0.86	—	1182
5595.06	5.04	−0.78	—	−1.84	—	−1.84	—	1314
5607.66	4.14	—	—	−2.27*	—	−2.27	—	1058
5608.98	4.19	−1.73	—	−2.37	—	−2.37	—	1108
5609.98	3.62	−3.73	—	−3.25	—	−3.25	—	866
5611.36	3.62	−4.54	—	−2.99	—	−2.99	—	869
5614.28	5.06	−0.95	—	−1.39*	—	−1.39	—	1314
5615.65	3.33	−0.22	—	—	−0.19	−0.19	50	686
5617.22	3.24	−4.52	—	—	−2.89	−2.89	—	626
5618.64	4.19	−1.32	—	−1.38*	−1.34	−1.36	—	1107
5619.23	3.68	−2.64	—	−3.27*	—	−3.27	—	923
5619.60	4.37	−2.43	—	−1.55	−1.66	−1.60	—	1161
5620.53	4.14	−2.29	—	—	−1.75	−1.75	—	1061
5624.03	4.73	−1.92	—	−1.26*	−1.44	−1.35	—	1160
5624.55	3.42	−1.02	—	—	−0.89	−0.89	10	686
5633.95	4.97	0.15	—	−0.31*	−0.29	−0.30	—	1314
5635.83	4.24	−3.12	—	−1.65	−1.85	−1.75	—	1088
5636.70	3.62	−3.04	—	−2.61	−2.62	−2.61	—	868
5638.27	4.20	−1.40	—	−0.80*	−0.83	−0.81	—	1087
5640.46	4.54	—	—	—	−1.69	−1.69	—	1202
5641.44	4.24	−1.70	—	−1.15*	−1.14	−1.14	—	1087
5642.76	4.59	−3.57	—	−2.03*	−2.08	−2.05	—	1184
5644.35	4.14	−3.85	—	−3.25	—	−3.25	—	1057
5646.68	4.24	−4.69	—	−2.50*	—	−2.50	—	1109
5649.99	5.08	−0.40	—	−0.84*	−0.82	−0.83	—	1314
5650.69	5.06	−0.25	—	−0.86*	−0.86	−0.86	—	1314
5651.47	4.45	−1.85	—	−1.87	−1.96	−1.91	—	1161
5652.02	4.20	−1.76	—	−3.12*	—	−3.12	—	1059
5652.32	4.24	−1.66	—	−1.84*	−1.91	−1.87	—	1108
5653.87	4.37	−1.97	—	−1.50*	−1.60	−1.55	—	1159
5655.18	5.04	−0.11	—	—	−0.60	−0.60	—	1314
5658.83	3.40	−1.06	—	—	−0.91	−0.91	12	686
5660.79	3.62	−3.07	—	—	−2.89	−2.89	—	869
5661.02	4.27	−2.09	—	−2.48	—	−2.48	—	1234
5661.35	4.27	−1.87	—	−1.93	−1.98	−1.95	—	1108
5661.98	4.24	−3.92	—	−2.73*	—	−2.73	—	1109
5662.52	4.16	−1.05	—	−0.47*	—	−0.47	—	1087
5672.26	4.56	−3.36	—	−2.80*	—	−2.80	—	1234
5677.69	4.09	−2.97	—	−2.70	—	−2.70	—	1057

Appendix Continued

Wavelength	*E*(low)	Log *gf*					Int.	Mult. No.
		KP	BW	Solar†	MRW+GK	Adopted		
5678.06	4.96	−3.33	—	−2.62*	—	−2.62	—	1290
5678.39	3.87	−3.44	—	−3.04*	—	−3.04	—	982
5678.06	2.41	−4.77	—	−4.67*	—	−4.67	—	113
5679.03	4.63	−1.06	—	−0.81*	−0.88	−0.84	—	1183
5680.24	4.17	−2.67	—	−2.37	−2.54	−2.45	—	1026
5686.54	4.53	−0.75	—	−0.60*	−0.65	−0.62	—	1182
5691.51	4.28	−2.07	—	—	−1.48	−1.48	—	1087
5698.02	3.62	−2.87	—	−2.78*	−2.69	−2.73	—	867
5698.37	4.28	−2.03	—	—	−2.11	−2.11	—	1130
5701.55	2.56	−2.02	−2.216	−2.23*	—	−2.22	—	209
5702.43	3.62	−2.88	—	—	−2.88	−2.88	—	866
5705.47	4.28	−1.98	—	−1.57*	−1.56	−1.56	—	1087
5705.99	4.59	−0.75	—	—	−0.55	−0.55	—	1183
5707.24	3.63	−4.03	—	−3.59	—	−3.59	—	866
5708.10	4.42	−1.38	—	−1.48*	−1.53	−1.50	—	1161
5711.87	4.26	−1.70	—	—	−1.42	−1.42	—	1087
5712.13	3.40	−2.25	—	−2.12*	−2.06	−2.09	—	686
5715.47	4.14	—	—	−2.98*	—	−2.98	—	1059
5717.84	4.27	−1.24	—	−1.09*	−1.09	−1.09	—	1107
5720.89	4.53	−2.28	—	−1.95*	—	−1.95	—	1178
5724.46	4.27	−4.72	—	−2.64*	—	−2.64	—	1109
5731.77	4.24	−1.52	—	−1.18*	−1.26	−1.22	—	1087
5732.30	4.97	−1.25	—	−1.51*	−1.52	−1.51	—	1313
5732.88	4.04	−2.22	—	−3.04*	—	−3.04	—	1055
5737.71	4.09	—	—	—	−2.36	−2.36	—	1053
5738.24	4.20	−2.82	—	−2.30	—	−2.30	—	1084
5741.85	4.24	−2.38	—	−1.73	−1.69	−1.71	—	1086
5742.95	4.16	−4.54	—	−2.42	−2.47	−2.44	—	1086
5747.95	4.59	−1.62	—	−1.44*	−1.39	−1.41	—	1182
5752.04	4.53	−1.14	—	−0.99*	—	−0.99	—	1180
5753.13	4.24	−0.89	—	−0.66*	—	−0.66	—	1107
5754.41	3.63	−2.53	—	−2.90	−2.71	−2.81	—	866
5759.27	4.63	−1.97	—	−2.13	—	−2.13	—	1184
5760.35	3.63	−1.93	—	−2.53	−2.50	−2.51	—	867
5760.53	4.15	—	—	−3.26	—	−3.26	—	1054
5762.42	3.63	−2.53	—	−2.40*	−2.29	−2.34	—	866
5763.00	4.19	−0.59	—	−0.21*	−0.47	−0.34	7	1107
5775.08	4.20	−1.48	—	−1.22*	—	−1.22	—	1087
5778.46	2.58	−3.23	—	−3.56	−3.57	−3.56	—	209
5780.60	3.23	−2.91	—	−2.59*	−2.65	−2.62	—	552
5784.66	3.38	−2.77	—	−2.68	−2.68	−2.68	—	686
5787.27	3.24	—	—	−4.13*	—	−4.13	—	625
5791.04	3.20	−2.70	—	—	−2.47	−2.47	—	552
5793.92	4.20	−2.35	—	−1.68	−1.66	−1.67	—	1086
5798.19	3.91	−2.03	—	—	−1.89	−1.89	—	982
5804.03	3.86	−2.34	—	−2.32*	−2.30	−2.31	—	959
5804.46	4.26	−2.27	—	−2.05*	−2.00	−2.02	—	1087
5805.76	5.01	−1.48	—	—	−1.49	−1.49	—	1313
5806.73	4.59	−1.33	—	−1.00*	−1.01	−1.00	—	1180
5807.99	4.61	−2.39	—	−2.60*	—	−2.60	—	1178
5809.22	3.87	−1.98	—	−1.83*	−1.84	−1.84	—	982

Appendix Continued

Wavelength	*E*(low)	Log *gf*					Int.	Mult. No.
		KP	BW	Solar†	MRW+GK	Adopted		
5809.88	4.28	−.46	—	−3.09	—	−3.09	—	1084
5811.91	4.12	−2.25	—	−2.44	−2.39	−2.41	—	1022
5814.81	4.26	−2.34	—	−1.90	−1.93	−1.91	—	1086
5815.16	4.14	−2.95	—	—	−2.58	−2.58	—	1055
5816.06	4.28	−2.91	—	−2.30*	—	−2.30	—	1127
5826.64	4.26	−2.72	—	−2.94*	—	−2.94	—	1084
5827.88	3.27	−3.58	—	−3.23	−3.43	−3.33	—	552
5835.10	4.24	−2.54	—	−2.25	−2.33	−2.29	—	1084
5837.70	4.28	−1.63	—	−2.37	−2.30	−2.33	—	1129
5838.38	3.93	−2.37	—	−2.39*	−2.35	−2.37	—	959
5844.93	4.14	—	—	−3.02	—	−3.02	—	1056
5845.29	5.01	−1.94	—	−1.82*	—	−1.82	—	1313
5849.69	3.68	−3.28	—	−3.02	−3.00	−3.01	—	922
5852.22	4.53	−1.98	—	−1.32*	−1.29	−1.30	—	1178
5853.16	1.48	−4.88	—	−5.17	−5.46	−5.31	—	35
5855.08	4.59	−2.08	—	−1.66	−1.72	−1.69	—	1179
5856.09	4.28	−2.64	—	−1.64	−1.60	−1.62	—	1128
5858.78	4.20	−2.40	—	−2.26	−2.22	−2.24	—	1084
5859.59	4.53	−1.08	—	−0.62*	—	−0.62	—	1181
5861.11	4.26	−2.97	—	−2.43	—	−2.43	—	1084
5862.36	4.53	−0.60	—	−0.36*	—	−0.36	—	1180
5864.24	4.28	−2.72	—	−2.52*	—	−2.52	—	1086
5873.21	4.24	−2.31	—	−2.13*	−2.10	−2.11	—	1087
5876.29	4.28	−3.83	—	−2.78*	—	−2.78	—	1084
5877.77	4.16	—	—	—	−2.19	−2.19	—	1083
5879.49	4.59	−3.13	—	−2.06	−2.10	−2.08	—	1201
5880.02	4.54	−2.94	—	−2.02	−1.90	−1.96	—	1201
5881.27	4.59	−3.56	—	−1.84	−1.80	−1.82	—	1178
5883.84	3.94	−1.39	—	—	−1.36	−1.36	—	982
5898.21	4.71	−1.98	—	—	−1.79	−1.79	—	1259
5902.47	4.57	−1.76	—	−1.93	−1.77	−1.85	—	1234
5905.68	4.63	−2.25	—	−0.84*	−0.75	−0.79	—	1181
5909.98	3.20	−3.26	—	−2.80*	−2.79	−2.80	—	552
5916.25	2.45	−2.76	−2.994	−3.02*	−2.97	−2.99	—	170
5916.70	0.86	−5.44	−4.605	−4.62*	−4.86	−4.61	—	14
5927.79	4.63	−0.96	—	−1.16*	−1.05	−1.10	—	1175
5929.68	4.53	−0.95	—	−1.33*	−1.37	−1.35	—	1176
5933.80	4.62	—	—	−2.21	—	−2.21	—	1198
5934.66	3.91	−1.23	—	−1.25*	−1.17	−1.21	—	982
5941.97	4.16	—	—	—	−2.11	−2.11	—	1083
5947.53	4.61	−3.86	—	−2.11	—	−2.11	—	1199
5952.72	3.97	−1.48	—	−1.52*	−1.44	−1.48	—	959
5955.67	4.24	−4.43	—	−3.32*	—	−3.32	—	1106
5956.70	0.86	−5.44	—	−4.62	−4.86	−4.74	—	14
5961.89	4.20	—	—	−3.16*	—	−3.16	—	1080
5969.57	4.26	−2.89	—	−2.78	—	−2.78	—	1086
5976.17	4.29	−3.21	—	−3.22	—	−3.22	—	1125
5976.78	3.93	−1.35	—	−1.39*	—	−1.39	—	959
5984.82	4.71	−0.64	—	−0.30*	—	−0.30	—	1260
5987.07	4.77	−0.73	—	−0.57*	—	−0.57	—	1260
6003.02	3.86	−1.14	—	−1.13*	—	−1.13	—	959

Appendix Continued

Wavelength	E(low)	Log gf					Int.	Mult. No.
		KP	BW	Solar†	MRW+GK	Adopted		
6007.96	4.63	−1.60	—	−0.79*	—	−0.79	—	1178
6008.56	3.87	−1.07	—	−1.01*	—	−1.01	—	982
6015.25	0.21	−4.57	—	−4.74	−1.90	−3.32	—	63
6016.16	3.53	—	—	—	−1.82	−1.82	—	738
6019.36	3.56	−3.39	—	−3.30	—	−3.30	—	780
6027.06	4.06	−0.71	—	—	−1.17	−1.17	—	1018
6032.67	4.20	—	—	−3.33*	—	−3.33	—	1082
6034.03	4.29	−2.45	—	−2.45	—	−2.45	—	1142
6035.35	4.28	−2.54	—	−2.59*	—	−2.59	—	1125
6054.07	4.35	−2.63	—	−2.33	—	−2.33	—	1142
6056.01	4.71	−0.56	—	−0.45*	—	−0.45	—	1259
6060.82	4.20	−3.08	—	−3.14*	—	−3.14	—	1081
6062.89	2.17	−4.50	—	—	−4.12	−4.12	—	63
6065.49	2.61	−1.49	−1.530	−1.38*	—	−1.53	12	207
6078.49	4.77	−0.63	—	−0.36*	—	−0.36	—	1259
6079.01	4.63	—	—	−1.11*	−1.08	−1.09	—	1176
6082.72	2.22	−3.90	−3.573	−3.65*	−3.65	−3.57	—	64
6085.27	2.75	−3.02	—	—	−3.18	−3.18	—	269
6089.57	5.00	—	—	−0.93	−0.90	−0.92	—	1327
6093.64	4.59	−1.52	—	−1.45	−1.46	−1.45	—	1177
6094.37	4.63	−1.92	—	−1.65	−1.90	−1.77	—	1177
6096.67	3.97	−2.04	—	−1.96*	−1.93	−1.95	—	959
6097.09	2.17	—	—	−5.08	—	−5.08	—	64
6098.25	4.54	—	—	−1.89	—	−1.89	—	1200
6102.18	4.81	−0.82	—	−0.25*	—	−0.25	—	1259
6105.13	4.53	−3.13	—	−2.05*	—	−2.05	—	1175
6120.25	0.91	−3.80	—	−5.94	—	−5.94	—	14
6136.62	2.45	−1.42	−1.400	−1.34*	—	−1.40	30	169
6137.00	2.20	−3.17	−2.950	−3.01*	—	−2.95	—	62
6137.70	2.59	−1.38	−1.403	−1.17*	—	−1.40	20	207
6141.73	3.59	−1.85	—	—*	−1.61	−1.61	—	816
6151.62	2.18	−3.52	−3.299	−3.36*	−3.40	−3.30	—	62
6157.41	3.29	—	—	−3.87	—	−3.87	—	624
6157.73	4.06	−0.92	—	−1.27*	−1.22	−1.24	—	1015
6159.38	4.59	−1.45	—	−1.95	—	−1.95	—	1175
6163.56	2.19	—	—	—	−2.47	−2.47	—	64
6165.36	4.12	−0.89	—	−1.58*	−1.51	−1.54	—	1018
6173.34	2.22	−3.09	−2.880	−2.94*	−3.03	−2.88	—	62
6180.20	2.72	−2.64	—	−2.76*	−2.75	−2.76	—	269
6187.40	2.83	−4.32	—	−4.19	—	−4.19	—	342
6187.99	3.93	−1.92	—	−1.80*	−1.72	−1.76	—	959
6191.57	2.42	−1.38	—	−1.39*	—	−1.39	20	169
6199.50	2.55	−4.68	—	−4.41*	—	−4.41	—	208
6200.32	2.61	−2.43	−2.437	−2.49*	−2.46	−2.44	—	207
6213.43	2.21	−2.75	—	−2.66*	—	−2.66	—	62
6215.15	4.17	−1.03	—	—	−1.40	−1.40	—	1018
6219.29	2.20	−2.62	−2.433	−2.46*	—	−2.43	—	62
6220.79	3.86	−2.22	—	−2.45	—	−2.45		958
6226.74	3.87	−2.09	—	−2.15	−2.23	−2.19	—	981
6229.23	2.83	−2.99	—	−3.02*	−2.94	−2.98	—	342
6230.73	2.56	−1.20	−1.281	—	—	−1.28	20	207

Appendix Continued

Wavelength	E(low)	Log gf					Int.	Mult. No.
		KP	BW	Solar†	MRW+GK	Adopted		
6240.31	4.12	−1.85	—	−2.28*	—	−2.28	0	1015
6240.65	2.21	−3.95	—	−3.36*	−3.41	−3.38	0	64
6246.32	3.59	−1.10	—	−0.68*	—	−0.68	7	816
6252.56	2.40	−1.43	−1.687	−1.67*	—	−1.69	12	169
6253.83	4.71	−2.14	—	−1.66*	—	−1.66	—	1256
6254.26	2.27	−2.72	—	—	−2.51	−2.51	0	111
6256.37	2.44	−2.30	—	—	−2.59	−2.59	0	169
6265.14	2.18	−2.74	−2.550	—	—	−2.55	5	62
6270.23	2.85	−2.61	—	−2.69*	−2.68	−2.69	0	342
6271.28	3.32	−3.37	—	−2.84*	−2.96	−2.90	0	685
6280.63	0.86	−4.26	−4.387	−4.35*	−4.66	−4.39	0	13
6290.53	2.58	−4.63	—	−4.44	—	−4.44	—	208
6290.97	4.71	−1.19	—	−0.76*	—	−0.76	0	1258
6293.93	4.81	−2.24	—	−1.73*	—	−1.73	—	1260
6297.80	2.22	−2.89	−2.740	−2.75*	−2.82	−2.74	0	62
6301.50	3.64	−1.04	—	−0.58*	—	−0.58	0	816
6302.49	3.67	−1.50	—	−1.15*	—	−1.15	0	816
6303.46	4.30	—	—	−2.67	—	−2.67	—	1140
6311.50	2.82	−3.30	—	−3.20	—	−3.20	—	342
6315.81	4.06	−1.37	—	−1.74*	−1.67	−1.70	0	1014
6322.69	2.59	−2.42	−2.426	−2.44*	—	−2.43	0	207
6330.85	4.71	−2.74	—	−1.29	−1.70	−1.49	—	1254
6335.33	2.19	−2.47	—	−2.23*	—	−2.23	0	62
6336.83	3.67	−1.17	—	−0.74*	—	−0.74	0	816
6338.88	4.77	−2.33	—	−1.03*	−1.02	−1.02	0	1258
6344.15	2.42	−2.59	−2.923	−2.96*	−2.96	−2.92	0	169
6353.84	0.91	−6.08	−6.477	−6.57	—	−6.48	—	13
6355.04	2.83	−2.37	—	—	−2.39	−2.39	0	342
6358.69	0.86	−4.74	−4.468	—	−4.58	−4.47	0	13
6362.89	4.17	—	—	—	−1.93	−1.93	0	1019
6364.36	4.77	−1.30	—	−1.37*	−1.39	−1.38	0	1253
6376.19	4.30	—	—	−3.05	—	−3.05	0	1140
6380.75	4.17	−1.02	—	−1.41*	−1.36	−1.38	0	1015
6385.72	4.71	−1.57	—	−1.90	—	−1.90	—	1253
6392.53	2.27	−4.79	—	−4.04	—	−4.04	—	109
6393.61	2.42	−2.09	—	−1.59*	—	−1.59	10	168
640—	3.59	−0.63	—	0.07*	—	0.07	16	816
6411.11	4.73	−2.40	—	−2.37	—	−2.37	10	1256
6411.65	3.64	−0.92	—	−0.49	—	−0.49	10	816
6419.95	4.71	−0.82	—	−0.24*	−0.26	−0.25	0	1258
6421.36	2.28	−2.24	−2.027	−1.95*	—	−2.03	8	111
6430.85	2.18	−2.20	−2.006	−1.99*	—	−2.01	10	62
6436.41	4.17	−2.58	—	−2.46	—	−2.46	—	1016
6462.73	2.44	−2.17	—	—	−2.57	−2.57	0	168
6469.21	4.81	−2.69	—	—	−0.79	−0.79	0	1258
6475.63	2.55	−2.67	—	−2.96*	−2.91	−2.94	0	206
6481.88	2.28	−4.32	−2.984	−3.02*	−3.03	−2.98	0	109
6494.49	4.71	−1.65	—	−1.40*	—	−1.40	—	1255
6494.99	2.39	−1.66	—	−1.23*	—	−1.23	30	168
6495.74	4.81	−1.05	—	−1.09*	−0.90	−0.99	0	1253
6496.47	4.77	−1.05	—	−0.66*	−0.59	−0.62	—	1258

Appendix Continued

Wavelength	E(low)	Log *gf*					Int.	Mult. No.
		KP	BW	Solar†	MRW+GK	Adopted		
6498.95	0.96	−4.66	−4.699	−4.70*	−4.94	−4.70	—	13
6509.60	4.06	−2.31	—	−2.97*	—	−2.97	—	1012
6518.37	2.82	−2.70	—	−2.64*	−2.72	−2.68	—	342
6533.97	4.54	−1.24	—	−1.35	−1.42	−1.38	—	1197
6569.26	4.71	−2.66	—	—*	−0.44	−0.44	—	1253
6574.24	0.99	−5.02	−5.004	−5.01*	−5.27	−5.00	—	13
6575.03	2.58	−2.52	—	−2.82*	−2.79	−2.81	—	206
6581.21	1.48	−5.89	—	−4.79*	−5.02	−4.90	—	34
6591.32	4.57	−1.79	—	−2.09	—	−2.09	—	1229
6593.88	2.43	−2.73	−2.422	−2.45*	−2.55	−2.42	—	168
6597.61	4.77	−3.59	—	—	−1.03	−1.03	—	1253
6606.12	2.56	−2.41	−2.692	—	—	−2.69	—	206
6608.04	2.27	−4.06	—	−4.02	−4.01	−4.01	—	109
6609.11	2.55	−2.41	—	−2.74*	−2.78	−2.76	—	206
6625.04	1.01	−5.44	−5.366	−5.35	—	−5.37	—	13
6627.56	4.53	−2.21	—	−1.61	−1.64	−1.62	—	1174
6633.42	4.81	−1.83	—	−1.36*	−1.45	−1.40	—	1258
6633.75	4.54	−0.98	—	−0.81*	−0.80	−0.80	—	1197
6634.12	4.77	−1.78	—	−1.32*	−1.39	−1.35	—	1258
6639.71	4.59	−2.01	—	−1.72*	—	−1.72	—	1195
6639.89	4.06	−2.03	—	−2.46*	—	−2.46	—	1007
6646.96	2.60	−4.33	—	−3.99*	—	−3.99	—	206
6648.08	1.01	−5.74	−5.918	—	—	−5.92	—	13
6653.91	4.14	−2.82	—	−2.52*	—	−2.52	—	1052
6663.24	4.54	−1.43	—	−1.48	—	−1.48	—	1195
6663.45	2.42	−2.70	−2.479	−2.51*	—	−2.48	—	111
6667.45	2.44	−4.71	—	−4.40*	—	−4.40	—	168
6667.74	4.56	−2.37	—	−2.16*	—	−2.16	—	1228
6677.99	2.68	−1.51	—	−1.21	—	−1.21	18	268
6696.32	4.81	−2.04	—	−1.67*	—	−1.67	—	1255
6699.13	4.57	−2.90	—	−2.17	—	−2.17	—	1228
6703.57	2.75	−3.53	—	−3.07	−3.13	−3.10	—	268
6704.50	4.20	−2.38	—	−2.69	—	−2.69	—	1052
6710.32	1.48	−5.40	—	−4.91	—	−4.91	—	34
6712.46	4.97	−2.66	—	−2.16*	—	−2.16	—	1279
6713.14	4.59	−1.39	—	—	−1.54	−1.54	—	1195
6713.74	4.79	−1.72	—	−1.50	−1.56	−1.53	—	1225
6715.41	4.59	−2.22	—	—	−1.60	−1.60	—	1174
6716.25	4.56	−2.10	—	−1.92*	—	−1.92	—	1225
6725.36	4.09	−2.10	—	−2.27	—	−2.27	—	1052
6726.67	4.59	−1.29	—	−1.16*	—	−1.16	—	1197
6732.06	4.56	−2.48	—	−2.21*	—	−2.21	—	1225
6733.15	4.62	−1.77	—	−1.50	−1.54	−1.52	—	1195
6736.54	4.28	—	—	−3.14	—	−3.14	—	1122
6739.52	1.55	−5.65	—	−4.93	—	−4.93	—	34
6745.11	4.56	−2.23	—	−2.16*	—	−2.16	—	1227
6745.98	4.06	−2.49	—	−2.76	—	−2.76	—	1005
6746.97	2.60	−4.13	—	−4.35*	—	−4.35	—	205
6750.15	2.42	−2.80	−2.621	—	−2.60	−2.62	—	111
6752.71	4.62	−1.55	—	−1.34*	—	−1.34	—	1195
6753.47	4.54	−4.61	—	−2.39	—	−2.39	—	1196

Appendix Continued

Wavelength	E(low)	Log gf					Int.	Mult. No.
		KP	BW	Solar†	MRW+GK	Adopted		
6756.55	4.29	−3.32	—	−2.83	—	−2.83	—	1120
6761.01	4.56	−2.86	—	−2.53*	—	−2.53	—	1227
6769.68	4.56	−3.53	—	−2.66*	—	−2.66	—	1226
6783.71	2.58	—	—	−3.98*	—	−3.98	—	205
6786.86	4.17	−1.68	—	−1.99	−2.03	−2.01	—	1052
6793.27	4.06	−1.71	—	−2.47	—	−2.47	—	1005
6794.62	4.93	−2.56	—	−2.11*	—	−2.11	—	1279
6796.12	4.12	−2.28	—	−2.46	—	−2.46	—	1007
6801.87	1.60	−5.47	—	−5.87	—	−5.87	—	34
6804.01	4.63	−2.39	—	−1.67*	—	−1.67	—	1174
6804.29	4.56	−2.06	—	−1.92	—	−1.92	—	1225
6806.85	2.72	−3.83	—	−3.21	−2.20	−2.71	—	268
6810.26	4.59	−1.30	—	−1.11*	−1.08	−1.09	—	1197
6820.37	4.62	−1.33	—	−1.21	−1.28	−1.24	—	1197
6824.85	4.97	−2.52	—	−2.23	—	−2.23	—	1280
6828.59	4.62	−1.63	—	−0.94*	−0.88	−0.91	—	1195
6833.24	4.62	−2.01	—	−2.03	—	−2.03	—	1197
6837.01	4.57	−2.08	—	−1.79	−1.77	−1.78	—	1225
6839.83	2.55	—	—	−3.42	−3.43	−3.42	—	205
6841.34	4.59	−1.15	—	−0.83*	−0.77	−0.80	—	1195
6842.68	4.62	−1.79	—	−1.30*	−1.28	−1.29	—	1197
6843.65	3.65	−1.76	—	−0.97*	−0.92	−0.95	—	1173
6851.65	1.60	−5.83	—	−5.38	—	−5.38	—	34
6854.85	4.57	−2.02	—	−1.98*	—	−1.98	—	1224
6855.16	4.54	−0.82	—	−0.67*	—	−0.67	—	1195
6855.72	4.39	−2.02	—	−1.79	—	−1.79	—	1197
6857.25	4.06	−3.92	—	−2.15	−2.11	−2.13	—	1006
6858.15	4.59	−1.89	—	−1.09	−1.02	−1.05	—	1173
6859.49	2.83	−4.37	—	−4.52*	—	−4.52	—	1173
6860.10	4.83	−2.80	—	−2.43	—	−2.43	—	1255
6860.32	2.60	−4.41	—	−4.15*	—	−4.15	—	1194
6861.94	2.41	−4.31	—	−3.84	—	−3.84	—	109
6862.49	4.54	—	—	−1.49	−1.53	−1.51	—	1191
6864.32	4.54	—	—	−2.34	—	−2.34	—	1186
6880.63	4.14	−2.47	—	−2.37	—	−2.37	—	1051
6898.30	4.20	−1.97	—	−2.21	—	−2.21	—	1078
6911.52	2.41	−4.60	—	−4.04*	—	−4.04	—	109
6916.68	4.14	−1.14	—	−1.44*	−1.41	−1.42	—	1052
6930.63	5.49	−2.30	—	−2.08	—	−2.08	—	1221
6933.02	4.17	−2.28	—	−2.34*	—	−2.34	—	1051
6933.62	2.43	−3.54	—	−3.54	—	−3.54	—	167
6933.62	4.14	−2.30	—	−1.90	—	−1.90	—	1005
6936.49	4.59	—	—	−2.27	—	−2.27	—	1196
6945.21	2.42	−2.66	−2.482	−2.45	—	−2.48	4	111
6960.32	4.57	−2.55	—	−2.01	—	−2.01	—	1222
6970.47	3.02	−3.78	—	−3.84	—	−3.84	—	463
6971.94	3.00	−3.20	—	−3.49	—	−3.49	—	404
6976.90	4.56	−2.06	—	−1.85*	—	−1.85	—	1221
6978.86	2.48	−2.70	−2.500	−2.47	—	−2.50	3	1110
6988.53	2.39	−3.46	—	−3.53	—	−3.53	—	167
6997.08	4.93	−3.19	—	−2.30*	—	−2.30	—	1273

Appendix Continued

Wave-length	*E*(low)	Log *gf*					Int.	Mult. No.
		KP	BW	Solar†	MRW+GK	Adopted		
6999.88	4.09	−1.57	—	−1.55*	−1.52	−1.53	—	1051
7000.62	4.12	−1.65	—	−2.25	—	−2.25	—	1005
7007.97	4.16	−1.70	—	−1.93	—	−1.93	—	1078
7010.35	4.57	−2.08	—	−1.98	—	−1.98	—	1221
7014.99	2.44	−4.10	—	−4.25*	—	−4.25	—	167
7022.39	4.28	−2.38	—	−2.29*	—	−2.29	—	1078
7022.95	4.17	−1.10	—	−1.22*	—	−1.22	—	1051
7024.07	4.06	−1.62	—	−2.07	—	−2.07	—	1003
7024.64	4.54	−4.98	—	−1.31*	−1.33	−1.32	—	1187
7038.22	4.20	−1.15	—	−1.20*	—	−1.20	—	1057
7044.65	4.93	−1.82	—	−1.82*	−1.70	−1.76	—	1276
7057.92	3.64	−3.71	—	−3.38*	—	−3.38	—	815
7068.07	4.97	−1.76	—	−1.98*	—	−1.98	—	1276
7068.42	4.06	−1.71	—	−1.43*	−1.34	−1.38	—	1004
7069.54	2.55	−4.69	—	−4.36	—	−4.36	—	205
7071.86	4.59	−2.12	—	−1.50	—	−1.50	—	1194
7072.81	4.06	−2.57	—	−2.85	—	−2.85	—	1003
7079.27	4.89	−2.36	—	−2.07*	—	−2.07	—	1278
7083.40	4.89	−1.97	—	−1.40	—	−1.40	—	1276
7090.39	4.21	−0.99	—	−1.18*	−1.17	−1.17	—	1051
7093.09	4.54	−4.55	—	−2.02*	—	−2.02	—	1189
7094.33	3.56	—	—	−3.47*	—	−3.47	—	778
7107.46	4.17	−1.55	—	−2.07*	−2.00	−2.03	—	1005
7109.70	4.59	—	—	−2.77*	—	−2.77	—	1190
7112.17	2.98	−2.79	—	−3.12*	−3.06	−3.09	—	404
7114.56	2.68	−3.68	—	−4.02	—	−4.02	—	267
7118.00	4.99	−1.62	—	−1.63	—	−1.63	—	1278
7124.99	3.67	−4.03	—	−3.72	—	−3.72	—	815
7127.57	4.97	−1.65	—	−1.25*	—	−1.25	—	1273
7130.90	4.20	−0.63	—	−0.74*	−0.81	−0.77	6	1051
7132.99	4.06	−1.42	—	−1.75	—	−1.75	—	1002
7142.52	4.93	−1.43	—	−1.02	—	−1.02	—	1274
7151.47	2.47	−4.17	—	−3.68	—	−3.68	—	109
7155.64	4.99	−1.32	—	−1.02	—	−1.02	—	1276
7158.50	3.64	−3.22	—	−2.89*	—	−2.89	—	1051
7176.87	4.97	−1.29	—	−0.97*	—	−0.97	—	1276
718—	1.48	−4.77	—	−4.80	—	−4.80	—	33
7181.19	4.20	−1.11	—	−1.31*	—	−1.31	—	1078
7189.16	3.06	−2.68	—	−2.79	—	−2.79	—	463
7190.13	3.11	−3.28	—	−3.38	—	−3.38	—	463
7207.31	4.66	−0.89	—	−1.33*		−1.33	12	1001
7207.39	4.14	−0.21	—	−0.16*	—	−0.16	12	1051
7212.44	4.95	−1.38	—	−1.12	—	−1.12	—	1189
7213.84	4.24	−3.32	—	−2.64*	—	−2.64	—	1105
7219.68	4.06	−1.19	—	−1.69*	—	−1.69	—	1001
7221.20	4.54	—	—	−1.31	—	−1.31	—	1189
7228.70	2.75	−3.44	—	−3.38*	—	−3.38	—	267
7256.14	4.93	−2.15	—	−1.59*	—	−1.59	—	1278
7261.00	2.73	−3.64	—	−3.64	—	−3.64	—	267
7268.56	3.88	−3.39	—	−2.94	—	−2.94	—	957
7284.84	4.12	−2.55	—	−1.72*	—	−1.72	—	1004

Appendix Continued

Wavelength	E(low)	Log gf					Int.	Mult. No.
		KP	BW	Solar†	MRW+GK	Adopted		
7285.30	4.59	−2.08	—	−1.70*	—	−1.70	—	1188
7288.74	4.20	−1.23	—	−1.35*	—	−1.35	—	1077
7306.57	4.16	−1.78	—	−1.64	—	−1.64	—	1077
7312.06	5.03	−2.45	—	−1.96	—	−1.96	—	1310
7330.15	4.62	—	—	−2.03*	—	−2.03	—	1187
7347.17	2.75	−4.35	—	−4.22*	—	−4.22	—	266
7348.50	4.14	−1.82	—	−2.87	—	−2.87	—	1004
7351.11	4.97	−2.44	—	−1.06*	—	−1.06	—	1273
7351.51	4.93	−1.45	—	−0.91*	—	−0.91	—	1275
7353.50	4.71	−2.40	—	−1.57*	—	−1.57	—	1251
7359.98	4.97	−2.39	—	−1.85*	—	−1.85	—	957
7363.91	4.93	−1.73	—	−1.32*	—	−1.32	—	1274
7366.36	4.62	−2.02	—	−1.90*	—	−1.90	—	1188
7396.52	4.97	−2.20	—	−1.64*	—	−1.64	—	1278
7400.86	2.61	−4.50	—	−4.51	—	−4.51	—	204
7401.69	4.17	−1.43	—	−1.67	—	−1.67	—	1004
7411.16	4.26	−0.33	—	−0.36*	—	−0.36	7	1077
7418.33	4.14	−2.76	—	−3.03	—	−3.03	—	1002
7418.67	4.12	−1.17	—	−1.59*	—	−1.59	—	1001
7420.24	5.06	−3.14	—	−2.04*	—	−2.04	—	1307
7421.56	4.62	−1.68	—	−1.80	—	−1.80	—	1188
7430.55	2.58	−3.81	—	−3.92	—	−3.92	—	204
7440.91	4.89	−1.40	—	−0.77*	—	−0.77	—	1273
7443.02	4.17	−1.76	—	−1.88*	—	−1.88	—	1002
7445.75	4.24	−0.13	—	−0.02*	—	−0.02	14	1077
7447.40	4.93	−1.83	—	−1.10	—	−1.10	—	1273
7454.00	4.17	−2.85	—	−2.41*	—	−2.41	—	1001
7461.52	2.55	−3.48	—	−3.55	—	−3.55	—	204
7463.39	5.06	−2.20	—	−1.73	—	−1.73	—	1307
7473.56	4.59	−1.40	—	−1.87*	—	−1.87	—	1188
7476.37	4.77	−2.35	—	−1.68*	—	−1.68	—	1251
7481.74	2.76	—	—	−4.25	—	−4.25	—	266
7481.93	4.77	−2.79	—	−1.80*	—	−1.80	—	1250
7484.31	5.08	−2.38	—	−1.71	—	−1.71	—	1306
7491.65	4.28	−0.98	—	−1.14*	—	−1.14	—	1077
7494.99	2.41	−1.66	−1.273	—	—	−1.27	—	168
7495.07	4.20	0.02	—	0.18*	—	0.18	18	1077
7498.53	4.12	−1.94	—	−2.22*	—	−2.22	—	1001
7501.27	4.18	−2.77	—	−2.96	—	−2.96	—	1002
7507.27	4.40	−1.89	—	−1.18*	—	−1.8	—	1137
7511.03	4.16	0.18	—	0.53*	—	−0.53	30	1077
7531.15	4.35	−1.38	—	−0.63*	—	−0.63	—	1137
7540.44	2.73	−4.80	—	−3.84	—	−3.84	—	266
7541.57	3.93	−3.71	—	−3.12*	—	−3.12	—	957
7547.90	5.10	−2.20	—	−1.23	—	−1.23	—	1306
7551.10	5.08	−2.93	—	−1.65	—	−1.65	—	1303
7568.90	4.26	−0.87	—	−1.00*	—	−1.00	—	1077
7582.12	4.93	−2.70	—	−1.71	—	−1.71	—	1274
7583.79	3.00	−2.06	—	−1.99*	—	−1.99	—	402
7586.02	4.29	−0.84	—	−0.18*	—	−0.18	10	1137
7617.99	4.19	−2.10	—	−2.42	—	−2.42	10	1001

Appendix Continued

Wavelength	*E*(low)	Log *gf*					Int.	Mult. No.
		KP	BW	Solar†	MRW+GK	Adopted		
7710.36	4.20	−1.13	—	−1.21	—	−1.21	—	1077
7719.05	5.01	−2.86	—	−1.09	—	−1.09	—	1304
7723.20	2.28	−2.70	−3.617	−3.55	—	−3.62	—	108
7737.67	4.39	−2.72	—	−2.84	—	−2.84	—	1137
7742.72	4.97	−1.41	—	−0.45*	—	−0.45	—	1306
7745.52	5.05	−2.20	—	−1.26	—	−1.26	—	1305
7746.60	5.04	−2.09	—	−1.40*	—	−1.40	—	1309
7748.28	2.94	−1.86	—	−1.76*	—	−1.76	10	402
7751.11	4.97	−1.84	—	−0.79	—	−0.79	—	1304
7780.56	4.45	−0.07	—	−0.08*	—	−0.08	10	1154
7807.91	4.97	−1.49	—	−0.66*	—	−0.66	—	1303
7820.79	4.28	—	—	−2.69	—	−2.69	—	1118
7832.20	4.42	0.02	—	0.11*	—	0.11	14	1154
7844.56	4.81	−2.88	—	−1.77*	—	−1.77	—	1250
7855.40	5.04	−2.12	—	−1.20*	—	−1.20	—	1305
7869.63	4.35	−3.91	—	−1.88*	—	−1.88	—	1137
7879.78	5.01	−2.00	—	−1.65*	—	−1.65	—	1306
7912.87	0.86	−4.84	−4.840	−4.88*	—	−4.84	—	12
7937.15	4.29	0.17	—	0.23*	—	0.23	14	1136
7941.09	3.26	−2.53	—	−2.52	—	−2.52	—	623
7945.85	4.37	0.17	—	0.29*	—	0.29	—	1154
7954.94	2.99	−3.31	—	−3.82	—	−3.82	—	402
7955.70	5.01	−2.51	—	−1.24	—	−1.24	—	1305
7959.15	5.01	−2.15	—	−1.30	—	−1.30	—	1304
8075.16	0.91	−5.02	−5.088	—	—	−5.09	—	12
8204.09	0.91	−7.06	−6.052	—	—	−6.05	—	12
8327.06	2.20	−1.73	−1.525	—	—	−1.52	40	60
8387.78	2.18	−1.71	−1.493	—	—	−1.49	35	60
8468.41	2.22	−2.24	−2.072	—	—	−2.07	12	60
8514.08	2.20	−2.41	−2.229	—	—	−2.23	9	60
8688.63	2.18	−1.41	−1.212	—	—	−1.21	70	60
8804.62	2.28	−3.30	−3.234	—	—	−3.23	—	106

† Values from GK when followed by *, otherwise from RZ.