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LINE IDENTIFICATIONS IN THE ULTRAVIOLET SPECTRA OF TAU HERCULIS, B5 IV, AND ZETA DRACONIS, B6 III

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LINE IDENTIFICATIONS IN THE ULTRAVIOLET SPECTRA OF TAU HERCULIS, B5 IV, AND ZETA DRACONIS, B6 III

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ABSTRACT

Tables of the lines found on two tracings each of the ultraviolet spectrum of τ Her, B5 IV, and ζ Dra, B6 III, made by the Copernicus satellite and possible identifications are given. The ranges 1025-1451Å for τ Her and 1035-1425Å for ζ Dra are covered by the U2 spectrometer at a resolution of 0.2Å; the ranges 2028-2959Å for τ Her and 2000-3000Å for ζ Dra are covered by the V2 spectrometer at a resolution of 0.4Å. The observed density of lines in the U2 region is 1.1 lines/Å for τ Her and 1.7 lines/Å for ζ Dra. In the V2 region it is 0.8 lines/Å for τ Her and 0.9 lines/Å for ζ Dra. The lines listed in Tables 1 through 4 should be useful as a guide for identifying features in the ultraviolet spectra of stars of types B2 to B8.

For τ Her the identifications come from the following atomic species: H I, He I, C I, C II, C III, N I, N II, O I, Mg I, Mg II, Al II, Si II, Si III, Si IV, P III, S II, S III, Cl II, Ti III, V III, Cr II, Cr III, Mn II, Mn III, Fe II, Fe III,

Co II, and Ni II. The strongest lines of O II, Al III, P II, S IV, Cl I, Ti II, Ti IV, V II and Mn IV are probably present while those of Si I, V IV, Cr IV, Ni III, Ge II and Y III are possibly present.

In ζ Dra the identifications come from: H I, He I, C II, C III, N I, N II, O I, O II, Mg II, Al II, Al III, Si II, Si III, P II, P III, S II, S III, Ti III, V III, Cr II, Cr III, Mn III, Fe II, Fe III, Ni II and Ni III. Lines from the following spectra are also possibly present: Be II, B II, C I, Mg I, Si I, Si IV, S IV, Cl II, Sc III, Ti II, Ti IV, V II, V IV, Cr IV, Mn II, Mn IV, Fe IV, Ni IV, Y III.

I. INTRODUCTION

The ultraviolet spectra of Tau Herculis, B5 IV, and of Zeta Draconis, B6 III, as recorded by the Copernicus (OAO-3) spectrometer are very full of lines. The lines of τ Her and ζ Dra are sharper than those of the supergiant Eta Canis Majoris, B5 Ia. Hence, many of the blends listed for η CMa (Underhill 1974) are resolved into several components. This paper presents lists of lines found in the regions 1025-1451Å and 2028-2959Å for τ Her and in the regions 1035-1425Å and 2000-3000Å for ζ Dra along with possible identifications determined by slightly different techniques for both stars. These lists should be useful guides for identifying features in the ultraviolet spectra of stars with spectral types between B2 and B8.

II. OBSERVATIONAL MATERIAL

Two tracings of the spectrum of each star were available for study, numbers 113.01 and 113.02 for τ Her and numbers 107.01 and 107.02 for ζ Dra. Rogerson et al. (1973) have described the

Copernicus spectrometer; the U2 photomultiplier steps through the second order spectrum with steps of about 0.2Å using an exit slit of 0.2Å while the V2 photomultiplier steps through the first order spectrum with steps of about 0.4Å. The U2 observations were corrected for stray and scattered light (Bohlin 1975) and for the signal due to charged particles in the neighborhood of the spacecraft (York 1975), and the results were plotted as a tracing giving the number of counts per dwell interval (13.76 seconds) vs. wavelength, the linear scale being 1Å per inch. For τ Her, the apparent center of each absorption dip was read from a tracing which averaged the two scans. This observed wavelength was checked using both tracings. Corrections to the U2 wavelength scale were applied to observed wavelengths shortward of 1110Å as suggested by Budich et al. (1975).

For ζ Dra, the apparent center of each absorption dip was read from both tracings and the mean wavelength was recorded as the observed wavelength. The estimated uncertainty in each

wavelength is ± 0.1Å. In January 1976 after the wavelength tables had been sent for typing, Budich, Bohlin and Drake (1976) noted that the U2 wavelengths shortward of 1180Å suffer from a systematic error, the apparent wavelength being too small. They estimate that the error is 0.16Å at 1035Å and that it decreases to 0.05Å at 1100Å. This systematic error is not corrected in Table 1. Since coincidences were sought within ± 0.2Å of the apparent line center on the U2 tracings some of the listings in the first part of Table 1 may not be complete. For wavelengths longer than 1060Å, this systematic error is not important.

The two V2 tracings for each star were corrected for particle background (York 1975) and for variation of the V3 monitor and an averaged spectrum was found by sorting the observed scans into bins ranging in length from 0.318 to 0.385Å depending upon the wavelength. This procedure allows for the varying step size. The averaged spectrum was plotted at a scale of 1Å per inch for τ Her and at 2Å per inch for ζ Dra and the

center of each dip was estimated. The accuracy of the resulting wavelength is believed to be 0.1Å. Tables 1 and 2 contain the U2 and V2 data for ζ Dra while tables 3 and 4 contain the U2 and V2 data for τ Her.

The two tracings for each star were averaged in order to minimize irregularities due to the noise that might be interpreted as absorption lines. In general, each absorption dip or well defined still-stand on the wing of a line was listed as a potential absorption line. Therefore, tables 1 through 4, contain the maximum number of lines that could be clearly distinguished on the tracings. But, some features may be spurious. Most, however, appear at about the same wavelength on both tracings. The correction for particles is statistical and some remaining noise may cause dips which are interpreted as lines.

III. THE IDENTIFICATIONS

The identifications have been made by comparing the observed wavelengths with those of atoms and ions known from laboratory studies.

For ζ Dra, all possible coincidences were sought within ± 0.2Å on the U2 tracings and within ± 0.3Å on the V2 tracings and these possible identifications are listed in tables 1 and 2. Previous studies suggest that the identifications should come from the following spectra: H I, He I, C II, C III, N I, N II, O I, Mg I, Mg II, Al II, Al III, Si II, Si III, Si IV, P II, P III, S II, S III, Ti III, Ti IV, V III, V IV, Cr II, Cr III, Cr IV, Mn III, Mn IV, Fe II, Fe III, Ni II, Ni III, and Ni IV. In general, all lines from these spectra lying within the specified coincidence intervals are listed. Tables 1 and 2 were prepared by Underhill.

For τ Her, a slightly different procedure was followed. Candidate atomic species for attempted line identification were chosen from those observed by Underhill (1974) in α CMa and from those with similar ionization potentials and greater or equal solar abundances. Consideration was given to the apparent line width, to the relative strength of the stellar continuum as a

function of wavelength, and to whether lines of other atomic species of the same element were found to be present. Lines of a given atomic species are included if lines of equal or greater laboratory intensity are positioned so that they might be present in observed features. Tables 3 and 4 were prepared by Adelman.

Most observed lines have several possible contributors. A detailed spectrum synthesis is required to prove which are the major ones. Kurucz and Peytreman (1975) typically list 25 lines within ± 0.3Å of anywhere in the wavelength region under study. Thus, the identifications listed in tables 1 through 4 present a conservative estimate of what is possible.

The identifications are listed as follows:

1. The element and spectrum number.
2. In parenthesis, the multiplet number in The Ultraviolet Multiplet Tables or the Selected Tables of Atomic Spectra (Moore 1950, 1952, 1962, 1965, 1970, 1975). The prefix UV is omitted. In Table 2, the one multiplet number

from the Revised Multiplet Table (Moore 1945) is given the prefix R.

3. At wavelengths shorter than 2000Å, the vacuum wavelength in angstrom units are used while longward of 2000Å the wavelengths are in air.
4. In parenthesis, a number indicating the relative strength of the line in the laboratory spectra.

For ζ Dra the identifications in the spectral region 1035 to 1425Å were made using the compilation of Kelly and Palumbo (1973) who scaled the relative intensities so that the strongest lines in each spectrum have intensity 1000. For τ Her, the identifications in the comparable spectral region were made from the Ultraviolet Multiplet Table (Moore 1950, 1952, 1962), the Selected Tables of Atomic Spectra (Moore 1965, 1970, 1975), and a few selected references which are given in the notes at the end of table 3. This difference in choice of primary line sources results in fewer identifications given for τ Her compared to ζ Dra.

In the spectral region 2000 to 3000Å the

identifications are made primarily from the Ultraviolet Multiplet Table (Moore 1950, 1952, 1962) and the Selected Tables of Atomic Spectra (Moore 1965, 1970, 1975). For ζ Dra a few additional lines were found in the compilation by Striganov and Sventitskii (1968). For τ Her a few selected references were used which are given at the end of table 4. Some of the wavelengths differ by a small amount in these various sources. Usually, the wavelengths from the most recent tabulations by Moore are given. The relative intensities are from Moore for tables 2 and 4 except when noted in table 4. The intensity scale is different for each spectrum, but within one spectrum the relative laboratory intensities should be typical of what would occur in a star, provided one takes into consideration the temperature difference of the laboratory source and the star in question.

IV. DISCUSSION

The identifications suggested in Tables 1, 2, 3 and 4 for the features observed in the ultraviolet spectra of ζ Dra and τ Her are not exhaustive.

An effort was made to list all possible contributors from the various lists of spectra deemed relevant. However, cross-checking after the tables were typed reveals that in a few places either Underhill or Adelman left out a few lines which might logically have been included. We believe that our identification of the species probably present and possibly present in B5 and B6 stars is reliable and that Tables 1, 2, 3 and 4 form a sound basis from which to interpret the ultraviolet spectra of B stars. However, before computing synthetic ultraviolet spectra one should review all possibilities for blending lines listed by Kurucz and Peytreman (1975) which are not found in laboratory lists of lines.

If the wavelength range of the observation had included the region 1450 to 2000Å, lines of additional atomic species, particularly those whose strongest lines are located in this region, would probably have been identified. Furthermore, we only know the strongest lines with rather modest excitation potentials for many of the atomic species which we have found to be present in ζ Dra

and τ Her.

It is difficult to rule on the presence or absence of any atomic species whose spectrum contains many lines since the density of lines recorded in the spectra of τ Her and ζ Dra is large. It is 1.1 lines/Å in the region 1026 to 1451Å of τ Her and 1.7 lines/Å in the region 1035 to 1425Å of ζ Dra. The density is 0.8 lines/Å in the region 2000 to 3000Å of τ Her and 0.9 lines/Å for ζ Dra. Many coincidences may be noted within the range allowed in ζ Dra, which approximates or is smaller than the step size, and within the range considered for τ Her, namely the apparent width of the feature. Furthermore, many lines are masked by overlapping lines from other species. Lines of Fe II and Cr II account for very many observed absorption features in the region 2000 to 3000Å.

The folowing spectra are present or probably present in the spectrum of ζ Dra, most of the strongest lines being found in each case as well as evidence for many of the weaker lines: H I, He I, C II, C III, N I, N II, O I, O II, Mg II,

Al II, Al III, Si II, Si III, P II, P III, S II, S III, Ti III, V III, Cr II, Cr III, Mn III, Fe II, Fe III, Ni II, Ni III. The resonance lines from N I and O I may be composed of an interstellar component as well as a stellar component.

The following spectra are possibly present in ζ Dra: Be II, B II, C I, Mg I, Si I, Si IV, S IV, Cl II, Sc III, Ti II, Ti IV, V II, V IV, Cr IV, Mn II, Mn IV, Fe IV, Ni IV, Y III. Notes on each of these spectra follow:

Be II: All of the 8 lines known in the region 1035 to 1425Å coincide with stellar lines attributed to other ions. Multiplet 1 and a blend at 1048Å are listed in Table 1.

B II: Four lines of the 9 known in the region 1035 to 1425Å are listed as possible contributors to blends. In particular, the resonance line at 1362.461Å may contribute to the feature observed at 1362.40Å. The line λ2395.06 may contribute to the blend observed at 2395.0Å.

C I: Many C I lines occur in the range 1035 to 1425Å. Twenty of the 27 lines with intensity 10 or greater coincide with observed features

attributed to other ions. C I is possibly present but it is not listed as a contributor in Tables 1 and 2.

Mg I: Only the two resonance lines λλ2025.824 and 2852.127 are listed in Table 2 although coincidence occurs with 43 of the 62 lines with wavelengths between 2000 and 3000Å. The observed resonance lines may be partly interstellar in origin.

Si I: Coincidence occurs with 43 of the 64 lines falling in the range 2000 to 3000Å, however all but 3 of these can be attributed to other ions. The strongest line λ2881.579 (intensity 1000) is not found, although coincidence does occur with λ2058.132 (intensity 600) and with λ2516.112 (intensity 500). No Si I lines are entered in Table 2.

Si IV: Three lines, λλ1066.629, 1122.486 and 1393.755, are listed as contributing to observed features. There is no feature that can be attributed to the resonance line at 1402.770Å.

S IV: Two lines from multiplet 1 are listed in Table 1 as contributors to blends while 8 of the remaining 9 lines in the range 1035 to 1425Å coincide with features attributed to other ions but are not listed. The level of ionization of S IV seems high for a B6 star.

Cl II: Coincidence occurs with 6 of the 8 lines which fall in the region 1035 to 1425Å and with 21 of the 33 lines falling in the region 2000 to 3000Å. However, only the four coincidences with lines of multiplet 1 are listed in Table 1 and no Cl II lines are listed in Table 2.

Sc III: Nine lines of Sc III fall in the spectral range observed for ζ Dra. Four are listed as possible contributors to blends.

Ti II: Twenty-three lines of intensity 30 or greater occur in the region 2000 to 3000Å. Although 15 coincide with features attributed to other ions, Ti II is not listed in Table 2.

Ti IV: Five of the 8 strongest lines in the regions 1035 to 1425Å and 2000 to 3000Å coincide with features in ζ Dra and they are listed as possible contributors.

V II: Of the 46 lines in the range 2000 to 3000Å having intensity 150 or greater, 18 coincide with observed lines attributed to other ions. No lines of V II are listed in Table 2.

V IV: Six coincidences occur with the 12 strongest lines in the region 1035 to 1425Å. A few coincidences with weaker lines are also noted in Table 1.

Cr IV: Coincidence occurs with 11 of the 12 lines having intensity 100 or greater in the range 1035 to 1425Å. Eight of these and a few coincidences with weaker lines are listed in Table 1.

Mn II: Eighteen lines of intensity 200 or greater fall in the range 2000 to 3000Å. Although coincidence occurs with 15 of them, Mn II is not listed as a contributor in Table 2.

Mn IV: Eighteen of the 21 strong lines in the region 1035 to 1425Å coincidence with features attributed to other ions. Lines from Mn IV are listed as possible contributors to a number of blends.

Fe IV: Coincidence is found with 8 of the 11 lines known in the region 1035 to 1425Å, but no Fe IV lines are listed in Table 1.

Ni IV: Coincidence is found with 13 of the 18 lines in the region 1035 to 1425Å having intensity 100 or greater. Some coincidences with weaker lines are also noted.

Y III: Nine of the 10 lines between 2000 and 3000Å listed in the Ultraviolet Multiplet Tables coincide with observed lines. Eight of these are noted in Table 2; in addition, Y III λ2945.92 may contribute to the feature at 2946.2Å.

The same basic set of atomic species was considered for presence in τ Her as for ζ Dra. Comments on those atomic species identified as present, probably present, or possibly present in τ Her are given in table 5. In addition, many other atomic species were studied for possible coincidences but their identifications were rejected as being far less likely than those listed in table 5. For example, lines of both Be II and B II had a fair number of possible coincidences but both elements have rather low relative abundances and occur only in blends. To a large degree where one decides to cut off the identifications is a matter of taste and judgment. Generally, for both τ Her and ζ Dra lines of the third spectrum of the metals are most plentiful in the U2 region while those of the second spectrum dominate in the V2 region.

The chief characteristic of the ultraviolet spectrum of B5 and B6 stars is the presence of many absorption lines. The lines of τ Her and ζ Dra are not fully resolved by the U2 spectrometer and the level of the continuum must be estimated from the high points in the continuously varying spectrum. Nowhere is there a flat continuum visible such as is familiar from the Paschen continuum. This observation agrees with the predictions of Peytreman (1975) who computed a few ultraviolet line spectra of B type stars based on the compilation of oscillator strengths of Kurucz and Peytreman (1975).

The lines of ζ Dra in the visible region are moderately sharp, the rotational velocity being about 40 km s^{-1} (Underhill 1973). This corresponds to a maximum half-extent of the wings of 0.13, 0.20, 0.27, 0.33, and 0.40Å at 1000, 1500, 2000, 2500, and 3000Å. These widths are less than the steps taken by the Copernicus spectrometer in the U2 and V2 regions. Consequently, the observed profiles of all but the strongest

lines in the spectrum of ζ Dra are instrumental in origin. A similar conclusion can be drawn for τ Her whose rotational velocity is $\leq$ 15 km s^{-1} (Heintze 1968). Thus, only the profiles of a few lines such as the blends at C II 1335 and C III 1176 have shapes characteristic of the line. The resonance lines of Si II at 1260 and 1265Å are conspicuous, but that of Si III at 1206Å is submerged in the wing of Lyman α.

The identifications listed in tables 1 through 4 give a conservative estimate of what lines are possibly present in ζ Dra and τ Her. Although the stars are quite similar, there are some differences. For example, in ζ Dra the presence of Si IV is questionable, a weak blended line appearing at 1393.84Å close to the wavelength of Si IV 1393.755Å, but nothing at Si IV 1402.769Å. In τ Her, both of these Si IV lines coincide with features of similar wavelength. We wish to emphasize that before any feature in the ultraviolet spectra of B stars is attributed dominantly to one line, it will be necessary to analyze the region

carefully for blends. Peytreman (1975) reached this conclusion independently from a study of predicted ultraviolet spectra of B and A stars.

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Table 1

The Spectrum of ζ Dra: 1035Å to 1425Å

Observed Wavelength	Identifications
1035.22	CrIII(2)35.29(250), MnIII(-)35.392(0)
35.65	CrIII(2)35.57(250), SiIII(33)35.657(60), FeIII(20)35.768(400), CrIII(2)35.77(200)
35.92	CrIII(1)35.93(500), CrIII(1)36.03(1000), MnIII(-)36.081(20)
36.27	NiII(-)36.182(2), BeII(1)36.299(550), BeII(1)36.319(250), CII(2)36.337(800)
36.78	FeIII(20)36.659(150)
37.71	MnIII(-)37.695(200), MnIII(-)37.746(750), CrIII(1)37.80(200)
38.29	NI(-)38.31(3), FeIII(20)38.355(6), FeII(-)38.370(20)
38.70	MnIII(-)38.752(20), CrIII(-)38.80(50), NiII(-)38.866(5), NI(-)38.90(1)
39.14	CrIII(25)38.97(30), OI(3)39.230(400)
39.80	MnIII(-)39.850(250)
40.31	CrIII(1)40.17(300), MnIII(-)40.323(80), VIII(-)40.37(0), CrIII(24)40.41(250), CrIII(25)40.53(400)
40.81	CrIII(1)40.70(50), CIII(11.60)40.715(P), CrIII(-)40.79(50), OI(3)40.942(240)
41.64	OI(3)41.688(80)
42.16	CrIII(1)42.02(10)
42.66	CrIII(-)42.58(20), NiII(-)42.704(2)
42.96	CrIII(-)42.87(30)
43.43	CrIII(-)43.39(20), NI(-)43.58(2)
44.10	NI(-)44.06(5), VIII(-)44.19(0)
44.51	NiII(-)44.349(30), VIII(-)44.60(0), MnIII(-)44.610(50), NI(-)44.65(4)
44.98	MnIII(-)44.790(700), NiII(-)44.871(2), CrIII(24)45.06(400), NiII(-)45.073(15), CrIII(24)45.14(400)
45.80	VIII(-)45.64(5), CrIII(-)45.71(30), SII(-)45.74(65), NiII(-)45.813(5), MnIII(-)45.984(30)
46.34	MnIII(-)46.167(700), MnIII(-)46.473(80), NiII(-)46.537(8)
47.35	SiIV(21)47.271(P)
48.09	AIII(-)47.92(0), BeII(-)48.147(200)

Table 1 (Continued)

Observed Wavelength	Identifications
1048.38	BeII(-)48.220(400), NiII(-)48.400(6), SII(-)48.43(35), AlII(-)48.59(1)
49.05	NiII(-)48.936(1), NiII(-)48.982(3), NiII(-)49.051(1), SII(-)49.06(35), MnIII(-)49.105(0), NiII(-)49.137(8)
49.96	MnIII(-)49.816(650), PIII(-)49.824(400), AlII(-)49.922(6), MnIII(-)50.122(80)
50.73	NiII(-)50.718(3), PIII(-)50.82(400)
51.46	
52.06	CrIII(-)51.92(50), NI(-)52.07(3), NI(-)52.18(3), MnIII(-)52.193(100)
52.78	NI(-)52.64(2), MnIII(-)52.718(450), CrIII(-)52.89(20)
53.13	NiII(-)52.983(2), NI(-)53.04(3), SII(-)53.210(35)
54.01	CrIII(-)54.10(70)
54.58	CrIII(-)54.66(150)
55.00	
55.38	NiII(-)55.246(15), FeII(21)55.269(500), AlII(-)55.28(1), MnIII(-)55.289(80), NiII(-)55.291(30), CrIV(-)55.43(10), MnIII(-)55.523(350)
55.92	CrIV(-)55.89(400), CrIII(-)56.11(100)
56.90	VIII(-)56.76(5), SiII(13.07)56.899(2-A), CrIII(-)56.97(30), SiII(13.07)57.050(30-A)
57.44	CrIII(8)57.30(5), SiII(13.07)57.503(15-A)
58.42	MnIII(-)58.270(120), VIII(-)58.48(50)
59.02	CrIII(-)59.13(600)
60.07	CrIII(8)60.15(60)
60.43	FeIII(-)60.258(250), MnIII(-)60.565(0)
61.02	CrIII(8)61.04(600), FeIII(-)61.127(250)
61.73	FeIII(40)61.708(400), MnIII(-)61.825(150), FeIII(40)61.827(250)
62.14	FeIII(40)62.272(200)
62.80	SIV(1)62.672(600), CrIII(8)62.68(500), FeII(21)62.758(400), NiII(-)62.965(1), FeII(19)62.982(300)
63.28	FeIII(-)63.188(250), CII(12.01)63.285(5), FeIII(40)63.309(200), CII(12.01)63.313(5)

Table 1 (Continued)

Observed Wavelength	Identifications
1063.70	CrII(17)63.63(10), MnIII(-)63.745(20), CIII(1)63.83(500), FeIII(40)63.872(550)
64.59	CrII(17)64.32(300), CrII(17)64.43(300), FeIII(-)64.611(70)
64.90	PII(-)64.80(150), CrII(17)65.12(15)
65.94	CII(12)65.891(700), CII(12)65.920(100), CII(12)66.133(500), FeIII(27)66.143(350)
66.48	MnIII(-)66.287(10), CrIV(-)66.36(50), CrIII(-)66.55(50), SiIV(11)66.629(550)
67.26	CrII(-)67.16(200), CrII(-)67.25(200), NI(-)67.308(8), MnIII(-)67.343(0), NI(-)67.386(10)
68.26	FeIII(27)68.190(300), FeIII( )68.299(200), FeII(19)68.356(600)
68.52	CrII(-)68.41(800), NI(-)68.477(13), NI(-)68.627(12), NI(-)68.670(11)
69.04	MnIII(-)68.980(450), FeIII(27)69.019(300), FeII(20)69.038(300), NI(-)69.110(8), NI(-)69.206(9)
69.52	NI(-)69.374(7), CrIII(-)69.45(20), NI(-)69.468(6)
70.08	NI(-)69.990(11), MnIII(-)70.011(450), FeIII(-)70.284(250)
70.49	CrIII(-)70.55(30), CrIV(-)70.55(30), FeIII(26)70.556(200), NiII(-)70.590(10)
70.96	CIII(1)71.05(1000)
71.58	MnIII(-)71.331(700), FeII(19)71.596(600), FeIII(26)71.746(300), CIII(1)71.76(500)
72.16	CrIII(16)72.13(200), FeIII(-)72.217(250)
72.60	MnIII(-)72.598(400), MnIII(-)72.727(50)
73.18	SIV(1)72.992(600), MnIII(-)73.027(30)
73.82	CrIII(16)73.74(200), MnIII(-)73.789(800)
74.32	MnIII(-)74.460(80)
75.04	FeIII(26)75.024(250), CIII(1)75.24(350)
75.60	NiII(-)75.551(3)
76.04	NiII(-)76.006(2), CrIII(16)76.15(200)
76.50	FeII(52)76.556(40), CrIII(32)76.74(200)
77.10	SIII(8)77.135(800), NiII(-)77.163(4), CrIII(-)77.29(10)
77.56	

Table 1 (Continued)

Observed Wavelength	Identifications
1077.85	MnIII(-)77.920(250)
78.48	MnIII(-)78.572(20)
78.84	CrIII(32)78.80(30)
79.34	CrIII(32)79.43(150)
80.19	CrIII(32)80.21(20), MnIII(-)80.386(100)
80.88	NiII(-)81.035(200)
81.23	
81.80	BII(-)81.875(300), VIII(-)81.98(0), BII(-)82.073(300)
82.28	MnIII(-)82.300(800)
82.80	FeIII(-)82.838(250)
83.18	FeIII(-)83.176(150), SiIII(23)83.210(120), MnIII(-)83.276(1)
83.98	MnIII(-)83.795(300), NII(1)83.990(400)
84.56	MnIII(-)84.485(450), NII(1)84.562(150), NII(1)84.580(750)
85.58	MnIII(-)85.423(600), NiII(-)85.441(150), NII(1)85.529(P), NII(1)85.546(400), NII(1)85.701(1000), MnIII(-)85.772(850)
86.56	NiII(-)86.503(4), VIII(-)86.53(0), MnIII(-)86.533(90), MnIII(-)86.688(400), FeIII(-)86.748(300), MnIII(-)86.751(400)
87.26	MnIII(-)87.368(50)
88.08	MnIII(-)88.185(650), FeIII(-)88.224(70)
88.35	CrIII(-)88.28(10), MnIII(-)88.324(350)
88.94	FeIII(-)89.061(200)
89.44	CrIII(-)89.30(10), MnIII(-)89.313(250), FeIII(-)89.416(250)
89.74	FeIII(-)89.671(250), MnIII(-)89.715(50), CrIII(-)89.76(40)
90.26	MnIII(-)90.126(250), CrIII(-)90.27(20)
91.31	MnIII(-)91.233(40), NiII(-)91.407(4)
91.73	VIII(-)91.53(5), CrIII(-)91.54(10), VIII(-)91.860(5), CII(14.05)91.937(100-A)
92.20	MnIII(-)92.002(300), CrIV(-)92.23(10), CII(14.05)92.232(10-A), CII(14.05)92.431(10-A)

Table 1 (Continued)

Observed Wavelength	Identifications
1092.66	CrIII(-)92.65(30), CII(14.05)92.726(200-A)
93.11	SiIII(42)92.915(P), SiIII(42)92.940(P), SiIII(42)92.969(P), SiIII(42)93.105(P), SiIII(42)93.133(P), VIII(-)93.15(0), CrIII(-)93.17(50), SiIII(42)93.293(P)
94.04	MnIII(-)93.844(70)
94.42	CrIII(-)94.38(200), CrIII(-)94.53(5)
94.96	MnIII(-)94.773(750)
95.52	FeIII(-)95.476(300)
95.96	CrIII(31)95.96(50), MnIII(-)96.033(750)
96.78	SII(3)96.57(200), FeIII(-)96.606(200), FeII(18)96.616(400), FeII(18)96.793(400), FeII(18)96.886(600), CrIII(-)96.90(30)
97.14	MnIII(-)97.158(0), NI(-)97.237(21), CrIII(-)97.25(100)
97.53	CrIII(-)97.45(30), FeIII(-)97.649(70)
98.14	NI(-)97.995(8), CrIV(-)98.06(10), NI(-)98.097(17), CrIII(-)98.21(100), FeIII(-)98.247(300), FeII(-)98.26(0), NI(-)98.261(17)
98.62	CrIII(-)98.61(100), NI(-)98.625(12), NI(-)98.759(6)
99.04	CrIII(23)98.86(100), CrIII(-)98.95(50), NI(-)98.952(9), VIII(-)98.96(75), NI(-)99.042(8), FeIII(-)99.061(150), FeII(18)99.117(500), NI(-)99.150(13)
99.83	CrIII(-)99.82(10), MnIII(-)99.858(750), FeII(18)00.026(400)
1100.40	NI(-)00.359(50), NI(-)00.465(15), FeII(18)00.525(400)
01.06	VIII(-)00.87(5)
01.38	CrIII(31)01.26(50), NI(-)01.291(45), VIII(-)01.42(25), CrIII(23)01.43(300), FeII(18)01.538(400)
02.05	CrIII(31)01.91(150), NiII(-)01.956(5), VIII(-)02.19(5)
02.37	SII(3)02.32(300), FeII(18)02.385(160)
02.94	FeII(17)02.758(20), CrIII(23)02.88(300)
03.90	
04.28	CrIII(31)04.44(150)
04.90	FeII(18)04.978(20)
05.21	VIII(-)05.17(25)

Table 1 (Continued)

Observed Wavelength	Identifications
1105.72	CrIII(-)05.80(70)
06.18	FeII(17)06.215(300), FeII(15)06.362(100)
06.79	
07.55	MnIII(-)07.517(0), VIII(-)07.76(25)
08.37	SiIII(5)08.368(280)
09.08	MnIII(-)09.073(300)
10.02	SiIII(5)09.965(320)
10.74	VIV(-)10.720(2), VIII(-)10.92(25)
11.16	MnIII(2)11.105(10), FeII(15)11.114(300), CrIV(-)11.17(10)
11.50	
12.05	VIII(-)12.03(100), FeII(16)12.036(700)
12.33	MnIII(-)12.284(750)
13.22	MnIII(2)13.18(5), MnIII(-)13.193(900) SiIII(5)13.228(360), CrIII(30)13.26(100)
14.05	
14.42	MnIII(-)14.530(1)
15.14	MnIII(-)15.147(90)
15.80	VIII(-)15.71(50)
16.23	MnIII(-)16.151(350)
16.67	NiII(-)16.557(40)
17.08	CrIII(22)17.19(300)
17.84	CrIII(30)17.88(20), VIII(-)17.78(5)
18.01	MnIII(-)18.068(0)
18.46	NiII(-)18.404(20), NiII(-)18.547(25), CrIII(30)18.55(200)
19.26	MnIII(-)19.303(300), NiII(-)19.330(75), CrIII(30)19.40(5)
19.88	
20.42	
21.32	VIII(3)21.16(15), NiII(-)21.162(125), CrIII(-)21.35(30), MnIII(-)21.413(1)

Table 1 (Continued)

Observed Wavelength	Identifications
1122.41	MnIII(-)22.397(450), SIII(-)22.42(200), CrIII(22)22.43(150), SiIV(3)22.486(550), FeIII(1)22.526(600)
23.57	CrIII(-)23.37(30), VIII(3)23.55(50), CrIII(-)23.59(150)
24.12	MnIII(-)24.109(400), FeII(14)24.134(400)
24.40	SII(8)24.39(100), CrIII(30)24.43(5)
24.92	VIII(-)24.76(5), FeIII(1)24.883(600), PII(-)24.945(10), SII(8)25.00(100)
25.65	VIII(3)25.70(200), CrIII(22)25.73(200)
26.77	FeII(14)26.603(400), FeIII(1)26.728(400), SIII(-)26.85(100), FeII(12)26.850(400)
27.52	SiII(13.06)27.442(20-A), NiII(-)27.486(5), CrIII(-)27.71(150)
27.94	VIV(-)27.836(20), SiII(13.06)27.907(40-A), FeIII(1)28.050(550), FeII(14)28.074(500)
28.72	FeII(194)28.530(200), MnIII(-)28.577(120), VIII(-)28.63(75), FeIII(1)28.723(450), CrIII(-)28.78(10), MnIII(-)28.825(120), CrIII(-)28.88(30), FeII(13)28.909(400)
29.20	FeIII(1)29.190(450)
30.01	
30.40	FeIII(1)30.404(300), FeII(12)30.428(500)
31.14	SII(8)31.05(200), VIII(-)31.05(60), FeIII(1)31.194(450), VIV(-)31.255(20)
31.83	CrIII(-)31.90(150), FeIII(1)31.914(3)
32.44	
32.96	
33.75	FeII(11)33.678(500), NiII(-)33.730(75), CrIII(-)33.91(50)
34.34	VIII(-)34.16(50), NI(2)34.165(560), NI(2)34.415(550), NiII(-)34.533(150)
34.96	NI(2)34.980(780)
35.50	
36.40	VIII(-)36.54(0)
36.85	CrIII(-)36.67(500), MnIII(-)36.867(80), CrIII(-)36.91(10)
37.20	CrIII(-)37.08(20), NiII(-)37.091(100)
37.82	

Table 1 (Continued)

Observed Wavelength	Identifications
1138.10	FeII(48)38.039(100)
38.52	VIII(-)38.32(15), NiII(-)38.547(10), FeII(11)38.642(500)
39.28	CII(14.04)38.936(200-A), NI(-)39.14(1), CII(14.04)39.332(300-A), CII(14.04)39.473(10-A)
39.84	VIII(-)39.67(25), VIII(-)39.85(75)
40.48	MnIII(-)40.396(200), NiII(-)40.459(75), VIII(-)40.66(10), SiIII(32)40.545(120)
41.38	NI(-)41.19(1), VIII(-)41.20(5), FeIII(-)41.272(200)
41.66	SiIII(32)41.580(140), NI(-)41.60(2), CII(11.01)41.625(300), CII(11.01)41.657(30)
42.36	SiIII(32)42.282(120), FeII(10,11)42.334(500), VIII(-)42.34(10), FeIII(39)42.464(250)
43.24	FeIII(39)42.955(300), VIII(-)43.19(15), FeII(10)43.235(500), NI(-)43.31(1), NiII(-)43.397(50)
43.60	FeIII(39)43.545(70), CrIII(-)43.63(150), NI(-)43.646(15), NI(-)43.651(30), FeIII(39)43.671(200)
44.36	NI(-)44.16(2), SiIII(32)44.306(160)
45.00	FeII(10)44.946(700), SiIII(32)44.959(120), PII(-)45.01(1), SiIII(41)45.122(150), SiIII(41)45.149(13), SiIII(41)45.16(1), SiIII(41)45.177(80), SiIII(41)45.19(10), SiIII(41)45.22(50)
45.56	MnIV(-)45.361(120), SiIII(32)45.669(-), MnIII(-)45.744(0)
46.51	MnIII(-)46.335(30), CrIII(-)46.34(250)
46.80	VIII(2)46.75(75), FeII(10)46.963(300)
47.55	FeII(10)47.413(500), NiII(-)47.633(1), NI(-)47.66(4)
48.22	ScIII(-)48.241(30), FeII(10)48.295(600)
48.88	FeII(155)48.693(160), NI(-)48.77(4), VIII(-)49.08(25)
49.60	MnIII(-)49.572(550)
50.00	VIII(2)49.94(500), PII(3)49.96(70)
50.54	FeII(10)50.689(400)
51.03	VIII(2)51.05(150), FeII(10)51.163(500)
51.80	
52.19	OI(6)52.151(200), VIII(2)52.18(150), NI(-)52.30(4)

Table 1 (Continued)

Observed Wavelength	Identifications
1152.92	PII(3)52.81(10), FeII(10)52.882(400)
53.20	VIII(2)53.18(25), FeII(10)53.281(400)
53.52	NI(-)53.53(4), CrIII(29)53.60(150)
54.05	FeII(10)53.955(300), PII(3)53.99(120), CrIII(29)54.12(150), NI(-)54.19(3)
54.30	VIII(2)54.23(250), FeII(10)54.401(400), CrIII(29)54.43(10)
54.88	VIII(2)54.77(75), SiIII(31)54.998(120), PII(3)55.00(40)
55.30	VIII(2)55.11(75), FeII(157)55.273(40), SIII(-)54.34(200), CrIII(29)55.39(150)
56.08	SiIII(31)55.957(120)
56.44	VIII(-)56.47(15), FeII(-)56.575(40)
57.06	PII(3)56.96(50), AlII(-)57.10(20), NiII(-)57.132(1)
57.30	VIII(-)57.18(400)
58.06	SiIII(31)58.102(140), AlII(-)58.24(1)
58.94	NiII(-)58.830(100), VIII(-)58.86(50), MnIII(-)59.022(150), PII(3)59.08(80)
59.38	NI(-)59.28(4), FeII(73)59.347(400), NiII(-)59.510(150)
60.08	SiIII(31)60.255(120)
60.94	VIII(-)60.77(300), NiII(-)60.776(2), NI(-)60.937(P)
61.56	CrIII(-)61.43(500), SiIII(31)61.579(160)
61.98	NiII(-)61.927(1), VIII(-)62.02(250)
62.66	ScIII(-)62.443(40), SIII(-)62.52(100), CrIII(-)62.60(10), NiII(-)62.748(150), VIII(-)62.81(50)
63.24	VIII(1)63.26(75)
63.62	NiII(-)63.645(50), NiII(-)63.729(8)
64.28	NI(7)64.206(60), NiII(-)64.279(150), NI(7)64.325(95), FeII(-)64.48(1)
64.91	
65.28	FeII(73)65.269(240)
65.95	NiII(-)65.798(12), NI(-)65.836(15), CIII(11.76)65.870(100), SIII(-)66.13(50)
66.38	CrIII(-)66.23(10), VIII(-)66.29(75), VIII(1)66.45(75), VIII(1)66.58(75)

Table 1 (Continued)

Observed Wavelength	Identifications
1166.92	VIII(-)66.86(0), NiII(-)67.030(25)
67.56	NI(6)67.448(350)
68.20	NiII(-)68.040(75), NI(-)68.215(50), CrIII(-)68.32(100), NI(-)68.334(200)
68.50	NI(6)68.417(60), NI(6)68.536(300)
69.22	VIII(1)69.11(75), FeII(-)69.19(0), CrIII(-)69.25(20), VIII(1)69.26(100)
70.20	CrIII(-)70.10(30), NI(-)70.157(10), NiII(-)70.169(20), NI(-)70.277(80)
70.39	NI(-)70.417(5)
70.90	NI(-)71.083(60)
71.18	NiII(-)71.117(15), VIII(1)71.27(20), NiII(-)71.291(100), NI(-)71.37(2)
71.60	NI(-)71.60(2), FeII(154)71.606(160)
72.14	NI(-)72.01(2)
72.63	NI(-)72.46(3), VIII(1)72.47(5), SiIII(30)72.529(80), MnIII(-)72.721(20)
73.28	NiII(-)73.121(1), CrIII(-)73.19(40), NiII(-)73.298(50), CrIII(-)73.34(50), NiII(-)73.477(75)
74.00	
74.36	SiIII(30)74.369(100), SiIII(30)74.432(120)
74.95	MnIII(-)74.810(10), CrIII(-)74.82(150), CIII(4)74.933(800)
75.56	CIII(4)75.263(700), CIII(4)75.590(600), FeII(-)75.699(20), CIII(4)75.711(1000)
75.90	CIII(4)75.987(700)
76.48	CIII(4)76.370(800), NI(-)76.510(350), NI(-)76.630(180)
77.54	AlII(-)77.43(40), MnIII(-)77.484(6), NI(-)77.695(320)
78.04	SiIII(30)78.004(160), MnIII(-)78.031(40)
78.54	MnIII(-)78.510(2), CrIII(-)78.55(30), NiII(-)78.571(30)
78.94	CrIII(-)78.80(20), CrIII(-)78.99(10)
79.22	AlII(-)79.34(1)
79.88	CrIII(-)79.68(30), MnIII(7)79.85(20)
80.40	

Table 1 (Continued)

Observed Wavelength	Identifications
1180.92	CrIII(-)80.81(60), CrIII(-)81.03(10), NiII(-)81.075(30)
81.59	CrIII(-)81.45(10), NiII(-)81.620(15), CrIII(-)81.63(50)
82.20	SiIII(64)82.018(60), NiII(-)82.169(75)
82.70	MnIII(-)82.825(350)
83.56	TiIV(-)83.63(100)
83.86	FeII(-)83.83(1), MnIII(7)83.860(25)
84.50	NiII(-)84.512(20)
84.80	NiII(-)84.980(3)
85.41	
85.70	
86.14	MnIII(7)86.14(10), CrIII(-)86.24(20)
86.92	VIII(-)86.890(25), NiII(-)86.933(8), NiII(-)86.993(1), NiII(-)87.102(20)
87.55	CrIII(-)87.36(200), FeII(-)87.41(0), NiII(-)87.608(15), CrIII(-)87.65(300)
88.16	
89.04	NI(-)88.971(14), AlII(-)89.180(5)
90.42	SiII(5)90.416(100), NiII(-)90.442(1), NI(-)90.494(6)
91.90	MnIII(4)91.730(15), AlII(-)91.812(50), NI(-)91.925(8), FeII(-)92.02(2)
92.35	SiIII(40)92.228(P), SiIII(40)92.258(P), SiIII(40)92.293(P), NiII(-)92.306(5)
93.30	NiII(-)93.267(5), SiII(5)93.289(200), CrIII(-)93.47(70)
94.01	CrIII(-)93.89(10), SIII(1)94.02(400)
94.56	SIII(1)94.40(300), CrIII(-)94.44(30), VIV(-)94.462(20), SiII(5)94.500(250)
95.44	TiIV(-)95.25(100), CrIII(-)95.42(10), FeII(-)95.46(1)
95.87	CrIII(-)96.04(30)
96.40	CrIII(15)96.32(50), SiIII(40)96.436(P), SiIII(40)96.470(P)
96.75	VIII(-)96.63(0)
97.39	CrIII(15)97.37(200), SiII(5)97.394(100)
98.40	SiIII(40)98.297(P), CrIII(-)98.31(70), MnIII(-)98.493(30)

Table 1 (Continued)

Observed Wavelength	Identifications
1198.95	MnIII(-)98.994(400)
99.58	NI(1)99.549(1000)
1200.26	NI(1)00.224(950), NiII(-)00.307(1)
00.70	NI(1)00.711(700), CrIII(-)00.91(50), SiII(1)00.97(400)
01.62	CrIII(15)01.42(150), SIII(1)01.71(200)
02.26	SIII(1)02.10(50), VIII(-)02.25(50), CrIII(15)02.45(100), NiII(-)02.452(8)
02.56	NiII(-)02.511(10)
02.90	MnIII(-)02.807(0), VIII(-)02.87(5)
03.56	CrIII(-)03.59(120)
03.98	VIII(-)03.86(0), CrIII(-)03.95(20), NiII(-)04.102(30)
04.36	SII(-)04.30(500), CrIII(7)04.46(50)
05.29	NiII(-)05.088(15), CrIII(-)05.15(10), NiII(-)05.201(1), NiII(-)05.266(20)
05.68	NiII(-)05.552(10), CrIII(15)05.78(100)
06.04	CrIII(-)06.12(10), NiII(-)06.246(7)
06.37	CrIII(7)06.38(600), MnIII(-)06.425(20), SiIII(2)06.510(600)
06.79	SiIII(11)06.533(600), CrIII(-)06.70(30)
07.40	CrIII(7)07.36(40), SiIII(22)07.517(180)
—	Weak Center of Lα
24.20	NiII(-)24.033(75), SiII(8.02)24.252(20), NiII(-)24.268(1)
25.18	SiII(8.02)24.972(10), CrIII(-)25.02(100), NI(-)25.027(21), MnIII(-)25.133(350), CrIII(-)25.27(150), CrIII(-)25.32(150), NI(-)25.374(20)
25.60	CrIII(14)25.65(300)
26.16	CrIII(-)26.18(10)
26.86	SII(7)26.70(100), CrIII(14)26.72(200), SiII(8.01)26.814(50), SiII(8.02)26.887(20), SiII(8.01)26.986(40)
27.55	SII(7)27.45(100), NiII(-)27.491(5), SiII(8.02)27.604(100)
27.90	NI(-)27.793(8), CrIII(-)28.03(10)

Table 1 (Continued)

Observed Wavelength	Identifications
1228.68	SiII(8.01)28.437(10), NiII(-)28.581(0), SiII(8.01)28.617(25), CrIII(14)28.65(300), SiII(8.01)28.746(150)
29.38	SiII(8.01)29.388(200), CrIII(14)29.53(150)
30.08	NiII(-)30.116(8), MnIII(5)30.12(20)
30.66	NI(-)30.535(7), CrIII(14)30.63(10), NiII(-)30.782(40), CrIII(21)30.80(200)
31.18	NiII(-)31.041(100), PII(-)31.18(50)
31.86	CrIII(-)31.88(300)
32.36	VIII(-)32.49(50)
33.22	CrIII(21)32.96(500), NI(-)33.24(2), NiII(-)33.250(150), CrIII(-)33.28(10), SII(7)33.36(50)
33.56	NiII(-)33.484(10), NiII(-)33.557(100), FeII(275)33.660(160)
34.08	CrIII(21)33.92(200), NiII(-)34.092(0), SII(7)34.14(300)
34.88	NiII(-)35.069(6)
35.22	NiII(-)35.112(20)
35.50	NiII(-)35.405(10), SiIII(49)35.431(140), TiIII(-)35.461(2)
35.94	SiII(-)35.920(10)
36.25	CrIII(21)36.20(400), FeII(-)36.34(0)
37.14	TiIII(-)37.028(4), NiII(-)37.049(10), NiII(-)37.247(1), NiII(-)37.260(1)
37.52	SiII(-)37.360(3)
38.52	CrIII(21)38.51(400)
39.22	NiII(-)39.061(25), MnIII(5)39.24(50)
39.96	NiII(-)39.832(60), MgII(-)39.925(250)
40.40	MgII(-)40.395(200)
41.03	NiII(-)40.877(50), NiII(-)41.189(1)
41.39	NiII(-)41.233(2), CrIII(-)41.32(20), NiII(-)41.320(10), NiII(-)41.548(3), NiII(-)41.588(10)
42.00	NiII(-)41.827(1), CrIII(-)42.08(10), NiII(-)42.099(30)
42.32	MnIV(-)42.246(900), VIV(-)42.48(3)

Table 1 (Continued)

Observed Wavelength	Identifications
1242.92	NiII(-)43.093(75)
43.24	NI(5)43.180(550), NI(5)43.307(400), NiII(-)43.345(1), CrIII(-)43.43(20)
43.81	NiII(-)43.622(3), VIV(-)43.718(10), NiII(43.848(5), CrIII(-)43.97(40)
44.70	NiII(-)44.560(50), CrIII(-)44.58(100), NiII(-)44.811(100), MnIV(-)44.876(0)
45.28	CrIII(-)45.09(50), CrIII(6)45.23(150)
45.85	MnIII(-)45.673(750), MnIII(-)45.975(700)
46.75	NiII(-)46.598(150), SiII(8)46.738(100), CrIII(-)46.83(100)
47.30	NiII(-)47.333(20), CIII(9)47.383(600)
47.79	MnIV(-)47.726(850), CrIII(6)47.86(200)
48.44	NiII(-)48.413(9), SiII(8)48.426(150), NiII(-)48.467(10), MgII(-)48.511(60)
49.15	NiII(-)49.101(100), NiII(-)49.213(8)
49.46	NiII(-)49.369(3), MnIII(-)49.529(0)
49.83	PII(-)49.82(200), MgII49.932(80)
50.23	SiII(13.05)50.089(100-A), CrIII(-)50.33(20)
50.50	SiII(13.05)50.433(150-A), NiII(-)50.467(6), SII(1)50.50(300), CrIII(-)50.57(20), NiII(-)50.685(4)
51.21	SiII(8)51.164(200), NiII(-)51.394(10), CrIII(6)51.42(150)
51.59	NiII(-)51.438(16)
52.14	VIII(7)52.11(500), MnIII(-)52.289(30)
52.62	CrIII(6)52.61(500), MnIV52.736(450)
53.24	NiII(-)53.122(50)
53.82	SII(1)53.79(500), CrIII(-)53.87(5), VIII(7)54.01(400)
54.38	NiII(-)54.290(2), NiII(-)54.346(0), NiII(-)54.471(1)
54.98	AlIII(-)54.933(-), AlIII(-)54.969(-), NiII(-)54.978(7), NiII(-)55.034(8), MnIII(-)55.078(10)
55.40	MnIII(-)55.210(20), AlIII(-)55.284(-), NiII(-)55.335(6), FeII(-)55.410(0)
55.90	NiII(-)56.029(5)
56.30	CrIII(-)56.18(20), NiII(-)56.187(6)

Table 1 (Continued)

Observed Wavelength	Identifications
1256.59	MnIV(-)56.457(40), NiII(-)56.459(0), CII(11.53)56.47(100), CrII(20)56.73(80)
57.24	NiII(-)57.116(8), FeII(-)57.18(0), MnIV(-)57.277(950)
57.70	VIII(7)57.50(75), MnIII(-)57.885(0)
58.00	MnIV(-)58.131(750)
58.48	NiII(-)58.303(0), CrII(6)58.55(200), MnIII(-)58.55(30)
58.90	AlII(-)58.86(40), CrII(20)59.02(400)
59.17	FeII(-)59.06(1)
59.52	SII(1)59.53(500)
60.49	SiII(4)60.421(500), FeII(9)60.542(400)
61.49	CrIII(-)61.53(20)
62.16	NiII(-)61.975(10), NiII(-)62.239(8), AlIII(-)62.248(-), CrII(5)62.34(300)
63.04	NiII(-)62.979(2), CrII(13)63.06(50), VIII(-)63.20(150)
63.72	CrII(20)63.61(350), VIII(-)63.68(125)
64.33	CrII(13)64.21(350), MnIV(-)64.412(900), PII(-)64.47(30)
64.77	SiII(4)64.737(1000), CrIII(-)64.75(10)
65.06	SiII(4)65.001(100), NiII(-)65.157(14), CrIII(-)65.22(5)
66.23	NiII(-)66.065(1), CrII(5)66.14(150), FeII(-)66.24(2)
66.55	CrIII(-)66.53(20), NiII(-)66.608(8), AlII(-)66.66(0), FeII(9)66.694(400)
67.12	PII(-)67.06(5)
67.48	FeII(9)67.437(500), NiII(-)67.478(6)
68.08	NiII(-)68.007(8), CrII(5)68.01(250), CrII(13)68.15(20)
68.44	NiII(-)68.359(2)
69.12	NiII(-)69.059(1), MnIII(-)69.104(800), CrII(13)69.11(250)
69.93	NiII(-)69.917(2), FeII(-)69.96(0), NiII(-)70.061(1)
71.20	VIV(-)71.153(2), MgII(-)71.239(80), FeII(9)71.235(20), FeII(-)71.37(1)
71.68	CrII(13)71.85(200)
72.12	MgII(-)71.940(90), NiII(-)71.993(1), FeII(9)72.001(500), NiII(-)72.080(1)

Table 1 (Continued)

Observed Wavelength	Identifications
1272.60	FeII(9)72.638(300), MgII(-)72.721(80)
73.36	CrII(5)73.31(150), MgII(-)73.423(110), NiII(-)73.488(2), VIV(-)73.529(10)
74.24	NiII(-)74.180(2), NiII(-)74.270(100), SiII(-)74.300(3)
75.10	NII(-)75.038(300), FeII(9)75.154(300)
75.37	NII(-)75.251(P), NII(-)75.275(P), CrIII(-)75.34(150)
75.76	NiII(-)75.640(10), SiII(-)75.662(5), VIII(-)75.78(75), FeII(9)75.801(400)
76.13	MnIII(-)76.092(700), NII(-)76.201(200), NII(-)76.225(P)
76.84	CrIII(-)76.76(200), NiII(-)76.800(100), NiII(-)76.859(1)
77.29	CrIII(-)77.23(30), NiII(-)77.243(20), NiII(-)77.344(1)
77.65	NiII(-)77.617(1), MnIV(-)77.628(100), FeII(9)77.667(10), NiII(-)77.725(2)
78.30	
79.13	
79.55	NiII(-)79.400(1)
79.98	CrIII(12)79.91(200)
80.37	SiIII(63)80.354(120)
80.88	NiII(-)81.056(1)
81.92	NiII(-)81.723(12), NiII(-)81.834(50), CrIII(-)81.98(200)
82.48	TiIII(2)82.484(125)
83.07	CrIII(13)83.12(50)
83.56	NiII(-)83.399(12), MnIII(9)83.581(500), NiII(-)83.731(3)
84.19	MnIII(9)84.058(30), CrIII(12)84.09(200), VIII(5)84.27(150), PII(-)84.31(5), NiII(-)84.327(25)
85.00	
85.50	
85.80	CrIII(-)85.90(10)
86.34	TiIII(2)86.228(90), NiII(-)86.338(50), TiIII(2)86.365(700), NiII(-)86.396(3)
87.34	VIII(5)87.19(50), NiII(-)87.329(15), VIII(5)87.34(75)

Table 1 (Continued)

Observed Wavelength	Identifications
1288.06	VIII(5)87.87(500)
88.42	VIII(5)88.63(100)
89.36	NiII(-)89.298(3), TiIII(2)89.299(500), NiII(-)89.354(7), NiII(-)89.369(11), VIII(4)89.42(400), NiII(-)89.513(2)
90.15	PIII(-)90.13(1), FeII(88)90.204(300)
90.88	VIII(-)90.77(300), FeII(-)90.78(0), NiII(-)90.908(4), CrIII(37)90.93(200)
91.24	CrIII(37)91.25(20), NiII(-)91.251(10), VIII(-)91.40(15)
91.66	CrIII(37)91.53(250), VIII(5)91.59(5), FeII(87)91.594(300), NiII(-)91.614(10), MnIII(9)91.618(300), TiIII(2)91.622(450), MnIII(9)91.714(600), VIII(5)91.76(25), CrIII(37)91.77(250)
92.06	NiII(-)92.033(2)
92.29	NiII(-)92.224(2)
92.72	VIII(5)92.79(250)
93.18	NiII(-)93.232(5), TiIII(2)93.228(400)
93.65	NiII(-)93.533(6), FeII(88)93.543(10), CrIII(-)93.57(100), MnIII(9)93.661(200)
94.24	
94.64	NiII(-)94.500(10), SiIII(4)94.543(340), PII(-)94.64(150), TiIII(1,2)94.698(600), VIII(-)94.82(50)
95.42	
96.02	TiIII(1)95.883(400), CrIII(-)96.01(40), FeII(86)96.088(400)
96.43	CIII(12.07)96.33(200)
96.73	SiIII(4)96.726(280)
97.02	NiII(-)96.950(13), NiII(-)97.087(2)
97.43	NiII(-)97.417(3)
97.98	VIII(-)97.94(50), MnIV(-)97.947(0)
98.86	FeII(87)98.815(40), SiIII(4)98.891(300), SiIII(4)98.960(360), TiIII(1)98.970(800)
99.21	VIII(-)99.07(50), VIII(-)99.25(50)
99.58	CrIII(-)99.56(40)

Table 1 (Continued)

Observed Wavelength	Identifications
1300.08	FeII(86)99.984(10)
00.60	SiIII(54)00.703(P)
01.11	SiIII(4)01.146(280)
01.75	PII(2)01.87(200)
02.15	OI(2)02.169(1000), NiII(-)02.246(10)
02.74	NiII(-)02.603(1), CrIII(-)02.85(5)
03.30	NiII(-)03.170(2), NiII(-)03.237(0), NiII(0)03.283(5), SiIII(4)03.320(320), CrIII(-)03.47(40)
03.90	
04.39	SiII(3)04.372, PII(2)04.47(200), NiII(-)04.555(1)
04.87	PII(2)04.68(150), OI(2)04.858(600)
05.35	NiII(-)05.169(25), NiIII(-)05.344(100), VIV(-)05.420(40), PII(2)05.48(350)
05.79	SiII(13.04)05.590(50-A)
06.03	OI(2)06.029(200), VIII(-)06.21(50)
06.75	NiII(-)06.621(6), MgII(-)06.714(110)
07.30	NiII(-)07.146(10), CrIII(-)07.24(100), FeII(-)07.24(0), NiII(-)07.276(50), CrIII(-)07.47(10)
07.67	CrIII(-)07.64(60)
08.28	CrIII(-)08.27(150), MgII(-)08.281(120)
08.78	CIII(11.44)08.70(200), NiII(-)08.714(8), NiII(10)08.869(16)
09.28	SiII(3)09.277(200), CrIII(28)09.34(200)
09.49	MgII(-)09.443(140), SiII(13.04)09.458(20), VIV(-)09.502(10)
09.75	SiII(13.04)09.77(2), PII(2)09.87(250)
10.62	NiII(-)10.457(15), NI(13)10.540(200), PII(2)10.70(600)
11.28	NiII(-)11.152(1), SiII(-)11.265(2)
11.79	
12.64	SiIII(10)12.590(260), VIV(-)12.717(20)

Table 1 (Continued)

Observed Wavelength	Identifications
1313.39	VIII(6)13.35(400), NiII(-)13.403(7)
13.88	NiII(-)13.903(2)
14.23	
14.64	NiII(-)14.771(12)
15.14	CrIII(33)15.00(100), NiII(-)15.255(70)
15.40	NI(-)15.44(3), CrIII(28)15.44(20), NiII(-)15.558(3)
15.91	CrIV(-)15.86(125), MnIII(-)16.091(80)
16.22	CrIII(-)16.16(200), NI(-)16.291(2)
16.52	CrIII(28)16.40(200), FeII(-)16.49(1), NiII(-)16.502(4)
17.21	NiII(-)17.045(6), NiII(-)17.122(10), NiII(10)17.220(500), VIII(6)17.27(300)
17.63	NiII(-)17.531(15), VIV(-)17.566(5)
18.09	NiII(-)18.017(100)
18.73	NI(-)18.822(5)
19.08	NI(12)18.998(150), NI(12)19.005(80)
19.68	NI(12)19.669(50), NI(12)19.676(250), CrIV(-)19.68(150)
20.25	
20.73	NiII(-)20.779(0), CrIV(-)20.85(40)
21.08	
21.42	NiII(-)21.432(3)
21.70	CrIII(28)21.65(30), NiII(-)21.704(2), VIV(-)21.719(10), NiIII(-)21.804(10)
22.00	VIV(-)21.917(10), MnIII(-)22.186(40)
22.59	
22.97	CrIII(28)22.83(100), NiII(-)22.825(2), NiII(-)23.107(1)
23.48	NiII(-)23.417(25)
23.92	CII(11)23.862(30), CII(11)23.906(300), CII(11)23.951(450), CII(11)23.996(30)
24.27	FeII(-)24.25(0)

Table 1 (Continued)

Observed Wavelength	Identifications
1324.63	NiII(-)24.475(25)
24.87	NiIV(-)24.859(100)
25.01	CrIV(-)25.03(200), NiII(-)25.105(1)
25.42	NiII(-)25.359(100), PIII(-)25.51(70)
25.76	FeII(-)25.61(2), NiII(-)25.691(4), CrIV(-)25.86(50)
26.15	NiII(-)26.292(7)
26.54	NiII(-)26.548(11), NI(11)26.564(10), NI(11)26.571(50), NiII(-)26.623(12)
26.80	VIV(-)26.666(5), VIV(-)26.807(5)
27.20	FeII(-)27.10(0), CrIII(-)27.17(10), NiII(-)27.187(3), NiII(-)27.319(20)
27.59	TiIII(4)27.592(550), SiIII(53)27.703(P), NiII(-)27.730(8), NiII(-)27.755(50), CrIII(-)27.79(100)
28.10	NI(11)27.917(25), NI(11)27.924(15), NiIII(-)28.084(75), SIII(-)28.12(50)
28.50	CrIII(-)28.37(10), NiIV(-)28.470(70), SIII(-)28.52(50), MnIV(-)28.564(0)
28.80	CrIII(-)28.78(10), SiIII(48)28.806(P), NiII(-)28.847(3), NiII(-)28.964(25)
29.11	VIII(9)29.05(25), CIII(11.59)29.187(P), VIV(-)29.288(10), CrIII(-)29.29(20)
29.64	
29.96	TiIII(-)29.837(40), NiII(-)29.857(13), NiIV(-)29.885(10), VIV(-)29.968(10), FeII(-)30.05(1)
30.38	VIV(-)30.355(10)
30.94	NiIII(-)30.787(2)
31.31	NiII(-)31.264(9), VIII(-)31.30(100)
31.66	CrIII(-)31.56(50), VIV(-)31.665(0)
32.26	
32.60	CrIV(-)32.44(250), VIV(-)32.459(3), MnIV(-)32.660(20), NiII(-)32.706(1), NiII(-)32.766(6)
32.94	NiII(-)32.808(7)
33.25	NiII(-)33.171(3)
33.72	MnIV(-)33.561(10)

Table 1 (Continued)

Observed Wavelength	Identifications
1334.37	NiII(-)34.287(12), VIV(-)34.493(-), CII(1)34.532(800)
34.85	PIII(1)34.87(650)
35.30	VIII(9)35.12(500), NiII(-)35.203(400)
35.59	CII(1)35.663(100)
35.84	CII(1)35.708(1000), NiII(-)35.779(18)
36.20	MnIV(-)36.123(450), NiII(-)36.201(2)
36.76	NiIV(-)36.790(70)
37.35	PIII(-)37.50(70)
37.75	PIII(-)37.71(150), NiIV(-)37.737(100), NiII(-)37.958(15)
38.18	CrIV(-)38.20(10)
38.50	NiII(-)38.402(1)
38.80	NiIV(-)38.786(70)
39.18	NiIV(-)39.071(740), NiII(-)39.221(3), VIV(-)39.335(5)
39.64	NiII(-)39.487(3), TiIII(-)39.691(170)
40.07	NiII(-)40.007(15), FeII(-)40.22(0)
40.44	NiII(-)40.374(20)
40.76	MnIV(-)40.617(250)
41.00	CrIII(-)41.17(10)
41.40	NiII(-)41.226(0), NiIII(-)41.421(10), MnIV(-)41.461(300), SiIII(39)41.465(160), SiIII(39)41.496(P)
42.32	NiIII(-)42.148(50), CrIII(-)42.24(40), NiII(-)42.242(20), SiIII(39)42.351(P), SiIII(39)42.392(140), SiIII(39)42.432(P)
42.64	
43.32	NiII(-)43.338(200), SiIII(39)43.388(120)
43.63	SIII(-)43.53(50), NiII(-)43.544(10), NiII(-)43.574(P), NiII(-)43.642(2)
43.89	PIII(-)43.8(70-A)
44.30	NiII(-)44.196(2), NiII(-)44.334(1), PIII(1)44.343(1000), VIV(-)44.493(0)

Table 1 (Continued)

Observed Wavelength	Identifications
1344.72	NiII(-)44.614(50), PIII(1)44.900(650)
45.42	NII(-)45.313(100), NII(-)45.340(P), CrIII(-)45.46(70)
45.88	NiIV(-)45.718(760), NiII(-)45.882(50), MnIV(-)46.014(0), NiIV(-)46.083(740)
46.40	NiII(-)46.334(1), NII(-)46.413(P), NII(-)46.441(10), MnIII(-)46.58(100)
46.90	MnIII(-)46.854(50), MnIV(-)46.865(0), SiII(7)46.873(100), PIII(-)47.00(200-A), VIV(-)47.030(1), MnIII(-)47.087(0)
47.31	FeII(-)47.29(1)
47.96	
48.50	NiII(-)48.333(30), CrIV(-)48.44(20), PIII(-)48.45(10-A), SiII(7)48.543(100)
49.26	PIII(-)49.11(200-A)
49.56	NiII(-)49.594(0), FeII(-)49.60(0)
50.13	SiII(7)50.057(150), AlII(-)50.18(150), NiIV(-)50.215(650), NiII(-)50.256(5), NiII(-)50.321(10)
50.60	SiII(7)50.520(20), SiII(7)50.658(20)
51.30	NiII(-)51.256(30), NiII(-)51.287(10)
51.66	CrIV(-)51.63(40)
52.68	MnIII(-)52.599(30), SiII(7)52.635(100)
53.44	NiII(-)53.512(20), NiII(-)53.606(8)
53.85	SiII(7)53.718(100), NiII(-)53.821(15)
54.26	CrIII(-)54.16(10)
54.92	CrIII(-)54.75(50), FeII(-)54.87(0), PIII(-)54.96(10)
55.44	MnIV(-)55.441(250), OI(1)55.598(100)
55.95	MnIII(-)55.959(20), NiIV(-)56.078(650)
56.36	CrIII(-)56.25(10), NiII(-)56.318(5), MnIV(-)56.436(0), NiII(-)56.469(20)
57.18	NiIV(-)57.063(760), NiII(-)57.132(11), CrIII(36)57.20(150), NiII(-)57.371(5)
57.66	CrIII(-)57.69(20)
57.87	NiII(-)57.802(50), CrIII(36)57.85(5), VIII(-)57.90(40)
58.80	CrIII(-)58.65(30), CrIII(-)58.75(20), MnIII(-)58.958(40)

Table 1 (Continued)

Observed Wavelength	Identifications
1359.09	NiII(-)58.992(15)
60.29	FeII(-)60.17(0), SiIII(68)60.360(20), CrIII(-)60.40(60)
60.67	CrIII(-)60.56(20), MnIII(8)60.718(1000)
60.92	FeII(111)60.870(100), NiII(-)60.956(14), CrIII(-)60.97(10), MnIII(-)61.032(10)
61.42	MnIII(-)61.26(1), CrIII(-)61.30(200), FeII(-)61.372(85), SiIII(46)61.597(160)
62.08	NiII(-)61.885(50), MnIV(-)61.996(0)
62.40	SiIII(38)62.366(100), BII(1)62.460(600), VIII(4)62.51(50)
62.80	FeII(152)62.771(400), NiIII(-)62.783(3), CrIII(-)62.85(50), NiII(-)62.926(20)
63.40	NiIV(-)63.258(560), NiII(-)63.421(3), SiIII(38)63.459(140), SiIII(38)63.504(P), NiII(-)63.540(2)
63.93	CrIII(-)63.73(20), NiII(-)63.861(1), NiII(-)64.067(25)
64.42	CrIII(-)64.26(50), FeII(-)64.38(0), CrIV(-)64.49(10), NiII(-)64.505(20), FeII(103)64.575(240)
64.84	MnIII(8)64.645(5), NiII(-)64.793(2), TiIII(-)65.021(6)
65.30	MnIII(8)65.199(800), SiIII(38)65.253(160), CrIII(36)65.29(200), SiIII(38)65.292(P), SiIII(38)65.337(P)
65.74	MgII(-)65.544(140), NiII(-)65.760(4), CrIII(36)65.94(70)
66.58	MnIII(-)66.46(4), CrIII(-)66.63(120), FeII(-)66.720(85)
67.22	SiIII(46)67.049(140), NiII(-)67.067(20), CrIII(-)67.13(40), MgII(-)67.257(150), CrIV(-)67.39(150), NiII(-)67.394(1)
68.06	FeII(-)68.098(50), NiII(-)68.171(10), MnIII(8)68.20(20), CrIII(36)68.23(20)
68.49	VIII(-)68.31(100), TiIII(-)68.442(25), FeII(-)68.57(1)
69.32	MgII(-)69.423(180), MnIII(8)69.430(400), SiIII(46)69.437(100)
69.65	MnIII(-)69.535(700), CrIV(-)69.58(20), NiII(-)69.651(20), VIII(4)69.70(100)
70.12	NiII(8)70.136(500), CrIII(-)70.20(20), VIII(4)70.26(100)
70.59	PIII(-)70.39(10-A), NiII(-)70.549(25), CrIII(-)70.74(20)
71.26	FeII(-)71.024(500), AlII(-)71.240(5)
71.65	MnIII(8)71.647(300), SiII(67)71.652(60), NiIV(-)71.679(580), NiII(-)71.733(1)

Table 1 (Continued)

Observed Wavelength	Identifications
1372.26	CrIII(-)72.27(60), FeII(-)72.29(1), VIII(-)72.43(10)
73.16	SiIII(67)73.030(100), VIII(-)73.34(5)
73.72	FeII(-)73.717(120), NiII(-)73.746(4)
74.10	NiII(9)74.075(150)
74.84	NiII(-)74.660(10), PIII(-)74.78(100-A), CrIII(-)74.91(10)
75.20	SiIII(67)75.083(2), FeII(-)75.172(200)
75.76	CrIV(-)75.56(200), SiIII(67)75.688(40), NiII(-)75.822(50)
76.33	NiIII(-)76.183(15)
76.88	CrIII(-)76.90(10)
77.11	NiII(-)77.001(10), SiIII(67)77.082(60), VIII(-)77.15(125)
77.37	SiIII(67)77.238(40)
78.15	VIII(-)77.99(100), BII(-)78.18(1)
78.92	
79.48	FeII(-)79.466(40), NiII(-)79.586(50), FeII(-)79.61(0)
79.74	AlIII(-)79.670(600), PIII(7)79.873(500)
80.71	NiII(-)80.793(20)
81.23	PIII(7)81.11(1000), FeII(152)81.250(200), NiII(8)81.295(200), NiII(-)81.423(6)
81.76	PIII(7)81.633(800), CrIII(-)81.67(30), NiII(-)81.694(4)
82.36	CrIII(-)82.19(100), NiIV(-)82.448(380), VIII(-)82.45(100)
82.75	NiII(-)82.695(2), FeII(-)82.71(0), FeIII(-)82.857(70)
83.43	CrIV(-)83.24(10), FeII(-)83.578(20)
83.77	CrIII(35)83.79(250), NiII(-)83.966(0)
84.26	AlIII(-)84.132(800), NiII(-)84.327(12)
84.78	
85.38	NiII(-)85.216(6), VIII(-)85.34(15)
85.92	NiII(-)86.063(1)

Table 1 (Continued)

Observed Wavelength	Identifications
1386.35	FeII(-)86.47(0)
87.14	FeII(-)87.22(4)
87.52	VIII(-)87.40(15)
87.96	NiII(-)87.851(5), FeII(-)87.87(0), NiIII(-)87.870(3), SiIII(37)87.948(25), SiIII(37)87.979(10), SiIII(37)87.994(8), SiIII(37)88.011(50), SiIII(37)88.052(8), SiIII(37)88.098(1), CrIII(-)88.13(40)
88.23	CrIII(-)88.24(20)
88.70	NiIII(-)88.629(5), NiII(-)88.796(1)
89.27	NiIII(-)89.149(1)
89.86	CrIII(-)89.73(150), NiIII(-)89.735(20), VIII(8)89.79(200)
90.32	
90.84	SIII(-)90.67(50), CrIII(-)90.77(40), VIV(-)91.105(20)
91.38	CrIII(35)91.26(20)
92.01	FeII(-)92.14(3)
92.66	FeII(-)92.32(4), CrIII(-)92.83(10)
93.32	CrIII(-)93.22(10), NiII(-)93.330(100), FeII(-)93.49(1)
93.84	SiIV(1)93.755(1000), NiII(-)93.867(12), CrIII(-)93.98(10), FeIII(-)94.024(70)
94.65	VIII(-)94.46(5), CrIII(-)94.58(70)
95.20	VIV(-)95.001(60), FeIII(-)95.213(200), FeIII(-)95.382(20)
95.75	FeIII(-)95.750(150), CrIV(-)95.83(30)
96.28	CrIII(-)96.26(10), CrIII(-)96.42(100)
96.66	CrIII(-)96.63(30), NiII(-)96.695(10), NiII(-)96.790(14)
97.02	CrIII(-)96.96(30)
97.41	CrIII(-)97.40(30), NiII(-)97.480(2), FeII(350)97.572(10)
97.82	VIII(8)97.62(60), CrIII(-)97.69(10), NiII(-)97.858(2), CrIII(-)97.90(30), NiII(-)98.009(3)
98.52	FeII(-)98.38(1), VIII(8)98.47(75), NiII(-)98.612(40)
98.92	NiII(-)98.758(16), NiII(8)99.026(80), CrIII(-)99.05(100)

Table 1 (Continued)

Observed Wavelength	Identifications
1399.62	CrIII(-)99.42(10), CrIV(-)99.50(10), SiIII(73)99.615(P)
1400.03	CrIII(-)00.02(5)
00.30	CrIII(35)00.34(150), VIV(-)00.416(5)
00.72	CrIII(-)00.62(10), NiII(-)00.644(30), CrIII(-)00.72(10)
01.26	NiIII(-)01.214(15), VIII(-)01.38(10)
01.80	FeII(-)01.772(4), CrIV(-)01.81(30)
02.19	CrIII(-)02.07(30)
02.52	NiII(-)02.379(20), CrIII(-)02.62(40)
03.08	CrIII(-)02.99(10), NiIII(-)03.113(15), FeII(-)03.246(1)
03.85	SiII(13.03)03.783(5), CrIII(-)03.92(30)
04.24	SiII(13.03)04.170(1)
04.55	SiII(13.03)04.478(6), CrIII(-)04.50(10)
04.78	
05.28	VIII(-)05.14(5), MnIII(-)05.244(40), NiIII(-)05.279(10), CrIII(-)05.37(30)
05.70	FeII(-)05.604(2), CrIII(-)05.72(20), VIII(-)05.74(5), FeII(-)05.797(1)
06.09	NiIII(-)06.250(50)
06.34	CrIII(-)06.31(40)
06.72	VIII(-)06.52(50)
06.98	CrIII(-)06.90(100), MnIII(-)06.957(0)
07.33	CrIII(-)07.22(10)
07.52	FeIII(-)07.46(0)
07.74	CrIII(-)07.89(40)
08.60	FeII(-)08.478(80), VIV(-)08.639(8), CrIII(-)08.71(50)
09.08	NiIII(-)09.000(15), SiII(13.02)09.073(10), CrIII(-)09.10(10), FeII(-)09.277(1)
09.52	NiII(-)09.612(15)
10.12	SiII(13.02)09.90(2), NiIII(-)09.974(5), VIV(-)10.018(8), CrIII(-)10.03(20), NiIII(-)10.126(10), SiII(13.02)10.219(20), NiII(-)10.219(4)

Table 1 (Continued)

Observed Wavelength	Identifications
1410.56	NiIII(-)10.446(3), NiIII(-)10.642(5)
11.13	NiII(-)11.071(100)
11.64	NiIV(-)11.461(780), FeII(-)11.47(1), CrIII(-)11.53(10)
12.12	NI(10)11.932(150), NI(10)11.939(30), NI(10)11.949(300), CrIV(-)12.24(30), NiIII(-)12.304(50)
12.85	VIV(-)12.686(20), FeII(47)12.834(70), NiII(-)12.868(30)
13.41	NiIII(-)13.211(5), CrIII(-)13.32(10), MnIII(-)13.387(0)
13.68	NiII(-)13.679(10), FeII(-)13.699(70), CrIII(-)13.77(40)
14.02	
14.36	NiII(-)14.299(15), NiIII(-)14.389(20), VIV(-)14.409(50)
14.82	CrIII(-)14.62(50), CrIII(-)14.79(10), VIV(-)14.842(20), FeII(-)14.89(1), NiIII(-)14.916(15)
15.22	CrIII(-)15.25(50)
15.73	NiII(-)15.728(20), FeII(-)15.75(1), CrIII(-)15.81(10), NiIII(-)15.909(5)
16.55	FeII(-)16.62(0), NiII(-)16.660(0), FeII(-)16.73(0)
17.01	NiIII(-)16.956(75), SiII(18.06)16.972(10-A), NiII(-)17.007(10), CrIII(-)17.13(70)
17.56	NiIII(-)17.387(2), NiII(-)17.553(1), CrIII(-)17.67(10), NiII(-)17.699(10), VIII(-)17.71(50)
17.88	FeII(-)17.727(30), FeII(143)17.744(400), SiII(18.06)17.781(5-A), NiIII(-)17.841(10)
18.20	SiII(18.06)18.110(0-A), NiIII(-)18.292(5)
18.48	NiIV(-)18.501(150), VIV(-)18.533(30)
18.92	FeII(-)18.855(10), VIV(-)18.921(10)
19.48	FeII(-)19.31(0), NiIII(-)19.382(10), VIV(-)19.580(80)
19.94	TiIII(-)20.036(300)
20.57	TiIII(-)20.440(280), NiIII(-)20.448(75), NiII(-)20.674(5)
21.02	NiII(-)20.843(18), FeII(-)20.911(30), NiIII(-)21.082(10), CrIII(-)21.20(50)
21.59	TiIII(-)21.631(280), TiIII(-)21.767(250)

Table 1 (Continued)

Observed Wavelength	Identifications
1421.92	CrIII(-)21.80(10), NiII(-)21.913(1)
22.38	TiII(-)22.405(650), CrIII(-)22.47(40), FeII(-)22.53(0)
22.94	
23.21	NiII(-)23.212(16)
23.49	VIV(-)23.420(10)
23.70	NiII(-)23.722(10), NiII(-)23.786(11)
24.11	FeII(47)24.047(50), TiII(-)24.140(300), VIV(-)24.197(0), FeII(-)24.31(0)
24.70	NiII(-)24.511(100), CrIV(-)24.62(100), FeII(47)24.716(70), SiII(62)24.775(40), NiII(-)24.890(3)
25.16	NiII(-)25.025(10), MnII(22)25.05(2), CrIII(-)25.30(10)

Table 2

The Spectrum of ζ Dra: 2000Å to 3000Å

Observed Wavelength	Identifications
2000.1	FeIII(81)00.228(9), FeII(122)00.368(30)
01.3	FeIII(55)01.258(4)
01.9	CrII(49)01.94(25)
03.4	FeIII(55)03.491(8)
04.8	
05.5	CrII(17)05.50(4)
06.4	FeIII(55)06.262(3)
07.1	FeII(187)07.013(12), FeII(83)07.452(15)
08.0	FeII(83)07.711(12), FeIII(55)07.841(6)
09.3	CIII(11.71)09.327(2)
10.9	FeII(122)10.688(25)
12.7	FeIII(86)12.677(4)
13.6	FeII(83)13.268(15), CrIII(53)13.79(20)
14.5	CrIII(53)14.68(20)
15.6	FeIII(83)15.500(20)
16.8	SiII(15.03)16.654(3), FeII(83)17.090(15)
18.1	CII(18)17.94(1)
18.7	FeII(94)18.772(25)
20.4	OII(-)20.44(2), FeII(83)20.739(25)
21.3	OII(-)21.45(1)
22.1	AlII(-)22.14(2)
23.5	
25.2	
25.9	MgI(2)25.824(15)
26.9	MnIII(11)26.861(20)

Table 2 (Continued)

Observed Wavelength	Identifications
2027.9	FeII(186)27.778(5)
28.2	MnIII(-)27.964(500)
29.2	FeII(93)29.182(8)
30.7	
31.9	
32.7	FeII(94)32.407(25)
34.3	MnIII(11)34.424(100)
35.3	
36.9	FeIII(60)36.845(2)
38.8	MnIII(11)38.874(100)
39.5	FeIII(134)39.507(6), CrIII(69)39.63(50)
40.3	FeIII(71)40.407(3), FeII(93)40.687(25)
41.1	
42.2	
43.1	
43.7	FeIII(71)44.034(3)
44.5	FeIII(71)44.302(4), MnIII(11)44.486(300), FeIII(60)44.970(4)
45.7	
46.5	
47.5	CrIII(69)47.23(80)
48.7	MnIII(-)48.840(400)
49.9	MnIII(11)49.597(500), SiIII(57)49.913(2)
50.7	FeIII(60)50.739(7), FeII(93)51.028(25)
52.2	CII(35)52.16(2)
52.9	
54.7	CrII(27)54.75(10)

Table 2 (Continued)

Observed Wavelength	Identifications
2055.6	CrII(1)55.59(200), FeIII(105)55.855(6)
56.8	FeIII(78)57.058(6)
57.5	
58.3	FeIII(100)58.560(8), SiII(9.01)58.646(50)
59.0	SiII(9.01)59.014(50)
59.9	FeIII(78)59.677(7)
61.7	CrII(1)61.54(175), FeIII(48)61.552(10), FeIII(78)61.751(9)
62.9	
63.8	FeII(92)63.672(25)
65.9	CrII(52)65.89(10), FeII(109)66.005(15)
66.7	NiII(15)66.41(5), CrII(52)66.66(2), CrII(52)66.75(3)
68.1	FeII(137)67.917(20), FeIII(48)68.243(12)
68.9	MnIII(10)68.965(1000), CrIII(38)69.00(20)
70.1	FeII(273)69.952(10), FeII(273)70.330(8)
71.9	FeII(107)71.821(10), SiII(9)72.016(200)
72.7	SiII(9)72.701(200)
73.5	CrIII(38)73.36(15)
74.4	FeII(91)74.195(8)
75.3	SiIII(80)75.04(2)
75.9	FeII(107)75.683(5)
76.9	NII(14.07)76.944(4), CrII(38)76.96(30)
77.8	FeII(136)77.507(12), FeIII(105)77.755(4), FeIII(91)78.164(8)
78.8	NiII(16)78.76(3), FeIII(48)78.989(14)
80.5	FeII(92)80.246(20), NiII(16)80.84(5)
81.6	AlII(3)81.5(2)
82.7	

Table 2 (Continued)

Observed Wavelength	Identifications
2084.1	FeIII(67)84.349(10)
84.8	FeIII(67)84.515(3), NiII(42)84.87(5), FeIII(77)84.968(5)
85.8	FeIII(105)86.128(4)
87.4	FeIII(77)87.132(8), FeII(108)87.527(25)
88.7	FeIII(67)88.625(5)
90.1	FeIII(124)90.053(7), FeIII(67)90.139(12), MnIII(10)90.169(300), FeIII(59)90.240(6)
91.5	FeIII(77)91.312(7), CII(28)91.63(2)
93.3	FeIII(129)92.945(6), CII(28)93.13(1), FeIII(77)93.504(4), FeII(290)93.683(35)
94.3	NII(16.06)94.183(3)
95.0	MnIII(10)94.712(500), FeIII(105)95.327(3)
96.1	NII(16.06)96.192(4), FeIII(59)96.430(6)
97.3	FeIII(67)97.480(15), FeII(80,120)97.512(25), FeIII(66)97.672(12)
99.6	FeIII(129)99.332(6), MnIII(10)99.908(500)
2101.0	FeIII(129)00.961(8), FeII(250)00.963(5)
02.0	
03.0	TiIV(2)03.08(10), CrIII(41)03.22(20), CaII(9)03.239(2), CrIII(41)03.32(20)
04.1	FeIII(66)03.799(12)
05.0	CrIII(41)04.85(20), FeIII(146)05.020(5)
06.0	MnIII(10)05.982(10)
06.8	
07.7	FeII(250)07.555(10), CrIII(41)07.68(20), MnIII(10)07.811(5), MnIII(10)07.853(15)
09.0	FeIII(105)08.676(5), FeII(227)08.942(25), FeII(227,250)09.097(10)
09.7	FeII(227)09.613(25)
10.5	FeII(290)10.240(25), CrII(16)10.37(5), CrII(26)10.68(4), FeII(108)10.724(15)
11.1	CrII(26)10.92(5), CrII(26)10.98(10), CrII(26)11.26(4)
12.1	CrII(15)12.16(10)

Table 2 (Continued)

Observed Wavelength	Identifications
2113.4	NiII(60)13.51(12)
14.9	CrII(41)14.87(100)
16.1	
16.8	FeIII(58)16.588(7), FeII(213)16.960(25)
17.6	CrII(41)17.53(100), FeII(-)17.633(25)
18.7	FeIII(58)18.415(5), FeIII(58)18.567(6), CrII(70)18.65(20)
19.8	
20.6	CrII(41)20.35(25), FeIII(58)20.767(4)
21.4	CrII(79)21.26(30), CrII(70)21.69(30)
22.2	CrII(61)22.44(40)
23.3	CrII(61)23.53(80), FeIII(104)23.59(8)
24.0	
24.6	
25.8	CrII(41)25.62(15)
27.3	CrII(25)27.26(7), CrII(25)27.53(8)
28.1	FeIII(290)27.967(10), YIII(5)27.99(100)
29.2	NiII(31)29.14(3), CrII(41)29.23(5)
30.3	NII(25)30.179(5), CrII(14,24,79)30.22(50), FeII(80)30.259(15)
31.8	CaII(3)31.505(2), CrII(61)31.95(20)
33.0	CrII(24)32.93(40), CrII(24)33.03(30)
34.8	CrII(23)34.52(100), CrII(23)34.62(75), FeIII(98)34.861(9)
35.9	
38.2	FeII(135)38.103(20)
38.7	NiII(13)38.60(10), NII(0.01)39.007(4)
39.7	CrII(14)39.33(7), CrII(14)39.54(10), FeII(6)39.676(25)
40.7	CrII(14)40.50(20), FeII(212)40.612(1)

Table 2 (Continued)

Observed Wavelength	Identifications
2142.7	NII(0.01)42.775(6)
44.1	CrIII(40)44.15(80), FeIII(58)44.282(8)
45.2	
45.9	FeII(6)46.058(10), FeIII(59)46.062(8)
46.7	
47.4	CrIII(40)47.16(50), CrIII(48)47.56(50), FeII(213)47.719(15)
48.1	FeIII(59)47.904(7)
48.9	CrIII(70)48.65(50), CrIII(40)48.85(40)
49.7	CrIII(52)49.48(50)
50.7	FeII(135)50.618(20), FeII(248)50.762(10), FeII(106)51.095(25)
52.3	FeII(106)52.373(12), FeII(151)52.488(25)
54.1	FeII(6)53.874(1)
54.9	CrIII(48)54.62(30), CII(39)54.70(0)
55.6	FeII(213)55.839(12)
56.3	CrII(133)56.22(20), CII(39)56.28(1)
57.5	CrIII(52)57.17(100), SiIII(95)57.280(2), FeIII(65)57.287(3)
58.6	FeIII(145)58.472(12)
59.6	CrIII(40)59.73(20)
61.1	FeII(213,227)61.161(15), FeIII(70)61.270(10), FeII(227,370)61.313(20)
62.0	FeII(90)62.023(20), FeIII(140)62.283(5)
63.8	CrIII(48)63.86(50)
64.9	FeII(213,370)64.558(25), CrII(133)64.67(7)
65.6	NiII(13)65.55(40), FeII(185)65.555(10)
66.8	FeIII(70)66.952(12)
67.5	FeII(119)67.401(12)
68.2	CrIII(48)68.23(30)

Table 2 (Continued)

Observed Wavelength	Identifications
2169.5	FeII(370)69.431(10), MnIII(-)69.657(1000), FeIII(140)69.709(5)
71.2	FeIII(70)71.045(12), CrII(36)71.06(40), CrII(36)71.18(30)
71.9	FeII(372)71.550(1), FeII(372)72.056(1)
73.0	FeII(372)72.679(8), FeII(134)72.989(15), FeII(248)73.220(20)
75.2	FeII(135)74.849(8), NiII(13)75.16(25), FeII(90)75.445(25)
76.5	FeII(370)76.826(20), MnIII(-)76.859(900)
77.3	FeII(106)77.025(10), NiII(40)77.08(6), NiII(40)77.36(6)
78.0	
79.6	FeIII(75)79.258(6), NiII(40)79.36(6), NiII(12)79.46(3), CrII(221)79.72(2)
81.6	FeII(370)81.407(5), FeIII(122)81.407(4), CrIII(51)81.41(15), CrII(221)81.54(4)
82.4	
83.9	CrIII(55,64)83.71(50), FeII(247)83.803(10), FeIII(65)83.980(6), FeIII(122)84.114(4)
85.1	MnIII(-)84.849(800), CrIII(51,68)85.01(100), MnIII(-)85.103(600)
85.7	NiII(140)85.51(12), FeII(271)85.622(8), FeIII(65)85.654(5)
86.9	FeIII(-)86.876(6)
87.9	FeII(89)87.678(10), FeII(135)87.868(15), NiII(12)88.05(6)
89.0	CII(29)88.72(1), CrII(221)89.24(3)
89.7	CII(29)86.62(1), FeIII(122)90.075(3)
90.5	CrII(132)90.52(2), CrIII(51)90.76(100)
91.2	CrII(209)90.92(5), NiII(29)90.97(2), CrII(221)91.08(2), FeIII(65)91.215(8), YIII(5)91.22(200), CrIII(47)91.24(40)
92.1	FeII(367)91.935(10)
93.8	
94.5	AlII(-)94.251(1)
95.3	FeIII(123)95.081(5), FeIII(123)95.532(6)
95.9	CrII(132)95.78(4), FeIII(74)95.866(5)

Table 2 (Continued)

Observed Wavelength	Identifications
2198.1	CrII(51)97.89(100)
99.3	CrII(13)99.09(1), CrII(132)99.23(2)
2200.8	YIII(5)00.80(50)
01.5	NiII(13)01.41(20), CrII(60,68)01.46(15), FeII(367)01.595(5)
02.7	FeIII(74)02.458(8)
03.7	FeII(406)03.420(1), NII(18.08)03.633(3), CrII(13)03.89(8)
05.2	CrII(247)05.34(2)
06.3	NII(15)06.088(6), FeII(367)06.153(8), YIII(4)06.22(30), FeII(134)06.582(2)
08.2	FeII(367)08.419(30)
09.0	CrIII(58)08.70(60), FeIII(110)08.85(10), FeII(366)09.049(20)
10.6	NiII(13)10.38(20)
11.6	CrIII(58)11.46(10), CrII(20)11.85(20), MnIII(–)11.942(400)
12.9	
13.5	CrII(21)13.56(10), FeII(168)13.679(20)
15.2	CrII(247)15.08(20), FeII(369)15.094(10), MnIII(16)15.211(800), CrII(12)15.30(5)
16.5	NiII(12)16.479(100)
17.2	FeII(168)17.048(0), VIII(12)17.40(30), CrIII(–)17.51(40)
18.3	FeII(367)18.289(30), VIII(12)18.35(30), CrII(209)18.36(6)
19.2	
20.2	FeII(168)19.889(20), CrII(21)20.01(2), FeII(118)20.388(25), NiII(28)20.40(10), FeII(371)20.453(6), MnIII(16)20.538(900)
22.6	FeII(168)22.446(tr), FeII(369)22.679(1)
23.5	FeII(168)23.481(1), FeII(368)23.866(2)
24.7	NiII(29)24.50(2), CrII(173,209)24.87(1), NiII(12)24.88(20)
26.7	CrII(12)26.47(7), CrIII(39)26.72(200)
27.4	FeII(168)27.407(0), FeII(369)27.469(4), MnIII(16)27.491(1000), FeII(168)27.597(0)

Table 2 (Continued)

Observed Wavelength	Identifications
2228.0	FeIII(69)27.848(7), CrII(20)27.88(10), CrII(20)28.18(8), CrII(20)28.26(12)
28.7	FeII(366)28.761(30), CrII(270)28.82(5)
29.8	NiII(51)29.85(3)
31.3	CrII(78)31.02(12), CrII(283)31.45(15), FeII(368)31.512(10)
31.9	FeIII(139)31.670(4), CrIII(45)31.81(100)
33.1	FeIII(122)33.172(4)
33.8	FeIII(128)33.654(6), CrIII(45)33.81(100), FeII(118)33.917(1)
35.7	FeIII(69,139)35.699(6), FeIII(139)35.908(10), CrIII(39)35.91(200)
37.1	
38.2	MnIII(16)38.061(20), FeIII(139)38.155(10)
39.3	FeII(365)39.047(25), CrII(20)39.24(8), CrII(20)39.51(4), FeII(334)39.638(tr)
40.2	
41.5	FeII(365)41.426(20), CrII(78)41.47(3), FeIII(109)41.54(12), CrII(50)41.69(15), CrII(78)41.80(30)
42.5	CII(44)42.10(1)
43.2	CrII(77)43.28(40), FeIII(64)43.405(8), FeII(118)43.578(tr)
44.2	CrIII(39)44.10(150), FeII(365)44.216(8)
45.6	FeII(365)45.505(45), FeIII(128)45.776(4)
47.2	NiII(30)47.24(6)
48.0	FeII(365)47.692(35), CrII(49)47.91(18), CrII(49)48.30(50)
49.4	FeII(365)49.063(30), FeII(5,365)49.181(25), CrII(49)49.32(2), CrII(49)49.78(30)
50.1	CrII(35)49.91(8), CrII(49)49.98(20), FeII(4)50.171(0)
51.0	FeII(4)50.937(1)
51.7	CrIII(39)51.45(80), FeII(5)51.556(0), FeII(365)51.831(80), CrIII(39)51.95(30)
53.0	FeII(4)53.119(1)
54.0	NiII(12)53.856(20), FeII(365)54.066(8), FeII(5)54.401(0)
55.2	CrIII(45)55.44(15)

Table 2 (Continued)

Observed Wavelength	Identifications
2255.9	CII(43)55.68(1), FeII(365)55.691(50), FeII(133)55.759(1), CrII(49,77)56.01(50)
56.7	CrII(49)56.38(12), CrII(49)56.56(2), CII(43)56.79(0), FeII(365)56.897(10)
57.9	FeII(365)57.788(25), CrIII(39)57.92(50), CrII(76)57.96(50)
58.7	CrIII(63)58.59(30)
60.0	FeII(4)60.078(1), FeII(5)60.228(1)
60.9	FeIII(64)60.547(7), FeII(4)60.853(1)
61.7	FeIII(111)61.592(12), CrIII(39)61.64(40)
63.1	FeII(246)63.224(1)
64.5	NiII(12)64.456(30), FeII(246)64.589(1)
65.2	NiII(39)65.36(2)
66.1	FeII(5)65.991(0)
67.1	FeIII(133)67.42(10)
67.8	FeII(4)67.584(1), CII(34)67.77(0)
68.9	FeII(5)68.562(0), FeII(5)68.844(0)
70.5	CII(34)70.20(2), NiII(12)70.209(40)
72.5	
73.2	CrIII(67)73.30(100)
73.9	FeIII(153)74.00(8)
75.0	NiII(38)74.75(8), CrIII(67)75.43(80)
75.7	NiII(39)75.70(7)
76.6	CrIII(50)76.38(100), FeII(315)76.378(tr), NiII(51)76.45(5), FeIII(73)76.870(8)
77.5	CrIII(67)77.47(80), FeIII(127)77.820(8)
78.6	FeIII(127)78.432(6), NiII(22)78.771(30)
80.2	FeII(4)79.918(2)
81.0	PII(6)81.003(10)
81.9	

Table 2 (Continued)

Observed Wavelength	Identifications
2282.9	
83.8	FeII(132)83.991(1)
86.0	CrII(48)86.27(8)
87.2	NiII(22)87.082(20)
88.7	
90.4	FeIII(153)90.126(5), NII(20.02)90.259(3), CrIII(50)90.66(80)
91.5	NII(16.02)91.652(4), FeIII(156)91.850(6)
92.5	NII(20.02)92.652(3), FeII(315)92.770(0)
93.6	NII(20.02)93.318(4), FeII(184)93.765(1)
94.4	CrII(191)94.46(8), FeII(184)94.603(1)
96.8	NiII(21)96.553(30), FeII(167)96.662(0), FeII(133)96.769(0), CIII(8)96.870(16)
98.6	FeII(133)98.225(1), NiII(21)98.269(30), NiII(39)98.50(6)
2300.0	NiII(27)99.65(8), CrII(319)00.08(8), NiII(27)00.10(15)
01.0	SiIII(76)00.930(8), NiII(39)01.01(4)
01.9	
02.7	FeIII(152)02.808(8), NiII(11)02.98(60), FeIII(138)03.012(7)
03.6	FeII(167)03.349(1), FeII(415)03.840(0)
05.0	MnII(2)05.001(8)
06.0	
07.7	CrII(131,319)07.56(10), NiII(38)07.79(8)
08.9	NiII(50)08.52(12)
10.6	
11.1	FeII(245)11.224(1)
11.9	FeII(105)12.028(1), NII(35)12.13(0), NiII(27)12.23(4)
12.7	NiII(58)12.91(20)
14.0	FeII(184)13.962(0)

Table 2 (Continued)

Observed Wavelength	Identifications
2315.1	CrII(19)14.71(40), CrII(19)14.81(8), FeII(389)15.314(tr)
16.0	FeIII(-)15.70(10), NiII(11)16.034(80)
17.5	FeII(183)17.377(0)
18.5	FeII(183)18.343(1), NiII(38)18.48(12), CrII(208)18.49(2), FeII(132)18.534(1), CrII(149)18.77(10)
20.0	NiII(37)19.73(12), NII(16)19.941(4), CrII(19)20.08(30), CrII(128)20.29(5)
21.6	NII(16)21.650(4), FeII(183)21.687(1), FeIII(132)21.71(10)
22.5	FeII(183)22.326(1)
23.2	
24.3	FeIII(156)24.359(8)
25.3	NII(16)25.16(0), FeII(183)25.296(1), FeII(288)25.577(1)
26.3	NiII(11)26.44(15), CrII(129)26.61(3)
27.6	YIII(1)27.30(20), FeII(3)27.391(7), CrIII(62)27.67(20)
29.1	
30.2	FeIII(72)29.905(9), CrII(128)30.03(10), VIII(11)30.37(100)
31.5	FeII(35)31.308(7), FeIII(72)31.38(P), VIII(11)31.67(75)
32.5	CrII(172)32.39(3), FeII(414)32.503(tr), FeII(3)32.798(8)
33.1	CrIII(44)33.09(25)
34.3	CrII(47)34.17(8), CrII(47)34.24(7), CrII(47)34.37(8), SiII(0.01)34.404(30), CrII(47)34.41(2), CrII(47)34.45(5), CrII(47)34.58(10), SiII(0.01)34.606(30)
35.6	
36.5	CrII(129)36.42(3), NiII(27)36.59(5), NiII(50)36.70(15), FeIII(121)36.768(10)
37.9	FeII(3)38.005(8)
39.6	FeII(105)39.408(2), FeIII(151)39.913(5)
40.7	FeII(166)40.459(2), CrIII(-)40.51(60), FeII(166)40.939(1)
41.7	FeII(314)41.953(1)
42.2	CrIII(44)42.46(15)

Table 2 (Continued)

Observed Wavelength	Identifications
2343.6	NiII(37)43.489(12), FeII(3)43.495(8), NiII(58)43.93(4), FeII(35)43.958(6)
44.4	SiII(0.01)44.203(10), FeII(3)44.278(8), CrII(203)44.54(20)
45.5	CrII(34)45.25(15), NiII(58)45.26(30), FeII(165)45.327(5), CrII(34)45.35(25), NiII(11)45.44(15)
46.8	MnIII(15)46.899(10), FeII(379)46.926(tr), FeIII(72)46.961(3)
47.7	FeII(36)48.118(8)
48.4	FeII(3)48.300(8)
50.6	MnIII(15)50.507(80), NiII(19)50.84(8)
52.1	CrII(293)51.96(4), FeII(379)52.315(2)
53.1	SiII(35)53.09(20), CrII(10)53.29(3)
53.8	FeII(379)53.682(1), CrII(10)54.05(3)
55.0	CrII(10)54.64(3), MnIII(15)54.659(50), FeII(35)54.884(5), CrII(203)55.10(3), FeII(165)55.218(3)
55.6	FeII(379)55.351(3), CrII(293)55.62(3)
56.3	SiII(35)56.295(100), NiII(22)56.41(25)
56.9	CrII(208)56.58(4), NII(49)56.90(0), CrII(46)56.96(5), FeII(333,379)57.005(3)
57.7	SiII(35)57.97(50)
58.7	VIII(15)58.70(180), CrII(148)58.82(5)
59.5	FeII(3,165,379)59.111(8), TiIV(-)59.51(5), FeII(165)59.594(3)
60.4	FeII(35)59.999(8), CrII(208)60.14(10), SiII(36)60.20(10), FeIII(121)60.28(P), FeII(36)60.287(8)
61.7	FeII(270)61.371(0), FeII(165,379)61.728(3), CrII(220)61.79(3), CrII(111)62.00(1), FeII(35)62.014(6)
62.6	CrII(111)62.26(2)
63.8	FeII(165)63.641(1), CrII(111)63.65(3), FeII(270)63.811(3), FeII(379)63.855(4), CrII(10)64.02(10)
65.0	FeII(3)64.825(8), CrII(111)65.15(4), NiIII(23)65.172(10), CrII(111,203)65.26(20)
65.7	MnIII(15)65.401(90), FeII(-)65.771(2), NiIII(23)65.972(8), FeII(287)66.040(0), SiII(18.01)66.053(5)

Table 2 (Continued)

Observed Wavelength	Identifications
2366.7	NiII(36)66.56(10), FeII(35)66.591(5), CrII(34)66.75(5), CrII(34)66.84(35), FeII(2,165)66.864(1)
67.5	YIII(1)67.25(200), NiII(11)67.395(20)
68.3	FeII(36)68.593(7)
69.3	NiII(36)69.23(6), FeII(182)69.232(1)
70.0	FeII(379)69.960(5)
70.6	FeII(35)70.494(5)
71.7	
72.7	CrII(127)72.63(2), FeII(333)72.631(3), FeII(148)72.777(0)
73.8	FeII(2)73.733(8), MnIII(14)73.840(20), FeIII(115)73.904(5)
75.1	TiIII(10)75.02(6), FeII(-)75.180, FeII(36)75.192(7), NiII(21)75.426(30)
76.3	CrII(147)76.40(5), FeII(379)76.435(5)
77.2	NiII(28)77.31(10)
77.9	
79.3	FeII(182)79.003(2), FeII(211)79.155(2), FeII(36)79.275(7)
81.0	FeII(3)80.757(7)
82.1	CrII(44)81.97(2), FeII(2)82.034(9), CrII(44)82.20(5), FeII(35)82.356(3)
83.1	FeII(117)82.902(3), FeII(2)83.060(4), FeII(36)83.242(7)
84.5	FeII(36)84.386(7)
85.2	FeII(35)84.999(3)
86.6	FeII(396)86.387(2), NII(18.06)86.78(1)
87.7	FeII(286)87.424(2), NiII(19)87.77(25)
88.9	FeII(2)88.629(9), MnIII(14)89.023(300)
90.1	FeII(244)89.870(1), FeII(304)90.311(0)
91.3	NiIII(23)91.106(15), FeII(35)91.475(4)
91.9	NiII(36)92.10(6)
92.6	NiII(36)92.58(10), CrII(299)92.90(4)

Table 2 (Continued)

Observed Wavelength	Identifications
2394.3	CrII(146)93.99(50), FeII(303)94.172(0), NiII(20)94.518(50)
95.0	NiII(36)94.843(12), FeII(116)94.892(3)
95.8	FeII(2)95.416(7), FeII(2)95.627(9)
96.7	CrII(147)96.48(10), FeII(211)96.714(3)
97.8	CrII(43)97.75(40)
98.5	CrII(43)98.28(1), CrII(43)98.51(15), NiII(49)98.62(2), FeII(402)98.664(2)
99.5	FeII(2,36)99.237(9), FeII(396)99.499(1), FeII(303)99.636(0), VIII(10)99.67(75), CrII(235)99.67(30)
2400.2	CrII(170)00.24(15), FeII(181)00.274(2), FeII(244)00.338(4)
01.6	FeII(402)01.301(2), CII(16)01.761(5)
02.6	CrII(44)02.31(2), CII(16)02.402(16), FeII(377)02.450(8), FeII(36)02.597(3), CrII(44)02.73(3), NiIII(26)02.877(20)
04.7	FeII(2)04.430(7), CrII(335)04.72(2), FeII(2)04.882(9), CrII(170)04.92(8)
05.8	FeII(402)05.688(2), CrII(282)05.72(1), NiIII(23)05.937(50), FeII(378)06.018(tr), FeII(131)06.086(1)
06.9	FeII(2)06.660(9), NiII(36)06.89(6), FeII(302)06.982(3), VIII(10)07.17(80)
07.8	FeII(396)07.765(0), FeII(116)07.940(2), CrII(335)08.02(3), MnIII(14)08.056(80)
08.5	FeII(402)08.653(2)
09.8	FeII(150)09.377(1), FeII(377)09.535(0), FeII(224)09.708(1), CrII(170)09.96(5)
10.8	CrII(170)10.43(3), FeII(2)10.521(9), NiII(18)10.74(30), CrII(235)10.75(2), CrII(170)11.01(15), FeII(2)11.062(9)
12.4	NiII(11)12.25(5)
13.4	FeII(2)13.308(9), CrII(170)13.64(15), CrIII(59)13.65(30)
14.1	VIII(10)13.89(40), TiIII(9)13.97(15), FeII(164)14.080(1)
14.9	YIII(1)14.68(100), FeII(181)15.068(3)
15.6	FeII(130)15.776(0)
16.4	NiII(20)16.134(50), CrII(235)16.40(40), FeII(396)16.457(2)
18.0	FeII(244)17.859(6)

Table 2 (Continued)

Observed Wavelength	Identifications
2418.7	FeII(396)18.440(2), FeIII(47)18.568(7), FeII(364)18.702(1)
19.8	FeII(364)19.485(0), CrII(43)19.87(15), FeII(180)19.892(1), FeII(396)19.998(1), CrII(43)20.11(25)
20.9	
22.0	FeII(116)21.898(0), CrII(169)21.90(3)
22.8	FeII(301)22.688(4), CrII(169)22.93(2), FeII(115)22.932(1)
23.6	MnIII(14)23.490(20), FeII(388)23.500(tr), MnIII(14)23.697(100), FeII(313)23.919(1)
24.3	FeII(180)24.141(8), FeII(149)24.380(3), FeII(180,301)24.585(3)
26.0	FeII(224)25.677(3), FeII(130)25.904(2)
27.3	FeII(114)27.197(1)
28.1	FeII(114)28.079(0), FeII(301)28.286(4), CrII(246)28.29(2), FeII(300)28.367(6)
28.7	SiII(34)28.45(10), FeII(301)28.795(3), FeII(375)28.970(6)
29.3	FeII(375)28.970(6), FeII(301)29.034(3), FeII(385)29.148(10), FeII(148)29.382(3), FeII(180)29.497(2)
30.1	CrIII(59)29.75(30), FeII(-)29.849(2), FeII(180)30.073(7), FeII(301)30.184(2)
30.9	FeII(375)30.876(10), FeII(375)31.236(3)
32.8	FeII(321)32.701(1), FeII(321)32.867(7), CII(52)32.90(0), FeII(384)33.050(1)
33.7	FeII(164)33.495(4), NiII(19)33.57(10), FeII(359)33.571(1), FeII(375)34.052(15)
34.9	FeII(301)34.645(3), FeII(321)34.733(7), CII(51)34.81(1), FeII(375)34.822(5), FeII(180)34.942(7), FeII(383)34.988(25)
36.6	FeII(360)36.413(0), FeII(384)36.615(20), FeII(375)36.987(10)
37.3	FeII(375)37.100(5), FeII(210)37.157(3), FeII(313)37.256(3)
38.0	FeII(375)37.632(20), NiII(19)37.892(20), FeIII(47)38.174(8)
39.6	FeII(209)39.301(8), FeII(375)39.860(8)
40.5	FeII(300)40.416(4)
41.1	FeII(396)41.133(2)
42.4	
44.6	FeII(375)44.274(10), FeII(148)44.515(8)

Table 2 (Continued)

Observed Wavelength	Identifications
2446.1	FeII(300)45.787(4), FeII(300)46.103(4), CrII(328)46.11(10), FeII(375)46.405(25)
47.7	FeII(299)47.320(3), FeIII(143)47.374(7), FeII(299)47.560(1), FeII(320)47.753(6), CrII(306)47.76(3)
48.8	FeII(222)48.731(1)
50.1	CrII(190)49.95(25), FeII(300)49.961(4), FeII(-)50.027(3), FeII(375)50.134(5), FeII(300)50.196(4), CrII(190)50.37(20)
51.3	FeII(34)51.106(2), FeII(209)51.208(3), FeII(114,300)51.354(1)
53.1	FeII(300)52.916(1), FeII(386)53.165(2)
53.9	FeII(375)53.747(15), FeII(163)53.794(3), CrII(328)53.90(1), FeII(375)53.935(25), FeII(401)53.973(2), CrII(74)54.06(15), FeII(222)54.158(2)
54.5	CrII(74)54.47(30), FeII(320)54.574(6)
55.9	FeII(395)55.721(2), FeII(384)55.892(10)
56.7	FeII(320)56.641(2), FeII(209)56.816(2), CrIII(43)56.83(50), CrII(310)56.94(8)
57.7	CrII(281)57.59(2), FeII(299)57.785(0)
59.0	FeII(209)58.782(8), FeII(299)58.964(5), CrIII(43)58.98(30), FeII(163,312)59.097(2), FeII(382)59.296(0)
60.5	FeII(401)60.171(1), CrII(168)60.42(30), FeII(395)60.453(5), SIII(17)60.50(5), CrII(-)60.55(10), FeII(359)60.644(2), CrII(310)60.77(15)
61.4	NII(23)61.270(6), FeII(209)61.282(8), FeII(163)61.667(2)
62.1	FeII(209)61.855(8), CrII(245)61.93(5), FeII(395)62.325(1), CrII(168)62.35(15)
62.9	CrII(168)62.82(1), FeII(208)63.280(6)
64.0	FeII(129,162)63.726(2), FeII(385)63.900(5), FeII(208)64.007(7), CrII(168)64.31(4)
65.2	FeII(208)64.903(7), CrII(168)64.94(8), FeII(148)65.194(7)
66.8	FeII(179)66.670(7), FeII(179)66.811(7)
68.5	FeII(145,163)68.292(4), FeII(113)68.561(1), CrII(189)68.67(1)
69.7	FeII(162)69.373(1), CrII(310)69.40(20), FeII(299)69.512(6), FeII(382)69.712(8), FeII(358)69.823(2), CrII(309)69.95(10)
70.8	FeII(208)70.406(4), FeII(179)70.661(7), FeII(223)70.752(4), CrII(92)70.81(8), CrII(309)70.87(12)

Table 2 (Continued)

Observed Wavelength	Identifications
2471.8	FeII(162)71.674(0), FeII(162)72.075(2)
73.0	CrIII(43)72.88(100), FeII(400)73.037(1), NiII(19)73.13(15), FeII(148)73.314(6)
74.8	FeII(208)74.762(6), CrII(-)74.90(20)
75.5	AlII(12)75.260(4), FeII(395)75.548(3), CrII(92)75.69(30)
76.2	FeII(163)76.264(3), AlII(-)76.30(4), FeII(386)76.437(0)
77.2	CrII(145)76.90(20), CrII(-)77.00(12), FeII(162)77.342(4), FeII(113)77.487(1)
78.4	FeII(224)78.115(3), FeII(149)78.206(2), FeII(161)78.449(2), FeII(179)78.568(6)
79.4	FeII(358)79.225(1), FeII(208)79.276(0), FeII(382)79.385(3), CrII(-)79.57(20), CrIII(43)79.77(100)
81.1	FeII(243)81.044(3), CrII(145)81.09(4)
81.7	SiIII(89)81.508(3), FeII(112,331)81.576(2), PII(5)81.984(3)
82.4	FeII(161)82.117(8), FeII(358)82.320(3), CrII(92)82.48, FeII(207)82.654(8)
83.0	FeII(400)82.869(1), CrIII(43)83.06(100)
84.1	CrII(75)83.79(40), PII(5)84.152(8), FeII(243)84.243(5), NiII(61)84.32(10)
84.7	FeII(400)84.442(3), FeII(243)84.553(1), FeII(34)85.076(0)
85.4	AlII(-)85.35(1), CrII(309)85.41(15), FeII(382)85.495(0)
86.5	CrII(92)86.29(30), FeII(208)86.343(7), CrII(219)86.66(20)
87.4	FeII(385)87.356(5)
88.4	NII(20)88.120(2), CrIII(66)88.26(60), CrII(-)88.30(12), FeII(-)88.335(2), CrII(93)88.34(12)
89.2	CrII(92)89.28(50), CrII(-)89.46(15), FeII(161)89.485(7)
90.1	FeII(207)89.826(8), CrII(219)90.07(20), NII(20)90.281(4)
91.1	FeII(179)90.856(6), NII(34)91.21(3), FeII(207)91.392(6)
92.5	FeII(243)92.341(4), CrII(234)92.62(40), CrII(234)92.86(30)
93.3	CrII(-)93.08(15), NII(20)93.16(2), FeII(161,207)93.174(2), FeII(161)93.269(12), CrII(93)93.28(25)
94.3	FeII(161)94.111(2), CrII(-)94.26(10)
95.8	FeII(-)95.860(5), PII(5)96.003(7)

Table 2 (Continued)

Observed Wavelength	Identifications
2496.7	CrII(145)96.44(10), NII(34)96.52(P), CrII(-)96.60(15), CrII(336)96.81(40), NII(20)96.83(5), NII(34)96.97(4)
97.8	FeII(128,242)97.709(3), NiII(18)97.80(6), FeII(175,207)97.817(7), CrII(298)97.87(10)
99.0	FeII(161)98.897(10), SIII(17)99.08(6)
2500.5	CrII(66)00.27(40), NII(33)00.672(4)
01.2	FeII(357)00.919(5), PII(5)00.922(7), SiII(18)00.928(3), FeII(400)01.351(0), CrII(73)01.48(25)
02.1	SiII(18)01.970(5), CrII(-)02.16(12), FeII(207)02.388(7)
03.5	FeII(206)03.323(7), CrII(298)03.41(2), FeII(161,175)03.560(5), CrII(201)03.62(3)
04.0	FeII(285)03.870(7), NII(33)04.188(4)
04.9	CrIII(-)04.72(40), NII(33)04.776(P), NII(33)04.993(P), CrIII(66)05.04(10), FeII(33)05.217(2)
06.3	FeII(207)06.091(7), CrII(41)06.11(8), CrIII(-)06.41(80), FeII(128)06.429(2)
07.1	CrII(167)06.76(5), FeII(175)06.797(2), CrII(41)06.93(4), FeII(207)07.014(2)
08.9	CrII(-)09.10(12), FeII(242)09.117(4), CII(14)09.121(10)
09.9	FeII(363)09.875(1), NII(33)09.902(P), FeII(400)10.121(1), CrII(200)10.24(20)
10.9	NiII(18)10.871(30), CrII(91)11.22(20)
11.9	CII(14)11.734(5), FeII(161)11.759(10), FeII(175)11.910(2), CII(14)12.065(12), CrII(167)12.22(8)
12.6	CrII(199)12.38(10), FeII(343)12.513(5), FeII(129)12.727(tr), FeIII(93)12.902(2)
13.5	FeII(207)13.372(1), CrII(308)13.66(50)
14.7	FeII(285)14.383(7), NiII(61)14.75(6), FeII(175,206)14.912(3)
15.3	CrII(308)15.06(55), FeII(-)15.105(3)
16.1	CrII(110)15.89(4), FeII(363)15.925(0), TiIII(7)16.01(20)
16.9	FeII(147)17.124(6), FeII(207)17.211(2)
18.5	CrII(308)18.29(100), CrII(308)18.85(30)
19.3	FeII(268)19.044(7), CrII(91)19.08(25), FeII(222)19.404(2), CrII(320)19.61(15)
20.2	FeIII(93)20.162(5), NII(19)20.222(5), FeII(363)20.267(1), NiII(47)20.33(2), FeII(343)20.535(0)

Table 2 (Continued)

Observed Wavelength	Identifications
2521.3	FeII(268)21.089(7), FeII(-)21.209(2), FeII(-)21.485(2)
22.1	FeII(330)21.810(7), CrII(9)22.01(4), FeII(159)22.189(3), NII(19)22.227(7), NII(19)22.458(4)
23.2	CrII(308)23.24(150), FeII(363)23.451(1)
24.2	CrII(199)23.93(15), NiIII(32)24.360(15), NII(19)24.488(4)
25.3	FeII(330)25.114(4), CrII(-)25.35(20), FeII(159)25.386(10), NiII(61)25.42(10)
25.8	FeII(241)25.858(3), FeII(363)25.933(2), FeII(159)26.071(5), NII(19)26.17(0)
27.4	CrII(308)27.40(2), CrII(9)27.57(7), FeII(329)27.694(5), TiIII(7)27.80(15)
29.1	FeII(357)29.078(5), FeII(241)29.221(5), CrII(9)29.48(25)
30.1	CrII(308)29.90(75), FeII(329)29.929(1), FeII(178,363)30.103(6), CrII(108)30.18(150), CrII(308)30.20(150)
30.9	CrII(110,126)30.78(20), CrII(42)30.99(80), FeII(33)31.082(1)
31.9	CrII(9)31.84(25), FeIII(92)31.890(5), FeII(392)32.093(tr)
32.7	CrII(-)32.65(20), AlII(15)32.655(2), CrII(110)32.99(6)
33.7	AlII(15)33.41(0.5), CrII(108)33.45(10), FeII(159)33.626(10)
34.4	CrII(9)34.33(40), FeII(159)34.413(9), CrII(244)34.49(5)
35.5	FeII(405)35.364(3), FeII(177)35.480(7), CrII(308)35.60(1)
36.8	CrII(41)36.35(5), FeII(241)36.673(7), FeII(159)36.822(9)
38.1	FeIII(92)37.934(2), FeII(319)38.205(6), CrII(308)38.31(100), FeII(178)38.393(1)
38.8	FeII(160)38.500(5), CrII(255)38.54(2), FeII(268)38.577(2), FeII(363)38.681(2), FeII(158)38.794(9), FeII(158)38.898(8), FeII(158)39.003(10)
40.8	FeII(349)40.531(2), FeII(177,343)40.669(6), CII(42)40.88(1), FeII(177)41.096(7)
42.4	FeII(33)42.316(1), CrII(90)42.38(3), TiIII(7)42.41(1)
43.1	CrII(108)43.14(30), FeII(159)43.382(8), FeII(177)43.431(5)
45.1	FeII(147)44.972(6), CrIII(57)45.17(50), FeII(159)45.215(7)
46.7	CrII(108)46.45(20), FeII(177)46.667(8), TiIV(4)46.85(12)
47.5	NiII(57)47.16(3), FeII(158)47.330(5), CII(50)47.35(1), CrII(-)47.50(20), FeII(176)47.740(tr), CrII(71)47.76(10)

Table 2 (Continued)

Observed Wavelength	Identifications
2548.6	FeII(146)48.325(4), CrII(308)48.42(5), CrII(109)48.58(40), FeII(158)48.590(6), FeII(145)48.741(7), FeII(319)48.925(5)
49.2	FeII(319)48.925(5), FeII(284)49.082(7), FeII(377)49.399(8), FeII(377)49.453(8)
49.9	CrII(108)49.72(1), FeII(266)49.774(3), FeII(240)50.023(8), FeII(363)50.155(2), AlII(-)50.23(3), CrII(90,108)50.28(15)
50.8	CrII(318)50.54(1), FeII(158)50.575(2), FeII(240)50.680(8), FeIII(130)51.098(6)
51.5	FeII(328)51.201(4), CrII(109)51.58(50), CrII(109)51.88(7)
52.5	
53.7	NII(47)53.422(4), CrII(108)53.62(3), FeII(127)53.738(2)
55.5	FeII(177)55.447(5), CrII(-)55.47(75)
56.2	CII(30)56.12(0), FeIII(92)56.207(5)
56.9	CrII(232)56.97(7), FeII(158)57.079(2)
57.6	CrII(89)57.45(10), FeII(175)57.500(4), NiII(47)57.88(6)
58.6	CrII(125)58.35(4), NII(18.09)58.62(0)
59.9	CrII(317)59.71(50), CrII(126)59.76(15), FeII(205)59.774(5), FeII(267)59.921(5), FeII(221)60.278(7)
61.2	CrII(233)60.99(20)
62.3	FeII(221)62.094(6), CrII(41,317)62.37(25), FeII(64)62.535(13)
63.6	NII(46)63.319(3), CrII(232)63.35(40), TiIII(6)63.42(15), FeII(64)63.472(12), CrII(89)63.58(50), FeII(266)63.834(4)
65.1	FeII(419)65.306(0), NiII(64)65.36(2), TiIII(6)65.42(8)
65.7	AlII(-)65.68(4)
66.6	FeII(405)66.397(4), CrII(89)66.52(8), FeII(174)66.623(4), CrII(305)66.85(10), FeII(64)66.908(9)
67.7	CrII(331)67.50(5), TiIII(6)67.53(8), CrII(305)67.59(8)
68.7	FeII(145)68.405(6), CrII(317,331)68.51(20), CrII(317)68.86(4), FeII(175)68.879(3)
69.7	CrII(331)69.40(15), FeII(266,349)69.775(4)
71.0	CrII(107)70.70(7), FeII(284)70.843(7), CrII(317)71.10(3)
71.7	FeII(174)71.542(2), CII(57)71.76(1), CrII(89)71.78(50)

Table 2 (Continued)

Observed Wavelength	Identifications
2573.3	FeII(190)72.965(3), FeII(205)73.206(4), CrII(71)73.32(4), CrII(232)73.54(50)
74.4	CrII(89)74.18(7), FeII(144)74.363(9)
76.2	TiIII(6)76.43(5), CrII(331)76.45(2)
78.1	FeII(64)77.920(9), CrIII(-)77.96(40), CrII(89)77.97(5), CrII(89)78.31(40)
79.1	FeII(265)78.985(1), CrII(262)79.12(25), FeII(-)79.127(3), FeII(239,266)79.406(3)
79.7	CrII(218)79.88(4)
80.4	TiIII(6)80.43(5), FeII(327)80.717(0), CrII(-)80.72(10)
81.4	FeII(190)81.111(2)
82.5	CrII(231)82.27(15), FeIII(80)82.37(8), FeII(310)82.422(3), FeII(64)82.582(10)
82.9	FeII(64)82.582(10), CrII(218)82.91(4), FeII(174)83.047(2)
84.1	NiII(48)84.01(8), FeIII(137)84.038(6), CrII(89)84.10(50)
84.7	CrII(-)84.83(10)
85.8	CrII(-)85.60(15), FeII(326)85.629(5), FeII(239)85.76(P), FeII(1)85.876(13)
87.1	AlII(-)86.95(6), NiII(17)87.25(4)
88.1	FeII(326)87.945(7), FeII(145)88.182(3), CrII(89)88.25(12), NiII(46)88.31(2)
88.7	FeII(265)88.786(3), CrII(301)89.05(15)
90.3	CrII(-)90.37(20), FeII(145)90.548(4)
91.6	CII(36)91.410(2), FeII(64)91.542(10)
92.8	CII(36)92.71(1), FeII(318)92.781(9), CrII(106)92.86(3), VIII(13)93.07(160)
93.6	CrII(301)93.49(8), FeII(64)93.722(7)
94.8	FeII(310)94.964(2), VIII(13)95.11(170)
95.4	FeII(172)95.285(2), CrII(87)95.34(4), CrII(262)95.55(25), FeIII(80)95.622(8)
96.5	CrII(217)96.17(40), CrII(144)96.87(8)
97.2	AlII(-)97.18(6)
98.4	FeII(1)98.369(14)
99.4	FeII(1)99.395(14)

Table 2 (Continued)

Observed Wavelength	Identifications
2600.5	FeII(204)00.415(1), CrII(87)00.73(5)
01.4	NiII(62)01.126(8), CII(33)01.42(2), CrII(88)01.58(6)
02.1	CrII(124)01.85(10), CII(33)02.02(2), CII(33)02.39(2)
02.8	CrII(-)03.00(10)
03.8	PII(4)03.71(2), CII(33)03.72(1), CrII(105)03.73(10), FeII(404)04.048(1)
04.5	SiII(15)04.422(2), FeII(265)04.655(1), CII(33)04.863(4)
05.7	FeII(204)05.416(6), NiII(62)05.45(3), CII(33)05.62(1), CrII(280)05.63(15)
07.0	CrII(87)07.06(12), FeII(1)07.086(13)
08.9	CrII(143)08.60(1), FeIII(136)08.682(5), CrII(87)08.80(8), FeII(171)08.852(3), FeII(310)09.122(5), CrII(261)09.11(1)
10.1	FeII(204)09.859(4), CrII(324)10.04(20), NiII(62)10.08(25)
10.8	CrII(316)10.70(40), CrII(105,124)11.04(30), FeII(64)11.075(6), CrII(316)10.81(50)
11.8	CrII(105)11.62(20), NiII(56)11.66(3), FeII(1)11.873(13)
13.8	CrII(269)13.51(12), FeII(172)13.576(2), CrII(297)13.82(3), FeII(1)13.820(13)
15.5	NiII(65)15.20(15), FeII(297)15.729(0)
16.5	CrII(-)16.18(50), CrIII(65)16.50(80)
17.7	CrII(280)17.50(3), FeII(1)17.618(12)
18.7	CrII(87)18.49(7), CrII(316)18.63(15), CrII(-)18.77(12), FeII(171)19.071(7)
19.6	CrII(324)19.59(75)
20.6	FeII(1)20.408(6), CrII(316)20.48(50), FeII(171)20.693(7)
21.5	FeII(1)21.669(10)
22.5	
23.5	CrII(324)23.20(40), CrII(124)23.39(30), FeII(171)23.721(5), CrII(324)23.82(10)
25.6	FeII(318)25.489(9), FeII(1)25.664(13), CrII(143)25.87(2)
26.6	FeII(173)26.499(6), NiII(62)26.57(4), FeII(203)26.695(1), CrII(280)26.78(20)
28.3	FeII(1)28.291(13), CII(59)28.46(1), PII(4)28.55(2), FeII(203)28.569(2)
29.5	CrII(324)29.42(4), CrII(198)29.58(8), FeII(171)29.590(8)

Table 2 (Continued)

Observed Wavelength	Identifications
2630.1	FeII(171)30.068(8), NiII(17)30.266(8)
31.1	CrII(63)30.93(50), FeII(1,171)31.045(13), FeII(1)31.321(13)
31.6	FeII(1)31.321(13), NiII(63)31.52(2), AlII(11)31.553(7), FeII(171)31.607(8)
32.3	CrII(144)32.10(3), CrII(324)32.36(20), CrII(337)32.54(15)
33.1	NiII(63)32.86(5), FeII(356)33.200(5)
34.4	CrII(-)34.27(12)
35.4	FeII(296)35.127(tr), FeII(238,296)35.401(2)
36.4	CrII(62)36.46(10), FeII(356)36.687(1), PII(4)36.78(3)
37.7	CrII(198)37.48(20), FeII(410)37.515(2), FeII(221)37.643(6), AlII(14)37.698(5)
38.7	CrII(324)38.53(3), AlII(14)38.547(0), AlII(14)38.625(0.5), AlII(14)38.695(3)
39.8	FeII(221)39.560(5), CrII(323)39.91(7), CrII(216)40.00(7)
41.5	CrII(323)41.30(15), FeIII(91)41.408(5), CII(32)41.425(8), CrII(164,242)41.80(25)
42.5	CII(32)42.331(3), CrII(330)42.60(2)
43.8	CII(32)43.427(3), CrII(123)43.54(12), NII(50)43.93(1)
45.3	FeII(263,309)45.084(3), FeII(421)45.191(2), FeII(426)45.328(3), FeIII(-)45.39(9), SiII(25)45.539(0)
45.9	FeII(410)45.911(0), NII(50)46.02(0), FeII(237)46.206(1)
47.1	CrII(323)47.04(2), NiII(63)47.04(5)
47.7	CrII(142)48.08(15)
48.6	CrII(323)48.30(8), FeII(409)48.704(0), NiII(17)48.713(3)
49.3	FeII(427)49.467(4)
50.5	CrII(64)50.38(2), FeII(410)50.492(4), CrII(143)50.80(7)
51.6	FeII(237)51.297(1), CrII(323)51.42(4), FeII(355)51.691(3), FeII(427)51.826(0)
52.5	FeII(237)52.557(3), CrII(330)52.78(3)
53.5	CrII(330)53.25(4), CrII(8)53.57(85), FeII(432)53.586(0), FeII(432)53.678(0)
54.9	FeII(410)54.639(2)
55.8	CrII(103)55.78(10), SiII(25)55.803(3), NiII(63)55.30(6)

Table 2 (Continued)

Observed Wavelength	Identifications
2657.9	FeII(283)57.917(2), FeII(309)58.251(4)
58.7	CrII(8)58.59(100), CrII(141)58.91(40), FeII(237)59.054(0)
59.4	CrII(103,164)59.47(10), FeIII(91)59.614(4), CrII(268)59.73(8), SiII(25)59.781(5)
60.9	MgII(4)60.755(10), CrII(164)60.77(8), MgII(4)60.821(10)
61.8	CrII(62)61.59(10), CrII(8)61.73(50), FeII(429)61.789(0)
62.5	FeII(410)62.563(2), CrII(165)62.72(7)
63.5	FeII(432)63.269(0), HeI63.271(2^3S-11^3P^o), CrII(329)63.28(30), CrII(8)63.42(75), CrII(8)63.67(45)
64.7	FeII(263)64.665(10)
65.7	SIII(19)65.40(7), FeII(428)65.563(1), CrII(329)65.58(30), CrII(8)66.02(80)
66.7	FeII(263)66.631(10)
67.8	FeII(430)67.635(tr), CII(164,329)67.89(25)
68.9	CrII(8)68.71(70), FeII(429)68.938(1), FeII(429)69.023(1), AlII(1)69.166(10)
69.8	FeII(416)69.932(2), CII(23)69.960(3), SII(11)70.0(3), CrII(63)70.06(30)
70.3	SiII(25)70.153(0), CrII(69)70.24(25), NiII(45)70.33(3), FeII(355)70.384(2)
71.1	CrII(61)71.02(2), FeII(410)71.404(2)
72.0	CrII(8)71.80(80), FeII(432)71.941(1), FeII(429)72.152(1)
72.6	FeII(202)72.310(0), CrII(122)72.37(15), FeII(429)72.506(2), CrII(8)72.83(90)
74.3	CrII(329)73.97(8), CrII(329)74.07(8), CrII(329)74.26(7)
75.0	
76.0	CrII(69)75.67(20), CrII(292)75.74(15), NII(52)75.78(2)
77.3	CrII(8)77.13(100), HeI77.132(2^3S-10^3P^o), CrII(8)77.19(125)
78.0	SiII(20)77.906(3)
79.0	CrII(7)78.79(100), FeIII(149)78.810(6), NiII(63)79.25(6)
80.2	CrII(267)79.89(15), CrII(142)80.16(8), FeII(408)80.244(1), CrII(292)80.32(15), SIII(19)80.47(4)
81.1	CrII(86)80.85(5), FeII(416,429)81.038(2), CrII(86)81.07(3)

Table 2 (Continued)

Observed Wavelength	Identifications
2682.4	SiII(20)82.210(10), FeII(426)82.510(3)
83.1	CrII(186)82.95(1), FeII(416)82.989(3), AlII(-)83.280(3)
84.0	CrII(304)83.73(4), CrII(277)84.09(8)
84.8	CrII(85)84.72(7), FeII(283)84.752(10), FeII(201)84.940(3), CrII(122)85.04(18)
86.4	FeII(202)86.100(1), FeII(262)86.388(1), CrII(241)86.40(6), CrII(68)86.66(4)
88.4	CrII(304)88.14(5), CrII(84)88.28(55), CrII(186)88.41(45), CrII(304)88.50(P)
89.7	CrII(188)89.79(10)
91.0	CrII(8,85)91.03(90)
91.8	SiII(19)91.66(5), FeII(202)91.732(4), CrII(277,322)91.99(3), CrII(84)92.11(25)
92.6	FeII(283)92.601(10), CrII(322)92.64(1), FeII(62)92.826(5)
94.2	FeII(261)93.862(3), CrII(215,277)93.87(7), FeII(374)94.269(2), CrII(322)94.43(4)
95.3	FeIII(159)95.13(10), FeIII(159)95.34(9)
96.4	CrII(61,215)96.10(4), HeI96.118(2^3S-9^3P^o), CrII(84)96.76(20)
97.5	FeII(341)97.330(4), FeIII(159)97.37(P), FeII(341)97.453(5), CrII(186)97.51(25), FeII(325)97.726(2), FeII(431)97.801(2)
98.7	CrII(7)98.40(100), FeIII(159)98.41(7), CrII(7)98.68(35), CrII(289)98.85(30), ScIII(3)99.01(3)
2700.3	FeIII(159)00.02(8)
01.3	CrII(62)01.10(30), FeIII(159)01.13(8), CrII(186,230)01.24(20), CrII(62)01.65(15)
02.7	SiII(19)02.76(5), CrII(186,322)02.96(4)
03.9	CrII(7)03.85(30), FeII(261)03.988(10)
05.6	
06.5	FeIII(159)06.17(2), FeII(341)06.566(7)
07.1	FeII(334)07.128(6)
09.0	CrII(186)08.78(65), NiII(63)08.780(9), FeII(218)09.051(7), CrII(186)09.31(60)
09.8	AlII(-)09.58(1.5), NII(22)09.837(6), FeII(340)09.937(0)
10.5	CII(60)10.59(1)

Table 2 (Continued)

Observed Wavelength	Identifications
2711.7	FeII(201)11.842(9)
12.3	CrII(7)12.30(80), FeII(431)12.317(1), CII(60)12.32(0), FeII(201)12.386(6)
13.0	CrII(289)12.85(10), FeII(325)12.989(1)
14.3	FeII(63)14.414(13)
16.4	FeII(261)16.216(9), FeII(339)16.429(3), FeII(434)16.572(3), FeII(62)16.683(2)
17.6	CrII(7,102)17.51(40), FeII(32,417)17.533(0), FeII(431)17.888(3)
18.5	CrII(102)18.32(40), CrII(121)18.43(55), FeII(417)18.639(5)
19.3	FeII(339)19.296(5), CrII(60)19.31(3)
20.3	CrII(102)20.06(50), CrII(102)20.25(40), FeIII(113)20.381(5)
21.9	FeII(199)21.813(4), FeII(260)22.060(5)
23.4	HeI23.190(2^3S-8^3P^o), FeII(431)23.438(0), CrII(102)23.48(30), CrII(59)23.64(60)
24.4	CrII(102)24.04(65)
25.0	FeII(62)24.879(9)
25.8	
26.4	FeII(434)26.254(3), CrII(162)26.26(15), FeII(261)26.509(3)
27.5	CrII(102)27.25(85), CII(31)27.36(2), FeII(200)27.382(8), FeII(63)27.538(13), CrII(162)27.59(1)
29.1	CII(31)28.707(4), FeII(260)28.898(5), CrII(162)28.93(2), CII(31)29.213(2)
29.8	FeII(417)29.569(1), CrII(162)29.73(6)
30.5	CII(31)30.61(1), FeII(62)30.735(11)
31.1	SIII(16)31.10(7), FeII(431)31.247(1), NII(54)31.37(1)
32.0	FeII(-)31.841(2), FeII(236)32.004(4)
32.7	CrII(185)32.41(2), FeII(32)32.441(2), FeII(417)32.936(3)
34.1	ScIII(3)34.02(2), CrII(60)34.07(3)
35.0	NII(54)34.702(2), FeII(416)34.803(2)
36.3	CrII(184)36.20(2), FeII(220)36.500(1)
37.4	CrII(120,253)37.09(15), CrII(61)37.19(3), CrII(120)37.47(4), FeII(200)37.630(4), CrII(120)37.66(3)

Table 2 (Continued)

Observed Wavelength	Identifications
2739.4	FeII(63)39.545(15)
40.3	CrII(6)40.09(35)
41.3	SiII(16)41.01(5), FeII(418)41.045(2), FeII(417)41.325(0), FeII(260)41.395(6)
43.0	NiII(66)42.981(15), FeII(62)43.196(14)
43.5	FeII(62)43.196(14), CrII(6)43.63(70)
44.2	CrII(184)43.94(6)
44.8	CrII(334)44.59(25), FeII(260)44.890(3), CrII(58)44.97(40)
45.5	CrII(185)45.41(12)
46.6	FeII(62)46.487(14), CII(15)46.488(10), FeII(63)46.978(14)
47.9	CrII(185)47.76(7), CrII(-)47.94(12)
49.4	FeII(63)49.178(13), FeII(62)49.324(14), FeII(63)49.482(12)
51.0	CrII(6)50.72(100), FeII(200)50.896(3), CrII(120)51.04(4), FeII(217)51.121(6), CrII(120)51.22(4)
51.9	CrII(6)51.85(85), FeII(418)52.092(3), FeII(373)52.159(4)
53.4	FeII(235)53.289(12), CrII(58,101)53.66(20)
54.0	FeII(-)54.155(2), CrII(101)54.28(30)
54.8	FeII(373)54.907(6), FeII(373)55.088(0)
55.4	CrII(185)55.18(2), CrII(101)55.53(15)
56.0	FeII(62)55.733(15), CrII(101)55.81(10), CrII(101)56.30(40)
57.1	SiII(16)56.89(8), CrII(101)56.89(15), CrII(100)56.96(20), FeII(199)57.029(5)
57.9	CrII(6)57.72(80), FeII(-)57.818(2)
59.0	CrII(252)58.99(40), NiII(66)59.02(8), FeII(32)59.336(2)
60.0	CrII(101)59.73(30), CrII(184)60.04(20), CrII(101)60.20(12)
60.5	CrII(100)60.36(20), CrII(253)60.53(15), NiII(55)60.67(2), FeII(433)60.757(tr)
62.0	FeII(63)61.813(9)
62.4	FeII(373)62.340(4), FeII(199)62.436(4), AlII(-)62.460(2), FeII(219)62.566(0), CrII(6)62.58(140)

Table 2 (Continued)

Observed Wavelength	Identifications
2763.8	CrII(101)63.59(20), FeII(440)63.674(2), HeI63.798(2^3S-7^3P^o), FeII(199)63.913(3), CrII(253)63.97(12), FeII(407)63.979(2)
64.8	FeII(198)64.787(3), CrII(138)64.96(10), CII(37)65.120(1)
66.0	CrII(260)65.86(20), CII(37)66.118(2), FeII(324)66.200(1)
67.4	CrII(266)67.26(10), FeII(235,373)67.500(13), CrII(253)67.62(20), CII(37)67.673(3)
69.3	FeII(63)68.940(8), FeII(200)69.153(6), CrII(333)69.29(8), FeII(198)69.354(9), FeII(199)69.566(1)
70.5	FeII(337)70.303(1), FeII(-)70.432(2), FeII(198,199)70.507(5)
71.6	FeII(197)71.553(3), CrII(333)71.89(20)
72.6	CrII(183)72.33(8), FeII(63)72.719(1)
74.9	FeII(218)74.686(7)
76.5	CrII(252)76.65(20)
78.1	FeII(281)77.840(1), FeII(233)77.892(5), CrII(266)78.06(70)
79.7	FeII(234)79.302(11), FeII(348)79.906(4)
80.3	FeII(348)80.035(3), FeII(259)80.178(tr), CrII(183,252)80.30(85)
81.2	CrII(58)80.89(25), CrII(260)81.07(25)
82.0	CrII(276)82.13(4)
83.5	FeII(337)83.410(1), FeII(234)83.690(12)
84.2	FeII(295)83.959(2), FeII(295)84.282(2), FeII(373)84.484(1)
85.0	CrII(99)85.10(10), FeII(373)85.213(8), CrII(266)85.32(2)
86.1	FeII(295)85.800(tr), CrII(183)86.30(2)
87.1	CrII(307)87.13(2), FeII(380)87.260(3), CrII(196)87.30(5)
87.7	CrII(58)87.61(55), CrII(259)87.90(25)
88.4	FeIII(120)88.258(6)
89.7	CrII(276,327)89.39(40), FeII(436)90.065(1)
90.7	FeII(282)90.557(3), CrII(327)90.64(1), FeII(32)90.752(0), MgII(3)90.768(40), CrII(327)90.94(5)
92.0	CrII(258)91.70(7), FeII(233)92.050(1), CrII(183)92.16(80)

Table 2 (Continued)

Observed Wavelength	Identifications
2792.7	CrII(251)92.49(4), CrII(196)92.79(4)
94.1	FeII(198)93.887(7), CrII(307)94.39(5)
95.5	CrII(197)95.32(2), MgII(1)95.523(50), FeII(281)95.760(1)
97.9	CII(49)97.70(1), FeII(234)97.914(5), MgII(3)97.989(40)
99.2	CII(49)99.15(1), NII(21)99.216(5), FeII(233)99.292(7)
2800.4	CrII(303)00.16(20), FeII(436)00.548(2)
02.7	MgII(1)02.698(50), CII(48)02.95(0)
03.5	CrII(67)03.22(8), CrII(116)03.35(20), FeIII(120)03.441(6), CII(48)03.45(0), FeII(438)03.450(2)
05.5	FeII(295)05.315(3), NiII(54)05.67(10), AlII(-)05.65(4), FeII(259)05.786(4)
06.6	
07.3	FeII(281,295)07.165(1)
08.1	CrII(-)08.02(20), NiII(26)08.35(2)
09.0	CrII(197)09.27(6)
10.0	FeII(380)09.804(4), CrII(307)10.03(20)
10.9	CrII(99)10.78(5), CrII(66,312)10.89, CrII(303)11.05(15)
11.7	CrII(66,98)11.45(10), CrII(182,257)12.00(85)
12.4	CrII(312)12.31(2), FeII(215)12.493(3), FeII(280)12.667(0)
13.6	CrII(99)13.53(5), FeII(198)13.613(5)
15.0	
15.5	
16.4	AlII(7)16.189(20)
17.1	CrII(58,81)16.83(30), CrII(307)17.00(15), YIII(3)17.03(200), FeII(380)17.107(4), SiIII(88)17.110(9)
18.2	CrII(182)17.96(12), CrII(67)18.08(3), CrII(182)18.36(75)
18.7	FeIII(157)18.624(6), CrII(67)18.66(5)
19.4	FeII(196)19.327(3)

Table 2 (Continued)

Observed Wavelength	Identifications
2820.5	SiII(24)20.580(2)
21.3	CII(47)21.54(1)
22.3	CrII(182)22.01(65), CrII(82)22.38(100)
23.3	NII(17)23.635(5)
24.3	FeII(423)24.401(tr), CrII(-)24.54(12), FeII(359)24.589(1)
25.2	NiII(25)25.23(4), CrII(83)25.50(20)
26.2	CrII(115)25.95(7), FeII(255)26.024(4), CrII(182)26.15(10)
27.5	FeII(231)27.431(5)
28.1	CrII(-)27.95(15)
28.7	FeII(231)28.622(6), FeII(255)28.681(5), CrII(117)28.79(15)
29.8	FeII(259)30.061(0), CrII(83)30.08(8)
30.7	CrII(82)30.46(100), CrII(81)30.60(60), FeII(280)30.939(1)
31.3	SiIII(88)31.490(7), FeII(217)31.562(11)
32.1	FeII(399)31.883(1), FeII(347)32.270(0)
33.6	CrII(214)33.37(8)
34.7	SiII(24)34.472(3)
35.9	CrII(5)35.63(200), FeII(216)35.716(9), FeIII(126)36.107(4), FeII(294)36.185(4)
37.6	FeII(231)37.300(5), CII(13)37.603(18), CrII(81)37.88(20)
39.4	CrII(-)39.23(12), FeII(391)39.535(7), SiIII(88)39.622(5)
40.0	FeII(380)39.819(6), CrII(82)40.01(85)
40.7	CrII(115)40.43(12), FeII(217)40.644(9), FeII(280)40.756(8)
42.4	FeII(196)42.076(3), CrII(228)42.32(5), NiII(54)42.401(8), CrII(250)42.43(5), FeII(279)42.677(1)
43.1	CrII(250)42.78(20), CrII(5)43.24(100), FeII(231)43.323(4)
45.0	CrII(181)44.83(3), FeII(399)44.973(3)
46.2	CrII(296)46.32(25), CrII(82,250)46.44(30)
47.5	FeII(197)47.208(4), SII(10)47.73(3), FeII(380)47.791(4)

Table 2 (Continued)

Observed Wavelength	Identifications
2848.3	FeII(196)48.046(8), FeII(399)48.122(7), CrII(81)48.15(4), FeII(391)48.332(7), CrII(250)48.40(20)
49.7	FeII(196)49.601(7), CrII(5)49.83(100)
51.1	CrII(82)51.35(60), FeII(195)51.430(1)
52.1	MgI(1)52.120(300), CrII(250)52.27(25)
53.4	FeII(294)53.119(1), CrII(81)53.18(30), FeII(197)53.199(2), CrII(296)53.26(30)
54.3	CrII(-)54.14(20), CrII(161)54.23(3), CrII(161)54.58(5)
55.3	CrII(161,214)55.05(35), CrII(250)55.43(8)
56.3	SIII(15)56.02(4), FeII(195)56.144(7), CrII(81)56.32(20), FeII(380)56.392(5), CrII(82)56.42(4)
57.0	CrII(11)56.77(40), FeII(399)56.928(8), FeII(294)57.171(7)
58.6	FeII(195,279)58.340(11), FeII(354)58.519(3), FeII(399)58.639(3), CrII(11)58.64(30), FeIII(126)58.664(7), CrII(5)58.91(75)
59.4	
60.3	
61.1	CrII(5)60.92(85), CII(55)61.060(2), FeII(61)61.187(3)
62.4	CrII(5)62.57(125)
63.9	NiII(26)63.706(25), FeII(380)64.134(3), NiII(67)64.16(2)
65.0	FeII(294)64.968(4), CrII(5)65.10(150)
66.8	CrII(5)66.72(100), CrII(11)67.09(65)
69.2	FeII(61)68.874(5), FeII(257)69.156(4)
70.1	CrII(11)70.43(100)
70.9	FeII(195)70.608(3), FeII(195)71.059(6), FeII(230)71.125(6)
71.7	CrII(295)71.45(20), SIII(15)72.00(2)
72.4	FeII(230)72.382(9)
73.3	FeII(279)73.399(10), CrII(5,295)73.46(65)
74.0	FeIII(155)73.795(4), CrII(11)73.81(50), CrII(229)74.07(8)
74.9	SiII(92)74.626(4), CrII(265)75.03(30), SiII(92)75.09(2)

Table 2 (Continued)

Observed Wavelength	Identifications
2876.1	CrII(11)75.97(100), CrII(5)76.24(60), OI(10)76.30(1), CrII(288)76.30(40)
76.8	CrII(263)76.66(20), FeII(257)76.804(7)
77.5	NII(32)77.681(4)
78.2	CrII(5)77.97(60), CrII(5)78.45(50)
79.3	CrII(56)79.17(10), FeII(278)79.241(4), FeII(230)79.543(2)
80.9	FeII(61)80.750(9), FeII(258)80.828(8), CrII(11)80.86(75), SII(10)81.01(1)
82.4	FeII(442)82.523(2)
83.8	FeII(230)83.709(10), OI(10)83.78(3)
85.2	NII(32)85.273(6), CrII(-)85.29(10)
86.0	FeII(317)85.929(5), SiII(17.01)86.133(1)
86.4	FeII(229)86.234(3), CrII(264)86.38(7)
87.3	FeII(257)87.312(3), SiII(17.01)87.358(5), SiII(17.01)87.511(10)
88.3	FeII(215)88.089(5), CrII(160)88.33(2)
89.6	CrII(207)89.50(35), CrII(160)89.82(25)
90.3	
91.6	CrII(194)91.40(20), CrII(291)91.87(20)
92.8	CrII(-)92.74(18), FeII(61)92.822(3), NII(31)92.868(4), CrII(160)92.95(20)
93.5	CrII(160,315)93.50(4)
94.4	CrII(288)94.24(25), CrII(160)94.40(10), FeII(230)94.776(7)
95.2	CrII(160,275)95.02(18), FeII(257)95.071(3), FeIII(125)95.076(8), FeII(294)95.215(7), FeII(435)95.331(0)
96.1	CrII(159)96.31(30), CrII(159,288)96.45(40)
96.7	CrII(159,288)96.45(40), CrII(97)96.74(35)
97.4	CrII(287,290)97.24(10), FeII(254)97.264(8), NII(31)97.503(4), CrII(212)97.67(30)
98.5	CrII(95)98.53(50), FeII(352)98.738(1)
99.5	CrII(240)99.15(25), FeII(435)99.284(1), FeIII(125)99.386(4), CrII(159)99.48(35)
2900.2	

Table 2 (Continued)

Observed Wavelength	Identifications
2900.9	CrII(97)01.00(12)
02.4	AlII(13)02.14(2), FeII(257)02.317(3), FeII(278)02.459(5), CrII(275)02.60(7)
03.4	AlII(13)03.22(1)
04.4	SiII(17)04.283(300), SIII(15)04.31(6), NII(31)04.357(1), FeIII(125)04.431(12), FeII(435)04.574(0)
05.1	FeII(255)05.185(1)
05.9	SiII(17)05.692(500), FeII(435)05.770(2), FeIII(148)05.80(8), CII(41)06.011(2), FeII(215)06.120(4), CrII(227)06.17(10)
06.5	CrII(57)06.76(2)
07.6	FeIII(88)07.497(10), FeIII(125)07.701(12), FeII(60)07.853(3)
08.5	CrII(97)08.29(10), FeIII(125)08.651(5)
09.2	CrII(315)09.13(2)
10.2	FeII(256)09.968(1)
10.7	CrII(179,211)10.64(30), FeII(435)10.724(2), CII(41)10.729(3), FeII(278)10.761(3)
11.6	CrII(212)11.69(35), FeII(441)11.823(1)
12.9	CrII(97)12.53(1)
13.7	CrII(-)13.50(10), NiII(26)13.59(15)
14.5	CrII(290)14.38(2)
15.3	CrII(227)15.22(10), CrII(239)15.28(15), CrII(263)15.46(30)
17.5	FeII(61)17.465(4), NII(39)17.734(1)
18.4	CrII(179)18.29(3), FeII(435)18.541(2)
19.1	CrII(315)18.93(1)
20.1	CrII(274)19.93(2)
21.4	CrII(286)21.23(50)
22.0	CrII(95)21.81(40), FeII(293)22.023(5)
22.5	CrII(256)22.46(5), NII(39)22.76(1)
23.6	CrII(286)23.46(30), CrII(286)23.67(40), CrII(114)23.80(8), FeIII(102)23.902(8)

Table 2 (Continued)

Observed Wavelength	Identifications
2924.3	FeII(351)24.160(1)
25.8	CrII(158)25.90(3), CrII(95)26.15(18)
26.9	FeII(60)26.584(12), CrII(256)27.09(50)
28.7	MgII(2)28.625(35), NII(38)28.655(3)
30.3	
31.7	FeII(215)31.479(1), FeII(-)31.593(4)
33.1	FeII(307)33.466(0)
34.1	CrII(95)33.95(35), CrII(-)34.13(10), CrII(211)34.30(20)
35.3	CrII(55)35.12(60)
36.5	MgII(2)36.496(35)
37.2	CrII(95)36.92(25)
38.1	
39.2	CrII(325)39.44(20)
39.7	FeII(60)39.506(5), CrII(237)39.78(3)
40.4	FeII(441)40.136(2), CrII(294)40.22(25), CrII(96)40.42(2)
41.4	CrII(95)41.32(3)
42.1	NII(37)42.17(3), CrII(294)41.96(35)
43.3	CrII(177)42.99(3)
44.1	FeII(78)44.399(13)
45.1	HeI(11)45.106(2^3S-5^3P^o)
46.3	FeII(307)46.173(0)
47.5	NiII(35)47.45(8), CrII(325)47.50(25), FeII(78)47.658(13)
48.4	CrII(210)48.20(3), FeII(87)48.388(8), CrII(113)48.47(3)
49.2	CrII(210)49.07(2), FeII(277)49.178(10), CrII(178)49.44(20)
50.3	CrII(65,178)50.10(10), SIII(18)50.23(3)
51.1	FeII(214)51.095(2), CrII(157,177)51.39(10)

Table 2 (Continued)

Observed Wavelength	Identifications
2952.6	CrII(311)52.45(12)
53.6	CrII(55)53.34(35), CrII(192)53.70(45), FeII(60)53.774(11)
54.1	FeII(253)54.050(4)
54.8	CrII(237)54.65(10), FeIII(87)55.060(4), CrII(177)55.12(10)
55.9	CrII(176)55.68(2)
56.8	CrII(176)56.60(10)
58.5	FeIII(102)58.286(6), CrII(226)58.51(2), FeII(398)58.528(1)
59.4	CrII(210)59.54(18), FeII(254)59.601(7)
61.2	FeII(403)61.119(tr), FeII(60)61.272(5)
61.9	CrII(55)61.70(50), CrII(177)61.72(50)
62.7	FeII(398)62.936(1)
63.3	FeIII(87)63.230(8), CrII(176)63.46(20)
64.0	FeII(439)63.897(3), FeII(252)64.131(7)
64.9	FeII(78)64.629(9), SIII(18)64.80(4), FeII(78)65.036(10), CrII(176)65.18(2), MgII(7)65.19(0)
65.5	FeII(251)65.395(2)
66.2	CrII(94)66.03(40), CII(40)66.187(3)
67.1	CII(40)66.871(5)
68.3	FeII(398)68.119(0), CrII(225)68.20(3)
68.9	CrII(176)68.68(15), FeII(253)68.738(2), CII(40)68.836(2), FeII(-)68.906(2), MgII(6)69.02(0)
70.1	FeII(277)69.934(8)
70.8	FeII(60)70.510(10), CrII(175)70.65(2), FeII(276)70.682(5)
71.9	FeII(252)71.616(1), MgII(6)71.70(1), CrII(80)71.90(75), FeII(398)72.016(0)
73.4	CrII(113)73.10(12), NII(43)73.601(3)
74.3	FeIII(87)73.896(5)
74.8	NII(43)74.65(2)

Table 2 (Continued)

Observed Wavelength	Identifications
2976.1	CrII(321)75.80(4), FeII(60)75.938(5)
76.7	CrII(55)76.70(35), NII(43)76.971(4)
77.7	FeIII(102)77.572(5), CrII(112)77.65(2)
79.4	FeII(306,403)79.096(3), FeII(60)79.349(8), CrII(80)79.73(80)
80.5	SiIII(34)80.519(5)
81.4	
82.2	FeII(335)82.059(8), CIII(13)82.106(8), FeII(277)82.239(3)
82.8	
83.5	
84.9	CrII(55)84.69(10), TiIII(8)84.76(10), FeII(78)84.831(15), CrII(174)85.01(7), CrII(80)85.32(75)
85.7	FeII(78)85.545(13), SIII(18)85.98(6)
86.3	FeII(254)86.617(4)
86.9	CrII(300)86.87(8), FeII(291)86.91(P)
88.6	
89.7	FeII(291)89.367(tr), FeII(291)89.731(0)
90.3	
90.9	FeII(252)91.244(0)
91.6	FeII(398)91.817(2)
92.5	CrII(80)92.42(10), CrII(300)92.59(7), CI(R7.02)92.618(18)
93.5	FeII(335)93.366(1), CrII(321)93.54(7)
94.6	CrII(80)94.74(20)
95.8	
97.3	FeII(335)97.298(7)
98.2	
99.1	FeII(252)98.855(2), CrII(321)99.00(1), CrII(94)99.30(8)
3000.1	CrII(137)99.96(25), FeII(276)00.059(5)

Table 3

The Spectrum of τ Her: 1026Å to 1451Å

Observed Wavelength	Identifications	Notes
1025.9	HI(2)25.722	1
33.4	CrIII(2)33.23(50), FeIII(28)33.298(5), CrIII(2)33.45(50), CrIII(2)33.69(100)	
35.2-37.9	CrIII(2)35.29(25), CrIII(2)35.57(25), FeIII(20)35.768(6), CrIII(2)35.77(20), MnIII(Y)35.895(70), CrIII(1)35.93(50), CrIII(1)36.03(100), CII(2)36.330(80), CII(2)37.017(150)	2
38.3	MnIII(Y)37.746(75), CrIII(1)37.80(20), FeIII(20)38.355(6)	3
39.2	OI(3)39.226(8)	3
40.0	CrIII(1)40.05(20), CrIII(1)40.17(30)	4
41.0	OI(3)40.932(8)	
41.8	OI(3)41.686(7)	5
43.1	NI(7.30)43.080(8), NI(7.28,7.30)43.166(8)	6
44.2:	NI(7.29)44.087(8), NI(7.27)44.188(7)	7
44.4	NI(7.25,7.25,7.26)44.633(8), MnIII(Y)44.790(70)	8
45.1	CrIII(24)45.06(40), CrIII(24)45.14(40)	5,8
45.9	MnIII(Y)46.167(70)	9
46.9:		4,10
47.5		
48.1		9
49.1		
50.1	MnIII(Y)49.816(65)	6
50.6	MnIII(Y)50.889(65)	11,12
52.1	NI(7.24)51.968(7), NI(7.23)52.092(9), NI(7.21)52.215(9)	8
52.9	NI(7.18)52.834(8)	8,13
53.2	NI(7.22)53.068(11), NI(7.19,7.20,7.21)53.184(8)	13
54.2	NI(7.19)53.656(7), NI(7.19,7.19)53.744(7), NI(7.18)53.988(12)	9
54.6		4,10
55.1		
55.4	FeII(21)55.269(25)	10
56.0	CrIII(-)55.89(40)	
57.0	SiII(13.07)57.050(30)	
57.5	SiII(13.07)57.503(15), CrIII(-)57.85(30)	10
58.5		
59.1	CrIII(-)59.13(60)	
59.5		
60.3	CrIII(8)60.15(60)	
61.2	CrIII(8)61.04(60), FeIII(40)61.245(5)	
61.9	FeIII(40)61.702(6)	13
62.3		13
62.7	MnII(16)62.507(30), SiIV(1)62.672(6), CrIII(8)62.68(50), FeII(21)62.758(20)	8
63.3		8

Table 3 (Continued)

Observed Wavelength	Identifications	Notes
1063.9	ClII(1)63.8307(6000), FeIII(40)63.872(8), FeII(19)63.982(15)	8
64.5	CrIII(17)64.32(30), CrIII(17)64.43(30)	8
65.0	CrIII(17)65.12(15d)	3,8
66.1	MnII(16)65.564(25), CII(12)65.8913(7), CII(12)65.9199(1), CII(12)66.1332(6) FeIII(27)66.143(10), FeIII(26)66.181(10), CrIII(17)66.23(50), SiIV(11)66.629(8)	6,9
67.3	NI(7.16)66.9928(10), NI(7.16)67.3056(8), NI(7.15)67.3883(10), NI(7.13)67.6144(15)	
68.4	ClII(1)67.9450(3000), FeIII(27)68.190(5), FeII(19)68.356(30), CrIII(-)68.41(80), NI(7.14)68.4756(13), NI(7.13)68.6119(12*), NI(7.12)68.6436(11*), NI(7.12)68.6685(11*), NI(7.11)68.6814(11*)	
69.0	FeIII(27)69.019(5), FeII(20)69.038(15),[MnII(16)69.110(20)], NI(7.11)69.1128(8)	10
69.6	NI(7.11)69.2083(9), NI(7.10)69.3758(7), NI(7.10)69.4754(6)	
70.1	NI(7.10)69.990(11)	13
70.5:		13
71.6	ClII(1)71.0359(9000), MnIII(Y)71.331(70), FeII(19)71.596(30), FeIII(26)71.746(5), ClII(1)71.7672(6000), MnIII(Y)71.803(70)	
72.2	CrIII(16)72.13(20)	11
73.3	SIV(1)72.992(6), SIV(1)73.522(4)	13
73.9	CrIII(16)73.74(20), MnIII(Y)73.789(80)	13
75.1	FeIII(26)75.024(4), ClII(1)75.2296(5000)	8
75.6		8
76.0	CrIII(16)76.15(20)	10,14
76.7	FeII(52)76.556(2), CrIII(32)76.74(20)	7,14
77.5	SIII(8)77.135(8)	
77.9		10
78.6		
79.1	ClII(1)79.0799(5000)	
79.6	CrIII(32)79.43(15)	
80.3		
81.0		
82.0		4,8
82.3	MnIII(Y)82.300(80), MnIII(Y)82.588(65)	4,8
83.2	SiIII(23)83.210(6)	8
84.0	NII(1)83.990(40)	8
84.7	NII(1)84.562(30), NII(1)84.580(80)	8
85.7	MnIII(Y)85.423(60), NII(1)85.546(30), NII(1)85.701(150), MnIII(Y)85.772(85)	8
86.6		8
87.3		4
88.2	MnIII(Y)88.185(65)	
89.1	MnIII(Y)88.724(55)	
89.8		3
90.3:		11
91.4		8

Table 3 (Continued)

Observed Wavelength	Identifications	Notes
1092.1	CII(14.05)91.917(1)	8
92.7	CII(14.05)92.726(2)	8
93.3		11
93.9		
94.5		
94.9:	MnIII(Y)94.773(75)	11
95.6		4,15
96.1	NI(7.08)95.9411(13), MnIII(Y)96.033(75)	3
96.9	NI(7.08)96.3247(11), SII(3)96.57(2), FeII(18)96.616(20), NI(7.07)96.7467(13), FeII(18)96.793(20), FeII(18)96.886(20)	
97.7	NI(7.05)97.2372(21)	16
98.3	NI(7.06)97.9900(8), NI(7.06)98.0951(17), NI(7.05)98.2599(17)	8
98.6	NI(7.03)98.6255(12), NI(7.04)98.7561(6)	8
99.0	NI(7.04)98.9537(9), NI(7.03)99.0468(8), FeII(18)99.117(25), NI(7.03)99.1521(13), NI(7.03)99.2612(8)	8
99.8	MnIII(Y)99.858(75), FeII(18)00.026(20)	
1100.4	NI(7.02)00.3597(16), NI(7.02)00.4652(10), FeII(18)00.525(20), CrIII(23)00.61(30)	17
01.3	NI(7.02)01.2907(15), CrIII(23)01.43(30), FeII(18)01.538(20)	3
02.1	CrIII(31)01.91(15), SII(3)02.32(3), FeII(18)02.385(8)	8,9
03.0	FeII(17)02.758(1), CrIII(23)02.88(30), MnIII(Y)03.190(65)	8
04.2	CrIII(31)04.44(15)	
04.9:	FeII(18)04.978(1)	4,15
05.2		
06.2	FeII(17)06.215(15), FeII(15)06.362(5)	18
06.6		4,11
06.9		11
07.4		
08.4	MnIII(2)08.157(20), SiIII(5)08.368(14), MnIII(Y)08.482(75)	8,19
09.0		10
10.0	SiIII(5)09.970(16)	8,19
11.0	MnIII(2)11.104(10), FeII(15)11.114(15)	10
12.1	MnII(31)11.898(10), FeII(16)12.086(35), MnIII(Y)12.284(75)	8
13.2	MnIII(Y)13.193(90), SiIII(5)13.228(18)	8,19
14.0		21
14.4	CI(30)14.4611(2)	21
15.1		21
15.6		21
16.2		
17.0	CrIII(22)17.19(30)	15
17.8	CI(29)17.706(3)	
18.6	CrIII(30)18.55(20)	10
19.3		

Table 3 (Continued)

Observed Wavelength	Identifications	Notes
1120.4		
21.3		15
22.5	FeII(12)21.987(25), CI(27)22.3438(21), CrIII(22)22.43(15), SiIV(3)22.486(8), FeIII(1)22.526(9), FeII(13)22.858(25)	3,19
23.6		
24.0	FeII(14)24.134(20)	4
24.4	SII(8)24.39(1)	8
24.9	FeIII(1)24.883(9), SII(8)25.00(1)	8,19
25.6	CrIII(22)25.73(20)	
26.4	FeII(13)26.425(20)	4,15
26.7	FeII(14)26.603(14), FeIII(1)26.72(6), FeII(12)26.850(12)	8,
27.4	MnIII(Y)27.314(65), SiII(13.06)27.442(20h)	15
27.9	SiII(13.06)27.907(40h), FeIII(1)28.02(8), FeII(14)28.074(25), FeII(50)28.180(5), SiIV(3)28.340(10)	3,8,19
28.7	FeII(194)28.530(10h), FeIII(1)28.72(7), CI(26.01)28.7240(2), CI(26)28.752(2), FeII(13)28.909(20)	8,13
29.2	CI(25.01)29.0299(2), CI(24.01)29.0777(2), CI(25)29.1607(4), FeIII(1)29.19(7)	13
30.4	FeII(49)29.777(12), FeIII(1)30.404(5), FeII(12)30.428(25)	3
31.1	FeIII(48)30.874(2), SII(8)31.05(2), FeIII(1)31.194(7)	
31.8	SII(8)31.65(2), FeIII(1)31.914(3)	
32.4		7
32.9		
33.8	FeII(50)33.413(25), MnIII(Y)33.613(50), FeII(11)33.678(25)	7
34.3	NI(2)34.1653(30), NI(2)34.4149(31)	8
35.0	NI(2)34.9303(32)	8
35.5		
36.6:	CrIII(-)36.67(50)	13
37.1		8,13
37.8	FeII(48)38.039(5)	8
39.0:	CI(23)38.625(1), FeII(11)38.642(25), CII(14.04)38.936(2), CI(22.01)39.0867(2), CI(23)39.0931(2), CI(22.03)39.1288(2)	8,22
39.4:	CII(14.04)39.332(3)	8A,22
39.8	CI(21.01)39.7657(3), CI(22)39.8120(4), CI(22)39.8650(4)	8A
40.5	CI(21.01)40.3163(2), CI(21)40.3573(2), SiIII(31)40.545(6), CI(21)40.6413(3)	8A
41.2		4,15
41.6	SiIII(32)41.580(7), CI(20)41.705(1), CII(11.01)41.625(2), CII(11.01)41.744(2)	8
42.4	SiIII(32)42.282(6), FeII(10,11)42.334(25), FeIII(39)42.464(4)	3,8
43.2	FeIII(39)42.955(5), FeII(10)43.235(25)	
43.5:	FeIII(39)43.67(3)	4,8,11
44.3	FeII(156)44.052(3), SiIII(32)44.306(8)	3,8
45.0	FeII(10)44.946(10), SiIII(32)44.959(6), SiIII(41)45.122(8), SiIII(41)45.149(8), SiIII(41)45.16(7), SiIII(41)45.177(7), SiIII(41)45.19(7), SiIII(41)45.22(7)	8

Table 3 (Continued)

Observed Wavelength	Identifications	Notes
1145.5		10
46.5		15
46.8	FeII(10)46.963(15)	8
47.5	FeII(10)47.413(25)	
48.0:	FeII(10)48.295(30)	8,11
48.8	FeII(155)48.693(8)	8
49.6	MnIII(Y)49.572(55)	8A
50.0	VIII(2)49.94(100), PII(3)49.960(10)	8A
50.5	FeII(10)50.292(20), FeII(10)50.689(20)	8A,22
51.0	VIII(2)51.04(90), FeII(10)51.163(25)	22
51.9		14,15
52.2	OI(6)52.129(6), VIII(2)52.18(80), FeII(10)52.440(15)	8,9
52.9	MnIII(Y)52.716(70), PII(3)52.803(10), FeII(10)52.882(20)	8,13
53.3	VIII(2)53.19(70), FeII(10)53.281(20)	13
54.2	FeII(10)53.955(15), PII(3)53.[illegible]97(10), CrIII(29)54.12(15), VIII(2)54.24(70), FeII(10)54.401(10)	8
54.9	SiIII(31)54.998(6), PII(3)55.02(10)	3,8
55.3	FeII(157)55.273(2), CrIII(29)55.39(15)	10
56.0	SiIII(31)55.957(6), CI(19)55.9790(3), CI(19)56.0283(3)	5,8
56.5	CI(19)56.3893(2), CI(18.01)56.4035(2), CI(19)56.5601(4)	8
57.2	[SiIII(31)56.782(4)], PII(3)56.968(10)	3
58.0	CI(17)57.4054(3), CI(17)57.7672(7), CI(16)57.7695(7), CI(17)57.9097(15), CI(16)58.0186(15), CI(15.01)58.0347(15), SiIII(31)58.102(7), CI(16)58.1296(8), CI(16)58.1315(8), CI(15.01)58.3240(2), CI(15.01)58.3969(2)	6
59.0	CI(15.01)58.6742(2), CI(15)58.7319(2), CI(15)58.9666(4), PII(3)59.085(10)	22
59.4	FeII(73)59.347(20)	8,22
60.1	NI(1.01)59.814(4), SiIII(31)60.255(6)	3,6
61.0	NI(1.01)60.932(2)	21
61.6	CrIII(-)61.43(50), SiIII(31)61.579(8)	
62.0		4
62.7	FeII(153)62.351(2)	
63.2		
63.8	NI(7)63.8836(18)	15
64.3	NI(7)64.2065(12), NI(7)64.3246(16)	
64.7		4,10
65.4	FeII(73)65.269(12)	4
66.1	NI(6.02)65.5944(12), CIII(11.76)65.71(0d), NI(6.02)65.8358(60), CIII(11.76)65.87(1d)	6,8
66.9		8
67.5	NI(6)67.4485(26)	8
68.3	NI(6.01)68.2155(11), NI(6.01)68.3344(16), NI(6)68.4168(12), NI(6)68.5358(22)	6,8
69.2		8
69.9	NI(5.04)69.6934(14)	7

Table 3 (Continued)

Observed Wavelength	Identifications	Notes
1170.2	NI(5.04)70.1573(5), NI(5.04)70.3766(13), NI(5.04)70.432(7), NI(5.03)70.6743(6)	
71.2	NI(5.03)71.0835(12)	22
71.6	FeII(154)71.606(8)	22
72.6	SiIII(30)72.529(4)	23
73.1:		7
73.4		23
74.0		23
74.5	SiIII(30,30)74.369(5), SiIII(30)74.432(6)	4,23
75.3:	CIII(4)74.933(3), CIII(4)75.263(3)	7
75.6	CIII(4)75.590(2), CIII(4)75.711(5)	19
75.9:	CIII(4)75.987(3)	24
76.4	CIII(4)76.370(3), NI(5.02)76.5098(24), NI(5.02)76.6304(16)	11
77.5:		4,15
78.0	NI(5.02)77.6948(72), SiIII(30,30)78.004(8)	
78.6		
79.0		
79.9	MnIII(7)79.846(20)	15
80.4		8
80.7		8
81.6		
82.0	SiIII(64)82.018(3)	
82.6		
83.0	NIII(20)83.031(14)	23
83.4	MnIII(4)83.305(30)	8
83.8	MnIII(7)83.870(25)	8
84.6	NIII(20)84.550(15)	
85.7		15
86.1	MnIII(7)86.133(10)	
87.0		15
87.5	CrIII(-)87.65(30)	
89.3	CI(14)88.8332(6), CI(14)88.9925(15), CI(14)89.2487(8), CI(14)89.4469(15), CI(14)89.6307(20)	6,8
90.4	CI(14)90.0650(6), SIII(1)90.17(2), SiII(5)90.418(100)	5,8
90.9		10
91.9	MnIII(4)91.726(15), CI(13)91.838(4), CI(12)92.2175(2)	9
93.3	CI(12)92.4507(4), CI(12)92.8347(2), CI(11)93.0088(30), CI(11)93.0308(30), CI(11)93.2401(30), CI(11)93.2643(30), SiII(5)93.284(200), CI(11)93.3932(10), CI(11)93.6489(15), CI(9.02)93.6787(15), CI(9.02)93.9955(4)	8,18,19
94.4	SIII(1)94.02(4), CI(9.02)94.0635(10), CI(9.02)94.2293(4), CI(10)94.3009(4), SIII(1)94.40(3), CI(9.02)94.4055(6), CI(10)94.4884(10), SiII(5)94.496(250), CI(9.02)94.6145(8)	8,19,25
96.4		
97.4	CrIII(15)97.37(20), SiII(5)97.389(100)	

Table 3 (Continued)

Observed Wavelength	Identifications	Notes
1198.4		
99.5	NI(1)99.5496(32)	
1200.2	NI(1)00.2233(31)	5
00.8	NI(1)00.7098(30), SIII(1)00.97(4)	
01.6	CrIII(15)01.42(15), SIII(1)01.71(2)	
02.6		15,23
03.0		
03.8:		13,26
04.4		13,26
05.8:		13A,26
06.6	CrIII(7)06.38(60), MnIII(3)06.425(20), SiIII(2)06.510(30), SiIII(11)06.533(30)	13A,26
07.4	SiIII(22)07.517(9)	4,26
15.0	H(1)15.668, H(1)15.674	2,27
21.6-22.5	CrIII(14)21.90(40)	4,26
24.0	MnIII(6)23.825(20w), SiII(8.02)23.907(20), SiII(8.02)24.252(20)	26
25.0	SiII(8.02)24.972(10), NI(21)25.0257(21)	4,26
25.4	NI(21)25.3684(20), NI(21)25.3742(20), CrIII(14)25.65(30)	4,26
26.8	SII(7)26.70(1), CrIII(14)26.72(20), SiII(8.01)26.814(50), SiII(8.02)26.887(20), SiII(8.01)26.986(40)	
27.5	SII(7)27.45(1), SiII(8.02)27.604(100)	
28.6	NI(17)28.4067(10), NI(17)28.4125(18), SiII(8.01)28.437(10), SiII(8.01)28.617(25), CrIII(14)28.65(30), SiII(8.01)28.746(150), NI(7)28.7852(20), NI(7)28.7911(20), MnIII(5)28.971(100)	
29.4	SiII(8.01)29.388(200), CrIII(14)29.53(15)	4
30.0	MnIII(5)30.120(20w)	4,8
30.6	CrIII(21)30.80(20)	8,23
31.3		8
32.4		
33.4	CrIII(21)32.96(50), SII(7)33.36(0), FeII(275)33.660(8)	8
34.1	CrIII(21)33.92(20), SII(7)34.14(3)	4,8
34.8		4
35.2-36.5	SiIII(49)35.431(7), SiII(-)35.92(10), CrIII(21)36.20(40)	9
37.1	GeII(4)37.06(20)	9
38.4	CrIII(21)38.51(40)	
39.1	MnIII(5)39.244(50w)	
39.9	MgII(-)39.936(25)	8,28
40.4	MgII(-)40.399(20)	8,28
41.0		4
41.4		
42.0	MnIV(-)42.246(90)	6,29

Table 3 (Continued)

Observed Wavelength	Identifications	Notes
1243.2	NI(5)43.1711(30), NI(5)43.1786(30), NI(5)43.3058(28), NI(5)43.3133(20)	
44.0		23
44.7	MnIV(-)44.495(90)	9,29
45.2	CrIII(6)45.23(15)	8
45.8	MnIII(Y)45.673(75), MnIII(Y)45.975(70)	8
46.8	SiII(8)46.738(100)	8
47.3	CIII(9)47.383(3)	8
47.8:	MnIV(-)47.726(85), CrIII(6)47.86(20)	10,29
48.4	SiII(8)48.426(150)	
49.4		4,15
50.4	SiII(13.05)50.089(100), SiII(13.05)50.433(150), SII(1)50.50(1)	3,6
51.2	SiII(8)51.164(200), CrIII(6)51.42(15)	9
52.2	MnIV(-)51.933(95)	29
52.6	CrIII(6)52.61(50)	4
53.2:		4,15
53.8	SII(1)53.79(5)	
56.5	CIII(11.53)56.52(1d)	6
57.3	MnIV(-)57.277(95)	29
58.7:	CrIII(6)58.55(20)	23
59.0	CrIII(20)59.02(40)	23
59.6	SII(1)59.53(5)	23
60.5	CrIII(5)59.80(20), SiII(4)60.418(1000), FeII(9)60.542(20), CI(9)60.7355(5), CI(9)60.9266(4), CI(9)60.9962(3), CI(9)61.1223(5)	6,19
61.4:	CI(9)61.4257(5), CI(9)61.5519(10)	4,14,21
62.1	CrIII(20)61.86(40), GeII(4)61.90(40), CrIII(5)62.36(30)	
62.9		
63.6	CrIII(20)63.61(35)	23
64.8	CrIII(13)64.21(35), MnIV(-)64.412(90), GeII(4)64.71(10), SiII(4)64.730(2000), SiII(4)65.023(200)	6,19,29
66.2	CrIII(5)66.14(15)	13,21
66.6:	FeII(9)66.694(20)	13
67.3	FeII(9)67.437(25)	
68.1	CrIII(5)68.01(25)	
69.1	MnIII(Y)69.104(80), CrIII(13)69.11(25)	
69.8		4
71.4:	FeII(9)71.235(1)	8,14
72.0	CrIII(13)71.85(20), FeII(9)72.001(25)	8
72.6	FeII(9)72.638(15)	8
73.2	CrIII(5)73.31(15)	4
73.8:		8
74.2		8
75.1	CI(55)74.9838(3), FeII(9)75.154(25)	8A,9

Table 3 (Continued)

Observed Wavelength	Identifications	Notes
1275.8	FeII(9)75.801(20)	8A,13
76.1	MnIII(Y)76.092(70), CI(7.01)76.4825(2)	13
76.7	CI(7.01)76.7498(4)	
77.3:	CI(7.01)77.1901(2), CI(7)77.2454(25), CI(7)77.2823(25)	7
77.6	CI(7)77.5130(30), CI(7)77.5496(30), FeII(9)77.667(10), CI(7)77.7229(8), CI(7)77.9538(2)	30
79.1	CI(6)79.0558(3), CI(6)79.2286(4), CI(6)79.4977(2)	6
79.9:	CI(5)79.8904(8), CrIII(12)79.91(20), CI(5)80.1353(6)	4,15
80.4	CI(5)80.3328(20), SiIII(63)80.354(6), CI(5)80.4042(2), CI(5)80.5970(6)	
80.7	CI(5)80.8470(8)	11
82.0:		13
82.4	TiIII(2)82.49(3)	13
83.0		13A
83.5	MnIII(9)83.566(500)	8,13A
84.1	MnIII(9)84.041(30), CrIII(12)84.09(20)	8
85.0		4
85.8		8
86.5	TiIII(2)86.38(40)	6,8
87.0	CrIII(12)87.05(40)	8
87.4	MnIII(9)87.583(400)	8
87.8		15,23
88.5	CI(53)88.4224(5), MnIII(9)88.674(50)	3
89.0:		4,15
89.4	TiIII(2)89.32(30)	
90.2	CI(51)89.9772(3), FeII(88)90.204(15)	
91.0:	CrIII(37)90.93(20)	15
91.5	CrIII(37)91.53(25), FeII(87)91.594(15), MnIII(9)91.597(300), TiIII(2)91.64(20), MnIII(9)91.681(402), CrIII(37)91.77(25)	
92.2		10
93.1:	TiIII(2)93.26(30)	4,6,8
93.6	MnIII(9)93.649(200)	8
94.6	SiIII(4)94.543(17), TiIII(1,2)94.67(50), FeII(87)94.914(12)	
95.8	TiIII(1)95.91(30)	8
96.3	FeII(86)96.088(20), CIII(12.07)96.30(3d)	15
96.7	SiIII(4)96.726(14)	8
98.1:		15
98.8	TiIII(1,1)98.67(50), FeII(87)98.815(2), SiIII(4)98.891(15), TiIII(1)98.95(40), SiIII(4)98.960(18)	16
99.4:		10,12,14
1300.7:		4,15
01.1	SiIII(4)01.146(14)	
02.2	PII(2)01.878(10), OI(2)02.174(10)	3

Table 3 (Continued)

Observed Wavelength	Identifications	Notes
1303.3	SiIII(4)03.320(16)	
04.4	SiII(3)04.369(100), FII(2)04.484(10)	13
04.7	FII(2)04.698(10), OI(2)04.858(10)	13,22
05.5	FII(2)05.531(10), SiII(13.04)05.590(50h), OI(2)06.023(10)	6,19,22
06.8		21
07.9		4,23
09.4	SiII(3)09.274(200), CrIII(2P\09.34(20), SiII(13.04)09.458(20h), FII(2)09.077(10)	3,19
10.6	NI(13)10.5403(27), FII(2)10.685(10), NI(13)10.9431(25), NI(13)10.9498(25)	21,22
11.2	CI(48)11.3626(10)	22
12.5	SiIII(10)12.590(13)	3
[illegible]	CI(45)13.4645(13)	
[illegible]		4,22
[illegible]		4,22
15.0	[CrIII(33)15.00(10)]	4,22
16.3	CI(44)15.981(2), NI(12.02)16.2908(12), CrIII(28)16.40(20)	3
17.2		
17.5	NiII(10)17.38(15)	4,8,11
18.0		8
19.0	NI(12.01)18.8224(10), NI(12.01)18.8293(12), NI(12)18.9983(24), NI(12)19.0050(24)	9
19.8	NI(12)19.6695(28), NI(12)19.6762(28)	
20.8		9
22.8	[CrIII(28)22.83(10)]	
23.4:		15
23.9	CII(11)23.8617(1), CII(11)23.9059(6), CII(11)23.9513(9), CII(11)23.9955(1)	8
24.8		8
25.6		
26.6	NI(11)26.5641(17), NI(11)26.5709(17)	
27.4	TiIII(4)27.60(15)	31
28.0:	NI(11)27.9172(17), NI(11)27.9240(17)	4,31
28.6		23,31
29.1	CI(4)28.8332(3), CI(4)29.0861(9), CI(4)29.1233(9)	8,31
29.6	CI(4)29.5777(12), CI(4)29.6001(12)	8
30.3		3
31.2		3
31.6		
33.5		4
33.6		23
34.5	CII(1)34.5323(150), FIII(1)34.866(10)	19
35.6	CII(1)35.6625(30), CII(1)35.7077(300)	19
37.2		21
37.8		21,25
38.2		21

Table 3 (Continued)

Observed Wavelength	Identifications	Notes
1339.0		21,23
40.2		8
40.6		8
41.4	SiIII(39)41.465(8)	
42.2	SiIII(39)42.392(7)	
43.4	SiIII(39,39)43.398(6)	8
44.3	PIII(1)44.343(15)	8
45.0	PIII(1)44.900(10)	6
46.0		8
46.4		7
46.9	SiII(7)46.873(100), ClI(2)47.2397(10000)	8,32
47.8		
48.6	SiII(7)48.543(100)	
49.5:		6,14
50.0	SiII(7)50.057(150)	13
50.4	SiII(7)50.520(20), SiII(7)50.658(20)	8,13
51.2		8
52.7	SiII(7)52.635(100), AlIII(-)52.810(100), AlIII(-)52.858(70)	33
53.7	SiII(7)53.718(100), [CI(43)54.2883(10)]	34
54.8		4
55.5	OI(1)55.605(8)	8
55.9	CI(42)55.844(15)	8
56.8		13
57.2	CI(41)57.1324(6), CrIII(36)57.20(15)	13
57.8		
58.9	CI(40)59.2750(4)	9
60.8	MnIII(8)60.704(1000), FeII(111)60.870(5)	22
61.3	SiIII(46)61.597(8)	22
62.3	SiIII(38)62.366(5)	
62.9	FeII(152)62.771(20)	
63.5	SiIII(38)63.459(7), ClI(2)63.4471(12000)	32
63.8-65.0	CIII(39)64.1636(12), FeII(103)64.590(12), MnIII(8)64.645(5)	35
65.2	MnIII(8)65.206(800), SiIII(38)65.253(8), CrIII(36)65.29(20)	9
66.5		4
67.1	SiIII(46)67.049(7)	36
68.3	MnIII(8)68.188(20), CrIII(36)68.60(15)	36
69.0-70.3	MnIII(8)69.419(400), HgII(8)69.425(18), SiIII(46)69.437(5), NiII(8)70.20(9)	6,28
71.2	FeII(-)70.985(70)	3,6,8
71.5	MnIII(8)71.649(300), SiIII(67)71.652(3)	4,10
73.2	SiIII(67)73.030(5)	8

Table 3 (Continued)

Observed Wavelength	Identifications	Notes
1373.8	NiII(9)74.14(3)	8,37
75.0	SiIII(67)75.083(2), FeII(-)75.134(50), SiIII(67)75.688(2)	38
76.2		4
76.9	SiIII(67)77.082(3), SiIII(67)77.238(2)	4,6
78.0		13
78.3		13
78.8		
79.6	FeII(-)79.434(40), ClI(1)79.5278(20000), AlIII(-)79.670(600), PIII(7)79.873(5)	32,33
80.4	PIII(7)80.464(10)	13
80.8		13
81.2	PIII(7)81.111(10), FeII(152)81.250(10), NiII(8)81.36(4)	
81.6	PIII(7)81.633(8)	4,13
82.0		4,13
82.6		9
83.6	CrIII(35)88.79(25)	4
84.2	AlIII(-)84.132(800)	33
85.2		3
87.9	SiIII(37)87.948(5), SiIII(37)87.979(5), SiIII(37)87.994(5), SiIII(37)88.011(5), SiIII(37)88.052(5), SiIII(37)88.098(5)	6,9
88.6		
89.7	ClI(1)89.6928(20000)	32
92.2		15,23
92.8:		8,14
93.7	SiIV(1)93.755(15)	
98.4		4,8,14
99.0		8
1402.8	SiIV(1)02.769(12)	22
03.2		24
03.8	SiII(13.03)03.783(5h)	8
04.3	SiII(13.03)04.478(6h)	8
05.7		
08.0		4
09.3	SiII(13.02)09.073(10h)	4
10.3	SiII(13.02)10.219(20h)	3
12.0	NI(10)11.9310(30), NI(10)11.9387(30), NI(10)11.9483(30)	
17.1	SiII(18.06)16.972(10h), SiIII(9)17.237(13)	9
19.1		
20.8		
22.4		
24.2	FeII(47)24.047(8)	8
24.6	FeII(47)24.747(12), SiIII(62)24.775(2)	8
28.8		3
30.8	MnIII(22)30.790(20u)	

Table 3 (Continued)

Observed Wavelength	Identifications	Notes
1438.0		8
38.5		8
41.0		8A
41.4		8A
43.0		
50.0		8
50.4		8

NOTES:

Bracketed lines unless noted are possible identifications. MnIII lines with Y as the multiplet number are from Yarosewick et al. (1971). Other identification information is from Moore (1950, 1952, 1962, 1965, 1970, 1975) unless indicated in the notes below.

1. Lyman β
2. Extremely broad feature
3. Line asymmetric shortward
4. Weak
5. Sharp
6. Broad feature
7. Feature in shoulder of following line
8. and 8A. Lines whose wings are blended together
9. Line asymmetric longward
10. Feature in wing of preceding line
11. Feature in shoulder of preceding line
12. Longward wing extends approximately 1.0Å
13. and 13A. Broad line with incipent core doubling, both features given
14. Ill-defined
15. Feature in wing of following line
16. Weak feature at end of broad shoulder of previous line
17. CrIII line in wing
18. Line winged shortward
19. Strong feature
20. MnII line minor constituent
21. Feature in wing of preceding strong line
22. Lines whose shoulders are blended together
23. Very weak
24. Feature in core of preceding line
25. Longward wing extends approximately 1.5Å
26. Wing of Lyman α distorts feature shape
27. Lyman α
28. MgII line from Goorwitch et al. (1970)
29. MnIV line from Yarosewick and Moore (1967)
30. FeII line from Sales (1953)
31. Very broad line with many blended features, all given
32. CII line values from Radziemski and Kaufman (1969)
33. AlIII line from Kelly and Palumbo (1973)
34. CI line may be in very weak feature between this line and the following one
35. Broad, flat bottomed region
36. Broad, flat bottomed region, strongest two features given
37. NiII line in wing
38. Line core asymmetric longward

Moore's (1976) revision of the multiplet table for OI arrived after this table was typed. Compared with the data in Moore (1950) it shows that the wavelengths of OI lines in this latter source require slight revisions, that OI (6)1152.129 is now OI(148)1152.1512, and that additional OI may be present in τ Her including λ1047.376 and λ1049.115 of multiplet UV2.01; λ1240.377, λ1240.378, and λ1240.379 of multiplet UV147, and λ1105.20 of multiplet UV208.

Table 4

The Spectrum of τ Her: 2028Å to 2959Å

Observed Wavelength	Identifications	Notes
2028.9	FeII(93)29.18(8), NiII(43)29.20(10)	
30.5		
32.4	[MnIII(11)31.439(100)], NiII(33)32.30(5), FeII(94)32.407(25), FeII(-)32.643(20)	1,2,3
33.2	FeII(-)33.254(20b), NiII(15)33.42(3)	2,3
34.5	FeII(-)34.402(10), MnIII(11)34.424(100)	2
35.5		2
37.9		
38.8	MnIII(11)38.874(100)	4
40.4	CrII(28,28)40.68(20d), FeII(93)40.687(25)	
41.5		5
44.0	FeIII(71)44.302(4), FeII(-)44.451(50), MnIII(11)44.486(300)	3,6
45.5		
46.4		2
47.1	CrIII(69)47.23(80)	2
48.4	FeII(-)48.375(10), FeII(121)48.492(5), MnIII(-)48.840(400)	3,7,8
49.3	FeIII(71)49.384(7), MnIII(11)49.597(500)	8
50.8	FeIII(60)50.739(7), FeII(93)51.028(25)	
51.4		
54.1	NiII(32)54.32(5)	5
55.2	FeII(109)55.270(20), CrII(1)55.59(200), FeII(-)55.641(10)	3,8
55.9	FeIII(105)55.855(6), FeIII(71)56.145(7)	8
58.8	FeIII(78)57.058(6), FeII(82)57.332(12), SiII(9.01)58.646(50), FeIII(100)58.560(8), SiII(9.01)59.014(50)	2,9
59.6:	FeIII(78)59.677(7), CrIII(56)60.18(15)	2,10
61.5	CrII(1)61.54(175), FeIII(48)61.552(10), FeIII(78)61.751(9)	
63.0:	MnIII(Y)63.138(85)	11
63.6	MnIII(Y)63.382(80), FeII(92)63.672(25)	
65.8	CrII(1)65.46(150), FeII(109)66.005(15), CrIII(38)66.18(15), MnIII(-)66.303(500), NiII(15)66.41(5)	6
67.2	FeIII(124)67.302(6), TiIV(2)67.564(20)	12
68.1	FeII(137)67.917(20), FeIII(48)68.243(12)	2
68.8:	MnIII(10)68.965(1000), CrIII(38)69.00(20)	2
69.6		
71.2	FeIII(99)70.539(8), FeII(107)71.821(10), [SiII(9)72.016(200)]	
72.8	MnIII(Y)72.696(70), SiII(9)72.701(200), FeII(-)73.231(10), CrIII(38)73.36(15H)	3,10
75.7	FeII(107)75.683(5), FeII(-)75.768(20)	3,8
76.6		11
77.1	NII(14.07)76.944(4), MnIII(10)77.310(900), FeII(136)77.507(12)	8
78.8	NiII(16)78.76(3), FeIII(48)78.989(14)	
80.6	FeII(92)80.246(20), NiII(16)80.84(5), MnIII(Y)81.053(70), MnIII(Y)81.141(75)	
82.4		13

Table 4 (Continued)

Observed Wavelength	Identifications	Notes
2083.0		13
84.2	MnIII(10)84.159(800), FeIII(67)84.349(10)	
85.2	NiII(42)84.87(5), FeIII(77)84.968(5)	
86.0	FeIII(105)86.128(4)	13
87.5	AlII(3)87.0(5), FeIII(77)87.132(8), FeII(108)87.527(25), FeIII(77)87.907(7)	6,8
88.4	FeIII(67)88.625(5), FeIII(77)89.089(6)	6,8
90.0	MnIII(10)89.992(600), FeIII(124)90.053(7), FeIII(67)90.139(12), NiII(15)90.14(5), MnIII(10)90.169(300), FeIII(59)90.240(6)	
90.6		13
91.6	FeIII(77)91.312(7)	
92.9	FeIII(129)92.945(6)	2,8
93.6	FeIII(77)93.504(4), NiII(15)93.55(8), FeII(290)93.683(35)	2
94.9	MnIII(Y)94.140(80), FeII(-)94.286(60), MnIII(10)94.712(500), MnIII(10)95.012(200), FeIII(105)95.327(3), NII(16.06)95.532(6), MnIII(Y)95.809(75)	3,8
96.5	NII(16.06)96.192(4), FeIII(59)96.430(6), NII(16.06)96.856(5)	4
97.5	NiII(31)97.08(12), FeIII(67)97.480(15), FeII(80,120)97.512(25), FeIII(66)97.692(12), MnIII(10)97.870(500)	14
99.1	FeIII(66)99.231(5), FeIII(129)99.332(6), MnIII(10)99.908(500)	5,15
2100.8	CIII(23)00.46(0), FeIII(129)00.961(8), FeII(250)00.963(5), MnIII(10)01.038(200)	16
03.2	TiIV(2)03.160(18), CrIII(41)03.22(20), CrI[illegible](41)03.32(20), NiII(31)03.39(5)	12
03.8	FeIII(66)03.647(5), FeIII(66)03.799(12)	13
04.8	CrIII(41)04.85(20), MnIII(Y)05.332(60)	7
07.4	FeIII(66)07.324(0), FeII(250)07.555(10), CrIII(41)07.68(20), MnIII(10)07.853(15), NiII(60)07.94(188), FeII(81)08.139(15)	6,17
09.5	FeIII(105)08.676(5), FeII(227)08.942(25), MnIII(Y)08.989(50), NiII(60)09.01(5), FeII(227,250)09.097(10)	
10.4	FeII(290)10.240(25), FeII(108)10.724(15)	
11.8		
13.8	NiII(60)13.51(12), CrIII(41)13.73(100), CrIII(41)13.83(100), CrIII(41)14.26(50), CrIII(61)14.53(50)	7
15.2	CrIII(41)14.87(100)	
17.5	FeIII(58)16.588(7), FeII(213)16.960(25), CrIII(41)17.53(100)	6,8
18.6	FeII(120)18.195(8), FeIII(58)18.415(5), FeII(58)18.567(6), CrIII(70)18.65(20), FeII(120)19.050(12)	6,8,10
20.4	FeIII(58)20.239(5), CrIII(41)20.35(25), FeIII(58,58)20.767(4)	
22.3	CrIII(70)21.69(30), CrIII(61)22.44(40)	
23.2	[CrIII(41)22.75(10)],CrIII(61)23.53(80), FeIII(104)23.590(8)	
25.1	NiII(14)25.12(8), CrIII(41)25.62(15), NiII(13)25.89(4)	18
26.7		8
27.6	FeII(-)27.691(10), NiII(41)27.77(6), FeII(290)27.967(10), YIII(5)27.99(100)	8
29.4	CrII(24)28.89(50)	
30.5	NII(25)30.179(5), CrII(14,24,79)30.222(50), FeII(80)30.259(15), FeII(249)30.548(12)	2
31.2	FeII(-)31.201(60), NiII(14)31.27(3), [CrIII(61)31.95(20)]	2,3
32.4		5

Table 4 (Continued)

Observed Wavelength	Identifications	Notes
2134.0	FeII(-)33.175(30), CrII(23)33.49(100), SiII(33)33.99(10h), FeII(213)33.990(8), VII(7)34.12(200), CrII(23)34.20(40), NiII(31)34.26(8), CrII(23)34.52(100), CrII(23)34.62(75)	3,6, 8,19
35.2	FeIII(98)34.861(9), FeII(-)35.249(20), CrII(23)35.34(50), CrII(23)35.42(50)	3,8
36.4	FeIII(76)36.390(5), SiII(32)36.402(30h), FeII(249)36.519(20), SiII(32)36.560(50h), FeIII(59)37.009(5), FeII(-)37.177(70)	2,3, 8,20
37.9	FeIII(58)37.365(8), CII(17)37.417(3h), FeII(6)37.735(15b), CII(17)37.897(5h), FeII(135)38.103(20), NiII(13)38.60(10), NII(0.01)39.007(4), CrIII(48)39.11(80)	20,21
39.6	FeII(6)39.676(25b)	
41.1	CrIII(40)41.15(100), FeII(-)41.710(50)	3,22,23
43.2	FeII(-)42.428(20a), NII(0.01)42.775(6), FeIII(76)43.045(7), FeIII(59,59)43.470(8)	3,19,23
44.7	FeIII(59)43.76(3), FeIII(58,59)43.827(7), CrIII(40)44.15(80), FeIII(58)44.282(8), FeIII(98)44.743(7)	5,19
46.3	FeII(6)46.058(10b), FeIII(59,59)46.062(8), FeIII(59)46.339(6), CrIII(40)47.16(50)	
47.6	CrIII(48)47.56(50), FeII(213)47.719(15), FeIII(59)47.904(7)	
48.7	CrIII(70)48.65(50), CrIII(40)48.85(40), CrIII(52)49.48(50)	
50.0		7
50.7:	FeII(135)50.618(20), FeII(248)50.762(10), FeII(106)51.095(25)	24
52.5	FeIII(112)51.776(15), FeII(106)52.373(12), FeII(151)52.488(25), FeIII(141)52.706(6), CrIII(50)52.76(50)	22
53.6	FeII(225)53.281(5), FeIII(98)53.320(3), FeII(6)53.874(1)	25
54.5	CrIII(48)54.62(30)	
55.2:		24,26
56.0:	FeII(213)55.839(12), [CrIII(52)57.17(100)]	24,26
58.0	FeIII(70)57.710(12), FeIII(145)58.472(12)	8
58.8	FeII(89)58.518(25), NiII(13)58.73(8), CrIII(48)59.08(40), FeII(6)59.152(10b)	8
60.5:	FeIII(140)60.655(6)	8
61.3	FeII(213,227)61.161(15), NiII(14)61.21(10), FeIII(70)61.270(10), FeII(227,370)61.313(20), FeII(119)61.582(20)	3,8
62.0:	FeII(90)62.023(5), FeIII(140)62.283(5)	2
63.2:	FeII(372)63.370(20), CrIII(48)63.86(50)	13,25
64.8	FeII(79,372)64.339(20), FeII(213,370)64.558(25)	
66.4	NiII(13)65.55(40R), FeII(185)65.555(10), FeII(212)66.198(20), CrIII(52)66.25(60), FeIII(70)66.952(12)	6
67.6	FeII(-)67.393(80b), FeII(119)67.401(12), FeII(213)67.880(12), CrIII(48)68.23(30)	27
69.2	FeII(247)68.925(8), NiII(13)69.10(30R), FeII(370)69.431(10), MnIII(-)69.657(1000), [FeIII(140)69.709(5)], FeII(-)69.848(20), FeII(370)69.950(12)	3,5
70.3	FeII(372)70.193(5), CrIII(68)70.70(100), CrII(36)70.71(50)	28
71.1	FeIII(70)71.045(12), CrII(36,36)71.06(40)	28
72.2:	FeII(372)72.056(1)	11
72.7	FeII(372)72.679(8), FeII(134)72.989(15)	
73.8	FeII(248)73.220(20b), FeII(79)73.720(15), FeIII(75)73.829(7), CII(14.06)73.848(5), MnIII(-)74.132(700), CII(14.06)74.168(3)	7,22
75.0	FeIII(70)74.658(15), NiII(14)74.67(30R), FeII(135)74.849(8), NiII(13)75.16(25R), FeII(90)75.445(25)	

Table 4 (Continued)

Observed Wavelength	Identifications	Notes
2177.2	FeII(370)76.826(20), MnIII(-)76.859(900), FeII(106)77.025(10), NiII(40)77.08(6), FeII(-)77.200(40), NiII(40)77.36(6)	3,8
77.9		7,8
79.4:	FeIII(75)79.258(6), NiII(40)79.36(6), NiII(12)79.46(3), NiII(30)79.99(3)	29
80.4:	FeII(370)80.255(12), FeIII(70)80.410(12), NiII(40)80.46(10)	29
81.2:	FeII(370)80.870(12), FeII(370)81.137(8), FeII(370)81.407(5b), FeIII(122)81.407(4) CrIII(51)81.41(15), [MnIII(-)81.847(800)]	29,30
82.4		
83.9	FeIII(75)82.889(4), FeII(89)83.301(12), FeII(119)83.468(8), CrIII(55,64)83.71(50), FeII(247)83.803(347), FeIII(65)83.980(6), FeIII(122)84.114(4), FeII(-)84.498(50), NiII(13)84.61(25R)	3,6
85.9	[CrIII(51,68)85.01(100)], [MnIII(-)85.103(600)], NiII(40)85.51(12R), FeII(271)85.622(8), FeIII(65)85.654(5)	15,27
88.0	FeII(271)87.444(12), FeII(-)87.546(30d), FeII(89)87.678(10), MnIII(Y)87.756(75), FeII(135)87.868(15), FeII(-)87.991(30), NiII(12)88.05(6)	3,25
89.3	CrIII(60)90.09(50)	27
91.2	CrIII(51)90.76(100), FeIII(65)91.215(8), YIII(5)91.22(200), CrIII(47)91.24(40), CrIII(51)91.58(100)	
92.5	FeII(367)91.935(10)	7,8
93.5	CoII(22)93.605(100)	8
94.4		
95.6	FeIII(123)95.532(6), FeIII(74)95.866(5)	
96.8	FeII(-)96.680(80), FeII(226)97.273(5h)	3,5,11
97.9	CrIII(51)97.89(100)	2
98.6:	CrIII(68)98.62(100), FeII(367)98.660(4), MnIII(Y)99.033(75)	2,8
99.8		8
2201.6	[YIII(5)00.80(50)], FeII(-)00.964(20), CrIII(47,51)00.98(20), NiII(13)01.41(20R), CrIII(60,68)01.46(15), FeII(367)01.595(5), CrIII(58)01.93(20)	3
02.4	FeIII(74)02.458(6), CIII(27)02.54(1)	8,24
03.3	CoII(1)02.928(100), CrIII(47)03.22(100), FeII(406)03.420(1), [NII(18,08)03,633(3)]	8
04.6	CrIII(51)04.57(30)	5
06.1:	NII(15)06.088(6), FeII(367)06.153(8), YIII(4)06.22(30)	2
06.8	FeII(134)06.582(2), NiII(13)06.71(25R), CrIII(47)07.46(40)	2
08.4	FeII(367)08.419(30), CrIII(58)08.70(60), FeIII(110)08.85(10), FeII(366)09.049(20)	
10.3	FeIII(123)09.739(5), FeIII(110)10.073(6), NiII(13)10.38(20R)	5
11.2	FeII(118,134)10.952(5), NiII(52)11.09(8), FeII(168,289)11.112(5), CrIII(47)11.21(25), FeII(305)11.243(12)	
11.8:	MnIII(Y)11.955(80)	24
14.0	[MnIII(16)12.418(600)], NiII(30)13.19(7), FeII(168)13.679(20), FeII(368)14.059(20), FeIII(69)14.616(4)	6,9
15.2	FeII(369)15.094(10), MnIII(16)15.211(800)	
16.5	NiII(12)16.479(100R)	
18.1	CrIII(-)17.51(40), CrIII(47)17.75(15), FeII(367)18.289(30), CrIII(-)18.69(40)	8
20.4	CrIII(47)19.58(40), FeII(168)19.889(20), FeII(118)20.388(25), NiII(28)20.40(10R), FeII(371)20.453(6), MnIII(16)20.530(900)	6,8, 9,21

Table 4 (Continued)

Observed Wavelength	Identifications	Notes
2222.3	FeIII(69)21.830(10), SiIII(85)22.01(8S), FeII(369)22.679(1)	
23.6	NiII(12)22.948(20R), FeII(168)23.481(1), FeII(368)23.866(2)	
24.7	NiII(21)24.351(6), NiII(12)24.88(20R)	
25.6:	SiII(15.02)25.267(1), NiII(12)26.34(18R)	24
26.8	CrIII(39)26.72(200)	8
27.5	FeII(369)27.469(4), MnIII(16)27.491(1000), FeIII(69)27.848(7)	8
28.8	FeII(366)28.761(30), FeIII(122)28.881(4), FeIII(128)29.267(10)	
30.5		
31.5	FeII(368)31.512(10), CrIII(45)31.81(100)	11
32.4	FeIII(64)32.430(10), FeIII(139)32.690(10)	
33.9	FeIII(126)33.654(6), CrIII(45)33.81(100)	
34.8		8
35.7	FeIII(69,139)35.699(6), FeIII(139)35.908(10), CrIII(39)35.91(200)	2,8
36.4:		2,8
37.9	FeII(365)37.577(20), CrIII(45)37.59(150), FeIII(139)38.155(10)	8
38.8:	FeII(365)39.047(25)	11,26
39.6		8
40.7		5,8
41.6	FeII(365)41.426(20), FeIII(109)41.54(12)	8,29
42.4		29
44.0	FeIII(64)43.405(8), CrII(77)43.62(50), CrIII(39)44.10(150), FeII(365)44.216(8)	
44.8	CoII(10)45.11(100)	13,31
45.5	FeII(365)45.505(45)	
46.3		
47.2	NiII(30)47.24(6), CrIII(-)47.64(40)	2
47.9:	FeII(365)47.692(35), CrII(49)48.30(50)	2
49.2	CrIII(45)48.94(15), FeII(365,365)49.063(30), FeII(365)49.181(25)	
50.4	[FeII(4)50.171(0)]	22
51.3	FeII(4)50.937(1), CrIII(39)51.45(80), FeII(365)51.831(80), CrIII(39)51.95(30), FeIII(64)52.268(5)	7,32
53.2	FeII(4)53.119(1), NiII(29)53.67(6)	33
54.0	NiII(12)53.856(20R), FeII(365)54.066(8)	
55.4	CrIII(45)55.44(15), FeII(365)55.691(50), FeII(133)55.759(1), CrII(49,77)56.01(50), NiII(51)56.15(8)	
56.8	CrIII(-)56.64(40), FeII(365)56.897(10)	13
57.6	[CrIII(39)57.33(20)], FeIII(73)57.406(8), CrIII(50)57.53(30d), CrII(76)57.76(45), FeII(365)57.788(25), CrIII(39)57.92(50d), CrII(76)57.96(50)	8
58.3	CrIII(63)58.59(30)	8
60.4	FeII(4)60.078(1), FeII(5)60.228(1), FeIII(64)60.547(7), FeII(4)60.853(1)	5
62.0	FeIII(11)61.592(12), CrIII(39)61.64(40)	29
62.7	FeII(5)62.686(1)	29
63.6:	FeII(246)63.224(1)	29

Table 4 (Continued)

Observed Wavelength	Identifications	Notes
2264.7	NiII(12)64.456(30R), FeII(246)64.589(1), CrIII(39)64.888(40)	8
65.5	[FeII(5)65.991(0)]	8
66.6	[FeII(315)66.699(0)]	8
67.6	FeIII(133)67.42(10), FeII(4)67.584(1)	24
68.6	VIV(8)68.30(100), [FeII(5)68.562(0)], [FeII(5)68.844(0)]	7,8
69.9	NiII(12)70.209(40R)	7,8
71.6		
73.8	CrIII(67)73.30(100), FeIII(153)74.00(8)	8,22
74.8	NiII(38)74.75(8)	8
75.7:	CrIII(67)75.43(80), NiII(39)75.70(7)	2
76.3	CrIII(50)76.38(100), NiII(51)76.45(9)	2,5
77.6	FeIII(73)76.870(8), CrIII(67)77.47(80), FeIII(127)77.820(8)	22
78.6	FeIII(127)78.432(6), NiII(22)78.771(30R)	
79.9	FeII(4)79.918(2)	5,21
82.3		5
83.9	SiII(18.03)83.266(3), NII(20.02)83.652(4), FeII(132)83.991(1)	6
84.7	CrIII(-)84.44(150), YIII(4)84.5(100), SiII(18.03)84.542(1), FeIII(73)84.979(5n)	24,32
86.2	CoII(9)86.165(150), CrIII(50)86.55(15), NII(16.02,20.02)86.689(6)	6,34
87.8	NiII(22)87.082(20R), NiII(38)87.66(10)	6
88.7	NII(16.02)88.444(5)	33
89.6	[CrIII(-)89.23(50)]	
90.8	NII(20.02)90.259(3), CrIII(50)90.66(80)	29
91.7:	NII(16.02)91.652(4), FeIII(156)91.850(6), CIII(12.01)91.851(6), CIII(12.01)91.974(6), CIII(12.01)92.012(6), CIII(12.01)92.060(6), CIII(12.01)92.111(6)	29
92.3	NII(20.02)92.652(3), [FeII(315)92.770(0)], FeIII(156)93.056(10)	29
94.0	NII(20.02)93.318(4), FeII(184)93.765(1)	34
94.8	FeII(184)94.603(1)	
96.1	CrIII(-)95.55(60)	33
96.9	NiII(21)96.553(30R), SiIII(93)96.873(10), CIII(8)96.870(16), NiII(11)97.140(30R), CrII(19)97.17(50), NiII(11)97.466(20R), [CrIII(50)97.89(25)]	
98.3	FeII(133)98.225(1), NiII(21)98.269(30R), NiII(39)98.50(6)	25
2300.0	NiII(27)99.65(8), NiII(27)00.10(15), OII(19)00.35(8), CrII(149)00.58(30)	7
01.5		5
02.8	NiII(59)02.465(10), FeIII(152)02.808(8), NiII(11)02.98(60R), FeIII(138)03.012(7)	
03.5:	FeIII(138)03.203(3), FeII(167)03.349(1), NiII(51)03.85(6)	13
05.1	FeII(184)04.736(1), NiII(38,59)05.24(10)	5
05.8:		13
07.5	CrII(19)07.19(35), NiII(38)07.79(8), SiII(18.02)07.863(2)	
08.5	NiII(50)08.52(12)	
09.6	CrIII(54)09.99(50)	7
11.0:	FeII(245)11.224(1)	29
11.6	SiII(22)11.719(1)	29
12.4	FeII(105)12.028(1), NiII(58)12.91(20)	8,29
		8

Table 4 (Continued)

Observed Wavelengths	Identifications	Notes
2313.9	FeII(288)13.30(1)	8
14.6:	CrIII(44)14.63(80d), CrII(19)14.71(40)	24
16.0	NiII(11)16.034(80R), NII(16)16.493(7), [NII(16)16.690(6)]	
17.2	NII(16)17.046(8), [FeII(183)17.377(0)]	
18.4	FeII(183)18.343(1), NiII(38)18.48(12), FeII(132)18.534(1)	8
19.2	CrIII(44)19.07(100), FeIII(72)19.220(10), CrII(34)19.38(50), FeIII(144)19.466(8)	8,25
20.0	NiII(37)19.73(12), NII(16)19.941(4)	8
21.5	NII(16)21.650(4), FeII(183)21.687(1), FeIII(132)21.71(10)	
22.6	FeII(183)22.326(1)	6
24.4	FeIII(156)24.359(8)	8
25.1	CrIII(44)24.88(150), FeII(183)25.296(1), FeII(288)25.577(1)	8
26.0		8
26.8:	NiII(11)26.44(15), FeIII(121)26.948(10)	24
27.5	YIII(1)27.30(20), FeII(3)27.391(7), CrIII(62)27.67(20), FeII(183)27.953(1)	8
28.8		
29.6	MgII(-)29.578(3), FeIII(72)29.905(9), SiIII(87)29.931(2h)	35
30.4	VIII(11)30.37(100)	
31.2	FeII(183)31.076(1n), FeII(35)31.308(7)	
32.0		24
32.8	FeII(3)32.798(8), [CrIII(44)33.09(25)]	
33.6	[CrII(47)33.46(25)]	
34.5	SiII(0.01)34.203(10), SiII(0.01)34.404(30), NiII(20)34.59(30), SiII(0.01)34.606(30)	
36.7	NiII(27)36.59(5), NiII(50)36.70(15), FeIII(121)36.768(10)	6,7
38.1	FeII(3)38.605(8)	
39.4	FeIII(72)38.961(10), FeII(105)39.408(2)	
40.8	FeII(344)40.352(1), FeII(166)40.459(2), CrIII(-)40.51(60), FeII(166)40.939(1), NiII(50)41.18(40)	22,25
41.6	FeII(314)41.953(1)	
43.6	NiII(37)43.489(12), FeII(3)43.495(8), FeII(35)43.958(6)	8
44.4	SiII(0.01)44.203(10), FeII(3)44.278(8)	8
45.3	NiII(58)45.26(30), FeII(165)45.327(5), NiII(11)45.44(15)	8
46.4	FeII(314,379)46.271(1)	8
48.3	FeII(36)48.118(8), FeII(3)48.300(8)	5,8A
49.6	SiII(36)49.54(10H), SiII(0.01)50.174(20), FeII(379)50.186(1h)	8A
51.2	NiII(19)50.84(8), FeII(165)51.198(5)	8
51.9	FeII(379)51.672(1h), FeII(379)52.315(2h)	8
53.6	SiII(35)53.09(20H), FeII(379)53.682(1h)	
54.7:	FeII(165)54.473(5), FeII(35)54.884(5), [FeII(165)55.218(3)]	6,24
56.0	[FeII(379)55.351(3h)], SiII(35)56.295(100H), NiII(22)56.41(25)	7
57.2	FeII(333,379)57.005(3n1), SiII(35)57.18(30H)	5
58.0	SiII(35)57.97(50H), [VIII(15)58.70(160)]	5
59.2	FeII(3,165,379)59.111(8), FeII(165)59.594(3)	2

Table 4 (Continued)

Observed Wavelength	Identifications	Notes
2360.0	FeII(35)59.999(8), SiII(36)60.20(10H), FeII(36)60.287(8), SiII(36)60.59(5h)	2
61.2		8
62.3	FeII(165,379)61.728(3), FeII(35)62.014(6)	6,8,25
63.8	FeII(165)63.641(1), FeII(270)63.811(3), FeII(379)63.855(4), SiII(35)64.33(3h), FeII(3)64.825(8)	
65.6	FeII(-)65.771(2)	25
66.7	SiII(18.01)66.053(5), VIII(15)66.27(180), NiII(36)66.56(10), FeII(35)66.591(5), FeII(2,165)66.864(1), SiII(18.01)66.972(5h), YIII(1)67.25(200), NiII(11)67.395(20)	6
68.0	FeII(36)68.593(7)	30
69.6	NiII(36)69.23(6), FeII(182)69.232(1)	33
70.6	FeII(379)69.960(5), FeII(35)70.494(5), VIII(10)71.04(200)	21
72.8	FeII(333)72.631(3)	5
73.9	FeII(2)73.733(8), FeIII(115)73.904(5), SiII(18.01)74.255(5h)	
75.2	CII(26)75.08(4h1), FeII(36)75.192(7), NiII(21)75.426(30)	5,8
76.4	FeII(379)76.435(5h), FeIII(115)76.725(5)	8
79.1	FeII(270,377)78.526(2), CoII(7)78.636(100), FeII(182)79.003(2), FeII(211)79.155(2), FeII(36)79.275(7)	5,17
80.8	FeII(3)80.757(7)	
82.0	CrII(34,34)81.48(50), FeII(2)82.034(9), FeII(35)82.356(3), VIII(10)82.45(150)	7,8
83.2	FeII(117)82.902(3), FeII(2)83.060(4), FeII(36)83.242(7)	8
84.4	FeII(36)84.386(7), FeII(35)84.999(3)	8
86.6	FeII(396)86.387(2d)	
88.0	NiII(19)87.77(25), FeII(148)88.230(2), FeII(117)88.387(3)	
88.8	FeII(2)88.629(9), CoII(7)88.930(100), MnIII(14)89.023(300), FeIII(131)89.533(8), FeII(244)89.870(1)	7,21
90.8	FeII(402)90.766(1h)	8,25
91.6	FeII(35)91.475(4)	8
92.4	NiII(36)92.58(10)	8
93.2	NiII(36)93.10(6), VIII(10)93.54(125)	8
94.8	NiII(20)94.518(50R), NiII(36)94.843(12), FeII(116)94.892(3)	8A
95.6	FeII(2)95.416(7), FeII(2)95.627(9)	8A
96.8	FeII(21)96.714(3)	7
98.0		25
99.2	FeII(402)98.664(2), FeII(2,36)99.237(9), FeII(396)99.499(1)	8
2400.4	FeII(181)00.274(2), FeII(244)00.338(4)	8
01.6	FeII(402)01.301(2h), CII(16)01.761(5z)	8,25
02.4	FeII(181)02.255(2), CII(16)02.402(7z), FeII(377)02.450(8), FeII(36)02.597(3)	7,8
04.8	VIII(10)04.16(100), FeII(2)04.430(7), CrIII(-)04.72(40), FeII(2)04.882(9), NiII(49)05.17(15)	36
06.0:	FeII(402)05.688(2h), NiIII(23)05.937(50), FeII(131)06.086(1), NiII(36)06.39(5)	33
06.8	FeII(2)06.660(9), NiII(36)06.89(6), FeII(302)06.982(3)	
07.7:	FeII(116)07.940(2), FeII(402)08.563(2h)	21,25
09.7	FeII(150)09.377(1), FeII(224)09.708(1)	33
10.5	FeII(2)10.521(9)	8

Table 4 (Continued)

Observed Wavelength	Identifications	Notes
2411.2:	FeII(2)11.062(9)	8
12.0	FeII(388)12.021(1), NiII(11)12.25(5)	24
13.3	NiII(19)13.04(8), FeII(2)13.308(9), CrIII(59)13.65(30)	2
14.2	TiIII(9)13.97(15), FeII(164)14.08(1), YIII(1)14.68(100)	2,16
15.2	FeII(181)15.068(3)	25
16.1	NiII(20)16.134(50R), CrII(235)16.40(40)	8
16.7	FeII(396)16.457(2h), FeII(286)16.705(1)	8
18.1	FeII(244)17.859(6)	
18.8	FeII(396)18.440(2), FeIII(47)18.568(7), FeII(364)18.702(1)	24
20.0	FeII(180)19.892(1), FeII(396)19.998(1), SiII(34)20.19(3h)	5
20.8		
21.6	FeIII(103)21.514(5), SiII(34)21.72(3h)	13
23.2:	FeII(301)22.688(4), FeII(115)22.932(1), FeII(301)23.204(4), SiII(34)23.42(3h)	6,19,25
24.4	FeII(313)23.919(1), FeII(180)24.141(8), FeII(149)24.380(3), FeII(180,301)24.585(3)	6
25.9	FeII(210)25.362(2), FeII(224)25.677(3), FeII(130)25.904(2)	
27.2	FeII(114)27.197(1h)	
29.1	FeII(301)28.286(4), FeII(300)28.367(6), SiII(34)28.45(10h), FeII(301)28.795(3), FeII(375)28.970(6), FeII(301)29.034(3), FeII(385)29.148(10), FeII(148)29.382(3), FeII(180)29.497(2)	6,19
29.9:	CrIII(59)29.75(30), FeII(-)29.849(2), FeII(180)30.073(7), FeII(301,301)30.184(2)	24
30.8:	FeII(375)30.876(10), FeII(375)31.236(3), FeIII(114)31.325(5), NiII(49)31.57(8)	6,13,14
32.8	FeII(321)32.701(1), FeII(321)32.867(7), FeII(384)33.050(1)	8
33.6	FeII(164)33.495(4), OII(18)33.56(9), NiII(19)33.57(10), FeII(359)33.571(1)	8
34.9	FeII(375)34.052(15), FeII(384)34.229(20), NiIII(26)34.230(30), FeII(301)34.645(3), FeII(321)34.733(7), FeII(375)34.822(5), FeII(190)34.942(7), FeII(383)34.998(25), CrIII(59)35.32(30)	6,8
37.4	FeII(209)36.222(2), FeII(384)36.615(20), FeII(375)36.987(10), FeII(375)37.100(5), FeII(210)37.157(3), FeII(313)37.256(3), FeII(375)37.632(20), MnIII(Y)37.853(60), NiII(19)37.892(20), FeII(47)38.174(8)	6,8, 19,21
39.4	FeII(209)39.301(8), FeII(375)39.860(8)	8
40.4:	FeII(300)40.416(4)	13
41.2:	FeII(395)41.133(2h), MnIII(Y)41.319(80), FeII(210)41.548(1)	13,21,25
43.9	FeII(375)43.842(15), FeII(375)44.274(10), FeII(148)44.515(8)	6,19
45.6	FeII(375)45.114(40), OII(18)45.55(10), FeII(148)45.569(7), FeII(300)45.787(4)	8
46.4	FeII(328)46.103(4), FeII(375)46.405(25)	8
47.6	FeII(300)47.203(3), FeII(299)47.320(3), FeIII(143)47.374(7), FeII(299)47.560(1h), FeII(320)47.753(6)	
48.4:	NiIII(23)48.347(100)	24
50.0	MgII(5)49.573(6), FeII(34)49.739(1), FeII(300)49.961(4), FeII(-)50.027(3), FeII(375)50.134(5), FeII(300)50.196(4)	6
51.3	FeII(34)51.106(2), FeII(209)51.208(3), FeII(114,300)51.354(1)	
53.3	FeII(300)52.916(1), FeII(386)53.165(2h)	2
53.9:	FeII(375)53.747(15), FeII(163)53.794(3), FeII(375)53.935(25), FeII(401)53.973(2h), FeII(222)54.158(2)	2

Table 4 (Continued)

Observed Wavelength	Identifications	Notes
2455.0:	FeII(320)54.574(6)	13
56.0	FeII(395)55.721(2h), FeII(384)55.892(10)	
57.6	FeII(320)56.641(2), FeII(209)56.816(2), CrIII(43)56.83(50)	5,19
59.0	FeII(209)58.782(8), FeII(299)58.964(5), CrIII(43)58.98(30), FeII(163,312)59.097(2)	
60.4	FeII(401)60.171(1h), FeII(395)60.453(5), SiII(17)60.50(5), FeII(359)60.644(2)	8
61.6:	FeII(209)61.382(8), FeII(163)61.667(7), FeII(209)61.855(8), FeII(395)62.325(1h)	6,8
63.9	FeII(206)63.280(6), FeII(129,162)63.726(3), FeII(385)63.900(5), FeII(208)64.007(7)	5,9
64.9:	FeII(208)64.903(7), FeII(148)65.194(7)	33
65.8:	FeII(208)65.911(7)	2
66.4	FeII(179)66.670(7), FeII(179)66.811(7)	2,21
68.4	FeII(387)67.732(6), FeII(332)68.194(1), FeII(145,163)68.292(4), FeII(113)68.561(1)	8
69.3:	FeII(163)69.373(1), FeII(299)69.512(6), FeII(382)69.712(8), FeII(350)69.923(2)	7,8,26
70.8	FeII(208)70.406(4), FeII(179)70.661(7), FeII(223)70.752(4), FeII(394)71.276(1h)	6,8
72.7	FeII(162)72.075(2), FeII(179)72.426(5), FeII(395)72.610(4), CrIII(43)72.88(100), FeII(400)73.037(1), NiII(19)73.13(15), FeII(148)73.314(6)	6,8,21
75.0	FeII(208)74.762(6), FeII(395)75.125(3h), AlII(12)75.260(4), FeII(395)75.548(3h)	6
76.5	FeII(163)76.264(3)	2
77.1:	FeII(162)77.342(4), FeII(113)77.487(1)	2
78.0	FeII(224)78.115(3), FeII(149)78.206(2), FeII(161)78.449(2), CI(61)78.561(16), FeII(179)78.568(6)	7,8
79.2	FeII(350)79.225(1), FeII(382)79.385(3)	8
79.8:	CrIII(43)79.77(100), FeII(179)80.155(8)	13,26
81.2	FeII(243)81.044(3), SiIII(89)81.508(3), [FeII(112,311)81.576(2)]	
82.3	FeII(161)82.117(8), FeII(358)82.320(3), FeII(207)82.654(8)	
84.2	CrIII(43)83.06(100), SiIII(89)83.196(6), FeII(331)83.721(331), FeII(243)84.243(5), HiII(61)84.32(10u), FeII(400)84.442(3h), FeII(243)84.553(1)	6,17
86.5	FeII(208)86.343(7), FeII(385)87.356(5b)	7,8
88.0	CrIII(66)88.26(60), [FeII(-)88.335(2)]	8
89.7	CrII(92)89.28(50), FeII(161)89.485(7), SiII(17)89.59(5), FeII(207)89.826(8)	5,6,9
90.7	FeII(331)90.728(4), FeII(179)90.856(6), FeII(207)91.392(6)	
93.3	FeII(243)92.341(4), FeII(161,207)93.174(2), FeII(161)93.269(12), FeII(400)93.880(2)	6,9
94.4:	FeII(161)94.111(2), FeII(382)94.893(2)	24,26
95.6	FeII(-)95.860(5)	
96.8	SiII(17)96.24(6), NiI(20)96.83(5)	6,22,25
97.8	FeII(128,242)97.709(3), NiII(18)97.80(6), FeII(175,207)97.817(7)	
99.0	FeII(161)98.897(10), SiII(17)99.08(6), CrIII(66)00.27(40)	10,30
2501.2	FeII(357)00.919(5), SiII(18)00.928(3)	
02.5	SiII(18)01.970(5), FeII(207)02.388(7)	8,22
03.6	FeII(206)03.323(7), FeII(161,175)03.560(5), FeII(285)03.870(7)	6,8
04.8	SiII(17.03)04.331(2h), SiII(17.03)05.091(2h), [FeII(33)05.217(2)]	8
06.0	HiII(48)05.84(20), FeII(207)06.091(7), VII(21)06.215(200)	8A
06.8	CrIII(-)06.41(80), FeII(128)06.429(2), FeII(175)06.797(2h), SiI(1)06.897(425), FeII(207)07.014(7)	8A

Table 4 (Continued)

Observed Wavelength	Identifications	Notes
2507.6	FeII(363)07.607(2h), FeII(363)07.695(2h), SIII(7)08.15(7)	
08.9:	FeII(242)09.117(4), CII(14)09.121(10)	2
09.5:	NiIII(22)09.467(10)	2
10.8	NiII(18)10.871(30)	22,23
11.9	FeII(33)11.375(2), FeIII(93)11.418(6), CII(14)11.734(5), FeII(161)11.759(10), FeII(175)11.910(2), CII(14)12.065(12), FeII(343)12.513(5)	6
13.3	FeIII(93)12.902(6), FeII(363)13.155(2h), FeII(207)13.372(1), CrII(308)13.66(50w1)	25
14.4	SiI(1)14.316(375), FeII(285)14.383(7), VII(21)14.633(200)	
15.2	FeII(175,206)14.912(3), CrII(308)15.06(55w1), FeII(-)15.105(3)	25
16.0	TiIII(7)16.01(20), SiI(1)16.112(500)	8
17.1	FeII(147)17.124(6), FeII(207)17.211(2)	5,8
18.1	CrII(308)18.29(100w1)	7
19.6	FeII(268)19.044(7), SiI(1)19.202(350), FeII(222)19.404(2), FeIII(93)20.162(5), NII(19)20.222(5), [FeII(363)20.267(1h)]	
21.2	NII(19)20.791(6), FeII(268)21.099(7), FeII(-)21.209(2), FeII(-)21.485(2)	8,22
22.0	FeII(330)21.810(7), FeII(159)22.189(3), NII(19)22.227(7)	8
23.1	CrII(308)23.24(150w1), FeII(363)23.451(1h), SiI(1)24.108(425)	6,7,18
25.6	FeII(330)25.114(4), FeII(159)25.386(10), NiII(62)25.42(10u), FeII(241)25.858(3), FeII(362)25.933(2)	8,19
26.4	FeII(159)26.071(5), FeII(145)26.292(9)	8
27.2	FeII(159)27.107(6), FeII(329)27.694(5), TiIII(7)27.80(15), VII(50)27.903(250)	8,30
29.2	[SiI(1)28.509(450)], VII(50)28.833(220), FeII(357)29.078(5), FeII(241)29.221(5), CrII(9)29.48(25), FeII(145,177)29.545(10)	2
29.9	CrII(308)29.90(75w1), FeII(329)29.929(1), FeII(178,363)30.103(6), CrII(108)30.18(150w1), CrII(308)30.20(150w1)	2
31.2	CrIII(42)30.99(80), FeII(33)31.082(1)	
32.0	CrII(9)31.84(25), FeIII(92)31.890(5)	
32.8:		4
34.3	FeII(159)33.626(10), CrII(9)34.33(40), FeII(159)34.413(9)	8
35.2	FeII(405)35.364(3), FeII(177)35.480(7)	8
36.8	FeII(241)36.673(7), FeII(159,159)36.822(9), FeII(363)37.142(5)	
38.2:	CrIII(42)37.73(80), FeII(319)38.205(6), CrII(308)38.31(100w1), FeII(160)38.509(5), FeII(268)38.577(2)	33
38.8	FeII(363)38.681(2), FeII(158)38.794(9), FeII(158)38.898(8), FeII(158)39.003(10), NiII(48)39.09(7)	6
40.8	TiIII(7)40.02(15), FeII(349)40.531(2), FeII(177,343)40.669(6), FeII(177)41.096(7), SiII(26)41.393(2)	6
42.0	TiIV(4)41.786(8), FeII(158)41.831(7), FeII(33)42.316(1)	8,12
43.1	FeII(223)42.733(5), FeII(159)43.382(8), FeII(177)43.431(5), NiIII(22)43.513(30)	8
44.6:	SiII(26)44.046(3), CrIII(42)44.37(80)	22,33
45.2	FeII(147)44.972(6), CrIII(57)45.17(50), FeII(159)45.215(7), FeII(267)45.432(3)	8
45.9:	NiII(18)45.903(20), SiIII(56)46.093(10)	24
46.9	FeII(177)46.667(8), TiIV(4)46.880(12), FeII(158)47.330(5)	8,12

Table 4 (Continued)

Observed Wavelength	Identifications	Notes
2548.8	VIII(14)48.22(150), FeII(146)48.325(4), FeII(158)48.500(6), FeII(145)48.741(7), FeII(319)48.925(5), FeII(284)49.082(7)	6,8A,19
49.6:	FeII(177)49.399(8), FeII(177)49.453(8), NiII(48)49.56(8), FeII(266)49.774(3), FeII(240)50.023(8), FeII(363)50.155(2)	24
50.8	FeII(158)50.575(2), FeII(240)50.680(8), NiII(17)51.04(5), FeIII(130)51.098(6), FeII(1[illegible]d)51.201(4)	8A
51.8	CrII(109)51.58(50)	24
52.8		
54.7	FeII(127)53.738(2h), VIII(14)54.23(160), CII(30)54.478(3), SiII(26)54.530(10), [FeII(205)54.950(1)], FeII(1[illegible])55.066(5), NiII(62)55.13(10u)	5,6,9
55.7:	FeII(177)55.447(5), CrII(-)55.47(75wl), NiII(47)55.68(6), FeIII(92)56.207(5)	8,26
56.8:	FeII(158)57.079(2h), SiII(26)57.206(1)	2,8
57.6	FeII(175)57.500(4), NiII(47)57.88(6)	2
59.3:	SiIII(55)59.210(14), FeII(266)59.237(3)	2A
60.0	CrII(317)59.71(50wl), FeII(205)59.774(5), FeII(267)59.921(5), FeII(221)60.278(7), NiII(62)60.30(10u)	2A,8
60.8		8
62.3	FeII(221)62.094(6), FeII(64)62.535(13)	6
63.8	TiIII(6)63.42(15), FeII(64)63.472(12), CrII(89)63.58(50), MnII(20)63.640(200), FeII(266)63.834(4), [CrIII(-)64.76(80)]	7
66.6	NiII(62)66.08(15u), FeII(404)66.218(5), FeII(405)66.397(4), FeII(174)66.623(4), FeII(64)66.908(9)	6
67.4:	TiIII(6)67.53(8)	24
68.4	FeII(145)68.405(6)	
69.2	FeII(175)68.879(3)	
71.0	FeII(266,349)69.775(4), FeII(412)70.527(5), FeII(284)70.843(7), FeII(174)71.542(2)	9
72.0	CrII(89)71.78(50)	
73.4	FeII(190)72.965(3), FeII(205)73.206(4), CrII(232)73.54(50), FeII(284)73.754(1)	2
74.3	FeII(144)74.363(9), CII(24)74.826(10hl), FeIII(80)74.838(7)	2
76.0	MnII(1)76.107(400), TiIII(6)76.43(5)	2A,6
76.8	FeII(326)76.859(7)	2A,8
77.6	FeII(64)77.920(9), CrIII(-)77.96(40)	8,30
79.2	FeII(265)78.985(1), FeII(-)79.127(3h), FeII(239,266)79.406(3)	
80.0		
81.1	FeII(190)81.111(2)	5
82.6	FeIII(80)82.37(8), FeII(310)82.422(3), FeII(64)82.582(10), FeII(174)83.047(2)	18
84.0	NiII(48)84.01(8), FeIII(137)84.038(6), CrII(89)84.10(50)	
85.8	FeII(326)85.629(5), FeII(1)85.876(13)	5
86.7:		13,25
88.4	FeII(326)87.945(7), FeII(145)88.182(3), FeII(265)88.786(3)	6,25
90.1	FeII(145)90.548(4), [CrII(70)90.72(75)]	6
91.5	FeII(64)91.542(10)	
92.7	FeII(318)92.781(9), VIII(13)93.07(160)	
93.6:	FeII(64)93.722(7), MnII(1)93.731(300)	24

Table 4 (Continued)

Observed Wavelength	Identifications	Notes
2595.2	FeII(310)94.964(2), VIII(13)95.11(170), FeII(172)95.285(2)	8,19,25
95.9	FeIII(80)95.622(8)	8
97.6		
98.4:	FeII(1)98.369(14)	33
99.2	FeII(1)99.395(14)	6
3600.5	[FeII(204)00.415(1)]	8,25
01.5:		5,8,25
02.4		
03.7	[FeII(404)04.048(1)], SiII(15)04.422(2), [FeII(265)04.655(1)]	6,18
05.6	FeII(404)05.034(6), FeII(342)05.307(6), FeII(204)05.416(6), MnII(1)05.697(10X0), FeII(356)05.895(3), SiII(15)06.084(1)	6,8
07.1	FeII(342)06.514(7), FeII(1)07.086(13), CrII(70)07.90(50), FeIII(91)08.112(7)	6,8,21
09.4	FeII(171)08.852(3), FeII(310)09.122(5), FeII(265)09.431(2), FeII(204)09.859(4)	6
10.8	NiII(62)10.08(25u), MnII(19)10.202(200), CrII(316)10.81(50w1), FeII(64)11.075(6), [FeII(173)11.339(1)]	33
11.9	FeII(1)11.873(13)	6
13.2:		11,25
14.0	FeII(172)13.576(2), FeII(1)13.820(13), FeII(264)14.177(2)	
15.4	FeII(171)14.867(2), NiII(65)15.20(15u)	
16.5	CrIII(65)16.50(80)	5
17.5	FeIII(142)17.149(8), FeII(1)17.618(14)	
18.8	MnII(19)18.142(200), FeII(171)19.071(7)	37
20.4	FeII(173)20.175(4), CII(27)20.20(3h1), FeII(1)20.408(6), CrII(316)20.46(50w1), FeII(171)20.693(7)	
21.6	FeII(1)21.669(10)	
22.4	FeII(318)23.129(4)	13
23.6:	FeII(171)23.721(5)	2
24.4		2
25.3:	FeII(318)25.489(9), MnII(19)25.606(200u)	25,33
26.0	FeII(1)25.664(13), CrIII(-)26.08(100)	8
26.8	FeII(173)26.499(6), [FeII(203)26.695(1)]	8
28.0	FeII(1)28.291(13), FeII(203)28.569(2)	18
29.8	FeII(171)29.590(8), FeII(171)30.068(8), NiII(17)30.266(8)	
31.4	CrII(63)30.93(50), FeII(1,171)31.045(13), FeII(1)31.321(13), AlII(11)31.553(7), FeII(171)31.607(8)	5,6
32.7	MnII(19)32.353(200), [FeII(356)33.200(5)]	25
35.3	FeII(238,296)35.401(2)	6
37.3	FeII(410)37.515(2h), FeII(221)37.643(6), AlII(14)37.696(5), MnII(19)38.173(200), AlII(14)38.263(4)	6,7,10
39.6	FeII(221)39.560(5)	8
40.4	CII(32,32)40.560(6), CrIII(65)40.73(100), SiIII(86)40.788(11)	8
41.7	FeIII(91)41.408(5), CII(32,32)41.425(8w), FeII(309)42.015(5)	8A
42.8		8A

Table 4 (Continued)

Observed Wavelength	Identifications	Notes
2644.0		33
45.2	FeII(263,309)45.084(3), FeII(421)45.191(2), FeII(426)45.328(3)	6
46.6	[FeII(237)46.206(1)], FeIII(91)46.751(6)	
48.0:		4,8
48.8	NiII(17)48.713(3)	8
49.6:	FeII(427)49.467(4)	4,8
50.4	FeII(410)50.492(4h)	8
51.2:	[FeII(237)51.297(1)]	2
51.9	FeII(355)51.691(3?), [FeII(237)52.557(3)]	1,2
53.6	CrII(8)53.57(85)	
54.7	FeII(410)54.639(2h)	5,6,25
55.9	SiIII(84)55.512(14), SiII(25)55.803(3h), [NiII(63)55.90(6u)]	
58.0	FeII(283)57.917(2), FeII(309)58.251(4)	
58.8	CrII(8)58.59(100), ClII(7)58.723(950)	
60.6	FeIII(91)59.614(4), SiII(25)59.781(5h), MgII(4)60.755(10), MgII(4)60.821(10), CrII(329)61.22(50v), CrII(8)61.73(50)	6,9,10
62.8:	FeII(410)62.563(2h), VII(213)63.25(250H), CrII(8)63.42(75)	11
64.7	CrII(8)63.67(45), FeII(237)64.209(2), FeII(427)64.259(3), FeII(263)64.665(10), NiII(45)65.25(6), SiII(19)65.40(7)	6
66.4	CrII(8)66.02(80), FeII(263)66.631(10)	
67.5:	FeII(410)67.221(2h)	13
68.7	CrII(8)68.71(70), [FeII(429)68.938(1h)], [FeII(429)69.023(1h)], AlII(1)69.166(10)	6
70.4	FeII(355)70.384(2)	
71.2:	FeII(410)71.404(2h), CrII(8)71.80(80), [FeII(432)71.941(1h)]	7,8
72.8	[FeII(429)72.152(1h)], FeII(429)72.506(2h), MnII(34)72.581(200), CrII(8)72.83(90)	5,8
74.4		
75.9		5,19
76.8	FeII(426)76.881(2), ClII(6)76.952(750), CrII(8)77.13(100), HeI(2^3S-10^3P^o)77.135(4), CrII(8)77.19(125)	8
78.0	SiII(20)77.906(3h)	8
79.2	CrII(100)78.79(100), FeIII(141)78.810(6), VII(3)79.327(200r)	8A
80.0		8A,25
80.8	FeII(429)80.723(2), [FeII(202)80.784(1)], FeII(416,429)81.030(2)	
81.8	SiII(20)82.210(10h)	
82.8	FeII(425)82.510(3), FeII(416)82.989(3)	
84.7	NiII(63)84.405(20u), FeII(283)84.752(10), FeII(201)84.940(3), CrII(85,85)85.19(18)	6,8,19
86.4	[FeII(202)86.100(1)], [FeII(262)86.388(1)]	8
87.2:	CrII(7)87.09(65)	8,25,33
88.2	VII(3)87.960(300r), ClII(6)88.040(1200), CrII(54)88.28(55), [CrII(186)88.41(45)]	2,8
89.0:		2
90.5	[VII(3)90.792(200)]	11
90.2:	CrII(8,85)91.03(90), SiII(19)91.68(5), FeII(202)91.732(4)	2,38

Table 4 (Continued)

Observed Wavelength	Identifications	Notes
2746.4	FeII(373)46.157(4h), CrII(58,253)46.21(50), FeII(62)46.487(14), CII(15)46.488(10)	8
47.2	FeII(63)46.978(14), CII(15)47.282(12f)	2
47.9		2
49.4	CrII(6)48.98(100), FeII(63)49.178(13), FeII(62)49.324(14), FeII(63)49.482(12), FeII(199)50.003(2)	6
51.3	CrII(6)50.72(100), FeII(200)50.896(37), FeII(217)51.121(6), CrII(6)51.85(85), FeII(418)52.092(3h), FeII(373)52.159(4h)	7,18
52.6:	FeII(417)53.034(2)	24
53.6	FeII(235)53.289(12)	
54.8:	FeII(-)54.155(2), FeII(373)54.907(6h)	33
55.6	FeII(62)55.733(15)	17
56.3	FeII(200)56.504(5), SIII(16)56.89(8), FeII(199)57.029(5)	24
58.0	CrII(6)57.72(80), FeII(-)57.818(2)	8,25
59.0	CrII(252)58.99(40), FeII(32)59.336(2), CrII(101)59.40(50)	8
60.0	[FeII(-)61.128(2)]	8,21
62.4	[FeII(-)61.635(2)], FeII(63)61.813(9), FeII(373)62.340(4h), FeII(199)62.436(4), CrII(6)62.58(140)	6,8
63.8:	FeII(440)63.674(2h), HeI(2^3S-7^3P^o)63.804(20), FeII(199)63.913(3), FeII(198)64.787(3)	8,10
65.6		
67.3	CrII(6)66.55(150), FeII(235,373)67.500(13)	39
68.8	CrII(252)68.59(50), FeII(63)68.940(8), FeII(200)69.153(6)	
69.6	FeII(198)69.354(9)	24
70.4	FeII(-)70.432(2), FeII(198,199)70.507(5)	
72.8	[FeII(63)72.719(1)]	8
73.6:	FeIII(158)73.306(8)	2,8
74.7:	CrII(266)74.44(50), FeII(218)74.686(7)	2
75.8	[SiII(16)75.25(5)], FeII(199)76.180(4)	
77.2:	FeII(373)76.923(5h), FeII(233)77.892(5), CrII(266)78.06(70)	11,25
78.4		8
79.2	FeI(234)79.302(11)	8
80.0	FeII(348)79.906(4), FeII(348)80.035(3), CrII(183,252)80.30(85)	8
81.7		6
83.6	FeII(234)83.690(12), FeII(295)83.959(2)	8
84.4	FeII(295)84.282(2)	8
85.2	FeII(373)85.213(8h), SiII(20)85.49(6), CrII(183)85.69(65)	8
86.4		8
87.2	FeII(380)87.260(3h)	8
88.4:	FeIII(120)88.258(6)	8,25
90.7	FeII(282)90.557(3), MgII(3)90.768(40), FeII(232)91.001(2), CrII(183)92.16(60)	8,10
92.8		
93.8	FeII(337)93.239(2), FeII(198)93.887(7)	
95.4	MgII(1)95.523(50), FeII(373)96.644(4h)	7

Table 4 (Continued)

Observed Wavelength	Identifications	Notes
2692.8	FeII(283)92.601(10), FeII(62)92.826(5)	2,8
93.6	CrII(84)93.53(45), FeII(261)93.852(3), FeII(374)94.269(2)	8
95.1	FeIII(159)95.13(10n), FeIII(159)95.34(9n)	
96.2	HeI(2^3S-9^3P^o)96.119(7)	
97.2	FeIII(159)96.89(7n), FeII(341)97.330(4), CIII(28)97.42(3), FeII(341)97.453(5), FeII(325)97.726(2), CIII(28)97.75(7), FeII(431)97.801(2h)	2
98.2:	CrII(7)98.40(100), FeIII(159)98.41(7n), CrII(7)98.68(35)	2
99.2	FeII(416)99.185(2), CrII(141)99.34(20), FeIII(159)00.02(8n)	13,21
2701.2	VII(1)00.944(300r), CrII(62)01.10(30), FeII(159)01.13(8n)	8
02.4	MnII(18)01.693(18), CrII(277)01.75(12), VII(2)02.185(200r), [SIII(19)02.76(5)]	5,8
03.6	CrII(84)03.56(75), CrII(7)03.85(30), FeII(261)03.988(10)	
04.8	[FeII(202)04.569(1)], FeIII(159)05.10(7n)	
06.0	MnII(18)05.727(150), VII(1)06.17(200rs)	
07.6	FeII(341)06.566(7), FeII(339)07.128(6)	19
09.0	NiII(63)08.780(9u), CrII(186)08.78(65), FeII(218)09.051(7), CrII(186)09.31(60)	
10.0	NII(22)09.837(6)	
11.6:	CrII(269)10.92(65), FeII(201)11.842(9)	2,26
12.3	CrII(7)12.30(80), FeII(201)12.386(6)	2,8
14.3	FeII(63)14.414(13)	5,8
15.2		8
16.8	FeII(261)16.216(9), FeII(434)16.572(3), FeII(62)16.683(3h)	8A,22
17.6	CrII(7,102)17.51(40), FeII(431)17.888(3h), CrII(102)18.32(40), CrII(121)18.43(55)	8A
19.0	FeII(417)18.639(5), SIII(16)18.88(7), FeII(339)19.296(339)	8A
20.8	FeIII(113)20.381(5)	
21.6:	SIII(19)21.40(5), FeII(199)21.813(4), FeII(260)22.060(5)	11,25
22.4	SiII(19)22.250(2h), CrII(7)22.74(70)	
23.6	HeI(2^3S-8^3P^o)23.191(10), CrII(59)23.64(60), CrII(102)24.04(65)	
24.8	FeII(62)24.879(9)	7
26.8	FeII(434)26.254(3h), FeII(261)26.509(3), SiII(19)26.702(5h)	5,11
27.6	CrII(102)27.25(85), FeII(200)27.382(8), FeII(63)27.538(13)	
28.8	FeII(-)28.567(2h), CII(31)28.707(4), FeII(260)28.898(5)	
30.1	[FeII(62)30.735(11)]	
31.6:	SIII(16)31.10(7), FeII(-)31.841(2), FeII(236)32.004(4), FeII(-)32.328(2)	2
32.8	FeII(32)32.441(2), FeII(417)32.936(3), OII(20)33.34(10)	2,21
34.9	FeII(381)34.655(2), FeII(416)34.803(2)	7
36.8	[FeII(220)36.500(1)], FeII(63)36.968(12), FeII(200)37.630(4)	18
39.7	FeII(63)39.545(15), CrII(6)40.09(35)	
41.6	SIII(16)41.01(5), FeII(418)41.045(2), FeII(260)41.395(6), CrII(6)42.02(7)	8,19
42.4		8
43.2	NiII(66)42.931(15u), FeII(62)43.196(14), CrII(6)43.63(70)	8
44.0		8,25
45.1	FeII(260)44.880(3), CrII(58)44.97(40)	

Table 4 (Continued)

Observed Wavelength	Identifications	Notes
2797.2:	FeII(436)97.215(2h)	11
98.0	FeII(234)97.914(5), MgII(3)97.989(40)	8
99.4	FeII(233)99.292(7), FeII(198)99.712(2)	8
2801.2:	FeII(436)00.548(2h), CrII(182)00.77(85)	11,25
02.6	MgII(1)02.698(50), FeIII(120)03.441(6), FeII(438)03.450(2h)	8,40
04.4	FeII(259)04.021(3)	8
05.3	FeII(438)05.007(2h), FeII(295)05.315(3), NiII(54)05.67(10), FeII(259)05.786(4)	8
06.4		25
07.6		25
08.8		33
10.0	FeII(380)09.804(4h), TiII(25)10.276(50)	
11.6		22
12.4	CrII(182,257)12.00(85), FeII(215)12.493(3)	
13.7	FeIII(120)13.241(10), FeII(198)13.631(5)	6,8
14.8		8
16.0	AlII(7)16.189(20)	8A
17.2	YIII(3)17.03(200), SiIII(88)17.110(9), FeII(380)17.107(4h)	8A
18.3	TiII(25)17.838(60), SiII(24)18.302(2), CrII(182)18.36(75), FeIII(157)18.624(6)	8A,26
20.3	FeII(196)19.327(3), SiII(24)20.580(2h)	8,22,23
21.2		8
22.1	CrII(182)22.01(65), CrII(82)22.38(100)	2,8
22.8:		2
24.0		2A
24.8		2A,8
26.0	FeII(195)25.747(3), FeII(255)26.024(4)	8
27.5	FeII(231)27.431(5), TiII(25)28.150(60)	8A
28.5	FeII(231)28.622(6), FeII(255)28.681(5), HeI(12)29.076(40), SiIII(88)29.23(1)	8A
30.0	SiIII(90)30.02(1)	8
31.7	CrII(82)30.46(100), CrII(81)30.60(60), SiIII(88)31.490(7), FeII(217)31.562(11), GeII(12)31.845(10)	8,18,41
32.8	CrII(195)32.45(60), FeII(380)33.100(5h)	7,8
34.4	CrII(195)34.24(60), SiII(24)34.472(3h)	8
35.6	CrII(5)35.63(200), FeII(216)35.716(9)	8
36.6	FeII(294)36.185(4), FeII(294)36.509(4), CII(8)36.710(8), SiII(24)36.765(1)	6,8A
37.6	FeII(231)37.300(5), CII(7)37.602(13)	8A
39.6	FeII(380)38.235(4h), CrII(250)38.78(65), FeII(391)39.535(7h), SiIII(5)39.622(5), FeII(380)39.819(6h), CrII(82)40.01(85)	6,8,9
40.4	FeII(195)40.342(7), FeII(217)40.644(9), FeII(280)40.756(8)	6,8
41.6	FeII(196)41.354(2), FeII(196)42.076(3)	8,30
43.3	CrII(5)43.24(100), FeII(231)43.323(4), FeII(294)43.485(5), FeIII(126)43.779(4)	6,39
45.4	FeII(399)44.973(3h), FeII(294)45.392(4), FeII(399)45.450(4), GeII(12)45.516(15)	9
46.7		25

Table 4 (Continued)

Observed Wavelength	Identifications	Notes
2848.4	[FeII(197)47.208(4)], SII(10)47.73(3), FeII(380)47.791(4h), FeII(196)48.046(8), FeII(399)48.122(7h), FeII(391)48.332(7h), FeII(317)48.899(5), CIII(24)49.050(5)	8,18
49.6	FeII(196)49.601(7), CrIII(5)49.83(100)	8
50.4	FeIII(155)50.288(7)	
51.2:	CrII(82)51.35(60), SiII(17.02)51.456(2)	33
52.0	FeII(391)51.738(7?), MgI(1)52.120(300)	42
53.2	FeII(219)52.864(2), FeII(197)53.199(2)	6,25
54.7		
56.0:	CrII(5)55.67(100), FeII(196)55.676(9), SiII(15)56.02(4), FeII(195)56.144(7), FeII(380)56.392(5h)	33
56.9	CrII(11)56.77(40), FeII(399)56.928(8h), CIII(26)57.013(1), FeII(294)57.171(7), SiII(17.02)57.231(1), CrII(11)57.40(40), FeII(195)57.415(4)	8
58.0	FeII(195,279)58.340(11)	8,25
58.8	SiII(17.02)58.514(1), FeII(354)58.519(3), FeII(399)58.639(3h), CrII(11)58.64(30), FeIII(126)58.664(7), CrII(5)58.91(75)	8
59.6:		33
60.4	CrII(5)60.92(85)	
62.0	CrII(5)60.92(85), FeII(61)61.187(3), CrII(5)62.57(125)	6,9
63.7	SiII(15)63.53(5), NiII(26)63.706(25), FeII(380)64.134(3h), FeII(195)64.367(2)	7
65.1	FeII(294)64.968(4), CrII(5)65.10(150), CrII(11)65.34(30), FeII(391)65.473(2h), [FeIII(89)65.54(3)]	2
66.0	CrII(26S)65.87(50), CrII(5)66.72(100), CrII(11)67.09(65)	2,21
68.0	CrII(5)67.65(100)	2A
69.0	FeII(353)68.446(4), FeII(61)68.874(5), FeII(257)69.156(4), FeII(257)69.694(2)	2A,6
70.4:	CrII(11)70.43(100), FeII(195)70.608(3)	2
71.2	FeII(195)71.059(6), FeII(230)71.125(6), SiII(15)72.00(2), [FeII(230)72.382(9)]	2,30
73.6	FeII(279)73.399(10), CrII(5,295)73.46(65)	6
74.4	CrII(11)73.81(50), CIII(22)74.24(0), CIII(22)74.43, SiIII(92)74.626(4), CIII(22)74.722(3)	24,26
75.9	SiIII(92,92)75.09(2), FeII(258)75.342(8), CrII(11)75.97(100), CrII(5)76.24(60), CrII(288)76.30(40)	8,22
76.8	FeII(257)76.804(7)	8
77.9	TiII(14)77.418(60), CrII(5)77.97(60), CrII(5)78.45(50)	6
79.6	FeII(279)79.241(4), FeII(230)79.543(2)	22
80.8	FeII(61)80.750(9), FeII(258)80.828(8), CrII(11)80.86(75), SiI(43)81.579(1000), CrII(302)81.86(55), CrII(206)81.91(45)	21
82.8	FeII(442)82.523(2h)	25
84.0	FeII(230)83.709(10), TiII(14)84.099(70), FeII(442)84.282(2h)	8
84.8	FeII(399)84.779(4h)	8
86.3	FeII(317)85.929(5), SiII(17.01)86.133(1), FeII(229)86.234(3)	8A,18
87.6	SiII(17.01)87.358(5h), FeII(257)87.312(3), SiII(17.01)87.511(10h), FeII(215)88.089(5)	8A
89.4	CrII(11)89.19(35)	
90.6		
92.5	VII(12)92.650(200r), FeII(61)92.822(3)	6,8,19

Table 4 (Continued)

Observed Wavelength	Identifications	Notes
2893.8	VII(12)93.314(250r), FeII(293)94.058(2)	8
95.0	FeII(230)94.776(7), FeII(257)95.071(3), FeIII(125)95.076(8), FeII(294)95.215(7)	6,7
96.5		8
97.2	FeII(254)97.264(8), FeII(323)97.744(2)	8
98.4	CrII(95)98.53(50)	
99.9		19
2900.8		21
02.1	FeII(257)02.317(3)	8
02.8	FeII(270)02.459(5)	8
04.4	SiII(17)04.283(300), SiII(15)04.31(6), FeIII(125)04.431(12),	18,43
06.0	SiII(17)05.692(500), FeII(~5)05.770(2h), FeIII(148)05.80(8), FeII(215)06.12(4)	
06.8:		13
07.6:	FeIII(88)07.497(10), FeIII(125)07.701(12), FeII(60)07.853(3)	11
08.6	[FeIII(125)08.651(5)], VII(12)08.810(300R)	8
09.6		8
10.8	FeII(435)10.724(2h), FeII(278)10.761(3)	6,8
11.9		13,25
13.7	NiII(26)13.59(15)	8,19
14.4		7,8
15.8	FeII(60)16.150(2)	
17.2	FeII(229)16.933(2), FeII(336)17.087(4), FeII(61)17.465(4)	5
18.8	FeII(435)18.541(2h)	6
20.0		
21.2	[CrII(286)21.23(50)]	
22.1	FeII(293)22.093(5)	7,21
23.7	FeIII(102)23.902(8), VII(10)24.017(300R)	8
24.4	VII(10)24.633(250R)	2,8
25.1		2
26.6	FeII(60)26.584(12), [CrII(256)27.09(50)]	2,21
27.6	CII(55)28.12(40), CrII(95,256)28.32(50)	2,8
28.8	MgII(2)28.625(35)	8
31.4	FeII(-)31.593(4)	
32.4		
33.2:	MnII(5)33.051(500)	33
34.0		
35.2	CrII(55)35.12(60)	25
36.6	MgII(2)36.496(35), TiIV(-)37.328(14)	6,12,44
39.3	MnII(5)39.302(800), FeII(60)39.506(5)	2
40.0	VII(10)41.372(200)	2,10
42.3	TiII(26)41.993(50)	6
44.5	FeII(78)44.399(13), VII(10)44.566(250r), [HeI(11)45.106(100)]	
45.7:	TiII(26)45.47(50), YIII(3)46.01(150)	7
		7,24

Table 4 (Continued)

Observed Wavelength	Identifications	Notes
2946.4	[CrII(92)46.81(50)]	7,24
47.6	[NiII(35)47.45(8)], FeII(78)47.658(13)	25
48.4	FeIII(87)48.388(8)	
49.2	FeII(277)49.178(10), MnII(5)49.201(1000)	7
50.4:	SIII(18)50.23(3)	2
51.2	FeII(214)51.895(2)	2,21
52.8		4
53.8	CrII(55)53.34(35), FeII(60)53.774(11), FeII(253)54.050(4)	30
55.8	FeIII(87)55.060(4)	6,8
56.8		8,25
57.6	TiIV(-)57.306(12)	8A,12
58.4	FeIII(102)58.286(6)	8A

NOTES:

Bracketed lines unless noted are possible identifications. MnIII lines with Y as the multiplet number are from Yarosewick et al. (1971). The data on the He I lines are primarily from Martin (1960). Other identification information is from Moore (1950, 1952, 1962, 1965, 1970, 1975) unless indicated in the notes below.

1. Line in brackets possibly in line wing
2. and 2A. Broad line with core line doubling, both features given
3. FeII line(s) without noted multiplet number from Sales (1963)
4. Very weak
5. Line asymmetric shortward
6. Broad
7. Line asymmetric longward
8. and 8A. Lines whose wings are blended together
9. Shortward wing extends ~ 1.5Å
10. Longward wing extends ~ 1.5Å
11. Feature in wing of following line
12. TiIV line values from Svensson and Edlen (1974)
13. Feature in wing of preceding line
14. NiII line in wing
15. MnIII line in wing
16. Line core asymmetric shortward while wings asymmetric longward
17. Width ~ 2.5Å
18. Width ~ 2Å
19. Shortward wing extends ~ 1.2Å
20. Broad lines whose shoulders are blended together
21. Longward wing extends ~ 1.2Å
22. Line winged shortward
23. FeII line in wing
24. Feature in shoulder of preceding line
25. Weak feature
26. Ill-defined
27. CrIII line in wing
28. Weak features whose wings are blended together
29. Flat bottomed line (or region) with multiple weak features, all given
30. Line winged longward
31. CoII line in wing
32. FeIII line in wing
33. Feature in shoulder of following line
34. NII line in wing
35. MgII line without multiplet number from Risberg (1964)
36. VIII line in wing
37. MnII in wing
38. Shortward wing extends ~ 2Å

Table 4 (Continued)

NOTES:

39. Line core asymmetric longward
40. FeII and FeIII lines in wing
41. CrII line in wing
42. MgI line possibly circumstellar
43. Flat bottomed line
44. TiIV line in wing