

Wavelengths and Transition Probabilities for Atoms and Atomic Ions

Part I. Wavelengths

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NATIONAL BUREAU OF STANDARDS, Ernest Ambler, Director
Issued December 1980

Library of Congress Cataloging in Publication Data

United States. National Bureau of Standards.

Wavelengths and transition probabilities for atoms and atomic ions.

(Nat. stand. ref. data ser. ; NSRDS-NBS 68)

"CODEN: NSRDAP."

"Issued December 1980."

CONTENTS: pt. 1. Reader, J., and Corliss, C. H. Wavelengths. —
pt. 2. Wiese, W. L., and Martin, G. A. Transition probabilities.

Supt. of Docs. no.: C 13.48:68/pt. 1-2

1. Atomic spectra—Tables. 2. Ions—Spectra—Tables. 3. Atomic
transition probabilities—Tables. I. Reader, Joseph. II. Title. III.

Series: United States. National Bureau of Standards.

National standard reference data series ; NSRDS-NBS 68.

QC100.U573 no. 68 [QC454.A8] 602'.18s

[539.7] 80-607997

NSRDS-NBS 68

Nat. Stand. Ref. Data Ser., Nat. Bur. Stand. (U.S.), 68, 415 pages (Dec. 1980)

CODEN: NSRDAP

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U.S. GOVERNMENT PRINTING OFFICE
WASHINGTON: 1980

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C. 20402 - Price \$14

Foreword

The National Standard Reference Data System provides access to the quantitative data of physical science, critically evaluated and compiled for convenience and readily accessible through a variety of distribution channels. The System was established in 1963 by action of the President's Office of Science and Technology and the Federal Council for Science and Technology, and responsibility to administer it was assigned to the National Bureau of Standards.

NSRDS receives advice and planning assistance from a Review Committee of the National Research Council of the National Academy of Sciences-National Academy of Engineering. A number of Advisory Panels, each concerned with a single technical area, meet regularly to examine major portions of the program, assign relative priorities, and identify specific key problems in need of further attention. For selected specific topics, the Advisory Panels sponsor subpanels which make detailed studies of users' needs, the present state of knowledge, and existing data resources as a basis for recommending one or more data compilation activities. This assembly of advisory services contributes greatly to the guidance of NSRDS activities.

The System now includes a complex of data centers and other activities in academic institutions and other laboratories. Components of the NSRDS produce compilations of critically evaluated data, reviews of the state of quantitative knowledge in specialized areas, and computations of useful functions derived from standard reference data. The centers and projects also establish criteria for evaluation and compilation of data and recommend improvements in experimental techniques. They are normally associated with research in the relevant field.

The technical scope of NSRDS is indicated by the categories of projects active or being planned: nuclear properties, atomic and molecular properties, solid state properties, thermodynamic and transport properties, chemical kinetics, and colloid and surface properties.

Reliable data on the properties of matter and materials are a major foundation of scientific and technical progress. Such important activities as basic scientific research, industrial quality control, development of new materials for building and other technologies, measuring and correcting environmental pollution depend on quality reference data. In NSRDS, the Bureau's responsibility to support American science, industry, and commerce is vitally fulfilled.



ERNEST AMBLER, *Director*

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Part II. Transition Probabilities

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Wavelengths for about 47 000 spectral lines of atoms and atomic ions, as well as transition probabilities A for about 5000 lines, are tabulated. The data were selected in such a way as to include the prominent lines over a wide spectral region. Part I contains wavelengths of lines of neutral through quadruply ionized atoms in the range 40 to 40 000 Å. This information is presented in two different ways: 1) separate line lists grouped according to chemical element and further subdivided according to stage of ionization; and 2) a general table of wavelengths ordered numerically, with relative intensity, chemical element, and stage of ionization indicated for each line. Part II contains transition probability data for atoms in various stages of ionization, with emphasis on the neutral and singly ionized species. This table is arranged according to the chemical element and is further subdivided according to stage of ionization. Estimates of the accuracies of the A -values are provided. Wavelengths, energy levels, and statistical weights serve to identify the lines and to provide useful data for plasma spectroscopy applications.

Key words: Atom; atomic ion; intensities; line strengths; oscillator strengths; spectral lines; transition probabilities; wavelengths.

Part I. Wavelengths

Section 1. Arranged by Element

Section 2. Arranged by Wavelength

Joseph Reader and Charles H. Corliss

These tables were prepared under the auspices of the Committee on Line Spectra of the Elements of the National Academy of Sciences—National Research Council. They contain the outstanding spectral lines of neutral (I), singly ionized (II), doubly ionized (III), triply ionized (IV), and quadruply ionized (V), atoms. Listed are lines that appear in emission from the vacuum ultraviolet to the far infrared. For most atoms these lines were selected from much larger lists in such a way as to include the stronger observed lines in each spectral region. In a few cases prominent monoxide band heads are also given.

The data were compiled by the following contributors, whose initials are given in the headings of the tables that they prepared:

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All wavelengths are given in Ångstroms. Below 2000 Å the wavelengths are in vacuum; above 2000 Å the wavelengths are in air. Wavelengths given to three decimal places have an uncertainty of less than 0.001 Å and are therefore suitable for the calibration of most spectrographs. In the air region, the elements used most commonly for calibration purposes are Ne, Ar, Kr, Fe, Th, and Hg; in the vacuum region, the most common are C, N, O, Si, and Cu.

A large number of the lines for the neutral and singly ionized atoms were extracted from the National Bureau of Standards (NBS) Tables of Spectral-Line Intensities [1]¹. The intensities of these lines represent quantitative estimates of relative line strengths that take account of varying detection sensitivity at different wavelengths. They are on a linear scale. For nearly all of the other lines the intensities represent qualitative estimates of the relative strengths of lines not greatly separated in wavelength. Because different observers frequently use different scales for their intensity estimates, these intensities are useful only as a rough indication of the appearance of a spectrum. In some cases the intensity scale is not intended to be linear. In the tables of first and second spectra the intensities of the lines of the singly ionized atom relative to those of the neutral atom should be used with caution, inasmuch as the concentration of ions in a light source depends greatly on the excitation conditions.

Hg I and II lines given to three decimal places are for Hg(198). Kr I and II lines below 11,000 Å given to three decimal places are for Kr(86). Xe I lines above 12,000 Å are for Xe(136).

¹ Figures in brackets refer to literature references.

Descriptive symbols used in the tables have the following meanings:

- c — complex
- d — line consists of two unresolved lines
- h — hazy
- l — shaded to longer wavelengths
- s — shaded to shorter wavelengths
- p — perturbed by a close line

- b — band head
- r — easily reversed
- w — wide

Part I is divided into two sections. In section 1 the lines are given in a separate table for each element. In section 2 the lines are given in a single table ordered by wavelength. The literature references are collected at the end of section 1.

Section 1. Arranged by Element

ACTINIUM (Ac)			Ac I and II			Al I and II			Al I and II		
Z = 89			Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
Ac I and II			300 l	5732.05	II	300	1855.929	II	60	3479.81	I
Ref. 193 - J.G.C.			400	5758.97	II	700	1858.026	II	60	3482.63	I
Intensity	Wavelength		1000	5910.85	II	120	1859.980	II	450	3586.56	II
	Air		600 l	6164.75	II	1000	1862.311	II	360	3587.07	II
8 h	2100.00	II	200 l	6167.83	II	200	1929.978	II	290	3587.45	II
20	2712.50	II	400	6242.83	II	150	1931.048	II	220	3651.06	II
10	2726.23	II	20	6359.86	I	200	1932.377	II	110	3651.10	II
10 h	2760.18	II	20 l	6691.27	I	400	1934.503	II	150	3654.98	II
10 h	2781.56	II	6	7290.40	I	150	1934.713	II	290	3655.00	II
20	2797.59	II	6 l	7866.10	I	150	1936.907	II	450	3900.68	II
20	2806.76	II	Ac III			220	1939.261	II	60	3932.00	I
8	2833.47	II	Ref. 193 - J.G.C.			700	1990.531	II	4500 r	3944.006	I
150 h	2847.16	II	Air			Air			9000 r	3961.520	I
8	2895.20	II	1000 h	2626.44	III	150	2016.052	II	110	3995.86	II
30	2896.82	II	50 h	2682.90	III	150	2016.234	II	290	4226.81	II
30	2923.02	II	2000 h	2952.55	III	100	2016.368	II	150	4585.82	II
200	2994.17	II	2000 h	3392.78	III	200	2074.008	II	110	4588.19	II
500	3043.30	II	3000	3487.59	III	700	2094.264	II	550	4666.80	II
200	3069.36	II	2000 h	4413.09	III	150	2094.744	II	110	4898.76	II
100	3078.07	II	3000 h	4569.87	III	300	2094.791	II	110	4902.77	II
100	3086.04	II	8 h	5193.21	III	100	2095.104	II	150	5280.21	II
100	3087.37	II	Ac IV			200	2095.141	II	70	5107.52	I
200	3112.83	II	Ref. 193 - J.G.C.			60	2150.70	I	290	5283.77	II
100	3120.16	II	Air			60	2181.00	I	150	5285.85	II
500 s	3153.09	II	20 h	2062.00	IV	400	2269.10	I	110	5312.32	II
600 s	3154.41	II	30 h	2502.12	IV	120	2269.22	I	220	5316.07	II
200 s	3164.81	II	100 h	2558.08	IV	60	2312.49	I	150	5371.84	II
300 s	3230.59	II	5 h	2790.83	IV	70	2313.53	I	180	5557.06	I
150 s	3237.70	II	50 h	2793.90	IV	90	2317.48	I	110	5557.95	I
500	3260.91	II	20 l	3224.7	IV	60	2319.06	I	450	5593.23	II
100 s	3318.01	II	ALUMINUM (Al)			140	2321.56	I	110	5853.62	II
200 s	3383.53	II	Z = 13			460	2367.05	I	220	5971.94	II
200	3413.84	II	Al I and II			110	2367.61	I	290	6001.76	II
500	3417.77	II	Refs. 81,89,144,227,228,282			110	2368.11	I	220	6001.88	II
500 s	3481.16	II	- E.F.W.			180	2369.30	I	450	6006.42	II
200	3489.53	II	Vacuum			140	2370.22	I	150	6061.11	II
100	3529.24	II	40	1177.43	II	70	2370.73	I	290	6068.43	II
100	3534.63	II	50	1191.812	II	160	2372.07	I	110	6068.53	II
200 s	3554.99	II	150	1350.18	II	850	2373.12	I	450	6073.23	II
1000 s	3565.59	II	800	1539.830	II	170	2373.35	I	110	6181.57	II
100	3694.88	II	100	1569.385	II	110	2373.57	I	150	6181.68	II
300 s	3756.67	II	125	1596.059	II	60	2378.40	I	290	6182.28	II
200	3799.82	II	150	1625.627	II	60	2513.30	I	220	6182.45	II
2000 s	3863.12	II	100	1644.235	II	240	2567.98	I	450 h	6183.42	II
100	3914.47	II	100	1644.809	II	480	2575.10	I	450	6201.52	II
400 s	4061.60	II	1000	1670.787	II	60	2575.40	I	360	6201.70	II
3000 s	4088.44	II	100	1686.250	II	80	2631.55	II	290	6226.18	II
3000 s	4168.40	II	800	1719.440	II	110	2637.70	II	360	6231.78	II
100	4179.98	I	500	1721.244	II	150	2652.48	I	450	6243.36	II
20	4183.12	I	900	1721.271	II	200	2660.39	I	450	6335.74	II
20	4194.40	I	500	1724.952	II	160	2669.17	II	360	6696.02	I
300 s	4209.69	II	900	1724.984	II	650	2816.19	II	230	6698.67	I
300	4359.13	II	350	1760.104	II	90	2837.96	I	60	7083.97	I
20 l	4384.53	I	300	1761.975	II	90	2840.10	I	70	7084.64	I
1000 l	4386.41	II	290	1763.00	I	150	3041.28	II	110	7361.57	I
20	4396.71	I	500	1763.869	II	360	3050.07	I	140	7362.30	I
20	4462.73	I	700	1763.952	II	60	3054.68	I	60	7606.16	I
1000 l	4507.20	II	450	1765.64	I	450	3057.14	I	90	7614.82	I
500	4605.45	II	300	1765.815	II	90	3064.29	I	230	7835.31	I
10	4716.58	I	450	1766.38	I	60	3066.14	I	290	7836.13	I
400 s	4720.16	II	400	1767.731	II	150	3074.64	II	60	7993.05	I
300	4812.22	II	450	1769.14	I	4500 r	3082.153	I	90	8003.19	I
100	4945.18	II	600	1828.588	II	7200 r	3092.710	I	70	8065.97	I
100	4958.23	II	400	1832.837	II	1800 r	3092.839	I	110	8075.35	I
100	4960.87	II	250	1834.808	II	150	3428.92	II	290	8640.70	II
150	5446.38	II				70	3439.35	I	360	8772.87	I
						150	3443.64	I	450	8773.90	I
						70	3444.86	I	110	8828.91	I
						70	3458.22	I	180	8841.28	I

Intensity	Al I and II Wavelength	
90	8912.90	I
140	8923.56	I
60	9089.91	I
70	9139.95	I
150	9290.65	II
110	9290.75	II
150	10076.29	II
110	10768.36	I
140	10782.04	I
110	10872.98	I
230	10891.73	I
450	11253.19	I
570	11254.88	I
570	13123.41	I
450	13150.76	I
230	16718.96	I
300	16750.56	I
140	16763.36	I
300	21093.04	I
360	21163.75	I

Al III
Refs. 127 - E.F.W.
Vacuum

70	486.884	III
30	486.912	III
250	511.138	III
150	511.191	III
500	560.317	III
200	560.433	III
100	670.068	III
200	671.118	III
500	695.829	III
400	696.217	III
200	725.683	III
300	726.915	III
400	855.034	III
500	856.746	III
400	892.024	III
50	893.887	III
450	893.897	III
10	1162.59	III
5	1162.62	III
100	1352.81	III
5	1352.82	III
70	1352.86	III
600	1379.67	III
800	1384.13	III
700	1605.766	III
100	1611.814	III
800	1611.874	III
1000	1854.716	III
600	1862.790	III
300	1935.840	III
15	1935.863	III
200	1935.949	III

Air

110	2399.00	III
285	2762.77	III
220	2762.87	III
450	2906.93	III
360	3348.52	III
290	3350.88	III
870	3601.63	III
550	3601.93	III
750	3612.36	III
450	3702.11	III
550	3713.12	III
110 h	3980.14	III

Intensity	Al III Wavelength	
110	4082.45	III
150	4088.61	III
110 h	4142.37	III
650	4149.92	III
650	4150.17	III
110 h	4364.64	III
650	4479.89	III
650	4479.97	III
760	4512.56	III
550	4528.94	III
870	4529.19	III
110	4701.15	III
150	4701.41	III
110 h	4904.10	III
110 h	5151.01	III
110 h	5163.89	III
1200	5696.60	III
1000	5722.73	III
110	6055.21	III
220 h	7635.37	III
150	7660.26	III
220	7681.97	III
360	7881.79	III
150	7882.52	III
290	7905.51	III
290 h	8243.59	III
360 h	8275.11	III
290	9571.52	III
360	9605.99	III

Al IV
Refs. 8,146 - E.F.W.
Vacuum

400	124.03	IV
700	129.73	IV
800	160.07	IV
700	161.69	IV
500	1027.34	IV
800	1042.17	IV
700	1048.52	IV
500	1058.90	IV
500	1061.43	IV
600	1064.89	IV
500	1066.57	IV
600	1069.44	IV
400	1105.74	IV
600	1118.82	IV
500	1125.61	IV
400	1136.82	IV
400	1198.50	IV
400	1220.55	IV
900	1237.19	IV
600	1240.21	IV
700	1240.86	IV
700	1248.79	IV
900	1257.62	IV
800	1264.18	IV
1000	1272.76	IV
400	1337.90	IV
500	1376.62	IV
500	1388.79	IV
600	1431.94	IV
700	1441.82	IV
800	1447.51	IV
600	1457.96	IV
700	1486.89	IV
800	1494.79	IV
400	1519.07	IV
800	1537.54	IV

Intensity	Al IV Wavelength	
500	1550.19	IV
1000	1557.25	IV
500	1559.03	IV
700	1564.16	IV
900	1582.04	IV
800	1584.46	IV
400	1589.28	IV
400	1606.65	IV
400	1617.81	IV
600	1627.54	IV
500	1636.82	IV
800	1639.06	IV
1000	1818.56	IV
700	1881.16	IV

Al V
Ref. 6 - E.F.W.
Vacuum

300	103.80	V
400	103.88	V
250	104.07	V
250	104.18	V
600	107.95	V
300	108.06	V
300	108.11	V
250	118.50	V
900	125.53	V
800	126.07	V
800	130.41	V
1000	130.85	V
900	131.00	V
900	131.44	V
500	132.63	V
1000	278.69	V
900	281.39	V
250	1068.26	V
500	1088.67	V
300	1090.14	V
300	1150.30	V
350	1165.42	V
250	1168.48	V
500	1287.70	V
400	1330.06	V
400	1350.52	V
400	1363.35	V
600	1369.20	V
300	1373.70	V
400	1445.87	V
300	1455.26	V
600	1475.64	V
300	1486.05	V
700	1508.37	V
1000	1526.14	V
500	1539.12	V
300	1577.90	V
350	1589.87	V

AMERICIUM (Am)

Z = 95

Am I and II
Ref. 92 - J.G.C.

Intensity	Wavelength	
Air		
100 s	2706.35	II
100 s	2728.69	II
200 s	2756.55	II
100 l	2812.10	II
200 s	2812.92	II
1000 l	2815.28	II
100 s	2815.98	II
100 l	2831.24	II
5000 s	2832.26	II
100 l	2833.95	II
100 l	2861.92	II
100 s	2866.20	II
1000 l	2888.51	II
100 l	2893.29	II
200 l	2899.56	II
100 l	2909.86	II
200 l	2911.13	II
1000 s	2920.59	II
200 l	2927.53	II
200 l	2936.99	II
100 l	2939.08	II
500 l	2950.39	II
100 s	2957.05	II
100 l	2958.39	II
100 l	2963.02	II
1000 l	2966.71	II
1000 l	2969.29	II
1000 s	2987.24	II
500 l	2993.51	II
1000 s	3004.25	II
500 s	3027.99	II
100 l	3028.86	II
500 l	3038.36	II
200 s	3053.69	II
2000 s	3120.49	II
200 s	3161.83	II
100 s	3167.86	II
100 l	3203.26	II
500 s	3282.32	II
200 l	3286.67	II
100 l	3343.87	I
500 s	3362.55	II
200 l	3395.01	I
200 s	3419.66	II
200	3446.19	I
1000 l	3452.10	II
5000 l	3483.31	II
5000	3510.13	I
1000 l	3530.95	I
200 s	3562.68	II
5000	3569.16	I
100 s	3596.07	II
500	3603.41	I
5000	3673.12	I
100 l	3684.57	II
1000 s	3696.42	II
100 l	3707.86	II
5000 l	3777.50	II
5000 l	3926.25	II
1000 l	3952.58	II
100 s	4020.25	I

Sb III			Sb IV			Ar I and II			Ar I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
15	999.62	III		1145.9	IV	100	835.002	I	20	3979.356	II
40	1011.94	III		1151.5	IV	100	842.805	I	35	3994.792	II
10	1056.58	III		1171.4	IV	180	866.800	I	50	4013.857	II
40	1065.90	III		1192.9	IV	150	869.754	I	50	4033.809	II
20	1069.93	III		1199.1	IV	180 r	876.058	I	20	4035.460	II
20	1070.43	III		1499.2	IV	180 r	879.947	I	150	4042.894	II
5	1073.76	III				150	894.310	I	50	4044.418	I
30	1075.82	III				1000	919.781	II	100	4052.921	II
5	1078.10	III				1000	932.054	II	200	4072.005	II
20	1084.06	III				1000 r	1048.220	I	70	4072.385	II
10	1098.34	III				500 r	1066.660	I	25	4076.628	II
10	1135.43	III							35	4079.574	II
30	1151.49	III							25	4082.387	II
40	1157.74	III				5	2420.456	II	150	4103.912	II
12	1166.96	III				10	2516.789	II	300	4131.724	II
50	1205.20	III				10	2534.709	II	35	4156.086	II
50	1210.64	III				15	2562.087	II	400	4158.590	I
20	1306.69	III				25	2891.612	II	50	4164.180	I
8	1379.58	III				200	2942.893	II	35	4179.297	II
20	1404.18	III				100	2979.050	II	50	4181.884	I
10	1429.57	III				50	3033.508	II	100	4190.713	I
15	1673.89	III				50	3093.402	II	50	4191.029	I
3	1710.23	III				8	3200.37	I	200	4198.317	I
15	1711.84	III				20	3243.689	II	400	4200.674	I
15	1725.33	III				25	3293.640	II	25	4218.665	II
12	1762.30	III				20	3307.228	II	25	4222.637	II
12	1839.32	III				7	3319.34	I	25	4226.988	II
10	1946.13	III				25	3350.924	II	100	4228.158	II
	Air					7	3373.47	I	100	4237.220	II
3	2054.10	III				25	3376.436	II	25	4251.185	I
2	2091.85	III				25	3388.531	II	200	4259.362	I
5	2127.00	III				7	3393.73	I	100	4266.286	I
5	2507.71	III				70	3461.07	I	70	4266.527	II
15	2590.13	III				70	3476.747	II	150	4272.169	I
1	2614.20	III				20	3478.232	II	550	4277.528	II
12	2617.17	III				50	3491.244	II	20	4282.898	II
1	2617.63	III				100	3491.536	II	100	4300.101	I
20	2669.39	III				70	3509.778	II	25	4300.650	II
5	2785.87	III				70	3514.388	II	70	4309.239	II
20	2790.27	III				70	3545.596	II	200	4331.200	II
20	3336.61	III				70	3545.845	II	50	4332.030	II
50	3504.07	III				7	3554.306	I	100	4333.561	I
15	3519.06	III				100	3559.508	II	50	4335.338	I
15	3533.45	III				100	3561.030	II	25	4345.168	I
40	3559.18	III				70	3576.616	II	800	4348.064	II
40	3566.25	III				25	3581.608	II	50	4352.205	II
30	3738.90	III				50	3582.355	II	25	4362.066	II
40	4265.09	III				70	3588.441	II	50	4367.832	II
50	4352.16	III				7	3606.522	I	200	4370.753	II
30	4591.89	III				25	3622.138	II	70	4371.329	II
30	4692.91	III				20	3639.833	II	50	4375.954	II
1	5247.71	III				35	3718.206	II	150	4379.667	II
1	5690.8	III				70	3729.309	II	50	4385.057	II
1	5717.3	III				50	3737.889	II	70	4400.097	II
3	5845.5	III				150	3765.270	II	200	4400.986	II
5	6246.7	III				50	3766.119	II	400	4426.001	II
3	6287.6	III				20	3770.369	I	150	4430.189	II
	Sb IV					20	3770.520	II	50	4430.996	II
	Ref. 386 - L.J.R.					25	3780.840	II	50	4433.838	II
	Vacuum					25	3803.172	II	20	4439.461	II
	861.5	IV				50	3809.456	II	35	4448.879	II
	873.5	IV				7	3834.679	I	100	4474.759	II
	888.3	IV				70	3850.581	II	200	4481.811	II
	891.2	IV				35	3925.719	II	100	4510.733	I
	1087.6	IV				50	3928.623	II	20	4522.323	I
	1099.3	IV				25	3932.547	II	20	4530.552	II
	1115.1	IV				70	3946.097	II	400	4545.052	II
	1120.4	IV				7	3947.505	I	20	4564.405	II
						35	3948.979	I	400	4579.350	II

Ar I and II			Ar I and II			Ar I and II			Ar III		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
400	4589.898	II	70	6416.307	I	550	9194.638	I			
15	4596.097	I	25	6483.082	II	15000	9224.499	I	12	769.15	III
550	4609.567	II	15	6538.112	I	400	9291.531	I	10	871.10	III
7	4628.441	I	15	6604.853	I	1600	9354.220	I	9	875.53	III
35	4637.233	II	25	6638.221	II	25000	9657.786	I	12	878.73	III
400	4657.901	II	20	6639.740	II	4500	9784.503	I	8	879.62	III
15	4702.316	I	50	6643.698	II	180	10052.06	I	9	883.18	III
20	4721.591	II	5	6660.676	I	30	10332.72	I	10	887.40	III
550	4726.868	II	5	6664.051	I	100	10467.177	II	7	1669.67	III
50	4732.053	II	25	6666.359	II	1600	10470.054	I	7	1673.42	III
300	4735.906	II	100	6677.282	I	13	10478.034	I	7	1675.48	III
800	4764.865	II	35	6684.293	II	180	10506.50	I	9	1914.40	III
550	4806.020	II	150	6752.834	I	200	10673.565	I	7	1915.56	III
150	4847.810	II	5	6756.163	I	11	10681.773	I		Air	
50	4865.910	II	15	6766.612	I	7	10683.034	II	10	2125.16	III
800	4879.864	II	20	6861.269	II	30	10733.87	I	15	2133.87	III
70	4889.042	II	150	6871.289	I	30	10759.16	I	10	2138.59	III
20	4904.752	II	5	6879.582	I	7	10812.896	II	10	2148.73	III
35	4933.209	II	10	6888.174	I	11	11078.869	I	15	2166.19	III
200	4965.080	II	50	6937.664	I	30	11106.46	I	10	2168.26	III
50	5009.334	II	7	6951.478	I	12	11441.832	I	20	2170.23	III
70	5017.163	II	7	6960.250	I	400	11488.109	I	25	2177.22	III
70	5062.037	II	10000	6965.431	I	200	11668.710	I	8	2184.06	III
20	5090.495	II	150	7030.251	I	12	11719.488	I	10	2188.22	III
100	5141.783	II	10000	7067.218	I	200	12112.326	I	15	2192.06	III
70	5145.308	II	100	7068.736	I	50	12139.738	I	7	2248.73	III
5	5151.391	I	25	7107.478	I	50	12343.393	I	10	2279.10	III
15	5162.285	I	25	7125.820	I	200	12402.827	I	7	2281.22	III
25	5165.773	II	1000	7147.042	I	200	12439.321	I	7	2282.21	III
20	5187.746	I	15	7158.839	I	100	12456.12	I	12	2293.03	III
20	5216.814	II	70	7206.980	I	200	12487.663	I	10	2300.85	III
7	5221.271	I	15	7265.172	I	150	12702.281	I	15	2302.17	III
5	5421.352	I	7	7270.664	I	30	12733.418	I	9	2317.00	III
10	5451.652	I	2000	7272.936	I	12	12746.232	I	15	2317.47	III
25	5495.874	I	35	7311.716	I	200	12802.739	I	12	2318.04	III
5	5506.113	I	25	7316.005	I	50	12933.195	I	10	2319.13	III
25	5558.702	I	5	7350.814	I	500	12956.659	I	10	2319.37	III
10	5572.541	I	70	7353.293	I	200	13008.264	I	9	2345.17	III
35	5606.733	I	200	7372.118	I	200	13213.99	I	7	2351.67	III
20	5650.704	I	20	7380.426	II	200	13228.107	I	9	2360.26	III
10	5739.520	I	10000	7383.980	I	100	13230.90	I	10	2395.63	III
5	5834.263	I	20	7392.980	I	500	13272.64	I	12	2399.15	III
10	5860.310	I	15	7412.337	I	1000	13313.210	I	10	2413.20	III
15	5882.624	I	10	7425.294	I	1000	13367.111	I	7	2415.61	III
25	5888.584	I	25	7435.368	I	30	13499.41	I	10	2418.82	III
50	5912.085	I	10	7436.297	I	1000	13504.191	I	12	2423.52	III
15	5928.813	I	20000	7503.869	I	11	13573.617	I	12	2423.93	III
5	5942.669	I	15000	7514.652	I	30	13599.333	I	7	2443.69	III
7	5987.302	I	25000	7635.106	I	400	13622.659	I	8	2472.95	III
5	5998.999	I	15000	7723.761	I	200	13678.550	I	7	2476.10	III
5	6025.150	I	10000	7724.207	I	1000	13718.577	I	12	2488.86	III
70	6032.127	I	10	7891.075	I	10	13825.715	I	7	2631.90	III
35	6043.223	I	20000	7948.176	I	10	13907.478	I	10	2654.63	III
10	6052.723	I	20000	8006.157	I	200	14093.640	I	8	2674.02	III
20	6059.372	I	25000	8014.786	I	100	15046.50	I	9	2678.38	III
7	6098.803	I	7	8053.308	I	25	15172.69	I	10	2724.84	III
10	6105.635	I	20000	8103.693	I	10	15329.34	I	7	2762.23	III
100	6114.923	II	35000	8115.311	I	30	15989.49	I	7	2842.88	III
10	6145.441	I	10000	8264.522	I	30	16519.86	I	8	2855.29	III
7	6170.174	I	20	8392.27	I	500	16940.58	I	9	2884.12	III
150	6172.278	II	15000	8408.210	I	12	18427.76	I	10	3010.02	III
10	6173.096	I	20000	8424.648	I	50	20616.23	I	12	3024.05	III
10	6212.503	I	15000	8521.442	I	30	20986.11	I	12	3054.82	III
5	6215.938	I	7	8605.776	I	20	23133.20	I	10	3064.77	III
25	6243.120	II	4500	8667.944	I	20	23966.52	I	10	3078.15	III
7	6296.872	I	20	8771.860	II				7	3110.41	III
15	6307.657	I	180	8849.91	I		Ar III		7	3127.90	III
7	6369.575	I	20	9075.394	I	Refs. 367,372,373,375			25	3285.85	III
20	6384.717	I	35000	9122.967	I	- E.F.W.			20	3301.88	III

Ar III		
Intensity	Wavelength	
15	3311.25	III
7	3323.59	III
25	3336.13	III
20	3344.72	III
15	3358.49	III
7	3361.28	III
15	3391.85	III
7	3417.49	III
9	3424.25	III
8	3438.04	III
9	3471.32	III
20	3480.55	III
12	3499.67	III
15	3503.58	III
8	3511.12	III
20	3795.37	III
10	3858.32	III
7	3907.84	III
8	3960.53	III
6	4023.60	III
5	4146.70	III
Ar IV		
Ref. 367,368,374 - E.F.W.		
Vacuum		
4	396.87	IV
4	398.55	IV
6	623.77	IV
10	683.28	IV
7	688.39	IV
12 p	689.01	IV
6	699.41	IV
8	700.28	IV
4	754.20	IV
5	761.47	IV
5	800.57	IV
10	801.09	IV
10	801.41	IV
5	801.91	IV
15	840.03	IV
20	843.77	IV
25	850.60	IV
5	900.36	IV
9	901.17	IV
Air		
4	2299.72	IV
8	2447.71	IV
12	2513.28	IV
6	2518.40	IV
9	2525.69	IV
12	2562.17	IV
10	2568.07	IV
7	2569.53	IV
12	2599.47	IV
10	2608.06	IV
7	2608.44	IV
12	2615.68	IV
6	2619.98	IV
12	2621.36	IV
12	2624.92	IV
15	2640.34	IV
9	2682.63	IV
14	2757.92	IV
10	2776.26	IV
12	2784.47	IV
14	2788.96	IV
7	2797.11	IV
16	2809.44	IV
10	2830.25	IV

Ar IV		
Intensity	Wavelength	
6	2874.40	IV
12	2913.00	IV
11	2926.33	IV
6	3037.98	IV
8	3077.40	IV
Ar V		
Refs. 414,421 - E.F.W.		
Vacuum		
3	336.56	V
3	337.56	V
6	338.00	V
2	338.43	V
2	339.01	V
3	339.89	V
3	350.88	V
2	436.67	V
5	446.00	V
8	446.95	V
4	447.53	V
18	449.06	V
4	449.49	V
3	458.12	V
2	458.98	V
6 p	461.23	V
3	462.42	V
7	463.94	V
3	522.09	V
5	524.19	V
6	527.69	V
2	554.50	V
5	558.48	V
3	635.12	V
3	705.35	V
5	709.20	V
4	715.60	V
3	715.65	V
2	725.11	V
4	822.16	V
5	827.05	V
3	827.35	V
4 p	834.88	V
2	836.13	V
ARSENIC (As)		
Z = 33		
As I and II		
Refs. 168,197 - R.L.K.		
Vacuum		
165	761.24	II
165	802.83	II
340	1021.96	II
340	1082.35	II
500	1139.40	II
615	1149.31	II
555	1181.51	II
555	1189.87	II
615	1196.38	II
615	1196.56	II
340	1207.44	II
800	1211.17	II
800	1218.10	II
340	1223.15	II
760	1241.31	II
965	1243.08	II
870	1245.67	II
800	1258.58	II
965	1263.77	II

As I and II		
Intensity	Wavelength	
800	1266.34	II
800	1267.59	II
715	1280.99	II
715	1287.54	II
715	1305.70	II
340	1307.74	II
760	1333.15	II
965	1341.55	II
760	1355.93	II
965	1369.77	II
800	1373.65	II
1000	1375.07	II
760	1375.78	II
800	1394.64	II
800	1400.31	II
500	1448.59	II
500	1558.88	II
500	1570.99	II
100 r	1593.60	I
500	1660.55	II
100	1758.60	I
170	1806.15	I
340	1860.34	II
1000 r	1890.42	I
500	1912.94	II
800 r	1937.59	I
585 r	1972.62	I
170 r	1990.35	I
100 r	1991.13	I
100 r	1995.43	I
Air		
230 r	2003.34	I
100 r	2009.19	I
100	2013.32	I
100	2112.99	I
100	2144.08	I
135	2165.52	I
350 r	2288.12	I
350 r	2349.84	I
100 r	2370.77	I
135 r	2381.18	I
170 r	2456.53	I
340	2602.00	II
170 r	2780.22	I
300	2830.359	II
300	2831.164	II
100 r	2860.44	I
300	2884.406	II
615	2959.572	II
300	3003.819	II
300	3116.516	II
340	3842.60	II
715	4190.082	II
615	4197.40	II
615	4242.982	II
500	4315.657	II
500	4323.867	II
500	4336.64	II
500	4352.145	II
425	4352.864	II
375	4371.17	II
615	4427.106	II
615	4431.562	II
715	4458.469	II
340	4461.075	II
715	4466.348	II
500	4474.46	II
800	4494.230	II
850	4507.659	II

As I and II		
Intensity	Wavelength	
615	4539.74	II
715	4543.483	II
615	4602.427	II
340	4629.787	II
340	4707.586	II
340	4730.67	II
340	4888.557	II
100	5068.98	I
340	5105.58	II
500	5107.55	II
100	5121.34	I
100	5141.63	I
425	5231.38	II
500	5331.23	II
100	5408.13	I
135	5451.32	I
340	5497.727	II
425	5558.09	II
425	5651.32	II
425	6110.07	II
500	6170.27	II
300	6511.74	II
300	7092.27	II
300	7102.72	II
340	7990.53	II
300	8174.51	II
100	8428.91	I
100	8564.71	I
100	8654.14	I
135	8821.73	I
100	8869.66	I
135	9267.28	I
200	9300.61	I
230	9597.95	I
290	9626.70	I
230	9833.76	I
100	9886.05	I
140	9900.55	I
170	9915.71	I
290	9923.05	I
100	10010.63	I
290	10024.04	I
100	10453.09	I
100	10575.02	I
170	10614.07	I
As III		
Ref. 163 - R.L.K.		
Vacuum		
185	849.9	III
185	866.3	III
510	871.7	III
325	889.0	III
325	927.5	III
325	953.6	III
325	937.2	III
325	963.8	III
120	1172.2	III
185	1209.3	III
Air		
80	2926.3	III
185	2982.0	III
325	3922.6	III
185	4037.2	III
As IV		
Ref. 244 - R.L.K.		
Air		
150	2253.1	IV
200	2263.2	IV

As IV		
Intensity	Wavelength	
200	2301.0	IV
250	2417.5	IV
150	2446.1	IV
250	2454.0	IV
200	2461.4	IV
150	3108.8	IV

As V		
Ref. 280 - R.L.K.		
Vacuum		
	Wavelength	
25	600.7	V
40	616.0	V
120	715.5	V
150	734.8	V
60	737.2	V
250	987.7	V
250	1029.5	V
40	1051.6	V
60	1056.6	V

ASTATINE (At)

Z = 85

Ba I and II
Ref. 188 - E.F.W.

Air		
	Wavelength	
8	2162.25	I
10	2244.01	I

BARIUM (Ba)

Z = 56

Ba I and II
Refs. 1,252,277,279
- J.J.W.

Vacuum		
	Wavelength	
200	1486.72	II
400	1504.01	II
300	1554.38	II
200	1572.73	II
	1573.92	II
	1630.40	II
100	1674.51	II
400	1694.37	II
	1697.16	II
	1761.75	II
	1771.03	II
	1786.93	II
100	1904.15	II
500	1924.70	II
	1985.60	II
300	1999.54	II
Air		
	2009.20	II
400	2023.95	II
	2052.68	II
	2054.57	II
500	2214.7	II
800	2245.61	II
1000	2254.73	II
1400	2304.24	II
2000	2335.27	II
190	2347.58	II
60	2528.51	II
8 h	2596.64	I
100	2634.78	II
8	2702.63	I
18	2771.36	II

Ba I and II		
Intensity	Wavelength	
15	2785.28	I
100 r	3071.58	I
10 h	3108.21	I
8	3132.60	I
8 h	3135.72	I
10	3137.70	I
10	3155.34	I
10	3155.67	I
12	3158.05	I
12 h	3158.54	I
25	3165.60	I
15 h	3173.69	I
30	3183.16	I
15	3183.96	I
10	3193.91	I
25 h	3203.70	I
30	3221.63	I
40	3222.19	I
50	3261.96	I
60 r	3262.34	I
40	3281.50	I
15	3281.77	I
50	3322.80	I
80 h	3356.80	I
60 r	3377.08	I
20	3377.39	I
70 r	3420.32	I
25	3421.01	I
30 h	3421.48	I
40	3463.74	I
200 r	3501.11	I
80 h	3524.97	I
30 h	3531.35	I
80 h	3544.66	I
20 h	3547.68	I
100	3552.45	II
200	3567.73	II
100	3576.28	II
30	3577.62	I
80 h	3579.67	I
200	3596.57	II
40	3630.64	I
40 h	3636.83	I
20 h	3688.47	I
400	3735.75	II
200	3816.69	II
200	3842.80	II
100	3854.76	II
20	3889.33	I
1400 l	3891.78	II
20	3892.65	I
40	3909.91	I
500	3914.73	II
50	3935.72	I
20	3937.87	I
200	3939.67	II
500	3949.51	II
80	3993.40	I
30	3995.66	I
300	4036.26	II
200	4083.77	II
30 h	4084.86	I
1500 h	4130.66	II
20	4132.43	I
200	4166.00	II
500	4216.04	II
800	4267.95	II
100	4283.10	I
300	4287.80	II

Ba I and II		
Intensity	Wavelength	
200	4297.60	II
800	4309.32	II
20 h	4323.00	I
600	4325.73	II
200	4326.74	II
300	4329.62	II
80	4350.33	I
60	4402.54	I
400	4405.23	II
40	4431.89	I
60 h	4488.98	I
50 h	4493.64	I
40	4505.92	I
200	4509.63	II
60 h	4523.17	I
130	4524.93	II
65000	4554.03	II
40	4573.85	I
80	4579.64	I
30	4599.75	I
20 h	4619.92	I
25 h	4628.33	I
300	4644.10	II
30	4673.62	I
35	4691.62	I
20	4700.43	I
800	4708.94	II
40	4726.44	I
800	4843.46	II
300	4847.14	II
200	4850.84	II
30 h	4877.65	I
400	4899.97	II
15	4902.90	I
20000	4934.09	II
8	4947.35	I
1000	4957.15	II
300	4997.81	II
1000	5013.00	II
20 h	5159.94	I
20	5267.03	I
800	5361.35	II
1000	5391.60	II
200	5421.05	II
100	5424.55	I
200	5428.79	II
300	5480.30	II
200	5519.05	I
1000 r	5535.48	I
20 h	5620.40	I
10	5680.18	I
400	5777.62	I
800	5784.18	II
100	5800.23	I
20	5805.69	I
150	5826.28	I
2800	5853.68	II
15	5907.64	I
100	5971.70	I
800	5981.25	II
100	5997.09	I
300	5999.85	II
100	6019.47	I
200	6063.12	I
300	6110.78	I
400	6135.83	II
20000	6141.72	II
150	6341.68	I
500	6378.91	II

Ba I and II		
Intensity	Wavelength	
90	6450.85	I
150	6482.91	I
12000	6496.90	II
300	6498.76	I
150	6527.31	I
3000	6595.33	I
150	6654.10	I
1500	6675.27	I
1800	6693.84	I
1000	6769.62	II
600	6865.69	I
300 h	6867.85	I
1000	6874.09	II
6000	7059.94	I
2400 h	7120.33	I
600	7195.24	I
600 h	7228.84	I
3000	7280.30	I
1200	7392.41	I
300	7417.53	I
900 h	7459.78	I
600	7488.08	I
450 h	7636.90	I
600 h	7642.91	I
1800	7672.09	I
1200	7780.48	I
180 h	7839.57	I
1500	7905.75	I
600	7911.34	I
900 h	8210.24	I
1800 h	8559.97	I
100	8710.74	II
100	8737.71	II
300 h	8799.76	I
300	8860.98	I
450	8914.99	I
300	9219.69	I
300	9308.08	I
300 h	9324.58	I
1500	9370.06	I
300	9455.92	I
450	9589.37	I
900	9608.88	I
300 h	9645.72	I
1500 h	9830.37	I
900	10001.08	I
600	10032.10	I
1200 h	10233.23	I
300	10471.26	I
120 h	10791.25	I
180 h	11012.69	I
150 h	11114.42	I
240	11303.04	I
120 h	11697.45	I
120	13207.30	I
120	13810.50	I
120	14077.90	I
120	15000.40	I
120	20712.00	I
150	25515.70	I
150	29223.90	I

Ba III
Ref. 111 - J.J.W.

Vacuum		
	Wavelength	
5	403.82	III
2	407.12	III
7	420.12	III
4	423.84	III

Ba III			Ba III			Bk I and II			Bk I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
9	448.95	III	30	3103.92	III	10000 l	3453.90	I	10000	3827.41	I
8	456.96	III	30	3119.22	III	10000 s	3461.24	II	10000	3830.55	I
14	555.48	III	30	3152.70	III	10000 s	3464.13	II	10000 l	3831.57	II
14	587.57	III	25	3195.17	III	10000 s	3472.02	II	10000 s	3833.48	
18	647.27	III	25	3235.04	III	10000 s	3477.62	II	10000 s	3835.97	II
9	653.36	III	25	3281.65	III	10000	3528.72	I	10000	3842.19	I
15	743.12	III	20	3286.79	III	10000 l	3531.40	I	10000 l	3846.62	I
12	1097.41	III	50	3368.18	III	10000 l	3535.73	I	10000	3847.63	I
15	1113.67	III	30	3369.68	III	10000 s	3542.19	II	10000	3855.03	I
11	1116.01	III	25	3649.18	III	10000	3553.60	I	10000 l	3859.89	II
14	1133.05	III	25	3926.85	III	10000 s	3555.88	I	10000 l	3877.94	II
12	1151.76	III	25	3993.06	III	10000	3556.52	I	10000	3880.11	I
12	1170.62	III	18 p	4053.71	III	10000	3565.41		10000 l	3882.60	I
13	1207.29	III	15	4697.44	III	10000 l	3567.25	II	10000 l	3894.55	II
11	1218.92	III	10	5049.55	III	10000	3590.32	I	10000 s	3906.09	II
12	1224.55	III	10	5097.54	III	10000	3595.88	I	10000 l	3912.16	II
12	1288.53	III	12 p	5102.25	III	10000	3601.12	I	10000 l	3916.37	II
11	1299.18	III	10	5134.54	III	10000 s	3603.20	II	10000	3921.42	I
11	1307.40	III	10	5998.00	III	10000	3604.78		10000 l	3928.05	II
12	1308.87	III	13	6101.99	III	10000 l	3608.49		10000 l	4147.13	II
12	1315.72	III	10	6377.11	III	10000	3609.61		10000 s	4189.69	II
12	1334.01	III	10	6383.76	III	10000	3611.03		10000 s	4197.44	II
11	1354.71	III	8	6526.17	III	10000 l	3611.93		10000 l	4329.58	I
11	1369.53	III	8	7095.49	III	10000	3613.91		10000	4351.50	I
11	1416.61	III	8	8308.69	III	10000	3616.62		10000	4363.64	I
12	1478.85	III	8	9521.76	III	10000	3619.37		10000	4423.01	I
12	1510.68	III				10000 s	3621.81		10000	4466.46	I
12	1514.22	III				10000	3627.61	I	10000	4685.70	
12	1565.61	III				10000	3633.28		10000 l	4765.40	
12	1566.12	III				10000 l	3637.05	I	10000 s	5056.73	I
12	1574.55	III	40000	794.89	IV	10000	3640.26	I	10000 l	5118.24	I
12	1596.80	III	50000	923.74	IV	10000 s	3640.93	II	10000 s	5135.53	II
12	1610.95	III				10000 l	3675.59	I	10000	5170.61	I
12	1615.78	III				10000 s	3681.22	II	10000	5197.55	I
12	1711.53	III				10000 l	3684.43	I	10000	5212.53	I
12	1861.74	III				10000 s	3685.21	I	10000	5271.95	I
12	1883.92	III				10000 l	3686.74	I	10000	5392.03	I
11	1974.76	III				10000	3692.73	I	10000	5394.24	I
	Air					10000	3695.37	I	10000 l	5404.62	I
10	2001.30	III	10000 s	2748.02	II	10000	3703.28	I	10000	5449.63	I
15	2008.40	III	10000 s	2827.57	II	10000 s	3704.02	I	10000 l	5467.47	I
13	2022.45	III	10000 l	2872.11	II	10000	3705.26	I	10000 s	5484.58	I
10	2038.84	III	10000 s	2878.57	II	10000 s	3711.14	II	10000	5512.22	II
12	2070.43	III	10000 l	2884.77	II	10000	3712.93	I	10000 l	5537.93	I
12	2071.68	III	10000 s	2889.80	II	10000	3725.39	I	10000 l	5556.80	I
10	2076.00	III	10000 s	2893.66	II	10000	3739.92	I	10000 s	5557.09	I
12	2081.35	III	10000 l	2910.65	II	10000	3743.05	I	10000	5581.21	I
10	2134.87	III	10000 s	2926.49		10000	3745.40	I	10000 l	5656.54	I
16	2156.37	III	10000 s	2927.91		10000	3750.08	I	10000	5659.03	I
10	2160.76	III	10000 l	2941.71	II	10000	3751.91	I	10000	5702.24	I
20	2230.33	III	10000 l	2951.76	II	10000	3757.35	I	10000	5910.71	I
30	2280.68	III	10000 l	2969.13	II	10000	3757.85	I	10000 l	7040.85	I
35	2323.51	III	10000 l	2987.76	II	10000 s	3771.06	II	10000	7107.85	I
60	2331.10	III	10000 l	3178.47	II	10000	3780.72	I	10000 l	7176.22	I
25	2476.73	III	10000	3239.72	I	10000	3781.17	I	10000	7249.26	
25	2505.07	III	10000 s	3247.26	II	10000	3785.38	I	10000	7252.50	I
40	2512.28	III	10000	3252.19	I	10000	3788.21	I	10000 l	7257.21	I
40	2523.83	III	10000 s	3263.47	II	10000	3791.42	I	10000	7306.94	I
25	2530.92	III	10000 l	3288.75	I	10000	3796.21	I	10000	7394.26	
50	2559.54	III	10000	3289.35	I	10000	3797.12		10000 l	7511.26	I
25	2570.48	III	10000 s	3302.35	II	10000	3798.63	I	10000	7551.12	I
40	2681.89	III	10000	3335.26	I	10000	3801.08	II	10000	7579.77	I
30	2745.78	III	10000 s	3387.45	II	10000 s	3802.35	I	10000 l	7729.93	I
25	2938.95	III	10000	3408.28	I	10000	3802.47	I	10000 s	7903.90	I
25	2960.05	III	10000 l	3412.13	II	10000	3815.29	I	10000 s	9319.30	I
30	2962.48	III	10000	3426.95	I	10000 s	3823.10	II	10000 s	9429.13	I
20	3014.22	III	10000 l	3432.62	I	10000 s	3824.08	II	10000 l	9801.18	I
30	3043.42	III	10000 l	3437.47	I	10000	3825.19	I	10000 l	9862.39	II
40	3079.14	III	10000	3442.66	I	10000 s	3825.84	II	10000 l	9879.29	I

Bk I and II		Be I and II		Be I and II		Be I and II	
Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength
10000 I	9892.38 I	20	842.06 II		2764.2 II	40	4849.16 I
10000	10126.20 I		865.3 II	20	2898.13 I	2 h	4858.22 II
10000 I	10186.58 I	2	925.25 II	10	2898.19 I	80	5087.75 I
10000	10292.44 I	10	943.56 II	20	2898.25 I	8	5218.12 II
10000 I	10527.71 I	10	973.27 II	30	2986.06 I	20	5218.33 II
10000 I	10570.53 I		981.4 II	10	2986.42 I	3	5255.86 II
10000 I	11293.14 I		1020.1 II	60	3019.33 I	64	5270.28 II
10000 I	11500.30 I	8	1026.93 II	30	3019.49 I	500	5270.81 II
10000 s	11575.34 I	5	1036.32 II	30	3019.53 I	20	5403.04 II
10000 s	11793.09 I	15	1048.23 II	20	3019.60 I	20	5410.21 II
10000 s	12159.05 I	20	1143.03 II	10	3046.52 II		5558. I
10000	13061.13 I		1155.9 II	30	3046.69 II	10	6229.11 I
10000	13498.36 I	60	1197.19 II		3090.3 I	16	6279.43 II
10000 s	14196.93 I		1426.12 I	10	3110.81 I	30	6279.73 II
10000	15136.10 I		1491.76 I	10	3110.92 I	30	6473.54 I
10000	18352.31	20	1512.30 II	20	3110.99 I	60	6547.89 II
10000 I	19273.87 I	60	1512.43 II		3120. I	60	6558.36 II
10000 s	19653.22 I	100	1661.49 I	480	3130.42 II	30	6564.52 I
10000 s	23902.85 I	15	1776.12 II	320	3131.07 II	2 h	6636.44 II
10000 s	24192.62 I	20	1776.34 II		3136. I	1	6756.72 II
			1907. I		3150. I	2	6757.13 II
			1909.0 II		3160.6 I	30	6786.56 I
			1912. I		3163. I	1 h	6884.22 I
			1919. I		3168. I	6 h	6884.44 I
		5	1929.67 I		3180.7 II	100	6982.75 I
		10	1943.68 I		3187. I	6 h	7154.40 I
			1956. I	20	3193.81 I	40 h	7154.65 I
		50	1964.59 I	20	3197.10 II	100	7209.13 I
		5	1985.13 I	30	3197.15 II	3	7401.20 II
			1997.95 I	20	3208.60 I	2	7401.43 II
			1997.98 I		3220. I	10	7551.90 I
		60	1998.01 I	60	3229.63 I	10 h	7618.68 I
			Air	2	3233.52 II	20 h	7618.88 I
			2033.25 I	10	3241.62 II	60	8090.06 I
			2033.28 I	30	3241.83 II	5 h	8158.99 I
			2033.38 I	15	3269.02 I	10 h	8159.24 I
		50	2055.90 I	100	3274.58 II	4	8254.07 I
		100	2056.01 I	30	3274.67 II	10 h	8287.07 I
		10	2125.57 I	30	3282.91 I	30	8547.36 I
		20	2125.68 I	30	3321.01 I	60	8547.67 I
		25	2145. I	30	3321.09 I	300	8801.37 I
		55	2174.99 I	220	3321.34 I	6	8882.18 I
		55	2175.10 I	20	3345.43 I	40	9190.45 I
			2273.5 II	60	3367.63 I	20 h	9243.92 I
			2324.6 II		3405.6 II	1 h	9343.89 II
			2337.0 I	5	3451.37 I	40	9392.74 I
		950	2348.61 I	300	3455.18 I	2	9476.43 II
		20	2350.66 I	20	3476.56 I	16	9477.03 II
		60	2350.71 I	300	3515.54 I	20	9847.32 I
		200	2350.83 I	10	3555. I	10 h	9895.63 I
		2	2413.34 II	100	3736.30 I	20 h	9895.96 I
		16	2413.46 II	700	3813.45 I	80	9939.78 I
		20	2453.84 II	40	3865.13 I	16	10095.52 II
			2480.6 I	80	3865.42 I	20	10095.73 II
		35	2494.54 I	1	3865.51 I	60	10119.92 II
		35	2494.58 I	6	3865.72 I	80	10331.03 I
		100	2494.73 I	100	3866.03 I	30	11066.46 I
		16	2507.43 II	100	4253.05 I		11173. II
		5	2617.99 II	60	4253.76 I	1	11173.73 II
		20	2618.13 II	300	4360.66 II	120	11496.39 I
		100	2650.45 I	500	4360.99 II	2 h	11625.16 II
		60	2650.55 I	400	4407.94 I		11659. II
		200	2650.62 I		4526.6 I	2	11660.25 II
		60	2650.69 I		4548. I	100	12095.36 II
		100	2650.76 I		4572.66 I	30	12098.18 II
		5	2697.46 II		4673.33 II	100	14643.92 I
5	725.71 II	20	2697.58 II	1000	4673.42 II	60	14644.75 I
5	743.58 II	20	2728.88 II	6	4709.37 I	200	16157.72 I
8	775.37 II	30	2738.05 I	200	4828.16 II	80	17855.38 I

BERYLLIUM (Be)

Z = 4

Be I and II
Refs. 15,114,115,134,135,
198,335 - J.O.S.

Vacuum

- 82.58 II
- 83.66 II
- 89.16 I
- 89.80 II
- 90.04 II
- 90.21 I
- 90.67 I
- 91.06 II
- 91.36 II
- 91.74 II
- 92.19 I
- 92.61 II
- 93.14 II
- 93.42 II
- 93.93 II
- 94.78 II
- 95.76 II
- 96.29 I
- 97.24 I
- 97.44 I
- 97.86 I
- 97.97 I
- 98.12 I
- 98.37 I
- 98.66 I
- 98.94 I
- 99.19 I
- 100.86 I
- 101.20 I
- 102.13 I
- 102.49 II
- 104.40 II
- 104.67 I
- 105.80 I
- 107.26 I
- 107.38 I
- 714.0 II
- 725.71 II
- 743.58 II
- 775.37 II

Be I and II		
Intensity	Wavelength	
120	17856.63	I
100	18143.54	I
160	31775.05	I
200	31778.70	I

Be III
Refs. 73,102,175 - J.O.S.

Vacuum		
1 h	76.10	III
2	76.48	III
3	78.53	III
4	78.66	III
1 h	78.92	III
5	81.89	III
10	82.38	III
20	83.20	III
30	84.76	III
50	88.31	III
100	100.25	III
3	509.99	III
2	549.31	III
6	582.08	III
4	661.32	III
8	675.59	III
4	725.59	III
7	746.23	III
2	767.75	III
1	1114.69	III
2	1213.12	III
1	1214.32	III
2	1362.25	III
1	1401.52	III
10	1421.26	III
5	1422.86	III
1	1435.17	III
2	1440.77	III
2 h	1754.69	III
3	1917.03	III
60 h	1954.97	III

Air		
75 h	2076.94	III
60 h	2080.38	III
25	2118.56	III
15 h	2122.27	III
15 h	2127.20	III
5	2137.25	III
5	2191.57	III
100	3720.36	III
	3720.92	III
	3722.98	III
90 h	4249.14	III
2	4485.52	III
100 h	4487.30	III
1	4495.09	III
140 h	4497.8	III
140 h	6142.01	III

Be IV
Ref. 272 - J.O.S.

Vacuum		
	58.13	IV
	58.57	IV
	59.32	IV
	60.74	IV
	64.06	IV
	75.93	IV

BISMUTH (Bi)

Z = 83
Bi I and II
Refs. 1,357,358,359
- C.H.C.

Vacuum		
15	1058.88	II
20	1085.47	II
10	1099.20	II
8	1163.19	II
8	1167.06	II
10	1225.43	II
15	1232.78	II
10	1241.05	II
10	1265.35	II
15	1283.73	II
10	1306.18	II
20	1325.46	II
20	1329.47	II
20	1350.07	II
25	1372.61	II
15	1376.02	II
20	1393.92	II
45	1436.83	II
25	1447.94	II
50	1455.11	II
25	1462.14	II
35	1486.93	II
20	1502.50	II
40	1520.57	II
40	1533.17	II
30	1536.77	II
35	1538.06	II
20	1563.67	II
40	1573.70	II
60	1591.79	II
25	1601.58	II
40	1609.70	II
40	1611.38	II
20	1652.81	II
20	1749.29	II
80	1777.11	II
60	1787.47	II
70	1791.93	II
70	1823.80	II
100	1902.41	II
9000	1954.53	I
7000	1960.13	I
25	1989.35	II
Air		
7000	2021.21	I
9000	2061.70	I
45 h	2068.9	II
4600	2110.26	I
2500	2133.63	I
15	2143.40	II
15	2143.46	II
60	2186.9	II
40 h	2214.0	II
360	2228.25	I
1700	2230.61	I
340	2276.58	I
16	2368.12	II
12	2368.25	II
190	2400.88	I
10	2501.0	II
25	2515.69	I
70	2524.49	I
20 h	2544.5	II
700	2627.91	I

Bi I and II		
Intensity	Wavelength	
12	2693.0	II
280 c	2696.76	I
20	2713.3	II
140 d	2730.50	I
360	2780.52	I
15	2803.42	II
11	2803.70	II
12	2805.3	II
140 c	2809.62	I
4000	2897.98	I
15	2936.7	II
3200	2938.30	I
20	2950.4	II
12	2963.4	II
2800	2989.03	I
700	2993.34	I
2400	3024.64	I
60	3034.87	I
9000 c	3067.72	I
140	3076.66	I
550 c	3397.21	I
10	3430.83	II
12	3431.23	II
500 c	3510.85	I
380 c	3596.11	I
12	3654.2	II
70 h	3792.5	II
12	3811.1	II
20	3815.8	II
10	3845.8	II
30	3863.9	II
40 h	4079.1	II
10	4097.2	II
140	4121.53	I
140	4121.86	I
75 h	4259.4	II
25	4272.0	II
70 h	4301.7	II
12 h	4339.8	II
25 h	4340.5	II
12 h	4379.4	II
25 h	4476.8	II
60 h	4705.3	II
600 c	4722.52	I
30	4730.3	II
20	4749.7	II
12	4908.2	II
10	4916.6	II
12	4969.7	II
20	4993.6	II
10	5091.6	II
50 h	5124.3	II
60 h	5144.3	II
20	5201.5	II
75 h	5209.2	II
40 h	5270.3	II
10	5397.8	II
10 c	5552.35	I
3	5599.41	I
20	5655.2	II
40 h	5719.2	II
6	5742.55	I
12	5818.3	II
20	5860.2	II
20	5973.0	II
15	6059.1	II
15	6128.0	II
6	6134.82	I
3	6475.73	I

Bi I and II		
Intensity	Wavelength	
3	6476.24	I
15	6497.7	II
10	6577.2	II
40 h	6600.2	II
50 h	6808.6	II
4 h	6991.12	I
12	7033.	II
2	7036.15	I
10 h	7381.	II
2	7502.33	I
10 h	7637.	II
10	7750.	II
3	7838.70	I
2	7840.33	I
20	7965.	II
12 h	8050.	II
15	8328.	II
15	8388.	II
30	8532.	II
2	8544.54	I
1	8579.74	I
25	8653.	II
2	8754.88	I
3	8761.54	I
25	8863.	II
2	8907.81	I
2000 d	9657.04	I
40	9827.78	I
20	10104.5	I
15	10138.8	I
20	10300.6	I
20	10536.19	I
50	11072.44	I
15	11551.6	I
1500 d	11710.37	I
40	11999.49	I
200	12165.08	I
10	12374.64	I
200	12690.04	I
100	12817.8	I
200	14330.5	I
50	16001.5	I
60	22551.6	I

Bi III
Ref. 359 - C.H.C.

Vacuum		
1	590.73	III
5	670.76	III
4	775.16	III
6	803.65	III
7	920.93	III
6	925.48	III
25	1039.99	III
50 h	1045.76	III
30	1051.81	III
20	1139.01	III
15	1145.91	III
50	1224.64	III
40	1326.84	III
60	1346.12	III
35	1423.33	III
35	1423.52	III
60 h	1461.00	III
60 h	1606.40	III
20 h	1691.5	III
20	1834.32	III
10	1863.9	III
10	1912.12	III

Br I and II			Br I and II			Br I and II			Br I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
7500	1232.43	I	300	4024.04	II	350	5589.94	II	10000 c	8793.47	I
1200	1243.90	I	300	4135.66	II	300	5718.71	II	15000	8819.96	I
800	1249.59	I	300	4140.20	II	300	5830.78	II	25000	8825.22	I
1500	1251.66	I	400	4179.63	II	1800	5852.08	I	4000	8888.98	I
1000	1255.80	I	300	4193.45	II	1600	5940.48	I	30000	8897.62	I
1500	1259.20	I	1000	4223.89	II	2400	6122.14	I	6000	8932.40	I
1200	1261.66	I	300	4236.89	II	40000	6148.60	I	1800	8949.39	I
1200	1266.20	I	300	4291.39	II	300	6161.74	II	9000	8964.00	I
1000	1279.48	I	2000	4365.14	I	2000	6177.39	I	350	9024.42	II
1000	1286.26	I	1000	4365.60	II	1500	6335.48	I	30000	9166.06	I
3000	1309.91	I	1500	4425.14	I	60000	6350.73	I	15000	9173.63	I
3000	1316.74	I	10000	4441.74	I	400	6352.94	II	20000	9178.16	I
1000	1317.37	I	10000	4472.61	I	2500	6410.32	I	40000	9265.42	I
2000	1317.70	I	20000	4477.72	I	1800	6483.56	I	15000	9320.86	I
12000	1384.60	I	1000	4490.42	I	1000	6514.62	I	300	9434.04	II
3000	1449.90	I	3000	4513.44	I	20000	6544.57	I	6000	9793.48	I
50000	1488.45	I	15000	4525.59	I	1500	6548.09	I	10000	9896.40	I
30000	1531.74	I	300	4529.60	II	50000 c	6559.80	I	3000	10140.08	I
25000	1540.65	I	500	4542.92	II	1000	6571.31	I	6000	10237.74	I
30000	1574.84	I	3000	4575.74	I	1800	6579.14	I	1000	10299.62	I
20000	1576.39	I	300	4601.36	II	20000	6582.17	I	1500	10377.65	I
25000	1582.31	I	2500	4614.58	I	1500	6620.47	I	30000	10457.96	I
75000	1633.40	I	350	4622.70	II	50000 c	6631.62	I	1000	10742.14	I
	Air		300	4642.02	II	20000	6682.28	I	3000	10755.92	I
350	2285.17	II	300	4651.98	II	10000	6692.13	I	1700	13217.17	I
350	2287.60	II	500	4678.70	II	8000	6728.28	I	1800	14354.57	I
500 h	2317.30	II	400	4693.17	II	2000	6760.06	I	1250	14888.70	I
400	2336.93	II	500	4704.85	II	2000	6779.48	I	1800	16731.19	I
350	2386.45	II	350	4719.76	II	2200	6786.74	I	1200	18568.31	I
500	2386.70	II	400	4720.36	II	6500	6790.04	I	3500	19733.62	I
300	2388.69	II	300	4728.20	II	1600 c	6791.48	I	1000	20281.73	I
450	2388.96	II	300	4735.41	II	1800	6861.15	I	1000	20624.67	I
500	2389.69	II	400	4742.64	II	10000	7005.19	I	1200	21787.24	I
350	2392.21	II	2500	4752.28	I	2000	7260.45	I	4000	22865.65	I
400	2392.42	II	350	4766.00	II	10000	7348.51	I	1000	23513.15	I
300	2488.50	II	400	4779.40	II	40000	7512.96	I	500	28346.50	I
300 h	2495.22	II	4000	4780.31	I	1600	7591.61	I	500	30380.85	I
450	2521.70	II	1600	4785.19	I	1800	7595.07	I	600	31630.13	I
400	2541.48	II	500	4785.50	II	2000	7616.41	I	120	32693.90	I
400	2556.92	II	300	4802.33	II	30000	7803.02	I	150	34181.87	I
350	2690.17	II	500	4816.70	II	1200	7827.23	I	150	38345.75	I
400	2713.77	II	300	4818.46	II	2500 s	7881.45	I	120	39964.36	I
350 h	2746.52	II	350	4844.81	II	2500	7881.57	I			
300 h	2807.55	II	350	4848.75	II	2500	7925.81	I			
400 h	2893.40	II	400	4921.12	II	30000 c	7938.68	I			
400 h	2917.18	II	400	4928.79	II	3000	7947.94	I			
400 h	2967.21	II	450	4930.66	II	3000	7950.18	I	450	611.1	III
500 h	2972.26	II	300	4945.51	II	8000	7978.44	I	300	620.4	III
300	2981.86	II	4000	4979.76	I	10000	7978.57	I	500	665.54	III
300 h	2985.87	II	300	5038.74	II	30000	7989.94	I	500	677.19	III
300 h	2986.53	II	300	5054.64	II	2000	8026.35	I	300	677.8	III
300 h	3016.48	II	400	5164.38	II	2500	8026.54	I	450	687.68	III
350	3423.82	II	300	5180.01	II	30000	8131.52	I	400	690.2	III
300 h	3606.80	II	500	5182.35	II	1000 c	8152.65	I	350	696.99	III
350	3714.30	II	300	5193.90	II	10000	8153.75	I	300	727.0	III
1200	3815.65	I	500	5238.23	II	25000	8154.00	I	300	736.4	III
350	3834.69	II	300	5272.68	II	5000	8246.86	I	250	769.63	III
300	3871.21	II	350	5304.10	II	15000	8264.96	I	250	817.79	III
400	3891.63	II	400	5330.57	II	75000 c	8272.44	I	350	949.0	III
300	3901.24	II	500	5332.05	II	20000	8334.70	I	400	960.4	III
300	3914.20	II	1200	5395.48	I	10000	8343.70	I	450	984.9	III
500	3914.38	II	400	5422.78	II	1200	8384.04	I	250	1313.5	III
350	3919.51	II	350	5424.99	II	40000	8446.55	I	250	1402.9	III
400	3924.09	II	300	5435.07	II	4000	8477.45	I			
300	3929.55	II	1200	5466.22	I	1500	8513.38	I	400 h	2293.44	III
350	3939.69	II	350	5478.47	II	1000	8557.73	I	300	2313.29	III
350	3950.61	II	300	5488.79	II	1000	8566.28	I	300	2462.39	III
500	3980.38	II	300	5495.06	II	20000	8638.66	I	300	2482.60	III
1500	3992.36	I	500	5506.69	II	4000	8698.53	I	350	2499.25	III

Br III
Refs. 246,250 - G.V.S.

Vacuum

450	611.1	III
300	620.4	III
500	665.54	III
500	677.19	III
300	677.8	III
450	687.68	III
400	690.2	III
350	696.99	III
300	727.0	III
300	736.4	III
250	769.63	III
250	817.79	III
350	949.0	III
400	960.4	III
450	984.9	III
250	1313.5	III
250	1402.9	III
	Air	
400 h	2293.44	III
300	2313.29	III
300	2462.39	III
300	2482.60	III
350	2499.25	III

Br III			Br IV			Cd I and II			Cd I and II			
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		
350	2529.49	III	1000	607.03	IV	100	1668.60	II	200 r	2981.362	I	
350 h	2551.09	III	1000	617.85	IV	50	1702.47	II	50	2981.845	I	
350 h	2570.83	III	1000	619.87	IV	50	1724.41	II	50	3030.60	II	
300 h	2573.17	III	1000	630.14	IV	100	1785.84	II	150	3080.822	I	
400 h	2584.99	III	1000	642.23	IV	100	1827.70	II	25	3081.48	II	
500	2589.14	III	1000	661.53	IV	300	1922.23	II	30	3082.593	I	
300 h	2594.48	III	1000	683.51	IV	100	1943.54	II	100	3092.34	II	
400 h	2595.98	III	1000	697.72	IV	40	1965.54	II	200	3133.167	I	
450 h	2606.20	III	1000	715.39	IV	30	1986.89	II	50	3146.79	II	
350 h	2608.15	III	1000	731.00	IV	200	1995.43	II	150	3250.33	II	
500 h	2613.13	III	1000	800.12	IV		Air		300	3252.524	I	
350 h	2616.26	III	1000	813.66	IV	100	2007.49	II	300	3261.055	I	
500 h	2626.52	III	900	1274.82	IV	50	2032.45	II	50	3343.21	II	
350 h	2629.23	III	1000	1703.51	IV	75	2036.23	II	50	3385.49	II	
350 h	2639.60	III		Air		150	2096.00	II	30	3388.88	II	
350 h	2671.53	III	1000	2133.79	IV	1000 r	2144.41	II	800	3403.652	I	
350 h	2735.83	III	1000	2145.02	IV	50	2155.06	II	50	3417.49	II	
300	2770.50	III	1000	2257.21	IV	100	2187.79	II	50	3442.42	II	
300 h	2785.28	III	1000	2272.73	IV	1000	2194.56	II	100	3464.43	II	
300	2804.16	III	1000	2307.40	IV	1000	2265.02	II	1000	3466.200	I	
400	2926.96	III	1000	2408.16	IV	1500 r	2288.022	I	800	3467.655	I	
300	2936.22	III	1000	2411.58	IV	1000	2312.77	II	25	3483.08	II	
350	2969.00	III	700	2491.14	IV	200	2321.07	II	150	3495.44	II	
400	2994.04	III	1000	2581.19	IV	40	2376.82	II	25	3499.952	I	
500	3020.76	III	600	2661.40	IV	50	2418.69	II	100	3524.11	II	
300	3033.63	III	700	2820.87	IV	50	2469.73	II	100	3535.69	II	
350	3036.45	III	1000	2842.88	IV	40	2487.93	II	1000	3610.508	I	
500	3074.42	III	1100 h	2907.71	IV	3	2491.00	I	800	3612.873	I	
350	3091.94	III	500	3041.18	IV	40	2495.58	II	60	3614.453	I	
350	3117.29	III	500	3380.56	IV	10	2508.91	I	20	3649.558	I	
300	3147.81	III		Br V		50	2509.11	II	10	3981.926	I	
400	3174.08	III		Ref. 42 - G.V.S.		30	2516.22	II	100	4029.12	II	
300	3321.08	III		Vacuum		15 h	2518.59	I	200	4134.77	II	
450	3333.07	III	600	468.37	V	25 h	2525.196	I	50	4141.49	II	
500	3349.64	III	800	482.11	V	50	2544.613	I	100	4285.08	II	
300	3385.25	III	900	531.97	V	50	2551.98	II	8	4306.672	I	
450	3447.36	III	1000	547.90	V	25	2553.465	I	100	4412.41	II	
400	3487.58	III	700	549.77	V	3	2565.789	I	3	4412.989	I	
300	3506.47	III	800	621.03	V	500	2572.93	II	1000	4415.63	II	
450	3517.36	III	800	632.22	V	50	2580.106	I	30	4440.45	II	
500	3540.16	III	700	645.44	V	3	2584.87	I	8	4662.352	I	
300	3551.08	III	400	652.64	V	30	2592.026	I	200	4678.149	I	
500	3562.43	III	800	657.54	V	25 h	2602.048	I	30	4744.69	II	
450	3600.71	III	800	679.62	V	50	2628.979	I	300	4799.912	I	
250	3693.53	III	700	812.95	V	40	2632.190	I	50	4881.72	II	
450	3820.26	III	1000	850.81	V	75	2639.420	I	50	5025.50	II	
200	3903.95	III	150	855.27	V	40	2659.23	II	1000 h	5085.822	I	
350	4506.55	III	600	1041.60	V	50 h	2660.325	I	6	5154.660	I	
200	4519.74	III	1000	1069.15	V	25	2668.20	II	100	5268.01	II	
150	5175.87	III	500	1080.54	V	50	2672.62	II	100	5271.60	II	
100	5446.80	III	900	1112.13	V	100	2677.540	I	1000	5337.48	II	
100	7192.8	III	1000	1143.56	V	25	2677.748	I	1000	5378.13	II	
100	7673.1	III	150	1429.75	V	50	2707.00	II	200	5381.89	II	
	Br IV		400	1442.60	V	75	2712.505	I	40	5843.30	II	
	Refs. 139,142,243,249		150	1470.35	V	50	2733.820	I	50	5880.22	II	
	- G.V.S.			CADMIUM (Cd)		1000	2748.54	II	300	6099.142	I	
	Vacuum			Z = 48		100 h	2763.894	I	100	6111.49	I	
700	379.73	IV		Cd I and II		50 h	2764.230	I	100	6325.166	I	
700	400.37	IV		Refs. 44,285,296 - R.D.C.		50	2774.958	I	30	6330.013	I	
1000	545.43	IV		Vacuum		30	2823.19	II	400	6354.72	II	
1000	559.76	IV		100	1256.00	II	200	2836.900	I	500	6359.98	II
1000	569.19	IV		150	1296.43	II	25	2856.46	II	2000	6438.470	I
1000	576.59	IV		100	1326.50	II	100	2868.180	I	400	6464.94	II
1000	585.10	IV		150	1370.91	II	200 r	2880.767	I	25	6567.65	II
1000	586.71	IV		100	1514.26	II	50 r	2881.224	I	500	6725.78	II
1000	597.51	IV		200	1571.58	II	200	2914.67	II	100	6759.19	II
1000	600.09	IV				50	2927.87	II	30	6778.116	I	
1000	601.27	IV				200	2929.27	II	50	7237.01	II	
						1000 r	2980.620	I	100	7284.38	II	

Cd I and II		
Intensity	Wavelength	
1000	7345.670	I
50	8066.99	II
5	8200.309	I
20	9292	I
15	11655	I
35	14491	I
80	15712	I
55 d	19125	I
25	24378	I
35	25455	I
Cd III		
Ref. 296 - R.D.C.		
Vacuum		
8	677.39	III
15	684.58	III
10	720.70	III
5	1383.60	III
15	1392.10	III
10	1396.78	III
25	1416.28	III
5	1420.29	III
8	1420.54	III
5	1432.86	III
20	1446.08	III
25	1447.55	III
30	1455.74	III
8	1466.14	III
5	1471.97	III
15	1491.81	III
5	1511.01	III
10	1511.65	III
5	1513.13	III
10	1523.55	III
15	1528.40	III
30	1529.30	III
5	1532.10	III
50	1545.17	III
25	1547.57	III
10	1550.07	III
20	1550.45	III
15	1550.89	III
5	1552.18	III
5	1556.48	III
15	1560.66	III
5	1566.03	III
15	1568.98	III
10	1582.39	III
40	1601.59	III
20	1604.87	III
20	1606.64	III
10	1607.28	III
15	1608.91	III
10	1609.61	III
15	1612.51	III
15	1625.27	III
25	1628.54	III
20	1651.87	III
25	1655.63	III
30	1678.15	III
10	1699.70	III
40	1707.16	III
10	1721.93	III
40	1722.95	III
30	1725.66	III
25	1739.00	III
5	1745.69	III
40	1747.67	III
15	1748.15	III

Cd III		
Intensity	Wavelength	
30	1768.82	III
40	1773.06	III
30	1789.19	III
75	1793.40	III
15	1796.10	III
5	1800.57	III
40	1823.41	III
50	1844.66	III
40	1851.13	III
20	1851.37	III
40	1855.85	III
200	1856.67	III
150	1874.08	III
15	1886.49	III
15	1903.48	III
25	1909.98	III
15	1910.57	III
10	1939.59	III
15	1988.81	III
Air		
20	2000.60	III
15	2004.07	III
15	2016.12	III
40	2039.83	III
50	2045.61	III
10	2061.25	III
75	2087.91	III
10	2097.45	III
5	2100.47	III
50	2111.60	III
5	2188.13	III
5	2218.43	III
5	2224.43	III
7	2418.24	III
10	2426.36	III
25	2499.81	III
15	2618.81	III
5	2630.56	III
20	2766.99	III
30	2805.59	III
10	3035.72	III
Cd IV		
Refs. 353,399 - R.D.C.		
Vacuum		
50	427.01	IV
20	437.88	IV
50	447.85	IV
60	480.90	IV
10	489.49	IV
70	493.00	IV
70	495.13	IV
70	498.14	IV
70	498.53	IV
80	504.09	IV
70	504.20	IV
70	504.50	IV
80	506.31	IV
60	508.01	IV
50	508.95	IV
70	509.55	IV
25	509.81	IV
70	511.40	IV
80	513.00	IV
70	514.50	IV
60	519.42	IV
15	520.97	IV
80	524.41	IV
70	524.47	IV

Cd IV		
Intensity	Wavelength	
50	524.77	IV
70	525.10	IV
60	525.19	IV
70	527.07	IV
50	530.79	IV
80	531.09	IV
80	531.51	IV
70	534.29	IV
70	536.77	IV
50	537.24	IV
60	540.90	IV
70	541.74	IV
80	542.60	IV
80	546.55	IV
40	548.01	IV
20	548.33	IV
15	548.90	IV
25	551.27	IV
20	552.90	IV
60	553.06	IV
80	554.05	IV
25	560.26	IV
10	564.16	IV
60	567.01	IV
20	1062.23	IV
150	1118.16	IV
30	1126.00	IV
20	1134.08	IV
15	1139.04	IV
20	1154.64	IV
10	1155.73	IV
100	1164.65	IV
20	1165.78	IV
40	1167.30	IV
20	1179.73	IV
15	1183.07	IV
100	1183.40	IV
40	1194.13	IV
20	1195.63	IV
30	1196.47	IV
20	1198.93	IV
15	1215.38	IV
20	1223.52	IV
20	1246.06	IV
15	1246.56	IV
15	1249.94	IV
30	1266.47	IV
15	1274.41	IV
20	1285.63	IV
20	1287.58	IV
20	1299.46	IV
40	1304.36	IV
30	1306.07	IV
15	1316.89	IV
15	1321.85	IV
20	1325.55	IV
30	1340.97	IV
15	1346.15	IV
30	1354.78	IV
20	1358.11	IV
30	1362.55	IV
60	1370.48	IV
30	1380.98	IV
20	1397.65	IV
30	1403.68	IV
15	1406.58	IV
60	1418.89	IV
15	1429.83	IV
20	1447.54	IV

Cd IV		
Intensity	Wavelength	
20	1452.63	IV
15	1465.97	IV
15	1466.67	IV
15	1482.95	IV
20	1491.79	IV
20	1570.20	IV
20	1598.73	IV
20	1600.42	IV
15	1622.87	IV
CALCIUM (Ca)		
Z = 20		
Ca I and II		
Refs. 70,150,270		
- J.J.W. and H.H.S.		
Vacuum		
24	1341.89	II
12	1342.54	II
20	1433.75	II
12	1432.50	II
20	1553.18	II
32	1554.64	II
4	1642.80	II
20	1643.77	II
36	1644.44	II
60	1649.86	II
32	1651.99	II
12	1673.86	II
20	1680.05	II
2	1680.13	II
8	1691.78	II
16	1698.18	II
20	1807.34	II
40	1814.50	II
4	1814.65	II
60	1840.06	II
40	1838.01	II
20	1843.09	II
40	1850.69	II
Air		
	2103.24	II
	2112.76	II
	2113.15	II
	2128.75	II
	2131.51	II
	2132.30	II
2	2150.80	I
	2197.79	II
5	2200.73	I
	2208.61	II
6	2275.46	I
8	2398.56	I
7	2721.65	I
9	2994.96	I
8	2997.31	I
8	2999.64	I
9	3000.86	I
10	3006.86	I
9	3009.21	I
2	3024.94	I
2	3034.54	I
2	3045.74	I
3	3055.32	I
2	3071.57	I
2	3076.95	I
2	3080.79	I
2	3099.30	I

Ca I and II			Ca I and II			Ca I and II			Ca I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
10	3125.18	II	40	4206.18	II	29	6471.66	I	25	12816.04	I
5	3136.02	I	50	4220.07	II	32	6493.78	I	24	12823.86	I
6	3140.79	I	50	4226.73	I	28	6499.65	I	25	12909.10	I
7	3150.75	I	15	4240.46	I	23	6572.78	I	30	13033.57	I
170	3158.87	II	24	4283.01	I	30	6717.69	I	21	13086.44	I
180	3179.33	II	22	4289.36	I	33	7148.15	I	24	13134.95	I
5	3180.52	I	22	4298.99	I	31	7202.19	I	20	16150.77	I
150	3181.28	II	25	4302.53	I		7291.47	II	22	16157.36	I
7	3209.96	I	23	4307.74	I		7323.89	II	21	16197.04	I
8	3215.17	I	22	4318.65	I	33	7326.15	I	20	18925.47	I
6	3215.34	I	20	4355.08	I	30	7575.81	II	24	18970.14	I
9	3225.90	I	25	4425.44	I	60	7581.11	II	30	19046.14	I
6	3226.15	I	26	4434.96	I	80	7601.30	II	48	19309.20	I
5	3274.67	I	25	4435.69	I	20	7602.32	II	49	19452.99	I
6	3286.07	I	30	4454.78	I	40	7820.78	II	47	19505.72	I
10	3308.02	II	28	4455.89	I	60	7843.38	II	50	19776.79	I
20	3316.51	II	20	4456.61	I	20	8017.50	II	35	19853.10	I
10	3344.51	I	20	4472.04	II	20	8020.50	II	34	19862.22	I
10	3347.04	II	10	4479.23	II	70	8133.05	II	23	19917.19	I
11	3350.21	I	20	4489.18	II	100	8201.72	II	24	19933.70	I
9	3350.36	I	23	4526.94	I	110	8248.80	II		21389.00	II
12	3361.92	I	22	4578.55	I	70	8254.73	II		21428.90	II
9	3362.14	I	23	4581.40	I	14	8256.67	I	20	22607.93	I
10	3452.66	II	23	4581.47	I	10	8338.04	I	25	22624.93	I
20	3461.87	II	24	4585.87	I	12	8339.12	I	30	22651.23	I
9	3468.48	I	24	4585.96	I	10	8352.39	I			
11	3474.76	I	20	4685.27	I	11	8357.17	I			
10	3485.61	II	30	4716.74	II	130	8498.02	II			
13	3487.60	I	40	4721.03	II	170	8542.09	II			
10	3495.16	II	40	4799.97	II	10	8633.95	I			
15	3624.11	I	25	4878.13	I	160	8662.14	II	6	296.96	III
17	3630.75	I	70	5001.48	II	12	8842.61	I	9	403.72	III
14	3630.97	I	80	5019.97	II	15	8909.18	I	7	409.95	III
20	3644.41	I	40	5021.14	II	100	8912.07	II	5	439.69	III
14	3644.77	I	23	5041.62	I	110	8927.36	II	5	633.59	III
8	3644.99	I	25	5188.85	I	12	8967.47	I	5	685.41	III
5	3675.29	I	22	5261.71	I	16	9099.10	I	5	697.55	III
6	3678.21	I	23	5262.24	I	13	9105.62	I	5	699.09	III
30	3683.70	II	22	5264.24	I	12	9108.82	I	5	699.89	III
40	3694.11	II	24	5265.56	I	10	9171.14	I	6	701.39	III
10	3694.36	II	25	5270.27	I	110	9213.90	II	5	727.66	III
170	3706.03	II	60	5285.27	II	90	9312.00	II	8	740.55	III
180	3736.90	II	70	5307.22	II	100	9319.56	II	6	746.25	III
10	3739.38	II	50	5339.19	II	110	9320.65	II	5	747.98	III
6	3748.35	I	27	5349.47	I	25	9416.97	I	5	779.61	III
8	3750.29	I	23	5512.98	I	10	9456.80	I	5	800.30	III
9	3753.34	I	25	5581.97	I	10	9534.88	I	5	809.93	III
20	3755.67	II	27	5588.76	I	11	9548.38	I	5	817.06	III
30	3758.39	II	24	5590.12	I	100	9567.97	II	6	821.57	III
9	3870.48	I	26	5594.47	I	110	9599.24	II	6	840.56	III
11	3872.54	I	25	5598.49	I	80	9601.82	II	6	1020.07	III
11	3872.56	I	24	5601.29	I	10	9604.28	I	5	1034.65	III
12	3875.78	I	24	5602.85	I	12	9663.65	I	5	1187.30	III
12	3875.80	I	30	5857.45	I	10	9664.41	I	8	1188.61	III
6	3889.10	I	10	5922.72	II	14	9676.30	I	8	1188.61	III
6	3923.48	I	10	5923.69	II	14	9688.67	I	5	1190.86	III
230	3933.66	II	27	6102.72	I	13	9701.94	I	10	1262.65	III
9	3935.29	I	29	6122.22	I	80	9854.74	II	11	1278.39	III
6	3946.04	I	22	6161.29	I	110	9890.63	II	10	1281.55	III
15	3948.90	I	30	6162.17	I	90	9931.39	II	12	1286.52	III
17	3957.05	I	22	6163.76	I	100	10223.04	II	12	1298.04	III
220	3968.47	II	24	6166.44	I	20	10343.81	I	11	1317.70	III
8	3972.57	I	26	6169.06	I	13	10838.97	I	10	1328.95	III
18	3973.71	I	28	6169.56	I	13	10861.58	I	11	1335.13	III
50	4097.10	II	35	6439.07	I	13	10863.87	I	10	1360.01	III
15	4098.53	I	30	6449.81	I	14	10869.50	I	11	1385.43	III
15	4098.57	I	22	6455.60	I	14	10879.87	I	11	1397.69	III
60	4109.82	II	80	6456.87	II	20	11838.99	II	13	1453.16	III
30	4110.28	II	34	6462.57	I	10	11949.72	II	12	1459.79	III

Ca III
 Refs. 25,26
 - J.J.W. and H.H.S.
 Vacuum

Ca III			Ca III			Ca IV			CALIFORNIUM (Cf)	
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength
11	1461.88	III	19	3119.67	III	150	339.79	IV	Z = 98	
15	1463.34	III	15	3367.79	III	200	340.29	IV		
16	1484.87	III	19	3372.67	III	200	341.29	IV	Cf I and II Refs. 52,331 - J.G.C.	
12	1496.88	III	18	3537.77	III	200	341.46	IV		
11	1506.88	III	15	4081.77	III	250 c	342.45	IV	Intensity	Wavelength
20	1545.29	III	15	4153.57	III	100	343.19	IV		Air
15	1555.53	III	15	4164.31	III	200	343.44	IV	10000	2739.31
18	1562.47	III	15	4184.20	III	250	343.93	IV	10000 s	2759.10
13	1571.27	III	18	4207.24	III	200	344.96	IV	10000	2774.52
13	1586.13	III	17	4233.74	III	215	345.13	IV	10000 l	2852.03
10	1762.26	III	16	4240.74	III	250	374.74	IV	10000 s	2855.24
10	1783.93	III	15	4284.39	III	600	434.57	IV	10000	3298.14
10	1794.22	III	20	4302.81	III	100	437.27	IV	10000	3352.71
12	1800.21	III	15	4329.19	III	250	437.77	IV	10000 l	3367.79
13	1807.89	III	16	4333.57	III	200	438.93	IV	10000	3392.22
14	1812.15	III	15	4358.38	III	750	443.82	IV	10000	3481.07
11	1813.59	III	19	4399.59	III	50	445.02	IV	10000 l	3513.47
12	1830.06	III	17	4406.29	III	500	450.57	IV	10000	3531.49
10	1860.43	III	17	4431.30	III	50	454.55	IV	10000	3540.98
14	1870.26	III	19	4499.88	III	250	456.98	IV	10000	3598.77
14	1872.37	III	18	4516.59	III	250	461.09	IV	10000	3605.32
10	1894.12	III	18	4572.12	III	150	565.46	IV	10000	3612.11
11	1910.10	III	11	4708.83	III	750	656.00	IV	10000	3617.49
12	1935.72	III	11	4716.27	III	500	669.70	IV	10000 s	3626.76
10	1939.68	III	10	4859.17	III	Ca V			10000	3659.46
11	1943.01	III	10	5008.95	III	Ref. 150			10000	3662.70
12	1948.26	III	10	5050.07	III	- J.J.W. and H.H.S.			10000 s	3699.49
10	1953.55	III	10	5231.82	III	200	190.36	V	10000 l	3722.11
10	1958.97	III	11	5247.37	III	250	190.46	V	10000	3739.35
13	1964.61	III	13	5271.98	III	250	196.97	V	10000	3785.61
13	1967.94	III	10	5301.32	III	300	199.55	V	10000 l	3789.04
12	1972.82	III	11	5321.29	III	250	200.51	V	10000 s	3893.23
10	1977.01	III	10	5328.06	III	265	257.98	V	10000 l	3993.57
10	1978.55	III	11	5570.58	III	165	260.45	V	10000	4035.45
11	1981.19	III	10	5579.06	III	400	267.77	V	10000	4099.12
	Air		13	6069.98	III	300	270.31	V	10000	4242.38
12	2033.36	III	10	6173.22	III	200	271.14	V	10000	4329.03
12	2041.53	III	12	6213.98	III	250	272.27	V	10000	4335.22
13	2078.92	III	11	6294.89	III	200	272.98	V	10000	5173.96
13	2098.49	III	11	6370.11	III	400	280.99	V	10000	5179.08
15	2114.41	III	10	6387.55	III	300	284.98	V	10000	5219.24
17	2123.03	III	12	6424.51	III	450 c	286.96	V	10000 s	5279.01
14	2129.19	III	12	6485.35	III	500	322.17	V	10000 s	5320.09
14	2133.96	III	10	6538.78	III	250	322.76	V	10000 s	5339.13
13	2140.36	III	10	6542.24	III	300	323.22	V	10000	5408.88
16	2152.43	III	10	7308.69	III	250	324.48	V	10000	5726.05
12	2171.57	III	10	7843.06	III	250	325.28	V	10000	6222.83
12	2276.52	III	12	7898.46	III	300	330.94	V	10000	6631.26
15	2312.08	III	10 l	8217.20	III	200	333.44	V	10000	6677.90
14	2497.74	III				200	333.57	V	10000	6894.59
15	2541.50	III				300	334.55	V	10000	6927.10
13	2587.15	III				250 c	335.34	V	10000 l	7074.52
12	2590.41	III				200	336.55	V	10000 s	7307.90
15	2620.82	III				200	337.54	V	10000	8141.29
15	2634.14	III	150	249.41	IV	250	338.06	V	10000	8241.77
12	2686.72	III	150	250.15	IV	200	343.64	V	10000	8333.85
16	2687.76	III	150	251.35	IV	450	352.92	V	10000	8423.49
15	2704.86	III	250	296.55	IV	250	356.25	V	10000	8568.83
14	2771.28	III	200	299.32	IV	250	377.18	V	10000 l	9228.52
15	2791.59	III	200	318.09	IV	200	387.08	V	10000	9337.70
16	2813.88	III	50	318.39	IV	750	425.00	V	10000	9649.51
17	2866.54	III	120	321.59	IV	500	558.60	V	10000 s	10308.41
18	2869.95	III	250	329.12	IV	400	637.93	V	10000 l	10568.83
19	2881.78	III	150	329.39	IV	300	643.12	V	10000 s	10614.84
21	2899.79	III	200	331.44	IV	400	646.57	V	10000	11300.19
19	2924.33	III	250	331.99	IV	250	647.88	V	10000	11681.85
20	2988.63	III	235	332.53	IV	250	651.55	V	10000	11941.33
18	2989.27	III	150	332.81	IV	300	656.76	V		
15	3028.59	III	200	338.83	IV					

Cf I and II		C I and II		C I and II		C III	
Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength
10000 l	12183.05	100	1354.288 I	200	7860.89 I	150 l	2725.30 III
10000 s	12352.72	150	1355.84 I	200	8058.62 I	150 l	2725.90 III
10000 s	12437.48	120	1364.164 I	520	8335.15 I	200	2982.11 III
10000 l	12787.41	100	1459.032 I	250	9061.43 I	150	4056.06 III
10000 l	13329.98	200	1463.336 I	200	9062.47 I	200	4067.94 III
10000 s	13362.98	120	1467.402 I	200	9078.28 I	250	4068.91 III
10000 l	13376.89	150	1481.764 I	250	9088.51 I	250	4070.26 III
10000 l	13474.44	150	1560.310 I	450	9094.83 I	150	4162.86 III
10000 l	14772.49	400	1560.683 I	300	9111.80 I	250 h	4186.90 III
10000 s	15281.32	400	1560.708 I	800	9405.73 I	200	4325.56 III
10000	15587.12	100	1561.341 I	150	9603.03 I	600	4647.42 III
10000	15675.92	400	1561.438 I	250	9620.80 I	520	4650.25 III
10000	16759.06	150	1656.266 I	300	9658.44 I	375	4651.47 III
10000 s	17626.25	120	1656.928 I	200	10683.08 I	200	4665.86 III
10000 l	18718.69	300	1657.008 I	300	10691.25 I	450	5695.92 III
10000 h	19068.71	120	1657.380 I	12	11619.29 I	150	5826.42 III
10000 l	19336.96	120	1657.907 I	23	11628.83 I	150	6744.38 III
10000 l	19576.84	150	1658.122 I	13	11658.85 I	150 h	7037.25 III
10000 l	20393.38	500	1751.823 I	47	11659.68 I	150	7612.65 III
10000 s	20869.98	1000	1930.905 I	24	11669.63 I	300 h	8196.48 III
CARBON (C)		Air		85	11748.22 I	150	8332.99 III
Z = 6		800	2478.56 I	142	11753.32 I	300	8500.32 III
C I and II		250	2509.12 II	114	11754.76 I	C IV	
Ref. 211 - R.L.K.		350	2512.06 II	11	11777.54 I	Refs. 66,211 - R.L.K.	
Vacuum		250 h	2574.83 II	17	11892.91 I	Vacuum	
9	595.022 II	350 l	2741.28 II	30	11895.75 I	250	244.91 IV
30	687.053 II	250	2746.49 II	26	12614.10 I	200	289.14 IV
50	687.345 II	1000	2836.71 II	20	13502.27 I	250	289.23 IV
10	858.092 II	800	2837.60 II	38	14399.65 I	570	312.42 IV
20	858.559 II	800 h	2992.62 II	16	14403.25 I	500	312.46 IV
30	903.624 II	350	3876.19 II	61	14420.12 I	650	384.03 IV
60	903.962 II	350	3876.41 II	12	14429.03 I	700	384.18 IV
150	904.142 II	350	3876.66 II	13	14442.24 I	400	419.52 IV
30	904.480 II	570	3918.98 II	12	16559.66 I	500	419.71 IV
9	1009.86 II	800	3920.69 II	50	16890.38 I	1000	1548.202 IV
10	1010.08 II	250	4074.52 II	10	17338.56 I	900	1550.774 IV
10	1010.37 II	350 l	4075.85 II	11	17448.60 I	Air	
80	1036.337 II	800	4267.00 II	13	18139.80 I	200 l	2524.41 IV
150	1037.018 II	1000	4267.26 II	23	19721.99 I	300 s	2529.98 IV
150	1157.910 I	200	4771.75 I	C III		200 w	4658.30 IV
150	1158.019 I	200	4932.05 I	Refs. 22,211 - R.L.K.		250	5801.33 IV
150	1158.035 I	200	5052.17 I	Vacuum		200	5811.98 IV
150	1158.992 I	350	5132.94 II	250	371.69 III	90 w	7726.2 IV
150	1189.447 I	350	5133.28 II	250	371.75 III	C V	
200	1189.631 I	350	5143.49 II	150	371.78 III	Ref. 211 - R.L.K.	
300	1193.009 I	570	5145.16 II	500	386.203 III	Vacuum	
300	1193.031 I	400	5151.09 II	200	450.734 III	110	34.973 V
300	1193.240 I	300	5380.34 I	400	459.46 III	450	40.268 V
300	1193.264 I	250	5648.07 II	500	459.52 III	110	227.19 V
100	1193.393 I	350	5662.47 II	570	459.63 III	160	248.66 V
150	1193.649 I	570	5889.77 II	250	511.522 III	160	248.74 V
150	1193.679 I	350	5891.59 II	250	535.288 III	Air	
100	1194.064 I	200	6001.13 I	300	538.080 III	40	2270.91 V
100	1194.488 I	250	6006.03 I	350	538.149 III	5	2277.25 V
100	1261.552 I	110	6007.18 I	400	538.312 III	20	2277.92 V
250	1277.245 I	150	6010.68 I	350	574.281 III	5	4943.88 V
250	1277.282 I	300	6013.22 I	800	977.03 III	5	4944.56 V
300	1277.513 I	250	6014.84 I	370	1174.93 III	CERIUM (Ce)	
300	1277.550 I	800	6578.05 II	350	1175.26 III	Z = 58	
200	1280.333 I	570	6582.88 II	330	1175.59 III	Ce I and II	
100	1311.363 I	200	6587.61 I	500	1175.71 III	Ref. 1 - C.H.C.	
9	1323.951 II	250	6783.90 II	350	1175.99 III	Air	
120	1329.578 I	250	7113.18 I	370	1176.37 III	130	2462.97 II
120	1329.600 I	250	7115.19 I	Air		110	2518.51 II
150	1334.532 II	250	7115.63 II	250	2162.94 III	200	2548.68 II
300	1335.708 II	200	7116.99 I	800	2296.87 III		
		350	7119.90 II	150	2697.75 III		
		800	7231.32 II	110 l	2724.85 III		
		1000	7236.42 II				

Ce I and II			Ce I and II			Ce I and II			Ce I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
340	2651.01	II	330	3274.86	II	220	3704.98	II	270	3909.31	II
120	2696.07	II	200	3279.84	II	1000	3709.29	II	230	3912.19	II
120	2706.88	II	330	3285.22	II	1000	3709.93	II	980	3912.44	II
120	2723.38	II	240	3295.28	II	1400	3716.37	II	390	3915.52	II
110	2741.96	II	200	3296.88	II	420	3718.19	II	390	3916.14	II
100	2750.89	II	220	3300.15	II	420	3718.38	II	230	3917.64	II
150	2761.42	II	240	3304.84	II	210	3719.80	II	770	3918.28	II
120	2784.27	II	200	3312.22	II	420	3725.68	II	480	3919.81	II
100	2785.35	II	240	3314.72	II	490	3728.02	II	590	3921.73	II
100	2790.53	II	200	3317.80	II	800	3728.42	II	560	3923.11	II
140	2791.42	II	200	3334.46	II	320	3748.06	II	450	3924.64	II
270	2830.90	II	240	3341.87	II	250	3751.45	II	770	3931.09	II
100	2833.31	II	330	3343.86	II	200	3755.43	II	310	3931.37	II
250	2874.14	II	440	3344.76	II	300	3762.98	II	230	3931.83	II
110	2908.42	II	200	3355.02	II	680	3764.12	II	310	3933.73	II
100	2918.67	II	240	3357.22	II	200	3765.04	II	560	3938.09	II
120	2955.94	II	200	3360.54	II	300	3768.76	II	770	3940.34	II
110	2964.80	II	240	3366.55	II	210	3770.76	II	310	3940.97	II
100	2972.58	II	200	3371.18	II	300	3771.60	II	2000	3942.15	II
400	2976.91	II	200	3373.46	II	250	3776.61	II	2700	3942.75	II
150	2977.46	II	200	3373.73	II	620	3781.62	II	770	3943.89	II
120	2980.41	II	480	3377.13	II	440	3782.52	II	310	3947.97	II
250	2990.87	II	200	3383.68	II	200	3783.58	II	3100	3952.54	II
110	2994.42	II	200	3404.91	II	860	3786.63	II	340	3953.66	II
320	2995.64	II	240	3405.98	II	520	3788.75	II	310	3955.36	II
400	3008.79	II	290	3417.45	II	300	3792.32	II	230	3956.06	II
370	3017.20	II	600	3422.71	II	2500	3801.52	II	980	3956.28	II
210	3037.73	II	390	3426.21	II	800	3803.09	II	230	3958.27	II
200	3051.98	II	290	3441.21	II	1000	3808.11	II	230	3958.87	II
350	3055.24	II	480	3476.84	II	490	3809.21	II	770	3960.91	II
320	3056.78	II	240	3482.35	II	250	3812.20	II	390	3964.50	II
680	3063.01	II	710	3485.05	II	490	3815.85	II	770	3967.05	II
320	3083.67	II	210	3507.94	II	470	3817.46	II	450	3971.68	II
250	3084.44	II	600	3517.38	II	300	3819.02	II	270	3972.07	II
200	3090.37	II	210	3520.52	II	470	3823.90	II	270	3975.07	II
370	3103.38	II	330	3521.88	II	470	3830.55	II	770	3978.65	II
200	3107.47	II	210	3526.68	II	490	3831.08	II	560	3980.88	II
320	3110.28	II	600	3534.05	II	490	3834.55	II	560	3982.89	II
300	3111.17	II	770	3539.08	II	270	3836.10	II	310	3983.29	II
220	3127.53	II	210	3545.60	II	1100	3838.54	II	770	3984.68	II
200	3130.33	II	290	3546.19	II	200	3843.76	II	370	3989.44	II
240	3130.87	II	240	3552.73	II	220	3846.52	II	700	3992.39	II
200	3144.60	II	420	3555.00	II	250	3848.10	II	370	3992.91	II
290	3145.28	II	1200	3560.80	II	860	3848.59	II	910	3993.82	II
290	3146.41	II	210	3576.23	II	860	3853.15	II	2800	3999.24	II
290	3164.15	II	1000	3577.45	II	1200	3854.18	II	230	4001.56	II
290	3169.18	II	330	3590.60	II	1200	3854.31	II	910	4003.77	II
290	3171.61	II	390	3607.63	II	620	3855.29	II	370	4005.64	II
480	3183.52	II	550	3609.69	II	390	3857.02	II	210	4007.59	II
240	3186.13	II	420	3613.70	II	370	3857.64	II	2700	4012.39	II
200	3190.34	II	440	3622.15	II	200	3862.46	II	910	4014.90	II
710	3194.83	II	380	3623.74	II	200	3868.13	II	250	4015.88	II
200	3199.28	II	440	3623.84	II	270	3874.68	II	200	4019.04	II
990	3201.71	II	200	3631.19	II	620	3876.97	II	240	4022.27	II
200	3218.38	II	350	3646.97	II	1100	3878.36	II	840	4024.49	II
710	3218.94	II	260	3647.75	II	1500	3882.45	II	240	4025.15	II
880	3221.17	II	260	3647.95	II	1000	3889.98	II	840	4028.41	II
330	3225.67	II	420	3653.11	II	210	3890.75	II	250	4030.34	II
710	3227.11	II	660	3653.67	II	210	3890.98	II	840	4031.34	II
240	3229.36	II	310	3654.97	II	620	3895.11	II	340	4037.67	II
480	3231.24	II	1800	3655.85	II	590	3896.80	II	2100	4040.76	II
710	3234.16	II	440	3659.23	II	490	3898.27	II	910	4042.58	II
330	3234.89	II	350	3659.97	II	270	3898.94	II	230	4045.21	II
390	3236.74	II	880	3660.64	II	200	3903.34	II	620	4046.34	II
390	3243.37	II	880	3667.98	II	250	3904.34	II	210	4051.43	II
200	3246.67	II	220	3672.18	I	200	3906.92	II	210	4051.99	II
200	3260.98	II	350	3672.79	II	770	3907.29	II	700	4053.51	II
200	3263.88	II	220	3679.42	II	560	3908.41	II	450	4054.99	II
990	3272.25	II	300	3694.91	II	390	3908.54	II	280	4062.22	II

Ce I and II			Ce I and II			Ce I and II			Ce I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
230	4062.94	II	530	4187.32	II	450	4444.70	II	110	5147.57	II
280	4067.28	II	560	4193.09	II	770	4449.34	II	100	5149.99	I
420	4068.84	II	370	4193.28	II	620	4450.73	II	280	5159.69	I
1100	4071.81	II	370	4193.87	II	2400	4460.21	II	280	5161.48	I
270	4072.92	II	630	4196.34	II	450	4461.14	II	190	5174.55	I
1800	4073.48	II	280	4198.00	II	420	4463.41	II	370	5187.46	II
210	4073.74	II	280	4198.67	II	280	4467.54	II	210	5191.66	II
1500	4075.71	II	840	4198.72	II	1400	4471.24	II	190	5211.92	I
1500	4075.85	II	240	4201.24	II	450	4472.72	II	260	5223.46	I
210	4076.24	II	910	4202.94	II	700	4479.36	II	180	5229.75	I
420	4077.47	II	270	4209.41	II	700	4483.90	II	140	5232.92	II
530	4078.32	II	370	4214.04	II	840	4486.91	II	260	5245.92	I
270	4078.52	II	310	4217.59	II	250	4497.85	II	130	5265.71	II
270	4080.44	II	1500	4222.60	II	100	4506.41	I	340	5274.23	II
670	4081.22	II	770	4227.75	II	110	4515.86	II	130	5296.56	I
910	4083.23	II	390	4231.74	II	100	4519.59	II	130	5328.08	I
450	4085.23	II	240	4234.21	II	770	4523.08	II	190	5330.54	II
250	4087.36	II	200	4236.02	II	840	4527.35	II	450	5353.53	II
230	4088.85	II	980	4239.92	II	840	4528.47	II	300	5393.40	II
450	4101.77	II	390	4242.72	II	110	4532.49	II	150	5397.64	I
250	4105.00	II	310	4245.89	II	110	4539.07	II	280	5409.23	II
510	4107.42	II	310	4245.98	II	840	4539.75	II	110	5420.38	I
200	4110.38	II	390	4246.72	II	210	4544.96	II	140	5449.24	I
250	4111.39	II	1100	4248.68	II	250	4551.30	II	140	5468.37	II
420	4115.37	II	390	4253.37	II	650	4560.28	II	140	5472.29	II
250	4117.01	II	620	4255.79	II	310	4560.96	II	260	5512.08	II
200	4117.29	II	200	4263.43	II	2100	4562.36	II	110	5556.25	I
200	4117.59	II	620	4270.19	II	420	4565.84	II	170	5564.97	I
770	4118.14	II	390	4270.72	II	1100	4572.28	II	130	5565.97	I
250	4119.02	II	200	4278.86	II	420	4582.50	II	100	5595.88	I
310	4119.79	II	280	4285.37	II	130	4591.12	II	240	5601.28	I
310	4119.88	II	200	4288.66	II	840	4593.93	II	190	5655.14	I
450	4120.83	II	200	4289.44	II	420	4606.40	II	240	5669.96	I
510	4123.24	II	2000	4289.94	II	420	4624.90	II	120	5677.75	I
510	4123.49	II	200	4296.07	II	1700	4628.16	II	120	5692.94	I
980	4123.87	II	1500	4296.67	II	170	4632.32	I	300	5696.99	I
510	4124.79	II	420	4296.78	II	110	4650.51	I	370	5699.23	I
980	4127.37	II	590	4299.36	II	130	4654.29	II	240	5719.03	I
250	4127.74	II	770	4300.33	II	110	4669.50	II	140	5773.12	I
200	4128.07	II	420	4305.14	II	150	4680.13	II	120	5788.15	I
530	4130.71	II	770	4306.72	II	270	4684.61	II	120	5812.92	I
480	4131.10	II	390	4309.74	II	200	4714.00	II	230	5940.86	I
2700	4133.80	II	560	4320.72	II	100	4714.81	II	11	6000.18	I
270	4135.44	II	310	4330.45	II	110	4725.09	II	55	6001.90	I
270	4137.47	II	310	4332.71	II	100	4733.52	II	55	6005.86	I
2000	4137.65	II	240	4336.23	II	310	4737.28	II	15	6006.20	I
270	4138.10	II	980	4337.77	II	100	4739.53	II	55	6006.82	I
210	4138.35	II	340	4339.31	II	160	4747.17	II	19	6007.37	I
770	4142.40	II	700	4349.79	II	110	4757.84	II	75	6013.42	I
390	4144.49	II	560	4352.71	II	100	4768.77	II	23	6016.59	I
670	4145.00	II	910	4364.66	II	230	4773.94	II	110	6024.20	I
480	4146.23	II	350	4373.82	II	110	4822.55	I	15	6027.16	I
280	4148.90	II	530	4375.92	II	140	4847.77	I	11	6031.26	I
420	4149.79	II	910	4382.17	II	180	4882.46	II	23	6033.58	II
980	4149.94	II	700	4386.84	II	110	4943.44	I	35	6034.20	II
420	4150.91	II	310	4388.01	II	130	4971.50	II	23	6034.41	I
1400	4151.97	II	1700	4391.66	II	130	4994.63	I	35	6035.49	II
230	4153.13	II	200	4398.79	II	210	5009.10	I	110	6043.39	II
450	4159.03	II	510	4399.20	II	100	5011.77	II	28	6045.42	I
310	4163.52	II	350	4410.64	II	120	5022.87	II	55	6047.40	I
1300	4165.61	II	350	4410.76	II	120	5037.78	II	19	6051.80	II
620	4166.88	II	310	4416.90	II	120	5040.85	I	23	6057.50	I
250	4167.80	II	980	4418.78	II	180	5044.02	II	35	6058.00	I
320	4169.77	II	200	4423.68	II	120	5071.78	I	23	6066.75	I
320	4169.88	II	310	4427.07	II	240	5075.35	II	19	6069.46	I
340	4176.70	II	480	4427.92	II	470	5079.68	II	35	6069.48	I
340	4181.08	II	310	4428.44	II	130	5112.70	I	35	6072.00	I
340	4185.33	II	650	4429.27	II	160	5117.17	II	35	6076.61	I
3500	4186.60	II	480	4444.39	II	170	5129.57	I	17	6077.16	I

Ce I and II			Ce I and II			Ce I and II			Ce III		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
17	6080.37	I	19	6517.31	I	25	7329.91	I	400	860.15	III
17	6081.28	I	19	6551.70	I	16	7334.68	II	200	862.25	III
19	6088.86	I	45	6555.65	I	12	7343.44	I	40	868.74	III
19	6088.96	I	23	6579.10	I	25	7397.77	I	20	869.51	III
35	6093.19	I	15	6606.35	I	11	7401.27	I	40	869.84	III
45	6098.34	II	15	6606.86	II	12	7417.94	II	20	871.15	III
11	6099.80	I	22	6612.06	I	11	7424.70	CeO	40	871.27	III
28	6108.74	II	10	6623.00	I	12	7433.08	I	20	880.68	III
15	6118.56	I	30	6628.93	I	11	7438.56	I	60	881.75	III
17	6118.90	I	13	6650.89	I	12	7444.44	I	60	884.04	III
45	6123.67	I	22	6652.72	II	10	7472.41	I	20	885.22	III
19	6132.00	II	10	6661.41	I	16	7486.57	II	30	888.39	III
19	6132.18	I	13	6665.59	I	11	7527.46	I	80	892.75	III
11	6135.45	I	10	6675.54	II	11	7527.68	I	20	899.32	III
23	6139.03	I	15	6686.60	I	10	7533.73	I	100	912.77	III
15	6142.92	I	26	6700.66	I	10	7551.25	I	40	937.04	III
35	6143.36	II	35	6704.27	I	12	7562.44	I	40	999.26	III
23	6146.43	I	13	6704.52	II	10	7562.86	I	20	1025.25	III
19	6147.84	I	10	6706.04	II	10 h	7563.60	I	20	1025.29	III
23	6151.72	I	15	6728.71	I	10	7603.10	I	20	1026.28	III
19	6159.82	I	15	6729.57	I	25	7616.11	II	40	1029.37	III
19	6162.14	I	15	6744.70	II	12	7646.08	I	20	1034.55	III
19	6165.45	I	10	6746.90	I	10	7647.88	I	20	1041.14	III
19	6175.28	I	30	6774.28	II	12	7682.47	I	100	1042.74	III
35	6186.17	I	35	6775.59	I	25	7689.17	II	50	1051.61	III
15	6187.97	I	10	6778.28	I	10	7732.33	I	70	1057.40	III
15	6195.23	I	18	6807.81	I	16	7748.35	I	100	1057.66	III
19	6195.53	I	10	6808.82	I	10	7797.70	I	100	1058.46	III
19	6198.05	I	15	6818.23	I	12	7842.59	I	50	1062.99	III
35	6208.98	I	10	6829.73	II	22	7844.94	II	30	1063.26	III
11	6216.82	I	13	6847.25	I	16	7850.02	II	50	1063.51	III
35	6228.94	I	12	6856.55	I	16	7851.18	II	100	1067.76	III
19	6229.13	I	10	6893.66	I	22	7857.54	II	100	1068.69	III
23	6232.45	II	10	6898.45	II	12	7864.49	I	20	1070.54	III
28	6237.45	I	30	6924.81	I	10	7866.04	I	200	1072.79	III
13	6238.71	I	10	6939.45	I	16	7898.96	II	40	1073.69	III
11	6241.87	I	19	6973.50	II	11	7913.52	I	30	1079.35	III
13	6242.91	I	10	6983.82	II	10	7927.30	CeO	20	1080.82	III
15	6253.65	I	30	6986.02	I	10	7927.72	I	30	1088.70	III
13	6257.99	I	12	7054.51	I	10	7934.50	II	30	1090.03	III
15	6264.27	I	11	7058.68	II	30	8025.56	II	20	1092.48	III
45	6272.05	II	11	7060.00	I	16	8070.71	I	20	1099.25	III
15	6276.47	I	35	7061.75	II	10	8094.43	I	40	1100.71	III
35	6295.58	I	11	7064.49	I	16	8120.36	I	20	1107.09	III
28	6299.51	II	35	7086.35	II	10	8241.55	II	20	1111.19	III
23	6300.21	I	11	7105.04	II	12	8261.09	I	20	1116.30	III
13	6306.64	I	11	7115.08	II	16	8418.23	II	20	1125.58	III
35	6310.01	I	10	7124.73	I	11	8495.82	I	20	1129.73	III
15	6335.40	I	16	7141.42	I	12	8539.08	II	20	1132.74	III
11	6337.21	I	19	7150.23	II	10	8612.64	I	100	1142.55	III
13	6340.70	I	10	7151.67	I	10 h	8647.66	I	20	1192.41	III
35	6343.95	II	16	7155.25	I	11 h	8702.38	II	50	1201.87	III
35	6371.11	II	16	7156.99	II	25	8772.14	II	20	1204.05	III
28	6386.84	I	16	7189.40	II	12	8810.84	I	20	1719.43	III
23	6393.02	II	10	7191.72	I	30	8891.20	II	20	1796.89	III
11	6395.16	I	11	7201.56	II				20	1836.66	III
11	6425.29	II	16	7201.89	I				20	1836.99	III
35	6430.07	I	10	7203.55	I	Refs. 136,305 - J.R.			30	1862.32	III
19	6434.39	I	12	7210.67	I	Vacuum			30	1950.36	III
23	6436.40	I	19	7217.36	I	100	840.24	III	20	1990.54	III
19	6446.12	I	16	7235.71	II	20	844.11	III			
35	6458.03	I	22	7238.36	II	40	845.02	III	Air		
19	6466.88	II	12	7241.73	I	20	847.88	III	100	2033.34	III
28	6467.39	I	25	7252.75	I	200	851.18	III	100	2057.65	III
35	6473.72	I	12	7262.64	I	200	852.63	III	100	2077.87	III
17	6490.97	I	11 h	7277.90	I	200	853.47	III	200	2083.32	III
11	6503.27	II	11	7296.17	I	60	853.78	III	100	2089.96	III
11	6507.16	II	19	7301.42	II	200	855.16	III	400	2109.07	III
23	6513.59	II	19	7313.45	II	200	858.30	III	100	2122.55	III
									500	2136.95	III

Ce III			Ce III			Ce III			Ce IV		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
1000	2151.44	III	4000	2748.90	III	1000	5983.40	III	20	1779.03	IV
3000	2166.88	III	4000	2754.87	III	3000	6002.63	III	35	1914.75	IV
2000	2169.48	III	4000	2768.28	III	10000	6032.54	III	10	1937.21	IV
5000	2180.64	III	3000	2849.40	III	10000	6060.91	III		Air	
1000	2183.71	III	2000	2861.39	III	500	6061.79	III	100	2000.42	IV
2000	2203.15	III	4000	2907.05	III	500	6097.35	III	35	2003.11	IV
3000	2218.11	III	10000	2923.81	III	500	6098.87	III	100	2009.94	IV
5000	2222.01	III	5000	2925.26	III	500	6135.10	III	3	2433.50	IV
5000	2225.08	III	10000	2931.54	III	300	6287.79	III	5	2445.50	IV
3000	2227.84	III	2000	2948.53	III	500	6308.16	III		Ce V	
3000	2228.05	III	5000	2973.72	III	300	6341.75	III		Ref. 261 - J.R.	
5000	2242.29	III	10000	3022.75	III	1000	6944.94	III		Vacuum	
2000	2249.25	III	50000	3031.58	III	700	7739.04	III	100	365.66	V
2000	2264.85	III	95000	3055.59	III	300	7758.27	III	300	399.36	V
2000	2268.20	III	20000	3056.56	III	500	7826.80	III	150	404.21	V
2000	2287.82	III	40000	3057.23	III	300	7948.64	III	200	482.96	V
2000	2298.70	III	20000	3057.58	III	500	7960.31	III	100	552.13	V
3000	2300.65	III	40000	3085.10	III	500	7991.01	III		CESIUM (Cs)	
4000	2302.09	III	20000	3106.98	III	400	8030.80	III		Z = 55	
5000	2317.34	III	30000	3110.53	III	300	8084.12	III		Cs I and II	
10000	2318.64	III	30000	3121.56	III	400	8177.33	III		Refs. 82,130,154,155,200,	
5000	2324.31	III	20000	3141.29	III	300	8186.03	III		201,223,263,266,267,300,	
2000	2337.66	III	20000	3143.96	III	300	8222.16	III		325,326, - K.L.A.	
5000	2350.10	III	20000	3147.06	III	300	9056.53	III		Vacuum	
2000	2362.54	III	20000	3228.57	III	300	9079.58	III	25	591.044	II
2000	2367.77	III	3000	3234.20	III	400	9328.20	III	5	607.291	II
10000	2372.34	III	4000	3267.76	III	300	9367.03	III	4	612.786	II
5000	2377.07	III	3000	3267.94	III	300	9567.37	III	200	639.356	II
5000	2377.48	III	20000	3353.29	III	400	10458.37	III	10	657.112	II
10000	2380.12	III	10000	3395.77	III	400	10494.42	III	50	668.386	II
3000	2382.28	III	4000	3398.91	III	300	10534.36	III	1500	718.138	II
3000	2385.06	III	30000	3427.36	III	400	10684.46	III	1500	808.761	II
5000	2395.04	III	40000	3443.63	III	15	12756.96	III	1500	813.837	II
3000	2406.15	III	30000	3454.39	III	12	12821.62	III	3500	901.270	II
4000	2408.08	III	40000	3459.39	III	80	15847.58	III	4000	926.657	II
2000	2410.26	III	60000	3470.92	III	80	15956.79	III	130	1178.65	II
5000	2415.60	III	50000	3497.81	III	12	15960.59	III	80	1191.55	II
2000	2417.01	III	60000	3504.64	III	87	16128.75	III		Air	
2000	2423.02	III	500	3514.41	III	42	18579.82	III	25	2025.05	II
3000	2428.64	III	50000	3544.07	III	38	19141.29	III	60	2035.15	II
5000	2430.24	III	3000	3784.29	III	27	19377.15	III	80	2077.43	II
10000	2431.45	III	800	3936.80	III	26	19466.14	III	80	2080.05	II
15000	2439.80	III	300	3957.10	III	20	19498.14	III	80	2088.71	II
3000	2441.55	III	500	4169.42	III	55	19524.18	III	80	2091.97	II
2000	2444.78	III	300	4191.70	III	30	20685.63	III	15	2099.50	II
10000	2454.32	III	500	4194.83	III	12	21380.23	III	25	2112.65	II
10000	2469.95	III	300	4213.26	III		Ce IV		100	2146.75	II
3000	2471.66	III	300	4217.13	III		Ref. 166 - J.R.		130	2179.60	II
5000	2477.25	III	400	4284.77	III		Vacuum		25	2182.14	II
8000	2479.44	III	300	4304.71	III	2	447.58	IV	130	2189.47	II
3000	2479.51	III	600	4346.35	III	1	443.11	IV	25	2213.15	II
10000	2483.82	III	400	4389.97	III	8	558.92	IV	100	2220.51	II
10000	2497.50	III	600	4448.32	III	8	571.59	IV	130	2228.88	II
3000	2503.56	III	500	4485.27	III	40	741.79	IV	250	2254.58	II
2000	2504.43	III	1000	4521.92	III	30	754.60	IV	200	2257.82	II
20000	2531.99	III	1000	4535.73	III	12	755.75	IV	25	2258.35	II
3000	2539.27	III	300	4576.90	III	6	975.20	IV	350	2267.61	II
3000	2557.49	III	500	4627.60	III	5	1009.31	IV	350	2273.83	II
4000	2577.67	III	300	4766.07	III	2	1022.12	IV	25	2286.68	II
2000	2578.30	III	500	4976.45	III	9	1057.67	IV	25	2307.71	II
2000	2584.71	III	500	5650.97	III	1	1059.64	IV	40	2315.68	II
10000	2603.59	III	1000	5664.20	III	50	1289.41	IV	130	2321.07	II
2000	2607.96	III	500	5691.08	III	75	1332.16	IV	80	2343.13	II
2000	2615.79	III	300	5710.59	III	75	1372.72	IV	130	2354.44	II
2000	2649.38	III	500	5749.47	III	2	1577.60	IV	25	2357.85	II
2000	2662.81	III	500	5949.83	III	1	1572.62	IV	130	2364.81	II
3000	2719.30	III	2000	5962.22	III	15	1641.58	IV			
2000	2730.04	III	500	5962.71	III	20	1775.30	IV			
3000	2743.71	III	400	5979.56	III						

Cs I and II			Cs I and II			Cs I and II			Cs I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
250	2392.86	II	100	3092.31	II	100	4506.83	II	400	6955.52	II
80	2414.89	II	80	3180.94	II	100	4515.50	II	200	6973.297	I
25	2432.71	II	800	3265.92	II	150	4522.85	II	35	6983.491	I
25	2443.24	II	800	3267.13	II	1000	4526.72	II	200	7228.536	I
130	2476.07	II	500	3271.63	II	800	4538.94	II	60	7279.90	I
40	2480.41	II	100	3329.43	II	400 c	4555.276	I	200	7279.957	I
130	2515.72	II	800	3368.56	II	150	4566.98	II	150 c	7608.903	I
15	2523.66	II	100	3559.80	II	150	4571.79	II	300	7943.882	I
130	2539.08	II	100	3565.11	II	200 c	4593.169	I	60 s	7990.68	I
25	2539.17	II	15	3651.07	II	2500	4603.76	II	100	8015.724	I
60	2550.65	II	15	3680.10	II	100	4609.99	II	60 s	8053.35	I
130	2551.17	II	15	3687.64	II	150	4616.13	II	60	8078.92	I
130	2568.17	II	100	3699.48	II	350	4623.09	II	350	8079.033	I
250	2568.69	II	15	3732.54	II	500	4646.51	II	1000 c	8521.122	I
1000	2573.03	II	100	3734.34	II	150	4656.54	II	200 c	8761.415	I
130	2574.54	II	15	3751.40	II	350	4670.28	II	600 c	8943.46	I
130	2576.74	II	350	3785.42	II	100	4695.61	II	350	9172.322	I
130	2590.09	II	500	3805.10	II	500	4701.79	II	100	9208.538	I
250	2609.44	II	15	3870.16	II	350	4732.98	II	350	10024.359	I
130	2616.27	II	150 c	3876.143	I	350	4739.66	II	100	10123.414	I
25	2627.95	II	80 c	3888.608	I	100	4749.13	II	400	10123.602	I
80	2637.14	II	1000	3896.98	II	500	4763.62	II	140	13588.31	I
25	2644.69	II	350	3906.93	II	200	4786.36	II	15	13602.57	I
130	2648.07	II	500	3925.58	II	800	4830.16	II	15	13758.83	I
200	2651.71	II	350	3959.50	II	800	4870.02	II	350	14694.93	I
25	2660.24	II	500	3965.19	II	800	4952.84	II	12	17923.62	I
130	2669.79	II	150	3978.00	II	500	4972.59	II	9	17924.21	I
15	2671.17	II	350	4047.18	II	800	5043.80	II	25	19162.53	I
40	2673.24	II	200	4053.96	II	500	5052.70	II	20	19163.20	I
130	2686.60	II	500	4067.96	II	500	5059.87	II	50	21311.46	I
25	2689.41	II	500	4068.77	II	100	5081.77	II	45	21312.29	I
15	2701.19	II	70	4073.36	II	400	5096.60	II	100	25763.49	I
130	2724.21	II	60	4119.29	II	1500	5227.00	II	90	25764.70	I
25	2730.07	II	500	4121.21	II	800	5249.37	II	200	39421.22	I
25	2733.88	II	100	4132.00	II	400	5274.04	II	180	39424.08	I
250	2748.23	II	350	4151.27	II	350	5306.61	II			
80	2749.84	II	350	4158.61	II	350	5349.16	II			
60	2757.81	II	60	4193.20	II	800	5370.97	II			
80	2761.97	II	500	4213.13	II	500	5419.69	II			
25	2766.10	II	200	4221.12	II	5 c	5465.944	I			
250	2776.99	II	500	4232.19	II	5	5502.884	I			
130	2788.24	II	350	4234.41	II	1000	5563.02	II			
130	2789.80	II	100	4241.97	II	11	5635.212	I			
25	2793.32	II	100	4271.74	II	30 c	5664.018	I			
130	2794.50	II	2000	4277.10	II	8	5745.724	I			
130	2799.41	II	1000	4288.35	II	350	5814.18	II			
500	2816.94	II	200	4292.00	II	500	5831.16	II			
25	2820.27	II	500	4300.64	II	5 c	5838.835	I			
25	2829.04	II	50	4307.94	II	30	5845.141	I			
25	2829.42	II	50	4327.58	II	500	5925.65	II			
130	2846.19	II	350	4330.24	II	80 c	6010.490	I			
80	2852.42	II	2000	4363.28	II	30	6034.089	I			
80	2866.37	II	500	4373.02	II	400	6128.62	II			
250	2881.19	II	400	4384.43	II	120	6213.100	I			
25	2883.74	II	100	4388.76	II	15	6217.599	I			
80	2899.75	II	200	4396.91	II	50 c	6354.555	I			
80	2914.65	II	350	4399.50	II	100	6419.54	II			
500	2931.09	II	350	4403.85	II	15	6431.969	I			
500	2940.95	II	1000	4405.25	II	15	6472.623	I			
80	2942.25	II	350	4410.21	II	200	6495.53	II			
30	2949.80	II	100	4424.05	II	200	6536.44	II			
20	2968.38	II	350	4435.71	II	30	6586.02	I			
25	2970.85	II	100	4444.00	II	200	6586.510	I			
100	3001.27	II	200	4453.44	II	35	6628.660	I			
80	3012.04	II	200	4457.68	II	200 c	6723.284	I			
15	3020.37	II	200	4459.18	II	100	6824.652	I			
15	3060.98	II	100	4493.66	II	c	6848.91	I			
100	3066.60	II	1000	4501.52	II	100 c	6870.455	I			
25	3080.87	II	200	4506.71	II	c	6895.01	I			

Cs III				
Intensity	Wavelength			
		Ref. 78 - J.R.		
		Vacuum		
		75	556.91	III
		250	584.15	III
		50	584.40	III
		1200	603.01	III
		600	607.85	III
		800	607.94	III
		10000	614.01	III
		1500	621.15	III
		600	635.86	III
		300	637.67	III
		2000	638.17	III
		25	657.94	III
		450	663.82	III
		450	664.60	III
		2500	666.25	III
		1800	673.06	III
		400	679.60	III
		800	687.55	III
		5000	691.60	III
		800	699.43	III
		3500	703.89	III
		1000	710.25	III
		20000	721.79	III
		20000	722.20	III
		5000	731.56	III
		300	731.95	III
		1000 p	736.66	III
		12000	740.29	III
		150	742.23	III
		1000	749.94	III

Cs III			Cl I and II			Cl I and II			Cl I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
1500	750.38	III	2000	961.499	II	950	3057.96	II	10000	5444.21	II
1500	755.18	III	30	969.92	I	1300	3071.32	II	5600	5457.02	II
1200	758.82	III	40	978.284	I	1400	3092.19	II	40	5532.162	I
6	759.90	III	25	998.372	I	1200	3123.72	II	50 d	5796.305	I
300	787.73	III	25	998.432	I	1900	3315.43	II	45	5799.914	I
75	801.95	III	75	1002.346	I	1200	3329.10	II	30	5856.742	I
200	814.02	III	150	1013.664	I	2500	3353.35	II	100 d	5948.58	I
15	817.35	III	90	1025.553	I	20	3726.54	I	50	6019.812	I
800	820.34	III	6000	1063.831	II	1200	3749.96	II	35	6082.61	I
200	825.99	III	3000	1067.945	II	1000	3781.17	II	1900	6094.69	II
7500	830.39	III	9000	1071.036	II	1500	3798.76	II	160	6114.43	I
100	837.39	III	6000	1071.767	I	1900	3805.18	II	200	6140.245	I
4	843.37	III	5000	1075.230	II	1300	3809.46	II	160	6194.757	I
250	847.92	III	5000	1079.080	II	1700	3820.20	II	160	6398.66	I
15000 c	920.35	III	200	1084.667	I	2800	3827.59	II	150	6434.833	I
500	921.66	III	200	1085.171	I	4500	3833.35	II	150	6531.43	I
25	932.67	III	250	1085.304	I	2500	3843.20	II	1400	6661.67	II
25000 c	1054.79	III	400	1088.06	I	3100	3845.37	II	150	6678.43	I
			350	1090.271	I	3900	3845.65	II	1300	6686.02	II
			250	1090.982	I	1500	3845.80	II	1200	6713.41	II
			250	1092.437	I	10000	3850.99	II	150	6840.29	I
			400	1094.769	I	7900	3851.37	II	300	6932.903	I
			350	1095.148	I	1200	3851.65	II	300	6981.886	I
			350	1095.662	I	25000	3860.83	II	600	7086.814	I
			400	1095.797	I	4400	3860.99	II	7500	7256.62	I
			250	1096.810	I	1000	3861.37	II	5000	7414.11	I
			300	1097.369	I	1500	3913.87	II	550	7462.370	I
			200	1098.068	I	1100	3916.63	II	550	7489.47	I
			200	1099.523	I	20	3944.82	I	700	7492.118	I
			500	1107.528	I	20	4104.79	I	11000	7547.072	I
			800	1139.214	II	10000 h	4132.50	II	2300	7672.42	I
			800	1167.148	I	65	4209.67	I	450	7702.828	I
			3000	1179.293	I	50	4226.42	I	7000	7717.581	I
			1200	1188.774	I	60	4264.58	I	10000	7744.97	I
			900	1201.353	I	100	4363.27	I	2200	7769.16	I
			3000	1335.726	I	100	4369.50	I	650	7771.09	I
			10000	1347.240	I	5000	4372.93	II	2200	7821.36	I
			5000	1351.657	I	100	4379.90	I	1700	7830.75	I
			12000	1363.447	I	100	4389.75	I	3000	7878.22	I
			2500	1373.116	I	90	4390.40	I	220	7893.34	I
			20000	1379.528	I	90	4403.03	I	2300	7899.31	I
			25000	1389.693	I	100	4438.49	I	1800	7915.08	I
			20000	1389.957	I	90	4475.30	I	3000	7924.645	I
			12000	1396.527	I	1500	4489.91	II	2100	7933.89	I
			500	1441.470	II	100	4526.19	I	1700	7935.012	I
			500	1528.569	II	80	4600.98	I	650	7952.52	I
			500	1542.942	II	40	4623.938	I	1500	7974.72	I
			500	1558.144	II	50	4654.040	I	1300	7976.97	I
			500	1565.050	II	80	4661.208	I	600	7980.60	I
			500	1857.488	II	45	4691.523	I	2900	7997.85	I
			450 h	1997.370	II	40	4721.255	I	2200	8015.61	I
				Air		45	4740.729	I	1100	8023.33	I
			450	2032.116	II	4300	4768.65	II	400	8051.07	I
			350 h	2088.583	II	13000	4781.32	II	1700	8084.51	I
			350 h	2091.458	II	99000	4794.55	II	2200	8085.56	I
			170	2427.79	II	29000	4810.06	II	3000	8086.67	I
			360	2434.07	II	16000	4819.47	II	1300	8087.73	I
			340	2498.53	II	81000	4896.77	II	250	8094.67	I
			470	2502.74	II	47000	4904.78	II	2500	8194.42	I
			260	2546.96	II	26000	4917.73	II	2200	8199.13	I
			500	2549.88	II	10000	4995.48	II	2200	8200.21	I
			460	2564.84	II	26000	5078.26	II	800	8203.78	I
			320	2603.31	II	30	5099.789	I	18000	8212.04	I
			950	2658.72	II	56000	5217.94	II	3000	8220.45	I
			750	2676.95	II	23000	5221.36	II	20000	8221.74	I
			1200	2688.04	II	15000	5392.12	II	18000	8333.31	I
			410	2912.05	II	99000	5423.23	II	1000	8360.71	II
			950	2996.65	II	10000	5423.51	II	560	8361.84	II
			500	3006.06	II	19000	5443.37	II	99900	8375.94	I

Cl I and II			Cl I and II			Cl III			Cl IV		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
180	8382.67	II	185	19766.8	I	700	3289.80	III	200	1549.15	IV
100	8392.02	II	227	20199.4	I	700	3320.57	III	200	1622.86	IV
400	8406.199	I	85	20370.1	I	800	3329.06	III		Air	
15000	8428.25	I	100	24470.0	I	900	3340.42	III	400	2701.36	IV
2200	8467.34	I		39603.7	I	800	3392.89	III	500	2724.03	IV
2200	8550.44	I		39615.3	I	800	3393.45	III	500	2751.23	IV
20000	8575.24	I		39716.0	I	900	3530.03	III	400	2770.64	IV
750	8578.02	I		39744.0	I	800	3560.68	III	700	2782.47	IV
75000	8585.97	I		39750.9	I	900	3602.10	III	400	2835.4	IV
450	8628.54	I		39875.3	I	800	3612.85	III	500	3063.13	IV
300	8641.71	I		39881.0	I	700	3622.69	III	600	3076.68	IV
3500	8686.26	I		39985.7	I	700	3656.95	III	200	3167.87	IV
2200	8912.92	I		40085.5	I	700	3670.28	III		Cl V	
3000	8948.06	I		40089.5	I	700	3682.05	III	Refs. 11,28,30,85,233		
2000	9038.982	I		40171.0	I	600	3705.45	III	- L.J.R.		
2500	9045.43	I		40310.3	I	600	3707.34	III	Vacuum		
1000	9069.656	I		40335.4	I	800	3720.45	III	300	287.33	V
2000	9073.17	I		40532.2	I	800	3748.81	III	300	373.78	V
7500	9121.15	I		Cl III		500	3779.35	III	400	390.15	V
3000	9191.731	I	Refs. 28,30 - L.J.R.		500	3925.87	III	500	392.43	V	
500	9197.596	I	Vacuum		700	3991.50	III	300	536.53	V	
4000	9288.86	I	100	406.27	III	600	4018.50	III	400	537.01	V
1500	9393.862	I	400	411.37	III	600	4059.07	III	300	537.46	V
3500	9452.10	I	400	411.81	III	500	4104.23	III	500	538.03	V
500	9486.964	I	600	556.23	III	500	4106.83	III	400	538.68	V
1000	9584.801	I	700	556.61	III	400	4370.91	III	800	542.23	V
3500	9592.22	I	700	557.12	III	500	4608.21	III	600	542.30	V
250	9632.509	I	700	561.53	III	300	4703.14	III	400	542.87	V
1000	9702.439	I	700	561.68	III	100	4863.75	III	1000	545.11	V
250	9744.426	I	700	561.74	III	10	4971.64	III	600	546.33	V
200	9807.057	I	500	606.35	III		Cl IV		1000	547.63	V
400	9875.970	I	400	621.28	III	Refs. 11,28,30,31 - L.J.R.			400	633.19	V
331	10392.549	I	300	670.38	III	Vacuum			400	635.32	V
38	10432.83	II	300	673.13	III	300	319.62	IV	400	681.92	V
10	10506.62	II	100	936.28	III	200	331.84	IV	400	683.17	V
14	10509.12	II	500	1005.28	III	400	437.83	IV	400	688.93	V
19	10512.46	II	600	1008.78	III	400	464.86	IV		715.55	V
25	10514.17	II	700	1015.02	III	800	486.17	IV		716.19	V
9	10801.47	II	600	1822.50	III	800	534.73	IV	400	883.13	V
5	10885.42	II	500	1828.40	III	700	535.67	IV	400	894.34	V
1	10955.71	II	500	1901.61	III	600	536.15	IV	100	894.91	V
300	11123.05	I	500	1983.61	III	900	537.61	IV		914.5	V
231	11392.62	I		Air		600	538.12	IV		CHROMIUM (Cr)	
269	11409.69	I	400	2006.84	III	500	549.22	IV		Z = 24	
1000	11436.33	I	700	2253.07	III	400	550.02	IV		Cr I and II	
180	11720.56	I	500	2268.95	III	700	552.02	IV	Ref. 1 - C.H.C.		
195	11866.76	I	500	2278.34	III	600	553.30	IV	Air		
172	12021.7	I	700	2283.93	III	600	554.62	IV	19000	2055.52	II
350	13243.8	I	600	2323.50	III	500	601.50	IV	14000	2061.49	II
310	13296.0	I	500	2336.45	III	500	604.59	IV	8900	2065.42	II
550	13346.8	I	600	2340.64	III	400	608.90	IV	80 h	2364.71	I
525	13821.7	I	600	2359.67	III	400	612.07	IV	130	2383.33	I
148	14369.7	I	600	2370.37	III	400	653.70	IV	140	2408.62	I
294	14931.7	I	700	2416.42	III	400	745.21	IV	170	2496.31	I
269	15108.0	I	600	2447.14	III	400	831.43	IV	110	2502.53	I
381	15465.1	I	600	2448.58	III	500	834.84	IV	190	2504.31	I
169	15467.6	I	500	2486.91	III	500	834.97	IV	50	2508.11	I
1094	15520.3	I	500	2532.48	III	400	840.81	IV	60	2508.98	I
1487	15730.1	I	600	2580.67	III	400	840.93	IV	40	2513.62	I
193	15818.4	I	500	2603.59	III	500	865.3	IV	110	2516.92	I
2780	15869.7	I	500	2632.67	III	600	973.21	IV	80	2518.71	I
277	15883.3	I	500	2633.18	III	400	977.56	IV	390	2519.52	I
342	15928.9	I	600	2665.54	III	700	977.90	IV	190	2527.12	I
735	15960.0	I	700	2710.37	III	400	984.95	IV	40	2530.45	I
283	15970.5	I	600	2965.56	III	400	985.75	IV	70	2534.34	II
129	16077.6	I	600	3104.46	III	300	1537.21	IV	50	2545.64	I
259	16198.5	I	800	3139.34	III	200	1539.30	IV			
227	19370.3	I	900	3191.45	III	200	1545.19	IV			
717	19755.3	I									

Cr I and II			Cr I and II			Cr I and II			Cr I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
160	2549.54	I	22	2754.90	I	55	2889.82	II	170	3029.16	I
40	2553.06	I	22	2755.27	I	55	2891.42	I	710	3030.24	I
80	2557.15	I	22	2756.75	I	370	2893.25	I	140	3031.35	I
130	2560.69	I	150	2757.10	I	190	2894.17	I	28	3032.93	II
150	2571.74	I	350	2757.72	II	55	2896.46	II	390	3034.19	I
100	2577.65	I	60	2758.98	II	210	2896.75	I	550	3037.04	I
50	2588.20	I	80	2759.39	II	55 d	2897.67	II	80	3039.78	I
380	2591.85	I	45	2759.73	II		2897.73	II	550	3040.85	I
35	2603.57	I	90 h	2761.76	I	90	2898.54	II		3040.91	II
35	2622.86	I	750	2762.59	II	80	2899.21	I	55	3041.74	II
22	2625.32	I	22	2763.06	I	55	2899.48	II	110	3050.14	II
18	2626.60	I	80 h	2764.35	I	26	2903.97	II	710	3053.88	I
18	2629.82	I	750	2766.54	II	55	2904.68	I	24	3059.52	II
35	2642.12	I	22	2767.54	I	180	2905.49	I	85	3065.07	I
250	2653.59	II	250 h	2769.92	I	260	2909.05	I	28	3067.16	II
250	2658.59	II	18	2771.45	I	260	2910.90	I	85	3073.68	I
70	2661.73	II	45	2778.06	II	250	2911.14	I	55	3077.83	I
320	2663.42	II	22	2779.14	I	45	2911.68	II	28	3095.86	I
70	2663.68	II	80	2780.30	II	60	2913.73	I	28	3109.34	I
440	2666.02	II	610	2780.70	I	22	2915.23	II	28	3110.86	I
280	2668.71	II	70	2785.70	II	22	2915.46	II	240	3118.65	II
350	2671.81	II	35	2787.63	II	90	2921.24	II	45	3119.25	I
280	2672.83	II	35	2787.84	I	60	2921.82	II	40	3119.71	I
1800	2677.16	II	90	2792.16	II	60	2927.08	II	430	3120.37	II
35	2678.16	I	55	2798.67	II	80	2928.15	II	28	3122.60	II
320	2678.79	II	70	2800.77	II	95	2928.30	II	470	3124.94	II
18	2680.34	II	80	2812.01	II	26	2929.44	II		3125.02	II
230	2687.09	II	60	2818.36	II	35	2930.85	II	120	3128.70	II
60	2688.04	I	45	2822.01	II	26	2932.70	II	590	3132.06	II
55	2688.29	II	180	2822.37	II	55	2933.97	II	140	3136.68	II
26	2690.26	I	22	2826.75	I	90	2935.14	II	140	3147.23	II
280	2691.04	II	180	2830.47	II	45	2940.22	II	85	3148.44	I
35	2693.52	II	70	2834.26	II	60	2946.84	II	100	3155.15	I
35	2697.91	II	2500	2835.63	II	55	2953.36	II	100	3163.76	I
180	2698.41	II	45	2836.48	II	45	2953.71	II	240	3180.70	II
180	2698.69	II	55	2838.79	II	55	2961.73	II	30	3181.43	II
18	2700.60	I	110	2840.02	II	45	2966.05	II	65 h	3188.01	I
110	2701.99	I	1700	2843.25	II	480	2967.64	I	220	3197.08	II
18	2702.53	I	22	2846.02	I	480	2971.11	I	24	3198.11	I
70	2703.48	I	45	2849.29	I	210	2971.91	II	30	3208.59	II
	2703.55	II	1200	2849.84	II	480	2975.48	I	170	3209.18	II
35	2703.86	II	120	2851.36	II	30	2976.72	II	140	3217.40	II
18	2705.43	I	55	2853.22	II	190	2979.74	II	30	3229.20	I
60	2708.79	II	55	2855.07	II	350	2980.79	I	28	3234.06	II
35	2709.31	II	880	2855.68	II	110	2985.32	II	65	3237.73	I
140	2712.31	II	90	2856.77	II	480	2985.85	I	120	3245.54	I
45	2716.18	I	70	2857.40	II	1500	2986.00	I	130	3251.84	I
55	2717.51	II	610	2858.91	II	2100	2986.47	I	130	3257.82	I
45	2718.43	II	440	2860.93	II	660	2988.65	I	95	3259.98	I
170	2722.75	II	790	2862.57	II	160	2989.19	II	30	3295.43	II
18	2724.04	II	750	2865.11	II	480	2991.89	I	24	3307.02	II
420 h	2726.51	I	55	2865.33	II	230	2994.07	I	55	3324.06	II
45	2727.26	II	610	2866.74	II	300	2995.10	I	28	3326.59	I
280 h	2731.91	I	90	2867.10	II	700	2996.58	I	30	3328.35	II
170 h	2736.47	I	480	2867.65	II	210	2998.79	I	30	3329.05	I
70	2739.38	I	210	2870.44	II	1100	3000.89	I	95	3336.33	II
70	2740.10	II	110	2871.63	I	750	3005.06	I	130	3339.80	II
95	2741.07	I	160	2873.48	II	140	3013.03	I	110	3342.59	II
95	2742.03	II	90	2873.82	II	710	3013.71	I	30	3343.34	I
95	2742.17	I	320	2875.99	II	710	3014.76	I	95	3346.02	I
250	2743.64	II	230	2876.24	II	1400	3014.92	I	95	3346.74	I
35	2746.21	II	180	2877.98	II	710	3015.19	I	95	3347.84	II
110 h	2748.29	I	70	2878.45	II	2800	3017.57	I	65	3349.07	I
330	2748.98	II	120	2879.27	I	430	3018.50	I	55	3349.32	I
390	2750.73	II	95	2880.87	II	240	3018.82	I	30	3351.60	I
45	2751.60	I	30	2881.14	I	430	3020.67	I	55	3351.97	I
280	2751.87	II	170	2887.00	I	2800	3021.56	I	55 h	3353.03	I
110 h	2752.88	I	55	2888.74	II	1100	3024.35	I		3353.13	II
35	2754.28	II	700	2889.29	I	85	3026.65	II	170	3358.50	II

Cr I and II		Cr I and II		Cr I and II		Cr I and II	
Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength
160	3360.30	350	3636.59	660	3883.29	140	4163.62
65	3361.77	630	3639.80	50	3883.66	70	4165.52
55	3362.21	85	3640.39	570	3885.22	40	4169.84
430	3368.05	70	3641.47	380	3886.79	35	4170.20
30	3376.40	220	3641.83	60	3891.93	40	4172.77
55	3378.34	45	3646.16	260	3894.04	170	4174.80
30	3379.17	85	3648.53	40	3897.65	30	4175.94
30	3379.37	220	3649.00	35	3902.11	170	4179.26
95	3379.83	170	3653.91	360	3902.92	35	4184.90
140	3382.68	220	3656.26	60	3903.16	30	4186.36
95	3391.43	45	3662.84	960	3908.76	35	4190.13
55	3392.99	130	3663.21	120hd	3911.82	85	4191.27
70	3393.84	45	3665.98		3912.00	35	4192.10
55	3394.30	95	3666.64	120	3915.84	85	4193.66
30	3402.40	55	3668.03	190	3916.24	70	4194.95
170	3403.32	65	3676.32	35	3917.60	40	4197.23
360	3408.76	40	3677.68	1900	3919.16	85	4198.52
210	3421.21	55	3677.89	600	3921.02	60	4203.59
270	3422.74	40	3679.82	30	3926.65	40	4204.47
140	3433.31	19	3681.69	600	3928.64	35	4208.36
270	3433.60	120	3685.55	410	3941.49	110	4209.37
55	3434.11	130	3686.80	30	3951.10	40	4209.76
160	3436.19	130	3687.25	40	3952.40	40	4211.35
70	3441.12	75	3687.54	35	3953.16	40	4216.36
140	3441.44	19	3688.46	1900	3963.69	85	4217.63
30	3443.79	75	3712.95	120	3969.06	40	4221.57
170	3445.62	40	3716.53	1600	3969.75	40	4222.73
30	3447.02	130	3730.81	85	3971.26	40	4238.96
170	3447.43	150	3732.03	1600	3976.66	60	4240.70
70	3447.76	95	3742.97	85	3978.68	20000	4254.35
190	3453.33	480	3743.58	40	3979.80	70	4255.50
40	3453.74	570	3743.88	85	3981.23	60	4261.35
130	3455.60	85	3744.49	960	3983.91	110	4263.14
100	3460.43	55	3748.61	190	3984.34	30	4271.06
65	3465.25	340	3749.00	160	3989.99	40	4272.91
40	3467.02	50	3757.17	960	3991.12	16000	4274.80
70	3467.72	230	3757.66	160	3991.67	85	4280.40
45	3469.59	60	3758.04	190	3992.84	10000	4289.72
16	3472.76	24	3767.43	40	3993.97	40	4291.96
24	3472.91	260	3768.24	160	4001.44	85	4295.76
40	3473.61	95	3768.73	120	4012.47	70	4297.74
70	3481.30	95	3788.86	30	4014.67	35	4300.51
55	3481.54	95	3790.45	85	4022.26	50	4301.18
55	3494.97	130	3791.38	70	4025.01	30	4305.45
40	3495.38	130	3792.14	120	4026.17	35	4319.64
80	3510.54	120	3793.29	85	4027.10	60	4325.08
40	3511.84	130	3793.88	85	4030.68	780	4337.57
120	3550.64	85	3794.61	190	4039.10	1100	4339.45
80	3558.52	140	3797.13	160	4048.78	380	4339.72
130	3566.16	200	3797.72	120	4058.77	60	4340.13
130	3573.64	530	3804.80	40	4065.72	1900	4344.51
80	3574.04	110	3806.83	85	4066.94	70	4346.83
330 h	3574.80	110	3807.93	35	4074.86	380	4351.05
	3574.94	180	3815.43	40	4076.06	2300	4351.77
19000	3578.69	70	3818.48	40	4077.09	570	4359.63
160 h	3584.33	180	3819.56	40	4077.68	70	4363.13
130	3585.30	70	3823.52	40	4104.87	530	4371.28
17000	3593.49	130	3826.42	40	4109.58	70	4373.25
350	3601.67	130	3830.03	40	4120.61	110	4374.16
40	3602.57	380	3841.28	40	4121.82	70	4375.33
85	3603.74	190	3848.98	35	4122.16	50	4381.11
	3603.78	140	3849.36	40	4123.39	530	4384.98
13000	3605.33	290	3850.04	140	4126.52	60	4387.50
40	3608.40	140	3852.22	35	4127.30	70	4391.75
40	3609.48	190	3854.22	40	4127.64	60	4403.50
40	3610.05	110	3855.29	40	4131.36	24	4410.30
70	3612.61	140	3855.57	30	4152.78	60	4411.09
85	3615.64	260	3857.63	120	4153.82	35	4412.25
130	3632.84	70	3874.53	85	4161.42	50	4413.87

Cr I and II			Cr I and II			Cr I and II			Cr I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
60	4424.28	I	570	4651.28	I	5300	5204.52	I	22	6362.87	I
24	4428.50	I	840	4652.16	I	8400	5206.04	I	19	6661.08	I
50	4430.49	I	35	4654.74	I	11000	5208.44	I	11	6669.26	I
50	4432.18	I	19	4656.19	I	19	5214.13	I	5 h	6881.62	I
110	4458.54	I	40	4663.33	I	30	5221.75	I	10 h	6882.38	I
30	4459.74	I	70	4663.83	I	85	5224.94	I	21 h	6883.03	I
30	4465.36	I	95	4664.80	I	12	5226.89	I	27 h	6924.13	I
30	4482.88	I	35	4665.90	I	19	5238.97	I	17 h	6925.20	I
40	4488.05	I	22	4666.22	I	30	5243.40	I	30 h	6978.48	I
50	4489.47	I	70	4666.51	I	290	5247.56	I	11 h	6979.82	I
60	4492.31	I	50	4669.34	I	60	5254.92	I	7	7185.52	I
660	4496.86	I	40	4680.54	I	60	5255.13	I	6 h	7236.20	I
50	4498.73	I	19	4680.87	I	19	5261.75	I	85	7355.90	I
70	4500.30	I	70	4689.37	I	530	5264.15	I	130	7400.21	I
50	4501.11	I	60	4693.95	I	30	5265.16	I	150	7462.31	I
22	4501.79	I	24	4695.15	I	180	5265.72	I	11 h	7942.04	I
24	4506.85	I	60	4697.06	I	35	5272.01	I	5 h	8163.18	I
95	4511.90	I	240 d	4698.46	I	30	5273.44	I	9	8348.28	I
12	4514.37	I		4698.62	I	95 h	5275.17	I	6	8450.26	I
35	4514.53	I	35	4700.61	I	35 h	5275.69	I	3	8455.24	I
24	4521.14	I	190	4708.04	I	70 h	5276.03	I	6	8548.86	I
24	4526.11	I	240	4718.43	I	19	5280.29	I	40	8947.15	I
380	4526.47	I	50	4723.10	I	10	5287.19	I	19	8976.83	I
70 d	4527.34	I	50	4724.42	I	340	5296.69	I			
	4527.47	I	50	4727.15	I	70 h	5297.36	I			
24	4529.85	I	24	4729.72	I	660	5298.27	I			
380	4530.74	I	120	4730.71	I	85	5300.75	I			
50	4535.15	I	140	4737.35	I	17	5304.21	I	20	969.26	III
240	4535.72	I	19	4745.31	I	24	5312.88	I	40	1000.86	III
40	4539.79	I	70	4752.08	I	24	5318.78	I	40	1001.04	III
240	4540.50	I	340	4756.11	I	340 h	5328.34	I	30	1002.96	III
240	4540.72	I	50	4764.29	I	70 h	5329.17	I	50	1017.14	III
35	4541.07	I	22	4766.63	I	17 h	5329.72	I	50	1017.31	III
19	4541.51	I	30	4767.86	I	14	5340.44	I	50	1017.57	III
24	4542.62	I	190	4789.32	I	10	5344.76	I	30	1028.33	III
140	4544.62	I	95	4792.51	I	780	5345.81	I	60	1030.47	III
24	4545.34	I	120	4801.03	I	380	5348.32	I	30	1030.89	III
600	4545.96	I	110	4829.38	I	30	5386.98	I	50	1033.23	III
50	4556.17	I	14	4836.86	I	22	5387.57	I	50	1033.45	III
22	4558.66	II	17	4861.20	I	10	5390.39	I	100	1033.69	III
19	4564.17	I	70	4861.84	I	40	5400.61	I	50	1035.93	III
120	4565.51	I	140	4870.80	I	22	5405.00	I	100	1036.03	III
95	4569.64	I	35	4885.78	I	1400	5409.79	I	30	1040.17	III
120	4571.68	I	19	4885.96	I	12	5442.41	I	40	1040.53	III
22	4575.12	I	130	4887.01	I	19	5463.97	I	40	1045.06	III
360	4580.06	I	19	4888.53	I	19	5480.50	I	40	1045.14	III
24	4586.14	I	35	4903.24	I	24	5628.64	I	60	1059.13	III
360	4591.39	I	260	4922.27	I	7	5642.36	I	60	1060.15	III
70	4595.59	I	110	4936.33	I	12 h	5649.37	I	60	1061.04	III
50	4600.10	I	70	4942.50	I	24	5664.04	I	50	1062.68	III
480	4600.75	I	110	4954.81	I	7 h	5681.20	I	30	1064.32	III
50	4601.02	I	35	4964.93	I	7 h	5682.48	I	30	1064.43	III
240	4613.37	I	60	5013.32	I	24	5694.73	I	50	1066.23	III
600	4616.14	I	17	5051.90	I	40	5698.33	I	80	1068.41	III
70	4619.55	I	17	5065.91	I	24	5702.31	I	30	1100.61	III
85	4621.96	I	40	5067.71	I	12	5712.64	I	30	1101.43	III
70	4622.49	I	40	5072.92	I	24	5712.78	I	30	1102.88	III
24	4622.76	I	30	5110.75	I	7	5719.82	I	30	1117.19	III
550	4626.19	I	17	5113.13	I	7	5746.43	I	30	1132.75	III
24	4632.18	I	17	5123.46	I	7	5753.69	I	50	1136.67	III
40	4637.18	I	50	5139.65	I	12 h	5781.20	I	50	1161.43	III
50	4637.77	I	14	5144.67	I	6 h	5781.81	I	30	1187.65	III
50 d	4639.52	I	70	5166.23	I	24 h	5783.11	I	60	1206.38	III
	4639.70	I	35	5177.43	I	30 h	5783.93	I	80	1209.13	III
1600	4646.17	I	70	5184.59	I	24 h	5785.00	I	80	1211.12	III
24	4646.81	I	70	5192.00	I	19 h	5785.82	I	40	1221.07	III
24	4648.13	I	12	5193.49	I	60 h	5787.99	I	40	1221.90	III
24	4648.87	I	85	5196.44	I	180 h	5791.00	I	30	1225.65	III
35	4649.46	I	35	5200.19	I	35	6330.10	I	30	1228.65	III

Cr III
Ref. 412 - C.H.C.

Intensity	Wavelength	
		Vacuum
20	969.26	III
40	1000.86	III
40	1001.04	III
30	1002.96	III
50	1017.14	III
50	1017.31	III
50	1017.57	III
30	1028.33	III
60	1030.47	III
30	1030.89	III
50	1033.23	III
50	1033.45	III
100	1033.69	III
50	1035.93	III
100	1036.03	III
30	1040.17	III
40	1040.53	III
40	1045.06	III
40	1045.14	III
60	1059.13	III
60	1060.15	III
60	1061.04	III
50	1062.68	III
30	1064.32	III
30	1064.43	III
50	1066.23	III
80	1068.41	III
30	1100.61	III
30	1101.43	III
30	1102.88	III
30	1117.19	III
30	1132.75	III
50	1136.67	III
50	1161.43	III
30	1187.65	III
60	1206.38	III
80	1209.13	III
80	1211.12	III
40	1221.07	III
40	1221.90	III
30	1225.65	III
30	1228.65	III

Cr III			Cr III			Cr IV			Cr V		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
30	1231.88	III	150	2284.44	III	40	1375.05	IV	50	1259.99	V
50	1232.96	III	50	2289.23	III	70	1401.82	IV	100	1263.50	V
40	1236.20	III	80	2290.66	III	100	1417.42	IV	150	1465.86	V
40	1238.51	III	60	2295.55	III	30	1485.05	IV	50	1481.65	V
50	1252.61	III	50	2309.99	III	80	1595.04	IV	50	1482.76	V
40	1259.02	III	80	2314.63	III	90 d	1595.59	IV	50	1484.67	V
40	1261.86	III	100	2319.07	III	100	1658.08	IV	100	1489.71	V
30	1262.34	III	150	2324.88	III	120	1672.66	IV	150	1497.97	V
35	1263.61	III	60	2340.51	III	90	1686.07	IV	170	1519.03	V
35	1264.21	III	50	2456.83	III	100	1690.88	IV	220	1579.70	V
40	1287.05	III	100	2472.88	III	80	1725.26	IV	170	1591.72	V
30	1455.27	III	100	2479.77	III	90	1727.07	IV	150	1603.19	V
40	1584.60	III	100	2483.06	III	100	1732.04	IV	60	1638.50	V
30	1603.19	III	60	2488.26	III	40	1733.98	IV	50	1639.40	V
30	1679.25	III	80	2506.41	III	80	1734.16	IV	200	1837.44	V
30	1690.28	III	80	2530.99	III	50	1739.19	IV	COBALT (Co)		
60	1692.89	III	80	2537.73	III	70	1746.88	IV	Z = 27		
60	1696.64	III	80	2544.37	III	80	1747.13	IV	Co I and II		
60	1701.48	III	50	2545.17	III	110	1755.64	IV	Refs. 1,125,276 - C.R.C.		
80	1707.43	III	80	2564.76	III	120	1758.51	IV	Vacuum		
40	1707.78	III	80	2616.50	III	100	1769.64	IV	20	1265.93	II
45	1762.81	III	100	2626.08	III	100	1777.82	IV	40	1271.94	II
30	1766.92	III	100	2640.73	III	40	1791.09	IV	20	1276.90	II
30	1769.17	III	50	2647.50	III	140	1802.72	IV	30	1293.97	II
30	1827.26	III	40	2655.28	III	130	1812.41	IV	25	1295.53	II
	Air		40	2916.57	III	60	1819.23	IV	30	1295.86	II
60	2036.39	III			30	1826.21	IV	20	1297.10	II	
50	2039.63	III			30	1826.86	IV	80	1299.58	II	
80	2047.23	III			100	1840.14	IV	30	1302.39	II	
100	2113.73	III			50	1851.89	IV	20	1306.76	II	
100	2113.83	III			100	1863.11	IV	80	1306.95	II	
50	2114.26	III			140	1873.89	IV	40	1311.12	II	
50	2114.53	III			35	1883.16	IV	40	1311.86	II	
100	2114.87	III			40	1937.63	IV	30	1315.42	II	
100	2117.53	III			30	1946.59	IV	30	1316.09	II	
80	2123.53	III			140	1967.18	IV	20	1318.19	II	
80	2139.11	III			120	1972.07	IV	30	1318.60	II	
100	2141.15	III			40	1990.25	IV	20	1319.84	II	
80	2144.15	III				Air	30	1409.33	II		
50	2147.16	III			50 d	2042.91	IV	20	1466.21	II	
50	2147.56	III			40	2055.73	IV	20	1471.87	II	
50	2148.65	III			70	2299.21	IV	30	1472.90	II	
50	2149.48	III			90	2299.59	IV	30	1475.81	II	
50	2152.76	III			100	2316.85	IV	20	1484.26	II	
100	2157.17	III			40	2324.06	IV	30	1486.50	II	
50	2163.86	III			50	2360.40	IV	20	1509.23	II	
60	2166.25	III			70	2405.15	IV	20	1590.54	II	
100	2170.70	III			60	2423.32	IV	20	1595.77	II	
50	2183.71	III					20	1599.30	II		
100	2185.01	III				Cr V	20	1693.34	II		
50	2190.09	III				Ref. 380 - C.H.C.	8	1706.05	II		
100	2190.76	III				Vacuum	10	1723.01	II		
100	2191.58	III					15 h	1740.55	II		
100	2197.89	III					15	1743.39	II		
100	2198.62	III					8	1754.21	II		
100	2203.22	III					20 d	1808.01	II		
60	2208.70	III					10	1837.56	II		
200	2226.72	III					15	1839.37	II		
100	2231.81	III					1500	1842.34	I		
100	2233.81	III					1800	1847.89	I		
200	2235.91	III					1800	1852.71	I		
150	2237.59	III					2400	1855.05	I		
150	2244.10	III					1500	1878.28	I		
80	2251.45	III					10	1917.62	II		
50	2257.92	III					1800	1936.58	I		
100	2273.30	III					1500	1946.79	I		
80	2275.43	III									
100	2276.38	III									
80	2277.47	III									

Co I and II			Co I and II			Co I and II			Co I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
30	1950.09	II	300	2301.40	II	200	2560.03	II	21000	3453.50	I
1500	1951.90	I	800 d	2307.85	II	960	2562.15	I	1000	3455.23	I
1800	1954.22	I	2600	2309.02	I	500	2564.04	II	5100	3462.80	I
1800	1955.17	I	500	2311.60	II	1100	2567.35	I	5100	3465.80	I
30	1957.42	II	500	2314.05	II	960	2574.35	I	8000	3474.02	I
1500	1958.55	I	300	2314.96	II	800	2580.32	II	1900	3483.41	I
1500	1961.59	I	200 p	2317.06	II	300 d	2582.22	II	4800	3489.40	I
1500 h	1968.69	I	2400	2323.14	I	500	2587.22	II	2400	3495.69	I
1500 h	1968.93	I	300 p	2324.31	II	500	2587.52	II	40	3497.33	II
3000	1970.71	I	200 d	2326.11	II	200	2588.91	II	50	3501.72	II
1800 h	1971.16	I	500	2326.47	II	100 p	2605.71	II	9600	3502.28	I
1800 h	1972.52	I	1400	2335.99	I	100	2612.50	II	7000	3506.32	I
1500	1973.85	I	1600	2338.67	I	100	2614.36	II	50	3507.77	II
1800	1976.97	I	200	2347.39	II	100 p	2628.77	II	2900	3509.84	I
2400 h	1980.89	I	1600	2352.85	I	100	2632.26	II	1400	3510.43	I
1500	1989.80	I	200 d	2353.41	II	100	2636.07	II	4800	3512.64	I
1800	1990.34	I	2000	2353.42	I	310	2646.42	I	3800	3513.48	I
1500 l	1998.49	I	500	2363.80	II	770	2648.64	I	10	3514.23	II
	Air		400	2378.62	II	100	2653.72	II	30	3517.50	II
20	2000.79	II	1400	2380.48	I	100	2663.53	II	4800	3518.35	I
1500	2002.32	I	200	2381.76	II	200	2666.73	II	1300	3520.08	I
900	2008.04	I	300 p	2383.45	II	100	2675.85	II	2700	3521.57	I
50	2011.51	II	1400	2384.86	I	100	2684.42	II	3800	3523.43	I
1200 h	2014.58	I	200	2386.36	II	100	2702.02	II	60	3523.51	II
900	2016.17	I	500	2388.92	II	200	2706.62	II	6400	3526.85	I
50	2022.35	II	200	2397.38	II	200	2707.35	II	2700	3529.03	I
40	2025.76	II	1100 d	2402.06	I	190	2715.99	I	7300	3529.81	I
50	2027.04	II	200 p	2404.16	II	100	2727.78	II	1900	3533.36	I
900	2031.96	I	5300	2407.25	I	80	2734.54	II	40	3535.92	II
30	2036.58	II	5300	2411.62	I	190	2745.10	I	50	3545.03	II
1500	2039.95	I	1600	2412.76	I	100	2753.22	II	20	3555.93	II
1200	2041.11	I	4800	2414.46	I	190	2764.19	I	1100	3560.89	I
20	2049.17	II	4800	2415.30	I	100	2766.70	II	80	3561.07	II
40	2058.82	II	300	2417.65	II	100	2774.97	II	20	3566.98	II
40	2063.78	II	4100	2424.93	I	100	2791.00	II	8800	3569.38	I
50	2065.54	II	3300	2432.21	I	100	2793.73	II	50	3574.95	II
1500 h	2077.76	I	2900	2436.66	I	150	2815.56	I	1600	3574.96	I
900	2085.67	I	2400	2439.05	I	80	2835.63	II	60	3575.32	II
900	2087.55	I	200	2442.63	II	80	2847.35	II	2500	3575.36	I
900	2089.35	I	200 d	2446.03	II	80	2871.22	II	60	3577.96	II
900	2093.40	I	200 p	2447.69	II	190	2886.44	I	1000	3585.16	I
900	2094.86	I	200	2450.00	II	100	2918.38	II	6700	3587.19	I
900	2095.77	I	200	2464.20	II	100	2930.24	II	1900	3594.87	I
1200	2097.51	I	200	2486.44	II	100	2954.73	II	1600	3602.08	I
1500	2104.73	I	200	2498.82	II	690	2987.16	I	100	3621.21	II
1500	2106.80	I	570	2504.52	I	690	2989.59	I	1000	3627.81	I
900	2108.98	I	500	2506.46	II	20	3008.86	II	80	3643.61	II
30	2111.44	II	360	2506.88	I	60	3022.59	II	10	3656.75	II
900 s	2117.68	I	200	2511.16	II	30	3035.13	II	60	3681.35	II
20	2128.79	II	860	2517.87	I	3100	3044.00	I	5	3695.32	II
900	2137.78	I	500	2519.82	II	1700	3061.82	I	5	3714.73	II
900	2138.97	I	4300	2521.36	I	20	3352.79	II	1100	3745.50	I
900	2163.03	I	200 h	2524.65	II	80	3387.70	II	20	3754.69	II
20	2164.44	II	300	2524.97	II	1100	3388.17	I	1400	3842.05	I
30	2173.33	II	500	2528.62	II	2200	3395.38	I	6900	3845.47	I
1100	2174.60	I	2900	2528.97	I	11000	3405.12	I	5500	3873.12	I
20	2181.99	II	200 p	2530.09	II	4500	3409.18	I	2800	3873.96	I
30	2187.01	II	720	2530.13	I	6700	3412.34	I	7900	3894.08	I
20	2190.68	II	860	2532.18	I	2200	3412.63	I	20 h	3911.40	II
20	2192.50	II	200 d	2533.82	II	30	3415.77	II	1500	3935.97	I
200	2193.60	II	2900	2535.96	I	2700	3417.16	I	80 h	3963.10	II
20	2200.40	II	860	2536.49	I	50	3423.84	II	40 h	3976.74	II
40 p	2202.95	II	300	2541.94	II	2500	3431.58	I	10	3983.02	II
200	2256.73	II	1700	2544.25	I	4500	3433.04	I	6000	3995.31	I
150	2260.00	II	200	2546.74	II	1600	3442.93	I	970	3997.91	I
200	2283.52	II	340	2548.34	I	8800	3443.64	I	350	4020.90	I
1000	2286.15	II	310	2553.37	I	50	3446.39	II	10 h	4036.14	II
200	2291.98	II	310	2555.07	I	4100	3449.17	I	20 h	4037.37	II
300 d	2293.38	II	300	2559.41	II	2100	3449.44	I	4	4040.02	II

Co I and II		Co I and II		Co III		Co V	
Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength
370	4045.39 I	17	5991.88 I	500	1895.37 III	1	1017.43 V
5 h	4050.23 II	17	6082.44 I	500	1919.12 III	10	1018.36 V
10 h	4052.40 II	17	6282.63 I	500	1928.57 III	10	1021.14 V
20 h	4062.73 II	45	6450.24 I	500	1940.15 III	1	1028.08 V
2 h	4064.50 II	21	6455.00 I	500	1953.94 III	3	1226.31 V
350	4066.37 I	15	6563.42 I	500	1959.41 III	8	1228.19 V
5 h	4074.34 II	15	6632.44 I	400	1989.60 III	15	1231.73 V
830	4092.39 I	14	6814.94 I		Air	2	1234.55 V
1	4096.57 II	14	6872.40 I	100	2001.09 III	20	1236.95 V
550	4110.54 I	21	7052.89 I	200	2011.62 III	2	1239.85 V
2800	4118.77 I	45	7084.99 I	200	2013.88 III	8	1246.91 V
4400	4121.32 I	8	7417.38 I	100	2031.81 III	6	1258.61 V
3	4130.88 II	8	7712.68 I	200	2053.11 III	5	1263.28 V
3	4145.13 II	7	7908.71 I	100	2056.21 III	20	1270.70 V
3 d	4160.67 II	9	7987.38 I	10	2062.17 III	20	1272.23 V
1	4181.13 II	13	8007.27 I	10	2079.74 III	2	1275.52 V
90	4190.71 I	9	8093.96 I	15	2088.58 III	50	1277.01 V
1	4208.61 II	9	8372.84 I	10	2090.51 III	30	1281.63 V
30 s	4244.25 II	4	8575.35 I	10	2097.63 III	15	1284.00 V
8	4272.33 II	3	8819.15 I	10	2134.15 III	28	1286.95 V
20 h	4288.25 II		Co III	10	2452.16 III	25	1295.55 V
3	4328.86 II		Ref. 291 - C.R.C.	20	2811.75 III	40	1295.87 V
2	4384.26 II		Vacuum	10	2888.31 III	35	1301.12 V
2 h	4396.94 II	1000	1696.01 III	10	2933.27 III	50	1345.67 V
3	4413.91 II	800	1697.99 III	10	2978.01 III	6	1351.22 V
90	4469.56 I	500	1702.79 III	20	2991.89 III	15	1353.42 V
10	4482.50 II	1000	1707.35 III	25	3010.92 III	40	1355.20 V
2 h	4489.12 II	500	1707.95 III	10	3116.68 III	30	1357.67 V
4 h	4497.44 II	500	1723.97 III	2	3151.40 III	20	1361.32 V
10 d	4500.54 II	400	1745.67 III	2	3180.64 III	30	1362.46 V
0	4516.65 II	500	1755.98 III	20	3232.11 III	30	1364.17 V
690	4530.96 I	5000	1760.35 III	2	3249.24 III	30	1368.24 V
2 h	4533.22 II	500	1769.96 III	20	3259.68 III	4	1369.30 V
0 h	4537.95 II	500	1773.22 III	2	3269.23 III	10	1371.01 V
90	4549.66 I	500	1773.57 III	10	3287.68 III	30	1373.09 V
1 h	4559.29 II	5000	1774.42 III	15	3305.38 III	30	1375.20 V
140	4565.59 I	500	1774.42 III	10	3451.25 III	25	1378.12 V
1	4569.26 II	1000	1777.14 III	2	3526.24 III	10	1379.05 V
190	4581.60 I	2000	1780.05 III	1	3634.21 III	10	1380.21 V
5	4616.30 II	3000	1782.97 III	1	3636.31 III	32	1389.11 V
120	4629.38 I	500	1784.06 III	2	3667.52 III	15	1459.77 V
25 h	4660.66 II	1000	1787.08 III	2	3677.23 III	35	1468.98 V
85	4663.41 I	1000	1789.07 III	3	3680.74 III	30	1476.65 V
110	4792.86 I	500	1790.26 III	1	3762.50 III	25	1482.62 V
10 d	4831.16 II	500	1791.28 III	15	3782.27 III	20	1482.91 V
100	4840.27 I	500	1798.06 III		Co IV	25	1486.02 V
150	4867.88 I	500	1805.54 III		Ref. 236 - C.R.C.	20	1488.73 V
80 h	4964.18 II	400	1811.47 III		Vacuum		
10 h	4970.05 II	400	1821.26 III	81	606.79 IV		COPPER (Cu)
10 h	4990.47 II	400	1821.69 III	74	607.59 IV		Z = 29
20 h	4995.98 II	400	1821.77 III	55	608.24 IV		Cu I and II
35	5146.74 I	1000	1823.08 III	66	609.16 IV		Refs. 273,290 - V.K.
50	5212.71 I	400	1825.36 III	70	609.21 IV		Vacuum
50	5230.22 I	750	1825.95 III	64	609.28 IV		
45	5235.21 I	2000	1830.09 III	43	610.04 IV	80	685.141 II
50	5247.93 I	2000	1831.44 III	37	610.25 IV	100	709.313 II
26	5266.30 I	750	1831.92 III	24	610.79 IV	100	718.179 II
45	5266.49 I	400	1832.20 III		Co V	150	724.489 II
26	5268.52 I	5000	1835.00 III		Refs. 100,159 - C.R.C.	200	735.520 II
45 h	5280.65 I	1000	1837.63 III		Vacuum	250	736.032 II
26	5301.06 I	500	1846.16 III	20	355.52 V	80	779.295 II
50	5342.71 I	500	1852.92 III	18	355.88 V	100	797.455 II
26	5343.39 I	400	1854.39 III	12	356.06 V	150	810.998 II
50	5352.05 I	400	1854.76 III	4	1006.86 V	200	813.883 II
26	5353.48 I	1000	1861.78 III	10	1007.51 V	300	826.996 II
35	5369.58 I	2000	1863.83 III	15	1009.02 V	150	848.808 II
45	5483.34 I	400	1864.19 III	10	1010.94 V	250	851.303 II
17	5530.77 I	500	1871.87 III	10	1013.80 V	250	858.487 II
17	5647.22 I	1000	1881.70 III				

Cu I and II		Cu I and II		Cu I and II		Cu I and II	
Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength
400	861.994 II	150	1265.506 II	200	1540.239 II	320	2117.310 II
400	865.390 II	300	1275.572 II	300	1540.389 II	350	2122.980 II
250	869.336 II	150	1282.455 II	300	1540.588 II	350	2126.044 II
150	873.263 II	150	1287.468 II	750	1541.703 II	420	2134.341 II
200	876.723 II	150	1298.395 II	400	1544.677 II	900	2135.981 II
250	877.012 II	300	1308.297 II	100	1547.958 II	400	2148.984 II
200	877.555 II	300	1314.337 II	300	1550.653 II	150	2161.320 II
500	878.699 II	100	1320.686 II	300	1551.389 II	1300 r	2165.09 I
100	884.133 II	100	1326.395 II	500	1552.646 II	250	2174.982 II
250	885.847 II	150	1350.594 II	250	1553.896 II	1600 r	2178.94 I
600	886.943 II	250	1351.837 II	400	1555.134 II	700	2179.410 II
600	890.567 II	150	1355.305 II	500	1555.703 II	1700 r	2181.72 I
500	892.414 II	300	1358.773 II	300	1558.345 II	700	2189.630 II
800	893.678 II	200	1359.009 II	400	1565.924 II	900	2192.268 II
400	894.227 II	200	1362.600 II	400	1566.415 II	400	2195.683 II
600	896.759 II	250	1367.951 II	100	1569.416 II	1700 r	2199.58 I
400	896.976 II	200	1371.840 II	300	1579.492 II	1300 r	2199.75 I
600	901.073 II	100	1393.128 II	300	1580.626 II	100	2200.509 II
400	906.113 II	100	1398.642 II	400	1581.995 II	200	2209.806 II
800	914.213 II	150	1402.777 II	500	1583.682 II	750	2210.268 II
600	922.019 II	150	1407.169 II	400	1590.165 II	1600 r	2214.58 I
500	924.239 II	100	1414.898 II	600	1593.556 II	250	2215.106 II
400	935.232 II	250	1418.426 II	400	1598.402 II	1000 r	2215.65 I
600	935.898 II	250	1421.759 II	400	1602.388 II	750	2218.108 II
600	943.335 II	200	1427.829 II	200	1604.848 II	2100 r	2225.70 I
600	945.525 II	400	1430.243 II	300	1605.281 II	150	2226.780 II
500	945.965 II	250	1434.904 II	400	1606.834 II	1600 r	2227.78 I
200	954.383 II	150	1436.236 II	250	1608.639 II	350	2228.868 II
250	956.290 II	150	1442.139 II	150	1610.296 II	2500 r	2230.08 I
400	958.154 II	200	1445.984 II	200	1617.915 II	1100 r	2238.45 I
200	960.414 II	200	1449.058 II	600	1621.426 II	900	2242.618 II
250	968.042 II	250	1450.304 II	400	1622.428 II	2300 r	2244.26 I
200	974.759 II	200	1452.294 II	250	1630.268 II	1000	2247.002 II
250	977.567 II	300	1458.002 II	100	1636.605 II	1300 r	2260.53 I
100	987.657 II	250	1459.412 II	250	1649.458 II	2200 r	2263.08 I
250	992.953 II	200	1463.752 II	30 r	1655.32 I	150	2263.786 II
300	1004.055 II	400	1463.838 II	200	1656.322 II	200	2276.258 II
300	1008.569 II	200	1466.070 II	200	1660.001 II	100	2286.645 II
300	1008.728 II	400	1470.697 II	300	1663.002 II	2500 r	2293.84 I
300	1010.269 II	200	1472.395 II	100	1672.776 II	170	2294.368 II
250	1012.597 II	250	1473.978 II	30	1688.09 I	1000	2303.12 I
500	1018.707 II	200	1474.935 II	30	1691.08 I	150	2369.890 II
500	1027.831 II	150	1476.059 II	30 r	1703.84 I	2500 r	2392.63 I
250	1028.328 II	200	1481.544 II	50 r	1713.36 I	120	2403.337 II
200	1030.263 II	200	1485.328 II	150	1717.721 II	1500	2406.66 I
600	1036.470 II	750	1488.831 II	50 r	1725.66 I	1000 r	2441.64 I
600	1039.348 II	300	1492.834 II	100	1736.551 II	100	2485.792 II
600	1039.582 II	250	1493.366 II	50 r	1741.57 I	2000 r	2492.15 I
800	1044.519 II	250	1495.430 II	150	1753.281 II	150	2506.273 II
800	1044.744 II	350	1496.687 II	200 r	1774.82 I	120	2526.593 II
500	1049.755 II	150	1503.368 II	100 r	1825.35 I	300	2544.805 II
600	1054.690 II	250	1504.757 II	250	1929.751 II	100	2571.756 II
400	1055.797 II	200	1505.388 II	250	1944.597 II	150	2590.529 II
600	1056.955 II	300	1508.632 II	100	1946.493 II	200	2600.270 II
400	1058.799 II	350	1510.506 II	200	1957.518 II	2500 r	2618.37 I
600	1059.096 II	200	1512.465 II	150	1970.495 II	200	2666.291 II
600	1060.634 II	200	1513.366 II	150	1977.027 II	750	2689.300 II
600	1063.005 II	500	1514.492 II	500	1979.956 II	700	2700.962 II
200	1065.782 II	200	1517.631 II	300	1989.855 II	650	2703.184 II
200	1066.134 II	500	1519.492 II		Air	700	2713.508 II
500	1069.195 II	600	1519.837 II	250	1999.698 II	650	2718.778 II
300	1073.745 II	200	1520.540 II	270	2035.854 II	300	2721.677 II
200	1088.395 II	200	1524.860 II	250	2037.127 II	120	2737.342 II
300	1094.402 II	150	1525.764 II	350	2043.802 II	270	2745.271 II
250	1097.053 II	500	1531.856 II	300	2054.980 II	2500 r	2766.37 I
150	1119.947 II	300	1532.131 II	100	2078.663 II	800	2769.669 II
200	1142.640 II	250	1533.986 II	110	2098.398 II	200	2791.795 II
300	1144.856 II	250	1535.002 II	320	2104.797 II	170	2799.528 II
100	1250.048 II	500	1537.559 II	300	2112.100 II	100	2810.804 II

Cu I and II			Cu I and II			Cu I and II			Cu I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
1250 r	2824.37	I	200	4255.635	II	600	6150.384	II	500	8277.560	II
350	2837.368	II	950	4275.11	I	750	6154.222	II	800	8283.160	II
100	2857.748	II	300	4279.962	II	500	6172.037	II	250	8503.396	II
600	2877.100	II	500	4292.470	II	550	6186.884	II	750	8511.061	II
270	2884.196	II	400	4365.370	II	400	6188.676	II	200	8609.134	II
2500 r	2961.16	I	100	4444.831	II	300	6198.092	II	500	9813.213	II
100	2986.335	II	400	4506.002	II	470	6204.261	II	250	9827.978	II
2000	2997.36	I	150	4516.049	II	450	6208.457	II	200	9830.798	II
2000	3010.84	I	150	4541.032	II	750	6216.939	II	600	9861.280	II
2500	3036.10	I	500	4555.920	II	700	6219.844	II	600	9864.137	II
2500	3063.41	I	100	4596.906	II	500	6261.848	II	200	9883.969	II
1400	3073.80	I	120	4649.271	II	1000	6273.349	II	550	9916.419	II
1500	3093.99	I	2000	4651.12	I	350	6288.696	II	500	9917.954	II
1250	3099.93	I	120	4661.363	II	900	6301.009	II	550	9925.594	II
2000	3108.60	I	320	4671.702	II	550	6305.972	II	450	9938.998	II
1400 h	3126.11	I	300	4673.577	II	400	6312.492	II	500	9960.354	II
1500	3194.10	I	450	4681.994	II	120	6326.466	II	450	10006.588	II
1400	3208.23	I	100	4758.433	II	400	6373.268	II	550	10022.969	II
1500 h	3243.16	I	400	4812.948	II	750	6377.840	II	550	10038.093	II
0000 r	3247.54	I	120	4851.262	II	400	6403.384	II	650	10054.938	II
0000 r	3273.96	I	300	4854.988	II	850	6423.884	II	450	10080.354	II
1400 h	3282.72	I	100	4873.304	II	200	6442.965	II			
400	3290.418	II	150	4901.427	II	750	6448.559	II			
1500 h	3290.54	I	1000	4909.734	II	170	6466.246	II			
110	3300.881	II	500	4918.376	II	950	6470.168	II			
250	3301.229	II	200	4926.424	II	750	6481.437	II			
2500 h	3307.95	I	900	4931.698	II	400	6484.421	II			
200	3316.276	II	120	4943.026	II	220	6517.317	II			
1500	3337.84	I	700	4953.724	II	400	6530.083	II			
150	3338.648	II	500	4985.506	II	120	6551.286	II			
200	3365.648	II	400	5006.801	II	200	6577.080	II			
450	3370.454	II	350	5009.851	II	750	6624.292	II			
300	3374.952	II	400	5012.620	II	800	6641.396	II			
200	3380.712	II	350	5021.279	II	450	6660.962	II			
100	3384.945	II	200	5039.016	II	100	6770.362	II			
1250 h	3483.76	I	300	5047.348	II	300	6806.216	II			
1250	3524.23	I	900	5051.793	II	400	6809.647	II			
2000	3530.38	I	400	5058.910	II	320	6823.202	II			
1400	3599.13	I	500	5065.459	II	250	6844.157	II			
1400	3602.03	I	450	5067.094	II	320	6868.791	II			
1000	3686.555	II	350	5072.302	II	270	6872.231	II			
150	3786.270	II	450	5088.277	II	270	6879.404	II			
170	3797.849	II	420	5093.816	II	220	6937.553	II			
100	3818.879	II	350	5100.067	II	150	6952.871	II			
140	3826.921	II	1500	5105.54	I	150	6977.572	II			
160	3864.137	II	250	5124.476	II	200	7022.860	II			
280	3884.131	II	2000	5153.24	I	300	7194.896	II			
150	3892.924	II	100	5158.093	II	400	7326.008	II			
170	3903.177	II	100	5183.367	II	300	7331.694	II			
140	3920.654	II	2500	5218.20	I	250	7382.277	II			
120	3933.268	II	100	5269.991	II	1000	7404.354	II			
120	3987.024	II	100	5276.525	II	270	7434.156	II			
150	3993.302	II	1650	5292.52	I	500	7562.015	II			
140	4003.476	II	100	5368.383	II	700	7652.333	II			
1250	4022.63	I	1500	5700.24	I	1000	7664.648	II			
100	4032.647	II	1500	5782.13	I	150	7681.788	II			
600	4043.484	II	150	5805.989	II	450	7744.097	II			
500	4043.751	II	100	5833.515	II	800	7778.738	II			
2000	4062.64	I	200	5897.971	II	750	7805.184	II			
120	4068.106	II	120	5937.577	II	1500	7807.659	II			
500	4131.363	II	400	5941.196	II	1000	7825.654	II			
200	4143.017	II	100	5993.260	II	350	7860.577	II			
300	4153.623	II	650	6000.120	II	300	7890.567	II			
500	4161.140	II	100	6023.264	II	700	7902.553	II			
370	4164.284	II	250	6072.218	II	1500	7933.13	I			
400	4171.851	II	150	6080.343	II	400	7944.438	II			
500	4179.512	II	150	6099.990	II	400	7972.033	II			
500	4211.866	II	160	6107.412	II	1200	7988.163	II			
320	4230.449	II	300	6114.493	II	2000	8092.63	I			

Cu III
Ref. 295 - V.K.
Vacuum

75	542.90	III
200	615.67	III
150	616.03	III
150	687.98	III
150	715.53	III
125	730.38	III
250	788.07	III
250	788.46	III
250	791.36	III
150	801.14	III
100	829.34	III
40	1048.88	III
50	1186.80	III
50	1200.96	III
300	1219.30	III
200	1244.38	III
100	1279.14	III
200	1312.39	III
300	1332.97	III
200	1339.48	III
150	1363.08	III
300 r	1376.79	III
200 r	1377.49	III
150	1423.48	III
300 r	1481.23	III
200	1543.46	III
500 r	1593.75	III
1000 r	1642.21	III
300	1679.14	III
400	1702.10	III
500	1722.37	III
600	1741.37	III
200	1768.86	III
200	1840.91	III
100	1971.95	III
	Air	
200	2013.22	III
150	2157.28	III
100	2299.47	III
500	2368.17	III
400	2391.74	III
800	2405.50	III
700	2412.34	III
2000	2444.44	III

Cu III			Cu IV			Cu V			Cm I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
500	2468.41	III	80	484.53	IV	77	363.96	V	10000	3158.60	I
1000	2482.36	III	90	497.00	IV	65	370.63	V	10000	3169.98	II
700	2486.46	III	90	504.60	IV	74	377.76	V	10000	3177.55	I
500	2508.49	III	70	509.38	IV	70	387.40	V	10000	3179.10	I
500	2522.38	III	40	519.51	IV	51	396.06	V	10000	3186.41	I
500	2538.66	III	40	540.65	IV	25	406.94	V	10000	3188.11	I
400	2566.37	III	60	550.92	IV	13	1097.10	V	10000	3207.12	II
400	2573.33	III	20	584.85	IV	42	1106.24	V	10000	3207.71	I
500	2609.32	III	60	1056.13	IV	77	1113.22	V	10000	3209.89	II
200	2643.92	III	30	1074.72	IV	67	1121.20	V	10000	3209.94	I
200	2696.38	III	50	1091.65	IV	76	1128.80	V	10000	3210.05	II
20	2751.33	III	30	1105.50	IV	59	1133.86	V	10000	3220.76	II
100	2812.94	III	25	1119.43	IV	63	1142.38	V	10000	3224.23	I
100	2978.87	III	40 p	1152.18	IV	54	1149.06	V	10000	3225.11	I
75	3548.87	III	60	1227.44	IV	72	1157.54	V	10000	3226.41	II
100	3639.42	III	70	1228.87	IV	64	1167.35	V	10000	3230.28	I
500	3702.92	III	70	1258.69	IV	77	1176.53	V	10000	3230.35	II
800	3744.70	III	90	1274.84	IV	84	1183.63	V	10000	3236.74	I
400	3748.27	III	90	1293.46	IV	76	1192.54	V	10000	3238.55	II
600	3752.06	III	90	1309.41	IV	83	1201.22	V	10000	3242.66	II
1000	3776.97	III	70	1321.17	IV	77	1204.90	V	10000	3246.25	I
800	3790.80	III	100 d	1340.08	IV	71	1214.36	V	10000	3252.68	I
600	3804.13	III	100	1350.42	IV	70	1221.34	V	10000	3265.81	I
600	3809.18	III	100	1362.05	IV	76	1230.11	V	10000	3280.45	I
300	3881.68	III	100	1372.14	IV	80	1239.73	V	10000	3296.71	II
150	3953.81	III	100	1377.82	IV	79	1246.99	V	10000	3304.85	I
100	4090.49	III	100	1388.80	IV	65	1253.07	V	10000	3317.14	I
200	4283.40	III	90	1405.49	IV	70	1260.24	V	10000	3374.70	I
500	4351.97	III	90	1415.27	IV	77	1269.35	V	10000	3452.92	I
1000	4352.80	III	90	1434.34	IV	78	1278.20	V	10000	3458.34	I
500	4355.24	III	90	1449.69	IV	68	1286.13	V	10000	3510.28	I
500	4370.84	III	80	1466.18	IV	67	1292.08	V	10000	3522.36	I
500	4371.40	III	70	1482.77	IV	73	1299.22	V	10000	3524.94	I
500	4373.43	III	80	1499.81	IV	65	1309.72	V	10000	3542.06	I
1000	4377.11	III	90	1515.28	IV	55	1318.89	V	10000	3547.02	I
200	4386.42	III	90	1535.12	IV	65	1323.28	V	10000	3547.92	I
150	4927.41	III	80	1551.12	IV	64	1329.22	V	10000	3561.44	I
400	5094.28	III	90	1567.35	IV				10000	3572.95	II
200	5168.97	III	80	1583.47	IV	CURIUM (Cm)			10000	3600.62	I
400	5208.34	III	70	1595.12	IV	Z = 96			10000	3639.94	I
600	5219.21	III	80 p	1608.14	IV	Cm I and II			10000	3664.34	I
200	5268.59	III	90	1639.75	IV	Refs. 51,332 - J.G.C.			10000	3709.43	I
400	5317.78	III	20	1650.16	IV	Air			10000	3729.00	I
300	5369.79	III	70	1704.37	IV	10000	2462.76	II	10000	3732.35	I
350	5418.48	III	30	1797.99	IV	10000	2617.17	II	10000	3747.86	I
250 d	5494.94	III	70	1817.56	IV	10000	2636.28	II	10000	3763.05	I
50	5573.94	III	70	1819.23	IV	10000	2651.17	II	10000	3775.75	I
100	5609.00	III	60	1837.04	IV	10000	2653.80	II	10000	3816.30	I
75	5702.12	III	80	1849.62	IV	10000	2653.80	II	10000	3825.14	I
100	5768.56	III	30	1867.24	IV	10000	2725.68	II	10000	3833.32	I
100	5850.72	III	30	1918.71	IV	10000	2736.89	II	10000	3837.59	I
200	5965.25	III	40	1966.31	IV	10000	2748.04	II	10000	3842.00	I
30	6100.87	III				10000	2748.04	II	10000	3849.92	I
50	6369.27	III	Cu V			10000	2784.83	II	10000	3854.11	I
20	6512.54	III	Ref. 324 - V.K.			10000	2811.62	II	10000	3900.25	I
20	6644.13	III	Vacuum			10000	2824.20	II	10000	3904.06	II
50	6793.20	III	9 h	258.95	V	10000	2833.58	II	10000	3908.24	II
			49	271.33	V	10000	2899.90	H	10000	3936.67	I
			49	283.97	V	10000	2912.97	II	10000	3942.03	I
			22	293.41	V	10000	2928.92	II	10000	3944.15	I
			56	299.64	V	10000	2996.18	II	10000	3948.68	I
			65	305.83	V	10000	2999.39	I	10000	3953.36	I
			51	312.51	V	10000 b	3014.87	II	10000	3964.83	I
			66	321.05	V	10000	3044.85	II	10000	3995.10	I
			74	326.57	V	10000	3109.69	I	10000	4016.17	I
			82	333.56	V	10000	3116.41	I	10000	4031.76	I
			81	339.88	V	10000	3137.16	I	10000	4048.29	I
			81	346.00	V	10000	3147.33	I	10000	4049.65	I
			86	355.41	V	10000	3155.10	I	10000	4113.29	I

Cm I and II			Cm I and II			Dy I and II			Dy I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
10000	4129.71	I	10000	17619.28	I	110	2800.53	II	1200	3251.27	II
10000	4207.66	II	10000	18069.02	I	110	2801.41	II	200	3252.19	II
10000	4211.62	I	10000	19572.62	I	300	2816.39	II	290	3256.26	II
10000	4266.45	I	10000	19975.98	I	140	2825.42	II	200	3266.21	II
10000	4293.00	I	10000	20526.32	I	140	2862.70	I	240	3269.11	II
10000	4330.82	I	10000	20853.49	I	190	2877.88	II	200	3272.73	II
10000	4345.69	I	10000	20911.52	I	110	2884.28	II	890	3280.09	II
10000	4447.77	I	10000	20968.11	I	120	2885.53	I	490	3282.77	II
10000	4459.16	I	10000	21241.06	I	120	2890.74	II	200	3287.94	II
10000	4608.40	I	10000	21393.23	I	120	2900.82	II	200	3293.88	II
10000	5846.07	I				110	2904.62	II	200	3296.30	II
10000	5952.41	I	DYSPROSIUM (Dy)			190	2906.39	II	200	3305.40	II
10000	6058.90	I	Z = 66			390	2913.95	II	200	3305.51	II
10000	6243.35	I	Dy I and II			110	2934.31	II	240	3306.19	II
10000	6376.71	I	Ref. 1 - C.H.C.			250	2934.52	II	440	3308.79	II
10000	6510.16	I	Air			110	2941.05	II	1100	3308.88	II
10000	6554.41	I	260	2356.91	II	140	2944.56	II	510	3312.72	II
10000	6640.17	I	65	2381.95		150	2947.06	II	780	3316.32	II
10000	6663.25	I	130	2387.36	II	150	2947.21	II	240	3317.12	II
10000	6686.87	I	150	2392.15		250	2948.31	II	1000	3319.88	II
10000	6706.85	I	180	2402.29	II	170	2950.33	II	270	3326.19	II
10000	6726.68	I	240	2410.01	II	110	2952.12	II	780	3341.00	II
10000	6793.15	I	150	2422.75	II	140	2953.70	II	270	3341.88	II
10000	7162.69	I	260	2439.84	II	220	2964.60	I	200	3347.83	II
10000	7577.80	I	90	2455.15	II	110	2977.42	II	270	3352.69	II
10000	7673.79	I	110	2459.99	II	110	2985.97	II	510	3353.58	II
10000	7720.47	I	90	2471.40	II	220	3015.68	II	240	3359.46	II
10000	8392.37	I	110	2480.93	II	390	3026.16	II	510	3368.11	II
10000	9293.25	I	170	2490.61	II	210	3029.81	II	5300	3385.02	II
10000	9567.08	I	90	2510.31	II	610	3038.28	II	210	3386.57	II
10000	10310.83	I	170	2513.55	II	280	3043.13	II	610	3388.85	II
10000	10351.73	I	170	2517.61	II	210	3047.56	II	210	3391.96	II
10000	10424.49	I	130	2543.81	II	280	3060.64	II	3800	3393.57	II
10000	10508.11	I	90	2545.12	II	390	3062.62	II	1300	3396.16	II
10000	10542.98	I	150	2552.29	II	220	3066.99	II	380	3407.16	II
10000	10792.25	I	180	2557.94	II	330	3071.91	II	5300	3407.80	II
10000	10897.45	I	90	2560.21	II	280	3073.54	II	420	3408.14	II
10000	11507.45	I	90	2566.25	II	220	3078.68	II	1300	3413.78	II
10000	11707.73	I	220	2585.30	I	280	3101.93	II	530	3414.82	II
10000	11780.95	I	90	2591.56	II	220	3103.24	II	780	3419.63	II
10000	11834.28	I	75	2592.54	II	410	3109.76	II	530	3425.06	II
10000	12017.85	I	130	2600.16	II	330	3128.41	II	420	3429.44	II
10000	12394.16	I	130	2600.76	II	830	3135.38	II	1900	3434.37	II
10000	12454.98	I	75	2608.69	II	360	3140.64	II	330	3438.94	II
10000	12464.99	I	370	2623.69	I	500	3141.14	II	560	3440.93	II
10000	13004.56	I	440	2634.80	II	220	3143.83	II	1300	3441.45	II
10000	13258.18	I	110	2642.15	I	250	3146.16	II	3800	3445.57	II
10000	13289.84	I	110	2645.35	II	1200	3156.52	II	830	3446.99	II
10000	13344.62	I	110	2667.94	I	670	3162.83	II	440	3449.89	II
10000	13480.54	I	55	2676.84	II	1000	3169.99	II	2700	3454.32	II
10000	13590.01	I	50	2677.34	II	400	3177.89	II	440	3454.51	II
10000	13644.77	I	85	2689.31	II	220	3178.37	II	1300	3456.56	II
10000	13789.52	I	85	2692.83	II	200	3184.79	II	4400	3460.97	II
10000	13840.18	I	55	2709.01	II	330	3186.38	II	720	3468.43	II
10000	13908.46	I	55	2727.17	II	240	3187.68	II	560	3471.14	II
10000	13964.14	I	85	2729.50	II	330	3193.30	II	560 d	3471.53	II
10000	14235.27	I	55	2735.79	I	240	3206.40	II	380	3473.70	II
10000	14334.52	I	40	2739.30	II	220	3207.12	II	1300	3477.07	II
10000	14563.41	I	85	2740.70	II	290	3208.85	II	4400	3494.49	II
10000	14580.23	I	220	2755.75	II	470	3215.19	II	560	3496.34	II
10000	15018.13	I	55	2757.08	II	830	3216.63	II	400	3497.81	II
10000	15222.27	I	70	2766.50	II	240	3221.49	II	830	3498.71	II
10000	15642.59	I	70	2772.42	II	290	3223.28	II	400	3501.50	II
10000	15757.23	I	110	2772.61	II	240	3225.08	II	830	3504.53	II
10000	15793.31	I	40	2779.58	II	330	3225.95	II	1300	3505.45	II
10000	16008.41	I	55	2791.44	II	490	3235.89	II	830	3506.81	II
10000	17148.22	I	120	2800.33	II	290	3236.69	II	560	3517.26	II
10000	17453.18	I				490	3245.12	II	4400	3523.98	II
						200	3248.36	II	22000	3531.70	II

Dy I and II			Dy I and II			Dy I and II			Dy I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
4400	3534.96	II	1200	3747.82	II	540	4011.29	II	100	4541.66	II
5500	3536.02	II	1400	3753.51	II	540	4013.82	I	140	4565.09	I
4400	3538.52	II	1400	3753.75	II	540	4014.70	II	420	4577.78	I
400	3539.37	II	1200	3757.05	I	370	4023.71	I	2100	4589.36	I
1700	3542.33	II	4700	3757.37	II	420	4027.78	II	990	4612.26	I
400	3544.20	II	640	3767.63	I	520 d	4028.32	II	50	4613.83	I
400	3544.35	II	330	3771.11	I	520	4032.47	II	50	4614.82	I
1400	3546.83	II	640	3773.05	I	420	4033.65	II	60	4617.26	II
330	3548.19	II	370	3774.71	I	420	4036.32	II	140	4620.03	II
4400	3550.22	II	420	3781.47	I	320	4041.98	II	50	4662.72	I
2200	3551.62	II	330	3785.41	II	12000	4045.97	I	110	4664.66	II
440 h	3558.23	II	3300	3786.18	II	1600	4050.56	II	85	4673.60	II
440	3559.30	II	1600	3788.44	II	520	4055.14	II	50	4682.03	II
2200	3563.15	II	700	3791.87	II	2500	4073.12	II	50	4689.75	II
560	3563.69	II	510	3804.14	II	7400	4077.96	II	95	4698.68	II
780	3573.83	II	580	3806.27	II	370	4085.34	I	85	4721.22	I
1400	3574.15	II	470	3812.27	I	390	4096.10	I	70	4727.13	II
4400	3576.24	II	470	3813.67	II	3900	4103.30	II	170	4731.84	II
1700	3576.87	II	1400	3816.76	II	860	4103.87	I	40	4745.73	II
830	3577.98	II	700	3825.68	II	1500	4111.34	II	60	4754.99	II
440	3580.04	II	2300	3836.50	II	490	4124.63	II	50	4760.04	II
400	3584.42	II	370	3840.89	I	390	4128.24	II	60	4771.94	I
3300	3585.06	II	1400	3841.31	II	350	4129.12	I	50	4774.80	I
1400	3585.78	II	330	3842.00	II	990	4129.42	II	120 h	4775.79	I
560	3586.11	II	330	3844.36	I	350	4130.35	I	75	4786.92	II
360	3590.07	II	420	3846.34	II	390	4133.85	I	95	4791.29	I
1100	3591.41	II	420	3847.02	I	470	4141.50	II	29	4800.64	I
560	3591.81	II	330	3849.39	II	1200	4143.10	II	50	4807.94	I
560	3592.11	II	1200	3853.03	II	990	4146.06	I	40	4810.28	I
1800	3595.04	II	420	3858.40	I	5700	4167.97	I	50	4812.80	I
400	3596.06	II	370	3866.58	II	370	4171.93	I	75	4819.04	I
560	3600.38	II	560	3868.45	II	930	4183.72	I	85	4824.96	I
360	3602.82	II	1600	3868.81	I	12000	4186.82	I	75	4828.88	I
1800	3606.12	II	300	3869.42	II	320	4190.94	I	50	4829.68	II
440	3618.51	II	820	3869.86	II	2200	4191.64	I	70	4832.38	I
560	3620.16	II	7000	3872.11	II	6800	4194.84	I	35	4833.75	II
470	3624.27	II	1200	3873.99	II	320	4195.19	II	75	4841.75	I
1100	3629.42	II	470	3879.11	II	800	4198.02	I	40	4856.24	II
4000	3630.24	II	300	3881.99	II	680	4201.30	I	40	4868.05	II
440	3632.78	II	5800	3898.53	II	680	4202.24	I	40	4875.93	I
400	3635.27	II	540	3914.87	II	230	4205.06	I	85	4880.16	I
360	3637.28	II	540	3915.59	II	370	4206.54	II	40	4884.55	I
1100	3640.25	II	540 d	3917.29	I	440	4211.24	I	95	4888.08	I
400	3643.92	II	320	3923.38	II	16000	4211.72	I	40	4889.33	II
11000	3645.40	II	420	3927.86	I	1800	4213.18	I	75	4890.10	II
360	3645.86	II	540	3930.14	I	3700	4215.16	I	50	4893.68	I
1000	3648.78	II	2100	3931.52	II	4400	4218.09	I	24	4899.24	I
700	3664.62	II	320	3932.22	II	4400	4221.11	I	55	4916.41	I
400	3666.84	I	370	3933.00	II	540	4222.21	I	50	4922.22	II
990	3672.30	II	320	3934.21	II	2700	4225.16	I	65	4923.16	II
420	3672.70	II	420	3936.70	I	680	4232.02	I	480	4957.34	II
400	3673.14	II	540	3942.53	II	680	4239.85	I	24	4959.59	I
1400	3674.08	II	10000	3944.68	II	440	4245.91	I	28	4973.57	I
2200	3676.59	II	420	3946.93	II	440	4256.33	II	40	4985.52	I
640	3678.51	I	540	3950.39	II	250	4276.69	I	50	5003.87	I
820	3684.85	I	420	3954.55	II	370 d	4294.93	II	55	5004.28	II
1300	3685.78	I	800	3957.79	II		4295.04	I	24	5010.60	I
4700	3694.81	II	370	3962.59	I	1000	4308.63	II	24	5017.98	II
370	3697.31	II	320	3967.51	I	320	4325.86	I	70	5022.12	I
990	3698.21	II	14000	3968.39	II	200	4358.44	II	30	5024.03	I
540	3701.63	II	2700	3978.57	II	320	4374.24	II	24	5024.54	I
330	3707.40	II	1400	3981.92	II	320	4374.76	II	40	5027.87	I
440	3707.57	II	1600	3983.65	II	540	4409.38	II	50	5033.00	I
440	3708.22	II	800	3984.21	II	150	4444.58	I	160	5042.63	I
420	3710.07	II	540	3991.32	II	740	4449.70	II	24	5047.25	I
330	3711.66	II	1600	3996.69	II	110	4455.60	II	50 h	5050.21	I
1600	3724.45	II	8000	4000.45	II	250	4468.14	II	30	5053.35	I
300	3728.00	I	420	4005.84	I	100 d	4527.58	I	24	5055.46	I
930	3739.34	I	320	4006.07	I		4527.76	II	95	5070.68	I

Dy I and II			Dy I and II			Dy I and II			Er I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
120	5077.67	I	24 h	5738.73	DyO	11	6951.42	I	Ref. 1 - C.H.C.		
80	5090.38	II	50	5740.20	I	40	6958.08	I	Air		
80	5110.32	I	55	5745.53	I	13 h	6982.44	I	110	2358.51	II
130 h	5120.04	I	24	5750.48	I	13	6991.30	I	100	2386.58	II
30	5135.02	I	24	5758.79	I	45	6998.10	I	120	2387.17	II
190	5139.60	II	80 h	5832.01	DyO	20	7017.42	I	110	2396.38	III
40	5161.03	II	55 h	5833.85	DyO	35	7055.95	II	140	2446.39	II
40	5164.12	II	40 h	5834.86	DyO	24	7075.14	II	100	2537.02	II
50	5165.34	I	28 h	5844.41	DyO	17	7109.26	II	110	2547.28	II
110	5169.69	II	24	5845.65	DyO	11	7120.81	II	290	2586.73	II
20	5172.90	II	40 h	5848.05	DyO	13	7175.11	II	110	2587.04	II
80	5185.30	I	40	5855.56	DyO	11	7213.27	I	130	2592.57	II
40	5188.45	II	55 h	5868.11	II	17 h	7230.04	I	120	2595.03	II
290	5192.86	II	40	5915.16	II	13	7250.01	I	140	2624.18	II
95	5197.66	II	20	5924.56	II	17	7345.13	II	490	2670.26	II
50	5246.94	II	70	5945.80	I	11	7370.23	II	330	2672.25	II
70	5259.88	I	50 l	5964.46	I	20	7376.04	I	100	2675.35	II
130	5260.56	I	120	5974.49	I	11	7407.59	I	270	2739.31	II
55bl	5263.3	DyO	24	5984.86	I	24	7412.37	I	310	2750.19	II
65	5267.11	I	140	5988.56	I	55	7426.86	II	230	2755.01	II
50	5272.25	II	24 h	6005.75	DyO	20	7457.05	II	610	2755.63	II
50	5275.29	II	24 h	6006.54	DyO	17	7516.61	II	510	2770.02	II
50	5279.70	II	24 h	6006.97	DyO	55	7543.73	I	230	2778.97	II
55	5282.07	I	30	6008.94	I	17 h	7553.00	I	230	2802.53	II
28	5284.99	II	65	6010.82	I	27	7559.78	I	310	2804.35	II
40	5297.82	II	24	6017.26	I	40	7562.96	II	410	2820.19	II
160	5301.58	I	24	6030.98	I	20 h	7577.46	II	270 d	2833.91	II
40	5309.02	II	24bl	6042.49	DyO	27 h	7591.30	I	390	2838.71	II
50	5324.69	I	24	6058.18	I	13 h	7611.55	I	270	2848.37	II
24	5337.43	II	30	6085.06	I	11 h	7617.70	I	250	2855.41	II
65	5340.30	I	140	6088.26	I	35 h	7641.09	I	310	2859.84	II
30	5352.11	I	24	6127.15	I	17	7645.86	I	310	2896.96	II
30	5368.20	II	24	6133.64	I	13	7646.64	I	390	2897.52	II
20	5385.63	II	24	6158.28	I	80	7662.36	I	1000	2904.47	II
85	5389.58	II	100	6168.43	I	11	7666.78	II	210	2909.58	II
40	5395.57	I	20	6196.23	II	35	7715.33	I	1500	2910.36	II
20 h	5398.26	DyO	270	6259.09	I	45	7729.76	II	270	2915.62	II
24	5399.93	II	30	6260.36	I	20	7751.62	II	350	2929.27	II
50	5404.19	I	14	6343.32	I	35	7812.06	I	270	2945.28	II
80	5419.13	I	40	6386.80	I	27	7909.38	I	230	2946.62	II
70	5423.32	I	24	6396.60	II	11	7968.63	I	1500	2964.52	II
30	5424.27	I	50	6421.92	I	12	7982.85	II	410	2968.76	II
40	5426.70	II	13 h	6436.55	I	13	8147.29	I	210	2974.47	II
30	5443.34	II	8	6460.83	I	27	8198.77	II	230	2975.68	II
95	5451.11	I	10	6468.58	II	100	8201.57	II	270	2983.80	II
30	5455.47	II	11	6474.91	I	11	8218.62	II	1200	3002.41	II
24	5469.10	II	20	6483.59	II	20	8265.53	I	310	3002.65	II
28	5496.83	I	28	6486.59	I	35	8326.10	I	230	3012.47	II
24	5502.79	I	20	6558.02	I	35	8392.01	II	230	3016.84	II
28	5506.52	I	160	6579.37	I	12	8405.85	II	290	3025.95	II
24	5515.41	II	14	6594.14	II	20	8416.64	II	270	3028.27	II
30	5528.01	I	15	6643.37	I	24	8438.58	II	370	3031.31	II
65	5547.27	I	22	6658.36	I	11	8630.12	I	310	3036.22	II
40 d	5600.65	II	29	6661.64	I	27	8655.94	II	210	3054.42	II
24	5605.53	I	75	6667.86	I	17	8657.68	II	230	3066.22	II
30	5613.23	I	10	6700.64	II	17	8678.49	II	450	3070.74	II
20	5627.49	I	29	6747.93	I	11	8696.83	II	560	3072.53	II
100	5639.50	I	10	6757.62	I	11 h	8715.95	II	610	3073.34	II
55 h	5645.99	I	45	6765.89	I	20	8750.40	II	210	3078.87	II
80	5652.01	I	12	6818.20	I	12	8780.83	I	720	3082.08	II
24	5685.58	I	180	6835.42	I	45	8791.39	II	610	3084.02	II
28 h	5693.67	DyO	80	6852.96	I	13	8833.08	II	370	3099.19	II
24 h	5694.10	DyO	22	6856.46	I	24	8850.37	II	230	3106.78	II
28cw	5694.54	DyO	22	6888.83	I	ERBIUM (Er)			310 d	3113.43	II
28	5698.72	II	15	6897.97	II	Z = 68				3113.54	II
24	5702.91	I	65	6899.32	II	Er I and II			770	3122.72	II
70 h	5718.46	I	22	6906.53	II				290	3132.52	II
28 h	5725.84	DyO	15	6929.55	I				470	3132.77	II
55 h	5728.64	DyO	29	6950.28	II				410	3141.10	II

Er I and II		Er I and II		Er I and II		Er I and II	
Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength
	3141.15 II	390	3518.18 II	810	3902.76 II	110	4369.39 II
250	3144.33 II	610	3524.91 II	250	3903.98 I	160	4382.17 I
410	3154.29 II	410	3539.59 I	250	3904.56 II	300	4384.70 II
870	3181.92 II	310	3548.26 II	1200	3905.40 I	300	4386.40 I
410	3183.42 II	820	3549.84 II	11000	3906.31 II	100	4403.17 II
250	3185.25 II	310	3553.20 II	280	3918.05 I	810	4409.34 I
310	3200.58 II	1500	3558.02 I	210	3918.35 II	180	4418.70 I
230	3205.15 II	510	3558.71 I	280	3921.88 II	570	4419.61 II
270	3214.44 II	1000	3559.90 II	810	3932.25 II	110	4422.51 II
870	3220.73 II	310	3565.17 I	3200	3937.01 I	320	4424.57 I
610	3223.31 II	920	3570.75 II	2100	3938.63 II	370	4426.77 I
210	3227.16 II	310	3578.24 I	3200	3944.42 I	110	4437.66 I
2300	3230.58 II	1000	3580.52 II	550	3948.06 I	100	4459.24 II
250	3232.03 II	370	3586.60 I	250	3951.48 I	100	4473.50 II
330	3237.98 II	610	3590.76 I	320	3956.42 I	130	4496.39 I
330	3249.34 II	410	3595.84 I	280	3966.35 I	200	4500.75 II
560	3259.05 II	610	3599.50 II	2700	3973.04 I	130	4522.74 I
	3259.11 II	1000	3599.83 II	3200	3973.58 I	160	4563.26 II
2700	3264.78 II	510	3604.90 II	1400	3974.72 II	1000	4606.61 I
430	3267.10 II	410	3607.42 I	280	3976.73 I	160	4630.88 II
	3267.18 II	3100	3616.56 II	810	3977.02 I	110	4640.60 II
330	3269.41 II	510	3617.85 II	1100	3982.33 I	110	4665.44 II
250	3278.22 II	510	3618.92 II	280	3987.53 I	310	4673.16 I
720	3279.33 II	720	3628.04 I	810	3987.66 I	570	4675.62 II
720	3280.22 II	310	3629.37 I	230	3991.15 I	150	4679.06 II
470	3286.77 II	1000	3633.54 II	230	4004.05 I	230	4722.69 I
330 d	3303.88 II	510	3634.67 I	14000	4007.96 I	150	4729.05 I
	3303.95 II	1600	3638.68 I	230	4008.18 II	130	4751.52 II
370	3305.56 II	900	3645.94 II	280	4009.16 II	170	4759.65 II
2300	3312.42 II	520	3650.41 II	1100	4012.58 I	190	4820.35 II
560	3316.39 II	360	3652.58 II	350	4015.57 II	140	4857.44 I
770	3323.19 II	500	3652.87 II	3000	4020.51 I	150	4872.09 II
290	3329.66 II	360	3664.45 I	450	4021.55 I	210	4900.08 II
770	3332.70 II	470	3669.02 II	230	4043.01 II	210	4934.11 II
370	3337.25 II	500	3682.70 II	1000	4046.96 I	130	4944.36 I
290	3337.79 II	320	3684.01 I	280	4048.34 II	180	4951.74 II
250	3340.03 II	380	3684.28 II	200	4049.49 II	130	4976.42 I
290	3341.84 II	7900	3692.65 II	940	4055.47 II	250	5007.25 I
1300	3346.04 II	450	3696.25 II	550	4059.51 I	140	5028.33 I
470	3350.06 II	380	3697.68 I	690	4059.78 II	120	5028.91 II
350	3350.26 II	540	3700.72 II	420	4077.88 I	200	5035.94 I
1400	3364.08 II	520	3707.64 II	550	4081.24 II	210	5042.05 II
1400 d	3368.02 II	520	3712.39 II	3500	4087.63 I	130	5043.86 I
	3368.13 I	320	3719.35 I	210	4092.90 I	130	5044.89 I
450	3370.55 II	1300	3729.52 II	1100	4098.10 I	130	5077.59 II
7700	3372.71 II	450	3731.26 II	350	4100.56 II	120	5124.56 I
970	3374.17 II	540	3738.16 II	320	4116.36 I	130	5127.41 II
290	3381.32 II	340	3741.10 II	320	4118.55 I	120	5131.53 I
230	3382.06 I	900	3742.64 II	600	4131.50 I	130	5133.83 II
1700	3385.08 II	900	3747.43 I	550	4142.91 II	170	5164.77 II
450	3389.74 II	540	3756.05 I	6900	4151.11 I	130	5172.78 I
2300	3392.00 II	410	3781.01 II	280	4189.98 II	160	5188.90 II
350	3396.07 II	1800	3786.84 II	1000	4190.70 I	150	5206.52 I
290	3396.84 II	560	3787.86 II	130	4205.32 I	60	5212.91 II
390	3401.83 II	560	3791.83 II	1400	4218.43 I	30	5215.13 II
350	3417.63 II	500	3792.79 I	200	4220.99 I	30	5218.26 II
490	3428.39 II	560	3797.06 II	320	4230.20 II	45	5229.34 II
770	3441.13 II	1600	3810.33 I	140	4234.78 II	140	5255.93 II
390	3442.68 I	3600	3830.48 II	200	4251.94 II	22	5256.47 II
490	3469.51 I	540	3849.91 I	140	4276.48 II	27	5257.02 II
970	3471.71 II	320	3851.60 II	690	4286.56 I	35	5264.77 II
610	3479.41 II	680	3855.90 I	320	4298.91 I	80	5272.91 I
970	3485.85 II	540	3858.39 II	320	4301.60 II	55	5277.71 I
350	3486.82 II	7500	3862.85 I	140	4303.81 II	27	5279.34 II
350	3496.86 II	1500	3880.61 II	110	4319.94 II	45	5302.30 II
6700	3499.10 II	1200	3882.89 II	130	4328.81 I	55	5333.06 I
610	3502.78 I	400	3890.61 II	110	4331.36 I	27	5333.33 II
390	3508.38 II	4200	3892.68 I	140	4340.92 I	27	5334.23 II
490	3514.89 II	5200	3896.23 II	190	4348.34 I	22	5343.94 II

Er I and II			Er I and II			Er I and II			Er III		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
30	5344.50	II	22	6032.12	II	22	7659.25	I	200	2419.81	III
90	5348.06	I	22	6045.63	II	4	7665.64	I	200	2422.47	III
45	5350.47	I	22	6048.14	II	35	7680.01	I	40	2431.51	III
35	5368.85	I	45	6054.85	I	9	7722.14	I	60	2464.60	III
35	5395.87	II	70	6061.25	I	8	7726.19	II	2	2492.04	III
60	5414.63	II	60	6076.45	II	11 h	7747.44	I	100	2508.59	III
18	5422.81	II	35	6116.01	I	22	7754.63	I	2	2531.03	III
18 h	5451.30	I	35	6125.32	I	4	7762.16	I	100	2532.36	III
35	5454.27	II	30	6170.06	II	9	7796.69	I	8	2536.76	III
180	5456.62	I	27	6183.21	II	35	7797.47	I	80	2540.91	III
35	5462.43	II	360	6221.02	I	9	7838.80	I	3	2543.31	III
90	5468.32	I	35	6230.90	I	11	7844.00	I	10	2545.95	III
18	5477.47	II	55	6262.56	I	16	7847.55	I	50	2557.22	III
80	5485.97	II	45	6267.93	I	5	7875.36	I	80	2570.74	III
27	5497.44	II	60	6268.87	I	5	7879.36	I	40	2580.02	III
27	5516.02	I	35	6274.94	I	18	7899.55	I	2	2589.55	III
80	5593.46	I	30	6286.86	I	8	7913.08	I	80	2590.72	III
45 d	5601.14	I	45	6299.42	I	35	7921.85	I	20	2591.56	III
	5601.32	I	130	6308.77	I	30	7937.84	I	200	2591.83	III
45 h	5609.94	I	55	6326.13	I	8	7952.93	I	20	2598.39	III
60	5611.82	I	22	6347.16	II	12	7964.51	I	3	2599.18	III
70	5622.01	I	45	6388.19	I	8	7979.03	II	100	2603.62	III
80	5626.53	II	22	6432.53	I	8	7980.87	I	40	2604.91	III
30	5636.20	I	27	6485.87	I	5	8023.03	I	25	2614.53	III
90	5640.36	I	55	6492.35	I	12	8035.91	I	30	2617.64	III
22	5641.42	I	22	6541.57	I	12	8181.85	I	2	2618.40	III
22 h	5658.63	II	60	6583.48	I	35	8312.82	I	2	2618.94	III
70	5664.95	I	70	6601.11	I	18	8328.57	II	8	2625.19	III
45	5665.44	II	27	6721.91	I	5	8367.58	II	20	2626.37	III
55	5675.48	I	70	6759.87	I	55	8409.90	I	4	2637.52	III
14	5695.53	II	22	6762.92	I	11	8466.18	II	200	2637.77	III
27	5710.87	II	27	6773.37	I	35	8472.42	I	5	2651.49	III
55	5717.48	I	35	6790.92	I	14	8517.71	II	25	2683.10	III
70	5719.55	I	22	6825.44	I	18	8521.37	II	400	2723.29	III
55	5726.97	I	22	6825.98	I	22	8768.64	I	100	2738.53	III
22	5733.43	II	70	6848.10	I	11 h	8776.63	II	500	2739.27	III
22	5736.56	I	55	6865.13	I	9	8866.84	II	8	2741.41	III
22	5736.94	I	27	6879.98	I				80	2746.03	III
100	5739.19	I	22	7001.40	I		Er III		6	2752.20	III
35	5740.61	I	12	7058.55	I		Ref. 301 - J.R.		80	2756.20	III
60	5748.65	I	12 h	7065.04	I		Air		400	2759.23	III
55	5752.53	I	11	7070.99	II	2	2165.26	III	150	2761.92	III
70	5757.63	II	18	7101.27	I	3	2190.77	III	60	2762.66	III
290	5762.80	I	8	7109.67	I	10	2198.15	III	15	2767.11	III
70	5769.92	I	11	7155.40	II	1	2223.98	III	100	2768.72	III
45	5782.82	I	5	7161.91	I	4	2232.35	III	60	2772.07	III
70	5784.66	I	14 h	7197.00	I	60	2235.28	III	60	2774.80	III
22	5791.15	II	7 h	7264.82	II	8	2245.60	III	20	2775.55	III
70	5800.79	I	7 h	7283.95	I	2	2255.95	III	2	2780.60	III
22	5806.10	I	14	7329.73	II	80	2269.36	III	80	2783.11	III
430	5826.79	I	18	7355.37	I	600	2277.65	III	500	2792.54	III
45	5835.84	I	11	7356.34	I	100	2309.19	III	10	2804.10	III
100	5850.07	I	18	7428.67	I	40	2358.69	III	100	2805.87	III
120	5855.31	I	55	7459.55	I	10	2358.79	III	6	2808.44	III
140	5872.35	I	9	7460.42	I	50	2359.33	III	50	2824.75	III
120	5881.14	I	120	7469.51	I	200	2367.64	III	150	2830.34	III
27	5886.30	II	22	7532.34	I	20	2375.50	III	1	2831.95	III
27	5902.08	II	6 h	7539.18	I	10	2377.07	III	8	2833.03	III
55	5906.06	I	27	7556.26	I	80	2381.25	III	8	2845.29	III
45	5909.24	I	6 h	7574.21	I	20	2381.40	III	60	2846.08	III
35	5933.50	I	5 h	7590.51	I	40	2381.75	III	6	2849.63	III
22	5946.37	I	11	7597.33	I	6	2391.96	III	1	2869.52	III
55	5968.68	I	6	7607.23	I	60	2393.08	III	8	2878.24	III
27	5975.49	I	11	7613.52	I	5	2393.60	III	1	2955.93	III
35	6006.79	II	6	7623.48	I	250	2396.40	III	1	2958.63	III
22	6008.75	II	16 h	7645.67	I	10	2398.91	III	1000	3055.10	III
55	6014.83	I	8	7650.63	I	2	2402.75	III	1000	3070.40	III
35	6015.74	II	22	7654.45	II	80	2404.58	III	500	3100.40	III
70	6022.56	I	12 h	7658.05	I	100	2410.47	III	1500	3166.25	III

Er III			Eu I and II			Eu I and II			Eu I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
3	3172.47	III	1900	2802.84	II	40	3351.56	II	140	3844.23	II
1	3173.45	III	220	2811.75	II	40	3354.38	II	190	3865.57	I
50	3175.74	III	30	2813.08	II	45	3367.64	II	45	3872.72	I
400	3214.95	III	3400	2813.94	II	140	3369.06	II	70	3877.27	II
2000	3301.23	III	550	2816.18	II	65	3380.25	II	150	3884.75	I
8	3341.00	III	2000	2820.78	II	75	3390.78	II	23	3896.78	I
200	3480.54	III	400cw	2828.72	II	190	3391.99	II	23	3900.18	I
8	3592.96	III	120	2829.30	II	280	3396.58	II	70	3900.51	I
600	3715.67	III	140	2833.26	II	45	3419.84	II	2800cw	3907.10	II
200	3739.43	III	80	2843.96	II	65	3423.09	II	45	3915.24	II
4000	3816.78	III	60	2852.05	II	150	3425.02	II	45	3916.00	I
600	3962.87	III	260	2859.67	II	45	3426.44	II	230	3917.29	I
40	4009.70	III	280	2862.57	II	45	3435.05	II	23	3917.70	II
2	4088.58	III	25	2864.42	II	65	3435.20	II	40	3918.52	I
1000	4288.18	III	60	2876.06	II	40	3435.72	II	100	3919.09	II
40000	4290.06	III	100	2878.87	I	45	3440.82	II	40	3928.87	II
300	4338.24	III	80	2887.85	II	150	3441.00	II	32000cw	3930.48	II
20000	4386.86	III	200	2892.54	I	45	3445.18	II	55	3941.56	II
30	4612.93	III	140	2893.03	I	85	3457.05	I	30 h	3942.21	II
15000	4735.56	III	360	2893.83	I	45	3457.56	II	60	3942.94	II
2000	4783.12	III	3200	2906.68	II	130	3461.38	II	120	3943.08	II
8	4876.07	III	160	2908.99	I	85	3467.88	I	30	3944.59	II
8000	5903.30	III	30	2917.44	II	75	3477.07	I	30	3945.67	II
			850	2925.04	II	75 h	3505.30	II	30	3949.13	II
			60	2947.29	II	470cw	3521.09	II	60	3949.60	I
			200cw	2952.68	II	75	3531.15	II	45	3950.76	II
			30	2958.91	I	45	3532.23	II	55	3951.33	II
			35	2959.47	II	65	3538.08	II	60	3955.75	I
			260	2960.21	II	150	3542.15	II	40	3957.92	II
			300	2991.33	II	85	3543.85	II	30	3963.61	I
			35	2995.22	II	45	3549.71	II	120	3964.90	II
			40	3006.26	II	180	3552.52	II	150	3966.59	II
			35	3022.15	I	75	3589.27	I	45	3967.18	I
			30	3040.77	II	45	3591.31	II	30000cw	3971.96	II
			320cw	3054.94	II	150	3603.20	II	60	3978.42	I
			120	3058.98	I	75	3611.57	II	30	3979.63	II
			35	3069.11	II	45	3616.15	II	55 h	3986.60	I
			35	3076.07	II	95	3622.54	II	40	3988.24	II
			220	3077.36	II	95	3632.18	II	30	3993.93	II
			35	3089.35	II	45	3673.19	II	55	3995.98	II
			120	3097.45	II	45	3674.63	II	60	4003.71	II
			320	3106.18	I	45	3678.26	II	180	4011.69	II
			950	3111.43	I	6400	3688.42	II	150	4017.58	II
			120	3130.73	II	60	3710.87	II	120	4039.19	I
			40	3132.16	I	95	3713.45	II	45 h	4078.24	I
			45	3149.88	II	95	3714.90	II	120	4085.38	II
			85	3173.61	II	35	3716.94	II	75	4096.80	II
			40	3185.54	I	35	3717.69	II	60	4106.88	I
			420	3210.57	I	40	3719.16	I	90 h	4112.04	II
			1000	3212.81	I	20000cw	3724.94	II	45	4119.30	II
			420	3213.75	I	45	3729.68	II	75	4127.28	I
			45	3235.13	I	45	3729.74	II	33000cw	4129.70	II
			95	3241.40	I	21	3732.20	I	30	4136.59	II
			45	3246.03	I	45	3738.08	II	40	4137.07	I
			45	3247.32	II	350	3741.31	II	30	4141.02	II
			100	3247.55	I	100	3743.56	II	60	4141.72	II
			100	3266.39	II	260	3761.12	II	30	4151.52	II
			150	3272.77	II	95	3765.93	II	45	4151.64	II
			210	3277.78	II	40	3774.10	I	30	4157.72	I
			150	3301.95	II	60	3781.40	II	110	4172.80	II
			45	3304.50	II	40	3788.76	II	30	4175.16	II
			140	3308.02	II	45	3791.50	II	110	4182.22	I
			140	3313.33	II	130	3799.01	II	40	4195.36	II
			65	3319.89	II	70	3801.36	II	40	4196.18	II
			95	3321.86	II	95	3807.54	II	60000cw	4205.05	II
			85	3322.26	I	120	3811.33	I	45	4221.08	II
			950	3334.33	I	120	3815.50	II	40	4223.88	II
			45	3338.75	II	39000cw	3819.67	II	90 h	4227.40	II
			110	3350.40	I	120	3826.68	II	75	4229.33	II

EUROPIUM (Eu)

Z = 63

Eu I and II
Ref. 1 - C.H.C.

Air

21	2499.39	II
26	2554.78	II
26	2559.18	II
160	2564.17	II
110	2568.17	II
26	2574.76	II
230	2577.14	II
26	2581.86	II
26	2604.61	I
30	2635.50	II
1000	2638.77	II
380	2641.27	II
40	2653.61	II
640	2668.34	II
110	2673.42	II
250	2678.29	II
250	2685.66	II
550	2692.03	II
700	2701.14	II
800	2701.90	II
240	2705.28	II
180	2709.99	I
700	2716.98	II
70	2723.96	I
4200	2727.78	II
190	2729.33	II
380	2729.44	II
50	2731.37	I
40	2732.61	I
80	2735.25	I
160	2740.62	II
70	2743.28	I
120	2744.26	II
40	2745.61	I
70	2747.29	II
80	2747.83	I
90	2752.17	II
480	2781.89	II

Eu I and II			Eu I and II			Eu I and II			Eu I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
75	4232.45	II	120	5239.24	I	12	5909.94	I	60	6519.59	I
90	4237.51	II	200	5266.40	I	75	5915.74	I	15	6522.72	I
45	4238.69	II	390	5271.96	I	12	5925.30	I	8 h	6549.12	I
45	4244.74	I	110	5272.48	I	27	5926.52	I	75	6567.87	I
45	4247.06	II	150	5282.82	I	45	5942.72	I	45	6593.79	I
45	4253.80	II	55	5287.25	I	27	5953.49	I	18 h	6603.55	I
30	4270.24	II	60	5289.25	I	27	5953.84	II	1400	6645.11	II
150	4298.73	I	120	5291.26	I	30	5954.28	I	26	6685.21	I
90	4329.36	I	60	5293.68	I	90	5963.76	I	95	6693.96	I
75	4329.97	I	120	5294.64	I	330	5966.07	II	7 h	6701.06	I
60	4330.61	II	90	5303.85	I	480cw	5967.10	I	12 h	6710.45	I
40	4331.18	I	30 h	5350.41	I	15 h	5968.43	I	30	6744.88	I
90	4337.68	I	75 h	5351.69	I	30	5971.69	I	30 h	6782.54	I
240	4355.09	II	40	5352.84	I	170	5972.75	I	14 h	6787.48	I
27	4361.57	II	90	5355.10	I	15	5980.47	I	140	6802.72	I
55	4369.47	II	540	5357.61	I	27	5983.14	I	35	6816.06	I
45 h	4372.20	II	60	5360.83	I	27	5983.78	I	11 h	6834.30	I
75	4383.17	II	120	5361.61	I	240	5992.83	I	17	6840.93	I
90	4387.88	I	110	5376.94	I	60	6004.36	I	17 h	6844.83	I
21 h	4405.27	II	120	5392.94	I	15 h	6005.61	I	14 h	6847.04	I
55	4407.07	II	450	5402.77	I	60 h	6012.20	I	360	6864.54	I
18	4419.66	II	45	5405.33	I	110	6012.56	I	21	6898.21	I
120	4434.81	II	45	5411.86	I	60	6015.58	I	60 h	6903.67	I
14000cw	4435.56	II	55	5421.07	I	420	6018.15	I	14 h	6910.17	I
75 h	4464.97	II	90	5426.94	I	60	6023.15	I	30 h	6914.82	I
24	4485.15	II	40	5443.56	I	170	6029.00	I	120	7040.20	I
3000	4522.57	II	380	5451.51	I	60	6044.66	I	12	7074.54	I
45 h	4535.59	I	260	5452.94	I	420	6049.51	II	330	7077.10	II
11000	4594.03	I	40	5457.62	I	140	6057.36	I	100	7106.48	I
21	4602.63	I	90	5472.32	I	90	6075.58	I	6	7164.66	I
9800	4627.22	I	120	5488.65	I	30	6077.38	I	30	7175.55	I
8300	4661.88	I	45	5495.20	I	240	6083.84	I	570	7194.81	II
30	4713.59	I	15	5500.83	I	240	6099.35	I	570	7217.55	II
27	4740.50	I	120	5510.52	I	60	6108.15	I	11 h	7224.68	I
45	4792.59	I	30	5526.63	I	120	6118.78	I	15	7258.72	I
40 h	4829.30	I	30	5533.25	I	60	6124.67	I	30	7262.77	I
60	4830.33	I	30	5542.54	I	330	6173.05	II	11 h	7281.53	I
40 h	4840.47	I	200	5547.44	I	110	6178.76	I	6 h	7297.56	I
60 h	4849.64	I	150	5570.33	I	260cw	6188.13	I	540	7301.17	II
110	4867.62	I	200	5577.14	I	140	6195.07	I	11	7310.46	I
40 h	4884.05	I	75	5579.63	I	15 h	6207.60	I	12	7313.63	I
90	4894.68	I	120	5580.03	I	15	6230.51	I	55cw	7336.18	I
60	4900.86	I	90	5586.24	I	90 h	6233.73	I	4	7346.25	I
150	4907.18	I	75	5586.83	I	55	6250.47	I	4	7356.65	I
180	4911.40	I	18	5592.25	I	240	6262.25	I	11	7362.25	I
55	4953.52	I	18	5599.80	I	55	6266.95	I	55cw	7369.60	I
55	4960.21	I	18	5605.86	I	15 h	6285.95	I	720	7370.22	II
55	4962.55	I	40	5618.81	I	60	6291.34	I	4	7387.36	I
45	4975.76	I	60	5622.44	I	170	6299.77	I	12	7389.16	I
180	5013.17	I	75	5632.54	I	230	6303.41	II	11 h	7404.41	I
170	5022.91	I	210	5645.80	I	24 h	6313.78	I	300	7426.57	II
110	5029.54	I	15	5651.11	I	15	6318.58	I	21 h	7436.59	I
90	5033.55	I	60	5673.85	I	75	6335.82	I	8	7470.53	I
75	5067.95	I	27	5681.10	I	120cw	6350.04	I	5 h	7491.00	I
75 h	5092.69	I	27	5684.24	I	60	6355.89	I	50cw	7528.70	I
90 h	5096.44	I	60	5730.87	I	60	6369.25	I	5 h	7533.02	I
170	5114.37	I	60	5739.00	I	55	6382.73	I	6	7547.32	I
90	5124.77	I	330	5765.20	I	75	6383.86	I	160	7583.91	I
170	5129.10	I	180	5783.69	I	120cw	6400.93	I	60cw	7742.57	I
90	5130.08	I	15	5792.72	I	40	6406.11	I	70	7746.19	I
210	5133.52	I	60	5800.27	I	180	6410.04	I	8 h	7803.32	I
270	5160.07	I	170	5818.74	II	140	6411.32	I	8	7818.21	I
210	5166.70	I	600cw	5830.98	I	55	6428.29	I	35	7887.99	I
60	5193.74	I	27	5845.77	I	830	6437.64	II	7	8015.47	I
200	5199.85	I	27	5860.97	I	18	6439.93	I	24cw	8209.80	I
110	5200.96	I	15	5864.77	I	120	6457.96	I	15cw	8226.81	I
120	5206.44	I	90	5872.98	II	12	6470.70	I	6 h	8464.71	I
750	5215.10	I	15	5895.31	I	18	6483.02	I	21cw	8642.67	I
300	5223.49	I	27	5902.97	I	45	6501.55	I	7	8727.77	I

Eu I and II			Eu III			Eu III			Eu III		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
6	8782.46	I	10	2409.63	III	10	2616.33	III	50 c	3029.92	III
12cw	8790.88	I	20	2410.08	III	10	2616.35	III	20 c	3031.24	III
18	8870.30	I	40	2412.02	III	10	2620.79	III	40 c	3032.84	III
Eu III			20	2412.96	III	20	2623.33	III	20 c	3036.98	III
Ref. 312 - J.R.			20	2413.26	III	10	2626.98	III	10	3038.64	III
Air			10	2413.41	III	20 c	2628.46	III	10	3039.05	III
10	2073.40	III	10	2419.11	III	10	2628.82	III	20 c	3039.98	III
10	2093.50	III	10	2419.25	III	10	2631.98	III	10	3054.07	III
30	2124.69	III	10	2419.58	III	30 c	2642.27	III	10 c	3054.97	III
10	2167.12	III	30	2422.00	III	20	2645.22	III	20	3076.43	III
10	2173.59	III	10	2422.90	III	20 c	2650.93	III	10 c	3089.09	III
10	2184.68	III	10	2425.33	III	10	2653.19	III	10	3105.25	III
10	2190.59	III	50	2425.68	III	10	2655.09	III	10	3109.67	III
10	2194.81	III	40	2427.67	III	10	2662.24	III	10	3129.31	III
20	2211.85	III	40	2429.32	III	20 c	2666.86	III	10	3142.54	III
20	2212.63	III	10 d	2429.66	III	20 c	2668.21	III	50 c	3171.00	III
20	2214.66	III	10	2430.04	III	40 c	2676.09	III	10	3178.08	III
10	2215.34	III	10	2431.49	III	20 c	2683.21	III	20 h	3178.87	III
30	2217.23	III	10	2431.76	III	20	2686.13	III	50 c	3183.78	III
30	2219.33	III	10	2432.55	III	20 c	2687.74	III	10 h	3191.46	III
20	2219.42	III	10	2433.65	III	40 c	2693.51	III	20 c	3194.34	III
10	2223.13	III	10	2434.19	III	10	2694.80	III	10	3206.30	III
10	2235.17	III	100 d	2435.14	III	20	2699.87	III	10	3208.95	III
10	2240.14	III	20	2436.39	III	20 c	2700.78	III	10 h	3213.84	III
10	2261.88	III	10	2436.77	III	10 c	2708.25	III	10	4837.98	III
20	2265.74	III	10	2438.83	III	20 c	2708.84	III	50	6666.35	III
10	2269.39	III	10	2440.26	III	10	2712.08	III	30	7221.84	III
20	2276.85	III	50	2440.67	III	50 c	2720.67	III	20	7690.44	III
40	2291.62	III	1000	2444.38	III	20 c	2725.54	III	10	8079.07	III
20	2304.37	III	4000	2445.99	III	10	2743.94	III	FLUORINE (F)		
10	2311.92	III	30 h	2446.43	III	10	2752.68	III	Z = 9		
10	2327.69	III	20	2448.57	III	20	2755.12	III	F I and II		
10	2334.56	III	20	2451.24	III	10	2757.75	III	Refs. 169,224 - G.V.S.		
10	2336.96	III	10	2451.73	III	20 c	2760.21	III	Vacuum		
10	2339.84	III	30	2455.22	III	10	2761.72	III	30	375.30	II
10	2343.10	III	10	2461.79	III	10 c	2766.26	III	30	380.90	II
10	2346.83	III	30	2463.30	III	20 c	2768.38	III	40	407.04	II
10	2347.64	III	30	2464.47	III	10 c	2768.54	III	50	430.91	II
100	2350.38	III	40	2470.51	III	10	2769.71	III	40	431.55	II
200	2350.51	III	10	2474.94	III	20 c	2780.48	III	40	435.64	II
10	2352.28	III	10	2476.24	III	20	2792.51	III	70	457.18	II
10	2357.87	III	20	2476.45	III	10	2808.09	III	40	471.95	II
10	2359.08	III	10	2477.78	III	20	2817.58	III	60	472.00	II
10	2360.65	III	20	2480.02	III	20 c	2839.56	III	50	472.71	II
20	2363.76	III	20	2483.29	III	20	2844.99	III	40	473.02	II
20	2368.04	III	10	2486.92	III	10 c	2848.44	III	90	484.60	II
20	2374.08	III	10	2488.91	III	20	2850.39	III	50	513.64	II
10	2375.20	III	10	2490.50	III	10 c	2892.60	III	70	514.94	II
4000	2375.46	III	10	2491.08	III	40	2912.23	III	70	546.85	II
10	2376.42	III	10	2492.48	III	40 c	2912.64	III	60	547.87	II
20	2377.23	III	10	2496.92	III	10	2913.04	III	50	548.32	II
10	2381.81	III	10	2499.17	III	10	2928.91	III	40	548.52	II
10	2383.62	III	2000	2513.76	III	20 c	2931.00	III	90	605.67	II
20	2387.29	III	20	2517.94	III	10 c	2950.20	III	80	606.29	II
20	2389.11	III	200	2522.14	III	20	2956.74	III	100	606.80	II
10	2389.98	III	10	2539.14	III	10	2956.90	III	70	606.92	II
20	2391.11	III	10	2548.30	III	10 c	2972.30	III	80	607.47	II
20	2391.90	III	20	2548.59	III	30 c	2982.29	III	90	608.06	II
10	2392.59	III	10	2554.50	III	20 c	3000.11	III	15	780.39	I
10	2394.66	III	10	2558.07	III	20	3006.37	III	10	780.52	I
20	2395.62	III	10	2560.36	III	20 c	3013.28	III	10	782.38	I
20	2398.79	III	10	2594.71	III	10 c	3018.43	III	12	791.88	I
20	2401.00	III	20	2594.76	III	20 c	3022.08	III	10	792.54	I
20	2402.34	III	10	2596.34	III	50 c	3022.69	III	10	794.42	I
20	2404.08	III	10	2604.44	III	20 c	3023.40	III	150	806.96	I
10	2406.14	III	30	2608.34	III	100 c	3023.93	III	125	809.60	I
20	2407.30	III	30	2610.09	III	10	3025.32	III			
20	2408.32	III	50 c	2616.11	III	10 c	3026.09	III			
			20	2616.26	III	200 c	3026.79	III			

F I and II			F I and II			F I and II			F III		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
500	951.87	I	5	3948.56	I	400	6708.28	I	60	255.77	III
1000	954.83	I	150	3972.04	II	7000	6773.98	I	70	255.86	III
750	955.55	I	160	3972.67	II	1500	6795.53	I	70	261.71	III
500	958.52	I	170	3974.78	II	9000	6834.26	I	60	261.75	III
20	972.40	I	240	4024.73	II	50000	6856.03	I	80	263.81	III
350	973.90	I	220	4025.01	II	8000	6870.22	I	70	279.69	III
100	976.22	I	230	4025.49	II	15000	6902.48	I	80	315.22	III
40	976.51	I	160	4083.91	II	6000	6909.82	I	70	315.54	III
100	977.75	I	190	4103.07	II	4000	6966.35	I	60	315.75	III
40	1129.76	II	170	4103.22	II	45000	7037.47	I	100	429.51	III
40	1327.06	II	200	4103.51	II	30000	7127.89	I	110	430.15	III
50	1328.11	II	180	4103.71	II	130	7179.90	II	80	430.22	III
40	1333.59	II	170	4103.87	II	15000	7202.36	I	90	464.29	III
50	1343.60	II	170	4109.16	II	130 h	7211.79	II	100	465.11	III
40	1344.04	II	160	4116.54	II	1000	7309.03	I	120	508.39	III
50	1400.61	II	150	4119.21	II	15000	7311.02	I	120	567.69	III
40	1407.14	II	140	4207.15	II	700	7314.30	I	110	567.75	III
60	1493.09	II	170 h	4225.16	II	5000	7331.96	I	80	630.14	III
50	1493.24	II	150 h	4244.12	II	10000	7398.69	I	90	630.20	III
40	1493.31	II	200	4246.23	II	4000	7425.65	I	120	656.12	III
40	1702.13	II	190	4246.39	II	2200	7482.72	I	130	656.87	III
40	1744.75	II	180	4246.59	II	2500	7489.16	I	140	658.33	III
50	1745.55	II	170	4246.77	II	900	7514.92	I	80	1219.03	III
60	1747.39	II	160	4246.84	II	5000	7552.24	I	80	1266.87	III
	Air		170 h	4275.36	II	5000	7573.38	I	90	1267.71	III
100	2556.11	II	160 h	4277.53	II	7000	7607.17	I	70	1297.54	III
100	2871.40	II	160 h	4278.93	II	18000	7754.70	I	70	1359.92	III
120	3059.99	II	200	4299.17	II	15000	7800.21	I	110	1498.93	III
140	3153.49	II	160	4446.53	II	300	7879.18	I	120	1502.01	III
170	3202.76	II	170	4446.72	II	500	7898.59	I	110	1504.18	III
140	3264.08	II	180	4447.19	II	350	7936.31	I	140	1504.79	III
140	3414.65	II	140	4734.38	II	300	7956.32	I	130	1506.30	III
150	3416.45	II	170	4859.39	II	80	8016.01	II	110	1506.77	III
140	3416.80	II	160	4933.26	II	1000	8040.93	I	100	1553.02	III
160	3417.00	II	6	4960.65	I	900	8075.52	I	110	1557.59	III
160	3472.96	II	140	5002.00	II	350	8077.52	I	100	1563.73	III
150	3473.31	II	150	5173.25	II	350	8126.56	I	100	1565.54	III
170	3474.78	II	15	5230.41	I	600	8129.26	I	100	1623.40	III
190	3501.39	II	12	5279.01	I	300	8159.51	I	100	1650.76	III
200	3501.45	II	18	5540.52	I	600	8179.34	I	130	1670.39	III
200	3501.57	II	12	5552.43	I	300	8191.24	I	140	1677.40	III
180	3502.84	II	10	5577.33	I	350	8208.63	I	100	1716.99	III
200	3502.96	II	160	5589.27	II	2500	8214.73	I	120	1770.09	III
210	3503.11	II	20	5624.06	I	3000	8230.77	I	150	1770.67	III
170	3505.37	II	12	5626.93	I	500	8232.19	I	110	1772.93	III
200	3505.52	II	15	5659.15	I	1500	8274.62	I	140	1773.36	III
220	3505.63	II	40	5667.53	I	2000	8298.58	I	160	1791.65	III
160	3522.89	II	90	5671.67	I	600	8302.40	I	110	1803.03	III
150	3536.87	II	18	5689.14	I	900	8807.58	I	100	1804.70	III
160	3541.77	II	25	5700.82	I	1000	8900.92	I	170	1805.90	III
160	3590.92	II	25	5707.31	I	300	8912.78	I	110	1839.30	III
6	3594.10	I	12	5950.15	I	350	9025.49	I	120	1839.97	III
170	3598.69	II	25	5959.19	I	400	9042.10	I	110	1840.14	III
180	3601.39	II	70	5965.28	I	350	9178.68	I	80	1900.76	III
190	3602.84	II	50	5994.43	I	200	9433.67	I		Air	
12	3668.17	I	150	6015.83	I	25	9505.30	I	100	2027.44	III
180	3704.53	II	80	6038.04	I	12	9662.04	I	120	2030.32	III
160	3710.35	II	900	6047.54	I	25	9734.34	I	120	2217.17	III
160	3739.57	II	100	6080.11	I	15	9822.11	I	120	2452.07	III
140	3805.83	II	800	6149.76	I	12	9902.65	I	130	2464.85	III
270	3847.09	II	400	6210.87	I	80 h	10047.98	II	130	2470.29	III
260	3849.99	II	13000	6239.65	I	15	10285.45	I	120	2478.73	III
250	3851.67	II	140	6247.90	II	20	10862.31	I	150	2484.37	III
5	3898.48	I	10000	6348.51	I				120	2542.77	III
190	3898.83	II	8000	6413.65	I		F III		120	2580.04	III
180	3901.93	II	450	6569.69	I		Ref. 225 - G.V.S.		130	2583.81	III
170	3903.82	II	300	6580.39	I		Vacuum		120	2593.23	III
8	3930.69	I	400	6650.41	I	50 h	230.12	III	130	2595.53	III
5	3934.26	I	1800	6690.48	I	50	255.72	III	140	2599.28	III

F III			F IV			F V			Gd I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
130	2625.01	III	60	201.10	IV	40	191.97	V	70	2787.68	I
140	2629.70	III	80	201.16	IV	40	205.55	V	390	2791.96	II
120	2656.44	III	60	201.22	IV	100	464.37	V	100	2794.66	II
130	2755.55	III	90	208.25	IV	110	465.37	V	930	2796.93	II
160	2759.63	III	70	213.85	IV	120	465.98	V	60	2808.38	II
120	2788.15	III	70	214.06	IV	100	466.99	V	750	2809.72	II
160	2811.45	III	70	220.77	IV	90	506.16	V	160	2810.93	II
140	2833.99	III	60	226.94	IV	100	508.08	V	45	2814.01	II
150	2835.63	III	50	227.10	IV	70	513.97	V	300	2833.75	II
150	2860.33	III	60	233.22	IV	60	514.08	V	35	2836.69	II
120	2862.86	III	50	233.39	IV	80	524.59	V	70	2837.00	II
140	2887.58	III	70	239.86	IV	90	525.29	V	560	2840.23	II
150	2889.45	III	70	240.02	IV	100	526.30	V	140	2841.33	II
120	2905.30	III	90	240.08	IV	70	647.67	V	40	2853.91	II
140	2913.29	III	70	240.15	IV	100	647.77	V	60	2856.52	II
160	2916.34	III	70	240.28	IV	110	647.87	V	19	2859.78	II
140	2932.49	III	70	240.37	IV	70	647.97	V	120	2862.48	II
140	2994.28	III	100	251.03	IV	130	654.03	V	60	2865.06	II
120 h	2997.21	III	60	270.23	IV	110	657.23	V	40	2866.33	II
130	2997.53	III	140	419.65	IV	140	657.33	V	40	2871.75	II
120	2999.47	III	150	420.05	IV	60	757.04	V	460	2881.33	II
130	3039.25	III	160	420.73	IV	60	1082.31	V	40	2882.13	II
120	3039.75	III	150	430.76	IV	70	1088.39	V	130	2885.60	II
160	3042.80	III	130	490.57	IV		Air		35	2907.44	II
150	3049.14	III	160	491.00	IV	10	2229.18	V	170	2910.53	II
140	3113.62	III	50	497.38	IV	20	2252.72	V	60	2913.08	II
160	3115.70	III	60	497.83	IV	20	2450.63	V	45	2918.52	II
180	3121.54	III	70	498.80	IV	10	2461.33	V	95	2923.32	II
140	3124.79	III	140	570.64	IV	10	2693.98	V	35	2924.25	II
140	3134.23	III	140	571.30	IV	10	2702.30	V	35	2928.34	II
140	3146.99	III	150	571.39	IV	10	2703.96	V	35	2947.80	II
180	3174.17	III	160	572.66	IV	20	2707.17	V	70	2948.01	II
170	3174.76	III	140	676.12	IV				35	2952.43	I
120	3214.00	III	130	677.15	IV	FRANCIUM (Fr)			35	2955.60	II
140 h	4420.30	III	150	677.22	IV	Z = 87			70	2960.93	II
120 h	4427.35	III	130	678.99	IV	Fr I			130	2963.60	II
120 h	4432.32	III	160	679.21	IV	Ref. 408 - C.H.C.			80	2965.43	II
140 h	4479.99	III		Air		Air			29	2972.74	II
150	5012.54	III	40	2171.44	IV	7177. I			560	2980.15	II
160	5110.99	III	50	2298.29	IV	GADOLINIUM (Gd)			35	2983.74	II
140	5753.17	III	40	2451.58	IV	Z = 64			40	2991.52	II
120	5761.20	III	50	2456.92	IV	Gd I and II			95	2993.04	II
150	6091.82	III	40	2820.74	IV	Ref. 1 - C.H.C.			1200	2999.04	II
140	6125.50	III	50	2826.13	IV	Air			370	3002.86	II
130	6233.57	III				2468.22 II			100	3005.09	II
140	6363.05	III				2471.58 II			2100	3010.13	II
120	7336.77	III				2485.67 II			130	3012.19	II
130	7354.94	III				2487.46 II			1900	3027.60	II
						2493.29 II			120	3028.98	II
						2496.35 II			2100	3032.84	II
						2499.04 II			1600	3034.05	II
						2543.68 II			130	3043.01	I
						2586.13 II			160	3046.48	I
						2661.50 II			280	3053.57	II
						2720.50 II			100	3059.92	I
						2750.22 II			1000	3068.64	II
						2764.08 II			560	3072.56	II
						2768.51 II			640	3076.92	II
						2769.81 II			150	3077.08	II
						2770.17 II			2100	3081.99	II
						2770.98 II			140	3084.01	II
						2778.76 I			280	3089.95	II
						2779.14 II			140	3092.06	II
						2781.40 II			460	3098.64	II
									190	3098.90	II
									3500	3100.50	II
									120	3101.18	II
									230	3101.91	II
									580	3102.55	II

Gd I and II		Gd I and II		Gd I and II		Gd I and II	
Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength
130	3108.36 II		3397.32 I	830	3610.76 II	770	3791.17 II
170	3111.19 I	200	3399.41 II	220	3610.91 II	490	3792.39 II
160	3113.17 II	540	3399.99 II	540	3613.39 II	5100	3796.37 II
120	3118.60 II	540	3402.07 II	270 d	3614.21 II	720	3801.29 II
120	3119.01 I	200	3406.92 I		3614.42 I	210	3804.39 I
510	3119.94 II	1100 d	3407.56 II	430	3617.16 II	210	3805.09 II
100	3120.18 II		3407.61 II	390	3620.46 II	560	3805.52 II
370	3123.99 II	250	3409.30 II	270	3624.89 II	3700	3813.97 II
120	3124.25 II	220	3411.02 I	250	3629.51 II	430	3814.74 II
130	3128.56 II	220	3413.27 II	330	3634.76 II	770	3816.64 II
130	3130.81 II	1400	3416.95 II	220	3639.05 II	430	3818.75 II
100	3133.09 II	1400	3418.73 II	250	3640.18 II	350	3826.05 II
460	3133.85 II	6900	3422.47 II	330	3641.39 II	230	3827.33 II
210	3135.03 II	390	3422.75 II	870	3645.62 II	230	3829.46 II
190	3136.93 I	1100	3423.90 I	6100	3646.19 II	370	3831.80 II
190	3137.30 I		3423.92 II	310	3649.44 II	210	3832.97 I
120	3138.71 I	830	3424.59 II	450	3650.95 II	330	3834.99 II
230	3143.13 II	390	3425.93 II	620	3652.54 II	970	3836.91 II
930	3145.00 II	220	3428.47 II	3900	3654.62 II	1000	3839.64 II
370	3145.52 II	690	3432.99 II	3100	3656.15 II	1200	3842.20 II
230	3146.88 II	1700	3439.21 II	210	3658.19 I	1400	3843.28 I
980	3156.53 II	830	3439.78 II	1400	3662.26 II	1400	3844.58 II
200	3158.63 I	2700	3439.99 II	2700	3664.60 II	3300	3850.69 II
140	3160.69 II	390	3449.62 II	2000	3671.20 II	5100	3850.97 II
980	3161.37 II	1400	3450.38 II	1000	3674.05 I	4300	3852.45 II
220	3190.28 I	1100	3451.23 II	350	3679.21 I	470	3855.56 II
220	3199.30 I	540	3454.14 II	2000	3684.13 I	250	3863.05 II
160	3199.58 I	880	3454.90 II	720	3686.33 II	1600	3866.99 I
110	3203.41 I	200	3455.27 I	3100	3687.74 II	250	3873.57 I
690	3223.74 II	200	3457.05 II	210	3694.03 II	220	3875.46 II
	3223.78 I	220	3461.95 II	2000	3697.73 II	1500	3894.70 II
110	3225.46 II	220	3463.00 II	1300	3699.73 II	450	3895.79 II
160	3226.32 II	2700	3463.98 II	2700	3712.70 II	750	3902.40 II
220	3232.78 I	330	3466.95 II	2000	3713.57 I	300	3902.71 I
100	3250.19 II	1700	3467.27 II	1400	3716.36 II	240	3904.29 I
110	3259.25 II	1700	3468.99 II	2000	3717.48 I	450	3905.65 I
540	3266.73 I	1400	3473.22 II	1800 d	3719.45 II	2200	3916.51 II
250	3267.64 I	2200	3481.28 II		3719.53 II	450	3923.25 II
140	3268.34 II	1700	3481.80 II	250	3722.07 II	1200	3934.79 I
110	3274.18 II	490	3482.60 II	430	3725.47 II		3934.82 II
110	3279.53 II	220	3486.20 I	1500	3730.84 II	220	3935.38 I
100	3281.61 II	980	3491.95 II	270	3732.32 I	450	3941.80 I
250	3282.25 I	1700	3494.40 II	230	3732.45 II	590	3942.63 I
	3282.30 II	1400	3505.51 II	230	3732.67 I	270	3943.24 I
430	3291.48 I	780	3512.22 II	510	3733.08 II	220	3943.62 I
370	3292.21 II	1100	3512.50 II	490	3739.76 I	1400	3945.54 I
430	3294.08 I	830	3513.65 I	330	3740.02 II	300	3952.00 II
330	3313.73 II	980	3524.20 II	4500	3743.47 II	590	3953.37 I
200	3315.59 II	430	3528.54 II	620	3744.83 I	1200	3957.67 II
430	3330.34 II	540	3542.77 II	230	3757.74 II	750	3959.44 II
1400	3331.38 II	4300	3545.80 II	1000	3757.94 I		3959.52 II
830	3332.13 II	3900	3549.36 II	1400	3758.31 II	220	3963.66 II
1100	3336.18 II	1400	3557.05 II	820	3759.00 II	590	3966.28 I
590	3345.98 II	540	3558.19 II	620	3760.71 II	590	3968.26 II
200	3350.10 II	430	3558.47 II	290	3760.92 II	750	3969.00 I
5400	3350.47 II	200	3564.05 II	870	3762.20 I	270	3969.29 II
220	3357.61 I	690	3571.93 II	210	3763.33 II	450	3971.75 II
270	3358.43 II	330	3574.74 II	370	3764.20 II	390	3972.71 I
4300	3358.62 II	390	3578.36 II	870	3767.04 II	590	3973.98 II
780	3360.71 II	980	3581.91 II	8700	3768.39 II	300	3974.81 I
5400	3362.23 II	5400	3584.96 II	620	3769.45 II	750	3979.33 I
270	3364.24 II	540	3590.47 II	1400	3770.69 II	450	3987.21 II
200	3365.59 II	1100	3592.71 II	250	3771.26 I	470	3987.84 I
220	3374.69 II	200	3593.44 II	210	3773.45 I	320	3992.69 I
220	3379.76 II	540	3600.96 II	210	3776.83 I	220	3993.21 II
220	3380.52 II	1100	3604.87 I	1000	3782.34 II	650	3994.16 II
1100	3392.53 II	270	3605.26 II	2900	3783.05 I	700	3996.32 II
540	3395.12 II	250	3605.66 II	1100	3787.56 II	320	3997.76 II
220 d	3397.22 I	830	3608.75 II	200	3790.63 I	470	4001.26 II

Gd I and II			Gd I and II			Gd I and II			Gd I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
260	4004.94	II	750	4191.07	II	220	4478.80	II	170	4865.02	II
320	4008.33	I	750	4191.63	I	280	4481.06	II	120	4871.50	I
300	4008.91	II	450	4197.68	II	220	4483.33	II	280	4934.12	I
300	4013.80	II	590	4204.86	II	220	4484.70	I	220	4938.61	I
200	4015.58	I	1300	4212.00	II	280	4486.90	I	110	4952.47	I
300	4017.25	I	970	4215.02	II	500	4497.13	I	130	4958.79	I
430	4017.71	I	650	4217.20	II	220	4497.32	I	65	5010.82	II
300	4019.73	I	320	4225.03	I	430	4506.21	I	55	5011.74	I
300	4022.33	II	4800	4225.85	I	140	4506.33	II	750	5015.04	I
1100	4023.14	I	220	4227.14	II	140	4514.50	II	55	5023.13	II
810	4023.35	I	220	4229.80	II	1100	4519.66	I	65	5031.29	II
220	4027.61	I	650	4238.78	II	300	4522.82	II	75	5039.09	I
1100	4028.15	I	200	4246.57	II	150	4524.12	I	65	5050.88	II
860	4030.88	I	1700	4251.73	II	910	4537.81	I	55	5073.74	I
700	4033.49	I	860	4253.37	II	220	4540.02	II	55	5082.80	I
340	4035.40	I	650	4253.61	II	300	4542.03	I	95	5092.25	II
260	4036.84	I	810	4260.12	I	240	4548.00	I	65	5096.06	II
1400	4037.33	II	1600	4262.09	I	120	4558.08	II	130	5098.38	II
700	4037.90	II	650	4266.60	I	130	4573.81	I	55	5100.94	II
410	4043.71	I	470	4267.00	I	260	4575.91	I	910	5103.45	I
1600	4045.01	I	300	4274.17	I	280	4579.59	I	180	5108.91	II
270	4046.84	II	910	4280.49	II	410	4581.29	I	120	5125.56	II
270	4047.09	I	430	4285.82	I	130	4582.53	II	65	5130.28	II
270	4049.20	I	300	4286.12	I	410	4583.07	I	65	5135.59	I
1300	4049.43	II	540	4296.08	II	160	4586.99	I	75	5136.04	I
2200	4049.86	II	220	4297.17	II	220	4596.98	II	85	5140.84	II
270	4050.37	I	430	4299.29	I	320	4597.91	II	75	5141.50	I
810	4053.29	II	1100	4306.34	I	410	4598.90	I	75	5142.68	I
2600	4053.64	I	260	4309.29	I	340	4601.05	II	860	5155.84	I
810	4054.72	I	1800	4313.84	I	240	4602.93	I	55	5156.76	II
2600	4058.22	I	520	4314.40	I	520	4614.50	I	75	5158.48	I
650	4059.88	I	520	4316.05	II	140	4624.42	I	75	5163.70	I
270	4061.30	II	370	4320.52	I	430	4636.64	I	55	5164.54	II
650	4062.59	II	750	4321.11	II	110	4639.00	II	190	5176.28	II
1900	4063.39	II	4321.20	I	170	4640.04	I	55	5187.24	II	
540	4063.59	II	2600 d	4325.57	II	170	4646.00	I	55	5187.88	I
260	4066.04	I	4325.69	I	170	4647.64	I	55	5191.08	II	
520	4068.35	I	1900	4327.12	I	170 d	4648.59	I	410	5197.77	I
260	4068.74	I	370	4329.58	I	4648.70	I	55	5210.49	II	
750	4070.29	II	340	4330.61	II	430	4653.54	I	85	5217.48	I
	4070.39	II	240	4331.38	I	140 h	4670.87	I	280	5219.40	I
650	4073.20	II	450	4341.28	II	170	4679.18	I	75	5220.30	II
300	4073.76	II	910	4342.18	II	260	4680.04	I	130	5233.93	I
1300	4078.44	II	1000	4344.30	II	430	4683.33	I	65	5246.87	I
2800	4078.70	I	2200	4346.46	I	140	4688.12	I	320	5251.18	I
520	4083.70	I	910	4346.62	I	700	4694.33	I	120	5252.14	II
1500	4085.56	II	220	4347.31	II	170	4695.49	I	85	5254.75	I
260	4087.69	II	300	4369.77	II	430	4697.42	I	140	5255.80	I
650	4090.41	I	970	4373.83	I	170	4703.13	I	65	5268.78	I
1100	4092.71	I	280	4392.06	I	200	4709.78	I	55	5272.91	I
260	4093.72	I	1400	4401.86	I	110	4721.46	I	55	5282.48	I
260	4094.48	II	520	4403.14	I	150	4728.47	II	280	5283.08	I
2600	4098.61	II	260	4406.67	II	220	4732.60	II	280	5301.67	I
520	4098.90	II	260	4408.25	II	260	4735.75	I	220	5302.76	I
650	4100.26	I	220	4409.25	I	410	4743.65	I	55	5306.70	I
390	4111.44	II	520	4411.16	I	110	4745.82	I	280	5307.30	I
2200	4130.37	II	860	4414.16	I	320	4758.70	I	130	5321.50	I
270	4131.48	II	700	4414.73	I	110	4760.74	I	280	5321.78	I
1100	4132.28	II	340	4419.03	II	130	4763.82	I	110	5327.32	I
750	4134.16	I	1400	4422.41	I	470	4767.24	I	65	5328.30	I
410	4137.10	II	1100	4430.63	I	180	4781.92	I	170	5333.30	I
280	4148.86	I	240 d	4436.10	I	300	4784.62	I	55	5337.53	I
540	4162.73	II	4436.22	II	110	4786.75	I	300	5343.00	I	
280	4163.09	II	300	4464.74	I	140	4801.05	II	85	5345.13	I
280	4167.16	II	300	4466.55	II	220	4807.45	I	75	5345.68	I
	4167.27	I	4466.60	I	320	4821.69	I	200	5348.67	I	
2400	4175.54	I	520	4467.08	I	130	4835.26	I	300	5350.38	I
2400	4184.25	II	700	4474.13	I	110	4848.10	I	240	5353.26	I
2200	4190.78	I	860	4476.12	I	110	4862.59	I	55	5361.66	I

Gd I and II			Gd I and II			Gd I and II			Gd I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
95	5365.38	I	75	6305.15	II	45	7006.16	II	14 h	8849.14	I
95	5369.92	I	30	6309.11	II	10	7016.60	I	18 h	8867.31	I
150	5370.63	I	27	6317.19	I	21	7037.26	II	Gd III		
85	5389.50	I	40	6331.35	I	14	7051.00	II	Refs.	46,137,151	- J.F.K.
85	5413.20	I	17	6333.75	I	13	7054.62	II	Vacuum		
85	5415.69	I	17	6336.34	I	10	7058.02	II	600	1813.47	III
65	5453.46	I	27	6346.65	II	10	7068.09	II	900	1946.26	III
55	5583.68	II	27 h	6351.72	I	18	7071.00	I	1100	1974.34	III
55 d	5591.85	I	17	6363.23	I	18	7073.63	I	2200	1975.24	III
190	5617.91	I	40	6380.95	II	14	7098.11	I	Air		
65	5629.55	I	17	6382.19	II	14	7098.73	I	900	2008.79	III
110	5632.25	I	22	6408.55	I	10 h	7116.77	II	3400	2018.07	III
260	5643.24	I	22	6422.42	II	21	7118.86	II	1800	2027.82	III
55bl	5680.89	GdO	17	6424.52	I	35	7122.57	I	800	2046.02	III
390	5696.22	I	19 h	6470.29	I	13	7135.73	II	500	2057.79	III
95	5701.35	I	15	6480.11	II	18	7147.31	II	1500	2080.08	III
65	5709.42	I	40 h	6538.15	I	13	7158.28	I	1800	2098.20	III
120	5733.86	II	22	6549.25	I	170	7168.37	I	1300	2125.68	III
85	5746.36	I	55	6564.78	I	21	7172.26	II	1400	2148.03	III
85 d	5754.17	I	10	6568.00	II	28	7189.57	II	1700	2176.84	III
75	5776.02	I	10	6573.80	I	13	7197.08	II	1700	2223.95	III
240	5791.38	I	30	6591.60	I	13	7201.41	II	1700	2236.73	III
65 h	5796.80	I	15	6593.42	I	10	7228.02	I	1200	2239.84	III
55	5802.92	I	10	6610.04	II	25	7233.45	I	1500	2243.75	III
55hs	5807.72	I	50	6634.36	II	14	7252.70	II	1700	2250.18	III
55 h	5809.22	I	35	6640.08	I	28	7262.66	I	1300	2257.05	III
55	5815.85	II	10	6642.76	I	14	7291.35	I	1300	2292.51	III
65hs	5819.51	GdO	30	6643.98	I	21	7313.28	I	1000	2300.38	III
55	5840.47	II	10	6646.85	I	18	7324.89	II	1200	2303.72	III
220	5851.63	I	10	6653.55	I	14	7373.81	I	1500	2307.03	III
55	5855.24	II	10	6679.56	II	14	7376.41	I	1100	2313.50	III
280	5856.22	I	35	6681.23	II	13	7377.27	II	1700	2313.56	III
55	5860.73	II	10	6692.86	I	13	7380.28	I	1000	2315.09	III
65	5877.26	II	10	6704.18	II	13	7394.90	II	1400	2323.12	III
55	5886.46	I	14	6718.14	II	13	7430.19	I	1700	2323.18	III
55	5904.07	II	17	6727.83	II	35	7441.85	I	2200	2323.78	III
110	5904.56	I	85	6730.73	I	40	7464.36	I	1900	2329.35	III
170	5911.45	II	50	6752.67	II	55	7562.97	I	2100	2335.01	III
65	5913.55	II	14	6753.91	II	10	7563.19	II	1600	2336.02	III
55	5916.77	I	14	6783.39	I	10	7588.20	I	1900	2338.97	III
85	5930.29	I	26	6786.33	II	10	7611.78	I	1600	2339.88	III
85	5936.84	I	10	6787.18	I	21	7621.96	I	2100	2342.74	III
65	5937.71	I	12	6814.56	I	21	7650.32	I	2500	2346.52	III
55 h	5940.95	GdO	26	6816.49	I	25	7672.56	I	2800	2359.31	III
55 h	5942.78	GdO	17	6820.90	I	10	7676.06	I	1900	2360.87	III
55	5951.60	II	100	6828.25	I	13	7694.45	I	2300	2361.91	III
55	5956.48	II	35	6846.60	II	80	7733.50	I	1400	2362.38	III
85	5977.25	I	30	6857.13	II	35	7749.30	I	2100	2363.26	III
110 h	5988.02	I	15	6864.25	I	10	7755.97	I	1600	2365.22	III
85	5999.08	I	21	6887.63	II	10	7766.48	II	2000	2373.38	III
65	6000.96	GdO	14	6900.73	II	11 h	7844.87	I	1300	2374.29	III
75 h	6001.87	GdO	100	6916.57	I	10	7845.80	I	1300	2381.38	III
55	6004.57	II	21	6920.62	II	35	7846.35	II	1600	2387.82	III
55	6008.71	I	15	6924.99	II	35	7856.93	I	2000	2388.77	III
55	6021.13	I	21	6926.49	I	14	7869.72	I	1200	2393.86	III
55	6080.65	II	17	6945.98	II	25	7930.25	II	1200	2397.34	III
430	6114.07	I	15	6957.74	II	13	8077.59	I	1200	2405.03	III
55	6180.42	II	15	6959.24	II	18	8146.15	I	1300	2408.41	III
110bl	6182.68	GdO	14	6964.33	I	11	8218.08	I	1200	2409.35	III
110bl	6200.86	GdO	15	6971.66	II	10	8275.42	I	1500	2466.84	III
110bl	6211.71	GdO	12	6976.35	II	10	8349.73	I	1100	2469.14	III
110bl	6220.93	GdO	10	6978.27	II	11	8398.30	I	1300	2499.53	III
55bl	6231.62	GdO	26 h	6980.86	I	10	8445.47	I	1600	2520.38	III
75bl	6241.66	GdO	50	6985.89	II	13 h	8527.88	I	1600	2534.11	III
55 b	6252.12	GdO	10	6988.75	II	21	8668.63	I	1300	2536.10	III
55bl	6262.64	GdO	75	6991.92	I	11	8770.36	I	1600	2551.56	III
45 b	6273.00	GdO	21	6993.18	I	13	8784.85	I	2200	2553.90	III
85	6289.73	II	60	6996.76	II	10	8795.76	I	2100	2554.04	III
30	6292.87	I	17	7000.75	II	21 h	8832.06	II			

Gd III			Gd III			Gd IV			Ga I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
2500	2563.33	III	300	3831.73	III	500	2390.07	IV	3	2371.29	I
2100	2564.46	III	300	3910.24	III	700	2392.30	IV	2	2377.53	II
1000	2565.04	III	300	4016.91	III	700	2393.29	IV	4	2418.69	I
2400	2565.95	III	600	4177.26	III	700	2395.76	IV	5	2438.88	II
1800	2569.27	III	400	4279.96	III	500	2396.22	IV	6	2450.08	I
1800	2573.57	III	300	4314.28	III	600	2396.27	IV	7	2500.19	I
2000	2576.06	III	300	4445.91	III	1400	2397.87	IV	3	2500.71	I
1300	2576.15	III	600	4684.25	III	700	2402.70	IV	5	2513.55	II
1400	2578.13	III	600	4715.06	III	500	2412.21	IV	3	2514.15	II
1600	2578.76	III	600	4782.79	III	900	2419.26	IV	2	2551.26	II
1700	2583.62	III	250	4976.72	III	500	2439.84	IV	3	2552.87	II
2000	2588.21	III	5000	5091.70	III	600	2440.38	IV	4	2555.28	II
2000	2588.46	III	300	5124.06	III	600	2468.60	IV	5	2607.47	I
1300	2595.81	III	1800	5347.95	III				8	2624.82	I
1800	2609.77	III	3000	5365.96	III	GALLIUM (Ga)					
1200	2619.40	III	1100	5412.62	III	Z = 31					
1200	2621.52	III	4000	5553.30	III	Ga I and II					
1400	2623.52	III	3000	5587.88	III	Refs. 19,132,195,281					
1400	2625.48	III	3000	5658.98	III	- L.J.R.					
2000	2628.10	III	1800	5786.96	III	Vacuum					
1300	2628.99	III	1500	5862.09	III	2	829.60	II	15	2780.15	II
2400	2629.83	III	1500	5987.85	III	2	958.67	II	6	2874.24	I
2100	2632.30	III	5000	14332.88	III	1	960.57	II	1	2886.45	II
1800	2633.32	III	2000	17474.78	III	1	969.19	II	2	2893.65	II
1400	2635.71	III	800	19996.34	III	2	969.19	II	2	2910.77	II
1600	2636.44	III	800	21259.44	III	2	998.52	II	6	2943.64	I
1700	2637.15	III	600	22493.33	III	3	1002.95	II	6	2944.17	I
2100	2637.97	III			5	1012.38	II	3	2969.41	II	
2100	2638.06	III	Gd IV			3	1019.10	II	1	2971.01	II
2200	2640.53	III	Ref. 152 - J.F.K.			5	1023.80	II	3	2971.60	II
1600	2641.65	III	Vacuum			8	1033.69	II	5	2974.77	II
2100	2643.71	III	1000	967.92	IV	1	1113.87	II	1	2992.84	II
1600	2644.52	III	1000	983.42	IV	3	1119.25	II	2	3011.90	II
1800	2646.04	III	1000	987.10	IV	5	1130.81	II	1	3158.18	II
1800	2646.84	III	1000	987.91	IV	1	1167.62	II	4	3374.94	II
1600	2651.48	III	1000	995.04	IV	2	1173.78	II	1	3375.95	II
2000	2655.59	III	1000	995.80	IV	1	1186.81	II	2	3436.66	II
1900	2656.55	III	1000	996.49	IV	3	1227.13	II	3	3446.46	II
2200	2660.83	III	1000	999.24	IV	1	1286.38	II	2	3447.26	II
1800	2675.75	III	1000	1000.36	IV	5	1327.81	II	5	3470.34	II
1800	2679.44	III	1000	1002.73	IV	5	1327.81	II	1	3471.46	II
1700	2680.63	III	1000	1004.46	IV	20	1414.44	II	1	3472.52	II
1800	2682.52	III	1000	1005.66	IV	5	1449.49	II	2	3583.60	II
1500	2683.91	III	1000	1006.55	IV	2	1463.65	II	1	3693.93	II
1600	2692.78	III	1200	1007.24	IV	3	1473.73	II	2	3705.85	II
1900	2692.86	III	1200	1063.84	IV	3	1483.52	II	4	3734.85	II
1500	2694.43	III	500	1228.37	IV	3	1485.95	II	9	3924.39	II
2800	2697.39	III	500	1307.23	IV	3	1495.21	II	10	4032.99	I
1500	2702.91	III	500	1313.29	IV	3	1504.41	II	10	4172.04	I
2800	2703.28	III	500	1316.71	IV	3	1505.01	II	4	4251.11	II
1600	2704.53	III	600	1321.42	IV	5	1514.57	II	15	4251.16	II
1800	2717.35	III	500	1330.79	IV	3	1515.19	II	10 h	4254.04	II
2700	2727.89	III	1100	1393.24	IV	8	1535.40	II	4 h	4255.64	II
450	2751.24	III	1600	1476.98	IV	5	1536.37	II	5	4255.70	II
1800	2833.83	III	1500	1705.03	IV	1	1536.91	II	10	4255.77	II
9000	2904.73	III	1600	1706.01	IV	3	1669.83	II	40	4262.00	II
1800	2918.40	III	2000	1736.24	IV	5	1695.85	II	3	5218.21	II
9500	2955.53	III	1500	1815.32	IV	5	1799.42	II	1	5338.3	II
1000	2975.42	III	400	1997.89	IV	10	1813.98	II	2	5353.49	I
1000	2984.10	III	Air			15	1845.30	II	2	5360.6	II
1000	3116.59	III	800	2049.28	IV	Air					
2500	3118.04	III	800	2061.30	IV	20	2091.34	II	1	5363.5	II
4000	3176.66	III	800	2070.40	IV	1	2218.04	I	3	5416.8	II
400	3253.53	III	800	2076.66	IV	1	2255.03	I	1	5421.6	II
400	3330.34	III	1000	2094.29	IV	1	2259.23	I	1	5425.6	II
400	3371.05	III	1000	2296.89	IV	2	2294.19	I	10	6334.2	II
400	3402.97	III	1000	2352.66	IV	1	2297.87	I	2000	6396.56	I
450	3624.90	III	800	2379.17	IV	3	2338.24	I	1000	6413.44	I
250	3700.47	III	900	2385.65	IV	1	2338.60	I	5	6419.4	II
									3	6456.3	II

Intensity	Ga I and II Wavelength
1	7000.0 II
3 h	7051.24 I
5 h	7106.82 I
1 h	7116.3 I
2 h	7172.9 I
5 h	7193.6 I
7	7198.7 II
10 h	7251.4 I
3 h	7289.6 I
5 h	7349.3 I
20 h	7403.0 I
30 h	7464.0 I
6 h	7556.6 I
10 h	7620.5 I
50 h	7734.77 I
2	7793.0 II
100 h	7800.01 I
4 h	7801.6 I
15 h	8002.55 I
20 h	8074.25 I
3 h	8167.5 I
5 h	8171.6 I
100 h	8311.86 I
200 h	8386.49 I
10 h	8389.30 I
7 h	8415.51 I
10 h	8419.91 I
20 h	8808.75 I
30 h	8813.56 I
20 h	8856.37 I
30 h	8944.33 I
200 h	9492.92 I
200 h	9493.12 I
300 h	9589.36 I
20 h	9594.25 I
60 h	10898.10 I
100 h	10905.95 I
10	10968.27 I
20	11103.51 I
400	11949.12 I
200	12109.78 I
40	12885.05 I
50	13057.50 I
50	14982.75 I
60	14996.64 I
20	17757.91 I
10	17868.96 I
60	22016.81 I
70	22568.71 I

Ga III	
Ref. 141 - L.J.R.	
Vacuum	
50	620.00 III
40	622.01 III
90	806.51 III
90	817.30 III
50	828.70 III
80	1085.00 III
60	1105.61 III
90	1150.27 III
90	1267.16 III
80	1293.46 III
60	1295.36 III
60	1323.15 III
70	1353.92 III
90	1495.07 III
50	1534.46 III

Ga III	
Air	
90	2417.70 III
90	2423.98 III
15	2424.36 III
50	3521.77 III
80	3581.19 III
100	3589.34 III
10	3731.10 III
10	3806.60 III
100	4380.69 III
150	4381.76 III
100	4863.00 III
150	4993.78 III
10	5808.28 III
20	5848.25 III
15	5993.51 III

Ga IV	
Refs. 141,143 - L.J.R.	
Vacuum	
14	294.53 IV
61	295.67 IV
41	304.99 IV
4	422.12 IV
25	423.18 IV
16	439.92 IV
67	1137.06 IV
70	1156.10 IV
70	1163.60 IV
75	1170.58 IV
48	1171.71 IV
68	1185.23 IV
40	1186.06 IV
73	1190.89 IV
73	1193.02 IV
75	1195.02 IV
69	1201.54 IV
72	1206.89 IV
63	1216.15 IV
50	1228.03 IV
60	1236.38 IV
60	1238.59 IV
45	1241.81 IV
75	1245.53 IV
83	1258.77 IV
81	1264.66 IV
82	1267.15 IV
81	1279.24 IV
80	1285.33 IV
82	1295.86 IV
83	1299.46 IV
82	1303.53 IV
80	1309.68 IV
80	1314.82 IV
85	1338.09 IV
77	1347.03 IV
76	1351.06 IV
74	1364.63 IV
60	1395.54 IV
77	1402.55 IV
70	1405.32 IV
73	1465.87 IV

Ga V	
Refs. 2,62,140 - L.J.R.	
Vacuum	
5	290.53 V
1	296.13 V
5	296.82 V
30	298.44 V
20	299.47 V

Intensity	Ga V Wavelength
30	300.01 V
25	300.57 V
10	300.78 V
20	301.19 V
30	302.86 V
20	303.84 V
30	307.03 V
30	308.26 V
15	309.64 V
30	311.79 V
25	312.41 V
30	313.68 V
15	315.95 V
20	316.48 V
40	319.41 V
12	320.53 V
40	322.31 V
50	322.99 V
30	323.10 V
40	324.25 V
40	324.95 V
40	326.14 V
30	326.77 V
30	328.65 V
5	336.61 V
20	878.17 V
40	973.21 V
10	977.89 V
15	979.60 V
20	984.95 V
40	989.75 V
90	1014.47 V
90	1019.71 V
20	1033.55 V
30	1038.76 V
30	1047.50 V
120	1050.48 V
80	1054.56 V
90	1058.12 V
80	1066.69 V
35	1068.59 V
30	1069.45 V
60	1069.60 V
55	1071.19 V
45	1071.41 V
80	1073.77 V
90	1078.83 V
110	1079.60 V
60	1080.99 V
250	1085.01 V
80	1087.37 V
40	1090.53 V
90	1091.71 V
100	1094.36 V
80	1095.10 V
70	1101.62 V
160	1102.83 V
140	1103.03 V
60	1104.93 V
75	1105.62 V
70	1106.17 V
40	1115.55 V
80	1118.34 V
55	1123.18 V
80	1123.66 V
120	1126.40 V
80	1127.75 V
130	1128.10 V
120	1128.53 V

Intensity	Ga V Wavelength
100	1129.94 V
80	1131.43 V
40	1133.91 V
130	1136.07 V
65	1138.20 V
60	1144.30 V
50	1145.70 V
30	1148.42 V
45	1150.09 V
130	1150.23 V
120	1156.51 V
35	1157.74 V
25	1169.40 V
40	1178.95 V
80	1213.17 V
30	1265.45 V
30	1276.85 V
15	1283.64 V
10	1311.35 V

GERMANIUM (Ge)

Z = 32
 Ge I and II
 Refs. 5,119,293,340
 - C.H.C.

Vacuum		
1	822.97	II
3	835.08	II
10	850.50	II
10	862.234	II
15	875.493	II
15	905.977	II
20	920.554	II
50	999.101	II
100	1016.638	II
100	1075.072	II
300	1085.51	II
200	1098.71	II
500	1106.74	II
500	1120.46	II
200	1164.27	II
500	1181.19	II
500	1181.65	II
200	1188.73	II
100	1189.62	II
300	1191.26	II
50	1191.72	II
500	1237.059	II
500	1261.905	II
100	1264.710	II
100	1380.42	II
50	1392.26	II
200	1401.24	II
200	1538.091	II
500	1576.855	II
75	1581.070	II
100	1602.486	II
3 r	1615.57	I
2 r	1624.130	I
2 r	1630.173	I
3 r	1636.31	I
2	1638.96	I
4 r	1639.730	I
2	1647.531	I
200	1649.194	II
2	1651.528	I
4 r	1651.955	I

Ge I and II			Ge I and II			Ge I and II			Ge I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
3	1661.345	I	15	2220.375	I	9	5802.093	I	150	11483.77	I
4 r	1663.539	I	18	2256.001	I	1000	5893.389	II	175	11614.81	I
10 h	1665.275	I	18	2314.201	I	500	6021.041	II	600	11714.76	I
4	1667.802	I	24	2327.918	I	150	6078.39	II	10	11839.77	I
3 r	1670.608	I	15	2359.233	I	50	6267.14	II	55	11917.01	I
100 r	1691.090	I	20	2379.144	I	150	6268.07	II	10	12025.64	I
200 r	1716.784	I	10	2389.472	I	100	6268.34	II	10	12055.49	I
100 h	1739.102	I	15	2397.885	I	75	6283.452	II	30	12061.41	I
100	1742.195	I	130	2417.367	I	100	6336.377	II	45	12065.76	I
50	1746.065	I	30	2436.412	I	100	6484.181	II	1300	12069.20	I
200	1750.043	I	100	2478.66	II	6	6557.488	I	30	12198.88	I
100	1758.279	I	90	2497.962	I	50	6780.51	II	20	12207.73	I
100 h	1764.185	I	500	2500.54	II	50	7049.369	II	60	12286.75	I
100 h	1765.284	I	70	2533.230	I	6	7130.12	I	55	12338.76	I
50 h	1766.433	I	3	2556.298	I	30	7145.390	II	1050	12391.58	I
200	1774.176	I	28	2589.188	I	7	7330.38	I	48	12540.41	I
200	1785.046	I	500	2592.534	I	5	7353.334	I	15	12636.80	I
100 h	1793.071	I	8	2644.184	I	7	7384.208	I	150	12676.58	I
75 h	1801.432	I	1200	2651.172	I	6	7402.64	I	40	12681.28	I
200 h	1841.328	I	500	2651.568	I	7	7511.57	I	115	12800.66	I
200 h	1842.410	I	500	2691.341	I	5	7776.20	I	175	12836.38	I
100 h	1844.410	I	200	2704.03	II	10	7833.575	I	12	12847.92	I
100 h	1845.872	I	850	2709.624	I	7	7837.63	I	120	12955.73	I
100 h	1846.958	I	400	2729.78	II	6	7853.77	I	15	13028.64	I
200	1853.134	I	40	2740.426	I	7	7878.12	I	235	13107.61	I
500 r	1860.086	I	650	2754.588	I	5	7962.26	I	20	13492.28	I
100	1865.052	I	50	2770.59	II	5	7983.33	I	42	13534.85	I
300 r	1874.256	I	75	2772.35	II	10	8031.039	I	28	13724.48	I
100	1895.197	I	70	2793.925	I	6	8044.165	I	42	14116.70	I
500 r	1904.702	I	80	2829.008	I	5	8095.29	I	42	14297.15	I
50 h	1908.434	I	1000	2831.843	II	5	8225.22	I	40	14569.84	I
30	1912.409	I	50	2834.28	II	7	8226.09	I	12	14667.52	I
300 r	1917.592	I	75	2839.68	II	10	8256.013	I	470	14822.38	I
100 h	1923.467	I	1000	2845.527	II	5	8264.15	I	16	14921.97	I
500 r	1929.826	I	75	2853.97	II	5	8280.09	I	15	15001.75	I
10 h	1934.048	I	750	3039.067	I	6	8281.04	I	13	15041.21	I
100 r	1937.483	I	600	3067.021	I	8	8367.81	I	20	15504.34	I
500	1938.008	II	20	3124.816	I	7	8391.70	I	14	16424.77	I
100 r	1938.300	I	50	3186.72	II	5	8396.36	I	12	16626.64	I
500	1938.891	II	100	3221.64	II	5	8429.42	I	70	16699.29	I
30 s	1944.116	I	110	3269.489	I	10	8482.21	I	150	16759.79	I
200	1944.731	I	50	3312.56	II	8	8506.70	I	135	17214.34	I
200	1955.115	I	75	3323.64	II	5	8507.66	I	16	18428.30	I
500	1962.013	I	100	3455.72	II	8	8564.89	I	35	18495.54	I
30 h	1963.373	I	300	3499.21	II	6	8599.27	I	10	18764.11	I
30	1965.383	I	30	3845.11	II	6	8652.42	I	70	18811.86	I
200	1970.880	I	70	4226.562	I	5	8669.60	I	62	19279.24	I
200	1979.274	II	10	4685.829	I	9	8700.60	I	28	20673.64	I
300 h	1987.849	I	75 h	4689.87	II	5	8712.90	I	4	21518.30	I
300	1988.267	I	50 h	4690.02	II	6	8734.78	I	9	22091.84	I
500 r	1998.887	I	1000	4741.806	II	6	8789.88	I	5	23921.92	I
	Air		1000	4814.608	II	5	9068.785	I		Ge III	
50	2007.04	II	50	4824.097	II	5	9095.957	I		Ref. 341 - C.H.C.	
200	2011.29	I	100	5131.752	II	6	9398.868	I		Vacuum	
1700	2019.068	I	200	5178.648	II	20	9474.993	II	2	542.90	III
2400 r	2041.712	I	3	5194.583	I	20	9475.645	II	2	663.77	III
1600 r	2043.770	I	6	5265.892	I	4	9492.559	I	3	670.88	III
420	2054.461	I	6	5513.263	I	7	9625.664	I	2	680.28	III
220 h	2057.238	I	8	5564.741	I	5	10039.436	I	2	952.76	III
750 r	2065.215	I	8	5607.010	I	4	10200.952	I	12	988.96	III
2600 r	2068.656	I	6	5616.135	I	10	10382.427	I	15	995.72	III
420	2086.021	I	7	5621.426	I	10	10404.913	I	10	996.50	III
2000 r	2094.258	I	8	5655.96	I	8	10734.068	I	15	1011.21	III
240	2105.824	I	6	5664.226	I	8	10947.416	I	10	1012.31	III
95 h	2124.744	I	5	5664.842	I	10	11125.130	I	10	1032.62	III
50 h	2186.451	I	9	5691.954	I	230	11252.83	I	8	1040.99	III
100	2197.62	II	6	5701.776	I	24	11293.40	I	12	1058.91	III
340 r	2198.714	I	5	5717.877	I	33	11318.13	I	40	1088.45	III
100	2205.85	II	6	5801.029	I	55	11459.05	I			

Au I and II			Au I and II			Au I and II			Au III		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
3	2872.36	I	30	3622.74	I	100	5655.77	I	300	1439.12	III
300	2883.45	I	100 h	3631.31	I	100 h	5721.36	I	200	1441.21	III
3	2886.96	I	10	3633.22	II	300	5837.37	I	150	1446.37	III
10	2888.40	I	30	3634.53	I	100 h	5862.93	I	80	1446.69	III
300	2891.96	I	10	3635.12	I	300 h	5956.96	I	250	1448.42	III
100	2893.25	II	300	3637.90	I	30 h	5962.68	I	250	1454.95	III
3	2905.74	I	3	3639.87	I	600	6278.17	I	100	1464.72	III
30	2905.90	I	100 h	3645.02	I	100	6562.68	I	150	1471.28	III
100	2907.04	II	10	3649.09	I	30	6652.89	I	80	1473.32	III
300	2913.52	II	100	3650.74	I	600	7510.73	I	100	1474.73	III
3	2914.82	I	10	3653.53	I	10	8145.06	I	150	1481.10	III
300	2918.24	II	3	3654.69	I	10	9254.28	I	300	1487.15	III
16	2932.19		10	3655.30	I				250	1487.91	III
30	2940.67	I	10	3656.90	I				200	1489.47	III
100	2954.22	II	30	3706.55	II	Refs. 72,393,395 - R.D.C.			250	1500.37	III
10	2973.33	I	100	3709.62	I		Au III Vacuum		200	1502.47	III
100 h	2990.27	II	10	3766.61	I	30	779.73	III	200	1503.74	III
300	2994.80	II	10	3770.76	I	30	788.78	III	80	1540.26	III
10	3002.65	I	100	3796.01	I	50	799.93	III	100	1542.00	III
3	3005.85	I	30	3801.92	I	40	811.83	III	80	1542.25	III
10	3024.67	I	30	3804.01	II	50	817.95	III	100	1548.50	III
320	3029.20	I	10	3821.85	I	40	820.06	III	80	1554.61	III
30	3033.25	I	10	3825.70	I	80	833.16	III	80	1562.33	III
300	3065.42	I	100	3874.73	I	100	843.44	III	80	1562.41	III
10	3102.63	I	30	3880.25	I	100	845.14	III	200	1567.54	III
10 h	3117.01	I	30	3889.48	I	80	855.49	III	80	1571.94	III
100	3122.50	II	100 h	3892.26	I	80	859.90	III	200	1574.85	III
1600	3122.78	I	400	3897.86	I	80	863.42	III	200	1579.44	III
30	3126.86	II	30	3901.09	I	80	901.03	III	150	1584.10	III
30	3127.03	I	300	3909.38	I	80	910.45	III	200	1589.56	III
10	3164.88	I	100	3927.69	I	80	924.02	III	80	1589.68	III
10	3172.35	II	10 h	3959.10	I	200	945.10	III	150	1593.41	III
30	3191.76	I	30	3966.23	I	100	1040.63	III	200	1600.51	III
100	3194.72	I	30	3976.65	I	80	1044.49	III	250	1617.16	III
30	3200.37	I	30	3979.68	I	80	1046.81	III	100	1617.78	III
30	3204.74	I	30	3991.37	I	100 h	1239.96	III	500	1621.93	III
1	3221.86	I	3	4012.57	I	100	1278.51	III	300 d	1629.13	III
30	3225.25	I	10	4016.07	II	100	1314.84	III	250	1638.88	III
300	3230.63	I	400	4040.93	I	200	1336.72	III	100	1644.17	III
10	3253.94	I	30	4052.79	II	180	1341.68	III	250	1652.74	III
10 h	3265.10	I	700	4065.07	I	100	1348.89	III	250	1664.77	III
30 h	3267.07	I	10	4076.35	II	150	1350.32	III	100	1668.11	III
10	3271.63	I	3	4083.28	II	150	1355.61	III	125	1673.93	III
10	3273.47	I	100	4084.10	I	150	1356.13	III	1000	1693.94	III
300	3308.30	I	30	4101.70	I	80	1362.06	III	150	1697.09	III
300	3309.64	I	30	4128.59	I	500	1365.40	III	200	1698.98	III
100	3320.12	I	30	4201.13	I	200	1367.17	III	200	1700.00	III
100	3355.15	I	30 h	4227.88	I	180	1377.73	III	200	1702.25	III
30 h	3368.44	I	100	4241.80	I	150	1378.69	III	100	1707.53	III
10	3381.90	I	200	4315.11	I	150	1379.98	III	250	1710.16	III
100 h	3391.31	I	30	4361.04	II	125	1380.53	III	200	1715.69	III
100	3395.40	I	10	4420.61	II	200	1381.36	III	100	1716.71	III
30 h	3440.36	I	120 h	4437.27	I	300	1385.79	III	300	1717.83	III
100	3467.21	I	250	4488.25	I	100	1389.41	III	500	1727.31	III
30	3471.61	I	900 h	4607.51	I	180	1391.46	III	100 d	1733.17	III
30 h	3509.04	I	100 h	4620.56	I	180	1396.00	III	300	1738.48	III
10	3510.82	I	1	4663.92	I	100	1402.91	III	150	1744.39	III
3	3523.34	II	3	4663.97	I	225	1409.50	III	500	1746.10	III
3	3545.61	I	10	4694.69	I	250	1413.80	III	500	1756.92	III
30	3553.57	I	3	4760.17	II	100	1414.27	III	500	1761.95	III
300	3557.36	I	500	4792.58	I	80	1415.54	III	300	1767.42	III
10	3558.22	I	100	4811.60	I	100	1417.09	III	100	1774.42	III
30	3565.97	I	10	4822.96	I	125	1417.39	III	800	1775.17	III
30 h	3584.37	I	30 h	4950.82	I	150	1427.42	III	200	1776.40	III
300	3586.73	I	30	5064.59	I	300	1428.93	III	100	1780.57	III
30 h	3588.79	I	30 h	5108.84	I	250	1430.06	III	300	1786.11	III
30	3598.06	I	100	5147.44	I	275	1433.37	III	150	1792.65	III
100	3611.57	I	300	5230.26	I	250	1435.81	III	500	1793.76	III
30 h	3614.00	I	100 h	5261.76	I	80	1436.12	III	200	1801.98	III

Au III			Hf I and II			Hf I and II			Hf I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
400	1805.24	III	320	2417.69	II	140	2789.73	II	150	3080.66	II
100	1809.81	III	120	2425.98	II	230	2808.00	II	430	3080.84	I
400	1821.17	III	45	2428.75	I	230	2813.86	II	200	3096.76	I
400	1844.89	III	120	2428.99	II	170	2814.48	II	340	3101.40	II
150	1848.83	III	130	2433.57	II	230	2817.68	I	710	3109.12	II
80	1850.15	III	45	2434.74	II	140	2818.94	I	130	3110.87	II
500	1861.80	III	35	2444.99	I	200	2819.74	I	130	3119.98	I
150	1871.92	III	390	2447.25	II	1200	2820.22	II	710	3131.81	I
150	1918.28	III	140	2449.44	II	490	2822.68	II	850	3134.72	II
100	1932.04	III	35	2452.30	II	180	2833.28	I	130	3137.51	I
100	1935.42	III	110	2453.34	II	110	2834.13	I	170	3139.65	II
200	1948.79	III	450	2460.49	II	410	2845.83	I	120	3140.76	II
100	1958.47	III	70	2463.97	II	270	2849.21	II	220	3145.32	II
400	1989.63	III	430	2464.19	II	270	2850.96	I	220	3148.41	I
150	1996.85	III	90	2465.06	II	180	2851.21	II	120	3151.63	I
	Air		35	2465.67	I	180	2860.56	I	450	3156.63	I
300	2083.09	III	140	2467.97	II	760	2861.01	II	270	3159.82	I
80	2085.45	III	210	2469.18	II	760	2861.70	II	710	3162.61	II
100	2159.08	III	100	2473.92	II	2100	2866.37	I	450	3168.39	I
80	2167.33	III	55	2481.44	II	130	2869.82	II	890	3172.94	I
200	2172.20	III	55	2482.65	I	150	2876.33	II	450	3176.86	II
100	2184.11	III	55	2487.16	I	210	2887.14	I	220	3181.01	I
500	2188.97	III	290	2496.99	II	100	2887.54	I	120	3181.15	I
300	2322.27	III	580	2512.69	II	800	2889.62	I	130	3189.62	I
100	2382.40	III	580	2513.03	II	1800	2898.26	I	360	3193.53	II
150	2402.71	III	130	2515.48	II	130	2898.71	II	670	3194.19	II
150	2405.12	III	890	2516.88	II	1200	2904.41	I	200	3196.93	I
100	3227.99	III	340	2531.19	II	890	2904.75	I	130	3199.99	II
100	3309.86	III	200	2537.33	II	140	2909.91	II	310	3206.11	I
			110	2548.20	II	2000	2916.48	I	180	3210.98	I
			320	2551.40	II	580	2918.58	I	180	3217.30	II
			130	2559.19	II	320	2919.59	II	180	3220.61	II
			250	2563.61	II	180	2924.62	I	130	3230.06	I
			890	2571.67	II	490	2929.63	II	130	3239.44	I
			320	2573.90	II	450	2929.90	I	130	3243.35	I
			320	2576.82	II	710	2937.80	II	360	3247.66	I
			300	2578.14	II	2000	2940.77	I	220	3249.53	I
			320	2582.54	II	160	2944.71	I	890	3253.70	II
			130	2591.33	II	1200	2950.68	I	270	3255.28	II
			390	2606.37	II	1100	2954.20	I	120	3262.47	I
			450	2607.03	II	540	2958.02	I	180	3273.66	II
			120	2608.45	I	120	2961.80	II	270	3279.98	II
			230	2613.60	II	1400	2964.88	I	160	3291.05	I
			450	2622.74	II	620	2966.93	I	210	3306.12	I
			160	2637.00	I	140	2967.23	II	120	3309.19	I
			1100	2638.71	II	710	2968.81	II	340	3310.27	I
			1100	2641.41	II	110	2973.37	I	670	3312.86	I
			160	2642.75	I	890	2975.88	II	180	3317.99	II
			670	2647.29	II	150	2979.28	I	130	3328.21	II
			100	2651.16	II	1100	2980.81	I	890	3332.73	I
			160	2657.84	II	210	2982.72	I	370	3352.06	II
			210	2661.88	II	170	3000.10	II	130	3356.78	I
			290	2683.35	II	800	3005.56	I	230	3358.91	I
			670	2705.61	I	1100	3012.90	II	180	3360.06	I
			110	2706.73	II	540	3016.78	I	140	3366.68	I
			210	2712.42	II	1100	3016.94	II	180	3378.93	I
			140	2713.84	I	980	3018.31	I	140	3384.14	II
			250	2718.59	I	1200	3020.53	I	230	3384.70	II
			120	2730.85	I	140	3025.29	II	170	3386.21	I
			710	2738.76	II	410	3031.16	II	800	3389.83	II
			200	2743.64	I	110	3046.08	II	230	3392.81	I
			360	2751.81	II	710	3050.76	I	230	3394.59	II
			450	2761.63	I	1100	3057.02	I	140	3394.98	II
			160	2766.96	I	130	3063.78	I	230	3397.26	I
			170	2773.02	I	130	3064.68	II	230	3397.60	I
			980	2773.36	II	850	3067.41	I	2300	3399.80	II
			180	2774.02	II	2100	3072.88	I	170	3400.21	I
			390	2779.37	I	170	3074.10	I	180	3402.51	I
			100	2789.50	II	250	3074.79	I	140	3407.76	II

HAFNIUM (Hf)

Z = 72

Hf I and II
Ref. 1 - C.H.C.

Air

6200	2012.78	II
8500	2028.18	II
1200	2096.18	II
540	2210.82	II
320	2254.01	II
160	2255.15	II
250	2266.83	II
620	2277.16	II
230	2321.14	II
580	2322.47	II
300	2323.25	II
120	2324.50	II
300	2324.89	II
200	2332.97	II
200	2337.33	II
230	2343.32	II
320	2347.44	II
540	2351.22	II
110	2353.02	I
90	2365.98	II
250	2380.30	II
100	2381.00	II
170	2393.18	II
450	2393.36	II
670	2393.83	II
130	2400.78	II
70	2404.56	II
540	2405.42	II
130	2406.44	II
370	2410.14	II
90	2413.33	II
55	2415.96	II

Hf I and II			Hf I and II			Hf I and II			Hf I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
230	3410.17	II	100	3765.56	I	110	4367.90	II	19	5650.83	I
230	3417.34	I	170	3766.92	II	180	4370.97	II	40bl	5698.03	HfO
410	3419.18	I	200	3768.25	I	120	4417.35	II	25	5713.28	I
140	3427.44	I	1400	3777.64	I	160	4417.91	I	160	5719.18	I
200	3428.37	II	1400	3785.46	I	200	4438.04	I	25bl	5720.16	HfO
250	3438.24	II	650	3793.37	II	140	4457.34	I	12	5748.72	I
140	3438.43	I	100	3798.66	I	140	4461.18	I	14	5767.18	II
100	3441.84	I	850 d	3800.38	I	140	4540.93	I	12	5809.50	II
100	3452.31	I	140	3806.07	II	250	4565.94	I	19	5817.47	I
140	3462.64	II	320	3811.78	I	500 d	4598.80	I	25	5842.23	II
140	3467.60	I	100	3817.20	II	230	4620.86	I	25	5845.87	I
710	3472.40	I	100	3819.38	I	210	4655.19	I	19	5847.77	I
200	3478.99	II	1300	3820.73	I	120	4699.01	I	22	5883.66	I
480	3479.28	II	140	3829.67	I	160	4782.74	I	15	5926.47	I
250	3495.75	II	280	3830.02	I	310	4800.50	I	60	5933.69	I
250	3497.16	I	800	3849.18	I	130	4859.24	I	75	5974.28	I
980	3497.49	I	140	3849.52	II	120	4975.25	I	25	5974.72	I
100	3498.98	I	600	3858.31	I	95	5018.20	I	60	5978.66	I
1200	3505.23	II	230	3860.91	I	15	5021.75	I	25	5992.96	I
150	3513.28	I	200	3872.55	II	55	5040.82	II	45 c	6016.79	I
130	3518.75	II	160	3877.10	II	95	5047.45	I	28 b	6021.12	HfO
980	3523.02	I	380	3880.82	II	55 b	5074.74	HfO	25 b	6043.19	HfO
100	3530.87	I	200	3882.52	I	30	5079.65	II	25	6054.17	I
100	3531.23	I	150	3883.77	II	55 b	5093.88	HfO	95	6098.67	I
980	3535.54	II	200	3889.23	I	15	5112.13	I	95	6185.13	I
760	3536.62	I	200	3889.33	I	19	5128.53	II	55	6210.70	I
180	3548.81	I	620	3899.94	I	30	5157.96	I	28	6216.82	I
540	3552.70	II	620	3918.09	II	55	5167.42	I	45	6238.58	I
150	3554.00	I	200	3923.90	II	75	5170.18	I	60	6248.95	II
1300	3561.66	II	120	3926.42	I	230	5181.86	I	22 h	6299.54	I
150	3564.31	I	150	3927.57	I	30	5186.84	I	25 h	6311.85	I
270	3567.36	I	110	3929.54	II	30	5187.75	II	19	6318.33	I
1100	3569.04	II	320	3931.38	I	110	5243.99	I	30	6338.10	I
150	3579.90	I	120	3935.65	II	55	5247.10	II	19 h	6380.19	I
110	3583.28	I	120	3939.04	I	25	5260.44	II	60	6386.23	I
210	3597.42	II	410	3951.83	I	30	5264.95	II	19 h	6409.52	I
540	3599.87	I	160	3968.01	I	55	5275.04	I	15 h	6556.50	I
110	3615.04	I	150bl	3970.05	HfO	22	5286.09	I	28	6587.23	I
800	3616.89	I	200	3973.48	I	120	5294.87	I	45	6644.60	II
110	3617.68	I	180	4032.27	I	45	5298.06	II	19	6647.06	II
110	3624.00	II	100	4047.96	II	30	5307.82	I	11	6659.40	I
320	3630.87	II	230	4062.84	I	45	5309.68	I	30	6713.48	I
100	3635.43	I	140	4066.21	I	55	5311.60	II	17	6754.61	II
800	3644.36	II	180	4083.35	I	12	5324.26	II	11	6769.95	I
320	3649.10	I	540	4093.16	II	9	5346.30	II	85	6789.27	I
200	3651.84	I	110	4104.23	I	110	5354.73	I	160	6818.94	I
140	3661.05	II	140	4106.58	I	110	5373.86	I	15	6826.56	I
220	3665.35	II	110	4113.53	II	40	5389.34	I	13	6850.07	I
100	3668.21	I	110	4118.60	I	19	5391.36	II	35	6858.70	I
200	3672.27	I	150	4127.80	II	19	5404.47	I	45	6911.40	I
480	3675.74	I	140	4145.76	I	28	5424.02	I	10	6926.19	I
2200	3682.24	I	150	4162.36	II	12	5435.78	I	19	6979.59	I
280	3696.51	I	110	4162.69	I	40	5438.74	I	21	6980.91	II
100	3698.40	II	1100	4174.34	I	14	5444.07	II	7	7019.25	I
240	3699.72	II	120	4190.95	I	75	5452.92	I	7	7030.33	II
340	3701.15	II	160	4206.58	II	30	5463.38	II	7	7035.13	I
100	3704.92	I	190	4209.70	I	15	5497.30	I	11	7061.90	I
120	3705.40	II	170	4228.08	I	15	5510.12	I	15	7062.87	I
1000	3717.80	I	170	4232.44	II	15	5510.45	I	160	7063.83	I
650	3719.28	II	120bl	4252.08	HfO	19	5524.35	II	11 h	7094.40	I
140	3726.49	I	170	4260.98	I	45	5538.02	I	15	7100.54	I
160	3729.10	I	200	4263.39	I	28	5538.26	I	55	7119.52	I
460	3733.79	I	170	4272.85	II	230	5550.60	I	570	7131.81	I
160	3737.88	II	320	4294.79	I	230	5552.12	I	650	7237.10	I
120	3739.04	I	120	4318.14	I	55	5575.86	I	410	7240.87	I
100	3744.98	II	160	4330.27	I	14	5600.77	I	6	7262.62	I
400	3746.80	I	180	4336.66	II	95	5613.27	I	75	7320.05	I
140	3753.22	I	150	4350.51	II	25	5614.01	I	16	7321.76	I
100	3765.05	I	250	4356.33	I	8	5628.27	I	6	7356.10	I

He I and II		Ho I and II		Ho I and II		Ho I and II	
Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength
25	4471.68 I	170	2502.91 II	110	2995.86 II	2000 c	3428.13 II
6	4685.4 II	80	2508.53 II	320 c	3008.10 II	630 c	3429.18 II
30	4685.7 II	110	2513.55 II	220	3014.60 II	320 c	3432.10 II
30	4713.146 I	95	2518.73 II	270	3038.69 II	390	3449.35 I
4	4713.38 I	170	2533.80 I	480 c	3049.38 II	810 c	3455.70 II
20	4921.931 I	130	2536.86 II	410 c	3054.00 II	16000 c	3456.00 II
100	5015.678 I	80	2556.84 I	500 c	3057.45 II	1600	3461.97 II
10	5047.74 I	80	2567.73 II	230	3074.30 II	360 c	3467.07 II
5	5411.52 II	80	2586.52 I	500 c	3082.34 II	810 c	3473.91 II
500	5875.62 I	60	2591.05 II	910	3084.36 II	5400 c	3474.26 II
100	5875.97 I	95	2592.99 I	430 c	3086.54 II	6300	3484.84 II
8	6560.10 II	190	2605.86 II	200	3108.31 II	490	3489.58 II
100	6678.15 I	110	2610.51 II	200 c	3109.91 II	580 c	3493.09 II
3	6867.48 I	95	2613.99 II	760	3118.50 II	2500 c	3494.76 II
200	7065.19 I	60	2625.20 II	300 c	3130.99 II	810 c	3498.88 II
30	7065.71 I	80	2640.09 I	200 c	3134.39 II	410 c	3506.95 II
50	7281.35 I	80	2640.30 II	300 c	3144.36 II	320	3509.37 II
1	7816.15 I	60	2649.68 II	200	3156.18 II	810	3510.73 I
2	8361.69 I	80	2666.24 II	270	3156.97 II	4100 c	3515.59 II
2	9063.27 I	70	2689.03 II	200 c	3159.67 II	410 c	3519.94 II
2	9210.34 I	210	2713.65 II	580 c	3166.62 II	630	3540.76 II
10	9463.61 I	230	2733.95 II	390dl	3171.72 II	1600	3546.05 II
4	9516.60 I	270	2750.35 II	810	3173.78 II	1100 c	3556.78 II
3	9526.17 I	110 c	2759.35 II	390	3174.84 II	410	3560.15 II
1	9529.27 I	110	2766.85 II	270 c	3176.97 II	410 c	3573.24 II
1	9603.42 I	270	2769.89 II	810 c	3181.50 II	630 c	3574.80 II
3	9702.60 I	110	2772.83 II	390	3183.84 II	810	3579.12 I
6	10027.73 I	140	2777.10 II	270cw	3184.48 II	410	3580.75 II
2	10031.16 I	140	2794.41 II	200	3186.37 I	410	3581.83 II
15	10123.6 II	100	2799.99 II	390 c	3197.83 II	630 c	3592.23 II
1	10138.50 I	100	2806.72 II	390	3201.76 II	1100cw	3598.77 II
10	10311.23 I	160 c	2809.99 II	200	3206.86 II	340	3599.48 I
2	10311.54 I	220	2811.36 II	270 c	3210.41 II	540 c	3600.95 II
3	10667.65 I	180	2812.00 II	200 c	3221.42 II	340	3613.31 II
300	10829.09 I	190	2814.74 II	320	3233.34 II	410	3618.43 I
1000	10830.25 I	300	2824.20 II	200	3236.90 II	430 c	3626.69 II
2000	10830.34 I	140	2826.64 II	200	3237.40 II	490	3627.25 II
9	10913.05 I	270 c	2831.69 II	200 c	3257.45 II	430 c	3631.76 II
3	10917.10 I	210	2834.99 II	390 c	3278.15 II	430 c	3638.30 II
4	11626.4 II	110	2835.85 II	270	3279.25 II	1600 c	3662.29 I
30	11969.12 I	110	2844.18 II	980 c	3281.97 II	430	3662.99 I
20	12527.52 I	100	2844.68 II	390	3288.46 II	720	3666.65 I
50	12784.99 I	270	2849.10 II	270 c	3290.96 II	1400	3667.97 I
20	12790.57 I	100	2861.23 II	200 c	3305.16 II	320	3669.05 II
7	12845.96 I	250	2861.49 II	200	3319.87 II	450	3669.52 I
10	12968.45 I	150	2862.72 II	230	3320.25 II	450 c	3674.77 II
2	12984.89 I	210	2871.99 II	200	3331.93 II	720	3679.19 I
12	15083.64 I	230	2874.06 II	630 c	3337.23 II	670	3679.70 I
200	17002.47 I	160	2874.43 II	390 c	3338.86 II	720	3682.65 I
1	18555.55 I	360	2880.26 II	980 c	3343.58 II	430	3685.16 II
6	18636.8 II	460	2880.98 II	200	3344.47 II	580	3690.65 I
500	18685.34 I	340	2894.99 II	360	3350.49 II	340	3691.95 I
200	18697.23 I	160	2895.62 II	320	3352.10 II	410	3700.04 I
100	19089.38 I	170	2900.84 II	320cw	3353.55 II	490 c	3702.35 II
20	19543.08 I	570 c	2909.41 II	320	3354.58 II	320	3709.76 I
1000	20581.30 I	170	2915.82 II	320	3357.91 II	430	3712.88 I
80	21120.07 I	300	2919.62 II	320	3364.27 II	450	3720.72 I
10	21121.43 I	110	2925.35 II	290	3370.87 II	1100	3731.40 I
20	21132.03 I	160	2926.09 II	230	3374.16 II	360	3732.09 I
3	30908.5 II	300 c	2928.30 II	290 c	3390.75 II	810	3736.35 I
4	40478.90 I	220	2942.05 II	320 c	3394.60 II	3200cw	3748.17 II
		300	2944.49 II	8100 c	3398.98 II	320 c	3753.73 II
		250 c	2953.11 II	810 c	3410.26 II	340	3769.09 I
		390	2973.00 II	1200	3421.63 II	320	3788.08 II
		410 c	2979.63 II	3200	3453.14 II	8900 c	3796.75 II
		180	2981.46 II	390 c	3410.65 II	8900 c	3810.73 II
		140	2985.48 II	1400 c	3414.90 II	490	3811.86 I
		410	2987.64 II	5400	3416.46 II	900 c	3813.25 II
		250	2990.27 II	2000 c	3425.34 II	300	3821.73 II

HOLMIUM (Ho)

Z = 67

Ho I and II
Ref. 1 - C.H.C.
Air

Ho I and II			Ho I and II			Ho I and II			Ho I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
390	3829.27	I	200	4087.59	I	130 c	4661.33	II	65	5251.82	I
320cw	3831.9	II	140	4091.64	I	140 c	4674.62	II	55	5275.48	I
410 c	3835.35	II	120	4094.78	I	70	4701.17	II	90	5301.25	I
1300cw	3837.51	II	230	4100.22	I	80	4701.69	II	35	5319.24	I
410 c	3842.05	II	8900	4103.84	I	130	4709.84	II	35	5319.65	I
1100	3843.86	II	120	4105.04	I	65	4711.39	I	80	5330.11	I
490 c	3846.73	II	270	4106.50	I	130 c	4717.52	I	90	5359.99	I
300	3849.88	I	100	4107.36	I	35 c	4728.72	II	55	5381.40	I
320	3852.40	II	2900	4108.62	I	35	4738.00	II	30	5384.56	I
1800 c	3854.07	II	300	4112.00	I	290	4742.04	II	30	5384.97	I
390cw	3856.94	II	100	4112.72	I	35 c	4749.09	II	18 h	5393.85	I
720	3857.72	II	270	4116.73	I	35	4751.40	I	70	5403.17	I
2700 c	3861.68	II	1500	4120.20	I	100 c	4757.01	I	100	5407.08	I
540	3862.62	I	1300	4125.65	I	35	4762.39	II	14	5413.62	II
360	3872.05	II	4300	4127.16	I	35	4763.57	II	16	5434.39	II
320 c	3874.09	II	300	4134.54	I	55	4777.48	II	18	5435.87	I
630	3874.68	II	1500	4136.22	I	30	4779.42	I	30	5445.39	I
540	3881.61	II	130	4139.34	I	70 c	4781.19	I	18	5449.8	II
3000 c	3888.96	II	230	4142.19	I	65	4782.92	I	30 h	5451.90	I
490	3890.42	I	290	4148.97	I	55 c	4786.29	I	14	5454.0	II
13000 c	3891.02	II	980cw	4152.61	II	35	4791.48	II	30 c	5498.57	I
540	3896.76	II	8100	4163.03	I	35	4795.92	II	30	5504.51	I
290	3902.23	II	160	4172.23	I	45 h	4798.87	I	27	5515.56	II
320	3904.44	I	2500	4173.23	I	27	4812.92	II	18	5516.45	II
1300cw	3905.68	II	540	4194.35	I	55	4832.31	II	30	5534.33	I
320	3911.80	I	100	4198.08	I	30	4833.32	I	27	5553.14	I
320	3919.45	I	130	4203.21	I	30	4855.54	II	35 c	5560.94	I
320 c	3936.44	II	100	4211.30	II	45	4860.39	I	35 b	5563.6	HoO
220	3938.85	I	290	4222.29	I	27 c	4889.67	II	70	5566.52	I
320cw	3940.53	II	290	4223.47	I	30	4892.35	I	18	5573.96	II
220	3950.56	I	2000	4227.04	I	35	4896.44	II	35bl	5584.7	HoO
580	3955.73	I	390	4229.52	II	55	4906.99	II	55 b	5591.1	HoO
230 c	3959.51	II	130 h	4231.24	I	45	4922.73	I	55bl	5592.3	HoO
490	3959.68	I	290	4243.78	I	55 c	4934.89	I	30 b	5607.1	HoO
220	3975.88	I	1300cw	4254.43	I	290	4939.01	I	27	5613.64	I
390 c	3976.93	I	130 c	4258.61	II	27 c	4946.80	I	45 b	5626.4	HoO
220cw	3985.71	II	490	4264.05	I	45	4948.18	II	65	5627.60	I
220	3993.73	II	300	4266.04	I	65 c	4959.42	II	30	5628.24	II
380	3999.58	I	100	4273.63	II	35	4961.03	II	55	5640.62	I
160cw	4002.59	II	200	4311.04	I	55cw	4966.73	II	70bs	5655.9	HoO
220	4003.39	I	250	4330.64	II	250 c	4967.21	II	65 b	5658.9	HoO
110	4013.50	I	300	4337.13	II	220	4979.97	I	140	5659.58	I
320	4014.20	II	100cw	4346.84	II	35 c	4988.96	I	70 c	5671.84	I
160 c	4018.09	II	1300	4350.73	I	90	4995.05	I	65	5674.70	I
160 c	4022.76	II	290	4356.73	II	35 c	5012.42	I	140 c	5691.47	I
160 c	4023.94	II	140	4363.93	II	55	5013.28	II	70bs	5696.3	HoO
110	4025.39	I	170	4379.14	II	65	5026.53	I	140 c	5696.57	I
320	4027.21	I	180 c	4384.83	II	30	5028.17	I	27	5734.02	I
270	4028.86	I	150	4400.55	II	55	5032.95	II	45	5736.4	HoO
180 c	4031.80	I	120	4401.24	II	65 c	5037.60	I	55	5739.24	I
220	4037.62	I	180	4403.27	I	130	5042.37	I	22	5749.58	I
220 c	4038.87	II	200	4420.56	II	35	5044.73	I	30	5766.64	I
2700	4040.81	I	130	4444.63	I	30	5051.44	II	27 b	5803.8	HoO
5400 c	4045.44	II	100	4473.59	II	30	5054.92	II	45 b	5819.2	HoO
220 c	4047.52	I	300	4477.64	II	35 c	5060.75	I	27 h	5821.90	I
8100	4053.93	I	120	4484.57	II	65	5074.34	I	22	5839.47	I
540	4054.48	II	140	4510.82	I	80	5093.07	I	45 b	5849.4	HoO
270	4057.55	I	100 c	4526.14	II	140	5127.81	I	140 c	5860.28	I
220	4060.31	I	170	4530.08	II	55	5129.27	II	27 h	5864.42	I
1700	4065.09	II	170 c	4531.28	I	130	5142.59	II	45	5870.85	I
170	4067.57	I	130 c	4531.65	II	110	5143.22	II	27 b	5879.6	HoO
720	4068.05	I	170	4534.58	I	160	5149.59	II	70 c	5882.99	I
270	4071.83	I	200	4562.52	I	90 c	5167.88	I	35 c	5892.56	I
270	4073.13	I	120cw	4609.32	II	130 c	5182.11	I	22	5904.29	I
290	4073.51	I	130	4613.37	I	55	5187.85	I	70	5921.76	I
120 c	4080.23	II	100	4618.84	I	90	5190.11	II	30 c	5933.71	I
230	4083.67	I	100 c	4628.22	I	18	5195.23	I	70cw	5948.03	I
140	4085.09	I	290	4629.10	II	45	5221.54	I	45	5955.98	I
170	4087.35	I	200 c	4649.77	II	35 c	5244.47	I	70	5972.76	I

Ho I and II		Ho I and II		H I		In I and II			
Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength		
90	5973.52 I	10	7079.07	7	10049.4 I	50 h	2406.47 II		
22	5981.43 I	12	7098.58	12	10938.1 I	50	2408.76 II		
230 c	5982.90 I	9	7242.08 I	20	12818.1 I	50	2419.06 II		
55	6002.04 I	9	7250.60 I	40	18751.0 I	50	2419.20 II		
27	6005.33 I	14	7308.55	5	21655.3 I	70 h	2427.20 II		
35	6021.43 I	25	7341.43	8	26251.5 I	20	2429.86 I		
16	6038.97 I	18	7389.40	15	40511.6 I	10	2430.99 I		
27	6050.71 I	5 h	7496.20 I	4	46525.1 I	50	2432.73 II		
45	6060.31 I	10 h	7510.74 I	6	74578 I	60	2442.63 II		
120	6081.79 I	140	7555.09 I	3	123685 I	100	2447.90 II		
70cw	6133.60 I	18	7589.20 I			60	2453.23 II		
35	6156.38 I	25	7591.87 I	INDIUM (In)				60	2460.08 I
27	6156.58 I	9 h	7593.64 I	Z = 49				30 h	2468.02 I
55	6191.68 I	7 h	7594.35 I	In I and II				70	2486.15 II
70	6208.65 I	12	7602.31 II	Refs. 1,132,348,349,350				110 d	2488.62 II
18	6234.17 I	16	7605.35 I	- C.H.C.				90	2488.95 II
45 c	6255.75 I	12	7617.05 I	Vacuum				80	2498.59 II
70 c	6305.36 I	14	7627.98 I	2	1648.00 I	100	2499.60 II		
22	6306.68 I	40 c	7628.42 I	1 h	1676.16 I	90 d	2500.99 II		
30	6321.94	9 c	7641.14 I	5 h	1711.54 I	60	2508.16 II		
30 c	6354.35 I	4	7648.16 I	2 h	1741.23 I	110 d	2512.31 II		
30 c	6372.59 I	14 c	7653.80 I	1 h	1758.49 I	100	2521.37 I		
14 h	6373.86 I	12 c	7667.30 I	Air				10	2522.98 I
22 h	6413.41 I	20	7690.43 I	10	2103.89 II	70	2553.56 II		
27 c	6471.77 I	50 c	7693.15 I	10	2166.88 II	160 d	2554.44 II		
13	6479.17 I	40cw	7715.06 I	2	2179.90 I	1100	2560.15 I		
11	6515.30 I	16	7719.05 I	2	2182.40 I	70	2565.13 II		
11 h	6538.99 I	16 h	7738.98 I	2	2187.40 I	70 d	2598.75 II		
70	6550.97 I	8 c	7752.01 I	2	2190.84 I	200	2601.76 I		
15	6560.08 I	60cw	7815.48 I	2	2195.67 II	50	2604.04 II		
35 d	6600.58 I	40cw	7823.63 I	2	2197.41 I	90 d	2654.70 II		
260	6604.94 I	8 h	7879.22 I	15	2195.67 II	100 d	2662.63 II		
55	6607.47 I	60	7894.64 I	2	2197.41 I	140 d	2668.65 II		
13	6628.35 I	10 h	8464.66 I	2	2202.24 I	140 d	2674.56 II		
120	6628.99 I	10 h	8482.67 I	50	2205.28 II	80	2683.12 II		
15	6632.24 I	50	8512.94 I	3	2211.14 I	1600	2710.26 I		
9 h	6652.98 I	20	8545.61 II	5	2230.70 I	300	2713.94 I		
15	6662.52 I	18	8601.84 II	3	2241.66 I	130 d	2749.75 II		
19 c	6680.46 I	40	8670.19 I	30	2255.79 II	700	2753.88 I		
24 c	6681.62 I	8 h	8697.32 I	10	2259.99 I	40	2775.37 I		
15 h	6682.02 I	16 h	8805.48 II	5	2278.20 I	60	2798.76 II		
55cw	6694.32 I	20 c	8834.49 I	40	2281.64 II	90 d	2818.97 II		
15cw	6722.34 I	90	8915.98 II	2	2283.75 I	180 c	2836.92 I		
40	6745.05 I	HYDROGEN (H)				2	2298.33 I	30 c	2858.14 I
13	6766.74 I	Z = 1				2	2298.70 I	80	2865.68 II
28 c	6774.68 I	H I				2	2302.49 I	120 d	2890.18 II
55 c	6785.43 I	Ref. 214 - W.C.M.				100 c	2306.05 II	1100	2932.63 I
13	6793.7 I	Vacuum				25	2306.86 I	100	2941.05 II
13cw	6811.04 I	15	926.226 I	3	2309.32 I	20 c	2957.01 I		
15cw	6820.38 I	20	930.748 I	2	2309.75 I	60 d	2966.17 II		
24	6821.64 I	30	937.803 I	90 d	2313.21 II	110 c	2999.40 II		
17 c	6825.72 I	50	949.743 I	2	2315.09 I	8000	3039.36 I		
8 h	6826.62 I	100	972.537 I	30	2323.40 II	8 d	3051.15 I		
8 h	6852.97 I	300	1025.722 I	5	2324.41 I	110 d	3099.80 II		
17cw	6865.85 I	1000	1215.668 I	3	2324.92 I	180 c	3101.8 II		
9	6883.36 I	500	1215.674 I	70 d	2327.95 II	130 c	3138.60 II		
13	6888.50 I	Air				3	2332.76 I	80 c	3142.75 II
15 c	6892.96 I	5	3835.384 I	80 h	2334.57 II	130 d	3146.70 II		
17	6897.95 I	6	3889.049 I	10	2340.19 I	150	3155.77 II		
15 h	6903.80 I	8	3970.072 I	8	2345.90 I	100 c	3158.40 II		
15cw	6913.47 I	15	4101.74 I	5	2346.56 I	90 c	3176.30 II		
9	6916.70 I	30	4340.47 I	50 d	2350.75 II	90 d	3198.11 II		
40cw	6939.49 I	80	4861.33 I	5	2358.70 I	13000	3256.09 I		
45cw	6950.39 I	120	6562.72 I	15	2378.14 I	3000	3258.56 I		
13hl	6955.3 I	180	6562.852 I	10	2379.00 I	90 c	3338.50 II		
19	6976.7 II	5	9545.97 I	110 d	2382.63 II	75 c	3376.59 II		
10	6985.11 I			40	2389.54 I	100 c	3404.28 II		
9	6994.38 I			40	2393.18 II	110 d	3438.40 II		
14 h	7000.71 I			10	2399.18 I	180 c	3693.91 II		

In I and II			In I and II			In I and II			In III		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
95 c	3708.13	II	50	5727.68	I	10	12912.59	I	200	6197.72	III
380 w	3716.14	II	210 c	5853.15	II	9	13429.96	I	In IV		
120 c	3718.30	II	490 w	5903.4	II	5	13824.48	I	Ref. 352 - C.H.C.		
160 c	3718.72	II	260 w	5915.4	II	6	14316.25	I	Vacuum		
160 c	3723.40	II	120 c	5918.78	II	3	14419.20	I	8	677.33	IV
170 w	3795.21	II	130 c	6062.9	II	6	14668.66	I	15	684.53	IV
230 c	3799.21	II	250 c	6095.95	II	7	14719.08	I	8	720.64	IV
250 c	3834.65	II	210 c	6108.66	II	2	16504.31	I	4	1470.34	IV
200 c	3842.18	II	180 w	6115.9	II	6	22291.06	I	5	1512.62	IV
100	3889.78	II	230 w	6128.7	II	7	23879.13	I	5	1523.50	IV
100 c	3902.07	II	240 w	6129.4	II	In III			7	1532.03	IV
60 d	3922.12	II	320 w	6132.1	II	Ref. 351 - C.H.C.			8	1568.92	IV
65 c	3934.40	II	150 c	6140.0	II	Vacuum			3	1569.33	IV
250 w	3962.35	II	90	6143.23	II	7	685.31	III	12	1601.50	IV
120 c	4004.66	II	140 c	6148.10	II	5	691.62	III	7	1606.59	IV
140 d	4013.92	II	190 w	6149.5	II	1	782.17	III	10	1628.48	IV
410 w	4056.94	II	80	6161.15	II	10	882.24	III	8	1651.80	IV
17000	4101.76	I	180 w	6162.45	II	10	890.84	III	10	1655.62	IV
140 c	4205.14	II	100 c	6224.28	II	10	915.87	III	1	1667.38	IV
100 d	4213.04	II	280 w	6228.3	II	2	917.45	III	5	1670.64	IV
110 d	4219.66	II	140 w	6231.1	II	5	926.83	III	12	1678.07	IV
150 d	4372.87	II	270 w	6304.8	II	30	1403.08	III	4	1702.02	IV
150 c	4500.78	II	290 w	6362.3	II	30	1434.85	III	15	1707.11	IV
18000	4511.31	I	300 w	6469.0	II	20	1487.70	III	7	1721.89	IV
110 c	4549.01	II	210 c	6541.20	II	20	1494.14	III	12	1747.65	IV
140 c	4570.85	II	190 c	6751.88	II	10	1524.78	III	10	1748.10	IV
180 w	4578.02	II	180 c	6765.9	II	20	1530.21	III	10	1768.77	IV
180 w	4578.40	II	100 c	6783.72	II	30	1532.95	III	12	1773.01	IV
140 c	4616.08	II	8 h	6847.44	I	100	1625.42	III	8	1789.15	IV
170 c	4617.17	II	320 w	6891.5	II	20	1642.28	III	12	1793.38	IV
250 c	4620.14	II	4 h	6900.13	I	20	1702.53	III	12	1844.67	IV
150 w	4620.70	II	380 w	7182.9	II	100	1748.83	III	9	1851.10	IV
170 c	4627.30	II	180 c	7255.0	II	2	1767.88	III	9	1855.84	IV
140 c	4637.04	II	210 c	7276.5	II	1	1810.71	III	15	1856.64	IV
380 c	4638.16	II	180 c	7303.4	II	30	1842.41	III	15	1874.08	IV
220 c	4644.58	II	320 c	7350.6	II	40	1850.30	III	5	1903.52	IV
360 c	4655.62	II	100 c	7632.7	II	15	1862.98	III	5	1939.58	IV
320 w	4656.74	II	100 c	7682.9	II	Air			3	1943.31	IV
190 c	4681.11	II	210 c	7740.7	II	30	2154.08	III	Air		
450 w	4684.8	II	100 c	7776.96	II	2	2154.42	III	6	2004.73	IV
3	4878.37	I	180 c	7789.0	II	10	2199.52	III	1	2101.17	IV
90 d	4907.06	II	70 c	7806.8	II	5	2232.18	III	8	2112.31	IV
70 h	4924.93	II	70 c	7814.5	II	20	2261.26	III	4	2225.13	IV
150 c	4973.77	II	90 c	7840.9	II	5	2266.26	III	1	1605.08	IV
80 h	5109.36	II	20 h	8050.78	I	5	2272.41	III	In V		
100 w	5115.14	II	240 c	8227.0	II	5	2272.84	III	Ref. 353 - C.H.C.		
140 c	5117.40	II	30 h	8238.66	I	10	2300.90	III	Vacuum		
270 c	5120.80	II	15 h	8314.92	I	100	2527.41	III	6	368.67	V
200 w	5121.75	II	50 c	8434.55	II	50	2725.52	III	6	370.10	V
80 d	5129.85	II	30	8678.95	I	80	2726.15	III	10	372.82	V
240 c	5175.42	II	20	8682.63	I	100	2982.80	III	10	372.94	V
140 c	5184.44	II	50	8700.25	I	100	3008.08	III	2	374.95	V
30	5254.32	I	100 w	8813.5	II	30	3008.82	III	6	375.84	V
12	5262.74	I	80 c	8832.6	II	30	3293.55	III	6	376.07	V
150 c	5309.45	II	40	8894.47	I	8	3350.91	III	10	376.79	V
80	5411.41	II	10	9170.08	I	5	3562.32	III	17	378.61	V
140 c	5418.45	II	120 c	9197.7	II	100	3852.82	III	3	379.24	V
220 w	5436.70	II	120 c	9202.0	II	100	4023.77	III	9	380.27	V
130 c	5497.50	II	220 w	9213.0	II	150	4032.32	III	11	381.56	V
140 c	5507.08	II	160 d	9241.1	II	50	4062.30	III	9	382.14	V
320 c	5513.00	II	40 h	9349.83	I	100	4071.57	III	11	382.76	V
250 w	5523.28	II	60 h	9370.27	I	100	4072.93	III	10	383.05	V
130 c	5536.50	II	20	9427.99	I	100	4252.68	III	17	386.21	V
190 w	5555.45	II	100	9977.86	I	40	4509.58	III	10	386.70	V
240 c	5576.90	II	200	10257.03	I	200	5248.77	III	3	388.66	V
200 w	5636.70	II	60 h	10717.42	I	100	5645.15	III	14	388.91	V
160 c	5708.50	II	100 h	10744.31	I	40	5723.17	III	11	390.03	V
50	5709.91	I	20	11334.72	I	100	5819.50	III	11	390.92	V
100 c	5721.80	II	20	11731.48	I						

In V			I I and II			I I and II			I I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
9	392.29	V	200	1218.41	I	5000	3078.75	II	500	6213.10	I
9	392.46	V	20000	1220.89	II	200	3161.03	II	800	6244.48	I
1	393.60	V	600	1224.05	I	1000	3175.07	II	900 c	6257.49	II
25	393.89	V	600	1224.08	I	300	3355.53	II	1000	6293.98	I
11	395.74	V	500	1228.89	I	250 c	3424.99	II	500	6313.13	I
3	397.73	V	20000	1234.06	II	300 c	3497.41	II	800	6330.37	I
10	399.79	V	600	1251.34	I	500	3526.90	II	400	6333.50	I
9	400.05	V	2500	1259.15	I	200	3742.14	II	2000	6337.85	I
25	400.57	V	3000	1259.51	I	200	4102.23	I	1000	6339.44	I
25	402.39	V	800	1261.27	I	200	4129.21	I	500	6359.16	I
3	405.33	V	600	1267.57	I	100 d	4134.15	I	1000	6566.49	I
9	407.28	V	600	1267.60	I	500 d	4321.84	I	2000	6583.75	I
3	407.36	V	1500	1275.26	I	300	4452.86	II	1000	6585.27	I
9	407.95	V	3000	1289.40	I	200	4599.77	II	5000	6619.66	I
9	417.43	V	10000	1300.34	I	300 c	4632.45	II	500	6661.11	I
2	418.45	V	3000	1302.98	I	500 d	4666.48	II	600	6665.96	II
2	423.16	V	3000	1313.95	I	1000	4675.53	II	500 c	6697.29	I
			3000	1317.54	I	250	4763.31	I	300	6718.83	II
			2000	1330.19	I	1000	4862.32	I	400	6732.03	I
			20000	1336.52	II	200	4916.94	I	4000	6812.57	II
			5000	1355.10	I	1000	4986.92	II	1000	6958.78	II
			3000	1357.97	I	400 c	5065.37	II	500	6989.78	I
			5000	1360.97	I	10000	5119.29	I	200 c	7085.21	II
			3000	1361.11	I	200	5149.73	II	500	7120.05	I
			2500	1367.71	I	3000 c	5161.20	II	1200	7122.05	I
			2500	1368.22	I	300	5176.19	II	2000	7142.06	I
			4000	1383.23	I	600	5216.27	II	1000	7164.79	I
			3000	1390.75	I	500 d	5228.97	II	400 d	7191.66	I
			2000	1392.90	I	1000	5234.57	I	700	7227.30	I
			2000	1400.01	I	3000 c	5245.71	II	1000	7236.78	I
			8000	1425.49	I	500	5269.36	II	500	7237.84	I
			5000	1446.26	I	400	5299.78	II	500	7351.35	II
			5000	1453.18	I	400	5322.80	II	5000	7402.06	I
			5000	1457.39	I	10000	5338.22	II	1000	7410.50	I
			5000	1457.47	I	5000 c	5345.15	II	500	7416.48	I
			10000	1457.98	I	1000 c	5369.86	II	5000	7468.99	I
			2500	1458.79	I	800 c	5405.42	II	500 c	7490.52	I
			4000	1459.15	I	800 c	5407.36	II	2000	7554.18	I
			2500	1465.83	I	600 c	5427.06	I	500 d	7556.65	I
			1000	1485.92	I	3000	5435.83	II	2000 c	7700.20	I
			5000	1492.89	I	1000	5438.00	II	500	7798.98	II
			5000	1507.04	I	2000 c	5464.62	II	600	7897.98	I
			5000	1514.68	I	800	5491.50	II	500	7969.48	I
			15000	1518.05	I	1000 c	5496.94	II	1000	8003.63	I
			2500	1526.45	I	1000	5504.72	II	99000	8043.74	I
			5000	1593.58	I	600 c	5522.06	II	300 d	8065.70	I
			5000	1617.60	I	600 c	5598.52	II	1000	8090.76	I
			2500	1640.78	I	1000	5600.32	II	800 c	8169.38	I
			15000	1702.07	I	1500	5612.89	II	500 d	8222.57	I
			12000	1782.76	I	10000	5625.69	II	4000	8240.05	I
			5000	1799.09	I	1000	5678.08	II	10000 c	8393.30	I
			75000	1830.38	I	2000 c	5690.91	II	150	8414.60	II
			15000	1844.45	I	500	5702.05	II	1000	8486.11	I
				Air		4000 c	5710.53	II	1500 c	8664.95	I
			2000	2061.63	I	1000	5738.27	II	500 c	8700.80	I
			100	2408.01	II	1000	5760.72	II	250 d	8748.22	I
			100	2419.18	II	1000 d	5764.33	I	1000	8853.24	I
			100	2494.74	II	500 c	5774.83	II	2000	8853.80	I
			100	2533.60	II	500	5787.02	II	3000	8857.50	I
			200	2534.27	II	2000	5894.03	I	1000 d	8898.50	I
			1000	2566.24	II	5000	5950.25	II	400	8964.69	I
			2000	2582.79	II	300	5984.86	I	400	8993.13	I
			300	2593.46	II	2000 d	6024.08	I	5000	9022.40	I
			200 c	2688.98	II	500	6068.93	II	15000	9058.33	I
			500	2730.12	II	2000 c	6074.98	II	1000	9098.86	I
			20	2765.15	II	1000	6082.43	I	12000	9113.91	I
			200	2808.59	II	2000 c	6127.49	II	600	9128.03	I
			1500	2878.63	II	800	6191.88	I	30	9195.30	II
			1000	2993.87	II	1000	6204.86	II	600	9227.74	I

I I and II			I III			I IV			Ir I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
1000	9335.05	I	2	2309.38	III	7	919.28	IV	2000	2125.44	I
4000	9426.71	I	3	2340.85	III		Air		4500	2126.81	II
3000	9427.15	I	3	2350.43	III	5	2249.30	IV	2000	2127.52	I
10 c	9480.33	II	2	2353.46	III	4	2340.84	IV	4500	2127.94	I
2000	9598.22	I	4	2367.74	III	7	2361.13	IV	3700	2148.22	I
2000	9649.61	I	2	2371.45	III	5	2367.75	IV	2500	2150.54	I
3000 d	9653.06	I	3	2372.45	III	6	2372.45	IV	3500	2152.68	II
5000	9731.73	I	4	2376.47	III	7	2376.46	IV	2900	2155.81	I
500	10003.05	I	4	2387.12	III	4	2385.28	IV	7900	2158.05	I
750	10131.16	I	3	2392.01	III	8	2387.11	IV	2100	2162.88	I
1000	10238.82	I	2	2403.06	III	6	2392.00	IV	5800	2169.42	II
400	10375.20	I	2	2403.63	III	4	2403.05	IV	4500	2175.24	I
400	10391.74	I	2	2414.85	III	2	2418.45	IV	2700	2178.17	I
6	10405.49	II	2	2418.49	III	3	2423.89	IV	1600	2187.43	II
5000	10466.54	I	2	2418.85	III	9	2426.10	IV	1100	2190.38	II
1	11084.68	II	2	2423.91	III	6	2434.85	IV	740	2191.64	I
400	11236.56	I	5	2426.12	III	3	2466.68	IV	910	2208.09	II
350	11558.46	I	3	2434.88	III	3	2466.96	IV	1300	2220.37	I
320	11778.34	I	2	2462.50	III	8	2475.35	IV	790	2221.07	II
450	11996.86	I	3	2466.69	III	4	2485.51	IV	2500	2242.68	II
300	12033.69	I	3	2466.99	III	5	2489.24	IV	620	2245.76	II
150	12304.58	I	6	2475.36	III	4	2493.20	IV	2100	2253.38	I
60	13149.16	I	4	2489.27	III	2	2501.38	IV		2253.49	I
140	13958.27	I	2	2493.21	III	3	2513.74	IV	2100	2255.10	I
200	14287.02	I	2	2494.27	III	8	2519.74	IV	1400	2255.81	I
100	14460.00	I	3	2495.16	III	6	2521.72	IV	350	2258.51	I
225	15032.57	I	2	2496.07	III	4	2531.98	IV	1400	2258.86	I
105	15528.65	I	3	2501.41	III	5	2537.54	IV	830	2264.61	I
150	16037.33	I	2	2516.82	III	8	2545.67	IV	1100	2266.33	I
15	18275.71	I	6	2519.75	III	4	2640.77	IV	1000	2268.90	I
20	18348.52	I	4	2521.72	III	5	2642.11	IV	660	2280.00	I
15	18982.41	I	3	2531.99	III	8	2652.23	IV	950	2281.02	II
35	19070.17	I	2	2537.56	III	3	2818.45	IV	660	2281.91	I
110	19105.12	I	7	2545.71	III	6	2864.68	IV	330	2284.60	I
50	19370.02	I	4	2640.77	III	4	2910.97	IV	330	2295.08	I
10	20648.69	I	4	2642.11	III	5	2917.33	IV	790	2298.05	I
220	22183.03	I	6	2652.25	III	4	3069.17	IV		2298.16	I
150	22226.53	I	2	2818.48	III	4	3170.11	IV	460	2299.53	I
30	22309.21	I	2	2839.44	III	4	3181.64	IV	910	2300.50	I
32	24420.82	I	4	2864.67	III	4	3210.12	IV	2700	2304.22	I
12	27365.42	I	4	2885.15	III	6	3213.48	IV	410	2305.47	I
9	27573.05	I	3	2910.98	III	6	3224.90	IV	210	2307.27	I
10	30361.93	I	3	2917.35	III	4	3546.90	IV	910	2308.93	I
8	30383.88	I	2	2931.11	III		I V	460	2315.38	I	
10	34295.73	I	2	3005.68	III		Ref. 84 - L.J.R.	410	2321.45	I	
9	34513.11	I	3	3069.23	III		Vacuum	410	2321.58	I	
3	40228.54	I	3	3153.88	III	30	363.78	V	210	2327.98	I
2	41633.80	I	3	3170.14	III	36	380.74	V	540	2333.30	I
			3	3181.66	III	45	565.53	V	740	2333.84	I
			3	3210.14	III	50	607.57	V	580	2334.50	I
			4	3213.49	III				1600	2343.18	I
			4	3224.93	III				740	2343.61	I
			2	3300.47	III				100	2352.62	I
			2	3479.53	III				580	2355.00	I
			3	3546.92	III				230	2357.53	II
			3	3613.81	III				410	2358.16	I
			2	3754.40	III				500	2360.73	I
			2	3754.55	III				2500	2363.04	I
			3	3963.16	III				370	2368.04	II
			3	4077.14	III				3500	2372.77	I
									290	2375.09	II
									250	2377.28	I
									250	2377.98	I
									500	2379.38	I
									540	2381.62	I
									210	2383.17	I
									120	2386.58	II
									1300	2386.89	I
									2500	2390.62	I

Ir I and II			Ir I and II			Ir I and II			Ir I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
2700	2391.18	I	230	2572.70	I	1200	2934.64	I	410	3522.03	I
230	2407.59	I	740	2577.26	I	880	2936.68	I	160	3557.17	I
290	2409.37	I	100	2578.71	I	250	2938.47	I	320	3558.99	I
290	2410.17	I	35	2579.49	II	190	2939.27	I	1200	3573.72	I
290	2410.73	I	740	2592.06	I	140	2940.54	I	320	3594.39	I
540	2413.31	I	740	2599.04	I	2700	2943.15	I	220	3609.77	I
370	2415.86	I	150	2602.04	I	230	2946.97	I	190	3617.21	I
620	2418.11	I	190	2604.55	I	200	2949.76	I	160	3626.29	I
120	2424.32	I	190	2607.52	I	1200	2951.22	I	660	3628.67	I
120	2424.66	I	700	2608.25	I	150	2962.99	I	220	3636.20	I
210	2424.89	I	1800	2611.30	I	200	2974.95	I	300	3661.71	I
370	2424.99	I	210	2614.98	I	440	2980.65	I	300	3664.62	I
290	2425.66	I	330	2617.78	I	150	2985.80	I	320	3674.98	I
170	2426.53	II	210	2619.88	I	190	2990.62	I	200	3687.08	I
540	2427.61	I	70	2623.64	II	300	2996.08	I	140	3725.38	I
540	2431.24	I	250	2625.32	I	180	2997.41	I	200	3731.36	II
1300	2431.94	I	100	2626.76	I	220	3002.25	I	130	3738.53	I
170	2432.36	I	700	2634.17	I	600	3003.63	I	530	3747.20	I
100	2432.58	I	170	2635.27	I	160	3011.69	I	120	3793.79	I
270	2435.14	I	250	2639.42	I	120	3016.43	I	3100	3800.12	I
250	2445.34	I	3500	2639.71	I	270	3017.31	I	230	3817.24	I
250	2447.76	I	210	2644.19	I	140	3019.23	I	170	3865.64	I
190	2448.23	I	170	2653.76	I	110	3025.82	I	480	3902.51	I
910	2452.81	I	100	2656.81	I	380	3029.36	I	480	3915.38	I
1300	2455.61	I	1800	2661.98	I	330	3039.26	I	400	3934.84	I
230	2455.87	I	350	2662.63	I	35	3042.65	II	120	3946.27	I
210	2457.03	I	2700	2664.79	I	300	3047.16	I	590	3976.31	I
210	2457.23	I	140	2668.99	I	300	3049.44	I	460	3992.12	I
120	2465.09	I	520	2669.91	I	300	3057.28	I	180	4020.03	I
870	2467.30	I	520	2671.84	I	1600	3068.89	I	350	4033.76	I
3300	2475.12	I	330	2673.61	I	190	3069.09	I	130	4040.08	I
210	2478.11	I	120	2676.83	I	190	3069.71	I	370	4069.92	I
2100	2481.18	I	110	2684.04	I	170	3076.69	I	150	4070.68	I
100	2485.38	I	270	2692.34	I	320	3083.22	I	100	4092.61	I
620	2493.08	I	3000	2694.23	I	240	3086.44	I	140	4115.78	I
210	2496.27	I	110	2704.03	I	390	3088.04	I	23	4127.92	I
250	2502.63	I	160	2712.74	I	510	3100.29	I	27	4155.70	I
4100	2502.98	I	140	2744.00	I	510	3100.45	I	15	4166.04	I
170	2504.37	I	330	2772.46	I	340	3120.76	I	90	4172.56	I
120	2505.74	I	250	2775.55	I	200	3121.78	I	35	4182.47	I
120	2507.63	I	520	2781.29	I	3400	3133.32	I	15 h	4183.21	I
170	2509.71	I	330	2785.22	I	190	3150.61	I	18	4185.66	I
170	2511.94	I	540	2797.35	I	190	3154.74	I	23	4197.54	I
170	2512.58	II	1600	2797.70	I	190	3159.15	I	27	4217.76	I
210	2513.71	I	380	2798.18	I	140	3168.18	I	13	4220.80	I
120	2515.36	I	410	2800.82	I	490	3168.88	I	75	4259.11	I
40	2524.88	II	680	2823.18	I	370	3177.58	I	27	4265.30	I
170	2525.05	I	1200	2824.45	I	170	3180.35	I	260	4268.10	I
120	2532.52	I	110	2833.24	II	370	3198.92	I	23	4286.62	I
990	2533.13	I	110	2835.66	I	610	3212.12	I	75	4301.60	I
1100	2534.46	I	820	2836.40	I	370	3219.51	I	55	4310.59	I
580	2537.22	I	160	2837.33	I	5100	3220.78	I	220	4311.50	I
170	2537.68	I	1100	2839.16	I	100	3221.28	I	18	4351.30	I
100	2541.48	I	820	2840.22	I	300	3229.28	I	18	4352.56	I
580	2542.02	I	160	2842.28	I	100	3230.76	I	18	4392.59	I
40	2542.80	II	3800	2849.72	I	470	3241.52	I	160	4399.47	I
7900	2543.97	I	110	2863.84	I	200	3262.01	I	65	4403.78	I
150	2545.54	I	380	2875.60	I	390	3266.44	I	110	4426.27	I
790	2546.03	I	380	2875.98	I	160	3277.28	I	15	4450.18	I
120	2547.20	I	270	2877.68	I	100	3287.59	I	55	4478.48	I
120	2547.69	I	140	2879.41	I	160	3310.52	I	16	4495.35	I
210	2551.40	I	820	2882.64	I	200	3322.60	I	11 h	4496.03	I
190	2554.40	I	650	2897.15	I	130	3334.16	I	55	4545.68	I
210	2555.35	I	260	2901.95	I	560	3368.48	I	30	4548.48	I
170	2555.88	I	260	2904.80	I	660	3437.02	I	13	4550.78	I
150	2563.28	I	200	2907.24	I	100	3437.50	I	35	4568.09	I
910	2564.18	I	440	2916.36	I	410	3448.97	I	18	4570.02	I
210	2569.88	I	230	2918.57	I	3200	3513.64	I	18	4604.48	I
100	2570.62	I	4400	2924.79	I	220	3515.95	I	75	4616.39	I

Ir I and II			Fe I and II			Fe I and II			Fe I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
26	4656.18	I	18	1144.95	II	200	2297.787	I	1000	2395.62	II
17 h	4668.99	I	12	1147.41	II	600	2298.169	I	15	2396.72	II
21	4708.88	I	15	1148.29	II	80	2299.220	I	300	2399.24	II
50	4728.86	I	12	1151.16	II	300	2300.142	I	20	2400.05	II
21	4731.86	I	12	1267.44	II	50	2301.684	I	15	2401.29	II
26	4756.46	I	12	1272.00	II	100	2303.424	I	50	2404.43	II
13	4757.96	I	12	1371.02	II	150	2303.581	I	800	2404.88	II
65	4778.16	I	12	1563.79	II	120	2308.999	I	250	2406.66	II
30	4795.67	I	12	1580.62	II	150	2313.104	I	80	2406.97	II
10	4807.14	I	18	1608.46	II	200	2320.358	I	300	2410.52	II
21	4809.47	I	12	1618.47	II	100	2327.40	II	200	2411.07	II
10	4840.77	I	15	1621.68	II	15	2327.88	II	50	2411.81	II
17	4845.38	I	15	1629.15	II	100	2331.31	II	150	2413.31	II
50	4938.09	I	15	1631.12	II	15	2331.97	II	20	2416.45	II
26	4970.48	I	18	1635.40	II	300	2332.80	II	80	2417.87	II
25	4999.74	I	15	1636.32	II	200	2338.01	II	15	2418.44	II
25	5002.74	I	15	1639.40	II	600	2343.49	II	60	2420.396	I
17	5009.17	I	12	1641.76	II	80	2343.96	II	60	2422.69	II
30	5014.98	I	12	1647.16	II	150	2344.28	II	60	2423.089	I
17	5046.06	I	12	1670.74	II	25	2344.98	II	40	2423.21	II
30	5123.66	I	12	1702.04	II	50	2345.34	II	150	2424.14	II
20	5177.95	I	12	1761.38	II	200	2348.11	II	15	2424.39	II
22	5238.92	I	20	1785.26	II	250	2348.30	II	30	2424.59	II
12	5340.74	I	20	1786.74	II	50	2351.20	II	30	2428.29	II
35	5364.32	I	18	1788.07	II	15	2351.67	II	120	2428.36	II
75	5449.50	I	30	1934.538	I	25	2352.31	II	25	2428.80	II
30	5454.50	I	25	1937.269	I	30	2353.47	II	25	2429.03	II
7	5469.40	I	50	1946.988	I	15	2353.68	II	20	2429.39	II
10	5620.04	I	25	1951.571	I	50	2354.48	II	30	2429.86	II
45	5625.55	I	30	1952.59	I	40	2354.89	II	120	2430.08	II
10	5828.55	I	30	1953.005	I	200	2359.12	II	25	2431.02	II
10	5882.30	I	60	1957.823	I	15	2359.59	II	80	2432.26	II
7	5887.36	I	60	1960.144	I	150	2360.00	II	60	2432.87	II
35	5894.06	I	30	1961.25	I	120	2360.29	II	25	2434.06	II
7	6026.10	I	50	1962.111	I	30	2360.51	II	20	2434.24	II
12	6067.83	I	12	1963.11	II	40	2362.02	II	20	2434.65	II
20	6110.67	I		Air	60	2363.86	II	50	2434.73	II	
12	6288.28	I	100	2084.122	I	200	2364.83	II	50	2434.95	II
7	6334.44	I	50	2157.794	I	80	2365.76	II	25	2436.62	II
5	6624.73	I	15	2162.02	II	25	2366.59	II	60	2438.182	I
10	6686.08	I	40	2166.773	I	80	2368.59	II	150	2439.30	II
5	6830.01	I	300	2178.118	I	80	2369.456	I	150	2439.74	I
5	6929.88	I	250	2186.486	I	80	2369.95	II	80	2440.11	I
4	7183.71	I	60	2186.892	I	25	2370.50	II	40	2440.42	II
6	7834.32	I	120	2187.195	I	120	2371.430	I	30	2442.37	II
			250	2191.839	I	300	2373.624	I	100	2442.57	I
			150	2196.043	I	150	2373.74	II	60	2443.71	II
			80	2200.390	I	120	2374.518	I	250	2443.872	I
			80	2200.724	I	60	2375.19	II	100	2444.51	II
			15	2208.41	II	120	2376.43	II	50	2445.11	II
			20	2213.65	II	20	2378.13	II	50	2445.212	I
			12	2218.26	II	80	2379.27	II	100	2445.57	II
			20	2220.38	II	20	2379.41	II	40	2445.80	II
			25	2245.58	II	40	2380.20	II	50	2446.11	II
			50	2250.790	I	120	2380.76	II	30	2446.47	II
			60	2251.874	I	150	2381.835	I	40	2447.20	II
			25	2255.77	II	1000	2382.04	II	25	2447.33	II
			300	2259.511	I	20	2382.90	II	60	2447.709	I
			60	2264.389	I	20	2383.06	II	30	2447.75	II
			80	2267.085	I	60	2383.25	II	25	2449.96	II
			80	2267.469	I	50	2384.39	II	25	2450.20	II
			50	2270.862	I	40	2388.37	II	100	2453.476	I
			150	2272.070	I	300	2388.63	II	20	2453.98	II
			150	2276.026	I	200	2389.973	I	30	2454.58	II
			80	2279.937	I	30	2390.10	II	15	2455.71	II
			150	2284.086	I	20	2390.77	II	15	2455.90	II
			150	2287.250	I	15	2391.48	II	15	2457.09	II
			300	2292.524	I	20	2392.58	II	1500	2457.598	I
			80	2294.41	I	40	2395.42	II	150	2458.78	II

Refs. 56,63,105,138,174,278
- H.M.C. and H.C.

IRON (Fe)

Z = 26

Fe I and II

Vacuum

12	1055.27	II
15	1068.36	II
15	1071.60	II
15	1096.89	II
12	1099.12	II
18	1112.09	II
12	1121.99	II
12	1122.86	II
12	1128.07	II
12	1130.43	II
15	1133.41	II
12	1133.68	II
12	1138.64	II
12	1142.33	II
12	1143.23	II

Fe I and II			Fe I and II			Fe I and II			Fe I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
40	2458.97	II	20	2493.88	II	150	2538.99	II	30	2666.64	II
60	2460.44	II	60	2494.000	I	50	2539.357	I	300	2666.812	I
80	2461.28	II	50	2494.251	I	20	2540.52	II	60	2666.965	I
100	2461.86	II	100	2495.87	I	200	2540.66	II	600	2679.062	I
100	2462.181	I	600	2496.533	I	600	2540.972	I	500	2684.75	II
1500	2462.647	I	50	2497.82	II	80	2541.10	II	400	2689.212	I
50	2463.29	II	150	2498.90	I	60	2541.84	II	60	2692.60	II
50	2463.730	I	40	2500.92	II	300	2542.10	I	50	2696.28	I
40	2464.01	II	1000	2501.132	I	25	2542.78	II	200	2699.106	I
40	2464.90	II	40	2501.31	II	60	2543.38	II	60	2703.99	II
800	2465.149	I	50	2501.693	I	250	2543.92	I	80	2706.012	I
50	2465.91	II	60	2502.39	II	150	2544.70	I	400	2706.582	I
15	2466.50	II	40	2503.33	II	40	2544.97	II	60	2708.571	I
60	2466.67	II	20	2503.57	II	40	2545.22	II	20	2709.05	II
60	2466.82	II	60	2503.87	II	20	2545.44	II	200	2711.655	I
60	2467.732	I	80	2506.09	II	800	2545.978	I	80	2714.41	II
15	2468.29	II	40	2506.80	II	40	2546.44	II	50	2716.22	II
600	2468.879	I	500	2507.900	I	80	2546.67	II	50	2716.257	I
60	2469.51	II	30	2508.34	II	80	2546.87	I	50	2717.786	I
25	2470.41	II	50	2508.753	I	20	2548.59	II	50	2717.87	II
80	2470.67	II	1000	2510.835	I	100	2548.74	II	250	2718.436	I
80	2470.965	I	120	2511.76	II	80	2549.08	II	4000	2719.027	I
800	2472.336	I	80	2512.275	I	80	2549.39	II	100	2719.420	I
40	2472.43	II	400	2512.365	I	60	2549.46	II	50	2720.197	I
40	2472.60	II	50	2514.38	II	600	2549.613	I	1500	2720.903	I
1000	2472.895	I	80	2516.570	I	40	2549.77	II	400	2723.578	I
200	2473.16	I	50	2517.13	II	60	2550.03	II	30	2724.88	II
50	2473.32	II	300	2517.661	I	25	2550.15	II	150	2724.953	I
30	2474.05	II	800	2518.102	I	50	2550.68	II	80	2726.05	I
600	2474.814	I	60	2519.05	II	40	2560.28	II	50	2726.235	I
50	2475.12	II	150	2519.629	I	25	2562.09	II	25	2727.38	II
40	2475.54	II	40	2521.09	II	400	2562.53	II	80	2727.54	II
15	2476.26	II	30	2521.82	II	200	2563.48	II	200	2728.020	I
60	2476.657	I	50	2522.480	I	20	2566.22	II	50	2728.820	I
25	2477.34	II	4000	2522.849	I	60	2566.91	II	80	2728.90	II
60	2478.57	II	200	2523.66	I	25	2570.52	II	40	2730.73	II
120	2479.480	I	500	2524.293	I	30	2570.85	II	1000	2733.581	I
1200	2479.776	I	100	2525.02	I	150	2574.36	II	60	2734.005	I
100	2480.16	II	200	2525.39	II	50	2575.74	I	50	2734.268	I
15	2481.05	II	25	2526.07	II	300	2576.691	I	500	2735.475	I
80	2482.12	II	300	2526.29	II	25	2576.86	II	50	2735.612	I
25	2482.32	II	20	2527.10	II	60	2577.92	II	500	2737.310	I
100	2482.66	II	2000	2527.435	I	100	2582.58	II	120	2737.83	I
15	2482.87	II	30	2527.70	II	1500	2584.54	I	400	2739.55	II
10000	2483.271	I	20	2528.88	II	60	2593.51	I	250	2742.254	I
300	2483.533	I	20	2529.08	II	20	2605.34	II	800	2742.405	I
15	2483.72	II	800	2529.135	I	20	2605.42	II	200	2743.20	II
1000	2484.185	I	25	2529.23	II	60	2605.657	I	150	2743.565	I
60	2484.24	II	80	2529.31	I	300	2606.51	II	200	2744.068	I
30	2484.44	II	250	2529.55	II	800	2606.827	I	80	2744.527	I
50	2485.990	I	150	2529.836	I	20	2611.07	II	300	2746.48	II
800	2486.373	I	40	2530.11	II	600	2611.87	II	100	2749.32	II
100	2486.691	I	200	2530.687	I	250	2618.018	I	500	2749.48	II
100	2487.066	I	20	2531.87	II	20	2619.07	II	1200	2750.140	I
120	2487.370	I	120	2533.63	II	20	2620.69	II	20	2751.13	II
4000	2488.143	I	60	2533.80	I	40	2621.67	II	20	2752.15	II
100	2488.945	I	100	2534.42	II	400	2623.53	I	80	2753.29	II
80	2489.48	II	120	2535.49	II	50	2625.49	II	50	2753.69	I
1000	2489.750	I	400	2535.607	I	200	2625.67	II	150	2754.032	I
50	2489.83	II	60	2536.67	II	150	2628.29	II	100	2754.426	I
50	2489.913	I	200	2536.792	I	20	2630.07	II	30	2754.89	II
3000	2490.644	I	200	2536.80	II	250	2631.05	II	800	2755.73	II
100	2490.71	II	50	2536.84	II	250	2631.32	II	250	2756.328	I
60	2490.86	II	50	2537.14	II	50	2631.61	II	100	2757.316	I
2000	2491.155	I	50	2538.20	II	100	2632.237	I	50	2759.81	I
100	2491.40	II	40	2538.50	II	300	2635.809	I	120	2761.780	I
25	2492.34	II	20	2538.68	II	50	2641.646	I	150	2761.81	II
100	2493.18	II	100	2538.80	II	200	2643.998	I	150	2762.026	I
500	2493.26	II	100	2538.91	II	60	2664.66	II	120	2762.772	I

Fe I and II			Fe I and II			Fe I and II			Fe I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
120	2763.109	I	250	2994.502	I	50	3265.617	I	60	3612.068	I
20	2763.66	II	500	2999.512	I	50	3271.000	I	150	3617.788	I
25	2765.13	II	120	3000.451	I	50	3280.26	I	1500	3618.768	I
80	2766.910	I	800	3000.948	I	150	3286.75	I	200	3621.462	I
250	2767.522	I	60	3001.655	I	120	3305.97	I	150	3622.004	I
50	2769.30	I	15	3002.64	II	200	3306.343	I	150	3623.19	I
25	2769.35	II	200	3007.282	I	400	3355.227	I	100	3631.096	I
300	2772.07	I	500	3008.14	I	80	3355.517	I	1200	3631.463	I
50	2773.23	I	120	3009.569	I	60	3369.546	I	60	3632.041	I
20	2774.69	II	60	3017.627	I	120	3370.783	I	100	3638.298	I
15	2776.91	II	60	3018.983	I	50	3378.678	I	200	3640.389	I
60	2778.07	I	60	3020.01	II	50	3380.110	I	80	3643.717	I
600	2778.220	I	500	3020.491	I	60	3383.978	I	1500	3647.842	I
40	2779.30	II	1500	3020.639	I	12	3388.13	II	250	3649.506	I
50	2783.69	II	600	3021.073	I	50	3392.304	I	80	3650.279	I
30	2785.19	II	500	3024.032	I	150	3392.651	I	200	3651.467	I
3000	2788.10	I	150	3025.638	I	150	3399.333	I	120	3670.024	I
20	2793.89	II	500	3025.842	I	80	3404.353	I	150	3670.089	I
200	2797.78	I	80	3030.148	I	500	3407.458	I	100	3676.311	I
30	2799.29	II	60	3031.214	I	250	3413.131	I	150	3677.629	I
400	2804.521	I	60	3034.484	I	60	3424.284	I	1500	3679.913	I
1500	2806.98	I	40	3036.96	II	500	3427.119	I	200	3682.242	I
2500	2813.287	I	800	3037.389	I	60	3428.748	I	120	3683.054	I
300	2823.276	I	80	3041.637	I	6000	3440.606	I	150	3684.107	I
600	2825.56	I	800	3047.604	I	2500	3440.989	I	120	3685.998	I
50	2825.687	I	600	3057.446	I	1000	3443.876	I	500	3687.456	I
120	2828.808	I	1000	3059.086	I	200	3445.149	I	120	3689.477	I
25	2831.56	II	250	3067.244	I	15	3453.61	II	150	3694.008	I
1500	2832.436	I	120	3075.719	I	1200	3465.860	I	120	3695.051	I
120	2835.950	I	120	3091.577	I	2000	3475.450	I	150	3701.086	I
200	2838.119	I	80	3098.189	I	500	3476.702	I	80	3704.462	I
30	2839.51	II	100	3099.895	I	2500	3490.574	I	1200	3705.566	I
20	2839.80	II	100	3099.968	I	500	3497.840	I	60	3707.041	I
15	2840.65	II	60	3100.303	I	250	3513.817	I	150	3707.821	I
200	2843.631	I	100	3100.665	I	300	3521.261	I	300	3707.919	I
1000	2843.977	I	12	3154.20	II	400	3526.040	I	600	3709.246	I
100	2845.594	I	80	3175.445	I	100	3526.166	I	120	3716.442	I
15	2848.11	II	150	3184.895	I	60	3526.237	I	8000	3719.935	I
15	2848.32	II	250	3191.659	I	60	3526.381	I	1500	3722.563	I
800	2851.797	I	500	3193.226	I	60	3526.467	I	120	3724.377	I
30	2856.91	II	800	3193.299	I	100	3533.199	I	60	3725.491	I
25	2858.34	II	12	3196.08	II	200	3536.556	I	60	3727.093	I
50	2869.307	I	200	3196.928	I	300	3541.083	I	500	3727.619	I
50	2872.334	I	80	3199.500	I	250	3542.075	I	150	3732.396	I
80	2874.172	I	60	3200.47	I	80	3553.739	I	1200	3733.317	I
50	2894.504	I	50	3205.398	I	400	3554.925	I	5000	3734.864	I
120	2912.157	I	50	3211.67	I	200	3556.878	I	120	3735.324	I
120	2929.007	I	100	3211.88	I	400	3558.515	I	6000	3737.131	I
1200	2936.903	I	13	3213.31	II	1000	3565.379	I	100	3738.306	I
60	2941.343	I	200	3214.011	I	1200	3570.097	I	400	3743.362	I
12	2944.40	II	200	3214.396	I	800	3570.25	I	80	3743.47	I
1000	2947.876	I	60	3215.938	I	120	3571.996	I	6000	3745.561	I
60	2950.24	I	50	3217.377	I	100	3573.393	I	1200	3745.899	I
600	2953.940	I	80	3219.583	I	60	3573.829	I	3000	3748.262	I
250	2957.364	I	60	3219.766	I	60	3573.888	I	80	3748.964	I
80	2959.99	I	300	3222.045	I	4000	3581.19	I	3000	3749.485	I
150	2965.254	I	600	3225.78	I	150	3582.199	I	1500	3758.232	I
1500	2966.898	I	13	3227.73	II	150	3584.660	I	400	3760.05	I
120	2969.36	I	80	3227.796	I	120	3584.929	I	1500	3763.788	I
800	2970.099	I	20	3230.42	II	300	3585.319	I	400	3765.54	I
15	2970.52	II	80	3233.05	I	150	3585.705	I	600	3767.191	I
1200	2973.132	I	50	3233.967	I	200	3586.103	I	60	3776.452	I
500	2973.235	I	120	3234.613	I	400	3586.984	I	250	3785.95	I
600	2981.445	I	300	3236.222	I	100	3594.633	I	100	3786.68	I
1000	2983.570	I	100	3239.433	I	150	3603.204	I	250	3787.880	I
60	2984.77	I	80	3244.187	I	200	3605.454	I	250	3790.092	I
50	2984.82	II	80	3246.005	I	500	3606.680	I	150	3794.34	I
13	2985.54	II	60	3254.36	I	1500	3608.859	I	400	3795.002	I
1000	2994.427	I	80	3265.046	I	250	3610.16	I	120	3797.518	I

Fe I and II		Fe I and II		Fe I and II		Fe I and II	
Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength
250	3798.511 I	150	4118.544 I	100	4890.754 I	40	5367.47 I
400	3799.547 I	40	4127.608 I	250	4891.492 I	50	5369.96 I
200	3805.345 I	400	4132.058 I	30	4903.309 I	400	5371.489 I
20	3806.696 I	80	4134.676 I	150	4918.992 I	60	5383.37 I
600	3812.964 I	40	4136.997 I	500	4920.502 I	14	5387.06 II
60	3813.059 I	200	4143.415 I	12	4923.92 II	40	5393.167 I
1500	3815.840 I	800	4143.869 I	1500	4957.597 I	12	5395.86 II
2500	3820.425 I	40	4153.898 I	11	4990.50 II	300	5397.127 I
150	3821.179 I	50	4154.500 I	80	5001.862 I	15	5402.06 II
80	3824.306 I	60	4156.799 I	18	5001.91 II	60	5404.12 I
2500	3824.444 I	50	4172.744 I	11	5004.20 II	250	5405.774 I
1500	3825.880 I	60	4174.912 I	30	5005.711 I	30	5410.91 I
1200	3827.823 I	50	4175.635 I	100	5006.117 I	60	5415.20 I
1000	3834.222 I	50	4177.593 I	60	5012.067 I	60	5424.07 I
120	3839.257 I	120	4181.754 I	30	5014.941 I	30	5427.83 II
500	3840.437 I	50	4184.891 I	12	5018.43 II	250	5429.695 I
800	3841.047 I	120	4187.038 I	11	5030.64 II	13	5429.99 II
120	3843.256 I	120	4187.795 I	25	5030.77 I	100	5434.523 I
80	3846.800 I	80	4191.430 I	12	5035.71 II	200	5446.871 I
200	3849.96 I	40	4195.329 I	150	5041.755 I	25	5455.45 I
120	3850.817 I	150	4198.304 I	30	5049.819 I	120	5455.609 I
2500	3856.372 I	40	4199.095 I	30	5051.634 I	16	5465.93 II
150	3859.212 I	300	4202.029 I	25	5074.748 I	20	5466.94 II
10000	3859.911 I	40	4203.984 I	18	5100.73 II	16	5482.31 II
150	3865.523 I	80	4206.696 I	15	5100.95 II	14	5493.83 II
60	3867.215 I	80	4210.343 I	150	5110.357 I	25	5497.516 I
250	3872.501 I	400	4216.183 I	40	5133.69 I	20	5501.464 I
150	3873.761 I	100	4219.360 I	40	5139.251 I	18	5506.20 II
250	3878.018 I	50	4222.212 I	100	5139.462 I	30	5506.778 I
2000	3878.573 I	50	4225.956 I	11	5144.36 II	12	5510.78 II
4000	3886.282 I	200	4227.423 I	12	5149.46 II	12	5529.06 II
200	3887.048 I	11	4233.17 II	25	5151.910 I	13	5544.76 II
300	3888.513 I	100	4233.602 I	30	5162.27 I	30	5569.618 I
800	3895.656 I	250	4235.936 I	80	5166.281 I	60	5572.841 I
1200	3899.707 I	50	4238.809 I	2500	5167.487 I	120	5586.755 I
400	3902.945 I	50	4247.425 I	80	5168.897 I	200	5615.644 I
250	3906.479 I	200	4250.118 I	12	5169.03 II	20	5624.541 I
80	3916.731 I	300	4250.787 I	500	5171.595 I	12	5645.40 II
600	3920.258 I	40	4258.315 I	50	5191.454 I	50	5662.515 I
1200	3922.911 I	800	4260.473 I	80	5192.343 I	20	5762.990 I
1200	3927.920 I	250	4271.153 I	200	5194.941 I	11	5783.63 II
2000	3930.296 I	1200	4271.759 I	30	5204.582 I	30	5862.353 I
60	3948.774 I	1200	4282.402 I	25	5215.179 I	13	5885.02 II
60	3949.953 I	80	4291.462 I	150	5216.274 I	16	5902.82 II
50	3951.164 I	250	4299.234 I	18	5216.85 II	30	5914.114 I
50	3952.601 I	1200	4307.901 I	60	5226.862 I	14	5955.70 II
60	3956.454 I	150	4315.084 I	1000	5227.150 I	30	5986.956 I
250	3956.68 I	1500	4325.761 I	13	5227.49 II	18	5961.71 II
60	3966.614 I	80	4352.734 I	250	5232.939 I	30	5962.4 II
100	3969.257 I	80	4369.771 I	13	5247.95 II	13	5965.63 II
80	3977.741 I	800	4375.929 I	13	5251.23 II	40	6065.482 I
40	3981.771 I	3000	4383.544 I	18	5260.26 II	30	6102.159 I
50	3983.956 I	1200	4404.750 I	11	5264.18 II	40	6136.614 I
60	3994.114 I	300	4415.122 I	100	5266.555 I	40	6137.694 I
200	3997.392 I	600	4427.299 I	1200	5269.537 I	30	6147.73 II
40	3998.053 I	400	4461.652 I	800	5270.357 I	20	6149.24 II
400	4005.241 I	120	4466.551 I	30	5281.789 I	15	6175.16 II
60	4009.713 I	80	4476.017 I	60	5283.621 I	40	6191.558 I
80	4014.53 I	80	4482.169 I	25	5302.299 I	30	6213.429 I
100	4021.867 I	200	4482.252 I	11	5306.18 II	30	6219.279 I
50	4040.638 I	50	4489.739 I	13	5316.23 II	40	6230.726 I
4000	4045.813 I	50	4528.613 I	150	5324.178 I	20	6238.37 II
1500	4063.594 I	11	4583.83 II	800	5328.038 I	20	6246.317 I
50	4066.975 I	30	4647.433 I	300	5328.531 I	80	6247.56 II
50	4067.977 I	30	4736.771 I	100	5332.899 I	30	6252.554 I
1200	4071.737 I	50	4859.741 I	14	5339.59 II	15	6305.32 II
40	4076.629 I	120	4871.317 I	80	5339.928 I	12	6331.97 II
40	4100.737 I	60	4872.136 I	500	5341.023 I	15	6383.75 II
40	4107.489 I	30	4878.208 I	25	5364.87 I	20	6393.602 I

Fe I and II		Fe I and II		Fe III		Fe III	
Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength
30	6399.999 I	96	14400.56 I	10	1882.05 III	8	2595.62 III
20	6411.647 I	20	14442.28 I	12	1886.76 III	8	2617.15 III
20	6416.90 II	72	14512.23 I	13	1890.67 III	9 p	2645.39 III
20	6421.349 I	50	14555.06 I	11	1893.98 III	10 h	2695.13 III
30	6430.844 I	14	14565.95 I	20	1895.46 III	9 h	2695.34 III
20	6446.43 II	40	14826.43 I	10 s	1907.58 III	8 h	2700.02 III
200	6456.38 II	37	15051.77 I	19	1914.06 III	8 h	2701.13 III
60	6494.981 I	28	15207.55 I	15	1915.08 III	8	2773.31 III
20	6516.05 II	94	15294.58 I	15	1922.79 III	10 p	2813.24 III
20	6546.239 I	16	15335.40 I	10 p	1926.01 III	8 p	2895.08 III
20	6592.913 I	30	15621.67 I	18	1926.30 III	9 p	2902.47 III
40	6677.989 I	25	15631.97 I	15	1930.39 III	12	2904.43 III
15	6855.18 I	14	15723.59 I	14	1931.51 III	8 p	2905.80 III
15	6945.21 I	41	15769.42 I	14	1937.34 III	10	2907.50 III
20	7067.44 II	28	15813.13 I	10 l	1938.90 III	12	2907.70 III
15	7130.94 I	13	16444.82 I	14 s	1943.48 III	8	2923.90 III
25	7164.443 I	20	16486.69 I	12	1945.34 III	8	2948.39 III
80	7187.313 I	105	18856.65 I	10	1950.33 III	8	2963.23 III
30	7207.381 I	47	18987.01 I	12	1951.01 III	12	3001.62 III
12	7224.51 II	25	19113.68 I	11	1952.65 III	12 h	3007.28 III
50	7307.97 II	22	19791.88 I	13	1953.32 III	15	3013.17 III
40	7320.70 II	14	22380.82 I	10	1953.49 III	10 p	3136.43 III
20	7376.46 II	21	22619.85 I	10 w	1954.22 III	10	3174.09 III
30	7445.746 I	38	26222.04 I	11	1958.58 III	10	3175.99 III
20	7462.38 II	17	26659.22 I	13	1960.32 III	10	3178.01 III
40	7495.059 I			15	1987.50 III	13	3266.88 III
60	7511.045 I			14	1991.61 III	11	3276.08 III
15	7586.04 I			13	1994.07 III	10	3288.81 III
15	7711.71 II			12	1995.56 III	9	3305.22 III
30	7780.59 I			12	1996.42 III	9	3339.39 III
40	7832.22 I				Air	9	3499.59 III
80	7937.131 I			10	2061.55 III	9	3500.28 III
60	7945.984 I			12	2068.24 III	10	3501.76 III
80	7998.939 I			14	2078.99 III	10	3586.04 III
60	8046.047 I			10	2084.35 III	11	3600.94 III
50	8085.176 I			12	2090.14 III	11	3603.88 III
150	8220.41 I			15	2097.48 III	16	3954.33 III
120	8327.053 I			12	2097.69 III	11	3968.72 III
20	8331.908 I			12	2103.80 III	9	3969.49 III
120	8387.770 I			10	2107.32 III	10 w	3979.42 III
30	8468.404 I			15	2151.78 III	10	4035.42 III
15	8514.069 I			12	2157.71 III	11	4053.11 III
60	8661.898 I			12	2158.47 III	12	4081.00 III
150	8688.621 I			10	2161.27 III	10	4120.90 III
12	8793.38 I			12	2166.95 III	11	4122.02 III
12	8824.23 I			12	2171.04 III	11	4122.78 III
20	8866.96 I			15	2174.66 III	15	4137.76 III
15	8999.56 I			12	2180.41 III	13	4139.35 III
15	10216.32 I			10 p	2208.85 III	9	4140.48 III
13	10469.65 I			10	2221.83 III	9	4154.96 III
21	11119.80 I			10	2229.27 III	18	4164.73 III
14	11374.08 I			10	2232.43 III	9	4164.92 III
52	11422.32 I			10	2232.69 III	13	4166.84 III
87	11439.12 I			10	2235.91 III	13	4174.26 III
91	11593.59 I			10	2238.16 III	9	4210.67 III
255	11607.57 I			12 p	2241.54 III	11	4222.27 III
160	11638.26 I			12	2261.59 III	13	4235.56 III
230	11689.98 I			10	2267.42 III	9	4238.62 III
160	11783.26 I			10	2293.06 III	12	4243.75 III
580	11882.84 I			15	2295.86 III	12 h	4273.40 III
225	11884.08 I			10 p	2317.70 III	12	4279.72 III
1030	11973.05 I			10	2319.22 III	14 h	4286.16 III
15	12638.71 I			10 p	2321.71 III	16 h	4296.85 III
14	12879.76 I			10	2326.95 III	18 h	4304.78 III
17	13565.04 I			10 p	2336.77 III	20 h	4310.36 III
30	14236.25 I			10	2338.96 III	9	4323.68 III
24	14285.11 I			8	2389.53 III	9 h	4372.04 III
14	14292.38 I			8	2438.17 III	9 h	4372.14 III
16	14308.69 I			8 p	2582.37 III	11 h	4372.31 III

Fe III			Fe III			Fe IV			Fe IV		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
14 h	4372.53	III	9 w	8235.45	III	12	1596.67	IV	12	1700.40	IV
18 h	4372.81	III	8 w	8236.75	III	13	1598.01	IV	12	1704.93	IV
9	4395.76	III	6 w	8238.98	III	12	1600.50	IV	13	1709.81	IV
12	4419.60	III	5	8563.49	III	13	1600.58	IV	15	1711.41	IV
9	4431.02	III				13	1601.67	IV	14	1712.76	IV
9	5111.07	III				12	1602.08	IV	12	1717.11	IV
9	5127.35	III				13	1603.18	IV	14	1717.90	IV
12	5156.12	III				13	1603.73	IV	14	1718.16	IV
10	5199.08	III				13	1604.88	IV	12	1718.42	IV
10	5235.66	III				13	1605.68	IV	14	1719.46	IV
18	5243.31	III				15	1605.97	IV	14	1722.71	IV
13 l	5260.34	III				13	1606.98	IV	14	1724.06	IV
9	5272.37	III				17	1609.10	IV	12	1724.26	IV
14	5272.98	III				14	1609.83	IV	16	1725.63	IV
15	5276.48	III				13	1610.47	IV	13	1761.08	IV
16	5282.30	III				13	1611.20	IV	12	1764.92	IV
12	5284.83	III				13	1613.64	IV	12	1767.36	IV
11	5298.12	III				15	1614.02	IV	13	1792.10	IV
12	5299.93	III				13	1614.64	IV	13	1796.93	IV
14 w	5302.60	III				13	1615.00	IV	12	1805.32	IV
10	5306.76	III				12	1615.61	IV	12	1820.42	IV
9	5310.88	III				16	1616.68	IV	13	1827.98	IV
10	5322.74	III				14	1617.68	IV	12	1840.24	IV
11	5346.88	III				14	1619.02	IV	12	1860.42	IV
12	5353.77	III				12	1620.91	IV	12	1869.64	IV
12	5363.76	III				13	1621.16	IV	12	1874.23	IV
10	5368.06	III				14	1621.57	IV			
11 l	5375.47	III				13	1623.38	IV			
11	5719.88	III				13	1623.53	IV			
9	5744.19	III				15	1626.47	IV			
10	5756.38	III				14	1626.90	IV	300	361.28	V
18	5833.93	III				13	1628.54	IV	300	365.43	V
9	5848.76	III				13	1630.18	IV	300	365.86	V
10	5854.62	III				17	1631.08	IV	300	374.24	V
9	5876.26	III				12	1632.08	IV	300	374.87	V
15	5891.91	III				14	1632.40	IV	300	375.98	V
9	5898.68	III				13	1634.01	IV	300	379.59	V
9	5918.96	III				12	1638.07	IV	300	380.31	V
10 p	5920.13	III				12	1638.30	IV	300	381.27	V
18 p	5929.69	III				14	1639.40	IV	300	384.96	V
10	5952.31	III				16	1640.04	IV	300	384.96	V
14	5953.62	III				14	1640.16	IV	300	384.97	V
9	5968.48	III				15	1640.16	IV	300	385.03	V
12	5979.32	III				15	1641.87	IV	300	385.11	V
9 h	5981.01	III				12	1642.88	IV	300	385.25	V
12 h	5989.08	III				15	1642.88	IV	300	385.26	V
18	5999.54	III				15	1647.09	IV	300	385.30	V
9	6031.02	III				15	1651.58	IV	300	385.75	V
16	6032.59	III				13	1652.90	IV	300	385.88	V
13	6036.56	III				13	1653.41	IV	350	386.16	V
11	6048.72	III				13	1656.11	IV	300	386.74	V
11	6054.18	III				15	1656.65	IV	300	386.78	V
9	6056.36	III				12	1657.82	IV	300	386.85	V
9	6149.99	III				12	1658.43	IV	300	386.88	V
9	6169.74	III				14	1660.10	IV	350	386.88	V
9	6185.26	III				13	1661.57	IV	400	387.20	V
7	6186.56	III				13	1662.32	IV	400	387.50	V
7	6194.79	III				13	1662.52	IV	300	387.62	V
6	6195.43	III				13	1663.54	IV	400	387.76	V
6	6201.37	III				13	1668.09	IV	400	387.78	V
5 s	6203.04	III				12	1669.61	IV	300	387.98	V
5	6259.81	III				14	1671.04	IV	300	388.61	V
6 p	6294.50	III				12	1672.86	IV	300	388.82	V
5	6357.81	III				13	1673.68	IV	300	390.11	V
5 h	7317.63	III				14	1675.66	IV	300	390.19	V
6 h	7320.14	III				12	1676.78	IV	300	390.78	V
5 w	7921.17	III				12	1677.12	IV	300	391.94	V
5 w	8230.88	III				13	1681.36	IV	300	392.06	V
5 w	8231.79	III				12	1681.95	IV	300	392.38	V
						15	1687.69	IV	300	392.50	V
						15	1698.88	IV			

Fe V		Fe V		Kr I and II			Kr I and II		
Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength		Intensity	Wavelength	
300	392.51 V	300	1365.57 V	20	951.06 I		500	4615.292 II	
300	392.70 V	700	1373.59 V	50	953.40 I		1000	4619.166 II	
300	392.91 V	600	1373.67 V	50	963.37 I		800	4633.885 II	
300	393.27 V	300	1374.12 V	2000	964.97 II		2000	4658.876 II	
300	393.72 V	500	1376.34 V	100	1001.06 I		500	4680.406 II	
300	393.73 V	300	1376.46 V	100	1003.55 I		100	4691.301 II	
300	393.91 V	500	1378.56 V	100	1030.02 I		200	4694.360 II	
300	393.97 V	300	1385.68 V	200	1164.87 I		3000	4739.002 II	
300	394.04 V	800	1387.94 V	650	1235.84 I		300	4762.435 II	
300	394.64 V	400	1397.97 V		Air		1000	4765.744 II	
300	395.15 V	600	1400.24 V	100 h	2464.77 II		300	4811.76 II	
300	395.79 V	800	1402.39 V	60	2492.48 II		300	4825.18 II	
400	395.90 V	400	1406.67 V	80 h	2712.40 II		800	4832.077 II	
300	399.84 V	500	1406.82 V	100	2833.00 II		700	4846.612 II	
300	400.11 V	400	1407.25 V	100 h	3607.88 II		150	4857.20 II	
300	400.51 V	300	1409.03 V	200	3631.889 II		300	4945.59 II	
300	400.52 V	300	1409.22 V	250	3653.928 II		200	5022.40 II	
300	400.63 V	600	1409.45 V	80	3665.324 I		250	5086.52 II	
300	401.04 V	400	1415.20 V	150	3669.01 II		400 h	5125.73 II	
300	401.64 V	300	1418.12 V	100	3679.559 I		500	5208.32 II	
300	401.86 V	600	1420.46 V	80	3686.182 II		200	5308.66 II	
300	402.87 V	800	1430.57 V	300 h	3718.02 II		500	5333.41 II	
300	403.06 V	800	1440.53 V	200	3718.595 II		200	5468.17 II	
400	404.62 V	300	1440.79 V	150	3721.350 II		500	5562.224 I	
400	405.50 V	400	1442.22 V	200	3741.638 II		2000	5570.288 I	
800	407.42 V	800	1446.62 V	150	3744.80 II		80	5580.386 I	
600	407.44 V	700	1448.85 V	80	3754.245 II		100	5649.561 I	
400	407.49 V	400	1449.93 V	500	3778.089 II		400	5681.89 II	
500	407.75 V	300	1455.56 V	500	3783.095 II		200 h	5690.35 II	
400	409.71 V	700	1456.16 V	150 h	3875.44 II		100	5832.855 I	
400	410.20 V	500	1459.83 V	150	3906.177 II		3000	5870.914 I	
600	411.55 V	400	1460.73 V	200	3920.081 II		200	5992.22 II	
300	415.01 V	500	1462.63 V	100	3994.840 II		60	5993.849 I	
300	416.66 V	700	1464.68 V	100 h	3997.793 II		60	6056.125 I	
300	416.84 V	500	1465.38 V	300	4057.037 II		300	6420.18 II	
700	417.39 V	400	1466.65 V	300	4065.128 II		100	6421.026 I	
700	418.04 V	500	1469.00 V	500	4088.337 II		200	6456.288 I	
500	418.47 V	300	1475.60 V	250	4098.729 II		150	6570.07 II	
300	420.56 V	500	1479.47 V	100	4109.248 II		60	6699.228 I	
700	421.06 V	300	1554.22 V	250	4145.122 II		100	6904.678 I	
500	421.78 V			150	4250.580 II		250	7213.13 II	
300	422.28 V			1000	4273.969 I		100	7224.104 I	
500	422.31 V			100	4282.967 I		80	7287.258 I	
300	423.23 V			600	4292.923 II		400	7289.78 II	
500	426.06 V			200	4300.49 II		400	7407.02 II	
500	426.11 V			500 h	4317.81 II		60	7425.541 I	
300	426.83 V			400	4318.551 I		200	7435.78 II	
350	426.97 V			1000	4319.579 I		100	7486.862 I	
300	434.42 V			150 h	4322.98 II		300	7524.46 II	
300	439.22 V			100	4351.359 I		1000	7587.411 I	
300	444.70 V			3000	4355.477 II		2000	7601.544 I	
300	445.44 V			500	4362.641 I		150	7641.16 II	
300	446.04 V			200	4369.69 II		1000	7685.244 I	
300	458.16 V			800	4376.121 I		1200	7694.538 I	
300	486.17 V			300 h	4386.54 II		250	7735.69 II	
400	1317.86 V			200	4399.965 I		150	7746.827 I	
300	1318.35 V			100	4425.189 I		800	7854.821 I	
300	1320.41 V			500	4431.685 II		200	7913.423 I	
300	1321.34 V			600	4436.812 II		180	7928.597 I	
300	1321.49 V			600	4453.917 I		200	7933.22 II	
400	1323.27 V			800	4463.689 I		120	7973.62 II	
400	1330.40 V			800	4475.014 II		100	7982.401 I	
300	1345.61 V			400 h	4489.88 II		1500	8059.503 I	
400	1359.01 V			600	4502.353 I		4000	8104.364 I	
300	1361.28 V			400 h	4523.14 II		6000	8112.899 I	
300	1361.45 V			200 h	4556.61 II		60	8132.967 I	
600	1361.82 V			800	4577.209 II		3000	8190.054 I	
300	1363.08 V			300	4582.978 II		200	8202.72 II	
300	1363.64 V			150 h	4592.80 II		80	8218.365 I	

KRYPTON (Kr)

Z = 36

Kr I and II

Refs. 61,121,123,147,
208,232 - E.F.W.

Vacuum

60	729.40 II
200	761.18 II
100	763.98 II
60	766.20 II
200	771.03 II
60 p	773.69 II
200	782.10 II
100	783.72 II
60	818.15 II
60	830.38 II
100	844.06 II
60	864.82 II
60	868.87 II
200	884.14 II
1000	886.30 II
400	891.01 II
200	911.39 II
2000	917.43 II
50	945.44 I
50	946.54 I

Kr V			La I and II			La I and II			La I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
120	637.87	V	3000	4042.91	II	160	4671.83	II	720	6249.93	I
	690.86	V	320	4050.08	II	230	4692.50	II	260 d	6262.30	II
	691.75	V	220	4060.33	I	140	4703.28	II	180	6296.09	II
600	708.85	V	160	4064.79	I	170	4716.44	II	160	6320.39	II
	810.70	V	850	4067.39	II	140	4719.94	II	110	6325.91	I
			110	4076.71	II	230	4728.42	II	170	6390.48	II
LANTHANUM (La)			2800	4077.35	II	500	4740.28	II	450	6394.23	I
Z = 57			120	4079.18	I	390	4743.09	II	210	6410.99	I
La I and II			5500	4086.72	II	320	4748.73	II	250	6455.99	I
Ref. 1 - C.H.C.			180	4089.61	I	160	4766.89	I	110	6526.99	II
Air			280	4099.54	II	160	4804.04	II	130	6543.16	I
240	2187.87	II	110	4104.87	I	160	4809.01	II	140	6578.51	I
770	2256.76	II	4400	4123.23	II	200	4824.06	II	180	6709.50	I
200	2319.44	II	110	4137.04	I	320	4860.91	II	120	6774.26	II
400	2610.34	II	550	4141.74	II	850	4899.92	II	13 b	7011.22	LaO
420	2808.39	II	1100	4151.97	II	1000	4920.98	II	75	7023.67	I
130	2885.14	II	220	4152.78	II	1000	4921.79	II	26	7032.05	I
160	2893.07	II	100	4160.26	I	140	4934.83	II	26 b	7040.84	LaO
110	2950.50	II	280	4187.32	I	110	4946.47	II	110	7045.96	I
180	3104.59	II	280	4192.36	II	370	4949.77	I	13 b	7054.80	LaO
130	3142.76	II	1500	4196.55	II	340	4970.39	II	160	7066.23	II
510	3245.13	II	240	4204.04	II	370	4986.83	II	65	7068.37	I
260	3249.35	II	300	4217.56	II	140	4991.28	II	21bl	7070.79	LaO
550	3265.67	II	200	4230.95	II	720	4999.47	II	13	7076.38	I
800	3303.11	II	1600	4238.38	II	140	5046.88	I	21bl	7085.40	LaO
1500	3337.49	II	140	4249.99	II	210	5050.57	I	26bl	7101.02	LaO
870	3344.56	II	320	4263.59	II	170	5056.46	I	10 h	7116.8	II
200	3376.33	II	480	4269.50	II	200	5106.23	I	19bl	7131.58	LaO
1500	3380.91	II	240	4275.64	II	470	5114.56	II	10	7149.77	I
130	3452.18	II	300	4280.27	I	470	5122.99	II	40 h	7158.08	I
180	3453.17	II	600	4286.97	II	450	5145.42	I	50	7161.25	I
200	3574.43	I	600	4296.05	II	180	5156.74	II	10	7162.60	LaO
320	3628.83	II	120	4300.44	II	180	5157.43	II	21	7219.91	I
120	3637.15	II	440	4322.51	II	290	5158.69	I	10 b	7257.16	LaO
170 d	3641.53	I	4600	4333.74	II	120	5163.62	II	26	7270.09	I
	3641.66	II	550	4354.40	II	580	5177.31	I	10	7270.30	I
1000	3645.42	II	110	4364.67	II	850	5183.42	II	110cw	7282.34	II
390	3650.18	II	110bl	4371.97	LaO	260	5188.22	II	10	7320.91	I
170	3662.08	II	110bl	4375.84	LaO	170	5204.15	II	110cw	7334.18	I
120	3704.54	I	110	4378.10	II	720	5211.86	I	65	7345.34	I
320	3705.82	II	280	4383.44	II	520	5234.27	I	50bl	7379.71	LaO
550	3713.54	II	100	4385.20	II	340	5253.46	I	85bl	7380.08	LaO
140	3714.87	II	220bl	4418.24	LaO	110	5259.39	II	35	7382.73	I
270	3715.53	II	160bl	4423.17	LaO	370	5271.19	I	110bl	7403.52	LaO
2400	3759.08	II	160	4423.90	I	140	5290.84	II	210bl	7403.75	LaO
120	3780.67	II	260	4427.55	II	370	5301.98	II	50 b	7411.34	LaO
3700	3790.83	II	100bl	4428.10	LaO	140	5302.62	II	65bl	7434.28	LaO
3900	3794.78	II	2000	4429.90	II	180	5303.55	II	110bl	7434.36	LaO
190	3835.08	II	160bl	4432.98	LaO	110	5340.67	II	30 b	7442.92	LaO
600	3840.72	II	100bl	4438.01	LaO	110	5357.86	I	50 h	7463.08	I
120	3846.00	II	100	4452.15	I	130	5377.09	II	50bl	7465.25	LaO
1600	3849.02	II	100	4455.80	II	140	5380.99	II	95bl	7465.48	LaO
130	3854.91	II	850	4522.37	II	500	5455.15	I	75cw	7483.50	II
3400	3871.64	II	170	4525.31	II	470	5501.34	I	40bl	7496.50	LaO
1700	3886.37	II	420	4526.12	II	110bl	5602.50	LaO	95bl	7496.78	LaO
1300	3916.05	II	400	4558.46	II	160	5631.22	I	50	7498.83	I
1100	3921.54	II	110	4559.29	II	240	5648.25	I	30 b	7506.79	LaO
160	3927.56	I	160	4567.91	I	130	5657.72	I	19bl	7528.21	LaO
2200	3929.22	II	200	4570.02	I	180	5740.66	I	50bl	7528.39	LaO
180	3936.22	II	400	4574.88	II	160	5744.41	I	30	7533.59	I
9000	3949.10	II	200	4580.06	II	160	5761.84	I	85	7539.23	I
4400	3988.52	II	160	4605.78	II	160	5769.07	II	35bl	7560.09	LaO
3600	3995.75	II	410	4613.39	II	370	5769.34	I	35bl	7592.26	LaO
180	4015.39	I	410	4619.88	II	320	5789.24	I	19 h	7612.94	II
250	4025.88	II	110	4645.28	II	450	5791.34	I	19 b	7624.99	LaO
2800	4031.69	II	540	4655.50	II	220	5797.58	II	21	7664.34	I
140	4037.21	I	360	4662.51	II	160	5805.78	II	15 h	7841.80	I
			230	4663.76	II	140	5821.99	I	21 b	7876.87	LaO
			200	4668.91	II	320	5930.62	I	75bl	7877.22	LaO

La I and II			La III			La III			La IV		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
75bl	7910.19	LaO	200	1058.63	III	2	5511.72	III	750 d	1645.21	IV
150bl	7910.54	LaO	1000	1072.59	III	1	5518.19	III	1000	1664.84	IV
50 b	7944.61	LaO	5000	1076.91	III	45	5529.54	III	750	1684.17	IV
110bl	7944.95	LaO	50000	1081.61	III	1	5744.09	III	2000 p	1767.65	IV
40	7964.83	I	95000	1099.73	III	200	5778.14	III	4000	1808.66	IV
35 b	7979.34	LaO	5000	1100.70	III	2	5813.45	III	1000	1851.81	IV
75bl	7979.70	LaO	30	1208.80	III	3	5875.63	III	1500	1852.77	IV
35 h	8001.89	I	30	1212.29	III	55	5888.62	III	750	1879.79	IV
21 b	8014.43	LaO	200	1236.54	III	3	5932.71	III	1000	1881.57	IV
65bl	8014.79	LaO	100	1253.99	III	2	6017.11	III	800	1889.22	IV
30 b	8019.48	LaO	2000	1255.63	III	20	6055.84	III	1000	1891.47	IV
35hc	8051.39	I	100	1259.55	III	35	6119.25	III	5000	1902.97	IV
75	8086.05	I	100	1322.42	III	120	6141.99	III	800	1907.44	IV
15 b	8122.20	LaO	5000	1330.04	III	55	6220.00	III	1500 c	1950.80	IV
15 b	8159.02	LaO	10000	1349.18	III	60	6348.21	III	1200 c	1957.57	IV
7 h	8203.38	I	5000	1459.49	III	3	8114.42	III		Air	
50	8247.44	I	2000	1466.44	III	2	8135.96	III	3000	2012.42	IV
13 h	8316.04	I	10000	1523.79	III	250	8252.60	III	750	2037.43	IV
85	8324.69	I	500	1528.55	III	100	8275.39	III	2000 c	2066.50	IV
95	8346.53	I	5000	1536.17	III	200	8287.75	III	3000 c	2073.18	IV
8 h	8379.80	I	200	1923.34	III	250	8321.11	III	1500	2143.23	IV
8 b	8453.55	LaO	500	1938.57	III	300	8583.45	III	4000 c	2197.45	IV
8 h	8467.62	I		Air		120	9184.38	III	1000 w	2221.12	IV
26	8476.48	I	60	2216.07	III	100	9212.63	III	900	2227.34	IV
13 h	8507.37	I	20	2238.36	III	80	9923.99	III	3000	2244.95	IV
13 h	8513.57	I	25	2258.61	III	140	10284.79	III	7500 w	2265.91	IV
8 h	8514.65	II	5	2260.30	III	20	10370.34	III	2000	2315.89	IV
17 b	8526.59	LaO	250	2297.74	III	12	10937.90	III	750	2348.36	IV
17 c	8543.46	I	400	2379.37	III				750	2355.31	IV
65	8545.44	I	10	2387.99	III		La IV		2000 c	2407.10	IV
15 b	8563.54	LaO	20	2392.49	III		Ref. 79 - J.R.		25000 w	2417.58	IV
9 h	8590.94	I	100	2476.60	III		Vacuum		1200 p	2443.92	IV
9 b	8600.81	LaO	50	2478.65	III	100	344.12	IV	18000 c	2502.81	IV
7 h	8624.22	I	2	2513.43	III	7000	453.50	IV	15000	2515.02	IV
15	8638.47	I	4	2588.87	III	10000	463.14	IV	50000	2532.75	IV
19hw	8672.11	I	2	2604.83	III	15000	499.54	IV	900 d	2535.76	IV
40	8674.43	I	400	2651.50	III	40000	552.02	IV	45000	2582.05	IV
13 h	8720.41	I	100	2682.34	III	30000	631.26	IV	18000 c	2591.30	IV
35	8748.38	I	150	2684.76	III	25	724.92	IV	95000 w	2597.50	IV
19	8818.93	I	110	2897.88	III	15	733.29	IV	5000 c	2608.01	IV
35	8825.82	I	160	2904.58	III	10	797.03	IV	70000 w	2662.75	IV
21	8839.63	I	7	2950.84	III	10 c	980.03	IV	50000 w	2848.30	IV
			10	2953.77	III	50	1039.30	IV	12000 c	2863.30	IV
			40	2992.10	III	60 p	1062.09	IV	30000 c	2962.58	IV
			4	3006.19	III	75	1158.35	IV	70000 w	3009.51	IV
			15	3009.22	III	50	1164.29	IV	90000 c	3056.68	IV
			100	3075.17	III	400	1230.90	IV	3500	3522.28	IV
			4	3085.38	III	75 p	1260.79	IV	2000	3650.40	IV
			25	3093.03	III	300	1261.12	IV	2000 p	4270.76	IV
			15	3096.26	III	150	1283.19	IV	1500 w	4549.80	IV
			200	3111.97	III	2000	1302.31	IV	500	4836.89	IV
			50	3116.74	III	1200	1333.53	IV			
			1000	3171.63	III	3500	1334.96	IV		La V	
			1500	3171.74	III	1000	1352.76	IV		Ref. 78 - J.R.	
			50	3172.69	III	25000	1368.04	IV		Vacuum	
			20	3196.84	III	8000	1377.49	IV	2	389.03	V
			70	3289.11	III	3000	1394.32	IV	400	390.72	V
			15	3301.48	III	5000	1414.58	IV	1	398.53	V
			35	3327.66	III	7000	1432.55	IV	30	399.34	V
			500	3517.09	III	7000	1441.63	IV	350	405.10	V
			600	3517.22	III	7500	1462.15	IV	50	416.13	V
			3	4129.24	III	20000	1463.47	IV	3	421.55	V
			5	4137.43	III	7500	1467.54	IV	50	423.07	V
			200	4482.97	III	15000	1507.87	IV	400	424.78	V
			300	4499.05	III	5000	1527.19	IV	1000	432.11	V
			5	5145.73	III	2500	1575.92	IV	2500	435.28	V
			8	5158.41	III	1500	1583.61	IV	700	436.14	V
			6	5467.81	III	750	1585.11	IV	700	436.84	V
			55	5491.90	III	750	1637.42	IV	300	437.11	V

Pb III			Pb IV			Pb V			Pb V		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
1	1266.9	III	12	917.90	IV	2	394.38	V	2	1843.00	V
20	1553.1	III	10	922.12	IV	5	424.64	V	2	1888.67	V
1	1610.1	III	12	922.49	IV	3	431.03	V	2	1897.02	V
4	1711.23	III	7	924.52	IV	3	436.60	V	2	1914.33	V
	Air		10	927.64	IV	2	438.47	V	4	1919.74	V
10	3043.85	III	14	932.20	IV	6	438.91	V	5	1957.96	V
4	3089.08	III	8	937.00	IV	4	453.45	V	2	1998.58	V
4	3102.74	III	7	952.85	IV	3	461.70	V	10	1998.83	V
10	3137.81	III	8	1012.44	IV	3	496.20	V		Air	
10	3176.50	III	14	1028.61	IV	4	694.42	V	8	2078.45	V
5	3242.84	III	20	1032.05	IV	8	696.20	V	10	2142.55	V
1	3530.17	III	16	1041.24	IV	20	703.73	V	10	2167.97	V
7	3589.87	III	18	1044.14	IV	4	706.29	V	20	2259.01	V
7	3689.31	III	15	1056.53	IV	6	707.66	V	10	2276.66	V
3	3706.02	III	12	1072.09	IV	5	730.85	V	8	2301.49	V
5	3728.69	III	7	1079.88	IV	12	749.46	V	15	2424.81	V
12	3854.08	III	18	1080.81	IV	10	752.52	V	4	4809.36	V
8	3951.92	III	20	1084.17	IV	10	755.80	V	5	6650.99	V
3	4031.16	III	6	1089.94	IV	6	762.76	V	4	6753.20	V
3	4094.54	III	7	1099.47	IV	10	765.87	V		LITHIUM (Li)	
2	4128.11	III	6	1115.30	IV	18	767.45	V		Z = 3	
8	4272.66	III	20	1116.08	IV	18	769.49	V		Li I and II	
6	4499.34	III	18	1137.84	IV	14	771.42	V		Refs. 3,15,17,18,37,41,112,	
7	4571.21	III	8	1142.77	IV	14	782.79	V		284,321,335 - J.O.S.	
1	4596.45	III	14	1144.93	IV	10	787.05	V		Vacuum	
6	4761.12	III	20	1189.95	IV	15	797.02	V		125.5	II
4	4798.59	III	8	1267.55	IV	5	799.80	V		136.5	II
1	4826.86	III	8	1290.82	IV	18	809.63	V		140.5	II
2	4855.06	III	10	1291.10	IV	5	812.32	V		167.21	II
3	5065.12	III	20	1313.05	IV	8	814.10	V		168.74	II
4	5191.56	III	8	1323.92	IV	8	820.09	V		171.58	II
5	5523.97	III	12	1343.06	IV	5	825.52	V		178.02	II
3	5779.41	III	16	1388.94	IV	8	829.32	V		199.28	II
6	5857.96	III	6	1397.02	IV	5	851.98	V		207.5	II
	Pb IV		18	1400.26	IV	20	863.97	V		456.	II
	Ref. 106 - D.R.W.		10	1404.34	IV	10	867.10	V		483.	II
	Vacuum		7	1510.76	IV	6	880.50	V		540.	II
8	475.36	IV	14	1535.71	IV	18	883.90	V		729.	II
7	478.35	IV	8	1798.39	IV	14	888.37	V		800.	II
10	496.38	IV	8	1893.19	IV	14	894.40	V		820.	II
12	499.94	IV	12	1959.34	IV	12	896.08	V		861.	II
9	515.07	IV	16	1973.16	IV	8	915.09	V		905.5	II
14	529.78	IV		Air		14	915.71	V		917.5	II
20	570.16	IV	10	2042.58	IV	12	918.09	V		936.	II
8	573.90	IV	12	2049.34	IV	12	920.28	V		945.	II
8	584.52	IV	12	2079.22	IV	12	920.66	V		965.	II
10	648.50	IV	8	2151.96	IV	6	940.74	V		972.	II
9	656.10	IV	15	2154.01	IV	8	946.20	V		988.	II
10	761.09	IV	12	2177.46	IV	6	950.93	V		1018.	II
18	802.07	IV	16	2359.53	IV	12	954.35	V		1032.	II
12	802.82	IV	4	2864.24	IV	4	954.95	V		1036.	II
10	812.59	IV	4	2864.50	IV	10	955.28	V		1093.	II
8	822.07	IV	16	2417.61	IV	4	964.38	V		1103.	II
10	827.41	IV	4	2978.14	IV	6	989.14	V		1109.	II
12	832.60	IV	4	3052.56	IV	8	1005.42	V		1116.	II
8	840.99	IV	4	3221.17	IV	10	1051.26	V		1132.1	II
8	842.88	IV	4	3962.48	IV	4	1059.26	V		1141.	II
12	845.94	IV	4	4049.80	IV	10	1088.86	V		1166.4	II
18	857.64	IV	10	4496.15	IV	9	1096.52	V		1198.09	II
8	859.02	IV	16	4534.60	IV	6	1104.79	V		1215.	II
16	862.33	IV	8	4605.40	IV	4	1121.33	V		1238.	II
14	870.44	IV	2	5914.54	IV	10	1137.50	V		1253.8	II
12	879.96	IV		Pb V		4	1152.36	V		1420.89	II
7	880.35	IV		Ref. 106 - D.R.W.		12	1157.88	V		1424.	II
14	884.96	IV		Vacuum		14	1185.43	V		1492.93	II
14	884.99	IV	2	367.40	V	11	1233.50	V		1492.97	II
16	890.72	IV	2	372.53	V	10	1248.47	V	3		
12	908.51	IV	2	387.87	V	8	1635.75	V	5		
						2	1802.87	V			

Li I and II		Li I and II		Li I and II		Lu I and II	
Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength
1	1493.04	0	2674.46		4760.	20	2549.72
	1555.		2728.24		4763.	35	2561.80
3	1653.08	5	2728.29		4788.36	930	2571.23
5	1653.13	2	2728.32		4843.0	1700	2578.79
1	1653.21	3	2730.47	4	4881.32	80 h	2582.13
	1681.66	1	2730.55	4	4881.39	1800	2613.40
	1755.33	5	2741.20	1	4881.49	18000	2615.42
	Air		2766.99	8	4971.66	1800	2619.26
	2009.		2790.31	8	4971.75	90	2657.05
	2039.		2801.		5037.92	2700	2657.80
	2068.		2846.		5095.	90 h	2677.25
	2131.		2868.		5114.	570 h	2685.08
	2164.		2895.		5190.	90 h	2685.54
	2173.4	2	2934.02		5271.	4200	2701.71
	2183.	2	2934.07		5315.	90 h	2715.91
	2214.	5	2934.12		5395.	180 d	2719.09
	2222.	1	2934.25		5440.	480 h	2728.95
	2237.		2968.	600 c	5483.55	75 c	2738.17
h	2249.21	3	3029.12	600 c	5485.65	3600	2754.17
	2286.82	3	3029.14	320	6103.54	750 h	2765.74
	2302.57		3144.	320	6103.65	2700	2796.63
	2303.33	3	3155.31	3600	6707.76	35	2821.23
	2304.59	4	3155.33	3600	6707.91	270 c	2834.35
	2304.92	1	3196.26	48	8126.23	330 h	2845.13
	2305.36	9	3196.33	48	8126.45	3000	2847.51
	2305.83	4	3196.36		8517.37	570 h	2885.14
	2306.29	5	3199.33		9581.42	6300	2894.84
	2306.82	2	3199.43		10120.	4500	2900.30
	2307.44	17	3232.66		12232.	300	2903.05
	2308.97		3249.87		12782.	9000	2911.39
	2309.88		3306.28		13566.	270 h	2949.73
	2310.94		3393.		17552.	1200	2951.69
	2312.11		3488.		18697.	60	2955.78
	2313.49		3579.8		19290.	4200	2963.32
	2315.08		3618.		24467.	2400	2969.82
	2316.95		3662.		40475.	1800	2989.27
	2319.18		3684.32			3000	3020.54
	2321.88	1	3714.00		Li III	120	3027.29
	2325.11	5	3714.16	Ref. 335 - J.O.S.	Vacuum	2100	3056.72
	2329.02	6 d	3714.27		102.9	7500	3077.60
	2329.84	8	3714.29		103.4	390	3080.11
	2333.94	7 d	3714.40		104.1	5100 h	3081.47
3	2336.88	10	3714.41		105.5	3000	3118.43
5	2336.91	1	3714.51		108.0	2400	3171.36
2	2337.00	0	3714.58		113.9	100	3183.73
	2340.15	3	3718.7		135.0	260	3191.80
	2348.22	6	3794.72		540.0	1400	3198.12
	2358.93	20	3915.30		729.1	4800	3254.31
	2373.54	20	3915.35			3800	3278.97
	2381.54	10	3985.48		LUTETIUM (Lu)	7600	3281.74
	2383.20	10	3985.54		Z = 71	6200	3312.11
1	2394.39	40	4132.56		Lu I and II	7600	3359.56
	2402.33	40	4132.62		Ref. 1 - C.H.C.	6200	3376.50
	2410.84		4196.		Air	950	3385.50
3	2425.43	20	4273.07		1700 h	160 h	3391.55
	2429.81	20	4273.13		95	1400	3396.82
	2460.2	5	4325.42		2195.54	4100	3397.07
10	2475.06	5	4325.47		2276.94	4800	3472.48
	2506.94	1	4325.54		2297.41	8300 c	3507.39
	2508.78		4516.45		2392.19	1600	3508.42
	2518.		4590.		2399.14	4800	3554.43
	2539.49	13	4602.83		2419.21	4800	3567.84
24	2551.7	13	4602.89		2430.26	340	3596.34
	2559		4607.34		2459.64	800	3623.99
15	2562.31	0	4671.51		2469.27	680	3636.25
	2605.08	6	4671.65		2481.72	2600	3647.77
	2640.	2	4671.70	21 h	2536.95	60	3684.32
2	2657.29	3	4678.06		2546.87	60	3710.95
3	2657.30	1	4678.29		2549.44	110	3756.70

Lu IV			Lu V			Mg I and II			Mg I and II			
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		
20	1551.59	IV	40	922.73	V	193.40	II		20	1476.00	II	
20	1562.06	IV	80	925.79	V	193.64	II		25	1478.01	II	
30	1592.55	IV	50	927.22	V	197.76	II		20	1480.89	II	
1 s	1594.92	IV	40	947.80	V	199.31	II		30	1482.90	II	
100 c	1607.72	IV	50 w	1420.02	V	200.29	I			1625.22	I	
50 c	1631.65	IV	50	1432.50	V	202.00	II			1625.50	I	
20	1684.50	IV	100	1432.77	V	202.27	II			1625.81	I	
60 c	1693.67	IV	200	1441.76	V	202.51	II			1626.16	I	
400 c	1721.42	IV	40	1443.64	V	202.94	II			1626.36	I	
100	1725.14	IV	100	1448.14	V	203.15	I			1626.56	I	
100 c	1735.79	IV	40	1449.32	V	203.42	II			1626.79	I	
100	1736.78	IV	100	1450.36	V	203.53	II			1627.02	I	
100	1741.74	IV	100	1450.69	V	204.22	I			1627.27	I	
50 c	1743.84	IV	100	1452.64	V	209.09	II			1627.53	I	
40 c	1752.60	IV	200	1453.35	V	209.43	II			1627.82	I	
200	1759.61	IV	100	1454.38	V	209.84	I			1628.12	I	
300	1772.08	IV	100	1455.21	V	213.53	I			1628.46	I	
600	1772.57	IV	100	1460.11	V	215.12	I			1628.80	I	
200	1782.45	IV	40 c	1467.81	V	215.31	I			1629.21	I	
100	1797.52	IV	200	1468.99	V	215.45	I			1629.59	I	
20 c	1901.63	IV	50	1469.45	V	215.66	I			1630.52	I	
100	1983.92	IV	100	1471.20	V	215.79	I			1631.62	I	
20	1990.52	IV	400	1472.12	V	216.22	I			1632.93	I	
40	1996.18	IV	200	1473.71	V	216.36	I			1634.52	I	
	Air		40	1475.77	V	216.68	I			1636.48	I	
100	2003.18	IV	200	1485.58	V	217.21	I			1638.90	I	
100	2020.94	IV	50	1709.02	V	217.37	I			1641.97	I	
20	2071.10	IV	40	1728.90	V	218.19	I	1		1645.93	I	
100	2081.09	IV	50 c	1775.92	V	218.34	I	1		1651.16	I	
400 c	2085.70	IV	40 c	1777.68	V	218.42	I	2		1658.31	I	
600 c	2086.47	IV	40 c	1784.71	V	218.74	I	5		1668.43	I	
400 c	2092.16	IV	100 c	1786.25	V	219.04	I	10		1683.41	I	
100	2103.63	IV	60 c	1787.58	V	219.28	I	15		1707.06	I	
1000 c	2104.41	IV	60 c	1793.85	V	220.03	I	40		1734.84	II	
200 c	2107.85	IV	60	1809.73	V	220.33	I	50		1737.62	II	
1000 c	2108.31	IV	60	1814.24	V	222.03	I	20		1747.80	I	
100 c	2127.43	IV				222.67	I	40		1750.65	II	
						223.45	I	50		1753.46	II	
						223.74	I	30		1827.93	I	
						225.18	I			Air		
						225.54	I	9		2025.82	I	
						226.26	I	3		2329.58	II	
						247.14	II	6		2449.57	II	
						248.47	II	1		2557.23	I	
						884.70	II	1		2560.94	I	
						884.72	II	1		2562.26	I	
						907.38	II	1		2564.94	I	
						907.41	II	1		2570.91	I	
						8	946.70	II	1		2572.25	I
						9	946.77	II	2		2574.94	I
						14	1025.96	II	1		2577.89	I
						12	1026.11	II	1		2580.59	I
						25	1239.94	II	1		2584.22	I
						20	1240.40	II	2		2585.56	I
						6	1248.51	II	3		2588.28	I
						8	1249.93	II	1		2591.89	I
						8	1271.24	II	1		2593.23	I
						9	1271.94	II	2		2595.97	I
						8	1272.72	II	2		2602.50	I
						11	1273.43	II	4		2603.85	I
						11	1306.71	II	5		2606.62	I
						12	1307.88	II	1		2613.36	I
						12	1308.28	II	2		2614.73	I
						14	1309.44	II	3		2617.51	I
						14	1365.45	II	3		2628.66	I
							1365.54	II	6		2630.05	I
							1367.26	II	8		2632.87	I
							1367.70	II	2		2644.80	I
							1369.42	II	3		2646.21	I

Lu V			Mg I and II		
Ref.	Wavelength		Ref.	Wavelength	
401 - J.R.			49,83,103,217,269,		
Vacuum			315,335 - J.O.S.		
40	555.44	V	Vacuum		
100	563.72	V	184.05	II	
50	601.54	V	184.31	II	
60	614.23	V	184.68	II	
40	628.79	V	184.81	II	
50 p	637.44	V	185.26	II	
40	637.53	V	185.59	II	
50	663.29	V	185.98	II	
60	850.06	V	186.47	II	
100	861.92	V	186.84	II	
70	866.93	V	187.19	II	
40	870.84	V	187.38	II	
50	875.89	V	188.54	II	
50	876.45	V	188.91	II	
100	880.32	V	189.01	II	
40	884.21	V	189.23	II	
70	886.16	V	189.37	II	
50	886.32	V	191.30	II	
50	886.44	V	191.56	II	
100	891.81	V	191.65	II	
60	895.01	V	192.40	II	
40	895.15	V	192.55	II	
40	898.42	V	192.84	II	
100	914.72	V	193.09	II	
40	918.26	V	193.31	II	
50	920.92	V			
40	921.32	V			
60	921.90	V			

Mg I and II		Mg I and II		Mg I and II		Mg I and II	
Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength
4	2649.06 I	7	3850.40 II	5	7387.00 I	17	9986.47 I
8	2660.76 II	2	3853.96 I	12	7387.69 I	18	9993.21 I
8	2660.82 II	1	3854.96 I	4	7580.76 II	14	10092.16 II
6	2668.12 I	2	3858.86 I	20	7657.60 I	5	10391.76 II
8	2669.55 I	3	3878.31 I	19	7659.15 I	6	10392.23 II
10	2672.46 I	2	3891.91 I	17	7659.90 I	35	10811.08 I
3	2693.72 I	2	3893.30 I	8	7690.16 I	11	10914.23 II
5	2695.18 I	3	3895.57 I	15	7691.55 I	7	10915.27 II
6	2698.14 I	4	3903.86 I	1	7722.61 I	10	10951.78 II
8	2731.99 I	6	3938.40 I	1	7746.34 I	25	10953.32 I
10	2733.49 I	1	3984.21 I	1	7759.30 I	27	10957.30 I
12	2736.53 I	8	3986.75 I	5	7786.50 II	28	10965.45 I
5	2765.22 I	2	4054.69 I	4	7790.98 II	15	11032.10 I
7	2768.34 I	10	4057.50 I	3	7811.14 I	14	11033.66 I
38	2776.69 I	3	4075.06 I	12	7877.05 II	5	11255.93 II
32	2778.27 I	2	4081.83 I	2	7881.67 I	4	11256.35 II
90	2779.83 I	4	4165.10 I	13	7896.37 II	45	11828.18 I
8	2781.29 I	15	4167.27 I	7	7930.81 I	30	12083.66 I
32	2781.42 I	20	4351.91 I	3	8047.73 I	28	14877.62 I
36	2782.97 I	6	4354.53 I	5	8049.85 I	35	15024.99 I
13	2790.79 II	6	4380.38 I	7	8054.23 I	30	15040.24 I
1000	2795.53 II	9	4384.64 II	10	8098.72 I	25	15047.70 I
16	2798.06 II	10	4390.59 II	9	8115.22 II	6	15740.71 I
600	2802.70 II	8	4428.00 II	8	8120.43 II	8	15748.99 I
12	2846.75 I	9	4433.99 II	1	8154.64 I	10	15765.84 I
14	2848.42 I	5	4436.49 II	2	8159.13 I	30	17108.66 I
16	2851.65 I	4	4436.60 II	10	8209.84 I	5	26392.90 I
6000	2852.13 I	14	4481.16 II	20	8213.03 I		
3	2915.45 I	13	4481.33 II	10	8213.99 II		Mg III
10	2936.74 I	6	4534.29 II	7	8222.92 II	Refs. 4,83,177 - J.O.S.	
12	2938.47 I	28	4571.10 I	7	8233.19 II	Vacuum	
2	2942.00 I	3	4621.30 I	11	8234.64 II	106.30	III
3	2809.76 I	7	4702.99 I	7	8303.31 I	106.92	III
2	2811.11 I	10	4730.03 I	9	8305.60 I	108.08	III
1	2811.78 I	6	4739.59 II	10	8310.26 I	110.16	III
12	2846.72 I	5	4739.71 II	15	8346.12 I	114.32	III
14	2848.34 I	7	4851.10 II	2	8466.48 I	126.50	III
16	2851.66 I	75	5167.33 I	5	8468.84 I	170.80	III
2	2902.92 I	220	5172.68 I	7	8473.69 I	171.39	III
4	2906.36 I	400	5183.61 I	10	8710.18 I	182.24	III
3	2915.45 I	8	5264.21 II	12	8712.69 I	182.97	III
2	2928.75 II	7	5264.37 II	13	8717.83 I	186.51	III
3	2936.54 II	1	5345.98 I	10	8734.99 II	187.20	III
10	2936.74 I	9	5401.54 II	17	8736.02 I	188.53	III
12	2938.47 I	2	5509.60 I	11	8745.66 II	100	231.73 III
13	2942.00 I	6	5528.41 I	14	8806.76 I	80	234.26 III
1	2967.87 II	30	5711.09 I	10	8824.32 II	10	1274.83 III
1	2971.70 II	5	5785.31 I	11	8835.08 II	11 h	1280.70 III
20	3091.08 I	4	5785.56 I	20	8923.57 I	12	1391.27 III
22	3092.99 I	7	5916.43 II	7	8989.03 I	15	1393.39 III
14	3096.90 I	6	5918.16 II	9	8991.69 I	10	1431.14 III
9	3104.71 II	10	6318.72 I	10	8997.16 I	16	1572.71 III
8	3104.81 II	9	6319.24 I	14	9218.25 II	12	1586.24 III
6	3168.98 II	7	6319.49 I	13	9244.27 II	13	1687.09 III
6	3172.71 II	10	6346.74 II	12	9246.50 I	13	1697.28 III
7	3175.78 II	9	6346.96 II	30	9255.78 I	10	1722.04 III
2	3197.62 I	11	6545.97 II	10	9327.54 II	22	1738.84 III
17	3329.93 I	5	6620.44. II	10	9340.54 II	12	1747.56 III
6	3332.15 I	6	6620.57 II	25	9414.96 I	18	1748.93 III
9	3336.68 I	2	6630.83 I	17	9429.81 I	15	1772.98 III
7	3535.04 II	7	6781.45 II	19	9432.76 I	20	1783.25 III
8	3538.86 II	8	6787.85 II	20	9438.78 I	14	1794.58 III
7	3549.52 II	7	6812.86 II	8	9502.45 I	15	1800.66 III
8	3553.37 II	8	6819.27 II	7	9503.11 I	13	1858.19 III
140	3829.30 I	4	6894.90 I	5	9503.43 I	12	1879.49 III
300	3832.30 I	6	6965.40 I	12	9631.89 II	10	1908.50 III
500	3838.29 I	8	7060.41 I	11	9632.43 II	12	1923.90 III
8	3848.24 II	10	7193.17 I	15	9953.20 I	13	1930.67 III
1	3848.91 I	10	7291.06 I	15	9983.20 I	11	1937.84 III

Mg III			Mg IV			Mn I and II			Mn I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
	Air		400	1459.62	IV	1500	2092.16	I	27	2650.99	II
15	2039.55	III	400	1481.51	IV	20	2097.46	II	60	2655.91	II
15	2055.49	III	350	1490.45	IV	20	2102.50	II	30	2666.77	II
25	2064.60	III	300	1495.50	IV	1700	2109.58	I	45	2667.00	I
15	2085.90	III	300	1607.11	IV	30	2113.96	II	30	2667.03	II
20	2091.96	III	500	1683.02	IV	290	2208.81	I	110	2672.59	II
13	2097.93	III	400	1698.81	IV	540	2213.85	I	55	2673.37	II
15	2112.77	III	300	1844.17	IV	770	2221.84	I	55	2674.43	II
16	2134.06	III		Air		20	2373.36	II	30	2676.33	I
20	2177.70	III	12 p	2518.40	IV	20	2427.38	II	45	2680.34	II
20	2395.15	III	4	2534.79	IV	50	2427.72	II	30	2680.68	II
15	2467.75	III		Mg V		30	2427.94	II	30	2681.25	II
10	2490.54	III		Ref. 128 - J.O.S.		30	2437.37	II	40	2681.72	I
10	2529.19	III		Vacuum		20	2437.84	II	45	2683.02	I
12	3299.05	III	5	251.58	V	30	2452.49	II	23	2683.75	I
13	3306.39	III	35	276.58	V	50	2499.00	II	55	2684.55	II
12	3335.90	III	10	312.30	V	30	2507.60	II	55	2685.94	II
11	3342.58	III	20	351.09	V	20	2516.60	II	110	2688.25	II
12	3361.41	III	18	352.20	V	30	2516.74	II	85	2692.66	I
10	3381.24	III	30	353.09	V	20	2521.66	II	27	2693.19	II
11	3382.90	III	15	353.30	V	20	2530.72	II	55	2695.36	II
11	3387.37	III	18	354.22	V	20	2531.80	II	27	2698.97	II
10	3706.74	III	20	355.33	V	50	2532.78	II	85	2701.00	II
10	4916.00	III		MANGANESE (Mn)		75	2533.06	I	50	2701.17	II
10	5839.82	III		Z = 25		50	2533.33	II	160	2701.70	II
15	6256.75	III		Mn I and II		30	2534.10	II	100	2703.98	II
	Mg IV			Z = 25		80	2534.22	II	130	2705.74	II
	Refs. 7,128,129 - J.O.S.			Mn I and II		100	2535.66	II	80	2707.53	II
	Vacuum			Refs. 1,126 - C.H.C.		30	2535.98	II	110	2708.45	II
40	118.16	IV		Vacuum		100	2537.92	II	45	2709.96	II
80 p	118.81	IV	20	1726.47	II	50	2541.11	II	80	2710.33	II
70	123.59	IV	30	1732.70	II	80	2542.92	II	110	2711.58	II
240	124.65	IV	50	1733.55	II	50	2543.45	II	30	2716.80	II
300	129.86	IV	40	1734.49	II	100	2548.75	II	30	2717.53	II
300	132.81	IV	30	1737.93	II	50	2551.85	II	30	2719.01	II
400	146.95	IV	20	1740.16	II	30	2553.27	II	50	2719.74	II
300	147.41	IV	20	1742.00	II	75	2556.57	II	30	2722.10	II
300	147.54	IV	30	1853.27	II	30	2556.89	II	30	2724.46	II
350	180.07	IV	20	1857.92	II	50	2557.54	II	55	2728.61	II
400	180.62	IV	50	1902.95	II	95	2558.59	II	30	2738.86	I
400	180.80	IV	20	1907.84	II	30	2559.41	II	45 h	2760.93	I
350	181.34	IV	30	1911.41	II	150	2563.65	II	30	2771.44	I
4000	320.99	IV	20 d	1914.68	II	30	2565.22	II	30 h	2776.23	I
3000	323.31	IV	100	1915.10	II	580	2572.76	I	30	2780.00	I
40	800.41	IV	20	1918.64	II	480	2575.51	I	55	2789.20	I
150	857.29	IV	30	1919.64	II	12000	2576.10	II	60	2790.36	I
30	866.74	IV	80	1921.25	II	550	2584.31	I	60	2791.08	I
50	919.03	IV	20	1923.07	II	30	2588.97	II	6200	2794.82	I
30	929.78	IV	20	1923.34	II	45	2589.71	II	5100	2798.27	I
40	1008.76	IV	30	1925.52	II	250	2592.94	I	220	2799.84	I
30	1026.41	IV	50	1926.59	II	6200	2593.73	II	3700	2801.06	I
250	1037.41	IV	30	1931.40	II	250	2595.76	I	70	2804.10	I
80	1044.37	IV	20	1945.15	II	95	2598.90	II	60	2806.14	I
60	1055.76	IV	20	1947.93	II	40	2602.14	I	55	2808.02	I
300	1210.99	IV	20	1950.14	II	30	2602.72	II	110	2809.11	I
300	1342.19	IV	30	1953.23	II	45	2603.72	II	60	2812.84	I
800	1346.57	IV	20 d	1954.81	II	4300	2605.69	II	70	2813.47	I
300	1346.68	IV	30	1959.25	II	190	2610.20	II	60	2815.02	II
600	1352.05	IV	20	1969.24	II	500	2618.14	II	30	2816.33	II
900	1384.46	IV	30	1994.23	II	140	2622.90	I	85	2817.97	I
500	1385.77	IV	9700	1996.06	I	150	2624.04	I	40	2818.77	I
800	1387.53	IV	14000	1999.51	I	40	2624.80	II	55	2821.45	I
300	1404.68	IV		Air		200	2625.58	II	55	2822.55	I
1000	1409.36	IV		Vacuum		95	2626.64	I	80	2830.79	I
500	1437.53	IV	18000	2003.85	I	30	2630.26	I	27	2836.31	I
1000	1437.64	IV	50	2037.31	II	60	2630.57	I	60	2870.08	II
300	1447.42	IV	40	2037.64	II	190	2632.35	II	30	2872.94	II
300	1459.54	IV	40	2039.97	II	130	2638.17	II	80	2879.49	II
			30	2076.21	II	80	2639.84	II	40	2882.90	I

Mn I and II			Mn I and II			Mn I and II			Mn I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
70	2886.68	II	720	3441.99	II	1500	4035.73	I	80	4626.54	I
160	2889.58	II	50	3460.03	II	55	4038.73	I	35	4671.69	I
55	2892.39	II	360	3460.33	II	5600	4041.36	I	50	4701.16	I
50	2898.70	II	360 h	3474.04	II	210 d	4045.13	I	160	4709.72	I
80	2900.16	II		3474.13	II		4045.21	I	180	4727.48	I
40	2907.22	I	290	3482.91	II	1100	4048.76	I	130	4739.11	I
140 h	2914.60	I	180	3488.68	II	80	4049.00	I	1000	4754.04	I
190 h	2925.57	I	140	3495.84	II	55	4051.73	I	180	4761.53	I
27	2928.68	I	50	3496.81	II	65	4052.47	I	750	4762.38	I
1100	2933.06	II	100	3497.54	II	150	4055.21	I	300	4765.86	I
27	2934.02	I	360	3531.85	I	1900	4055.54	I	500	4766.43	I
1500	2939.30	II		3532.00	I	210	4057.95	I	940	4783.42	I
250 h	2940.39	I	1100	3532.12	I	1100	4058.93	I	1000	4823.52	I
	2940.48	I	1300	3547.80	I	150	4059.39	I	25	4844.32	I
60	2941.04	I	1100	3548.03	I	730	4061.74	I	35	4965.88	I
1900	2949.20	II	390	3548.20	I	730	4063.53	I	19	5004.91	I
40	3007.66	I	2200	3569.49	I	80	4065.08	I	30	5074.79	I
40	3011.16	I	720	3569.80	I	80	4068.00	I	60	5117.94	I
40	3011.38	I		3570.04	I	290	4070.28	I	50	5150.89	I
40	3014.67	I	1400	3577.88	I	730	4079.24	I	50	5196.59	I
60	3016.45	I	720	3586.54	I	730	4079.42	I	85	5255.32	I
30	3019.92	II	290	3595.12	I	1100	4082.94	I	160	5341.06	I
70	3022.75	I	420	3607.54	I	1100	4083.63	I	19	5349.88	I
55	3031.06	II	420	3608.49	I	65	4089.94	I	95	5377.63	I
30	3035.35	II	360	3610.30	I	55	4105.36	I	95	5394.67	I
95	3040.60	I	290	3619.28	I	200	4110.90	I	50	5399.49	I
27	3042.73	I	220	3623.79	I	150	4131.12	I	95	5407.42	I
85	3043.36	I	140	3629.74	I	120	4135.04	I	35	5413.69	I
330	3044.57	I	100	3660.40	I	80	4141.06	I	85	5420.36	I
120	3045.59	I	70	3670.52	I	55	4147.53	I	35	5432.55	I
200	3047.04	I	70	3676.96	I	80	4148.80	I	12	5457.47	I
40	3048.86	I	50	3682.09	I	150	4176.60	I	60	5470.64	I
30	3050.65	II	280	3693.67	I	120	4189.99	I	40	5481.40	I
250	3054.36	I	180	3696.57	I	65	4201.76	I	30	5505.87	I
140	3062.12	I	70	3701.73	I	65	4211.75	I	50	5516.77	I
170	3066.02	I	210	3706.08	I	370	4235.14	I	40	5537.76	I
170	3070.27	I	130	3718.93	I	510	4235.29	I	21	5551.98	I
160	3073.13	I	55	3728.89	I	190	4239.72	I	8	5567.76	I
90	3079.63	I	130	3731.93	I	290	4257.66	I	7	5573.01	I
50	3081.33	I	260	3790.22	I	290	4265.92	I	8	5573.68	I
23	3082.05	I	55	3799.26	I	270	4281.10	I	7	5738.29	I
40	3097.06	I	110	3800.55	I	65	4284.08	I	7	5780.19	I
40	3110.68	I	55	3801.91	I	65	4312.55	I	7	5816.84	I
60 h	3148.18	I	3200	3806.72	I	50	4323.63	II	140	6013.50	I
90 h	3161.04	I	700	3809.59	I	45	4374.95	I	200	6016.64	I
140 h	3178.50	I	55	3810.69	I	45	4381.70	I	290	6021.80	I
220	3212.88	I	90	3816.75	I	55	4411.88	I	7	6384.67	I
65	3216.95	I	2100	3823.51	I	350	4414.88	I	17	6440.97	I
1000	3228.09	I	390	3823.89	I	55	4419.78	I	24	6491.71	I
300	3230.72	I	200	3829.68	I	210	4436.35	I	14 h	6942.52	I
850	3236.78	I	480	3833.86	I	800	4451.59	I	12	6989.96	I
330	3243.78	I	1300	3834.36	I	160	4453.00	I	14	7069.84	I
650	3248.52	I	350	3839.78	I	130	4455.01	I	12	7184.25	I
100	3251.14	I	670	3841.08	I	160	4455.32	I	10	7247.82	I
310	3252.95	I	350	3843.98	I	110	4455.82	I	24 h	7283.82	I
65	3254.04	I	65	3918.32	I	55	4457.04	I	35 h	7302.89	I
310	3256.14	I	120	3926.47	I	210	4457.55	I	50	7326.51	I
220	3258.41	I	65	3952.84	I	270	4458.26	I	12	7680.20	I
180	3260.23	I	55	3975.89	I	55	4460.38	I	10	7712.42	I
180	3264.71	I	65	3977.08	I	150	4461.08	I	10 h	7764.72	I
65	3296.88	I	130	3982.58	I	510	4462.02	I	10 h	8670.92	I
65	3298.22	I	150	3985.24	I	290	4464.68	I	12 h	8672.06	I
65	3320.69	I	190	3986.83	I	200	4470.14	I	10 h	8673.97	I
70	3330.67	I	150	3987.10	I	130	4472.79	I	12 h	8701.05	I
200	3330.78	II	1500	4018.10	I	40	4479.40	I	17 h	8703.76	I
100	3336.39	II	150	4026.44	I	170	4490.08	I	30 h	8740.93	I
30	3365.02	II	27000	4030.76	I	240	4498.90	I			
30	3400.12	II	19000	4033.07	I	240	4502.22	I			
50	3438.97	II	11000	4034.49	I	80	4605.36	I			

Mn III
Ref. 385 - C.H.C.

Mn III			Mn III			Mn IV			Hg I and II (198)		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
	Vacuum		1000	2227.42	III						
20	892.39	III	100	3287.49	III	80	1795.79	IV	20	2759.710	I
20	1108.16	III	100	3540.52	III	60	1907.03	IV	40	2803.471	I
30	1183.30	III	150	3601.72	III	75	1910.25	IV	30	2804.438	I
25 w	1183.86	III	100	3616.00	III	65	1997.54	IV	750	2847.675	II
30	1198.49	III	100	4246.17	III				50	2856.939	I
30	1219.80	III	100	5079.20	III				150	2893.598	I
100	1228.97	III	200	5079.20	III				150	2916.227	II
500	1283.58	III	150	5100.03	III				60	2925.413	I
400	1287.59	III	100	5117.03	III				1200	2967.283	I
300	1291.62	III	100	5252.23	III				300	3021.500	I
1000	1360.72	III	100	5365.59	III				120	3023.476	I
800	1365.20	III	150	5454.07	III				30	3025.608	I
400	1369.43	III	200	5474.68	III				50	3027.490	I
300	1371.65	III	100	5671.12	III				400	3125.670	I
300	1596.95	III	200	5946.65	III				320	3131.551	I
500 h	1609.17	III	100 s	6213.11	III				320	3131.842	I
1000	1614.14	III	200	6231.21	III				80	3341.481	I
2000	1620.60	III	100	6238.64	III				2800	3650.157	I
300	1623.91	III	100	6273.71	III				300	3654.839	I
400	1629.12	III							80	3662.883	I
500	1633.80	III							240	3663.281	I
250	1647.46	III							30	3701.432	I
400	1653.57	III							35	3704.170	I
400	1804.06	III							30	3801.660	I
300	1806.47	III							20	3901.867	I
300	1811.02	III							60	3906.372	I
400	1877.62	III							200	3983.839	II
300	1885.21	III							1800	4046.572	I
500	1941.28	III							150	4077.838	I
250 w	1942.89	III							40	4108.057	I
800	1943.21	III							250	4339.224	I
500	1952.36	III							400	4347.496	I
1000	1952.52	III							4000	4358.337	I
300	1956.61	III							80	4916.068	I
250	1962.04	III							1100	5460.753	I
500	1978.95	III							160	5675.922	I
400	1982.76	III							240	5769.598	I
400	1989.59	III							280	5790.663	I
	Air								20	6072.713	I
300	2022.19	III							30	6234.402	I
1000 w	2027.83	III							160	6716.429	I
500 w	2028.14	III							250	6907.461	I
300	2044.57	III							240	11287.407	I
400	2048.93	III									
500	2049.68	III									
300	2056.80	III									
500	2066.38	III									
1000	2069.02	III									
900	2077.38	III									
300	2078.13	III									
800	2084.23	III									
600	2090.05	III									
300	2090.25	III									
300	2094.14	III									
500	2094.78	III									
500	2097.93	III									
500	2099.97	III									
300	2123.25	III									
1000	2169.78	III									
700	2174.15	III									
900	2176.87	III									
800	2181.86	III									
800 w	2184.87	III									
600	2185.13	III									
400	2211.95	III									
600	2212.42	III									
800	2215.21	III									
900	2220.55	III									

Mo I and II			Mo I and II			Mo I and II			Mo I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
40	2412.84	II	330	2636.67	II	1700	2816.15	II	70	2971.91	II
120	2413.01	II	250	2638.30	I	220	2817.44	II	250	2972.61	II
70	2415.33	I	720	2638.76	II	50	2822.03	II	80	2975.40	II
80	2417.96	II	410	2640.99	I	240	2826.54	I	180	2978.28	I
65	2419.01	II	600	2644.35	II	80	2827.74	II	120	2981.52	I
80	2420.18	II	370	2646.49	II	40	2831.44	II	110	2987.92	I
70	2424.00	II	640	2649.46	I	30	2832.07	II	160	2988.68	I
65	2430.43	I	480	2653.35	II	80	2834.39	II	190	2989.80	I
65	2435.96	II	560 h	2655.03	I	80	2835.33	II	95	2992.84	II
65	2440.28	II	290	2658.11	I	160	2842.15	II	50	2993.52	II
40	2461.81	II	640	2660.58	II	24	2843.73	II	190	3002.21	I
50	2466.68	II	110	2665.10	I	220	2844.39	I	40	3004.46	II
50	2466.97	II	55	2671.83	II	1700	2848.23	II	130	3013.39	I
50	2468.78	II	720	2672.84	II	160	2849.38	I	140 h	3013.76	I
30	2470.04	II	250	2673.27	II	370	2853.23	II	250	3025.00	I
150 h	2471.97	I	1000	2679.85	I	50	2856.00	II	95	3027.77	II
70	2477.57	II	95	2681.36	II	24	2863.20	II	100	3036.31	I
70 h	2481.81	I	640	2683.23	II	370	2863.81	II	300	3041.70	I
65	2482.57	II	880	2684.14	II	160	2864.31	I	150	3046.80	I
40	2484.75	II	560	2687.99	II	140	2864.66	I	210	3047.31	I
40 h	2485.31	I	30	2692.61	II	40	2865.62	II	210	3055.32	I
24	2496.24	II	55	2695.22	II	220	2866.69	II	100	3060.78	II
85	2498.28	II	30	2696.83	II	40	2868.11	II	160	3061.59	I
40	2500.44	II	55	2699.41	II	40	2868.32	II	800	3064.28	I
65	2502.84	II	140	2701.03	I	1700	2871.51	II	250	3065.04	II
50	2511.80	II	480	2701.42	II	85	2872.88	II	100	3068.00	I
65	2515.08	II	30	2701.87	II	220	2879.05	II	250	3070.90	I
70	2527.14	II	30	2704.93	II	65	2888.15	II	800	3074.37	I
50	2530.34	II	40	2710.19	II	95	2891.28	II	85	3077.66	II
70	2532.31	II	30	2711.49	II	1300	2890.99	II	150	3079.88	I
440	2538.46	II	50	2712.35	II	190	2892.81	II	210	3080.41	I
50	2539.44	II	190	2713.51	II	950	2894.45	II	800	3085.62	I
110 h	2540.45	I	290	2717.35	II	140	2897.63	II	270	3087.62	II
330	2542.67	II	110	2724.41	I	70	2900.80	II	100	3089.12	I
40	2543.61	II	180	2725.15	I	290	2903.07	II	100	3089.71	I
330	2548.22	I	85	2726.97	II	160	2905.27	I	190	3092.07	II
110 h	2550.85	I	140	2729.68	II	80	2907.12	II	560	3094.66	I
65	2555.42	II	80	2730.20	II	600	2909.12	II	110	3099.93	I
40	2556.75	II	330	2732.88	II	1100	2911.92	II	110	3100.88	I
80	2558.88	II	250	2733.39	I	55	2913.81	II	560	3101.34	I
65	2562.08	II	160	2736.96	II	120	2918.83	II	1400	3112.12	I
85	2564.34	II	80 h	2737.88	II	1300	2923.39	II	290	3122.00	II
40	2566.26	II	50	2738.60	II	140	2924.32	II	14000	3132.59	I
250	2567.05	I	40	2741.32	II	65	2927.54	II	110	3138.72	II
20	2571.45	II	55	2741.62	II	50	2930.06	II	220	3147.35	I
320	2572.34	I	240	2743.07	I	1100	2930.50	II	220	3152.82	II
50	2574.42	II	290	2746.30	II	55	2930.77	II	55	3155.64	II
40	2576.56	II	320	2751.47	I	800	2934.30	II	6000	3158.16	I
40	2578.36	II	110	2756.07	II	65	2935.20	II	120	3164.53	I
250	2582.16	I	65 d	2758.63	II	120	2937.66	I	8700	3170.35	I
30	2585.95	II	20	2760.53	II	40	2938.30	II	95	3172.03	II
65	2588.78	II	190	2761.53	I	95	2940.10	II	160	3172.74	II
40	2591.77	II	220	2763.62	II	110	2941.22	II	370	3183.03	I
250	2593.70	II	110	2766.26	I	140	2944.21	I	120	3184.57	I
100	2595.40	I	240	2769.76	II	150	2944.82	II	370	3185.10	I
40	2597.38	II	160	2773.78	II	140	2945.66	I	180	3185.71	I
250	2602.80	II	190	2774.39	II	190	2945.95	II	120 d	3187.59	II
40	2605.08	II	1700	2775.40	II	190	2946.01	I	7600	3193.97	I
40	2605.93	II	130	2777.74	I	140	2946.42	I	290	3195.96	I
250	2607.37	I	65	2777.86	II	140	2946.69	II	120	3198.85	I
190	2611.20	I	880	2780.04	II	95	2947.28	II	40	3201.50	II
290	2613.08	I	400	2784.99	II	95	2955.84	II	330	3205.22	I
130	2615.39	I	180	2787.83	I	240	2956.06	II	880	3205.88	I
400	2616.78	I	40	2791.54	II	70	2956.90	II	3000	3208.83	I
70	2619.34	II	240 d	2797.93	I	95	2960.24	II	240	3210.97	I
140	2621.07	I	220	2801.47	I	140	2962.89	I	560	3215.07	I
320	2627.55	I	400	2807.76	II	250	2963.79	II	350	3221.74	I
160	2628.74	I	28	2812.58	II	50	2964.96	II	880	3228.22	I
440	2629.85	I	24	2814.67	II	210	2965.27	II	600	3229.79	I

Mo I and II			Mo I and II			Mo I and II			Mo I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
1100	3233.14	I	200	3623.23	I	990	4434.95	I	100	5167.76	I
950	3237.08	I	1400	3624.46	I	200	4442.20	I	160 d	5171.08	I
65	3240.71	II	330	3626.18	I	340	4449.74	I		5171.25	I
950	3256.21	I	28	3635.14	II	480	4457.36	I	230 h	5172.94	I
300	3262.63	I	1000	3635.43	I	630	4474.56	I	160 h	5174.18	I
480	3264.40	I	400	3657.35	I	230	4491.28	I	40	5191.44	I
800	3270.90	I	540	3664.81	I	120	4504.90	I	110	5200.17	I
240	3285.02	I	290	3666.72	I	140	4512.15	I	50	5200.74	I
320	3285.36	I	590	3672.82	I	230	4517.13	I	26	5210.44	I
1100	3289.02	I	1300	3680.60	I	230	4524.34	I	50	5211.86	I
950	3290.82	I	45	3684.22	II	120	4529.40	I	80	5219.40	I
190	3292.31	II	65	3688.31	II	400	4536.80	I	65	5231.06	I
320	3305.56	I	240	3690.59	I	110	4558.11	I	26	5232.36	I
320	3307.12	I	180	3692.64	II	210	4576.50	I	100	5234.26	I
100	3313.62	II	1400	3694.94	I	170	4595.16	I	460 h	5238.20	I
190	3320.90	II	220	3702.03	I	360	4609.88	I	230 h	5240.88	I
640	3323.95	I	220	3715.65	I	100	4621.38	I	110 h	5242.81	I
360	3325.67	I	500	3727.69	I	460	4626.47	I	100	5245.51	I
360	3327.30	I	330 d	3732.71	I	100	4627.48	I	150	5259.04	I
240	3340.17	I	240	3742.28	I	220	4662.76	I	16	5260.17	I
1300	3344.75	I	80	3744.37	II	130	4671.90	I	65	5261.14	I
95	3346.40	II	360	3770.45	I	130	4688.22	I	20	5268.95	I
320	3347.02	I	220	3779.77	I	640	4707.26	I	35	5271.80	I
1600	3358.12	I	360	3781.59	I	150	4708.22	I	35	5276.28	I
250	3361.37	I	250	3797.30	I	220	4717.92	I	65	5279.65	I
950	3363.78	I	29000	3798.25	I	100	4729.14	I	210	5280.86	I
950	3379.97	I	290	3801.84	I	700	4731.44	I	20	5283.84	I
320	3382.48	I	520	3826.70	I	100	4750.39	I	55	5292.08	I
1900	3384.62	I	940	3828.87	I	770	4760.19	I	35	5293.46	I
130	3395.36	II	1700	3833.75	I	150	4776.34	I	55	5295.47	I
640	3404.34	I	380	3847.25	I	100	4796.52	I	20	5306.26	I
1300	3405.94	I	29000	3864.11	I	410	4819.25	I	55	5313.89	I
240	3418.52	I	580	3869.08	I	410	4830.51	I	35	5315.04	I
250	3420.04	I	580	3886.82	I	360	4868.00	I	20	5319.89	I
250	3422.31	I	380	3901.77	I	110	4950.62	I	20	5324.47	I
380	3434.79	I	19000	3902.96	I	150	4957.54	I	35	5327.06	I
320	3435.45	I	65	3941.48	II	210	4979.12	I	20	5352.35	I
640	3437.22	I	230	3943.04	I	110	4999.91	I	80	5354.88	I
250	3438.87	I	270	4056.01	I	20	5010.81	I	35	5355.51	I
250	3441.44	I	1400	4062.08	I	180	5014.60	I	65	5356.48	I
250	3443.26	I	2300	4069.88	I	26	5016.78	I	560hl	5360.56	I
130	3446.08	II	1300	4081.44	I	20	5019.85	I	110hl	5364.28	I
3200	3447.12	I	940	4084.38	I	80	5029.00	I	35hl	5367.11	I
640	3449.07	I	250	4102.15	I	65	5030.78	I	35	5372.40	I
300	3451.75	I	730	4107.47	I	23	5038.91	I	26	5388.69	I
250	3452.60	I	630	4120.10	I	26	5046.52	I	65	5394.52	I
950	3456.39	I	2900	4143.55	I	100	5047.71	I	35	5397.38	I
640	3460.78	I	230	4148.94	I	50	5055.00	I	50	5400.47	I
320	3466.83	I	250	4155.28	I	35	5058.07	I	35	5405.79	I
250	3467.85	I	200	4157.40	I	200	5059.88	I	35	5406.39	I
320	3469.22	I	200	4178.27	I	35	5062.52	I	40	5417.38	I
240	3485.93	I	480	4185.82	I	29	5064.64	I	23	5426.89	I
800	3504.41	I	2500	4188.32	I	35	5079.87	I	55	5435.68	I
240	3505.32	I	250	4194.56	I	100	5080.02	I	65	5437.75	I
560	3508.12	I	1500	4232.59	I	35	5081.26	I	40	5450.51	I
480	3521.41	I	270	4269.28	I	40	5090.97	I	35	5456.46	I
240	3524.98	I	890	4276.91	I	35	5091.34	I	26	5460.53	I
640	3537.28	I	1200	4277.24	I	35	5092.16	I	23	5465.57	I
320	3542.17	I	1400	4288.64	I	40	5095.89	I	35	5475.90	I
520	3558.10	I	680	4292.13	I	100	5096.65	I	35	5490.28	I
400	3563.14	I	890	4293.21	I	130	5097.52	I	20	5492.17	I
300	3566.05	I	360	4293.88	I	35	5098.03	I	26 h	5493.80	I
240	3570.65	I	840	4326.14	I	130	5109.71	I	26	5498.49	I
320	3573.88	I	250	4326.74	I	80	5114.97	I	50	5501.54	I
1400	3581.89	I	230	4350.34	I	35	5116.97	I	23	5501.87	I
200	3590.74	I	230	4369.04	I	29	5123.83	I	26 h	5503.54	I
210	3598.88	I	1900	4381.64	I	150	5145.38	I	7800	5506.49	I
270	3602.94	I	2500	4411.57	I	110	5147.39	I	23	5520.04	I
210	3608.37	I	210	4423.62	I	80	5163.19	I	26	5520.64	I

Nd I and II			Nd I and II			Nd I and II			Nd I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
95	3018.35	II	250	3331.57	II	370	3755.60	II	1300	3889.93	II
80	3026.47	II	290	3334.48	II	510	3757.82	II	1300	3890.58	II
50	3038.98	II	290	3339.07	II	930	3758.95	II	1300	3890.94	II
50	3043.29		320	3353.59	II	300	3759.79	II	580	3891.51	II
50	3051.11	II	200	3355.93	II	930	3763.47	II	470	3892.06	II
80	3052.15	II	270	3364.96	II	300	3766.59	II	810	3894.63	II
140	3056.71	II	290	3393.63	II	510	3769.65	II	270	3896.13	II
130	3069.73	II	120 h	3484.88	I	1400	3775.50	II	440	3897.63	II
65 d	3071.43	II	200	3527.53	II	250	3776.34	II	2000	3900.21	II
	3071.50	II	290	3543.35	II	710	3779.47	II	1300	3901.84	II
160	3075.38	II	200	3555.77	II	580	3780.40	II	1700	3905.89	II
95	3079.38	II	410	3560.75	II	510	3781.32	II	200	3907.70	II
95	3080.94	II	340	3568.87	II	300	3783.78	II	510	3907.84	II
95	3092.73		470	3587.51	II	2400	3784.25	II	2000	3911.16	II
240	3092.92	II	300	3592.59	II	270	3784.73	II	850	3912.23	II
140	3098.48	II	340	3598.02	II	340	3791.50	II	340	3913.69	II
55	3099.52	II	300	3600.91	II	340	3795.45	II	440	3915.13	II
130	3105.43	II	320	3609.79	II	240	3799.55	II	610	3915.95	II
95	3106.18	II	370	3615.82	II	370	3801.12	II	340	3917.65	II
65	3108.01	II	300	3618.96	II	200	3801.38	II	220	3919.92	II
260	3115.18	II	300	3631.02	II	340	3802.30	II	1100	3920.96	II
190	3116.15	II	340	3634.30	II	1200	3803.47	II	510	3927.10	II
50	3119.75	II	240	3637.00	II	200	3804.10	II	200	3929.26	II
160	3123.06	II	240	3637.23	II	2500	3805.36	II	610	3934.82	II
190	3124.58	II	240	3640.24	II	340	3805.55	II	410	3936.11	II
290	3133.60	II	240	3645.78	II	470	3807.23	II	510	3938.86	II
220	3134.90	II	340	3648.20	II	540	3808.77	II	2000	3941.51	II
100	3137.24	II	240	3649.46		440	3809.06	II	2000	3951.16	II
170	3141.46	II	240	3650.42	II	580	3810.49	II	810	3952.20	II
170	3142.44	II	410	3653.15	II	240	3811.06	II	320	3952.87	II
100	3144.55	II	240	3654.16		270	3811.77	II	320	3953.52	II
100	3144.82	II	470	3662.26	II	200	3812.53	II	240	3957.45	II
100	3148.51	II	540	3665.18	II	710	3814.73	II	590	3958.00	II
100	3149.29	II	540	3672.36	II	240	3819.70	II	510	3962.21	II
100	3149.51	II	580	3673.54	II	410	3822.47	II	1400	3963.12	II
100	3162.62	II	240	3678.18	II	1200	3826.42	II	270	3963.90	II
100	3175.99	II	1200	3685.80	II	240	3828.00	II	1100	3973.30	II
50	3181.54	II	440	3687.30	II	540	3828.85	II	740	3973.69	II
50	3188.73	II	410	3689.69	II	440	3829.16	II	740	3976.85	II
50	3200.62	II	300	3694.81	II	510	3830.47	II	740	3979.49	II
150	3203.47	II	410	3697.56	II	740	3836.54	II	320	3982.36	II
85	3211.00	II	240	3702.84		340	3837.91	II	470	3986.25	II
100	3217.12	II	240	3704.95	II	1700	3838.98	II	1400	3990.10	II
50	3222.62	I	200	3712.81		340	3839.51	II	1000	3991.74	II
50	3228.04	II	470	3713.70	II	410 d	3841.82	II	1100	3994.68	II
60	3234.62		370	3714.20	II		3841.88	II	410	4000.50	II
40	3237.91	II	640 d	3714.73	II	1700 d	3848.24	II	540	4004.02	II
100	3254.08	II	250	3715.04	II		3848.31	II	410	4007.43	II
50	3256.91	II	200	3715.39	II	1500	3848.52	II	3700	4012.25	II
220	3259.24	II	470	3715.68	II	470	3850.22	II	540	4012.70	II
100	3260.66	II	410	3718.54	II	2400 d	3851.66	II	370	4018.81	II
220	3265.12	II	410	3721.35	II		3851.74	II	1000	4020.87	II
50	3265.38	II	220	3722.42	II	340	3858.55	II	1000	4021.34	II
170	3267.25	II	780	3723.50	II	270	3860.94	II	1000	4021.78	II
100	3273.18	II	410	3724.87	II	300	3862.52	II	1200	4023.00	II
320	3275.22	II	250	3726.90	II	3700 d	3863.33	II	340	4024.78	II
50	3281.49	II	710	3728.13	II		3863.40	II	410	4030.47	II
50	3282.78	II	470	3730.58	II	240	3866.52	II	1200	4031.82	II
290	3285.10	II	270	3732.78	II	220	3866.81	II	270	4038.12	II
100	3286.62	II	1000 d	3735.54	II	850	3869.07	II	3000	4040.80	II
50	3289.52			3735.60	II	240	3875.74	II	200	4041.06	II
100	3290.65	II	440	3737.10	II	470	3875.87	II	410	4043.59	II
70	3293.84	II	1000	3738.06	II	1100	3878.58	II	410	4048.81	II
70	3294.68	II	270	3741.42	II	1000	3879.55	II	850	4051.15	II
70	3298.61		200	3749.85	II	780	3880.38	II	850	4059.96	II
300	3300.16	II	320	3750.31	II	1200	3880.78	II	4700	4061.09	II
200	3312.75	II	580	3752.49	II	200	3881.59		1100	4069.28	II
200	3325.90	II	370	3752.67	II	540	3887.87	II	710	4075.12	II
410	3328.28	II	250	3754.83	II	370 h	3889.66	II	470	4075.28	II

Nd I and II			Nd I and II			Nd I and II			Nd I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
240	4077.62	II	340	4541.27	II	340	5123.79	II	23	5767.33	I
470	4080.23	II	340	4542.61	II	680	5130.60	II	45	5776.12	I
240	4085.82	II	100	4556.14	II	170	5132.33	II	45	5784.96	I
270	4096.13	II	170	4559.67	I	170	5165.14	II	45	5788.22	I
220	4098.18	II	340	4563.22	II	130	5181.17	II	45	5800.09	I
200	4106.59	II	200	4578.89	II	120	5182.60	II	160	5804.02	II
1400	4109.08	II	200	4579.32	II	500	5191.45	II	80	5811.57	II
2500	4109.46	II	100	4586.62	I	630	5192.62	II	45	5813.89	I
510	4110.48	II	200	4597.02	II	330	5200.12	II	27	5820.37	I
300 h	4113.83	II	100	4603.82	I	310	5212.37	II	70	5825.87	II
410	4123.88	II	100	4609.87	I	150	5213.23	I	30	5826.74	I
470	4133.36	II	300	4621.94	I	130	5225.05	II	80	5842.39	II
510	4135.33	II	100	4627.98	I	130	5228.43	II	30	5844.66	I
3000	4156.08	II	510	4634.24	I	450	5234.20	II	23	5845.95	I
510	4156.26	II	340	4641.10	I	250	5239.79	II	55	5858.91	I
340	4160.57	II	250	4645.77	II	720	5249.59	II	35	5867.08	I
410	4168.00	II	200	4646.40	I	200	5250.82	II	30	5868.90	I
810	4175.61	II	300	4649.67	I	360	5255.51	II	27	5871.04	I
2400	4177.32	II	200	4654.73	I	120	5269.48	II	30	5883.29	I
200	4178.64	II	130	4670.56	II	590	5273.43	II	23	5886.24	I
640	4179.59	II	170	4680.74	II	150	5276.88	II	30	5887.91	I
250	4184.98	II	310	4683.45	I	110	5291.67	I	27	5921.22	I
470	4205.60	II	110	4684.04	I	680	5293.17	II	27	5955.87	I
470	4211.29	II	110	4690.35	I	160	5302.28	II	30	5994.76	I
290	4220.25	II	190	4696.44	I	110	5306.47	II	27	5996.47	I
440	4227.73	II	130	4703.57	II	220	5311.46	II	45	6007.67	I
1300	4232.38	II	470	4706.54	II	500	5319.82	II	35	6031.27	II
250	4234.19	II	140	4706.96	I	180	5356.98	II	27	6033.29	I
290 h	4235.24	II	190	4709.71	II	290	5361.47	II	45	6034.24	II
290	4239.84	II	190	4715.59	II	150	5371.94	II	55	6066.03	I
2000	4247.38	II	240	4719.02	I	110	5385.90	II	27	6071.70	I
850	4252.44	II	190	4724.35	II	160	5431.53	II	30	6073.97	I
290	4254.29	II	140	4731.77	I	110	5451.12	II	23 d	6133.47	II
410	4261.84	II	120	4779.46	I	170	5485.70	II	27	6149.28	I
340	4266.71	II	170	4789.41	II	35	5501.47	I	27	6155.06	I
240	4270.56	II	120	4797.15	II	45	5525.72	I	35	6157.83	II
340	4272.79	II	240	4811.34	II	90	5533.82	I	23	6166.67	II
340	4275.09	II	140	4820.34	II	55	5535.27	II	35	6170.49	II
470	4282.44	II	350	4825.48	II	55	5543.24	I	45	6178.59	I
240	4282.57	II	130	4832.28	II	55	5548.47	II	27	6183.91	II
710	4284.52	II	110	4849.06	II	55	5561.17	I	27	6208.24	I
270	4297.80	II	280	4859.02	II	27	5575.50	I	45	6223.39	I
5400	4303.58	II	190	4866.74	I	27	5576.70	I	27	6226.50	I
340	4304.45	II	350	4883.81	I	27	5577.70	I	23	6238.50	II
200	4307.78	II	140	4889.10	II	27	5587.61	I	35	6244.08	I
470	4314.52	II	220	4890.70	II	240	5594.43	II	23	6257.49	I
1100	4325.76	II	240	4891.07	I	55	5601.43	I	27	6258.73	II
510	4327.93	II	280	4896.93	I	45	5601.92	I	23	6277.29	II
540	4338.70	II	120	4901.53	I	220	5620.54	I	27	6285.79	I
680	4351.29	II	210	4901.84	I	65	5635.76	I	23	6292.84	II
850	4358.17	II	110	4902.03	II	45	5639.54	I	23	6297.07	I
240	4366.38	II	190	4913.41	I	35	5653.57	I	55	6310.49	I
340	4368.64	II	170	4914.37	II	70	5668.87	II	27	6341.51	II
470 d	4374.93	II	330	4920.68	II	65	5669.77	I	23	6382.07	II
	4375.04	II	470	4924.53	I	140 d	5675.97	I	65	6385.20	II
710	4385.66	II	260	4944.83	I	55	5676.33	I	35	6485.69	I
250	4390.66	II	290	4954.78	I	220	5688.53	II	45	6630.14	I
540	4400.83	II	290	4959.13	II	23	5689.51	I	35	6637.96	II
510	4411.06	II	150	4961.39	II	30	5701.57	I	45	6650.57	II
580	4446.39	II	250	4989.94	II	130	5702.24	II	30	6655.67	I
1400	4451.57	II	150	5033.52	II	80	5706.21	II	25	6737.79	II
200	4451.99	II	110	5063.73	II	160	5708.28	II	40	6740.11	II
300	4456.40	II	360	5076.59	II	80	5718.12	II	25	6742.54	I
740	4462.99	II	150 h	5089.84	II	65	5726.83	II	30	6790.37	II
410	4501.82	II	360	5092.80	II	100	5729.29	I	30	6804.00	II
200	4506.59	II	180	5102.39	II	23	5734.55	I	25	6846.72	II
170	4513.34	II	150 d	5105.21	II	70	5740.86	II	40	6900.43	II
250	4516.36	II		5105.35	I	55	5749.19	I	24	6941.39	II
120	4527.25	I	360	5107.59	II	27	5749.66	I	17 h	7010.80	II

Nd I and II			Nd I and II			Nd I and II			Ne I and II			
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		
8	7018.85	II	10	7750.95	II	17	8839.10	II	80	2629.89	II	
17	7020.92	II	6	7773.06	II				90 w	2636.07	II	
17	7024.58	II	7	7792.22	II	NEON (Ne)			80	2638.29	II	
10	7033.21		6	7796.40	II	Z = 10			80	2644.10	II	
35	7037.30	II	8	7797.32	II	Ne I and II			80	2762.92	II	
7	7052.14	II	5	7798.32	II	Refs. 56,58,118,150,230	- S.P.D.			90	2792.02	II
7	7054.74	II	10	7808.47	II	Vacuum			80	2794.22	II	
7	7061.47	II	7	7818.83	II	90	352.956	I	100	2809.48	II	
40	7066.89	II	5	7825.20	II	60	354.962	I	80	2906.59	II	
8	7082.93	II	12	7863.04	II	90	361.433	II	80	2906.82	II	
12 h	7089.71	II	5 h	7872.03	I	60	362.455	II	90	2910.06	II	
12 h	7092.09		7	7886.60	II	90	364.433	II	90	2910.41	II	
12 h	7092.74	II	4 h	7896.50	II	60	366.455	II	80	2911.14	II	
12 h	7092.94		9	7900.40	II	150	405.854	II	80	2915.12	II	
17 h	7093.98	I	5 h	7906.03	I	120	407.138	II	80	2925.62	II	
20 h	7095.42	I	12	7917.01	II	200	445.040	II	80 w	2932.10	II	
29	7129.35	II	10	7925.03	II	300	446.256	II	80	2940.65	II	
12 h	7142.04	II	5	7947.93	II	250	446.590	II	90	2946.04	II	
10	7143.72		10	7949.68	II	180	447.815	II	150	2955.72	II	
8	7151.03	II	5 h	7955.38	II	150	454.654	II	150	2963.24	II	
6	7153.09	I	12	7958.95	I	200	455.274	II	150	2967.18	II	
6 h	7185.01		12	7965.73	II	10	456.275	II	100	2973.10	II	
10	7189.09	II	15	7982.09	II	120	456.348	II	15	2974.72	I	
24	7189.42	II	12	7982.68	II	90	456.896	II	100	2979.46	II	
20	7192.01	II	12	8000.76	II	1000	460.728	II	12	2982.67	I	
10	7199.00	II	9	8007.70	I	500	462.391	II	150	3001.67	II	
8 h	7227.01	I	4 h	8020.07		35	587.213	I	120	3017.31	II	
15	7236.54	II	8	8026.35		35	589.179	I	300	3027.02	II	
7 h	7261.64	II	10	8043.24	I	35	589.911	I	300	3028.86	II	
9	7285.29	II	8	8051.33	II	70	591.830	I	100	3030.79	II	
9	7288.56	II	5	8064.00	II	100	595.920	I	120	3034.46	II	
6	7291.38	II	10	8099.17	I	75	598.706	I	100	3035.92	II	
7	7298.72	II	10	8120.93	II	35	598.891	I	100	3037.72	II	
12	7316.81	II	12	8122.07	II	70	600.036	I	100	3039.59	II	
7 h	7321.43	I	12	8141.75	II	170	602.726	I	100	3044.09	II	
7	7323.12	II	12	8143.27	II	170	615.628	I	100	3045.56	II	
6	7334.54	I	7 h	8164.97	I	170	618.672	I	120	3047.56	II	
6	7357.10	I	8	8172.56	II	120	619.102	I	100	3054.34	II	
6	7374.04	II	9	8179.83	II	200	626.823	I	100	3054.68	II	
7	7381.79	II	9	8182.41	II	200	629.739	I	100	3059.11	II	
9	7401.31	I	4	8185.58	II	1000	735.896	I	100	3062.49	II	
10	7406.62	II	7 h	8205.38	II	400	743.720	I	100	3063.30	II	
6	7411.20	II	10	8231.52	II	60	993.88	I	100	3070.89	II	
10	7418.18	II	4	8248.76	II	70	1068.65	I	100	3071.53	II	
9	7427.41	II	5 h	8249.68	II	90	1131.72	I	100	3075.73	II	
9	7448.71	II	4 h	8262.80	II	100	1131.85	II	120	3088.17	II	
5	7481.28	II	7 h	8266.72	II	90	1229.83	I	100	3092.09	II	
12	7511.16	II	4	8272.79	II	90	1418.38	I	120	3092.90	II	
17	7513.73	II	4 h	8302.74	II	90	1428.58	I	100	3094.01	II	
7 h	7514.44	II	10	8307.72	II	90	1436.09	I	100	3095.10	II	
7	7516.02	II	6	8324.50	II	120	1681.68	II	100	3097.13	II	
9	7526.45	II	4	8332.01	II	180	1688.36	II	100	3117.98	II	
12	7528.99	II	12	8346.36	II	100	1888.11	II	120	3118.16	II	
10	7538.26	II	4	8375.16	II	100	1889.71	II	10	3126.199	I	
5	7540.97	II	4	8375.33	II	200	1907.49	II	300	3141.33	II	
7	7547.00	II	4	8394.71	II	500	1916.08	II	100	3143.72	II	
5	7577.54	II	7	8400.85	II	300	1930.03	II	100 p	3148.68	II	
7	7587.65	II	5 h	8456.87	II	200	1938.83	II	100	3164.43	II	
6	7590.75	II	4	8530.53	II	100 c	1945.46	II	100	3165.65	II	
6	7603.73	II	5	8582.03	II	Air			100	3188.74	II	
5	7605.92	II	5	8591.53	II	80	2007.01	II	120	3194.58	II	
5	7614.72	I	7	8594.87	II	80	2025.56	II	500	3198.59	II	
9	7639.79	II	8 c	8643.43	II	150	2085.47	II	60	3208.96	II	
8	7646.00	II	5	8667.07	II	180	2096.11	II	120	3209.36	II	
6	7663.52	II	5	8677.48		120	2096.25	II	120	3213.74	II	
12	7696.56	II	6	8691.29	II	80 p	2562.12	II	150	3214.33	II	
6	7718.20	II	6	8695.07	II	90 w	2567.12	II	150	3218.19	II	
4	7743.90	II	6	8712.82	II	80	2623.11	II	120	3224.82	II	
4	7748.92	II	6	8715.03	I				120	3229.57	II	

Ne I and II			Ne I and II			Ne I and II			Ne I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
200	3230.07	II	10	3701.225	I	250	6182.146	I	500	8830.907	I
120	3230.42	II	150	3709.62	II	150	6217.281	I	7000	8853.867	I
120	3232.02	II	250	3713.08	II	150	6266.495	I	1000	8865.306	I
150	3232.37	II	250	3727.11	II	60	6304.789	I	1000	8865.755	I
100	3243.40	II	800	3766.26	II	100	6334.428	I	3000	8919.501	I
100	3244.10	II	1000	3777.13	II	120	6382.992	I	2000	8988.57	I
100	3248.34	II	100	3818.43	II	200	6402.246	I	100	9079.46	II
100	3250.36	II	120	3829.75	II	150	6506.528	I	6000	9148.67	I
150	3297.73	II	150	4219.74	II	60	6532.882	I	6000	9201.76	I
150	3309.74	II	100	4233.85	II	150	6598.953	I	4000	9220.06	I
300	3319.72	II	120	4250.65	II	70	6652.093	I	2000	9221.58	I
1000	3323.74	II	120	4369.86	II	90	6678.276	I	2000	9226.69	I
150	3327.15	II	70	4379.40	II	20	6717.043	I	1000	9275.52	I
100	3329.16	II	150	4379.55	II	100	6929.467	I	200	9287.56	II
200	3334.84	II	100	4385.06	II	90	7024.050	I	6000	9300.85	I
150	3344.40	II	200	4391.99	II	100	7032.413	I	1500	9310.58	I
300	3345.45	II	150	4397.99	II	50	7051.292	I	3000	9313.97	I
150	3345.83	II	150	4409.30	II	80	7059.107	I	6000	9326.51	I
200	3355.02	II	100	4413.22	II	100	7173.938	I	2000	9373.31	I
120	3357.82	II	100	4421.39	II	150	7213.20	II	5000	9425.38	I
200	3360.60	II	100	4428.52	II	150	7235.19	II	3000	9459.21	I
120	3362.16	II	100	4428.63	II	100	7245.167	I	5000	9486.68	I
100	3362.71	II	150	4430.90	II	150	7343.94	II	5000	9534.16	I
120	3367.22	II	150	4430.94	II	40	7472.439	I	3000	9547.40	I
12	3369.808	I	120	4457.05	II	90	7488.871	I	120	9577.01	II
40	3369.908	I	100	4522.72	II	100	7492.10	II	1000	9665.42	I
100	3371.80	II	10	4537.754	I	150	7522.82	II	100	9808.86	II
500	3378.22	II	10	4540.380	I	80	7535.774	I	800	10295.42	I
150	3388.42	II	100	4569.06	II	60	7544.044	I	2000	10562.41	I
120	3388.94	II	15	4704.395	I	100	7724.628	I	1500	10798.07	I
300	3392.80	II	12	4708.862	I	120	7740.74	II	2000	10844.48	I
100	3404.82	II	10	4710.067	I	300	7839.055	I	3000	11143.020	I
120	3406.95	II	10	4712.066	I	120	7926.20	II	3500	11177.528	I
100	3413.15	II	15	4715.347	I	400	7927.118	I	1600	11390.434	I
120	3416.91	II	10	4752.732	I	700	7936.996	I	1100	11409.134	I
120	3417.69	II	12	4788.927	I	2000	7943.181	I	3000	11522.746	I
50	3417.904	I	10	4790.22	I	2000	8082.458	I	1500	11525.020	I
15	3418.006	I	10	4827.344	I	100	8084.34	II	950	11536.344	I
120	3428.69	II	10	4884.917	I	1000	8118.549	I	500	11601.537	I
60	3447.703	I	4	5005.159	I	600	8128.911	I	1200	11614.081	I
50	3454.195	I	10	5037.751	I	3000	8136.406	I	300	11688.002	I
100	3456.61	II	10	5144.938	I	2500	8259.379	I	2000	11766.792	I
100	3459.32	II	25	5330.778	I	100	8264.81	II	1500	11789.044	I
25	3460.524	I	20	5341.094	I	2500	8266.077	I	500	11789.889	I
30	3464.339	I	8	5343.283	I	800	8267.117	I	1000	11984.912	I
30	3466.579	I	60	5400.562	I	6000	8300.326	I	3000	12066.334	I
60	3472.571	I	5	5562.766	I	100	8315.00	II	800	12459.389	I
150	3479.52	II	10	5656.659	I	1500	8365.749	I	1000	12689.201	I
200	3480.72	II	5	5719.225	I	100	8372.11	II	1100	12912.014	I
200	3481.93	II	12	5748.298	I	8000	8377.606	I	700	13219.241	I
25	3498.064	I	80	5764.419	I	1000	8417.159	I	800	15230.714	I
30	3501.216	I	12	5804.450	I	4000	8418.427	I	400	17161.930	I
25	3515.191	I	40	5820.156	I	1500	8463.358	I	400	18035.80	I
150	3520.472	I	500	5852.488	I	800	8484.444	I	1000	18083.21	I
120	3542.85	II	100	5872.828	I	5000	8495.360	I	350	18221.11	I
120	3557.80	II	100	5881.895	I	600	8544.696	I	250	18227.02	I
100	3561.20	II	60	5902.462	I	1000	8571.352	I	2500	18276.68	I
250	3568.50	II	60	5906.429	I	4000	8591.259	I	2000	18282.62	I
100	3574.18	II	100	5944.834	I	6000	8634.647	I	1200	18303.97	I
200	3574.61	II	100	5965.471	I	3000	8647.041	I	250	18359.12	I
50	3593.526	I	100	5974.627	I	15000	8654.383	I	1200	18384.85	I
30	3593.640	I	120	5975.534	I	4000	8655.522	I	2000	18389.95	I
15	3600.169	I	80	5987.907	I	100	8668.26	II	1000	18402.84	I
20	3633.665	I	100	6029.997	I	5000	8679.492	I	1200	18422.39	I
150	3643.93	II	100	6074.338	I	5000	8681.921	I	300	18458.65	I
200	3664.07	II	80	6096.163	I	2000	8704.112	I	400	18475.79	I
20	3682.243	I	60	6128.450	I	4000	8771.656	I	900	18591.55	I
12	3685.736	I	100	6143.063	I	12000	8780.621	I	1600	18597.70	I
200	3694.21	II	120	6163.594	I	10000	8783.753	I	350	18618.96	I

Ni I and II			Ni III			Ni III			Ni IV		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
40 h	5146.48	I	200	662.37	III	500	1767.94	III	67	1560.18	IV
40 h	5155.76	I	150	663.57	III	2000	1769.64	III	Ni V		
16	5168.66	I	500	676.94	III	400	1776.07	III	Ref. 416 - C.H.C.		
15	5176.56	I	200	700.17	III	200	1788.30	III	Vacuum		
8	5435.87	I	300	713.33	III	250	1790.40	III	29	304.02	V
180	5476.91	I	300	713.38	III	200	1790.93	III	55	315.24	V
6	5510.00	I	500	718.48	III	200	1791.64	III	56	315.71	V
6	5578.73	I	200	721.26	III	200	1794.90	III	63	336.79	V
9	5587.86	I	300	722.09	III	300	1807.24	III	68	343.93	V
13	5592.28	I	250	725.20	III	200	1811.69	III	78	347.34	V
9	5614.79	I	500	729.82	III	300	1819.28	III	70	347.46	V
5 h	5625.33	I	250	730.11	III	800	1823.06	III	67	347.72	V
4	5649.70	I	400	731.70	III	400	1830.01	III	71	348.10	V
5	5664.02	I	300	732.16	III	200	1830.08	III	69	350.77	V
12	5682.20	I	200	738.26	III	650	1847.28	III	69	353.59	V
8	5695.00	I	300	747.99	III	800	1854.15	III	72	354.18	V
23	5709.56	I	200	749.68	III	300	1858.75	III	76	354.42	V
10	5711.90	I	300	750.05	III	200	1930.43	III	68	354.49	V
10	5715.09	I	200	752.02	III	200	1952.54	III	68	355.61	V
16	5754.68	I	300	757.80	III	Ni IV			70	355.78	V
8	5760.85	I	250	758.73	III	Ref. 415 - C.H.C.			65	357.37	V
10	5857.76	I	250	758.27	III	Vacuum			69	358.57	V
10	5892.88	I	400	770.22	III	33	392.68	IV	68	358.58	V
10	6108.12	I	200	772.04	III	32	393.24	IV	66	359.47	V
10	6176.81	I	500	778.81	III	49	424.40	IV	69	365.62	V
10	6191.18	I	200 d	785.02	III	57	444.21	IV	70	370.62	V
13	6256.36	I	300	788.04	III	67	469.67	IV	67	371.31	V
10	6314.66	I	200	788.30	III	65	471.24	IV	68	371.76	V
16	6643.64	I	200	805.01	III	65	485.42	IV	67	373.60	V
22	6767.77	I	500	811.57	III	66	536.28	IV	72	377.68	V
9	6772.32	I	500	826.14	III	67	537.96	IV	70	393.91	V
10	6914.56	I	200	826.50	III	58	1345.72	IV	66	394.31	V
5	7110.90	I	500	842.14	III	69	1357.07	IV	66	395.24	V
26	7122.20	I	400	845.24	III	76	1398.19	IV	41	400.59	V
6	7182.00	I	300	847.43	III	74	1411.45	IV	NiOBIUM (Nb)		
5	7197.02	I	200	857.09	III	69	1419.58	IV	Z = 41		
5	7261.93	I	300	860.64	III	74	1421.22	IV	Nb I and II		
5	7291.45	I	300	862.88	III	70	1427.45	IV	Ref. 1 - C.H.C.		
4	7385.24	I	300	863.22	III	67	1428.93	IV	Air		
16	7393.60	I	300	867.51	III	67	1435.24	IV	3300	2029.32	II
16	7409.35	I	200	869.70	III	70	1438.82	IV	3000	2032.99	II
5	7414.51	I	200	870.84	III	73	1449.01	IV	2000	2109.42	II
23	7422.28	I	300	973.79	III	76	1452.22	IV	1700	2125.21	II
13	7522.76	I	400	979.59	III	70	1455.42	IV	1100	2126.54	II
9	7525.12	I	200	1428.87	III	69	1472.63	IV	1500	2131.18	II
19	7555.60	I	200	1434.31	III	68	1476.82	IV	370	2295.68	II
8	7574.05	I	200	1451.50	III	73	1482.25	IV	280	2302.08	II
23	7617.00	I	300	1604.54	III	67	1489.53	IV	170	2376.40	II
9	7619.21	I	300	1652.87	III	72	1489.83	IV	110	2387.09	II
16	7714.32	I	200	1653.12	III	69	1493.01	IV	140	2387.52	II
5 h	7715.58	I	250	1656.13	III	74	1493.67	IV	45	2388.27	II
19	7727.61	I	200	1661.79	III	68	1498.71	IV	160	2398.48	II
19	7748.89	I	400	1687.90	III	71	1498.77	IV	55	2405.34	II
10	7788.94	I	1000	1692.51	III	72	1498.90	IV	55	2405.85	II
13	7797.59	I	200	1707.35	III	67	1499.97	IV	140	2412.46	II
2	7917.44	I	200	1707.43	III	70	1512.74	IV	160	2416.99	II
1000	8096.75	II	800	1709.90	III	70	1516.66	IV	140	2418.69	II
500	8114.21	II	650	1715.30	III	73	1520.63	IV	75	2433.80	II
700	8121.48	II	500	1719.46	III	75	1525.31	IV	40	2435.95	II
2	8809.42	I	200	1721.26	III	74	1527.68	IV	35	2436.33	I
9	8862.55	I	400	1722.28	III	74	1527.80	IV	45	2437.42	II
500 w	9900.92	II	250	1733.13	III	76	1534.71	IV	40	2442.14	II
Ni III			500	1738.25	III	73	1537.25	IV	28	2442.68	II
Ref. 422 - C.H.C.			300	1739.78	III	69	1538.93	IV	65	2451.87	II
Vacuum			300	1741.96	III	75	1543.41	IV	65	2453.95	II
100	625.68	III	550	1747.01	III	74	1546.23	IV	55	2458.09	II
500	630.71	III	300	1752.43	III	68	1548.04	IV			
200	637.54	III	400	1753.01	III	69	1557.28	IV			
			800	1764.69	III						

Nb I and II			Nb I and II			Nb I and II			Nb I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
65	2462.89	I	800	2875.39	II	200	3283.46	II	2000	3535.30	I
35	2466.73	I	270	2876.95	II	230	3285.66	I	1300	3537.48	I
55	2469.08	I	530	2877.03	II	200	3287.59	I	250	3540.96	II
110	2477.38	II	100	2880.72	II	160	3287.92	I	500	3544.02	I
65	2478.29	II	570	2883.18	II	160	3292.02	II	250	3544.65	I
65	2479.94	II	280	2888.83	II	320	3296.01	I	300	3550.45	I
35	2483.88	II	470	2897.81	II	160	3299.61	I	250	3554.52	I
110	2504.65	I	400	2899.24	II	120	3304.83	I	1000	3554.66	I
110	2511.00	II	470	2908.24	II	120	3308.05	I	630	3563.50	I
110	2521.40	II	670	2910.59	II	120	3310.47	I	630	3563.62	I
390	2544.80	II	470	2911.74	II	400	3312.60	I	1500	3575.85	I
110	2551.38	II	1100	2927.81	II	200	3315.22	I	200	3577.72	I
130	2556.94	II	110	2931.47	II	200	3318.98	I	5000	3580.27	I
130	2562.41	II	870	2941.54	II	120	3319.26	I	500	3584.97	I
130	2565.41	I	110 h	2945.88	II	120	3319.58	II	750	3589.11	I
100	2569.03	I	110	2946.12	II	240	3326.62	I	500	3589.36	I
110	2571.33	II	110	2946.90	II	170	3329.36	I	500	3593.97	I
200	2578.74	I	1100	2950.88	II	110	3332.16	I	500	3602.56	I
390	2583.99	II	400	2972.57	II	130	3341.60	II	300	3619.51	II
390	2590.94	II	320	2974.10	II	1300	3341.97	I	200	3621.03	I
270	2592.20	I	210	2977.68	II	1300	3343.71	I	200	3639.33	I
130	2616.48	I	200	2982.11	II	130	3346.93	I	420	3649.85	I
130	2623.51	I	330	2990.26	II	1700	3349.06	I	250	3650.81	I
130	2627.44	I	470	2994.73	II	420	3349.52	I	400	3651.19	II
130	2628.49	I	140	3024.74	II	340	3354.74	I	200	3659.61	II
200	2642.24	II	350	3028.44	II	130	3357.04	I	630	3660.37	I
320	2646.26	II	300	3032.77	II	1700	3358.42	I	900	3664.70	I
330	2647.50	I	100	3044.76	II	130	3365.58	II	220	3669.01	I
240	2649.52	I	150	3048.10	I	340	3366.96	I	270	3674.78	I
330	2654.45	I	110	3053.09	I	130	3369.16	II	1500	3697.85	I
310	2656.08	II	100	3055.52	II	170	3371.33	I	330	3711.34	I
160	2657.62	I	220	3064.53	II	350	3374.92	I	3300	3713.01	I
110	2665.25	II	110	3069.68	II	270	3380.41	I	480	3716.99	I
110	2666.59	II	100	3070.90	II	130	3380.86	I	2700	3726.24	I
110	2667.30	II	110	3071.56	II	170	3386.24	II	270	3738.42	I
130	2668.29	I	100	3073.24	II	350	3392.34	I	2700	3739.80	I
400	2671.93	II	400	3076.87	II	170	3395.93	I	670	3740.73	II
200	2673.57	II	110	3080.35	II	120	3399.40	I	270	3741.78	I
200	2675.94	II	1800	3094.18	II	230	3405.41	I	1700	3742.39	I
130	2687.15	I	140	3099.19	II	130	3406.13	I	250	3753.18	I
160	2691.77	II	150	3111.45	I	270	3408.38	I	210	3755.77	I
1000	2697.06	II	270	3127.53	II	230	3408.68	II	530	3763.49	I
320	2698.86	II	1500	3130.79	II	180	3409.19	II	350	3765.08	I
320	2702.20	II	390	3145.40	II	230	3412.94	II	250	3766.13	I
150	2702.52	II	140	3151.87	I	180	3415.97	I	530	3771.85	I
470	2716.62	II	1200	3163.40	II	180	3423.76	I	870	3781.01	I
470	2721.98	II	150	3175.78	II	230	3425.42	II	1700	3787.06	I
310	2733.26	II	390	3180.29	II	130	3425.85	I	1300	3790.15	I
110	2737.09	II	200	3187.49	I	230	3426.57	II	3500	3791.21	I
200	2746.91	I	300	3191.10	II	230	3427.45	I	2700	3798.12	I
200	2748.85	I	150	3191.43	II	130	3429.04	I	270	3801.30	I
190	2753.01	I	1000	3194.98	II	180	3432.70	II	2700	3802.92	I
280	2758.61	I	120	3203.35	II	180	3440.59	II	670	3803.88	I
240	2768.13	II	300	3206.34	II	170	3463.81	I	530	3804.74	I
310	2773.20	I	390	3215.60	II	180	3465.86	I	670	3810.49	I
270	2780.24	II	800	3225.48	II	130	3469.44	I	530	3811.03	I
130	2782.36	I	140	3229.56	II	100	3471.19	I	530	3815.51	I
110	2793.05	II	400	3236.40	II	140	3473.02	I	210	3818.86	II
190	2827.08	II	200	3247.47	II	290	3478.69	I	210	3819.15	I
150	2836.24	I	120	3248.94	II	200	3479.56	II	670	3824.88	I
110	2840.94	I	160	3249.52	I	100	3484.05	II	350	3835.18	I
250	2841.15	II	320	3254.07	II	230	3491.03	I	250	3836.45	I
280	2842.65	II	230	3260.56	II	200	3497.81	I	210	3845.90	I
160	2846.28	II	160	3263.37	II	500	3498.63	I	290	3858.95	I
110	2851.45	I	160	3264.59	I	460	3507.96	I	350	3863.38	I
240	2861.09	II	120	3270.47	I	200	3510.26	II	270	3867.92	I
100	2864.32	I	100	3270.76	I	200	3515.42	II	530	3877.56	I
100	2865.61	II	200	3272.07	I	200	3517.67	II	870	3878.82	I
500	2868.52	II	160	3277.67	I	200	3520.06	I	670	3883.14	I

Nb I and II		Nb I and II		Nb I and II		Nb I and II	
Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength
1100	3885.44 I	190	4419.44 I	65	5203.22 I	25	5628.26 I
670	3885.68 I	230 c	4437.22 I	35	5205.13 I	65	5629.17 I
210	3886.07 I	290	4447.18 I	85 c	5219.10 I	35 c	5635.42 I
580	3891.30 I	140	4456.80 I	65	5225.16 I	170	5642.11 I
210	3908.97 I	140	4457.42 I	150	5232.81 I	35	5645.30 I
670	3914.70 I	140	4469.71 I	85 c	5237.43 I	17	5654.14 I
530	3920.20 I	140	4471.29 I	29	5240.39 I	130	5664.71 I
670	3937.44 I	140	4472.53 I	150 d	5251.62 I	170	5665.63 I
520	3943.67 I	150	4503.04 I		5251.81 I	17	5666.86 I
250	3965.69 I	530	4523.41 I	75	5253.03 I	65cw	5671.02 I
910 d	3966.09 I	480	4546.82 I	85	5253.93 I	85	5671.91 I
210	3971.85 I	370	4564.53 I	50	5269.92 I	25	5677.47 I
1100	4032.52 I	720	4573.08 I	270	5271.53 I	25	5693.09 I
250	4039.53 I	480	4581.62 I	25	5272.48 I	35 d	5697.90 I
16000 c	4058.94 I	1200	4606.77 I	130 c	5276.20 I		5698.03 I
210	4059.51 I	170	4616.17 I	29 c	5279.43 I	40	5706.16 I
350	4060.79 I	450	4630.11 I	50	5285.26 I	85	5706.48 I
210	4068.26 I	450	4648.95 I	35	5296.34 I	29	5709.33 I
12000	4079.73 I	110	4649.27 I	50	5315.55 I	17	5715.59 I
270	4084.86 I	450	4663.83 I	17	5317.01 I	65	5716.35 I
440	4100.40 I	340	4666.24 I	250	5318.60 I	25	5725.66 I
6700	4100.92 I	240	4667.22 I	50	5319.49 I	130	5729.19 I
310	4116.90 I	580	4672.09 I	75	5334.87 I	21	5737.36 I
5300	4123.81 I	530	4675.37 I	25	5336.81 I	13	5738.20 I
670	4129.43 I	110	4678.48 I	50	5340.80 I	85	5751.44 I
770	4129.93 I	320	4685.14 I	25	5343.58 I	110	5760.34 I
2300	4137.10 I	130 c	4706.14 I	460	5344.17 I	65	5764.99 I
440	4139.44 I	260	4708.29 I	340	5350.74 I	29	5771.08 I
2700	4139.71 I	150	4713.50 I	40	5353.28 I	50 c	5776.07 I
350	4143.21 I	110 c	4733.89 I	25	5355.31 I	17	5780.34 I
870	4150.12 I	220 c	4749.70 I	40	5355.70 I	85	5787.54 I
4400	4152.58 I	110	4816.38 I	29	5359.19 I	17	5789.79 I
870	4163.47 I	110 c	4848.37 I	17	5362.01 I	50	5794.24 I
4400	4163.66 I	130 c	4967.78 I	40	5375.27 I	50	5804.03 I
4000	4164.66 I	110	4973.14 I	40	5381.34 I	29 h	5815.33 I
3500	4168.13 I	190	4988.97 I	17	5388.30 I	110	5819.43 I
310	4184.44 I	85	5000.95 I	21	5395.86 I	35	5820.62 I
1200	4190.88 I	65	5002.25 I	29	5396.33 I	75	5834.90 I
870	4192.07 I	40	5013.27 I	29	5411.24 I	25	5838.15 I
870	4195.09 I	230	5017.75 I	21	5416.30 I	130 d	5838.64 I
1300	4195.66 I	40	5019.51 I	65	5422.44 I	50	5842.47 I
310	4198.51 I	150	5026.36 I	21	5431.26 I	17	5846.09 I
350	4201.52 I	40	5030.13 I	110	5437.27 I	65	5866.47 I
870	4205.31 I	210	5039.04 I	19	5448.31 I	35	5874.70 I
350	4214.73 I	40	5047.96 I	19	5456.19 I	17	5877.79 I
420	4217.94 I	170	5058.01 I	40	5458.04 I	40	5893.44 I
420	4229.15 I	65	5059.35 I	19 h	5468.10 I	190cw	5900.62 I
250	4255.44 I	130	5065.25 I	40	5481.00 I	40 c	5903.80 I
770	4262.05 I	40	5077.40 I	13	5483.09 I	29	5927.41 I
420	4266.02 I	750	5078.96 I	19	5483.49 I	40 c	5934.16 I
290	4270.69 I	40 c	5094.41 I	13	5491.06 I	40	5957.70 I
400	4286.99 I	420	5095.30 I	17	5499.53 I	150	5983.22 I
580	4299.60 I	170	5100.16 I	40	5504.58 I	65	5986.08 I
580	4300.99 I	170	5120.30 I	17	5509.12 I	85cw	5997.93 I
120	4309.56 I	85	5121.80 I	35 c	5512.82 I	50	6029.75 I
390	4311.27 I	85	5127.66 I	17	5517.39 I	50	6031.84 I
120	4312.45 I	40	5133.34 I	50	5523.57 I	50	6045.50 I
350	4326.33 I	210	5134.75 I	25	5541.47 I	25	6048.72 I
120	4327.38 I	75	5140.58 I	85	5551.35 I	29	6056.65 I
390	4331.37 I	75	5147.54 I	29	5563.00 I	29	6107.71 I
140	4342.82 I	40	5150.64 I	17 c	5571.44 I	40	6142.51 I
140	4348.65 I	75	5152.63 I	35 c	5576.16 I	50	6148.13 I
110	4349.03 I	250	5160.33 I	35	5578.29 I	50	6164.32 I
290	4351.57 I	250	5164.38 I	50	5586.97 I	29	6213.06 I
210	4368.43 I	230	5180.31 I	17 c	5590.95 I	75	6221.96 I
140	4377.96 I	110	5186.98 I	13	5594.89 I	40 c	6251.76 I
130	4388.36 I	190	5189.20 I	17 c	5599.59 I	21	6260.77 I
160	4392.69 I	170	5193.08 I	40	5603.52 I	85 c	6430.46 I
330	4410.21 I	150	5195.84 I	13	5603.93 I	50 c	6433.22 I

Nb I and II		Nb I and II		Nb III		Nb IV	
Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength
17	6497.84 I	17	8439.77 I	60	2240.31 III	500	1007.05 IV
65	6544.61 I	17cw	8475.98 I	60	2244.19 III	500	1010.19 IV
15	6574.73 I	25	8526.99 I	60	2265.63 III	45	1030.27 IV
19cw	6591.00 I	13 c	8547.25 I	80	2273.92 III	100	1116.08 IV
19	6606.16 I	17 c	8560.54 I	100	2275.23 III	150	1120.02 IV
19	6607.28 I	17	8575.87 I	80	2279.36 III	50	1447.48 IV
35	6614.15 I	21 c	8697.55 I	100	2281.51 III	40	1473.43 IV
19	6626.98 I	21	8740.96 I	80	2284.40 III	40	1487.23 IV
210cw	6660.84 I	21	8767.97 I	100	2290.36 III	60	1502.30 IV
150cw	6677.33 I	29cw	8815.56 I	60	2304.78 III	60	1524.36 IV
65	6701.20 I	35	8905.78 I	50	2309.92 III	50	1534.06 IV
130 c	6723.62 I			100	2313.30 III	40	1635.68 IV
75	6739.88 I			50	2330.22 III	40	1910.70 IV
25	6795.31 I			100	2338.09 III	60	1922.41 IV
85	6828.11 I			80	2344.12 III	60	1978.22 IV
25 c	6849.35 I			90	2349.21 III		Air
19	6870.92 I			80	2355.54 III	40	2027.50 IV
40	6876.36 I			100	2362.06 III	65	2032.53 IV
25 c	6902.89 I			80	2362.50 III	40	2034.67 IV
35	6908.07 I			80	2365.70 III	40	2068.62 IV
40	6918.32 I			100	2372.73 III	55	2084.07 IV
17	6946.07 I			100	2387.41 III	35	2093.12 IV
17	6972.49 I			80	2388.23 III	50	2093.30 IV
25	6986.09 I			50	2404.23 III	20	2122.68 IV
85	6990.32 I			80	2404.89 III	25	2130.23 IV
17 c	6996.11 I			100	2413.94 III	45	2146.36 IV
21	7023.48 I			60	2414.50 III	18	2249.98 IV
17	7038.04 I			100	2421.91 III		
190 c	7046.81 I			50	2437.74 III		
8	7066.41 I			60	2446.45 III		
8	7075.23 I			100	2456.99 III		
40 c	7098.94 I			50	2460.34 III		
17cw	7102.01 I			50	2460.45 III		
19	7119.31 I			50	2463.72 III		
15	7122.95 I			80	2468.72 III		
35	7126.17 I			60	2469.39 III		
17	7130.06 I			80	2475.87 III		
130	7159.43 I			50	2486.02 III		
17	7191.37 I			60	2488.74 III		
19 c	7208.94 I			60	2493.02 III		
50	7252.35 I			100	2499.73 III		
15	7274.81 I			60	2508.53 III		
13	7317.03 I			50	2511.95 III		
17 c	7323.92 I			100	2545.64 III		
29cw	7328.38 I			80	2557.94 III		
65 c	7353.16 I			50	2567.44 III		
190cw	7372.50 I			60	2593.75 III		
13	7419.83 I			80	2598.86 III		
15	7436.02 I			50	2628.67 III		
19	7478.20 I			80	2633.17 III		
65	7515.93 I			80	2657.99 III		
29 c	7519.77 I			50	2937.71 III		
170 c	7574.58 I			80	3001.84 III		
17 c	7583.21 I			80	3142.26 III		
13	7639.81 I			60	3266.11 III		
13	7647.71 I						
25	7703.33 I						
75 c	7726.68 I						
25	7757.31 I						
6	7787.11 I						
13cw	7873.41 I						
35	7885.31 I						
25	7938.89 I						
8	7954.76 I						
40	8135.20 I						
13cw	8240.00 I						
29cw	8320.93 I						
29	8346.08 I						
10	8350.04 I						

N I and II		N I and II		N I and II		N I and II	
Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength
550	916.012 II	70	2496.97 II	650	5941.65 II	220 h	9891.09 II
650	916.701 II	110	2520.22 II	285	5952.39 II	160 h	9961.86 II
90	953.415 I	160	2520.79 II	160	5999.43 I	220 h	9969.34 II
100	953.655 I	220	2522.23 II	210	6008.47 I	285 h	10023.27 II
130	953.970 I	110	2590.94 II	285	6167.76 II	220 h	10035.45 II
130	963.990 I	160	2709.84 II	360	6379.62 II	220 h	10065.15 II
115	964.626 I	110	2799.22 II	185	6411.65 I	160 h	10070.12 II
70	965.041 I	110	2823.64 II	210	6420.64 I	250	10105.13 I
90	1067.614 I	160	2885.27 II	210	6423.02 I	300	10108.89 I
60	1068.612 I	220	3006.83 II	210	6428.32 I	350	10112.48 I
450	1083.990 II	360	3437.15 II	185	6437.68 I	400	10114.64 I
600	1084.580 II	285	3838.37 II	235	6440.94 I	110 h	10126.27 II
430	1085.546 II	360	3919.00 II	185	6457.90 I	250	10539.57 I
650	1085.701 II	450	3955.85 II	300	6468.44 I	200	12074.51 I
175	1097.237 I	1000	3995.00 II	750	6482.05 II	380	12186.82 I
115	1098.095 I	360	4035.08 II	360	6482.70 I	225	12288.97 I
115	1098.260 I	550	4041.31 II	300	6483.75 I	290	12328.76 I
105	1100.360 I	360	4043.53 II	265	6481.71 I	310	12381.65 I
40	1100.465 I	140	4099.94 I	325	6484.80 I	180	12438.40 I
90	1101.291 I	185	4109.95 I	160	6491.22 I	510	12461.25 I
360	1134.165 I	285	4176.16 II	210	6499.54 I	920	12469.62 I
385	1134.415 I	285	4227.74 II	185	6506.31 I	500	13429.61 I
410	1134.980 I	285	4236.91 II	750	6610.56 II	840	13581.33 I
105	1143.65 I	220	4237.05 II	185	6622.54 I	180	13587.73 I
130	1163.884 I	450	4241.78 II	185	6636.94 I	180	13602.27 I
60	1164.206 I	285	4432.74 II	235	6644.96 I	290	13624.18 I
105	1164.325 I	650	4447.03 II	185	6646.50 I	250	14757.07 I
270	1167.448 I	360	4530.41 II	235	6653.46 I	100	14868.87 I
105	1168.334 I	550	4601.48 II	210	6656.51 I	160	14966.60 I
60	1168.417 I	450	4607.16 II	185	6722.62 I	180	15582.27 I
195	1168.536 I	360	4613.87 II	210	7398.64 I	120 s	17516.58 I
230	1176.510 I	450	4621.39 II	160	7406.12 I	100 I	17584.86 I
105	1176.630 I	870	4630.54 II	265	7406.24 I	100	17878.26 I
195	1177.695 I	550	4643.08 II	685	7423.64 I		
410	1199.550 I	285	4788.13 II	785	7442.29 I		
385	1200.223 I	450	4803.29 II	900	7468.31 I		
360	1200.710 I	180	4847.38 I	185	7608.80 I		
175	1225.026 I	285	4895.11 II	450	7762.24 II		
160	1225.37 I	160	4914.94 I	400	8184.87 I		
130	1228.41 I	210	4935.12 I	400	8188.02 I		
160	1228.79 I	160	4950.23 I	250	8200.36 I		
360	1243.179 I	350	4963.98 I	300	8210.72 I		
315	1243.306 I	285	4987.37 II	570	8216.34 I		
290	1310.540 I	450	4994.36 II	400	8223.14 I		
250	1310.95 I	650	5001.48 II	400	8242.39 I		
230	1319.00 I	360	5002.70 II	550	8438.74 II		
315	1319.68 I	870	5005.15 II	500	8567.74 I		
115	1326.57 I	550	5007.32 II	570	8594.00 I		
115	1327.92 I	450	5010.62 II	650	8629.24 I		
360	1411.94 I	360	5016.39 II	500	8655.89 I		
700	1492.625 I	360	5025.66 II	220	8676.08 II		
490	1492.820 I	550	5045.10 II	700	8680.28 I		
640	1494.675 I	185	5281.20 I	650	8683.40 I		
775	1742.729 I	140	5292.68 I	500	8686.15 I		
700	1745.252 I	450	5495.67 II	110	8687.43 II		
	Air	285	5535.36 II	110 h	8699.00 II		
160	2095.53 II	650	5666.63 II	500	8703.25 I		
70	2096.20 II	550	5676.02 II	160 h	8710.54 II		
110	2096.86 II	870	5679.56 II	570	8711.70 I		
110	2130.18 II	450	5686.21 II	500	8718.83 I		
160	2142.78 II	450	5710.77 II	250	8728.89 I		
160	2206.09 II	285	5747.30 II	200	8747.36 I		
160	2286.69 II	700	5752.50 I	500	9386.80 I		
110	2288.44 II	240	5764.75 I	570	9392.79 I		
220	2316.49 II	265	5829.54 I	250	9460.68 I		
160	2316.69 II	235	5854.04 I	200	9863.33 I		
285	2317.05 II	360	5927.81 II	160 h	9865.41 II		
160	2461.27 II	550	5931.78 II	110 h	9868.21 II		
110	2496.83 II	285	5940.24 II	160 h	9887.39 II		

N III		
Refs.	66,213 -	R.L.K
		Vacuum
500	257.95	III
650	258.50	III
700	259.19	III
800	260.09	III
800	261.28	III
500	262.91	III
500	265.23	III
500	265.27	III
500	268.70	III
150	314.715	III
200	314.850	III
90	314.877	III
600	323.26	III
500	338.35	III
500	340.20	III
500	351.98	III
120	362.833	III
150	362.881	III
150	362.946	III
90	362.985	III
300	374.204	III
350	374.441	III
500	387.48	III
250	451.869	III
300	452.226	III
500	684.996	III
570	685.513	III
650	685.816	III
500	686.335	III
500	763.336	III
570	764.359	III
250	771.544	III

N III			N IV			N IV			Os I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
300	771.901 III		400	192.9 IV		90	3747.54 IV		1900	2123.84 I	
350	772.385 III		500	196.87 IV		150	4057.76 IV		5300	2137.11 I	
200	772.891 III		500	197.23 IV		90	4606.33 IV		2400	2149.97	
150	772.975 III		500	202.60 IV		150	6380.77 IV		2600	2154.59 I	
650	979.842 III		500	205.94 IV		N V			1300	2157.84 I	
700	979.919 III		500	205.97 IV		Refs. 66,107,318 - R.L.K.			1200	2158.53 I	
900	989.790 III		500	206.03 IV		Vacuum			2400	2161.00	
700	991.514 III		500	217.20 IV		52	166.947 V		3100	2166.90 I	
1000	991.579 III		500 d	217.90 IV		52	186.069 V		1100	2167.75 I	
500	1183.031 III		500 d	223.4 IV		62	186.153 V		2100	2171.65 I	
570	1184.550 III		800 w	225.12 IV		90	209.303 V		960	2184.68 I	
150	1387.371 III		800	225.21 IV		90	247.561 V		840	2194.39 II	
250	1729.945 III		600 w	234.12 IV		120	247.706 V		760	2202.49 I	
570	1747.848 III		600 w	234.20 IV		150	266.196 V		600	2227.98 I	
350	1751.218 III		600 w	234.25 IV		200	266.379 V		1100	2234.61 I	
650	1751.657 III		550	236.07 IV		90	713.518 V		1300	2252.15 I	
150	1804.486 III		500	237.99 IV		150	713.860 V		2000	2255.85 II	
200	1805.669 III		500 w	238.7 IV		150	748.195 V		1400	2264.60 I	
150	1846.42 III		600	238.80 IV		200	748.291 V		360	2268.28 I	
350	1885.06 III		500 w	239.62 IV		1000	1238.821 V		960	2270.17 I	
400	1885.22 III		900	247.20 IV		900	1242.804 V		1400	2282.26 II	
200	1907.99 III		500 w	248.43 IV		90	1549.336 V		840	2283.67 I	
150	1919.55 III		500 w	248.46 IV		200 I	1616.33 V		570	2289.32 I	
150	1919.77 III		500 w	248.48 IV		350 I	1619.69 V		380	2297.31 I	
300	1920.65 III		600	260.45 IV		90 w	1860.37 V		660	2308.31 I	
150	1920.84 III		650	270.99 IV		Air			190	2313.75 II	
200	1921.30 III		250	283.42 IV		60 I	2859.16 V		550	2320.18 I	
	Air		300	283.48 IV		90 I	2974.52 V		310	2323.98 I	
200	2064.01 III		350	283.58 IV		150 w	2980.78 V		660	2324.24 I	
250	2064.42 III		600	285.56 IV		250 w	2981.31 V		330	2326.99 I	
120	2068.68 III		600 w	297.7 IV		60 w	2998.43 V		310	2334.56 I	
90	2071.09 III		700	297.82 IV		350	4603.73 V		720	2336.80 II	
90	2117.59 III		650	300.32 IV		250	4619.98 V		430	2338.63 I	
90	2121.50 III		90	303.123 IV		200 w	4944.56 V		290	2340.69 I	
90	2147.31 III		500	303.28 IV		60 w	7618.46 V		430	2343.74 I	
200	2188.20 III		150	315.053 IV		OSMIUM (Os)			260	2345.75 I	
150	2188.38 III		120	322.503 IV		Z = 76			430	2347.38 I	
250 w	2682.18 III		150	322.570 IV		Os I and II			230	2350.23 II	
90	2689.20 III		200	322.724 IV		Ref. 1 - C.H.C.			360	2352.99 I	
120	3367.34 III		120	323.175 IV		Air			120	2355.28 II	
90	3754.67 III		300	335.050 IV		9600	2001.45 I		240	2356.92 I	
120	3771.05 III		500 w	351.93 IV		13000	2003.73 I		240	2357.25 I	
90	3938.52 III		700	353.06 IV		9000	2004.78		310	2362.41 I	
150	3998.63 III		500	420.77 IV		17000	2010.15 I		900	2362.77 I	
200	4003.58 III		650	463.74 IV		29000	2018.14 I		500	2367.35 II	
250	4097.33 III		570	765.148 IV		29000	2020.26		290	2369.24 I	
200	4103.43 III		520	921.992 IV		14000	2022.76 I		500	2370.70 I	
120	4195.76 III		500	922.519 IV		18000	2034.44 I		480	2371.18 I	
150	4200.10 III		480	923.057 IV		26000	2045.36 I		95	2375.06 II	
90	4332.91 III		520	921.992 IV		8600	2058.69 I		2600	2377.03 I	
120	4345.68 III		500	922.519 IV		7800	2067.21 II		260	2377.61 I	
300	4379.11 III		520	924.283 IV		4200	2070.67 II		900	2379.39 I	
90	4510.91 III		1000	955.335 IV		7200	2076.95 I		240	2384.62 I	
120	4514.86 III		150 w	1036.16 IV		7200	2078.09		1700	2387.29 I	
90	4634.14 III		90	1078.71 IV		14000	2079.97 I		330	2394.29 I	
120	4640.64 III		90	1188.01 IV		2900	2082.54 I		290	2395.39 I	
90	4858.82 III		1000	1718.55 IV		2900	2089.03 I		1100	2395.88 I	
150	4867.15 III			Air		2900	2089.21 I		220	2396.78 I	
90	5314.35 III		90	2080.34 IV		6000	2097.60 I		960	2401.13 I	
200	5320.82 III		90 w	2318.09 IV		5300	2100.63 I		260	2402.23 I	
150	5327.18 III		150	2477.69 IV		2100	2117.66 I		200	2403.54 I	
90	6454.11 III		250	2645.65 IV		4800	2117.96 I		330	2403.85 I	
120	6467.02 III		300	2646.18 IV		6600	2119.79		95	2405.08 II	
	N IV		350	2646.96 IV					290	2405.45 I	
	Refs. 108,212 - R.L.K.		90	3078.25 IV					200	2405.96 I	
	Vacuum		90	3463.37 IV					360	2408.67 I	
400	181.75 IV		570	3478.71 IV					240	2410.98 I	
400	191.7 IV		500	3482.99 IV					290	2414.52 I	
			400	3484.96 IV					530	2417.99 I	

Os I and II			Os I and II			Os I and II			Os I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
530	2418.53	I	3800	2637.13	I	450	2964.06	I	310	3327.42	I
95	2420.02	II	1900	2644.11	I	740	2970.97	I	960	3336.15	I
200	2423.07	II	340	2646.89	I	450	2977.64	I	110	3351.74	I
70	2424.02	II	380	2647.73	I	510	2982.90	I	120	3353.91	I
500	2424.56	I	380	2649.34	I	340	2983.49	I	230	3357.97	I
1400	2424.97	I	490	2656.68	I	260	2997.65	I	250	3361.15	I
240	2426.81	I	1900	2658.60	I	330	3013.07	I	190	3364.12	I
70	2427.90	II	640	2659.83	I	570	3017.25	I	120	3370.20	I
380	2431.19	I	380	2661.18	I	4400	3018.04	I	960	3370.59	I
380	2431.61	I	40	2664.29	II	480	3019.38	I	160	3372.08	I
360	2446.02	I	580	2674.57	I	1100	3030.70	I	120	3378.68	I
900	2450.74	I	400	2674.88	I	2900	3040.90	I	310	3384.00	I
530	2451.73	I	2100	2689.82	I	210	3043.50	I	190	3385.94	I
530	2453.90	I	510	2699.59	I	120	3042.74	II	620	3387.84	I
110	2454.91	II	580	2706.70	I	230	3049.46	I	120	3401.17	I
530	2456.46	I	3000	2714.64	I	210	3050.39	I	620	3401.86	I
1800	2461.42	I	580	2715.36	I	8600	3058.66	I	250	3402.51	I
110	2468.90	II	1300	2720.04	I	290	3060.30	I	120	3408.76	I
290	2472.28	I	850	2721.86	I	570	3062.19	I	120	3412.74	I
290	2474.78	I	580	2730.61	I	210	3069.94	I	120	3421.69	I
900	2476.84	I	40	2731.36	II	360	3074.08	I	150	3427.67	I
360	2482.43	I	580	2732.80	I	290	3074.96	I	250	3440.60	I
530	2486.24	II	690	2761.42	I	290	3077.44	I	120	3444.46	I
4500	2488.55	I	470	2763.27	I	1100	3077.72	I	160	3445.55	I
290	2491.02	I	340	2765.04	I	360	3078.11	I	310	3449.20	I
290	2491.69	I	960	2770.71	I	230	3078.38	I	120	3458.38	I
360	2492.42	I	300	2776.91	I	230	3090.08	I	120	3465.44	I
2600	2498.41	I	740	2782.55	I	270	3093.59	I	120	3478.53	I
330	2499.92	I	40	2783.88	II	310	3101.53	I	120	3482.11	I
330	2502.29	I	640	2786.31	I	360	3105.99	I	120	3487.46	I
500	2504.39	I	230	2793.99	I	310	3108.98	I	120	3490.33	I
260	2504.51	I	230	2794.19	I	620	3109.38	I	160	3498.54	I
35	2507.18	II	530	2796.73	I	250	3111.09	I	250	3501.16	I
70	2509.71	II	320	2804.07	I	310	3118.33	I	620	3504.66	I
660	2512.87	I	2800	2806.91	I	480	3131.12	I	440	3512.99	I
2400	2513.25	I	470	2808.94	I	250	3152.67	I	310	3518.72	I
660	2515.04	I	420	2813.84	I	290	3153.61	I	120	3520.00	I
500	2517.92	I	740	2814.20	I	3100	3156.25	I	480	3523.64	I
660	2518.44	I	300	2815.78	I	250	3156.78	I	120	3526.04	I
200	2519.29	I	420	2829.27	I	310	3166.51	I	1200	3528.60	I
330	2519.79	I	230	2837.42	I	180	3173.93	II	230	3530.06	I
200	2532.44	I	470	2838.17	I	420	3178.06	I	230	3532.80	I
780	2538.00	II	5100	2838.63	I	230	3181.88	I	120	3533.41	I
240	2538.10	I	740	2841.60	I	230	3185.33	I	230	3542.71	I
1000	2542.51	I	2300	2844.40	I	310	3186.98	I	960	3559.79	I
30	2548.83	II	420	2846.39	I	310	3189.46	I	1200	3560.86	I
310	2554.46	I	420	2848.25	I	310	3194.23	I	120	3562.34	I
190	2563.16	II	1500	2850.76	I	150	3213.31	II	310	3569.78	I
600	2566.49	I	1500	2860.96	I	1900	3232.06	I	120	3574.08	I
290	2566.88	I	35	2863.37	II	290	3238.63	I	120	3587.32	I
480	2568.83	I	360	2874.96	I	190	3241.04	I	620	3598.11	I
340	2571.78	I	300	2878.40	I	120	3248.00	I	190	3601.83	I
150	2578.32	II	35	2879.39	II	190	3254.91	I	95	3604.48	II
130	2580.03	II	30	2880.20	II	190	3256.92	I	250	3616.57	I
360	2581.05	I	260	2896.06	I	190	3260.30	I	120	3619.43	I
740	2581.96	I	9600	2909.06	I	3100	3262.29	I	450	3640.33	I
1000	2590.76	I	2100	2912.33	I	380	3262.75	I	230	3654.49	I
200	2591.98	I	530	2917.26	I	3100	3267.94	I	330	3656.90	I
170	2596.00	II	2100	2919.79	I	620	3269.21	I	120	3666.31	I
210	2609.20	I	300	2925.57	I	190	3272.16	I	480	3670.89	I
380	2609.56	I	360	2929.51	I	530	3275.20	I	120	3675.45	I
400	2610.78	I	510	2931.28	I	330	3277.97	I	250	3689.06	I
470	2612.63	I	260	2934.64	I	190	3288.84	I	190	3703.25	I
1800	2613.06	I	200	2942.85	I	1200	3290.26	I	120	3706.56	I
800	2619.94	I	1100 h	2948.23	I	7600	3301.56	I	120	3709.14	I
230	2620.62	I	1400	2949.53	I	250	3306.23	I	230	3713.73	I
530	2621.82	I	210 d	2949.81	I	620	3310.91	I	210	3719.52	I
380	2628.48	I	300	2961.01	I	120	3315.42	I	230	3720.13	I
27	2631.22	II	530	2962.15	I	250	3324.33	I	180	3746.47	I

Os I and II		Os I and II		Os I and II		Os I and II	
Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength
3700	3752.52 I	100	4338.75 I	13	5552.88 I	7	7789.96 I
100	3757.12 I	100	4351.53 I	11	5560.62 I	7	7852.17 I
130	3766.30 I	210	4365.67 I	16	5580.66 I	6	7981.20 I
120	3768.14 I	110	4370.66 I	80	5584.44 I	7	8041.29 I
120	3774.40 I	520	4394.86 I	8	5600.50 I		
110	3774.62 I	160	4397.26 I	35	5620.08 I		
120	3776.25 I	160	4402.74 I	9	5637.41 I		
290	3776.99 I	4900	4420.47 I	22	5642.56 I		
2100	3782.20 I	100	4432.41 I	28	5645.25 I		
620	3790.14 I	290	4436.32 I	7	5648.98 I		
180	3790.73 I	100	4439.64 I	9	5660.21 I		
370	3793.91 I	230	4447.35 I	7	5674.38 I		
250	3836.06 I	120	4484.76 I	28	5680.88 I		
150	3840.30 I	110	4548.66 I	11	5709.37 I		
150	3841.29 I	540	4550.41 I	170	5721.93 I		
190	3849.94 I	140	4551.30 I	8	5737.89 I		
230	3857.09 I	170	4616.78 I	8	5739.72 I		
230	3865.47 I	170	4631.83 I	22	5765.05 I		
730	3876.77 I	140	4663.82 I	170	5780.82 I		
250	3881.86 I	670	4793.99 I	40	5800.60 I		
140	3900.39 I	110	4865.60 I	8	5842.49 I		
190	3901.71 I	55	5031.83 I	110	5857.76 I		
100	3930.00 I	45	5039.12 I	28	5860.64 I		
250	3938.59 I	35	5072.88 I	11	5882.92 I		
100	3949.78 I	35	5074.77 I	11	5903.98 I		
200	3961.02 I	35	5079.09 I	11	5906.84 I		
1000	3963.63 I	90	5103.50 I	7	5908.95 I		
100	3964.96 I	55	5110.81 I	7	5981.36 I		
150	3969.67 I	22	5122.23 I	11	5983.22 I		
110 h	3975.44 I	22	5145.54 I	65	5996.00 I		
730	3977.23 I	140	5149.74 I	20	6015.79 I		
100	3988.18 I	28	5152.01 I	7	6054.63 I		
150	4003.48 I	28	5168.98 I	20	6144.53 I		
100	4004.02 I	40	5193.52 I	11	6158.03 I		
150	4005.16 I	270	5202.63 I	35	6227.70 I		
160	4018.26 I	35	5203.23 I	7	6241.70 I		
100	4037.84 I	20	5250.46 I	22	6269.41 I		
280	4041.92 I	45	5255.82 I	11	6274.94 I		
160	4048.05 I	55	5265.15 I	11	6286.83 I		
960	4066.69 I	20	5283.89 I	9	6398.86 I		
250	4070.86 I	20	5295.65 I	22	6403.15 I		
190	4071.56 I	40	5298.78 I	9	6448.13 I		
230	4074.68 I	13	5302.58 I	6	6520.85 I		
490	4091.82 I	18	5336.23 I	7	6528.87 I		
120	4100.30 I	11	5346.03 I	7	6533.14 I		
1200	4112.02 I	13	5352.25 I	11	6538.30 I		
180	4124.60 I	110	5376.79 I	11	6576.83 I		
180	4128.96 I	16	5403.43 I	8	6614.56 I		
2500	4135.78 I	13	5412.14 I	4	6615.43 I		
150	4137.84 I	120	5416.34 I	7	6661.81 I		
180	4172.57 I	45	5416.69 I	27	6729.56 I		
1200	4173.23 I	28	5417.51 I	18	6791.53 I		
620	4175.63 I	16	5441.82 I	14	6806.61 I		
120	4184.13 I	55	5443.31 I	5	6878.70 I		
320	4189.91 I	22	5446.93 I	4	6901.58 I		
180	4201.45 I	11	5447.76 I	11	6956.02 I		
250	4202.06 I	20	5449.37 I	6	6984.95 I		
1200	4211.86 I	20	5453.40 I	15	7060.67 I		
120	4213.86 I	22	5457.30 I	22	7145.54 I		
100	4215.16 I	28	5470.00 I	10	7149.89 I		
170	4233.46 I	13	5474.58 I	4	7184.10 I		
4900	4260.85 I	13	5475.13 I	10	7206.33 I		
100	4264.75 I	9	5477.27 I	5	7209.96 I		
120	4269.61 I	16	5481.85 I	9	7251.16 I		
100	4285.90 I	22	5509.33 I	6	7253.49 I		
560	4293.95 I	9	5516.01 I	6	7375.07 I		
560	4311.40 I	270	5523.53 I	9	7407.95 I		
110	4326.25 I	22	5546.82 I	26	7602.95 I		
340	4328.68 I	9	5549.79 I	4	7701.46 I		

OXYGEN (O)	
Z = 8	
O I and II	
Intensity	Wavelength
	Refs. 66,69,209,210,215
	- R.L.K.
	Vacuum
250	537.83 II
300	538.26 II
220	539.09 II
200	539.55 II
150	539.85 II
150	644.148 II
200	672.95 II
150	673.77 II
70	685.544 I
900	718.484 II
600	718.562 II
70	744.794 I
70	770.793 I
90	771.056 I
70	775.321 I
70	791.973 I
300	796.66 II
90	804.267 I
70	804.848 I
70	805.295 I
80	805.810 I
240	832.762 II
450	833.332 II
600	834.467 II
40	877.879 I
80	922.008 I
90	935.193 I
40	948.686 I
90	971.738 I
40	976.448 I
160	988.773 I
40	990.204 I
250	1025.762 I
90	1027.431 I
160	1039.230 I
60	1040.942 I
40	1152.152 I
900	1302.168 I
600	1304.858 I
300	1306.029 I
	Air
30 d	2283.42 II
30 d	2284.89 II
110	2293.32 II
200	2300.35 II
30 d	2313.05 II
30 d	2316.12 II
30 d	2316.79 II
50 d	2319.68 II
30 d	2322.15 II
30 d	2339.31 II
110	2411.60 II
80	2425.55 II
250	2433.56 II
80 d	2436.06 II
80	2444.26 II

O I and II			O I and II			O I and II			O III		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
300	2445.55	II	285	4596.17	II	810	8446.25	I			
300	2733.34	II	80 d	4609.39	II	1000	8446.36	I	80 d	264.34	III
110	2747.46	II	160	4638.85	II	935	8446.76	I	110	264.48	III
265	2972.29	I	360	4641.81	II	325	8820.43	I	110	266.97	III
160	3122.62	II	450	4649.14	II	160 d	9057.01	I	150	266.98	III
220	3129.44	II	160	4650.84	II	120	9118.29	I	150	267.03	III
450	3134.82	II	360	4661.64	II	80	9134.71	I	150	277.38	III
285	3138.44	II	285	4676.23	II	80	9150.14	I	80	295.62	III
220	3270.98	II	220	4699.21	II	80	9151.48	I	110	295.66	III
220	3273.52	II	285	4705.36	II	235	9156.01	I	120	295.72	III
220	3277.69	II	160	4924.60	II	450	9260.81	I	150	303.41	III
360	3287.59	II	220	4943.06	II	490	9260.84	I	150	303.46	III
160	3305.15	II	135	5329.10	I	450	9260.94	I	140	303.52	III
160	3306.60	II	160	5329.68	I	400	9262.58	I	160	303.62	III
220	3377.20	II	190	5330.74	I	540	9262.67	I	160	303.69	III
285	3390.25	II	90	5435.18	I	590	9262.77	I	250	303.80	III
220	3407.38	II	110	5435.78	I	490	9265.94	I	200	305.60	III
160	3409.84	II	135	5436.86	I	640	9266.01	I	250	305.66	III
285	3470.81	II	120	5577.34	I	185	9399.19	I	190	305.70	III
220	3712.75	II	160	5958.39	I	120	9481.16	I	300	305.77	III
285	3727.33	II	190	5958.58	I	120 d	9482.88	I	190	305.84	III
160	3739.92	II	80	5995.28	I	235	9487.43	I	450	320.979	III
360	3749.49	II	160	6046.23	I	140	9492.71	I	300	328.45	III
160	3803.14	II	190	6046.44	I	265	9497.97	I	250	328.74	III
120	3823.41	I	110	6046.49	I	160	9499.30	I	300	345.31	III
450	3911.96	II	100	6106.27	I	235	9505.59	I	110	355.14	III
160	3919.29	II	400	6155.98	I	210	9521.96	I	90	355.33	III
185	3947.29	I	450	6156.77	I	120	9523.36	I	80	355.47	III
160	3947.48	I	490	6158.18	I	120	9523.96	I	200	359.02	III
140	3947.59	I	80	6256.83	I	100	9528.28	I	190	359.22	III
220	3954.37	II	100	6261.55	I	100	9622.13	I	150	359.38	III
100	3954.61	I	100	6366.34	I	120	9625.29	I	210	373.80	III
450	3973.26	II	100	6374.32	I	160	9677.38	I	200	374.00	III
220	3982.20	II	320	6453.60	I	80	9694.66	I	300	374.08	III
160	4069.90	II	360	6454.44	I	65	9694.91	I	190	374.16	III
285	4072.16	II	400	6455.98	I	235	9741.50	I	200	374.33	III
450	4075.87	II	80	6604.91	I	235	9760.65	I	210	374.44	III
80 d	4083.91	II	100	6653.83	I	120	9909.05	I	450	395.558	III
50 d	4087.14	II	360	7001.92	I	140	9936.98	I	300	434.98	III
150 d	4089.27	II	450	7002.23	I	120	9940.41	I	800	507.391	III
110	4097.24	II	210	7156.70	I	160	9995.31	I	900	507.683	III
220	4105.00	II	400	7254.15	I	120 d	10421.18	I	1000	508.182	III
285	4119.22	II	450	7254.45	I	590	11286.34	I	1000	525.795	III
160	4132.81	II	320	7254.53	I	640	11286.91	I	700	597.818	III
50	4146.06	II	210	7476.44	I	490	11287.02	I	1000	599.598	III
220	4153.30	II	100	7477.24	I	490	11287.32	I	110	609.70	III
285	4185.46	II	120	7479.08	I	490	11295.10	I	160	610.04	III
450	4189.79	II	120	7480.67	I	540	11297.68	I	200	610.75	III
80	4233.27	I	100	7706.75	I	590	11302.38	I	100	610.85	III
50 d	4253.74	II	870	7771.94	I	265	11358.69	I	800	702.332	III
50 d	4253.98	II	810	7774.17	I	490	12464.02	I	800	702.822	III
50 d	4275.47	II	750	7775.39	I	450	12570.04	I	900	702.899	III
50 d	4303.78	II	80	7886.27	I	120	12990.77	I	1000	703.850	III
285	4317.14	II	100	7943.15	I	160	13076.91	I	600	832.927	III
160	4336.86	II	100	7947.17	I	700	13163.89	I	780	833.742	III
220	4345.56	II	235	7947.55	I	750	13164.85	I	600	835.096	III
285	4349.43	II	210	7950.80	I	640	13165.11	I	800	835.292	III
220	4366.90	II	185	7952.16	I	160	16212.06	I	160	1476.89	III
100	4368.25	I	110	7981.94	I	120	17966.70	I	285	1590.01	III
220	4395.95	II	135	7982.40	I	590	18021.21	I	160	1591.33	III
450	4414.91	II	190	7986.98	I	120	18041.48	I	220	1760.12	III
285	4416.98	II	135	7987.33	I	120	18042.19	I	110	1760.42	III
160	4448.21	II	250	7995.07	I	120	18046.23	I	220	1763.22	III
160	4452.38	II	400	8221.82	I	140	18229.23	I	220	1764.48	III
50	4465.45	II	265	8227.65	I	540	18243.63	I	750	1767.78	III
50 d	4466.28	II	265	8230.02	I	140	26173.56	I	550	1768.24	III
50	4467.83	II	325	8233.00	I				360	1771.67	III
50	4469.41	II	120	8235.35	I				110	1773.00	III
360	4590.97	II	120	8426.16	I				110	1773.85	III

O III
Refs. 23,66,210 - R.L.K.

Intensity	O III Wavelength	
220	1779.16	III
160	1781.03	III
160	1784.85	III
220	1789.66	III
110	1848.26	III
110	1856.62	III
285	1872.78	III
285	1872.87	III
285	1874.94	III
160	1920.04	III
110	1920.75	III
110	1921.52	III
220	1923.49	III
110	1923.82	III
110	1926.94	III
	Air	
360	2013.27	III
160	2026.96	III
220	2045.67	III
160	2052.74	III
200 d	2390.44	III
80	2394.33	III
80	2422.84	III
80 d	2438.83	III
200	2454.99	III
200	2558.06	III
80	2687.53	III
110	2695.49	III
80	2959.68	III
250	2983.78	III
80	3017.63	III
80	3023.45	III
80	3043.02	III
200	3047.13	III
110	3059.30	III
80	3121.71	III
110	3132.86	III
80	3238.57	III
200	3260.98	III
300	3265.46	III
80	3267.31	III
80	3312.30	III
110	3340.74	III
80	3444.10	III
80	3455.12	III
80	3698.70	III
80	3702.75	III
80	3703.37	III
110	3707.24	III
110	3715.08	III
110	3744.00	III
150	3754.67	III
80	3757.21	III
250	3759.87	III
110	3791.26	III
200	3961.59	III
110	5592.37	III
	O IV	
	Refs. 36,66 - R.L.K.	
	Vacuum	
150	195.86	IV
200	196.01	IV
110	207.18	IV
150	207.24	IV
140	233.46	IV
150	233.50	IV
110	233.52	IV
200	233.56	IV

Intensity	O IV Wavelength	
110	233.60	IV
90	238.36	IV
180	238.57	IV
110	252.56	IV
110	252.95	IV
150	253.08	IV
300	260.39	IV
250	260.56	IV
300	279.63	IV
375	279.94	IV
110	285.71	IV
150	285.84	IV
200	306.62	IV
150	306.88	IV
700	553.330	IV
775	554.075	IV
850	554.514	IV
700	555.261	IV
580	608.398	IV
640	609.829	IV
270	616.952	IV
150	617.005	IV
200	617.036	IV
520	624.617	IV
580	625.130	IV
640	625.852	IV
200	779.734	IV
315	779.821	IV
360	779.912	IV
200	779.997	IV
640	787.711	IV
520	790.109	IV
700	790.199	IV
200	802.200	IV
160	802.255	IV
130	921.296	IV
160	921.366	IV
200	923.367	IV
130	923.433	IV
200	1338.612	IV
130	1342.992	IV
230	1343.512	IV
	Air	
200	2449.372	IV
200	2450.040	IV
200	2493.44	IV
200	2493.77	IV
200	2507.73	IV
230	2509.19	IV
200	2517.2	IV
160	2836.26	IV
160	2921.45	IV
460	3063.42	IV
410	3071.61	IV
160	3209.66	IV
230	3348.08	IV
270	3349.11	IV
160	3354.27	IV
200	3375.40	IV
130	3378.06	IV
360	3381.20	IV
360	3385.52	IV
270	3396.79	IV
360	3403.52	IV
230	3409.66	IV
410	3411.69	IV
230	3413.64	IV
200	3489.83	IV
160	3492.24	IV

Intensity	O IV Wavelength	
230	3560.39	IV
270	3563.33	IV
315 w	3725.93	IV
360	3729.03	IV
410	3736.85	IV
230	3744.89	IV
	O V	
	Refs. 24,66 - R.L.K.	
	Vacuum	
80	124.616	V
110	135.523	V
80	138.109	V
110	139.029	V
80	151.447	V
110	151.477	V
150	151.546	V
80	164.574	V
110	164.657	V
80	164.709	V
80	166.235	V
150	167.99	V
110	170.219	V
450	172.169	V
250	185.745	V
375	192.751	V
450	192.799	V
520	192.906	V
80	193.003	V
200	194.593	V
80	202.161	V
80	202.224	V
80	202.283	V
80	202.334	V
150	202.393	V
110	203.78	V
150	203.82	V
100	203.85	V
200	203.89	V
100	203.94	V
300	207.794	V
150	215.040	V
200	215.103	V
250	215.245	V
250	216.018	V
520	220.352	V
80	227.372	V
80	227.469	V
150	227.511	V
80	227.549	V
80	227.634	V
80	227.689	V
150	231.823	V
110	248.459	V
110	286.448	V
1000	629.730	V
230	681.272	V
700	758.678	V
640	759.441	V
580	760.228	V
775	760.445	V
640	761.128	V
700	762.003	V
520	774.518	V
640	1371.292	V
160 w	1506.72	V
315 w	1643.68	V
160	1707.996	V
	Air	

Intensity	O V Wavelength	
1000	2781.01	V
920	2786.99	V
775	2789.85	V
200	2941.33	V
210	2941.65	V
160	3144.66	V
100	4123.99	V
230 w	4930.27	V
130	5597.91	V
130	6500.24	V
	PALLADIUM (Pd)	
	Z = 46	
	Pd I and II	
	Refs. 1,287 - C.H.C.	
	Air	
50	2162.27	II
50	2182.35	II
50	2212.15	II
100 r	2231.59	II
200 r	2296.53	II
50	2351.32	II
50	2362.31	II
75	2367.92	II
60	2372.16	II
50	2388.29	II
60	2414.73	II
75	2418.72	II
75	2424.49	II
100	2426.87	II
100	2430.94	II
100	2433.11	II
100	2435.32	II
150	2446.17	II
75	2446.72	II
1100	2447.91	I
80	2448.15	II
100	2457.29	II
60	2457.76	II
150	2469.29	II
80	2470.06	II
100	2471.18	II
50	2472.55	II
1700	2476.42	I
250	2486.52	II
300	2488.92	II
75	2489.61	II
200	2498.81	II
150	2505.73	II
50	2514.47	II
80	2534.57	II
50 h	2539.44	II
150	2551.84	II
150	2565.51	II
100	2569.56	II
60	2593.24	II
50	2628.24	II
70	2635.92	II
150	2658.75	II
1900	2763.09	I
150 h	2776.85	II
100 h	2787.92	II
50 h	2800.64	II
50 h	2807.59	II
200	2854.59	II
100 h	2871.37	II
100 h	2878.01	II

P I and II			P III			P IV			P V		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
600	6503.46	II	200	3556.546	III	120	1862.893	IV		Air	
600	6507.97	II	200	3577.526	III	200	1863.580	IV	200	2180.29	V
150	6713.28	II	200	3904.812	III	650	1888.523	IV	150	2186.42	V
120	6717.42	I	250	3914.314	III	200	1910.183	IV	375	2424.40	V
100	7165.45	I	300	3957.641	III	120	1985.682	IV	450	2440.93	V
150	7175.12	I	350	3978.307	III	150	1985.851	IV	200	2441.24	V
120	7176.66	I	200	4057.440	III	200	1986.114	IV	300	2961.00	V
100	7505.76	I	400	4059.312	III	150	1987.022	IV	450	2978.55	V
250	7845.63	II	300	4080.084	III		Air		700	3175.09	V
120	8278.07	I	500	4222.195	III	200	2477.823	IV	520	3204.04	V
150	8367.84	I	350	4246.720	III	150	2478.070	IV	150	4083.18	V
100	8531.46	I	200	4428.171	III	250	2478.256	IV	110	4094.95	V
100	8613.85	I	200	4463.668	III	250	2605.506	IV	110	5156.72	V
150	8637.62	I	250	4479.776	III	400	2644.295	IV			
250	8741.54	I	150	6083.409	III	300	2724.764	IV		PLATINUM (Pt)	
50	8872.17	I	150	6409.204	III	400	2728.770	IV		Z = 78	
30	9525.78	I	150	6484.440	III	200	2729.120	IV		Pt I and II	
25	9593.54	I	150	6486.381	III	500	2739.309	IV		Refs. 1,288 - C.H.C.	
20	9734.74	I	150	6992.690	III	250	2739.872	IV		Vacuum	
25	9750.73	I	150	8113.528	III	200	2740.223	IV	30	1621.66	II
50	9796.79	I		P IV		200	2961.242	IV	30	1723.13	II
25	10084.22	I		Ref. 336 - R.L.K.		650	3347.736	IV	30	1751.70	II
6	10529.45	I		Vacuum		570	3364.467	IV	30	1777.09	II
8	10581.52	I	90	282.301	IV	400	3371.122	IV	50 r	1777.09	II
			90	304.996	IV	200	3413.543	IV	30	1781.86	II
			120	359.293	IV	200	3733.393	IV	30	1879.09	II
			150	359.899	IV	300	4249.656	IV	40	1883.05	II
			120	361.514	IV	250	4540.288	IV	50	1889.52	II
			150	361.629	IV	250	4541.112	IV	50	1911.70	II
			120	371.299	IV	150	4548.056	IV	30	1929.25	II
			150	371.504	IV	200	4548.449	IV	30	1929.68	II
			200	372.001	IV	150	5235.499	IV	30	1939.80	II
			500	388.318	IV	150	5989.774	IV	30	1949.90	II
			120	414.604	IV	150	6142.605	IV	30	1983.74	II
			200	414.999	IV	150	6713.939	IV		Air	
			250	415.805	IV	120	6715.906	IV	40	2014.93	II
			250	444.245	IV	200	7443.657	IV	3200	2030.63	I
			300	445.158	IV		P V		4400	2032.41	I
			250	568.038	IV		Ref. 179 - R.L.K.		100	2036.46	II
			350	629.008	IV		Vacuum		40	2041.57	II
			400	629.914	IV	80	255.59	V	5500	2049.37	I
			500	631.779	IV	50	255.67	V	1500	2067.50	I
			350	648.482	IV	110	310.58	V	3000	2084.59	I
			300	756.510	IV	150	311.34	V	1000	2103.33	I
			300	776.353	IV	300	328.47	V	30	2115.57	II
			650	823.179	IV	250	328.78	V	950	2128.61	I
			700	824.730	IV	150	347.23	V	30	2130.69	II
			800	827.932	IV	200	348.20	V	1900	2144.23	I
			250	847.019	IV	110	378.56	V	100	2144.24	II
			350	849.799	IV	250	389.50	V	600	2165.17	I
			200	850.392	IV	300	390.70	V	1500	2174.67	I
			700	877.476	IV	150	410.03	V	30	2190.32	II
			1000	950.655	IV	375	475.60	V	400	2202.22	I
			570	1025.563	IV	110	534.63	V	50 h	2202.58	II
			500	1028.096	IV	80	534.99	V	320	2222.61	I
			570	1030.517	IV	520	542.57	V	50 h	2233.11	II
			500	1033.111	IV	600	544.92	V	150	2249.30	I
			500	1035.517	IV	450	673.90	V	30 h	2240.99	II
			570	1118.551	IV	450	865.45	V	100	2245.52	II
			200	1206.422	IV	600	871.39	V	30	2251.52	II
			200	1335.705	IV	250	997.62	V	30 h	2251.92	II
			500	1366.695	IV	150	1000.38	V	190	2268.84	I
			400	1372.674	IV	900	1117.98	V	30 h	2271.72	II
			350	1377.282	IV	700	1128.01	V	280	2274.38	I
			500	1484.507	IV	150	1379.62	V	50 h	2287.50	II
			400	1487.788	IV	250	1385.05	V	30	2288.20	II
			300	1489.098	IV	375	1447.83	V	150	2289.27	I
			250	1862.762	IV	450	1610.50	V	150	2292.40	I

Pt I and II			Pt I and II			Pt I and II			Pu I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
240	2308.04	I	50	2774.77	II	110	3922.96	I	10000	2966.84	II
50	2310.96	II	50	2793.27	I	35	3948.40	I	10000	2967.54	II
90	2315.50	I	100	2794.21	II	100	3966.36	I	10000	2972.50	II
220	2318.29	I	40 h	2799.98	II	20	3996.57	I	10000	2977.81	II
100	2326.10	I	140	2803.24	I	110	4118.69	I	10000	2978.37	II
170	2340.18	I	10	2808.51	I	80	4164.56	I	10000	2980.23	II
280	2357.10	I	50	2818.25	I	40	4192.43	I	10000	2981.23	II
180	2368.28	I	30 h	2822.27	II	18	4327.06	I	10000	2986.95	II
50	2377.28	II	1400	2830.30	I	18	4391.83	I	10000	2988.21	II
130	2383.64	I	70	2834.71	I	80	4442.55	I	10000	2991.31	II
40	2386.81	I	16	2853.11	I	14	4445.55	I	10000	2996.40	II
120	2389.53	I	80 h	2860.68	II	25	4498.76	I	10000	3000.31	II
35	2396.17	I	40 h	2865.05	II	12	4520.90	I	10000	3009.57	II
70	2401.87	I	40 h	2875.85	II	35	4552.42	I	10000	3028.85	II
200	2403.09	I	100 h	2877.52	II	12	4879.53	I	10000	3042.61	II
100	2418.06	I	25	2888.20	I	14	5044.04	I	10000	3043.12	II
50	2424.87	II	25	2893.22	I	30	5059.48	I	10000	3060.32	II
80	2428.04	I	600	2893.86	I	35	5227.66	I	10000	3069.32	II
50	2428.20	I	300	2897.87	I	40	5301.02	I	10000	3091.33	II
25	2429.10	I	60	2905.90	I	12	5368.99	I	10000	3091.94	II
180	2436.69	I	120	2912.26	I	12	5390.79	I	10000	3092.59	II
650	2440.06	I	120	2913.54	I	14	5475.77	I	10000	3104.12	II
60	2450.97	I	70	2919.34	I	14	5478.50	I	10000	3105.04	II
440	2467.44	I	30	2921.38	I	6	5763.57	I	10000	3106.03	II
35	2471.01	I	1700	2929.79	I	20	5840.12	I	10000	3123.87	II
1000	2487.17	I	30	2942.76	I	8	5844.84	I	10000	3159.21	II
25	2488.74	II	30	2944.75	I	6	6026.04	I	10000	3161.73	II
200	2490.12	I	25	2959.10	I	7	6318.37	I	10000	3163.18	II
160	2495.82	I	60	2960.75	I	8	6326.58	I	10000	3174.49	II
240	2498.50	I	1800	2997.97	I	9	6523.45	I	10000	3179.41	II
50	2505.93	I	35	3001.17	II	10	6710.42	I	10000	3185.12	II
120	2508.50	I	220	3002.27	I	20	6760.02	I	10000	3187.60	II
50	2514.07	I	30	3017.88	I	60	6842.60	I	10000	3189.23	II
60	2515.03	I	30 h	3031.22	II	20	7113.73	I	10000	3193.54	II
240	2515.58	I	130	3036.45	I	10	8224.74	I	10000	3193.55	II
140	2524.30	I	800	3042.64	I				10000	3194.56	II
40	2529.41	I	3200	3064.71	I				10000	3198.47	II
50	2536.49	I	30	3071.94	I				10000	3200.23	II
160	2539.20	I	130	3100.04	I				10000	3201.00	II
18	2549.46	I	320	3139.39	I				10000	3201.66	II
50	2552.25	I	140	3156.56	I				10000	3204.48	II
50	2596.00	I	120	3200.71	I				10000	3206.80	II
70	2603.14	I	320	3204.04	I				10000	3207.97	II
30	2616.76	II	30	3230.29	I	10000	2781.40	II	10000	3215.08	I
50	2619.57	I	20	3233.42	I	10000	2784.48	II	10000	3216.15	II
30	2625.34	II	20	3250.36	I	10000	2806.11	II	10000	3220.94	II
1100	2628.03	I	40	3251.98	I	10000	2815.77	II	10000	3224.87	II
130	2639.35	I	160	3255.92	I	10000	2897.97	II	10000	3231.86	II
1000	2646.89	I	25	3268.42	I	10000	2898.94	II	10000	3232.24	II
500	2650.86	I	25	3281.97	I	10000	2904.25	II	10000	3232.63	II
20	2658.17	I	120	3290.22	I	10000	2904.94	II	10000	3241.39	II
2800	2659.45	I	500	3301.86	I	10000	2910.40	II	10000	3242.96	II
40	2674.57	I	60	3315.05	I	10000	2918.00	II	10000	3243.40	II
440	2677.15	I	35	3323.80	I	10000	2918.80	II	10000	3244.16	I
200	2698.43	I	340	3408.13	I	10000	2926.08	II	10000	3245.25	II
2000	2702.40	I	35	3427.93	I	10000	2928.25	II	10000	3245.71	II
1600	2705.89	I	60	3483.43	I	10000	2929.71	II	10000	3246.35	II
60	2713.13	I	160	3485.27	I	10000	2930.98	II	10000	3247.50	II
1300	2719.04	I	120	3628.11	I	10000	2932.32	II	10000	3247.56	II
130	2729.92	I	70	3638.79	I	10000	2933.30	II	10000	3252.08	I
1800	2733.96	I	70	3643.17	I	10000	2938.54	II	10000	3260.54	II
70	2738.48	I	50	3663.10	I	10000	2938.95	II	10000	3265.17	II
70	2747.61	I	80	3671.99	I	10000	2941.39	II	10000	3273.11	II
80	2753.86	I	80	3674.04	I	10000	2945.26	II	10000	3274.71	II
200	2754.92	I	35	3699.91	I	10000	2946.00	II	10000	3275.24	I
30	2769.84	I	18	3706.53	I	10000	2950.06	II	10000	3292.56	I
500	2771.67	I	20	3801.05	I	10000	2951.62	II	10000	3293.61	I
40	2773.24	I	80	3818.69	I	10000	2954.46	II	10000	3296.91	I
20	2774.00	I	40	3900.73	I	10000	2963.47	II	10000	3297.87	I

PLUTONIUM (Pu)

Z = 94

Pu I and II
Ref. 91 - J.G.C.

Air

10000	2781.40	II
10000	2784.48	II
10000	2806.11	II
10000	2815.77	II
10000	2897.97	II
10000	2898.94	II
10000	2904.25	II
10000	2904.94	II
10000	2910.40	II
10000	2918.00	II
10000	2918.80	II
10000	2926.08	II
10000	2928.25	II
10000	2929.71	II
10000	2930.98	II
10000	2932.32	II
10000	2933.30	II
10000	2938.54	II
10000	2938.95	II
10000	2941.39	II
10000	2945.26	II
10000	2946.00	II
10000	2950.06	II
10000	2951.62	II
10000	2954.46	II
10000	2963.47	II

Pu I and II			Pu I and II			Pu I and II			Po I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
10000	3298.47	II	10000	3835.52	I	10000	6012.78	I	250	2344.61	I
10000	3301.76	I	10000	3836.96	I	10000	6192.80	I	250	2421.72	I
10000	3306.59	I	10000	3838.92	I	10000	6304.66	I	300	2426.09	I
10000	3306.66	I	10000	3842.10	I	10000	6449.75	I	1500 w	2450.08	I
10000	3307.66	II	10000	3851.01	I	10000	6486.71	I	700	2483.94	I
10000	3308.75	I	10000	3851.85	I	10000	6488.86	I	700	2490.53	I
10000	3312.65	II	10000	3878.54	I	10000	6488.89	I	200 h	2502.18	
10000	3315.34	II	10000	3895.89	I	10000	6535.27	I	300	2534.95	I
10000	3316.96	II	10000	3928.53	I	10000	6544.21	I	300	2557.33	I
10000	3320.61	I	10000	3975.43	II	10000	6608.95	I	1500 w	2558.01	I
10000	3320.84	I	10000	4097.12	I	10000	6672.72	I	400	2562.31	
10000	3323.48		10000	4101.96	I	10000	6784.66	I	300	2578.80	
10000	3327.19	I	10000	4105.95	II	10000	6880.16	I	400	2587.64	I
10000	3330.11		10000	4111.07	I	10000	6891.38	I	200	2637.01	
10000	3331.52	II	10000	4114.91	I	10000	7059.23	I	300	2645.36	I
10000	3332.34	I	10000	4128.12	I	10000	7068.90	I	700 h	2663.33	
10000	3333.03		10000	4129.93	II	10000	7092.46	I	200	2671.67	I
10000	3337.71	II	10000	4133.01	I	10000	7116.88	I	600	2761.92	I
10000	3338.40	II	10000	4135.97	I	10000	7141.66	I	400	2800.26	I
10000	3338.94	I	10000	4140.04	I	10000	7177.14	I	250	2824.11	I
10000	3347.87	II	10000	4141.20	II	10000	7231.09	I	300	2866.01	I
10000	3349.63	I	10000	4151.09	I	10000	7258.06	I	400	2919.31	I
10000	3351.82	II	10000	4151.45	I	10000	7322.23	I	600	2958.92	I
10000	3356.61	II	10000	4155.46	I	10000	7325.97	I	2500 w	3003.21	I
10000	3358.41	II	10000	4159.39	II	10000	7331.81	I	450	3069.31	I
10000	3358.84	II	10000	4167.77	I	10000	7431.18	I	200	3115.95	
10000	3362.26	II	10000	4170.95	I	10000	7447.99	I	400	3189.02	I
10000	3365.20	I	10000	4178.28	II	10000	7507.80	I	600	3240.24	I
10000	3365.66		10000	4189.90	II	10000	7526.93	I	250	3286.38	I
10000	3368.86	I	10000	4190.06	II	10000	7547.45	I	600	3328.60	I
10000	3370.64	II	10000	4196.20	II	10000	7564.50	I	300	3489.79	
10000	3371.19	I	10000	4206.48	I	10000	7571.87	I	200	3493.65	
10000	3375.80	I	10000	4208.23	I	10000	7572.93	I	400	3588.33	
10000	3376.76	II	10000	4221.87	I	10000	7609.77	I	200	3671.36	
10000	3376.94	II	10000	4224.20	I	10000	7689.40	I	500	3861.93	I
10000	3377.37	II	10000	4229.77	II	10000	7758.20	I	200	4051.98	
10000	3379.51	I	10000	4254.76	II	10000	7798.54	I	1200	4170.52	I
10000	3381.82	I	10000	4261.88	I	10000	7953.17	I	250	4236.13	
10000	3381.97	II	10000	4269.77	I	10000	8102.54	I	200 h	4415.58	
10000	3382.70	I	10000	4273.34	II	10000	8130.86	I	800	4493.21	I
10000	3390.33	II	10000	4281.17	I	10000	8309.61	I	350	4611.44	I
10000	3391.41	II	10000	4289.08	II	10000	8435.47	I	200	4867.12	
10000	3393.67	I	10000	4337.18	II	10000	8476.13	I	400	4876.24	I
10000	3394.32	I	10000	4352.71	II	10000	8495.75	I	450	4946.81	
10000	3418.88	II	10000	4367.41	I	10000	8597.26	I	350	5323.23	I
10000	3465.10	II	10000	4379.91	II	10000	8665.02	I	300	5744.85	I
10000	3473.64	II	10000	4385.35	II	10000	8691.94	I	600	7962.62	I
10000	3483.20	I	10000	4393.93	II	3000	8729.82	I	300	8433.87	I
10000	3585.87	II	10000	4404.90	I	3000	8836.16	I	500	8618.26	I
10000	3632.21	II	10000	4441.65	II	3000	9533.07	I	250	9227.87	
10000	3699.19	II	10000	4468.54	II	3000	10046.75	I			
10000	3720.59	I	10000	4472.79	II	3000	11114.82	I			
10000	3725.98	I	10000	4493.78	II	3000	12144.46	I			
10000	3726.11	II	10000	4504.91	II	3000	12231.22	I			
10000	3726.79	II	10000	4536.15	II	3000	15377.31	I			
10000	3732.03	II	10000	4735.40	I	3000	16897.38	I			
10000	3744.78	I	10000	4989.34	I						
10000	3753.63	I	10000	5269.86	I						
10000	3755.94	I	10000	5381.02	I						
10000	3757.82	I	10000	5498.50	I						
10000	3758.34	I	10000	5510.72	I						
10000	3774.38	I	10000	5537.59	I						
10000	3776.71	I	10000	5549.62	I						
10000	3792.22	I	10000	5590.54	I						
10000	3799.37	I	10000	5592.33	I						
10000	3805.93	I	10000	5712.39	I						
10000	3811.40	I	10000	5770.26	I						
10000	3812.30	II	10000	5839.05	I						
10000	3827.57	I	10000	5983.35	I						

POLONIUM (Po)		
Z = 84		
Po I and II		
Intensity	Wavelength	
250 w	2139.02	I
300 h	2203.80	
300	2220.67	I
200	2222.13	I
200	2284.22	

POTASSIUM (K)		
Z = 19		
K I and II		
Refs. 59,76,172,268		
- L.J.R.		
Vacuum		
5	261.20	II
25	441.81	II
5	465.08	II
	469.50	II
10	476.03	II
30	495.14	II
30	600.77	II
25	607.93	II
30	612.62	II
3	1725.0	II

K I and II			K I and II			K I and II			K III		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
	Air		5	4340.03	II	10	8505.11	I	20	765.31	III
6	2190.00	II	7	4388.16	II	4	8763.96	I	30	765.64	III
4	2210.53	II	5	4466.65	II	3	8767.05	I	35	778.53	III
5	2265.04	II	6	4505.33	II	13	8902.19	I	20	872.31	III
6	2550.02	II	5	4595.65	II	12	8904.02	I	10	873.86	III
4	2743.55	II	8	4608.45	II	5	8923.31	I	15	874.04	III
	2992.12	I	10	4641.88	I	4	8925.44	I		Air	
	2992.22	I	11	4642.37	I	7	9347.24	I	6	2550.02	III
	3034.76	I	5	4659.38	II	3	9349.25	I	5	2635.11	III
	3034.92	I	4	4740.91	I	6	9351.59	I	1	2736.96	III
5	3062.18	II	6	4744.35	I	15	9595.70	I	5	2689.90	III
4	3101.79	I	5	4753.93	I	14	9597.83	I	1	2898.90	III
3	3102.04	I	7	4757.39	I	6	9949.67	I	5	2938.45	III
6	3105.00	II	5	4786.49	I	5	9954.14	I	1	2948.94	III
5	3190.07	II	7	4791.05	I	9	10479.63	I	5	2986.20	III
7	3217.16	I	6	4799.75	I	5	10482.15	I	6	2992.42	III
6	3217.62	I	8	4804.35	I	8	10487.11	I	6	3052.07	III
4	3220.60	II	9	4829.23	II	17	11019.87	I	5	3056.84	III
5	3290.65	II	7	4849.86	I	16	11022.67	I	6	3201.95	III
6	3345.32	II	8	4856.09	I	17	11690.21	I	6	3209.34	III
6	3373.60	II	8	4863.48	I	16	11769.62	I	6	3278.79	III
6	3380.62	II	9	4869.76	I	17	11772.83	I	6	3289.06	III
6	3384.86	II	8	4942.02	I		12432.24	I	6	3322.40	III
6	3404.24	II	6	4943.29	II		12522.11	I	6	3364.22	III
7	3440.05	II	9	4950.82	I		13377.86	I	6	3420.82	III
11	3446.37	I	9	4956.15	I		13397.09	I	4	3421.83	III
10	3447.38	I	10	4965.03	I		15163.08	I	6	3468.32	III
6	3481.11	II	8	5005.60	II		15168.40	I	6	3481.11	III
7	3530.75	II	7	5056.27	II		40158.37	I	5	3513.88	III
5	3608.88	II	10	5084.23	I	K III			1	3885.50	III
6	3618.49	II	11	5097.17	I	Refs. 60,76 - L.J.R.			K IV		
4	3626.42	II	11	5099.20	I	Vacuum			Refs. 32,76,86,150,160,		
3	3648.84	I	12	5112.25	I	2	325.28	III	314,322 - L.J.R.		
4	3648.98	I	5	5310.24	II	5	327.60	III	Vacuum		
6	3681.54	II	12	5323.28	I	25	330.68	III	150	271.82	IV
5	3716.60	II	13	5339.69	I	30	341.92	III	100	273.06	IV
5	3721.34	II	12	5342.97	I	15	348.00	III		279.88	IV
5	3739.13	II	14	5359.57	I	30	379.12	III	300	340.46	IV
5	3744.42	II	6	5470.13	II	25	380.48	III	150	340.74	IV
6	3767.36	II	5	5642.73	II	30	382.23	III	300	354.93	IV
6	3783.19	II	4	5772.32	II	15	398.63	III	150	356.26	IV
6	3800.14	II	16	5782.38	I	20	402.10	III	300	359.73	IV
6	3816.56	II	17	5801.75	I	30	406.48	III	200	359.91	IV
7	3817.50	II	15	5812.15	I	40	408.96	III	250	362.08	IV
5	3873.74	II	17	5831.89	I	50	413.79	III	150	362.15	IV
4	3878.62	II	2	5969.64	II	30	414.87	III	150	363.02	IV
8	3897.92	II	8	6120.27	II	30	416.00	III	300	375.96	IV
5	3923.00	II	6	6246.59	II	30	417.54	III	300	379.88	IV
5	3926.36	II	7	6307.29	II	30	418.62	III	250	380.48	IV
6	3942.53	II	5	6427.96	II	75	434.72	III	200	381.70	IV
6	3955.21	II	2	6595.00	II	50	435.68	III	300	382.23	IV
6	3966.72	II	19	6911.08	I	75	444.34	III	150	382.49	IV
6	3972.58	II	12	6936.28	I	75	448.60	III	200	382.65	IV
6	3995.10	II	20	6938.77	I	75	466.79	III	300	382.91	IV
7	4001.24	II	7	6964.18	I	100	470.09	III	250	384.10	IV
5	4012.10	II	12	6964.67	I	75	471.57	III	200	386.61	IV
6	4042.59	II	25	7664.90	I	45	474.92	III	250	388.92	IV
18	4044.14	I	24	7698.96	I	40	479.18	III	250	389.07	IV
17	4047.21	I	5	7955.37	I	10	482.11	III	250	390.42	IV
5	4093.69	II	4	7956.83	I	10	482.41	III	300	390.57	IV
6	4114.99	II	7	8078.11	I	75	497.10	III	200	391.46	IV
7	4134.72	II	6	8079.62	I	10	514.94	III	200	392.47	IV
7	4149.19	II	9	8250.18	I	50	520.61	III	500	393.14	IV
8	4186.24	II	8	8251.74	I	25	523.79	III	400	400.21	IV
7	4222.97	II	3	8390.22	I	40	529.80	III	300	402.91	IV
7	4225.67	II		8391.44	I	15	539.71	III	250	403.97	IV
7	4263.40	II	2	8417.54	I	15	546.12	III	150	404.41	IV
7	4305.00	II	1	8420.00	I	20	708.84	III	250	408.08	IV
7	4309.10	II	11	8503.45	I						

Intensity	K IV Wavelength	
150	417.28	IV
200	442.30	IV
300	443.57	IV
200	445.61	IV
250	446.83	IV
750	448.60	IV
400	456.33	IV
250	523.00	IV
200	526.45	IV
150	527.62	IV
750	646.19	IV
500	737.14	IV
500	741.95	IV
500	745.26	IV
400	746.35	IV
300	749.99	IV
150	754.19	IV
400	754.67	IV

K V
Refs. 32,75,76,150,322
- L.J.R.

Intensity	K V Wavelength	
Vacuum		
100	214.35	V
150	282.35	V
150	293.33	V
300	294.84	V
200	296.17	V
200	297.06	V
200	300.25	V
200	300.50	V
200	311.24	V
250	312.77	V
200	315.18	V
250	327.38	V
250	389.07	V
200	349.50	V
500	372.15	V
200	372.46	V
200	372.77	V
300	375.96	V
250	377.76	V
300	379.12	V
300	387.80	V
250	390.11	V
250	395.40	V
200	398.36	V
200	398.88	V
200	399.75	V
250	415.05	V
200	415.79	V
400	422.18	V
300	425.16	V
500	425.59	V
250	438.02	V
200	449.71	V
200	452.90	V
250	455.67	V
400	456.33	V
200	482.71	V
200	483.75	V
750	580.32	V
250	585.51	V
500	586.32	V
250	602.27	V
400	603.43	V
250	638.67	V
300	687.50	V
300	720.43	V

Intensity	K V Wavelength	
400	724.42	V
600	731.86	V
150	770.29	V
150	771.46	V
	1035.60	V

PRASEODYMIUM (Pr)

Z = 59

Pr I and II
Ref. 1 - C.H.C.

Air

Intensity	K V Wavelength	
25	2558.58	II
25	2578.27	I
30	2579.31	I
40 h	2598.04	II
25	2608.92	II
25	2615.75	II
25	2648.48	II
30	2654.75	II
25	2666.70	II
20	2672.52	II
30	2685.19	II
45	2685.70	II
50	2698.92	II
60	2700.38	II
30	2702.25	II
100 h	2707.37	II
20	2714.16	II
60	2720.17	II
30	2721.90	II
50	2726.50	II
12	2731.78	II
25	2733.12	II
50	2734.30	II
25	2737.90	II
40	2742.12	II
25	2744.66	II
20	2746.28	II
60	2760.35	II
50	2769.60	II
50 d	2775.94	II
	2776.03	II
40	2778.80	II
50	2783.31	II
30	2789.05	II
35	2792.51	II
50	2802.05	II
20	2823.17	II
20	2824.14	II
20	2828.29	II
20	2842.98	I
20	2844.01	II
20	2850.62	I
25	2853.99	II
30	2865.64	II
50	2881.60	I
30	2882.31	II
30	2884.89	II
30	2943.97	II
30	2967.58	II
30	2971.13	II
40 d	2971.40	II
	2971.46	II
50	2984.98	II
30	2986.18	II
30	2990.22	II
110	3082.11	II

Intensity	Pr I and II Wavelength	
100	3111.34	II
140	3121.58	II
140	3163.73	II
270	3168.24	II
160	3172.31	II
110	3191.42	II
200 d	3195.99	II
110	3199.04	II
100	3207.89	II
190	3219.48	II
100	3234.27	II
100	3245.48	II
140	3355.67	II
110	3394.62	II
110	3465.74	II
200	3584.21	II
130	3611.94	II
170	3630.96	II
100	3645.55	II
250	3645.66	II
250	3646.30	II
100	3648.30	II
150 c	3660.36	II
100	3661.62	II
370	3668.83	II
250	3687.03	II
150	3687.19	II
100	3689.71	II
150	3698.06	II
230	3706.75	II
170 c	3711.10	II
290	3714.05	II
120 c	3733.03	II
210 c	3734.41	II
250	3735.76	II
190	3736.49	II
410	3739.18	II
150	3740.99	II
120	3743.98	II
190	3750.98	II
140	3759.60	II
120	3760.08	II
680	3761.87	II
230	3764.77	II
230	3768.94	II
170 c	3772.82	II
170	3774.06	II
140	3777.62	II
170	3780.66	II
150	3785.46	II
150	3786.86	II
210	3792.51	II
190	3794.93	II
680	3800.30	II
290	3804.84	II
140	3809.18	II
390	3811.84	II
1300 h	3816.02	II
120	3817.66	II
680	3818.28	II
120	3819.14	II
310	3821.80	II
150 c	3823.18	II
120	3826.67	II
960	3830.72	II
140	3834.93	II
480	3840.99	II
270	3842.34	II
150 c	3844.54	II

Intensity	Pr I and II Wavelength	
580	3846.59	II
1200	3850.79	II
720 c	3851.55	II
960	3852.80	II
120	3858.25	II
110	3859.14	II
480 c	3865.45	II
210	3867.52	II
210	3870.72	II
480	3876.19	II
1700 c	3877.18	II
270	3879.20	II
680	3880.47	II
440 c	3885.19	II
440 c	3889.34	II
120 c	3891.71	II
190	3897.25	II
210	3898.84	II
250	3902.45	II
770 c	3908.05	II
630	3912.90	II
310	3913.55	II
210	3914.76	II
1300 c	3918.85	II
420	3919.63	II
250	3920.53	II
960	3925.47	II
480	3927.46	II
370	3929.29	II
370	3935.82	II
250	3938.30	II
730 c	3947.63	II
900 c	3949.43	II
900 c	3953.51	II
380	3956.75	II
190	3959.44	I
470	3962.45	II
560	3964.26	II
1600 c	3964.81	II
560 c	3966.57	II
500	3971.16	II
320	3971.67	II
620 c	3972.14	II
320	3974.85	II
1300 c	3989.68	II
230	3991.91	II
340	3992.16	II
1600	3994.79	II
270	3995.83	II
560 c	3997.04	II
230	3997.96	II
320	3999.12	II
620 c	4000.17	II
730	4004.70	II
1900	4008.69	II
620	4010.60	II
730	4015.39	II
620	4020.96	II
470	4022.71	II
360	4025.54	II
230	4026.83	II
230	4029.00	II
360 c	4029.72	II
730 c	4031.75	II
230	4032.47	II
960	4033.83	II
230	4034.33	II
230	4038.22	II
730	4038.45	II

Pr I and II			Pr I and II			Pr I and II			Pr I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
470	4039.34	II	470 c	4347.49	II	410	5129.52	II	22	5645.41	II
1300	4044.81	II	340	4350.40	II	270	5133.44	I	35	5654.23	II
230	4045.70	II	450	4354.91	II	270	5135.14	II	55	5659.84	II
230	4046.63	II	410 c	4359.79	II	100	5139.81	I	35 h	5661.57	I
340	4047.08	II	1200	4368.33	II	100 c	5152.30	II	16	5662.19	II
450	4051.13	II	320	4371.62	II	200	5161.74	II	65 c	5668.46	I
2200	4054.88	II	270	4396.08	II	620	5173.90	II	45	5669.55	II
2200	4056.54	II	170	4403.60	II	200	5191.32	II	35	5669.99	II
450	4058.80	II	100	4405.12	II	120	5194.43	I	16	5674.14	II
230	4062.22	II	430	4405.83	II	150	5195.11	II	16	5677.03	II
3400	4062.81	II	1700	4408.82	II	200	5195.31	II	55	5681.89	II
210	4068.80	II	410	4413.77	II	360	5206.55	II	13	5685.60	II
500 c	4079.77	II	160	4419.04	II	150	5207.90	II	16	5686.52	I
500 c	4080.98	II	190	4419.65	II	360	5219.05	II	22 h	5687.17	II
790	4081.85	II	160 c	4421.22	II	560	5220.11	II	65	5688.44	II
500	4083.34	II	160	4424.58	II	110	5227.97	I	22	5689.21	II
200 c	4087.21	II	1200 c	4429.13	II	680	5259.73	II	55 h	5690.97	II
560	4096.82	II	110	4432.28	II	180	5263.88	II	22	5695.90	II
380	4098.40	II	730	4449.83	II	340 c	5292.02	II	22	5704.38	I
2900 c	4100.72	II	140	4451.90	II	340	5292.62	II	65	5707.61	I
270 c	4113.89	II	140	4454.68	II	230	5298.09	II	40	5711.63	II
1700 c	4118.46	II	100	4465.97	II	430	5322.76	II	22	5713.83	II
250	4129.15	II	960	4468.66	II	200	5352.40	II	16	5716.08	II
340	4130.77	II	140 c	4477.26	II	16	5501.50	I	45	5719.08	II
200	4133.61	II	1100	4496.46	II	40	5508.79	II	45 d	5719.63	II
1500 c	4141.22	II	790	4510.15	II	65	5509.15	II		5719.80	II
2700	4143.11	II	200 c	4517.58	II	16 c	5511.63	II	11	5728.38	I
270 c	4146.50	II	340 c	4534.15	II	55	5513.58	II	40	5731.88	II
270	4148.44	II	340	4535.92	II	28	5515.12	II	20	5747.13	II
200	4156.50	II	200	4563.12	II	13	5519.38	II	11	5747.74	I
1700 c	4164.16	II	140	4612.08	II	20 c	5520.31	II	11	5747.95	II
270	4168.04	II	270 c	4628.74	II	45 c	5522.79	II	22	5753.02	II
230	4169.45	II	140	4632.28	I	28 c	5524.15	I	90	5756.17	II
620	4171.82	II	140	4635.68	I	28 c	5525.91	II	16	5759.40	II
730	4172.25	II	200	4639.55	I	16 c	5527.93	I	22	5760.20	I
250	4175.32	II	110 c	4643.49	II	13	5530.21	I	22	5769.16	II
250	4175.62	II	140	4646.05	II	45	5531.16	I	16	5769.79	II
200	4178.63	II	200 c	4651.50	II	150	5535.17	II	45	5773.16	II
5200	4179.39	II	140	4664.65	II	28	5538.37	I	11	5775.91	II
2500	4189.48	II	270 c	4672.09	II	20	5538.78	II	16	5777.29	II
560 c	4191.60	II	180	4687.80	I	55	5545.01	II	90	5779.28	I
290	4201.17	II	290	4695.77	I	20	5548.33	II	65 c	5785.28	II
2500 c	4206.72	II	140cw	4708.07	II	11	5553.42	II	65	5786.17	II
500	4208.32	II	140	4709.52	I	22	5561.46	II	16 h	5788.29	II
320	4211.86	II	180	4730.67	I	45 c	5562.06	I	16	5788.92	II
320	4217.81	II	250	4736.69	I	13	5565.52	I	16	5790.86	II
3800	4222.93	II	100	4744.16	I	13	5566.91	II	45	5791.36	II
3800	4225.35	II	150	4746.92	II	45	5571.83	II	22	5792.95	I
320	4233.11	II	100	4762.72	II	11	5574.61	II	40	5810.58	II
320 c	4236.15	II	110	4783.35	II	11	5578.81	I	16	5813.55	II
270	4240.02	II	110	4906.99	I	13	5582.35	II	160 d	5815.17	II
960	4241.01	II	140	4914.02	I	11	5584.02	II		5815.33	II
340	4243.51	II	200	4924.60	I	22	5594.92	I	55	5818.57	II
840 c	4247.63	II	140	4936.00	I	22	5597.29	II	40	5820.62	II
500	4254.40	II	320	4939.74	I	13	5601.30	II	16 h	5821.36	I
270 c	4263.78	II	160	4940.30	I	90	5605.65	II	55	5822.59	II
320	4269.09	II	380	4951.37	I	13	5606.68	I	90	5823.72	II
790 c	4272.27	II	110	4975.75	I	28	5608.93	II	45	5830.94	II
470 c	4280.07	II	120	5018.59	I	55	5610.22	II	40	5835.13	I
790 c	4282.42	II	200	5019.76	I	11	5620.06	II	35 c	5844.65	II
450 c	4298.98	II	200	5026.96	I	20	5620.26	I	40	5844.98	II
290	4303.61	II	100	5033.38	I	45 c	5621.89	II	65	5847.13	II
1500	4305.76	II	270	5034.41	II	110	5623.05	II	65 c	5850.64	II
210	4323.55	II	110	5043.83	I	90	5624.45	II	45	5852.63	II
270	4329.41	II	320	5045.52	I	11 h	5633.03	I	11 c	5854.44	I
1300	4333.97	II	160	5053.40	I	22	5636.46	II	45	5856.07	II
200	4335.74	II	180	5087.12	I	55 c	5638.79	II	55	5856.90	II
360	4338.70	II	360	5110.38	II	16	5640.37	II	90	5859.68	II
620cw	4344.30	II	560	5110.76	II	16cw	5643.16	I	80	5868.83	II

Pr I and II		Pr I and II		Pr I and II		Pr I and II	
Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength
22	5873.83 II	18	6165.38 I	22	6564.62 II	20	7645.66 II
35	5874.72 I	270	6165.94 II	45	6566.77 II	7	7704.98 II
35	5878.10 I	55	6182.34 II	7	6571.03 I	16	7721.84 I
35	5879.04 I	13	6187.96 I	6	6578.00 I	6 h	7786.16 II
80	5879.25 II	35	6197.45 II	6	6584.56 II	6cw	7841.27 I
35 c	5884.72 I	35	6200.81 II	9 h	6593.74 II	14	7871.67 I
55	5892.23 II	13	6205.63 II	11	6595.48 I	6	7881.09 I
22	5894.22 II	13	6210.59 I	15	6609.86 I	6cw	7888.56 II
40	5903.11 II	22	6212.73 I	55	6616.67 I	6	7915.19 II
45	5904.45 II	18	6218.06 I	11	6618.34 II	6	8031.92 I
40	5908.67 II	20 h	6236.80 I	7 h	6631.00 I	6	8055.43 I
11	5915.31 I	20 h	6241.05 I	13 h	6632.06 I	14	8067.44 I
11	5915.97 I	45	6244.35 II	14	6647.12 I	10cw	8122.78 II
40	5920.76 I	35	6255.10 II	75	6656.83 II	11	8141.10 I
40	5930.66 II	40	6262.55 II	55	6673.41 II	5	8181.34 II
16	5936.33 II	18	6264.54 II	75	6673.78 II	5 c	8211.93 I
160	5939.90 II	22 c	6274.66 II	5 h	6687.51 II	6	8289.93 I
65	5940.72 II		6274.81 II	4 h	6699.25 I	6	8379.84 I
22	5941.65 I	40	6278.68 II	13	6736.79 I	6 h	8427.82 I
35	5947.16 II	110	6281.28 II	35 c	6747.09 I	6 h	8605.27 II
22 c	5949.76 I	18 c	6289.02 I	19 c	6749.19 I	10	8714.59 II
55	5951.27 II	11 c	6298.01 I	7 c	6784.99 II		Pr III
20	5951.76 II	11	6302.05 I	55cw	6798.60 I	Refs. 306,308 - J.R.	
90	5956.60 II	35	6302.35 II	11	6811.76 II	Vacuum	
	5956.70 I	16	6304.05 I	17cw	6812.87 II	25	1008.61 III
13	5959.25 I	35	6305.23 II	13	6814.04 II	50	1021.35 III
20	5962.18 I	11 h	6318.13 II	9	6817.61 I	25	1026.18 III
28	5963.00 I	45 c	6322.36 I	35cw	6827.60 II	100	1029.03 III
110	5967.82 II	22 h	6343.88 I	19	6830.50 II	50	1038.29 III
13 c	5976.95 I	28	6347.11 II	9	6844.39 I	50	1042.96 III
13	5978.88 I	18 c	6350.98 I	9 h	6845.47 II	25	1043.80 III
65	5981.19 II	22 c	6357.20 I	9	6846.59 II	25	1044.03 III
40	5986.14 I	55 c	6359.03 I	17 c	6850.46 II	25	1046.20 III
45 c	5987.14 I	11 h	6363.62 II	11	6852.77 I	150	1047.24 III
	5987.29 II	16	6377.61 I	11 c	6870.44 I	100	1049.09 III
13	5991.27 I	16	6378.59 I	7	6884.66 I	50	1052.63 III
13 c	5994.89 I	11	6389.57 I	8	6892.71 I	25	1061.60 III
11	5996.06 I	18 c	6391.99 I	8 h	6970.38 I	25	1066.03 III
29	6002.44 II	40	6393.18 I	8 c	6980.12 I	25 p	1068.85 III
90	6006.33 II	45	6397.96 II	40	7021.51 II	25	1069.88 III
13	6008.54 I	10 h	6410.69 I	10	7024.53 I	25	1084.42 III
55	6016.48 II	55	6411.23 I	13	7042.40 I	25	1088.66 III
150	6017.80 II	40	6413.68 II	8	7044.45 II	100	1104.84 III
28 c	6019.85 I	10	6415.43 I	7	7051.07 I	25	1108.82 III
150	6025.72 II	45	6429.63 II	10	7079.99 I	30	1352.70 III
35	6042.87 II	45	6431.84 II	11 c	7095.18 I	25	1881.22 III
55	6046.66 II	7 h	6442.78 II	20	7114.55 I		Air
35	6049.26 I	9 h	6443.91 II	10 h	7116.90 I	50	2031.46 III
28	6050.04 II	16 c	6453.44 I	11	7118.24 II	100	2033.30 III
11	6050.88 I	9	6454.84 II	7	7137.33 II	25	2043.12 III
140	6055.13 I	9	6456.18 I	10 h	7159.88 I	100	2052.30 III
13	6067.27 II	9 h	6460.19 I	7	7167.77 II	50	2052.87 III
13	6085.81 I	18	6467.72 II	7 h	7189.95 I	50	2053.85 III
28	6086.16 II	9 h	6475.26 II	10 c	7208.85 II	200	2058.59 III
65	6087.52 II	35cw	6478.02 II	24	7227.70 II	50	2064.08 III
20	6090.38 II	45	6486.55 I	13	7231.53 I	25	2075.08 III
28	6093.09 II	9 h	6486.97 II	7 c	7243.26 I	200	2090.75 III
18	6096.28 I	40 h	6491.75 I	7 c	7259.21 I	200	2093.49 III
22	6106.72 II	9	6493.49 I	7 c	7287.61 I	25	2096.85 III
18	6109.08 I	11	6494.89 I	7 h	7289.19 I	50	2096.94 III
65	6114.38 II	22 c	6497.11 I	7cw	7324.42 I	10 w	2148.14 III
22 c	6118.02 I	18	6498.94 II	7	7328.47 I	10 w	2194.24 III
22 c	6122.15 I	22	6500.72 I	7	7344.86 I	10 w	2197.25 III
35	6141.51 II	9	6504.09 I	16	7407.56 II	10 w	2205.48 III
65	6148.23 I	8	6517.14 I	20 c	7451.74 II	10 w	2206.26 III
	6148.24 II	16	6518.79 II	11 h	7495.59 I	10 w	2214.45 III
22	6157.82 II	8	6534.52 I	6 h	7499.42 I	10 w	2215.25 III
13	6159.10 II	16	6540.47 I	14	7541.02 II	10 w	2217.12 III
190	6161.18 II	7 h	6553.30 I	6	7574.86 I		

Pr III			Pr III			Pr III			Pr III		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
10 w	2223.23	III	10 w	2494.20	III	50 s	3353.87	III	270	4728.21	III
10 w	2230.35	III	10 w	2495.37	III	250 s	3354.91	III	300	4747.11	III
10 w	2237.26	III	10 w	2495.51	III	500 l	3357.56	III	300 w	4771.83	III
10	2239.06	III	10	2499.97	III	500 l	3359.41	III	450 w	4775.30	III
10	2239.42	III	20 w	2587.71	III	100 l	3364.52	III	600	4857.39	III
10 w	2242.15	III	40 w	2624.91	III	50	3364.88	III	150	5208.51	III
10 w	2284.62	III	20 w	2644.62	III	50 s	3365.80	III	150	5261.68	III
10	2307.59	III	20 w	2656.88	III	200 s	3367.35	III	1000	5264.44	III
10	2307.77	III	20 w	2667.51	III	500 s	3367.58	III	1500	5284.70	III
10	2308.41	III	70 w	2679.47	III	100 l	3371.92	III	1500	5299.99	III
10	2311.29	III	40 w	2710.30	III	100 s	3377.14	III	1500	5340.02	III
10	2311.44	III	20 w	2718.65	III	50 s	3379.13	III	100	5427.70	III
10	2314.18	III	100 w	2724.03	III	150 s	3380.21	III	100	5581.74	III
10 w	2315.46	III	20 l	2841.94	III	150 s	3381.26	III	150	5646.80	III
10	2318.15	III	70 s	2910.61	III	300 s	3381.84	III	600	5765.27	III
10	2318.36	III	50 s	2911.77	III	100 s	3391.08	III	1500	5844.41	III
10	2318.64	III	100 l	2914.49	III	1000 w	3394.22	III	200	5947.98	III
10	2318.82	III	50 s	2930.19	III	600 d	3396.07	III	7000 w	5956.05	III
10	2318.97	III	70 s	2942.43	III	300 s	3396.62	III	900 w	5998.94	III
10 w	2319.40	III	70 s	2953.58	III	300 l	3397.46	III	1500 w	6053.01	III
10	2320.41	III	90 w	2954.40	III	50 l	3402.97	III	900	6071.09	III
10 w	2328.56	III	90 s	2964.85	III	500 c	3413.21	III	9000 w	6090.02	III
10 w	2336.13	III	150 s	2968.83	III	300 s	3415.15	III	5000	6160.24	III
10	2365.52	III	80 s	2969.41	III	150 s	3420.07	III	1500 w	6161.22	III
10	2368.78	III	150 l	2976.86	III	300 l	3422.22	III	100	6195.05	III
10	2369.08	III	150 s	2977.06	III	50 c	3426.27	III	2000	6195.63	III
10 w	2378.06	III	500 s	2980.54	III	500 l	3427.02	III	200	6310.36	III
10 w	2378.97	III	100 l	2981.65	III	300 l	3436.36	III	100	6361.65	III
10	2395.44	III	150 c	2982.42	III	150 l	3440.62	III	300	6429.26	III
10	2399.70	III	500 s	2985.82	III	50 l	3445.29	III	300	6444.74	III
10 w	2405.56	III	150 s	2997.12	III	70 s	3454.05	III	600	6500.04	III
10	2408.19	III	70 l	2998.79	III	180	3653.58	III	300	6501.49	III
10	2409.80	III	150 l	3000.46	III	60	3817.25	III	200	6578.90	III
10	2412.40	III	150 s	3003.20	III	60 l	3861.80	III	100	6616.46	III
10	2417.69	III	60 l	3006.47	III	150	3980.51	III	600	6706.70	III
10	2418.95	III	150 s	3008.04	III	200	4000.20	III	100	6727.63	III
10	2426.14	III	150 l	3010.61	III	90	4018.36	III	200	6827.96	III
10	2426.85	III	90 s	3014.60	III	180	4029.60	III	100	6854.63	III
10 w	2430.32	III	100 l	3015.13	III	90	4142.46	III	200	6857.30	III
10 w	2434.18	III	90 s	3016.26	III	120	4144.48	III	1000	6866.80	III
10	2434.39	III	70 s	3021.77	III	90	4147.85	III	1000	6899.06	III
10	2435.91	III	70 s	3025.26	III	90	4172.15	III	500	6903.52	III
10	2436.89	III	100 l	3029.38	III	150	4179.77	III	7000	6910.14	III
10	2438.63	III	100 l	3033.31	III	180	4184.18	III	150 w	6934.55	III
10 w	2444.93	III	90 l	3034.25	III	240	4197.01	III	500	6970.96	III
10	2445.49	III	70	3040.02	III	120	4219.45	III	100	6979.83	III
10	2446.77	III	60 c	3040.94	III	180	4231.45	III	5000	7030.39	III
10	2448.16	III	60 l	3041.78	III	180	4275.07	III	100	7075.21	III
10	2452.02	III	100 s	3042.35	III	120	4286.32	III	4500	7076.62	III
10 w	2452.81	III	100 l	3045.81	III	90	4298.27	III	100	7083.99	III
10 w	2452.85	III	70 l	3046.98	III	90	4301.73	III	500	7112.53	III
10	2454.60	III	120 l	3050.30	III	90	4316.34	III	100 w	7165.64	III
10	2454.82	III	70 s	3055.30	III	60	4354.28	III	250	7231.62	III
10 w	2459.77	III	150 l	3058.90	III	90	4379.82	III	100 w	7238.26	III
10 w	2460.72	III	150 l	3066.71	III	90	4381.47	III	250	7240.21	III
10	2462.18	III	70 s	3078.68	III	120	4404.71	III	100 w	7262.32	III
10	2462.90	III	150 l	3080.20	III	120	4421.10	III	150 w	7340.69	III
10	2468.20	III	50 w	3248.39	III	120	4431.85	III	350	7343.70	III
10	2468.97	III	90 s	3280.92	III	150 w	4447.93	III	200	7349.75	III
10 w	2473.42	III	90 l	3292.58	III	180 w	4450.14	III	300 w	7350.61	III
10 w	2478.32	III	90 s	3296.10	III	120 w	4451.00	III	100 w	7355.52	III
10	2479.98	III	100 l	3306.14	III	120	4461.02	III	2000	7426.48	III
10	2481.02	III	60 s	3333.26	III	200	4461.81	III	4000	7429.05	III
10	2483.30	III	90 s	3340.58	III	300 w	4500.31	III	100	7463.96	III
10	2483.99	III	500 s	3341.43	III	450 w	4612.02	III	250	7487.40	III
10 w	2484.60	III	70 s	3341.68	III	600 w	4625.18	III	200	7493.20	III
10 w	2485.16	III	70 s	3345.38	III	120	4654.16	III	100	7511.17	III
10 w	2488.72	III	70 l	3345.44	III	600 w	4713.70	III	500	7529.11	III
10	2491.97	III	50 w	3351.07	III	300 w	4725.55	III	100 w	7549.20	III

Pr III			Pr IV			Pr IV			Pr V		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
150 w	7588.64	III	100	741.45	IV	500	1485.88	IV		Air	
300	7596.41	III	20	743.15	IV	500	1503.35	IV	300	2246.06	V
100 w	7625.63	III	20	743.89	IV	400	1516.86	IV	300	2246.20	V
100 w	7648.34	III	20	746.14	IV	200	1520.71	IV	PROMETHIUM (Pm)		
100 w	7670.65	III	40	763.16	IV	2000	1520.98	IV	Z = 61		
200 w	7674.65	III	20	764.00	IV	400	1523.46	IV	Pm I and II		
500	7742.34	III	300	1226.40	IV	500	1553.62	IV	Refs. 196,260 - C.H.C.		
250 w	7745.59	III	2000	1228.59	IV	500	1559.49	IV	Air		
500	7754.31	III	500	1230.69	IV	500	1570.13	IV	40 w	2502.12	II
100 w	7755.48	III	400	1238.19	IV	200	1572.80	IV	40	2608.24	II
3000	7781.98	III	200	1249.35	IV	5000	1574.55	IV	150	2632.00	II
200 w	7814.74	III	200	1255.64	IV	5000	1575.10	IV	70	2638.46	II
1500 w	7866.14	III	200	1261.27	IV	3000	1578.38	IV	100	2671.05	II
1000	7888.12	III	400	1268.32	IV	500	1585.10	IV	50 w	2787.72	II
400	7897.09	III	300	1270.58	IV	300	1613.00	IV	40	2808.05	II
1000	7914.00	III	1000	1275.10	IV	400	1613.65	IV	100 h	2820.10	II
100	7923.16	III	200	1275.40	IV	1000	1618.03	IV	100 w	2840.82	II
1000 w	7972.75	III	1000	1278.65	IV	2000	1622.30	IV	150 w	2841.86	II
250	8001.14	III	200	1279.34	IV	300	1634.77	IV	200 c	2857.46	II
3000	8102.90	III	1000	1287.44	IV	400	1676.08	IV	100	3004.59	II
250	8119.54	III	300	1290.93	IV	200	1688.49	IV	100	3008.85	II
400	8132.23	III	1000	1292.30	IV	200	1713.53	IV	300	3072.41	II
100	8138.34	III	5000	1293.22	IV	500	1732.86	IV	150	3086.02	II
150 w	8235.33	III	5000	1295.28	IV	300	1762.86	IV	120	3090.19	II
250 w	8244.89	III	400	1296.50	IV	1000	1766.88	IV	150	3091.86	II
100	8409.10	III	200	1298.26	IV	1000	1771.14	IV	150	3108.11	II
100 w	8494.99	III	300	1298.54	IV	500	1841.08	IV	100	3115.36	II
200 w	8567.63	III	200	1304.71	IV	10000	1884.87	IV	100	3117.22	II
5000 w	8602.74	III	300	1306.86	IV	400	1951.23	IV	100	3118.76	II
500	8691.58	III	200	1308.08	IV	200	1954.61	IV	35	3162.23	I
500	8771.38	III	200	1310.71	IV	Air			35	3168.82	I
1000	8854.05	III	500	1314.96	IV	200	2025.06	IV	100	3172.77	II
125	8886.17	III	300	1315.28	IV	1000	2039.15	IV	35	3222.04	I
100	8908.70	III	300	1316.96	IV	200	2047.05	IV	35	3238.55	I
250	9099.98	III	500	1320.10	IV	200	2050.73	IV	60	3239.62	II
250	9131.90	III	1000	1320.70	IV	200	2058.48	IV	75	3296.63	I
200	9222.32	III	5000	1321.36	IV	2000	2083.23	IV	60	3311.76	II
250 w	9265.56	III	500	1322.51	IV	500	2100.42	IV	50	3313.38	I
125	9320.54	III	500	1326.38	IV	1000	2154.31	IV	.50	3329.22	I
250	9334.33	III	5000	1333.57	IV	300	2193.37	IV	75	3331.57	I
175	9377.44	III	300	1335.96	IV	1000	2205.13	IV	100	3354.45	I
175	9388.56	III	500	1339.29	IV	300	2265.70	IV	100	3358.14	II
175	9549.77	III	1000	1340.74	IV	200 c	2334.46	IV	80	3360.21	II
100	9579.74	III	200	1341.32	IV	200 c	2339.08	IV	80	3364.44	II
150	9802.98	III	300	1344.23	IV	500 c	2376.09	IV	300	3366.03	I
175	9806.37	III	1000	1347.07	IV	2000 c	2378.98	IV	90	3377.68	II
500 w	9991.16	III	1000	1352.81	IV	1000 c	2379.66	IV	100	3391.28	II
500	10031.10	III	500	1354.35	IV	500 c	2427.07	IV	100	3408.06	II
500	10160.33	III	5000	1354.66	IV	500 c	2428.13	IV	500	3427.40	II
500	10238.63	III	2000	1360.64	IV	500 c	2438.57	IV	120	3441.15	II
500	10301.58	III	1000	1364.81	IV	500 c	2455.64	IV	400	3449.80	II
500	10324.59	III	2000	1365.77	IV	500 c	2705.19	IV	250	3460.25	II
500	10716.58	III	400	1368.90	IV	200 c	2708.01	IV	200	3462.91	II
			5000	1374.41	IV	200 c	2753.47	IV	200	3480.61	II
			1000	1382.62	IV	200 c	2767.60	IV	150	3497.13	II
			200	1384.23	IV	Pr V			100	3514.85	II
			200	1385.91	IV	Ref. 149 - J.R.			200	3546.81	I
			300	1394.11	IV	Vacuum			100	3559.43	II
			500	1397.11	IV	200	843.78	V	200	3565.31	II
			1000	1399.31	IV	7000	865.90	V	150	3580.10	II
			1000	1400.96	IV	5000	869.17	V	200	3610.76	II
			400	1410.90	IV	80	869.66	V	200	3629.84	II
			1000	1424.36	IV	1000	896.65	V	300	3634.20	II
			500	1426.59	IV	750	922.29	V	300	3659.39	II
			5000	1435.56	IV	250	1234.07	V	300 r	3669.22	I
			200	1459.95	IV	250	1342.78	V	200	3674.85	I
			200	1461.76	IV	200	1958.09	V			
			1000	1474.91	IV	400	1958.20	V			
			200	1477.32	IV						

Pm I and II			Pm I and II			Pm I and II			Pm I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
200	3678.51	II	300 r	4284.37	I	300 r	4585.49	I	400 r	4838.92	I
300 r	3679.85	I	600	4297.78	II	200	4593.82	I	300	4839.62	I
200	3687.65	II	200	4303.89	II	400 r	4595.82	I	200	4844.01	I
400	3689.79	II	200 r	4305.64	I	800	4597.55	I	350 r	4852.73	I
300	3692.50	II	400	4318.80	I	500 r	4600.25	I	400 r	4860.62	I
300	3697.50	II	250	4325.92	II	400 r	4602.96	I	700 r	4860.74	I
300 r	3697.63	I	200	4332.05	II	400	4604.59	I	300 r	4865.30	I
400	3702.63	II	300	4336.54	II	600 r	4605.66	I	500 r	4865.72	I
800	3711.72	II	200	4337.48	II	500 r	4609.85	I	400 r	4869.80	I
200	3715.75	II	300	4342.12	II	100	4615.87	II	700 r	4872.42	I
200	3721.72	II	200	4347.72	I	600 r	4617.02	I	500 r	4887.02	I
500	3726.01	I	350 r	4363.92	I	200	4618.40	I	700 r	4892.52	I
200	3738.43	I	300 r	4369.64	I	400 r	4618.49	I	400 r	4900.30	I
300	3740.68	I	200	4381.88	II	500 r	4619.75	I	300 r	4904.28	I
300	3742.52	II	400 r	4388.49	I	500	4621.57	I	400 r	4918.28	I
300 r	3742.97	I	200	4388.76	II	500	4623.31	I	600 r	4932.99	I
500	3745.86	II	400 r	4409.42	I	700 r	4623.68	I	700 r	4959.46	I
300	3747.09	II	500 r	4412.47	I	900	4624.41	I	100	4971.40	II
500	3750.09	II	1000	4417.96	II	500 r	4625.29	I	500 r	4997.10	I
200	3761.68	I	400	4432.51	II	400 r	4627.60	I	200 r	5030.80	I
300	3765.75	I	250 r	4435.86	I	200	4630.93	I	300 r	5058.31	I
300	3775.42	I	300 r	4436.55	I	600 r	4633.45	I	100	5067.35	II
300	3780.77	I	300 r	4438.68	I	400 r	4640.96	I	150	5080.52	II
200	3781.43	I	500	4445.41	II	700 r	4643.36	I	150	5089.35	II
400	3795.66	II	600	4446.90	II	700 r	4643.76	I	200	5092.42	I
250	3806.06	II	800	4453.95	II	400	4645.94	I	400 r	5094.83	I
300 r	3809.20	I	200	4459.97	II	600 r	4647.03	I	200	5096.18	I
400	3810.93	I	250 r	4468.16	I	600 r	4650.42	I	150	5097.30	II
200	3819.26	II	200	4471.48	II	500	4650.52	I	400 r	5100.77	I
300	3820.53	II	300	4473.23	II	400 r	4653.41	I	250	5121.47	II
300	3839.52	I	200	4477.46	II	400	4654.50	I	400 r	5127.34	I
200	3842.88	II	350 r	4478.58	I	500 r	4655.05	I	200	5129.75	I
300	3842.98	II	300 r	4481.60	I	300	4659.38	I	400 r	5145.13	I
250	3845.38	II	300 r	4485.05	I	500 r	4660.79	I	500 r	5146.30	I
300	3874.03	I	300 r	4490.50	I	300 r	4663.26	I	400	5153.86	II
800	3877.62	II	250	4492.05	II	600 r	4663.46	I	300	5169.71	II
300 r	3885.79	I	600	4500.15	II	400 r	4665.19	I	500	5171.58	II
250	3890.97	I	350 r	4500.33	I	500 r	4671.23	I	300	5194.05	II
1000	3892.15	II	250	4506.84	I	400	4671.76	I	500	5208.09	II
300	3898.73	I	100	4509.38	II	500 r	4674.42	I	150	5215.96	II
400	3899.78	II	100	4513.56	II	200	4677.46	I	250	5225.12	II
250	3909.50	II	200	4517.31	I	500 r	4677.92	I	500	5236.26	II
1000	3910.26	II	200	4523.32	I	400 r	4678.09	I	300	5236.66	II
1000	3919.10	II	600	4525.20	II	700 r	4682.92	I	400	5246.33	II
800	3936.48	II	250 r	4526.12	I	500 r	4696.80	I	150	5262.42	II
300	3944.21	II	250 r	4526.76	I	200	4699.51	I	500	5270.64	II
300 r	3954.76	I	400 r	4527.70	I	250	4722.06	II	200	5293.92	II
1000	3957.74	II	800	4529.21	II	300	4727.06	I	100	5308.86	II
500	3980.74	II	300	4540.06	I	900 r	4728.36	I	150	5318.58	II
300	3995.05	II	300 r	4541.42	I	400 r	4728.68	I	200	5410.45	II
1000 r	3998.96	II	450 r	4541.75	I	800 r	4734.27	I	200	5424.54	II
500	4009.96	II	500 r	4544.08	I	200 r	4737.99	I	180	5424.79	II
200	4012.72	II	200	4545.17	I	100	4739.08	II	150	5429.04	II
250	4014.20	II	400 r	4549.78	I	200	4739.78	I	100	5467.64	II
200	4019.34	II	300 r	4554.03	I	350 r	4745.13	I	150	5495.45	II
250	4028.20	II	200	4554.63	I	500 r	4757.73	I	100	5516.42	II
200	4045.36	II	500 r	4555.34	I	800 r	4759.00	I	180	5534.96	II
300	4051.54	II	200	4556.06	I	700 r	4762.57	I	200	5537.38	I
600 r	4055.20	II	300	4557.03	I	700 r	4773.46	I	800	5546.08	II
200 r	4056.56	I	300	4559.21	I	900 r	4781.29	I	120	5556.88	II
600	4075.84	II	100	4564.83	II	250	4794.59	I	150	5558.39	II
200 r	4085.31	I	300 r	4568.14	I	200	4795.43	I	200	5561.73	II
500	4086.10	II	200	4570.37	I	700 r	4798.98	I	800	5576.02	II
250	4140.46	II	300 r	4572.15	I	900 r	4801.36	I	200	5641.29	II
200	4185.74	II	400 r	4575.27	I	700 r	4809.54	I	200	5730.81	I
300	4192.92	II	300	4578.28	I	900 r	4811.96	I	200	5768.16	II
200	4194.70	II	200 r	4578.41	I	400 r	4817.12	I	200	5776.99	I
200	4222.15	II	300 r	4579.48	I	400 r	4827.72	I	500	5823.93	II
300 r	4264.32	I	300	4581.14	I	800 r	4837.66	I	300 c	5868.79	II

Rn I			Re I and II			Re I and II			Re I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
20	3753.65	I				75	2403.04	II	190	2637.01	II
10	3917.20	I				1500	2405.06	I	90	2641.02	II
10	3941.72	I	25000	2003.53	I	740	2405.60	I	270	2642.75	I
10	3952.36	I	16000	2017.87	I	320	2406.70	I	65	2648.46	II
10	4226.06	I	27000	2049.08	I	270	2410.37	I	270	2649.05	I
80	4307.76	I	4200	2074.70	I	60	2418.20	II	660	2651.90	I
7	4335.78	I	3700	2083.92	I	1200	2419.81	I	400	2654.12	I
100	4349.60	I	10000	2085.59	I	300	2421.73	I	220	2663.63	I
40	4435.05	I	4700	2092.41	II	300	2421.88	I	940	2674.34	I
50	4459.25	I	9800	2097.12	I	60	2423.84	II	220	2688.53	I
50	4508.48	I	2700	2109.22	I	2500	2428.58	I	1300	2715.47	I
50	4577.72	I	3400	2139.04	II	490	2431.54	I	200	2731.56	II
50	4609.38	I	1600	2142.74	II	420	2432.18	I	220	2732.21	I
30	4721.76	I		2142.97	I	340 c	2441.47	I	610	2733.04	II
6	5722.58	I	3700	2156.67	I	230	2442.51	I	110 h	2753.64	II
10	6061.92	I	4900	2167.94	I	250	2444.94	I	220	2758.00	I
6	6200.75	I	3400	2176.21	I	610	2446.98	I	210	2763.79	I
6	6380.45	I	4200 c	2214.26	II	85	2449.03	II	200	2766.39	I
10	6557.49	I	2200	2214.58	I	85	2449.52	II	310	2767.74	I
10	6606.43	I	1700	2226.42	I	610	2449.71	I	220	2768.85	I
15	6627.23	I	920	2235.44	I	200	2455.83	II	220	2769.32	I
6	6669.60	I	440	2255.73	I	390	2461.20	I	350	2770.42	I
8	6704.28	I	860	2256.19	I	800 c	2461.84	II	550	2783.57	I
20	6751.81	I	2000	2264.39	I	200	2467.57	II	220	2791.29	I
6	6806.79	I	2100	2274.62	I	120	2467.85	II	120	2803.28	II
8	6836.95	I	5200 c	2275.25	II	150 c	2469.36	II	220	2814.68	I
8	6837.57	I	1600	2281.62	I	120	2470.61	II	75	2819.78	II
10	6891.16	I	2900	2287.51	I	75	2471.05	II	880	2819.95	I
10	6998.90	I	2700	2294.49	I	150	2473.72	II	310	2834.08	I
200	7055.42	I	390	2298.09	II	160	2475.17	II	200	2837.55	I
100	7268.11	I	390	2299.77	I	75	2477.43	II	200	2840.35	I
20	7291.00	I	610	2302.99	I	200	2479.02	I	220	2843.00	I
6	7320.98	I	680	2306.54	I	1200	2483.92	I	270	2850.98	I
10	7419.04	I	230	2312.97	I	390	2485.81	I	240	2867.19	I
300	7450.00	I	220	2313.34	I	980	2487.33	I	200	2875.28	I
8	7470.89	I	220	2319.19	I	75	2490.16	II	200	2883.44	I
8	7483.13	I	370	2320.16	I	200	2492.84	I	2900	2887.68	I
8	7514.13	I	800	2322.49	I	370	2496.04	I	130 c	2888.06	II
8	7516.92	I	300	2328.66	I	200	2498.22	I	490	2896.01	I
6	7523.93	I	270	2334.33	I	370	2501.72	I	830 c	2902.48	I
6	7597.55	I	270	2335.73	I	570	2502.35	II	210	2905.58	I
8	7601.28	I	220	2336.10	I	230	2504.60	II	550	2909.82	I
10	7657.48	I	270	2337.95	I	270	2505.94	I	65 h	2916.73	II
10	7738.43	I	860	2344.78	I	1800 c	2508.99	I	830 c	2927.42	I
20	7746.64	I	230	2349.39	I	570	2520.01	I	270	2930.61	I
100	7809.82	I	220 d	2350.46	I	540	2521.50	I	440	2943.14	I
20	8049.00	I	680	2352.07	I	150	2534.10	II	130 h	2957.91	II
100	8099.51	I	210 d	2353.95	I	370	2534.80	I	270	2962.27	I
6	8173.84	I	250	2356.50	I	570	2540.51	I	720	2965.11	I
100	8270.96	I	200	2365.32	I	740 d	2544.74	I	1500	2965.76	I
8	8314.51	I	1200	2365.90	I	370	2545.48	I	90	2968.98	II
6	8349.74	I	570	2367.68	I	160	2550.09	II	310	2976.29	I
10	8381.05	I	180	2368.53	II	300	2552.02	I	210	2978.15	I
10	8487.48	I	520	2369.27	I	150 c	2553.59	II	220	2980.82	I
10	8494.89	I	220	2370.76	II	370	2554.63	II	220	2982.19	I
20	8520.95	I	210	2371.52	I	1000	2556.51	I	220	2988.47	I
100	8600.07	I	150	2373.48	II	250	2559.08	I	1800	2992.36	I
10	8639.76	I	320	2375.07	I	340	2564.19	I	5500	2999.60	I
15	8675.83	I	75	2378.53	II	540	2568.64	II	350	3001.14	I
10	8807.75	I	370	2379.77	I	370	2571.81	II	220	3004.14	I
50	9327.02	I	180	2386.90	II	380	2586.79	I	200	3006.42	I
6	9948.57	I	340	2388.57	I	290	2599.86	I	500	3016.02	I
5	10106.13	I	230	2393.65	I	290	2603.89	I	300	3016.49	I
			320	2394.37	I	660	2608.50	II	380	3030.45	I
			320	2396.79	I	610 d	2611.54	I	240	3047.25	I
			200	2397.31	I	160 c	2616.72	II	200	3058.78	I
			210 d	2400.72	I	200	2622.76	I	1600	3067.40	I
				2400.89	I	310	2635.83	II	320	3069.94	I
			210	2401.68	I	550	2636.64	I	260	3071.16	I

RHENIUM (Re)

Z = 75

Re I and II

Re I and II		Re I and II		Re I and II		Re I and II	
Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength
200	3072.96 I	400	3449.37 I	140	3936.90 I	20	5333.85 I
550	3082.43 I	16000 c	3451.88 I	110	3944.72 I	35	5369.48 I
340	3088.76 I	240	3453.50 I	180	3945.91 I	50 c	5369.80 I
200	3093.64 I	55000 c	3460.46 I	280	3961.04 I	100 c	5377.10 I
200	3095.06 I	40000 c	3464.73 I	350 c	3962.48 I	25	5431.90 I
700	3100.67 I	400	3467.96 I	100	4004.93 I	14	5437.03 I
140	3103.06 II	240	3476.44 I	140	4022.96 I	14	5447.92 I
700	3108.81 I	400	3480.38 I	100	4023.31 I	25	5460.64 I
340	3110.86 I	320	3480.85 I	110 c	4029.63 I	14 h	5520.05 I
340 c	3118.19 I	240	3482.23 I	220	4033.31 I	25	5521.10 I
340	3121.36 I	560	3503.06 I	110	4037.49 I	50 c	5532.68 I
420	3128.94 I	100 c	3512.28 I	200	4048.99 I	50 c	5563.24 I
260	3134.02 I	320	3516.65 I	240	4081.43 I	25	5573.47 I
250	3141.38 I	320	3517.33 I	140	4104.42 I	25	5584.72 I
440	3151.64 I	120	3534.82 I	240 c	4110.89 I	10 h	5607.21 I
330	3153.79 I	320	3537.46 I	190	4121.64 I	12 h	5612.27 I
360 c	3158.31 I	160	3539.33 I	240cw	4133.42 I	100	5667.88 I
220	3164.52 I	240	3549.89 I	1800	4136.45 I	25	5711.43 I
700	3168.37 I	160	3551.29 I	700	4144.36 I	18	5716.95 I
220	3174.61 I	160	3553.65 I	140	4149.96 I	110 c	5752.93 I
440	3177.71 I	160	3558.94 I	160	4170.40 I	110cw	5776.83 I
260	3178.61 I	160	3568.23 I	220	4182.90 I	18	5791.60 I
600	3182.87 I	240	3570.26 I	220	4183.06 I	10 c	5815.92 I
1100	3184.76 I	360	3579.12 I	650	4221.08 I	550	5834.31 I
1100	3185.57 I	810 c	3580.15 II	3600 c	4227.46 I	10	5919.86 I
260	3190.78 I	650	3580.97 I	150	4241.39 I	60	5943.24 I
260	3192.36 I	810	3583.02 I	260 c	4257.60 I	10	5950.21 I
200	3194.50 I	160	3596.39 I	120 c	4291.17 I	18 h	5969.77 I
220	3198.58 I	160	3610.49 I	200	4304.40 I	10	5989.99 I
1100 c	3204.25 I	320	3617.08 I	200	4332.25 I	18 h	5995.73 I
380	3235.94 I	160	3621.46 I	40	4357.98 II	30	6114.22 I
600	3258.85 I	160	3625.91 I	380	4358.69 I	35 c	6145.81 I
600	3259.55 I	140	3637.06 I	190	4367.58 I	50	6146.82 I
200	3261.56 I	810	3637.84 I	140	4391.34 I	18	6203.24 I
300	3268.89 I	440	3651.97 I	360cw	4394.38 I	25	6217.97 I
200	3294.83 I	120	3669.78 I	110cw	4406.40 I	30cw	6229.42 I
280	3296.70 I	320	3670.53 I	180	4415.82 I	35cw	6243.24 I
280	3296.99 I	860 c	3689.50 I	150	4475.08 I	35 d	6260.02 I
280	3301.60 I	1500 c	3691.48 I	120	4478.39 I		6260.24 I
240	3302.23 I	100	3697.71 I	120 c	4507.04 I	18 c	6271.37 I
320	3303.21 II	520	3703.24 I	2600	4513.31 I	18	6278.76 I
280	3303.75 I	100	3705.02 I	260	4516.64 I	10	6286.41 I
240	3313.95 I	240	3709.93 I	500	4522.73 I	10	6303.42 I
600	3322.48 I	360 c	3717.28 I	120	4523.88 I	200	6307.70 I
200	3331.52 I	4000	3725.76 I	120	4529.95 I	200	6321.90 I
2000	3338.18 I	140	3731.87 I	100	4545.17 I	80 d	6350.75 I
1600	3342.24 I	140	3732.28 I	120	4580.68 I	16 h	6382.94 I
810	3344.32 I	240 c	3735.01 I	120	4605.73 I	14	6411.47 I
320	3346.20 I	810	3735.31 I	100	4621.38 I	50	6511.47 I
240 d	3356.33 I	910	3740.10 I	190 c	4791.42 I	14	6515.25 I
200	3358.02 I	140	3740.41 I	2200cw	4889.14 I	12	6544.91 I
200	3362.74 I	130	3742.26 II	220	4923.90 I	35 c	6577.11 I
240	3377.74 I	300cw	3745.44 I	40	5058.56 I	40cw	6592.52 I
320	3379.06 II	140	3766.48 I	70	5096.50 I	100cw	6605.19 I
320	3379.70 I	120	3768.26 I	20	5120.32 I	30 c	6623.91 I
200	3385.76 I	140	3777.66 I	25	5161.65 I	10 c	6637.25 I
240	3389.43 I	700	3787.52 I	40 c	5178.89 I	27cw	6652.39 I
200	3390.25 I	160	3796.59 I	20	5181.74 I	15 h	6683.28 I
4000	3399.30 I	160	3797.59 I	35	5234.31 I	9 c	6711.30 I
650	3404.72 I	190	3807.74 I	50	5248.86 I	30	6751.22 I
650	3405.89 I	120	3815.66 I	1300	5270.95 I	5 c	6761.19 I
240	3408.67 I	120	3836.30 I	1600cw	5275.56 I	180 c	6813.41 I
320	3409.83 I	240	3869.94 I	100	5278.24 I	260	6829.90 I
320	3417.77 I	240	3875.26 I	30	5305.56 I	85	6971.53 I
810	3419.41 I	240	3876.86 I	20	5317.28 I	35cw	7006.63 I
8000	3424.62 I	100	3908.21 I	35	5321.28 I	65cw	7024.15 I
400	3426.19 I	130	3913.92 I	50	5327.46 I	65cw	7246.67 I
300	3427.61 I	380 c	3917.27 I	20	5331.90 I	13cw	7292.72 I
320	3437.71 I	550	3929.85 I	20	5332.76 I	40cw	7578.73 I

Re I and II			Rh I and II			Rh I and II			Rh I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
13	7611.89	I	30	2492.30	I	50	2767.73	I	520	3271.61	I
7cw	7620.25	I	75 h	2494.51		100	2771.51	I	2300	3280.55	I
50cw	7640.94	I	15	2499.02	I	50	2778.06	I	110	3281.70	I
65cw	7912.94	I	40	2500.58		75	2779.54	I	2300	3283.57	I
35cw	7980.77	I	130	2502.46	I	130	2783.03	I	280	3289.14	I
40	8417.13	I	15	2503.84	II	25	2791.16	I	45	3289.64	I
29cw	8527.73	I	300	2504.29	II	75	2796.63	I	210	3294.28	I
			40	2505.10	II	150	2826.43	I	45	3296.72	I
			150	2505.67	I	180	2826.68	I	260	3300.46	I
			350	2509.70	I	30	2827.31	I	4200	3323.09	I
			50	2510.66	II	75	2834.12	I	60	3331.09	I
			300	2511.03	II	45	2835.44	I	45	3331.24	I
			75	2513.36	II	75	2836.69	I	330	3338.54	I
			200	2515.75	I	50	2856.16	I	70	3342.90	I
			130	2520.53	II	50 d	2860.68	I	80	3344.20	I
			13	2525.99	I		2860.76	I	60	3359.90	I
			13	2531.74	I	280	2862.94	I	280	3360.80	I
			50	2532.66		65	2864.40	I	60	3362.18	I
			13	2533.59		50	2871.35	I	420	3368.38	I
			50	2534.07		30	2873.62	I	45	3369.68	I
			110	2536.71		110	2878.66	I	1100	3372.25	I
			110	2537.04	II	75	2880.76	I	110	3377.14	I
			30	2539.72		140	2882.37	I	80	3377.71	I
			40	2544.22		75	2885.97	I	110	3385.78	I
			350	2545.70	I	75	2889.11	I	5600	3396.82	I
			13	2548.60		75	2889.84	I	820	3399.70	I
			550	2555.36	I	65	2899.96	I	160	3406.55	I
			25	2558.62	I	25	2904.81	I	820	3412.27	I
			50	2565.79	I	160	2907.21	I	60	3420.16	I
			45	2566.04	I	65	2910.17	II	330	3421.22	I
			25	2566.92	II	75	2912.62	I	120 d	3424.38	I
			50	2567.28		90	2915.42	I	8200	3434.89	I
			25	2574.66		30	2923.10	I	1400	3440.53	I
			25	2575.75	I	180	2924.02	I	35	3442.63	I
			13	2576.23		130	2929.11	I	120	3447.74	I
			40	2587.29	II	130	2931.94	I	60	3448.58	I
			30	2598.07		30	2955.41	I	120	3450.29	I
			30	2603.32	II	230	2968.66	I	60	3451.15	I
			75	2606.44	II	25	2974.03	I	400	3455.22	I
			75	2613.60		160	2977.68	I	60	3455.42	I
			150	2622.58	I	450	2986.20	I	180	3457.07	I
			230	2625.88	I	90	2986.99	I	220	3457.93	I
			100	2630.42	I	50	2987.45	I	5900	3462.04	I
			40	2634.99	I	110	3004.46	I	180	3469.62	I
			30	2638.74	II	50	3019.54	I	4700	3470.66	I
			75	2643.00	I	130	3023.91	I	120	3472.25	I
			110	2647.28	I	50	3028.43	I	4700	3474.78	I
			400	2652.66	I	30	3045.77	I	2100	3478.91	I
			30	2659.01	I	30	3046.76	I	95	3484.04	I
			30	2671.06	I	25	3057.89	I	80	3491.07	I
			65	2676.11	I	65	3067.30	I	110	3494.44	I
			25	2680.28	I	180	3083.96	I	1200	3498.73	I
			100	2680.63	I	29	3087.42	I	5900	3502.52	I
			30	2681.78	I	70	3114.91	I	60	3505.41	I
			30 h	2686.50		140	3121.76	I	2800	3507.32	I
			30 h	2686.91		240	3123.70	I	60	3511.78	I
			50	2694.31	I	35	3130.79	I	60	3513.10	I
			400	2703.73	I	95	3137.71	I	60	3519.54	I
			40	2705.63	II	45	3151.36	I	8800	3528.02	I
			40	2707.23	I	45	3152.60	I	880 d	3538.14	I
			75	2714.41	I	130	3155.78	I		3538.26	I
			100	2715.31	II	70	3179.73	I	280	3541.91	I
			75	2717.51	I	80	3185.59	I	1200	3543.95	I
			180	2718.54	I	140	3189.05	I	1800	3549.54	I
			65	2720.14	I	470	3191.19	I	240	3564.13	I
			30	2720.52	I	190	3197.13	I	1200	3570.18	I
			160	2728.94	I	70	3214.32	I	4700	3583.10	I
			40	2736.76	I	80	3237.66	I	120	3583.53	I
			75	2741.75	I	520	3263.14	I	4700	3596.19	I

Rh I and II		Rh I and II		Rh I and II		Rh I and II	
Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength
5900	3597.15 I	380	3975.31 I	35	5184.19 I	9	6627.80 I
310	3605.86 I	240	3984.40 I	95	5193.14 I	19	6630.16 I
3100	3612.47 I	240	3995.61 I	16	5206.95 I	40	6752.35 I
240	3614.78 I	380	3996.15 I	16	5211.52 I	9	6796.65 I
200	3620.46 I	120	4023.14 I	19	5212.73 I	13	6827.33 I
1800	3626.59 I	60	4048.41 I	16	5214.79 I	11	6857.68 I
95	3627.80 I	23	4049.04 I	19	5222.66 I	20	6879.94 I
310	3639.51 I	40	4053.44 I	19	5230.62 I	65	6965.67 I
350	3654.87 I	23	4056.34 I	45	5237.16 I	8	6972.91 I
8200	3657.99 I	70	4077.57 I	9	5237.80 I	16	6979.15 I
280	3661.86 I	560	4082.78 I	14	5269.27 I	16	7001.58 I
1300	3666.22 I	19	4084.28 I	11 h	5280.12 I	11	7038.76 I
180	3666.91 I	45	4087.79 I	14	5292.14 I	18	7101.64 I
140	3674.76 I	60	4088.50 I	14	5314.79 I	15	7104.45 I
560	3681.04 I	140	4097.52 I	40 h	5329.74 I	6	7142.55 I
1900	3690.70 I	45	4107.49 I	14 h	5331.08 I	9	7219.06 I
9400	3692.36 I	70	4116.33 I	9	5349.31 I	18	7268.18 I
60	3694.95 I	120	4119.68 I	130	5354.40 I	35	7270.82 I
940	3695.52 I	1100	4121.68 I	23	5356.47 I	12	7271.94 I
280	3698.26 I	1500	4128.87 I	45	5379.10 I	5	7273.03 I
380	3698.60 I	2100	4135.27 I	95	5390.44 I	9	7375.57 I
7600	3700.91 I	240	4154.37 I	23 h	5404.73 I	5 h	7386.64 I
940	3713.02 I	330	4196.50 I	60 h	5424.07 I	9	7430.80 I
60	3713.43 I	70	4206.62 I	19	5424.72 I	18 h	7442.39 I
45	3714.83 I	3300	4211.14 I	19 h	5425.45 I	7	7446.77 I
16	3724.94 I	29	4230.20 I	12	5439.58 I	12	7475.74 I
650	3735.28 I	40	4244.44 I	12 h	5441.36 I	12	7495.24 I
420	3737.27 I	60	4273.43 I	9 h	5444.32 I	8	7542.02 I
420	3744.17 I	60	4278.60 I	35 h	5445.23 I	11	7557.67 I
1200	3748.22 I	820	4288.71 I	23 h	5468.11 I	8	7577.22 I
240	3754.12 I	70	4296.77 I	35 h	5470.85 I	11	7690.05 I
380	3754.27 I	23	4342.44 I	12	5476.12 I	18	7772.90 I
490	3755.58 I	45	4373.04 I	12	5481.42 I	29	7791.61 I
1000	3760.40 I	4200	4374.80 I	16	5484.23 I	55	7824.91 I
2300	3765.08 I	95	4379.92 I	9	5504.65 I	15	7830.05 I
490	3769.97 I	23	4433.32 I	29	5535.04 I	15	7846.50 I
70	3775.72 I	35	4492.47 I	21 l	5544.58 I	21	8029.91 I
380	3778.13 I	29	4503.78 I	160	5599.42 I	11 h	8036.09 I
1000	3788.47 I	23	4528.72 I	7	5607.71 I	29	8045.36 I
1300	3792.18 I	16	4544.27 I	16	5608.35 I	7	8063.50 I
3800	3793.22 I	35	4548.73 I	5	5632.77 I	15	8136.20 I
4900	3799.31 I	40	4551.64 I	9	5659.62 I	7 h	8193.67 I
760	3805.92 I	19	4560.89 I	40	5686.38 I	5 h	8369.67 I
1300	3806.76 I	16	4565.19 I	9 h	5702.47 I	8	8425.59 I
45	3809.50 I	130	4569.00 I	6	5727.30 I		
95	3812.45 I	14	4571.31 I	29	5792.66 I		
470	3815.01 I	29	4608.12 I	9	5795.79 I		
760	3816.47 I	14	4619.91 I	9	5803.34 I		
1300	3818.19 I	23	4643.18 I	40	5806.91 I	10	746.28 III
3800	3822.26 I	150	4675.03 I	6	5821.84 I	30	759.54 III
2300	3828.48 I	19	4721.00 I	35	5831.58 I	50	813.44 III
2000	3833.89 I	70	4745.11 I	7	5907.31 I	30	826.01 III
45	3834.75 I	12	4755.58 I	9	5918.54 I	30	843.63 III
5900	3856.52 I	23	4810.49 I	9	5918.54 I	30	849.08 III
490	3870.01 I	21	4842.43 I	7	5941.46 I	40	852.70 III
70	3872.39 I	45	4843.99 I	130	5983.60 I	40	854.77 III
380	3877.34 I	60	4851.63 I	9	5991.19 I	40	859.89 III
70	3888.34 I	60	4963.71 I	35	6102.72 I	40	861.34 III
29	3904.22 I	60	4977.75 I	6	6116.15 I	50	863.78 III
23	3912.83 I	60	4977.75 I	8	6128.06 I	50	865.22 III
120	3913.51 I	40	4979.18 I	8	6186.89 I	50	870.40 III
240	3922.19 I	14	5085.52 I	14	6199.99 I	80	882.51 III
2000	3934.23 I	70	5090.63 I	16	6253.72 I	100	925.75 III
45	3934.98 I	23	5120.69 I	5	6276.66 I	150	937.28 III
50	3935.84 I	19	5130.76 I	8	6277.46 I	100	976.12 III
590	3942.72 I	60	5155.54 I	6	6293.38 I	500	991.62 III
95	3958.24 I	14	5157.09 I	29	6319.53 I	400	992.48 III
3800	3958.86 I	40	5158.69 I	12	6414.72 I	500 d	1009.60 III
45	3964.54 II	60	5175.97 I	16	6510.41 I	200	1012.22 III
		12	5177.27 I	19	6519.70 I		

Rh III
Ref. 396 - L.J.R.
Vacuum

Rh III			Rb I and II			Rb I and II			Rb I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
200	1015.17	III	40	542.887	II	200	2502.67	II	2500 c	4287.97	II
100	1050.00	III	200	555.036	II	250	2514.18	II	1500	4293.97	II
100	1058.97	III	2500	589.419	II	1000	2524.24	II	500 c	4306.26	II
200	1073.87	III	1500	643.878	II	200	2594.56	II	1000	4346.96	II
100	1100.58	III	3000	697.049	II	400	2623.76	II	2500	4377.12	II
100	1113.79	III	6000	711.187	II	400	2645.58	II	300	4440.10	II
100	1768.43	III	10000	741.456	II	1000	2684.10	II	1000	4469.47	II
150	1784.24	III	1000	1604.12	II	1000	2711.76	II	400 c	4493.92	II
200	1784.94	III	200	1644.96	II	250	2741.01	II	700	4519.04	II
150	1796.50	III	200	1707.52	II	500	2812.15	II	3000	4530.34	II
200	1816.03	III	600	1716.85	II	350	2838.51	II	500 l	4533.79	II
1000	1832.05	III	5000	1760.50	II	750	2873.88	II	400	4540.74	II
500	1859.85	III	200	1803.47	II	1000	3051.36	II	20000	4571.77	II
100	1874.70	III	500	1809.68	II	2	3082.02	I	3000 c	4622.42	II
800	1880.66	III	500	1865.33	II	250	3088.58	II	350 c	4631.89	II
500	1884.91	III	500	1889.42	II	10	3112.57	I	10000	4648.57	II
500	1887.36	III	500	1954.24	II	3	3113.06	I	500	4659.28	II
700	1888.62	III	300	1956.54	II	5000 c	3148.90	II	1000	4730.45	II
800	1901.32	III	200	1971.42	II	25	3157.54	I	1000	4755.30	II
500	1910.16	III	500	1983.19	II	5	3158.26	I	400 c	4757.82	II
600	1919.37	III		Air		1200	3161.00	II	30000	4775.95	II
500	1927.07	III	300	2042.23	II	50	3227.98	I	5000 c	4782.83	II
700	1931.79	III	300	2052.21	II	6	3229.16	I	300 c	4855.34	II
500	1954.25	III	500	2052.80	II	2000	3270.99	II	1500 c	4885.59	II
400	1965.16	III	2000	2068.92	II	1500	3321.49	II	2	5087.987	I
500	1994.26	III	1000	2071.50	II	1200	3340.55	II	2	5132.471	I
	Air		10000	2075.95	II	60	3348.72	I	10	5150.134	I
400	2005.14	III	1000	2090.29	II	75	3350.82	I	10000	5152.08	II
800	2013.71	III	200	2108.06	II	750	3353.89	II	300	5164.58	II
500	2017.47	III	300	2116.50	II	1200	3393.03	II	1	5165.023	I
500	2028.53	III	1000	2125.25	II	750	3415.58	II	2	5165.142	I
800	2036.72	III	400	2129.82	II	1000	3434.18	II	1	5169.65	I
600	2037.61	III	200	2143.10	II	1500	3461.50	II	15	5195.278	I
1000	2040.18	III	30000	2143.83	II	3000	3521.39	II	2	5233.968	I
3000	2048.67	III	200	2190.36	II	3000 l	3531.55	II	20	5260.034	I
2000	2064.11	III	600	2197.99	II	1000	3541.15	II	1	5260.228	I
800	2076.84	III	600	2198.26	II	100	3587.05	I	200	5270.51	II
1000	2118.53	III	300	2207.86	II	40	3591.57	I	3	5322.380	I
1000	2118.63	III	10000	2217.08	II	5000	3600.60	II	40	5362.601	I
1000	2139.44	III	200	2223.79	II	10000	3600.64	II	4	5390.568	I
1000	2152.23	III	400	2237.72	II	600 c	3639.80	II	75	5431.532	I
3000	2158.17	III	500	2250.65	II	400 c	3646.26	II	3	5431.830	I
3000	2163.19	III	200	2251.43	II	350 c	3647.56	II	500	5512.55	II
3000	2167.33	III	800	2254.19	II	1000 c	3662.74	II	5000	5522.78	II
100	2207.00	III	200	2254.55	II	900 c	3663.81	II	6	5578.788	I
100	2230.66	III	200	2263.54	II	350	3666.72	II	5000 c	5635.99	II
50	2250.84	III	500	2263.94	II	300	3675.66	II	40	5647.774	I
30	2374.84	III	500	2286.82	II	2500 c	3699.58	II	20	5653.750	I
20	2470.65	III	5000	2291.71	II	350	3746.33	II	3000 d	5699.15	II
50	3006.43	III	300	2298.80	II	3500	3796.81	II	60	5724.121	I
50	3052.44	III	250	2333.01	II	2500	3801.90	II	3	5724.614	I
50	3310.69	III	2000	2333.39	II	1000	3826.66	II	200	5739.64	II
1	3852.98	III	350	2353.11	II	450	3860.74	II	75	6070.755	I
			300	2353.96	II	250	3907.29	II	200	6135.27	II
			400	2356.97	II	500	3922.20	II	30 c	6159.626	I
			300	2358.04	II	2500 l	3926.44	II	1000 c	6199.08	II
			300	2364.27	II	25000	3940.51	II	75 c	6206.309	I
			200	2364.32	II	1000 c	3978.15	II	300	6269.40	II
			200	2365.15	II	1700	4029.49	II	120 c	6298.325	I
			300	2367.51	II	2500 c	4083.88	II	5	6299.224	I
			200	2373.21	II	2000 c	4104.28	II	10000	6458.33	II
			2000	2385.34	II	1700 c	4136.11	II	1000	6555.62	II
			250	2405.94	II	3500	4193.08	II	5000	6560.81	II
			400	2434.17	II	1000	4201.80	I	3000 l	6775.07	II
			800	2459.14	II	500	4215.53	I	100 l	7279.997	I
			50000	2472.20	II	90000	4244.40	II	300 c	7316.52	II
			300	2484.56	II	500	4266.58	II	150	7408.173	I
			700	2484.70	II	250 c	4270.25	II	200 l	7618.933	I
			2000	2496.38	II	15000	4273.14	II	300	7757.651	I

RUBIDIUM (Rb)

Z = 37

Rb I and II

Refs. 12,130,241,257,264

- J.R.

Vacuum

10	474.88	II
40	481.118	II
90	497.430	II
20	508.434	II
150	513.266	II
300	530.173	II
75	533.801	II

Rb I and II		Rb III		Rb IV		Ru I and II	
Intensity	Wavelength	Intensity	Wavelength	Ref. 109 - J.R.	Intensity	Wavelength	
60	7759.436 I	100	591.42 III	Intensity	30	2489.91 I	
90000 c	7800.27 I	900	593.65 III	Wavelength	18	2491.78 I	
5 I	7925.26 I	1000	594.94 III	Vacuum	65	2493.69 II	
4	7925.54 I	1300	595.88 III	10	595.18 IV	85	2494.02 I
45000 c	7947.60 I	1200	598.49 III	25	663.76 IV	45	2494.48 II
40 I	8271.41 I	450	602.09 III	25	716.24 IV	85	2495.69 II
30	8271.71 I	50	605.51 III	50	733.41 IV	65	2496.56 I
2000	8603.96 II	500	607.28 III	20	740.85 IV	140	2498.42 II
40 I	8868.512 I	400	613.31 III	20	749.86 IV	140	2498.57 II
30	8868.852 I	500	619.67 III	20	753.75 IV	140	2498.72 II
300	8978.88 II	20	620.83 III	10	771.54 IV	85	2499.78 I
300	9021.77 II	100	622.24 III	25	776.89 IV	260	2507.01 II
3	9224.64 I	250	630.06 III	9	817.92 IV	130	2508.27 I
2	9234.25 I	500	645.67 III	15	850.18 IV	110	2509.07 I
500 c	9246.41 II	20	674.81 III	10	988.00 IV	110	2512.81 I
300	9338.87 II	5000	769.04 III	RUTHENIUM (Ru)			
200 w	9373.50 II	2500	815.28 III	Z = 44			
300	9391.36 II	Air		Ru I and II			
1000	9479.32 II	100	2153.21 III	Ref. 1 - C.H.C.			
700 I	9493.72 II	250	2164.59 III	Air			
30 I	9522.65 I	100	2268.00 III	2400	2076.43 I	120	2546.67 I
5	9523.05 I	150	2300.12 III	2600	2083.77 I	280	2549.48 I
20 I	9540.18 I	500	2304.14 III	2400	2090.89 I	550	2549.58 I
300	9612.99 II	150	2304.45 III	690	2255.52 I	130	2560.26 I
300	9671.54 II	250	2312.46 III	290	2259.53 I	120	2560.83 I
2000 c	9689.05 II	200	2337.07 III	780	2272.09 I	110	2563.15 I
200	9776.06 II	100	2341.90 III	240	2278.19 I	160	2568.77 I
200	9934.76 II	200	2345.37 III	780	2279.57 I	100	2570.97 I
35 I	10075.282 I	100	2349.81 III	170	2285.38 I	100	2578.57 I
30 I	10075.708 I	150	2380.44 III	290	2302.54 I	100	2579.53 I
100	13235.17 I	100	2381.29 III	480	2317.80 I	100	2589.57 I
20	13442.81 I	150	2418.46 III	150	2322.01 I	170	2591.12 I
30	13443.57 I	300	2561.86 III	120	2334.96 II	120	2592.02 I
75	13665.01 I	100	2573.71 III	240	2340.69 I	100	2593.70 I
1000	14752.41 I	100	2577.07 III	190 h	2342.85 II	110	2594.85 I
800	15288.43 I	200	2586.83 III	190	2349.34 I	370	2609.06 I
150	15289.48 I	1000	2631.75 III	310	2351.33 I	830	2612.07 I
20	22529.65 I	350	2636.83 III	170	2357.91 II	100	2615.09 I
10	22932.47 I	100	2656.68 III	140	2360.56 I	220	2631.30 I
4	27314.31 I	100	2713.86 III	170	2370.17 I	220	2635.86 I
2	27905.37 I	500	2798.86 III	80	2375.27 I	170	2636.67 I
Rb III		150	2800.27 III	160	2375.63 II	110	2640.33 I
Refs. 258,262 - J.R.		500	2807.58 III	170	2375.63 II	460	2642.96 I
Vacuum		100	2845.44 III	240	2375.27 I	110	2647.32 I
30	465.85 III	150	2869.77 III	80	2375.63 II	110	2651.29 I
35 p	482.43 III	500	2903.69 III	160	2392.42 I	330	2651.84 I
30 p	482.47 III	150	2949.62 III	95	2396.71 II	28	2656.25 II
500	482.83 III	100	2951.01 III	780	2402.72 II	400	2659.62 I
300	484.84 III	2000	2956.07 III	150	2407.92 II	23	2661.17 II
500	489.66 III	500 I	2967.45 III	55	2410.89 I	330	2661.61 II
100	489.96 III	150	2968.13 III	55	2414.82 II	200	2664.76 I
600	493.48 III	500	2970.74 III	130	2420.82 I	30	2667.40 II
50	497.82 III	250	2987.40 III	55	2422.92 I	690	2678.76 II
100	500.28 III	350	3023.61 III	45	2429.60 I	220	2686.29 I
30	508.33 III	200	3039.62 III	65	2432.93 I	28	2687.50 II
400	516.79 III	200	3041.48 III	30	2447.45 I		2688.16 II
800	533.64 III	250	3070.70 III	30	2450.58 I	330	2692.06 II
1200	535.86 III	500	3086.84 III	65	2454.92 I	110	2701.34 I
1200	556.19 III	100	3098.49 III	180	2455.53 II	110	2702.83 I
500	558.36 III	500	3111.36 III	150	2456.44 II	170	2709.20 I
700	564.77 III	250 s	3114.82 III	370	2456.57 II	200	2712.41 II
1500	566.71 III	120	3118.92 III	65 h	2458.62 I	690	2719.52 I
1000	572.82 III	100	3169.34 III	55	2462.94 I	130	2722.65 I
1500	576.65 III	200	3222.60 III	85	2464.70 I	140	2725.47 II
2500	579.63 III	500	3286.41 III	30	2474.04 I	310	2734.35 II
1500	581.26 III	100	3330.16 III	110	2475.41 I	1800	2735.72 I
500	582.34 III	200	3346.92 III	100	2476.88 I	170	2739.22 I
800	586.77 III	250	3439.26 III	280	2478.93 II	130	2744.45 I
		100	3492.68 III	28	2481.11 II	35	2747.97 II
						75	2752.45 II

Ru I and II			Ru I and II			Ru I and II			Ru I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
75	2752.77	II	60	3177.05	II	200	3640.64	I	870	3984.86	I
260	2763.42	I	180	3186.04	I	290	3650.32	I	280	3995.98	I
35	2765.44	II	240	3188.34	I	310	3654.40	I	1500	4022.16	I
90	2768.93	II	240	3189.98	I	6200	3661.35	I	600	4023.83	I
100	2778.38	II	180	3196.59	I	830	3663.37	I	310	4039.21	I
110	2787.83	II	180	3223.27	I	650	3669.49	I	1400	4051.40	I
140	2802.81	I	110	3226.37	I	240	3678.32	I	710	4054.05	I
35	2806.74	II	100	3227.88	I	260	3696.59	I	370	4064.46	I
350	2810.03	I	220	3228.53	I	410	3717.00	I	200	4067.61	I
1700	2810.55	I	220	3238.53	I	260	3719.33	I	760	4068.37	I
350	2818.36	I	120	3241.24	I	550	3726.10	I	200	4073.00	I
110	2822.03	I	120	3243.50	I	8700	3726.93	I	980	4076.73	I
200	2827.87	I	280	3260.35	I	11000	3728.03	I	6000	4080.60	I
400	2829.16	I	120 d	3264.55	I	7100	3730.43	I	310	4085.43	I
130	2834.00	I	120	3266.44	I	280	3737.40	I	930	4097.79	I
150	2840.54	I	200	3268.21	I	410	3739.46	I	350	4101.74	I
35	2841.68	II	200	3273.08	I	3500	3742.28	I	1900	4112.74	I
640	2854.07	I	200	3274.71	I	870	3742.78	I	2000	4144.16	I
180	2860.02	I	100	3277.57	I	280	3744.22	I	650	4145.74	I
420	2861.41	I	490	3294.11	I	410	3744.40	I	260	4146.77	I
550	2866.64	I	370	3301.59	I	2800	3745.59	I	870	4167.51	I
110	2868.31	I	220	3306.17	I	760	3753.54	I	550	4197.58	I
1800	2874.98	I	290	3315.23	I	310	3755.09	I	550	4198.88	I
220	2879.76	I	290	3316.39	I	870	3755.93	I	7600	4199.90	I
55	2882.12	II	100	3325.00	I	1200	3759.84	I	1500	4206.02	I
130	2883.60	I	120	3335.69	I	370	3760.03	I	5400	4212.06	I
740	2886.54	I	930	3339.55	I	600	3761.51	I	760	4214.44	I
180	2892.56	I	240	3341.66	I	600	3767.35	I	930	4217.27	I
110	2901.94	I	200	3361.15	I	1500	3777.59	I	370	4220.68	I
140	2905.65	I	370	3368.45	I	460	3781.18	I	550	4230.31	I
370	2908.88	I	100	3371.86	I	600	3782.74	I	760	4241.05	I
1100	2916.26	I	130	3374.65	I	3900	3786.06	I	760	4243.06	I
150	2919.61	I	120	3378.02	I	6000	3790.51	I	370	4246.73	I
35	2927.54	II	100	3379.60	I	240	3794.92	I	310	4258.99	I
180	2945.67	II	130	3380.18	I	760	3798.05	I	760	4284.33	I
180	2946.99	I	130	3385.14	I	7600	3798.90	I	220	4293.28	I
370	2949.50	I	130	3388.71	I	7600	3799.35	I	260	4294.79	I
150	2954.49	I	100	3389.50	I	310	3800.26	I	550	4295.93	I
18	2963.40	II	370	3392.54	I	310	3808.68	I	3700	4297.71	I
550	2965.16	I	310	3401.74	I	600	3812.72	I	930	4307.60	I
170	2965.55	II	310	3409.28	I	760	3817.27	I	370	4318.43	I
140	2976.59	II	3100	3417.35	I	760	3819.03	I	550	4319.87	I
550	2976.92	I	4900	3428.31	I	650	3822.09	I	550	4342.07	I
45	2977.23	II	490	3430.77	I	550	3824.93	I	350	4349.70	I
75	2979.96	II	310	3432.74	I	760	3831.80	I	710	4354.13	I
1400	2988.95	I	6400	3436.74	I	220	3835.05	I	870	4361.21	I
35	2991.62	II	260	3438.37	I	310	3838.07	I	2400	4372.21	I
110	2993.27	I	220	3440.20	I	930	3839.70	I	870	4385.39	I
460	2994.96	I	260	3473.75	I	480	3846.68	I	1300	4385.65	I
440	3006.59	I	240	3481.30	I	760	3850.43	I	1700	4390.44	I
330	3017.24	I	8300	3498.94	I	480	3856.46	I	1600	4410.03	I
310	3020.88	I	640	3514.49	I	1300	3857.55	I	160	4421.46	I
240	3033.45	I	330	3519.64	I	220	3860.72	I	330	4428.46	I
200	3040.31	I	200	3528.68	I	650	3862.69	I	460	4439.76	I
220	3042.48	I	240	3532.81	I	1300	3867.84	I	440	4449.34	I
110	3045.71	I	390	3537.95	I	260	3873.52	I	1100	4460.04	I
110	3048.78	I	790	3539.37	I	650	3892.21	I	190	4473.93	I
150	3054.94	I	200	3541.63	I	760	3909.08	I	150	4480.45	I
390	3064.84	I	690	3570.59	I	260	3920.92	I	350	4498.14	I
170	3089.14	I	200	3574.58	I	1500	3923.47	I	120	4510.10	I
120	3089.80	I	390	3587.20	I	3300	3925.92	I	220	4516.89	I
330	3096.57	I	6400	3589.22	I	600	3931.76	I	220	4517.82	I
120	3097.60	I	6900	3593.02	I	310	3933.55	I	110	4520.95	I
830	3099.28	I	6400	3596.18	I	760	3945.57	I	170	4547.33	I
740	3100.84	I	1300	3599.76	I	460	3950.21	I	110	4547.85	I
120	3125.96	I	350	3625.20	I	310	3952.68	I	5400	4554.51	I
120	3153.82	I	370	3626.74	I	460	3964.90	I	110	4559.98	I
290	3159.92	I	3100	3634.93	I	600	3978.44	I	1700	4584.44	I
200	3168.52	I	210	3637.47	I	600	3979.42	I	110	4591.10	I

Ru I and II			Ru I and II			Ru I and II			Ru III		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
150	4592.52	I	65	5385.88	I	26 h	6444.84	I	200	850.30	III
330	4599.08	I	110 h	5401.04	I	8	6496.44	I	50	851.22	III
170	4635.69	I	40	5401.39	I	11	6528.74	I	50	852.49	III
200	4645.09	I	40	5418.86	I	4	6560.45	I	150	856.32	III
720	4647.61	I	55	5427.59	I	4	6593.74	I	50	867.48	III
290	4654.32	I	26 l	5439.21	I	9	6618.20	I	250	919.74	III
290	4681.79	I	13	5452.71	I	21	6663.14	I	50	921.78	III
190	4684.02	I	80 h	5454.82	I	55	6690.00	I	250	928.08	III
290	4690.11	I	90	5456.13	I	11	6707.52	I	150	937.16	III
1400	4709.48	I	13 h	5475.18	I	15	6718.30	I	500	940.09	III
140	4731.33	I	55	5479.40	I	15	6730.45	I	250	940.68	III
120	4733.52	I	26	5480.30	I	7	6756.54	I	50	941.85	III
500	4757.84	I	80	5484.32	I	21	6766.95	I	50	942.63	III
260	4815.52	I	18	5484.64	I	30	6775.02	I	50	943.06	III
120	4844.56	I	26	5496.69	I	13	6787.23	I	150	945.68	III
550	4869.15	I	13	5501.02	I	8	6813.51	I	100	946.05	III
160	4895.60	I	130	5510.71	I	15	6823.88	I	100	947.14	III
470	4903.05	I	20	5512.37	I	21	6824.17	I	100	949.83	III
120	4907.89	I	8	5517.86	I	7	6831.52	I	50	950.35	III
260	4921.07	I	12	5521.78	I	26	6911.48	I	100	950.45	III
180	4938.43	I	12	5530.99	I	110	6923.23	I	50	952.59	III
160	4968.90	I	24	5540.66	I	26	6982.01	I	50	957.06	III
160	4980.35	I	12	5556.52	I	26	7027.98	I	50	957.18	III
120	4992.74	I	90	5559.75	I	9	7086.06	I	50	961.58	III
160	5011.23	I	11	5569.03	I	12	7087.35	I	250	961.68	III
90	5014.95	I	21	5578.40	I	4	7141.72	I	100	962.56	III
90	5026.18	I	21	5603.14	I	6	7219.26	I	500	966.54	III
65	5028.16	I	8	5603.55	I	35	7238.92	I	250	967.09	III
35	5040.35	I	13	5606.73	I	7	7266.96	I	150	967.85	III
35	5040.74	I	11	5629.79	I	8	7323.56	I	150	967.92	III
65	5047.31	I	290	5636.24	I	16	7393.93	I	150	971.83	III
450	5057.33	I	11	5641.66	I	18	7468.91	I	250	972.40	III
21	5062.64	I	7	5649.56	I	12	7475.40	I	100	973.54	III
90	5072.97	I	7	5653.30	I	26	7485.79	I	150	973.78	III
120	5076.32	I	11	5665.20	I	70	7499.75	I	750	974.14	III
200	5093.83	I	16	5679.63	I	7	7532.07	I	250	974.46	III
80	5107.07	I	180	5699.05	I	26	7559.61	I	250	977.51	III
24	5123.73	I	13	5724.82	I	5	7612.94	I	100	978.18	III
55	5127.26	I	13	5725.73	I	18	7621.50	I	900	979.43	III
65	5133.89	I	16	5745.99	I	18	7722.87	I	500	981.35	III
530	5136.55	I	16	5747.47	I	5	7729.91	I	250	983.81	III
170	5142.76	I	11	5752.02	I	22	7791.86	I	250	983.91	III
250	5147.24	I	11	5756.83	I	4	7797.89	I	250	985.55	III
110	5151.07	I	11	5767.92	I	4	7806.82	I	900	986.84	III
55	5153.20	I	16	5804.39	I	3	7813.43	I	200	987.87	III
500	5155.14	I	65	5814.98	I	4	7829.81	I	250	991.67	III
55	5160.00	I	8	5828.06	I	5 h	7833.39	I	250	992.75	III
920	5171.03	I	16 h	5833.21	I	6 h	7841.90	I	900	994.56	III
180	5195.02	I	55	5919.34	I	30	7847.80	I	250	995.30	III
80	5199.87	I	80	5921.45	I	80	7881.49	I	200	1000.78	III
45	5202.12	I	21	5926.87	I	16	7890.37	I	300	1001.65	III
45	5213.43	I	26	5932.38	I	16	7924.43	I	250	1004.29	III
65	5223.55	I	8	5936.65	I	5	7948.15	I	500	1009.13	III
40	5242.38	I	8	5951.15	I	9	7967.84	I	900	1009.87	III
55	5251.67	I	21 h	5973.38	I	9	8112.47	I	500	1014.68	III
40	5257.07	I	8	5974.17	I	18	8264.96	I	100	1018.72	III
40	5266.47	I	16	5988.67	I	11	8348.98	I	100	1019.33	III
40	5266.83	I	35	5993.65	I	6	8352.94	I	100	1020.77	III
40	5280.82	I	18	6116.77	I	4	8435.77	I	200	1080.00	III
130	5284.08	I	26	6199.42	I	11	8473.64	I	100	1184.37	III
40	5291.16	I	26	6225.20	I	11	8483.56	I	800	1190.51	III
80	5304.86	I	9	6284.49	I	22	8710.84	I	500	1200.07	III
260	5309.27	I	18	6295.22	I	14	8724.98	I	100	1204.57	III
13	5315.33	I	13	6330.62	I	9	8777.36	I	200	1204.88	III
40	5332.93	I	9	6336.12	I				500	1207.17	III
45 h	5334.70	I	9 h	6363.41	I				500	1209.77	III
110	5335.93	I	9	6376.45	I				300	1211.31	III
130	5361.77	I	16	6390.23	I				200	1232.57	III
65	5377.84	I	8	6417.57	I				100 h	1653.77	III

Ru III
Ref. 423 - C.H.C.
Vacuum
850.09 III

Ru III			Sm I and II			Sm I and II			Sm I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
200	1699.84	III	45	2889.06		430	3264.94	II	170	3419.77	II
100 h	1715.97	III	60	2891.34		180	3270.49	II	120	3424.78	II
200	1759.49	III	85 d	2907.88		180	3270.68	II	170	3426.20	II
200 h	1880.95	III		2907.99	II	430 d	3272.48	II	170	3433.68	II
100 h	1883.56	III	130	2910.28	II		3272.60	II	150	3437.10	II
200 h	1899.04	III	85	2937.48	II	430	3272.81	II	170	3438.06	II
100 h	1899.42	III	70	2943.49	II	430	3273.48	II	240	3440.50	II
100	1908.31	III	150	2953.19	II	430	3276.75	II	170	3453.56	II
500	1941.35	III	85	2962.74	II	270	3280.84	II	170	3459.20	II
100	1981.82	III	160	2969.02	II	180	3285.66	II	120	3459.42	II
100	1982.10	III	100	2983.43	II	430	3286.23	II	240	3461.13	II
200	1989.22	III	60	2991.57	II	720 d	3290.28	II	120	3464.07	II
200	1993.32	III	100	3021.01			3290.39	II	170	3467.87	II
100	1997.55	III	150	3034.84	II	180	3290.65	II	130	3473.96	II
	Air		100	3039.13	II	240	3293.37	II	130	3479.53	II
200	2005.71	III	120	3046.93	II	360	3295.44	II	130	3480.26	II
100	2006.46	III	150	3067.54		430	3295.81	II	170	3480.56	II
500	2009.28	III	120	3071.29	II	720	3298.10	II	170	3487.41	II
100	2011.17	III	100	3086.45	II	170	3300.98	II	170	3493.61	II
50	2011.56	III	120	3096.88	II	340	3301.68	II	220	3499.84	II
50	2011.66	III	100 h	3102.30	II	340	3304.52	II	340	3511.23	II
100	2015.20	III	250	3106.52	II	340	3305.18	II	310	3530.60	II
50	2018.58	III	220	3110.20	II	1700	3306.39	II	220	3532.57	II
100	2044.59	III	200	3117.72	II	170	3306.61	II	270	3535.65	II
			270	3136.30	II	850	3307.02	II	240	3554.15	II
			150	3139.97	II	340	3309.52	II	510	3559.10	II
			150	3147.19	II	850	3310.66	II	220	3566.84	II
			180	3152.10	II	600	3312.42	II	4200	3568.27	II
			410	3152.52	II	410	3316.58	II	270	3577.79	II
			150	3162.30	II	430	3320.16	II	390	3580.94	II
			360	3169.88	II	110	3320.59	II	310	3583.39	II
			180	3178.12	II	1200	3321.18	II	4200	3592.60	II
			720	3183.92	II	340	3323.77	II	340	3601.69	II
			310	3187.01	II	340	3325.26	II	1700	3604.28	II
			430	3187.22	II	170	3325.48	II	3400	3609.49	II
			360	3187.79	II	340	3327.88	II	240	3620.58	II
			360	3193.01	II	170	3333.64	II	1700	3621.23	II
			360	3196.18	II	170	3336.12	II	240	3623.32	II
			150	3201.80	II	850	3340.58	II	850	3627.01	II
			150	3204.90	II	240	3343.49	II	850	3631.13	II
			360	3207.18	II	110	3343.64	II	3400	3634.29	II
			180	3208.17	II	240	3344.35	II	240	3634.93	II
			600	3211.73	II	170	3347.30	II	410	3638.77	II
			150	3214.12	II	240	3348.68	II	360	3645.29	II
			270	3215.26	II	220	3350.88	II	300	3645.39	II
			530	3216.85	II	410 d	3354.18	II	660	3649.53	II
			600	3218.61	II		3354.30	II	340	3650.19	II
			150	3219.43	II	170	3354.72	II	340	3656.22	II
			270	3226.84	II	1200	3365.86	II	2200	3661.36	II
			180	3228.50	II	150	3367.27	II	220	3662.69	II
			270	3228.78	II	340	3368.57	II	340	3667.93	II
			720	3230.56	II	340	3369.46	II	340	3670.66	II
			360	3231.53	II	170	3370.59	II	2200	3670.84	II
			150	3231.95	II	340	3371.21	II	340	3677.79	II
			430	3233.68	II	150	3376.48	II	270	3681.73	II
			720	3236.64	II	1200	3382.40	II	270	3688.42	II
			150	3237.89	II	510	3384.66	II	270	3692.22	II
			720	3239.66	II	150	3384.86		1100	3693.99	II
			530	3241.16	II	150	3387.66	II	480	3706.75	II
			180	3241.59	II	410	3389.32	II	480	3706.98	II
			180	3242.04	II	150	3391.11	II	480	3708.41	II
			150	3244.69	II	410	3396.19	II	930	3708.65	II
			240	3249.75	II	150	3397.76	II	480	3711.54	II
			720	3250.37	II	150	3399.84	II	350	3712.76	II
			360	3253.40	II	600	3402.46	II	930	3718.88	II
			270	3253.94	II	210	3403.09	II	930	3721.85	II
			850	3254.38	II	850	3408.68	II	420	3724.90	II
			110	3255.63	II	270	3418.15	II	1600	3728.47	II
			360	3262.28	II	430	3418.51	II	2100	3731.26	II

SAMARIUM (Sm)		
Z = 62		
Sm I and II		
Ref. 1 - C.H.C.		
Air		
45	2610.07	
90	2640.27	
35	2649.17	
45	2657.68	
70	2662.42	
120	2675.15	
100	2688.60	
45	2690.90	II
130	2693.34	
45	2693.74	
60	2696.08	
85	2707.96	
50	2732.42	
35	2739.87	
29	2762.28	
35	2764.18	
85	2767.85	II
60	2774.77	
85	2776.11	
85	2779.23	II
85	2786.64	
150	2789.38	II
130 h	2796.70	
85	2807.36	
150	2809.50	
120	2810.86	II
85	2817.20	II
29	2820.96	II
220	2830.94	
60	2840.30	
60	2847.49	II
60	2851.35	
120	2866.09	II
70	2868.40	II
70	2881.34	
85	2881.68	
60	2883.09	

Sm I and II			Sm I and II			Sm I and II			Sm I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
1600	3735.98	II	450	3881.38	II	410	4113.90	II	500	4368.03	II
800	3737.14	II	450	3881.79	II	1900	4118.55	II	210	4369.92	II
320	3737.48	II	320	3882.50	II	410	4121.36	II	440	4373.46	II
2900	3739.12	II	3700	3885.29	II	280	4122.51	II	320	4374.98	II
	3739.20	II	660	3889.16	II	710	4123.96	II	880	4378.24	II
800	3741.29	II		3889.22	II	280	4129.23	II	530	4380.42	I
1200	3743.87	II	610	3890.08	II	250	4135.14	II	290	4384.29	II
930	3745.46	I	320	3891.21	II	320	4147.71	II	1600	4390.86	II
	3745.60	II	400	3894.05	II	810	4149.83	II	210	4393.35	I
480	3747.62	II	1600	3896.98	II	1200	4152.21	II	290	4397.34	I
800	3755.28	II	1300	3903.42	II	530	4153.33	II	410	4401.17	I
800	3756.41	I	620	3917.44	II	560	4155.22	II	810 d	4403.06	II
1200	3757.53	II	2500	3922.40	II	810	4169.48	II		4403.13	I
450	3758.45	II	1900	3928.28	II	410	4171.57	II	410	4403.36	II
660	3758.97	II	470	3935.76	II	440	4178.02	II	520	4409.33	II
350	3760.04	II	1300	3941.87	II	530	4181.10	II	290	4411.58	I
1900	3760.69	II	620	3943.24	II	210	4183.33	I	380	4417.58	II
660	3762.59	II	500	3946.51	II	530	4183.76	II	470	4419.33	I
1100	3764.37	II	740	3948.11	II	1000	4188.13	II	1500	4420.53	II
480	3767.36	II	470	3951.89	I	410	4191.93	II	960	4421.14	II
480	3767.76	II	370	3959.53	II	270	4199.45	II	2900	4424.34	II
370 d	3773.33	I	1500	3963.00	II	650	4202.92	II	470	4429.66	I
	3773.42	II	620	3966.04	II	1100	4203.05	II	1600	4433.88	II
1100	3778.14	II	470	3967.68	II	660	4206.13	II	1800	4434.32	II
660	3780.76	II	740	3970.53	II	270	4206.62	II	530	4441.81	I
420	3780.93	II	1500	3971.40	II	660	4210.35	II	440	4442.28	I
320	3787.20	II	620	3974.66	I	740	4220.66	II	710	4444.26	II
1500	3788.12	II	960	3976.27	II	1000	4225.33	II	710	4445.15	I
1600	3793.97	II	1000	3976.43	II	740	4229.70	II	1300	4452.73	II
420	3797.28	II	960	3979.20	II	620	4234.57	II	250	4452.95	I
1600	3797.73	II	740	3983.14	II	1200	4236.74	II	1200	4454.63	II
500	3799.54	II	740	3986.68	II	500	4237.66	II	1000	4458.52	II
800	3800.89	II	370	3987.43	II	620	4244.70	II	250	4459.29	I
320	3805.63	II	1500	3990.00	II	210	4249.55	II	2200	4467.34	II
420	3808.46	II		3990.02	I	250	4251.78	II	810	4470.89	I
320	3809.75	II	740	3993.31	II	2100	4256.39	II	470	4472.43	II
320	3809.88	II	280	4003.46	II	210	4258.58	II	620	4473.02	II
420	3810.43	II	470	4007.48	II	1300	4262.68	II	740	4478.66	II
500	3812.07	II	280	4019.98	II	500	4265.08	II	370	4499.11	I
480	3813.63	II	880	4023.23	II	1200	4279.68	II	370	4499.48	II
420	3814.63	II	740	4035.11	II		4279.75	II	240	4503.38	I
930 d	3820.82		590	4041.68	II	240	4279.94	II	180	4505.05	II
530	3824.18	II	740	4042.72	II	2200	4280.79	II	120	4511.33	I
1600	3826.20	II	880	4042.90	II	710	4282.21	I	560	4511.83	II
530	3830.29	II	240	4044.11	II	470	4282.83	I	440	4515.09	II
1100	3831.50	II	560	4045.05	II	240	4283.50	I	880	4519.63	II
530	3833.83	II	440	4046.16	II	350	4286.64	II	440	4523.04	II
560	3834.48	I	740	4047.16	II	350	4292.18	II		4523.18	I
560	3834.60	II	210	4048.62	II	1600	4296.74	I	650	4523.91	II
370	3835.72	II	590	4049.81	II	320	4304.94	II	290	4533.80	I
500	3838.94	II	440	4058.87	II	880	4309.01	II	270	4536.51	II
400	3840.45	II	560	4063.54	II	240	4312.85	I	710	4537.95	II
1600	3843.50	II	280	4064.32	II	1900	4318.94	II	150	4538.53	II
530	3847.51	II	1400	4064.58	II	470	4319.53	I	290	4540.19	II
640	3848.78	II	810	4066.74	II	590	4323.28	II	380	4542.06	II
420	3851.88	II	710	4068.33	II	240	4324.46	I	810	4543.95	II
530	3853.30	I	810	4075.84	II	1800	4329.02	II	100	4544.83	II
2700	3854.21	II	280	4076.65	II	440	4330.02	I	410	4552.66	II
480	3854.56	I	240	4080.56	II	1300	4334.15	II	270	4554.45	II
800	3855.90	II	410	4082.60	II	880	4336.14	I	240	4560.43	II
480	3857.91	II	280	4083.58	II	560	4345.86	II	470	4566.21	II
400	3858.74	I	220	4084.40	II	1100	4347.80	II	590	4577.69	II
660	3862.05	II	1000	4092.27	II	560	4350.46	II	290	4581.58	I
350	3862.23	II	290	4094.05	II	560	4352.10	II	440	4581.73	I
320	3865.24	II	240	4104.13	II	560	4360.72	II	560	4584.83	II
800	3871.78	II	810	4107.28	II	220	4361.07	II	290	4591.82	II
400	3875.19	II		4107.39	II	810	4362.04	II	380	4593.54	II
560	3875.54	II	410	4109.40	II	440	4362.91	I	560	4595.29	II
800	3880.77	II	280	4110.19	II	220	4363.45	II	240	4596.74	I

Sm I and II			Sm I and II			Sm I and II			Sm I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
220	4604.18	II	260	5103.09	II	50	6291.82	II	26	7281.47	II
290	4606.51	II	140	5104.48	II	35	6307.06	II	8	7282.21	I
290	4615.44	II	140	5116.70	II	70	6327.47	II	19	7283.33	II
470	4615.69	II	510	5117.16	I	45	6426.64	II	16	7288.92	II
150	4630.21	II	350	5122.14	I	45	6472.34	II	13	7290.23	I
880	4642.24	II	360	5155.03	II	35	6484.52	II	26 h	7300.72	II
290	4645.40	I	250	5172.74	I	35	6498.67	II	13	7327.08	II
290	4646.68	II	470	5175.42	I	50	6542.76	II	13	7332.65	I
240	4648.16	II	250	5200.59	I	140	6569.31	II	8	7338.04	I
380	4649.49	I	260	5251.92	I	35 h	6570.67	II	26	7347.30	I
150	4655.13	II	400	5271.40	I	40 h	6585.21	II	26	7376.69	II
290	4663.56	I	250	5282.91	I	110	6589.72	II	13	7393.98	II
740	4669.40	II	190	5320.60	I	40	6601.83	II	30	7444.56	I
620	4669.65	II	110	5341.29	I	95	6604.56	II	26	7445.41	I
470 d	4670.75	I	140	5368.36	I	40 h	6632.28	II	26 d	7453.03	II
	4670.83	I	130	5405.23	I	50	6671.51	I	13	7470.76	I
1100	4674.60	II	220	5453.00	I	70	6679.21	II	26	7481.99	II
680	4676.91	II	140	5466.72	I	70	6693.55	II	23 h	7502.39	II
210	4681.55	I	230	5493.72	I	40 d	6723.07	I	10 h	7517.00	II
370	4687.18	II	80	5512.10	I	120 d	6731.84	II	23 h	7541.42	II
370	4688.73	I	230	5516.09	I	70 d	6734.06	II	9	7544.74	I
130	4693.63	II	50	5548.95	I	40 d	6734.81	II	10	7546.57	I
120	4699.34	II	140	5550.40	I	55	6741.47	II	12 h	7560.03	II
530	4704.40	II	45	5573.42	I	40 h	6778.61	II	19	7562.94	II
270	4713.06	II	35	5588.20	I	60	6790.00	II	23	7570.95	II
130	4715.26	II	50	5600.86	II	95	6794.20	II	23	7572.29	II
730	4716.10	I	50	5621.79	I	55	6844.71	II	19	7578.09	II
270	4717.07	I	70	5626.01	I	75	6856.03	II	30	7585.85	II
210	4717.72	II	85	5644.10	I	120	6860.93	I	23	7588.31	II
190	4718.33	II	140	5659.86	I	40	6862.82	II	10	7598.01	I
270	4719.84	II	120	5696.73	I	30	6950.51	II	23 d	7607.48	II
130	4726.02	II	85	5706.20	I	120	6955.29	II		7607.74	I
770	4728.42	I	35	5710.93	I	90	7020.44	II	12	7613.94	II
470	4745.68	II	50	5732.95	I	13	7036.73	II	10 h	7631.77	II
150	4750.72	I	50	5743.35	II	90	7039.22	II	23	7637.94	II
730	4760.27	I	45	5759.52	II	90	7042.24	II	45	7645.09	II
110	4770.20	I	70	5773.77	I	13	7049.15	II	12	7645.82	I
110	4774.15	II	60	5778.33	I	90	7051.52	II	19	7648.02	II
190	4777.85	II	45	5779.24	I	16	7054.97	II	10	7655.78	II
580	4783.10	I	45	5781.93	II	19	7074.67	I	19	7667.20	II
350	4785.86	I	70 d	5786.98	II	90	7082.37	II	8	7672.49	II
160	4789.96	I	60	5788.38	I	40 d	7085.52	II	10 h	7678.79	II
230	4791.58	II	60	5800.52	I	26	7088.30	I	10 h	7695.78	I
430	4815.81	II	65	5802.84	I	16	7091.16	I	23	7712.04	II
130	4829.57	II	45	5814.89	I	30	7095.50	I	30	7728.56	II
970	4841.70	I	45	5831.02	II	16	7096.33	I	30	7736.26	II
310	4844.21	II	45	5836.37	II	30	7104.54	I	30	7749.30	II
140	4847.76	II	35	5860.78	I	19	7106.23	I	23	7755.20	II
270	4848.32	I	65	5867.79	I	26	7115.96	I	10	7794.50	I
120	4854.36	II	45	5868.61	I	23	7117.51	II	10	7801.54	I
210	4883.77	I	35	5871.06	I	26 h	7119.81	II	8 h	7812.75	II
730	4883.97	I	50	5874.21	I	12	7122.40	II	16	7820.15	II
170	4904.97	I	45	5897.39	II	23 h	7125.11	II	10	7831.40	II
630	4910.40	I	50	5898.96	I	13	7131.80	I	40 w	7835.08	II
350	4913.25	II	35	5938.90	II	10	7136.01	I	26	7837.27	II
430	4918.99	I	65	5965.71	II	12	7139.39	II	10	7844.82	II
110	4924.04	I	35 h	5968.82	II	40 d	7143.98	II	6	7859.53	I
120	4938.10	II	35	5984.29	I	85 d	7149.60	II	19	7863.65	II
170	4948.63	II	50	6045.00	I	10	7172.67	I	10 h	7880.01	II
120	4952.37	II	45	6045.39	I	10	7189.57	II	16	7895.96	I
170	4961.94	II	50	6070.06	I	9	7210.95	I	26	7914.96	II
170	4975.98	I	45	6084.12	I	23	7213.82	I	90	7928.14	II
140	5028.44	II	35 h	6091.40	I	26 d	7218.09	II	9	7931.92	I
400	5044.28	I	45	6110.66	II	13	7220.07	I	19	7937.09	II
200	5052.76	II	45 h	6159.56	I	13	7237.02	II	16	7948.12	II
170	5069.46	II	45	6246.76	II	60	7240.90	II	19 w	8001.61	II
540	5071.20	I	45	6256.54	I	9	7257.11	II	19 w	8014.92	II
170	5100.22	II	45	6256.66	II	9 d	7261.52	II	23	8025.12	II
	5100.39	I	100	6267.28	II	13	7279.25	I	23 w	8026.32	II

Sm I and II			Sc I and II			Sc I and II			Sc I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
16	8032.03	II	120 h	3056.31	I	2700	4047.79	I	120	4709.34	I
40	8048.70	II	130	3065.11	II	120	4049.95	I	200	4728.77	I
16	8065.16	I	45	3139.75	II	5500	4054.55	I	490	4729.23	I
45	8068.46	II	990	3251.32	II	220	4056.59	I	40 h	4732.30	I
9 w	8117.16	II	1500	3255.69	I	160 h	4074.97	I	590	4734.10	I
9	8125.12	II	4400	3269.91	I	160	4078.57	I	60	4735.08	I
26	8161.82	II	5500	3273.63	I	6100	4082.40	I	690	4737.65	I
19 w	8195.50	II	110 d	3343.28	II	200	4086.67	I	790	4741.02	I
6	8206.30	II	270	3352.05	II	400	4087.16	I	1200	4743.81	I
26 w	8218.76	II	9900	3353.73	II	40 h	4093.13	I	200	4753.16	I
9	8230.33	I	65 d	3357.30	II	65	4094.85	I	220	4779.35	I
16	8240.98	II	2000	3359.68	II	55 h	4098.35	I	90	4791.50	I
19 w	8289.26	II	1700	3361.27	II	65	4100.33	I	100	4827.28	I
10	8300.88	II	1700	3361.94	II	440 h	4133.00	I	100	4833.67	I
40 w	8305.79	II	4000	3368.95	II	530 h	4140.30	I	170	4839.44	I
10	8315.45	I	6600	3372.15	II	65 h	4147.40	I	40	4840.47	I
19 w	8348.68	II	90	3416.68	I	720	4152.36	I	80	4847.68	I
19	8383.71	I	130	3418.51	I	55 h	4154.72	I	80	4852.68	I
19	8387.77	II	65	3419.36	I	90hd	4161.88	I	140ld	4857.79	ScO
30 w	8432.64	II	200	3429.21	I	1100 h	4165.19	I		4858.09	ScO
19 w	8473.54	II	200	3429.48	I	65 h	4171.56	I	80	4906.67	I
45 w	8485.99	II	270	3431.36	I	45 h	4186.45	I	90	4909.76	I
30 w	8510.90	II	530	3435.56	I	65 h	4187.62	I	90	4922.84	I
23	8543.22	II	90	3439.41	I	75	4205.20	I	90	4934.25	I
23 w	8617.03	II	65	3440.18	I	65	4212.34	I	45	4935.74	I
23 w	8632.82	II	65	3448.49	I	45	4212.49	I	70	4941.33	I
12 w	8677.81	II	270	3457.45	I	75 h	4216.10	I	170	4954.06	I
13	8706.32	II	180	3462.19	I	110 h	4218.26	I	120	4973.66	I
45 w	8708.43	II	130 d	3469.65	I	110 h	4219.73	I	150	4980.37	I
30 w	8717.89	II	110	3471.13	I	40	4221.88	I	80	4983.45	I
30 w	8758.28	II	200	3498.91	I	90 d	4225.59	I	140	4991.92	I
16 w	8780.59	II	2700	3535.73	II	180	4231.93	I	80	5018.39	I
23 w	8788.83	II	6600	3558.55	II	200	4233.61	I	70	5020.14	I
26	8859.76	II	6100	3567.70	II	100	4237.82	I	80	5021.51	I
95	8913.66	II	13000	3572.53	II	400	4238.05	I	530	5031.02	II
			9900	3576.35	II	90	4239.57	I	55	5032.74	I
			7700	3580.94	II	100	4246.12	I	250	5064.32	I
			4000	3589.64	II	15000	4246.83	II	80	5068.86	I
			4000	3590.48	II	55	4283.56	I	530	5070.23	I
			28000	3613.84	II	290	4294.77	II	250	5075.81	I
			110	3617.43	I	350	4305.71	II	2100	5081.56	I
			20000	3630.75	II	4200	4314.09	II	1200	5083.72	I
			13000	3642.79	II	3300	4320.74	II	1100	5085.55	I
			6600	3645.31	II	2400	4325.01	II	750	5086.95	I
			110	3646.90	I	28	4348.53	I	390	5087.14	I
			5300	3651.80	II	180	4354.61	II	270	5089.89	I
			110	3664.25	II	110	4358.64	I	45	5092.46	I
			290	3666.54	II	55	4359.08	I	390	5096.73	I
			55	3675.26	II	28	4364.92	I	620	5099.23	I
			40	3678.35	II	2000	4374.46	II	370	5101.12	I
			75 h	3717.10	I	130	4384.81	II	180	5109.06	I
			270	3833.07	II	45 h	4389.60	I	150	5112.86	I
			610	3843.03	II	1100	4400.37	II	320	5116.69	I
			90	3894.97	I	880	4415.56	II	70 b	5133.68	ScO
			20000	3907.49	I	28	4420.66	II	45 b	5171.06	ScO
			23000	3911.81	I	45	4431.36	II	390	5210.52	I
			45	3923.51	II	65	4542.55	I	45	5211.28	I
			4400	3933.38	I	90	4544.68	I	280	5219.67	I
			45	3952.27	I	120 h	4557.24	I	350	5239.82	II
			45	3989.06	II	160 h	4573.99	I	280	5258.33	I
			5500	3996.61	I	65 h	4592.94	I	35	5284.97	I
			530	4014.49	II	65 h	4598.45	I	210	5285.76	I
			20000	4020.40	I	55 h	4604.72	I	35	5301.94	I
			20000	4023.69	I	45	4609.53	I	22	5318.35	II
			220	4030.67	I	45	4609.95	I	70	5331.77	I
			140	4031.39	I	350	4670.40	II	14	5334.23	II
			100	4034.23	I	40 h	4680.49	I	95	5339.41	I
			220	4043.80	I	50	4698.29	II	120	5341.05	I
			200	4046.48	I	120	4706.97	I	95	5342.96	I

Sc I and II			Sc I and II			Sc I and II			Sc IV Ref. 298 - C.H.C.		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
350	5349.30	I	35bl	5918.04	ScO	12	7257.57	I			
120	5349.71	I	30	5919.11	I	8	7275.57	I			
60	5350.30	I	60bl	5928.10	ScO	3 h	7300.62	I	8	220.28	IV
210	5355.75	I	35	5961.49	I	12 h	7524.13	I	15	289.85	IV
530	5356.10	I	60bl	5968.25	ScO	14 h	7553.96	I	15	296.31	IV
14	5357.19	II	35	5969.19	I	15 h	7574.44	I	15	299.04	IV
270	5375.35	I	90	5988.42	I	11	7617.45	I	10	371.16	IV
370	5392.08	I	160bl	6017.07	ScO	14 h	7665.72	I	9	438.80	IV
45	5416.12	I	60	6026.18	I	30	7697.73	I	8	557.50	IV
45	5425.57	I	620bl	6036.17	ScO	18	7729.72	I	8	584.83	IV
45	5429.41	I	490bl	6064.31	ScO	55 h	7741.17	I	9	617.08	IV
35	5432.94	I	440bl	6072.65	ScO	5 h	7750.37	I	8	761.43	IV
55	5433.23	I	620bl	6079.30	ScO	5	7752.72	I	8	769.70	IV
45	5438.22	I	320bl	6101.87	ScO	6 h	7771.06	I	10	785.12	IV
55	5439.03	I	370bl	6109.93	ScO	15	7785.17	I	8	789.00	IV
55 h	5442.60	I	370bl	6115.97	ScO	8	7794.68	I	8	791.71	IV
270	5446.20	I	180 b	6148.70	ScO	30	7800.44	I	8	861.24	IV
18	5447.39	I	150 b	6153.93	ScO	11	7821.64	I	8	861.30	IV
120	5451.34	I	150 b	6188.09	ScO	11 h	8196.98	I	8	890.87	IV
30	5455.21	I	150 b	6192.90	ScO	15	8241.13	I	8	1219.40	IV
18	5465.20	I	620	6210.68	I	19 h	8761.40	I	9	1228.20	IV
55	5468.40	I	90	6239.41	I	11 h	8774.8	I	9	1424.66	IV
60	5472.19	I	320	6239.78	I	15 h	8794.72	I	9	1444.10	IV
18	5474.64	I	120	6245.63	II	15 h	8823.8	I	8	1489.64	IV
750	5481.99	I	110	6249.96	I	30 h	8834.35	I	8	1514.96	IV
530	5484.62	I	250	6258.96	I	70	20616.32		8	1535.76	IV
570	5514.22	I	60	6262.25	I	30	20985.81		9	1543.86	IV
16	5515.39	I	55	6276.31	I	400	22051.86	I	9	1549.55	IV
660	5520.50	I	45	6279.76	II	150	22065.05	I	15	1550.80	IV
45	5526.06	I	18	6300.70	II				8	1555.72	IV
660	5526.82	II	750	6305.67	I				9	1563.81	IV
55	5541.04	I	26	6309.90	II				10	1574.92	IV
30	5546.40	I	16	6320.85	II				9	1583.41	IV
18	5550.40	I	26	6344.83	I	10	730.60	III	8	1584.64	IV
5	5552.25	II	60	6378.82	I	15	731.65	III	8	1592.23	IV
35	5553.59	I	55bl	6408.41	ScO	15	1148.24	III	8	1660.71	IV
16	5561.10	I	90	6413.35	I	20	1154.52	III	10	1665.92	IV
70	5564.86	I	26 b	6437.08	ScO	20	1162.44	III	8	1746.23	IV
18	5571.24	I	55bl	6446.24	ScO	25	1168.61	III			
14	5579.76	I	26 b	6457.78	ScO	10	1168.88	III			
110	5591.33	I	35 b	6485.40	ScO	80	1598.00	III	10	2056.06	IV
35 h	5593.38	I	26 b	6495.90	ScO	180	1603.06	III	8	2078.93	IV
22	5604.19	I	55 b	6525.62	ScO	150	1610.19	III	12	2118.97	IV
22	5631.02	I	22 b	6535.30	ScO	40	1895.44	III	9	2164.43	IV
80	5640.98	II	45 b	6557.84	ScO	60	1912.62	III	11	2185.43	IV
45	5646.36	I	35 b	6566.88	ScO	90	1993.89	III	11	2205.46	IV
16	5647.60	I	18 b	6575.85	ScO				14	2222.22	IV
55	5649.56	I	60	6604.60	II	160	2010.42	III	11	2271.33	IV
250	5657.88	II	26bl	6609.99	ScO	50	2012.26	III	9	2464.45	IV
60	5658.34	II	18bl	6617.94	ScO	350	2699.07	III	8	2520.93	IV
55	5667.16	II	18bl	6645.08	ScO	230	2734.05	III	11	2586.93	IV
70	5669.04	II	22bl	6654.42	ScO	10	2831.75	III	9	2595.17	IV
1500	5671.81	I	26bl	6661.01	ScO	80	4061.21	III	8	2678.01	IV
95	5684.20	II	18 b	6700.48	ScO	100	4068.66	III	8	2723.52	IV
1200	5686.84	I	18 b	6705.93	ScO	40	4309.47	III	8	2773.04	IV
1100	5700.21	I	65	6737.87	I	10	4740.95	III	8 d	4594.42	IV
190	5708.61	I	35	6739.40	I	15	4780.87	III	8 d	4639.96	IV
880	5711.75	I	35	6817.08	I	50	4992.89	III	8	5501.74	IV
230	5717.28	I	50	6819.52	I	60	5032.09	III	9	5620.72	IV
180	5724.08	I	29	6829.54	I	80	6256.01	III	10	5706.82	IV
55bl	5736.85	ScO	50	6835.03	I	60	6307.60	III	14	5771.63	IV
55bl	5764.45	ScO	5 b	6963.12	ScO	90	7449.16	III	9	6548.03	IV
95bl	5772.74	ScO	5bl	6990.68	ScO	70	7548.15	III			
55bl	5775.32	ScO	5bl	7025.72	ScO	70	7868.65	III			
70bl	5809.84	ScO	8 b	7035.77	ScO	35	8814.29	III			
70bl	5811.60	ScO	5 b	7072.37	ScO	50	8829.78	III	150	179.42	V
95bl	5847.73	ScO	5 b	7094.38	ScO	30	8865.89	III	350	180.14	V
70bl	5849.07	ScO	12 h	7138.14	I	15	8881.58	III	200	180.82	V
70 b	5887.38	ScO	14	7169.13	I				200	180.96	V

Sc V		Se I and II		Se I and II		Se I and II	
Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength
50	181.55 V	120	1456.3 I	285	6535.0 II	240	21730.60 I
200	182.39 V	150	1500.9 I	150	6831.3 I	105	23133.66 I
300	228.56 V	250	1530.4 I	120	6990.690 I	150	23388.85 I
100	230.85 V	150	1531.3 I	100	6991.792 I	110	23628.17 I
40	243.82 V	200	1531.8 I	200	7010.809 I	265	24148.18 I
500	243.87 V	120	1547.1 I	150	7013.875 I	170	24159.23 I
400	246.42 V	120	1560.3 I	300	7062.065 I	185	24204.44 I
400	250.98 V	150	1575.3 I	200	7575.1 I	375	24385.99 I
500	252.85 V	150	1577.6 I	250	7583.4 I	160	24413.67 I
500	253.73 V	150	1577.9 I	150	7592.2 I	225	24471.17 I
50	255.38 V	150	1579.5 I	120	7606.8 I	255	25017.51 I
300	255.64 V	200	1580.0 I	300	8001.0 I	510	25127.43 I
200	257.16 V	150	1587.5 I	200	8036.4 I	Se III	
150	258.24 V	150	1593.2 I	120	8060.9 I	Refs. 9,247 - R.L.K.	
40	258.81 V	250	1606.5 I	120	8065.3 I	Vacuum	
50	260.05 V	100	1610.7 I	120	8081.1 I	220	709.2 III
400	281.00 V	100	1611.3 I	150	8093.2 I	220	709.4 III
900	283.91 V	200	1617.4 I	150	8094.7 I	220	720.6 III
800	284.45 V	150	1621.2 I	180	8149.3 I	360	724.3 III
600	288.29 V	100	1622.7 I	150	8152.0 I	285	726.4 III
900	289.59 V	120	1626.2 I	200	8157.7 I	220	737.2 III
1000 d	291.93 V	150	1643.4 I	180	8163.1 I	220	741.9 III
800	293.25 V	250	1671.2 I	150	8182.9 I	285	777.3 III
400	296.17 V	250	1675.3 I	100	8185.0 I	220	790.8 III
700	300.00 V	250	1690.7 I	120	8194.6 I	360	843.0 III
400	375.05 V	250	1793.3 I	150	8440.47 I	220	879.2 III
100	378.68 V	300	1795.3 I	150	8450.38 I	285	953.7 III
200	388.68 V	300	1855.2 I	150	8742.33 I	220	954.4 III
400	395.32 V	250	1858.8 I	300	8918.86 I	220	954.7 III
200	399.50 V	400	1898.6 I	100	8969.69 I	160	974.1 III
1000	573.36 V	350	1913.8 I	200	9001.97 I	360	974.8 III
600	587.94 V	300	1919.2 I	200	9038.61 I	285	1079.8 III
		500	1960.9 I	80	9083.14 I	360	1099.1 III
		150	1995.1 I	120	9088.79 I	450	1119.2 III
			Air	80	9140.83 I		Air
		500	2039.8 I	60	9181.88 I	285	2057.5 III
		500	2074.8 I	60	9271.12 I	285	2767.2 III
		500	2164.2 I	100	9432.50 I	220	2773.8 III
		150	2332.8 I	60	9825.58 I	285	3379.8 III
		600	2413.5 I	200	10217.25 I	450	3387.2 III
		300	2548.0 I	377	10307.45 I	450	3413.9 III
		220	3038.7 II	900	10327.26 I	285	3428.4 III
		220	3041.3 II	640	10386.36 I	450	3457.8 III
		285	4070.2 II	124	10650.30 I	360	3543.6 III
		360	4175.3 II	125	11934.56 I	285	3570.2 III
		450	4180.9 II	275	11946.87 I	450	3637.6 III
		120	4328.7 I	100	11947.92 I	360	3711.7 III
		100	4330.3 I	105	11952.27 I	450	3738.7 III
		285	4382.9 II	170	11952.64 I	285	3743.0 III
		285	4446.0 II	100	11966.04 I	450	3800.9 III
		220	4449.2 II	205	11972.93 I	360	4046.7 III
		285	4467.6 II	115	11973.07 I	220	4083.2 III
		500	4730.8 I	315	14817.93 I	450	4169.1 III
		400	4739.0 I	410	14917.47 I	220	4637.9 III
		300	4742.2 I	500	15151.44 I	285	6303.8 III
		285	4840.6 II	115	15469.06 I		Se IV
		360	4845.0 II	320	15471.00 I		Ref. 245 - R.L.K.
		450	5227.5 II	265	15520.97 I		Vacuum
		360	5305.4 II	395	15618.40 I	285	636.0 IV
		100	5365.5 I	115	15620.38 I	285	654.2 IV
		120	5369.9 I	360	16659.44 I	360	652.7 IV
		110	5374.1 I	505	16813.78 I	450	670.1 IV
		285	5522.4 II	165	16817.76 I	285	671.9 IV
		285	5566.9 II	205	16866.54 I	220	722.8 IV
		285	5866.3 II	115	16972.71 I	285	734.6 IV
		450	6056.0 II	235	21374.24 I	450	746.4 IV
		200	6325.6 I	680	21442.56 I	285	759.0 IV
		360	6444.2 II	415	21473.48 I	285	776.5 IV
		285	6490.5 II	270	21716.36 I		

Se IV			Si I and II			Si I and II			Si I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
285	803.8	IV	50	1226.81	II	50 h	1689.29	I	30	2065.52	I
360	959.6	IV	20	1226.89	II	30 h	1690.79	I	200	2072.02	II
450	996.7	IV	40	1226.99	II	50	1693.29	I	200	2072.70	II
22C	1307.2	IV	100	1227.60	II	50	1695.51	I	30 h	2103.21	I
285	1314.4	IV	10	1228.44	II	200	1696.20	I	30	2114.63	I
	Air		25	1228.62	II	200	1697.94	I	100	2124.12	I
220	2090.0	IV	150	1228.75	II	50	1700.42	I	10 h	2133.99	II
285	2136.6	IV	200	1229.39	II	30	1700.63	I	30 h	2136.40	II
160	2165.2	IV	10	1235.92	II	30	1702.86	I	50 h	2136.56	II
160	2166.6	IV	100	1246.74	II	50	1704.43	I	50 h	2147.91	I
360	2665.5	IV	150	1248.43	II	10 h	1710.83	II	110	2207.98	I
285	2724.3	IV	100	1250.09	II	20 h	1711.30	II	115	2210.89	I
160	2951.6	IV	150	1250.43	II	30 h	1743.88	I	110	2211.74	I
	Se V		200	1251.16	II	50	1747.40	I	120	2216.67	I
	Ref. 245 - R.L.K.		10	1255.28	I	30 h	1753.11	I	120	2218.06	I
	Vacuum		40	1256.49	I	50	1763.66	I	50	2218.91	I
285	596.0	V	50	1258.80	I	40	1765.03	I	35	2291.03	I
285	601.0	V	1000	1260.42	II	30 h	1765.60	I	55	2303.06	I
220	608.7	V	2000	1264.73	II	30	1766.06	I	30	2334.40	II
360	613.0	V	200	1265.02	II	30	1770.63	I	30	2334.61	II
285	614.3	V	100	1304.37	II	100 h	1770.92	I	10	2344.20	II
450	759.1	V	50 h	1305.59	II	100 h	1776.83	I	10 h	2349.54	II
285	785.8	V	200	1309.27	II	50 h	1783.23	I	20	2350.17	II
285	804.3	V	20 h	1309.46	II	100 h	1799.12	I	20 h	2353.09	II
360	808.7	V	100	1346.87	II	150	1808.00	II	100 h	2356.30	II
220	814.8	V	100	1348.54	II	50 h	1809.09	I	30 h	2357.18	II
220	820.7	V	150	1350.06	II	500 h	1814.07	I	50 h	2357.97	II
360	830.3	V	20	1350.52	II	200	1816.92	II	10 h	2360.20	II
450	839.5	V	20	1350.66	II	10	1817.45	II	30	2366.97	II
360	845.8	V	100	1352.64	II	50	1822.45	I	20	2374.26	II
360	1094.7	V	100	1353.72	II	200	1836.51	I	10 h	2428.45	II
220	1151.0	V	10 h	1409.07	II	30 h	1838.01	I	300	2435.15	I
450	1227.6	V	20 h	1410.22	II	100 h	1841.15	I	65	2438.77	I
	SILICON (Si)		10 h	1416.97	II	200	1841.44	I	65	2443.36	I
	Z = 14		15 h	1474.65	II	200	1843.77	I	70	2452.12	I
	Si I and II		15	1484.87	II	300	1845.51	I	425	2506.90	I
	Refs. 170,237,292 - L.J.R.		90 h	1485.02	II	100	1846.10	I	375	2514.32	I
	Vacuum		30	1485.22	II	400	1847.47	I	500	2516.113	I
10 h	805.10	II	100 h	1485.51	II	200	1848.14	I	350	2519.202	I
20 h	820.52	II	100 h	1509.10	II	100	1848.74	I	425	2524.108	I
20 h	843.72	II	50 h	1512.07	II	500	1850.67	I	450	2528.509	I
40 h	845.77	II	30 p	1513.57	II	30 h	1851.79	I	110	2532.381	I
10	850.14	II	60 p	1516.91	II	200	1852.46	I	30	2563.679	I
100	889.72	II	500	1526.72	II	50	1853.15	I	85	2568.641	I
200	892.00	II	1000	1533.45	II	20	1869.32	II	45	2577.151	I
10	899.41	II	10	1562.45	II	15	1870.23	II	190	2631.282	I
20	901.74	II	15	1562.85	II	100	1873.10	I	10 h	2682.21	II
10	913.01	II	10	1563.77	II	500 h	1874.84	I	1000	2881.579	I
20	913.85	II	50	1573.87	I	100	1875.81	I	10 h	2887.51	II
20	929.81	II	50	1574.82	I	200	1881.85	I	300	2904.28	II
100	989.87	II	50	1592.41	I	200	1887.70	I	500	2905.69	II
200	992.68	II	150	1594.55	I	200 h	1893.25	I	55	2970.355	I
25	1020.70	II	50	1594.93	I	1000 h	1901.33	I	150	2987.645	I
50	1023.69	II	30	1597.95	I	100 h	1902.46	II	50	3006.739	I
30	1057.05	II	100	1622.87	I	50 h	1904.66	I	100 h	3030.00	II
15	1057.50	II	30	1625.71	I	50 h	1910.62	II	75	3020.004	I
20 h	1127.44	II	300	1629.43	I	50	1941.67	II	20 h	3021.55	II
40 h	1127.91	II	200	1629.92	I	15	1944.59	II	20 h	3041.57	II
100	1190.42	II	75	1631.13	I	10	1949.33	II	30 h	3042.19	II
200	1193.28	II	50	1633.98	I	100	1949.56	II	100 h	3043.69	II
250	1194.50	II	30 h	1653.35	I	100	1954.97	I	10 h	3043.85	II
100	1197.39	II	30	1664.52	I	30	1984.43	I	10 h	3045.77	II
10 h	1216.12	II	50	1666.37	I	50	1991.85	I	50 h	3048.30	II
20	1223.91	II	100	1667.62	I		Air		150 h	3053.18	II
20	1224.25	II	100	1668.52	I	30	2010.97	I	150	3188.97	II
10	1224.97	II	100	1672.59	I	50	2054.83	I	50	3192.25	II
			200	1675.20	I	50	2058.65	II	150	3193.09	II
			30	1682.68	I	50	2059.01	II	50	3194.21	II
			30	1686.82	I	40	2061.19	I	50	3194.69	II

Si I and II			Si I and II			Si I and II			Si I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
100	3195.41	II	300 h	5688.81	II	100	7226.206	I	95	16060.03	I
200	3199.51	II	100	5690.425	I	100	7235.326	I	20	16094.80	I
20	3202.49	II	90	5701.105	I	60	7235.82	I	60	16163.71	I
100 h	3203.87	II	200 h	5701.37	II	180	7250.625	I	11	16215.68	I
200 h	3210.03	II	100 h	5706.37	II	160	7275.294	I	16	16381.55	I
75	3214.66	II	160	5708.397	I	40	7282.81	I	29	16680.77	I
15 h	3217.99	II	45	5747.667	I	400	7289.173	I	28	17327.29	I
10	3220.44	II	45	5753.625	I	55	7290.26	I	26	18722.90	I
20	3223.01	II	45	5754.220	I	35	7373.00	I	15	19385.94	I
300	3333.14	II	45	5762.977	I	375	7405.774	I	48	19432.97	I
500	3339.82	II	70	5772.145	I	200	7409.082	I	13	19493.38	I
100 h	3853.66	II	70	5780.384	I	40	7415.35	I	110	19722.50	I
500 h	3856.02	II	30 h	5785.73	II	275	7415.946	I	31	19928.88	I
200 h	3862.60	II	90	5793.071	I	425	7423.497	I	12	20917.13	I
300	3905.523	I	30 h	5794.90	II	85	7424.60	I	21	21354.24	I
10 h	3955.74	II	100	5797.859	I	100	7680.267	I	12	22062.71	I
10 h	3977.46	II	150 h	5800.47	II	40	7742.71	I			
15 h	3991.77	II	200	5806.74	II	30	7800.008	I			
10 h	3998.01	II	30	5827.80	II	400	7848.80	II			
20 h	4075.45	II	50	5846.13	II	500	7849.72	II			
15 h	4076.78	II	10	5867.48	II	30	7849.967	I	8	566.61	III
70	4102.936	I	300 h	5868.40	II	90	7918.386	I	6	652.22	III
300 h	4128.07	II	40	5873.764	I	120	7932.349	I	8	653.33	III
500 h	4130.89	II	150	5915.22	II	140	7944.001	I	5	673.48	III
10 h	4183.35	II	200	5948.545	I	35	7970.306	I	5	800.07	III
100 h	4190.72	II	500	5957.56	II	35	8035.619	I	9	823.41	III
50	4198.13	II	500	5978.93	II	70	8093.241	I	5	883.40	III
100	4621.42	II	10 h	6067.45	II	35	8230.642	I	7	939.09	III
150	4621.72	II	20 h	6080.06	II	40	8443.982	I	9	967.95	III
50	4782.991	I	10 h	6086.67	II	40	8501.547	I	10	993.52	III
35	4792.212	I	90	6125.021	I	60	8502.221	I	13	994.79	III
80	4792.324	I	85	6131.574	I	40	8536.165	I	16	997.39	III
15 h	4883.20	II	90	6131.850	I	120	8556.780	I	7	1005.37	III
20 h	4906.99	II	100	6142.487	I	50	8648.462	I	7	1031.16	III
20 h	4932.80	II	100	6145.015	I	40	8728.011	I	8	1033.92	III
30	4947.607	I	160	6155.134	I	75	8742.451	I	7	1037.05	III
40	5006.061	I	160	6237.320	I	100	8752.009	I	6	1083.22	III
1000	5041.03	II	40	6238.287	I	35	8790.389	I	14	1108.37	III
1000	5055.98	II	125	6243.813	I	100	9412.72	II	16	1109.97	III
100	5181.90	II	125	6244.468	I	100	9413.506	I	18	1113.23	III
100 h	5185.25	II	180	6254.188	I	30	10371.269	I	6	1140.55	III
200 h	5192.86	II	45	6331.954	I	120	10585.141	I	7	1141.58	III
500 h	5202.41	II	1000	6347.10	II	120	10603.431	I	6	1142.28	III
30 h	5295.19	II	1000	6371.36	II	120	10660.975	I	8	1144.31	III
100 h	5405.34	II	45	6526.609	I	30	10694.251	I	6	1144.96	III
15 h	5417.24	II	45	6527.199	I	30	10727.408	I	8	1145.11	III
15 h	5428.92	II	45	6555.462	I	60	10749.384	I	7	1145.18	III
15 h	5432.89	II	50 h	6660.52	II	30	10784.550	I	6	1155.00	III
100 h	5438.62	II	15	6665.00	II	80	10786.856	I	6	1155.96	III
20 h	5447.26	II	100	6671.88	II	140	10827.091	I	7	1158.10	III
15 h	5454.49	II	20	6699.38	II	60	10843.854	I	6	1160.26	III
100 h	5456.45	II	50 h	6717.04	II	30	10868.79	I	8	1161.58	III
500 h	5466.43	II	100	6721.853	I	130	10869.541	I	5	1174.37	III
500 h	5466.87	II	30	6741.64	I	30	10882.802	I	6	1174.43	III
100 h	5469.21	II	20 h	6750.28	II	30	10885.336	I	8	1178.00	III
40	5493.23	I	30	6818.45	II	80	10979.308	I	30	1206.51	III
200 h	5496.45	II	50	6829.82	II	30	10982.061	I	30	1206.53	III
35	5517.535	I	30	6848.568	I	80	11017.965	I	9	1207.52	III
100 h	5540.74	II	80	6976.523	I	13	11187.60	I	10	1210.46	III
150 h	5576.66	II	180	7003.567	I	12	11289.84	I	7	1235.43	III
30	5622.221	I	180	7005.883	I	12	11611.09	I	6	1280.35	III
100 h	5632.97	II	30	7017.28	I	370	11984.19	I	17	1294.54	III
200 h	5639.48	II	90	7017.646	I	220	11991.57	I	14	1296.73	III
90	5645.611	I	250	7034.903	I	440	12031.51	I	15	1298.89	III
150 h	5660.66	II	70	7164.69	I	150	12103.53	I	18	1298.96	III
80	5665.554	I	200	7165.545	I	120	12270.68	I	14	1301.15	III
1000 h	5669.56	II	70	7184.89	I	11	13176.90	I	16	1303.32	III
30 h	5681.44	II	65	7193.58	I	190	15888.39	I	13	1312.59	III
120	5684.484	I	30	7193.90	I	40	15960.04	I	8	1341.47	III

Ag I and II		Ag I and II		Ag I and II		Ag III	
Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength
50 r	1507.37 I	10 h	3547.16 I	25	8403.8 II	700	1656.18 III
100 r	1515.63 I	10 h	3557.01 I	15	8492.5 II	150	1657.10 III
50 r	1548.58 I	20 h	3586.67 I	30 h	8645.70 I	100	1661.54 III
100	1555.16 II	10 h	3623.49 I	10 h	8704.85 I	130	1670.75 III
100	1644.50 II	50 h	3624.68 I	12	8747.6 II	150	1676.14 III
60	1651.52 I	75	3682.46 II	15	9000.9 II	100	1681.07 III
50	1652.10 I	30	3682.50 I	10	12551.0 I	500	1693.51 III
120	1682.82 II	80	3683.34 II	60	16819.5 I	200	1705.06 III
10	1708.11 I	50 h	3709.20 I	20	17416.7 I	150	1708.86 III
50	1709.27 I	10 h	3727.42 I	15	18307.9 I	130	1717.68 III
125	1736.44 II	20 h	3753.14 I	15	18382.3 I	200	1722.27 III
10 h	1766.14 I	200	3810.94 I	Ag III			
75	1790.37 II	50	3811.78 I	Refs. 363,387,398 - R.D.C.			
20	1847.71 I	100 h	3840.74 I	Vacuum			
100	1967.38 II	15	3847.85 I	200	709.80 III	120	1749.64 III
	Air	50 h	3907.41 I	200	713.85 III	150	1750.89 III
150	2015.96 II	50	3909.31 II	100	717.73 III	750	1751.03 III
150	2033.98 II	50 h	3914.40 I	200	718.53 III	100	1760.57 III
200	2061.17 I	70	3920.10 II	300	726.96 III	150	1762.62 III
100	2069.85 I	10 h	3928.01 I	350	730.04 III	150	1768.70 III
80 r	2113.82 II	10 h	3940.43 I	150	730.28 III	100	1771.81 III
60	2145.60 II	10 h	3942.97 I	150	730.94 III	100	1783.85 III
15	2170.00 I	60	3949.43 II	200	736.57 III	100	1791.70 III
50	2186.76 II	100 h	3981.58 I	100	738.13 III	100	1792.69 III
60	2229.53 II	70	3985.19 II	200	740.98 III	150	1793.90 III
100 r	2246.43 II	10 h	3992.15 I	200	742.29 III	150	1802.24 III
75 r	2248.74 II	100 h	4055.48 I	200	748.30 III	150	1802.26 III
75	2280.03 II	10 h	4083.43 I	200	748.30 III	100	1802.77 III
30 h	2309.56 I	80	4085.91 II	150	755.73 III	300	1808.23 III
10 h	2312.60 I	100	4185.48 II	100	758.27 III	250	1816.83 III
70 r	2317.05 II	90 h	4210.96 I	200	767.19 III	150	1822.45 III
80 r	2320.29 II	100	4212.82 I	250	768.33 III	350	1828.83 III
70 r	2324.68 II	50	4311.07 I	150	769.61 III	250	1832.33 III
80 r	2331.40 II	20	4396.23 I	350	776.38 III	120	1832.50 III
70	2357.92 II	50 h	4476.04 I	200	782.91 III	100	1834.31 III
50 h	2375.02 I	20 h	4556.0 I	150	785.76 III	250	1836.10 III
75	2411.41 II	30 h	4615.69 I	200	789.08 III	150	1838.64 III
90 r	2413.23 II	80	4620.04 II	250	792.35 III	400	1840.14 III
100 r	2437.81 II	50	4620.46 II	200	796.54 III	100	1846.96 III
80	2447.93 II	60 h	4668.48 I	250	797.91 III	120	1849.93 III
80	2473.84 II	30 h	4677.60 I	400	799.41 III	150	1856.33 III
60	2506.63 II	100	4788.40 II	300	808.88 III	120	1858.91 III
50 h	2575.63 I	20 h	4796.2 I	150	816.12 III	100	1860.39 III
60	2660.49 II	30 h	4847.82 I	180	822.39 III	100	1860.64 III
60	2721.77 I	100	4874.10 I	200	838.11 III	350	1867.12 III
75	2767.54 II	20	4888.21 I	120	1373.22 III	150	1868.10 III
100 h	2824.39 I	10 h	4917.5 I	120	1374.76 III	100	1872.55 III
10 h	2926.77 I	10	4935.75 I	110	1404.93 III	400	1873.45 III
20 h	2938.42 I	20 h	4992.89 I	120	1413.90 III	250	1880.36 III
20	3099.10 I	80	5027.35 II	120	1414.29 III	300	1889.57 III
30 h	3130.02 I	15 h	5123.50 I	120	1428.61 III	400	1916.92 III
10 h	3170.58 I	1000	5209.08 I	120	1452.74 III	600	1917.08 III
90	3180.70 II	10 h	5333.62 I	200	1456.41 III	200	1925.30 III
15 h	3215.67 I	1000	5465.50 I	100	1471.44 III	150	1946.32 III
10	3225.15 I	100	5471.55 I	300	1489.01 III	100	1948.44 III
15	3233.18 I	20	5475.38 I	150	1515.08 III	700	1957.62 III
100	3267.35 II	20 h	5545.67 I	100	1524.23 III	120	1959.27 III
55000 r	3280.68 I	10 h	5559.58 I	120	1527.04 III	100	1960.86 III
10 h	3305.67 I	100	5667.34 I	150	1541.14 III	400	1966.89 III
28000 r	3382.89 I	10 h	6083.78 I	150	1550.89 III	600	1975.92 III
10 h	3403.78 I	10 h	6268.50 I	130	1553.04 III	500	1977.03 III
30	3469.16 I	20	6621.08 I	130	1587.41 III	150	1981.87 III
70	3475.82 II	20	7359.96 I	120	1589.28 III	200	1987.02 III
80	3495.28 II	320	7687.78 I	100	1613.79 III	130	1995.16 III
20 h	3501.92 I	25	8005.4 II	130	1619.14 III	Air	
20	3508.03 I	15	8254.7 II	100	1634.46 III	600	1999.59 III
15 h	3513.38 I	500	8273.52 I	100	1652.24 III	300	2007.30 III
10	3521.12 I	20	8324.4 II	130	1653.60 III	200	2011.49 III
50	3542.61 I	15	8379.5 II	300	1654.43 III	150	2013.65 III

Ag III			Na I and II			Na I and II			Na I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
150	2041.33	III	45	1885.74	II	1000	2977.13	II	2	4238.99	I
150	2053.17	III		Air		1100	2979.66	II	200	4240.37	II
150	2053.83	III	80	2228.53	II	1100	2980.63	II	250	4240.90	II
200	2056.99	III	80	2303.58	II	1300	2984.19	II	3	4242.08	I
200	2081.04	III	300	2315.65	II	550	3004.15	II	4	4273.64	I
300	2146.47	III	130	2393.28	II	750	3007.44	II	5	4276.79	I
150	2149.19	III	100	2401.01	II	750	3009.14	II	2	4287.84	I
600	2161.89	III	300	2420.99	II	450	3009.48	II	3	4291.01	I
150	2166.21	III	300	2424.73	II	600	3015.40	II	250	4292.48	II
150	2211.23	III	200	2439.14	II	450	3017.34	II	250	4292.86	II
100	2238.40	III	250	2441.50	II	400	3029.07	II	250	4308.81	II
500	2246.51	III	200	2448.72	II	400	3037.08	II	250	4309.04	II
100	2286.50	III	200	2452.18	II	400	3045.60	II	250	4320.91	II
700	2310.04	III	1000	2493.15	II	550	3053.67	II	6	4321.40	I
100	2386.85	III	300	2502.84	II	550	3055.35	II	7	4324.62	I
300	2395.69	III	450	2506.30	II	550	3056.16	II	250	4337.29	II
100	2469.62	III	600	2515.46	II	550	3057.38	II	4	4341.49	I
100	2562.87	III	600	2531.54	II	550	3057.95	II	250	4344.11	II
			550	2586.31	II	550	3058.72	II	5	4344.74	I
			600	2594.96	II	700	3060.25	II	200	4368.60	II
			850	2611.81	II	800	3061.35	II	200	4375.22	II
			300	2627.41	II	500	3064.38	II	200	4387.49	II
			300	2631.81	II	500	3066.22	II	8	4390.03	I
			160	2648.53	II	500	3066.54	II	250	4392.81	II
			200	2651.31	II	550	3074.33	II	9	4393.34	I
			200	2659.81	II	550	3078.32	II	200	4405.12	II
			850	2661.00	II	550	3080.25	II	6	4419.89	I
			200	2663.46	II	550	3087.06	II	7	4423.25	I
			350	2666.46	II	450	3088.26	II	200	4446.70	II
			1000	2671.83	II	550	3092.04	II	200	4447.41	II
			200	2674.04	II	550	3092.73	II	200	4454.74	II
			850	2678.09	II	650	3094.45	II	200	4455.23	II
			650	2808.71	II	650	3095.55	II	200	4457.21	II
			850	2809.52	II	500	3103.58	II	200	4474.63	II
			350	2818.29	II	500	3104.40	II	200	4478.80	II
			600	2829.87	II	450	3111.45	II	200	4481.67	II
			800	2839.56	II	500	3113.69	II	200	4490.15	II
			1000	2841.72	II	400	3122.94	II	200	4490.87	II
			16	2852.81	I	1700	3124.42	II	10	4494.18	I
			15	2853.01	I	600	3125.21	II	11	4497.66	I
			650	2856.51	II	600	3129.38	II	200	4499.62	II
			800	2859.49	II	2500	3135.48	II	200	4506.97	II
			350	2861.02	II	1700	3137.86	II	200	4519.21	II
			750	2871.28	II	950	3145.71	II	200	4524.98	II
			650	2872.95	II	2000	3149.28	II	200	4533.32	II
			900	2881.15	II	2000	3163.74	II	7	4541.63	I
			850	2886.26	II	700	3175.09	II	8	4545.19	I
			700	2893.95	II	1000	3179.06	II	200	4551.53	II
			900	2901.14	II	1700	3189.79	II	160	4590.92	II
			800	2904.72	II	1600	3212.19	II	160	4722.23	II
			1100	2904.92	II	700	3234.93	II	160	4731.10	II
			1100	2917.52	II	1500	3257.96	II	100	4732.50	II
			1100	2919.05	II	650	3260.21	II	160	4741.67	II
			1200	2919.85	II	950	3274.22	II	160	4768.79	II
			1300	2920.95	II	1700	3285.60	II	100	4788.79	II
			1000	2923.49	II	1700	3301.35	II	50	4814.75	II
			750	2930.88	II	19	3302.37	I	50	4835.26	II
			850	2934.08	II	18	3302.98	I	60	5143.11	II
			950	2937.74	II	1500	3304.96	II	100	5191.65	II
			450	2942.66	II	1000	3318.04	II	50	5203.33	II
			800	2945.70	II	950	3327.69	II	80	5208.55	II
			950	2947.50	II	6	3426.86	I	60	5390.63	II
			1200	2951.24	II	1500	3533.05	II	70	5400.46	II
			1100	2952.40	II	1200	3631.27	II	90	5414.55	II
			850	2960.12	II	850	3711.07	II	5	5682.633	I
			450	2965.74	II	200	4081.37	II	9	5688.204	I
			500	2970.73	II	300	4113.70	II	32	5889.950	I
			600	2974.24	II	250	4123.08	II	16	5895.924	I
			750	2974.99	II	250	4233.26	II	60	6175.25	II

SODIUM (Na)		
Z = 11		
Na I and II		
Refs.	268,334 - T.K.M.	
Vacuum		
160	300.15	II
160	300.20	II
90	301.32	II
100	301.44	II
60	302.45	II
300	372.08	II
350	376.38	II
60	1293.97	II
50	1327.74	II
45	1347.54	II
90	1374.69	II
90	1404.68	II
45	1495.21	II
40	1496.01	II
45	1497.73	II
80	1506.41	II
60	1506.91	II
70	1513.10	II
60	1519.63	II
60	1657.92	II
90	1776.57	II
40	1778.24	II
60	1783.04	II
80	1787.19	II
45	1788.85	II
80	1798.41	II
45	1801.26	II
90	1807.09	II
60	1808.38	II
50	1821.70	II
45	1833.87	II
80	1835.22	II
45	1837.89	II
60	1841.82	II
70	1845.02	II
45	1850.15	II
70	1851.19	II
80	1853.17	II
45	1866.45	II
45	1873.37	II
60	1875.08	II
160	1881.91	II
50	1885.09	II

Na V			Sr I and II			Sr I and II			Sr III		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
600	445.19	V		5650.54	II	4	17626.00	II	35	2622.69	III
600	459.90	V		5723.70	II	30	17743.00	I	30	2642.96	III
850	461.05	V		5819.00	II	15	19759.60	I	30	2648.51	III
1000	463.26	V	200 h	5970.10	I	230	20261.40	I	35	2654.66	III
STRONTIUM (Sr)			250 h	6345.75	I	120	20700.70	I	40	2722.47	III
Z = 38			250 h	6363.94	I	40	20764.50	I	50	2786.00	III
Sr I and II			350 h	6369.96	I	15	20778.70	I	50	2821.42	III
Refs. 1,218,279,313 - J.J.W.			1000	6380.75	I	30	26023.60	I	30	2874.86	III
Air			900 h	6386.50	I	Sr III			30	2929.34	III
1400	2152.84	II	600 h	6388.24	I	Refs. 231,265 - J.J.W.			30	2983.00	III
1400	2165.96	II	9000	6408.47	I	Vacuum			100	3002.61	III
160	2428.10	I	250	6446.68	I	25	307.18	III	200	3012.32	III
120	2569.47	I	250 h	6465.79	I	50	316.11	III	100	3021.73	III
200	2931.83	I		6483.17	II	50	321.61	III	30	3059.83	III
300	3301.73	I	5500	6504.00	I	125	330.67	III	50	3061.43	III
300	3329.99	I	1000	6509.20	II	500	351.62	III	30	3104.25	III
400	3351.25	I	1700	6546.79	I	75	358.80	III	50	3182.61	III
300	3366.33	I	3000	6550.26	I	250	363.49	III	100	3235.39	III
650	3380.71	II	800	6617.26	I	150	371.21	III	30	3302.72	III
950	3464.46	II	1800	6643.54	I	1000	437.24	III	50	3430.76	III
120	3474.89	II	4800	6791.05	I	1875	491.79	III	30	3874.26	III
300 h	3940.80	I	1200	6878.38	I	1250	507.04	III	30	3936.40	III
600	3969.26	I	5500	6892.59	I	3750	514.38	III	30	3936.72	III
300	3970.04	I	60	7070.10	I	2500	562.75	III	30	3958.75	III
1300	4030.38	I	250 h	7153.09	I	20	968.37	III	30	4094.03	III
300	4032.38	I	200	7167.24	I	20	975.78	III	30	4097.02	III
46000	4077.71	II	200	7232.27	I	25	992.98	III	30	4105.63	III
200	4161.80	II	2500	7309.41	I	50	1025.23	III	35	4335.80	III
32000	4215.52	II	500	7621.50	I	35	1044.91	III	30	5071.09	III
340	4305.45	II	400 h	7673.06	I	20	1057.74	III	30	5130.34	III
350 h	4438.04	I	50 h	7850.00	I	25	1060.20	III	35	5158.26	III
	4526.10	II	30 h	7866.90	I	20	1098.77	III	40	5257.71	III
	4585.91	II	20 h	7874.00	I	35	1125.49	III	30	5262.21	III
65000	4607.33	I	200 h	8422.80	I	20	1140.24	III	30	5288.32	III
3200	4722.28	I	120	8505.69	II	20	1168.27	III	30	5391.03	III
2200	4741.92	I	200	8688.91	II	20	1182.09	III	40	5443.48	III
1400	4784.32	I	30	8719.56	II	50	1236.23	III	30	5463.90	III
4800	4811.88	I	40	9170.00	I	20	1940.58	III	30	5664.66	III
3600	4832.08	I	30	9204.50	I	30 p	1958.44	III	30	5689.72	III
500	4855.04	I	20	9283.90	I	30	1966.92	III	Sr IV		
600	4868.70	I	100	9294.10	I	Air			Ref. 110 - J.J.W.		
3000	4872.49	I	15	9306.60	I	25	2068.63	III	Vacuum		
600	4876.06	I	30	9319.20	I	50	2099.59	III	12	284.31	IV
2000	4876.32	I	60	9380.45	I	25	2114.31	III	12	291.09	IV
1000	4891.98	I	40 h	9411.25	I	30	2118.48	III	12	291.19	IV
8000	4962.26	I	400 h	9448.95	I	50	2119.52	III	12	293.22	IV
1300	4967.94	I	600	9596.00	I	50	2133.12	III	15	298.12	IV
800 h	5156.07	I	300	9624.70	I	30	2142.80	III	15	300.12	IV
1400	5222.20	I	100	9638.10	I	20	2145.74	III	12	300.27	IV
2000	5225.11	I	100 h	9647.70	II	30	2178.91	III	12	301.67	IV
2000	5229.27	I	300	10036.66	II	30	2180.14	III	20	378.53	IV
2800	5238.55	I	1000	10327.31	II	50	2190.88	III	75	392.44	IV
4800	5256.90	I	7	10872.70	II	50	2203.86	III	50	393.00	IV
	5303.13	II	200	10914.88	II	50	2219.50	III	45	394.90	IV
350 h	5329.82	I	10	10984.00	I	50	2220.05	III	50	396.22	IV
	5379.13	II	13	11224.57	II	50	2267.03	III	40	399.92	IV
	5385.45	II	700	11241.25	I	100	2273.71	III	35	403.85	IV
1500	5450.84	I	100	12014.76	II	50	2277.87	III	35	406.94	IV
7000	5480.84	I	20	12236.20	I	30	2310.33	III	30	412.93	IV
1100	5486.12	I	60	12445.90	II	50	2314.95	III	40	413.07	IV
3500	5504.17	I	20	12479.60	I	50	2334.79	III	40	415.32	IV
2600	5521.83	I	40	12495.00	I	100	2340.13	III	30	419.78	IV
2000	5534.81	I	15	12652.20	I	50	2404.17	III	25	430.21	IV
2000	5540.05	I	75	12974.70	II	30	2410.52	III	30	430.65	IV
250 h	5543.36	I	100	13123.80	II	50	2454.03	III	25	442.73	IV
	5622.94	II	15	13522.80	I	100	2486.52	III	25	471.76	IV
			15	17140.90	I	50	2503.59	III	25	484.20	IV
			30	17170.50	I	30	2599.10	III	25 p	508.14	IV
			50	17447.40	I						

Intensity	Sr IV Wavelength	
25	534.19	IV
200	664.43	IV
100	710.35	IV
20	1189.21	IV
30	1244.14	IV
20 p	1244.75	IV
20 p	1244.87	IV
20 p	1257.78	IV
20	1268.62	IV
20	1331.13	IV
30	1347.90	IV
20	1361.15	IV
25	1408.67	IV
20	1592.74	IV
25	1677.03	IV
20	1705.16	IV
20	1724.23	IV
25	1729.53	IV
20	1732.12	IV
20	1777.25	IV
20	1994.61	IV
	Air	
20	2104.38	IV
20	2117.90	IV
20	2217.99	IV
20	2230.41	IV
20	2240.49	IV
20	2253.38	IV
50	2346.97	IV
20	2357.34	IV
20	2438.93	IV
25	2441.41	IV
30	2482.79	IV
25	2483.57	IV
18	2500.57	IV
20	2508.02	IV
20	2534.03	IV
18	2548.02	IV
40	2555.60	IV
40	2571.04	IV
25	2571.58	IV
15	2589.34	IV
25	2620.35	IV
20	2621.16	IV
20	2642.16	IV
15	2830.53	IV
9	2934.60	IV
10	3019.29	IV
9	3266.52	IV
9	3566.43	IV
9	3741.05	IV
9	4298.57	IV
9	4685.08	IV
	Sr V	
	Ref. 109 - J.J.W	
	Vacuum	
10	517.28	V
6	540.51	V
25	578.01	V
30	624.93	V
25	642.23	V
50	649.21	V
20	659.15	V
25	660.94	V
9	669.93	V
35	686.23	V
6	715.79	V
12	747.82	V

Intensity	Sr V Wavelength	
9	862.32	V
	SULFUR (S)	
	Z = 16	
	S I and II	
	Refs. 144,209,210 - R.L.K.	
	Vacuum	
40	906.9	II
40	910.5	II
40	912.7	II
40	937.4	II
40	937.7	II
20	996.0	II
20	1000.5	II
20	1014.4	II
20	1019.5	II
20	1096.6	II
40	1102.3	II
20	1131.0	II
20	1131.6	II
40	1234.1	II
40	1250.5	II
110	1253.8	II
110	1259.5	II
275	1270.782	I
250	1277.216	I
280	1295.653	I
275	1302.337	I
235	1302.863	I
235	1303.110	I
245	1303.430	I
260	1305.883	I
265	1310.194	I
355	1316.542	I
290	1316.618	I
375	1323.515	I
355	1326.643	I
775	1381.552	I
710	1385.510	I
960	1388.435	I
640	1389.154	I
775	1392.588	I
1000	1396.112	I
300	1409.337	I
510	1425.030	I
425	1433.280	I
300	1436.968	I
300	1448.229	I
425	1472.972	I
550	1473.995	I
300	1474.380	I
355	1481.665	I
485	1483.039	I
300	1483.233	I
330	1485.622	I
390	1487.150	I
680	1666.688	I
640	1687.530	I
710	1807.311	I
680	1820.343	I
640	1826.245	I
710	1900.286	I
550	1914.698	I
	Air	
20	2629.1	II
40	2670.0	II
40	2847.7	II

Intensity	S I and II Wavelength	
285	3867.6	I
285	3902.0	I
360	3933.3	II
450	4120.8	I
280	4142.3	II
360	4145.1	II
450	4153.1	II
450	4162.7	II
450	4694.1	I
285	4695.4	I
160	4696.2	I
280	4716.2	II
450	4815.5	II
360	4924.1	II
450	4925.3	II
285	4993.5	I
360	5428.6	II
650	5432.8	II
1000	5453.8	II
1000	5473.6	II
1000	5509.7	II
280	5564.9	II
1000	5606.1	II
450	5640.0	II
450	5640.3	II
280	5647.0	II
650	5659.9	II
450	5664.7	II
160	5706.1	I
450	5819.2	II
450	6052.7	I
280	6286.4	II
450	6287.1	II
450	6305.5	II
450	6312.7	II
280	6384.9	II
280	6397.3	II
280	6398.0	II
360	6413.7	II
160	6743.6	I
285	6748.8	I
450	6757.2	I
450	7579.0	I
450	7629.8	I
285	7686.1	I
450	7696.7	I
1000	7924.0	I
160	7928.8	I
285	7930.3	I
450	7931.7	I
450	7967.4	I
450	7967.4	II
450	8314.7	I
450	8314.7	II
450	8585.6	I
285	8680.5	I
450	8694.7	I
360	8874.5	I
110	8882.5	I
220	8884.2	I
160	9035.9	I
450	9212.9	I
450	9228.1	I
450	9237.5	I
285	9413.5	I
285	9421.9	I
285	9437.1	I
650	9649.9	I
450	9672.3	I

Intensity	S I and II Wavelength	
450	9680.8	I
450	9693.7	I
285	9697.3	I
285	9739.7	I
110	9741.9	I
285	9932.3	I
285	9949.8	I
285	9958.9	I
285	10455.5	I
70	10456.8	I
285	10459.5	I
	S III	
	Refs. 209,210 - R.L.K.	
	Vacuum	
70	729.5	III
110	732.42	III
70	735.2	III
70	738.5	III
70	789.0	III
70	796.7	III
70	824.9	III
70	836.3	III
285	1077.1	III
70	1194.0	III
70	1201.0	III
	Air	
110	2460.5	III
110	2489.6	III
160	2496.2	III
160	2499.1	III
220	2508.2	III
70	2636.9	III
220	2665.4	III
70	2680.5	III
110	2691.8	III
110	2702.8	III
220	2718.9	III
110	2721.4	III
220	2726.8	III
220	2731.1	III
110	2741.0	III
285	2756.9	III
110	2775.2	III
160	2785.5	III
70	2797.4	III
70	2856.0	III
110	2863.5	III
160	2904.3	III
70	2964.8	III
160	2986.0	III
70	3234.2	III
70	3324.9	III
110	3497.3	III
160	3632.0	III
70	3662.0	III
110	3709.4	III
160	3717.8	III
160	3838.3	III
160	3928.6	III
360	4253.6	III
110	4285.0	III
70	4332.7	III
	S IV	
	Refs. 29,202,209 - R.L.K.	
	Vacuum	
20	519.3	IV
20	520.1	IV
40	520.8	IV

S IV			TANTALUM (Ta)			Ta I and II			Ta I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
20	522.0	IV	Z = 73			250	2357.30	I	500	2484.95	I
20	522.5	IV	Ta I and II			170	2359.16	II	120	2486.70	I
20	551.2	IV	Ref. 1 - C.H.C.			260	2361.09	I	600	2488.70	II
40	652.5	IV	Intensity	Wavelength		160	2362.78	II	500	2490.46	I
40	653.0	IV	Air			130	2363.32	II	600	2504.45	I
70	653.6	IV	1100	2140.13	II	600	2364.24	II	600	2507.45	I
40	654.0	IV	1500	2146.87	II	50	2367.24	II	240	2512.65	I
70	655.6	IV	740	2150.62	II	150	2369.32	II	1200 d	2526.35	I
20	655.9	IV	600	2165.01	II	300	2370.76	II	600	2532.12	II
110	657.3	IV	740	2178.03	II	320	2371.58	I	240	2545.49	II
40	660.9	IV	1200	2182.71	II	100	2373.94	II	240	2546.80	I
160	661.4	IV	540	2193.20	II	70	2375.91	I	460 d	2551.07	I
40	663.7	IV	1100	2193.88	II	150	2378.31	II	460	2554.62	II
40	664.8	IV	1500	2196.03	II	440	2381.13	II	240	2555.05	I
70	666.1	IV	1500	2199.67	II	240	2381.52	II	1200	2559.43	I
110	744.9	IV	500	2207.14	II	170	2383.72	II	460	2562.10	I
110	748.4	IV	1400 d	2210.03	II	240	2384.28	II	340	2571.51	II
110	750.2	IV	420	2210.19	II	130	2385.73	I	430	2573.54	I
110	753.8	IV	1400	2215.60	II	1400	2387.06	II	390	2573.79	I
40	798.3	IV	240	2224.48	II	80	2388.37	II	600	2577.37	II
70	800.5	IV	480	2249.79	II	160	2389.11	II	340	2577.78	I
70	804.0	IV	1200	2250.76	II	70	2396.30	I	210	2580.16	I
70	809.7	IV	260	2254.86	II	110	2399.15	I	340	2584.03	II
110	816.0	IV	440	2255.77	II	50	2399.92	II	430	2593.08	I
160	1062.7	IV	360	2256.51	II	2400	2400.63	II	410	2593.66	II
160	1073.0	IV	500	2258.71	II	140	2402.13	II	310	2594.25	II
70	1073.5	IV	840	2261.42	II	100	2403.68	II	560	2595.26	I
20	1108.4	IV	260	2261.62	II	130	2406.55	I	310 I	2596.45	II
20	1110.9	IV	990	2262.30	II	130	2408.26	II	220	2600.14	I
20	1624.0	IV	220	2269.56	II	120	2414.32	I	600	2603.49	II
20	1629.2	IV	740	2271.85	II	240	2415.21	II	1400	2608.63	I
	Air		990	2272.59	II	320	2416.89	II	210	2609.00	I
20	2387.0	IV	200	2279.85	I	220	2417.86	II	310 d	2611.34	I
40	2398.9	IV	320	2282.19	II	150	2418.77	II	340	2615.46	I
110	3097.5	IV	130	2285.02	II	140	2421.03	I	310	2615.66	I
40	3117.7	IV	790	2285.25	II	150	2421.85	II	1200	2635.58	II
	S V		600	2286.59	II	170	2423.48	II	470	2636.67	I
	Ref. 29 - R.L.K.		240	2287.27	II	130	2425.91	II	860	2636.90	I
	Vacuum		990	2289.16	II	360	2427.64	I	510	2646.22	I
5	437.4	V	180	2292.54	II	360	2429.71	II	600	2646.37	I
5	438.2	V	160	2295.18	II	170	2431.06	II	2400	2647.47	I
5	439.6	V	160	2301.47	II	480	2432.70	II	270	2651.22	II
40	658.3	V	440	2302.24	II	130	2433.59	II	2600	2653.27	I
70	659.8	V	440	2302.93	II	130	2436.51	II	1900	2656.61	I
110	663.2	V	300	2303.49	II	110	2437.07	I	1500	2661.34	I
5	676.2	V	100	2308.46	II	110	2438.64	II	220	2665.60	II
5	677.3	V	440	2312.60	II	200	2439.91	I	220	2668.07	I
20	678.1	V	420	2315.46	II	130	2442.39	I	600	2668.62	I
40	680.3	V	260	2319.16	II	100	2444.13	II	770	2675.90	II
110	680.9	V	100	2331.29	II	100	2447.17	I	270	2680.06	II
40	681.6	V	690	2331.98	II	100	2454.48	I	220	2680.66	II
5	686.2	V	550	2332.19	II	100	2458.68	I	600	2684.28	I
5	686.9	V	110	2334.13	II	100	2460.55	I	1500	2685.17	II
5	689.8	V	180	2334.88	II	160	2463.82	II	340	2691.31	I
5	691.7	V	140	2335.75	II	130	2466.99	II	260	2692.40	I
20	693.5	V	300	2338.28	II	130	2467.37	II	470	2694.52	II
285	786.5	V	200	2340.94	II	380	2470.90	II	240	2696.81	I
160	849.2	V	200	2341.61	II	120	2471.38	I	1000	2698.30	I
110	852.2	V	130	2343.64	II	120	2472.13	I	470	2706.69	I
220	854.8	V	100	2346.42	II	150	2473.13	I	310	2709.27	II
110	857.9	V	90	2351.99	II	120	2473.31	II	1200	2710.13	I
110	860.5	V	170	2353.86	II	600	2474.62	I	2600	2714.67	I
20	883.6	V	120	2355.22	II	120	2475.33	I	240	2717.18	I
20	884.5	V	170	2356.05	II	200	2476.67	II	470	2720.76	I
5	885.8	V	140	2356.90	II	150	2478.22	I	470	2727.44	II
20	900.9	V			120	2481.86	II	410	2727.78	I	
5	902.8	V			100	2482.10	I	310	2736.25	II	
20	905.9	V			100	2482.58	II	210	2739.26	II	
					100	2484.04	II	210	2743.59	I	

Ta I and II			Ta I and II			Ta I and II			Ta I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
510	2746.68	I	210	3274.95	II	450	4681.88	I	23	5931.05	I
1200	2748.78	I	1100	3311.16	I	130	4691.90	I	20	5931.68	I
860	2749.83	I	210	3317.93	I	150	4740.16	I	18	5935.54	I
410	2752.49	II	680	3318.84	I	220	4756.51	I	130	5939.76	I
1000	2758.31	I	330 d	3330.99	II	120	4768.98	I	240	5944.02	I
430	2761.68	II	230	3358.47	I	220	4812.75	I	25	5951.78	I
770	2775.88	I	640	3371.54	I	110	4920.11	I	18	5960.13	I
390	2787.69	I	360	3385.05	I	100	4921.27	I	190 c	5997.23	I
680	2796.34	I	230	3398.33	I	110	4926.00	I	25 h	6009.89	I
680	2797.76	II	450	3406.94	I	150	4936.42	I	25	6015.90	I
380	2802.07	I	230	3463.77	I	200	5037.37	I	100	6020.72	I
430	2806.30	I	490	3480.52	I	100	5067.87	I	250	6045.39	I
510	2806.58	I	380	3497.85	I	110	5115.84	I	100	6047.25	I
260	2817.10	II	240	3503.87	I	100	5141.62	I	25	6053.70	I
260	2842.82	I	490	3511.04	I	100	5143.69	I	30	6090.82	I
640	2844.25	I	200	3513.61	I	330	5156.56	I	18	6092.06	I
290	2844.46	II	750	3607.41	I	110	5212.74	I	100	6101.58	I
290 c	2845.35	I	980	3626.62	I	110 d	5218.45	I	25	6140.07	I
560	2848.52	I	500	3642.06	I		5218.66	I	65	6144.56	I
1500	2850.49	I	100	3686.18	I	140	5341.05	I	30	6152.54	I
1900	2850.98	I	100	3689.73	I	200	5402.51	I	130	6154.50	I
220	2858.44	II	130	3731.02	I	130	5419.19	I	40	6158.84	I
360	2861.98	I	140	3736.76	I	18	5500.68	I	15	6170.46	I
310	2868.65	I	130	3746.36	I	20	5505.66	I	15	6189.66	I
470	2871.42	I	110	3754.52	I	15 c	5516.27	I	15	6193.11	I
270	2873.36	I	110	3777.10	I	90	5518.91	I	25	6208.37	I
260	2873.56	I	110	3792.02	I	9	5521.15	I	40	6249.79	I
210	2874.17	I	210	3833.74	II	10	5523.98	I	150	6256.68	I
380	2880.02	I	100	3848.05	I	13	5528.36	I	150	6268.70	I
770	2891.84	I	100	3885.20	I	10 l	5545.20	I	50	6278.34	I
260	2899.04	I	210	3918.51	I	20	5548.32	I	65	6281.33	I
560	2902.05	I	140	3922.78	I	30	5584.02	I	15	6287.36	I
210	2914.12	I	140	3922.92	I	15	5598.75	I	40	6287.91	I
310	2915.49	I	210	3970.10	I	30	5599.52	I	40	6289.34	I
410	2925.19	I	210	3996.17	I	9 c	5605.50	I	50	6309.06	I
310	2932.70	I	100	3999.28	I	9 c	5617.71	I	150	6309.58	I
1700	2933.55	I	190	4006.84	I	40	5620.68	I	25 c	6312.22	I
470	2940.06	I	190	4026.94	I	13	5628.20	I	75	6325.08	I
1200	2940.22	I	140	4029.94	I	20	5635.71	I	50	6332.91	I
240	2942.14	I	120	4040.87	I	40	5640.18	I	65	6341.17	I
510	2951.92	I	410	4061.40	I	150	5645.91	I	30	6346.02	I
340	2953.56	I	210	4064.63	I	130	5664.90	I	75	6356.16	I
1500	2963.32	I	100	4067.24	I	30	5688.25	I	65	6360.84	I
770	2965.13	II	310	4067.91	I	40	5699.24	I	40	6373.06	I
770	2965.54	I	120	4105.02	I	15	5704.31	I	15	6379.07	I
340	2969.47	I	210	4129.38	I	25	5706.28	I	90	6389.45	I
430	2975.56	I	230	4136.20	I	30	5715.24	I	23 h	6392.21	I
210	3011.88	I	230	4147.89	I	8	5716.53	I	65	6428.60	I
1800	3012.54	II	210	4175.21	I	23	5746.71	I	250	6430.79	I
290 d	3027.48	I	100	4177.92	I	30	5755.81	I	13	6437.36	I
290	3042.06	II	130	4181.15	I	15 h	5761.61	I	40	6444.61	I
530	3049.56	I	300	4205.88	I	25	5766.56	I	30	6445.87	I
530	3069.24	I	120	4206.40	I	30 c	5767.91	I	200	6450.36	I
360	3077.24	I	130	4245.35	I	10	5771.93	I	20	6455.83	I
560	3103.25	I	130	4268.26	I	130	5776.77	I	30	6459.92	I
380	3124.97	I	160 c	4302.98	I	25	5780.02	I	380	6485.37	I
380	3130.58	I	110	4355.14	I	90	5780.71	I	18 h	6502.43	I
270	3132.64	I	100	4378.82	I	130	5811.10	I	65	6505.52	I
320	3170.29	I	150	4386.07	I	25	5816.51	I	100	6514.39	I
270	3173.59	I	110	4398.45	I	45 c	5843.94	I	100	6516.10	I
200	3176.29	I	180	4402.50	I	13	5849.68	I	25 h	6561.60	I
600	3180.95	I	130	4415.74	I	15	5866.61	I	25cw	6564.26	I
240	3184.55	I	360 c	4510.98	I	240	5877.36	I	100	6574.84	I
200	3198.67	I	190	4530.85	I	130	5882.30	I	10	6585.13	I
200	3213.91	II	130	4551.95	I	90	5901.91	I	15 c	6587.16	I
300	3223.83	I	170	4565.85	I	30	5916.51	I	110	6611.95	I
230	3229.24	I	340	4574.31	I	90	5918.95	I	75	6621.30	I
200	3242.05	I	260	4619.51	I	15	5925.90	I	15cw	6662.24	I
200	3242.83	I	130	4669.14	I	15	5930.62	I	100	6673.73	I

Ta I and II		Ta I and II		Ta IV		Ta V	
Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength
180	6675.53 I	11 c	7322.72 I	80	1212.68 IV	1000	890.87 V
30	6684.00 I	13	7325.95 I	85	1213.09 IV	500	947.30 V
15	6693.61 I	11cw	7340.19 I	70	1214.66 IV	100	990.29 V
15	6706.46 I	160	7346.41 I	85	1215.53 IV	200	1066.64 V
25	6709.39 I	140 c	7352.86 I	80	1220.73 IV	200	1140.49 V
10	6714.44 I	100	7356.96 I	80	1220.96 IV	500	1213.42 V
15 h	6723.61 I	90cw	7369.09 I	90	1223.73 IV	100	1242.98 V
75 c	6740.73 I	160	7407.89 I	88	1238.12 IV	5000	1392.56 V
40	6754.91 I	11 c	7435.19 I	95	1240.06 IV	7000	1709.10 V
13 c	6755.85 I	23	7440.17 I	87	1258.34 IV	TECHNETIUM (Tc)	
13	6770.37 I	30	7467.75 I	94	1264.91 IV	Z = 43	
75	6771.74 I	23	7486.01 I	98	1272.42 IV	Tc I and II	
40cw	6774.25 I	30	7520.56 I	94	1275.48 IV	Ref. 35 - C.H.C.	
40cw	6788.99 I	6	7569.23 I	86	1275.94 IV	Air	
13 c	6790.06 I	9	7590.22 I	92	1308.51 IV	15	2106.23 II
13	6799.27 I	6	7649.62 I	85	1311.35 IV	20	2116.44 II
40 c	6810.46 I	11 h	7722.02 I	87	1315.58 IV	15	2119.41 I
160 c	6813.25 I	11	7763.11 I	81	1325.19 IV	30	2156.27 I
20	6819.36 I	9 c	7779.67 I	92	1332.38 IV	30	2185.39 I
18 c	6824.96 I	20 c	7842.76 I	86	1343.30 IV	30	2189.06 I
13	6832.00 I	100	7882.37 I	75	1350.46 IV	40	2193.35 I
15	6850.83 I	30	7950.19 I	92	1365.88 IV	10	2266.22 II
15	6865.13 I	5	7952.07 I	79	1376.62 IV	10	2282.12 I
210	6866.23 I	6	7998.75 I	78	1388.80 IV	10	2282.71 I
180	6875.27 I	6	8022.09 I	91	1398.78 IV	50	2285.45 I
40	6877.49 I	75	8026.50 I	93	1413.40 IV	100	2298.08 I
15	6896.77 I	5	8029.04 I	79	1430.11 IV	30	2416.22 I
40	6900.55 I	15	8039.08 I	83	1441.54 IV	50	2423.23 I
150	6902.10 I	8	8053.93 I	91	1454.32 IV	20	2424.54 I
140	6927.38 I	15	8068.98 I	92	1464.41 IV	20	2435.83 I
140	6928.54 I	5	8100.11 I	93	1469.82 IV	10	2436.99 I
8 h	6939.33 I	13	8128.76 I	90	1495.25 IV	80 w	2463.69 I
20 c	6946.87 I	9	8158.54 I	95	1514.19 IV	20	2465.09 I
65	6951.26 I	5 c	8180.74 I	70	1525.69 IV	30	2466.87 I
45	6953.88 I	13 c	8248.95 I	82	1565.97 IV	20	2475.11 I
180	6966.13 I	20 d	8264.85 I	82	1584.64 IV	50	2480.70 I
8	6969.49 I	75	8281.62 I	84	1594.91 IV	50	2483.22 I
8 c	6971.31 I	11	8389.06 I	85	1607.70 IV	20	2486.50 I
9	6971.53 I	5	8415.73 I	84	1631.65 IV	25	2492.72 I
23	6983.52 I	25cw	8447.62 I	79	1639.82 IV	20	2493.43 I
110 d	6995.22 I	11 h	8550.49 I	84	1668.76 IV	100	2496.77 II
	6995.49 I	15	8575.92 I	84	1676.45 IV	30	2510.17 I
20	7000.21 I	10cw	8595.84 I	85	1712.16 IV	80	2529.34 II
40	7005.07 I			85	1716.13 IV	500	2543.23 II
75	7006.96 I	Ta IV		82	1753.90 IV	60	2544.81 II
50	7025.03 I	Ref. 411 - R.L.K.		82	1759.04 IV	50	2547.92 II
13	7031.51 I	Vacuum		79	1763.03 IV	50	2558.61 II
40	7039.07 I	10	763.14 IV	83	1865.92 IV	30	2575.06 II
15 h	7081.30 I	32	934.41 IV	84	1901.63 IV	80	2577.86 II
20	7085.40 I	67	999.34 IV	84	1907.66 IV	300hl	2578.79 I
23	7093.02 I	65	1063.53 IV	84	1924.75 IV	200	2589.86 I
8	7108.05 I	68	1067.17 IV	77	1940.25 IV	20 w	2590.19 I
15 c	7117.52 I	71	1074.47 IV	79	1985.68 IV	100	2592.82 I
20	7121.27 I	71	1086.39 IV	82	1989.44 IV	20	2597.19 II
40	7125.72 I	72	1094.60 IV			500	2608.86 I
150	7148.63 I	68	1100.13 IV	Ta V		1000 c	2609.99 II
110	7172.90 I	79	1116.10 IV	Ref. 426 - R.L.K.		1500	2614.23 I
13 c	7174.91 I	71	1118.83 IV	Vacuum		1000	2615.87 I
13	7191.35 I	78	1136.17 IV	20	478.29 V	30	2618.28 I
8	7233.45 I	66	1138.26 IV	60	493.07 V	200	2634.91 II
30 h	7250.27 I	75	1149.72 IV			80	2636.36 I
11 h	7264.82 I	75	1150.42 IV			30	2641.26 I
6	7272.29 I	75	1151.92 IV			100	2642.37 I
30	7276.96 I	76	1172.51 IV			40	2644.50 II
5	7277.54 I	85	1175.51 IV				
9	7286.36 I	80	1189.28 IV				
13 c	7296.32 I	78	1192.52 IV				
140	7301.74 I	80	1192.67 IV				
20	7319.84 I	78	1211.94 IV				

Tc I and II			Tc I and II			Tc I and II			Tc I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
1000 c	2647.01	II	500	2921.91	I	400	3366.75	I	200	3618.94	I
300 c	2649.21	I	20 c	2923.34	II	40	3386.67	I	1000 c	3627.36	I
100	2652.35	II	1000	2928.20	I	50	3392.23	I	200	3630.39	I
50	2653.57	I	80	2933.89	I	300	3394.18	I	3000 c	3635.15	I
100	2654.31	I	200	2955.93	I	60	3396.90	I	10000 c	3636.07	I
120	2660.88	I	200	2973.65	I	40	3397.83	I	1000	3638.22	I
100	2662.30	I	100	2979.34	I	300	3398.33	I	200	3638.85	I
80	2681.19	II	150	2985.36	I	200	3402.10	I	900	3639.38	I
60	2683.14	I	100	3010.83	I	200 c	3403.93	I	400	3640.23	I
80	2683.89	I	300	3017.23	I	80	3405.33	I	1000 c	3648.04	I
80	2693.11	I	150	3021.56	I	80	3407.28	I	600	3651.47	I
50	2696.64	I	100	3022.66	I	50	3408.33	I	1000 c	3658.59	I
70	2702.27	I	200	3023.68	I	40	3411.80	I	400 c	3661.45	I
40	2702.96	II	80	3025.26	I	40 c	3418.20	I	200	3664.92	I
100	2707.90	II	300 w	3026.89	I	100	3419.10	I	1000	3679.15	I
1000	2708.78	I	50	3033.16	I	60	3427.85	I	300	3680.32	I
30	2715.20	I	80	3034.57	I	40	3431.75	I	5000	3684.74	I
30	2723.55	I	40	3036.88	I	200	3434.70	I	300	3692.76	I
1000	2726.69	I	20	3037.90	II	40	3435.68	I	800	3703.83	I
30 c	2728.47	I	100	3038.23	I	150	3437.44	I	300	3704.80	I
500	2730.53	I	40	3042.64	I	80	3438.73	I	200	3706.70	I
300	2732.87	I	100 h	3051.55	I	200 c	3443.47	I	200	3707.63	I
150	2736.23	I	40	3052.47	I	200	3451.05	I	200	3708.26	I
60 c	2736.83	II	80	3062.11	I	200	3456.85	I	1000	3712.26	I
100	2737.97	I	200	3062.36	I	400	3457.24	I	300	3712.82	I
20 c	2738.83	II	300	3064.67	I	40	3457.60	I	500	3715.94	I
100	2755.76	I	100 c	3066.60	I	5000 c	3466.28	I	10000	3718.86	I
100	2762.13	I	120 c	3068.34	I	150	3470.51	I	1500	3723.67	I
200	2762.34	I	80	3076.24	I	80	3475.18	I	2000	3724.40	I
60	2765.95	I	150	3089.34	I	1000	3475.59	I	5000	3726.35	I
500	2766.89	I	1000	3099.10	I	60	3484.62	I	200	3727.36	I
20	2777.31	II	200	3099.52	I	1000 c	3486.23	I	400 c	3729.18	I
150	2778.91	I	60	3108.25	I	100	3490.30	I	500	3731.74	I
25	2781.22	I	40	3109.15	I	400	3493.39	I	300	3737.42	I
1000	2782.05	I	60	3115.98	I	500	3494.62	I	400	3745.01	I
500	2785.59	I	80	3119.17	I	40	3499.14	I	1000	3746.15	I
40	2788.89	I	40	3119.66	I	1000	3500.70	I	5000	3746.84	I
500	2789.25	I	700	3122.64	I	200	3501.24	I	1000	3752.13	I
100	2794.53	I	1500	3131.23	I	800 c	3502.70	I	4000	3754.37	I
80	2795.65	I	40 c	3150.26	I	100 c	3507.19	I	1000	3758.54	I
200	2795.78	II	300	3161.67	I	100	3508.27	I	2000	3761.81	I
1000	2802.81	I	3000	3173.30	I	100	3510.91	I	5000	3768.77	I
150	2803.02	I	200	3180.30	I	800	3525.83	I	3000	3771.03	I
500	2808.36	I	2000	3182.37	I	300	3526.18	I	500	3777.27	I
50 c	2809.65	II	2000	3183.11	I	100	3529.83	I	2000	3779.37	I
500	2811.61	II	800 c	3195.20	II	150	3534.88	I	3000 c	3780.68	I
30	2814.86	I	40 w	3197.53	I	500	3535.51	I	500	3784.06	I
40	2819.46	I	300 c	3202.83	I	300	3538.12	I	200	3786.06	I
100	2821.35	II	1000	3212.02	II	800	3538.68	I	500	3791.28	I
200	2828.04	I	40	3220.74	I	2000 c	3541.77	I	300	3791.73	I
60	2831.18	II	60	3230.02	I	6000 c	3549.72	I	200	3797.44	I
50	2840.38	II	1000	3237.02	II	4000 c	3550.64	I	1000	3797.77	I
60	2845.04	I	100	3241.84	I	300	3559.75	I	200	3814.67	I
10	2846.39	II	500	3244.19	I	800	3560.32	I	300	3816.89	I
60	2849.20	I	300	3252.05	I	100	3565.22	I	300	3824.47	I
150	2850.96	I	40	3256.10	I	800	3568.85	I	500	3828.54	I
500 h	2857.13	I	40	3261.94	I	100	3570.65	I	200	3830.35	I
2000 c	2859.11	I	100	3287.14	I	100	3575.42	I	200	3832.45	I
500	2864.49	I	30	3298.84	II	1000	3580.06	I	600	3832.82	I
100	2868.09	I	100	3300.77	I	600	3581.26	I	1500	3837.56	I
1000	2887.73	I	80	3305.89	I	800	3582.08	I	800	3841.31	I
100	2888.46	I	200	3310.65	I	2000	3582.63	I	800	3845.97	I
30	2889.20	II	150	3313.65	I	4000	3587.94	I	500	3847.60	I
200	2893.16	I	200	3325.55	I	200	3593.47	I	300	3851.22	I
150	2893.45	I	150 c	3327.10	I	300	3594.57	I	500 c	3856.73	I
200	2894.32	I	100	3330.77	I	1000 c	3595.66	I	200	3863.07	I
1000	2896.34	I	50	3332.47	I	1000 c	3607.32	I	400	3864.11	I
40	2903.81	I	60	3350.56	I	200	3607.62	I	1000	3868.24	I
1000	2913.15	I	50 c	3350.83	I	2000 c	3608.27	I	200	3875.66	I

Tc I and II		Tc I and II		Tc I and II		Tc I and II	
Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength
500 c	3879.16 I	1000	4515.98 I	100	5005.74 I	60	6047.99 I
600 c	3880.72 I	10000	4522.84 I	200 c	5014.52 I	200	6065.09 I
300 w	3892.12 I	2000	4539.53 I	500	5026.24 I	800	6085.23 I
200	3893.22 I	400	4542.09 I	300	5026.79 I	300	6099.39 I
600	3899.83 I	400	4552.20 I	150	5027.89 I	500 c	6102.96 I
300	3919.38 I	800	4552.85 I	80	5032.45 I	1000	6120.68 I
300 c	3923.66 I	1000	4557.05 I	300	5055.27 I	1000	6130.80 I
200	3927.57 I	2000	4564.54 I	60	5058.33 I	150 c	6132.23 I
200	3933.70 I	1000	4578.45 I	500	5060.69 I	100	6184.70 I
4000 c	3946.57 I	1000	4593.35 I	80	5090.74 I	800	6192.66 I
2000	3947.09 I	300 c	4609.16 I	5000	5096.28 I	600 c	6244.18 I
200	3955.73 I	1000	4616.86 I	200 c	5103.24 I	100	6312.18 I
300	3979.64 I	200 c	4622.69 I	500	5104.32 I	100	6354.86 I
500	3980.35 I	300	4624.96 I	200	5109.81 I	100	6356.73 I
10000 c	3984.97 I	1000	4630.57 I	100	5120.60 I	80	6389.87 I
400	3987.78 I	200	4633.15 I	500	5139.26 I	100	6408.83 I
300	3994.04 I	3000	4637.50 I	500	5150.63 I	1000	6455.90 I
2000	3994.51 I	500	4643.28 I	2000	5161.81 I	600 c	6461.93 I
200	3996.97 I	2000	4648.33 I	2000	5174.81 I	100	6470.27 I
300	4004.69 I	2000 c	4660.21 I	100	5206.56 I	200 c	6491.68 I
500	4007.14 I	2000	4669.30 I	200	5225.55 I	200	6526.82 I
1000	4012.00 I	400	4672.17 I	200 c	5260.22 I	150	6579.24 I
400	4016.68 I	200	4678.90 I	200 c	5261.44 I	500 c	6625.57 I
600	4017.22 I	400	4689.36 I	1000	5275.51 I	300 c	6673.66 I
2000	4020.76 I	300	4694.28 I	800	5285.07 I	100	6687.10 I
20000 c	4031.63 I	1000	4706.92 I	100	5305.31 I	80	6786.00 I
1000	4039.25 I	200	4714.22 I	400	5314.96 I	70	6798.63 I
200	4041.78 I	2000	4717.77 I	600	5320.20 I	60	6856.90 I
10000 c	4049.11 I	500 c	4719.02 I	200	5334.79 I	150	7002.37 I
500	4051.95 I	4000 c	4719.28 I	500 c	5353.48 I	100	7016.57 I
200	4053.18 I	200 c	4736.51 I	200	5356.63 I	500 c	7086.18 I
200 c	4056.08 I	10000	4740.61 I	300	5358.65 I	60	7093.12 I
400	4083.54 I	500	4749.61 I	200	5360.14 I	200	7141.28 I
10000	4088.71 I	1000	4752.72 I	500 h	5375.20 I	200 c	7157.62 I
200	4093.69 I	200	4762.36 I	150 c	5423.05 I	70	7256.08 I
15000	4095.67 I	4000	4771.54 I	200	5447.40 I	100	7322.38 I
1000	4110.22 I	200	4773.89 I	500 c	5451.90 I	80	7329.14 I
10000	4115.08 I	200	4783.92 I	100	5455.95 I	100	7396.80 I
600	4119.27 I	500	4785.60 I	300	5471.96 I	100 c	7402.61 I
8000	4124.22 I	200 c	4790.48 I	70	5483.01 I	200	7405.36 I
1000	4128.27 I	250	4791.62 I	60	5485.37 I	60	7427.15 I
300	4134.81 I	300	4799.98 I	80 c	5506.89 I	150	7434.12 I
300	4139.12 I	100	4805.69 I	150	5524.11 I	600	7452.49 I
800	4139.85 I	100	4809.42 I	100	5528.23 I	60	7461.59 I
400	4141.27 I	500	4816.79 I	200	5541.94 I	80	7534.95 I
6000	4144.95 I	10000	4820.74 I	80	5543.63 I	800	7540.26 I
3000	4145.08 I	300	4831.35 I	100	5550.53 I	80	7543.39 I
200	4147.62 I	1000	4834.37 I	3000 c	5589.02 I	200	7574.02 I
10000	4165.61 I	1000	4835.39 I	200	5602.23 I	500	7579.26 I
500	4167.42 I	100	4841.36 I	2000 c	5620.45 I	90	7624.53 I
1000	4169.68 I	20000	4853.59 I	300	5629.94 I	100	7684.45 I
4000	4170.27 I	100	4857.21 I	1500	5642.13 I	500	7697.37 I
5000	4172.53 I	100 c	4862.19 I	800	5644.94 I	80 c	7698.19 I
1000	4176.28 I	10000	4866.73 I	100	5656.00 I	800 c	7793.04 I
800	4186.51 I	200	4870.77 I	60	5672.15 I	60	7798.28 I
300	4218.61 I	100	4888.70 I	200	5687.30 I	60	7816.74 I
10000 c	4238.19 I	150 c	4890.88 I	200	5689.05 I	800	7817.72 I
20000	4262.27 I	8000	4891.92 I	700	5725.31 I	100	7856.38 I
1000	4262.69 I	150	4892.49 I	500 c	5771.47 I	200	7861.44 I
800	4274.97 II	1000	4908.51 I	100	5794.65 I	400 d	7871.25 I
800	4278.90 I	2000	4909.57 I	80 c	5799.85 I	60 c	7874.76 I
30000	4297.06 I	500	4913.02 I	100 c	5814.24 I	70	7965.45 I
400 c	4336.86 I	150 c	4914.70 I	200	5831.48 I	500	7999.73 I
400	4358.49 I	200 c	4920.67 I	150 c	5836.33 I	200	8126.55 I
200	4359.26 I	300	4923.60 I	150	5923.36 I	200	8170.55 I
1000	4429.59 I	400	4948.06 I	1000 c	5924.47 I	150	8205.27 I
1000	4481.53 I	5000	4976.34 I	200	5926.29 I	100	8206.49 I
3000	4487.06 I	400	4995.00 I	600 c	5931.93 I	150	8211.31 I
400	4495.03 I	200	5002.67 I	60	6032.36 I	500 c	8237.08 I

Tc I and II			Te I and II			Te I and II			Te I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
200	8308.15	I	6	1853.8	I	60	3256.80	II	100	4784.87	II
200	8309.16	I	8	1857.2	I	30	3268.77	II	100	4827.14	II
60	8315.50	I	6	1860.4	I	30	3282.63	II	150	4831.28	II
100	8531.06	I	3	1962.88	II	40	3321.92	II	150	4842.90	II
100	8543.61	I	7	1994.83	I	40	3323.11	II	130	4865.12	II
100 c	8707.21	I		Air		60	3329.22	II	200	4866.24	II
100 c	8737.93	I	6	2000.2	I	60	3352.10	II	80	4885.22	II
200 c	8829.82	I	26000	2002.02	I	60	3362.79	II	80	4904.44	II
			8	2070.9	I	25	3374.10	II	60	4961.88	II
			6500	2081.16	I	150	3406.79	II	60	5000.82	II
			18000	2142.81	I	20	3419.63	II	8	5083.0	I
			3200	2147.25	I	50	3442.25	II	7	5148.7	I
			360	2159.85	I	40	3455.12	II	50	5449.84	II
			9	2208.74	I	20	3456.88	II	50	5487.95	II
			10	2255.49	I	20	3480.32	II	150	5576.35	II
			500	2259.02	I	40	3483.67	II	150	5649.26	II
			10	2265.52	I	20	3486.11	II	100	5666.20	II
			20	2373.06	II	50	3521.11	II	200	5708.12	II
			1200	2383.26	I	50	3552.19	II	7	5733.5	I
			1500	2385.78	I	100	3611.78	II	150	5755.85	II
			20	2387.82	II	50	3617.57	II	8	5789.1	I
			10	2401.63	II	40	3644.46	II	50	5936.15	II
			10	2436.47	II	20	3679.26	II	100	5974.68	II
			50	2438.69	II	30	3725.66	II	8 d	6273.5	I
			120	2530.72	I	40	3797.22	II	8 h	6349.7	I
			20	2567.82	II	20	3800.92	II	50	6367.13	II
			10	2574.96	II	20	3905.67	II	8	6405.9	I
			5	2576.10	II	20	3918.54	II	7 h	6456.7	I
			7	2579.24	II	30	3931.49	II	8 h	6613.4	I
			10	2591.12	II	20	3947.98	II	10	6648.58	II
			10	2592.85	II	40	3969.22	II	8	6660.2	I
			10	2605.72	II	25	3975.94	II	8 h	6690.0	I
			5	2621.92	II	20	3981.77	II	10 h	6790.0	I
			10	2624.86	II	50	4006.52	II	20 h	6837.6	I
			20	2627.96	II	20	4011.69	II	20 h	6854.7	I
			20	2641.89	II	30	4029.73	II	10	7016.06	II
			20	2648.48	II	40	4047.17	II	10	7039.13	II
			100	2649.66	II	30	4048.88	II	15 h	7191.1	I
			40	2657.70	II	15	4073.48	II	10	7236.62	II
			80	2661.10	II	30	4101.04	II	20 h	7263.5	I
			110	2677.13	I	70	4127.32	II	8	7280.9	I
			20	2711.58	II	30	4163.55	II	10	7289.26	II
			6	2769.65	I	100	4169.77	II	10	7445.39	II
			10	2841.17	II	30	4179.29	II	12	7460.98	II
			10	2846.15	II	25	4211.31	II	15	7468.75	II
			100	2858.29	II	80	4225.73	II	10	7481.26	II
			20	2861.00	II	30	4246.47	II	10	7556.8	I
			40	2868.82	II	20	4251.15	II	6	7688.61	II
			150	2895.41	II	100	4261.11	II	15	7759.1	I
			30	2919.89	II	30	4264.36	II	8	7818.79	II
			50	2942.11	II	60	4273.43	II	8	7861.61	II
			50	2946.68	II	80	4285.85	II	15	7921.69	II
			70	2967.29	II	40	4320.90	II	15	7943.14	II
			20	2973.67	II	30	4361.28	II	10	7950.34	II
			50	2975.90	II	150	4364.00	II	20	7972.9	I
			15	2997.04	II	30	4377.12	II	6	8056.15	II
			15	3012.02	II	75	4385.10	II	30 h	8061.4	I
			50	3017.58	II	60	4396.00	II	10 h	8082.5	I
			20	3023.31	II	170	4478.63	II	10	8122.44	II
			70	3047.00	II	80	4537.07	II	8	8130.39	II
			20	3052.46	II	100	4557.78	II	8	8154.47	II
			10	3063.16	II	70	4630.62	II	20	8186.44	II
			15	3073.56	II	100	4641.12	II	6	8190.94	II
			8	3104.44	II	180	4654.37	II	10	8251.5	I
			10	3132.58	II	200	4686.91	II	15	8273.53	II
			20	3160.66	II	100	4696.38	II	10	8276.6	I
			100	3175.14	I	100	4706.53	II	10	8291.1	I
			10	3189.83	II	100	4766.05	II	15	8355.8	I
			5	3211.21	II	70	4771.56	II	10	8372.12	II

Te I and II			Te I and II			Tb I and II			Tb I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
7	8469.8	I	464	21602.50	I	160	2932.89	II	250	3231.06	II
8	8492.2	I	37	21799.64	I	150	2940.05	II	210 d	3239.60	II
8	8500.8	I	74	22555.29	I	250	2956.21	II	250	3240.00	II
12	8521.4	I	48	22755.66	I	170	2968.87	II	480	3252.32	II
10	8535.68	II	27	23294.94	I	170	2977.78	II	250	3262.97	II
12	8575.78	II	17	23978.70	I	110	2987.03	II	230 d	3263.87	II
10	8604.63	II	25	24059.04	I	110	2988.57	II	230	3264.90	II
8	8621.68	II	13	26428.62	I	130	2996.00	II	400	3266.40	II
7 h	8632.1	I	38	26539.17	I	110	2999.03	II	250	3274.14	II
15	8672.95	II	15	26553.74	I	130	3005.52	II	250	3274.33	II
12	8701.09	I	7	27179.26	I	170	3009.30	II	210	3277.32	II
10	8733.81	II				230	3010.59	II	760	3280.31	II
205	8758.18	I	TERBIUM (Tb)			230	3016.18	II	760	3281.40	II
12	8831.52	I	Z = 65			130	3019.17	II	520	3283.10	II
18	8851.15	I	Tb I and II			170	3020.29	II	1000	3285.04	II
6	8897.92	II	Ref. 1 - C.H.C.			110	3023.43	II	310	3287.55	II
81	9004.37	I	Air			170	3027.33	II	310	3291.56	II
18	9043.39	I	29	2577.73	II	230	3031.60	II	1500	3293.07	II
12	9196.80	I	110	2584.61	II	230	3044.96	II	210	3295.33	II
15	9206.78	I	29	2590.31	II	190	3051.13	II	310	3298.66	II
17	9207.64	I	29	2591.42	II	130	3053.24	II	210	3304.95	II
12	9469.00	I	24	2592.64	II	460	3053.55	II	420 d	3307.44	II
5660	9722.74	I	55	2597.71	II	130	3062.78	II	210	3308.51	II
185	9785.54	I	40	2602.93	II	230	3064.09	II	210	3314.38	II
109	9842.30	I	110	2608.57	II	110	3065.69	II	340 d	3321.15	II
532	9868.92	I	40	2616.90	II	230	3067.20	II	420	3322.28	II
118	9902.61	I	130	2628.69	II	270	3069.03	II	210	3323.38	II
689	9956.30	I	55	2655.96	II	460	3070.05	II	210	3323.89	II
37	9959.93	I	50	2661.40	II	270	3072.60	II	3800	3324.40	II
325	9977.13	I	24	2661.64	II	670	3078.86	II	520	3329.08	II
136	9979.31	I	55	2667.64	II	480	3082.36	II	210	3334.48	II
45	9985.85	I	50	2668.86	II	120	3086.78	II	250	3336.70	II
5950	10051.41	I	50	2669.29	II	250	3088.43	II	310	3338.03	II
4097	10091.01	I	40	2674.13	II	480	3089.58	II	250	3339.00	II
104	10099.57	I	40	2674.69	II	230	3102.54	II	210	3347.27	II
279	10106.05	I	29	2678.15	II	480	3102.96	II	210	3348.07	II
381	10118.08	I	40	2683.97	II	290	3117.89	II	760	3349.42	II
296	10151.06	I	35	2687.82	II	290	3119.62	II	320	3362.25	II
397	10300.56	I	50	2691.90	II	230	3121.94	II	760	3364.93	II
205	10323.05	I	35	2693.05	II	230	3123.05	II	230 d	3370.61	II
745	10493.57	I	55	2693.41	II	160	3124.54	II	320	3371.50	II
197	10509.86	I	35	2695.46	II	110	3131.35	II	520	3372.36	II
1880	10918.34	I	50	2696.83	II	250	3134.26	II	460 d	3372.72	II
298	11007.80	I	190	2704.07	II	440	3139.64	II	520	3375.03	II
10200	11089.56	I	130	2736.24	II	190	3140.06	II	320	3378.73	II
508	11163.74	I	160	2759.47	II	230	3145.22	II	520	3378.86	II
6620	11487.23	I	270	2769.53	II	150	3146.67	II	320	3382.80	II
280	11978.96	I	130	2784.49	II	310	3147.04	II	210	3390.60	II
188	12566.24	I	180	2800.51	II	310	3147.15	II	380	3391.28	II
389	12589.19	I	250	2802.75	II	310	3148.71	II	270	3398.35	II
161	12805.50	I	250	2809.30	II	120	3155.62	II	320	3399.10	II
400	13104.18	I	180	2812.64	II	130	3162.42	II	270	3400.53	II
1580	13247.75	I	110	2857.68	II	290	3162.93	II	210 d	3400.86	II
483	13316.63	I	230	2886.29	II	190	3165.74	II	420	3402.33	II
217	14037.09	I	160	2894.45	II	380	3167.52	II	210	3410.40	II
144	14072.53	I	320	2897.44	II	140	3168.32	II	210	3410.68	II
434	14335.74	I	160	2898.86	II	230	3169.84	II	520	3413.76	II
220	14417.46	I	110	2901.54	II	190	3173.76	II	270	3416.24	II
1050	14513.51	I	110	2910.30	II	380	3174.66	II	400 d	3420.34	II
129	14554.68	I	160	2914.75	II	380	3180.54	II	210	3430.61	II
1480	15452.45	I	160	2915.30	II	140	3183.88	II	320	3433.26	II
2430	15546.23	I	190	2915.60	II	480	3187.26	II	270	3439.72	II
3760	16403.90	I	120	2916.24	II	290	3188.03	II	520	3440.37	II
1960	17303.54	I	120	2918.89	II	190	3194.69	II	320	3444.58	II
2780	18291.59	I	120	2924.16	II	380	3195.60	II	210	3446.40	II
394	18777.30	I	120	2924.53	II	480	3199.56	II	270	3449.46	II
269	19623.52	I				1100	3218.93	II	810	3454.06	II
239	20147.54	I				1200	3219.98	II	380	3460.38	II
1020	21043.73	I				250	3230.03	II	230 d	3462.97	II

Tb I and II		Tb I and II		Tb I and II		Tb I and II	
Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength
620	3468.03 II	4700	3702.86 II	870	4032.28 I	870	4336.43 I
270	3471.73 II	300	3703.12 I	2100	4033.03 II	600	4337.64 I
270	3472.37 II	2400	3703.92 II	350	4036.22 I	1700	4338.41 I
810 d	3472.79 II	370	3709.30 II	210	4038.86 I	700	4340.62 I
210	3473.00 II	1000 d	3711.76 II	300	4051.86 II	430cw	4342.53 I
380	3480.17 II	300	3719.45 II	300	4052.87 II	430 d	4353.20 II
230	3483.04 II	650	3729.91 II	430	4054.12 I	280	4356.09 I
230	3483.69 II	430	3732.39 II	410	4060.37 I	870	4356.81 I
290 d	3489.51 II	430	3743.09 II	220	4060.87 II	280	4360.16 I
210 d	3492.00 II	650	3745.04 I	1300	4061.58 I	220	4367.30 II
270	3494.21 II	870	3747.17 II	220	4063.89 II	220	4372.02 I
270	3495.36 II	870	3747.34 II	390	4066.22 II	330	4382.45 I
810	3500.84 II	1100	3755.24 II	260	4075.22 I	300	4388.23 I
570	3507.45 II	430	3757.44 II	390	4081.24 I	260	4390.91 I
5700	3509.17 II	430 d	3757.90 II	210	4086.60 I	200	4416.27 II
380	3510.10 II	650	3759.35 I	210	4092.19 I	140	4420.19 I
320	3513.10 II	350	3761.14 I	260	4094.37 II	350	4423.10 I
570	3519.76 II	1700	3765.14 I	260	4094.49 I	110	4432.72 I
1300	3523.66 II	2100	3776.49 II	260	4103.90 II	240	4436.12 I
380	3525.14 II	330	3779.22 II	650	4105.37 I	110	4439.38 I
440	3525.61 II	600	3783.53 I	300	4112.50 I	240	4448.04 I
440	3536.32 II	410 d	3787.22 II	260	4119.92 I	110	4467.69 I
570	3537.94 II	410	3789.92 I	280	4143.51 I	430	4493.07 I
1100	3540.24 II	390	3792.20 I	1100	4144.41 II	45 d	4509.04 II
810	3543.89 II	600	3793.55 II	350	4158.53 I	150 h	4511.52 I
310 d	3551.03 II	330	3801.80 II	240	4169.09 I	45	4512.96 II
320	3551.96 II	760 d	3806.85 II	240	4169.32 I	75	4514.31 II
460 d	3558.77 II	1500	3830.26 I	240	4171.05 I	45	4519.72 II
3200	3561.74 II	540	3833.42 I	240	4172.60 I	45	4525.01 II
480	3562.90 II	920 d	3842.50 II	240	4172.82 I	45	4529.76 II
570	3565.74 II	370 d	3845.61 II	260	4173.47 I	45 h	4531.83 II
810	3567.35 II	3700	3848.73 II	240	4186.21 I	45	4534.13 I
4200	3568.52 II	450 d	3869.75 II	300	4187.16 I	45	4537.14 I
1600	3568.98 II	3500 w	3874.17 II	390	4196.74 I	45	4537.23 I
320	3572.07 II	330	3883.34 I	450	4201.00 II	110	4549.07 I
1100	3579.20 II	480	3888.22 I	650	4203.74 I	45	4549.72 II
710	3585.03 II	490	3894.64 I	600	4206.49 I	110	4550.45 I
570	3587.44 II	330	3895.99 I	300cw	4213.50 I	110	4556.46 I
810	3596.38 II	330	3896.58 II	300	4214.42 II	55	4562.24 II
440	3598.06 II	330	3897.89 I	480	4215.09 I	110	4563.69 II
1600	3600.44 II	2400	3899.20 II	300	4217.56 I	30	4564.85 II
320	3604.90 II	1600	3901.33 I	260	4219.16 I	55	4573.19 II
320	3611.33 II	480	3908.06 I	260	4224.28 I	210	4578.69 II
320	3614.63 II	380	3909.14 I	480cw	4226.45 II	65	4584.84 II
320 d	3615.66 II	330	3909.55 I	260	4231.89 I	65	4591.56 II
320	3616.58 II	650	3915.43 I	480	4232.82 I	45	4592.38 I
380	3617.86 II	480	3919.52 II	300	4235.35 I	45 h	4604.10 II
380	3619.73 II	300	3922.10 II	370	4255.24 I	30	4611.96 I
810	3625.54 II	480	3922.74 II	480	4258.23 II	45 h	4615.92 II
570	3626.50 II	760	3925.45 II	260	4263.66 I	27	4617.49 I
380	3629.44 II	650	3935.24 II	650	4266.34 I	30	4619.36 II
670	3633.29 II	810 d	3939.52 II	330	4269.69 I	75 d	4626.32 II
670	3638.46 II	650	3946.89 II	220	4275.21 I	95	4626.94 II
670	3641.66 II	350 d	3958.36 II	760cw	4278.52 II	65	4632.07 I
440	3647.06 II	2200 d	3976.84 II	300	4285.13 II	65 h	4636.59 I
570	3647.75 II	1800	3981.87 II	300	4289.70 I	30	4636.99 II
2300	3650.40 II	300	3983.85 II	370	4298.36 I	85	4641.00 II
810	3654.88 II	350	3999.40 II	300	4299.90 I	210	4641.98 II
2000	3658.88 II	350 d	4002.19 II	240	4302.95 I	260cw	4645.31 II
450	3663.12 II	970	4002.59 II	240	4307.18 I	80	4647.23 I
3800	3676.35 II	1900	4005.47 II	450	4310.42 I	60	4658.38 I
300	3677.89 II	300	4010.04 I	300	4311.56 I	20	4658.73 I
810	3682.26 II	760	4012.75 II	370	4313.25 I	80	4662.79 I
320	3688.15 II	330	4013.26 I	2200	4318.83 I	50 c	4665.45 I
610	3691.15 II	370	4019.14 II	600	4322.23 I	40	4669.40 I
300	3692.95 II	540	4020.47 II	600	4325.83 II	80	4676.90 I
450	3693.58 I	220	4022.88 I	3000	4326.43 I	70 c	4681.87 I
320	3696.85 II	370	4024.77 I	240	4328.90 I	50	4682.52 I
450	3700.12 I	520	4031.66 II	600	4332.12 I	25 c	4682.79 II

Tb I and II			Tb I and II			Tb I and II			Tb I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
80	4688.63	II	50	5179.97	I	35cw	6518.68	I	11	8214.33	I
80	4693.11	II	50	5184.59	I	24 c	6574.04	II	8	8259.08	I
30 h	4693.39	II	85	5186.13	I	35	6581.82	I	40	8450.06	II
200	4702.41	II	50	5188.48	I	30	6607.17	II	8 h	8465.80	II
110	4707.94	II	50	5198.86	I	90	6677.94	II	13	8502.70	I
40 w	4716.07	II	35 w	5202.77	I	40cw	6702.61	I	30 h	8511.80	I
40	4728.16	II	40	5204.55	I	20 c	6706.79	II	45	8583.45	II
60cw	4734.20	I	40	5207.97	I	30	6785.12	II	30	8603.40	I
80	4739.93	I	40	5214.28	I	130	6794.58	II	9	8678.25	I
70	4747.80	I	40	5221.99	I	40	6874.18	II	65	8765.74	II
410cw	4752.53	II	120	5228.12	I	55	6896.37	II	Tb IV		
40	4758.44	II	40	5235.11	I	45 h	6899.95	I	Ref. 302 - J.R.		
40	4760.19	II	75	5248.71	I	40	6901.98	I	Vacuum		
30	4762.37	II	75 w	5262.11	II	9	7005.99	II	30	1176.58	IV
25	4764.47	II	24	5275.03	I	17	7082.85	II	30	1192.01	IV
35	4778.36	II	75	5281.05	I	11	7089.22	II	70	1200.58	IV
35	4778.80	II	65	5304.72	I	11	7112.69	I	50	1213.94	IV
180	4786.78	I	29	5308.19	I	10	7187.48	I	80	1221.22	IV
40cw	4789.91	II	29	5309.46	I	10 h	7195.89	II	500	1235.04	IV
30	4801.87	II	110	5319.23	I	65	7204.28	I	1000	1259.40	IV
100	4813.77	I	35	5331.04	I	19 h	7234.98	I	300	1301.48	IV
60	4837.59	II	65 w	5337.90	I	40	7257.73	I	300	1308.30	IV
25	4840.39	I	35 d	5338.59	I	17	7311.57	I	600	1311.70	IV
30 c	4842.69	II	24	5347.83	II	45	7348.88	II	700	1315.12	IV
30	4844.89	II	160	5354.88	I	10	7398.27	II	500	1325.56	IV
30	4854.81	I	75	5369.72	I	15 h	7424.24	II	1000	1327.67	IV
20	4856.54	II	75	5375.98	I	10 h	7429.62	II	100	1367.56	IV
30	4858.87	II	29 d	5402.06	II	9	7472.15	I	400	1367.71	IV
80	4875.57	II	29	5413.65	I	22	7484.54	I	700	1369.64	IV
25	4876.12	II	29	5416.20	I	9	7495.45	I	1000	1373.86	IV
80	4881.15	II	50	5424.10	II	45	7496.12	I	400	1376.46	IV
29	4894.33	I	29 c	5426.43	I	17	7499.69	II	200	1378.23	IV
95	4915.90	I	35	5443.38	I	27	7511.40	I	300	1381.00	IV
35	4924.09	I	29	5457.00	I	9	7519.77	II	100	1382.83	IV
35	4926.83	I	55	5459.81	I	6	7557.59	II	20	1389.92	IV
50	4928.93	I	29 w	5470.34	II	27 h	7582.03	II	200	1516.17	IV
65	4931.79	I	24	5481.45	I	27	7587.49	I	50	1530.10	IV
29	4970.99	II	55	5509.61	I	45	7590.24	I	5000	1595.39	IV
29	4971.42	I	50	5514.54	I	65	7596.44	I	2000	1633.19	IV
29	4973.04	I	65	5524.12	I	17 h	7601.18	II	300	1649.38	IV
29	4980.16	II	24 c	5525.62	I	17	7616.01	II	400	1654.75	IV
29	4980.56	I	35	5565.93	I	22 h	7624.05	I	400	1667.58	IV
85	4993.82	II	29 c	5638.80	I	30	7627.81	I	200	1672.55	IV
50	4995.84	II	29 c	5685.74	II	9 h	7639.05	II	400	1681.98	IV
55	4997.95	I	40 c	5686.48	I	8	7672.72	II	5	1684.46	IV
29	5006.10	II	85 c	5747.58	I	8 h	7694.74	II	100	1685.37	IV
50	5022.16	I	24	5762.66	I	22 h	7706.16	II	400	1691.95	IV
29	5024.24	II	24	5785.18	II	22 h	7726.97	II	10	1695.23	IV
29	5024.65	I	75	5795.64	I	30	7737.63	I	300	1698.36	IV
50	5033.12	I	75	5803.13	II	22	7793.20	I	30	1701.60	IV
50 w	5042.06	II	65	5815.36	I	8	7807.33	II	50	1704.79	IV
55	5054.30	I	29	5842.97	I	16	7832.91	II	20	1705.05	IV
55	5065.79	I	65	5851.07	I	30	7855.79	II	3	1943.94	IV
110	5078.25	I	65	5870.62	I	15	7864.99	I	50	1970.90	IV
24	5080.05	II	35	5898.84	I	6 h	7885.70	I	Air		
24	5081.11	I	24	5902.40	I	6	7913.11	I	2000	2027.79	IV
75	5089.12	II	35	5904.71	I	27	7927.90	II	200	2029.22	IV
24	5089.66	I	65 c	5920.78	I	13	7955.31	I	400	2048.88	IV
24	5101.09	I	50 c	5939.38	I	11	7998.03	I	200	2078.83	IV
24	5108.56	I	35	5940.17	I	17	8001.04	I	1000	2089.98	IV
35	5118.39	I	24	5951.17	I	13 h	8010.16	II	1000	2332.54	IV
24	5120.18	I	75	5967.34	II	30	8025.42	II	100	2436.01	IV
50 w	5131.69	I	29	6038.97	I	6	8053.80	I	THALLIUM (Tl)		
50 w	5141.08	II	29	6039.38	I	19	8067.35	II	Z = 81		
50	5147.58	I	24	6104.29	II	30	8085.06	II	Tl I and II		
24	5164.27	I	24 c	6292.43	I	27	8164.17	I	Refs. 1,195,348,354		
29	5170.13	I	35	6331.68	II	13	8171.70	I	- C.H.C.		
24	5170.61	I	24	6334.91	II	65	8194.82	II			
50	5176.51	I	24	6446.87	II	95	8212.57	I			

Tl I and II		Tl I and II		Tl I and II		THORIUM (Th)		
Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength	Z = 90		
	Vacuum	1200	3229.75 I	15	12491.8 I	Th I and II		
3	650.90 II	15	3291.01 II	150	12736.4 I	Refs. 1,97,98,434		
5 r	670.87 II	12	3319.91 II	700	13013.2 I	- J.G.C. and R.Z.		
4	674.10 II	12	3321.04 II	Tl III		Intensity	Wavelength	
15 r	696.30 II	8	3322.25 II	Ref. 355 - C.H.C.		Air		
5 r	709.23 II	15	3369.15 II	Vacuum		100	2326.926 II	
10 r	817.18 II	8	3381.00 II	7	1231.57 III	190	2377.84 II	
5 r	836.34 II	6	3381.80 II	10	1266.33 III	90	2404.504 II	
8 r	1018.85 II	6 d	3460.48 II	4	1332.36 III	100	2413.409 II	
10 r	1049.73 II	20000	3519.24 I	10	1477.14 III	100	2439.433 I	
8 r	1050.30 II	5000	3529.43 I	4	1506.37 III	30	2532.894 I	
5 r	1074.97 II	8	3540.08 II	8	1558.67 III	5	2547.901 II	
10 r	1130.17 II	9	3560.68 II	8	1660.05 III	150	2547.901 II	
15 r	1162.55 II	5	3567.67 II	Air		500	2565.593 II	
10 r	1167.43 II	12000cw	3775.72 I	6	3163.53 III	270	2566.588 II	
10 r	1183.41 II	8	3793.95 II	3	3300.80 III	200	2576.688 II	
12 r	1194.84 II	10	3832.30 II	9	3456.34 III	230	2589.059 II	
8	1231.81 II	6	3869.15 II	4	3507.41 III	230	2597.047 II	
5 r	1246.00 II	10	3887.15 II	6	3933.05 III	230	2600.882 II	
15 r	1307.50 II	8	4223.05 II	2	3946.02 III	100	2609.855 II	
8 r	1310.20 II	20	4274.98 II	7	4109.85 III	230	2618.91 II	
25 r	1321.71 II	40	4306.80 II	4	4155.75 III	270	2623.448 II	
8 r	1330.40 II	2	4359.9 I	6	4269.81 III	270	2625.737 II	
10 r	1373.52 II	8	4490.77 II	2	4380.57 III	55	2628.812 II	
1	1423.2 I	20	4737.05 II	4	5086.99 III	270	2641.488 II	
8 r	1489.65 I	15	4981.35 II	4	5362.40 III	170	2650.583 II	
5	1490.50 II	25	5078.54 II	2	5499.4 III	150	2658.663 II	
10 r	1499.30 II	25	5152.14 II	5	5927.8 III	50	2680.692 I	
10 r	1507.82 II	6	5181.95 II	4	8001. III	360	2684.288 II	
15 r	1561.58 II	6	5183.10 II	Tl IV		480	2692.415 II	
10 r	1568.57 II	18000	5350.46 I	Ref. 356 - C.H.C.		100	2695.553 II	
7 r	1593.26 II	15 d	5384.85 II	Vacuum		270	2703.958 II	
5 h	1616. I	7	5409.92 II	7	531.26 IV	170	2708.176 II	
1	1650.2 I	10	5410.97 II	10	570.49 IV	230	2721.691 II	
5	1685.40 I	25	5949.48 II	4	597.01 IV	170	2722.380 II	
1	1728. I	10	6179.98 II	1	868.99 IV	250	2729.327 II	
10 r	1792.76 II	8 d	6239.03 II	3	912.74 IV	250	2732.808 II	
12 r	1814.85 II	10	6378.32 II	8	917.31 IV	28	2735.834 II	
3 h	1847. I	16 h	6549.84 I	30	1028.69 IV	520	2747.156 II	
8	1892.72 II	6 h	6713.80 I	20	1034.73 IV	100	2749.530 II	
25 r	1908.64 II	10	6966.5 II	20	1036.61 IV	410	2752.166 II	
	Air	3	7493.6 I	10	1049.48 IV	130	2760.391 II	
100 r	2007.56 I	2	7678.93 I	10	1057.56 IV	100	2765.123 II	
2	2209.75 I	10	7815.80 I	20	1068.04 IV	270	2768.841 II	
100 r	2210.71 I	8	8130.0 I	20	1070.47 IV	200	2770.816 II	
3	2287.6 I	20	8373.6 I	30	1079.68 IV	70	2773.951 II	
30	2298.04 II	8	8445.8 II	5	1079.70 IV	50	2774.066 II	
140	2315.98 I	10	8474.27 I	2	1092.90 IV	70	2778.706 II	
900 h	2379.69 I	8	8632.9 II	4	1094.41 IV	35	2791.496 I	
8	2451.83 II	10	8664.1 II	6	1099.60 IV	90	2794.255 II	
6	2469.03 II	4	8850.4 I	4	1125.52 IV	70	2797.737 II	
1	2508.2 I	5	8976.75 I	5	1139.30 IV	55	2799.114 II	
20	2530.86 II	3	9038.4 I	3	1144.07 IV	110	2807.827 II	
700	2580.14 I	20	9130. II	3	1225.45 IV	180	2808.998 II	
60	2608.99 I	20	9130.5 I	6	1273.03 IV	70	2814.319 II	
80	2665.57 I	2 h	9183.1 I	3	1304.55 IV	45	2816.071 II	
420	2709.23 I	4	9225. II	6	1323.66 IV	100	2819.322 II	
50 h	2710.67 I	2 h	9252.6 I	7	1337.10 IV	100	2820.336 II	
4400 d	2767.87 I	3	9254. II	7	1358.56 IV	100	2822.025 II	
280	2826.16 I	40	9509.4 I	5	1374.62 IV	170	2826.855 II	
10	2849.80 II	10	9863.4 I	7	1377.75 IV	70	2830.442 II	
2800	2918.32 I	20	9930.4 I	8	1404.60 IV	800	2832.315 II	
440	2921.52 I	2	9937.4 I	5	1412.93 IV	1200	2837.295 II	
5	3029.01 II	30	10011.9 I	6	1434.72 IV	320	2842.812 II	
20	3091.56 II	40	10488.80 I	5	1449.37 IV	100	2848.084 I	
15	3185.51 II	5	11101.61 I	5	1883.2 IV	270	2851.260 II	
15	3186.56 II	4	11483.7 I	3	1974.6 IV	50	2854.342 I	
15	3187.74 II	1000	11512.82 I			30	2860.490 I	
		5	11592.9 I					

Th I and II		Th I and II		Th I and II		Th I and II	
Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength
220	2861.42 II	370	3124.387 II	310	3386.501 II	150	3682.486 I
35	2868.461 I	480	3125.507 II	110	3387.920 I	50	3688.658 I
70	2869.916 II	150	3131.070 II	1300	3392.035 II	100	3690.624 I
550	2870.406 II	100	3136.216 I	200	3396.727 I	170	3692.566 I
30	2878.657 I	420	3139.306 II	250	3398.544 I	180	3698.105 I
40	2882.511 II	420	3142.835 II	200	3405.558 I	50	3703.229 I
320	2884.289 II	310	3146.044 II	250	3413.012 I	340	3706.767 I
360	2885.049 II	150	3150.455 II	50	3417.497 I	280	3711.305 II
360	2887.817 II	310	3154.300 II	390	3421.210 I	590	3719.435 I
40	2892.172 II	50	3157.221 I	270	3423.989 I	50	3719.836 I
250	2899.720 II	30	3161.364 I	50	3428.622 I	770	3721.825 II
45	2903.167 II	140	3166.099 II	980	3433.998 II	110	3727.902 I
50	2908.506 I	110	3169.328 II	770	3435.976 II	50	3733.672 I
200	2910.594 II	420	3175.726 II	340	3438.949 II	1300	3741.183 II
90	2911.320 II	270	3179.048 II	110	3442.578 I	310	3747.539 I
90	2912.009 II	1100	3180.193 II	50	3446.547 I	650	3752.569 II
140	2919.840 II	310	3184.948 II	130	3451.702 I	140	3757.694 I
250	2925.050 II	770	3188.233 II	50	3457.068 I	110	3765.240 I
250	2928.254 II	85	3191.221 I	340	3462.850 II	180	3770.056 I
50	2931.281 I	55	3192.585 I	130	3465.924 II	50	3772.649 I
55	2934.135 II	55	3195.689 I	390	3468.219 II	85	3776.271 I
100	2936.086 I	30	3202.520 I	1300	3469.920 II	50	3780.966 I
35	2940.589 II	170	3210.308 II	170	3471.218 I	340	3785.600 II
340	2942.860 II	55	3214.380 I	250	3479.173 II	100	3789.167 I
100	2943.729 I	560	3221.292 II	70	3480.052 I	85	3795.386 I
150	2949.068 II	30	3223.168 I	200	3486.552 I	50	3800.197 I
80	2950.438 II	560	3229.009 II	100	3489.184 I	590	3803.075 I
35	2955.849 II	110	3230.868 II	270	3493.518 II	50	3807.273 I
170	2957.580 II	480	3235.84 II	70	3496.810 I	340	3813.068 II
28	2959.853 I	590	3238.116 II	130	3498.621 I	50	3818.685 I
28	2963.607 I	240	3241.108 II	70	3503.786 I	75	3825.133 I
270	2968.686 II	110	3244.448 I	50	3506.645 I	450	3828.384 I
110	2971.481 II	280	3251.915 II	110	3511.157 I	70	3836.584 I
220	2974.011 II	910	3256.274 II	140	3518.404 I	840	3839.746 II
50	2976.104 I	180	3257.366 I	70	3521.059 I	280	3841.960 II
55	2980.334 II	910	3262.668 II	70	3526.633 I	100	3846.887 I
160	2985.243 II	180	3267.003 II	140	3531.450 I	85	3852.135 I
360	2988.232 II	110	3272.027 I	670	3539.587 II	390	3854.511 II
150	2991.062 II	30	3278.733 I	180	3544.018 I	140	3859.840 II
110	2996.986 II	50	3281.048 I	170	3549.595 I	450	3863.405 II
50	3002.686 I	130	3285.752 I	140	3551.401 I	100	3869.663 I
30	3004.248 I	620	3287.789 II	200	3555.013 I	210	3875.374 I
180	3008.497 II	910	3291.739 II	530	3559.451 II	140	3879.644 I
50	3010.736 I	620	3292.520 II	110	3563.375 I	100	3886.915 I
20	3018.644 I	240	3297.832 II	70	3569.820 I	340	3895.419 I
50	3021.056 I	240	3301.650 I	200	3576.557 I	50	3901.661 I
150	3026.575 II	480	3304.238 I	100	3583.101 I	110	3903.102 I
40	3030.487 I	130	3309.365 I	170	3589.750 I	170	3905.186 II
370	3034.065 II	50	3314.790 I	270	3592.780 I	50	3908.750 I
170	3035.110 II	30	3318.390 I	270	3598.120 I	85	3911.909 I
85	3038.598 II	510	3321.450 II	390	3601.034 II	50	3916.417 I
130	3045.564 II	390	3324.752 II	170	3608.377 I	110	3919.023 I
420	3049.092 II	840	3325.120 II	980	3609.445 II	140	3925.093 I
30	3056.692 I	55	3328.255 II	200	3612.427 I	590	3929.669 II
220	3061.699 II	250	3330.476 I	480	3615.133 II	200	3932.911 I
450	3067.729 II	620	3334.604 II	400	3617.118 II	140	3937.040 II
370	3072.114 II	620	3337.870 II	270	3623.970 II	50	3942.072 I
670	3078.828 II	30	3342.073 II	390	3625.627 II	50	3948.030 I
480	3080.217 II	180	3346.557 II	140	3632.831 I	200	3948.964 II
240	3088.470 II	310	3348.768 I	270	3635.943 I	50	3952.760 I
130	3090.093 II	980	3351.228 II	70	3638.644 I	110	3959.300 I
50	3093.711 I	310	3354.179 II	210	3642.248 I	390	3967.392 I
140	3097.266 II	620	3358.602 II	170	3649.735 I	200	3972.155 I
200	3102.664 II	75	3361.738 II	50	3658.808 I	150	3980.089 I
510	3108.296 II	390	3367.819 II	100	3659.629 I	110	3991.730 I
50	3115.538 I	250	3374.974 I	220	3663.202 I	530	3994.549 II
100	3116.263 I	390	3378.573 II	140	3668.140 I	50	3998.061 I
510	3119.526 II	130	3380.859 I	280	3669.968 I	240	4003.309 II
510	3122.963 II	310	3385.531 II	700	3675.567 II	250	4007.021 II

Intensity	Th I and II Wavelength	Intensity	Th I and II Wavelength	Intensity	Th I and II Wavelength	Intensity	Th I and II Wavelength
220	4008.210 I	85	4342.256 II	20	4907.209 I	20	5399.175 I
220	4009.056 I	130	4344.326 II	240	4919.816 II	24	5417.486 I
280	4012.495 I	55	4349.072 I	18	4927.780 I	60	5425.678 II
4200	4019.129 II	55	4354.484 I	40	4939.642 I	50	5435.893 II
210	4025.656 II	85	4359.372 I	60	4947.575 II	40	5449.479 II
140	4027.009 I	85	4365.930 I	50	4954.659 II	30	5462.615 II
250	4030.842 I	85	4374.123 I	30	4965.731 I	15	5470.759 I
250	4036.047 I	1300	4381.860 II	35	4975.950 II	24	5484.147 II
240	4036.565 II	1100	4391.110 II	24	4985.372 I	10	5496.137 I
240	4041.204 II	55	4392.974 I	50	5002.097 I	19	5504.302 I
55	4048.287 I	55	4401.580 I	50	5002.097 I	35	5509.994 I
110	4050.887 I	85	4408.882 I	50	5015.889 II	12	5524.584 I
140	4059.253 I	210	4412.741 II	260	5017.255 II	50	5539.262 I
250	4063.407 I	28	4416.845 I	20	5029.892 I	70	5539.911 II
300	4069.201 II	50	4422.048 I	24	5039.230 I	35	5548.176 I
100	4069.461 I	250	4432.963 II	50	5044.719 I	50	5558.342 I
55	4075.503 I	140	4440.866 II	240	5049.796 II	60	5564.203 II
110	4081.368 I	25	4452.565 I	85	5055.347 II	40	5573.354 I
85	4085.434 I	85	4458.002 I	70	5058.562 II	60	5587.026 I
700	4086.520 II	220	4465.341 II	110	5067.974 I	24	5595.064 I
70	4088.726 I	30	4475.221 I	30	5081.446 I	50	5604.515 II
700	4094.747 II	75	4482.169 I	50	5090.051 I	35	5615.320 I
150	4100.341 I	50	4489.664 I	50	5098.043 II	7	5630.297 I
270	4105.330 II	110	4498.940 I	40	5101.130 I	70	5639.746 II
840	4108.421 II	55	4505.216 I	50	5110.867 II	7	5648.991 I
240	4112.754 I	280	4510.527 II	30	5115.044 I	12	5657.925 I
280	4115.758 I	70	4521.194 I	10	5125.950 I	15	5667.128 I
1100	4116.713 II	22	4530.319 I	20	5134.746 I	20	5677.053 I
30	4123.600 I	40	4535.255 I	95	5143.267 II	10	5685.192 I
200	4127.411 I	30	4545.915 II	120	5148.211 II	65	5700.918 II
110	4131.002 I	70	4555.812 I	50	5151.612 I	95	5707.103 II
340	4132.753 II	40	4563.660 I	50	5154.243 I	50	5720.183 I
200	4134.067 I	65	4570.972 I	85	5158.604 I	30	5732.975 II
220	4140.235 II	50	4588.426 I	70	5160.730 I	24	5742.084 II
250	4142.701 II	75	4595.421 I	20	5168.922 I	30	5749.388 II
200	4148.182 II	26	4612.554 II	50	5176.961 I	70	5760.551 I
450	4149.986 II	30	4621.163 I	35	5183.990 II	15	5773.946 I
110	4158.535 I	140	4631.761 II	50	5190.871 II	20	5789.645 I
140	4165.766 I	140	4631.761 II	50 h	5195.814 I	35	5804.141 I
620	4178.060 II	30	4641.254 I	50	5198.800 I	19	5815.422 II
250	4179.714 II	140	4651.558 II	95	5199.164 I	10	5832.370 I
30	4184.138 I	23	4663.202 I	50	5211.230 I	10	5845.919 I
130	4193.017 I	50	4669.984 I	95	5216.596 II	15	5854.121 I
620	4208.890 II	65	4676.056 I	50	5218.528 II	15	5868.373 I
130	4210.923 I	50	4686.195 I	35	5219.110 I	10	5878.933 I
28	4214.828 I	140	4694.091 II	110	5231.160 I	8	5891.451 I
55	4220.065 I	50	4703.990 I	85	5233.225 II	15	5899.844 I
55	4227.387 I	20	4712.841 I	85	5233.229 II	20	5914.387 II
30	4230.824 I	90	4723.438 I	95	5247.654 II	19	5925.893 II
85	4235.463 I	30	4729.128 I	10	5255.573 I	10	5937.162 I
20	4241.094 I	190	4740.529 II	35	5258.360 I	10	5944.648 I
30	4247.989 II	140	4752.414 II	12	5266.710 I	8	5957.587 I
110	4253.538 I	13	4766.600 I	70	5277.501 II	30	5973.665 I
70	4256.254 I	50	4778.294 I	15	5281.069 I	85	5989.044 II
110	4260.333 I	20	4786.531 I	10	5294.397 I	24	5994.129 I
28	4269.942 I	40	4789.387 I	30	5297.743 I	21	6007.072 I
280	4273.357 II	45	4808.134 I	30	5307.466 II	30	6015.426 II
480	4277.313 II	20	4819.193 I	35	5312.002 I	17	6021.036 I
700	4282.042 II	26	4822.855 I	20	5317.494 I	17	6037.698 I
28	4288.669 I	40	4826.700 I	60	5325.145 II	24	6044.431 II
55	4297.306 I	45	4831.121 I	50	5326.976 I	10	6053.381 I
85	4299.839 I	50	4840.843 I	20	5330.080 I	5	6061.536 I
100	4307.176 I	30	4848.362 I	60	5343.581 I	30	6077.106 I
200	4309.991 II	15	4852.868 I	14	5351.126 I	30	6087.262 II
55	4315.254 I	40	4858.333 II	30	5358.707 I	24	6099.083 I
110	4318.416 I	280	4863.163 II	20	5369.281 I	30	6104.580 I
30	4325.274 I	40	4872.917 I	30	5378.836 I	40	6112.837 I
28	4330.844 I	26	4878.733 I	70	5390.466 II	30	6120.557 II
130	4337.277 I	45	4894.955 I	50	5392.572 I	10	6124.480 I

Intensity	Th I and II Wavelength	Intensity	Th I and II Wavelength	Intensity	Th I and II Wavelength	Intensity	Th I and II Wavelength
14	6151.993 I	20	6889.303 II	4	7658.324 I	8	8775.573 I
10	6161.354 I	3	6908.988 I	7	7676.219 I	4	8792.058 I
60	6169.822 I	24	6911.227 I	21	7685.305 I	3	8804.590 I
50	6182.622 I	5	6916.129 I	4	7710.269 I	5	8841.185 I
12	6191.906 I	5	6936.652 I	4	7728.951 I	18	8842.073 II
24	6193.858 II	35	6943.611 I	10	7731.72 II	15	8868.834 I
12	6203.493 I	5	6954.657 I	4	7771.948 I	4	8875.233 I
12	6224.528 I	15	6965.947 I	15	7787.79 II	2	8907.038 I
24 h	6234.856 I	3	6981.086 I	15	7788.937 I	5	8955.848 I
8	6240.954 I	55	6989.656 I	5	7798.360 I	15	8957.97 II
10	6257.424 I	24	6993.038 II	4	7810.625 I	40	8967.641 I
21	6261.063 I	18	7000.806 I	21	7817.771 I	3	8987.408 I
21	6261.418 I	18	7000.806 I	8	7834.459 II	5	9031.819 I
50	6274.116 II	3	7015.319 I	15	7847.540 I	25	9048.252 I
50	6274.117 II	10	7018.569 I	4	7864.023 I	5	9063.953 I
30	6279.172 II	3	7026.462 I	12	7865.95 I	6	9094.831 I
8	6291.192 I	7	7036.281 I	6	7886.284 I	3	9107.225 I
10	6303.251 II	30	7045.795 II	11	7900.31 I	2	9118.140 I
8	6317.185 I	15	7053.619 II	4	7937.732 I	3	9170.825 I
21	6327.278 I	6	7060.654 I	11	7941.72 I	10	9203.963 I
35	6342.860 I	24	7075.333 II	5	7954.594 I	10	9266.208 I
50	6355.911 II	30	7084.171 I	7	7972.598 I	10	9276.276 I
14	6369.140 I	24	7089.339 II	24	7978.974 I	10	9289.563 I
40	6376.931 I	10	7100.512 II	11	7987.97 I	4	9317.722 I
30	6411.899 I	3	7109.861 I	5	7993.680 I	7	9340.706 I
24	6413.615 I	11	7124.562 I	2	8014.502 I	15	9399.085 I
15	6437.762 I	3	7132.613 I	5	8024.253 II	10	9431.603 I
15	6450.005 I	5	7148.560 I	11	8032.433 I	15	9461.030 I
60	6457.283 I	10	7154.954 I	11	8062.64 I	15	9474.882 I
50	6462.614 I	30	7168.896 I	5	8085.220 I	15	9495.501 I
5	6466.717 I	15	7173.373 I	5	8093.626 I	15	9497.191 I
14	6490.738 I	40	7191.132 II	5	8129.407 I	10	9505.392 I
5	6501.992 I	7	7200.046 I	11	8138.477 I	10	9561.24 I
20	6512.364 I	35	7208.006 I	18	8143.139 I	8	9613.689 II
5	6522.044 I	11	7212.69 I	12	8159.729 I	12	9632.647 I
50 h	6531.342 I	10	7217.755 II	10	8163.125 II	10	9664.700 I
6	6554.160 I	11	7218.054 I	7	8169.788 I	4	9676.106 I
5	6558.876 I	3	7242.355 I	15	8186.914 I	15	9700.564 I
3	6565.070 I	5	7255.354 I	12	8203.199 II	15	9746.46 I
5	6577.215 I	3	7270.558 I	2	8231.408 I	10	9812.70 I
24	6583.907 I	7	7284.904 I	5	8252.395 I	10	9826.45 I
24	6588.540 I	5	7298.143 I	3	8259.512 I	20	9833.42 I
24	6593.940 I	11	7305.405 II	18	8275.629 I	15	10039.364 I
24	6605.416 II	5	7315.067 I	3	8292.529 I	15	10089.138 I
24	6619.946 II	7	7324.808 I	15	8320.857 I	15	10133.56 II
24	6619.947 II	5	7339.606 I	30	8330.451 I	15	10419.57 II
21	6644.650 II	8	7341.152 I	4	8358.726 I	15	10556.45 I
6	6658.678 II	5	7361.349 I	6	8387.104 II	15	10723.92 II
30	6662.269 I	5	7384.175 I	18	8403.767 II	20	10726.93 I
6	6674.697 I	18	7385.501 I	15	8416.729 I	20	10942.24 II
3	6683.367 I	3	7393.431 II	12	8421.227 I	15	11051.90 I
8	6692.724 II	5	7402.252 I	21	8446.509 I	30	11230.259 I
5	6697.712 I	3	7418.550 I	5	8464.230 I	20	11354.719 I
16	6727.459 I	21	7428.940 I	18	8478.360 I	15	11703.46 I
3	6735.126 I	10	7430.254 I	5	8510.621 I	15	11864.25 I
5	6742.884 I	3	7444.749 I	5	8516.557 I	15	11940.64 I
20	6756.453 I	2	7462.993 I	5	8539.795 I	20	11984.67 II
6	6765.677 I	10	7481.355 I	6	8554.946 I	15	12018.72 I
15	6778.313 I	2	7493.427 I	11	8573.122 I	20	12127.30 I
15	6780.413 I	50	7525.508 II	12	8591.838 I	20	12194.16 II
6	6791.236 I	7	7549.314 I	3	8621.325 I	15	12206.89 I
3	6798.747 I	18	7567.740 I	3	8638.363 I	20	12231.94 I
3	6809.511 I	12	7585.69 I	10	8665.487 I	15	12338.00 I
5	6823.509 I	12	7585.792 I	4	8668.116 I	15	12477.30 I
11	6829.036 I	4	7598.204 I	2	8701.127 I	20	12646.54 I
14	6834.925 I	2	7607.824 I	5	8709.236 I	15	12866.64 I
4	6862.873 I	5	7627.176 I	8	8732.401 II	15	12940.65 II
5	6866.367 I	3	7636.176 I	18	8748.033 I	15	12959.82 I
8	6874.754 I	30	7647.380 I	15	8758.244 I	15	13145.90 II

Intensity	Th I and II Wavelength	
15	13565.67 I	
15	14090.25 I	
15	14168.67 I	
15	14424.54 I	
15	14618.98 I	
15	14654.91 I	
15	14940.49 II	
15	15240.24 II	
15	15429.78 I	
15	15831.75 I	
20	17208.22 II	
15	17307.66 I	
15	17381.91 I	
15	17481.04 I	
15	17584.52 I	
15	17936.43 II	
15	18811.88 I	
15	19145.60 II	
15	19338.98 II	
10	19774.30 II	
10	20634.36 I	
10	20692.06 II	
10	22264.35 II	
	Th III	
	Ref. 157 - J.G.C.	
	Vacuum	
100	1888.12 III	
	Air	
50	2149.18 III	
50	2162.82 III	
50	2199.74 III	
50	2206.62 III	
50	2291.59 III	
100	2301.18 III	
100	2319.52 III	
80	2324.68 III	
150	2335.50 III	
100	2340.58 III	
100	2363.06 III	
50	2368.91 III	
100	2371.42 III	
80	2381.47 III	
100	2391.48 III	
200	2413.50 III	
50	2424.54 III	
200	2427.94 III	
200	2431.68 III	
200	2441.24 III	
100	2463.66 III	
50	2473.93 III	
100	2501.08 III	
60	2512.69 III	
50	2514.31 III	
100	4555.73 III	
50	4589.28 III	
100	5376.13 III	
50	5447.18 III	
50	6242.95 III	
50	6599.39 III	
50	7461.59 III	
50	8105.14 III	
	Th IV	
	Refs. 156, 165 - J.G.C.	
	Vacuum	
4	797.53 IV	
1	835.55 IV	
30	846.91 IV	
1	854.02 IV	

Intensity	Th IV Wavelength	
30	882.39 IV	
12	886.66 IV	
100	1565.85 IV	
70	1682.22 IV	
30	1684.01 IV	
150	1707.37 IV	
200	1959.02 IV	
	Air	
200	2002.34 IV	
100	2066.70 IV	
20	2143.91 IV	
30	2146.81 IV	
1	2242.11 IV	
2	2261.26 IV	
5	2296.81 IV	
100	2693.99 IV	
2	4937.09 IV	
4	4952.52 IV	
3	5420.38 IV	
2	6711.87 IV	
3	6740.37 IV	
50	6901.16 IV	
	9839.25 IV	
	10875.05 IV	
	THULIUM (Tm)	
	Z = 69	
	Tm I and II	
	Ref. 1 - C.H.C.	
	Air	
360	2284.79 II	
120	2329.77 II	
70	2340.92 II	
120	2363.91 II	
45	2365.96 II	
160	2367.11 II	
150	2383.68 II	
110	2388.95 II	
450	2409.02 II	
110	2412.44 II	
120	2421.65 II	
450	2426.17 II	
140	2445.47 II	
770	2480.13 II	
150	2481.15 II	
130	2487.52 II	
250	2491.60 II	
100	2499.54 II	
130	2507.15 II	
1300	2509.08 II	
200	2520.87 II	
250	2522.17 II	
180	2524.11 II	
130	2527.02 I	
110	2527.42 II	
120	2542.66 II	
360	2552.76 I	
540	2561.65 II	
150	2563.86 II	
430	2588.27 II	
170 h	2596.49 I	
110	2601.09 I	
220	2606.02 II	
810	2607.06 II	
730	2624.33 II	
210	2640.76 II	
130	2646.45 II	

Intensity	Tm I and II Wavelength	
160	2650.27 II	
190	2658.48 II	
250	2660.09 II	
140	2668.20 II	
310	2679.57 II	
170	2697.50 II	
540	2721.19 II	
200	2744.08 II	
270	2779.55 II	
350	2785.07 II	
680	2794.60 II	
730	2797.27 II	
250	2818.47 II	
250	2827.02 II	
580	2827.92 II	
200	2831.55 II	
310	2844.67 II	
200	2854.17 I	
200	2860.12 II	
200	2861.74 II	
1600	2869.23 II	
630	2890.94 II	
210	2918.27 II	
270	2925.65 II	
680	2926.74 II	
630	2935.99 II	
350	2951.26 II	
430	2965.86 II	
490	2973.22 I	
540	2981.48 II	
350	2986.52 II	
630	2990.54 II	
200	2993.26 II	
230	3013.71 II	
430	3014.65 II	
1500	3015.30 II	
270	3017.09 II	
330	3026.07 II	
280	3042.35 II	
340 d	3046.76 II	
320	3050.73 II	
340	3056.07 II	
580	3073.08 II	
360	3081.12 I	
740	3098.60 II	
7400	3131.26 II	
2300	3133.89 II	
230	3144.90 II	
230	3146.16 II	
1900	3151.04 II	
1500	3157.34 II	
450	3172.65 I	
2300	3172.83 II	
380	3173.58 II	
230	3195.33 II	
320	3210.56 II	
320	3210.82 II	
320	3212.01 II	
230	3231.51 II	
470	3235.44 II	
1200	3236.81 II	
1600	3240.23 II	
2300	3241.54 II	
320	3246.96 I	
420	3247.46 II	
1900	3258.05 II	
400	3261.65 II	
320	3264.10 II	
1600	3266.64 II	

Intensity	Tm I and II Wavelength	
1200	3267.40 II	
790	3268.99 II	
1100	3276.81 II	
1200	3283.40 II	
1200	3285.61 II	
2300	3291.00 II	
2000	3302.46 II	
210	3306.01 II	
210	3306.91 II	
210	3308.01 II	
1200	3309.80 II	
640	3310.59 II	
400	3316.88 II	
210	3318.65 II	
230	3349.99 I	
230	3354.86 II	
4000	3362.61 II	
490	3374.50 II	
420 d	3384.99 II	
1700	3397.50 II	
420	3399.95 II	
850	3410.05 I	
340	3412.59 I	
340	3416.59 I	
6400	3425.08 II	
950	3425.63 II	
340	3429.33 I	
850	3429.96 II	
420	3431.19 II	
4900	3441.50 II	
4900	3453.66 II	
8500	3462.20 II	
210	3467.51 I	
340	3476.69 I	
340	3480.98 I	
340	3481.75 II	
420	3487.38 I	
210	3492.58 II	
340	3499.95 I	
250	3513.02 II	
250	3517.60 I	
250	3534.85 II	
1700	3535.52 II	
490	3536.21 II	
850	3536.58 II	
420	3537.91 I	
210	3555.82 I	
420	3557.79 II	
340	3560.92 I	
420	3563.88 I	
490	3565.91 II	
1300	3566.47 II	
420	3567.36 I	
280	3574.06 II	
280	3586.07 I	
2100	3608.77 II	
250	3609.53 II	
380	3638.41 I	
950	3643.65 II	
240	3647.72 II	
600	3653.61 II	
500	3665.81 II	
1100	3668.09 II	
410	3677.98 II	
450 d	3678.85 II	
410	3694.74 II	
4800	3700.26 II	
3800	3701.36 II	
330	3704.85 II	

Tm I and II			Tm I and II			Tm I and II			Tm I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
7700	3717.91	I	40	4561.86	II	27	5065.88	I	35	5838.76	II
890	3725.06	II	80	4564.68	I	80	5066.67	I	240	5895.63	I
2400	3734.12	II	40	4567.11	II	27	5072.42	I	35	5899.47	I
5000	3744.06	I	95	4596.63	I	27	5076.36	I	24	5901.57	I
1700	3751.81	I	270	4599.02	I	27	5077.18	I	8	5912.58	I
310	3756.86	II	35	4601.29	II	35	5085.09	I	11	5931.70	I
6000	3761.33	II	55	4603.43	II	40	5107.53	I	27	5935.90	I
4800	3761.91	II	40	4604.85	I	95	5113.97	I	140	5971.26	I
260	3783.55	II	50	4613.97	I	50	5114.55	II	27	5975.02	I
380	3795.16	II	40	4614.47	II	22	5120.67	I	11	5984.87	I
7100	3795.75	II	300	4615.94	II	22	5140.28	II	19	6025.44	I
770	3798.54	I	35	4619.06	II	40	5149.40	II	11	6067.78	II
240	3798.75	II	40	4621.72	I	19	5182.68	I	16	6131.53	I
600	3807.72	I	80	4626.33	II	40	5185.25	I	14	6175.29	I
380	3810.72	II	95	4626.56	II	14	5204.51	II	14	6181.41	II
550	3817.39	II	40	4626.97	I	80	5213.38	I	14	6299.46	II
290	3826.39	I	110	4634.26	II	22	5228.23	II	27	6352.66	I
1300	3838.20	II	40	4642.96	II	14	5260.93	II	22	6401.44	I
290	3840.87	I	95	4643.12	I	24	5267.34	II	8	6430.94	II
8900	3848.02	II	35	4644.58	I	40	5291.14	I	14	6440.54	I
140	3857.84	II	120	4655.09	I	40	5294.32	I	200	6460.26	I
6800	3883.13	I	35	4666.70	II	35	5300.21	I	14	6490.70	I
1800	3883.44	II	35	4671.99	II	35	5302.69	I	14	6519.78	I
5400	3887.35	I	35	4675.10	I	55	5305.87	II	8	6575.54	I
440	3890.53	II	80	4675.31	I	650	5307.12	I	95	6604.96	I
440	3896.62	I	40	4677.86	II	16	5322.99	II	8	6627.25	I
680	3900.79	II	160	4681.92	I	35	5338.90	I	35	6657.72	I
3500	3916.48	I	70	4685.11	I		5339.03	I	11	6658.64	I
120	3928.66	II	120	4691.11	I	80	5346.49	II	11	6692.93	I
570	3929.58	II	110	4724.26	I	27	5372.98	II	30	6721.36	I
1500	3949.27	I	680	4733.34	I	14	5391.96	II	9	6726.34	I
1500	3958.10	II	35	4750.75	II	27	5400.46	II	9	6727.94	II
440	3995.58	II	70	4759.90	I	27	5402.23	I	18	6739.22	I
1800	3996.52	II	27	4789.92	II	14	5405.98	II	9 h	6767.48	I
220	4024.23	I	27	4807.48	I	14	5461.95	II	9	6777.93	I
380	4044.47	I	35	4808.68	I	14	5464.14	I	110	6779.77	I
10000	4094.19	I	35	4813.50	I	14	5465.54	II	14 h	6782.00	I
9500	4105.84	I	27	4826.99	II	16	5500.30	II	18	6788.52	I
120	4132.69	II	27	4828.97	I	14	5526.82	II	13 h	6820.27	I
1100	4138.33	I	80	4831.20	II	24	5528.34	I	14	6826.95	I
120	4149.14	I	35	4835.75	I	14	5539.03	II	14	6829.12	II
120	4158.60	I	27 d	4851.76	I	27	5566.00	I	23	6831.09	I
8800	4187.62	I		4851.90	II	22	5581.37	I	120	6844.26	I
520	4199.92	II	19	4872.28	II	14	5586.65	II	80	6845.76	I
6000	4203.73	I	27	4879.19	I	14	5589.94	II	18	6854.12	I
220	4206.00	II	27	4891.64	I	14	5606.64	I	6	6898.56	I
380	4222.67	I	24	4909.74	I	270	5631.41	I	6	6915.86	I
3000	4242.15	II	55	4923.83	I	40	5642.60	I	10	6937.37	I
270	4271.71	I	140	4957.18	I	27	5645.40	I	5	6949.54	I
150	4298.36	I	40	4970.87	II	70	5658.30	I	5 h	6976.69	II
2700	4359.93	I	27	4971.26	I	520	5675.84	I	5	7010.79	I
1400	4386.43	I	40	4975.12	II	14	5683.59	I	6 h	7014.31	II
200	4394.42	I	50	4978.90	I	40	5684.76	II	10	7017.90	I
120	4395.96	I	40	4980.68	II	14	5696.42	II	6 h	7029.40	I
140	4396.50	I	55	4989.32	II	35	5709.97	II	12	7034.34	I
55	4437.40	II	27	4993.79	II	22	5715.79	I	10	7056.43	II
80	4442.74	I	19	4994.72	II	14	5733.81	II	5	7060.97	I
50	4447.58	I	35	5001.02	I	11 d	5737.20	II	6	7079.78	II
120	4454.03	I	27	5001.59	I		5737.25	II	10	7106.14	I
80	4459.99	I	160	5009.77	II	14 h	5738.92	II	5 h	7231.33	I
50	4467.98	I	35	5014.56	II	27	5758.02	I	5	7233.74	II
540	4481.26	II	27	5017.87	II	55	5760.20	I	4	7257.72	I
80	4489.70	II	160	5034.22	II	190	5764.29	I	17	7272.62	I
150	4519.60	I	27 h	5041.00	II	5	5778.82	II	8	7284.30	I
260	4522.57	II	22	5043.50	I	19	5782.36	II	11 h	7286.16	I
180	4529.38	II	35	5045.41	I	22	5784.46	II	14	7310.51	I
80	4532.15	I	27	5060.42	II	11	5799.97	II	11	7336.63	II
110	4548.60	I	150	5060.90	I	14	5811.19	II	14	7432.18	I
40	4556.68	II	27	5062.25	I	14 h	5816.46	I	5	7434.51	II

Sn I and II			Sn I and II			Sn I and II			Sn I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
9	1831.89	II	600 r	2317.23	I	6	3715.23	II	200	11616.26	I
50 r	1848.75	I	300 r	2334.80	I	280 r	3801.02	I	76	11670.77	I
30	1852.00	I	1000 r	2354.84	I	4	3841.44	II	25	11694.45	I
200 r	1860.32	I	20	2357.90	I	1	4294.65	II	258	11739.78	I
20	1861.42	I	3	2360.34	II	40	4524.74	I	96	11825.18	I
20	1865.52	I	22	2368.33	II	1	4579.13	II	106	11835.82	I
30	1865.96	I	60	2380.72	I	1	4580.29	II	254	11932.99	I
15	1873.29	I	4	2384.54	II	2	4877.22	II	48	12009.50	I
30	1882.64	I	100	2408.15	I	3	4944.31	II	111	12313.24	I
80	1886.05	I	800 r	2421.70	I	20	4979.73	I	33	12335.6	I
100	1891.40	I	1000 r	2429.49	I	2	5071.14	II	42	12530.87	I
20	1897.29	I	1	2433.52	II	2	5072.67	II	42	12536.5	I
12	1899.91	II	15	2448.98	II	20	5174.54	I	37	12788.2	I
50	1909.30	I	60	2455.24	I	10	5332.36	II	89	12888.5	I
40	1911.61	I	20	2476.40	I	20	5561.95	II	187	12981.7	I
20	1913.52	I	300	2483.39	I	25	5588.92	II	20	13000.3	I
80	1925.31	I	13	2483.48	II	2	5596.20	II	187	13018.5	I
20	1926.77	I	10	2486.99	II	500	5631.71	I	68	13081.5	I
15	1927.95	I	200	2495.70	I	15	5753.59	I	378	13460.2	I
40 h	1928.9	I	5	2522.61	II	1	5797.20	II	144	13608.2	I
25	1933.17	I	90	2523.92	I	15	5799.18	II	13	15018.2	I
20	1942.69	I	80 h	2531.17	I	50	5925.44	I	30	15464.2	I
150	1952.15	I	400	2546.55	I	100	5970.30	I	20	17000.5	I
15	1960.21	I	40 h	2558.01	I	150	6037.70	I	10	17807.5	I
30	1971.46	I	500 r	2571.58	I	200	6054.86	=	20	20622.2	I
50 h	1977.6	I	200	2594.42	I	250	6069.00	I	40	20861.7	I
80	1984.20	I	50 h	2636.94	I	100	6073.46	I	8	21686.2	I
15	1991.88	I	200 r	2661.24	I	6	6077.48	II	4	22131.7	I
20	1994.98	I	2	2664.93	II	5	6079.70	II	3	22997.2	I
	Air		700 r	2706.51	I	400	6149.71	I	4	24327.2	I
25	2008.05	I	2	2727.82	II	200	6154.60	I	4	24738.2	I
30	2015.76	I	20	2761.78	I	150	6171.50	I			
30	2026.98	I	150	2779.81	I	100	6310.78	I			
50	2040.66	I	80	2785.03	I	40	6354.35	I			
20	2040.90	I	60	2787.96	I	70	6453.50	II			
50	2054.03	I	60	2812.59	I	8	6761.45	II	100	753.01	III
70	2058.31	I	80	2813.58	I	25	6844.05	II	50	760.62	III
20	2064.00	I	2	2825.52	II	20	7191.40	II	75	775.79	III
80	2068.58	I	1400 r	2839.99	I	10	7387.79	II	50	784.68	III
100	2072.89	I	1	2846.42	II	20 h	7398.6	I	200	910.92	III
100	2073.08	I	200	2850.62	I	1	7408.62	II	50	1010.92	III
25	2080.62	I	1000 r	2863.32	I	30	7685.30	I	50	1048.84	III
30	2091.58	I	1	2912.80	II	13	7741.80	II	1000	1139.29	III
40	2094.35	I	200	2913.54	I	100	7754.97	I	1000	1158.33	III
200	2096.39	I	6	2919.82	II	3	7904.00	II	200	1161.09	III
100	2100.93	I	3	2991.00	II	100 h	8030.5	I	100	1161.58	III
100 r	2113.93	I	7	2994.44	II	30 h	8039.3	I	100	1180.62	III
50	2121.26	I	700 r	3009.14	I	200	8114.09	I	1000	1184.25	III
25	2140.73	I	1	3012.18	II	30 h	8121.0	I	200	1189.99	III
20	2141.43	I	8	3023.94	II	30	8349.35	I	200	1204.06	III
15	2148.46	I	200	3032.80	I	80	8357.04	I	2000	1210.52	III
1	2148.63	II	850 r	3034.12	I	300	8422.72	I	100	1215.10	III
40 r	2148.73	I	12	3047.50	II	400	8552.60	I	100	1218.14	III
20 r	2151.43	I	6	3094.69	II	50 h	8681.7	I	100	1230.17	III
30	2151.54	II	60	3141.84	I	30 h	9018.95	I	100	1231.38	III
80	2171.32	I	550 r	3175.05	I	50 h	9410.86	I	500	1243.63	III
150 r	2194.49	I	40	3218.71	I	80 h	9415.37	I	1000	1259.92	III
300 r	2199.34	I	550 r	3262.34	I	150	9616.40	I	40	1276.31	III
400 r	2209.65	I	50	3283.21	II	50	9741.1	I	1000	1305.97	III
4	2209.67	II	110	3330.62	I	100 h	9742.8	I	1000	1327.34	III
40	2211.05	I	60	3351.97	II	300 h	9805.38	I	200	1334.70	III
80 r	2231.72	I	2	3407.48	II	500	9850.52	I	200	1346.05	III
400 r	2246.05	I	10	3472.46	II	25	10456.47	I	1000	1347.65	III
6	2246.07	II	7	3537.57	II	11	10807.58	I	200	1369.71	III
60	2251.17	I	11	3575.45	II	54	10894.00	I	1000	1386.74	III
30	2267.19	I	3	3582.39	II	70	11191.85	I	500	1410.61	III
400 r	2268.91	I	2	3620.08	II	56	11277.66	I	200	1449.77	III
20	2282.26	I	6	3620.54	II	17	11336.97	I	1000	1570.36	III
200 r	2286.68	I	40	3655.78	I	200	11454.59	I	50	1674.29	III

Sn III		
Intensity	Wavelength	
		Ref. 423 - C.H.C.
		Vacuum
100	753.01	III
50	760.62	III
75	775.79	III
50	784.68	III
200	910.92	III
50	1010.92	III
50	1048.84	III
1000	1139.29	III
1000	1158.33	III
200	1161.09	III
100	1161.58	III
100	1180.62	III
1000	1184.25	III
200	1189.99	III
200	1204.06	III
2000	1210.52	III
100	1215.10	III
100	1218.14	III
100	1230.17	III
100	1231.38	III
500	1243.63	III
1000	1259.92	III
40	1276.31	III
1000	1305.97	III
1000	1327.34	III
200	1334.70	III
200	1346.05	III
1000	1347.65	III
200	1369.71	III
1000	1386.74	III
500	1410.61	III
200	1449.77	III
1000	1570.36	III
50	1674.29	III

Ti I and II		Ti I and II		Ti I and II		Ti I and II	
Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength
	3361.26 I	140	3694.45 I	4500	3948.67 I	40	4224.79 I
120	3361.84 I	30	3698.18 I	4500	3956.34 I	40	4227.65 I
1100	3370.44 I	60	3698.43 I	5200	3958.21 I	130	4237.89 I
4300	3371.45 I	60	3700.08 I	950	3962.85 I	85	4249.12 I
140	3372.21 II	120	3702.29 I	950	3964.27 I	130	4256.04 I
5700	3372.80 II	190	3704.30 I	4800	3981.76 I	70	4258.54 I
60	3374.35 II	140	3706.23 II	570	3982.48 I	70	4261.60 I
2900 d	3377.48 I	50	3707.53 I	60	3984.33 I	330	4263.13 I
	3377.58 I	290	3709.96 I	35	3985.25 I	35	4265.71 I
290	3379.22 I	30	3715.40 I	60	3985.59 I	40	4266.22 I
1400	3380.28 II	450	3717.40 I	5700	3989.76 I	70	4270.14 I
170	3382.31 I	140	3721.64 II	35	3994.70 I	85	4272.43 I
5700	3383.76 II	330	3722.57 I	7800	3998.64 I	240	4274.58 I
170	3385.66 I	600	3724.57 I	70	3999.36 I	120	4276.43 I
1400	3385.95 I	380	3725.16 I	70	4002.49 I	120	4278.23 I
1400	3387.84 II	2900	3729.82 I	70	4003.81 I	30	4278.81 I
60	3388.76 II	50	3735.67 I	35	4005.97 I	110	4281.38 I
140	3390.68 I	60	3738.90 I	70	4008.06 I	220	4282.71 I
140	3392.71 I	3300	3741.06 I	950	4008.93 I	160	4284.99 I
1100	3394.58 II	330	3741.64 II	190	4009.66 I	890	4286.01 I
60	3398.63 I	160	3748.10 I	70	4012.39 II	840	4287.40 I
60	3402.42 II	5200	3752.86 I	180	4013.58 I	30	4288.16 I
60	3407.20 II	600	3753.64 I	70	4015.38 I	950	4289.07 I
95	3409.81 II	140	3757.69 II	35	4016.28 I	120	4290.23 II
60	3439.30 I	3300	3759.30 II	120 h	4017.77 I	840	4290.94 I
890	3444.31 II	2900	3761.32 II	140	4021.83 I	120	4291.14 I
60	3452.47 II	50	3761.89 II	1200	4024.57 I	140	4294.12 II
180	3456.39 II	60	3766.45 I	40	4025.14 II	840	4295.76 I
600	3461.50 II	600	3771.66 I	190 h	4026.54 I	2000	4298.66 I
95	3467.26 I	30	3776.06 II	40	4027.48 I	200	4299.23 I
600	3477.18 II	840	3786.04 I	40	4028.34 II	200	4299.64 I
60	3478.92 I	120	3789.30 I	190 h	4030.51 I	200	4300.05 II
240	3480.53 I	70	3795.90 I	40	4033.91 I	2900	4300.56 I
60	3485.69 I	60	3798.31 I	30	4034.91 I	4100	4301.09 I
60	3489.74 II	70	3818.22 I	110	4035.83 I	85	4301.93 II
480	3491.05 II	60	3822.03 I	35 h	4040.32 I	6000	4305.92 I
60	3495.75 I	240	3828.19 I	290	4055.02 I	180	4307.90 II
95	3499.10 I	95	3833.68 I	85	4057.62 I	35	4308.50 I
890	3504.89 II	95	3836.78 I	85	4058.14 I	40	4311.65 I
120	3506.64 I	60	3846.45 I	410	4060.26 I	85	4312.87 II
600	3510.84 II	130	3853.05 I	200	4064.22 I	85	4314.35 I
60	3520.25 II	130	3853.73 I	200	4065.10 I	1200	4314.80 I
310	3535.41 II	170	3858.14 I	840	4078.47 I	360	4318.64 I
190	3547.03 I	240	3866.44 I	40	4079.72 I	180	4321.66 I
120	3573.74 II	170	3868.40 I	290	4082.46 I	190	4325.13 I
60	3574.24 I	120	3873.21 I	85	4099.17 I	160	4326.36 I
60	3587.13 II	260	3875.26 I	220	4112.71 I	30	4334.84 I
240	3596.05 II	170	3882.15 I	85	4122.17 I	160	4337.92 II
190	3598.72 I	170	3882.33 I	40	4123.31 I	24	4344.29 II
600	3610.16 I	500	3882.89 I	85	4123.57 I	70	4346.11 I
190	3624.82 II	60 h	3888.02 I	130	4127.54 I	35	4354.06 I
95	3635.20 I	70	3889.95 I	40	4129.17 I	95	4360.49 I
4800	3635.46 I	200 h	3895.25 I	40	4131.25 I	24	4368.94 I
120	3637.97 I	85	3898.49 I	140	4137.29 I	95	4369.68 I
190	3641.33 II	530	3900.54 II	85	4143.05 I	60	4372.38 I
6600	3642.68 I	180	3900.96 I	170	4150.96 I	30	4388.08 I
180	3646.20 I	2600	3904.78 I	85	4159.64 I	170	4393.92 I
7200	3653.50 I	110 h	3911.19 I	70	4163.65 II	330	4395.04 II
290	3654.59 I	500	3913.46 II	35	4164.14 I	60	4399.77 II
660	3658.10 I	500	3914.34 I	40	4166.32 I	240	4404.28 I
120	3659.76 II	24	3914.74 I	85	4169.35 I	60	4404.90 I
380	3660.63 I	35	3919.82 I	120	4171.03 I	30	4405.68 I
190	3662.24 II	290	3921.42 I	40	4171.90 II	60	4416.54 I
380	3668.97 I	1100	3924.53 I	35	4183.30 I	220	4417.28 I
600	3671.67 I	110	3926.32 I	360	4186.12 I	60	4417.72 II
3100	3685.20 II	890	3929.88 I	40	4188.69 I	120	4421.76 I
120	3685.96 I	35	3932.02 II	70	4200.75 I	120	4422.82 I
95	3687.35 I	70	3934.24 I	85	4203.46 I	24	4424.39 I
600	3689.91 I	1100	3947.78 I	35	4211.73 I	30	4425.83 I

Ti I and II			Ti I and II			Ti I and II			Ti I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
120	4426.06	I	240	4571.98	II	55	4925.41	I	75	5207.87	I
890	4427.10	I	19	4585.84		30	4926.16	I	65	5208.42	
21	4430.02	I	24	4589.95	II	150	4928.34	I	1400	5210.39	I
85	4430.37	I	60	4599.23	I	30	4937.74	I	65	5212.29	I
50	4431.28	I	21	4609.37	I	95	4938.29	I	150	5219.71	I
30	4432.60	I	950	4617.27	I	30	4941.58	I	95	5222.69	I
24	4433.58	I	24	4619.52	I	21	4948.19	I	85	5223.64	I
170	4434.00	I	480	4623.09	I	21	4958.25	I	250	5224.32	I
70	4436.59	I	190	4629.34	I	55	4964.75	I	95	5224.56	I
30	4438.23	I	50 d	4634.87		21	4966.04	I	190	5224.95	I
130	4440.35	I	60	4637.88	I	65	4968.58	I	65	5226.56	II
50	4441.27	I	240	4639.37	I	75	4973.05	I	120	5238.58	I
230	4443.80	II	220	4639.67	I	120	4975.35	I	21	5246.15	I
24	4444.27	I	190	4639.95	I	65	4977.74	I	55	5246.57	I
840	4449.15	I	140	4645.19	I	120	4978.20	I	75	5247.31	I
30	4450.49	II	120	4650.02	I	5800	4981.73	I	21	5250.95	I
550	4450.90	I	24	4656.04	I	150	4989.15	I	110	5252.11	I
840	4453.32	I	720	4656.47	I	4600	4991.07	I	75	5255.83	I
290	4453.71	I	840	4667.59	I	30	4995.08	I	55	5259.99	I
950	4455.33	I	70	4675.12	I	140	4997.10	I	55	5263.50	I
1100	4457.43	I	950	4681.92	I	4000	4999.51	I	150	5265.98	I
21	4462.09	I	21	4686.92	I	230	5001.01	I	40	5282.39	I
70	4463.38	I	24	4690.80	I	3600	5007.21	I	140	5283.45	I
95	4463.54	I	190	4691.34	I	120	5009.65	I	35	5284.39	I
290	4465.81	I	40	4693.68	I	230	5013.30	I	26	5288.81	I
240	4468.50	II	24	4696.94	I	3200 d	5014.19	I	65	5295.79	I
240	4471.24	I	190	4698.76	I		5014.24	I	120	5297.26	I
95	4474.85	I	120	4710.19	I	580	5016.17	I	65	5298.44	I
95	4479.70	I	24	4715.30	I	840	5020.03	I	26	5336.81	II
50	4480.59	I	65	4722.62	I	840	5022.87	I	17	5341.50	I
530	4481.26	I	65	4723.17	I	580	5024.84	I	75	5351.08	I
95	4482.69	I	55	4731.17	I	300	5025.58	I	26	5366.65	I
19	4488.32	II	45	4733.43	I	1200	5035.91	I	55	5369.64	I
260	4489.09	I	18	4734.68	I	840	5036.47	I	40	5389.18	I
24	4492.55	I	22	4742.11	I	740	5038.40	I	55	5389.99	I
40	4495.01	I	170	4742.79	I	1200	5039.95	I	17	5396.60	I
240	4496.15	I	22	4747.68	I	75	5040.62	I	85	5397.09	I
24	4497.73	I	310	4758.12	I	85	5043.59	I	35	5404.02	I
200	4501.27	II	310	4759.28	I	35	5044.27	I	110	5409.61	I
40	4503.78	I	45	4766.33	I	55	5045.41	I	40	5426.26	I
21	4506.36	I	28	4769.77	I	26	5048.21	I	75	5429.15	I
50	4511.17	I	65	4778.26	I	110	5052.87	I	26	5436.73	I
780	4512.74	I	45	4781.72	I	21	5054.08	I	17	5438.32	I
19	4515.62	I	110	4792.49	I	110	5062.11	I	40	5446.64	I
1000	4518.03	I	45	4796.22	I	35	5064.07	I	11bl	5448.34	TiO
95	4518.70	I	35	4797.98	I	1400	5064.66	I	30	5448.90	I
1000	4522.80	I	110	4799.80	I	95	5065.99	I	21	5449.16	I
780	4527.31	I	28	4805.10	II	35 h	5068.33	I	35	5453.65	I
6000	4533.24	I	110	4805.43	I	65	5069.35	I	55	5460.51	I
240	4533.97	II	45	4808.53	I	130	5071.48	I	75	5471.21	I
3600	4534.78	I	22	4811.08	I	40	5085.34	I	35	5472.70	I
2400	4535.58	I	40	4812.25	I	130	5087.07	I	40 h	5473.55	I
1200	4535.92	I	200	4820.42	I	21	5103.15	I	85	5474.23	I
1200	4536.05	I	22	4825.46	I	55	5109.44	I	30	5474.46	I
24	4537.23	I	40	4836.13	I	190	5113.44	I	120 h	5477.71	I
24	4539.10	I	470	4840.87	I	270	5120.42	I	110	5481.43	I
720	4544.69	I	65	4848.47	I	30	5129.15	II	75	5481.87	I
950	4548.77	I	290	4856.01	I	270	5145.47	I	85 h	5488.20	I
240	4549.63	II	35	4864.18	I	230	5147.48	I	150	5490.15	I
950	4552.46	I	200	4868.26	I	210	5152.20	I	26	5490.84	I
24	4555.08	I	250	4870.14	I	21bl	5166.86	TiO	110	5503.90	I
720	4555.49	I	28	4880.91	I	1100	5173.75	I	40	5511.78	I
19	4557.86	I	45	4882.35	I	40	5186.34	I	340	5512.53	I
19	4558.11	I	400	4885.08	I	85	5188.70	II	270	5514.35	I
60	4559.92	I	380	4899.91	I	30	5189.58	I	320	5514.54	I
50	4562.63	I	320	4913.62	I	1300	5192.98	I	26	5530.49	I
35	4563.43	I	55	4915.24	I	85 h	5194.04	I	110	5565.49	I
110	4563.77	II	130	4919.87	I	65	5201.10	I	13	5579.16	I
35	4570.91	I	180	4921.77	I	120	5206.08	I	21 h	5582.98	I

Ti I and II			Ti I and II			Ti I and II			Ti III		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
30 h	5585.68		55	6312.24	I	23	7654.44	I	10	2199.22	III
65bl	5597.85	TiO	26	6318.03	I	11bl	7705.21	TiO	12	2237.77	III
55bl	5629.28	TiO	30	6336.10	I	30	7949.17	I	10	2327.02	III
17	5635.84		35	6366.35	I	26 h	7961.58	I	15	2331.35	III
250	5644.14	I	11	6419.10	I	60	7978.88	I	15	2331.66	III
75	5648.58	I	17	6497.69	I	9	7979.07	I	15	2334.34	III
26bl	5661.55	TiO	19	6508.14	I	30	7996.53	I	17	2339.00	III
190	5662.16	I	55	6546.28	I	7 h	8003.55		18	2346.79	III
75	5662.91	I	65	6554.23	I	55	8024.84	I	18	2374.99	III
21	5673.42	I	11 h	6554.83		30	8068.24	I	22	2413.99	III
130	5675.44	I	75	6556.07	I	8	8267.62		25	2516.05	III
30 h	5679.94	I	19 h	6565.62	I	14 h	8306.31	I	24	2527.84	III
95	5689.47	I	14 h	6575.18	I	9 h	8307.41	I	23	2540.06	III
75	5702.68	I	35	6599.11	I	9 h	8311.76	I	24	2563.44	III
35	5708.23	I	18bl	6651.46	TiO	8 h	8312.85	I	23	2565.42	III
65	5711.88	I	18 h	6666.55	I	12	8334.37	I	22	2567.56	III
40 h	5713.92	I	22 h	6667.74		14	8353.15	I	15	2576.47	III
95	5715.13	I	9	6668.39		75	8364.24	I	15	2580.46	III
55	5716.48	I	18	6677.18	I	100	8377.85	I	10	2692.16	III
35	5720.48	I	22 b	6691.21	TiO	100	8382.54	I	12	2701.96	III
85	5739.51	I	26	6716.68	I	55	8382.82	I	22	2984.75	III
40	5740.02	I	16bl	6723.95	TiO	75	8396.87	I	12 d	3354.71	III
19	5741.22	I	80	6743.12	I	120	8412.36	I	12	3872.50	III
21	5752.84	I	22	6745.52	I	19	8416.98	I	12	3881.21	III
19	5756.86	I	18	6844.64		15	8424.41	I	12	3893.63	III
40 h	5762.27	I	18	6860.39		170	8426.52	I	10	3896.33	III
55 h	5766.35	I	35	6861.47	I	490	8434.94	I	15	3915.47	III
75 h	5774.05	I	9	6873.92	I	240	8435.70	I	12	3921.38	III
30	5780.78	I	12	6913.19	I	40	8438.93	I	10	3921.61	III
75 h	5785.98	I	14 h	6933.15	I	40	8450.89	I	12	3922.95	III
65hl	5804.26	I	14 h	6943.70	I	9 h	8457.10	I	10	3924.86	III
21bl	5814.96	TiO	23	6996.63	I	19 h	8467.15	I	10	4060.21	III
40	5823.71	I	15	7004.66	I	45	8468.50	I	10	4119.14	III
21 h	5841.18		14	7008.35	I	15	8496.04	I	11	4215.52	III
21	5852.34		14	7010.94	I	19 h	8518.05	I	11	4269.84	III
400	5866.46	I	14 h	7035.86	I	40	8518.32	I	11	4296.70	III
65	5880.31	I	40	7038.80	I	14	8539.38	I	10	4348.04	III
21 h	5888.68		14	7050.65	I	40	8548.12	I	11	4433.91	III
230	5899.32	I	40bl	7054.51	TiO	9	8569.77	I	10	4540.22	III
55	5903.33	I	23	7069.11	I	9 h	8598.18	I	15	4549.84	III
120	5918.55	I	23	7072.05		90	8675.39	I	10 d	4555.46	III
150	5922.12	I	45bl	7087.89	TiO	45	8682.99	I	15 d	4572.20	III
75	5937.82	I	30 b	7124.9	TiO	23	8692.33	I	10	4649.45	III
120	5941.76	I	40bl	7125.61	TiO	19	8734.69	I	12	4652.86	III
300	5953.17	I	26	7138.91	I	23	8766.64	I	10	4874.00	III
200	5965.84	I	26	7167.13		15 h	8778.71	I	10	4950.10	III
270	5978.56	I	23	7171.53					10	4971.19	III
340	5999.04	I	55	7189.89	I				10	5083.80	III
65	5999.68	I	26 b	7203.64	TiO				14	5147.31	III
21	6012.73		260	7209.44	I				12 d	5226.28	III
110	6064.63	I	60	7216.20	I	6	1282.48	III	11	5247.49	III
120	6085.23	I	130	7244.86	I	6	1286.23	III	17	5278.12	III
120	6091.17	I	130	7251.72	I	15	1286.36	III	10	5278.70	III
40	6092.81	I	19	7263.40		10	1289.30	III	12	5298.43	III
40 h	6098.67	I	19	7266.29	I	10	1291.62	III	16	5301.20	III
35 h	6121.01	I	19 b	7269.05	TiO	10	1293.23	III	15	5306.88	III
120	6126.22	I	15	7315.56	I	15	1294.70	III	10	5395.69	III
19	6138.38	I	26	7318.39	I	10	1295.88	III	12	5533.01	III
30	6146.22	I	120	7344.72	I	20	1298.66	III	10	5817.44	III
21	6149.74	I	11	7352.16	I	20	1298.97	III	12	6611.38	III
30bl	6162.23	TiO	90	7357.74	I	12	1327.59	III	18	6621.58	III
35	6186.15	I	60	7364.11	I	10	1420.04	III	10	6629.37	III
95 h	6215.28	I	26	7440.60	I	10	1420.44	III	14	6647.47	III
75 h	6220.49	I	9	7474.94	I	10	1421.63	III	18	6667.99	III
65 h	6221.41	I	26	7489.61	I	10	1421.77	III	15	6674.19	III
380	6258.10	I	19	7496.12	I	12	1422.40	III	14	6707.76	III
380	6258.70	I	12	7580.55	I	10	1424.14	III	12	6724.80	III
300	6261.10	I	9bl	7589.62	TiO	23	1455.19	III	16	6734.10	III
65	6303.75	I	15	7614.50	I	10	1498.70	III			

W I and II			W I and II			W I and II			W I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
50	2534.82	II	400	2678.88	I	50	2918.63	II	210 d	3266.62	I
580	2545.34	I	2100	2681.42	I	360	2923.10	I		3266.77	I
1200	2547.14	I	290	2683.35	I	230	2923.54	I	150	3281.94	I
50	2549.09	II	210	2691.09	I	230	2925.13	I	150	3293.71	I
40	2550.10	II	650	2695.67	I	690	2935.00	I	730	3300.82	I
780	2550.38	I	210	2697.71	II	2400	2944.40	I	440	3311.38	I
2700	2551.35	I	650	2699.59	I	2400	2946.99	I	440	3326.20	I
450	2553.82	I	400	2700.01	I	480	2947.39	I	440	3331.69	I
410	2554.86	II	40	2701.48	II	210	2952.29	II	150	3354.45	I
580	2555.09	II	160	2702.11	II	440	2964.52	I	150	3371.04	I
	2555.21	I	210	2702.52	I	480	2977.11	I	390	3373.75	I
310	2556.75	I	400	2706.58	I		2977.21	I	150	3412.96	I
290	2560.12	I	400	2708.59	I	730 d	2979.71	I	150	3413.53	I
730	2561.97	I	400 d	2708.80	I		2979.86	I	150	3422.42	I
230	2563.16	II		2708.93	I	400	2993.61	I	150	3427.71	I
110	2563.91	II	80	2709.58	II	240	2995.26	I	230	3429.59	I
530	2571.44	II	40	2710.78	II	190	3009.09	I	240	3443.00	I
170 d	2572.24	II	400	2715.50	I	360	3013.79	I	160	3477.94	I
	2572.35	II	80	2716.32	II	520	3016.47	I	400	3495.24	I
75	2573.95	II	80	2718.04	II	770	3017.44	I	160	3508.73	I
190	2579.26	II	2100	2718.91	I	110	3024.50	II	160	3510.02	I
290	2580.34	I	320	2719.33	I	210	3024.93	I	160	3526.85	I
870	2580.49	I	210	2719.86	I	310 d	3026.67	I	160	3535.54	I
40	2581.20	II	2600	2724.35	I		3026.79	I	160	3537.45	I
390	2584.39	I	210	2724.62	I	160	3033.56	I	650	3545.22	I
390	2589.17	II	400	2725.03	I	160	3034.19	I	160	3568.04	I
170	2591.49	II		2725.06	I	160	3039.31	I	240	3570.65	I
110	2598.74	II	80	2729.62	II	440 d	3041.73	I	80	3572.48	II
370	2601.96	I	75	2740.79	II		3041.86	I	160	3575.22	I
75	2602.51	II	650	2748.84	I	270	3043.80	I	80	3592.42	II
75	2603.02	II	40 d	2760.74	II	440	3046.44	I	240	3606.06	I
270	2603.54	I	80	2761.59	II	110	3048.66	I	80	3613.79	II
680	2606.39	I	400	2762.34	I	810	3049.69	I	1900	3617.52	I
320	2607.38	I	400	2764.27	II	110	3064.93	I	160	3622.34	I
370	2608.32	I	210	2768.98	I	180	3073.28	I	130	3627.24	I
970	2613.08	I	400	2769.74	I	110	3077.52	II	320	3631.94	I
480	2613.82	I	810	2770.88	I	180 d	3084.83	I	240	3641.41	II
230	2615.12	I	210	2773.70	I		3084.91	I	80	3646.52	II
70	2615.44	II	810	2774.00	I	370	3093.50	I	80	3657.59	II
210	2619.18	I	810	2774.48	I	240	3107.23	I	160	3675.55	I
400	2620.25	I	160	2776.50	II	240	3108.02	I	650	3682.08	I
400	2622.21	I	40	2778.69	II	230	3117.57	I	400	3683.30	I
400	2625.22	I	210	2787.98	I	260	3120.18	I		3683.39	I
210	2628.26	I	340	2791.96	I	160	3133.88	I	160	3683.93	I
400	2632.48	I	810	2792.70	I	130	3141.42	I	570	3688.06	I
400	2632.70	I	80	2799.03	II	65	3149.85	II	810	3707.92	I
810	2633.13	I	400	2799.93	I	290	3163.42	I	60	3716.08	II
290	2636.54	I	160 d	2801.05	II	130	3164.44	I	100	3719.39	I
400 d	2638.62	I		2801.17	I	130	3165.38	I	50	3736.22	II
	2638.75	I	130	2805.92	II	320	3176.60	I	120	3741.71	I
210	2645.69	I	40	2812.25	II	130	3179.06	I	510	3757.92	I
650	2646.18	I	810	2818.06	I	190	3181.82	I	680	3760.13	I
400	2646.73	I	160	2822.57	II	130	3184.05	I	1000	3768.45	I
75	2647.74	II	260	2829.82	I	130	3184.42	I	120	3769.21	I
40	2653.42	II	1600	2831.38	I	65	3189.24	II	120	3769.86	I
80	2653.57	II	810	2833.63	I	390	3191.57	I	340	3773.71	I
1600	2656.54	I	210	2835.64	I	390	3198.84	I	1000	3780.77	I
400	2657.38	I	400	2841.57	I	520	3207.25	I	170	3792.76	I
400 d	2658.04	II	810	2848.02	I	140	3208.28	I	290	3809.22	I
	2658.18	I	650	2856.03	I	1000	3215.56	I	190	3810.38	I
810	2662.84	I	650	2866.06	I	140	3221.21	I	260	3810.79	I
260	2664.97	I	230	2878.72	I	140	3221.91	I	1400	3817.48	I
75	2666.49	II	610	2879.11	I	190	3232.49	I	110	3829.13	I
210	2669.30	I	610	2879.40	I	140	3237.09	I	1100	3835.06	I
810	2671.47	I	440	2896.01	I	140	3242.03	I	290	3838.51	I
80	2673.59	II	1500	2896.44	I	140	3252.29	I	730	3846.22	I
650	2677.28	I	230	2910.48	I	210	3254.36	I	250	3847.49	I
160 d	2677.79	II	270	2911.00	I	140	3259.43	I	27	3851.57	II
	2677.91	I	360	2918.25	I	210	3259.66	I	150	3855.55	I

Intensity	W I and II Wavelength	Intensity	W I and II Wavelength	Intensity	W I and II Wavelength	Intensity	W I and II Wavelength
150	3859.30 I	110	4269.77 I	13	5676.60 I	8	6828.43 I
180	3864.34 I	220	4274.55 I	15	5676.90 I	4	6853.74 I
1800	3867.99 I	160	4275.49 I	15	5697.79 I	4	6876.01 I
250	3872.84 I	160	4276.74 I	55	5735.09 I	5	6908.29 I
110	3874.41 I	110	4282.34 I	13	5749.24 I	9	6934.23 I
730	3881.41 I	110	4286.01 I	11	5756.10 I	8	6964.12 I
110	3892.72 I	110	4294.10 I	13	5793.06 I	13	6984.27 I
140 h	3897.91 I	4100	4294.61 I	13	5796.49 I	8	6993.27 I
150	3935.03 I	2200	4302.11 I	45	5804.85 I	4	6994.06 I
120	3936.97 I	160	4306.87 I	13 d	5806.05 I	8	7017.88 I
120	3947.98 I	110	4307.64 I		5806.24 I	3	7028.68 I
120	3952.52 I	110	4332.13 I	13	5833.61 I	3	7098.22 I
120	3952.90 I	100	4347.00 I	13	5838.97 I	4 h	7111.18 I
160	3953.15 I	150	4355.17 I	17	5845.27 I	15	7140.52 I
200	3955.30 I	100	4361.81 I	28	5851.58 I	9	7162.64 I
160	3965.14 I	150	4364.78 I	11	5856.61 I	5 h	7191.33 I
130	3968.59 I	100 d	4365.95 I	22	5864.63 I	5	7198.62 I
150 h	3970.80 I		4366.07 I	11	5874.22 I	11	7200.16 I
130	3979.29 I	150	4372.52 I	13	5880.21 I	5	7216.35 I
130	3980.64 I	200	4378.48 I	13	5891.61 I	4	7226.06 I
250	3983.29 I	180	4384.85 I	13	5901.20 I	8	7237.12 I
8600	4008.75 I	100	4403.95 I	40	5902.64 I	5	7274.47 I
540	4015.22 I	200	4408.28 I	13	5928.58 I	10	7278.24 I
170 h	4016.52 I	130	4412.19 I	55	5947.57 I	15	7285.81 I
220	4019.23 I	160	4436.90 I	13	5953.96 I	15	7296.55 I
130	4022.12 I	140	4460.49 I	13	5956.19 I	3	7298.25 I
180	4028.79 I	140	4466.34 I	27	5960.83 I	7	7385.08 I
180	4036.86 I	140	4466.74 I	55	5965.86 I	4	7451.39 I
140	4039.85 I	640	4484.19 I	27	5972.51 I	3	7456.37 I
140 h	4044.28 I	160	4504.84 I	20	5978.86 I	8	7483.35 I
910	4045.59 I	130	4512.88 I	20	5983.82 I	7	7504.13 I
180	4064.79 I	120	4513.25 I	13	6009.01 I	10	7509.00 I
150	4069.79 I	150	4543.54 I	55	6012.78 I	3	7520.66 I
730	4069.95 I	150	4546.47 I	40	6021.52 I	9	7537.45 I
340	4070.61 I	150	4551.82 I	20	6028.32 I	9	7550.48 I
100	4071.93 I	140	4570.64 I	20	6043.31 I	17	7569.92 I
5000	4074.36 I	170	4588.73 I	13	6049.92 I	5	7582.88 I
150	4082.96 I	140	4599.94 I	13	6065.08 I	3	7612.18 I
130	4088.33 I	140	4609.89 I	22	6081.44 I	17	7614.15 I
100	4095.69 I	160	4613.30 I	13	6111.66 I	3	7631.29 I
1000	4102.70 I	100	4642.53 I	13	6115.52 I	3	7654.81 I
150	4109.75 I	130	4657.42 I	22	6128.25 I	13	7688.97 I
100	4111.82 I	640	4659.87 I	13	6143.94 I	4	7701.01 I
150	4118.05 I	640	4680.51 I	20	6153.72 I	5	7761.16 I
100	4118.19 I	100	4693.72 I	20	6154.87 I	3	7776.73 I
100	4120.85 I	140	4757.54 I	20	6203.51 I	11	7784.15 I
100	4125.16 I	790	4843.81 I	20	6254.28 I	7	7808.96 I
150	4126.80 I	380	4886.90 I	27	6285.88 I	2	7823.82 I
100	4133.48 I	220	4982.59 I	45	6292.02 I	4	7863.47 I
540	4137.46 I	330	5006.15 I	20	6303.21 I	2	7867.04 I
150	4138.02 I	220	5015.30 I	13	6386.47 I	4	7880.40 I
110	4142.25 I	820	5053.28 I	35	6404.21 I	5	7886.48 I
140	4145.16 I	210	5054.60 I	40	6445.12 I	9	7940.92 I
110	4145.95 I	210	5069.12 I	11	6508.05 I	3	7957.06 I
160	4154.66 I	120	5071.74 I	15	6532.39 I	22	8017.19 I
160	4170.53 I	770	5224.66 I	13	6538.11 I	7	8054.89 I
450	4171.17 I	27	5500.49 I	13	6563.20 I	22	8055.64 I
160	4204.40 I	27	5503.44 I	20	6573.93 I	5	8060.38 I
220	4207.05 I	10	5508.61 I	11	6607.13 I	13	8123.82 I
110	4215.38 I	220	5514.68 I	11	6609.05 I	5	8143.19 I
250	4219.37 I	15	5531.38 I	17	6611.62 I	3	8165.72 I
110	4222.04 I	15	5537.72 I	11	6621.74 I	5	8210.22 I
150	4234.34 I	13	5568.09 I	13	6678.42 I	4	8322.05 I
290	4241.44 I	13	5604.31 I	15	6693.08 I	10	8338.08 I
540	4244.36 I	11	5631.27 I	5	6746.56 I	4	8348.81 I
290	4259.35 I	27	5631.94 I	5	6764.45 I	7	8358.72 I
200	4260.29 I	65	5648.37 I	7	6805.31 I	3	8382.94 I
200	4263.30 I	35	5660.72 I	9	6814.92 I	4	8402.60 I
1400	4269.38 I	27	5674.39 I	9	6820.27 I	4	8475.14 I

W I and II			U I and II			U I and II			U I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
27	8585.11	I	320	2982.74	II	1600	3514.61	I	300	3776.48	I
10	8594.42	I	530	2984.61	II	390	3509.66	II	380	3780.71	II
8	8613.27	I	410	2992.72	II	320	3513.67	I	1900	3782.84	II
3	8614.50	I	360	3007.91	II	390	3519.96	II	430	3783.84	II
13	8865.53	I	320	3021.22	II	390	3531.11	II	570	3793.10	II
URANIUM (U)			630	3022.21	II	630	3533.57	II	380	3793.26	I
Z = 92			320	3024.51	II	320	3534.33	I	380	3793.57	II
U I and II			320	3028.19	II	530	3540.47	II	380	3808.92	I
Refs. 1,303 - J.G.C.			630	3031.99	II	320	3542.57	I	380	3809.22	II
Air			490	3033.18	II	390	3547.19	II	1900	3811.99	I
440	2565.41	II	490	3044.16	II	320	3549.20	I	380	3813.79	II
340	2569.71	II	580	3050.20	II	1200	3550.82	II	380	3814.06	II
340	2591.25	II	630	3057.91	II	320	3552.17	II	750	3826.51	II
610	2635.53	II	460	3061.62	II	680	3555.32	I	2000	3831.46	II
470	2645.47	II	630	3062.54	II	320	3561.41	I	1200	3839.63	I
340	2669.17	II	580	3072.78	II	1200	3561.80	I	490 p	3848.60	II
470	2683.28	II	580	3093.01	II	390	3563.66	I	620	3854.22	I
320	2691.04	II	320	3095.75	II	2300	3566.59	I	2400	3854.64	II
370	2706.95	II	320	3098.01	II	530	3569.08	I	4900	3859.57	II
370	2733.97	II	580	3102.39	II	320	3574.76	I	490	3861.17	II
470	2754.16	II	460	3104.15	II	360	3577.92	I	1900	3865.92	II
340	2762.85	II	970	3111.62	II	630	3578.72	II	380	3866.80	II
390	2770.04	II	530	3119.35	II	360	3581.84	II	1500	3871.03	I
410	2784.45	II	680	3124.95	II	3200	3584.88	I	620	3874.04	II
830	2793.94	II	530	3139.61	II	320	3590.50	II	620	3878.08	II
870	2802.56	II	410	3144.97	II	390	3591.74	I	1000	3881.45	II
630	2807.05	II	490	3145.56	II	460	3593.52	II	490	3882.36	II
440	2808.98	II	680	3149.24	II	360	3605.27	I	380	3883.28	II
630	2817.96	II	530	3153.11	II	320	3606.32	II	2200	3890.36	II
870	2821.12	II	340	3176.21	II	320	3616.33	I	620	3892.68	II
390	2824.37	II	340	3177.33	II	320	3616.76	II	490	3894.12	I
680	2828.90	II	340	3206.05	II	320	3620.08	I	490	3896.77	II
920	2832.06	II	730	3229.50	II	320	3622.70	I	620	3899.78	II
360	2837.19	II	680	3232.16	II	390	3623.06	II	410	3902.55	II
460	2839.89	II	440	3244.22	II	460	3630.73	II	460	3904.30	II
360	2842.09	II	340	3265.79	II	840	3638.20	I	380	3906.45	I
360	2849.48	II	440	3270.12	II	310	3640.76	II	330	3911.67	II
390	2860.47	II	440	3288.21	II	420	3644.24	I	380	3915.88	II
970	2865.68	II	730	3291.33	II	310	3645.03	II	330	3926.21	I
340	2870.97	II	1100	3305.89	II	660	3651.54	I	330	3926.72	I
490	2882.74	II	390	3337.79	II	490	3652.06	I	430	3930.98	II
460	2887.25	II	440	3341.66	II	960	3659.15	I	2000	3932.02	II
410	2888.26	II	390	3357.84	I	2800	3670.07	II	490	3935.38	II
1200	2889.62	II	730	3390.38	I	380	3678.75	II	330	3940.48	II
320	2894.14	II	340	3394.77	II	540	3691.92	II	1200	3943.82	I
410	2894.51	II	580	3424.56	II	330	3693.70	II	300	3948.44	I
780	2906.80	II	580	3435.49	I	540	3700.57	II	300	3953.58	II
780	2908.28	II	360	3453.55	II	1100	3701.52	II	360	3954.67	II
320	2914.25	II	320	3454.23	II	350	3713.55	I	350	3964.21	I
360	2914.63	II	320	3457.05	II	300	3717.42	II	600	3966.52	II
440 p	2921.68	II	320	3457.71	II	350	3718.11	II	1200	3985.79	II
320	2927.38	II	360	3459.92	I	350	3729.82	II	460	3990.42	II
490	2928.60	II	320	3462.22	I	350	3732.62	II	380	3992.53	II
580	2931.41	II	460	3463.55	I	350	3733.07	II	350	3998.24	II
440	2932.61	II	630	3466.30	I	600	3738.04	II	350	4004.06	II
340	2933.86	II	390	3472.52	II	300	3744.25	II	430	4005.21	I
530 p	2940.37	II	320	3473.43	I	680	3746.42	II	570	4017.72	II
1300	2941.92	II	360	3480.36	I	350	3747.14	II	300	4018.99	II
830	2943.90	II	680	3482.49	II	950	3748.68	II	1000	4042.75	I
340	2948.09	II	1600	3489.37	I	600	3751.17	I	520	4044.41	II
390	2954.77	II	390	3493.33	II	350	3752.66	II	410	4047.61	I
580	2956.06	II	340	3494.00	I	350	3755.48	II	1600	4050.04	II
460	2965.03	II	320	3494.84	II	490	3758.35	I	540	4051.91	II
580	2967.94	II	530	3496.41	II	350	3759.24	II	300	4054.30	II
580	2971.06	II	630	3500.08	I	330	3763.26	I	430	4058.19	II
410	2976.35	II	320	3504.01	I	490	3764.57	II	880	4062.54	II
			320	3505.07	II	430	3766.89	I	520	4067.75	II
			780	3507.34	I	330	3769.53	II	410	4071.12	II
			320	3508.84	II	540	3773.43	I	300	4074.48	II

U I and II			U I and II			U I and II			V I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
330	4076.69	II	90	6077.29	I	100	13185.16	I	110	2564.82	I
330	4080.60	II	28	6087.34	II	75	13306.23	I	230	2574.02	I
2200	4090.13	II	40	6171.86	I	100	13961.58	I	140	2630.67	II
460	4093.03	II	35	6175.39	I	50	16906.00	I	130	2642.21	II
380	4106.38	II	28	6280.18	II	50	17451.11	I	150	2645.26	I
810	4116.10	II	28	6359.29	I	50	18136.65	I	140	2651.90	I
410	4124.73	II	55	6372.46	I	50	18366.96	I	150	2656.22	I
410	4128.34	II	28	6378.52	II	75	18634.43	I	180	2661.42	I
460	4141.22	II	28	6392.77	I	25	19029.39	I	290	2672.00	II
880	4153.97	I	90	6395.42	I	10	20201.13	I	380	2677.80	II
380	4156.65	I	110	6449.16	I	10	20271.41	I	270	2678.57	II
350	4163.68	II	35	6464.98	I	10	20374.13	I	380	2679.32	II
1400	4171.59	II	90	6826.92	I	10	20517.29	I	180	2682.87	II
300	4189.27	II	35	6876.74	II	10	20690.64	I	180	2683.09	II
350	4222.37	I	23	7074.79	I	10	20772.19	I	1100	2687.96	II
1000	4241.67	II	27	7101.61	I	10	21008.38	I	170	2688.72	II
520	4244.37	II	30	7128.90	I	10	21099.98	I	150	2689.88	II
680	4341.69	II	16	7147.89	I	10	21112.14	I	230	2690.24	II
430 h	4355.74	I	16	7254.45	I	20	21144.90	II	240	2690.79	II
430	4362.05	I	23	7425.50	I	10	21674.51	I	120	2696.99	I
330	4393.59	I	45	7533.93	I	10	21693.38	I	120	2697.74	I
600	4472.33	II	16	7619.35	I	75	21910.22	I	680	2700.94	II
240	4515.28	II	50	7881.94	I	10	22110.73	I	380	2702.19	II
620	4543.63	II	18	7970.46	I	10	23156.76	I	530	2706.17	II
300	4620.21	I	16	8174.66	I	10	23948.19	I	150	2706.70	II
240	4627.07	II	18	8262.06	I	10	29557.07	I	110	2707.86	II
210	4631.62	I	16	8318.35	I				170	2711.74	II
220	4646.60	II	16	8337.50	II	VANADIUM (V)					
140	4666.85	II	18	8381.87	I	Z = 23					
100	4671.40	II	16	8441.21	I	V I and II					
170	4689.07	II	35	8445.39	I	Ref. 1 - C.H.C.					
100	4702.51	II	18	8450.03	I	Air					
160	4722.72	II	16	8570.52	I	2100	2092.44	I	140	2739.71	II
120	4731.59	II	75	8607.95	I	40	2384.00	II	140	2753.40	II
100	4755.74	II	23	8691.28	I	40	2384.28	I	140	2765.67	II
150	4756.81	I	18	8710.76	I	40	2386.96	I	140	2777.73	II
100	4772.70	II	18	8753.69	I	60	2388.92	I	120	2803.47	II
100	4860.99	II	30	8757.76	I	60	2390.87	I	120	2846.57	I
110	5008.21	II	16	8951.96	I	75	2391.26	I	110	2847.57	II
170	5027.38	I	16	8989.92	I	75	2392.90	I	140	2852.87	I
70	5117.24	II	10	9093.67	I	85	2397.78	I	140	2854.34	II
80	5160.32	II	10	9139.56	I	70	2398.27	I	200	2855.22	I
55	5164.14	I	10	9201.51	I	70	2399.96	I	180	2859.97	I
55	5184.57	II	10	9265.34	I	70	2406.75	I	240	2864.36	I
45	5204.31	II	10	9276.44	I	120	2407.90	I	170	2866.59	I
45	5247.75	II	10	9385.90	I	110	2415.33	I	210	2868.10	I
45	5257.04	II	10	9653.26	I	120	2416.75	I	140	2869.13	II
70	5280.38	I	10	9819.00	I	120	2420.12	I	210	2870.55	I
55	5386.19	II	10	9819.05	I	100	2421.06	I	110	2877.69	II
80	5475.70	II	10	9868.36	I	100	2421.98	I	110	2879.16	II
70	5480.26	II	10	9932.76	I	100	2428.28	I	350	2880.03	II
70	5481.20	II	10	9964.11	I	110	2435.52	I	380	2882.50	II
45	5482.53	II	50	10157.91	I	140	2501.61	I	380	2884.78	II
160	5492.95	II	50	10259.55	I	150	2506.90	I	140	2888.25	II
70	5527.82	II	100	10554.93	I	240	2507.78	I	380	2889.62	II
70	5564.17	I	50	10799.78	I	180	2511.65	I	900	2891.64	II
45	5581.59	II	25	10823.93	I	180	2511.95	I	530	2892.44	II
55	5620.78	I	25	11095.77	I	180	2517.14	I	900	2892.66	II
70	5780.59	I	75	11167.84	I	180	2519.62	I	1400	2893.32	II
70	5798.53	II	50	11294.13	I	240	2526.22	I	360	2896.21	II
45	5836.02	I	100	11384.13	I	210	2527.90	II	110	2899.60	I
55	5837.68	II	25	11410.43	I	410	2528.47	II	360	2903.08	II
230	5915.39	I	50	11503.38	I	120	2528.84	II	150	2906.13	I
55	5971.50	I	25	11568.81	I	150	2530.18	I	900	2906.46	II
100	5976.32	I	20	11784.72	II	240	2549.28	II	490	2907.47	II
45	5997.31	I	100	11859.42	I	110	2552.65	I	2400	2908.82	II
28	6017.38	II	100	11908.83	I	120	2562.13	I	710	2910.02	II
55	6051.74	II	100	12250.46	I				530	2910.39	II
45	6067.22	II	25	13088.28	I				560	2911.06	II

Intensity	V I and II Wavelength	Intensity	V I and II Wavelength	Intensity	V I and II Wavelength	Intensity	V I and II Wavelength
380	2914.93 I	530	3188.51 II	520	3790.32 I	120	4023.39 II
120	2917.37 II	750	3190.68 II	1100	3794.96 I	120	4031.83 I
210	2919.99 II	530	3198.01 I	570	3799.91 I	150	4035.63 II
380	2920.38 II	750	3202.38 I	570	3803.47 I	120	4042.64 I
710	2923.62 I	450	3205.58 I	190	3806.80 I	360	4050.96 I
2400	2924.02 II	450	3207.41 I	300	3807.50 I	360	4051.35 I
1700	2924.64 II	410	3212.43 I	520	3808.52 I	280	4057.07 I
710	2930.81 II	210	3217.11 II	230	3809.60 I	130	4057.82 I
210	2934.40 II	150	3237.87 II	1000	3813.49 I	230	4063.93 I
110	2935.87 I	140	3254.77 II	140 d	3817.84 I	230	4071.54 I
900	2941.37 II	140	3263.24 I	1300	3818.24 I	1100	4090.58 I
450	2941.49 II	1100	3267.70 II	230	3819.96 I	180	4092.41 I
230 d	2942.33 I	900	3271.12 II	230	3821.49 I	1800	4092.69 I
230	2943.20 I	750	3276.12 II	570	3822.01 I	120	4093.50 I
1100	2944.57 II	110	3279.84 II	450	3822.89 I	890	4095.49 I
110	2946.53 I	140	3298.14 I	300	3823.21 I	2800	4099.80 I
230	2949.63 I	110	3329.86 I	1700	3828.56 I	590	4102.16 I
300	2950.35 II	110	3365.55 I	280	3834.22 I	230	4104.40 I
640	2952.08 II	110	3377.62 I	160	3839.00 I	260	4104.78 I
120	2954.33 I	170	3400.40 I	110	3839.38 I	2800	4105.17 I
260	2957.52 II	110	3425.07 I	570	3840.44 I	120	4108.22 I
410	2962.77 I	110	3485.92 II	2600	3840.75 I	2300	4109.79 I
600	2968.38 II	210	3504.44 II	110	3841.89 I	8900	4111.78 I
120	2972.25 II	560	3517.30 II	380	3844.44 I	120	4112.33 I
120	2976.20 II	150	3520.02 II	320	3847.33 I	230	4113.52 I
380	2976.52 II	110	3524.72 II	110	3849.32 I	4300	4115.18 I
240	2977.54 I	230	3529.74 I	1200	3855.37 I	1800	4116.47 I
260	3001.20 II	230	3530.77 II	3000	3855.84 I	180	4118.18 I
140	3014.82 II	560	3533.68 I	150	3862.22 I	180	4118.64 I
180	3016.78 II	110	3543.50 I	130	3863.87 I	230	4119.46 I
270	3033.45 II	560	3545.20 II	1300	3864.86 I	180	4120.54 I
290	3033.82 II	110	3553.27 I	230	3867.60 I	180	4123.19 I
230	3043.12 I	560	3556.80 II	170	3871.08 I	2000	4123.57 I
230	3043.56 I	110	3566.18 I	1500	3875.08 I	120	4124.07 I
230	3044.94 I	560	3589.76 II	420	3875.90 I	3100	4128.07 I
230	3048.22 II	490	3592.02 II	570	3876.09 I	120	4128.86 I
170	3050.89 I	560	3592.53 I	130	3878.71 II	3100	4132.02 I
180	3053.39 II	270	3593.33 II	700	3890.18 I	2300	4134.49 I
450	3053.65 I	110	3606.69 I	460	3892.86 I	150	4159.69 I
1200	3056.33 I	110	3639.02 I	280 h	3898.02 I	100	4174.01 I
1400	3060.46 I	110	3644.71 I	140	3899.13 II	230	4179.42 I
140	3063.25 II	250	3663.59 I	140 h	3900.18 I	150	4182.59 I
2400	3066.38 I	250	3667.74 I	140 h	3901.15 I	180	4189.84 I
200	3067.12 II	110	3669.41 II	2400	3902.25 I	180	4191.56 I
140	3069.64 I	170	3671.20 I	100	3906.75 I	230	4209.86 I
170	3073.82 I	280	3673.40 I	700	3909.89 I	120	4226.62 I
100	3075.27 I	280	3675.70 I	100	3910.79 I	360	4232.46 I
150	3082.11 I	170	3676.68 I	220	3912.21 I	180	4232.95 I
3800	3093.11 II	300	3680.11 I	140	3914.33 II	180	4234.00 I
200	3094.20 II	570	3683.13 I	100	3916.41 II	120	4235.76 I
180	3100.94 II	190	3686.26 I	100	3920.49 I	100	4257.37 I
3000	3102.30 II	470	3687.47 I	100	3921.90 I	120	4259.31 I
2600	3110.71 II	1300	3688.07 I	230	3922.43 I	120	4262.16 I
2000	3118.38 II	1000	3690.28 I	240	3924.66 I	560	4268.64 I
380	3121.14 II	1500	3692.22 I	150	3925.24 I	460	4271.55 I
150	3122.90 II	450	3695.34 I	200	3927.93 I	460	4276.96 I
1500	3125.28 II	1000	3695.86 I	260	3930.02 I	430	4284.06 I
260	3126.22 II	3800	3703.58 I	150	3931.34 I	330	4291.82 I
530	3130.27 II	1800	3704.70 I	260	3934.01 I	220	4296.11 I
410	3133.33 II	570	3705.04 I	150	3935.14 I	170	4297.68 I
210	3134.93 II	130	3708.72 I	100	3936.28 I	170	4298.03 I
150	3136.51 II	320	3715.47 II	150	3943.66 I	170	4306.21 I
150	3139.74 II	250	3727.34 II	100	3950.23 I	140	4307.18 I
200	3142.48 II	280	3732.76 II	140	3951.97 II	170	4309.80 I
150	3145.34 II	150	3734.43 I	100	3973.64 II	460	4330.02 I
3200	3183.41 I	230	3745.80 II	540	3990.57 I	510	4332.82 I
5300	3183.98 I	210	3750.87 II	260	3992.80 I	760	4341.01 I
3800	3185.40 I	210	3770.97 II	430	3998.73 I	1000	4352.87 I
410	3187.71 II	270	3778.68 I	170	4005.71 II	130	4354.98 I

Intensity	V I and II Wavelength	Intensity	V I and II Wavelength	Intensity	V I and II Wavelength	Intensity	V I and II Wavelength
150	4355.94 I	35	4715.89 I	11	5397.87 I	28	6002.31 I
150	4368.04 I	55	4717.69 I	100	5401.93 I	55	6002.63 I
140 d	4373.23 I	40	4721.51 I	140	5415.26 I	28	6016.12 I
100	4375.30 I	40	4722.86 I	28	5418.09 I	20	6025.41 I
12000	4379.24 I	40	4729.53 I	50	5424.08 I	450	6039.73 I
100	4380.55 I	27	4730.38 I	40	5434.18 I	100	6058.14 I
7000	4384.72 I	27	4742.63 I	11	5437.66 I	20	6067.26 I
4800	4389.97 I	24	4746.63 I	17	5458.12 I	480	6081.44 I
3600	4395.23 I	40	4748.52 I	13	5471.33	1300	6090.22 I
1400	4400.58 I	45	4750.98 I	25	5487.22 I	28	6106.98 I
2300	4406.64 I	35	4751.56 I	85	5487.92 I	280	6111.67 I
2800	4407.64 I	40	4753.93 I	25	5489.94 I	600	6119.52 I
3600	4408.20 I	65	4757.48 I	28	5504.87 I	20	6128.34 I
4600	4408.51 I	55	4766.63 I	70	5507.75 I	280	6135.38 I
140	4412.14 I	130	4776.36 I	14	5511.18 I	180	6150.15 I
640	4416.47 I		4776.52 I	23	5545.93 I	85	6170.36 I
120	4419.94 I	110	4786.51 I	70	5547.07 I	23	6189.35 I
640	4421.57 I	130	4796.92 I	35	5558.75 I	450	6199.19 I
460	4426.00 I	19	4799.77 I	28	5561.66 I	130	6213.87 I
120	4427.31 I	130	4807.53 I	140	5584.50 I	450	6216.37 I
310	4428.52 I	130	4827.45 I	23	5586.00 I	28 h	6218.31 I
230	4429.80 I	150	4831.64 I	100	5592.42 I	130	6224.50 I
430	4436.14 I	120	4832.43 I	28	5601.38 I	430	6230.74 I
640	4437.84 I	19	4833.02 I	70	5604.94 I	100	6233.20 I
830	4441.68 I	19	4848.81 I	13	5624.20 I	55	6240.13 I
640	4444.21 I	320	4851.48 I	200	5624.60 I	170	6242.81 I
610	4452.01 I	35	4862.61 I	70	5624.89 I	710	6243.10 I
410	4457.48 I	480	4864.74 I	55	5626.01 I	280	6251.82 I
120	4457.76 I	21	4871.26 I	400	5627.64 I	85	6256.90 I
1000	4459.76 I	620	4875.48 I	13	5632.46 I	85	6258.57 I
2000	4460.29 I	55	4880.56 I	10	5633.90 I	55	6261.22 I
610	4462.36 I	740	4881.56 I	13	5635.51 I	85	6266.32 I
120	4468.01 I	27	4891.60 I	85	5646.11 I	130	6268.82 I
380	4469.71 I	21	4894.21 I	110	5657.44 I	170	6274.65 I
120	4474.04 I	55	4900.62 I	110	5668.36 I	17 h	6282.33 I
200	4474.71 I	95 d	4904.29 I	310	5670.85 I	200	6285.16 I
380	4488.89 I		4904.34 I	20	5683.22 I	200	6292.83 I
100	4496.06 I	85	4925.65 I	1200	5698.52 I	170	6296.49 I
120	4501.95 I	35	4932.03 I	920	5703.56 I	28 h	6311.50 I
140	4524.22 I	23	4966.12 I	570	5706.98 I	14	6324.66 I
360	4545.39 I	70	5002.33 I	11	5708.95 I	70	6326.84 I
100	4549.65 I	85	5014.62 I	11 h	5716.21 I	55	6339.09 I
280	4560.71 I	28	5051.63 I	70	5725.64 I	50	6349.48 I
200	4571.78 I	35	5064.12 I	850	5727.03 I	14	6355.58 I
510	4577.17 I	35	5105.14 I	170	5727.66 I	50	6357.30 I
140	4578.73 I	110	5128.53 I	230	5731.25 I	25	6358.82 I
640	4580.40 I	110	5138.42 I	40	5734.01 I	35	6361.27 I
830	4586.36 I	25	5139.53 I	230	5737.06 I	23	6379.36 I
170	4591.22 I	70	5148.72 I	110	5743.45 I	14	6393.28 I
1300	4594.11 I	40	5159.35 I	17	5747.70 I	35	6430.47 I
100	4606.15 I	23	5169.94 I	40	5748.87 I	23	6431.63 I
30	4609.65 I	70	5176.77 I	17	5752.74 I	14	6433.18 I
25	4611.74 I	20	5192.01 I	17	5761.41 I	11	6435.16 I
230	4619.77 I	110	5192.99 I	70	5772.42 I	70	6452.34 I
65	4624.41 I	23	5193.62 I	35	5776.64 I	11	6488.05 I
50	4626.48 I	110	5194.83 I	11	5782.61 I	55	6504.17 I
100	4635.18 I	55	5195.36 I	11	5783.50 I	110	6531.43 I
65	4640.07 I	20	5206.61 I	40 h	5784.38 I	28	6543.51 I
65	4640.74 I	40	5216.59 I	55 h	5786.16 I	17	6558.02 I
130	4646.40 I	35	5225.77 I	23	5788.56 I	11	6565.88 I
30	4648.89 I	35	5233.75 I	35 h	5807.14 I	50	6605.97 I
30	4666.14 I	110	5234.07 I	23	5817.06 I	15	6607.83 I
160	4670.49 I	20	5240.20 I	35 h	5817.53 I	10	6623.54 I
24	4684.45 I	110	5240.87 I	55 h	5830.72 I	50	6624.85 I
35	4686.92 I	17	5260.98 I	85 h	5846.30 I	13	6633.26 I
55	4706.16 I	40	5353.41 I	11	5850.32 I	13	6643.79 I
80	4706.57 I	35	5383.43 I	40	5924.57 I	8	6693.66 I
80	4710.56 I	40	5385.14 I	28	5978.91 I	8	6708.07 I
65	4714.12 I	14	5388.30 I	20	5980.78 I	65 c	6753.00 I

Xe I and II			Xe I and II			Xe I and II			Xe I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
350	803.07	II	150 l	4416.07	II	2000	6051.15	II	100	8029.67	I
600	880.80	II	500 h	4448.13	II	600	6093.50	II	200	8057.26	I
350	885.54	II	1000 h	4462.19	II	1500	6097.59	II	150	8061.34	I
600	925.87	II	500 l	4480.86	II	400	6101.43	II	100	8101.98	I
250	935.40	II	100 l	4521.86	II	100	6115.08	II	150 h	8151.80	II
800	972.77	II	600	4734.152	I	100	6146.45	II	100	8171.02	I
700	976.68	II	150	4792.619	I	150	6178.30	I	700	8206.34	I
500	1032.44	II	500	4807.02	I	120	6179.66	I	10000	8231.635	I
700	1037.68	II	400	4829.71	I	300	6182.42	I	500	8266.52	I
1100	1041.31	II	300	4843.29	I	500	6194.07	II	7000	8280.116	I
1000	1048.27	II	500	4916.51	I	100	6198.26	I	2000	8346.82	I
1200	1051.92	II	500	4923.152	I	100	6220.02	II	100	8347.24	II
2000	1074.48	II	200 l	4971.71	II	500	6270.82	II	2000	8409.19	I
600	1083.86	II	400	4972.71	II	400	6277.54	II	50 h	8515.19	II
1200	1100.43	II	300	4988.77	II	100	6284.41	II	200	8576.01	I
600	1158.47	II	100 l	4991.17	II	100	6286.01	I	50 h	8604.23	II
250	1169.63	II	200	5028.280	I	250	6300.86	II	250	8648.54	I
800 p	1183.05	II	200	5044.92	II	500	6318.06	I	100	8692.20	I
250	1192.04	I	1000	5080.62	II	400	6343.96	II	200	8696.86	I
600	1244.76	II	300	5122.42	II	600	6356.35	II	50 h	8716.19	II
250	1250.20	I	100	5125.70	II	200	6375.28	II	300	8739.39	I
1000	1295.59	I	100	5178.82	II	100	6397.99	II	100	8758.20	I
600	1469.61	I	300	5188.04	II	300	6469.70	I	5000	8819.41	I
	Air		400	5191.37	II	150	6472.84	I	300	8862.32	I
200	2864.73	II	100	5192.10	II	120	6487.76	I	200	8908.73	I
150 h	2895.22	II	500	5260.44	II	100	6498.72	I	200	8930.83	I
400	2979.32	II	500	5261.95	II	200 h	6504.18	I	1000	8952.25	I
100 h	3017.43	II	2000	5292.22	II	300	6512.83	II	100	8981.05	I
300	3128.87	II	300	5309.27	II	200	6528.65	II	200	8987.57	I
200 h	3366.72	II	1000	5313.87	II	100	6533.16	I	400	9045.45	I
2	3400.07	I	2000	5339.33	II	1000	6595.01	II	500	9162.65	I
2	3418.37	I	200	5363.20	II	100	6595.56	I	100	9167.52	I
2	3420.00	I	200	5368.07	II	400	6597.25	II	100	9374.76	I
3	3442.66	I	500	5372.39	II	100	6598.84	II	200	9513.38	I
100 h	3461.26	II	100	5392.80	I	150	6668.92	I	50 h	9591.35	II
4	3469.81	I	3000	5419.15	II	300	6694.32	II	150	9685.32	I
4	3472.36	I	800	5438.96	II	200	6728.01	I	50 l	9698.68	II
5	3506.74	I	300	5445.45	II	150	6788.71	II	100	9718.16	I
10	3549.86	I	200	5450.45	II	100	6790.37	II	2000	9799.70	I
10	3554.04	I	400	5460.39	II	1000	6805.74	II	3000	9923.19	I
15	3610.32	I	1000	5472.61	II	200	6827.32	I	100	10838.37	I
8	3613.06	I	100 l	5494.86	II	100	6872.11	I	90	11742.01	I
6	3633.06	I	200	5525.53	II	300	6882.16	I	375	12235.24	I
10	3669.91	I	600	5531.07	II	80	6910.22	II	100	12257.76	I
40	3685.90	I	100	5566.62	I	100	6925.53	I	300	12590.20	I
40	3693.49	I	300	5616.67	II	800 h	6942.11	II	2500	12623.391	I
100 l	3907.91	II	300	5659.38	II	100	6976.18	I	250	13544.15	I
100	4037.59	II	600	5667.56	II	2000	6990.88	II	2000	13657.055	I
200 l	4057.46	II	150	5670.91	II	150	7082.15	II	1250	14142.444	I
100 h	4098.89	II	100	5695.75	I	500	7119.60	I	800	14240.96	I
200 l	4158.04	II	200	5699.61	II	50 s	7147.50	II	375	14364.99	I
1000 h	4180.10	II	200	5716.10	II	200	7149.03	II	140	14660.81	I
500 h	4193.15	II	500	5726.91	II	500	7164.83	II	3000	14732.806	I
300 h	4208.48	II	500	5751.03	II	100	7284.34	II	100	15099.72	I
100 h	4209.47	II	300	5758.65	II	200	7301.80	II	2500	15418.394	I
300 h	4213.72	II	300	5776.39	II	200	7339.30	II	150	15557.13	I
100	4215.60	II	100	5815.96	II	100	7386.00	I	250	15979.54	I
300 h	4223.00	II	300	5823.89	I	150	7393.79	I	100	16039.90	I
400 h	4238.25	II	150	5824.80	I	300	7548.45	II	1000	16053.28	I
500 h	4245.38	II	100	5875.02	I	200	7584.68	I	125	16554.49	I
100 l	4251.57	II	300	5893.29	II	80	7618.57	II	1500	16728.15	I
500 h	4296.40	II	100	5894.99	I	500	7642.02	I	1500	17325.77	I
500 h	4310.51	II	200	5905.13	II	100	7643.91	I	350	18788.13	I
1000 l	4330.52	II	100	5934.17	I	200	7670.66	II	150	20187.19	I
200 h	4369.20	II	500	5945.53	II	60	7787.04	II	3000	20262.242	I
100 l	4373.78	II	300	5971.13	II	100	7802.65	I	250	21470.09	I
500 h	4393.20	II	2000	5976.46	II	100	7881.32	I	1250	23193.33	I
500 l	4395.77	II	200	6008.92	II	300	7887.40	I	110	23279.54	I
200 l	4406.88	II	1000	6036.20	II	500	7967.34	I	1800	24824.71	I

Xe I and II			Xe III			Xe III			Yb I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
175	25145.84	I				100 w	4641.4	III	390	2672.66	II
2000	26269.08	I	80	2668.98	III	30	4673.7	III	21	2680.40	II
2500	26510.86	I	100	2717.33	III	60	4683.57	III	14	2683.42	II
250	28381.54	I	30	2814.45	III	30	4723.60	III	70	2684.75	II
750	28582.25	I	40	2815.91	III	100 w	4757.3	III	25	2687.98	II
300	29384.41	I	30	2827.45	III	40	4869.5	III	28	2695.43	II
150	29448.06	I	40	2847.65	III	60	5239.0	III	14	2696.62	II
100	29649.58	I	30	2862.40	III	30	5367.1	III	18	2700.80	II
100	29813.62	I	80 w	2871.10	III	50	5401.0	III	21	2708.84	II
600	30253.14	I	60 w	2871.24	III	40	5524.4	III	65	2710.54	II
1500	30475.46	I	30	2871.7	III	60	6205.97	III	25	2711.78	II
100	30504.12	I	30	2896.62	III	25	6221.7	III	55	2712.66	II
500	30794.18	I	50	2906.6	III	60	6238.2	III	170	2718.35	II
6000	31069.23	I	40	2911.89	III	60	6259.05	III	21	2722.20	II
125	31336.01	I	80 w	2912.36	III				110	2732.74	II
550	31607.91	I	40	2940.2	III	YTTERBIUM (Yb)			21	2734.09	II
100	32293.08	I	60	2945.2	III	Z = 70			55	2741.71	II
1800	32739.26	I	40	2947.5	III	Yb I and II			55	2747.58	II
3500	33666.69	I	40	2948.1	III	Ref. 1 - C.H.C.			18	2748.04	II
150	34014.67	I	80 w	2970.47	III	Air			230	2748.66	II
450	34335.27	I	40	2992.87	III	2500	2116.67	II	1300	2750.48	II
170	34744.00	I	30	3004.25	III	3000	2126.74	II	85	2751.45	II
5000	35070.25	I	100	3023.81	III	370	2161.60	II	21	2759.00	II
110	35246.92	I	40	3083.5	III	850	2185.71	II	65	2760.78	II
250	36209.21	I	50	3091.1	III	640	2224.46	II	65	2761.37	II
150	36231.74	I	30	3106.46	III	140	2320.81	II	35	2764.41	II
450	36508.36	I	100 w	3138.3	III	50	2362.89	II	85	2771.32	II
850	36788.83	I	80 c	3150.82	III	170	2390.74	II	170	2776.28	II
140	38685.98	I	40	3185.2	III	18	2398.02	II	100	2784.66	II
175	38737.82	I	100	3242.86	III	28	2421.35	II	18	2787.96	II
270	38939.60	I	80	3268.98	III	25	2447.26	II	45	2793.28	II
120	39955.14	I	30	3287.82	III	25	2464.50	II	25	2794.44	II
			80 w	3301.55	III	28	2464.50	I	21	2795.07	II
			40	3331.6	III	14	2484.89	II	18	2795.29	II
			30	3358.0	III	70	2502.02	II	35	2797.80	II
			80	3384.12	III	28	2505.48	II	100	2798.21	II
			60	3444.2	III	11	2508.07	II	45	2799.38	II
			70	3454.2	III	140	2512.06	II	50	2800.00	II
			100 w	3458.7	III	18	2516.35	II	35	2800.06	II
			40	3468.22	III	50	2522.44	II	14	2810.72	II
			80	3522.83	III	65	2537.65	II	65	2814.53	II
			50	3542.3	III	270	2538.67	II	28	2816.32	II
			50	3552.1	III	14	2550.06	II	140	2821.15	II
			40	3561.4	III	70	2552.15	II	100	2824.97	II
			100	3579.7	III	55	2552.70	II	190	2830.99	II
			80	3583.6	III	21	2565.57	II	18	2832.20	II
			100 w	3595.4	III	28	2571.36	II	28	2834.97	II
			100	3606.06	III	13	2573.15	II	14	2842.59	II
			40	3607.0	III	18	2596.16	II	230 h	2847.18	II
			100 w	3615.9	III	28	2596.32	II	100	2848.44	II
			40	3623.1	III	21	2615.26	II	21	2849.34	II
			600	3624.08	III	100	2617.01	II	360	2851.13	II
			50	3676.67	III	55	2634.31	II	55	2851.86	II
			40	3776.3	III	45	2639.45	II	21	2853.41	II
			300	3781.02	III	85	2641.89	II	18	2853.68	II
			100	3841.5	III	110	2644.31	II	55	2854.14	II
			200	3877.8	III	28	2646.44	II	45	2854.49	II
			60	3880.5	III	28	2647.46	II	45	2858.33	II
			500	3922.55	III	28	2648.80	II	45	2858.46	II
			300	3950.59	III	28	2649.79	II	100	2859.39	II
			200	4050.07	III	28	2650.73	II	430	2859.80	II
			60	4060.4	III	990	2653.75	II	55	2860.39	II
			100	4109.1	III	35	2656.12	II	140	2861.21	II
			100	4145.7	III	21	2659.27	II	100	2861.34	II
			30	4285.9	III	200	2665.04	II	200	2867.06	II
			50	4434.2	III	55	2668.75	II	25	2870.06	II
			100 w	4462.1	III	390	2671.96	I	45	2873.49	I
			100 w	4569.1	III				28	2885.97	II
			100 w	4570.1	III				70	2886.26	II

Yb I and II			Yb I and II			Yb I and II			Yb I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
200	2888.04	II	70	3093.87	II	500	3454.08	II	60 h	4430.21	I
3600	2891.38	II	28	3100.74	I	190 d	3458.29	II	440	4439.19	I
45	2893.62	II	45	3101.36	II		3458.39	I	85 h	4482.42	I
28	2896.90	II	28	3102.07	II	360	3460.27	I	85	4515.16	II
85	2899.70	II	55	3107.76	II	35	3462.34	II	35	4553.58	II
18	2902.41	II	170	3107.90	II	2400	3464.37	I	85 h	4563.95	I
21	2902.92	II	85	3115.34	II	500	3476.30	II	640	4576.21	I
21	2906.88	II	55	3116.70	II	500	3478.84	II	200	4582.36	I
28	2908.33	II	190	3117.81	II	50	3482.56	II	70	4589.21	I
35	2909.19	II	50	3136.76	II	85	3485.76	II	140	4590.83	I
55	2909.48	II	230	3140.94	II	85	3488.43	II	40	4598.36	II
85	2911.52	II	80	3141.73	II	100hw	3495.90	II	35	4683.81	II
18	2912.86	II	80	3145.06	II	85	3507.83	II	40	4684.27	I
170	2914.21	II	28	3145.54	II	50	3517.00	I	190	4726.08	II
140	2915.28	II	28	3153.18	II	230	3520.29	II	170 h	4781.87	I
18	2916.43	II	90	3153.88	II	50	3545.72	II	170	4786.61	II
280	2919.35	II	50	3155.18	II	100	3549.82	II	35	4816.43	I
55	2921.12	II	28	3162.29	I	35	3559.03	I	40	4820.24	II
45	2924.24	II	70	3163.80	II	200	3560.33	II	35	4836.96	II
25	2927.85	II	50	3165.21	II	170	3560.70	II	40	4837.46	I
35	2934.36	I	120	3169.06	II	50 h	3563.94	II	17	4851.15	II
55	2935.11	II	120	3180.92	II	85	3570.57	II	40 h	4894.60	I
21	2937.19	II	390	3192.88	II	50	3572.50	II	27	4912.36	I
45	2939.53	II	70	3198.65	II	50	3574.58	II	710	4935.50	I
45	2940.52	II	240	3201.16	II	360	3585.47	II	24	4937.22	II
28	2942.04	II	80	3217.18	II	130	3606.48	II	140	4966.90	I
140	2945.91	II	50	3218.32	II	50	3610.23	II	24	5009.52	II
45	2946.30	II	50	3225.88	II	70	3611.30	II	17	5067.30	II
18	2946.76	II	45	3239.20	II	200	3619.80	II	30	5067.80	I
28	2950.33	II	35	3239.58	I	110	3634.52	I	70	5069.14	I
45	2955.32	II	35	3246.06	II	240	3637.76	II	220	5074.34	I
18	2957.63	II	130	3261.51	II	70	3648.15	I	50	5076.74	I
65	2962.52	II	18000	3289.37	II	90	3655.73	I	20	5135.98	II
21	2963.26	II	130	3305.25	I	240	3669.69	II	14	5147.02	II
45	2963.46	II	140	3305.73	II	50	3670.69	II	20	5184.15	II
130	2964.76	II	50	3315.10	II	140	3675.08	II	60	5196.08	I
2000	2970.56	II	80	3319.41	I	50	3690.56	II	85	5211.60	I
45	2982.49	II	50	3333.06	II	32000	3694.19	II	35	5240.51	II
21	2982.66	II	240	3337.17	II	70	3698.60	II	100	5244.11	I
28	2983.70	II	280 d	3342.93	II	70	3700.58	I	40	5257.49	II
200	2983.99	II		3343.07	II	50	3710.34	II	150 h	5277.04	I
90	2985.08	II	80	3346.50	II	60	3724.21	II	35	5279.53	II
35	2985.88	II	50	3347.54	II	180	3734.69	I	17	5300.94	II
45	2990.37	II	35	3351.09	II	550	3770.10	I	170	5335.15	II
65	2991.87	II	50	3351.26	II	80	3774.32	I	30 d	5345.66	II
28	2993.94	II	100	3352.49	II	60 h	3791.74	I		5345.83	II
170	2994.80	II	100	3362.44	II	170	3839.91	I	60	5347.22	II
28	2995.86	II	50	3363.64	II	340	3872.85	I	30 h	5351.29	I
70	3000.46	II	240	3375.48	II	340	3900.85	I	150	5352.95	II
25	3002.61	II	50	3376.62	II	50	3904.81	II	30	5358.64	II
310	3005.77	II	28	3382.54	II	140	3911.27	I	30	5363.66	I
100	3009.39	II	140	3387.50	I	32000	3987.99	I	17	5389.84	II
65	3010.62	II	50	3390.25	II	930	3990.88	I	14	5432.71	II
55	3014.43	II	28	3390.42	II	50	4007.36	I	40	5449.27	II
160	3017.56	II	50	3391.10	II	70	4052.28	I	14	5478.50	II
160	3026.67	II	50 h	3394.44	II	85	4077.28	II	60	5481.92	I
920	3031.11	II	50	3401.01	II	440	4089.68	I	40	5505.49	I
55	3034.64	II	35	3404.10	II	120 h	4119.25	II	17	5524.54	I
25	3037.99	II	50	3412.45	I	70	4135.09	II	85 h	5539.05	I
55	3039.67	II	140	3418.39	I	470	4149.07	I	2400	5556.47	I
80	3042.65	II	360	3426.04	I	120	4174.56	I	35	5562.09	I
21	3044.00	II	80	3428.46	II	340	4180.81	II	20	5568.11	I
45	3046.48	II	240	3431.11	I	150 d	4218.56	II	20	5586.36	I
35	3047.05	II	45	3434.61	II		4218.69	I	40	5588.45	II
45	3063.12	II	50	3438.71	II	120	4231.97	I	60	5651.98	II
21	3063.67	II	100	3438.85	II	70	4277.74	I	7	5686.53	II
110	3065.04	II	35	3443.59	II	120	4305.97	I	220	5719.99	I
18	3076.01	II	35	3446.89	II	70	4316.95	II	10	5749.91	II
100	3089.10	II	85	3452.40	I	60 h	4393.69	I	10 h	5755.89	I

Yb III			Yb IV			YTTRIUM (Y)			Y I and II		
Intensity	Wavelength		Intensity	Wavelength		Z = 39			Intensity	Wavelength	
15	4231.07	III	200	1353.43	IV				95	3135.17	II
20	4289.64	III	400	1356.15	IV	Y I and II			110	3173.06	II
40	4301.14	III	200	1361.75	IV	Ref. 1 - C.H.C.			220	3179.41	II
20	4304.01	III	300	1365.88	IV	Intensity	Wavelength		70	3191.31	I
15	4350.80	III	300	1369.72	IV	Air			2300	3195.62	II
10	4380.07	III	400	1375.42	IV	350	2243.06	II	2200	3200.27	II
100	4517.58	III	300	1376.66	IV	50	2354.20	I	2200	3203.32	II
40	4639.14	III	200	1384.41	IV	30	2373.83		3900	3216.69	II
10	4834.93	III	250	1393.93	IV	50	2385.24		6200	3242.28	II
15	5054.94	III	350	1398.77	IV	25	2413.93	II	310	3280.91	II
20	5256.85	III	400	1407.05	IV	560	2422.20	II	19	3308.47	II
20	5331.54	III	300	1413.14	IV	60	2460.61	II	4700	3327.89	II
15	5740.83	III	400	1416.15	IV	25	2490.42	I	55	3340.38	I
10 d	5949.02	III	400	1417.72	IV	12	2540.28		160	3362.00	II
20	5973.05	III	200	1423.99	IV	14	2547.57		85	3388.59	I
40	6055.85	III	300	1430.29	IV	10	2550.17		45	3397.04	I
100	6214.22	III	200	1440.61	IV	20	2681.65	I	85	3412.47	I
200	6328.52	III	400	1477.92	IV	60	2694.21	I	200	3448.82	II
10	6365.88	III	300	1491.57	IV	26	2695.39	I	70	3450.95	I
150	6378.33	III	400	1765.03	IV	95	2723.00	I	110	3467.88	II
25	6466.33	III	200	1776.18	IV	22	2730.08	I	170	3485.73	I
20	6985.15	III	200	1778.20	IV	22	2734.85	II	1700	3496.09	II
10	7037.04	III	200	1779.34	IV	70	2742.53	I	80	3521.53	I
15	7157.72	III	300	1789.71	IV	140	2760.10	I	45	3546.01	II
10	7311.02	III	800	1791.06	IV	30	2785.21	II	3900	3549.01	II
10	7399.98	III	200	1801.67	IV	12	2785.59	II	130	3551.80	I
80	7410.01	III	250	1809.63	IV	12	2791.20	I	540	3552.69	I
15	7456.86	III	600	1813.84	IV	30	2800.11	II	170	3558.76	I
70	7664.41	III	400	1816.07	IV	26	2813.64	I	190	3571.43	I
80	7892.39	III	250	1817.58	IV	18	2818.86	I	260	3576.05	I
20	7893.10	III	300	1819.02	IV	45	2822.56	I	3300	3584.52	II
100	7971.46	III	200	1824.22	IV	22	2825.37	II	300	3587.75	I
20	8056.02	III	Air			45	2826.38	II	100	3589.69	I
10	8117.44	III	300	2106.48	IV	70	2854.43	II	2800	3592.92	I
10	8326.86	III	900	2116.65	IV	26	2856.30	II	10000	3600.73	II
30	8327.88	III	500	2121.29	IV	11	2857.87	II	6200	3601.92	II
20	8400.01	III	250	2122.84	IV	95	2886.48	I	7800	3611.05	II
30	8489.90	III	800	2123.32	IV	18	2897.69	II	4300	3620.94	I
200	10110.60	III	600	2125.72	IV	14	2898.82	II	1900	3628.71	II
100	10830.36	III	200	2129.65	IV	160	2919.05	I	7800	3633.12	II
			500	2135.21	IV	18 h	2930.03	II	3000	3664.61	II
Yb IV			300	2137.58	IV	390	2948.40	I	45	3668.49	II
Refs. 40,311 - J.R.			500	2138.35	IV	350	2964.96	I	170	3692.53	I
Vacuum			200	2138.53	IV	18	2973.91	II	13000	3710.30	II
200	828.96	IV	800	2139.99	IV	480	2974.59	I	60	3718.12	I
200	870.35	IV	400	2141.04	IV	30	2980.55	II	60	3738.61	I
300	902.46	IV	200	2142.20	IV	750	2984.26	I	1200	3747.55	II
300	927.01	IV	300	2143.42	IV	70	2995.26	I	50	3749.89	I
300	936.22	IV	300	2143.89	IV	140	2996.94	I	10000	3774.33	II
400	943.04	IV	20000	2144.77	IV	70	3005.26	I	1400	3776.56	II
400	946.20	IV	400	2148.10	IV	55	3018.95	I	50	3782.30	II
200	975.21	IV	300	2148.52	IV	130	3021.73	I	7400	3788.70	II
1000	1050.24	IV	15000	2154.18	IV	90	3022.28	I	1300	3818.35	II
1000	1054.46	IV	250	2165.55	IV	26	3026.49	II	4000	3832.88	II
400	1092.51	IV	300	2169.12	IV	30	3036.59	II	70	3847.87	II
200	1109.96	IV	200	2172.16	IV	45	3044.84	I	80	3876.82	I
200	1110.55	IV	300	2177.53	IV	190	3045.37	I	480	3878.28	II
5000	1134.43	IV	400	2183.32	IV	22	3047.11	I	30	3887.77	I
300	1136.24	IV	270 h	2186.13	IV	60	3055.22	II	60 h	3904.59	I
500	1166.01	IV	270	2187.17	IV	60	3086.85	II	50 h	3918.25	I
600	1185.58	IV	90 h	2189.90	IV	55 h	3091.70	I	60 h	3930.11	I
200	1290.24	IV	120	2193.34	IV	22	3093.76	II	240	3930.66	II
600	1305.58	IV	150	2198.27	IV	95	3095.88	II	4400	3950.36	II
900	1316.04	IV	90	2224.64	IV	45	3111.81	I	150	3951.60	II
200	1326.32	IV	150	2231.28	IV	55	3112.04	II	60 h	3955.09	I
800	1326.36	IV	90	2233.30	IV	22	3114.28	I	3600	3982.60	II
200	1340.06	IV	90	2244.20	IV	60	3128.77	II	40	3987.50	I
300	1345.36	IV	140	2331.36	IV	80	3129.93	II	940	4039.83	I
900	1350.26	IV							2400	4047.64	I

Y I and II			Y I and II			Y I and II			Y I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
9400	4077.38	I	95	4604.80	I	90	5424.37	I	120	6004.65	
90 h	4081.22	I	40	4613.00	I	190	5438.24	I	120	6009.19	I
2000	4083.71	I	2000	4643.70	I	710	5466.46	I	620bl	6019.87	YO
9900	4102.38	I	200 h	4658.32	I	100	5468.47	I	120	6023.41	I
60 h	4106.39	I	70	4658.89	I	90	5473.39	II	500bl	6036.60	YO
80	4110.81	I	85	4667.47	I	90	5480.74	II	420bl	6053.81	YO
320	4124.92	II	60	4670.82	I	60	5493.17	I	130bl	6072.78	YO
8900	4128.31	I	2000	4674.84	I	35	5495.59	I	50	6088.00	I
7500	4142.85	I	60	4678.35	I	240	5497.41	II	210bl	6089.35	YO
100 h	4157.63	I	260	4682.32	II	300	5503.45	I	160bl	6096.78	YO
2400	4167.52	I	85	4689.77	I	250	5509.90	II	130bl	6107.82	YO
2000	4174.14	I	180	4696.81	I	60	5513.64	I	130bl	6114.73	YO
8000	4177.54	II	35	4708.85	I	120	5521.63	I	75bl	6127.38	YO
120	4199.28	II	60	4725.85	I		5521.70	II	1400bl	6132.06	YO
380	4204.70	II	170	4728.53	I	24	5526.76	I	120	6135.04	I
80	4213.02	I	60 h	4732.37	I	740	5527.54	I	150	6138.43	I
40	4213.54	I	85	4741.40	I	35	5541.63	I	1100bl	6148.36	YO
160	4217.80	I	160	4752.79	I	120	5544.50	I	120	6151.72	YO
280 h	4220.63	I	410	4760.98	I		5544.61	II	820bl	6165.08	YO
80	4224.25	I	17	4780.18	I	90	5546.02	II	560bl	6182.23	YO
600	4235.73	II	120	4781.04	I	75	5556.43	I	1200	6191.73	I
2200	4235.94	I	160	4786.58	II	60	5567.75	I	590bl	6199.82	YO
300	4251.20	I	170	4786.89	I	180	5577.42	I	450bl	6217.96	YO
360 h	4302.30	I	180	4799.30	I	24	5581.08	I	300	6222.59	I
2800	4309.63	II	50	4804.31	I	620	5581.87	I	270bl	6236.72	YO
50	4316.30	I	70	4804.81	I	21	5590.96	I	45	6251.05	I
110	4330.78	I	85bl	4817.38	YO	21	5594.12	I	120bl	6275.01	YO
30	4337.29	I	140bl	4818.20	YO	120	5606.33	I	60 b	6295.46	YO
60	4344.65	I	140	4819.64	I	15	5623.91	I	24 b	6316.20	YO
440 h	4348.79	I	120	4822.13	I	560	5630.13	I	24 b	6338.10	YO
60	4352.33	I	190	4823.31	II	24	5632.25	I	15 b	6359.48	YO
60	4352.70	I	60	4839.15	I	21	5632.89	I	15	6369.87	YO
120	4357.73	I	770	4839.87	I	120	5644.69	I	75	6402.01	I
800	4358.73	II	550	4845.68	I	120	5648.47	I	1000	6435.00	I
120	4366.03	I	410	4852.69	I	740	5662.94	II	24	6437.18	I
12000	4374.94	II	120	4854.25	I	90	5675.27	I	18 h	6501.23	YO
150 h	4375.61	I	890	4854.87	II	18	5693.63	I	18 h	6518.33	YO
80	4379.33	I	50	4856.70	I	160	5706.73	I	18 h	6535.84	YO
30	4385.48	I	330	4859.84	I	24	5720.61	I	90	6538.60	I
100	4387.74	I	50	4879.65	I	75	5728.89	II	12 h	6553.84	YO
30	4394.01	I	1900	4883.69	II	150bl	5730.12	YO	70	6557.39	I
30	4394.67	I	50	4886.28	I	21	5732.09	I	12 h	6572.58	I
1800	4398.02	II	40	4886.65	I	90	5743.85	I	35	6576.85	I
890	4422.59	II	95	4893.44	I	18bl	5746.93	YO	23	6584.87	I
80	4437.34	I	1100	4900.12	II	24bl	5764.22	YO	95	6613.75	II
100	4443.66	I	100	4906.11	I	75	5765.64	I	14	6622.49	I
130	4446.63	I	45	4909.00	I	35	5773.95	I	19 h	6636.49	I
20	4465.27	I	150	4921.87	I	100	5781.69	II	40	6650.61	I
40	4473.89	I	35	4930.93	I	15bl	5800.00	YO	21	6664.40	I
170	4475.72	I	45	4950.66	I	15bl	5818.58	YO	150	6687.58	I
180	4476.96	I	120	4974.30	I	30	5821.87	I	14 h	6691.83	I
160	4477.45	I	120	4982.13	II	21	5832.27	I	7	6694.75	I
110	4487.28	I	100	5006.97	I	9 b	5838.07	YO	16 h	6699.26	I
300	4487.47	I	75	5070.21	I	15	5858.83	YO	70	6700.71	I
30	4491.75	I	75	5072.19	I	15	5871.83	I	35	6713.20	I
25	4492.42	I	1100	5087.42	II	24	5876.14	YO	40	6735.99	I
500	4505.95	I	30	5088.18	I	24	5879.96	I	190	6793.71	I
50	4513.58	I	210	5119.11	II	24 b	5893.94	YO	70 h	6795.41	II
80	4514.01	I	450	5123.21	II	35	5902.96	I	12 h	6803.15	I
40 h	4522.05	I	180	5135.20	I	24 b	5912.19	YO	21	6815.16	I
890	4527.25	I	120	5196.43	II	24 b	5931.10	YO	14	6832.49	II
440	4527.80	I	960	5200.41	II	90bl	5939.08	YO	45	6845.24	I
100	4544.32	I	1500	5205.72	II	45	5945.72	I	14	6858.24	II
100	4559.37	I	180	5240.81	I	24	5950.02	I	29	6887.22	I
30	4564.39	I	60	5289.82	II	75 b	5956.41	YO	21	6896.00	II
60 h	4573.56	I	45	5320.78	II	1300bl	5972.04	YO	9	6908.26	I
35	4581.32	I	75	5380.62	I	50	5981.86	I	14	6933.52	I
30	4581.77	I	220	5402.78	II	1000bl	5987.64	YO	24 h	6950.31	I
130	4596.55	I	24	5417.03	I	740bl	6003.60	YO	10	6951.68	II

Zn I and II			Zn I and II			Zn III			Zn IV		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
75	1836.65	II	100	3197.10	II	200	1456.72	III	80	456.67	IV
75	1847.56	II	500 r	3282.33	I	100	1464.20	III	150	457.32	IV
100	1864.12	II	50	3299.42	II	100	1465.75	III	200	466.93	IV
100	1866.08	II	800	3302.58	I	300	1473.41	III	150	468.43	IV
100	1872.13	II	700 r	3302.94	I	100	1489.26	III	200	472.09	IV
75	1894.26	II	75	3306.01	II	100	1490.96	III	200	472.66	IV
60	1901.52	II	800	3345.02	I	200	1498.79	III	200	473.02	IV
60	1914.81	II	500	3345.57	I	300	1499.42	III	200	473.51	IV
100 d	1918.96	II	150	3345.94	I	300	1500.42	III	200	474.56	IV
70	1920.27	II	5	3799.00	I	300	1505.92	III	50	475.78	IV
100 d	1929.67	II	50	3806.34	II	300	1515.85	III	200	476.42	IV
60	1945.58	II	100	3840.29	II	30	1533.09	III	200	478.65	IV
60	1951.91	II	50	3883.34	I	300	1552.30	III	200	478.90	IV
80	1953.00	II	15	3965.43	I	200	1552.94	III	200	482.10	IV
75	1954.87	II	10	4113.21	I	80	1553.11	III	10	482.68	IV
80	1964.54	II	25	4292.88	I	200	1560.79	III	10	485.48	IV
100	1969.40	II	25	4298.33	I	150	1562.55	III	10	489.19	IV
100	1982.11	II	35	4629.81	I	200	1581.53	III	10	490.96	IV
70	1985.61	II	300	4680.14	I	100	1582.06	III	10	493.37	IV
100	1986.99	II	400	4722.15	I	100	1598.52	III	10	496.72	IV
50	1993.37	II	400	4810.53	I	100	1600.87	III	100	497.70	IV
50	1996.92	II	800	4911.62	II	100	1619.61	III	15	1193.29	IV
	Air		500	4924.03	II	150	1622.51	III	15	1203.44	IV
100	2011.94	II	7	5068.66	I	200	1629.19	III	8	1212.71	IV
500	2025.48	II	15	5069.58	I	200	1639.33	III	5	1214.14	IV
60	2039.31	II	200	5181.98	I	150	1644.82	III	25	1224.35	IV
500	2062.00	II	8	5308.65	I	100	1651.74	III	20	1227.62	IV
200	2064.23	II	7	5310.24	I	200	1673.05	III	40	1228.65	IV
120	2079.08	I	7	5311.02	I	100	1688.59	III	30	1231.46	IV
50	2079.93	II	4	5772.10	I	80	1695.40	III	30	1237.26	IV
60	2087.33	I	4	5775.50	I	80	1706.65	III	50	1239.12	IV
80	2096.93	I	10	5777.11	I	80	1749.63	III	3	1246.26	IV
300	2099.94	II	500	5894.33	II	50	1753.84	III	15	1247.01	IV
200	2102.18	II	500	6021.18	II	100	1767.69	III	50	1249.69	IV
150	2104.42	I	500	6102.49	II	80	1839.32	III	30	1253.67	IV
75	2122.74	II	100	6111.53	II				30	1257.31	IV
800 r	2138.56	I	500	6214.61	II	Refs. 370,377 - R.D.C.	Zn IV		8	1259.68	IV
75	2147.42	II	8	6237.90	I		Vacuum		500	1265.74	IV
60	2210.18	II	8	6239.17	I	30	412.67	IV	5	1269.15	IV
50	2273.15	II	1000 h	6362.34	I	30	423.42	IV	100	1272.21	IV
1000	2501.99	II	10	6479.18	I	30	423.54	IV	200	1272.98	IV
150	2515.81	I	15	6928.32	I	50	425.90	IV	30	1275.78	IV
50	2527.96	II	8	6938.47	I	200	428.54	IV	25	1278.51	IV
1000	2557.95	II	3	6943.20	I	200	428.79	IV	100	1280.47	IV
50	2567.80	II	200	7478.8	II	80	429.30	IV	100	1291.83	IV
50	2567.98	II	300	7588.5	II	150	430.59	IV	100	1292.49	IV
100 h	2569.87	I	100	7612.9	II	200	431.54	IV	10	1294.32	IV
100	2582.44	I	100	7732.5	II	150	431.62	IV	100	1296.62	IV
300	2582.49	I	200	7757.9	II	120	434.41	IV	100	1296.73	IV
200	2608.56	I	10	7799.36	I	10	435.02	IV	20	1301.88	IV
300	2608.64	I	100	11054.25	I	150	435.76	IV	500	1306.66	IV
200	2670.53	I	100	13053.63	I	150	436.25	IV	200	1318.00	IV
300	2684.16	I	100	13150.59	I	80	436.38	IV	200	1320.74	IV
300	2712.49	I	20	13196.61	I	30	436.82	IV	200	1321.22	IV
200	2756.45	I	100	14038.70	I	50	441.15	IV	200	1322.33	IV
300	2770.86	I	20	15680.29	I	50	441.52	IV	200	1322.43	IV
300	2770.98	I	20	16483.45	I	20	441.56	IV	200	1326.74	IV
400	2800.87	I	20	16491.98	I	20	441.70	IV	200	1329.11	IV
100	2801.06	I	20	16505.23	I	100	442.39	IV	100	1333.32	IV
5	2801.17	I	5	24044.16	I	200	442.39	IV	150	1344.08	IV
100	2801.96	II	10	24375.02	I	150	444.39	IV	200	1347.98	IV
100	2902.30	II				100	444.46	IV	200	1349.90	IV
125	3018.36	I		Zn III		100	446.58	IV	50	1352.27	IV
200	3035.78	I	Refs. 376,377 - R.D.C.			30	447.85	IV	100	1356.20	IV
200	3072.06	I		Vacuum		10	449.13	IV	200	1357.82	IV
150	3075.90	I	1000	677.63	III	200	449.98	IV	100	1363.43	IV
100	3171.45	II	750	677.96	III	200	450.99	IV	200	1363.95	IV
100	3172.23	II	200	713.90	III	30	451.62	IV	40	1368.17	IV
300	3196.31	II	100	1432.15	III	20	452.80	IV	200	1369.53	IV

Zn IV			Zr I and II			Zr I and II			Zr I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
50	1370.42	IV	70	2695.43	II	180	3030.92	II	760	3340.56	II
100	1375.33	IV	95	2699.60	II	350 d	3036.39	II	380	3344.79	II
50	1375.98	IV	750	2700.13	II	100	3045.83	I	130	3353.66	I
200	1377.65	IV	280	2711.51	II	690	3054.84	II	180	3354.39	II
50	1391.24	IV	140	2712.42	II	100	3060.11	II	760	3356.09	II
80	1393.07	IV	140	2714.26	II	100	3064.63	II	540	3357.26	II
50	1394.54	IV	1300	2722.61	II	110	3085.34	I	180	3359.96	II
30	1400.14	IV	140	2725.47	I	110	3094.80	I	150	3360.46	I
15	1403.98	IV	800	2726.49	II	250	3095.07	II	150	3363.82	II
30	1409.40	IV	490	2732.72	II	110	3095.82	I	150	3367.82	II
5	1410.33	IV	1400	2734.86	II	280	3099.23	II	150	3370.59	I
30	1419.60	IV	110	2740.51	II	690	3106.58	II	180	3373.42	II
50	1427.79	IV	140	2741.55	II	110	3108.37	I	380	3374.73	II
20	1438.58	IV	1100	2742.56	II	210	3110.88	II	110	3376.27	II
80	1455.65	IV	660	2745.86	II	350	3120.74	I	150	3377.46	II
200	1459.98	IV	660	2752.21	II	320	3125.92	II	570	3387.87	II
100	1476.43	IV	530	2758.81	II	500	3129.18	II	760	3388.30	II
100	1481.25	IV	200 d	2768.73	II	500	3129.76	II	5700	3391.98	II
100	1529.84	IV		2768.85	II	140	3131.11	I	570	3393.12	II
50	1533.68	IV	170 d	2774.04	I	350	3132.07	I	160	3396.33	II
				2774.16	II	110	3133.23	I	380	3399.35	II
			200	2790.14	I	350	3133.48	II	570	3404.83	II
			120	2792.04	I	180	3136.96	I	760	3410.25	II
			160	2796.90	II	690	3138.68	II	380	3414.66	I
			110	2799.15	II	140	3139.80	I	1000	3430.53	II
			180	2810.91	II	180	3148.82	I	380	3437.14	II
			620	2814.90	I	290	3155.67	II	4700	3438.23	II
			390	2818.74	II	150	3157.00	II	600	3447.36	I
			530	2825.56	II	320	3157.82	I	200	3455.91	I
			110	2833.91	II	540	3164.31	II	410	3457.56	II
			710	2837.23	I	150	3165.45	II	200	3458.93	II
			120	2839.34	II	880	3165.97	II	820	3463.02	II
			130	2843.52	II	150	3166.26	II	600	3471.19	I
			660	2844.58	II	190	3178.09	II	200	3478.79	I
			210	2848.19	II	190	3181.58	II	1200	3479.39	II
			350	2848.52	I	150	3181.92	II	1300	3481.15	II
			350	2851.97	II	880	3182.86	II	760	3483.54	II
			340	2869.81	II	540	3191.21	I	4100	3496.21	II
			490	2875.98	I	210	3191.90	II	350	3505.48	II
			120	2892.26	I	540	3212.01	I	820	3505.67	II
			160	2905.23	II	760	3214.19	II	1000	3509.32	I
			300	2915.99	II	110	3222.47	II	200	3510.46	II
			110	2916.64	II	200	3228.81	II	2000	3519.60	I
			270	2918.24	II	630	3231.69	II	440	3525.81	II
			320	2926.99	II	630	3234.12	I	440	3533.22	I
			160	2934.61	II	110	3236.58	II	210	3535.16	I
			160	2936.31	II	760	3241.05	II	630	3542.62	II
			320	2948.94	II	320	3250.39	I	1800	3547.68	I
			210	2951.48	II	200	3254.28	I	210	3549.74	I
			320	2955.78	II	200	3260.11	I	630	3550.46	I
			320	2960.87	I	190	3269.66	I	1800	3551.95	II
			320	2962.68	II	150	3271.13	II	2100	3556.60	II
			320	2968.96	II	540	3272.22	II	1100	3566.10	I
			120	2969.19	I	1000	3273.05	II	210	3568.88	I
			230	2969.63	II	1300	3279.26	II	2100	3572.47	II
			130	2976.61	II	320 d	3282.73	I	210	3573.08	II
			320	2978.05	II	880	3284.71	II	1100	3575.79	I
			230	2979.18	II	140	3285.88	II	1300	3576.85	II
			160	2981.02	II	150	3288.80	II	880	3586.29	I
			820	2985.39	I	540	3305.15	II	440	3587.98	II
			320	3003.74	II	880	3306.28	II	3500	3601.19	I
			100	3005.37	I	150	3313.70	II	690	3611.89	II
			160	3005.50	I	210	3314.50	II	1100	3613.10	II
			820	3011.75	I	150	3319.02	II	1100	3614.77	II
			100	3013.32	II	380	3322.99	II	1100	3623.86	I
			160	3019.84	II	380	3326.80	II	320	3634.15	I
			350	3020.47	II	380	3334.25	II	260	3661.20	I
			500	3028.04	II	210	3334.62	II	1100	3663.65	I
			880	3029.52	I	190	3338.41	II	390	3671.27	II

Zr I and II			Zr I and II			Zr I and II			Zr I and II		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
800	3674.72	II	290	4156.24	II	280	4824.29	I	30	5486.09	I
390	3697.46	II	400	4161.21	II	190	4828.04	I	140	5502.12	I
960	3698.17	II	400	4166.36	I	110	4838.78	I	25	5507.87	I
720	3709.26	II	200	4183.32	I	210	4851.36	I	30	5517.11	I
270	3731.26	II	660	4187.56	I	160	4866.06	I	10	5518.05	I
560	3745.98	II	400	4194.76	I	110	4881.24	I	75	5528.41	I
880	3751.60	II	610	4199.09	I	110	4883.60	I	20	5532.30	I
480	3764.39	I	610	4201.46	I	100	4994.76	I	45	5537.46	I
480	3766.72	I	610	4208.98	II	30	5011.46	I	50	5545.32	I
340	3766.82	II	200	4211.88	II	250	5046.58	I	22bl	5551.75	ZrO
720	3780.54	I	400	4213.86	I	85	5060.39	I	25bl	5553.17	ZrO
560	3791.40	I	2000	4227.76	I	360	5064.91	I	12	5612.11	I
210	3817.58	II	200	4236.06	I	110	5065.22	I	120	5620.14	I
560	3822.41	I	2000	4239.31	I	100	5070.26	I	35	5623.53	I
2200	3835.96	I	770	4240.34	I	75	5073.98	I	25bl	5629.02	ZrC
1300	3836.76	II	770	4241.20	I	470	5078.25	I	25bl	5629.58	ZrC
550	3843.02	II	1200	4241.69	I	85	5085.26	I	160	5664.51	I
550	3847.01	I	310	4268.02	I	50	5112.27	II	20	5666.28	I
550	3849.25	I	550	4282.20	I	140	5115.24	I	120	5680.90	I
2900	3863.87	I	550	4294.79	I	50	5120.42	I	15	5685.42	I
770	3864.34	I	310	4302.89	I	85	5133.40	I	30	5708.89	I
990	3877.60	I	550	4341.13	I	300	5155.45	I	75bl	5718.21	ZrC
200	3879.05	I	1000	4347.89	I	200	5158.00	I	120	5735.70	I
1500	3885.42	I	290	4359.74	II	35	5158.67	I	35bl	5748.17	ZrC
2900	3890.32	I	310	4360.81	I	75	5160.99	I	17bl	5778.57	ZrC
2000	3891.38	I	350	4366.45	I	85	5165.96	I	160	5797.74	I
400	3900.52	I	240	4379.78	II	17	5178.99	I	30	5847.32	I
310	3915.94	II	190	4413.04	I	100	5183.70	I	50	5868.27	I
610	3921.79	I	240	4420.46	I	30	5187.03	I	110	5869.50	I
1200	3929.53	I	120	4427.24	I	100	5191.60	II	340	5879.80	I
200	3934.12	II	160	4431.49	I	100	5201.15	I	85	5885.62	I
200	3934.79	II	140	4443.00	II	85	5209.30	I	50	5901.09	I
940	3958.22	II	110	4457.43	I	85	5224.93	I	30bl	5908.61	ZrC
490	3966.66	I	110	4466.91	I	30	5243.47	I	140	5925.13	I
990	3968.26	I	110	4470.31	I	120	5277.41	I	100	5935.20	I
660	3973.50	I	190	4470.56	I	75	5280.05	I	110	5955.35	I
200	3975.29	I	200	4496.97	II	60	5294.82	I	30bl	5977.80	ZrC
200 h	3981.60	I	550	4507.12	I	120	5296.79	I	100	5984.23	I
770	3991.13	II	610	4535.75	I	60	5301.97	I	17	5995.37	I
770	3998.97	II	490	4542.22	I	110	5311.40	I	50	6001.05	I
200	4007.60	I	200	4553.01	I	25	5321.26	I	30	6025.36	I
200	4012.25	I	200	4555.13	I	22	5330.84	I	85	6032.61	I
400	4023.98	I	140	4555.52	I	12	5338.43	I	170	6045.85	I
770	4024.92	I	490	4575.52	I	30	5350.09	II	100	6049.24	I
990	4027.20	I	100	4582.29	I	30	5350.35	II	140	6062.84	I
240	4028.95	I	140	4590.55	I	25	5350.90	I	50	6120.83	I
400	4029.68	II	350	4602.57	I	25	5351.92	I	170	6121.91	I
490	4030.04	I	140	4604.42	I	75	5362.56	I	85	6124.84	I
400	4035.89	I	210	4626.41	I	12	5363.35	I	680	6127.44	I
240	4042.22	I	700	4633.98	I	17	5369.39	I	340	6134.55	I
610	4043.58	I	210	4644.83	I	20	5382.37	I	100	6140.46	I
490	4044.56	I	260	4683.42	I	270	5385.14	I	440	6143.20	I
400	4045.61	II	2300	4687.80	I	30	5386.65	I	30	6155.61	I
610	4048.67	II	510	4688.45	I	17	5391.18	I	75	6157.71	I
200	4050.33	II	110	4707.79	I	17	5395.88	I	25	6160.20	I
200	4050.48	I	1900	4710.08	I	25	5405.13	I	35	6189.40	I
770	4055.03	I	160	4711.92	I	85	5407.62	I	60	6192.96	I
600	4055.71	I	120	4717.62	I	17	5413.93	I	85	6213.05	I
330	4061.53	I	210	4719.12	I	20	5421.86	I	100	6214.69	I
1500	4064.16	I	300	4732.33	I	15	5426.36	I	170bl	6226.51	Zr
2000	4072.70	I	1400	4739.48	I	25	5428.42	I	100	6257.26	I
310	4074.93	I	190	4762.78	I	25	5437.76	I	50 b	6261.05	Zr
200	4076.53	I	870	4772.31	I	15	5440.41	I	35	6267.06	I
240	4078.31	I	210	4784.92	I	35	5448.57	I	45bl	6292.84	Zr
2000	4081.22	I	160	4788.67	I	10	5474.92	I	120	6299.66	I
200	4108.40	I	260	4805.87	I	10	5477.40	I	15	6304.34	I
400	4121.46	I	140	4809.47	I	35	5478.33	I	300	6313.02	I
1200	4149.20	II	190	4815.04	I	35	5480.83	I	30	6314.71	I
200	4152.64	I	700	4815.63	I	10	5481.16	I	50	6321.35	I

Zr I and II			Zr I and II			Zr I and II			Zr III		
Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
22	6340.36	I	170	7103.72	I	390	8132.99	I	35	1831.89	III
50bl	6345.10	ZrO	140	7111.68	I	20	8152.58	I	40	1850.06	III
75	6345.22	I	40	7112.82	I	12	8188.77	I	40	1853.38	III
75bl	6378.56	ZrO	18	7113.52	I	40	8194.73	I	30	1859.12	III
35	6407.00	I	12	7132.95	I	60	8201.73	I	25	1860.47	III
50 b	6412.39	ZrO	16	7140.74	I	280	8212.53	I	25	1861.77	III
12	6426.17	I	12	7144.47	I	20	8240.37	I	75	1864.06	III
35	6434.33	I	590	7169.09	I	40	8283.81	I	30	1865.45	III
60	6445.74	I	50	7201.62	I	140	8305.90	I	35	1877.00	III
20	6451.62	I	12	7258.17	I	14	8332.44	I	50	1892.07	III
20	6457.63	I	35	7264.76	I	50	8370.23	I	65	1914.25	III
110	6470.21	I	20	7306.21	I	120	8389.41	I	75	1921.96	III
60bl	6473.79	ZrO	25	7311.62	I	70	8414.00	I	75	1932.54	III
11	6484.35	I	35	7313.72	I	50	8453.17	I	50	1934.32	III
110	6489.64	I	90	7318.08	I	50	8464.65	I	40	1935.20	III
22	6493.10	I	10	7327.82	I	40	8498.44	I	75	1936.48	III
50	6503.26	I	50	7335.97	I	18	8584.21	I	75	1936.67	III
50	6506.36	I	50	7343.96	I	10	8734.86	I	80	1937.27	III
50bl	6508.15	ZrO	20	7373.50	I	12	8749.48	I	200	1940.25	III
30bl	6542.90	ZrO	25	7383.63	I	10	8786.23	I	100	1941.08	III
35	6550.54	I	14	7400.90	I	16	8804.98	I	25	1946.12	III
30	6569.43	I	10	7411.39	I	70	8836.09	I	80	1946.61	III
20	6576.56	I	10	7422.75	I	60	8899.52	I	50	1946.99	III
30 b	6578.06	ZrO	10	7433.10	I				100	1953.95	III
50	6591.99	I	110	7439.86	I				50	1961.32	III
10	6596.71	I	18	7467.57	I				100	1962.01	III
10	6598.84	I	16	7479.58	I				40	1962.92	III
50	6603.27	I	14 h	7515.70	I	25	687.64	III	85	1966.22	III
15	6620.56	I	12	7517.95	I	50	690.39	III	25	1967.81	III
11	6678.01	II	20 h	7540.62	I	25	819.59	III	60	1974.99	III
22	6688.18	I	20	7544.59	I	30	820.21	III	40	1983.14	III
11	6702.12	I	29	7551.46	I	35	823.69	III	50	1989.83	III
17	6709.61	I	40	7554.70	I	25	829.50	III	30	1990.95	III
27	6717.88	I	25	7558.45	I	30	850.61	III	30	1994.46	III
40	6752.73	I	12	7560.09	I	25	859.56	III			
75	6762.38	I	12	7562.12	I	30	864.86	III		Air	
85	6769.16	I	80	7607.15	I	25	868.64	III	45	2000.23	III
27	6772.89	I	14	7612.08	I	25	868.99	III	100	2006.82	III
15	6787.15	II	20	7621.17	I	25	919.59	III	30	2013.30	III
35	6790.85	I	29	7658.60	I	30	1320.81	III	35	2016.63	III
45	6828.78	I	18	7690.83	I	25	1375.13	III	30	2021.52	III
45	6832.89	I	14	7704.27	I	30	1378.93	III	60	2026.78	III
13	6845.33	I	10	7708.42	I	40	1403.48	III	100	2035.42	III
17	6846.34	I	10	7766.55	I	35	1420.12	III	50	2036.92	III
100	6846.97	I	12	7816.32	I	25	1420.87	III	75	2056.13	III
27	6849.26	I	110	7819.35	I	25	1465.44	III	40	2058.73	III
13	6852.56	I	35	7822.94	I	25	1563.24	III	75	2060.83	III
120	6888.29	I	40	7826.72	I	40	1593.59	III	50	2061.47	III
29	6900.59	I	90	7849.35	I	100	1612.38	III	125	2070.43	III
20	6904.36	I	35	7869.99	I	50	1620.62	III	50	2074.12	III
29	6907.37	I	14	7876.25	I	75	1631.31	III	100	2077.92	III
20	6916.87	I	16	7882.18	I	50	1638.33	III	100	2080.99	III
16	6932.38	I	10	7897.98	I	35	1675.06	III	30	2081.81	III
29	6948.46	I	16	7908.46	I	35	1675.75	III	25	2085.35	III
150	6953.84	I	20	7940.47	I	40	1703.36	III	200	2086.78	III
60	6966.44	I	160	7944.61	I	40	1725.03	III	40	2089.50	III
10	6975.91	I	80	7956.66	I	40	1754.38	III	40	2097.03	III
150	6990.84	I	80	7959.98	I	35	1759.12	III	40	2102.30	III
80	6994.32	I	20	7963.63	I	30	1764.75	III	50	2103.16	III
10	7005.46	I	160	8005.27	I	30	1771.96	III	25	2104.23	III
100	7027.40	I	25	8046.05	I	40	1773.90	III	40	2113.98	III
25	7057.36	I	16	8053.06	I	100	1779.51	III	35	2114.10	III
14	7057.96	I	20	8055.29	I	40	1783.35	III	40	2125.06	III
140	7087.30	I	20	8055.76	I	200	1790.19	III	35	2137.90	III
25	7089.43	I	60	8058.08	I	150	1793.56	III	35	2138.45	III
35	7094.46	I	150	8063.09	I	125	1798.13	III	25	2139.85	III
50	7095.59	I	790	8070.08	I	75	1800.03	III	40	2159.24	III
540	7097.70	I	10	8114.28	I	25	1801.67	III	40	2162.20	III
280	7102.91	I	20	8120.17	I	100	1805.26	III	100	2175.80	III
									100	2191.15	III

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Section 2. Arranged by Wavelength

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
110	34.973	C V	250	104.07	Al V	200	131.41	Na V	40	162.27	F V
450	40.268	C V		104.1	Li III	900	131.44	Al V	12	162.448	Na IV
	41.00	B V	250	104.18	Al V	300 h	131.64	Na V	10	163.190	Na IV
30	48.59	B V		104.40	Be II	45	131.99	Ne V	40	163.50	F V
10	52.68	B IV		104.67	Be I	50	132.04	Ne V	50	163.56	F V
	58.13	Be IV		105.5	Li III	500	132.63	Al V	300	163.62	Na V
	58.57	Be IV		105.80	Be I	300	132.81	Mg IV	100	164.02	Ne V
	59.32	Be IV	100	106.28	Na V	500	133.16	Na V	100	164.14	Ne V
30	60.31	B IV		106.30	Mg III	400	133.39	Na V	80	164.574	O V
	60.74	Be IV	100	106.30	Na V	200	134.27	Na V	110	164.657	O V
	64.06	Be IV	100	106.40	Na V	40	134.54	F V	80	164.709	O V
	75.93	Be IV	100	106.49	Na V		135.0	Li III	90	165.98	F V
1 h	76.10	Be III		106.92	Mg III	110	135.523	O V	100	166.18	F V
2	76.48	Be III		107.26	Be I	300	135.79	Na V	80	166.235	O V
3	78.53	Be III		107.38	Be I	300	135.85	Na V	52	166.947	N V
1	78.61	Si V	200 c	107.93	Na V		136.5	Li II		167.21	Li II
4	78.66	Be III	600	107.95	Al V	4	136.551	Na IV	150	167.99	O V
1	78.90	Si V		108.0	Li III	4	136.854	Na IV	12	168.411	Na IV
1 h	78.92	Be III	200	108.02	Na V	80	138.109	O V	10	168.546	Na IV
2	80.81	Si V	300	108.06	Al V	200	138.81	Na V		168.74	Li II
2	81.11	Si V		108.08	Mg III	300	138.92	Na V	30	169.79	F IV
5	81.89	Be III	300	108.11	Al V	110	139.029	O V	30	169.84	F IV
10	82.38	Be III		110.16	Mg III	4	139.961	Na IV	110	170.219	O V
	82.58	Be II	200 c	110.82	Na V		140.5	Li II	15	170.80	Mg III
20	83.20	Be III	200	110.88	Na V	150	140.76	Ne V	30	171.07	F IV
	83.66	Be II	100	111.51	Na V	150	140.79	Ne V	15	171.39	Mg III
30	84.76	Be III	300 c	112.01	Na V	7	142.232	Na IV		171.58	Li II
10	85.18	Si V		113.9	Li III	6	142.359	Na IV	450	172.169	O V
6	85.58	Si V		114.32	Mg III	100	142.44	Ne V	80	172.62	Ne IV
50	88.31	Be III	100 h	114.70	Na V	100	142.50	Ne V	500	173.93	Ne V
	89.16	Be I	100	114.74	Na V	150	142.72	Ne V	40	174.70	F V
	89.80	Be II	20	117.86	Si V	100	143.27	Ne V	40	176.37	F IV
	90.04	Be II	400	117.99	Na V	150	143.34	Ne V	80	177.16	Ne IV
	90.21	Be I	40	118.16	Mg IV	8	146.064	Na IV		178.02	Li II
4	90.45	Si V	250	118.50	Al V	7	146.302	Na IV	50	178.43	F V
	90.67	Be I	80 p	118.81	Mg IV	400	146.95	Mg IV	40	178.59	F V
4	90.85	Si V	20	118.97	Si V	150	147.13	Ne V	150	179.42	Sc V
	91.06	Be II	66	119.01	Ne V	300	147.41	Mg IV	350	180.07	Mg IV
	91.36	Be II	100	120.04	Na V	300	147.54	Mg IV	350	180.14	Sc V
	91.74	Be II	200	122.52	Ne V	40	147.95	F V	400	180.62	Mg IV
	92.19	Be I	70	123.59	Mg IV	50	148.00	F V	400	180.80	Mg IV
	92.61	Be II	400	124.03	Al IV	400	148.64	Na V	200	180.82	Sc V
	93.14	Be II	80	124.616	O V	300	148.86	Na V	200	180.96	Sc V
	93.42	Be II	240	124.65	Mg IV	9	150.298	Na IV	350	181.34	Mg IV
	93.93	Be II	66	125.12	Ne V	7	150.543	Na IV	40	181.52	F IV
	94.78	Be II	400	125.18	Na V	7 c	150.64	Na IV	50	181.55	Sc V
	95.76	Be II	400	125.22	Na V	8	150.687	Na IV	40	181.57	F IV
	96.29	Be I	500	125.29	Na V	400	151.13	Na V	400	181.75	N IV
15	96.44	Si V	300	125.43	Na V	66	151.23	Ne V	15	182.24	Mg III
10	97.14	Si V	300	125.46	Na V	7	151.299	Na IV	200	182.39	Sc V
	97.24	Be I		125.5	Li II	120	151.42	Ne V	12	182.97	Mg III
	97.44	Be I	900	125.53	Al V	80	151.447	O V	40	182.98	F V
	97.86	Be I	200	125.90	Na V	110	151.477	O V	5	183.95	Na III
	97.97	Be I	800	126.07	Al V	150	151.546	O V		184.05	Mg II
	98.12	Be I	100	126.21	Na V	15	151.82	Ne IV		184.31	Mg II
2	98.21	Si V		126.50	Mg III	15	152.23	Ne IV		184.68	Mg II
	98.37	Be I	200	126.56	Na V	40	152.51	F V		184.81	Mg II
	98.66	Be I	100	126.61	Na V	45	154.50	Ne V		185.26	Mg II
	98.94	Be I	400	127.44	Na V	7	155.083	Na IV		185.59	Mg II
	99.19	Be I	400	127.47	Na V	7	155.240	Na IV	250	185.745	O V
100	100.25	Be III	400	128.03	Na V	7	155.448	Na IV		185.98	Mg II
	100.86	Be I	400	128.05	Na V	8	155.510	Na IV	52	186.069	N V
	101.20	Be I	700	129.73	Al IV	8	156.537	Na IV	62	186.153	N V
	102.13	Be I	300	129.86	Mg IV	300	157.21	Na V		186.47	Mg II
	102.49	Be II	800	130.41	Al V	40	158.54	F V	20	186.51	Mg III
	102.9	Li III	200	130.68	Na V	15	158.65	Ne IV	150	186.58	Ne IV
	103.4	Li III	1000	130.85	Al V	15	158.82	Ne IV	40	186.72	F V
300	103.80	Al V	900	131.00	Al V	800	160.07	Al IV	40	186.79	F V
400	103.88	Al V	300	131.35	Na V	700	161.69	Al IV	50	186.84	F V

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
	186.84	Mg II	60	201.22	F IV		216.68	Mg I	140	234.32	Ne IV
40	186.97	F V		202.00	Mg II	500	217.20	N IV	30	234.347	He II
40	187.01	F V	6	202.15	Na III		217.21	Mg I	120	234.70	Ne IV
	187.19	Mg II	80	202.161	O V		217.37	Mg I	3	235.17	Y IV
20	187.20	Mg III	6	202.19	Na III	6	217.39	Y IV	25	235.77	Y IV
30	187.24	F IV	80	202.224	O V	500 d	217.90	N IV	550	236.07	N IV
	187.38	Mg II		202.27	Mg II		218.19	Mg I	50	237.331	He II
10	188.53	Mg III	80	202.283	O V		218.34	Mg I	500	237.99	N IV
	188.54	Mg II	80	202.334	O V		218.42	Mg I	90	238.36	O IV
	188.91	Mg II	150	202.393	O V		218.74	Mg I	180	238.57	O IV
	189.01	Mg II	8	202.49	Na III		219.04	Mg I	500 w	238.7	N IV
	189.23	Mg II		202.51	Mg II		219.28	Mg I	600	238.80	N IV
5 h	189.35	Na III	500	202.60	N IV		220.03	Mg I	16	239.41	V V
	189.37	Mg II	5 d	202.71	Na III	8	220.28	Sc IV	19	239.48	V V
200	190.36	Ca V	7 d	202.72	Na III		220.33	Mg I	500 w	239.62	N IV
10	190.445	Na IV	8	202.76	Na III	520	220.352	O V	70	239.86	F IV
250	190.46	Ca V		202.94	Mg II	70	220.77	F IV	70	240.02	F IV
60	190.57	F V	8 p	203.06	Na III	12	221.71	Y IV	90	240.08	F IV
70	190.84	F V		203.15	Mg I		222.03	Mg I	70	240.15	F IV
	191.30	Mg II	8	203.28	Na III	3	222.18	Y IV	70	240.28	F IV
	191.56	Mg II	8	203.33	Na III		222.67	Mg I	70	240.37	F IV
	191.65	Mg II		203.42	Mg II	6	222.98	Y IV	1	242.12	Y IV
400	191.7	N IV		203.53	Mg II	140	223.24	Ne IV	30	242.30	Y IV
40	191.97	F V	110	203.78	O V	500 d	223.4	N IV	100	243.027	He II
	192.40	Mg II	150	203.82	O V		223.45	Mg I	40	243.82	Sc V
	192.55	Mg II	100	203.85	O V	120	223.60	Ne IV	500	243.87	Sc V
375	192.751	O V	200	203.89	O V		223.74	Mg I	3	244.14	Y IV
450	192.799	O V	100	203.94	O V	18	224.91	V V	250	244.91	C IV
	192.84	Mg II		204.22	Mg I	800 w	225.12	N IV	400	246.42	Sc V
400	192.9	N IV	10 c	205.49	Na IV		225.18	Mg I		247.14	Mg II
520	192.906	O V	40	205.55	F V	800	225.21	N IV	900	247.20	N IV
80	193.003	O V	500	205.94	N IV	12	225.35	Ti V	90	247.561	N V
	193.09	Mg II	500	205.97	N IV	20	225.46	V V	120	247.706	N V
	193.31	Mg II	500	206.03	N IV		225.54	Mg I	500 w	248.43	N IV
	193.40	Mg II	110	207.18	O IV		226.26	Mg I	110	248.459	O V
	193.64	Mg II	150	207.24	O IV	60	226.94	F IV	500 w	248.46	N IV
5	193.80	Na III	10	207.30	Na III	50	227.10	F IV		248.47	Mg II
5 h	194.04	Na III		207.5	Li II	110	227.19	C V	500 w	248.48	N IV
5 h	194.17	Na III	300	207.794	O V	80	227.372	O V	160	248.66	C V
100	194.28	Ne IV	90	208.25	F IV	80	227.469	O V	160	248.74	C V
5	194.29	Na III	100	208.48	Ne IV	150	227.511	O V	150	249.41	Ca IV
	194.37	B V	100	208.73	Ne IV	80	227.549	O V	150	250.15	Ca IV
200	194.593	O V	80	208.90	Ne IV	80	227.634	O V	50 c	250.52	Na III
6	194.68	Na III		209.09	Mg II	80	227.689	O V	400	250.98	Sc V
6	195.53	Na III	90	209.303	N V	17	227.88	V V	100	251.03	F IV
150	195.86	O IV		209.43	Mg II	300	228.56	Sc V	20	251.14	Ne III
200	196.01	O IV		209.84	Mg I	2	228.84	Y IV	150	251.35	Ca IV
50	196.39	F IV	3	211.80	Y IV	10	228.91	Ti V	30	251.37	Na III
60	196.45	F IV	150	212.56	Ne IV	20	228.94	Y IV	20	251.56	Ne III
500	196.87	N IV		213.53	Mg I	3	229.78	Y IV	5	251.58	Mg V
250	196.97	Ca V	70	213.85	F IV	15	229.87	Na III	20	251.66	V V
500	197.23	N IV	70	214.06	F IV	50 h	230.12	F III	20	251.73	Ne III
	197.76	Mg II	100	214.35	K V	12	230.59	Na III	18	252.44	V V
	199.28	Li II	3	214.51	Y IV	100	230.85	Sc V	110	252.56	O IV
	199.31	Mg II	150	215.040	O V	15	231.454	He II	500	252.85	Sc V
300	199.55	Ca V	200	215.103	O V	100	231.73	Mg III	110	252.95	O IV
50	199.76	F IV		215.12	Mg I	150	231.823	O V	17	252.96	Ti V
10	199.772	Na IV	250	215.245	O V	20	232.584	He II	150	253.08	O IV
50	199.80	F IV		215.31	Mg I	60	233.22	F IV	500	253.73	Sc V
50	199.85	F IV	10 c	215.34	Na III	50	233.39	F IV	50	255.38	Sc V
50	199.93	F IV		215.45	Mg I	140	233.46	O IV	80	255.59	P V
50	200.00	F IV		215.66	Mg I	150	233.50	O IV	300	255.64	Sc V
70	200.09	F IV		215.79	Mg I	110	233.52	O IV	50	255.67	P V
	200.29	Mg I	12	215.86	Na III	200	233.56	O IV	50	255.72	F III
250	200.51	Ca V	6	215.97	Y IV	110	233.60	O IV	60	255.77	F III
60	201.01	F IV	250	216.018	O V	600 w	234.12	N IV	70	255.86	F III
70	201.06	F IV	12	216.12	Na III	600 w	234.20	N IV	300	256.317	He II
60	201.10	F IV		216.22	Mg I	600 w	234.25	N IV	200	257.16	Sc V
80	201.16	F IV		216.36	Mg I	80	234.26	Mg III	500	257.95	N III

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
265	257.98	Ca V	350	283.58	N IV	90	301.32	Na II	300	319.62	Cl IV
150	258.24	Sc V	110	283.69	Ne III	100	301.44	Na II	10	319.644	Na I'
650	258.50	N III	40	283.89	Ne III	12	301.67	Sr IV	10	320.293	He I
40	258.81	Sc V	900	283.91	Sc V	60	302.45	Na II	40	320.47	Y V
9 h	258.95	Cu V	49	283.97	Cu V	30	302.86	Ga V	12	320.53	Ga V
700	259.19	N III	12	284.31	Sr IV	90	303.123	N IV	450	320.979	O III
50	260.05	Sc V	800	284.45	Sc V	500	303.28	N IV	4000	320.99	Mg I
800	260.09	N III	300	284.98	Ca V	150	303.41	O III	66	321.05	Cu V
300	260.39	O IV	600	285.56	N IV	150	303.46	O III	120	321.59	Ca IV
165	260.45	Ca V	110	285.71	O IV	140	303.52	O III	50	321.61	Sr II
600	260.45	N IV	150	285.84	O IV	160	303.62	O III	40	321.69	Y V
250	260.56	O IV	18	285.98	V V	160	303.69	O III	500	322.17	Ca V
5	261.20	K II	110	286.448	O V	1000	303.780	He II	40	322.31	Ga V
800	261.28	N III	20	286.84	V V	500	303.786	He II	120	322.503	N IV
70	261.71	F III	450 c	286.96	Ca V	250	303.80	O III	150	322.570	N IV
60	261.75	F III	300	287.33	Cl V	20	303.84	Ga V	200	322.724	N IV
	262.37	B V	600	288.29	Sc V	500	304.01	Zr V	250	322.76	Ca V
500	262.91	N III	200	289.14	C IV	29	304.02	Ni V	50	322.99	Ga V
3	263.72	Y IV	5	289.18	Y V	200	304.98	Ge V	30	323.10	Ga V
80	263.81	F III	250	289.23	C IV	41	304.99	Ga IV	120	323.175	N IV
80 d	264.34	O III	900	289.59	Sc V	90	304.996	P IV	300	323.22	Ca V
110	264.48	O III	15	289.85	Sc IV	300	305.24	Zr V	600	323.26	N III
150	264.64	Y IV	5	290.53	Ga V	200	305.60	O III	3000	323.31	Mg I
500	265.23	N III	12	291.09	Sr IV	250	305.66	O III	7	323.36	Ti V
500	265.27	N III	12	291.19	Sr IV	190	305.70	O III	40	324.25	Ga V
150	266.196	N V	1000 d	291.93	Sc V	300	305.77	O III	250	324.48	Ca V
200	266.379	N V	300	292.19	Zr V	65	305.83	Cu V	40	324.95	Ga V
25	266.90	Na III	12	293.22	Sr IV	190	305.84	O III	250	325.28	Ca V
110	266.97	O III	800	293.25	Sc V	200	306.62	O IV	2	325.28	K II
150	266.98	O III	150	293.33	K V	150	306.88	O IV	150	325.58	Y V
150	267.03	O III	22	293.41	Cu V	30	307.03	Ga V	40	326.14	Ga V
40	267.06	Ne III	700	294.51	Ge V	800	307.15	Na V	74	326.57	Cu V
40	267.52	Ne III	14	294.53	Ga IV	25	307.18	Sr III	200	326.57	Y V
70	267.65	Na III	300	294.84	K V	30	308.26	Ga V	30	326.77	Ga V
20	267.71	Ne III	80	295.62	O III	1000	308.26	Na V	250	327.38	K V
400	267.77	Ca V	1000	295.64	Ge V	15	309.64	Ga V	5	327.60	K II
50	267.87	Na III	110	295.66	O III	110	310.58	P V	175	328.34	Y V
50	268.63	Na III	61	295.67	Ga IV	200	311.24	K V	300	328.45	O II
500	268.70	N III	120	295.72	O III	150	311.34	P V	300	328.47	P V
60	270.23	F IV	1	296.13	Ga V	30	311.79	Ga V	30	328.65	Ga V
300	270.31	Ca V	200	296.17	K V	10	312.30	Mg V	250	328.74	O II
650	270.99	N IV	400	296.17	Sc V	17	312.39	V V	250	328.78	P V
200	271.14	Ca V	15	296.31	Sc IV	25	312.41	Ga V	250	329.12	Ca I
49	271.33	Cu V	250	296.55	Ca IV	570	312.42	C IV	150	329.39	Ca I
150	271.82	K IV	5	296.82	Ga V	500	312.46	C IV	50	330.40	Y V
20 p	272.08	Na III	6	296.96	Ca III	51	312.51	Cu V	125	330.67	Sr II
250	272.27	Ca V	200	297.06	K V	250	312.77	K V	25	330.68	K II
30	272.40	Y IV	600 w	297.7	N IV	3	312.89	Y V	300	330.94	Ca V
20	272.45	Na III	700	297.82	N IV	220	313.05	Ne III	200	331.44	Ca I
200	272.98	Ca V	15	298.12	Sr IV	200	313.35	Y V	200	331.84	Cl I'
150	273.03	Y IV	30	298.44	Ga V	30	313.68	Ga V	250	331.99	Ca I
100	273.06	K IV	15	299.04	Sc IV	220	313.68	Ne III	235	332.53	Ca I
35	276.58	Mg V	200	299.32	Ca IV	40	313.95	Ne III	800	332.55	Na V
150	277.38	O III	20	299.47	Ga V	150	314.715	N III	150	332.81	Ca I
10	278.60	Y IV	56	299.64	Cu V	200	314.850	N III	900	333.09	Y V
1000	278.69	Al V	50	299.99	Y V	90	314.877	N III	200	333.44	Ca V
300	279.63	O IV	700	300.00	Sc V	150	315.053	N IV	82	333.56	Cu V
70	279.69	F III	30	300.01	Ga V	200	315.18	K V	200	333.57	Ca V
	279.88	K IV	15	300.12	Sr IV	80	315.22	F III	500	333.80	Y V
375	279.94	O IV	160	300.15	Na II	55	315.24	Ni V	900	333.91	Na V
400	280.99	Ca V	160	300.20	Na II	70	315.54	F III	300	334.55	Ca V
400	281.00	Sc V	200	300.25	K V	56	315.71	Ni V	300	335.050	N IV
900	281.39	Al V	12	300.27	Sr IV	60	315.75	F III	100	335.12	Y V
90	282.301	P IV	650	300.32	N IV	15	315.95	Ga V	400	335.14	Y V
150	282.35	K V	200	300.50	K V	50	316.11	Sr III	250 c	335.34	Ca V
40	283.18	Ne III	25	300.57	Ga V	20	316.48	Ga V	200	336.55	Ca V
160	283.21	Ne III	10	300.78	Ga V	200	318.09	Ca IV	3	336.56	Ar V
250	283.42	N IV	220	301.12	Ne III	50	318.39	Ca IV	5	336.61	Ga V
300	283.48	N IV	20	301.19	Ga V	40	319.41	Ga V	500	336.62	Y V

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
63	336.79	Ni V	90	355.33	O III	250	371.75	C III	11	382.76	In V
200	337.54	Ca V	86	355.41	Cu V	68	371.76	Ni V	300	382.91	K IV
3	337.56	Ar V	80	355.47	O III	150	371.78	C III	10	383.05	In V
6	338.00	Ar V	20	355.52	Co V	200	372.001	P IV	650	384.03	C IV
250	338.06	Ca V	100	355.56	Y V	300	372.05	Y V	250	384.10	K IV
500	338.35	N III	68	355.61	Ni V	300	372.08	Na II	700	384.18	C IV
2	338.43	Ar V	1	355.77	Bi V	500	372.15	K V	300	384.96	Fe V
200	338.83	Ca IV	70	355.78	Ni V	200	372.46	K V	300	384.97	Fe V
2	339.01	Ar V	900	355.86	Y IV	2	372.53	Pb V	450	385.0	B IV
500	339.02	Y V	18	355.88	Co V	100	372.55	Sn V	300	385.03	Fe V
150	339.79	Ca IV	12	356.06	Co V	200	372.77	K V	300	385.11	Fe V
81	339.88	Cu V	250	356.25	Ca V	10	372.82	In V	300	385.25	Fe V
3	339.89	Ar V	150	356.26	K IV	10	372.94	In V	300	385.26	Fe V
200	340.02	Y V	65	357.37	Ni V	67	373.60	Ni V	300	385.30	Fe V
500	340.20	N III	50	357.83	Ne IV	300	373.78	Cl V	300	385.75	Fe V
200	340.29	Ca IV	400	357.96	Ne V	210	373.80	O III	300	385.88	Fe V
5	340.42	Y V	500	358.47	Ne V	200	374.00	O III	350	386.16	Fe V
300	340.46	K IV	69	358.57	Ni V	300	374.08	O III	500	386.203	C III
150	340.74	K IV	68	358.58	Ni V	190	374.16	O III	17	386.21	In V
200	341.29	Ca IV	200	358.72	Ne IV	300	374.204	N III	200	386.61	K IV
200	341.46	Ca IV	75	358.80	Sr III	300	374.24	Fe V	10	386.70	In V
30	341.92	K III	200	359.02	O III	200	374.33	O III	300	386.74	Fe V
250 c	342.45	Ca IV	190	359.22	O III	20	374.40	Cu IV	300	386.78	Fe V
100	343.19	Ca IV	120	359.293	P IV	210	374.44	O III	500	386.82	Y IV
200	343.44	Ca IV	500	359.38	Ne V	350	374.441	N III	300	386.85	Fe V
200	343.64	Ca V	150	359.38	O III	250	374.74	Ca IV	300	386.88	Fe V
250	343.93	Ca IV	66	359.47	Ni V	300	374.77	Fe V	350	386.88	Fe V
68	343.93	Ni V	300	359.73	K IV	2	374.95	In V	200	387.08	Ca V
160	344.0	B IV	150	359.899	P IV	400	375.05	Sc V	125	387.14	Ne IV
100	344.12	La IV	200	359.91	K IV	30	375.30	F II	400	387.20	Fe V
500	344.59	Y V	800	360.32	Na V	6	375.84	In V	70	387.40	Cu V
200	344.96	Ca IV	800	360.37	Na V	300	375.96	K IV	500	387.48	N III
215	345.13	Ca IV	10	360.76	Na IV	300	375.96	K V	400	387.50	Fe V
300	345.31	O III	30	360.86	Cu IV	300	375.98	Fe V	300	387.62	Fe V
81	346.00	Cu V	150	361.01	Sn V	6	376.07	In V	400	387.76	Fe V
150	347.23	P V	300	361.28	Fe V	350	376.38	Na II	400	387.78	Fe V
78	347.34	Ni V	90	361.433	Ne II	10	376.79	In V	300	387.80	K V
70	347.46	Ni V	120	361.514	P IV	250	377.18	Ca V	2	387.87	Pb V
67	347.72	Ni V	150	361.629	P IV	72	377.68	Ni V	300	387.98	Fe V
15	348.00	K III	250	362.08	K IV	74	377.76	Cu V	100	388.22	Ne IV
71	348.10	Ni V	150	362.15	K IV	250	377.76	K V	500	388.318	P IV
200	348.20	P V	60	362.455	Ne II	100	378.14	Na III	300	388.61	Fe V
200	349.50	K V	120	362.833	N III	20	378.53	Sr IV	3	388.66	In V
100	349.65	Y V	150	362.881	N III	110	378.56	P V	200	388.68	Sc V
2	349.75	Y V	150	362.946	N III	17	378.61	In V	300	388.82	Fe V
69	350.77	Ni V	90	362.985	N III	100	378.68	Sc V	14	388.91	In V
3	350.88	Ar V	150	363.02	K IV	30	379.12	K III	250	388.92	K IV
20	351.09	Mg V	250	363.49	Sr III	300	379.12	K V	2	389.03	La V
10	351.36	Y V	30	363.78	I V	3	379.24	In V	250	389.07	K IV
500	351.62	Sr III	77	363.96	Cu V	220	379.31	Ne III	250	389.07	K V
500 w	351.93	N IV	300	365.43	Fe V	300	379.59	Fe V	250	389.50	P V
500	351.98	N III	1000	365.59	Ne V	700	379.73	Br IV	11	390.03	In V
18	352.20	Mg V	69	365.62	Ni V	300	379.88	K IV	300	390.11	Fe V
450	352.92	Ca V	100	365.66	Ce V	400	379.96	Y V	250	390.11	K V
90	352.956	Ne I	300	365.86	Fe V	70	380.10	Na III	400	390.15	Cl V
700	353.06	N IV	2	367.40	Pb V	9	380.27	In V	300	390.19	Fe V
30	353.09	Mg V	400 p	368.18	Zr V	300	380.31	Fe V	250	390.42	K IV
15	353.30	Mg V	6	368.67	In V	25	380.48	K III	300	390.57	K IV
69	353.59	Ni V	1	369.52	Bi V	250	380.48	K IV	300	390.70	P V
100	353.98	Y V	6	370.10	In V	36	380.74	I V	400	390.72	La V
72	354.18	Ni V	300	370.42	Y IV	30	380.90	F II	300	390.78	Fe V
18	354.22	Mg V	70	370.62	Ni V	300	381.27	Fe V	11	390.92	In V
76	354.42	Ni V	65	370.63	Cu V	11	381.56	In V	200	391.46	K IV
68	354.49	Ni V	10	371.16	Sc IV	200	381.70	K IV	300	391.94	Fe V
300	354.93	K IV	150	371.21	Sr III	9	382.14	In V	300	392.06	Fe V
60	354.962	Ne I	120	371.299	P IV	30	382.23	K III	9	392.29	In V
110	355.14	O III	67	371.31	Ni V	300	382.23	K IV	300	392.38	Fe V
120	355.14	Sn V	150	371.504	P IV	150	382.49	K IV	500	392.43	Cl V
20	355.33	Mg V	250	371.69	C III	200	382.65	K IV	75	392.44	Sr IV

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
9	392.46	In V	35	403.85	Sr IV	800	416.20	Ne V	150	430.76	F IV
200	392.47	K IV	250	403.97	K IV	300	416.66	Fe V	50	430.91	F II
300	392.50	Fe V	150	404.21	Ce V	300	416.84	Fe V	3	431.03	Pb V
300	392.51	Fe V	300	404.36	Mn V	150	417.28	K IV	6	431.2	Bi I
33	392.68	Ni IV	150	404.41	K IV	700	417.39	Fe V	150	431.54	Zn
300	392.70	Fe V	400	404.62	Fe V	9	417.43	In V	40	431.55	F II
300	392.91	Fe V	350	405.10	La V	30	417.54	K III	120	431.62	Zn
50	393.00	Sr IV	30	405.24	Cu IV	700	418.04	Fe V	1000	432.11	La
500	393.14	K IV	3	405.33	In V	100	418.18	Y V	400	433.54	Mn
32	393.24	Ni IV	400	405.50	Fe V	2	418.45	In V	10	434.41	Zn
300	393.27	Fe V	150	405.854	Ne II	500	418.47	Fe V	300	434.42	Fe
1	393.60	In V	380	406.02	Mn V	150	418.59	Y V	600	434.57	Ca
300	393.72	Fe V	100	406.27	Cl III	30	418.62	K III	75	434.72	K I
300	393.73	Fe V	300	406.40	Mn V	285	418.7	B IV	300	434.98	O I
25	393.89	In V	80	406.45	Cu IV	400	419.52	C IV	150	435.02	Zn
300	393.91	Fe V	30	406.48	K III	140	419.65	F IV	2500	435.28	La
70	393.91	Ni V	25	406.94	Cu V	500	419.71	C IV	1	435.63	Bi V
300	393.97	Fe V	35	406.94	Sr IV	30	419.78	Sr IV	40	435.64	F II
300	394.04	Fe V	40	407.04	F II	50	419.79	Y V	600	435.67	Mn
66	394.31	Ni V	2	407.12	Ba III	350	419.80	Mn V	50	435.68	K I
2	394.38	Pb V	120	407.138	Ne II	150	420.05	F IV	150	435.76	Zn
300	394.64	Fe V	9	407.28	In V	7	420.12	Ba III	700	436.14	La
45	394.90	Sr IV	3	407.36	In V	300	420.56	Fe V	350	436.16	Mn
300	395.15	Fe V	800	407.42	Fe V	6	420.7	Bi IV	500	436.18	Mn
66	395.24	Ni V	600	407.44	Fe V	160	420.73	F IV	80	436.25	Zn
400	395.32	Sc V	400	407.49	Fe V	300	420.74	Y V	30	436.38	Zn
250	395.40	K V	500	407.75	Fe V	500	420.77	N IV	3	436.60	Pb
450	395.558	O III	9	407.95	In V	700	421.06	Fe V	2	436.67	Ar
11	395.74	In V	250	408.08	K IV	3	421.55	La V	50	436.82	Zn
300	395.79	Fe V	12	408.684	Na IV	150	421.61	Ne IV	700	436.84	La
400	395.90	Fe V	1	408.81	Y V	500	421.78	Fe V	300	437.11	La
51	396.06	Cu V	40	408.96	K III	4	422.12	Ga IV	1000	437.24	Sr I
50	396.22	Sr IV	200	409.31	Y V	400	422.18	K V	100	437.27	Ca
4	396.87	Ar IV	10	409.614	Na IV	300	422.28	Fe V	5	437.4	S V
3	397.73	In V	400	409.71	Fe V	500	422.31	Fe V	700	437.55	La
200	397.77	Y V	7	409.95	Ca III	50	423.07	La V	100	437.66	Y V
200	398.36	K V	150	410.03	P V	2	423.16	In V	250	437.77	Ca
1	398.53	La V	400	410.20	Fe V	25	423.18	Ga IV	400	437.83	Cl
4	398.55	Ar IV	600	410.30	Mn V	300	423.23	Fe V	20	437.88	Cd
15	398.63	K III	15	410.372	Na IV	30	423.42	Zn IV	250	438.02	K V
200	398.88	K V	600	410.60	Mn V	50	423.54	Zn IV	5	438.2	S V
30	399.34	La V	480	410.98	Mn V	4	423.84	Ba III	2	438.47	Pb
300	399.36	Ce V	400	411.32	Mn V	49	424.40	Ni IV	100	438.62	Cr
200	399.50	Sc V	10	411.334	Na IV	5	424.64	Pb V	450	438.74	Mn
200	399.75	K V	400	411.37	Cl III	400	424.78	La V	9	438.80	Sc
10	399.79	In V	600	411.55	Fe V	750	425.00	Ca V	6	438.91	Pb
300	399.84	Fe V	40	411.80	B III	600	425.03	Y IV	200	438.93	Ca
40	399.92	Sr IV	400	411.81	Cl III	300	425.16	K V	300	439.22	Fe
9	400.05	In V	13	412.242	Na IV	500	425.59	K V	350	439.35	Mn
300	400.11	Fe V	30	412.67	Zn IV	200	425.90	Zn IV	5	439.6	S V
400	400.21	K IV	460	412.74	Mn V	500	426.06	Fe V	5	439.69	Ca
700	400.37	Br IV	30	412.93	Sr IV	500	426.11	Fe V	16	439.92	Ga
300	400.51	Fe V	40	413.07	Sr IV	300	426.83	Fe V	1	440.11	Ge
300	400.52	Fe V	40	413.45	Cu IV	350	426.97	Fe V	50	441.15	Zn
25	400.57	In V	460	413.75	Mn V	50	427.01	Cd IV	20	441.52	Zn
41	400.59	Ni V	50	413.79	K III	1	427.87	Y V	20	441.56	Zn
300	400.63	Fe V	120	414.604	P IV	200	428.54	Zn IV	3	441.62	Y V
1000	400.72	Na V	30	414.87	K III	600	428.59	Mn V	100	441.70	Zn
300	401.04	Fe V	200	414.999	P IV	80	428.79	Zn IV	1000	441.72	Mr
300	401.64	Fe V	300	415.01	Fe V	500	429.05	Mn V	25	441.81	K I
300	401.86	Fe V	200	415.03	Y V	150	429.30	Zn IV	1	441.95	Ge
20	402.10	K III	250	415.05	K V	100	429.51	F III	200	442.30	K
25	402.39	In V	40	415.32	Sr IV	1	429.78	Bi V	200	442.39	Zn
300	402.87	Fe V	600	415.62	Mn V	110	430.15	F III	850	442.49	Mr
300	402.91	K IV	200	415.79	K V	25	430.21	Sr IV	25	442.73	Sr
300	403.06	Fe V	250	415.805	P IV	80	430.22	F III	30	442.96	Y V
300	403.45	Y V	650	415.98	Mn V	200	430.59	Zn IV	1	443.11	Ce
9	403.72	Ca III	30	416.00	K III	30	430.65	Sr IV	300	443.57	K
5	403.82	Ba III	50	416.13	La V	50	430.75	Y V	70	443.68	Cu

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
750	443.82	Ca IV	300	458.16	Fe V	10	476.03	K II	600	493.48	Rb III
20	444.01	La V	3	458.16	Si IV	200	476.42	Zn IV	70	495.13	Cd IV
10	444.07	La V	2	458.98	Ar V	150	476.67	La V	30	495.14	K II
57	444.21	Ni IV	400	459.46	C III	20	478.29	Ta V	3	496.20	Pb V
250	444.245	P IV	500	459.52	C III	7	478.35	Pb IV	250	496.25	Kr V
75	444.34	K III	570	459.63	C III	200	478.65	Zn IV	10	496.38	Pb IV
150	444.39	Zn IV	600	459.90	Na V	200	478.90	Zn IV	10	496.72	Zn IV
100	444.46	Zn IV	1000	460.728	Ne II	15	478.97	Zr IV	90	497.00	Cu IV
300	444.70	Fe V	850	461.05	Na V	40	479.18	K III	75	497.10	K III
50	445.02	Ca IV	250	461.09	Ca IV	250	480.41	Ne V	60	497.23	Zr IV
200	445.040	Ne II	6 p	461.23	Ar V	60	480.66	Zr IV	50	497.38	F IV
500	445.05	Na V	7	461.41	Ti V	60	480.90	Cd IV	90	497.430	Rb II
300	445.158	P IV	3	461.70	Pb V	40	481.118	Rb II	100	497.70	Zn IV
600	445.19	Na V	500	462.391	Ne II	150	481.28	Ne V	50	497.82	Rb III
300	445.44	Fe V	3	462.42	Ar V	250	481.36	Ne V	60	497.83	F IV
200	445.61	K IV	10000	463.14	La IV	200	482.10	Zn IV	7000	498.08	La V
5	446.00	Ar V	1000	463.26	Na V	800	482.11	Br V	70	498.14	Cd IV
300	446.04	Fe V	80	463.72	Cu IV	10	482.11	K III	120	498.180	P III
300	446.256	Ne II	650	463.74	N IV	5000	482.16	La V	15	498.26	Ti V
100	446.58	Zn IV	1000	463.85	La V	10	482.41	K III	70	498.53	Cd IV
250	446.590	Ne II	7	463.94	Ar V	200	482.43	La V	70	498.80	F IV
250	446.83	K IV	100	464.02	Cr V	35 p	482.43	Rb III	4000	499.03	La V
8	446.95	Ar V	90	464.29	F III	30 p	482.47	Rb III	15000	499.54	La IV
4	447.53	Ar V	100	464.37	F V	10	482.68	Zn IV	12	499.94	Pb IV
2	447.58	Ce IV	80	464.55	Nb V	200	482.71	K V	60	500.22	Zr IV
180	447.815	Ne II	400	464.86	Cl IV	500	482.83	Rb III	100	500.28	Rb III
50	447.85	Cd IV	5	465.08	K II	200	482.96	Ce V	4	500.34	Zr IV
30	447.85	Zn IV	100	465.11	F III	500	482.99	Ne V	120	500.77	Kr V
75	448.60	K III	110	465.37	F V		483.	Li II	14	502.08	Ti V
750	448.60	K IV	30	465.85	Rb III	35	483.01	V V	10	502.42	Fe IV
9	448.95	Ba III	120	465.98	F V	2000	483.30	La V	7	502.71	Ti V
18	449.06	Ar V	75	466.79	K III	200	483.75	K V	10000	503.58	La V
10	449.13	Zn IV	200	466.93	Zn IV	8	483.99	Ti V	80	504.09	Cd IV
4	449.49	Ar V	100	466.99	F V	25	484.20	Sr IV	70	504.20	Cd IV
200	449.71	K V	400	467.32	Mn V	90	484.278	P III	70	504.50	Cd IV
200	449.98	Zn IV	30	467.35	Kr III	100	484.39	Kr V	90	504.60	Cu IV
1250	450.40	La V	80	468.32	Nb V	25	484.51	V V	12	504.66	Ti V
500	450.57	Ca IV	600	468.37	Br V	80	484.53	Cu IV	11	505.35	Fe IV
200	450.734	C III	150	468.43	Zn IV	90	484.60	F II	2	505.500	He I
200	450.99	Zn IV		469.50	K II	300	484.84	Rb III	3	505.684	He I
80	451.16	Cu IV	50	469.64	Cr V	65	485.42	Ni IV	4	505.912	He I
30	451.62	Zn IV	67	469.67	Ni IV	10	485.48	Zn IV	90	506.16	F V
250	451.869	N III	140	469.77	Ne IV	800	486.17	Cl IV	5	506.200	He I
2	451.97	Y V	200	469.82	Ne IV	300	486.17	Fe V	80	506.31	Cd IV
300	452.226	N III	180	469.87	Ne IV	70	486.884	Al III	7	506.47	Ti V
20	452.80	Zn IV	140	469.92	Ne IV	30	486.912	Al III	7	506.570	He I
200	452.90	K V	100	470.09	K III	30	487.227	Ar II	11	506.69	Fe IV
4	453.45	Pb V	90	471.146	P III	285	488.10	Ne III	1250	507.04	Sr III
7000	453.50	La IV	65	471.24	Ni IV	2	488.39	Bi V	10	507.058	He I
50	454.55	Ca IV	75	471.57	K III	10 d	488.58	Ti V	200	507.20	Kr V
150	454.654	Ne II	25	471.76	Sr IV	220	488.87	Ne III	800	507.391	O III
200	455.274	Ne II	40	471.95	F II	10	489.19	Zn IV	900	507.683	O III
250	455.67	K V	60	472.00	F II	10	489.49	Cd IV	15	507.718	He I
15	455.84	Y V	200	472.09	Zn IV	450	489.50	Ne III	60	508.01	Cd IV
	456.	Li II	150	472.16	Kr V	70	489.64	Ne III	100	508.08	F V
10	456.275	Ne II	200	472.66	Zn IV	500	489.66	Rb III	25 p	508.14	Sr IV
400	456.33	K IV	50	472.71	F II	100	489.96	Rb III	40	508.15	La V
400	456.33	K V	40	473.02	F II	220	490.31	Ne III	1000	508.182	O III
120	456.348	Ne II	200	473.02	Zn IV	130	490.57	F IV	30	508.33	Rb III
80	456.67	Zn IV	300	473.10	Y IV	50	490.650	Ar II	120	508.39	F III
90	456.896	Ne II	200	473.51	Zn IV	30	490.701	Ar II	20	508.434	Rb II
8	456.96	Ba III	200	474.56	Zn IV	10	490.96	Zn IV	20	508.643	He I
250	456.98	Ca IV	8	474.69	Ti V	160	491.00	F IV	50	508.95	Cd IV
70	457.18	F II	300	474.82	Mn V	360	491.05	Ne III	70	509.38	Cu IV
600	457.30	La V	10	474.88	Rb II	1875	491.79	Sr III	70	509.55	Cd IV
150	457.32	Zn IV	45	474.92	K III	1	492.72	Bi V	25	509.81	Cd IV
4	457.82	Si IV	8	475.36	Pb IV	70	493.00	Cd IV	3	509.99	Be III
85	457.84	Y V	375	475.60	P V	60	493.07	Ta V	25	509.998	He I
3	458.12	Ar V	50	475.78	Zn IV	10	493.37	Zn IV	20	510.77	B III

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
40	510.85	B III	300	530.173	Rb II	520	542.57	P V	75	556.91	Cs II
250	511.138	Al III	50	530.79	Cd IV	80	542.60	Cd IV	700	557.12	Cl II
150	511.191	Al III	10	530.91	Fe IV	400	542.87	Cl V	8	557.50	Sc I'
70	511.40	Cd IV	10000	531.07	La V	40	542.887	Rb II	500	558.36	Rb I
250	511.522	C III	80	531.09	Cd IV	75	542.90	Cu III	5	558.48	Ar V
35	512.098	He I	7	531.26	Tl IV	2	542.90	Ge III	500	558.60	Ca V
	512.53	B V	80	531.51	Cd IV	30	542.912	Ar II	8	558.92	Ce I
80	513.00	Cd IV	10	531.78	Fe IV	12	543.09	Nb IV	350	559.305	Cl II
150	513.266	Rb II	900	531.97	Br V	7	543.10	Ti V	1000	559.76	Br I'
8	513.37	Ti V	15000	533.23	La V	200	543.203	Ar II	10	559.94	Nb I
50	513.64	F II	800	533.64	Rb III	7	543.34	Ti V	25	560.26	Cd I
70	513.97	F V	75	533.801	Rb II	150	543.89	Ne IV	500	560.317	Al I
60	514.08	F V	25	534.19	Sr IV	10	544.20	Fe IV	200	560.433	Al I
3750	514.38	Sr III	70	534.29	Cd IV	6000	544.80	La V	700	561.53	Cl II
70	514.50	Cd IV	110	534.63	P V	600	544.92	P V	700	561.68	Cl II
70	514.94	F II	800	534.73	Cl IV	1000	545.11	Cl V	700	561.74	Cl II
10	514.94	K III	80	534.99	P V	12	545.21	Nb IV	2500	562.75	Sr II
9	515.07	Pb IV	250	535.288	C III	220	545.41	Hf V	3	563.62	Bi V
2	515.12	Si IV	10	535.55	Fe IV	1000	545.43	Br IV	100	563.72	Lu V
50	515.616	He I	700	535.67	Cl IV	15	546.12	K III	10	564.16	Cd I
3	516.35	Si IV	10	535.84	Ti V	10	546.22	Fe IV	700	564.77	Rb I
400	516.79	Rb III	1200	535.86	Rb III	600	546.33	Cl V	150	565.46	Ca I
10	517.28	Sr V	10	535.89	Ti V	80	546.55	Cd IV	45	565.53	I V
150	518.24	B III	600	536.15	Cl IV	70	546.85	F II	30	565.64	Kr I
75	518.27	B III	66	536.28	Ni IV	8000	547.44	La V	10	566.22	Nb I
200	519.25	Zr V	200	536.50	Zr V	70	547.461	Ar II	8	566.61	Si II
20	519.3	S IV	300	536.53	Cl V	1000	547.63	Cl V	1500	566.71	Rb I
30	519.327	Ar II	14	536.61	Fe IV	60	547.87	F II	60	567.01	Cd I
60	519.42	Cd IV	10	536.74	Fe IV	1000	547.90	Br V	120	567.69	F II
40	519.51	Cu IV	70	536.77	Cd IV	40	548.01	Cd IV	110	567.75	F II
40	520.04	Hf IV	400	537.01	Cl V	60	548.04	Kr V	250	568.038	P IV
20	520.1	S IV	400	537.030	He I	50	548.32	F II	400	568.42	Ne'
50	520.61	K III	15	537.10	Fe IV	20	548.33	Cd IV	30	569.16	Kr I
40	520.8	S IV	50	537.24	Cd IV	40	548.52	F II	1000	569.19	Br I
15	520.97	Cd IV	13	537.26	Fe IV	10	548.80	Fe IV	50	569.19	Hf I
120	521.74	Ne IV	300	537.46	Cl V	15	548.90	Cd IV	250	569.76	Ne'
140	521.82	Ne IV	900	537.61	Cl IV	500	549.22	Cl IV	500	569.83	Ne'
20	522.0	S IV	14	537.79	Fe IV	2	549.31	Be III	200	569.853	P II
3	522.09	Ar V	250	537.83	O II	700	549.77	Br V	20	570.16	Pb I
100	522.213	He I	13	537.94	Fe IV	400	550.02	Cl IV	10	570.49	Tl I
20	522.5	S IV	67	537.96	Ni IV	11	550.32	Fe IV	140	570.64	F I'
250	523.00	K IV	500	538.03	Cl V	60	550.92	Cu IV	3000	570.90	La'
7	523.05	Ti V	300	538.080	C III	20	551.2	S IV	140	571.30	F I'
25	523.79	K III	600	538.12	Cl IV	25	551.27	Cd IV	150	571.39	F I'
5	524.19	Ar V	350	538.149	C III	10	551.77	Fe IV	8	571.59	Ce I
80	524.41	Cd IV	300	538.26	O II	700	552.02	Cl IV	400	571.904	Cl I
70	524.47	Cd IV	400	538.312	C III	40000	552.02	La IV	30	571.98	Kr I
12	524.58	Ti V	10	538.44	Fe IV	100	552.13	Ce V	250	572.11	Ne'
80	524.59	F V	400	538.68	Cl V	13	552.14	Fe IV	800	572.34	Ne'
50	524.77	Cd IV	220	539.09	O II	11	552.74	Fe IV	160	572.66	F I'
70	525.10	Cd IV	200	539.55	O II	20	552.90	Cd IV	1000	572.82	Rb
60	525.19	Cd IV	15	539.71	K III	60	553.06	Cd IV	10	572.88	Fe I
90	525.29	F V	150	539.85	O II	600	553.30	Cl IV	1000	573.36	Sc'
17	525.69	Fe IV	540.	540.	Li II	700	553.330	O IV	70	573.362	Ar
1500	525.71	La V		540.0	Li III	80	554.05	Cd IV	8	573.90	Pb I
1000	525.795	O III	8 d	540.14	Ti V	775	554.075	O IV	350	574.281	C II
15	526.29	Fe IV	4000	540.20	La V	10	554.26	Fe IV	800	574.406	Cl I
100	526.30	F V	6	540.51	Sr V	2	554.50	Ar V	50	575.05	Cr I
200	526.45	K IV	40	540.65	Cu IV	850	554.514	O IV	30	576.24	Cr I
10	526.57	Fe IV	30	540.86	Kr III	700	554.62	Cl IV	1000	576.59	Br I
13	526.57	Ti V	60	540.90	Cd IV	200	555.036	Rb II	30	576.62	Cr I
13	526.63	Fe IV	80	541.13	Ne IV	700	555.261	O IV	1500	576.65	Rb
12000	526.76	La V	8	541.46	Ti V	40	555.44	Lu V	30	576.736	Ar
70	527.07	Cd IV	9	541.71	Ti V	14	555.48	Ba III	10	576.76	Fe
150	527.62	K IV	70	541.74	Cd IV	10	555.66	Fe IV	25	578.01	Sr'
6	527.69	Ar V	100	542.07	Ne IV	1200	556.19	Rb III	2500	579.63	Rb
8	529.32	Ti V	800	542.23	Cl V	600	556.23	Cl III	10	579.76	Fe
14	529.78	Pb IV	600	542.30	Cl V	700	556.61	Cl III	60	579.79	Mn
40	529.80	K III	12	542.38	Nb IV	70	556.817	Ar II	30	579.83	Kr

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
70	580.263	Ar II	25	600.7	As V	60	614.23	Lu V	50	630.04	Kr III
750	580.32	K V	30	600.77	K II	285	614.3	Se V	250	630.06	Rb III
1500	581.26	Rb III	100	600.90	Hf IV	40	614.90	Cr IV	1000	630.14	Br IV
60	581.44	Mn IV	285	601.0	Se V	4	615.17	I IV	80	630.14	F III
60	581.65	Mn IV	1000	601.27	Br IV	30	615.34	Cr IV	90	630.20	F III
200	581.831	P III	500	601.50	Cl IV	30	615.60	Cr IV	80	630.30	Cr IV
6	582.08	Be III	50	601.54	Lu V	170	615.628	Ne I	500	630.71	Ni III
500	582.34	Rb III	5	601.86	I IV	200	615.67	Cu III	2000	630.97	Y V
30	583.437	Ar II	450	602.09	Rb III	40	616.0	As V	30000	631.26	La IV
250	584.15	Cs III	250	602.27	K V	150	616.03	Cu III	500	631.779	P IV
1000	584.334	He I	170	602.726	Ne I	25	616.09	V III	800	632.22	Br V
50	584.40	Cs III	30	602.858	Ar II	35	616.72	Kr III	30	632.62	Cr IV
8	584.52	Pb IV	1200	603.01	Cs III	50	616.82	Cr IV	35	633.09	Kr III
4	584.65	Zr IV	100	603.16	Hf IV	270	616.952	O IV	400	633.19	Cl V
8	584.83	Sc IV	400	603.43	K V	150	617.005	O IV	500	633.56	Zr IV
20	584.85	Cu IV	30	603.67	Kr III	200	617.036	O IV	100	633.58	Hf IV
4000	584.98	Y V	500	604.59	Cl IV	9	617.08	Sc IV	5	633.59	Ca III
1000	585.10	Br IV	50	605.23	Sn IV	500	617.60	La V	200	633.63	Zr IV
30	585.14	Kr III	50	605.51	Rb III	1000	617.85	Br IV	50	633.94	V III
60	585.21	Mn IV	90	605.67	F II	700	618.057	Cl II	3	635.12	Ar V
15	585.42	Zr IV	50	605.86	Kr III	40	618.23	Cr IV	400	635.32	Cl V
250	585.51	K V	80	606.29	F II	200	618.27	Hf IV	40	635.41	V III
30	585.96	Kr III	500	606.35	Cl III	170	618.672	Ne I	600	635.86	Cs III
500	586.24	Cl II	35	606.47	Kr III	50	619.04	Sn IV	800	635.881	Cl II
500	586.32	K V	81	606.79	Co IV	120	619.102	Ne I	285	636.0	Se IV
2	586.42	Zr IV	100	606.80	F II	40	619.13	Cr IV	1000	636.626	Cl II
1000	586.71	Br IV	70	606.92	F II	500	619.67	Rb III	30	637.34	Cr IV
800	586.77	Rb III	1000	607.03	Br IV	1000	619.87	Br IV	50 p	637.44	Lu V
35	587.213	Ne I	500	607.28	Rb III	600	619.982	Cl II	40	637.53	Lu V
14	587.57	Ba III	5	607.291	Cs II	50	620.00	Ga III	200	637.54	Ni III
600	587.94	Sc V	80	607.47	F II	100	620.19	Hf IV	50	637.55	Cr IV
60	588.89	Zr IV	14	607.53	Fe IV	800	620.298	Cl II	300	637.67	Cs III
35	589.179	Ne I	50	607.57	I V	300	620.4	Br III	120	637.87	Kr V
2500	589.419	Rb II	74	607.59	Co IV	100	620.66	Cr IV	400	637.93	Ca V
100	589.74	Zr IV	600	607.85	Cs III	20	620.83	Rb III	50	638.13	Cr IV
35	589.911	Ne I	25	607.93	K II	800	621.03	Br V	2000	638.17	Cs III
1	590.73	Bi III	800	607.94	Cs III	1500	621.15	Cs III	30	638.54	Cr IV
25	591.044	Cs II	90	608.06	F II	400	621.28	Cl III	250	638.67	K V
50	591.412	He I	55	608.24	Co IV	60	621.36	Cr IV	200	639.356	Cs II
100	591.42	Rb III	580	608.398	O IV	3	621.44	Hg III	50	639.98	Kr III
70	591.830	Ne I	220	608.7	Se V	40	621.45	Kr III	1000	642.23	Br IV
2500	593.18	La V	13	608.80	Fe IV	20	621.52	Ge V	25	642.23	Sr V
900	593.65	Rb III	400	608.90	Cl IV	40	622.01	Ga III	100	643.05	Hf IV
30	593.70	Kr III	66	609.16	Co IV	40	622.09	Cr IV	300	643.12	Ca V
30	594.10	Kr III	70	609.21	Co IV	100	622.24	Rb III	1	643.68	Y III
1000	594.94	Rb III	64	609.28	Co IV	45	622.80	Kr III	1500	643.878	Rb II
9	595.022	C II	10	609.65	Fe IV	30	623.54	Cr IV	150	644.148	O II
30	595.09	Cr IV	110	609.70	O III	6	623.77	Ar IV	200	644.54	Hf IV
10	595.18	Rb IV	640	609.829	O IV	520	624.617	O IV	285	644.634	N II
1300	595.88	Rb III	43	610.04	Co IV	30	624.93	Sr V	.360	644.837	N II
100	595.920	Ne I	160	610.04	O III	50	625.02	Kr III	450	645.178	N II
285	596.0	Se V	37	610.25	Co IV	40	625.04	Cr IV	700	645.44	Br V
30	596.41	Kr III	200	610.75	O III	580	625.130	O IV	500	645.67	Rb III
100	596.56	Hf IV	24	610.79	Co IV	100	625.68	Ni III	2	645.76	Si IV
4	597.01	Tl IV	100	610.85	O III	30	625.76	Kr III	750	646.19	Kr IV
1000	597.51	Br IV	450	611.1	Br III	640	625.852	O IV	60	646.41	Kr III
750	597.70	La V	50	611.12	Kr III	40	625.99	Cr IV	400	646.57	Ca V
70	597.700	Ar II	700	611.70	La V	700	626.735	Cl II	4	646.69	Y III
700	597.818	O III	400	612.07	Cl IV	200	626.823	Ne I	18	647.27	Ba III
1200	598.49	Rb III	30	612.372	Ar II	45	628.59	Kr III	400	647.39	Hf IV
75	598.706	Ne I	6	612.46	I IV	600	628.66	Zr IV	140	647.50	N I
35	598.891	Ne I	30	612.62	K II	50	628.73	Sn IV	70	647.67	F V
1000	599.598	O III	50	612.64	Cr IV	40	628.79	Lu V	100	647.77	F V
180	600.00	Hf V	4	612.786	Cs II	350	629.008	P IV	110	647.87	F V
2000	600.01	La V	360	613.0	Se V	100	629.26	Cr IV	250	647.88	Ca V
70	600.036	Ne I	400	613.31	Rb III	1000	629.730	O V	70	647.97	F V
1000	600.09	Br IV	40	613.75	Cr IV	200	629.739	Ne I	350	648.482	P IV
40	600.17	Kr III	10000	614.01	Cs III	50	629.74	Cr IV	10	648.50	Pb IV
5000	600.24	La V	40	614.03	Cr IV	400	629.914	P IV	50	649.21	Sr V

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
1000	650.894	Cl II	600	665.65	Hf IV	130	678.99	F IV	45	691.93	Kr II
3	650.90	Tl II	150	665.70	I II	160	679.21	F IV	350	692.70	N I
50	651.20	Kr III	200	666.011	Ar II	30	679.218	Ar II	50	693.13	V IV
250	651.55	Ca V	70	666.1	S IV	300	679.39	Zr V	20	693.5	S V
6	652.22	Si III	2500	666.25	Cs III	200	679.401	Ar II	1500	693.594	Cl II
40	652.5	S IV	100	666.55	Cr IV	400	679.60	Cs III	4	693.85	Y III
400	652.64	Br V	6	666.81	I III	800	679.62	Br V	100	693.92	Cr IV
360	652.7	Se IV	75	667.30	Cr IV	50	679.65	V IV	70	693.95	B II
40	653.0	S IV	50	668.386	Cs II	2	679.68	Hg III	10	694.0	Xe II
8	653.33	Si III	25	668.74	Y III	35	680.13	Kr III	4	694.42	Pb V
9	653.36	Ba III	500	669.70	Ca IV	2	680.28	Ge III	200	695.20	Y III
70	653.6	S IV	9	669.93	Sr V	40	680.3	S V	50	695.21	Cr IV
400	653.70	Cl IV	100	670.068	Al III	110	680.9	S V	50	695.61	Kr II
6	653.87	Y III	450	670.1	Se IV	230	681.272	O V	500	695.829	Al II
40	654.0	S IV	300	670.38	Cl III	40	681.6	S V	50	695.91	Pd II
130	654.03	F V	5	670.76	Bi III	400	681.92	Cl V	8	696.20	Pb V
285	654.2	Se IV	5 r	670.87	Tl II	1500	682.053	Cl II	400	696.217	Al II
4	654.22	I IV	3	670.88	Ge III	400	683.17	Cl V	15 r	696.30	Tl II
4	654.56	I IV	1000	670.946	Ar II	10	683.28	Ar IV	350	696.99	Br II
70	655.6	S IV	170	671.016	N II	1000	683.51	Br IV	3000	697.049	Rb I
2	655.80	I II	200	671.118	Al III	35	683.68	Kr III	5	697.55	Ca II
20	655.9	S IV	100	671.36	Hf IV	500	684.37	V IV	1000	697.72	Br IV
750	656.00	Ca IV	285	671.386	N II	100	684.45	V IV	30	698.05	Kr II
9	656.10	Pb IV	150	671.630	N II	15	684.53	In IV	20	698.5	Xe II
120	656.12	F III	160	671.773	N II	15	684.58	Cd III	10	698.69	Sb II
300	656.76	Ca V	3000	671.851	Ar II	500	684.996	N III	5	699.09	Ca II
130	656.87	F III	285	671.9	Se IV	80	685.141	Cu II	3	699.22	Sb V
10	656.98	Y III	40	671.98	Y III	7	685.31	In III	6	699.41	Ar I
10	657.112	Cs II	170	672.001	N II	5	685.41	Ca III	800	699.43	Cs II
110	657.23	F V	40	672.34	Kr III	570	685.513	N III	5	699.89	Ca II
110	657.3	S IV	35	672.85	Kr III	70	685.544	O I	200	700.17	Ni II
140	657.33	F V	200	672.95	O II	650	685.816	N III	30	700.25	Lu I
800	657.54	Br V	1800	673.06	Cs III	5	686.2	S V	8	700.28	Ar I
8	657.8	Xe III	300	673.13	Cl III	35	686.23	Sr V	6	701.39	Ca II
25	657.94	Cs III	5	673.48	Si III	45	686.25	Kr III	800	702.332	O III
40	658.3	S V	200	673.49	Hf IV	500	686.335	N III	800	702.822	O III
140	658.33	F III	150	673.77	O II	6	686.88	Bi V	900	702.899	O III
6	659.00	I II	9	673.8	Xe III	5	686.9	S V	200 p	703.03	Zr V
20	659.15	Sr V	450	673.90	P V	30	687.053	C II	150	703.40	Cs I
50	659.72	Kr III	9	674.0	Xe III	40	687.12	Cr IV	20	703.73	Pb V
70	659.8	S V	4	674.10	Tl II	50	687.345	C II	1000	703.850	O III
1000	659.811	Cl II	200 p	674.13	Zr V	300	687.50	K V	3500	703.89	Cs II
8	660.1	Xe III	20	674.81	Rb III	800	687.55	Cs III	12	705.1	Xe I
360	660.286	N II	200	675.53	Zr V	25	687.64	Zr III	8	705.11	I III
40	660.9	S IV	8	675.59	Be III	1500	687.656	Cl II	3	705.35	Ar V
25	660.94	Sr V	140	676.12	F IV	450	687.68	Br III	200	705.49	Pd I
4	661.32	Be III	5	676.2	S V	150	687.98	Cu III	50	705.98	Cr I
160	661.4	S IV	70	676.242	Ar II	45	687.98	Kr III	4	706.29	Pb V
1000	661.53	Br IV	35	676.57	Kr III	200	688.27	Zr V	1	706.54	Bi V
1300	661.841	Cl II	9	676.6	Xe III	7	688.39	Ar IV	6	707.66	Pb V
500	661.867	Ar II	500	676.94	Ni III	50	688.46	Cr IV	150	707.80	Pd I
200	662.37	Ni III	110	677.00	B III	10	688.74	Pd III	50	708.36	Kr I
2000	663.074	Cl II	160	677.14	B III	400	688.93	Cl V	20	708.84	K II
110	663.2	S V	130	677.15	F IV	12 p	689.01	Ar IV	600	708.85	Kr V
50	663.29	Lu V	500	677.19	Br III	20	689.46	Pd III	220	709.2	Se II
150	663.57	Ni III	150	677.22	F IV	50	689.54	Pd III	5	709.20	Ar V
40	663.7	S IV	5	677.3	S V	5	689.8	S V	5 r	709.23	Tl II
25	663.76	Rb IV	8	677.33	In IV	400	690.2	Br III	100	709.313	Cu I
2	663.77	Ge III	1	677.34	Lu III	50	690.39	Zr III	220	709.4	Se II
450	663.82	Cs III	200	677.34	V IV	7	690.86	Kr V	200	709.80	Ag I
8	663.98	I II	8	677.39	Cd III	7	691.05	Lu III	100	709.89	Pd I
200	664.43	Sr IV	40	677.55	Cr IV	10	691.18	Sb III	1000	710.25	Cs II
8	664.52	I II	1000	677.63	Zn III	1	691.20	Sb II	100	710.35	Sr I
30	664.562	Ar II	300	677.8	Br III	100	691.53	V IV	6000	711.187	Rb I
450	664.60	Cs III	30	677.952	Ar II	5000	691.60	Cs III	300	711.68	Br II
40	664.8	S IV	750	677.96	Zn III	5	691.62	In III	8	712.49	Zr I
30	664.86	Kr III	20	678.1	S V	5	691.7	S V	30	712.90	Cr I
8	665.06	I II	60	678.74	V IV	100	691.72	Y III	300	713.33	Ni II
500	665.54	Br III	2	678.87	Bi V		691.75	Kr V	300	713.38	Ni II

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
90	713.518	N V	6	728.81	Fe III	12000	740.29	Cs III	90	754.39	Zr IV
200	713.85	Ag III	2	728.83	Y III	200	740.33	Zr V	30	754.60	Ce IV
150	713.860	N V	2500	728.951	Cl II	350	740.41	Xe II	400	754.67	K IV
200	713.90	Zn III		729.	Li II	8	740.55	Ca III	200	755.03	Lu III
	714.0	Be II		729.1	Li III	2000	740.61	Zr V	3	755.16	Lu III
50	714.00	Kr III	60	729.40	Kr II	50	740.85	Rb IV	1500	755.18	Cs III
50	714.89	Lu III	70	729.5	S III	200	740.98	Ag III	150	755.73	Ag III
1000	715.39	Br IV	20	729.73	Y III	100	741.45	Pr IV	12	755.75	Ce IV
120	715.5	As V	500	729.82	Ni III	10000	741.456	Rb II	10	755.80	Pb V
150	715.53	Cu III	5	730.00	Fe III	35	741.52	Ge V	35	755.84	Ge V
	715.55	Cl V	350	730.04	Ag III	40	741.79	Ce IV	10	756.0	Xe III
4	715.60	Ar V	250	730.11	Ni III	220	741.9	Se III	300	756.510	P IV
3	715.65	Ar V	150	730.28	Ag III	500	741.95	K IV	100	756.85	Pd III
6	715.79	Sr V	50	730.37	Pr IV	150	742.23	Cs III	60	757.04	F V
	716.19	Cl V	125	730.38	Cu III	200	742.29	Ag III	100	757.41	Pd III
25	716.24	Rb IV	600	730.49	Y III	15	742.6	Xe III	300	757.80	Ni III
35	716.26	Ge V	10	730.60	Sc III	500	742.74	Zr V	250	758.27	Ni III
300	717.24	Zr V	5	730.71	Bi V	15	743.12	Ba III	100	758.27	Ag III
100	717.73	Ag III	25	730.83	Ag II	20	743.15	Pr IV	40	758.48	B III
100	717.90	Pd III	5	730.85	Pb V	5	743.58	Be II	70	758.67	B III
200	718.090	Ar II	70	730.930	Ar II	400	743.720	Ne I	700	758.678	O V
1500	718.138	Cs II	150	730.94	Ag III	20	743.89	Pr IV	250	758.73	Ni III
100	718.179	Cu II	15	731.0	Xe III	3	744.19	La III	1200	758.82	Cs III
20	718.23	Pr IV	1000	731.00	Br IV	70	744.794	O I	285	759.0	Se IV
500	718.48	Ni III	40	731.36	B II	110	744.9	S IV	450	759.1	Se V
900	718.484	O II	40	731.44	B II	200	744.925	Ar II	640	759.441	O V
200	718.53	Ag III	5000	731.56	Cs III	400	745.21	Cl IV	30	759.54	Rh III
600	718.562	O II	15	731.65	Sc III	500	745.26	K IV	6	759.90	Cs III
100	719.47	Pd III	400	731.70	Ni III	70	745.322	Ar II	60	760.05	Ge V
1000	719.55	I II	30	731.77	Pr IV	1	746.06	Sb V	90	760.15	Zr IV
300	720.43	K V	600	731.86	K V	20	746.14	Pr IV	580	760.228	O V
220	720.6	Se III	300	731.95	Cs III	7	746.23	Be III	775	760.445	O V
8	720.64	In IV	300	732.16	Ni III	6	746.25	Ca III	50	760.62	Sn III
10	720.70	Cd III	15	732.33	Sb III	10	746.28	Rh III	10	761.09	Pb IV
10	721.2	Xe III	110	732.42	S III	400	746.35	K IV	640	761.128	O V
200	721.26	Ni III	15	732.70	Y III	450	746.4	Se IV	200	761.18	Kr II
30	721.34	Pr IV	15	733.29	La IV	30	746.70	Kr III	165	761.24	As
20000	721.79	Cs III	10	733.3	Xe III	60	746.88	Ge V	8	761.43	Sc IV
100 p	722.04	Kr III	20	733.41	Rb IV	285	746.984	N II	5	761.47	Ar IV
300	722.09	Ni III	35	733.54	Ge V	12	747.82	Sr V	10	761.5	Xe III
20000	722.20	Cs III	800	734.36	Y III	5	747.98	Ca III	700	762.003	O V
60	722.41	Pr IV	285	734.6	Se IV	300	747.99	Ni III	6	762.76	Pb V
30	722.58	Pr IV	150	734.8	As V	150	748.195	N V	500	763.06	Pd III
220	722.8	Se IV	30	734.86	Pr IV	200	748.291	N V	10	763.14	Ta IV
15	722.86	Sb III	20	735.04	Pr IV	200	748.30	Ag III	40	763.16	Pr IV
1000	722.98	I II	70	735.2	S III	110	748.4	S IV	500	763.336	N III
3000	723.361	Ar II	35	735.35	Ge V	12	749.46	Pb V	80	763.77	Nb V
50	724.21	Ge V	200	735.520	Cu II	200	749.68	Ni III	100	763.98	Kr II
360	724.3	Se III	1000	735.896	Ne I		749.74	B V	20	764.00	Pr IV
400	724.42	K V	250	736.032	Cu II	20	749.86	Rb IV	570	764.359	N III
150	724.489	Cu II	20	736.19	Pr IV	1000	749.94	Cs III	1	764.43	Sb II
8	724.81	Sb III	50	736.32	Pr IV	5	749.94	Si IV	300	764.58	Zr V
25	724.92	La IV	300	736.4	Br III	300	749.99	K IV	570	765.148	N IV
2	725.11	Ar V	200	736.57	Ag III	300	750.05	Ni III	20	765.31	K III
250	725.20	Ni III	1000 p	736.66	Cs III	150	750.11	V IV	30	765.64	K III
2000	725.271	Cl II	500	737.14	K IV	110	750.2	S IV	10	765.87	Pb V
500	725.548	Ar II	100	737.17	Pr IV	40	750.26	Ge V	60	766.20	Kr II
4	725.59	Be III	60	737.2	As V	1500	750.38	Cs III	500	766.20	Zr V
200	725.683	Al III	220	737.2	Se III	200	752.02	Ni III	500	766.42	Pd III
5	725.71	Be II	5	737.71	Fe III	300	752.48	Zr V	200	767.19	Ag III
20	726.04	Pr IV	400	737.85	V IV	10	752.52	Pb V	18	767.45	Pb V
285	726.4	Se III	100	738.13	Ag III	30	752.80	Ag II	2	767.75	Be III
300	726.915	Al III	10	738.17	Bi V	60	753.01	Nb V	250	768.33	Ag III
300	726.96	Ag III	200	738.26	Ni III	100	753.01	Sn III	5000	769.04	Rb III
300	727.0	Br III	70	738.5	S III	10	753.03	La III	10	769.1	Xe III
5	727.66	Ca III	100	738.76	Lu III	20	753.75	Rb IV	12	769.15	Ar III
200	727.72	Pd III	150	738.79	Pd III	110	753.8	S IV	18	769.49	Pb V
9	727.91	Y III	5	739.26	Fe III	150	754.19	K IV	150	769.61	Ag III
4	728.47	Y III	200	740.269	Ar II	4	754.20	Ar IV	250	769.63	Br III

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
8	769.70	Sc IV	285	786.5	S V	10	801.09	Ar IV	1	814.85	Sb II
400	770.22	Ni III	1	786.64	La III	150	801.14	Cu III	7	815.05	Si IV
150	770.29	K V	10	787.05	Pb V	10	801.41	Ar IV	2500	815.28	Rb I
15	770.78	Y III	200	787.14	La III	5	801.91	Ar IV	250	815.48	Br II
70	770.793	O I	200	787.31	Pd III	75	801.95	Cs III	110	816.0	S IV
200	771.03	Kr II	5000	787.580	Cl II	15	802.0	Xe III	150	816.12	Ag I
90	771.056	O I	640	787.711	O IV	18	802.07	Pb IV	120	816.232	Ar I
14	771.42	Pb V	300	787.73	Cs III	200	802.200	O IV	70	816.464	Ar I
150	771.46	K V	200	787.95	Pd III	160	802.255	O IV	100	816.81	Hf V
10	771.54	Rb IV	300	788.04	Ni III	8	802.28	Te II	18	816.82	Kr I
250	771.544	N III	250	788.07	Cu III	12	802.82	Pb IV	5	817.06	Ca I
10	771.79	Y III	200	788.30	Ni III	165	802.83	As II	10 r	817.18	Tl II
300	771.901	N III	250	788.46	Cu III	20	802.859	Ar I	90	817.30	Ga I
200	772.04	Ni III	5000	788.740	Cl II	350	803.07	Xe II	15	817.35	Cs II
200	772.11	Pd III	30	788.78	Au III	6	803.65	Bi III	250	817.79	Br II
350	772.385	N III	70	789.0	S III	500	803.67	Pd III	9	817.92	Rb I
200	772.891	N III	8	789.00	Sc IV	285	803.8	Se IV	50	817.95	Au I
150	772.975	N III	200	789.08	Ag III	70	804.0	S IV	8	818.13	Si IV
7	773.61	Cs IV	200	789.58	Pd III	20	804.26	Y III	60	818.15	Kr I
60 p	773.69	Kr II	520	790.109	O IV	90	804.267	O I	25	819.59	Zr II
200	773.80	Zr V	700	790.199	O IV	285	804.3	Se V		820.	Li II
80	774.02	Nb V	6	790.5	Bi IV	70	804.848	O I	40	820.06	Au I
520	774.518	O V	6	790.6	Bi IV	200	805.01	Ni III	8	820.09	Pb V
4	775.16	Bi III	220	790.8	Se III	10 h	805.10	Si II	80	820.124	Ar I
70	775.321	O I	250	791.36	Cu III	5000	805.20	Y III	30	820.21	Zr II
8	775.37	Be II	8	791.71	Sc IV	70	805.295	O I	10	820.3	Bi IV
200	775.58	Zr V	12	791.88	F I	7	805.76	Kr IV	800	820.34	Cs II
75	775.79	Sn III	70	791.973	O I	80	805.810	O I	20 h	820.52	Si II
650	775.965	N II	250	792.35	Ag III	75	806.18	Y III	220	820.7	Se V
300	776.353	P IV	8	792.5	Bi IV	100	806.471	Ar I	20	820.86	V V
350	776.38	Ag III	10	792.54	F I	90	806.51	Ga III	6	821.57	Ca I
285	776.5	Se IV	15	792.9	Xe III	60	806.869	Ar I	500	822.06	Zr V
200	776.51	Pd III	5000	793.342	Cl II	10000	806.89	Zr V	8	822.07	Pb I
10	776.76	Ti IV		793.44	Kr IV	150	806.96	F I	4	822.16	Ar V
25	776.89	Rb IV	500	794.08	Pd III	30	807.218	Ar I	180	822.39	Ag I
285	777.3	Se III		794.11	Kr IV	9	807.55	Fe III	9	822.9	Bi IV
2000	777.562	Cl II	10	794.42	F I	40	807.653	Ar I	1	822.97	Ge I
35	778.53	K III	40000	794.89	Ba IV	8	807.86	Fe III	650	823.179	P IV
500	778.81	Ni III	8	795.52	I III	360	808.7	Se V	25	823.2	Xe I
18	779.07	Ti IV	1	796.03	La III	1500	808.761	Cs II	9	823.41	Si II
25	779.1	Xe III	12	796.1	Xe III	8	808.84	Fe III	300 p	823.46	Zr V
200	779.21	Zr V	200	796.54	Ag III	300	808.88	Ag III	4	823.64	Cs I
80	779.295	Cu II	300	796.66	O II	150	808.97	Y III	35	823.69	Zr I
5	779.61	Ca III	70	796.7	S III	125	809.60	F I	200	823.78	Zr V
30	779.73	Au III	400	796.99	La III	18	809.63	Pb V	700	824.730	P IV
200	779.734	O IV	15	797.02	Pb V	70	809.7	S IV	150	824.80	Cs I
315	779.821	O IV	10	797.03	La IV	200	809.75	Zr V	12	824.9	Bi IV
360	779.912	O IV	1	797.20	La III	7000	809.92	Y III	70	824.9	S III
200	779.997	O IV	400	797.23	Zr V	50	809.927	Ar I	30	824.9	Xe I
15	780.39	F I	100	797.455	Cu II	5	809.93	Ca III	200	825.13	Zr V
10	780.52	F I	500	797.52	Pd III	10	810.24	P II	120	825.346	Ar I
2000	781.02	Pd III	4	797.53	Th IV		810.70	Kr V	500	825.35	Pd I
16	781.73	Ti IV	250	797.91	Ag III	500	810.73	Lu III	5	825.52	Pb V
200	782.10	Kr II	1000	798.16	I II	150	810.998	Cu II	50	825.60	Cr V
1	782.17	In III	40	798.3	S IV	8 p	811.28	Fe III	200	825.99	Cs I
10	782.38	F I	400	799.41	Ag III	500	811.57	Ni III	30	826.01	Rh I
14	782.79	Pb V	6	799.60	Te II	40	811.83	Au III	500	826.14	Ni I
200	782.91	Ag III	5	799.80	Pb V	10000	812.05	Zr V	120	826.365	Ar I
100	783.72	Kr II	50	799.93	Au III	5	812.32	Pb V	200	826.50	Ni I
400	784.50	Zr V		800.	Li II	10	812.59	Pb IV	300	826.996	Cu I
7	784.64	I III	10000	800.00	Zr V	700	812.95	Br V	5	827.05	Ar V
50	784.68	Sn III	500	800.03	Pd III	10	813.38	Fe III	3	827.35	Ar V
7	784.80	I III	5	800.07	S III	50	813.44	Rh III	10	827.41	Pb I
200	784.99	Pd III	500	800.10	Pd III	1000	813.66	Br IV	800	827.932	P IV
200 d	785.02	Ni III	1000	800.12	Br IV	1500	813.837	Cs II	285	828.5	Se I
10	785.12	Sc IV	5	800.30	Ca III	200	813.883	Cu II	50	828.70	Ga I
150	785.76	Ag III	40	800.41	Mg IV	200	814.02	Cs III	200	828.96	Yb I
285	785.8	Se V	70	800.5	S IV	8	814.10	Pb V	8	829.32	Pb V
60	785.97	Kr III	5	800.57	Ar IV	220	814.8	Se V	100	829.34	Cu I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
30	829.48	V V	40	845.02	Ce III	350	855.624	P III	10	865.44	P II
25	829.50	Zr III	150	845.038	P III	100	855.64	Y III	450	865.45	P V
2	829.60	Ga II	100	845.14	Au III	5	855.68	Bi V	20	865.53	Mo IV
360	830.3	Se V	400	845.24	Ni III	350	856.19	Br II	7000	865.90	Pr V
60	830.38	Kr II	9	845.41	Fe III	100	856.32	Hf V	5	865.97	I III
7500	830.39	Cs III	30	845.62	La III	150	856.32	Ru III	185	866.3	As III
100	830.53	Lu III	250	845.664	P III	500	856.47	Pd III	30	866.74	Mg IV
200	830.59	Zr V	40 h	845.77	Si II	500	856.746	Al III	180	866.800	Ar I
100	830.69	Hf V	360	845.8	Se V	200	857.09	Ni III	70	866.93	Lu V
6	831.00	Sb V	12	845.94	Pb IV	150	857.29	Mg IV	10	867.10	Pb V
400	831.43	Cl IV	2	846.04	Pb II	18	857.64	Pb IV	270	867.25	Hf V
2000	832.28	Lu III	150	846.40	Zr IV	10	857.75	Mo IV	50	867.48	Ru III
12	832.60	Pb IV	100	846.87	Hf V	60	857.82	Y III	300	867.51	Ni III
360	832.7	Se II	30	846.91	Th IV	110	857.9	S V	50	867.92	Mo IV
240	832.762	O II	250	847.019	P IV	10	858.092	C II	3	868.30	Ge IV
600	832.927	O III	8 w	847.42	Fe III	200	858.30	Ce III	25	868.64	Zr III
80	833.16	Au III	300	847.43	Ni III	250	858.487	Cu II	40	868.74	Ce III
450	833.332	O II	300	847.669	P III	20	858.559	C II	60	868.87	Kr II
780	833.742	O III	3	847.80	Ge IV	8	859.02	Pb IV	1	868.99	Tl IV
1200	834.10	I II	600	847.80	I II	200	859.406	P III	25	868.99	Zr III
150	834.392	Ar I	20	847.88	Ce III	25	859.56	Zr III	5000	869.17	Pr V
600	834.467	O II	250	847.92	Cs III	500	859.652	P III	250	869.336	Cu II
500	834.84	Cl IV	200	848.016	P III	8	859.72	Fe III	20	869.51	Ce III
4 p	834.88	Ar V	120	848.465	P III	10	859.72	Mo IV	80	869.66	Pr V
500	834.97	Cl IV	150	848.639	P III	250	859.729	P III	200	869.70	Ni III
100	835.002	Ar I	150	848.808	Cu II	40	859.89	Rh III	150	869.754	Ar I
10	835.03	La III	30	849.08	Rh III	80	859.90	Au III	40	869.84	Ce III
3	835.08	Ge II	160	849.2	S V	400	860.15	Ce III	200	870.35	Yb IV
600	835.096	O III	1	849.39	Sb II	1	860.39	La III	2000	870.40	La III
800	835.292	O III	350	849.799	P IV	110	860.5	S V	50	870.40	Rh III
1	835.55	Th IV	6	849.86	Bi V	300	860.64	Ni III	14	870.44	Pb IV
2	836.13	Ar V	2 h	849.88	Pb II	2	860.88	La III	40	870.84	Kr III
70	836.3	S III	185	849.9	As III		861.	Li II	40	870.84	Lu V
5 r	836.34	Tl II	60	850.06	Lu V	8	861.24	Sc IV	200	870.84	Ni III
400	836.57	Zr V	250	850.09	Ru III	8	861.30	Sc IV	10	871.10	Ar III
100	836.74	Hf V	10	850.14	Si II	40	861.34	Rh III	20	871.15	Ce III
100	837.39	Cs III	15	850.18	Rb IV		861.5	Sb IV	40	871.27	Ce III
50	837.66	Kr III	200	850.30	Ru III	8 p	861.76	Fe III	600	871.39	P V
8	838.05	Fe III	200	850.392	P IV	100	861.80	Hf V	510	871.7	As III
200	838.11	Ag III	10	850.50	Ge II	15	861.83	Cs IV	20	872.31	K III
6000	839.297	Cl II	25	850.60	Ar IV	10 p	861.83	Fe III	30	872.43	La III
450	839.5	Se V	30	850.61	Zr III	100	861.92	Lu V	15	872.6	Bi IV
8000	839.599	Cl II	1	850.73	La III	400	861.994	Cu II	200	873.11	Zr V
15	840.03	Ar IV	1000	850.81	Br V	10	862.234	Ge II	150	873.263	Cu II
100	840.24	Ce III	200	851.18	Ce III	200	862.25	Ce III	8	873.46	Fe III
6	840.56	Ca III	50	851.22	Ru III	9	862.32	Sr V	1500	873.49	I II
500	840.58	Pd III	250	851.303	Cu II	16	862.33	Pb IV		873.5	Sb IV
400	840.81	Cl IV	5000	851.691	Cl II	60	862.58	Kr III	6	873.71	Pb II
600	840.93	Cl IV	5	851.98	Pb V	300	862.88	Ni III	10	873.86	K III
8	840.99	Pb IV	110	852.2	S V	3	863.00	Pb II	15	874.04	K III
200	841.31	Ta V	50	852.49	Ru III	300	863.22	Ni III	200	874.84	Cs IV
3000	841.40	Zr V	200	852.63	Ce III	80	863.42	Au III	15	875.493	Ge II
7000 p	841.41	Cl II	250	852.686	P III	20	863.63	Mo IV	9	875.53	Ar III
22	842.04	Kr IV	40	852.70	Rh III	300	863.65	Zr IV	180	875.88	Hf V
20	842.06	Be II	300 p	852.87	Zr V	50	863.78	Rh III	50	875.89	Lu V
500	842.14	Ni III	25	853.0	Xe III	20	863.97	Pb V	1000	875.94	I II
100	842.805	Ar I	200	853.47	Ce III	500	864.04	Pd III	180 r	876.058	Ar I
8	842.88	Pb IV	700	853.68	Zr V	100	864.27	V III	50	876.08	Kr III
360	843.0	Se III	60	853.78	Ce III	15 d	864.45	Bi V	50	876.45	Lu V
4	843.37	Cs III	1	854.02	Th IV	500	864.59	Zr IV	200	876.723	Cu II
100	843.44	Au III	50	854.73	Kr III	60	864.82	Kr II	8	876.8	Bi IV
30	843.63	Rh III	40	854.77	Rh III	30	864.86	Zr III	400	876.80	Lu IV
20 h	843.72	Si II	220	854.8	S V	5	865.04	La III	4	876.84	Sb II
20	843.77	Ar IV	400	855.034	Al III	135	865.16	Hf V	250	877.012	Cu II
200	843.78	Pr V	2	855.08	Sb II	50	865.22	Rh III	700	877.476	P IV
100	844.06	Kr II	200	855.16	Ce III	25	865.24	Mo IV	200	877.555	Cu II
20	844.11	Ce III	150	855.27	Br V		865.3	Be II	135	877.87	Hf V
10	844.28	Fe III	80	855.49	Au III		865.3	Cl IV	40	877.879	O I
200	844.646	P III	3	855.57	Pb II	400	865.390	Cu II	2	877.96	Pb II

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
20	878.17	Ga V	1000	889.23	Br II	100	902.06	Lu IV	5	920.38	I III
10	878.43	Mo IV	1000	889.29	Pd III	300	902.46	Yb IV	20	920.554	Ge I
2	878.59	Hg III	15	889.3	Xe III	5	902.8	S V	12	920.66	Pb V
500	878.699	Cu II	8	889.68	Pb II	30	903.624	C II	50	920.92	Lu V
12	878.73	Ar III	100	889.72	Si II	60	903.962	C II	7	920.93	Bi II
220	879.2	Se III	600	890.567	Cu II	150	904.142	C II	4	921.07	Sb I
8	879.62	Ar III	16	890.72	Pb IV	30	904.480	C II	130	921.296	O IV
2000	879.84	I II	9	890.76	Fe III	135	904.95	Hf V	40	921.32	Lu V
180 r	879.947	Ar I	10	890.84	In III		905.5	Li II	160	921.366	O IV
12	879.96	Pb IV	8	890.87	Sc IV	20	905.9	S V	500	921.66	Cs I
6	880.17	Bi V	1000	890.87	Ta V	15	905.977	Ge II	270	921.67	Hf V
100	880.32	Lu V	1000	891.00	I II	500	905.99	Br II	50	921.78	Ru I
7	880.35	Pb IV	400	891.01	Kr II	400	906.113	Cu II	250	921.849	P II
135	880.37	Hf V	10	891.17	Fe III	285	906.6	Se II	60	921.90	Lu V
6	880.50	Pb V		891.2	Sb IV	500	906.66	Zr V	520	921.992	N IV
500	880.59	Pd III	8	891.44	Fe III	40	906.9	S II	520	921.992	N IV
20	880.68	Ce III	50	891.74	Mo IV		907.38	Mg II	80	922.008	O I
600	880.80	Xe II	100	891.81	Lu V		907.41	Mg II	600	922.019	Cu I
100	880.85	Hf V	200	892.00	Si II	50	908.22	Sn IV	10	922.12	Pb I
200	881.30	Zr IV	400	892.024	Al III	12	908.51	Pb IV	750	922.29	Pr V
60	881.75	Ce III	20	892.39	Mn III	90	909.697	N I	12	922.49	Pb I
1500	881.88	I II	500	892.414	Cu II	135	909.70	Hf V	500	922.519	N IV
10	882.24	In III	80	892.75	Ce III	80	910.278	N I	500	922.519	N IV
1000	882.34	La III	400	893.08	Hg II	80	910.45	Au III	300	922.56	Br I
30	882.39	Th IV	1000	893.17	I II	40	910.5	S II	40	922.73	Lu V
80	882.51	Rh III	2000	893.549	Cl II	40	910.645	N I	100	923.02	Cs I
110	882.54	B II	800	893.678	Cu II	200	910.92	Sn III	480	923.057	N IV
200	882.59	Zr IV	50	893.887	Al III	200	911.39	Kr II	400	923.10	Zr V
110	882.68	B II	450	893.897	Al III	40	912.7	S II	200	923.367	O IV
20	882.72	La III	20	894.0	Xe III	3	912.74	Tl IV	150	923.39	Hg
400	883.13	Cl V	400	894.227	Cu II	100	912.77	Ce III	130	923.433	O IV
9	883.18	Ar III	135	894.24	Hf V	360	912.9	Se II	50000	923.74	Ba I
5	883.40	Si III	150	894.310	Ar I	10	913.01	Si II	12	923.9	Bi I
20	883.6	S V	400	894.34	Cl V	135	913.68	Hf V	80	924.02	Au
18	883.90	Pb V	14	894.40	Pb V	20	913.85	Si II	500	924.239	Cu
60	884.04	Ce III	100	894.41	Hf V	300	913.971	P III	520	924.283	N IV
100	884.133	Cu II	40	894.80	Mo IV	800	914.213	Cu II	7	924.52	Pb I
200	884.14	Kr II	100	894.91	Cl V		914.5	Cl V	2	925.25	Be I
100	884.19	Mo IV	60	895.01	Lu V	100	914.72	Lu V	6	925.48	Bi I
40	884.21	Lu V	40	895.15	Lu V	8	915.00	Ge IV		925.72	Au
20	884.5	S V	15	895.41	Mo IV	8	915.09	Pb V	100	925.75	Rh
	884.70	Mg II	20	896.0	Xe III	500	915.30	Zr V	80	925.79	Lu
	884.72	Mg II	12	896.08	Pb V	450	915.612	N II	600	925.87	Xe
10	884.82	Mo IV	180	896.14	Hf V	14	915.71	Pb V	15	926.226	H I
14	884.96	Pb IV	3	896.30	Pb II	300	915.83	Hg II	5	926.44	Pb
14	884.99	Pb IV	100	896.47	Hf V	10	915.87	In III	4000	926.657	Cs I
20	885.22	Ce III	500	896.64	Br II	450	915.962	N II	5	926.83	In I
350	885.54	Xe II	1000	896.65	Pr V	550	916.012	N II	300	927.01	Yb
180	885.58	Hf V	600	896.759	Cu II	9	916.7	Bi IV	50	927.22	Lu
90	885.67	N I	150	896.92	Cs IV	650	916.701	N II	325	927.5	As
300	885.68	Zr V	400	896.976	Cu II	300	917.120	P III	10	927.64	Pb
5	885.8	S V	75	897.81	Kr III	8	917.31	Tl IV	135	928.01	Hf
135	885.80	Hf V	1	898.02	Sb V	2	917.40	Sn II	250	928.08	Ru
250	885.847	Cu II	40	898.42	Lu V	2000	917.43	Kr II	200	929.71	La
60	886.05	Mo IV	20	899.32	Ce III	2	917.45	In III	30	929.78	Mg
70	886.16	Lu V	10	899.41	Si II		917.5	Li II	6	929.81	Bi V
1000	886.30	Kr II	8	899.42	Fe III	12	917.90	Pb IV	20	929.81	Si I
50	886.32	Lu V	135	899.70	Hf V	12	918.09	Pb V	20	930.748	H I
50	886.44	Lu V	1	899.92	Sn II	40	918.26	Lu V	135	931.50	Hf
1	886.48	Hg III	5	900.36	Ar IV	135	918.48	Hf V	1000	932.054	Ar
12	886.66	Th IV	300	900.48	Zr V	350	918.665	P III	14	932.20	Pb
600	886.943	Cu II	20	900.9	S V	50	919.03	Mg IV	25	932.67	Cs
10	887.40	Ar III	80	901.03	Au III	180	919.10	Hf V	32	934.41	Ta
2000	888.026	Cl II	600	901.073	Cu II	7	919.28	I IV	90	935.193	O I
	888.3	Sb IV	9	901.17	Ar IV	25	919.59	Zr III	400	935.232	Cu
14	888.37	Pb V	3500	901.270	Cs II	250	919.74	Ru III	250	935.40	Xe
30	888.39	Ce III	180	901.54	Hf V	1000	919.781	Ar II	1	935.63	Sn
500	888.84	Pd III	20	901.74	Si II	12	920.28	Pb V	600	935.898	Cu
325	889.0	As III	135	901.92	Hf V	15000	920.35	Cs III		936.	Li

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
300	936.22	Yb IV	285	953.7	Se III	160	971.51	Hf V	450	984.9	Br III
100	936.28	Cl III	130	953.970	N I	90	971.738	O I	150	984.92	Ge V
8	936.70	Ge IV	12	954.35	Pb V	150	971.83	Ru III	500	984.93	Br II
8	937.00	Pb IV	200	954.383	Cu II	972.	972.	Li II	700	984.95	Cl IV
40	937.04	Ce III	220	954.4	Se III	6	972.11	He II	20	984.95	Ga V
150	937.16	Ru III	4	954.50	Sn II	20	972.40	F I	7	985.13	Sn II
325	937.2	As III	220	954.7	Se III	250	972.40	Ru III	250	985.55	Ru III
150	937.28	Rh III	1000	954.83	F I	100	972.537	H I	400	985.75	Cl IV
40	937.4	S II	4	954.95	Pb V	9	972.56	Pb II	8	985.82	Fe III
40	937.7	S II	10	955.28	Pb V	10	972.66	Lu III	200	986.14	Cs IV
30	937.803	H I	1000	955.335	N IV	800	972.77	Xe II	10	986.71	Pb II
4	938.90	Ge IV	750	955.55	F I	20	973.16	Yb III	900	986.84	Ru III
7	939.09	Si III	500	956.25	Sn IV	500	973.21	Cl IV	1000	987.10	Gd IV
500	940.09	Ru III	250	956.290	Cu II	40	973.21	Ga V	50	987.29	Kr III
400	940.41	Zr V	50	957.06	Ru III	10	973.27	Be II	100	987.657	Cu II
250	940.68	Ru III	50	957.18	Ru III	100	973.54	Ru III	250	987.7	As V
6	940.74	Pb V	20	957.78	Au II	150	973.78	Ru III	200	987.87	Ru III
200	940.80	Hg II	400	958.154	Cu II	300	973.79	Ni III	1000	987.91	Gd IV
50	941.85	Ru III	60	958.51	Ge V	350	973.90	F I	15	987.96	Y III
6	942.62	Te II	500	958.52	F I	160	974.1	Se III	988.	988.	Li II
50	942.63	Ru III	2	958.67	Ga II	750	974.14	Ru III	10	988.00	Rb IV
400	942.86	La III	5	958.70	He II	10	974.33	La III	200	988.13	Ge V
400	943.04	Yb IV	2	958.76	Pb II	250	974.46	Ru III	160	988.773	O I
50	943.06	Ru III	360	959.6	Se IV	3	974.47	Au II	1	988.89	Hg III
15	943.3	Bi IV	180	960.12	Hf V	135	974.62	Hf V	12	988.96	Ge III
600	943.335	Cu II	2	960.21	Pb II	200	974.759	Cu II	6	989.14	Pb V
10	943.56	Be II	400	960.4	Br III	360	974.8	Se III	15000	989.21	Y III
	945.	Li II	200	960.414	Cu II	6	975.20	Ce IV	40	989.75	Ga V
200	945.10	Au III	1	960.57	Ga II	200	975.21	Yb IV	900	989.790	N III
50	945.44	Kr I	1	961.01	Pb III	20	975.78	Sr III	8	989.8	Bi IV
600	945.525	Cu II	6	961.17	I III	100	976.12	Rh III	100	989.87	Si II
150	945.68	Ru III	2000	961.499	Cl II	100	976.22	F I	40	990.204	O I
3	945.83	Sn II	50	961.58	Ru III	40	976.448	O I	100	990.29	Ta V
500	945.965	Cu II	250	961.68	Ru III	40	976.51	F I	300	990.66	Ge V
	946.03	Au II	15	962.03	V V	700	976.68	Xe II	9	991.23	Fe III
100	946.05	Ru III	100	962.56	Ru III	800	977.03	C III	2	991.26	Lu III
8	946.20	Pb V	100	962.74	Hg II	250	977.51	Ru III	135	991.50	Hf V
400	946.20	Yb IV	50	963.37	Kr I	600	977.56	Cl IV	700	991.514	N III
50	946.54	Kr I	325	963.8	As III	250	977.567	Cu II	1000	991.579	N III
8	946.70	Mg II	130	963.990	N I	100	977.75	F I	500	991.62	Rh III
9	946.77	Mg II	4	964.38	Pb V	10	977.89	Ga V	250	991.67	Ru III
135	947.12	Hf V	115	964.626	N I	400	977.90	Cl IV	8	992.36	He II
100	947.14	Ru III	180	964.74	Hf V	200	978.06	Zr V	400	992.48	Rh III
500	947.30	Ta V	2000	964.97	Kr II	100	978.18	Ru III	200	992.68	Si II
300	947.78	Pd III		965.	Li II	40	978.284	Cl I	250	992.75	Ru III
40	947.80	Lu V	70	965.041	N I	900	979.43	Ru III	250	992.953	Cu II
40	948.686	O I	3	965.36	Pb II	400	979.59	Ni III	25	992.98	Sr III
75	948.84	V III	10	965.5	Xe III	15	979.60	Ga V	10	993.52	Si III
1000	948.97	Br II	300	965.52	Pd III	650	979.842	N III	60	993.54	Nb IV
350	949.0	Br III	500	966.54	Ru III	700	979.919	N III	60	993.88	Ne I
200	949.70	Zr V	250	967.09	Ru III	50	979.99	La III	900	994.56	Ru III
50	949.743	H I	10	967.23	Pb II	10 c	980.03	La IV	10	994.56	Yb III
100	949.83	Ru III	9	967.6	Bi IV	10	980.29	La III	13	994.79	Si III
10	950.33	Fe III	30	967.69	La III	200	980.70	Zr V	1000	995.04	Gd IV
50	950.35	Ru III	150	967.85	Ru III	18	981.27	Nb IV	50 p	995.14	Cs IV
	950.39	Au II	1000	967.92	Gd IV	500	981.35	Ru III	250	995.30	Ru III
100	950.45	Ru III	150	967.92	Ru III	10	981.37	Fe III	300	995.59	Zr V
1000	950.655	P IV	3	967.94	Au II		981.4	Be II	15	995.72	Ge III
6	950.93	Pb V	9	967.95	Si III	8	982.17	Pb II	1000	995.80	Gd IV
20	951.06	Kr I	250	968.042	Cu II	2	982.24	Au II	10	995.89	Pb II
245	951.62	Hf V	20	968.37	Sr III	1000	983.42	Gd IV	20	996.0	S II
500	951.87	F I	5	968.46	Yb III	6	983.57	Sb II	18	996.16	Nb IV
50	952.59	Ru III	50	968.70	Cr V	250	983.81	Ru III	25000	996.37	Y III
2	952.76	Ge III	8	968.8	Bi IV	10 w	983.88	Fe III	100	996.44	Lu III
7	952.85	Pb IV	50	969.13	Hg II	250	983.91	Ru III	1000	996.49	Gd IV
50	953.40	Kr I	2	969.19	Ga II	200	984.18	Zr V	10	996.50	Ge III
90	953.415	N I	20	969.26	Cr III	25	984.23	Y III	450	996.7	Se IV
325	953.6	As III	30	969.92	Cl I	120	984.64	Hf V	4	997.21	Sn II
100	953.655	N I	300	971.35	Ge V	40	984.67	B II	16	997.39	Si III

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
250	997.62	P V	10	1010.08	C II	14	1025.96	Mg II	25	1039.99	Bi
200	997.999	P III	500	1010.19	Nb IV	12	1026.11	Mg II	30	1040.17	Cr
25	998.372	Cl I	300	1010.269	Cu II	25	1026.18	Pr III	40	1040.53	Cr
25	998.432	Cl I	10	1010.37	C II	20	1026.28	Ce III	100	1040.63	Au
2	998.52	Ga II	50	1010.92	Sn III	30	1026.41	Mg IV	4	1040.78	Sn
50	999.101	Ge II	10	1010.94	Co V	8	1026.93	Be II	60	1040.942	O
20	999.19	Y III	15	1011.21	Ge III	500	1027.34	Al IV	12	1040.99	Ge
1000	999.24	Gd IV	40	1011.94	Sb III	90	1027.431	O I	20	1041.14	Ce
40	999.26	Ce III	500	1012.10	Br II	500	1027.831	Cu II	16	1041.24	Pb
67	999.34	Ta IV	200	1012.22	Rh III	1	1028.08	Co V	1100	1041.31	Xe
15	999.62	Sb III	10	1012.31	Ge III	500	1028.096	P IV	1	1041.32	Sn
1000	1000.36	Gd IV	5	1012.38	Ga II	250	1028.328	Cu II	600	1041.60	Br
150	1000.38	P V	8	1012.44	Pb IV	30	1028.33	Cr III	800	1042.17	Al
20	1000.5	S II	250	1012.597	Cu II	14	1028.61	Pb IV	100	1042.74	Ce
150	1000.56	Y III	360	1013.4	Se II	30	1028.69	Tl IV	50	1042.96	Pr
1200	1000.57	I II	150	1013.664	Cl I	100	1029.03	Pr III	25	1043.80	Pr
200	1000.78	Ru III	10	1013.80	Co V	40	1029.37	Ce III	25	1044.03	Pr
40	1000.86	Cr III	360	1014.0	Se II	250	1029.5	As V	18	1044.14	Pb
40	1001.04	Cr III	5	1014.27	Te II	100	1029.83	Lu III	80	1044.37	Md
100	1001.06	Kr I	20	1014.4	S II	100	1030.02	Kr I	200	1044.41	Zr
6	1001.13	Sb II	90	1014.47	Ga V	200	1030.263	Cu II	80	1044.49	Au
400	1001.18	Lu III	500	1014.68	Ru III	45	1030.27	Nb IV	1000	1044.49	Sn
300	1001.65	Ru III	700	1015.02	Cl III	200	1030.33	Lu III	800	1044.519	Cu
6	1001.81	Pb II	200	1015.17	Rh III	60	1030.47	Cr III	800	1044.744	Cu
75	1002.346	Cl I	300	1015.18	Lu IV	3	1030.5	Pb III	50	1044.90	Nt
400	1002.48	Zr V	1000	1015.54	Br II	570	1030.517	P IV	35	1044.91	Sr
1000	1002.73	Gd IV	2	1016.26	Sn II	30	1030.89	Cr III	50	1045.04	Cr
50	1002.76	Nb IV	10	1016.61	Pb II	7	1031.16	Si III	40	1045.06	Cr
3	1002.95	Ga II	100	1016.638	Ge II	100	1031.54	Lu III	40	1045.14	Cr
30	1002.96	Cr III	300	1016.66	Ge V	1032.	1032.	Li II	900	1045.71	Gd
1000	1003.35	I II	50	1017.14	Cr III	20	1032.05	Pb IV	50 h	1045.76	Bi
25	1003.35	Y III	9	1017.25	Fe III	8	1032.12	Fe III	25	1046.20	Pr
35	1003.4	Xe III	50	1017.31	Cr III	500	1032.44	Xe II	80	1046.81	Au
100	1003.55	Kr I	1	1017.43	Co V	8	1032.62	Ge III	150	1047.24	Pr
250	1003.598	P III	50	1017.57	Cr III	500	1033.111	P IV	30	1047.50	Gd
6	1003.73	Te II	35	1017.7	Xe III	50	1033.23	Cr III	300	1047.77	Zr
300	1004.055	Cu II	8	1017.74	Fe III	50	1033.45	Cr III	10	1047.8	Xe
250	1004.29	Ru III	1018.	1018.	Li II	20	1033.55	Ga V	1000 r	1048.220	Au
300	1004.38	Ge V	8	1018.29	Fe III	450	1033.6	Se II	15	1048.23	Be
1000	1004.46	Gd IV	10	1018.36	Co V	100	1033.69	Cr III	1000	1048.27	Xe
500	1005.28	Cl III	4000	1018.58	I II	8	1033.69	Ga II	700	1048.52	Al
15	1005.32	Ag II	500	1018.707	Cu II	8	1033.92	Si III	50	1048.84	Sn
7	1005.37	Si III	100	1018.72	Ru III	20	1034.55	Ce III	40	1048.88	Cu
8	1005.42	Pb V	8 r	1018.85	Tl II	5	1034.65	Ca III	12	1048.9	Pt
1000	1005.66	Gd IV	3	1019.10	Ga II	10000	1034.66	I II	1000	1049.00	Br
400	1005.72	Nb IV	100	1019.33	Ru III	20	1034.73	Tl IV	100	1049.09	Pr
500	1006.46	V III	20	1019.5	S II	500	1035.517	P IV	10	1049.48	Tl
1000	1006.55	Gd IV	90	1019.71	Ga V	500	1035.60	K V	450	1049.6	Se
1000	1006.58	Y III	500	1019.72	Sn IV	50	1035.93	Cr III	10 r	1049.73	Tl
4	1006.86	Co V	6	1020.07	Ca III	1036.	1036.	Li II	500	1049.755	Cu
40	1007.02	Nb V	1020.1	1020.1	Be II	100	1036.03	Cr III	10	1049.82	Pt
500	1007.05	Nb IV	25	1020.70	Si II	150 w	1036.16	N IV	100	1050.00	Rh
1200	1007.24	Gd IV	100	1020.77	Ru III	5	1036.32	Be II	400	1050.05	Gd
10	1007.51	Co V	10	1021.14	Co V	80	1036.337	C II	1000	1050.24	Yl
6	1007.80	Te II	50	1021.35	Pr III	600	1036.470	Cu II	8 r	1050.30	Tl
1200	1007.86	Y III	340	1021.96	As II	20	1036.61	Tl IV	120	1050.48	Gd
300	1008.569	Cu II	2	1022.12	Ce IV	150	1037.018	C II	10	1050.77	Pt
25	1008.61	Pr III	1	1022.40	Lu III	500	1037.02	Br II	10	1051.26	Pt
300	1008.728	Cu II	5	1022.79	Te II	7	1037.05	Si III	40	1051.6	Au
40	1008.76	Mg IV	50	1023.69	Si II	250	1037.41	Mg IV	50	1051.61	Bi
600	1008.78	Cl III	5	1023.80	Ga II	700	1037.68	Xe II	30	1051.81	Cu
15	1009.02	Co V	50	1025.23	Sr III	50	1038.29	Pr III	1200	1051.92	Xe
500	1009.13	Ru III	20	1025.25	Ce III	250	1038.40	Ge V	6	1052.21	Si
2	1009.29	Hg III	15	1025.27	He II	400	1038.69	Zr V	50	1052.63	Pr
5	1009.31	Ce IV	20	1025.29	Ce III	30	1038.76	Ga V	1000	1054.46	Y
6	1009.43	Sb II	90	1025.553	Cl I	160	1039.230	O I	80	1054.56	Gd
500 d	1009.60	Rh III	570	1025.563	P IV	50	1039.30	La IV	300	1054.59	Gd
9	1009.86	C II	300	1025.722	H I	600	1039.348	Cu II	600	1054.690	Cu
900	1009.87	Ru III	250	1025.762	O I	600	1039.582	Cu II	1500	1054.74	I

tensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength		
5000 c	1054.79	Cs III	25	1066.03	Pr III	100	1075.072	Ge II	800	1089.49	Ge V
12	1055.27	Fe II	200	1066.134	Cu II	3000	1075.21	I II	6	1089.94	Pb IV
60	1055.76	Mg IV	50	1066.23	Cr III	5000	1075.230	Cl II	30	1090.03	Ce III
400	1055.797	Cu II	2000	1066.34	I II	30	1075.82	Sb III	6	1090.11	Te II
80	1055.89	Cr IV	12	1066.4	Xe III	5000	1076.91	La III	300	1090.14	Al V
60	1056.13	Cu IV	500	1066.57	Al IV	285	1077.1	S III	350	1090.271	Cl I
8	1056.27	Sb II	8	1066.63	Si IV	120	1077.52	Y III	40	1090.53	Ga V
50	1056.53	Lu III	200	1066.64	Ta V	8	1077.66	Te II	8	1090.78	Au II
15	1056.53	Pb IV	500 r	1066.660	Ar I	5	1078.10	Sb III	250	1090.982	Cl I
10	1056.58	Sb III	80	1066.69	Ga V	100	1078.42	Hf V	50	1091.65	Cu IV
60	1056.6	As V	8	1066.96	Au II	6	1078.58	I III	90	1091.71	Ga V
600	1056.955	Cu II	68	1067.17	Ta IV	90	1078.71	N IV	300	1092.09	Ge V
6	1057.00	Te II	90	1067.614	N I	90	1078.83	Ga V	250	1092.437	Cl I
30	1057.05	Si II	100	1067.76	Ce III	5000	1079.080	Cl II	20	1092.48	Ce III
8	1057.32	Sb II	3000	1067.945	Cl II	30	1079.35	Ce III	400	1092.51	Yb IV
360	1057.4	Se II	5	1068.03	Hg III	110	1079.60	Ga V	160	1092.76	Hf V
70	1057.40	Ce III	20	1068.04	Tl IV	30	1079.68	Tl IV	3	1092.84	Lu III
15	1057.50	Si II	250	1068.26	Al V	5	1079.70	Tl IV	2	1092.90	Tl IV
10	1057.56	Tl IV	15	1068.36	Fe II	285	1079.8	Se III		1093.	Li II
100	1057.66	Ce III	80	1068.41	Cr III	7	1079.88	Pb IV	200	1093.54	Zr V
9	1057.67	Ce IV	300	1068.43	Ge V	100	1079.92	Hf V	8	1094.20	I III
20	1057.74	Sr III	400	1068.55	Zr V	200	1080.00	Ru III	100	1094.36	Ga V
60	1057.85	Cr IV	35	1068.59	Ga V	500	1080.54	Br V	300	1094.402	Cu II
90	1058.12	Ga V	60	1068.612	N I	18	1080.81	Pb IV	4	1094.41	Tl IV
100	1058.37	Sn IV	70	1068.65	Ne I	20	1080.82	Ce III	72	1094.60	Ta IV
100	1058.46	Ce III	100	1068.69	Ce III	60	1080.99	Ga V	360	1094.7	Se V
50	1058.59	Sn IV	25 p	1068.85	Pr III	500	1081.35	Y III	400	1094.769	Cl I
200	1058.63	La III	6	1068.86	Te II	50000	1081.61	La III	5	1094.92	Au II
400	1058.799	Cu II	150	1068.91	Cs IV	110	1081.88	B II	80	1095.10	Ga V
15	1058.88	Bi II	400	1069.13	Ge V	110	1082.07	B II	350	1095.148	Cl I
500	1058.90	Al IV	1000	1069.15	Br V	60	1082.31	F V	250	1095.25	Y III
12	1058.91	Ge III	500	1069.195	Cu II	340	1082.35	As II	350	1095.662	Cl I
100	1058.97	Rh III	4	1069.2	Pb III	6	1083.22	Si III	400	1095.797	Cl I
600	1059.096	Cu II	600	1069.44	Al IV	300	1083.45	Zr V	25	1095.87	Y III
60	1059.13	Cr III	30	1069.45	Ga V	600	1083.86	Xe II	9	1096.52	Pb V
4	1059.26	Pb V	60	1069.60	Ga V	450	1083.990	N II	20	1096.6	S II
8	1059.51	Te II	25	1069.88	Pr III	20	1084.06	Sb III	250	1096.810	Cl I
1	1059.64	Ce IV	20	1069.93	Sb III	20	1084.17	Pb IV	15	1096.89	Fe II
60	1060.15	Cr III	20	1070.43	Sb III	25	1084.42	Pr III	300	1096.92	Sn IV
25	1060.20	Sr III	20	1070.47	Tl IV	600	1084.580	N II	250	1097.053	Cu II
600	1060.634	Cu II	20	1070.54	Ce III	75 p	1084.63	Y III	13	1097.10	Cu V
60	1060.65	Cr V	9000	1071.036	Cl I	200	1084.667	Cl I	175	1097.237	N I
10	1060.66	Pb II	55	1071.19	Ga V	30	1084.94	He II	135	1097.28	Hf V
60	1061.04	Cr III	45	1071.41	Ga V	80	1085.00	Ga III	300	1097.369	Cl I
500	1061.43	Al IV	15	1071.60	Fe II		1085.00	Au II	12	1097.41	Ba III
25	1061.60	Pr III	6000	1071.767	Cl II	250	1085.01	Ga V	285	1097.8	Se II
20	1061.99	Lu III	500	1071.87	Br II	200	1085.171	Cl I	200	1098.068	Cl I
60 p	1062.09	La IV	12	1072.09	Pb IV	250	1085.304	Cl I	115	1098.095	N I
3	1062.10	Sn II	12	1072.23	Ag II	20	1085.47	Bi II	115	1098.260	N I
20	1062.23	Cd IV	300	1072.25	Zr V	300	1085.51	Ge II	10	1098.34	Sb III
	1062.67	Au II	1000	1072.59	La III	430	1085.546	N II	200	1098.71	Ge II
50	1062.68	Cr III	700	1072.66	Ge V	650	1085.701	N II	20	1098.77	Sr III
160	1062.7	S IV	200	1072.79	Ce III	71	1086.39	Ta IV	360	1099.1	Se III
50	1062.99	Ce III	160	1073.0	S IV	600	1086.65	Ge V	12	1099.12	Fe II
600	1063.005	Cu II	1000	1073.41	Sn IV	200	1087.05	Zr V	10	1099.20	Bi II
30	1063.26	Ce III	1	1073.44	Ge IV	80	1087.37	Ga V	20	1099.25	Ce III
50	1063.51	Ce III	70	1073.5	S IV	200	1087.50	Sn IV	800	1099.26	Hg II
65	1063.53	Ta IV	40	1073.69	Ce III		1087.6	Sb IV		1099.3	Sb IV
5000	1063.831	Cl II	300	1073.745	Cu II	500	1087.85	Ge V	7	1099.47	Pb IV
1200	1063.84	Gd IV	5	1073.76	Sb III	400	1088.06	Cl I	200	1099.523	Cl I
8	1063.87	Fe III	80	1073.77	Ga V	70	1088.39	F V	6	1099.60	Tl IV
30	1064.32	Cr III	6	1073.81	Sb II	350 p	1088.39	Y III	95000	1099.73	La III
30	1064.43	Cr III	200	1073.87	Rh III	200	1088.395	Cu II	100	1099.76	Zr IV
450	1064.76	Br II	250	1074.22	Ag II	40	1088.45	Ge III	150	1100.00	Zr IV
600	1064.89	Al IV	71	1074.47	Ta IV	25	1088.66	Pr III	68	1100.13	Ta IV
10	1065.49	Ag II	2000	1074.48	Xe II	500	1088.67	Al V	105	1100.360	N I
9	1065.58	Pb II	3	1074.7	Pb III	30	1088.70	Ce III	1200	1100.43	Xe II
200	1065.782	Cu II	30	1074.72	Cu IV	10	1088.86	Pb V	40	1100.465	N I
40	1065.90	Sb III	5 r	1074.97	Tl II	200	1089.35	Sn V	100	1100.58	Rh III

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
30	1100.61	Cr III	1000	1116.94	Ge V	30	1132.75	Cr III	15	1145.9	Sb IV
5000	1100.70	La III	30	1117.19	Cr III	100	1132.79	Sn V	15	1145.91	Bi III
40	1100.71	Ce III	1500	1117.22	I II	14	1133.05	Ba III	4	1145.91	Pb II
90	1101.291	N I	80	1117.56	Cr V	10	1133.14	Pb II	12	1147.41	Fe II
30	1101.43	Cr III	900	1117.98	P V	15	1133.41	Fe II	15	1148.24	Sc III
250	1101.50	Br I	150	1118.16	Cd IV	12	1133.68	Fe II	15	1148.29	Fe II
70	1101.62	Ga V	50	1118.16	Cr V	59	1133.86	Cu V	30	1148.42	Ga V
40	1102.3	S II	80	1118.34	Ga V	40	1133.91	Ga V	54	1149.06	Cu V
160	1102.83	Ga V	570	1118.551	P IV	20	1134.08	Cd IV	615	1149.31	As II
30	1102.88	Cr III	4	1118.67	Pb III	360	1134.165	N I	7	1149.7	Bi IV
	1103.	Li II	600	1118.82	Al IV	385	1134.415	N I	75	1149.72	Ta IV
140	1103.03	Ga V	71	1118.83	Ta IV	5000	1134.43	Yb IV	500	1149.94	V III
150	1103.21	Y III	450	1119.2	Se III	300	1134.59	Br I	45	1150.09	Ga V
50	1103.24	Sn IV	3	1119.25	Ga II	410	1134.980	N I	130	1150.23	Ga V
20	1103.31	Au II	000	1119.34	Sn IV	10	1135.43	Sb III	90	1150.27	Ga III
24	1103.4	Bi IV	25	1119.43	Cu IV	130	1136.07	Ga V	300	1150.30	Al V
10	1103.94	Pb II	10	1119.57	Pb II	20	1136.17	Lu IV	75	1150.42	Ta IV
8	1104.32	Sb V	150	1119.947	Cu II	78	1136.17	Ta IV	12	1150.55	Gc III
6	1104.79	Pb V	150	1120.02	Nb IV	300	1136.24	Yb IV	220	1151.0	Se V
100	1104.84	Pr III		1120.4	Sb IV	250	1136.29	Br I	12	1151.16	Fe II
60	1104.93	Ga V	500	1120.46	Ge II	50	1136.67	Cr III	30	1151.49	Sb III
5000	1105.00	I II	200	1120.68	Sn IV	400	1136.82	Al IV		1151.5	Sb IV
30	1105.50	Cu IV	150	1121.07	Cr V	67	1137.06	Ga IV	12	1151.76	Ba III
60	1105.61	Ga III	67	1121.20	Cu V	135	1137.49	Hf V	75	1151.92	Ta IV
75	1105.62	Ga V	4	1121.33	Pb V	10	1137.50	Pb V	40	1152.152	O I
400	1105.74	Al IV	10	1121.36	Pb II	18	1137.84	Pb IV	40 p	1152.18	Cu IV
70	1106.17	Ga V	12	1121.99	Fe II	10	1137.92	Ge III	4	1152.36	Pb V
42	1106.24	Cu V	300	1122.01	Ge V	65	1138.20	Ga V	5	1153.10	Te II
500	1106.74	Ge II	8	1122.49	Si IV	66	1138.26	Ta IV	20	1154.52	Sc III
150	1107.03	Ag II	9	1122.53	Fe III	6	1138.6	Bi IV	20	1154.64	Cd IV
20	1107.09	Ce III	12	1122.86	Fe II	12	1138.64	Fe II	1500	1154.67	I II
500	1107.528	Cl I	55	1123.18	Ga V	20	1139.01	Bi III	6	1155.00	Si III
20	1108.16	Mn III	80	1123.66	Ga V	15	1139.04	Cd IV	10	1155.73	Cd IV
8	1108.19	Sn II	9	1124.88	Fe III	800	1139.214	Cl II		1155.9	Be II
14	1108.37	Si III	3500	1125.25	I II	1000	1139.29	Sn III	6	1155.96	Si III
20	1108.4	S IV	35	1125.49	Sr III	5	1139.30	Tl IV	220	1156.0	Se II
10	1108.43	Pb II	4	1125.52	Tl IV	500	1139.40	As II	70	1156.10	Ga IV
200	1108.79	Zr V	20	1125.58	Ce III	15 d	1139.46	Bi V	120	1156.51	Ga V
25	1108.82	Pr III	500	1125.61	Al IV	1200	1139.75	I II	285	1156.9	Se II
	1109.	Li II	30	1126.00	Cd IV	6	1139.8	Bi IV	400	1157.18	V III
10	1109.84	Pb II	120	1126.40	Ga V	10000	1139.80	I II	72	1157.54	Cu V
200	1109.96	Yb IV	20 h	1127.44	Si II	20	1140.24	Sr III	25	1157.58	V V
16	1109.97	Si III	150	1127.63	Cr V	200	1140.49	Ta V	40	1157.74	Sb III
200	1110.55	Yb IV	80	1127.75	Ga V	6	1140.55	Si III	35	1157.74	Ga V
20	1110.9	S IV	40 h	1127.91	Si II		1141.	Li II	12	1157.88	Pb V
2500	1111.16	I II	700	1128.01	P V	7	1141.58	Si III	150	1157.910	C I
20	1111.19	Ce III	8	1128.02	Fe III	360	1141.9	Se II	150	1158.019	C I
18	1112.09	Fe II	12	1128.07	Fe II	6	1142.28	Si III	150	1158.035	C I
900	1112.13	Br V	130	1128.10	Ga V	12	1142.33	Fe II	7	1158.10	Si III
70	1112.2	B IV	10	1128.34	Si IV	63	1142.38	Cu V	1000	1158.33	Sn II
50	1112.45	Cr V	120	1128.53	Ga V	100	1142.55	Ce III	75	1158.35	La IV
150	1112.46	Ag II	7	1128.55	Ti V	200	1142.640	Cu II	600	1158.47	Xe II
77	1113.22	Cu V	7	1128.8	Bi IV	15	1142.74	V V	30	1158.74	Kr II
18	1113.23	Si III	76	1128.80	Cu V	8	1142.77	Pb IV	4	1159.05	Sn II
15	1113.67	Ba III	20	1129.73	Ce III	20	1143.03	Be II	8	1159.15	Ge II
100	1113.79	Rh III	40	1129.76	F II	12	1143.23	Fe II	8	1159.62	Ge II
1	1113.87	Ga II	100	1129.94	Ga V	1000	1143.56	Br V	1000	1159.87	I II
60	1114.35	Cr V	10 r	1130.17	Tl II	105	1143.65	N I	6	1160.26	Si III
1	1114.69	Be III	30	1130.3	Xe III	6	1144.04	Te II	10000	1160.56	I II
	1115.1	Sb IV	12	1130.43	Fe II	3	1144.07	Tl IV	200	1160.74	Sn V
6	1115.30	Pb IV	5	1130.81	Ga II	60	1144.30	Ga V	300	1160.77	V III
40	1115.55	Ga V	20	1131.0	S II	8	1144.31	Si III	8	1160.79	Ge I
	1116.	Li II	80	1131.43	Ga V	300	1144.856	Cu II	200	1161.09	Sn II
11	1116.01	Ba III	2000	1131.50	I II	14	1144.93	Pb IV	10	1161.42	Te II
20	1116.08	Pb IV	20	1131.6	S II	18	1144.95	Fe II	50	1161.43	Cr II
100	1116.08	Nb IV	90	1131.72	Ne I	6	1144.96	Si III	10	1161.43	Sn II
79	1116.10	Ta IV	100	1131.85	Ne II	8	1145.11	Si III	8	1161.58	Si II
20	1116.30	Ce III		1132.1	Li II	7	1145.18	Si III	100	1161.58	Sn II
100	1116.48	Cr V	20	1132.74	Ce III	50	1145.70	Ga V	2	1161.95	Hg I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
20	1162.44	Sc III	77	1176.53	Cu V	80	1191.55	Cs II	200	1204.06	Sn III
15 r	1162.55	Tl II	30	1176.58	Tb IV	50	1191.72	Ge II	100	1204.57	Ru III
10	1162.59	Al III	105	1176.630	N I	50	1191.812	Al II	200	1204.88	Ru III
5	1162.62	Al III	200	1176.69	Ge V	30	1192.01	Tb IV	77	1204.90	Cu V
3	1162.94	Sn II	250	1177.23	Br I	250	1192.04	Xe I	50	1205.20	Sb III
8	1163.19	Bi II	40	1177.43	Al II	450	1192.3	Se II	220	1205.7	Se II
700	1163.39	Ge V	195	1177.695	N I	8	1192.35	Ti V	100	1205.72	Sn V
70	1163.60	Ga IV	8	1178.00	Si III	20	1192.41	Ce III	60	1206.38	Cr III
130	1163.884	N I	130	1178.65	Cs II	78	1192.52	Ta IV	200	1206.422	P IV
60	1164.206	N I	10000	1178.65	I II	76	1192.54	Cu V	30	1206.51	Si III
200	1164.27	Ge II	400	1178.90	Br I	80	1192.67	Ta IV	30	1206.53	Si III
50	1164.29	La IV	40	1178.95	Ga V		1192.9	Sb IV	72	1206.89	Ga IV
105	1164.325	N I	3000	1179.293	Cl I	300	1193.009	C I	500	1207.17	Ru III
100	1164.65	Cd IV	20	1179.73	Cd IV	73	1193.02	Ga IV	13	1207.29	Ba III
200	1164.87	Kr I	4	1180.51	Sn II	300	1193.031	C I	340	1207.44	As II
300	1165.26	Ge V	100	1180.62	Sn III	60	1193.23	Zn II	9	1207.52	Si III
350	1165.42	Al V	500	1181.19	Ge II	300	1193.240	C I	9	1208.54	Te II
20	1165.78	Cd IV	555	1181.51	As II	300	1193.264	C I	30	1208.80	La III
500	1166.01	Yb IV	500	1181.65	Ge II	200	1193.28	Si II	135	1208.88	Hf V
50	1166.07	Mo III	20	1182.09	Sr III	15	1193.29	Zn IV	80	1209.13	Cr III
	1166.4	Li II	500	1183.031	N III	100	1193.393	C I	185	1209.3	As III
20000	1166.48	I II	800 p	1183.05	Xe II	150	1193.649	C I	50	1209.60	Mo III
3	1166.76	Au II	15	1183.07	Cd IV	150	1193.679	C I	800	1209.76	Br I
12	1166.96	Sb III	30	1183.30	Mn III	100	1193.95	Cr V	500	1209.77	Ru III
4	1167.0	Pb III	100	1183.40	Cd IV	70	1194.0	S III	10	1210.46	Si III
1500	1167.05	I II	10 r	1183.41	Tl II	100	1194.064	C I	50	1210.50	Cr V
8	1167.06	Bi II	84	1183.63	Cu V	40	1194.13	Cd IV	2000	1210.52	Sn III
800	1167.148	Cl I	8	1183.64	Ti IV	300	1194.24	Zr V	50	1210.64	Sb III
40	1167.30	Cd IV	25 w	1183.86	Mn III	100	1194.488	C I	1000	1210.73	Br I
64	1167.35	Cu V	9000	1183.97	Zr IV	250	1194.50	Si II	5	1210.86	Au II
10 r	1167.43	Tl II	1000	1184.25	Sn III	20 p	1194.59	Lu IV	300	1210.99	Mg IV
270	1167.448	N I	100	1184.37	Ru III	12 r	1194.84	Tl II	80	1211.12	Cr III
1	1167.62	Ga II	570	1184.550	N III	75	1195.02	Ga IV	800	1211.17	As II
20	1168.27	Sr III	68	1185.23	Ga IV	10	1195.21	Ti IV	300	1211.31	Ru III
105	1168.334	N I	14	1185.43	Pb V	15	1195.29	I I	78	1211.94	Ta IV
60	1168.417	N I	600	1185.58	Yb IV	20	1195.63	Cd IV	70	1212.21	Nb V
250	1168.48	Al V	40	1186.06	Ga IV	60	1195.83	Ag II	30	1212.29	La III
285	1168.5	Se II	50	1186.80	Cu III	80	1196.04	Cr V	8	1212.47	Ge III
195	1168.536	N I	3	1186.81	Ga II	615	1196.38	As II	80	1212.68	Ta IV
25	1168.61	Sc III	5	1187.30	Ca III	30	1196.47	Cd IV	8	1212.71	Zn IV
10	1168.88	Sc III	15000	1187.34	I II	615	1196.56	As II	200	1212.71	Zr IV
450	1168.9	B IV	200	1187.34	Lu III	60	1197.19	Be II	5	1213.00	Te II
100	1169.33	Mo III	30	1187.65	Cr III	100	1197.39	Si II	100	1213.01	Zr IV
25	1169.40	Ga V	90	1188.01	N IV		1198.09	Li II	60	1213.08	Lu IV
250	1169.63	Xe II	8	1188.61	Ca III	500	1198.37	Br I	85	1213.09	Ta IV
75	1170.58	Ga IV	8	1188.61	Ca III	30	1198.49	Mn III	2	1213.12	Be III
12	1170.62	Ba III	200	1188.73	Ge II	400	1198.50	Al IV	80	1213.17	Ga V
70	1170.9	B IV	1200	1188.774	Cl I	9	1198.66	Ti V	500	1213.42	Ta V
	1171.4	Sb IV	20	1188.99	Ge IV	5000	1198.88	I II	50	1213.94	Tb IV
48	1171.71	Ga IV	150	1188.992	C I	20	1198.93	Cd IV	5	1214.14	Zn IV
120	1172.2	As III	20	1189.21	Sr IV		1199.1	Sb IV	1	1214.32	Be III
76	1172.51	Ta IV	50	1189.27	Lu IV	410	1199.550	N I	71	1214.36	Cu V
50	1173.67	Mo III	1000	1189.28	Br I	500	1200.07	Ru III	70	1214.66	Ta V
10	1173.78	Ge III	80	1189.28	Ta IV	7000	1200.22	I II		1215.	Li II
2	1173.78	Ga II	250	1189.38	Br I	385	1200.223	N I	35	1215.09	He II
10	1174.34	Te II	150	1189.447	C I	70	1200.58	Tb IV	100	1215.10	Sn III
5	1174.37	Si III	1000	1189.50	Br I	360	1200.710	N I	50	1215.17	He II
6	1174.43	Si III	100	1189.62	Ge II	300	1200.76	Zr V	15	1215.38	Cd IV
370	1174.93	C III	200	1189.631	C I	50	1200.96	Cu III	85	1215.53	Ta IV
350	1175.26	C III	555	1189.87	As II	70	1201.0	S III	1000	1215.668	H I
85	1175.51	Ta IV	100	1189.92	Sn V	83	1201.22	Cu V	500	1215.674	H I
330	1175.59	C III	20	1189.95	Pb IV	900	1201.353	Cl I	750	1216.01	Br I
500	1175.71	C III	200	1189.99	Sn III	69	1201.54	Ga IV	10 h	1216.12	Si II
12	1175.79	Te II	100	1190.42	Si II	160	1201.76	Hf V	63	1216.15	Ga IV
5000	1175.84	I II	800	1190.51	Ru III	9000	1201.77	Zr IV	800	1218.10	As II
350	1175.99	C III	10000	1190.85	I II	50	1201.87	Ce III	100	1218.14	Sn III
100	1176.26	Sn V	5	1190.86	Ca III	15	1203.44	Zn IV	200	1218.41	I I
370	1176.37	C III	73	1190.89	Ga IV	10	1203.63	Pb II	11	1218.92	Ba III
230	1176.510	N I	300	1191.26	Ge II	20	1204.05	Ce III	80	1219.03	F III

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
9	1219.07	Sn II	150	1228.75	Si II	20	1240.07	Lu IV	30	1253.67	Zn IV
300	1219.30	Cu III	160	1228.79	N I	600	1240.21	Al IV		1253.8	Li II
8	1219.40	Sc IV	70	1228.87	Cu IV	20	1240.40	Mg II	110	1253.8	S II
30	1219.80	Mn III	500	1228.89	I I	50	1240.80	Ag II	100	1253.99	La III
10000	1219.86	Zr IV	100	1228.97	Mn III	700	1240.86	Al IV	400	1254.01	V III
400	1220.55	Al IV	200	1229.39	Si II	10	1241.05	Bi II	100	1254.93	Mo III
80	1220.73	Ta IV	20	1229.81	Ge IV	760	1241.31	As II	20	1255.03	Ne III
15	1220.74	Lu IV	90	1229.83	Ne I	10	1241.67	Ti V	10	1255.28	Si I
20000	1220.89	I II	76	1230.11	Cu V	45	1241.81	Ga IV	2000	1255.63	La III
80	1220.96	Ta IV	110	1230.16	B II	90	1242.25	Mn IV	200	1255.64	Pr IV
9	1220.98	Te II	100	1230.17	Sn III	900	1242.804	N V	110	1255.68	Ne III
40	1221.07	Cr III	135	1230.21	Hf V	100	1242.98	Ta V	1000	1255.80	Br I
1000	1221.13	Br I	6	1230.30	Sb II	11	1243.00	Sn II	100	1256.00	Cd II
80	1221.22	Tb IV	50	1230.34	Mo III	965	1243.08	As II	40	1256.49	Si I
70	1221.34	Cu V	10	1230.36	Ti V	360	1243.179	N I	55	1256.81	Ag II
900	1221.87	Br I	500	1230.69	Pr IV	315	1243.306	N I	160	1257.19	Ne III
40	1221.90	Cr III	400	1230.90	La IV	500	1243.63	Sn III	95	1257.28	Mn IV
700	1222.30	Ge V	10	1231.20	Pb II	1200	1243.90	Br I	30	1257.31	Zn IV
9	1222.36	Ti V	100	1231.38	Sn III	30	1244.14	Sr IV	55	1257.55	Ag II
340	1223.15	As II	30	1231.46	Zn IV	200	1244.38	Cu III	900	1257.62	Al IV
1000	1223.24	Br I	7	1231.57	Tl III	160	1244.46	Hf V	20 p	1257.78	Sr IV
50	1223.33	Ag II	15	1231.73	Co V	90	1244.50	Mn IV	87	1258.34	Ta IV
20	1223.52	Cd IV	8	1231.81	Tl II	4	1244.66	I III	100	1258.52	Mo III
13	1223.70	Sn II	30	1231.88	Cr III	20 p	1244.75	Sr IV	800	1258.58	As II
90	1223.73	Ta IV	270	1232.03	Hf V	600	1244.76	Xe II	6	1258.61	Co V
20	1223.75	Lu IV	25	1232.1	Xe III	20 p	1244.87	S- IV	70	1258.69	Cu IV
20	1223.91	Si II	7500	1232.43	Br I	75	1245.53	Ga IV	83	1258.77	Ga IV
600	1224.05	I I	200	1232.57	Ru III	870	1245.67	As II	50	1258.80	Si I
600	1224.08	I I	15	1232.78	Bi II	5 r	1246.00	Tl II	100	1258.87	Nb V
20	1224.25	Si II	50	1232.96	Cr III	20	1246.06	Cd IV	40	1259.02	Cr III
25	1224.35	Zn IV	11	1233.50	Pb V	7	1246.13	Ti V	2500	1259.15	I I
1200	1224.41	Br I	200	1233.59	Hf V	3	1246.26	Zn IV	1500	1259.20	Br I
12	1224.55	Ba III	200	1233.91	Zr V	15	1246.56	Cd IV	8	1259.24	Hg I
20	1224.57	Au II	20000	1234.06	I II	100	1246.74	Si II	8	1259.242	Hg I
135	1224.62	Hf V	250	1234.07	Pr V	50	1246.87	Ag II	100	1259.25	Hf V
50	1224.64	Bi III	40	1234.1	S II	8	1246.91	Co V	1000	1259.40	Tb IV
10	1224.97	Si II	2	1234.55	Co V	79	1246.99	Cu V	110	1259.5	S II
175	1225.026	N I	50	1234.63	Mo III	15	1247.01	Zn IV	3000	1259.51	I I
160	1225.37	N I	220	1234.9	Se II	85	1247.73	Mn IV	100	1259.55	La III
10	1225.43	Bi II	500	1235.04	Tb IV	20	1248.10	Lu IV	8	1259.68	Zn IV
3	1225.45	Tl IV	7	1235.43	Si III	150	1248.43	Si II	200	1259.70	Zr V
50	1225.46	Mo III	650	1235.84	Kr I	10	1248.47	Pb V	1000	1259.92	Sn III
30	1225.65	Cr III	10	1235.92	Si II	6	1248.51	Mg II	50	1259.99	Cr V
12	1226.00	Sb V	30	1236.10	Mo III	700	1248.79	Al IV	70	1260.24	Cu V
3	1226.31	Co V	40	1236.20	Cr III	200	1249.35	Pr IV	1000	1260.42	Si II
300	1226.40	Pr IV	50	1236.23	Sr III	800	1249.59	Br I	75 p	1260.79	La IV
60	1226.52	V IV	60	1236.38	Ga IV	50	1249.69	Zn IV	400	1260.91	Zr V
50	1226.81	Si II	200	1236.54	La III	20	1249.82	P II	300	1261.12	La IV
20	1226.89	Si II	20	1236.95	Co V	8	1249.93	Mg II	800	1261.27	I I
1200	1226.90	Br I	500	1237.059	Ge II	15	1249.94	Cd IV	200	1261.27	Pr IV
40	1226.99	Si II	900	1237.19	Al IV	100	1250.048	Cu II	100	1261.552	C I
1	1227.13	Ga II	30	1237.26	Zn IV	100	1250.09	Si II	1200	1261.66	Br I
60	1227.44	Cu IV	160	1237.42	Hf V	250	1250.20	Xe I	40	1261.86	Cr III
450	1227.6	Se V		1238.	Li II	150	1250.43	Si II	500	1261.905	Ge II
100	1227.60	Si II	88	1238.12	Ta IV	40	1250.5	S II	100	1262.21	Mo II
20	1227.62	Zn IV	400	1238.19	Pr IV	80	1250.564	Hg I	30	1262.34	Cr III
135	1227.98	Hf V	40	1238.51	Cr III	80	1250.58	Hg I	10	1262.65	Ca III
50	1228.03	Ga IV	60	1238.59	Ga IV	4	1250.6	Pb III	5	1263.28	Co V
750	1228.05	Br I	1000	1238.821	N V	200	1251.16	Si II	100	1263.50	Cr V
8	1228.19	Co V	100	1238.85	Hf V	600	1251.34	I I	35	1263.61	Cr III
9	1228.20	Sc IV	300	1238.93	Zr V	2000	1251.38	Sn V	100	1263.74	Mo II
500	1228.37	Gd IV	50	1239.12	Zn IV	1500	1251.66	Br I	965	1263.77	As II
130	1228.41	N I	160	1239.53	Hf V	95	1251.93	Mn IV	800	1264.18	Al IV
10	1228.44	Si II	80	1239.73	Cu V	500	1252.11	V III	35	1264.21	Cr II
2000	1228.59	Pr IV	2	1239.85	Co V	8	1252.35	I III	90	1264.41	Mn I
25	1228.62	Si II	25	1239.94	Mg II	50	1252.61	Cr III	81	1264.66	Ga IV
30	1228.65	Cr III	100 h	1239.96	Au III	65	1253.07	Cu V	100	1264.710	Ge II
40	1228.65	Zn IV	11	1239.96	Ti V	300	1253.61	Zr V	2000	1264.73	Si II
50	1228.7	Lu III	95	1240.06	Ta IV	9	1253.62	Te II	94	1264.91	Ta IV

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
200	1265.02	Si II	20	1276.54	Lu IV	3000	1289.74	Y III	275	1302.337	S I
10	1265.35	Bi II	30	1276.85	Ga V	200	1290.24	Yb IV	30	1302.39	Co II
500	1265.38	Zr V	20	1276.90	Co II	100	1290.49	Mo III	400	1302.80	Zr V
30	1265.45	Ga V	50	1277.01	Co V	500	1290.56	Zr IV	235	1302.863	S I
150	1265.506	Cu II	250	1277.216	S I	300	1290.77	V III	3000	1302.98	I I
500	1265.74	Zn IV	250	1277.245	C I	8	1290.82	Pb IV	235	1303.110	S I
20	1265.93	Co II	250	1277.282	C I	20	1290.86	Sn II	16	1303.32	Si III
1200	1266.20	Br I	60	1277.31	Zn II	300	1290.93	Pr IV	245	1303.430	S I
40	1266.27	Lu IV	200	1277.40	Mo III	285	1291.0	Se II	82	1303.53	Ga IV
10	1266.33	Tl III	300	1277.513	C I	10	1291.10	Pb IV	500	1303.93	Zr V
800	1266.34	As II	200	1277.53	Lu III	300	1291.62	Mn III	40	1304.36	Cd IV
30	1266.47	Cd IV	300	1277.550	C I	10	1291.62	Ti III	100	1304.37	Si II
50	1266.63	Ag II	200	1277.58	Mo III	70	1291.70	Zr IV	20	1304.47	P II
80	1266.87	Fe II	100	1278.06	Mo III	100	1291.83	Zn IV	3	1304.55	Tl IV
1	1266.9	Pb III	78	1278.20	Cu V	67	1292.08	Cu V	15	1304.68	P II
82	1267.15	Ga IV	11	1278.39	Ca III	1000	1292.30	Pr IV	200	1304.71	Pr IV
90	1267.16	Ga III	200	1278.40	Mo III	100	1292.49	Zn IV	600	1304.858	O I
12	1267.44	Fe II	100	1278.51	Au III	5000	1293.22	Pr IV	15	1305.24	Hf IV
8	1267.55	Pb IV	25	1278.51	Zn IV	10	1293.23	Ti III	40 h	1305.34	Au I
600	1267.57	I I	1000	1278.65	Pr IV	90	1293.46	Cu IV	35	1305.48	P II
800	1267.59	As II	100	1279.14	Cu III	80	1293.46	Ga III	50	1305.58	Mo III
600	1267.60	I I	81	1279.24	Ga IV	30	1293.97	Co II	600	1305.58	Yb IV
40	1267.60	Nb V	200	1279.34	Pr IV	60	1293.97	Na II	50 h	1305.59	Si II
90	1267.71	F III	1000	1279.48	Br I	10	1294.32	Zn IV	715	1305.70	As II
400	1268.32	Pr IV	200	1280.333	C I	200	1294.36	Sn V	260	1305.883	S I
8	1268.49	Ti V	6	1280.35	Si III	17	1294.54	Si III	1000	1305.97	Sn III
20	1268.62	Sr IV	100	1280.47	Zn IV	15	1294.70	Ti III	300	1306.029	O I
100	1268.82	Hg I	11 h	1280.70	Mg III	5000	1295.28	Pr IV	30	1306.07	Cd IV
100	1268.825	Hg I	715	1280.99	As II	60	1295.36	Ga III	8	1306.11	Ti V
5	1269.15	Zn IV	10	1281.55	Ca III	25	1295.53	Co II	10	1306.18	Bi II
77	1269.35	Cu V	30	1281.63	Co V	25	1295.55	Co V	8	1306.53	Te II
9	1270.52	Te II	150	1281.90	Mo III	1000	1295.59	Xe I	500	1306.66	Zn IV
300	1270.58	Pr IV	150	1282.455	Cu II	280	1295.653	S I	20	1306.69	Sb III
20	1270.70	Co V	6	1282.48	Ti III	300	1295.81	Zr V	11	1306.71	Mg II
275	1270.782	S I	150	1283.19	La IV	30	1295.86	Co II	20	1306.76	Co II
8	1271.24	Mg II	30	1283.41	Lu III	82	1295.86	Ga IV	400	1306.76	Zr V
40	1271.94	Co II	500	1283.58	Mn III	40	1295.87	Co V	300	1306.86	Pr IV
9	1271.94	Mg II	150	1283.60	Mo III	10	1295.88	Ti III	5	1306.93	I III
12	1272.00	Fe II	15	1283.64	Ga V	150	1296.43	Cd II	80	1306.95	Co II
100	1272.21	Zn IV	15	1283.73	Bi II	400	1296.50	Pr IV	2500	1306.96	Y III
20	1272.23	Co V	100	1283.81	Sn V	100	1296.62	Zn IV	220	1307.2	Se IV
100	1272.42	Lu IV	15	1284.00	Co V	14	1296.73	Si III	500	1307.23	Gd IV
98	1272.42	Ta IV	80	1285.33	Ga IV	100	1296.73	Zn IV	11	1307.40	Ba III
8	1272.72	Mg II	20	1285.63	Cd IV	20	1297.10	Co II	15 r	1307.50	Tl II
1000	1272.76	Al IV	500	1285.89	Zr IV	65	1297.51	Ag II	340	1307.74	As II
200	1272.98	Zn IV	68	1286.13	Cu V	70	1297.54	F III	5	1307.75	Hg I
20	1273.02	Lu IV	6	1286.23	Ti III	12	1298.04	Ca III	5	1307.751	Hg I
6	1273.03	Tl IV	1000	1286.26	Br I	200	1298.26	Pr IV	12	1307.88	Mg II
11	1273.43	Mg II	15	1286.36	Ti III	150	1298.395	Cu II	300	1307.93	Hg II
70	1273.67	Ag II	5	1286.38	Ga II	300	1298.54	Pr IV	50	1308.06	V IV
100	1274.37	Mo III	100	1286.42	Mo III	20	1298.66	Ti III	200	1308.08	Pr IV
15	1274.41	Cd IV	12	1286.52	Ca III	15	1298.89	Si III	12	1308.28	Mg II
7	1274.76	Te II	28	1286.95	Co V	18	1298.96	Si III	300	1308.297	Co II
40	1274.77	Lu IV	40	1287.05	Cr III	20	1298.97	Ti III	300	1308.30	Tb IV
900	1274.82	Br IV	1000	1287.44	Pr IV	11	1299.18	Ba III	92	1308.51	Ta IV
10	1274.83	Mg III	150	1287.468	Cu II	73	1299.22	Cu V	12	1308.87	Ba III
90	1274.84	Cu IV	715	1287.54	As II	20	1299.46	Cd IV	285	1308.9	Se II
50	1274.94	Mo III	20	1287.58	Cd IV	83	1299.46	Ga IV	200	1309.27	Si II
8	1274.98	Sb II	400	1287.59	Mn III	80	1299.58	Co II	90	1309.41	Cu IV
1000	1275.10	Pr IV	500	1287.70	Al V	100	1299.82	Mo III	14	1309.44	Mg II
1500	1275.26	I I	500	1287.87	V III	10000	1300.34	I I	20 h	1309.46	Si II
200	1275.40	Pr IV	50	1288.07	Mo III	35	1301.12	Co V	80	1309.68	Ga IV
94	1275.48	Ta IV	50	1288.25	Mo III	14	1301.15	Si III	65	1309.72	Cu V
2	1275.52	Co V	12	1288.53	Ba III	300	1301.48	Tb IV	25	1309.87	P II
300	1275.572	Cu II	10	1289.30	Ti III	20	1301.87	P II	3000	1309.91	Br I
30	1275.78	Zn IV	50	1289.38	Lu IV	20	1301.88	Zn IV	60	1310.08	Lu IV
86	1275.94	Ta IV	3000	1289.40	I I	900	1302.168	O I	265	1310.194	S I
40	1276.31	Sn III	50	1289.41	Ce IV	100	1302.20	Sn V	8 r	1310.20	Tl II
100	1276.40	Mo III	400	1289.42	V III	2000	1302.31	La IV	25	1310.47	Au I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
290	1310.540	N I	200	1321.22	Zn IV	300	1332.97	Cu III	7	1345.20	Te II
60	1310.70	P II	300	1321.34	Fe V	760	1333.15	As II	300	1345.36	Yb IV
200	1310.71	Pr IV	5000	1321.36	Pr IV	100	1333.32	Zn IV	300	1345.61	Fe V
250	1310.95	N I	600	1321.42	Gd IV	1200	1333.53	La IV	50	1345.67	Co V
40	1311.12	Co II	300	1321.49	Fe V	5000	1333.57	Pr IV	58	1345.72	Ni IV
85	1311.20	Ag II	400	1321.71	Hg II	40	1333.59	F II	200	1346.05	Sn III
10	1311.35	Ga V	25 r	1321.71	Tl II	800	1333.79	Lu IV	60	1346.12	Bi III
85	1311.35	Ta IV	15	1321.85	Cd IV	12	1334.01	Ba III	15	1346.15	Cd IV
100	1311.363	C I	200	1322.33	Zn IV	4000	1334.04	Y III	800	1346.57	Mg IV
600	1311.70	Tb IV	100	1322.42	La III	150	1334.532	C II	70	1346.62	Ag II
40	1311.86	Co II	200	1322.43	Zn IV	200	1334.70	Sn III	300	1346.68	Mg IV
200	1312.39	Cu III	500	1322.51	Pr IV	500	1334.808	P III	100	1346.87	Si II
13	1312.59	Si III	50	1323.02	Lu IV	300	1334.94	Lu IV	77	1347.03	Ga IV
20	1313.05	Pb IV	60	1323.15	Ga III	3500	1334.96	La IV	1000	1347.07	Pr IV
300	1313.27	V III	4	1323.24	Ge III	500	1335.12	V III	10000	1347.240	Cl I
500	1313.29	Gd IV	400	1323.27	Fe V	11	1335.13	Ca III	45	1347.54	Na II
400	1313.35	V III	65	1323.28	Cu V	10	1335.20	Pb II	1000	1347.65	Sn III
250	1313.5	Br III	375	1323.515	S I	400	1335.20	Ni II	30	1347.90	Sr IV
55	1313.81	Ag II	6	1323.66	Tl IV	200	1335.705	P IV	200	1347.98	Zn IV
3000	1313.95	I I	500 p	1323.81	Zr V	300	1335.708	C II	10	1348.37	Pb II
300	1314.337	Cu II	60	1323.84	Ag II	3000	1335.726	Cl I	100	1348.54	Si II
285	1314.4	Se IV	8	1323.92	Pb IV	300	1335.96	Pr IV	100	1348.89	Au III
5000	1314.51	Y III	9	1323.951	C II	3	1336.26	Au II	10000	1349.18	La III
1000	1314.55	Sn IV	10	1324.92	Te II	7	1336.42	Te II	200	1349.90	Zn IV
60	1314.56	Nb III	81	1325.19	Ta IV	20000	1336.52	I II	150	1350.06	Si II
50	1314.61	Ag II	20	1325.46	Bi II	200	1336.72	Au III	20	1350.07	Bi II
80	1314.82	Ga IV	20	1325.55	Cd IV	7	1336.76	Na III	80	1350.07	Hg II
100	1314.84	Au III	500	1325.56	Tb IV	7	1337.10	Tl IV	20	1350.09	Au I
500	1314.96	Pr IV	200	1326.32	Yb IV	300	1337.34	Zr V	150	1350.18	Al II
700	1315.12	Tb IV	800	1326.36	Yb IV	7	1337.36	Na III	900	1350.26	Yb IV
200	1315.14	Zr V	500	1326.38	Pr IV	400	1337.90	Al IV	150	1350.32	Au II
300	1315.28	Pr IV	100	1326.395	Cu II	85	1338.09	Ga IV	100	1350.42	Cu IV
30	1315.42	Co II	100	1326.50	Cd II	50	1338.20	Lu IV	75	1350.46	Ta IV
87	1315.58	Ta IV	115	1326.57	N I	10 h	1338.37	Au I	400	1350.52	Al V
12	1315.72	Ba III	355	1326.643	S I	200	1338.612	O IV	20	1350.52	Si II
900	1316.04	Yb IV	200	1326.74	Zn IV	500	1339.29	Pr IV	150	1350.594	Cu II
30	1316.09	Co II	40	1326.84	Bi III	200	1339.48	Cu III	20	1350.66	Si II
1500	1316.10	Y III	40	1327.06	F II	100	1339.49	Lu IV	20	1350.84	Au I
355	1316.542	S I	1000	1327.34	Sn III	200	1340.06	Yb IV	76	1351.06	Ga IV
20	1316.59	Sn II	8	1327.40	Sb II	100 d	1340.08	Cu IV	6	1351.22	Co V
290	1316.618	S I	12	1327.59	Ti III	8	1340.67	Na III	5000	1351.657	Cl I
500	1316.71	Gd IV	1000	1327.67	Tb IV	1000	1340.74	Pr IV	200	1351.68	Lu IV
3000	1316.74	Br I	50	1327.74	Na II	30	1340.97	Cd IV	22	1351.74	Au I
15	1316.89	Cd IV	5	1327.81	Ga II	200	1341.32	Pr IV	250	1351.837	Cu II
300	1316.96	Pr IV	115	1327.92	N I	8	1341.47	Si III	600	1352.05	Mg I
60	1317.0	Bi IV	50	1328.11	F II	965	1341.55	As II	50	1352.27	Zn I'
500	1317.22	Ni II	100 h	1328.37	Au I	180	1341.68	Au III	100	1352.64	Si II
1000	1317.37	Br I	10	1328.95	Ca III	24	1341.89	Ca II	30	1352.70	Pr II
3000	1317.54	I I	200	1329.11	Zn IV	60	1342.09	Ag II	1000	1352.76	La I'
2000	1317.70	Br I	64	1329.22	Cu V	300	1342.19	Mg IV	100	1352.81	Al II
11	1317.70	Ca III	20	1329.47	Bi II	7	1342.39	Si III	1000	1352.81	Pr IV
400	1317.86	Fe V	120	1329.578	C I	9 d	1342.39	Na III	5	1352.82	Al II
200	1318.00	Zn IV	120	1329.600	C I	12	1342.54	Ca II	25	1352.82	Au I
20	1318.19	Co II	5000	1330.04	La III	50	1342.57	Ag II	70	1352.86	Al II
300	1318.35	Fe V	400	1330.06	Al V	300	1342.58	Lu IV	15	1353.42	Co V
30	1318.60	Co II	2000	1330.19	I I	10	1342.73	Na III	200	1353.43	Yb I
55	1318.89	Cu V	400	1330.40	Fe V	250	1342.78	Pr V	50	1353.54	Ag I
230	1319.00	N I	8 r	1330.40	Tl II	10 h	1342.80	Au I	100	1353.72	Si II
50	1319.15	Nb III	500	1330.79	Gd IV	130	1342.992	O IV	300	1353.74	Lu I
315	1319.68	N I	15	1331.04	Lu IV	12	1343.06	Pb IV	70	1353.92	Ga I
20	1319.84	Co II	20	1331.13	Sr IV	86	1343.30	Ta IV	25	1354.14	Au I
500	1320.10	Pr IV	10	1331.65	Pb II	6	1343.39	Si III	100	1354.288	C I
300	1320.41	Fe V	400	1331.74	Hg II	230	1343.512	O IV	500	1354.35	Pr I'
100	1320.686	Cu II	100	1331.93	Lu III	50	1343.60	F II	5000	1354.66	Pr I'
1000	1320.70	Pr IV	500	1331.99	V III	40	1344.04	F II	11	1354.71	Ba I
200	1320.74	Zn IV	300	1332.06	Zr V	150	1344.08	Zn IV	30	1354.78	Cd I
400	1320.74	Zr V	75	1332.16	Ce IV	300	1344.23	Pr IV	5000	1355.10	I I
30	1320.81	Zr III	4	1332.36	Tl III	650	1344.327	P III	80	1355.13	V I'
70	1321.17	Cu IV	92	1332.38	Ta IV	300	1344.845	P III	40	1355.20	Co I'

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
300	1355.21	Zr V	74	1364.63	Ga IV	300	1374.12	Fe V	200	1384.41	Yb IV			
11	1355.28	Na III	10	1364.74	Au II	5000	1374.41	Pr IV	900	1384.46	Mg IV			
150	1355.305	Cu II	1000	1364.81	Pr IV	5	1374.62	Tl IV	12000	1384.60	Br I			
150	1355.61	Au III	800	1365.20	Mn III	90	1374.69	Na II	8	1384.70	Sb II			
30	1355.79	Au I	8	1365.26	Si III	120	1374.76	Ag III	250	1385.05	P V			
150	1355.84	C I	500	1365.40	Au III	10	1374.80	Te II	50	1385.33	Au I			
200	1355.85	Lu IV	14	1365.45	Mg II	70	1374.82	Au I	11	1385.43	Ca III			
760	1355.93	As II		1365.54	Mg II	40	1375.05	Cr IV	710	1385.510	S I			
500	1355.98	Zr V	300	1365.57	Fe V	1000	1375.07	As II	300	1385.68	Fe V			
150	1356.13	Au III	2000	1365.77	Pr IV	25	1375.13	Zr III	500	1385.77	Mg IV			
400	1356.15	Yb IV	92	1365.88	Ta IV	30	1375.20	Co V	300	1385.79	Au III			
100	1356.20	Zn IV	300	1365.88	Yb IV	100	1375.33	Zn IV	200	1385.91	Pr IV			
69	1357.07	Ni IV	60 d	1366.68	Zn II	15	1375.36	Lu IV	1000	1386.74	Sn III			
12	1357.40	Hf IV	500	1366.695	P IV	400	1375.42	Yb IV	150	1387.371	N III			
30	1357.67	Co V	8	1366.73	Te II	50	1375.76	Au I	800	1387.53	Mg IV			
200	1357.82	Zn IV	7	1367.05	Si III	760	1375.78	As II	800	1387.94	Fe V			
35	1357.86	Au I	200	1367.17	Au III	50	1375.98	Zn IV	5	1387.99	Si III			
3000	1357.97	I I	15	1367.26	Mg II	15	1376.02	Bi II	960	1388.435	S I			
6	1358.04	Sb II	20	1367.34	Lu IV	100	1376.02	Lu IV	500	1388.79	Al IV			
20	1358.11	Cd IV	30	1367.39	Cr IV	500	1376.34	Fe V	100	1388.80	Cu IV			
7	1358.56	Tl IV	100	1367.56	Tb IV	300	1376.46	Fe V	78	1388.80	Ta IV			
300	1358.773	Cu II	15	1367.70	Mg II	400	1376.46	Tb IV	16	1388.94	Pb IV			
200	1359.009	Cu II	2500	1367.71	I I	500	1376.54	Zr V	32	1389.11	Co V			
400	1359.01	Fe V	400	1367.71	Tb IV	500	1376.62	Al IV	20	1389.14	Au I			
20	1359.67	Lu IV	250	1367.951	Cu II	79	1376.62	Ta IV	640	1389.154	S I			
70	1359.92	F III	25000	1368.04	La IV	300	1376.66	Yb IV	100	1389.41	Au III			
10	1360.01	Ca III	40	1368.17	Zn IV	300 r	1376.79	Cu III	25000	1389.693	Cl I			
40	1360.51	Au I	2500	1368.22	I I	20	1377.06	P I	15	1389.85	Lu IV			
2000	1360.64	Pr IV	30	1368.24	Co V	350	1377.282	P IV	20	1389.92	Tb IV			
1000	1360.72	Mn III	60	1368.62	Au I	200 r	1377.49	Cu III	20000	1389.957	Cl I			
5000	1360.97	I I	400	1368.90	Pr IV	8000	1377.49	La IV	60	1390.07	Lu IV			
3000	1361.11	I I	35	1368.98	Au I	200	1377.65	Zn IV	200	1390.30	Lu IV			
20	1361.15	Sr IV	600	1369.20	Al V	180	1377.73	Au III	40	1390.39	Hf IV			
200	1361.27	Hg II	4	1369.30	Co V	7	1377.75	Tl IV	50	1390.69	Lu IV			
300	1361.28	Fe V	18	1369.42	Mg II	100	1377.82	Cu IV	3000	1390.75	I I			
20	1361.32	Co V	400	1369.43	Mn III	20	1377.93	P I	50	1391.24	Zn IV			
300	1361.39	Zr V	5	1369.44	Si III	25	1378.12	Co V	12	1391.27	Mg III			
300	1361.45	Fe V	11	1369.53	Ba III	200	1378.23	Tb IV	180	1391.46	Au III			
8	1361.60	Si III	200	1369.53	Zn IV	500	1378.56	Fe V	15	1392.10	Cd III			
200	1361.75	Yb IV	700	1369.64	Tb IV	150	1378.69	Au III	50	1392.26	Ge II			
600	1361.82	Fe V	200	1369.71	Sn III	30	1378.87	Au I	60	1392.27	Au I			
12	1361.90	Na III	300	1369.72	Yb IV	30	1378.93	Zr III	40	1392.38	Lu IV			
100	1362.05	Cu IV	965	1369.77	As II	10	1379.05	Co V	5000	1392.56	Ta V			
80	1362.06	Au III	500	1370.14	Ni II	25	1379.40	P I	775	1392.588	S I			
2	1362.25	Be III	50	1370.42	Zn IV	20000	1379.528	Cl I	2000	1392.90	I I			
6	1362.33	Au II	60	1370.48	Cd IV	30	1379.56	Lu IV	80	1393.07	Zn IV			
5	1362.37	Si III	150	1370.91	Cd II	8	1379.58	Sb III	100	1393.128	Cu II			
220	1362.46	B II	10	1371.01	Co V	150	1379.62	P V	1100	1393.24	Gd IV			
30	1362.46	Co V	12	1371.02	Fe II	600	1379.67	Al III	15	1393.39	Mg III			
20	1362.47	Au I	640	1371.292	O V	150	1379.98	Au III	15	1393.76	Si IV			
30	1362.55	Cd IV	300	1371.65	Mn III	10	1380.21	Co V	6	1393.80	Au II			
200	1362.600	Cu II	200	1371.840	Cu II	100	1380.42	Ge II	20	1393.92	Bi II			
150	1363.08	Cu III	100	1372.14	Cu IV	250	1380.463	P III	250	1393.93	Yb IV			
300	1363.08	Fe V	11	1372.34	Na III	8	1380.53	Au II	300	1394.11	Pr IV			
8	1363.15	Au II	25	1372.61	Bi II	125	1380.53	Au III	3000	1394.32	La IV			
100	1363.24	Lu IV	400	1372.674	P IV	30	1380.98	Cd IV	50	1394.54	Zn IV			
9	1363.24	Te II	75	1372.72	Ce IV	300	1381.00	Tb IV	800	1394.64	As II			
400	1363.35	Al V	5	1373.03	Si III	150	1381.089	P III	60	1395.00	V IV			
50	1363.37	Lu IV	30	1373.09	Co V	200	1381.36	Au III	6	1395.22	Te II			
100	1363.43	Zn IV	2500	1373.116	Cl I	25	1381.47	P I	60	1395.54	Ga IV			
12000	1363.447	Cl I	120	1373.22	Ag III	775	1381.552	S I	180	1396.00	Au III			
7	1363.47	Si III	20	1373.49	P I	1000	1382.62	Pr IV	100	1396.00	Ag II			
300	1363.64	Fe V	10 r	1373.52	Tl II	80	1382.75	Au I	1000	1396.112	S I			
200	1363.95	Zn IV	20	1373.54	Lu IV	100	1382.83	Tb IV	12000	1396.527	Cl I			
50	1363.98	Au I	700	1373.59	Fe V	15	1383.18	Lu IV	440	1396.66	Hf V			
25	1364.15	Au I	800	1373.65	As II	4000	1383.23	I I	10	1396.78	Cd III			
120	1364.164	C I	600	1373.67	Fe V	5	1383.60	Cd III	200	1396.79	Zr V			
30	1364.17	Co V	300	1373.70	Al V	800	1384.13	Al III	6	1397.02	Pb IV			
150	1364.50	Ag II	1000	1373.86	Tb IV	200	1384.23	Pr IV	500	1397.11	Pr IV			

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
40	1397.18	Lu IV	300	1409.22	Fe V	10	1421.63	Ti III	67	1435.24	Ni IV
20	1397.65	Cd IV	20	1409.33	Co II	250	1421.759	Cu II	50	1435.26	Nb III
11	1397.69	Ca III	300	1409.337	S I	10	1421.77	Ti III	120	1435.3	Se I
400	1397.97	Fe V	1000	1409.36	Mg IV	160	1421.96	Hf V	10	1435.503	Hg I
76	1398.19	Ni IV	30	1409.40	Zn IV	12	1422.40	Ti III	10	1435.51	Hg I
100	1398.642	Cu II	600	1409.45	Fe V	220	1422.53	Hf V	5000	1435.56	Pr IV
350	1398.77	Yb IV	225	1409.50	Au III	5	1422.86	Be III	8	1435.77	Si III
91	1398.78	Ta IV	300	1410.03	Zr V	1	1423.2	Tl I	50	1435.79	Au I
1000	1399.31	Pr IV	20 h	1410.22	Si II	35	1423.33	Bi III	120	1435.8	Se I
2000	1400.01	I I	5	1410.33	Zn IV	150	1423.48	Cu III	250	1435.81	Au III
270	1400.09	Hf V	60	1410.44	Zn II	35	1423.52	Bi III	90	1436.09	Ne I
30	1400.14	Zn IV	500	1410.61	Sn III	200	1423.99	Yb IV	80	1436.12	Au III
600	1400.24	Fe V		1410.69	Au II		1424.	Li II	7	1436.17	Si III
18	1400.26	Pb IV	400	1410.90	Pr IV	10	1424.14	Ti III	150	1436.236	Cu II
800	1400.31	As II	100	1410.93	Ag II	1000	1424.36	Pr IV	8	1436.49	Sb II
25	1400.52	Sn II	8	1411.31	Ti V	9	1424.66	Sc IV	20	1436.61	Au II
50	1400.61	F II	74	1411.45	Ni IV	510	1425.030	S I	45	1436.83	Bi II
1000	1400.96	Pr IV	360	1411.94	N I	8000	1425.49	I I	300	1436.968	S I
200	1401.24	Ge II	270	1412.28	Hf V	12	1425.73	Fe IV	370	1437.27	Hf V
30	1401.32	Lu IV	5	1412.93	Tl IV		1426.12	Be I	50	1437.37	Mo III
100	1401.46	Lu IV	300	1413.14	Yb IV	500	1426.59	Pr IV	1000	1437.52	Sn IV
1	1401.52	Be III	93	1413.40	Ta IV	100	1426.65	V IV	500	1437.53	Mg IV
160	1401.70	Hf V	200	1413.40	Zr V	150	1427.42	Au III	1000	1437.64	Mg IV
70	1401.82	Cr IV	270	1413.51	Hf V	70	1427.45	Ni IV	500	1437.73	Hf V
50	1402.12	Au I	250	1413.80	Au III	50	1427.79	Zn IV	20	1438.58	Zn IV
800	1402.39	Fe V	120	1413.90	Ag III	200	1427.829	Cu II	70	1438.82	Ni IV
77	1402.55	Ga IV	100	1414.27	Au III	90	1428.58	Ne I	60	1439.09	Zn II
20	1402.619	Hg I	120	1414.29	Ag III	120	1428.61	Ag III	300	1439.12	Au III
20	1402.62	Hg I	50	1414.41	V IV	200	1428.87	Ni III	6	1439.52	Te II
12	1402.77	Si IV	200	1414.43	Hg II	300	1428.93	Au III	800	1440.53	Fe V
150	1402.777	Cu II	20	1414.44	Ga II	67	1428.93	Ni IV	200	1440.61	Yb IV
250	1402.9	Br III	5000	1414.58	La IV	200	1429.08	Lu IV	100	1440.62	Lu IV
100	1402.91	Au III	100	1414.898	Cu II	80	1429.19	Au I	500	1440.65	Zr IV
30	1403.08	In III	400	1415.20	Fe V	400	1429.38	Lu IV	2	1440.77	Be III
40	1403.48	Zr III		1415.22	Au II	10	1429.57	Sb III	300	1440.79	Fe V
30	1403.68	Cd IV	90	1415.27	Cu IV	150	1429.75	Br V	500	1441.06	Zr IV
15	1403.98	Zn IV	80	1415.54	Au III	15	1429.83	Cd IV	200	1441.21	Au III
	1404.12	Zn I	400	1416.15	Yb IV	250	1430.06	Au III	500	1441.470	Cl II
20	1404.18	Sb III	25	1416.28	Cd III	79	1430.11	Ta IV	83	1441.54	Ta IV
10	1404.34	Pb IV	11	1416.61	Ba III	50 d	1430.13	P I	7000	1441.63	La IV
8	1404.60	Tl IV	10 h	1416.97	Si II	400	1430.243	Cu II	5	1441.73	Si III
300	1404.68	Mg IV	100	1417.09	Au III	300	1430.29	Yb IV	200	1441.76	Lu V
90	1404.68	Na II	13	1417.24	Si III	800	1430.57	Fe V	700	1441.82	Al IV
110	1404.93	Ag III	125	1417.39	Au III	10	1430.76	Sb I	150	1442.139	Cu II
	1405.12	Au II	100	1417.42	Cr IV	40	1430.80	Lu IV	400	1442.22	Fe V
70	1405.32	Ga IV	500	1417.70	Zr IV	10	1431.14	Mg III	400	1442.60	Br V
100	1405.4	Se I	400	1417.72	Yb IV	13	1431.43	Fe IV	40	1443.64	Lu V
90	1405.49	Cu IV	300	1418.12	Fe V	60	1431.92	Nb III	9	1444.10	Sc IV
135	1405.77	Hf V	90	1418.38	Ne I	600	1431.94	Al IV	10	1444.19	Na II
100	1406.4	Se I	250	1418.426	Cu II	100	1432.15	Zn III	100	1444.8	Se I
15	1406.58	Cd IV	60	1418.89	Cd IV	12	1432.50	Ca II	60	1445.04	Zn II
100	1406.6	Se I	69	1419.58	Ni IV	50	1432.50	Lu V	370	1445.40	Hf V
200	1406.64	Lu IV	80	1419.58	V IV	7000	1432.55	La IV	80	1445.43	Nb II
400	1406.67	Fe V	30	1419.60	Zn IV	95	1432.60	Ag II	400	1445.87	Al V
500	1406.82	Fe V	90	1419.72	Ag II	100	1432.77	Lu V	80	1445.98	Nb II
100	1407.00	Lu IV	50 w	1420.02	Lu V	5	1432.86	Cd III	200	1445.984	Cu II
250	1407.04	Lu IV	10	1420.04	Ti III	425	1433.280	S I	20	1446.08	Cd II
400	1407.05	Yb IV	35	1420.12	Zr III	275	1433.37	Au III	5000	1446.26	I I
40	1407.14	F II	5	1420.29	Cd III	60	1433.39	Nb III	150	1446.37	Au I
150	1407.169	Cu II	20	1420.32	Lu IV	370	1433.43	Hf V	800	1446.62	Fe V
370	1407.17	Hf V	10	1420.44	Ti III	6	1433.69	Si III	80	1446.69	Au I
400	1407.25	Fe V	600	1420.46	Fe V	20	1433.75	Ca II	100	1446.8	Se I
70	1407.38	Au I	8	1420.54	Cd III	10	1433.96	Pb II	100	1447.0	Se I
6	1407.83	Sb II	25	1420.87	Zr III	200	1434.31	Ni III	80	1447.09	Nb I
370	1408.38	Hf V		1420.89	Li II	90	1434.34	Cu IV	6	1447.20	Si II
100	1408.45	Au I	10	1420.89	Na III	6	1434.72	Tl IV	300	1447.42	Mg I
25	1408.67	Sr IV	74	1421.22	Ni IV	30	1434.85	In III	50	1447.48	Nb I
300	1409.03	Fe V	10	1421.26	Be III	250	1434.904	Cu II	800	1447.51	Al I
10 h	1409.07	Si II	100	1421.59	Lu IV	1	1435.17	Be III	20	1447.54	Cd I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
25	1447.55	Cd III	250	1459.412	Cu II	5	1471.97	Cd III	100 h	1485.51	Si II
375	1447.83	P V	5000	1459.49	La III	400	1472.12	Lu V	200	1485.58	Lu V
25	1447.94	Bi II	300	1459.54	Mg IV	200	1472.395	Cu II	330	1485.622	S I
100	1448.14	Lu V	400	1459.62	Mg IV	69	1472.63	Ni IV	500	1485.88	Pr IV
100	1448.14	Lu IV	15	1459.77	Co V	30	1472.90	Co II	1000	1485.92	I I
300	1448.229	S I	12	1459.79	Ca III	425	1472.972	S I	3	1485.95	Ga II
250	1448.42	Au III	500	1459.83	Fe V	12	1473.20	Fe IV	25	1486.02	Co V
50	1448.50	Nb III	200	1459.95	Pr IV	80	1473.32	Au III	300	1486.05	Al V
500	1448.59	As II	200	1459.98	Zn IV	300	1473.41	Zn III	30	1486.50	Co II
700	1448.85	Fe V	300	1460.05	Zr V	40	1473.43	Nb IV	25	1486.55	Au II
73	1449.01	Ni IV	100	1460.11	Lu V	200	1473.71	Lu V	20 r	1486.57	Sb I
200	1449.058	Cu II	400	1460.73	Fe V	3	1473.73	Ga II	200 r	1486.72	Ba II
150	1449.2	Se I	60 h	1461.00	Bi III	250	1473.978	Cu II	50	1486.79	Nb III
12	1449.31	Na III	200	1461.76	Pr IV	550	1473.995	S I	700	1486.89	Al IV
40	1449.32	Lu V	11	1461.88	Ca III	300	1474.380	S I	300	1486.90	Zr V
3	1449.35	Pb II	25	1462.14	Bi II	15 h	1474.65	Si II	35	1486.93	Bi II
5	1449.37	Tl IV	7500	1462.15	La IV	100	1474.73	Au III	300	1487.15	Au III
5	1449.49	Ga II	500	1462.63	Fe V	1000	1474.91	Pr IV	390	1487.150	S I
90	1449.69	Cu IV	30	1462.65	Lu IV	200	1474.935	Cu II	40	1487.23	Nb IV
200	1449.77	Sn III	200	1463.336	C I	20	1475.15	Sn II	20	1487.70	In III
20	1449.83	Hf III	15	1463.34	Ca III	300	1475.60	Fe V	400	1487.788	P IV
3000	1449.90	Br I	20000	1463.47	La IV	600	1475.64	Al V	250	1487.91	Au III
400	1449.93	Fe V	2	1463.65	Ga II	40	1475.77	Lu V	50000	1488.45	Br I
250	1450.304	Cu II	200	1463.752	Cu II	30	1475.81	Co II	20	1488.73	Co V
100	1450.36	Lu V	400	1463.838	Cu II	20	1476.00	Mg II	750	1488.831	Cu II
100	1450.69	Lu V	10 h	1464.19	Sb I	150	1476.059	Cu II	300	1489.01	Ag III
200	1451.50	Ni III	100	1464.20	Zn III	100	1476.43	Zn IV	300	1489.098	P IV
60	1451.63	Nb III	92	1464.41	Ta IV	30	1476.65	Co V	9	1489.22	Sn II
18	1451.74	Ti IV	700	1464.68	Fe V	68	1476.82	Ni IV	100	1489.26	Zn III
76	1452.22	Ni IV	100	1464.72	Au III	160	1476.89	O III	200	1489.47	Au III
200	1452.294	Cu II	100	1464.72	Ag II	1600	1476.98	Gd IV	12	1489.53	Fe IV
200	1452.33	Lu IV	6	1465.25	Te II	60	1477.02	Zn II	67	1489.53	Ni IV
50	1452.38	Mo III	500	1465.38	Fe V	10	1477.14	Tl III	7	1489.56	Te II
20	1452.63	Cd IV	25	1465.44	Zr III	200	1477.32	Pr IV	8	1489.64	Sc IV
100	1452.64	Lu V	100	1465.75	Zn III	400	1477.92	Yb IV	8 r	1489.65	Tl I
120	1452.74	Ag III	2500	1465.83	I I	25	1478.01	Mg II	100	1489.71	Cr V
30	1452.89	P II	150	1465.86	Cr V	12	1478.85	Ba III	72	1489.83	Ni IV
13	1453.16	Ca III	73	1465.87	Ga IV	500	1479.47	Fe V	20	1489.11	V V
5000	1453.18	I I	15	1465.97	Cd IV	20	1480.89	Mg II	350	1490.45	Mg IV
200	1453.35	Lu V	200	1466.070	Cu II	150	1481.10	Au III	5	1490.50	Tl II
91	1454.32	Ta IV	8	1466.14	Cd III	300 r	1481.23	Cu III	100	1490.96	Zn III
100	1454.38	Lu V	80	1466.18	Cu IV	100	1481.25	Zn IV	300	1491.33	Zr V
250	1454.95	Au III	20	1466.21	Co II	400	1481.51	Mg IV	40 h	1491.36	Sb I
50	1455.11	Bi II	50	1466.23	Ag II	200	1481.544	Cu II	50	1491.36	P I
23	1455.19	Ti III	2000	1466.44	La III	50	1481.65	Cr V	300	1491.57	Yb IV
100	1455.21	Lu V	400	1466.65	Fe V	355	1481.665	S I	50	1491.67	Hf IV
300	1455.26	Al V	15	1466.67	Cd IV	100	1481.76	Au I	100	1491.76	Be I
30	1455.27	Cr III	20	1467.34	Ti IV	150	1481.764	C I	20	1491.79	Cd IV
70	1455.42	Ni IV	120	1467.402	C I	73	1482.25	Ni IV	15	1491.81	Cd III
300	1455.56	Fe V	7500	1467.54	La IV	25	1482.62	Co V	700	1492.625	N I
80	1455.65	Zn IV	40 c	1467.81	Lu V	50	1482.76	Cr V	490	1492.820	N I
30	1455.74	Cd III	10	1468.85	Au II	70	1482.77	Cu IV	300	1492.834	Cu II
700	1456.16	Fe V	35	1468.98	Co V	30	1482.90	Mg II	5000	1492.89	I I
120	1456.3	Se I	200	1468.99	Lu V	20	1482.91	Co V	3	1492.93	Li II
200	1456.41	Ag III	500	1469.00	Fe V	15	1482.95	Cd IV	5	1492.97	Li II
100	1456.68	Nb III	10	1469.17	Au II	485	1483.039	S I	40	1492.99	P I
200	1456.72	Zn III	12	1469.19	Ti IV	300	1483.233	S I	69	1493.01	Ni IV
50	1456.91	Nb II	10	1469.28	Au II	3	1483.52	Ga II	1	1493.04	Li II
5	1457.25	Si III	50	1469.45	Lu V	100	1483.79	Lu IV	60	1493.09	F II
5000	1457.39	I I	1000	1469.47	Zr IV	20	1484.26	Co II	50	1493.24	F II
5000	1457.47	I I	600	1469.61	Xe I	500	1484.507	P IV	200	1493.24	Lu IV
	1457.57	Zn I	93	1469.82	Ta IV	50	1484.67	Cr V	40	1493.31	F II
270	1457.91	Hf V	4	1470.34	In IV	80	1484.73	Nb III	250	1493.366	Cu II
600	1457.96	Al IV	150	1470.35	Br V	16	1484.87	Ca III	74	1493.67	Ni IV
10000	1457.98	I I	400	1470.697	Cu II	15	1484.87	Si II	20	1494.14	In III
300	1458.002	Cu II	100	1471.20	Lu V	90 h	1485.02	Si II	640	1494.675	N I
2500	1458.79	I I	150	1471.28	Au III	30	1485.05	Cr IV	800	1494.79	Al IV
100	1459.032	C I	100	1471.44	Ag III	30	1485.22	Si II	2	1494.89	Ge IV
4000	1459.15	I I	20	1471.87	Co II	200	1485.328	Cu II	90	1495.07	Ga III

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
12	1495.18	Fe IV	300	1508.632	Cu II	100	1524.91	Nb III	500	1537.559	Cu II
3	1495.21	Ga II	100 h	1509.10	Si II	75	1525.31	Ni IV	100	1537.77	Lu IV
45	1495.21	Na II	20	1509.23	Co II	10	1525.32	Ge III	35	1538.06	Bi II
90	1495.25	Ta IV	50	1509.71	Nb III	70	1525.69	Ta IV	200	1538.091	Ge II
250	1495.430	Cu II	350	1510.506	Cu II	150	1525.764	Cu II	12	1538.29	Fe IV
300	1495.50	Mg IV	12	1510.68	Ba III	1000	1526.14	Al V	10 h	1538.63	Fe III
100	1495.94	Nb III	7	1510.76	Pb IV	2500	1526.45	I I	69	1538.93	Ni IV
40	1496.01	Na II	5	1511.01	Cd III	13	1526.60	Fe IV	500	1539.12	Al V
350	1496.687	Cu II	400	1511.26	Lu IV	500	1526.72	Si II	200	1539.30	Cl IV
12	1496.88	Ca III	10	1511.65	Cd III	200 h	1526.88	Pd III	800	1539.830	Al II
45	1497.73	Na II	50 h	1512.07	Si I	120	1527.04	Ag III	200	1540.239	Cu II
150	1497.97	Cr V	20	1512.30	Be II	2	1527.15	Ge III	80	1540.26	Au III
80	1498.02	Nb III	50	1512.34	Nb III	5000	1527.19	La IV	300	1540.389	Cu II
10	1498.70	Ti III	10	1512.42	Pb II	74	1527.68	Ni IV	300	1540.588	Cu II
68	1498.71	Ni IV	60	1512.43	Be II	74	1527.80	Ni IV	25000	1540.65	Br I
71	1498.77	Ni IV	200	1512.465	Cu II	15	1528.40	Cd III	150	1541.14	Ag III
200	1498.79	Zn III	50 r	1512.57	Sb I	500	1528.55	La III	750	1541.703	Cu II
72	1498.90	Ni IV	5	1512.62	In IV	500	1528.569	Cl II	100	1542.00	Au II
110	1498.93	F III	70	1512.74	Ni IV	35	1528.82	Hf IV	13	1542.16	Fe IV
	1499.2	Sb IV	70	1513.10	Na II	30	1529.30	Cd III	80	1542.25	Au II
10 r	1499.30	Tl II	5	1513.13	Cd III	100	1529.84	Zn IV	120	1542.29	P II
300	1499.42	Zn III	50	1513.25	Nb III	50	1530.10	Tb IV	100	1542.63	Pd III
80	1499.45	Nb III	200	1513.366	Cu II	20	1530.21	In III	14	1542.70	Fe IV
80	1499.81	Cu IV	30 p	1513.57	Si II	13	1530.26	Fe IV	500	1542.942	Cl II
67	1499.97	Ni IV	80	1513.81	Nb III	250	1530.4	Se I	75	1543.41	Ni IV
12	1500.24	Si III	95	1514.19	Ta IV	150	1531.3	Se I	200	1543.46	Cu II
250	1500.37	Au III	12	1514.22	Ba III	30000	1531.74	Br I	9	1543.86	Sc IV
300	1500.42	Zn III	200	1514.26	Cd II	200	1531.8	Se I	400	1544.677	Cu II
6	1500.61	Ge IV	500	1514.492	Cu II	500	1531.856	Cu II	50	1545.17	Cd II
150	1500.9	Se I	5	1514.57	Ga II	7	1532.03	In IV	200	1545.19	Cl IV
10	1501.19	Si III	5000	1514.68	I I	5	1532.10	Cd III	20	1545.29	Ca II
50	1501.53	Nb III	50	1514.76	Zn II	300	1532.131	Cu II	200 h	1545.95	Pd II
9	1501.87	Si III	8	1514.96	Sc IV	80	1532.51	P II	10000	1546.17	Zr IV
100	1501.99	Nb III	150	1515.08	Ag III	14	1532.63	Fe IV	74	1546.23	Ni IV
120	1502.01	F III	3	1515.19	Ga II	120 r	1532.74	Sb I	12	1546.40	Fe IV
350	1502.228	P III	90	1515.28	Cu IV	20	1532.82	Au I	120	1547.1	Se I
60	1502.30	Nb IV	100 r	1515.63	Ag I	20	1532.86	Au I	25	1547.57	Cd II
200	1502.47	Au III	300	1515.85	Zn III	100	1532.90	Sn IV	100	1547.958	Cu II
20	1502.50	Bi II	200	1516.17	Tb IV	13	1532.91	Fe IV	68	1548.04	Ni IV
500	1503.35	Pr IV	70	1516.66	Ni IV	30	1532.95	In III	1000	1548.202	C IV
150	1503.368	Cu II	400	1516.86	Pr IV	60	1532.98	Nb III	60	1548.43	P I
200	1503.74	Au III	60 p	1516.91	Si II	30	1533.09	Zn III	100	1548.50	Au I
400	1504.01	Ba II	200	1517.18	Pd III	40	1533.17	Bi II	50 r	1548.58	Ag I
110	1504.18	F III	50	1517.38	Nb III	1000	1533.45	Si II	8	1549.08	Y III
3	1504.41	Ga II	200	1517.631	Cu II	50	1533.68	Zn IV	200	1549.15	Cl IV
250	1504.663	P III	15000	1518.05	I I	15	1533.86	Fe IV	90	1549.336	N V
250	1504.757	Cu II	170	1519.03	Cr V	13	1533.95	Fe IV	30	1549.35	Lu I
140	1504.79	F III	400	1519.07	Al IV	250	1533.986	Cu II	9	1549.55	Sc I
3	1505.01	Ga II	500	1519.492	Cu II	50	1534.06	Nb IV	10	1550.07	Cd I
60	1505.03	Nb III	60	1519.63	Na II	50	1534.46	Ga III	200	1550.12	Zr V
10 h	1505.17	Fe III	600	1519.837	Cu II	76	1534.71	Ni IV	500	1550.19	Al I
200	1505.388	Cu II	60	1520.14	V IV	50	1534.86	Mo III	12 h	1550.20	Fe I
100	1505.40	Pd III	200	1520.47	Zr V	250	1535.002	Cu II	20	1550.45	Cd I
12	1505.70	Sb V	200	1520.540	Cu II	80 r	1535.06	Sb I	300	1550.653	Cu I
300	1505.92	Zn III	40	1520.57	Bi II	90	1535.12	Cu IV	900	1550.774	C IV
6	1506.06	Si III	73	1520.63	Ni IV	8	1535.40	Ga II	15	1550.80	Sc I
130	1506.30	F III	200	1520.71	Pr IV	14	1535.71	Pb IV	15	1550.89	Cd I
4	1506.37	Tl III	2000	1520.98	Pr IV	8	1535.76	Sc IV	150	1550.89	Ag I
80	1506.41	Na II	200	1521.06	Lu IV	120	1535.90	P II	80	1551.12	Cu I
160 w	1506.72	O V	100	1522.21	Lu IV	5000	1536.17	La III	300	1551.389	Cu I
110	1506.77	F III	400	1523.46	Pr IV	5	1536.37	Ga II	20	1551.59	Lu I
11	1506.88	Ca III	5	1523.50	In IV	80	1536.39	P II	5	1552.18	Cd I
60	1506.91	Na II	10	1523.55	Cd III	14	1536.58	Fe IV	300	1552.30	Zn I
5000	1507.04	I I	10000	1523.79	La III	30	1536.77	Bi II	12	1552.35	Fe I
50 r	1507.37	Ag I	100	1524.23	Ag III	1	1536.91	Ga II	500	1552.646	Cu I
30	1507.82	Hf III	60	1524.36	Nb IV	300	1537.21	Cl IV	12	1552.71	Fe I
10 r	1507.82	Tl II	12	1524.47	Sb V	73	1537.25	Ni IV	200	1552.94	Zn I
15000	1507.87	La IV	10	1524.78	In III	60	1537.50	Nb III	100	1553.02	F II
700	1508.37	Al V	200	1524.860	Cu II	800	1537.54	Al IV	130	1553.04	Ag

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
20	1553.1	Pb III	90	1567.35	Cu IV	500	1583.682	Cu II	20	1598.73	Cd IV
80	1553.11	Zn III	200	1567.54	Au III	11 d	1583.98	Na IV	80	1598.86	Nb III
20	1553.18	Ca II	14	1568.27	Fe IV	150	1584.10	Au III	10000	1598.95	Zr IV
500	1553.62	Pr IV	10 r	1568.57	Tl II	12	1584.14	Na IV	20	1599.30	Co II
15 p	1553.81	Y III	8	1568.92	In IV	800	1584.46	Al IV	80 r	1599.96	Sb I
250	1553.896	Cu II	15	1568.98	Cd III	40	1584.60	Cr III	7	16 9.47	Sn II
300	1554.22	Fe V	3	1569.33	In IV	8	1584.64	Sc IV	9	1600.09	Ge III
300	1554.38	Ba II	100	1569.385	Al II	82	1584.64	Ta IV	20	1600.42	Cd IV
80	1554.61	Au III	100	1569.416	Cu II	500	1585.10	Pr IV	70	1600.46	B I
32	1554.64	Ca II	500	1570.13	Pr IV	750	1585.11	La IV	12	1600.50	Fe IV
	1555.	Li II	12	1570.18	Fe IV	13	1586.13	Ca III	200	1600.51	Au III
400	1555.134	Cu II	50	1570.19	Nb III	12	1586.24	Mg III	13	1600.58	Fe IV
100	1555.16	Ag II	20	1570.20	Cd IV	50	1586.82	Nb III	120	1600.73	B I
15	1555.53	Ca III	1000	1570.36	Sn III	10 d	1586.99	Na IV	100	1600.87	Zn III
500	1555.703	Cu II	12	1570.42	Fe IV	12 d	1587.05	Na IV	10 h	1601.21	Fe III
8	1555.72	Sc IV	500	1570.99	As II	200	1587.16	Au I	12	1601.50	In IV
5	1556.48	Cd III	12	1571.24	Fe IV	130	1587.41	Ag III	25	1601.58	Bi II
1000	1557.25	Al IV	13	1571.27	Ca III	150	1587.5	Se I	40	1601.59	Cd III
69	1557.28	Ni IV	200	1571.58	Cd II	400	1589.28	Al IV	13	1601.67	Fe IV
110	1557.59	F III	80	1571.94	Au III	120	1589.28	Ag III	80	1601.92	V IV
500	1558.144	Cl II	25	1572.03	Hf IV	200	1589.56	Au III	12	1602.08	Fe IV
300	1558.345	Cu II	1	1572.62	Ce IV		1589.57	Zn I	400	1602.388	Cu II
8	1558.67	Tl III	16	1572.71	Mg III	80	1589.68	Au III	100	1602.486	Ge II
500	1558.88	As II	200	1572.73	Ba II	350	1589.87	Al V	180	1603.06	Sc III
500	1559.03	Al IV	200	1572.80	Pr IV	285	1590.01	O III	13	1603.18	Fe IV
500	1559.49	Pr IV	90	1572.99	Zn II	400	1590.165	Cu II	30	1603.19	Cr III
15	1560.18	Hf IV	40	1573.70	Bi II	100	1590.21	Nb III	150	1603.19	Cr V
67	1560.18	Ni IV	50	1573.87	Si I	20	1590.54	Co II	70	1603.60	Mn IV
120	1560.3	Se I		1573.92	Ba II	12	1590.62	Fe IV	13	1603.73	Fe IV
150	1560.310	C I	12	1574.55	Ba III	160	1591.33	O III	1000	1604.12	Rb II
15	1560.66	Cd III	5000	1574.55	Pr IV	13	1591.51	Fe IV	300	1604.54	Ni III
10	1560.66	Yb III	50	1574.82	Si I	170	1591.72	Cr V	80	1604.72	Nb III
400	1560.683	C I	30000	1574.84	Br I	60	1591.79	Bi II	200	1604.848	Cu II
400	1560.708	C I	200	1574.85	Au III	13	1592.05	Fe IV	20	1604.87	Cd III
200	1560.79	Zn III	10	1574.92	Sc IV	8	1592.23	Sc IV	13	1604.88	Fe IV
100	1561.341	C I	5000	1575.10	Pr IV	50	1592.41	Si I	1	1605.08	In IV
80	1561.42	Yb III	150	1575.3	Se I	30	1592.55	Lu IV	150	1605.26	Zr IV
400	1561.438	C I	2500	1575.92	La IV	20	1592.74	Sr IV	300	1605.281	Cu II
15 r	1561.58	Tl II	8	1576.11	Sb II	150	1593.2	Se I	13	1605.68	Fe IV
10	1562.04	Au II	20000	1576.39	Br I	7 r	1593.26	Tl II	700	1605.766	Al III
20	1562.06	Lu IV	500	1576.855	Ge II	12	1593.41	Au II	15	1605.97	Fe IV
80	1562.33	Au III	12	1577.20	Fe IV	150	1593.41	Au III	200 h	1606.10	Pd III
80	1562.41	Au III	150	1577.6	Se I	600	1593.556	Cu II	60 h	1606.40	Bi III
10	1562.45	Si II	2	1577.60	Ce IV	5000	1593.58	I I	250	1606.5	Se I
12	1562.46	Fe IV	12	1577.76	Fe IV	40	1593.59	Zr III	7	1606.59	In IV
18	1562.47	Ca III	150	1577.9	Se I	100 r	1593.60	As I	20	1606.64	Cd III
150	1562.55	Zn III	300	1577.90	Al V	500 r	1593.75	Cu III	400	1606.65	Al IV
15	1562.85	Si II	3000	1578.38	Pr IV	150	1594.55	Si I	400	1606.834	Cu II
11	1562.87	Na III	200	1579.44	Au III	84	1594.91	Ta IV	10	1606.98	Sb II
25	1563.24	Zr III	300	1579.492	Cu II	15	1594.92	Lu IV	13	1606.98	Fe IV
20	1563.67	Bi II	150	1579.5	Se I	50	1594.93	Si I	300	1607.11	Mg IV
100	1563.73	F III	220	1579.70	Cr V	80	1595.04	Cr IV	10	1607.28	Cd III
10	1563.77	Si II	200	1580.0	Se I	70	1595.12	Cu IV	85	1607.70	Ta IV
12	1563.79	Fe II	10	1580.50	Na IV	5000	1595.39	Tb IV	100 c	1607.72	Lu IV
9	1563.81	Sc IV	12	1580.62	Fe II	90 d	1595.59	Cr IV	5000	1607.95	Zr IV
700	1564.16	Al IV	300	1580.626	Cu II	20	1595.77	Co II	8	1607.99	Te II
500	1565.050	Cl II	75	1581.070	Ge II	125	1596.059	Al II	80 p	1608.14	Cu IV
10	1565.29	Na III	7	1581.36	Sb II	10	1596.29	Zr IV	10	1608.41	Te II
6	1565.51	Sb II	200	1581.53	Zn III	12	1596.67	Fe IV	18	1608.46	Fe II
100	1565.54	F III	400	1581.995	Cu II	12	1596.80	Ba III	250	1608.639	Cu II
12	1565.61	Ba III	900	1582.04	Al IV	300	1596.89	Pd III	15	1608.91	Cd III
100	1565.85	Th IV	100	1582.06	Zn III	300	1596.95	Mn III	17	1609.10	Fe IV
400	1565.924	Cu II	11	1582.18	Na IV	30	1597.95	Si I	500 h	1609.17	Mn III
82	1565.97	Ta IV	25000	1582.31	Br I	80	1598.00	Sc III	90	1609.50	Zr IV
5	1566.03	Cd III	10	1582.33	Na IV	13	1598.01	Fe IV	10	1609.61	Cd III
12	1566.12	Ba III	10	1582.39	Cd III	10	1598.18	Na III	40	1609.70	Bi II
13	1566.26	Fe IV	9	1583.41	Sc IV	70	1598.24	Au I	14	1609.83	Fe IV
400	1566.415	Cu II	80	1583.47	Cu IV	400	1598.402	Cu II	1	1610.1	Pb III
50	1566.92	Nb III	1500	1583.61	La IV	100	1598.52	Zn III	150	1610.19	Sc III

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
150	1610.296	Cu II	100	1622.87	Si I	75000	1633.40	Br I	2	1648.00	In I
13	1610.47	Fe IV	100 w	1623.3	Sb I	500	1633.80	Mn III	3	1648.14	Ge IV
450	1610.50	P V	13	1623.38	Fe IV	50	1633.98	Si I	200	1649.194	Ge II
100	1610.7	Se I	100	1623.40	F III	13	1634.01	Fe IV	300	1649.38	Tb IV
12	1610.95	Ba III	13	1623.53	Fe IV	100	1634.46	Ag III	250	1649.458	Cu II
70	1611.10	Mn IV	160	1623.58	B II		1634.52	Mg I	60	1649.86	Ca II
12	1611.11	Au II	110	1623.77	B II	1	1634.61	Si IV	150	1649.94	Hg II
13	1611.20	Fe IV	300	1623.91	Mn III	300	1634.77	Pr IV	1000	1650.14	V III
100	1611.3	Se I	120	1623.95	Hg II	30	1635.14	Y III	20	1650.16	Cu IV
40	1611.38	Bi II	20	1624.0	S IV	18	1635.40	Fe II	1	1650.2	Tl I
100	1611.814	Al III	220	1624.02	B II	40	1635.68	Nb IV	100	1650.76	F III
800	1611.874	Al III	2 r	1624.130	Ge I	8	1635.75	Pb V	1	1651.16	Mg I
80	1611.88	V IV	70	1624.16	B II	3 r	1636.31	Ge I	50 h	1651.20	Sb I
100	1612.38	Zr III	160	1624.34	B II	15	1636.32	Fe II	60	1651.52	Ag I
15	1612.51	Cd III	100	1624.34	Au I		1636.48	Mg I	2	1651.528	Ge I
200 w	1612.8	Sb I		1625.22	Mg I	100	1636.605	Cu II	15	1651.58	Fe IV
300	1613.00	Pr IV	15	1625.27	Cd III	500	1636.82	Al IV	100	1651.74	Zn III
10	1613.15	Te II	100	1625.42	In III	750	1637.42	La IV	8	1651.80	In IV
13	1613.64	Fe IV		1625.50	Mg I	12	1638.07	Fe IV	20	1651.87	Cd III
400	1613.65	Pr IV	150	1625.627	Al II	12	1638.30	Fe IV	4 r	1651.955	Ge I
100	1613.79	Ag III	30	1625.71	Si I	50	1638.33	Zr III	32	1651.99	Ca II
10	1613.95	Na IV		1625.81	Mg I	60	1638.50	Cr V	50	1652.10	Ag I
15	1614.02	Fe IV		1626.16	Mg I	6	1638.82	Kr III	100	1652.24	Ag III
1000	1614.14	Mn III	120	1626.2	Se I	250	1638.88	Au III	250	1652.74	Au III
13	1614.64	Fe IV		1626.36	Mg I		1638.90	Mg I	20	1652.81	Bi II
13	1615.00	Fe IV	15	1626.47	Fe IV	6	1638.91	Te II	300	1652.87	Ni III
3 r	1615.57	Ge I		1626.56	Mg I	2	1638.96	Ge I	15	1652.90	Fe IV
12	1615.61	Fe IV		1626.79	Mg I	800	1639.06	Al IV	3	1653.08	Li II
12	1615.78	Ba III	14	1626.90	Fe IV	200	1639.33	Zn III	200	1653.12	Ni III
11	1615.92	Na IV		1627.02	Mg I	50	1639.40	Cr V	5	1653.13	Li II
5 h	1616.	Tl I		1627.27	Mg I	15	1639.40	Fe II	1	1653.21	Li II
200 l	1616.33	N V		1627.53	Mg I	14	1639.40	Fe IV	30 h	1653.35	Si I
	1616.65	Au II	600	1627.54	Al IV	80	1639.51	Nb III	13	1653.41	Fe IV
16	1616.68	Fe IV		1627.82	Mg I	4 r	1639.730	Ge I	400	1653.57	Mn II
250	1617.16	Au III		1628.12	Mg I	90	1639.75	Cu IV	130	1653.60	Ag II
200	1617.4	Se I	20	1628.25	Hg II	79	1639.82	Ta IV	50	1653.64	Hg II
5000	1617.60	I I		1628.46	Mg I	50	1639.90	Au I	100 h	1653.77	Ru II
14	1617.68	Fe IV	10	1628.48	In IV	16	1640.04	Fe IV	75	1653.83	Mn IV
60	1617.68	Zn II	25	1628.54	Cd III	14	1640.16	Fe IV	300	1654.43	Ag II
100	1617.78	Au III	13	1628.54	Fe IV	120	1640.34	He II	500	1654.46	Zr V
400	1617.81	Al IV		1628.80	Mg I	75	1640.43	Y III	400	1654.75	Tb IV
200	1617.915	Cu II	400	1629.12	Mn III	180	1640.47	He II	30 r	1655.32	Cu I
1000	1618.03	Pr IV	300 d	1629.13	Au III	2500	1640.78	I I	5	1655.4	Te I
12	1618.47	Fe II	15	1629.15	Fe II	15	1641.58	Ce IV	11	1655.47	Na IV
12	1618.57	Na IV	200	1629.19	Zn III	12	1641.76	Fe II	10	1655.62	In IV
150	1618.632	P III	20	1629.2	S IV	15	1641.87	Fe IV	25	1655.63	Cd II
200	1618.907	P III		1629.21	Mg I		1641.97	Mg I	13	1656.11	Fe IV
14	1619.02	Fe IV	300	1629.43	Si I	1000 r	1642.21	Cu III	250	1656.13	Ni III
130	1619.14	Ag III		1629.59	Mg I	20	1642.28	In III	700	1656.18	Ag II
15	1619.46	Hg II	200	1629.92	Si I	4	1642.80	Ca II	150	1656.266	C I
100	1619.61	Zn III	2 r	1630.173	Ge I	12	1642.88	Fe IV	200	1656.322	Cu II
350 l	1619.69	N V	13	1630.18	Fe IV	1000	1643.03	V III	70	1656.39	Mn I
2000	1620.60	Mn III	250	1630.268	Cu II	150	1643.4	Se I	15	1656.65	Fe IV
50	1620.62	Zr III		1630.40	Ba II	315 w	1643.68	O V	120	1656.928	C I
12	1620.91	Fe IV		1630.52	Mg I	20	1643.77	Ca II	10	1656.99	Au II
13	1621.16	Fe IV	150	1630.84	Pd III	100	1644.17	Au III	300	1657.008	C I
150	1621.2	Se I	17	1631.08	Fe IV	100	1644.235	Al II	20	1657.04	Sb II
600	1621.426	Cu II	15	1631.12	Fe II	36	1644.44	Ca II	150	1657.10	Ag II
14	1621.57	Fe IV	75	1631.13	Si I	100	1644.50	Ag II	120	1657.380	C I
30	1621.66	Pt II	75	1631.31	Zr III	100	1644.809	Al II	12	1657.82	Fe IV
15	1621.68	Fe II		1631.62	Mg I	150	1644.82	Zn III	120	1657.907	C I
500	1621.93	Au III	50 c	1631.65	Lu IV	200	1644.96	Rb II	60	1657.92	Na II
2000	1622.30	Pr IV	84	1631.65	Ta IV	750 d	1645.21	La IV	100	1658.08	Cr IV
400	1622.428	Cu II	12	1632.08	Fe IV	1	1645.93	Mg I	150	1658.122	C I
150	1622.51	Zn III	14	1632.40	Fe IV	150	1646.67	Au I	60	1658.25	Zn II
100	1622.7	Se I	2	1632.53	Au II	15	1647.09	Fe IV	2	1658.31	Mg I
2	1622.83	Au II		1632.93	Mg I	12	1647.16	Fe II	12	1658.43	Fe I'
200	1622.86	Cl IV	500	1633.03	Zr V	250	1647.46	Mn III	70	1659.25	Mn I
15	1622.87	Cd IV	2000	1633.19	Tb IV	2	1647.531	Ge I	200	1660.001	Cu I

Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength
8	1660.05	12	1673.86	30	1690.28	30	1702.86
14	1660.10	15	1673.89	250	1690.7	40	1703.36
500	1660.55	125	1673.93	30 h	1690.79	1000	1703.51
8	1660.71	50	1674.29	100	1690.88	30 r	1703.84
3	1661.345	100	1674.51	30	1691.08	100	1704.33
100	1661.49	230	1674.61	100 r	1691.090	70	1704.37
100	1661.54	35	1675.06	20 h	1691.5	50	1704.43
12	1661.57	9	1675.15	75	1691.68	50	1704.79
200	1661.79	200	1675.20	8	1691.78	12	1704.93
13	1662.32	250	1675.3	400	1691.95	1500	1705.03
13	1662.52	7	1675.48	1000	1692.51	20	1705.05
100 w	1662.6	14	1675.66	60	1692.89	200	1705.06
300	1663.002	35	1675.75	75	1693.15	20	1705.16
100	1663.04	400	1676.08	50	1693.29	100	1705.44
4 r	1663.539	150	1676.14	20	1693.34	1600	1706.01
13	1663.54	1 h	1676.16	500	1693.51	8	1706.05
30	1664.52	84	1676.45	60 c	1693.67	50	1706.40
75	1664.76	12	1676.78	1000	1693.94	60	1706.41
250	1664.77	25	1677.03	100	1694.06	80	1706.65
1000	1664.84	12	1677.12	400	1694.37	15	1707.06
10 h	1665.275	140	1677.40	7	1694.38	15	1707.11
100	1665.76	12	1678.07	1000	1694.78	100	1707.14
10	1665.92	30	1678.15	10	1695.23	40	1707.16
50	1666.37	300	1679.14	80	1695.40	1000	1707.35
680	1666.688	300	1679.19	50	1695.51	200	1707.35
150	1666.87	30	1679.25	5	1695.85	150	1707.37
80 b	1667.00	300	1679.71	1000	1696.01	100	1707.40
200	1667.29	50	1679.73	200	1696.20	80	1707.43
1	1667.38	20	1680.05	60	1696.64	75	1707.43
400	1667.58	2	1680.13	150	1697.09	200	1707.43
100	1667.62	100	1680.20	13	1697.16	200	1707.52
4	1667.802	100	1681.07	13	1697.28	100	1707.53
300	1668.03	13	1681.36	200	1697.94	40	1707.78
13	1668.09	9	1681.40	800	1697.99	500	1707.95
100	1668.11	120	1681.66	16	1698.18	160	1707.996
5	1668.43	12	1681.68	80	1698.30	5	1708.0
100	1668.52	12	1681.95	300	1698.36	10	1708.11
100	1668.60	400	1681.98	2	1698.65	150	1708.86
84	1668.76	10	1682.15	75	1698.70	50	1709.02
30	1669.60	70	1682.22	400	1698.81	7000	1709.10
12	1669.61	30	1682.68	50	1698.85	50	1709.27
7	1669.67	100	1682.77	15	1698.88	13	1709.81
3	1669.83	120	1682.82	200	1698.98	800	1709.90
70	1670.08	500	1683.02	70	1699.06	250	1710.16
130	1670.39	10	1683.41	10	1699.29	3	1710.23
3 r	1670.608	50	1683.95	200	1699.34	10 h	1710.83
5	1670.64	30	1684.01	10	1699.70	10	1711.12
300	1670.66	750	1684.17	200	1699.84	4	1711.23
12	1670.74	60	1684.40	6	1700.0	20 h	1711.30
130	1670.75	5	1684.46	200	1700.00	15	1711.41
50	1670.78	20	1684.50	12	1700.40	12	1711.53
1000	1670.787	100	1685.37	50	1700.42	5 h	1711.54
14	1671.04	5	1685.40	30	1700.63	15	1711.84
70	1671.07	120	1685.99	30	1700.69	85	1712.16
250	1671.2	90	1686.07	60	1701.48	14	1712.76
10	1671.53	100	1686.250	6	1701.58	50	1713.25
180	1671.68	30	1686.82	30	1701.60	50 r	1713.36
200	1672.41	13	1687.09	15 c	1701.97	200	1713.53
90	1672.48	8	1687.16	4	1702.02	650	1715.30
200	1672.55	640	1687.530	12	1702.04	200	1715.69
100	1672.59	15	1687.69	15000	1702.07	60	1715.76
120	1672.66	400	1687.90	400	1702.10	100 h	1715.97
100	1672.776	30	1688.09	40	1702.13	85	1716.13
12	1672.86	180	1688.36	200	1702.25	100	1716.71
200	1673.05	200	1688.49	10	1702.41	50	1716.72
7	1673.32	5	1688.5	50	1702.47	200 r	1716.784
7	1673.42	100	1688.59	20	1702.53	600	1716.85
25	1673.59	11	1688.94	100	1702.73	80 r	1716.93
13	1673.68	50 h	1689.29	500	1702.79	100	1716.99
							Si I
							Zr III
							Br IV
							Cu I
							Pd III
							Cu IV
							Si I
							Tb IV
							Fe IV
							Gd IV
							Tb IV
							Ag III
							Sr IV
							Nb III
							Gd IV
							Co II
							Pd III
							P I
							Zn III
							Mg I
							In IV
							Nb III
							Cd III
							Co III
							Ni III
							Th IV
							Hg II
							Cr III
							Mn IV
							Ni III
							Rb II
							Au III
							Cr III
							Co III
							O V
							Te I
							Ag I
							Ag III
							Lu V
							Ta V
							Ag I
							Fe IV
							Ni III
							Lu V
							Si II
							Na III
							Pb III
							Si II
							Fe IV
							Ba III
							In I
							Sb III
							Ta IV
							Fe IV
							Zn II
							Cu I
							Pr IV
							Ni III
							Au III
							Zn II
							Ru III
							Ta IV
							Au III
							V V
							Ge I
							Rb II
							Sb I
							F III

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
12	1717.11	Fe IV	1	1728.	Tl I	50	1746.065	Ge I	35	1759.12	Zr III
100	1717.21	Hf IV	250	1728.14	Ag III	500	1746.10	Au III	5	1759.4	Te I
11	1717.40	Ti V	11	1728.27	Na III	8	1746.23	Sc IV	200	1759.49	Ru III
150 r	1717.45	Sb I	40	1728.90	Lu V	70	1746.88	Cr IV	200	1759.61	Lu IV
130	1717.68	Ag III	550	1729.08	Hf V	550	1747.01	Ni III	15	1759.75	Hg III
150	1717.721	Cu II	25	1729.53	Sr IV	75	1747.12	Zn II	8	1759.76	Ti V
300	1717.83	Au III	250	1729.945	N III	80	1747.13	Cr IV	75	1759.82	Mn IV
14	1717.90	Fe IV	10	1731.11	Na III	200	1747.34	Ag III	1000	1760.07	V III
14	1718.16	Fe IV	750	1731.83	Hf V	60	1747.39	F II	350	1760.104	Al II
12	1718.42	Fe IV	100	1732.04	Cr IV	50	1747.40	Si I	220	1760.12	O III
1000	1718.55	N IV	20	1732.12	Sr IV	12	1747.56	Mg III	5000	1760.35	Co III
20	1718.57	Hf IV	250	1732.14	Hg II	12	1747.65	In IV	110	1760.42	O III
65	1718.67	Mn IV	30	1732.70	Mn II	40	1747.67	Cd III	5000	1760.50	Rb II
270	1719.32	Hf V	500	1732.86	Pr IV	20	1747.80	Mg I	50	1760.57	Mo II
20	1719.43	Ce III	250	1733.13	Ni III	570	1747.848	N III	100	1760.57	Ag III
800	1719.440	Al II	100 d	1733.17	Au III	10	1748.10	In IV	500	1760.89	Hf V
14	1719.46	Fe IV	50	1733.55	Mn II	15	1748.15	Cd III	13	1761.08	Fe IV
500	1719.46	Ni III	750	1733.96	Hf V	500	1748.28	Ni II	12	1761.38	Fe II
50	1719.82	Yb III	40	1733.98	Cr IV	100	1748.83	In III		1761.75	Ba II
200	1719.86	Pd III	80	1734.16	Cr IV	18	1748.93	Mg III	500	1761.95	Au II
10	1720.04	Au II	40	1734.49	Mn II	1000	1749.11	Hf V	300	1761.975	Al II
75 b	1720.52	Mn IV	40	1734.84	Mg II	20	1749.29	Bi II	70	1762.17	Mn IV
75	1720.74	Mn IV	80 d	1735.61	Zn II	80	1749.63	Zn III	80 c	1762.19	Zn II
500	1721.244	Al II	100 c	1735.79	Lu IV	120	1749.64	Ag III	10	1762.26	Ca III
200	1721.26	Ni III	100 r	1736.19	Sb I	10	1749.80	Au II	12	1762.30	Sb III
900	1721.271	Al II	2000	1736.24	Gd IV	200	1750.043	Ge I	150	1762.62	Ag II
75	1721.41	Mn IV	8	1736.43	Sb II	1000	1750.19	Hf V	70	1762.80	Yb II
400 c	1721.42	Lu IV	125	1736.44	Ag II	40	1750.65	Mg II	45	1762.81	Cr II
7	1721.89	In IV	100	1736.551	Cu II	150	1750.89	Ag III	300	1762.86	Pr IV
10	1721.93	Cd III	100	1736.78	Lu IV	6	1751.0	Te I	75	1762.94	Mn I
400	1721.98	V III	60	1736.89	Zn II	750	1751.03	Ag III	290	1763.00	Al I
10	1722.04	Mg III	10 r	1737.21	Sn I	350	1751.218	N III	79	1763.03	Ta IV
200	1722.27	Ag III	50	1737.62	Mg II	50	1751.22	Mo III	220	1763.22	O III
400	1722.28	Ni III	50	1737.90	Zn II	15 r	1751.46	Sn I	50	1763.66	Si I
500	1722.37	Cu III	30	1737.93	Mn II	85	1751.59	Mn IV	60	1763.72	Nb II
6	1722.53	Si IV	500	1738.25	Ni III	650	1751.657	N III	500	1763.869	Al II
14	1722.71	Fe IV	300	1738.48	Au III	500 d	1751.68	V III	700	1763.952	Al II
65	1722.94	Mn IV	22	1738.84	Mg III	30	1751.70	Pt II	100 h	1764.185	Ge I
40	1722.95	Cd III	25	1739.00	Cd III	500	1751.823	C I	220	1764.48	O III
10	1723.01	Co II	100 h	1739.102	Ge I	300	1752.43	Ni III	800	1764.69	Ni II
30	1723.13	Pt II	60	1739.18	Yb III	40 c	1752.60	Lu IV	30	1764.75	Zr II
150 r	1723.43	Sb I	50	1739.19	Cr IV	400	1753.01	Ni III	12	1764.92	Fe I
500	1723.97	Co III	50	1739.30	Nb III	30 h	1753.11	Si I	20 r	1764.98	Sn I
14	1724.06	Fe IV	300	1739.78	Ni III	150	1753.281	Cu II	40	1765.03	Si I
20	1724.23	Sr IV	2	1740.00	Pb I	10 h	1753.3	Sn I	400	1765.03	Yb I
12	1724.26	Fe IV	20	1740.16	Mn II	50	1753.46	Mg II	80 h	1765.21	Yb I
50	1724.41	Cd II	45	1740.52	Au II	50	1753.84	Zn III	100 h	1765.284	Ge I
300	1724.63	V III	15 h	1740.55	Co II	82	1753.90	Ta IV	30 h	1765.60	Si I
75	1724.83	Mn IV	2 h	1741.23	In I	8	1754.21	Co II	370	1765.62	Hf V
500	1724.952	Al II	600	1741.37	Cu III	40	1754.38	Zr III	450	1765.64	Al I
900	1724.984	Al II	1000	1741.55	Ni II	2 h	1754.69	Be III	100 h	1765.76	Sb I
15	1724.99	V V	50 r	1741.57	Cu I		1755.33	Li II	300	1765.815	Al I
3	1725.0	K II	500	1741.62	Pd III	10	1755.48	Na III	30	1766.06	Si I
700	1725.02	Zr V	440	1741.74	Hf V	110	1755.64	Cr IV	10 h	1766.14	Ag I
40	1725.03	Zr III	100	1741.74	Lu IV	500	1755.98	Co III	85 d	1766.27	Mn
100	1725.14	Lu IV	300	1741.96	Ni III	35	1756.15	Au II	450	1766.38	Al I
80	1725.26	Cr IV	20	1742.00	Mn II	50	1756.91	Hf III	50 h	1766.433	Ge I
15	1725.33	Sb III	85 b	1742.10	Mn IV	500	1756.92	Au III	2	1766.64	Pb I
16	1725.63	Fe IV	100	1742.195	Ge I	500	1757.73	V III	1000	1766.88	Pr I
30	1725.66	Cd III	775	1742.729	N I	50	1757.79	Sb I	30	1766.92	Cr I
50 r	1725.66	Cu I	15	1743.39	Co II	7	1758.00	Sn II	75	1767.09	Mn
25	1725.75	Au II	50 c	1743.84	Lu IV	400	1758.19	Pd III	12	1767.36	Fe I
20	1726.47	Mn II	30 h	1743.88	Si I	100	1758.279	Ge I	300	1767.42	Au
20	1726.75	Pb II	150	1744.39	Au III	100	1758.33	Nb V	2000 p	1767.65	La I
150	1726.76	Ag III	40	1744.75	F II	1 h	1758.49	In I	100	1767.69	Zn
90	1727.07	Cr IV	700	1745.252	N I	120	1758.51	Cr IV	400	1767.731	Al I
120	1727.18	Hg II	50	1745.55	F II	100	1758.60	As I	750	1767.78	O I
500	1727.31	Au III	400	1745.67	Co III	50	1758.63	Nb III	2	1767.88	In I
5	1727.38	Si IV	5	1745.69	Cd III	82	1759.04	Ta IV	500	1767.94	Ni I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
550	1768.24	O III	100	1779.51	Zr III	500	1791.28	Co III	2	1802.87	Pb V
100	1768.43	Rh III	500	1779.72	V III	200	1791.64	Ni III	110	1803.03	F III
150	1768.70	Ag III	70	1779.74	Yb III	160	1791.65	F III	200	1803.47	Rb II
10	1768.77	In IV	200	1779.80	Y III	100	1791.70	Ag III	30	1803.89	Hg II
30	1768.82	Cd III	2000	1780.05	Co III	70	1791.93	Bi II	400	1804.06	Mn III
200	1768.86	Cu III	100	1780.57	Au III	13	1792.10	Fe IV	500	1804.13	V III
450	1769.14	Al I	100 r	1780.87	Sb I	135	1792.39	Hf V	150	1804.486	N III
30	1769.17	Cr III	160	1781.03	O III	150	1792.65	Au III	80 r	1804.60	Sn I
100	1769.64	Cr IV	70	1781.31	Yb III	100	1792.69	Ag III	100	1804.70	F III
2000	1769.64	Ni III	30	1781.86	Pt II	10 r	1792.76	Tl II	400	1804.91	Pd III
500	1769.96	Co III	75	1782.21	Mn IV	25	1792.99	V V	400	1805.24	Au III
120	1770.09	F III	200	1782.45	Lu IV	100 h	1793.071	Ge I	100	1805.26	Zr III
30	1770.63	Si I	4000	1782.55	Pd III	250	1793.3	Se I	12	1805.32	Fe IV
150	1770.67	F III	12000	1782.76	I I	35	1793.31	Au II	500	1805.54	Co III
100 h	1770.92	Si I	200	1782.87	P I	12	1793.38	In IV	200	1805.669	N III
	1771.03	Ba II	3000	1782.97	Co III	75	1793.40	Cd III	170	1805.90	F III
1000	1771.14	Pr IV	60	1783.04	Na II	150	1793.56	Zr III	500	1806.09	Zr V
7	1771.45	Ti V	60	1783.22	Au II	20	1793.70	Yb III	170	1806.15	As I
360	1771.67	O III	50 h	1783.23	Si I	500	1793.76	Au III	80	1806.18	V IV
100	1771.81	Ag III	20	1783.25	Mg III	500	1793.82	V III	300	1806.47	Mn III
30	1771.96	Zr III	40	1783.35	Zr III	60 c	1793.85	Lu V	15	1807.07	Na III
300	1772.08	Lu IV	40	1783.70	Hg II	150	1793.90	Ag III	90	1807.09	Na II
65	1772.11	Mn IV	100	1783.85	Ag III	10	1794.22	Ca III	300	1807.24	Ni III
600	1772.57	Lu IV	10	1783.93	Ca III	14	1794.58	Mg III	710	1807.311	S I
110	1772.93	F III	500	1784.06	Co III	1000	1794.60	V III	20	1807.34	Ca II
15	1772.98	Mg III	150	1784.24	Rh III	2	1794.67	Pb I	50	1807.60	Mo III
110	1773.00	O III	400	1784.44	V III	200	1794.90	Ni III	13	1807.89	Ca III
12	1773.01	In IV	40 c	1784.71	Lu V	300	1795.3	Se I	150	1808.00	Si II
40	1773.06	Cd III	160	1784.85	O III	80	1795.65	Mn IV	20 d	1808.01	Co II
500	1773.22	Co III	200	1784.94	Rh III	6	1795.7	Te I	300	1808.23	Ag III
140	1773.36	F III	200	1785.046	Ge I	80	1795.79	Mn IV	40	1808.29	Hg II
20	1773.40	Sn I	20	1785.26	Fe II	15	1796.10	Cd III	60	1808.38	Na II
300	1773.43	V III	100	1785.84	Cd II	30	1796.22	Hg II	4000	1808.66	La IV
75	1773.51	Mn IV	75	1786.02	Mn IV	6	1796.3	Te I	50	1808.70	Nb III
5000	1773.57	Co III	600	1786.05	Y III	150	1796.50	Rh III	50 h	1809.09	Si I
110	1773.85	O III	300	1786.11	Au III	10	1796.670	Pb II	250	1809.63	Yb IV
40	1773.90	Zr III	500	1786.20	Zr V	300	1796.77	V III	500	1809.68	Rb II
270	1774.02	Hf V	100 c	1786.25	Lu V	20	1796.89	Ce III	60	1809.73	Lu V
75	1774.04	Zn II	20	1786.74	Fe II	200	1796.90	Hg II	100	1809.81	Au III
200	1774.176	Ge I		1786.93	Ba II	13	1796.93	Fe IV	60	1809.85	V IV
500	1774.42	Co III	75	1787.04	Mn IV	100	1797.52	Lu IV	50 r	1810.50	Sb I
100	1774.42	Au III	1000	1787.08	Co III	100	1797.64	Zn II	1	1810.71	In III
200 r	1774.82	Cu I	80	1787.19	Na II	30	1797.99	Cu IV	10	1810.77	Na III
250	1774.99	P I	75	1787.38	Mn IV	500	1798.06	Co III	65	1810.88	Yb III
5	1775.0	Te I	60	1787.47	Bi II	125	1798.13	Zr III	300	1811.02	Mn III
800	1775.17	Au III	60 c	1787.58	Lu V	500	1798.15	V III	100 d	1811.05	Zn II
65	1775.29	Yb III	180	1787.68	P I	8	1798.39	Pb IV	15	1811.34	Sn II
20	1775.30	Ce IV	18	1788.07	Fe II	80	1798.41	Na II	30	1811.42	V V
20	1775.68	Hg I	100 r	1788.24	Sb I	60	1798.74	Hg II	400	1811.47	Co III
50 c	1775.92	Lu V	1000	1788.26	V III	60	1798.85	Yb III	11	1811.67	Na III
400	1776.07	Ni III	200	1788.30	Ni III	5000	1799.09	I I	200	1811.69	Ni III
15	1776.12	Be II	75	1788.64	Mn IV	100 h	1799.12	Si I	500	1811.71	Sn III
200	1776.18	Yb IV	45	1788.85	Na II	5	1799.42	Ga II	14	1812.15	Ca III
20	1776.34	Be II	1000	1789.07	Co III	75	1800.03	Zr III	1000	1812.19	V III
200	1776.40	Au III	8	1789.15	In IV	150	1800.18	Sb I	130	1812.41	Cr IV
90	1776.57	Na II	30	1789.19	Cd III	12	1800.21	Ca III	5	1812.97	Pb I
100 h	1776.83	Si I	220	1789.66	O III	5	1800.57	Cd III	30	1813.04	Sn I
50 r	1777.09	Pt II	300	1789.71	Yb IV	35	1800.58	Au II	600	1813.47	Gd III
80	1777.11	Bi II	200	1790.19	Zr III	15	1800.66	Mg III	11	1813.59	Ca III
1000	1777.14	Co III	500	1790.26	Co III	45	1801.26	Na II	600	1813.84	Yb IV
20	1777.25	Sr IV	75	1790.37	Ag II	75 h	1801.432	Ge I	10	1813.98	Ga II
40 c	1777.68	Lu V	250	1790.40	Ni III	200	1801.67	Yb IV	500 h	1814.07	Si I
100	1777.82	Cr IV	75	1790.44	Mn IV	25	1801.67	Zr III	80 r	1814.20	Sb I
400	1778.02	V III	30 r	1790.75	Sn I	200	1801.98	Au III	60	1814.24	Lu V
200	1778.20	Yb IV	80	1790.76	Zn II	150	1802.24	Ag III	40	1814.50	Ca II
40	1778.24	Na II	200 p	1790.81	Zr V	150	1802.26	Ag III	4	1814.65	Ca II
20	1779.03	Ce IV	200	1790.93	Ni III	300	1802.55	V III	12 r	1814.85	Tl II
220	1779.16	O III	800	1791.06	Yb IV	140	1802.72	Cr IV	1500	1815.32	Gd IV
200	1779.34	Yb IV	40	1791.09	Cr IV	100	1802.77	Ag III	40 r	1815.74	Sn I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
200	1816.03	Rh III	400	1831.64	V III	70	1845.02	Na II	6	1853.8	Te I
400	1816.07	Yb IV	9	1831.89	Sn II	300	1845.07	V III	800	1854.15	Ni III
80	1816.48	Zn II	35	1831.89	Zr III	15	1845.30	Ga II	400	1854.39	Co III
10	1816.81	Na III	750	1831.92	Co III	300	1845.51	Si I	500	1854.42	V III
250	1816.83	Ag III	1000	1832.05	Rh III	100 h	1845.872	Ge I	1000	1854.57	Lu III
200	1816.92	Si II	400	1832.20	Co III	100	1846.10	Si I	1000	1854.716	Al III
10	1817.45	Si II	250	1832.33	Ag III	500	1846.16	Co III	100	1854.73	Mo III
70	1817.56	Cu IV	120	1832.50	Ag III	500	1846.37	Zr IV	400	1854.76	Co III
250	1817.58	Yb IV	5	1832.74	Hg I	150	1846.42	N III	90	1854.80	Yb III
100	1817.68	V IV	400	1832.837	Al I	100 h	1846.958	Ge I	2400	1855.05	Co I
150	1817.86	B I	100 d	1833.57	Zn II	100	1846.96	Ag III	300	1855.06	V III
35	1818.06	Zr IV	45	1833.87	Na II	3 h	1847.	Tl I	300	1855.2	Se I
200	1818.37	B I	100	1834.31	Ag III	100	1847.19	P I	9	1855.84	In IV
1000	1818.56	Al IV	20	1834.32	Bi III	650	1847.28	Ni III	40	1855.85	Cd III
300	1819.02	Yb IV	250	1834.808	Al II	30	1847.30	Yb III	10	1855.92	Mo III
60	1819.23	Cr IV	5000	1835.00	Co III	400	1847.47	Si I	300	1855.929	Al II
70	1819.23	Cu IV	80	1835.22	Na II	12 d	1847.53	Na III	150	1856.33	Ag III
300	1819.28	Ni III	10 d	1835.22	Na III	75	1847.56	Zn II	110	1856.62	O III
25	1819.31	Sn I	70	1836.01	Zn II	10 d	1847.59	Na III	15	1856.64	In IV
20	1819.50	Mo IV	250	1836.10	Ag III	20	1847.71	Ag I	500	1856.64	V III
400	1820.34	Hg II	500	1836.15	Zr IV	1800	1847.89	Co I	200	1856.67	Cd III
680	1820.343	S I	200	1836.51	Si I	200	1848.03	Zr IV	10	1856.71	Na III
12	1820.42	Fe IV	75	1836.65	Zn II	200	1848.14	Si I	80	1857.16	Yb III
400	1821.17	Au III	20	1836.66	Ce III	110	1848.26	O III	8	1857.2	Te I
400	1821.26	Co III	20	1836.99	Ce III	100	1848.74	Si I	500	1857.488	Cl I
30	1821.59	Mo IV	60	1837.04	Cu IV	50 r	1848.75	Sn I	20	1857.92	Mn II
400	1821.69	Co III	200	1837.44	Cr V	150	1848.83	Au III	700	1858.026	Al II
50	1821.70	Na II	10	1837.56	Co II	30	1849.24	Yb III	13	1858.19	Mg III
400	1821.77	Co III	1000	1837.63	Co III	10	1849.42	Yb III	300	1858.75	Ni III
10	1822.050	Pb II	45	1837.89	Na II	1000	1849.492	Hg I	250	1858.8	Se I
10	1822.4	Te I	40	1838.01	Ca II	1000	1849.50	Hg I	60	1858.89	Sb I
150	1822.45	Ag III	30 h	1838.01	Si I	15	1849.56	Na III	150	1858.91	P I
50	1822.45	Si I	30	1838.01	Yb III	80	1849.62	Cu IV	120	1858.91	Ag III
600	1822.50	Cl III	150	1838.64	Ag III	120	1849.93	Ag III	30	1859.12	Zr III
120 r	1823.00	Sn I	10	1838.94	Na III	40	1850.06	Zr III	1000	1859.21	Pd III
800	1823.06	Ni III	110	1839.30	F III	80	1850.15	Au III	150	1859.43	P I
1000	1823.08	Co III	12	1839.32	Sb III	45	1850.15	Na II	500	1859.85	Rh III
25	1823.24	Au II	80	1839.32	Zn III	40	1850.30	In III	120	1859.980	Al II
40	1823.41	Cd III	15	1839.37	Co II	12	1850.38	Na III	500 r	1860.086	Ge I
70	1823.80	Bi II	120	1839.97	F III	6	1850.6	Te I	200 r	1860.32	Sn I
200	1824.22	Yb IV	60	1840.06	Ca II	500	1850.67	Si I	340	1860.34	As II
100 r	1825.35	Cu I	100	1840.14	Cr IV	40	1850.69	Ca II	90 w	1860.37	N V
400	1825.36	Co III	110	1840.14	F III	30	1850.69	Mo IV	100	1860.39	Ag III
6	1825.5	Te I	400	1840.14	Ag III	300	1850.69	V III	6	1860.4	Te I
200	1825.84	V IV	12	1840.24	Fe IV	9	1851.10	In IV	12	1860.42	Fe IV
300	1825.91	B I	200	1840.91	Co III	40	1851.13	Cd III	10	1860.43	Ca III
750	1825.95	Co III	500	1841.08	Pr IV	70	1851.19	Na II	25	1860.47	Zr III
30	1826.21	Cr IV	100 h	1841.15	Si I	80	1851.22	P I	500	1860.48	Zr V
640	1826.245	S I	200 h	1841.328	Ge I	20	1851.37	Cd III	100	1860.64	Ag III
300	1826.41	B I	200	1841.44	Si I	1500	1851.59	Pd III	600	1860.86	Zr V
60	1826.41	Yb III	10	1841.49	Ti V	30 h	1851.79	Si I	10	1861.21	Na III
20	1826.77	Yb III	60	1841.82	Na II	1000	1851.81	La IV	20	1861.42	Sn I
30	1826.86	Cr IV	1500	1842.34	Co I	50	1851.89	Cr I	300	1861.56	V IV
30	1827.26	Cr III	30	1842.41	In III	70	1851.91	Zr IV	12	1861.74	Ba III
100	1827.70	Cd II	200 h	1842.410	Ge I	30	1852.00	Sn I	25	1861.77	Zr III
30	1827.93	Mg I	9	1842.55	Si III	400	1852.01	V III	1000	1861.78	Co III
13	1827.98	Fe IV	110	1842.81	B II	6	1852.1	Te I	500	1861.80	Au III
500	1828.40	Cl III	2	1843.00	Pb V	2000	1852.27	Pd III	1000	1862.311	Al II
600	1828.588	Al II	20	1843.09	Ca II	75	1852.36	Yb III	30	1862.32	Ce III
350	1828.83	Ag III	400	1843.49	Pd III	200	1852.46	Si I	250	1862.762	P IV
100	1829.50	Sb I	60	1843.64	Hf III	1800	1852.71	Co I	600	1862.790	Al III
400	1830.01	Ni III	200	1843.77	Si I	1500	1852.77	La IV	120	1862.893	P IV
12	1830.06	Ca III	300	1844.17	Mg IV	500	1852.92	Co III	15	1862.98	In III
200	1830.08	Ni III	11	1844.36	Na III	75	1852.94	Yb III	100	1863.11	Cr IV
2000	1830.09	Co III	100 h	1844.410	Ge I	200	1853.134	Ge I	50	1863.13	Nb III
75000	1830.38	I I	15000	1844.45	I I	50	1853.15	Si I	100	1863.32	Yb III
400	1831.15	V III	50	1844.66	Cd III	80	1853.17	Na II	200	1863.580	P IV
80	1831.38	Zn II	12	1844.67	In IV	30	1853.27	Mn II	2000	1863.83	Co III
2000	1831.44	Co III	400	1844.89	Au III	40	1853.38	Zr III	10	1863.9	Bi III

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
75	1864.06	Zr III	500	1878.33	Zr V	8	1892.72	Tl II	15	1910.57	Cd III
100	1864.12	Zn II	300	1878.68	V III	100	1892.92	Nb III	50 h	1910.62	Si II
400	1864.19	Co III	30	1879.09	Pt II	8	1893.19	Pb IV	40	1910.70	Nb IV
7	1864.45	Ti V	12	1879.49	Mg III	200 t	1893.25	Si I	70	1910.86	Yb III
300	1864.51	V III	750	1879.79	La IV	11	1893.98	Fe III	30	1911.41	Mn II
5	1864.85	Yb III	100	1879.83	Au I	10	1894.12	Ca III	40	1911.61	Sn I
100	1865.052	Ge I	70	1880.30	Yb III	75	1894.26	Zn II	50	1911.70	Pt II
500	1865.33	Rb II	250	1880.36	Ag III	1	1894.77	Hg III		1912.	Be I
30	1865.45	Zr III	400	1880.41	V III	300	1895.01	V III	10	1912.12	Bi III
20	1865.52	Sn I	800	1880.66	Rh III	100	1895.197	Ge I	30	1912.409	Ge I
83	1865.92	Ta IV	10	1880.66	Na III	500	1895.37	Co III	60	1912.62	Sc III
30	1865.96	Sn I	200 h	1880.95	Ru III	40	1895.44	Sc III	500	1912.94	As II
100	1866.08	Zn II	700	1881.16	Al IV	20	1895.46	Fe III	20	1913.52	Sn I
45	1866.45	Na II	25	1881.22	Pr III	5	1895.50	Yb III	350	1913.8	Se I
350	1867.12	Ag III	1000	1881.57	La IV	100	1896.18	Yb III	19	1914.06	Fe III
10	1867.23	Yb III	1000	1881.70	Co III	2	1897.02	Pb V	6	1914.09	Kr III
30	1867.24	Cu IV	200	1881.85	Si I	20	1897.29	Sn I	65	1914.25	Zr III
10	1867.63	Yb III	7	1881.89	Ti V	10	1897.57	Yb III	2	1914.33	Pb V
150	1868.10	Ag III	160	1881.91	Na II	500	1898.25	Yb III	9	1914.40	Ar III
50 r	1868.17	Sb I	10	1882.05	Fe III	400	1898.6	Se I	4000	1914.62	Pd III
10	1868.19	Yb III	150 r	1882.56	Sb I	200 h	1899.04	Ru III	20 d	1914.68	Mn II
4	1868.76	Pb I	30	1882.64	Sn I	70	1899.39	Sb I	550	1914.698	S I
5	1868.92	Yb III	40	1883.05	Pt II	100 h	1899.42	Ru III	35	1914.75	Ce IV
160	1869.23	Hg II	35	1883.16	Cr IV	400	1899.81	V III	60	1914.81	Zn II
20	1869.32	Si II	5	1883.2	Tl IV	12	1899.91	Sn II	15	1915.08	Fe III
12	1869.64	Fe IV	6	1883.26	Ge III	15	1900.16	Na III	100	1915.10	Mn II
10	1869.83	Fe III	100 h	1883.56	Ru III	20	1900.28	Hg II	7	1915.56	Ar III
10	1870.07	Yb III	12	1883.92	Ba III	710	1900.286	S I	500	1916.08	Ne II
15	1870.23	Si II	80	1884.22	Yb III	80	1900.76	F III	400	1916.92	Ag III
14	1870.26	Ca III	10000	1884.87	Pr IV	800	1901.32	Rh III	3	1917.03	Be III
300	1870.55	Hg II	500	1884.91	Rh III	1000 h	1901.33	Si I	600	1917.08	Ag III
60	1870.58	Hf III	350	1885.06	N III	60	1901.52	Zn II	300 r	1917.592	Ge I
15	1870.83	Yb III	70	1885.07	Yb III	500	1901.61	Cl III	10	1917.62	Co II
300 r	1871.15	Sb I	50	1885.09	Na II	20 c	1901.63	Lu IV	150	1918.28	Au III
10	1871.15	Yb III	150	1885.15	Hf III	84	1901.63	Ta IV	10	1918.45	Na III
500	1871.87	Co III	300	1885.21	Mn III	500	1902.23	V III	20	1918.64	Mn II
150	1871.92	Au III	400	1885.22	N III	100	1902.41	Bi II	30	1918.71	Cu IV
200	1872.03	Yb III	45	1885.74	Na II	100 h	1902.46	Si II	100 d	1918.96	Zn II
100	1872.13	Zn II	2000	1885.83	Pd III	50	1902.95	Mn II		1919.	Be I
14	1872.37	Ca III	80	1886.05	Sn I	5000	1902.97	La IV	500	1919.12	Co III
100	1872.55	Ag III	15	1886.49	Cd III	15	1903.48	Cd III	300	1919.2	Se I
285	1872.78	O III	12	1886.76	Fe III	5	1903.52	In IV	600	1919.37	Rh III
285	1872.87	O III	70	1887.22	Yb III	100	1904.15	Ba II	150	1919.55	N III
100	1873.10	Si I	500	1887.36	Rh III	50 h	1904.66	Si I	20	1919.64	Au I
15	1873.29	Sn I	10 d	1887.39	Na III	500 r	1904.702	Ge I	30	1919.64	Mn II
45	1873.37	Na II	1000	1887.40	Pd III	10	1904.77	Pb I	4	1919.74	Pb V
400	1873.45	Ag III	20 d	1887.47	Na III	7	1906.74	Yb III	150	1919.77	N III
140	1873.89	Cr IV	200	1887.70	Si I		1907.	Be I	160	1920.04	O III
800	1873.91	Yb III	100	1888.11	Ne II	60	1907.03	Mn IV	7	1920.16	Ti V
150	1874.08	Cd III	100	1888.12	Th III	800	1907.44	La IV	70	1920.27	Zn II
15	1874.08	In IV	650	1888.523	P IV	200	1907.49	Ne II	20	1920.53	Yb III
12	1874.23	Fe IV	700	1888.62	Rh III	10 s	1907.58	Fe III	300	1920.65	N III
300 r	1874.256	Ge I	2	1888.67	Pb V	84	1907.66	Ta IV	110	1920.75	O III
1500	1874.63	Pd III	800	1889.22	La IV	20	1907.84	Mn II	150	1920.84	N III
100	1874.70	Rh III	500	1889.42	Rb II	200	1907.99	N III	80	1921.25	Mn II
50	1874.81	Hf III	50	1889.52	Pt II	100	1908.31	Ru III	200	1921.30	N III
500 h	1874.84	Si I	300	1889.57	Ag III	50 h	1908.434	Ge I	7	1921.471	Pb II
285	1874.94	O III	100	1889.71	Ne II	10	1908.50	Mg III	110	1921.52	O III
60	1875.08	Na II	10	1890.34	Yb III	10	1908.50	Yb III	20	1921.64	Au II
100	1875.41	Yb III	1000 r	1890.42	As I	25 r	1908.64	Tl II	75	1921.96	Zr III
200	1875.54	Hg II	13	1890.67	Fe III		1909.0	Be II	300	1922.23	Cd II
100	1875.81	Si I	15 d	1890.75	Na III	50	1909.30	Sn I	60	1922.41	Nb IV
75	1875.92	Yb III	10	1890.87	Yb III	100	1909.66	Yb III	15	1922.79	Fe III
35	1877.00	Zr III	70	1891.28	Sb I	25	1909.98	Cd III	20	1923.07	Mn II
100	1877.34	Nb V	1500	1891.34	Pd III	30	1910.0	Bi IV	200	1923.34	La III
400	1877.62	Mn III	100	1891.40	Sn I	11	1910.10	Ca III	20	1923.34	Mn II
20	1877.88	Mo IV	1000	1891.47	La IV	500	1910.16	Rh III	100 h	1923.467	Ge I
12	1877.99	Fe III	50	1892.07	Zr III	200	1910.183	P IV	220	1923.49	O III
1500	1878.28	Co I	15	1892.42	Yb III	75	1910.25	Mn IV	110	1923.82	O III

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
12	1923.90	Mg III	80	1937.27	Zr III	30	1950.09	Co II	13	1960.32	Fe II
11	1923.96	Na III	14	1937.34	Fe III	20	1950.14	Mn II	12	1960.76	Na IV
500	1924.70	Ba II	100 r	1937.483	Ge I	10	1950.33	Fe III	100	1960.86	Ag II
84	1924.75	Ta IV	800 r	1937.59	As I	40	1950.34	Yb III	500	1960.9	Se I
200	1925.30	Ag III	40	1937.63	Cr IV	30	1950.36	Ce III	30	1961.25	Fe I
80	1925.31	Sn I	11	1937.84	Mg III	200 r	1950.39	Sb I	50	1961.32	Zr II
30	1925.52	Mn II	500	1938.008	Ge II	1500 c	1950.80	La IV	1500	1961.59	Co I
10 p	1926.01	Fe III	100 r	1938.300	Ge I	12	1950.91	Na III	100	1962.01	Zr II
400	1926.24	Zr V	500	1938.57	La III	12	1951.01	Fe III	500	1962.013	Ge I
80	1926.26	Mo IV	200	1938.83	Ne II	400	1951.23	Pr IV	250	1962.04	Mn I
14	1926.26	Na III	100	1938.84	Nb III	14	1951.24	Na III	50	1962.111	Fe I
18	1926.30	Fe III	500	1938.891	Ge II	400	1951.43	V IV	15	1962.80	Yb II
50	1926.59	Mn II	10 l	1938.90	Fe III	400	1951.56	Pd III	3	1962.88	Te II
10	1926.76	Yb III	500	1939.06	V IV	25	1951.571	Fe I	40	1962.92	Zr II
20	1926.77	Sn I	220	1939.261	Al II	1500	1951.90	Co I	300	1963.10	V IV
110	1926.94	O III	5	1939.58	In IV	60	1951.91	Zn II	12	1963.11	Fe II
500	1927.07	Rh III	10	1939.59	Cd III	25	1951.93	Au I	30 h	1963.373	Ge I
100	1927.08	Sb I	10	1939.68	Ca III	150	1952.15	Sn I	80 h	1964.3	Sb I
12	1927.24	Na III	30	1939.80	Pt II	500	1952.36	Mn III	80	1964.54	Zn I
500	1927.43	Zr V	500	1940.15	Co III	1000	1952.52	Mn III	50	1964.59	Be I
30	1927.60	Hg II	77	1940.25	Ta IV	200	1952.54	Ni III	13	1964.61	Ca II
15	1927.95	Sn I	200	1940.25	Zr III	30	1952.59	Fe I	11	1965.08	Na I
70	1928.09	Yb III	20	1940.58	Sr III	11	1952.65	Fe III	400	1965.16	Rh I
500	1928.57	Co III	100	1941.08	Zr III	80	1953.00	Zn II	30	1965.383	Ge I
40 h	1928.9	Sn I	500	1941.28	Mn III	30	1953.005	Fe I	40	1965.54	Cd I
100	1929.24	Mo IV	500	1941.35	Ru III	30	1953.23	Mn II	85	1966.22	Zr II
30	1929.25	Pt II	2000	1941.64	Pd III	13	1953.32	Fe III	40	1966.31	Cu I
5	1929.67	Be I	50	1941.67	Si II	10	1953.49	Fe III	400	1966.89	Ag I
100 d	1929.67	Zn II	500	1941.86	Sn III	10	1953.55	Ca III	30	1966.92	Sr II
30	1929.68	Pt II	300	1942.27	Hg II	20	1953.83	B III	80	1967.13	Yb I
250	1929.751	Cu II	45	1942.31	Au I	500	1953.94	Co III	140	1967.18	Cr I
500 r	1929.826	Ge I	55	1942.59	Yb III	100	1953.95	Zr III	100	1967.38	Ag I
200	1929.978	Al II	20	1942.69	Sn I	1800	1954.22	Co I	10	1967.60	Na I
300	1930.03	Ne II	250 w	1942.89	Mn III	10 w	1954.22	Fe III	25	1967.81	Zr I
1000	1930.33	Pd III	11	1943.01	Ca III	500	1954.24	Rb II	13	1967.94	Ca I
15	1930.39	Fe III	800	1943.21	Mn III	500	1954.25	Rh III	1500 h	1968.69	Co I
200	1930.43	Ni III	3	1943.31	In IV	9000	1954.53	Bi I	1500 h	1968.93	Co I
15	1930.63	Yb III	14 s	1943.48	Fe III	200	1954.61	Pr IV	20	1969.24	Mn
13	1930.67	Mg III	10	1943.52	Na III	20 d	1954.81	Mn II	100	1969.40	Zn I
1000	1930.905	C I	100	1943.54	Cd II	75	1954.87	Zn II	20	1969.47	Yb I
150	1931.048	Al II	10	1943.68	Be I	60 h	1954.97	Be III	30	1969.73	Yb I
30	1931.40	Mn II	3	1943.94	Tb IV	100	1954.97	Si I	150	1970.495	Cu I
14	1931.51	Fe III	30 s	1944.116	Ge I	200	1955.115	Ge I	3000	1970.71	Co I
700	1931.79	Rh III	15	1944.59	Si II	1800	1955.17	Co I	200	1970.880	Ge I
100	1932.04	Au III	250	1944.597	Cu II	50	1955.52	Sn III	50	1970.90	Tb I
200	1932.377	Al II	200	1944.731	Ge I	50	1956.	Be I	80	1971.06	Mo
75	1932.54	Zr III	20	1945.15	Mn II	300	1956.54	Rb II	1800 h	1971.16	Co I
12	1932.74	Na III	12	1945.34	Fe III	300	1956.61	Mn III	200	1971.42	Rb I
25	1933.17	Sn I	100 c	1945.46	Ne II	30	1957.42	Co II	30	1971.46	Sn I
13	1933.89	Na III	60	1945.58	Zn II	200	1957.518	Cu II	100	1971.95	Cu I
300	1934.00	V III	25	1946.12	Zr III	1200 c	1957.57	La IV	120	1972.07	Cr I
10 h	1934.048	Ge I	10	1946.13	Sb III	700	1957.62	Ag III	300	1972.29	Pd I
50	1934.32	Zr III	900	1946.26	Gd III	60	1957.823	Fe I	4	1972.44	Pb I
400	1934.503	Al II	150	1946.32	Ag III	5	1957.96	Pb V	1800 h	1972.52	Co I
30	1934.538	Fe I	12	1946.43	Na III	200	1958.09	Pr V	585 r	1972.62	As I
150	1934.713	Al II	100	1946.493	Cu II	400	1958.20	Pr V	12	1972.82	Ca I
400	1934.88	Zr V	30	1946.59	Cr IV	30 p	1958.44	Sr III	100	1972.94	Hg
40	1935.20	Zr III	80	1946.61	Zr III	100	1958.47	Au III	16	1973.16	Pb I
100	1935.42	Au III	1500	1946.79	Co I	1500	1958.55	Co I	1500	1973.85	Co I
12	1935.72	Ca III	50	1946.988	Fe I	11	1958.58	Fe III	200	1973.89	Hg
300	1935.840	Al III	50	1946.99	Zr III	10	1958.97	Ca III	10	1973.96	Yb
15	1935.863	Al III	20	1947.93	Mn II	200	1959.02	Th IV	10	1974.18	Yb
200	1935.949	Al III	12	1948.26	Ca III	30	1959.25	Mn II	1100	1974.34	Gd
75	1936.48	Zr III	100	1948.44	Ag III	120	1959.27	Ag III	3	1974.6	Tl I
1800	1936.58	Co I	200	1948.79	Au III	12	1959.34	Pb IV	11	1974.76	Ba
75	1936.67	Zr III	10	1949.33	Si II	500	1959.41	Co III	60	1974.99	Zr
150	1936.907	Al II	20	1949.44	Mo IV	7000	1960.13	Bi I	2200	1975.24	Gd
10	1937.21	Ce IV	100	1949.56	Si II	60	1960.144	Fe I	600	1975.92	Ag
25	1937.269	Fe I	30	1949.90	Pt II	15	1960.21	Sn I	25	1976.46	Yb

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
1800	1976.97	Co I	20	1990.52	Lu IV	800	2002.16	Pd III	1200 h	2014.58	Co I
10	1977.01	Ca III	700	1990.531	Al II	1500	2002.32	Co I	40	2014.93	Pt II
150	1977.027	Cu II	20	1990.54	Ce III	200	2002.34	Th IV	19000	2015.11	Mo II
500	1977.03	Ag III	6	1990.60	Sb II	100	2002.48	V IV	100	2015.20	Ru III
10	1977.16	Na III	30	1990.95	Zr III	35	2003.11	Ce IV	30	2015.76	Sn I
300	1977.53	Pd III	100 r	1991.13	As I	100	2003.18	Lu IV	150	2015.96	Ag II
50 h	1977.6	Sn I	50	1991.14	Yb III	230 r	2003.34	As I	150	2016.052	Al II
2	1977.88	Pb I	20	1991.41	Mo IV	25000	2003.53	Re I	15	2016.12	Cd III
30	1978.19	Au I	100	1991.44	Hf III	13000	2003.73	Os I	900	2016.17	Co I
2	1978.22	Ge III	2	1991.60	Pb I	18000	2003.85	Mn I	150	2016.234	Al II
60	1978.22	Nb IV	14	1991.61	Fe III	15	2004.07	Cd III	100	2016.368	Al II
10	1978.55	Ca III	50	1991.85	Si I	10	2004.21	Na III	35	2016.63	Zr III
500	1978.95	Mn III	15	1991.88	Sn I	1000	2004.47	Pd III	12	2017.03	Na III
60 h	1979.07	Nb III	2	1992.31	Pb I	6	2004.73	In IV	500	2017.47	Rh III
200	1979.274	Ge II	200	1993.32	Ru III	9000	2004.78	Os	16000	2017.87	Re I
500	1979.956	Cu II	50	1993.37	Ru II	400	2005.14	Rh III	3400	2018.07	Gd III
2400 h	1980.89	Co I	90	1993.89	Sc III	11	2005.22	Na III	29000	2018.14	Os I
11	1981.19	Ca III	13	1994.07	Fe III	200	2005.71	Ru III	10	2018.39	Na IV
2	1981.74	Yb III	30	1994.23	Mn II	100	2006.46	Ru III	65	2018.44	Ne IV
100	1981.82	Ru III	500	1994.26	Rh III	100	2006.82	Zr III	50	2018.58	Ru III
150	1981.87	Ag III	30	1994.46	Zr III	400	2006.84	Cl III	1700	2019.068	Ge I
100	1982.10	Ru III	20	1994.61	Sr IV	80	2007.01	Ne II	2	2019.22	Ge III
100	1982.11	Zn II	7	1994.83	Te I	50	2007.04	Ge II	29000	2020.26	Os
400	1982.76	Mn III	20	1994.98	Sn I	50 h	2007.28	Nb III	40000	2020.30	Mo II
40	1983.14	Zr III	45	1995.05	Yb III	300	2007.30	Ag III	20	2020.75	Bi III
500	1983.19	Rb II	150	1995.1	Se I	100	2007.49	Cd II	100	2020.94	Lu IV
500	1983.61	Cl III	130	1995.16	Ag III	100 r	2007.56	Tl I	20	2021.15	Bi III
30	1983.74	Pt II	100 r	1995.43	As I	900	2008.04	Co I	7000	2021.21	Bi I
5	1983.88	Yb III	200	1995.43	Cd II	25	2008.05	Sn I	2600	2021.38	Au I
100	1983.92	Lu IV	12	1995.56	Fe III	13000	2008.07	W II	30	2021.52	Zr III
80	1984.20	Sn I	10	1995.68	Na III	15	2008.40	Ba III	5 r	2022.02	Pb I
30	1984.43	Si I	9700	1996.06	Mn I	11	2008.47	Na III	300	2022.19	Mn III
25	1984.62	Yb III	40	1996.18	Lu IV	900	2008.79	Gd III	110	2022.19	Ne IV
5	1985.13	Be I	12	1996.42	Fe III	2009.	2009.	Li II	4	2022.25	Ge III
50	1985.15	Nb III	150	1996.85	Au III	100 r	2009.19	As I	50	2022.35	Co II
13	1985.57	Na III	50	1996.92	Zn II	2009.20	2009.20	Ba II	8700	2022.35	Ir I
	1985.60	Ba II	50	1997.11	Nb III	500	2009.28	Ru III	13	2022.45	Ba III
70	1985.61	Zn II	55	1997.28	Yb III	500	2009.29	Zr V	14000	2022.76	Os I
79	1985.68	Ta IV	450 h	1997.370	Cl II	100	2009.94	Ce IV	100	2023.48	P I
120	1985.682	P IV	65	1997.54	Mn IV	5100	2009.98	W II	20	2023.78	Mo IV
7	1985.74	Yb III	100	1997.55	Ru III	17000	2010.15	Os I	400	2023.95	Ba II
150	1985.851	P IV	55	1997.66	Yb III	4100	2010.23	W II	50	2024.00	Sb I
60	1986.05	Sb I	500	1997.72	V IV	160	2010.42	Sc III	25	2025.05	Cs II
200	1986.114	P IV	400	1997.89	Gd IV	9900	2010.65	Ir I	200	2025.06	Pr IV
80	1986.43	Yb III		1997.95	Be I	70	2010.92	Mo IV	500	2025.48	Zn II
30	1986.89	Cd II		1997.98	Be I	30	2010.97	Si I	80	2025.56	Ne II
100	1986.99	Zn II	60	1998.01	Be I	100	2011.17	Ru III	40	2025.76	Co II
200	1987.02	Ag III	1500 l	1998.49	Co I	200	2011.29	Ge I	9	2025.82	Mg I
150	1987.022	P IV	2	1998.58	Pb V	200	2011.49	Ag III	7300	2026.08	W II
15	1987.50	Fe III	500	1998.82	Yb III	50	2011.51	Co II	60	2026.78	Zr III
300 h	1987.849	Ge I	10	1998.83	Pb V	50	2011.56	Ru III	160	2026.96	O III
150	1987.98	Hg II	500 r	1998.887	Ge I	200	2011.62	Co III	90	2026.97	Hg II
10	1988.26	Bi III	200	1999.32	V IV	50	2011.66	Ru III	30	2026.98	Sn I
300	1988.267	Ge I	14000	1999.51	Mn I	15	2011.87	Na III	50	2027.04	Co II
7	1988.75	Ti V	300	1999.54	Ba II	100	2011.94	Zn II	100	2027.44	F III
15	1988.81	Cd III		Air		11000	2012.00	Au I	40	2027.50	Nb IV
200	1989.22	Ru III	600	1999.59	Ag III	50	2012.26	Sc III	2000	2027.79	Tb IV
25	1989.35	Bi II	250	1999.698	Cu II	3000	2012.42	La IV	1800	2027.82	Gd III
82	1989.44	Ta IV	6	2000.2	Te I	6200	2012.78	Hf II	1000 w	2027.83	Mn III
400	1989.59	Mn III	45	2000.23	Zr III	200	2013.22	Cu III	500 w	2028.14	Mn III
400	1989.60	Co III	100	2000.42	Ce IV	360	2013.27	O III	8500	2028.18	Hf II
400	1989.63	Au III	20	2000.60	Cd III	30	2013.30	Zr III	14000	2028.23	Os I
1500	1989.80	Co I	20	2000.79	Co I	100	2013.32	As I	500	2028.53	Rh III
80 h	1989.82	Yb III	25	2000.81	Au II	150	2013.65	Ag III	600	2028.54	Zr V
50	1989.83	Zr III	100	2001.09	Co III	800	2013.71	Rh III	12	2028.56	Na III
300	1989.855	Cu II	10	2001.30	Ba III	200	2013.88	Co III	200	2029.22	Tb IV
40	1990.25	Cr IV	9600	2001.45	Os I	7	2014.06	Hf IV	3300	2029.32	Nb II
1800	1990.34	Co I	5800	2001.71	W II	11	2014.17	Na III	60 r	2029.49	Sb I
170 r	1990.35	As I	26000	2002.02	Te I	4100	2014.23	W II	15000	2029.98	W II

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
120	2030.32	F III	350	2043.802	Cu II	200	2058.48	Pr IV	100	2069.85	Ag I
3200	2030.63	Pt I	50	2044.54	Au II	200	2058.59	Pr III	800	2070.40	Gd I
12	2031.13	Na III	300	2044.57	Mn III	50	2058.65	Si II	12	2070.43	Ba II
50	2031.46	Pr III	100	2044.59	Ru III	8600	2058.69	Os I	125	2070.43	Zr II
100	2031.81	Co III	10	2044.82	Na III	40	2058.73	Zr III	1500 c	2070.56	Lu I
900	2031.96	Co I	20	2045.12	Zr IV		2058.78	Os I	4200	2070.67	Os II
450	2032.116	Cl II	26000	2045.36	Os I	40	2058.82	Co II	8	2070.9	Te I
4400	2032.41	Pt I	10	2045.44	Na III	50	2059.01	Si II	300	2070.94	Hf II
50	2032.45	Cd II	50	2045.61	Cd III	50	2060.29	Nb III	90	2071.09	N II
50	2032.47	Nb III	220	2045.67	O III	10	2060.36	Na III	20	2071.10	Lu I
65	2032.53	Nb IV	17000	2045.98	Mo II	50	2060.38	Mo IV	3400	2071.21	W II
3000	2032.99	Nb II	800	2046.02	Gd III	1500	2060.58	Y III	1000	2071.50	Rb I
	2033.25	Be I	200	2047.05	Pr IV	5000	2060.64	Ir I	12	2071.68	Ba I
	2033.28	Be I	40	2047.15	Zr IV	75	2060.83	Zr III	200	2072.02	Si II
100	2033.30	Pr III	80	2047.23	Cr III	200	2061.17	Ag I	200	2072.70	Si II
100	2033.34	Ce III	3000	2048.67	Rh III	40	2061.19	Si I	100	2072.89	Sn I
12	2033.36	Ca III	400	2048.88	Tb IV	10	2061.25	Cd III	100	2073.08	Sn I
	2033.38	Be I	400	2048.93	Mn III	800	2061.30	Gd IV	3000 c	2073.18	La I
150	2033.47	P I	27000	2049.08	Re I	50	2061.47	Zr III	10	2073.22	Bi II
15000	2033.57	Ir I	20	2049.17	Co II	14000	2061.49	Cr II	14	2073.37	Bi II
150	2033.98	Ag II	800	2049.28	Gd IV	10	2061.55	Fe III	10	2073.40	Eu I
18000	2034.44	Os I	12	2049.34	Pb IV	2000	2061.63	I I	10	2073.64	Yb I
40	2034.67	Nb IV	5500	2049.37	Pt I	13000	2061.69	Os I	200	2074.008	Al I
2700	2035.03	W II	150 r	2049.57	Sb I	9000	2061.70	Bi I	50	2074.12	Zr I
60	2035.15	Cs II	5300	2049.63	W II	20 h	2062.00	Ac IV	4200	2074.70	Re I
100	2035.42	Zr III	500	2049.68	Mn III	500	2062.00	Zn II	500	2074.8	Se I
270	2035.854	Cu II	40	2050.72	Lu III	3	2062.14	Ge III	25	2075.08	Pr I
11	2035.90	Na III	200	2050.73	Pr IV	10	2062.17	Co III	2200	2075.59	W I
75	2036.23	Cd II	5	2050.88	Pb I	50	2063.43	Sb I	10000	2075.95	Rb I
60	2036.39	Cr III	11	2051.48	Na III	40	2063.78	Co II	10	2076.00	Ba I
100	2036.46	Pt II	300	2052.21	Rb II	20	2064.00	Sn I	30	2076.21	Mn
30	2036.58	Co II	6200	2052.22	Ir I	200	2064.01	N III	2400	2076.43	Ru I
800	2036.72	Rh III	100	2052.30	Pr III	50	2064.08	Pr III	800	2076.66	Gd
50	2036.92	Zr III		2052.68	Ba II	2000	2064.11	Rh III	800	2076.84	Rh I
250	2037.127	Cu II	160	2052.74	O III	200	2064.23	Zn II	75 h	2076.94	Be I
50	2037.31	Mn II	500	2052.80	Rb II	250	2064.42	N III	7200	2076.95	Os I
750	2037.43	La IV	50	2052.87	Pr III	25	2064.90	Mg III	160	2077.09	B II
600	2037.61	Rh III	90	2052.93	Hg II	750 r	2065.215	Ge I	900	2077.38	Mn
40	2037.64	Mn II	200	2053.11	Co III	1500	2065.35	Lu III	80	2077.43	Cs I
100	2037.76	Hf III	150	2053.17	Ag III	8900	2065.42	Cr II	1500 h	2077.76	Co I
21000	2038.44	Mo II	8 r	2053.28	Pb I	30	2065.52	Si I	100	2077.87	Ce I
10	2038.84	Ba III	150	2053.83	Ag III	50	2065.54	Co II	100	2077.92	Zr I
	2039.	Li I	50	2053.85	Pr III	2300	2065.57	W II	30	2078.05	Yb I
1000	2039.15	Pr IV	50	2054.03	Sn I	550	2065.78	B III	7200	2078.09	Os
60	2039.31	Zn II	3	2054.10	Sb III	250	2066.38	B I	300	2078.13	Mn
15	2039.55	Mg III	100	2054.46	Hf IV	500	2066.38	Mn III	8	2078.45	Pb I
50	2039.63	Cr III	420	2054.461	Ge I	10	2066.49	Yb III	100	2078.663	Cu I
70 r	2039.77	Sb I		2054.57	Ba II	2000 c	2066.50	La IV	200	2078.83	Tb I
500	2039.8	Se I	20	2054.80	Yb III	15	2066.60	Na III	13	2078.92	Ca I
40	2039.83	Cd III	50	2054.83	Si I	250	2066.65	B I	8	2078.93	Sc I
1500	2039.95	Co I	300	2054.980	Cu II	100	2066.70	Th IV	14	2078.99	Fe I
40	2039.97	Mn II	500	2055.11	Pd III	100	2066.93	B I	83	2079.01	Ta I
1000	2040.18	Rh III	15	2055.49	Mg III	300	2067.19	B I	120	2079.08	Zn I
50	2040.66	Sn I	19000	2055.52	Cr II	7800	2067.21	Os II	9700	2079.11	W I
20	2040.90	Sn I	25	2055.64	Mo IV	450	2067.23	B III	12	2079.22	Pb I
1200	2041.11	Co I	40	2055.73	Cr IV	1500	2067.50	Pt I	100	2079.56	Sb I
150	2041.33	Ag III	85	2055.75	Ta IV	20	2067.56	Ti IV	10	2079.74	Co
12	2041.53	Ca III	50	2055.90	Be I		2068.	Li II	50	2079.93	Zn
40	2041.57	Pt II	100	2056.01	Be I	12	2068.24	Fe III	14000	2079.97	Os
12	2041.66	Na III	10	2056.06	Sc IV	1000 r	2068.33	Sb I	80	2080.05	Cs I
2400 r	2041.712	Ge I	75	2056.13	Zr III	80	2068.58	Sn I	1500	2080.08	Gd
10	2041.93	Y III	100	2056.21	Co III	40	2068.62	Nb IV	90	2080.34	N I
5	2042.07	Y III	300	2056.80	Mn III	25	2068.63	Sr III	60 h	2080.38	Be
300	2042.23	Rb II	200	2056.99	Ag III	2600 r	2068.656	Ge I	25	2080.62	Sn
10	2042.58	Pb IV	220 h	2057.238	Ge I	120	2068.68	N III	100	2080.99	Zr
50 d	2042.91	Cr IV	285	2057.5	Se III	45 h	2068.9	Bi II	200	2081.04	Ag
25	2043.12	Pr III	100	2057.65	Ce III	2000	2068.92	Rb II	100	2081.09	Lu
12	2043.29	Na III	500	2057.79	Gd III	4000	2068.98	Y III	6500	2081.16	Te
1600 r	2043.770	Ge I	70	2058.31	Sn I	1000	2069.02	Mn III	12	2081.35	Ba

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
4800	2081.68	Mo II	80	2091.97	Cs II	300	2099.94	Zn II	10	2113.78	Mo IV
30	2081.81	Zr III	400 c	2092.16	Lu IV	500	2099.97	Mn III	80 r	2113.82	Ag II
150	2082.09	Au II	1500	2092.16	Mn I	8 h	2100.00	Ac II	100	2113.83	Cr III
2900	2082.54	Os I	20	2092.26	Yb III	15	2100.05	Ge III	100 r	2113.93	Sn I
13	2082.91	Na III	10000	2092.36	Zr IV	500	2100.42	Pr IV	30	2113.96	Mn II
300	2083.09	Au III	4700	2092.41	Re II	5	2100.47	Cd III	40	2113.98	Zr III
3700	2083.22	Ir I	240	2092.44	Ne III	5300	2100.63	Os I	35	2114.10	Zr III
2000	2083.23	Pr IV	2100	2092.44	V I	2200	2100.67	W II	50	2114.26	Cr III
200	2083.32	Ce III	2200	2092.50	Mo II	2700	2100.84	Mo II	25	2114.31	Sr III
100	2083.34	Lu III	14000	2092.63	Ir I	100	2100.93	Sn I	15	2114.41	Ca III
2600	2083.77	Ru I	30	2093.	Bi IV	1	2101.17	In IV	50	2114.53	Cr III
3700	2083.92	Re I	4000	2093.11	Mo II	1500	2101.54	W I	10	2114.53	Na IV
55	2084.07	Nb IV	35	2093.12	Nb IV	200	2102.18	Zn II	30	2114.63	Si I
100	2084.122	Fe I	50	2093.30	Nb IV	40	2102.30	Zr III	100	2114.87	Cr III
800	2084.23	Mn III	900	2093.40	Co I	15	2102.42	Ge III	10	2115.066	Pb I
10	2084.35	Fe III	200	2093.49	Pr III	20	2102.50	Mn II	30	2115.57	Pt II
3000	2084.59	Pt I	10	2093.50	Eu III	18	2103.16	Ti IV	20	2116.44	Tc II
150 h	2085.33	Hf III	300	2094.14	Mn III	50	2103.16	Zr III	300	2116.50	Rb II
25	2085.35	Zr III	2000 r	2094.258	Ge I	30 h	2103.21	Si I	900	2116.65	Yb IV
80	2085.45	Au III	700	2094.264	Al II		2103.24	Ca II	2500	2116.67	Yb II
150	2085.47	Ne II	1000	2094.29	Gd IV	1000	2103.33	Pt I	320	2117.310	Cu II
10000	2085.59	Re I	40	2094.35	Sn I	15	2103.42	Bi III	100	2117.53	Cr III
900	2085.67	Co I	150	2094.744	Al II	100	2103.63	Lu IV	90	2117.59	N III
400 c	2085.70	Lu IV	6100	2094.75	W II	12	2103.80	Fe III	2100	2117.66	Os I
3100	2085.74	Ir I	10	2094.77	Yb III	10	2103.89	In II	900 s	2117.68	Co I
15	2085.90	Mg III	500	2094.78	Mn III	25	2104.23	Zr III	20	2117.90	Sr IV
420	2086.021	Ge I	300	2094.791	Al II	1500	2104.29	Mo II	4800	2117.96	Os I
600 c	2086.47	Lu IV	900	2094.86	Co I	20	2104.38	Sr IV	80 r	2118.48	Sb I
200	2086.78	Zr III	100	2095.104	Al II	1000 c	2104.41	Lu IV	30	2118.48	Sr III
200	2086.96	Ne III	35	2095.13	Au II	150	2104.42	Zn I	1000	2118.53	Rh III
60	2087.33	Zn I	200	2095.141	Al II	25	2104.45	Ge III	25	2118.56	Be III
10	2087.37	Yb III	80	2095.31	Yb III	1500	2104.73	Co I	1000	2118.63	Rh III
900	2087.55	Co I	160	2095.53	N II	320	2104.797	Cu II	2100	2118.87	W II
75	2087.91	Cd III	400	2095.54	Ne III	240	2105.824	Ge I	12	2118.97	Sc IV
50	2087.98	Yb III	900	2095.77	Co I	1500	2106.18	W II	20	2119.18	Yb III
3600	2088.19	W II	150	2096.00	Cd II	15	2106.23	Tc II	15	2119.41	Tc I
15	2088.58	Co III	180	2096.11	Ne II	12 d	2106.33	Na IV	50	2119.52	Sr III
350 h	2088.583	Cl II	1200	2096.18	Hf II	300	2106.48	Yb IV	1800	2119.54	Ir I
80	2088.71	Cs II	70	2096.20	N II	10	2106.71	Yb III	100 h	2119.69	Hf III
50 h	2088.74	V IV	120	2096.25	Ne II	1500	2106.80	Co I	6600	2119.79	Os
17000	2088.82	Ir I	200	2096.39	Sn I	500	2107.10	Tm III	3	2120.18	Si IV
500	2088.91	B I	15	2096.79	Yb III	10	2107.32	Fe III	50	2121.26	Sn I
2900	2089.03	Os I	25	2096.85	Pr III	200 c	2107.85	Lu IV	500	2121.29	Yb IV
2200	2089.14	W II	110	2096.86	N II	1400	2108.02	Mo II	90	2121.50	N III
2900	2089.21	Os I	80	2096.93	Zn I	200	2108.06	Rb II	2400	2121.59	W II
900	2089.35	Co I	50	2096.94	Pr III	1000 c	2108.31	Lu IV	15 h	2122.27	Be III
300	2089.43	Ne III	40	2097.03	Zr III	900	2108.98	Co I	100	2122.55	Ce III
40	2089.50	Zr III	9800	2097.12	Re I	400	2109.07	Ce III	20	2122.68	Nb IV
2400	2089.52	Mo II	10	2097.45	Cd III	2700	2109.22	Re I	75	2122.74	Zn II
500	2089.57	B I	20	2097.46	Mn II	2000	2109.42	Nb II	250	2122.84	Yb IV
100	2089.96	Ce III	15	2097.48	Fe III	50	2109.54	Yb III	350	2122.980	Cu II
1000	2089.98	Tb IV	1200	2097.51	Co I	1700	2109.58	Mn I	17	2123.03	Ca III
220	2090.0	Se IV	6000	2097.60	Os I	4600	2110.26	Bi I	300	2123.25	Mn III
600	2090.05	Mn III	10	2097.63	Co III	200 h	2110.31	Hf III	800	2123.32	Yb IV
12	2090.14	Fe III	12	2097.69	Fe III	1300	2110.34	W II	80	2123.53	Cr III
300	2090.25	Mn III	13	2097.93	Mg III	60	2110.68	Au II	1900	2123.84	Os I
1000	2090.29	Rb II	500	2097.93	Mn III	30	2111.44	Co II	100	2124.12	Si I
1700	2090.48	W I	20	2098.14	Au II	75	2111.53	Ta IV	30	2124.69	Eu III
10	2090.51	Co III	1800	2098.20	Gd III	50	2111.60	Cd III	95 h	2124.744	Ge I
200	2090.75	Pr III	30	2098.36	Yb III	6	2111.758	Pb I	40	2125.06	Zr III
2400	2090.89	Ru I	110	2098.398	Cu II	300	2112.100	Cu II	10	2125.16	Ar III
20	2091.23	Yb III	50 r	2098.41	Sb I	8	2112.31	In IV	1700	2125.21	Nb II
20	2091.34	Ga II	13	2098.49	Ca III	25	2112.65	Cs II	1000	2125.25	Rb II
350 h	2091.458	Cl II	2400	2098.60	W II	2700	2112.68	Ir I	30	2125.29	Au II
10000	2091.49	Zr IV	500	2099.11	Tm III		2112.76	Ca II	2000	2125.44	Ir I
30	2091.58	Sn I	200 h	2099.30	Hf III	15	2112.77	Mg III	10	2125.57	Be I
2	2091.85	Sb III	200	2099.44	Lu III	100	2112.99	As I	20	2125.68	Be I
15	2091.89	Mo IV	15	2099.50	Cs II		2113.15	Ca II	1300	2125.68	Gd III
20	2091.96	Mg III	50	2099.59	Sr III	100	2113.73	Cr III	600	2125.72	Yb IV

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
350	2126.044	Cu II	15	2140.72	Na III	20 r	2151.43	Sn I	600	2165.17	Pt I
1100	2126.54	Nb II	25	2140.73	Sn I	1000	2151.44	Ce III	75	2165.19	Mo
15	2126.63	Au I	400	2141.04	Yb IV	30	2151.54	Sn II	160	2165.2	Se
3000	2126.74	Yb II	100	2141.15	Cr III	15	2151.78	Fe III	2	2165.26	Er
4500	2126.81	Ir II	20	2141.43	Sn I	8	2151.96	Pb IV	135	2165.52	As
5	2127.00	Sb III	10	2141.80	Sb II	1000	2152.23	Rh III	1000	2165.55	Ni
15 h	2127.20	Be III	50 r	2141.83	Sb I	16	2152.43	Ca III	250	2165.55	Yb
100 r	2127.39	Sb I	200	2142.20	Yb IV	3500	2152.68	Ir II	1400	2165.96	Sr
100 c	2127.43	Lu IV	10	2142.55	Pb V	50	2152.76	Cr III	15	2166.19	Ar
4	2127.47	Si IV	1600	2142.74	Re II	1400	2152.84	Sr II	150	2166.21	Ag
2000	2127.52	Ir I	160	2142.78	N II	100	2152.94	P I	60	2166.25	Cr
4500	2127.94	Ir I	30	2142.80	Sr III	100	2153.21	Rb III	1500	2166.32	W
10000	2127.98	Y III	18000	2142.81	Te I	850	2153.56	W II	160	2166.6	Se
950	2128.61	Pt I		2142.97	Re I	15	2154.01	Pb IV	40	2166.773	Fe
	2128.75	Ca II	200	2143.10	Rb II	30	2154.08	In III	3000	2166.88	Ce
20	2128.79	Co II	1500	2143.23	La IV	150	2154.08	P I	10	2166.88	In
14	2129.19	Ca III	15	2143.40	Bi II	15000	2154.18	Yb IV	3100	2166.90	Os
200	2129.65	Yb IV	300	2143.42	Yb IV	1000	2154.31	Pr IV	12	2166.95	Fe
400	2129.82	Rb II	15	2143.46	Bi II	2	2154.42	In III	10	2167.12	Eu
110	2130.18	N II	30000	2143.83	Rb II	2600	2154.59	Os I	80	2167.33	Au
25	2130.23	Nb IV	300	2143.89	Yb IV	50	2155.06	Cd II	3000	2167.33	Rh
80 h	2130.24	Nb III	20	2143.91	Th IV	100 h	2155.34	V IV	1100	2167.75	Os
30	2130.69	Pt II	100	2144.08	As I	200	2155.66	Hf III	4900	2167.94	Re
	2131.	Li II	80	2144.15	Cr III	10	2155.76	Na IV	10	2167.97	Pb
1500	2131.18	Nb II	1900	2144.23	Pt I	2900	2155.81	Ir I	10	2168.26	Ar
	2131.51	Ca II	100	2144.24	Pt II	30	2156.27	Tc I	2000	2169.10	Ni
	2132.30	Ca II	1000 r	2144.41	Cd II	200	2156.29	Tm III	300	2169.12	Yb
600	2132.42	Zr V	14	2144.54	Na III	16	2156.37	Ba III	5800	2169.42	Ir
50	2133.12	Sr III	20000	2144.77	Yb IV	3700	2156.67	Re I	2000	2169.48	Ce
2500	2133.63	Bi I	100 r	2144.86	Sb I	100	2157.17	Cr III	1000	2169.78	Mr
1000	2133.79	Br IV	25	2145.	Be I	150	2157.28	Cu III	500 r	2170.00	Pb
15	2133.87	Ar III	1000	2145.02	Br IV	12	2157.71	Fe III	15	2170.00	Ag
14	2133.96	Ca III	60	2145.60	Ag II	50	2157.794	Fe I	20	2170.23	Ar
10 h	2133.99	Si II	20	2145.74	Sr III	850	2157.80	W II	75	2170.57	Mo
16	2134.06	Mg III	45	2146.36	Nb IV	1300	2157.84	Os I	100	2170.70	Cr
10	2134.15	Co III	300	2146.47	Ag III	7900	2158.05	Ir I	20	2170.75	Au
420	2134.341	Cu II	100	2146.75	Cs II	3000	2158.17	Rh III	12	2171.04	Fe
10	2134.87	Ba III	30	2146.81	Th IV	12	2158.47	Fe III	80	2171.32	Sn
500	2135.21	Yb IV	50 h	2146.83	V IV	1200	2158.53	Os I	40	2171.44	F
100	2135.47	P I	1500	2146.87	Ta II	50	2158.91	Sb I	12	2171.57	Ca
900	2135.981	Cu II	50	2147.16	Cr III	100	2159.08	Au III	2100	2171.65	Os
200	2136.18	P I	3200	2147.25	Te I	40	2159.24	Zr III	200	2172.16	Yb
30 h	2136.40	Si II	90	2147.31	N III	360	2159.85	Te I	200	2172.20	At
50 h	2136.56	Si II	75	2147.42	Zn II	10	2160.76	Ba III	50	2172.46	Mo
285	2136.6	Se IV	50	2147.56	Cr III	2400	2161.00	Os	30	2173.33	Co
200	2136.67	Tm III	50 h	2147.91	Si I	200	2161.22	Ne III		2173.4	Li
500	2136.95	Ce III	70	2148.00	Hg II	10	2161.27	Fe III	10	2173.59	Eu
50 r	2137.05	Sb I	1400	2148.03	Gd III	150	2161.320	Cu II	700	2174.15	Mr
5300	2137.11	Os I	400	2148.10	Yb IV	370	2161.60	Yb II	1100	2174.60	Cc
5	2137.25	Be III	10 w	2148.14	Pr III	600	2161.89	Ag III	15	2174.66	Fe
300	2137.58	Yb IV	3700	2148.22	Ir I	15	2162.02	Fe II	2000	2174.67	Ni
900	2137.78	Co I	15	2148.46	Sn I	40	2162.20	Zr III	1500	2174.67	Pt
35	2137.90	Zr III	300	2148.52	Yb IV	8	2162.25	At I	250	2174.982	Ct
500	2138.35	Yb IV	1	2148.63	Sn II	50	2162.27	Pd II	55	2174.99	Be
35	2138.45	Zr III	50	2148.65	Cr III	50	2162.82	Th III	55	2175.10	Be
200	2138.53	Yb IV	10	2148.73	Ar III	2100	2162.88	Ir I	1500	2175.15	Ni
800 r	2138.56	Zn I	40 r	2148.73	Sn I	250	2162.94	C III	4500	2175.24	Ir
10	2138.59	Ar III	400	2148.984	Cu II	900	2163.03	Co I	7	2175.580	Pt
900	2138.97	Co I	200	2149.14	P I	3000	2163.19	Rh III	100	2175.80	Zr
250 w	2139.02	Po I	50	2149.18	Th III	10000	2163.68	Zr IV	1500 r	2175.81	Sb
3400	2139.04	Re II	150	2149.19	Ag III	300	2163.77	Ne III	3400	2176.21	Re
80	2139.11	Cr III	50	2149.48	Cr III	50	2163.86	Cr III	1700	2176.84	Ga
1000	2139.44	Rh III	500	2149.82	Pd III		2164.	Li II	900	2176.87	M
100 r	2139.69	Sb I	2400	2149.97	Os	500	2164.2	Se I	5	2176.89	Si
25	2139.85	Zr III	200	2150.18	Zr V	9	2164.43	Sc IV	500	2177.09	N
800	2139.99	Yb IV	2500	2150.54	Ir I	20	2164.44	Co II	25	2177.22	A
1100	2140.13	Ta II	740	2150.62	Ta II	250	2164.59	Rb III	400	2177.36	N
5	2140.33	Mo IV	60	2150.70	Al I	600	2165.01	Ta II	12	2177.46	Pt
13	2140.36	Ca III	2	2150.80	Ca I	1300 r	2165.09	Cu I	300	2177.53	Yl

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
500	2177.55	Pd III	150	2188.38	N III	80	2200.390	Fe I	20	2211.85	Eu III
500	2177.63	Pd III	35	2188.81	Au II	20	2200.40	Co II	200	2211.85	Ne III
20	2177.70	Mg III	500	2188.97	Au III	100	2200.509	Cu II	400	2211.95	Mn III
740	2178.03	Ta II	30	2189.06	Tc I	80	2200.724	Fe I	50	2212.15	Pd II
300	2178.118	Fe I	130	2189.47	Cs II	5	2200.73	Ca I	100	2212.25	Tm III
2700	2178.17	Ir I	8	2189.603	Pb I	8000	2200.76	Y III	600	2212.42	Mn III
30	2178.91	Sr III	700	2189.630	Cu II	200 r	2201.32	Sb I	20	2212.63	Eu III
1600 r	2178.94	Cu I	90 h	2189.90	Yb IV	25	2201.32	Au II	25	2213.15	Cs II
250 r	2179.19	Sb I	6	2190.00	K II	600	2201.41	Ni II	100	2213.54	Hf III
6	2179.25	Sb II	50	2190.09	Cr III	400	2202.22	Pt I	30	2213.55	Bi III
400	2179.35	Ni II	30	2190.32	Pt II	2	2202.24	In I	20	2213.65	Fe II
75	2179.37	Mo III	200	2190.36	Rb II	80	2202.27	Yb III	240	2213.76	Ne III
700	2179.410	Cu II	1100	2190.38	Ir II	760	2202.49	Os I	540	2213.85	Mn I
130	2179.60	Cs II	10	2190.59	Eu III	50 h	2202.58	Pt II		2214.	Li II
2	2179.90	In I	20	2190.68	Co II	15	2202.83	Na III	40 h	2214.0	Bi II
30	2180.14	Sr III	100	2190.76	Cr III	40 p	2202.95	Co II	4200 c	2214.26	Re II
200	2180.29	P V	3	2190.77	Er III	2000	2203.15	Ce III	10 w	2214.45	Pr III
12	2180.41	Fe III	2	2190.84	In I	100	2203.22	Cr III	1600 r	2214.58	Cu I
800	2180.47	Ni II	50	2190.88	Sr III	10	2203.534	Pb II	2200	2214.58	Re I
5000	2180.64	Ce III	100	2191.15	Zr III	300 h	2203.80	Po	20	2214.66	Eu III
200	2180.89	Ne III	16000	2191.16	Y III	50	2203.86	Sr III	500	2214.7	Ba II
60	2181.00	Al I	5	2191.57	Be III	30	2203.88	Ne IV	250	2215.106	Cu II
1700 r	2181.72	Cu I	100	2191.58	Cr III	1300	2204.48	W II	800	2215.21	Mn III
800	2181.86	Mn III	740	2191.64	Ir I	1000	2205.13	Pr IV	10 w	2215.25	Pr III
20	2181.99	Co II	250	2191.839	Fe I	50	2205.28	In II	10	2215.34	Eu III
25	2182.14	Cs II	35	2192.05	Zr III	11	2205.46	Sc IV	420	2215.60	Ta II
50	2182.35	Pd II	15	2192.06	Ar III	10 w	2205.48	Pr III	35	2215.63	Au II
2	2182.40	In I	3000	2192.09	Ni II	5000	2205.55	Ni II	1000 r	2215.65	Cu I
1200	2182.71	Ta II	900	2192.268	Cu II	100	2205.85	Ge II	60	2216.07	La III
480	2182.90	W I	20	2192.50	Co II	60	2206.01	Nb III	300	2216.07	Ne III
800	2182.98	Tm III	540	2193.20	Ta II	8000	2206.03	Y III	6000	2216.48	Ni II
	2183.	Li II	120	2193.34	Yb IV	160	2206.09	N II	120	2216.67	Si I
400	2183.32	Yb IV	40	2193.35	Tc I	10 w	2206.26	Pr III	10000	2217.08	Rb II
200	2183.50	Hf III	300	2193.37	Pr IV	60	2206.33	Zr III	10 w	2217.12	Pr III
1000	2183.71	Ce III	200	2193.60	Co II	50	2206.62	Th III	120	2217.17	F III
50	2183.71	Cr III	1100	2193.88	Ta II	4000	2206.72	Ni II	30	2217.23	Eu III
300	2183.91	Tm III	10 w	2194.24	Pr III	40	2206.97	Zr III	20	2217.99	Sr IV
8	2184.06	Ar III	840	2194.39	Os II	100	2207.00	Rh III	1	2218.04	Ga I
100	2184.11	Au III	150 r	2194.49	Sn I	500	2207.14	Ta II	120	2218.06	Si I
100	2184.37	Mo III	440	2194.52	W II	90	2207.64	Ta IV	750	2218.108	Cu II
800	2184.60	Ni II	1000	2194.56	Cd II	300	2207.86	Rb II	3000	2218.11	Ce III
10	2184.68	Eu III	10	2194.81	Eu III	110	2207.98	Si I	12	2218.26	Fe II
960	2184.68	Os I	200	2195.44	Hf III	910	2208.09	Ir II	5	2218.43	Cd III
800 w	2184.87	Mn III	1700 h	2195.54	Li II	15	2208.41	Fe II	50	2218.91	Si I
100	2185.01	Cr III	15	2195.67	In II	300 r	2208.45	Sb I	30	2219.33	Eu III
600	2185.13	Mn III	400	2195.683	Cu II	6	2208.50	Sb II	20	2219.42	Eu III
30	2185.39	Tc I	1500	2196.03	Ta II	60	2208.61	Ca II	50	2219.50	Sr III
11	2185.43	Sc IV	150	2196.043	Fe I	60	2208.70	Cr III	50	2220.05	Sr III
2500	2185.50	Ni II	10 w	2197.25	Pr III	9	2208.74	Te I	70	2220.30	B II
850	2185.71	Yb II	2	2197.41	In I	290	2208.81	Mn I	1300	2220.37	Ir I
5000	2185.94	Tm III	4000 c	2197.45	La IV	10 p	2208.85	Fe III	15	2220.375	Ge I
270 h	2186.13	Yb IV	100	2197.62	Ge II	200	2209.35	Ne III	20	2220.38	Fe II
150	2186.42	P V		2197.79	Ca II	400 r	2209.65	Sn I	800	2220.40	Ni II
50 h	2186.451	Ge I	100	2197.89	Cr III	4	2209.67	Sn II	100	2220.51	Cs II
250	2186.486	Fe I	600	2197.99	Rb II	2	2209.75	Tl I	900	2220.55	Mn III
50	2186.76	Ag II	20	2198.14	Yb III	200	2209.806	Cu II	300	2220.67	Po I
60	2186.892	Fe I	10	2198.15	Er III	1400 d	2210.03	Ta II	150 r	2220.73	Sb I
60	2186.9	Bi II	600	2198.26	Rb II	60	2210.18	Zn II	10	2220.81	Ne IV
30	2187.01	Co II	150	2198.27	Yb IV		2210.19	Ta II	500	2221.06	Ni II
270	2187.17	Yb IV	100	2198.62	Cr III	750	2210.268	Cu II	790	2221.07	Ir II
120	2187.195	Fe I	340 r	2198.714	Ge I	4	2210.53	K II	1000 w	2221.12	La IV
2	2187.40	In I	10	2199.22	Ti III	100 r	2210.71	Tl I	10	2221.83	Fe III
1600	2187.43	Ir II	300 r	2199.34	Sn I	540	2210.82	Hf II	770	2221.84	Mn I
100	2187.79	Cd II	10	2199.52	In III	115	2210.89	Si I	100	2221.98	Sb I
240	2187.87	La II	1700 r	2199.58	Cu I	100	2211.02	Mo III		2222.	Li II
7	2187.888	Pb I	90	2199.58	Ta IV	40	2211.05	Sn I	5000	2222.01	Ce III
5	2188.13	Cd III	1500	2199.67	Ta II	3	2211.14	In I	200	2222.13	Po I
200	2188.20	N III	50	2199.74	Th III	150	2211.23	Ag III	14	2222.22	Sc IV
10	2188.22	Ar III	1300 r	2199.75	Cu I	110	2211.74	Si I	320	2222.61	Pt I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
900	2222.96	Ni II	10	2235.91	Fe III	460	2248.75	W II	300	2259.511	Fe I
10	2223.13	Eu III	1000	2236.14	Lu III	h	2249.21	Li II	290	2259.53	Ru I
50	2223.19	Mo III	2000	2236.22	Lu III	2000	2249.25	Ce III	65	2259.57	Ne I
10 w	2223.23	Pr III	1700	2236.73	Gd III	5	2249.30	I IV	10	2259.99	In I
200	2223.79	Rb II		2237.	Li II	150	2249.30	Pt I	150	2260.00	Co I
1700	2223.95	Gd III	10 w	2237.26	Pr III	3	2249.31	I III	5	2260.30	La I
1	2223.98	Er III	3	2237.34	Kr IV	480	2249.79	Ta II	1300 r	2260.53	Cu I
5	2224.43	Cd III	20	2237.425	Pb I	460	2249.80	W I	20	2261.26	In I
1	2224.43	I III	150	2237.59	Cr III	18	2249.98	Nb IV	2	2261.26	Th I
640	2224.46	Yb II	400	2237.72	Rb II	1700	2250.18	Gd III	150	2261.41	Y II
90	2224.64	Yb IV	12	2237.77	Ti III	500	2250.65	Rb II	840	2261.42	Ta I
120 r	2224.93	Sb I	1	2238.12	I III	1200	2250.76	Ta II	80	2261.57	Y II
5000	2225.08	Ce III	10	2238.16	Fe III	50	2250.790	Fe I	12	2261.59	Fe I
4	2225.13	In IV	20	2238.36	La III	50	2250.84	Rh III	260	2261.62	Ta I
6	2225.15	Sb II	100	2238.40	Ag III	25	2251.14	Zr III	10	2261.88	Eu I
2100 r	2225.70	Cu I	1100 r	2238.45	Cu I	60	2251.17	Sn I	175	2262.07	Ne I
15	2225.93	Na III	10	2239.06	Pr III	200	2251.43	Rb II	60	2262.210	Hg I
1700	2226.42	Re I	10	2239.42	Pr III	80	2251.45	Cr III	60	2262.23	Hg I
200	2226.72	Cr III	1400	2239.48	Ta II	14	2251.47	Na III	100	2262.26	Yb I
150	2226.780	Cu I	1200	2239.84	Gd III	30	2251.52	Pt II	990	2262.30	Ta I
900	2227.34	La IV	300	2240.11	Yb III	60	2251.874	Fe I	300 r	2262.51	Sb I
1000	2227.42	Mn III	10	2240.14	Eu III	30 h	2251.92	Pt II	2200 r	2263.08	Cu I
75	2227.42	Ne V	25	2240.16	Au II	1300	2252.15	Os I	200	2263.2	As I
1600 r	2227.78	Cu I	60	2240.31	Nb III	20	2252.72	F V	240	2263.21	Ne I
3000	2227.84	Ce III	20	2240.49	Sr IV	700	2253.07	Cl III	65	2263.39	Ne I
600	2227.98	Os I	30 h	2240.99	Pt II	150	2253.1	As IV	200	2263.54	Rb I
3000	2228.05	Ce III	400	2241.53	V III	100	2253.18	Mo III	80	2263.62	Au I
360	2228.25	Bi I	12 p	2241.54	Fe III	2100	2253.38	Ir I	150	2263.786	Cu I
80	2228.53	Na II	3	2241.66	In I	20	2253.38	Sr IV	18	2263.88	Au I
350	2228.868	Cu II	1	2242.11	Th IV		2253.49	Ir I	500	2263.94	Rb I
130	2228.88	Cs II	10 w	2242.15	Pr III	500	2253.85	Ni II	60	2264.389	Fe I
45	2228.88	Au II	5000	2242.29	Ce III	320	2254.01	Hf II	2000	2264.39	Re I
10	2229.18	F V	900	2242.618	Cu II	800	2254.19	Rb II	1000	2264.46	Ni I
10	2229.27	Fe III	2500	2242.68	Ir II	200	2254.55	Rb II	110	2264.54	Ne I
60	2229.53	Ag II	500	2242.68	Ni II	250	2254.58	Cs II	1400	2264.60	Os I
2500 r	2230.08	Cu I	350	2243.06	Y II	1000	2254.73	Ba II	830	2264.61	Ir I
20	2230.33	Ba III	200	2243.34	Tm III	260	2254.86	Ta II	2000	2264.85	Ce I
30	2230.33	Na III	1500	2243.75	Gd III	1	2255.03	Ga I	200	2264.91	Ne I
10 w	2230.35	Pr III	400	2243.98	Tm III	2100	2255.10	Ir I	1000	2265.02	Cd I
20	2230.41	Sr IV	10	2244.01	At I	160	2255.15	Hf II	5	2265.04	K I
1700	2230.61	Bi I	150	2244.10	Cr III	10	2255.49	Te I	10	2265.52	Te I
100	2230.66	Rh III	60	2244.19	Nb III	690	2255.52	Ru I	60	2265.63	Nb I
5	2230.70	In I	90	2244.20	Yb IV	440	2255.73	Re I	200	2265.67	Yb I
300	2230.86	Tm III	2300 r	2244.26	Cu I	25	2255.77	Fe II	300	2265.70	Pr I
30	2231.00	Zr III	100	2244.28	Yb III	440	2255.77	Ta II	250	2265.71	Ne I
30	2231.18	Au II	3000	2244.95	La IV	30	2255.79	In II	20	2265.74	Eu I
400	2231.25	Tm III	50	2245.36	Zr III	1400	2255.81	Ir I	7500 w	2265.91	La I
150	2231.28	Yb IV	65	2245.48	Ne V	2000	2255.85	Os II	10	2266.22	Tc I
100 r	2231.59	Pd II	100	2245.52	Pt II	2	2255.95	Er III	5	2266.26	In I
80 r	2231.72	Sn I	25	2245.58	Fe II	18	2256.001	Ge I	1100	2266.33	Ir I
100	2231.81	Cr III	8	2245.60	Er III	860	2256.19	Re I	250	2266.83	Hf I
5	2232.18	In III	800	2245.61	Ba II	360	2256.51	Ta II	50	2267.03	Sr I
16	2232.19	Na III	620	2245.76	Ir II	200	2256.73	Co II	80	2267.085	Fe I
4	2232.35	Er III	400 r	2246.05	Sn I	770	2256.76	La II	30	2267.19	Sn I
110	2232.41	Ne V	300	2246.06	Pr V	200	2257.03	Yb III	10	2267.42	Fe I
10	2232.43	Fe III	6	2246.07	Sn II	1300	2257.05	Gd III	80	2267.469	Fe I
10	2232.69	Fe III	300	2246.20	Pr V	1000	2257.21	Br IV	350	2267.61	Cs I
500	2232.91	V III	100 r	2246.43	Ag II	200	2257.82	Cs II	100	2268.00	Rb I
50 h	2233.11	Pt II	500	2246.51	Ag III	40	2257.83	Zr III	2000	2268.20	Ce I
90	2233.30	Yb IV	200	2246.68	Tm III	50	2257.92	Cr III	360	2268.28	Os I
100	2233.81	Cr III	20 h	2246.70	Na III	250	2258.02	Ne IV	500	2268.30	V I
40	2234.09	B III	20	2246.86	Pb I	25	2258.35	Cs II	190	2268.84	Pt I
70	2234.59	B III	25	2246.89	Pb I	350	2258.51	Ir I	1000	2268.90	Ir I
200	2234.59	Hf III	1000	2247.002	Cu II	25	2258.61	La III	400 r	2268.91	Sn I
1100	2234.61	Os I	5	2247.55	Hg I	500	2258.71	Ta II	500	2268.95	Cl I
10	2235.17	Eu III	240	2248.48	Ta II	1400	2258.86	Ir I	400	2269.10	Al I
60	2235.28	Er III	70	2248.56	Au II	20	2259.01	Pb V	120	2269.22	Al I
920	2235.44	Re I	7	2248.73	Ar III	500	2259.02	Te I	80	2269.36	Er I
200	2235.91	Cr III	75 r	2248.74	Ag II	1	2259.23	Ga I	10	2269.39	Eu I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
200	2269.39	Tm III	100	2280.08	Tm III	140	2288.57	Rh I	2000	2298.70	Ce III
220	2269.56	Ta II	30	2280.68	Ba III	120	2288.98	Sb I	2	2298.70	In I
400	2269.69	Mo II	950	2281.02	Ir II	990	2289.16	Ta II	300	2298.80	Rb II
150	2269.71	Mo III	7	2281.22	Ar III	50	2289.23	Cr III	70	2299.21	Cr IV
960	2270.17	Os I	100	2281.27	Tm III	150	2289.27	Pt I	80	2299.220	Fe I
2000	2270.21	Ni II	30	2281.43	Zr III	570	2289.32	Os I	100	2299.47	Cu III
180	2270.24	W II	100	2281.51	Nb III	1600	2289.98	Ni I	460	2299.53	Ir I
50	2270.862	Fe I	1600	2281.62	Re I	100	2290.36	Nb III	90	2299.59	Cr IV
40	2270.91	C V	40	2281.64	In II	80	2290.66	Cr III	4	2299.72	Ar IV
11	2271.33	Sc IV	660	2281.91	Ir I	35	2291.03	Si I	390	2299.77	Re I
95	2271.37	W I	10	2282.12	Tc I	6	2291.26	Kr IV	150	2299.85	Ti I
30 h	2271.72	Pt II	320	2282.19	Ta II	25	2291.40	Au II	150	2300.12	Rb III
740	2271.85	Ta II	7	2282.21	Ar III	100	2291.45	Pd III	300	2300.142	Fe I
150	2272.070	Fe I	1400	2282.26	Os II	50	2291.59	Th III	200	2300.35	O II
780	2272.09	Ru I	20	2282.26	Sn I	40	2291.62	Eu III	1000	2300.38	Gd III
5	2272.41	In III	10	2282.71	Tc I	5000	2291.71	Rb II	910	2300.50	Ir I
990	2272.59	Ta II	100	2282.86	Tm III	200	2291.98	Co II	3000	2300.65	Ce III
140	2272.61	Ti I	200	2282.98	Tm III	150	2292.40	Pt I	630	2300.78	Ni I
1000	2272.73	Br IV	150	2282.99	Yb III	1300	2292.51	Gd III	10	2300.85	Ar III
5	2272.84	In III	25	2283.30	Au II	300	2292.524	Fe I	10	2300.90	In III
50	2273.15	Zn II	30 d	2283.42	O II	180	2292.54	Ta II	8	2300.93	Si III
180	2273.28	Ti I	200	2283.52	Co II	1000	2292.86	V III	200	2301.0	As IV
100	2273.30	Cr III	840	2283.67	Os I	2	2293.0	Ge IV	100	2301.18	Th III
	2273.5	Be II	2	2283.75	In I	12	2293.03	Ar III	300	2301.40	Co II
100	2273.71	Sr III	700	2283.93	Cl III	10	2293.06	Fe III	160	2301.47	Ta II
350	2273.83	Cs II	100	2283.99	Yb III	30	2293.14	Ne IV	8	2301.49	Pb V
80	2273.92	Nb III	150	2284.086	Fe I	110	2293.32	O II	100	2301.60	Zr III
280	2274.38	Pt I	200	2284.22	Po	300 d	2293.38	Co II	50	2301.684	Fe I
2100	2274.62	Re I	10000	2284.34	Y III	150 r	2293.44	Sb I	20	2302.06	Hg I
100	2275.23	Nb III	80	2284.40	Nb III	400 h	2293.44	Br III	20	2302.065	Hg I
5200 c	2275.25	Re II	150	2284.44	Cr III	250	2293.49	Ne IV	280	2302.08	Nb II
80	2275.43	Cr III	330	2284.60	Ir I	2500 r	2293.84	Cu I	4000	2302.09	Ce III
6	2275.46	Ca I	10 w	2284.62	Pr III	2	2294.19	Ga I	15	2302.17	Ar III
50	2275.47	Mo III	360	2284.79	Tm II	170	2294.368	Cu II	440	2302.24	Ta II
50	2275.64	Mo III	30 d	2284.89	O II	80	2294.41	Fe I	2	2302.49	In I
150	2276.026	Fe I	160	2284.91	W I	2700	2294.49	Re I	290	2302.54	Ru I
150	2276.21	Rh II	130	2285.02	Ta II	530 d	2294.49	W I		2302.57	Li II
200	2276.258	Cu II	350	2285.17	Br II		2294.54	W II	140	2302.73	Ti I
100	2276.38	Cr III	320	2285.17	W I	500	2294.73	Tm III	440	2302.93	Ta II
12	2276.52	Ca III	790	2285.25	Ta II	200	2294.97	Mo III	610	2302.99	Re I
340	2276.58	Bi I	170	2285.38	Ru I	330	2295.08	Ir I	1000	2303.00	Ni II
10	2276.66	Pb V	50	2285.45	Tc I	160	2295.18	Ta	55	2303.06	Si I
130	2276.70	Ti I	13	2285.66	Na III	6	2295.48	Si III	1000	2303.12	Cu I
20	2276.85	Eu III	550	2285.79	Ne IV	60	2295.55	Cr III		2303.33	Li II
1000	2276.91	Tm III	1000	2286.15	Co II	370	2295.68	Nb II	100	2303.424	Fe I
95	2276.94	Lu II	100	2286.50	Ag III	15	2295.86	Fe III	300	2303.49	Ta II
620	2277.16	Hf II	200	2286.57	Tm III	2000	2296.21	Tm III	80	2303.58	Na II
5	2277.25	C V	600	2286.59	Ta II	200 r	2296.53	Pd II	150	2303.581	Fe I
800	2277.28	Ni II	100	2286.645	Cu II	400	2296.55	Ni II	1200	2303.72	Gd III
80	2277.47	Cr III	10000	2286.67	Zr IV	5	2296.81	Th IV	240	2303.83	W II
25	2277.52	Au II	25	2286.68	Cs II	800	2296.87	C III	500	2304.14	Rb III
510	2277.58	W I	200 r	2286.68	Sn I	10	2296.87	Si III	2700	2304.22	Ir I
600	2277.65	Er III	160	2286.69	N II	1000	2296.89	Gd IV	1400	2304.24	Ba II
50	2277.87	Sr III		2286.82	Li II	400	2297.14	Ni II	160	2304.25	Mo II
20	2277.92	C V	500	2286.82	Rb II	380	2297.31	Os I	80	2304.26	Mo III
240	2278.19	Ru I	5 h	2287.04	Si IV	190	2297.41	Lu II	20	2304.37	Eu III
5	2278.20	In I	400	2287.21	Tm III	200	2297.43	Tm III	150	2304.45	Rb III
400	2278.32	Ni II	150	2287.250	Fe I	250	2297.74	La III		2304.59	Li I
500	2278.34	Cl III	240	2287.27	Ta II	200	2297.787	Fe I	100	2304.64	Tm III
15	2278.42	Na III	50 h	2287.50	Pt II	1	2297.87	Ga I	45	2304.69	Au II
800	2278.77	Ni II	2900	2287.51	Re I	30	2298.04	Tl II	60	2304.78	Nb III
10	2279.10	Ar III	3	2287.6	Tl I	790	2298.05	Ir I	400	2304.82	Tm III
80	2279.36	Nb III	350	2287.60	Br II	100	2298.08	Tc I		2304.92	Li I
780	2279.57	Ru I	500	2287.65	Ni II	390	2298.09	Re II	5000	2305.03	Tm III
200	2279.85	Ta I	2000	2287.82	Ce III		2298.16	Ir I	300	2305.32	Yb III
80	2279.937	Fe I	1500 r	2288.022	Cd I	600	2298.169	Fe I		2305.36	Li I
190	2279.96	Ti I	350 r	2288.12	As I	50	2298.29	F IV	410	2305.47	Ir I
660	2280.00	Ir I	30	2288.20	Pt II	2	2298.33	In I	190	2305.67	Ti I
75	2280.03	Ag II	110	2288.44	N II	270	2298.33	W I		2305.83	Li I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
100 c	2306.05	In II	1100	2313.50	Gd III		2319.18	Li I	100	2326.	Bi IV
	2306.29	Li I	70	2313.53	Al I	220	2319.19	Re I	290	2326.09	W II
300 r	2306.46	Sb I	1700	2313.56	Gd III	10	2319.22	Fe III	100	2326.10	Pt I
680	2306.54	Re I	1400	2313.66	Ni I	10	2319.37	Ar III	200 d	2326.11	Co II
240	2306.59	W I	190	2313.75	Os II	10 w	2319.40	Pr III	5000	2326.19	Tm III
	2306.82	Li I	1400	2313.98	Ni I	200	2319.44	La II	500	2326.47	Co II
25	2306.86	In I	500	2314.05	Co II	100	2319.52	Th III	140	2326.47	Rh I
160	2306.97	Mo II	7	2314.15	Hg III	20 d	2319.66	V V	390 d	2326.56	W I
1500	2307.03	Gd III	220	2314.17	W I	50 d	2319.68	O II		2326.70	W I
210	2307.27	Ir I	10	2314.18	Pr III	500	2319.75	Ni II	50	2326.75	Mo III
1000	2307.40	Br IV	400	2314.18	V III	3	2319.92	Y III	100	2326.926	Th II
	2307.44	Li I	18	2314.201	Ge I	2600	2320.03	Ni I	10	2326.95	Fe III
10	2307.59	Pr III	200	2314.49	Yb III	370	2320.16	Re I	330	2326.99	Os I
25	2307.71	Cs II	25	2314.55	Au II	550	2320.18	Os I	100	2327.02	Tm III
10	2307.77	Pr III	80	2314.63	Cr III	80 r	2320.29	Ag II	10	2327.02	Ti III
800 d	2307.85	Co II	200	2314.88	Tm III	200	2320.358	Fe I	300	2327.25	Tm III
240	2308.04	Pt I	50	2314.95	Sr III	10	2320.41	Pr III	10000	2327.31	Y III
75	2308.12	Zr III	300	2314.96	Co II	140	2320.81	Yb II	100	2327.40	Fe II
10	2308.19	Si III	190	2315.02	W II	500	2320.96	Tm III	10	2327.69	Eu III
660	2308.31	Os I		2315.08	Li I	200	2321.07	Cd II	15	2327.88	Fe II
10	2308.41	Pr III	1000	2315.09	Gd III	130	2321.07	Cs II	24	2327.918	Ge I
100	2308.46	Ta II	2	2315.09	In I	230	2321.14	Hf II	70 d	2327.95	In II
910	2308.93	Ir I	460	2315.38	Ir I	1900	2321.38	Ni I	210	2327.98	Ir I
	2308.97	Li I	10 w	2315.46	Pr III	410	2321.45	Ir I	75	2328.31	W II
120	2308.999	Fe I	420	2315.46	Ta II	140	2321.56	Al I	6000	2328.50	Tm III
2600	2309.02	Co I	90	2315.50	Pt I	410	2321.58	Ir I	10 w	2328.56	Pr III
340	2309.02	W I	300	2315.65	Na II	460	2321.63	W I	2 h	2328.56	Si IV
100	2309.19	Er III	40	2315.68	Cs II	10 p	2321.71	Fe III	80	2328.64	Rh I
100	2309.27	Yb III	20	2315.75	Au II	95	2321.73	Rh I	300	2328.66	Re I
3	2309.32	In I	150	2315.89	Sb I		2321.88	Li I	40	2328.67	B II
2	2309.38	I III	2000	2315.89	La IV	150	2322.01	Ru I		2329.02	Li I
30 h	2309.56	Ag I	140	2315.98	Tl I	30 d	2322.15	O II	6000	2329.29	Tm III
2	2309.75	In I	1000	2316.04	Ni II	300	2322.27	Au III	3	2329.3	Kr IV
110	2309.82	Rh I	30 d	2316.12	O II	580	2322.47	Hf II	1900	2329.35	Gd III
	2309.88	Li I	220	2316.49	N II	800	2322.49	Re I	3	2329.58	Mg II
50	2309.92	Nb III	160	2316.69	N II	350	2322.58	Rh I	120	2329.77	Tm II
50	2309.99	Cr III	30 d	2316.79	O II	240	2322.68	Ni I		2329.84	Li II
15	2309.99	Na III	100	2316.85	Cr IV	200	2322.83	Tm III	940	2329.96	Ni I
700	2310.04	Ag III		2316.95	Li I	40	2323.03	B II	50	2330.22	Nb III
30	2310.33	Sr III	9	2317.00	Ar III	1400	2323.12	Gd III	2500	2330.42	V III
	2310.94	Li I	285	2317.05	N II	2400	2323.14	Co I	240	2330.46	Mo I
2000	2310.96	Ni I	70 r	2317.05	Ag II	1700	2323.18	Gd III	200	2330.87	Tm III
50	2310.96	Pt II	200 p	2317.06	Co II	15	2323.20	Hg I	150	2330.93	Mo III
100	2311.	Bi IV	1400	2317.16	Ni I	300	2323.25	Hf II	60	2331.10	Ba III
20000	2311.16	Tm III	600 r	2317.23	Sn I	30	2323.40	In II	100	2331.29	Ta II
10	2311.29	Pr III	500 h	2317.30	Br II	600	2323.50	Cl III	100	2331.31	Fe II
10	2311.44	Pr III	5000	2317.34	Ce III	35	2323.51	Ba III	15	2331.35	Ti III
2500 r	2311.47	Sb I	400	2317.35	Tm III	100	2323.71	Tm III	140	2331.36	Yb IV
500	2311.60	Co II	15	2317.47	Ar III	100	2323.77	Tm III	80 r	2331.40	Ag II
10	2311.92	Eu III	90	2317.48	Al I	2200	2323.78	Gd III	15	2331.66	Ti III
15	2312.08	Ca III	10 p	2317.70	Fe III	500	2323.82	V III	500	2331.75	V III
	2312.11	Li I	480	2317.80	Ru I	310	2323.98	Os I	3000	2331.80	Tm III
1700	2312.34	Ni I	12	2318.04	Ar III	40	2324.06	Cr IV	15	2331.97	Fe II
250	2312.46	Rb III	500	2318.06	V III	660	2324.24	Os I	690	2331.98	Ta II
60	2312.49	Al I	90 w	2318.09	N IV	5000	2324.31	Ce III	110	2332.12	Mo II
10 h	2312.60	Ag I	10	2318.15	Pr III	300 p	2324.31	Co II	550	2332.19	Ta II
440	2312.60	Ta II	220	2318.29	Pt I	5	2324.41	In I	150	2332.418	Pb I
5000	2312.72	Tm III	10	2318.36	Pr III	100	2324.43	Tm III	1000	2332.54	Tb IV
1000	2312.77	Cd II	55	2318.36	Rh I	120	2324.50	Hf II	3	2332.76	In I
230	2312.97	Re I	10000	2318.64	Ce III		2324.6	Be II	150	2332.8	Se I
30 d	2313.05	O II	10	2318.64	Pr III	500	2324.62	Tm III	300	2332.80	Fe II
150	2313.104	Fe I	10	2318.82	Pr III	70 r	2324.68	Ag II	200	2332.97	Hf II
440	2313.17	W I	10	2318.97	Pr III	80	2324.68	Th III	250	2333.01	Rb II
90 d	2313.21	In II	400	2319.00	V III	150	2324.88	Cr III	540	2333.30	Ir I
300	2313.29	Br III	60	2319.06	Al I	300	2324.89	Hf II	2000	2333.39	Rb II
100	2313.30	Nb III	100	2319.07	Cr III	3	2324.92	In I	130	2333.77	W II
220	2313.34	Re I	95	2319.10	Rh I		2325.11	Li I	740	2333.84	Ir I
200 h	2313.44	Hf III	10	2319.13	Ar III	1400	2325.79	Ni I		2333.94	Li I
	2313.49	Li I	260	2319.16	Ta II	130	2325.94	Mo I	110	2334.13	Ta II

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
400	2334.20	V III	600	2340.64	Cl III	100	2349.81	Rb III	280	2357.10	Pf I
270	2334.33	Re I	290	2340.69	Os I	350 r	2349.84	As I	30 h	2357.18	Si II
15	2334.34	Ti III	240	2340.69	Ru I	5000	2350.10	Ce III	240	2357.25	Os I
30	2334.40	Si II	4	2340.84	I IV	20	2350.17	Si II	250	2357.30	Ta I
200 c	2334.46	Pr IV	3	2340.85	I III	230	2350.23	Os II	20	2357.34	Sr IV
580	2334.50	Ir I	70	2340.92	Tm II	120 d	2350.37	W II	230	2357.53	Ir II
10	2334.56	Eu III	200	2340.94	Ta II	10	2350.38	Eu III	25	2357.85	Cs II
310	2334.56	Os I	500	2341.20	Ni II	3	2350.43	I III	10	2357.87	Eu III
80 h	2334.57	In II	210	2341.37	W I	220 d	2350.46	Re I	20	2357.90	Sn I
500	2334.58	Ni II	190	2341.59	Mo II	200	2350.51	Eu III	170	2357.91	Ru II
30	2334.61	Si II	200	2341.61	Ta II	20	2350.66	Be I	70	2357.92	Ag II
190	2334.77	Rh II	500	2341.74	Tm III	60	2350.71	Be I	700	2357.96	Te IV
50	2334.79	Sr III	100	2341.90	Rb III	50 d	2350.75	In II	50 h	2357.97	Si II
300 r	2334.80	Sn I	300	2342.04	Tm III	200	2350.83	Be I	300	2358.04	Rb II
180	2334.88	Ta II	2100	2342.74	Gd III	250	2350.84	Ne IV	410	2358.16	Ir I
120	2334.96	Ru II	190 h	2342.85	Ru I	50	2351.20	Fe II	3	2358.5	Kr IV
2100	2335.01	Gd III	10	2343.10	Eu III	540	2351.22	Hf II	110	2358.51	Er II
400	2335.01	Tm III	500	2343.10	V III	50	2351.32	Pd II	40	2358.69	Er III
2000	2335.27	Ba II	80	2343.13	Cs II	310	2351.33	Ru I	5	2358.70	In I
150	2335.50	Th III	1600	2343.18	Ir I	7	2351.67	Ar III	500	2358.73	V III
270	2335.73	Re I	230	2343.32	Hf II	15	2351.67	Fe II	10	2358.79	Er III
140	2335.75	Ta II	2	2343.37	Ge IV	90	2351.99	Ta II	60	2358.81	W II
1400	2335.99	Co I	600	2343.49	Fe II	680	2352.07	Re I	2358.93	Li I	
1600	2336.02	Gd III	740	2343.61	Ir I	10	2352.28	Eu III	10	2359.08	Eu III
220	2336.10	Re I	130	2343.64	Ta II	25	2352.31	Fe II	200	2359.12	Fe II
10 w	2336.13	Pr III	430	2343.74	Os I	55	2352.47	Rh I	10	2359.14	Ti IV
500	2336.45	Cl III	80	2343.96	Fe II	20	2352.48	Hg I	170	2359.16	Ta II
300	2336.47	Hf III	80	2344.12	Nb III	450	2352.52	Ne IV	55	2359.18	Rh I
4	2336.75	Kr IV	10	2344.20	Si II	80	2352.61	Mo I	15	2359.233	Ge I
10 p	2336.77	Fe III	150	2344.28	Fe II	100	2352.62	Ir I	2800	2359.31	Gd III
720	2336.80	Os II	100	2344.59	Tm III	180	2352.65	Au I	50	2359.33	Er III
3	2336.88	Li II	250	2344.61	Po I	1000	2352.66	Gd IV	10	2359.50	Ti IV
5	2336.91	Li II	860	2344.78	Re I	1600	2352.85	Co I	16	2359.53	Pb IV
400	2336.93	Br II	25	2344.98	Fe II	360	2352.99	Os I	15	2359.59	Fe II
200	2336.94	Zr V	9	2345.17	Ar III	110	2353.02	Hf I	600	2359.67	Cl III
10	2336.96	Eu III	50	2345.34	Fe II	20 h	2353.09	Si II	100	2359.76	Mo III
	2337.0	Be I	200	2345.37	Rb III	400	2353.10	Tm III	150	2360.00	Fe II
2	2337.00	Li II	55	2345.41	Rh I	350	2353.11	Rb II	10 h	2360.20	Si II
200	2337.07	Rb III	20	2345.43	Hg I	200 d	2353.41	Co II	9	2360.26	Ar III
200	2337.33	Hf II	20	2345.440	Hg I	2000	2353.42	Co I	120	2360.29	Fe II
460	2337.49	Ni I	1200	2345.54	Ni I	2	2353.46	I III	3	2360.34	Sn II
2000	2337.66	Ce III	500	2345.61	Tm III	30	2353.47	Fe II	50	2360.40	Cr IV
160	2337.82	Ni I	260	2345.75	Os I	15	2353.68	Fe II	580	2360.44	W I
270	2337.95	Re I	8	2345.90	In I	170	2353.86	Ta II	30	2360.51	Fe II
200	2337.97	Yb III	100	2346.42	Ta II	210 d	2353.95	Re I	140	2360.56	Ru I
200	2338.01	Fe II	2500	2346.52	Gd III	300	2353.96	Rb II	160	2360.63	Ni I
100	2338.09	Nb III	5	2346.56	In I	50	2354.20	Y I	10	2360.65	Eu III
3	2338.24	Ga I	190	2346.63	Ni I	130	2354.44	Cs II	500	2360.73	Ir I
300	2338.28	Ta II	18	2346.79	Ti III	50	2354.48	Fe II	1900	2360.87	Gd III
1000	2338.36	Tm III	10	2346.83	Eu III	320	2354.61	W I	40	2361.08	Yb III
1	2338.60	Ga I	50	2346.97	Sr IV	1000 r	2354.84	Sn I	260	2361.09	Ta I
430	2338.63	Os I	430	2347.38	Os I	40	2354.89	Fe II	7	2361.13	I IV
1600	2338.67	Co I	200	2347.39	Co II	580	2355.00	Ir I	1000	2361.23	Tm III
10	2338.96	Fe III	300	2347.43	Tm III	80	2355.22	Mo I	2300	2361.91	Gd III
1900	2338.97	Gd III	320	2347.44	Hf II	120	2355.22	Ta II	300	2361.92	Rh I
17	2339.00	Ti III	400	2347.52	Ni I	120	2355.28	Os II	40	2362.02	Fe II
200 c	2339.08	Pr IV	190	2347.58	Ba II	750	2355.31	La IV	200	2362.06	Ni I
30 d	2339.31	O II	10	2347.64	Eu III	80	2355.42	Mo II	100	2362.06	Nb III
10	2339.84	Eu III	200	2348.11	Fe II	150 h	2355.48	Hf III	50	2362.31	Pd II
1600	2339.88	Gd III		2348.22	Li I	80	2355.54	Nb III	1400	2362.38	Gd III
25	2340.06	Au II	4	2348.27	Kr IV	100	2355.65	Tm III	310	2362.41	Os I
100	2340.13	Sr III	250	2348.30	Fe II	170	2356.05	Ta II	80	2362.50	Nb III
	2340.15	Li I	750	2348.36	La IV	100 h	2356.30	Si II	2000	2362.54	Ce III
170	2340.18	Pt I	950	2348.61	Be I	250	2356.50	Re I	250	2362.68	Ne IV
10	2340.19	In I	90	2349.21	Nb III	140	2356.90	Ta II	900	2362.77	Os I
190	2340.47	Mo I	75	2349.26	W II	260	2356.91	Dy II	160	2362.78	Ta II
60	2340.51	Cr III	190	2349.34	Ru I	240	2356.92	Os I	50	2362.89	Yb II
5	2340.57	Hg I	230	2349.39	Re I	400	2356.97	Rb II	2500	2363.04	Ir I
100	2340.58	Th III	10 h	2349.54	Si II	3000	2357.05	Tm III	100	2363.06	Th III

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
850	2363.07	W I	30	2369.99	Yb III	10	2376.42	Eu III	1000	2382.04	Fe II
2100	2363.26	Gd III	170	2370.17	Ru I	120	2376.43	Fe II	3000	2382.28	Ce III
250	2363.28	Ne IV	140	2370.22	Al I	7	2376.46	I IV	100	2382.40	Au III
130	2363.32	Ta II	600	2370.37	Cl III	4	2376.47	I III	1000	2382.46	V III
20	2363.76	Eu III	25	2370.50	Fe II	40	2376.82	Cd II	110 d	2382.63	In II
500	2363.80	Co II	500	2370.70	Os I	2600	2377.03	Os I	270	2382.89	Rh I
60	2363.86	Fe II	70	2370.73	Al I	5000	2377.07	Ce III	20	2382.90	Fe II
120	2363.91	Tm II	220	2370.76	Re II	10	2377.07	Er III	210	2382.99	W I
500	2363.97	Tm III	300	2370.76	Ta II	20	2377.22	Yb III	20	2383.06	Fe II
60	2364.22	W II	100 r	2370.77	As I	20	2377.23	Eu III	210	2383.17	Ir I
600	2364.24	Ta II	3	2370.99	Si IV	250	2377.28	Ir I		2383.20	Li II
300	2364.27	Rb II	2500	2371.06	V III	50	2377.28	Pt II	60	2383.25	Fe II
200	2364.32	Rb II	480	2371.18	Os I	5000	2377.48	Ce III	1200	2383.26	Te I
70	2364.37	Mo I	3	2371.29	Ga I	2	2377.53	Ga II	130	2383.33	Cr I
80 h	2364.71	Cr I	100	2371.42	Th III	120	2377.57	Hf III	230	2383.40	Rh I
130	2364.81	Cs II	120	2371.430	Fe I	260	2377.61	Os I	300 p	2383.45	Co II
200	2364.83	Fe II	2	2371.45	I III	190	2377.84	Th II	150	2383.52	Mo I
200	2365.15	Rb II	210	2371.52	Re I	250	2377.98	Ir I	250	2383.540	Hf III
1600	2365.22	Gd III	320	2371.58	Ta I	10 w	2378.06	Pr III	10	2383.62	Eu III
200	2365.32	Re I	160	2372.07	Al I	20	2378.13	Fe II	300 h	2383.64	Sb I
200	2365.43	Yb III	350	2372.16	Ne IV	15	2378.14	In I	130	2383.64	Pt I
110	2365.49	Ne IV	60	2372.16	Pd II	150	2378.31	Ta II	150	2383.68	Tm II
10	2365.52	Pr III	140	2372.27	Mo I	100	2378.32	Hg I	170	2383.72	Ta II
80	2365.70	Nb III	10000	2372.34	Ce III	100	2378.325	Hg I	40	2384.00	V II
80	2365.76	Fe II	6	2372.45	I IV	60	2378.40	Al I	60	2384.17	Zr I
1200	2365.90	Re I	3	2372.45	I III	75	2378.53	Re II	65	2384.20	Ne IV
45	2365.96	Tm II	100	2372.73	Nb III	400	2378.62	Co II	240	2384.28	Ta II
90	2365.98	Hf II	3500	2372.77	Ir I	10 w	2378.97	Pr III	40	2384.28	V I
50	2366.09	Mo II	20	2373.06	Te II	2000 c	2378.98	Pr IV	50	2384.39	Fe II
500	2366.31	V III	850	2373.12	Al I	10	2379.00	In I	35	2384.52	Ti I
25	2366.59	Fe II	200	2373.21	Rb II	20	2379.144	Ge I	4	2384.54	Sn II
2	2366.76	Si IV	100	2373.30	Hf III	800	2379.17	Gd IV	240	2384.62	Os I
30	2366.97	Si II	170	2373.35	Al I	80	2379.27	Fe II	40	2384.65	Rh I
460	2367.05	Al I	20	2373.36	Mn II	400	2379.37	La III	670	2384.82	W I
160	2367.11	Tm II	2000	2373.38	Gd III	500	2379.38	Ir I	1400	2384.86	Co I
50000	2367.23	Y III	150	2373.48	Re II	900	2379.39	Os I	350	2384.95	Ne IV
50	2367.24	Ta II	20	2373.54	Li I	20	2379.41	Fe II	3000	2385.06	Ce III
500	2367.35	Os II	110	2373.57	Al I	1000 c	2379.66	Pr IV	50	2385.24	Y
50	2367.46	Yb III	300	2373.624	Fe I	900 h	2379.69	Tl I	4	2385.28	I IV
300	2367.51	Rb II	400 h	2373.67	Sb I	370	2379.77	Re I	2000	2385.34	Rb II
110	2367.61	Al I	150	2373.74	Fe II	20	2380.00	Hg I	7	2385.40	He II
200	2367.64	Er III	30	2373.83	Y	20	2380.004	Hg I	900	2385.65	Gd IV
570	2367.68	Re I	100	2373.94	Ta II	10000	2380.12	Ce III	130	2385.73	Ta I
4	2367.74	I III	20	2374.08	Eu III	40	2380.20	Fe II	1500	2385.78	Te I
5	2367.75	I IV	20	2374.26	Si II	250	2380.30	Hf II	270	2386.14	Rh II
2000	2367.77	Ce III	1300	2374.29	Gd III	100	2380.41	Mo I	200	2386.36	Co II
75	2367.92	Pd II	60	2374.42	Zr I	150	2380.44	Rb III	350	2386.45	Br II
20	2368.04	Eu III	510	2374.47	W I	1400	2380.48	Co I	100	2386.58	Er II
370	2368.04	Ir II	120	2374.518	Fe I	4	2380.55	Hg III	120	2386.58	Ir II
110	2368.11	Al I	30	2374.84	Rh III	60	2380.72	Sn I	240	2386.58	Ni I
16	2368.12	Bi II	18	2374.99	Ti III	120	2380.76	Fe II	500	2386.70	Br II
500	2368.17	Cu III	50 h	2375.02	Ag I	65	2380.81	Ti I	40	2386.81	Pt I
12	2368.25	Bi II	95	2375.06	Os II	100	2381.00	Hf II	100	2386.85	Ag III
180	2368.28	Pt I	320	2375.07	Re I	440	2381.13	Ta II	1300	2386.89	Ir I
22	2368.33	Sn II	290	2375.09	Ir II	135 r	2381.18	As I	180	2386.90	Re II
110	2368.34	Rh I	60	2375.19	Fe II	80	2381.25	Er III	80	2386.96	Mo III
180	2368.53	Re II	10	2375.20	Eu III	100	2381.29	Rb III	60	2386.96	V I
80	2368.59	Fe II	240	2375.27	Ru I	1300	2381.38	Gd III	18	2386.99	Na III
10	2368.78	Pr III	1000	2375.32	Tm III	20	2381.40	Er III	20	2387.0	S IV
50	2368.91	Th III	1000	2375.42	Ni II	80	2381.47	Th III	1400	2387.06	Ta II
10	2369.08	Pr III	4000	2375.46	Eu III	240	2381.52	Ta II	110	2387.09	Nb II
290	2369.24	Os I	20	2375.50	Er III		2381.54	Li II	8	2387.11	I IV
520	2369.27	Re I	80	2375.63	Ru II	500 c	2381.59	Lu III	4	2387.12	I III
180	2369.30	Al I	700	2375.83	Tm III	540	2381.62	Ir I	120	2387.17	Er II
150	2369.32	Ta II	70	2375.91	Ta I	40	2381.75	Er III	20	2387.29	Eu III
80	2369.456	Fe I	100	2376.	Bi IV	200	2381.76	Co II	1700	2387.29	Os I
8	2369.73	Ra II	500 c	2376.09	Pr IV	10	2381.81	Eu III	130	2387.36	Dy II
150	2369.890	Cu II	20	2376.28	Au I	150	2381.835	Fe I	100	2387.41	Nb III
80	2369.95	Fe II	170	2376.40	Nb II	65	2381.95	Dy	140	2387.52	Nb II

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
120	2387.75	Au I	700	2393.29	Gd IV	20	2400.05	Fe II	10	2406.14	Eu III
1600	2387.82	Gd III	450	2393.36	Hf II	10	2400.49	Hg I	3000	2406.15	Ce III
20	2387.82	Te II	500	2393.58	V III	2400	2400.63	Ta II	40	2406.21	Zr III
10	2387.99	La III	5	2393.60	Er III	210 d	2400.72	Re I	130	2406.44	Hf II
50	2388.01	Zr I	230	2393.65	Re I	130	2400.78	Hf II	50 h	2406.47	In II
3	2388.05	Kr IV	550 r	2393.792	Pb I	190	2400.88	Bi I	130	2406.55	Ta I
80	2388.23	Nb III	670	2393.83	Hf II		2400.89	Re I	15	2406.59	Na III
45	2388.27	Nb II	1200	2393.86	Gd III	20	2401.00	Eu III	4000	2406.63	Tm III
50	2388.29	Pd II	40	2393.94	Kr III	100	2401.01	Na II	1500	2406.66	Cu I
40	2388.37	Fe II	17	2394.03	Na III	960	2401.13	Os I	250	2406.66	Fe II
80	2388.37	Ta II	330	2394.29	Os I	15	2401.29	Fe II	320	2406.70	Re I
340	2388.57	Re I	80	2394.33	O III	10	2401.63	Te II	120	2406.75	V I
300	2388.63	Fe II	320	2394.37	Re I	210	2401.68	Re I	80	2406.97	Fe II
300	2388.69	Br II	1	2394.39	Li I	70	2401.87	Pt I	2000 c	2407.10	La IV
2000	2388.77	Gd III	1000	2394.52	Ni II	320 r	2401.940	Pb I	5300	2407.25	Co I
180	2388.797	Pb I	10	2394.66	Eu III	1100 d	2402.06	Co I	20	2407.30	Eu III
500	2388.92	Co II	5000	2395.04	Ce III	140	2402.13	Ta II	60	2407.35	Hg II
60	2388.92	V I	220	2395.05	B II	260	2402.23	Os I	230	2407.59	Ir I
110	2388.95	Tm II	20	2395.15	Mg III	180	2402.29	Dy II	80	2407.88	Rh I
450	2388.96	Br II	100	2395.22	Sb I		2402.33	Li II	110	2407.90	V I
240	2389.08	W I	290	2395.39	Os I	20	2402.34	Eu III	150	2407.92	Ru II
20	2389.11	Eu III	40	2395.42	Fe II	700	2402.70	Gd IV	100	2408.01	I II
160	2389.11	Ta II	10	2395.44	Pr III	150	2402.71	Au III	4000	2408.08	Ce III
110	2389.20	Mo II	20	2395.62	Eu III	780	2402.72	Ru II	100	2408.15	Sn I
50	2389.21	Zr I	1000	2395.62	Fe II	2	2402.75	Er III	1000	2408.16	Br IV
10	2389.472	Ge I	10	2395.63	Ar III	75	2403.04	Re II	10	2408.19	Pr III
400	2389.52	Tm III	300	2395.69	Ag III	4	2403.05	I IV	27	2408.19	Rh I
8	2389.53	Fe III	700	2395.76	Gd IV	2	2403.06	I III	130	2408.26	Ta II
120	2389.53	Pt I	1100	2395.88	Os I	200	2403.09	Pt I	20	2408.32	Eu III
40	2389.54	In I	35	2396.17	Pt I	120	2403.337	Cu II	40	2408.39	Mo I
500	2389.69	Br II	500	2396.22	Gd IV	200	2403.54	Os I	1300	2408.41	Gd III
200	2389.973	Fe I	600	2396.27	Gd IV	140	2403.61	Mo II	140	2408.62	Cr I
10	2389.98	Eu III	70	2396.30	Ta I	50	2403.61	Mo III	360	2408.67	Os I
500	2390.07	Gd IV	110	2396.38	Er III	2	2403.63	I III	50	2408.76	In II
30	2390.10	Fe II	250	2396.40	Er III	100	2403.68	Ta II	450	2409.02	Tm II
120	2390.37	W II	95	2396.71	Ru II	330	2403.85	Os I	1200	2409.35	Gd III
200 d	2390.44	O III	15	2396.72	Fe II	50	2403.95	Yb III	290	2409.37	Ir I
2500	2390.62	Ir I	220	2396.78	Os I	20	2404.08	Eu III	10	2409.63	Eu III
170	2390.74	Yb II	320	2396.79	Re I	200 p	2404.16	Co II	10	2409.80	Pr III
20	2390.77	Fe II	730	2397.09	W II	50	2404.17	Sr III	240	2410.01	Dy II
75	2390.87	V I	200	2397.31	Re I	500	2404.18	V III	20	2410.04	Yb III
20	2391.11	Eu III	1200	2397.34	Gd III	50	2404.23	Nb III	20	2410.08	Eu III
2700	2391.18	Ir I	200	2397.38	Co II	75	2404.24	W II	370	2410.14	Hf II
75	2391.26	V I	560	2397.73	W I	50	2404.43	Fe II	290	2410.17	Ir I
15	2391.48	Fe II	70	2397.78	V I	90	2404.504	Th II	27	2410.25	Rh I
100	2391.48	Th III	1400	2397.87	Gd IV	70	2404.56	Hf II	2000	2410.26	Ce III
400	2391.74	Cu III	15	2397.885	Ge I	80	2404.58	Er III	270	2410.37	Re I
20	2391.90	Eu III	560	2397.98	W I	80	2404.66	Mo II	100	2410.47	Er III
6	2391.96	Er III	18	2398.02	Yb II	800	2404.88	Fe II	300	2410.52	Fe II
6	2392.00	I IV	70	2398.27	V I	80	2404.89	Nb III	30	2410.52	Sr III
3	2392.01	I III	160	2398.48	Nb II	1200	2405.03	Gd III	290	2410.73	Ir I
150	2392.15	Dy	8	2398.56	Ca I	1500	2405.06	Re I		2410.84	Li II
1300	2392.19	Lu II	20	2398.79	Eu III	95	2405.08	Os II	55	2410.89	Ru I
350	2392.21	Br II	40	2398.9	S IV	150	2405.12	Au III	240	2410.98	Os I
700	2392.30	Gd IV	10	2398.91	Er III	70	2405.15	Cr IV	200	2411.07	Fe II
400	2392.42	Br II	110	2399.00	Al III	55	2405.34	Nb II	75	2411.41	Ag II
160	2392.42	Ru I	120	2399.14	Lu II	540	2405.42	Hf II	75	2411.54	W II
20	2392.49	La III	12	2399.15	Ar III	290	2405.45	Os I	1000	2411.58	Br IV
20	2392.58	Fe II	110	2399.15	Ta I	800	2405.50	Cu III	110	2411.60	O II
10	2392.59	Eu III	10	2399.18	In I	45	2405.52	Zr I	5300	2411.62	Co I
2500 r	2392.63	Cu I	300	2399.24	Fe II	10 w	2405.56	Pr III	320 r	2411.734	Pb I
250	2392.86	Cs II	40	2399.349	Hg I	1700 d	2405.58	W I	50	2411.81	Fe II
85	2392.90	V I	40	2399.38	Hg I	740	2405.60	Re I	40	2412.02	Eu III
120	2392.93	W II	140	2399.597	Pb I		2405.69	W I	500	2412.21	Gd IV
60	2393.08	Er III	10	2399.70	Pr III	35	2405.81	Zr III	60	2412.33	Yb III
170	2393.18	Hf II	20	2399.729	Hg I	55	2405.85	Nb II	700	2412.34	Cu III
40	2393.18	In II	20	2399.73	Hg I	140	2405.86	Mo I	10	2412.40	Pr III
40	2393.20	B II	50	2399.92	Ta II	250	2405.94	Rb II	110	2412.44	Tm II
130	2393.28	Na II	70	2399.96	V I	200	2405.96	Os I	140	2412.46	Nb II

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
70	2412.71	Mo III	7	2418.24	Cd III	40	2423.21	Fe II	3	2428.04	Kr IV
300	2412.73	Ne III	55	2418.36	Ti I	50	2423.23	Tc I	80	2428.04	Pt I
1600	2412.76	Co I	15	2418.44	Fe II	60	2423.32	Cr IV	160	2428.10	Sr I
40	2412.84	Mo II	2	2418.45	I IV	70	2423.33	Ni I	500 c	2428.13	Pr IV
240	2412.94	Ne III	150	2418.46	Rb III	170	2423.48	Ta II	50	2428.20	Pt I
20	2412.96	Eu III	2	2418.49	I III	12	2423.52	Ar III	40	2428.23	Ti I
120	2413.01	Mo II	530	2418.53	Os I	70	2423.66	Ni I	110	2428.28	V I
10	2413.20	Ar III	55	2418.64	Rh	60	2423.84	Re II	30	2428.29	Fe II
90 r	2413.23	Ag II	50	2418.69	Cd II	3	2423.89	I IV	120	2428.36	Fe II
20	2413.26	Eu III	4	2418.69	Ga I	2	2423.91	I III	10 h	2428.45	Si II
540	2413.31	Ir I	140	2418.69	Nb II	12	2423.93	Ar III	2500	2428.58	Re I
150	2413.31	Fe II	75	2418.72	Pd II	75	2423.94	Rh	3000	2428.64	Ce III
90	2413.33	Hf II	150	2418.77	Ta II	90	2423.98	Ga III	45	2428.75	Hf I
2	2413.34	Be II	10	2418.82	Ar III	70	2424.00	Mo II	25	2428.80	Fe II
100	2413.409	Th II	2	2418.85	I III	70	2424.02	Os II	120	2428.99	Hf II
10	2413.41	Eu III	10	2418.95	Pr III	70	2424.03	Ni I	25	2429.03	Fe II
16	2413.46	Be II	65	2419.01	Mo II	150	2424.14	Fe II	25	2429.10	Pt I
600	2413.5	Se I	50	2419.06	In II	870	2424.21	W I	65	2429.16	Sc I
200	2413.50	Th III	10	2419.11	Eu III	95	2424.24	Ti I	10	2429.18	Yb III
200	2413.78	Ne III	100	2419.18	I II	120	2424.32	Ir I	40	2429.32	Eu III
25	2413.93	Y II	50	2419.20	In II	15	2424.36	Ga III	20	2429.39	Fe II
100	2413.94	Nb III	80	2419.21	Lu II	15	2424.39	Fe II	170	2429.39	W II
22	2413.99	Ti III	10	2419.25	Eu III	375	2424.40	P V	1000 r	2429.49	Sn I
320	2414.04	W I	900	2419.26	Gd IV	75	2424.49	Pd II	230	2429.52	Rh I
50	2414.13	Hg II	240	2419.31	Ni I	20	2424.54	Tc I	45	2429.60	Ru I
120	2414.32	Ta I	50	2419.34	W II	50	2424.54	Th III	10 d	2429.66	Eu III
4800	2414.46	Co I	60	2419.41	Zr II	500	2424.56	Os I	360	2429.71	Ta II
60	2414.50	Nb III	10	2419.58	Eu III	30	2424.59	Fe II		2429.81	Li II
290	2414.52	Os I	45	2419.75	Rh I	120	2424.66	Ir I	20	2429.86	In I
75 h	2414.6	Bi III	200	2419.81	Er III	300	2424.73	Na II	30	2429.86	Fe II
40000	2414.64	Y III	1200	2419.81	Re I	15	2424.81	Pb V	10	2430.04	Eu III
60	2414.73	Pd II	95	2420.02	Os II	50	2424.87	Pt II	120	2430.08	Fe II
55	2414.82	Ru II	100	2420.12	V I	210	2424.89	Ir I	5000	2430.24	Ce III
2	2414.85	I III	80	2420.18	Mo II	4100	2424.93	Co I	55	2430.26	Lu II
80	2414.89	Cs II	45	2420.18	Rh II	1400	2424.97	Os I	10 w	2430.32	Pr III
240	2415.21	Ta II	60	2420.396	Fe I	370	2424.99	Ir I	65	2430.43	Mo I
4800	2415.30	Co I	5	2420.456	Ar II	10	2425.33	Eu III	100	2430.94	Pd II
70	2415.33	Mo I	75	2420.65	Zr III	3	2425.43	Li I	10	2430.99	In I
120	2415.33	V I	130	2420.82	Ru I	80	2425.55	O II	25	2431.02	Fe II
5000	2415.60	Ce III	65	2420.98	Rh II	290	2425.66	Ir I	170	2431.06	Ta II
7	2415.61	Ar III	300	2420.99	Na II	50	2425.68	Eu III	580	2431.08	W I
610	2415.68	W I	50	2421.01	W II	130	2425.91	Ta II	380	2431.19	Os I
80	2415.84	Rh II	140	2421.03	Ta I	120	2425.98	Hf II	540	2431.24	Ir I
370	2415.86	Ir I	100	2421.06	V I	300	2426.09	Po I	10000	2431.45	Ce III
55	2415.96	Hf II	85	2421.23	Ni I	9	2426.10	I IV	10	2431.49	Eu III
2000	2416.13	Ni II	75	2421.30	Ti I	5	2426.12	I III	40	2431.51	Er III
30	2416.22	Tc I	50 h	2421.32	V IV	10	2426.14	Pr III	490	2431.54	Re I
700	2416.42	Cl III	28	2421.35	Yb II	450	2426.17	Tm II	380	2431.61	Os I
20	2416.45	Fe II	120	2421.65	Tm II	250	2426.35	Sb I	8	2431.65	Hg III
120	2416.75	V I	800 r	2421.70	Sn I	10	2426.36	Cd III	200	2431.68	Th III
320	2416.89	Ta II	250	2421.72	Po I	170	2426.53	Ir II	10	2431.76	Eu III
4	2416.9	Kr IV	300	2421.73	Re I	240	2426.81	Os I	40	2431.85	Rh II
160	2416.99	Nb II	150	2421.85	Ta II	10	2426.85	Pr III	1300	2431.94	Ir I
2000	2417.01	Ce III	300	2421.88	Re I	100	2426.87	Pd II	420	2432.18	Re I
130	2417.367	Ge I	100	2421.91	Nb III	500 c	2427.07	Pr IV	3300	2432.21	Co I
250	2417.5	As IV	100	2421.98	V I	65	2427.11	Rh II	80	2432.26	Fe II
25000 w	2417.58	La IV	30	2422.00	Eu III	70 h	2427.20	In II	170	2432.36	Ir I
16	2417.61	Pb IV	150	2422.13	Sb I	20	2427.38	Mn II	10	2432.55	Eu III
300	2417.65	Co II	50	2422.18	Mo III	190	2427.49	W II	100	2432.58	Ir I
320	2417.69	Hf II	560	2422.20	Y II	540	2427.61	Ir I	40	2432.66	Rh I
10	2417.69	Pr III	200	2422.47	Er III	360	2427.64	Ta I	480	2432.70	Ta II
90	2417.70	Ga III	60	2422.69	Fe II	40	2427.67	Eu III	25	2432.71	Cs II
220	2417.86	Ta II	150	2422.75	Dy II	130	2427.68	Rh I	50	2432.73	In II
80	2417.87	Fe II	80	2422.84	O III	50	2427.72	Mn II	60	2432.87	Fe II
80	2417.96	Mo II	10	2422.90	Eu III	170	2427.79	Cl II	65	2432.93	Ru I
530	2417.99	Os I	55	2422.92	Ru I	70	2427.90	Os II	100	2433.11	Pd II
100	2418.06	Pt I	2000	2423.02	Ce III	30	2427.94	Mn II	35	2433.22	Ti I
620	2418.11	Ir I	200	2423.07	Os II	200	2427.94	Th III	20	2433.43	Yb III
60	2418.20	Re II	60	2423.089	Fe I	2600	2427.95	Au I	3	2433.50	Ce IV

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
1	2433.52	Sn II	80 d	2438.83	O III	300	2445.55	O II	20	2451.24	Eu III
50 h	2433.53	V IV	5	2438.88	Ga II	100	2445.57	Fe II	270	2451.35	W I
250	2433.56	O II	20	2438.93	Sr IV	15	2445.71	Ge IV	780	2451.48	W II
130	2433.57	Hf II	2400	2439.05	Co I	40	2445.80	Fe II	40	2451.58	F IV
130	2433.59	Ta II	200	2439.14	Na II	4000	2445.99	Eu III	4	2451.7	Kr IV
10	2433.65	Eu III	150	2439.30	Fe II	360	2446.02	Os I	10	2451.73	Eu III
75	2433.80	Nb II	20	2439.31	Yb III	200 d	2446.03	Co II	530	2451.73	Os I
630	2433.98	W I	30	2439.433	Th I	150	2446.1	As IV	8	2451.83	Tl II
25	2434.06	Fe II	150	2439.74	Fe I	50	2446.11	Fe II	65	2451.87	Nb II
360	2434.07	Cl II	15000	2439.80	Ce III	150	2446.17	Pd II	870	2452.00	W I
19	2434.10	Ti I	260	2439.84	Dy II	160 r	2446.181	Pb I	10	2452.02	Pr III
400	2434.17	Rb II	500	2439.84	Gd IV	140	2446.39	Er II	120	2452.07	F III
10 w	2434.18	Pr III	200	2439.91	Ta I	160	2446.39	W II	70	2452.12	Si I
10	2434.19	Eu III	650	2440.06	Pt I	30 h	2446.43	Eu III	10	2452.16	Co III
20	2434.24	Fe II	80	2440.11	Fe I	60	2446.45	Nb III	200	2452.18	Na II
10	2434.39	Pr III	35	2440.21	Ti II	30	2446.47	Fe II	35	2452.30	Hf II
20	2434.65	Fe II	10	2440.26	Eu III	75	2446.72	Pd II	100	2452.42	Pd III
50	2434.73	Fe II	65	2440.28	Mo II	10	2446.77	Pr III	30	2452.49	Mn II
45	2434.74	Hf II	330	2440.34	Rh I	50 h	2446.80	V IV	910	2452.81	Ir I
6	2434.85	I IV	600	2440.38	Gd IV	20	2446.90	Hg I	10 w	2452.81	Pr III
3	2434.88	I III	40	2440.42	Fe II	20	2446.900	Hg I	10 w	2452.85	Pr III
50	2434.95	Fe II	20	2440.43	Yb III	610	2446.98	Re I	60	2453.23	In II
60	2435.01	W II	50	2440.67	Eu III	600	2447.14	Cl III	110	2453.34	Hf II
100 d	2435.14	Eu III	450	2440.93	P V	100	2447.17	Ta I	100	2453.476	Fe I
270	2435.14	Ir I	65	2440.98	Ti I	40	2447.20	Fe II	20	2453.84	Be II
300	2435.15	Si I	5	2441.06	Hg I	390	2447.25	Hf II	530	2453.90	Os I
500	2435.31	Tm III	200	2441.24	P V	25	2447.26	Yb II	65	2453.95	Nb II
100	2435.32	Pd II	200	2441.24	Th III	25	2447.33	Fe II	20	2453.98	Fe II
110	2435.52	V I	25	2441.41	Sr IV	30	2447.45	Ru I	85	2453.99	Ni I
20	2435.83	Tc I	340 c	2441.47	Re I	200 p	2447.69	Co II	250	2454.0	As IV
10	2435.91	Pr III	250	2441.50	Na II	60	2447.709	Fe I	50	2454.03	Sr III
40	2435.95	Nb II	3000	2441.55	Ce III	8	2447.71	Ar IV	10000	2454.32	Ce III
65	2435.96	Mo II	1000 r	2441.64	Cu I	30	2447.75	Fe II	100	2454.48	Ta I
1800	2435.96	W I	40	2442.14	Nb II	250	2447.76	Ir I	30	2454.58	Fe II
100	2436.01	Tb IV	30	2442.37	Fe II	100	2447.90	In II	10	2454.60	Pr III
80 d	2436.06	O II	130	2442.39	Ta I	1100	2447.91	Pd I	430	2454.72	W I
35	2436.33	Nb I	230	2442.51	Re I	80	2447.93	Ag II	10	2454.82	Pr III
20	2436.39	Eu III	100	2442.57	Fe I	80	2448.15	Pd II	110	2454.91	Os II
30	2436.412	Ge I	200	2442.63	Co II	10	2448.16	Pr III	65	2454.92	Ru I
10	2436.47	Te II	60	2442.63	In II	190	2448.23	Ir I	630	2454.98	W I
130	2436.51	Ta II	5	2442.68	Kr IV	270	2448.39	W I	200	2454.99	O III
25	2436.62	Fe II	28	2442.68	Nb II	20	2448.57	Eu III	90	2455.15	Dy II
250	2436.62	W I	25	2443.24	Cs II	600	2448.58	Cl III	30	2455.22	Eu III
2900	2436.66	Co I	65	2443.36	Si I	200	2448.72	Na II	60	2455.24	Sn I
180	2436.69	Pt I	7	2443.69	Ar III	65	2448.84	Rh I	780	2455.51	W I
10	2436.77	Eu III	60	2443.71	Fe II	100	2448.86	Zr III	180	2455.53	Ru II
10	2436.89	Pr III	150 r	2443.829	Pb I	15	2448.98	Sn II	1300	2455.61	Ir I
10	2436.99	Tc I	250	2443.872	Fe I	85	2449.03	Re II	500 c	2455.64	Pr IV
110	2437.07	Ta I	1200 p	2443.92	La IV	50	2449.04	Rh I	30	2455.70	Rh II
18	2437.08	Rh I	580	2444.06	W I	200	2449.372	O IV	15	2455.71	Fe II
30	2437.37	Mn II	100	2444.13	Ta II	140	2449.44	Hf II	200	2455.83	Re II
45	2437.42	Nb II	80	2444.26	O II	11	2449.48	Si III	230	2455.87	Ir I
10	2437.6	Bi III	50 h	2444.27	Rh I	85	2449.52	Re II	15	2455.90	Fe II
50	2437.74	Nb III	1000	2444.38	Eu III	6	2449.57	Mg II	150	2456.44	Ru II
100 r	2437.81	Ag II	2000	2444.44	Cu III	610	2449.71	Re I	530	2456.46	Os I
20	2437.84	Mn II	100	2444.51	Fe II	150	2449.85	Zr II	170 r	2456.53	As I
500	2437.89	Ni II	50	2444.58	Zr III	25	2449.96	Fe II	780	2456.53	W I
110	2437.90	Rh I	2000	2444.78	Ce III	200	2450.00	Co II	370	2456.57	Ru II
8	2438.17	Fe III	10 w	2444.93	Pr III	200	2450.040	O IV	50	2456.83	Cr III
60	2438.182	Fe I	250	2444.94	Re I	6	2450.08	Ga I	50	2456.92	F IV
100	2438.27	Yb III	35	2444.99	Hf I	1500 w	2450.08	Po I	100	2456.99	Nb III
500 c	2438.57	Pr IV	50	2445.11	Fe II	25	2450.20	Fe II	210	2457.03	Ir I
110	2438.62	Sc I	50	2445.212	Fe I	24	2450.44	Ti II	15	2457.09	Fe II
10	2438.63	Pr III	250	2445.34	Ir I	75	2450.56	Rh I	210	2457.23	Ir I
110	2438.64	Ta II	15	2445.38	Ge IV	30	2450.58	Ru I	100	2457.29	Pd II
50	2438.69	Te II	140	2445.47	Tm II	20	2450.63	F V	21	2457.44	Zr II
25	2438.70	Zr III	10	2445.49	Pr III	900	2450.74	Os I	1500	2457.598	Fe I
65	2438.77	Si I	5	2445.50	Ce IV	50 h	2450.87	V IV	60	2457.76	Pd II
10	2438.83	Eu III	400 r	2445.51	Sb I	60	2450.97	Pt I	500	2457.86	Tm III

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
55	2458.09	Nb II	460	2464.50	Yb I	80	2470.67	Fe II	100	2476.60	La III
65 h	2458.62	Ru I	10	2464.59	Yb III	75	2470.80	W II	60	2476.657	Fe I
10	2458.64	Yb III	60	2464.60	Er III	380	2470.90	Ta II	200	2476.67	Ta II
100	2458.68	Ta I	85	2464.70	Ru I	80	2470.965	Fe I	300	2476.71	Zr IV
150	2458.78	Fe II	100 h	2464.77	Kr II	35	2471.01	Pt I	25	2476.73	Ba III
65	2458.90	Rh II	130	2464.85	F III	75	2471.05	Re II	900	2476.84	Os I
40	2458.97	Fe II	40	2464.90	Fe II	100	2471.18	Pd II	85	2476.87	Ni I
800	2459.14	Rb II	90	2465.06	Hf II	500	2471.23	Tm III	100	2476.88	Ru I
1100	2459.30	W I	120	2465.09	Ir I	120	2471.38	Ta I	5000	2477.25	Ce III
25	2459.31	Na III	20	2465.09	Tc I	90	2471.40	Dy II	25	2477.34	Fe II
130	2459.64	Lu II	800	2465.149	Fe I	90	2471.47	Rh I	110	2477.38	Nb II
40	2459.69	B II	35	2465.67	Hf I	55	2471.58	Gd II	75	2477.43	Re II
6	2459.74	Kr IV	50	2465.91	Fe II	3000	2471.66	Ce III	15	2477.54	Rh II
10 w	2459.77	Pr III	15	2466.50	Fe II	150 h	2471.97	Mo I	70	2477.57	Mo II
40	2459.90	B II	230	2466.52	W II	160	2472.06	Ni I	150	2477.69	N IV
110	2459.99	Dy II	60	2466.67	Fe II	120	2472.13	Ta I	10	2477.78	Eu III
60	2460.08	In I	3	2466.68	I IV	50000	2472.20	Rb II	290	2477.80	W II
270	2460.16	W I	50	2466.68	Mo II	290	2472.28	Os I	200	2477.823	P IV
	2460.2	Li I	3	2466.69	I III	800	2472.336	Fe I	150	2478.070	P IV
28	2460.25	Yb II	35	2466.73	Nb I	40	2472.43	Fe II	210	2478.11	Ir I
50	2460.34	Nb III	60	2466.82	Fe II	30	2472.51	Rh I	150	2478.22	Ta I
60	2460.44	Fe II	1500 h	2466.84	Gd III	480	2472.51	W I	250	2478.256	P IV
50	2460.45	Nb III	3000 h	2466.85	Pa	50	2472.55	Pd II	65	2478.29	Nb II
450	2460.49	Hf II	1400	2466.85	W I	40	2472.60	Fe II	400	2478.32	Sb I
110	2460.5	S III	30	2466.87	Tc I	100	2472.88	Cr III	10 w	2478.32	Pr III
8	2460.55	Ra II	3	2466.96	I IV	1000	2472.895	Fe I	800	2478.56	C I
100	2460.55	Ta I	50	2466.97	Mo II	8	2472.95	Ar III	60	2478.57	Fe II
60	2460.61	Y II	3	2466.99	I III	130	2473.09	Rh I	50	2478.65	La III
10 w	2460.72	Pr III	130	2466.99	Ta II	150	2473.13	Ta I	100	2478.66	Ge II
90	2461.04	Rh II	870	2467.30	Ir I	200	2473.16	Fe I	120	2478.73	F III
390	2461.20	Re I	130	2467.37	Ta II	120	2473.31	Ta II	280	2478.93	Ru II
160	2461.27	N II	440	2467.44	Pt I	50	2473.32	Fe II	200	2479.02	Re I
80	2461.28	Fe II	200	2467.57	Re II	200	2473.40	Ne III	8000	2479.44	Ce III
10	2461.33	F V	60	2467.732	Fe I	10 w	2473.42	Pr III	120	2479.480	Fe I
200	2461.4	As IV	15	2467.75	Mg III	150	2473.72	Re II	3000	2479.51	Ce III
1800	2461.42	Os I	120	2467.85	Re II	200	2473.75	Zr IV	100	2479.77	Cr III
400	2461.74	Hf III	140	2467.97	Hf II	80	2473.84	Ag II	1200	2479.776	Fe I
10	2461.79	Eu III	30 h	2468.02	In I	100	2473.92	Hf II	65	2479.94	Nb II
40	2461.81	Mo II	10	2468.20	Pr III	50	2473.93	Th III	10	2479.98	Pr III
800 c	2461.84	Re II	100	2468.22	Gd II	30	2474.04	Ru I	20	2480.02	Eu III
100	2461.86	Fe II	15	2468.29	Fe II	30	2474.05	Fe II	770	2480.13	Tm II
10	2462.18	Pr III	500	2468.41	Cu III	5	2474.06	Kr IV	870	2480.13	W I
100	2462.181	Fe I	600	2468.60	Gd IV	1200	2474.15	W I	100	2480.16	Fe II
300	2462.39	Br III	80	2468.72	Nb III	600	2474.62	Ta I	40	2480.41	Cs II
2	2462.50	I III	50	2468.78	Mo II	20	2474.73	Na III	150	2480.44	Sb I
1500	2462.647	Fe I	18	2468.85	Na III	290	2474.78	Os I	8	2480.46	Sb II
10000	2462.76	Cm II	600	2468.879	Fe I	600	2474.814	Fe I	5	2480.56	Hg III
480	2462.79	W I	110	2468.90	Os II	10	2474.94	Eu III	2480.6	Be I	
65	2462.89	Nb I	10	2468.97	Pr III	10	2475.06	Li I	50	2480.70	Tc I
10	2462.90	Pr III	6	2469.03	Tl II	20	2475.11	Tc I	110	2480.93	Dy II
55	2462.94	Ru I	55	2469.08	Nb I	3300	2475.12	Ir I	390	2480.96	W I
130	2462.97	Ce II	1100	2469.14	Gd III	50	2475.12	Fe II	10	2481.02	Pr III
50	2463.29	Fe II	210	2469.18	Hf II	160	2475.17	Re II	15	2481.05	Fe II
30	2463.30	Eu III	80	2469.27	Lu II	120	2475.33	Ta I	28	2481.11	Ru II
30	2463.61	Rh I	150	2469.29	Pd II	8	2475.35	I IV	150	2481.15	Tm II
100	2463.66	Th III	150 c	2469.36	Re II	6	2475.36	I III	2100	2481.18	Ir I
80 w	2463.69	Tc I	60	2469.39	Nb III	110	2475.41	Ru I	55	2481.44	Hf II
50	2463.72	Nb III	60	2469.51	Fe II	10	2475.50	Ra II	1500	2481.44	W I
50	2463.730	Fe I	100	2469.62	Ag III	40	2475.54	Fe II	21 h	2481.72	Lu II
160	2463.82	Ta II	50	2469.73	Cd II	15	2475.64	Rh II	70 h	2481.81	Mo I
70	2463.97	Hf II	10000	2469.95	Ce III	80	2475.87	Nb III	120	2481.86	Ta II
40	2464.01	Fe II	30	2470.04	Mo II	130	2476.07	Cs II	40	2481.999	Hg I
15	2464.06	Hg I	80	2470.06	Pd II	7	2476.10	Ar III	40	2482.00	Hg I
15	2464.064	Hg I	130	2470.29	F III	10	2476.24	Eu III	25	2482.04	Rh I
430	2464.19	Hf II	75	2470.39	Rh I	15	2476.26	Fe II	100	2482.10	Ta I
200	2464.20	Co II	25	2470.41	Fe II	130 r	2476.378	Pb I	480 d	2482.10	W I
270	2464.30	W I	40	2470.51	Eu III	20	2476.40	Sn I	80	2482.12	Fe II
9	2464.45	Sc IV	120	2470.61	Re II	1700	2476.42	Pd I		2482.21	W I
30	2464.47	Eu III	20	2470.65	Rh III	20	2476.45	Eu III	25	2482.32	Fe II

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
1000	2482.36	Cu III	100	2487.066	Fe I	60	2492.48	Kr II	2600	2498.41	Os I
360	2482.43	Os I	55	2487.16	Hf I	25	2492.72	Tc I	140	2498.42	Ru II
65	2482.57	Mo II	1000	2487.17	Pt I	200	2492.84	Re I	240	2498.50	Pt I
100	2482.58	Ta II	75	2487.29	Zr II	3000 h	2492.85	Pa	340	2498.53	Cl II
300	2482.60	Br III	980	2487.33	Re I	75	2492.93	W II	140	2498.57	Ru II
55	2482.65	Hf I	120	2487.370	Fe I	60	2493.02	Nb III	80	2498.59	In II
100	2482.66	Fe II	70	2487.46	Gd II	620	2493.08	Ir I	200	2498.81	Pd II
30	2482.713	Hg I	150	2487.47	Rh I	1000	2493.15	Na II	200	2498.82	Co II
30	2482.72	Hg I	390	2487.50	W I	100	2493.18	Fe II	150	2498.90	Fe I
30	2482.79	Sr IV	130	2487.52	Tm II	4	2493.20	I IV	50	2499.00	Mn II
2	2482.82	Si IV	40	2487.93	Cd II	2	2493.21	I III	15	2499.02	Rh I
15	2482.87	Fe II	4000	2488.143	Fe I	500	2493.26	Fe II	45	2499.04	Gd II
100	2483.06	Cr III	30	2488.25	Ge IV	55	2493.29	Gd II	160	2499.1	S III
6	2483.20	Si III	60	2488.26	Cr III	20	2493.43	Tc I	10	2499.17	Eu III
50	2483.22	Tc I	300	2488.50	Br II	200	2493.44	O IV	350	2499.25	Br III
10000	2483.271	Fe I	4500	2488.55	Os I	65	2493.69	Ru II	21	2499.39	Eu II
20	2483.29	Eu III	110 d	2488.62	In II	200	2493.77	O IV	1300	2499.53	Gd III
10	2483.30	Pr III	600	2488.70	Ta II	20	2493.88	Fe II	100	2499.54	Tm II
50	2483.33	Rh I	110	2488.72	Gd II	60	2494.000	Fe I	100	2499.60	Rh I
300	2483.39	Sn I	10 w	2488.72	Pr III	40	2494.01	Kr III	140	2499.69	W II
13	2483.48	Sn II	60	2488.74	Nb III	85	2494.02	Ru I	100	2499.73	Nb III
300	2483.533	Fe I	25	2488.74	Pt II	10 w	2494.20	Pr III	85	2499.78	Ru I
25	2483.57	Sr IV	270	2488.77	W II	50	2494.251	Fe I	25	2499.81	Cd III
15	2483.72	Fe II	12	2488.86	Ar III	2	2494.27	I III	330	2499.92	Os I
10000	2483.82	Ce III	10	2488.91	Eu III	45	2494.48	Ru II	10	2499.97	Pr III
40	2483.82	Hg I	300	2488.92	Pd II	75 h	2494.51	Rh	40	2500.11	W II
40	2483.821	Hg I	100	2488.945	Fe I	35	2494.54	Be I	7	2500.19	Ga I
35	2483.88	Nb II	90	2488.95	In II	35	2494.58	Be I	40	2500.44	Mo II
1200	2483.92	Re I	390	2489.23	W II	100	2494.73	Be I	500	2500.54	Ge II
700	2483.94	Po I	5	2489.24	I IV	100	2494.74	I II	18	2500.57	Sr IV
10	2483.99	Pr III	4	2489.27	I III	2000	2495.16	Hf III	40	2500.58	Rh
100	2484.04	Ta II	30000	2489.44	Tm III	3	2495.16	I III	3	2500.71	Ga I
1000	2484.185	Fe I	80	2489.48	Fe II	300 h	2495.22	Br II	40	2500.92	Fe II
100	2484.19	P II	110	2489.6	S III	630	2495.26	W I	90 d	2500.99	In II
60	2484.24	Fe II	75	2489.61	Pd II	10 w	2495.37	Pr III	10	2501.0	Bi II
150	2484.37	F III	1000	2489.750	Fe I	10 w	2495.51	Pr III	100	2501.08	Th III
29	2484.40	W II	50	2489.83	Fe II	40	2495.58	Cd II	1000	2501.132	Fe I
30	2484.44	Fe II	30	2489.91	Ru I	85	2495.69	Ru II	40	2501.31	Fe II
7	2484.50	Hg III	50	2489.913	Fe I	200	2495.70	Sn I	2	2501.38	I IV
300	2484.56	Rb II	200	2490.12	Pt I	160	2495.82	Pt I	3	2501.41	I III
10 w	2484.60	Pr III	75	2490.16	Re II	100	2495.87	Fe I	140	2501.61	V I
700	2484.70	Rb II	200	2490.42	Yb III	370	2496.04	Re I	50	2501.693	Fe I
580	2484.74	W I	25	2490.42	Y I	2	2496.07	I III	370	2501.72	Re I
40	2484.75	Mo II	500	2490.46	Ta I	160	2496.2	S III		2501.90	W II
14	2484.89	Yb II	10	2490.50	Eu III	24	2496.24	Mo II	1000	2501.99	Zn II
500	2484.95	Ta I	700	2490.53	Po I	200	2496.25	Tm III	70	2502.02	Yb II
10 w	2485.16	Pr III	10	2490.54	Mg III	210	2496.27	Ir I	30 h	2502.12	Ac IV
40 h	2485.31	Mo I	170	2490.61	Dy II	170	2496.31	Cr I	40 w	2502.12	Pm II
100	2485.38	Ir I	3000	2490.644	Fe I	35	2496.35	Gd II	200 h	2502.18	Po
1	2485.38	Si IV	100	2490.71	Fe II	2000	2496.38	Rb II	330	2502.29	Os I
4	2485.51	I IV	100	2490.77	Rh II	45	2496.48	Zr II	570	2502.35	Re II
35	2485.67	Gd II	60	2490.86	Fe II	600	2496.533	Fe I	60	2502.39	Fe II
100	2485.792	Cu II	3	2491.00	Cd I	65	2496.56	Ru I	130	2502.46	Rh I
390	2485.81	Re I	290	2491.02	Os I	230	2496.64	W II	110	2502.53	Cr I
50	2485.990	Fe I	10	2491.08	Eu III	1000	2496.77	B I	250	2502.63	Ir I
50	2486.02	Nb III	700	2491.14	Br IV	100	2496.77	Tc II	200	2502.67	Rb II
70	2486.15	In II	2000	2491.155	Fe I	110	2496.83	N II	470	2502.74	Cl II
530	2486.24	Os II	100	2491.40	Fe II	10	2496.92	Eu III	18000 c	2502.81	La IV
800	2486.373	Fe I	250	2491.60	Tm II	70	2496.97	N II	65	2502.84	Mo II
200	2486.44	Co II	290	2491.69	Os I	290	2496.99	Hf II	300	2502.84	Na II
700	2486.46	Cu III	20	2491.69	Yb III	25	2497.03	Na III	170	2502.91	Ho II
20	2486.50	Tc I	18	2491.78	Ru I	95	2497.48	W II	4100	2502.98	Ir I
250	2486.52	Pd II	10	2491.97	Pr III	10000	2497.50	Ce III	40	2503.33	Fe II
100	2486.52	Sr III	2	2492.04	Er III	1000	2497.73	B I	3000	2503.56	Ce III
100	2486.691	Fe I	2000 r	2492.15	Cu I	14	2497.74	Ca III	20	2503.57	Fe II
120	2486.70	Ta I	30	2492.30	Rh I	50	2497.82	Fe II	50	2503.59	Sr III
500	2486.91	Cl III	25	2492.34	Fe II	90	2497.962	Ge I	15	2503.84	Rh II
10	2486.92	Eu III	360	2492.42	Os I	200	2498.22	Re I	60	2503.87	Fe II
10	2486.99	Sn II	10	2492.48	Eu III	85	2498.28	Mo II	300	2504.29	Rh II

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
190	2504.31	Cr I	350	2509.70	Rh I	25	2516.05	Ti III	4	2521.72	I III
170	2504.37	Ir I	170	2509.71	Ir I	500	2516.113	Si I	30	2521.82	Fe II
500	2504.39	Os I	70	2509.71	Os II	500	2516.14	V III	270	2522.04	W II
2000	2504.43	Ce III	30	2510.17	Tc I	30	2516.22	Cd II	15	2522.07	Yb III
600	2504.45	Ta I	250	2510.17	W I	18	2516.35	Yb II	200	2522.14	Eu III
260	2504.51	Os I	17	2510.26	Na III	80	2516.570	Fe I	250	2522.17	Tm II
570	2504.52	Co I	90	2510.31	Dy II	20	2516.60	Mn II	220	2522.23	N II
24	2504.54	Ti I	75	2510.47	W II	30	2516.74	Mn II	500	2522.38	Cu III
230	2504.60	Re II	100	2510.54	Sb I	10	2516.789	Ar II	50	2522.44	Yb II
110	2504.65	Nb I	50	2510.66	Rh II	2	2516.82	I III	50	2522.480	Fe I
680	2504.70	W I	1000	2510.835	Fe I	300	2516.82	Yb III	5	2522.61	Sn II
2000	2504.71	Tm III	500	2510.87	Ni II	890	2516.88	Hf II	4000	2522.849	Fe I
25	2505.07	Ba III	110	2511.00	Nb II	110	2516.92	Cr I	10	2522.98	In I
40	2505.10	Rh II	300	2511.03	Rh II	4	2517.0	Kr IV	780	2523.41	W I
28	2505.48	Yb II	200	2511.16	Co II	50	2517.13	Fe II	15	2523.66	Cs II
150	2505.67	Rh I	9	2511.20	He II	180	2517.14	V I	200	2523.66	Fe I
150	2505.73	Pd II	180	2511.65	V I	200	2517.2	O IV	40	2523.83	Ba III
120	2505.74	Ir I	120	2511.76	Fe II	110	2517.32	Ru II	90	2523.92	Sn I
50	2505.93	Pt I	50	2511.80	Mo II	75	2517.43	Ti II	425	2524.108	Si I
270	2505.94	Re I	170	2511.94	Ir I	7	2517.51	Si IV	180	2524.11	Tm II
270	2506.02	W I	50	2511.95	Nb III	170	2517.61	Dy II	1000	2524.24	Rb II
80	2506.09	Fe II	180	2511.95	V I	300	2517.661	Fe I	500	2524.293	Fe I
200	2506.19	Mo III	350	2512.06	C II	860	2517.87	Co I	140	2524.30	Pt I
40	2506.25	Yb III	140	2512.06	Yb II	500	2517.92	Os I	200 l	2524.41	C IV
150	2506.273	Cu II	80	2512.275	Fe I	20	2517.94	Eu III	70	2524.49	Ba I
450	2506.30	Na II	40	2512.28	Ba III		2518.	Li I	5	2524.5	Kr IV
80	2506.41	Cr III	110 d	2512.31	In II	5	2518.02	Kr IV	75	2524.64	Ti II
500	2506.46	Co II	400	2512.365	Fe I	800	2518.102	Fe I	200 h	2524.65	Co II
60	2506.63	Ag II	170	2512.58	Ir II	60	2518.14	W II	70	2524.7	B IV
40	2506.80	Fe II	240	2512.65	Ta I	6	2518.40	Ar IV	40	2524.88	Ir II
360	2506.88	Co I	580	2512.69	Hf II	12 p	2518.40	Mg IV	300	2524.97	Co II
425	2506.90	Si I	60	2512.69	Th III	660	2518.44	Os I	100	2525.02	Fe I
150	2506.90	V I	110	2512.81	Ru I	110	2518.51	Ce II	170	2525.05	Ir I
	2506.94	Li II	660	2512.87	Os I	15 h	2518.59	Cd I	25 h	2525.196	Cd I
260	2507.01	Ru II	580	2513.03	Hf II	80	2518.71	Cr I	200	2525.39	Fe II
130	2507.15	Tm II	2400	2513.25	Os I	95	2518.73	Ho II	360	2525.60	Ti II
35	2507.18	Os II	12	2513.28	Ir IV	40	2519.04	Ti I	9	2525.69	Ar IV
16	2507.43	Be II	60	2513.30	Al I	60	2519.05	Fe II	13	2525.99	Rh I
600	2507.45	Ta I	110	2513.32	Ru II	350	2519.202	Si I	25	2526.07	Fe II
30	2507.60	Mn II	75	2513.36	Rh II	200	2519.29	Os I	410	2526.22	V I
120	2507.63	Ir I	2	2513.43	La III	6	2519.38	Kr IV	300	2526.29	Fe II
5	2507.71	Sb III	170	2513.55	Dy II	390	2519.52	Cr I	1200 d	2526.35	Ta I
200	2507.73	O IV	5	2513.55	Ga II	240	2519.62	V I	120	2526.593	Cu II
240	2507.78	V I	110	2513.55	Ho II	150	2519.629	Fe I	8 c	2526.69	Pb II
500	2507.900	Fe I	40	2513.62	Cr I	8	2519.74	I IV	130	2527.02	Tm I
24	2508.00	W II	210	2513.71	Ir I	6	2519.75	I III	20	2527.10	Fe II
20	2508.02	Sr IV	3	2513.74	I IV	3000	2519.78	Tm III	190	2527.12	Cr I
11	2508.07	Yb II	2000	2513.76	Eu III	330	2519.79	Os I	70	2527.14	Mo II
50	2508.11	Cr I	50	2514.07	Pt I	500	2519.82	Co II	100	2527.41	In III
60	2508.16	In II	3	2514.15	Ga II	570	2520.01	Re I	110	2527.42	Tm II
220	2508.2	S III	250	2514.18	Rb II	110	2520.22	N II	2000	2527.435	Fe I
1	2508.2	Tl I	50	2514.31	Th III	1600	2520.38	Gd III	30	2527.70	Fe II
130	2508.27	Ru I	375	2514.32	Si I	310	2520.46	W I	430	2527.76	W I
30	2508.34	Fe II	50	2514.38	Fe II	130	2520.53	Rh II	24	2527.84	Ti III
500	2508.49	Cu III	50	2514.47	Pd II	140	2520.54	Ti I	210	2527.90	V II
120	2508.50	Pt I	15000	2515.02	La IV	160	2520.79	N II	50	2527.96	Zn II
80	2508.53	Ho II	60	2515.03	Pt I	200	2520.87	Tm II	29	2527.98	Ti I
60	2508.53	Nb III	660	2515.04	Os I	8	2520.93	Sc IV	120	2528.47	V II
100	2508.59	Er III	65	2515.08	Mo II	40	2521.09	Fe II	450	2528.509	Si I
50	2508.753	Fe I	1000	2515.16	Hf III	250	2521.16	V III	60	2528.51	Ba II
	2508.78	Li II	120	2515.36	Ir I	780	2521.32	W I	2000 r	2528.52	Sb I
10	2508.91	Cd I	600	2515.46	Na II	4300	2521.36	Co I	15	2528.54	Sb II
60	2508.98	Cr I	130	2515.48	Hf II	100	2521.37	In I	500	2528.62	Co II
1800 c	2508.99	Re I	240	2515.58	Pt I	110	2521.40	Nb II	150	2528.84	V II
110	2509.07	Ru I	25	2515.69	Bi I	540	2521.50	Re I	20	2528.88	Fe II
1300	2509.08	Tm II	130	2515.72	Cs II	250	2521.55	V III	2900	2528.97	Co I
50	2509.11	Cd II	200	2515.75	Rh I	20	2521.66	Mn II	20	2529.08	Fe II
250	2509.12	C II	150	2515.81	Zn I	450	2521.70	Br II	800	2529.135	Fe I
230	2509.19	O IV	400	2515.87	Al IV	6	2521.72	I IV	20	2529.14	Yb III

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
10	2529.19	Mg III	70	2534.34	Cr II	110 h	2540.45	Mo I	10	2546.09	Si II
25	2529.23	Fe II	100	2534.42	Fe II	570	2540.51	Re I	40	2546.44	Fe I
80	2529.31	Fe I	1100	2534.46	Ir I	20	2540.52	Fe II	400	2546.55	Sn I
80	2529.34	Tc II	80	2534.57	Pd II	200	2540.66	Fe II	80	2546.67	Fe II
40	2529.41	Pt I	190	2534.62	Ti II	80	2540.91	Er III	120	2546.67	Ru I
350	2529.49	Br III	10	2534.709	Ar II	600	2540.972	Fe I	200	2546.74	Co I
250	2529.55	Fe II	90	2534.769	Hg I	80	2541.10	Fe II	240	2546.80	Ta I
150	2529.836	Fe I	90	2534.77	Hg I	50	2541.11	Mn II	80	2546.87	Fe I
210	2529.85	Ti I	4	2534.79	Mg IV	400	2541.48	Br II	40	2546.87	Lu I
300 s	2529.98	C IV	370	2534.80	Re I	100	2541.48	Ir I	10	2546.88	Ti IV
200 p	2530.09	Co II	50	2534.82	W II	15	2541.50	Ca III	260	2546.96	Cl II
40	2530.11	Fe II	300	2534.95	Po I	8	2541.79	Ti IV	6	2547.0	Kr I
720	2530.13	Co I	120	2535.49	Fe II	25	2541.82	Si III	1200	2547.14	W I
240	2530.18	V I	150	2535.59	Ru II	60	2541.84	Fe II	120	2547.20	Ir I
15	2530.25	Na III	400	2535.607	Fe I	190	2541.92	Ti I	110	2547.28	Er II
160	2530.3	B IV	700	2535.61	P I	300	2541.94	Co II	14	2547.57	Y
50	2530.34	Mo II	100	2535.66	Mn II	580	2542.02	Ir I	120	2547.69	Ir I
40	2530.45	Cr I	900 d	2535.76	La IV	300	2542.10	Fe I	150	2547.901	Th II
200	2530.687	Fe I	130	2535.87	Ti II	220	2542.10	Zr II	50	2547.92	Tc II
20	2530.72	Mn II	2900	2535.96	Co I	20	2542.44	Ge IV	300	2548.0	Se I
120	2530.72	Te I	30	2535.98	Mn II	1000	2542.51	Os I	18	2548.02	Sr IV
20	2530.86	Tl II	1300	2536.10	Gd III	120	2542.66	Tm II	110	2548.20	Hf II
25	2530.92	Ba III	860	2536.49	Co I	330	2542.67	Mo II	250	2548.21	V III
80	2530.99	Cr III	50	2536.49	Pt I	120	2542.77	F III	330	2548.22	Mo I
2	2531.03	Er III	15000	2536.506	Hg I	25	2542.78	Fe II	10	2548.30	Eu II
80 h	2531.17	Sn I	15000	2536.52	Hg I	40	2542.80	Ir II	340	2548.34	Co I
340	2531.19	Hf II	60	2536.67	Fe II	14	2542.80	Na III	20	2548.59	Eu II
190	2531.25	Ti II	110	2536.71	Rh	80	2542.92	Mn II	20	2548.59	Fe II
600	2531.54	Na II	8	2536.76	Er III	500	2543.23	Tc II	13	2548.60	Rh
13	2531.74	Rh I	200	2536.792	Fe I	65	2543.25	Ru II	200	2548.68	Ce II
20	2531.80	Mn II	200	2536.80	Fe II	3	2543.31	Er III	100	2548.74	Fe II
20	2531.87	Fe II	50	2536.84	Fe II	60	2543.38	Fe II	100	2548.75	Mn II
4	2531.98	I IV	130	2536.86	Ho II	50	2543.45	Mn II	30	2548.83	Os II
20000	2531.99	Ce III	370	2536.95	Lu II	40	2543.61	Mo II	80	2549.08	Fe II
3	2531.99	I III	100	2537.02	Er II	28	2543.68	Gd II	50	2549.09	W II
600	2532.12	Ta II	110	2537.04	Rh II	130	2543.81	Dy II	110	2549.28	V II
860	2532.18	Co I	50	2537.14	Fe II	250	2543.92	Fe I	80	2549.39	Fe II
70	2532.31	Mo II	580	2537.22	Ir I	7900	2543.97	Ir I	20	2549.44	Lu I
100	2532.36	Er III	200	2537.33	Hf II	16	2544.19	Au I	60	2549.46	Fe II
110	2532.381	Si I	5	2537.54	I IV	40	2544.22	Rh	18	2549.46	Pt I
200	2532.44	Os I	2	2537.56	I III	280	2544.22	Ru I	280	2549.48	Ru I
180	2532.46	Zr II	65	2537.65	Yb II	1700	2544.25	Co I	160	2549.54	Cr I
500	2532.48	Cl III	170	2537.68	Ir I	80	2544.37	Cr III	550	2549.58	Ru I
120	2532.52	Ir I	80	2537.73	Cr III	20 h	2544.5	Bi II	600	2549.613	Fe I
50	2532.66	Rh	100	2537.92	Mn II	50	2544.613	Cd I	20	2549.72	Lu I
50000	2532.75	La IV	780	2538.00	Os II	150	2544.70	Fe I	40	2549.77	Fe II
50	2532.78	Mn II	240	2538.10	Os I	740 d	2544.74	Re I	500	2549.88	Cl II
5	2532.894	Th I	50	2538.20	Fe II	390	2544.80	Nb II	6	2550.02	K II
75	2533.06	Mn I	440	2538.46	Mo II	300	2544.805	Cu II	6	2550.02	K III
990	2533.13	Ir I	40	2538.50	Fe II	60	2544.81	Tc II	60	2550.03	Fe II
70	2533.230	Ge I	500	2538.66	Cu III	40	2544.97	Fe II	14	2550.06	Yb II
50	2533.33	Mn II	270	2538.67	Yb II	90	2545.12	Dy II	160	2550.09	Re II
60	2533.52	Au II	20	2538.68	Fe II	50	2545.17	Cr III	40	2550.10	W II
13	2533.59	Rh	100	2538.80	Fe II	40	2545.22	Fe II	25	2550.15	Fe II
100	2533.60	I II	100	2538.91	Fe II	560	2545.22	Sc II	10	2550.17	Y
120	2533.63	Fe II	150	2538.99	Fe II	580	2545.34	W I	780	2550.38	W I
780	2533.64	W I	130	2539.08	Cs II	20	2545.44	Fe II	40	2550.39	Yb III
170	2533.80	Ho I	10	2539.14	Eu III	370	2545.48	Re I	45	2550.51	Zr I
60	2533.80	Fe I	25	2539.17	Cs II	240	2545.49	Ta II	60	2550.65	Cs II
200 d	2533.82	Co II	160	2539.20	Pt I	150	2545.54	Ir I	50	2550.68	Fe II
500	2533.99	P I	3000	2539.27	Ce III	50	2545.64	Cr I	220	2550.74	Zr II
20	2534.03	Sr IV	50	2539.357	Fe I	100	2545.64	Nb III	110 h	2550.85	Mo I
50	2534.07	Rh	50	2539.44	Mo II	8	2545.67	I IV	460 d	2551.07	Ta I
30	2534.10	Mn II	50 h	2539.44	Pd II	350	2545.70	Rh I	350 h	2551.09	Br III
150	2534.10	Re II		2539.49	Li II	7	2545.71	I III	130	2551.17	Cs II
1600	2534.11	Gd III	90	2539.65	Zr I	10	2545.95	Er III	2	2551.26	Ga II
80	2534.22	Mn II	30	2539.72	Rh	800	2545.978	Fe I	2700	2551.35	W I
200	2534.27	I II	23	2540.06	Ti III	5	2546.0	Kr IV	110	2551.38	Nb II
100	2534.33	Hf III	12	2540.28	Y	790	2546.03	Ir I	320	2551.40	Hf II

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
210	2551.40	Ir I	180	2557.94	Dy II	25	2563.86	Hg I	100	2569.56	Pd II
1600	2551.56	Gd III	80	2557.94	Nb III	150	2563.86	Tm II	340	2569.71	U II
24	2551.7	Li II	1000	2557.95	Zn II	25	2563.861	Hg I	100 h	2569.87	Zn II
150	2551.84	Pd II	1500 w	2558.01	Po I	110	2563.91	W II	210	2569.88	Ir I
50	2551.85	Mn II	40 h	2558.01	Sn I	500	2564.04	Co II	25	2570.48	Ba III
50	2551.98	Cd II	200	2558.06	O III	160	2564.17	Eu II	25	2570.52	Fe II
300	2552.02	Re I	10	2558.07	Eu III	910	2564.18	Ir I	100	2570.62	Ir I
70	2552.15	Yb II	100 h	2558.08	Ac IV	340	2564.19	Re I	80 h	2570.72	V IV
50	2552.25	Pt I	4	2558.08	Kr IV	85	2564.34	Mo II	80	2570.74	Er III
150	2552.29	Dy II	25	2558.58	Pr II	2100	2564.46	Gd III	350 h	2570.83	Br III
2900	2552.37	Sc II	95	2558.59	Mn II	80	2564.76	Cr III	30	2570.85	Fe II
10000	2552.46	Tm III	50	2558.61	Tc II	110	2564.82	V I	1	2570.91	Mg I
120	2552.65	V I	25	2558.62	Rh I	460	2564.84	Cl II	100	2570.97	Ru I
45	2552.67	Au II	80	2558.88	Mo II	1	2564.94	Mg I	110	2571.03	Ti II
55	2552.70	Yb II	2559	2559	Li II	1000	2565.04	Gd III	40	2571.04	Sr IV
360	2552.76	Tm I	250	2559.08	Re I	70	2565.13	In II	930	2571.23	Lu II
3	2552.87	Ga II	26	2559.18	Eu II	30	2565.22	Mn II	110	2571.33	Nb II
40	2553.06	Cr I	130	2559.19	Hf II	130	2565.41	Nb I	28	2571.36	Yb II
600	2553.25	P I	14	2559.21	Si III	440	2565.41	U II	2100	2571.39	Zr II
30	2553.27	Mn II	300	2559.41	Co II	23	2565.42	Ti III	530	2571.44	W II
310	2553.37	Co I	30	2559.41	Mn II	150	2565.51	Pd II	20	2571.45	Mo II
25	2553.465	Cd I	1200	2559.43	Ta I	21	2565.57	Yb II	340	2571.51	Ta II
70	2553.56	In II	50	2559.54	Ba III	500	2565.593	Th II	25	2571.58	Sr IV
150 c	2553.59	Re II	200	2560.03	Co II	3	2565.789	Cd I	500 r	2571.58	Sn I
450	2553.82	W I	290	2560.12	W I	50	2565.79	Rh I	890	2571.67	Hf II
2200	2553.90	Gd III	1100	2560.15	In I	500	2565.92	Ni II	150	2571.74	Cr I
2100	2554.04	Gd III	90	2560.21	Dy II	2400	2565.95	Gd III	100	2571.756	Cu II
150	2554.22	V III	2300	2560.25	Sc II	45	2566.04	Rh I	340	2571.78	Os I
190	2554.40	Ir I	130	2560.26	Ru I	20	2566.22	Fe II	370	2571.81	Re II
160 d	2554.44	In II	40	2560.28	Fe II	1000	2566.24	I II	170 d	2572.24	W II
310	2554.46	Os I	10	2560.36	Eu III	90	2566.25	Dy II	1	2572.25	Mg I
10	2554.50	Eu III	100	2560.56	Yb III	40	2566.26	Mo II	5	2572.32	Zr IV
460	2554.62	Ta II	130	2560.69	Cr I	400	2566.37	Cu III	320	2572.34	Mo I
370	2554.63	Re II	400 h	2560.74	Hf III	600	2566.49	Os I	50	2572.35	W II
26	2554.78	Eu II	120	2560.83	Ru I	270	2566.588	Th II	50	2572.65	Ti II
410	2554.86	W II	1	2560.94	Mg I	100	2566.78	Yb III	230	2572.70	Ir I
500	2554.90	P I	540	2561.65	Tm II	290	2566.88	Os I	580	2572.76	Mn I
240	2555.05	Ta I	10	2561.66	Yb III	60	2566.91	Fe II	500	2572.93	Cd II
310	2555.07	Co I	35	2561.80	Lu II	25	2566.92	Rh II	1000	2573.03	Cs II
580	2555.09	W II	300	2561.86	Rb III	50	2567.01	Tc II	13	2573.15	Yb II
	2555.21	W I	730	2561.97	W I	250	2567.05	Mo I	300 h	2573.17	Br III
4	2555.28	Ga II	65	2562.08	Mo II	90 w	2567.12	Ne II	400	2573.33	Cu III
300	2555.29	Yb III	15	2562.087	Ar II	50	2567.28	Rh	430	2573.54	Ta I
210	2555.35	Ir I	25	2562.09	Fe II	1100	2567.35	Co I	1800	2573.57	Gd III
550	2555.36	Rh I	460	2562.10	Ta I	50	2567.44	Nb III	400	2573.66	Zr IV
65	2555.42	Mo II	80 p	2562.12	Ne II	60	2567.45	Zr I	100	2573.71	Rb III
40	2555.60	Sr IV	210	2562.13	V I	300 h	2567.46	Hf III	390	2573.79	Ta I
560	2555.82	Sc II	960	2562.15	Co I	22	2567.56	Ti III	320	2573.90	Hf II
170	2555.88	Ir I	12	2562.17	Ar IV	2000	2567.61	Yb III	75	2573.95	W II
65	2555.99	Ti II	1	2562.26	Mg I	570	2567.64	Zr II	230	2574.02	V I
100	2556.11	F II	15	2562.31	Li I	80	2567.73	Ho II	150	2574.06	Sb I
3	2556.298	Ge I	400	2562.31	Po	10	2567.75	Sb II	960	2574.35	Co I
45	2556.43	Zr I	130	2562.41	Nb II	50	2567.80	Zn II	150	2574.36	Fe II
1000	2556.51	Re I	400	2562.53	Fe II	20	2567.82	Te II	50	2574.42	Mo II
75	2556.57	Mn II	100	2562.87	Ag III	240	2567.98	Al I	1000	2574.52	Tm III
40	2556.75	Mo II	110	2563.15	Ru I	50	2567.98	Zn II	130	2574.54	Cs II
310	2556.75	W I	190	2563.16	Os II	10	2568.07	Ar IV	25	2574.66	Rh
80	2556.84	Ho I	230	2563.16	W II	130	2568.17	Cs II	26	2574.76	Eu II
30	2556.89	Mn II	1100	2563.21	Sc II	110	2568.17	Eu II	250 h	2574.83	C II
400	2556.92	Br II	30	2563.25	Kr III	540	2568.64	Re II	2	2574.94	Mg I
50 h	2556.92	V IV	150	2563.28	Ir I	85	2568.641	Si I	10	2574.96	Te II
130	2556.94	Nb II	150	2563.32	V III	250	2568.69	Cs II	500	2574.98	Tm III
80	2557.15	Cr I	2500	2563.33	Gd III	160	2568.77	Ru I	30	2575.06	Tc II
50	2557.22	Er III	24	2563.44	Ti III	480	2568.83	Os I	480	2575.10	Al I
1	2557.23	Mg I	200	2563.48	Fe II	1600	2568.87	Zr II	60	2575.40	Al I
300	2557.33	Po I	300	2563.51	Lu III	100	2569.03	Nb I	480	2575.51	Mn I
3000	2557.49	Ce III	250	2563.61	Hf II	1800	2569.27	Gd III	50 h	2575.63	Ag I
50	2557.54	Mn II	150	2563.65	Mn II	120	2569.47	Sr I	50	2575.74	Fe I
500	2557.90	Tm III	30	2563.679	Si I	7	2569.53	Ar IV	25	2575.75	Rh I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
2000	2576.06	Gd III	740	2581.96	Os I	800	2590.04	Ne III	8	2595.62	Fe III
12000	2576.10	Mn II	45000	2582.05	La IV	130	2590.09	Cs II	400	2595.68	Ne III
5	2576.10	Te II	80 h	2582.13	Lu II	15	2590.13	Sb III	250	2595.76	Mn I
1300	2576.15	Gd III	250	2582.16	Mo I	20 w	2590.19	Tc I	1300	2595.81	Gd III
13	2576.23	Rh	300 d	2582.22	Co II	35	2590.26	Ti I	2	2595.97	Mg I
80	2576.28	Tc II	8 p	2582.37	Fe III	29	2590.31	Tb II	400 h	2595.98	Br III
25	2576.29	Hg I	100	2582.44	Zn I	12	2590.41	Ca III	170	2596.00	Os II
25	2576.290	Hg I	300	2582.49	Zn I	150	2590.529	Cu II	50	2596.00	Pt I
15	2576.47	Ti III	320	2582.54	Hf II	80	2590.72	Er III	18	2596.16	Yb II
40	2576.56	Mo II	100	2582.58	Fe II	1000	2590.76	Os I	28	2596.32	Yb II
8 c	2576.60	Pb II	2000	2582.79	I II	390	2590.94	Nb II	10	2596.34	Eu III
200	2576.688	Th II	400	2583.32	Zr IV	110	2590.94	N II	310 l	2596.45	Ta II
300	2576.691	Fe I	75	2583.40	Zr II	60	2591.05	Ho II	170 h	2596.49	Tm I
130	2576.74	Cs II	1700	2583.62	Gd III	170	2591.12	Ru I	65	2596.58	Ti I
320	2576.82	Hf II	130	2583.81	F III	10	2591.12	Te II	8 h	2596.64	Ba I
25	2576.86	Fe II	390	2583.99	Nb II	340	2591.25	U II	230	2597.047	Th II
100	2577.07	Rb III	340	2584.03	Ta II	18000 c	2591.30	La IV	90	2597.13	Mo III
230	2577.14	Eu II	1	2584.22	Mg I	130	2591.33	Hf II	20	2597.19	Tc II
45	2577.151	Si I	550	2584.31	Mn I	29	2591.42	Tb II	500	2597.23	Yb III
740	2577.26	Ir I	390	2584.39	W I	170	2591.49	W II	40	2597.38	Mo II
80 r	2577.260	Pb I	1500	2584.54	Fe I	90	2591.56	Dy II	95000 w	2597.50	La IV
600	2577.37	Ta II	110	2584.61	Tb II	20	2591.56	Er III	55	2597.71	Tb II
50	2577.6	He I	2000	2584.71	Ce III	40	2591.77	Mo II	40 h	2598.04	Pr II
100	2577.65	Cr I	3	2584.87	Cd I	200	2591.83	Er III	1500 r	2598.05	Sb I
4000	2577.67	Ce III	400 h	2584.99	Br III	380	2591.85	Cr I	30	2598.07	Rh
29	2577.73	Tb II	220	2585.30	Dy I	1	2591.89	Mg I	500 r	2598.09	Sb I
340	2577.78	Ta I	100	2585.48	Tm III	200	2591.98	Os I	20	2598.39	Er III
40	2577.86	Tc II	2	2585.56	Mg I	120	2592.02	Ru I	110	2598.74	W II
1	2577.89	Mg I	30	2585.95	Mo II	30	2592.026	Cd I	70 d	2598.75	In II
20	2577.90	V V	28	2586.13	Gd II	740	2592.06	Ir I	80	2598.86	Nb III
60	2577.92	Fe II	550	2586.31	Na II	270	2592.20	Nb I	95	2598.90	Mn II
1400	2578.13	Gd III	80	2586.52	Ho I	500	2592.534	Ge I	740	2599.04	Ir I
300	2578.14	Hf II	8	2586.61	Ra II	75	2592.54	Dy II	30	2599.10	Sr III
25	2578.27	Pr I	290	2586.73	Er II	130	2592.57	Er II	800	2599.14	Yb III
2000	2578.30	Ce III	380	2586.79	Re I	24	2592.64	Tb II	3000	2599.16	Pa II
150	2578.32	Os II	200	2586.83	Rb III	20	2592.69	Yb III	3	2599.18	Er III
40	2578.36	Mo II	3	2586.9	Kr IV	100	2592.82	Tc I	140	2599.28	F III
100	2578.57	Ru I	11	2586.93	Sc IV	10	2592.85	Te II	12	2599.47	Ar IV
100	2578.71	Ir I	110	2587.04	Er II	250	2592.94	Mn I	290	2599.86	Re I
200	2578.74	Nb I	13	2587.15	Ca III	95	2592.99	Ho I	270	2599.92	Ti I
1600	2578.76	Gd III	500	2587.22	Co II	250	2593.05	V III	220	2600.14	Ta I
1700	2578.79	Lu II	40	2587.29	Rh II	430	2593.08	Ta I	130	2600.16	Dy II
300hl	2578.79	Tc I	500	2587.52	Co II	120	2593.23	F III	200	2600.270	Cu II
300	2578.80	Po	400	2587.64	Po I	1	2593.23	Mg I	130	2600.76	Dy II
5	2578.91	Hg I	20 w	2587.71	Pr III	60	2593.24	Pd II	230	2600.882	Th II
7	2579.24	Te II	50	2588.20	Cr I	300	2593.46	I II	110	2601.09	Tm I
190	2579.26	W II	2000	2588.21	Gd III	60	2593.51	Fe I	200	2601.76	In I
30	2579.31	Pr I	430	2588.27	Tm II	600	2593.60	Ne III	370	2601.96	W I
35	2579.49	Ir II	3	2588.28	Mg I	190	2593.64	Ti I	340	2602.00	As II
100	2579.53	Ru I	2000	2588.46	Gd III	100	2593.64	Zr III	150	2602.04	Ir I
1000	2579.57	Yb III	100	2588.62	Yb III	410	2593.66	Ta II	25 h	2602.048	Cd I
40	2580.02	Er III	65	2588.78	Mo II	250	2593.70	Mo II	40	2602.14	Mn I
130	2580.03	Os II	4	2588.87	La III	100	2593.70	Ru I	2	2602.50	Mg I
120	2580.04	F III	200	2588.91	Co II	6200	2593.73	Mn II	75	2602.51	W II
50	2580.106	Cd I	30	2588.97	Mn II	60	2593.75	Nb III	30	2602.72	Mn II
700	2580.14	Tl I	230	2589.059	Th II	310	2594.25	Ta II	250	2602.80	Mo II
210	2580.16	Ta I	130	2589.07	Zr II	200	2594.42	Sn I	40	2602.93	Tb II
800	2580.32	Co II	500	2589.14	Br III	300 h	2594.48	Br III	75	2603.02	W II
290	2580.34	W I	390	2589.17	W II	200	2594.56	Rb II	70	2603.14	Pt I
15	2580.46	Ti III	28	2589.188	Ge I	10	2594.71	Eu III	320	2603.31	Cl I
870	2580.49	W I	300	2589.20	Tm III	20	2594.76	Eu III	30	2603.32	Rh II
1	2580.59	Mg I	20	2589.25	Au I	110	2594.85	Ru I	4500 c	2603.35	Lu III
600	2580.67	Cl III	15	2589.34	Sr IV	600	2594.96	Na II	600	2603.49	Ta II
50	2580.82	Ti I	2	2589.55	Er III	120	2595.03	Er II	270	2603.54	W I
360	2581.05	Os I	100	2589.57	Ru I	250	2595.10	V III	35	2603.57	Cr I
1000	2581.19	Br IV	22	2589.65	Zr I	9	2595.17	Sc IV	10000	2603.59	Ce III
40	2581.20	W II	45	2589.71	Mn II	560	2595.26	Ta I	500	2603.59	Cl III
100	2581.84	Tm III	200	2589.86	Tc I	100	2595.40	Mo I	100	2603.62	Er III
26	2581.86	Eu II	30	2590.04	Au I	130	2595.53	F III	45	2603.72	Mn II

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
4	2603.85	Mg I	100	2609.855	Th II	160 c	2616.72	Re II	370	2623.69	Dy I
290	2603.89	Re I	500	2609.94	Ni II	30	2616.76	Pt II	400	2623.76	Rb II
50	2604.04	In II	1000 c	2609.99	Tc II	400	2616.78	Mo I	150	2624.04	Mn I
10	2604.44	Eu III	300	2610.03	Ne III	40	2616.90	Tb	140	2624.18	Er II
190	2604.55	Ir I	45	2610.07	Sm	100	2617.01	Yb II	50 h	2624.21	V IV
26	2604.61	Eu I	30	2610.09	Eu III	8	2617.15	Fe III	730	2624.33	Tm II
2	2604.83	La III	190	2610.20	Mn II	12	2617.17	Sb III	40	2624.80	Mn II
40	2604.91	Er III	400	2610.34	La II	10000	2617.17	Cm II	8	2624.82	Ga I
	2605.08	Li II	110	2610.51	Ho II	500	2617.22	Tm III	10	2624.86	Te II
40	2605.08	Mo II	400	2610.78	Os I	3	2617.51	Mg I	40 w	2624.91	Pr III
340	2605.15	Ti I	20	2611.07	Fe II	1	2617.63	Sb III	12	2624.92	Ar IV
20	2605.34	Fe II	200	2611.147	P III	30	2617.64	Er III	130	2625.01	F III
20	2605.42	Fe II	190	2611.20	Mo I	330	2617.78	Ir I	8	2625.19	Er III
250	2605.506	P IV	40	2611.22	Sc II	4	2617.97	Hg III	15	2625.19	Hg I
60	2605.657	Fe I	510	2611.28	Ti I	5	2617.99	Be II	60	2625.20	Ho II
4300	2605.69	Mn II	1800	2611.30	Ir I	250	2618.018	Fe I	400	2625.22	W I
100 p	2605.71	Co II	310 d	2611.34	Ta I	20	2618.13	Be II	22	2625.32	Cr I
10	2605.72	Te II	75	2611.48	Ti I	500	2618.14	Mn II	250	2625.32	Ir I
190	2605.86	Ho II	610 d	2611.54	Re I	30	2618.28	Tc I	30	2625.34	Pt II
40	2605.93	Mo II	850	2611.81	Na II	2500 r	2618.37	Cu I	1400	2625.48	Gd III
220	2606.02	Tm II	600	2611.87	Fe II	2	2618.40	Er III	50	2625.49	Fe II
150	2606.06	P II	830	2612.07	Ru I	500	2618.78	Tm III	200	2625.58	Mn II
5	2606.17	Kr IV	300 r	2612.31	Sb I	15	2618.81	Cd III	200	2625.67	Fe II
450 h	2606.20	Br III	100	2612.50	Co II	230	2618.91	Th II	270	2625.737	Th II
500	2606.26	Ni II	470	2612.63	Os I	2	2618.94	Er III	230	2625.88	Rh I
390	2606.37	Hf II	2	2612.92	Hg III	20	2619.07	Fe II	100	2626.08	Cr III
680	2606.39	W I	1800	2613.06	Os I	210	2619.18	W I	100	2626.18	P II
75	2606.44	Rh II	290	2613.08	Mo I	1800	2619.26	Lu II	20	2626.37	Er III
300	2606.51	Fe II	970	2613.08	W I	70	2619.34	Mo II	1000 h	2626.44	Ac III
5	2606.62	Mg I	500 h	2613.13	Br III	1200	2619.40	Gd III	500 h	2626.52	Br III
800	2606.827	Fe I	1	2613.36	Mg I	50	2619.57	Pt I	18	2626.60	Cr I
450	2607.03	Hf II	1800	2613.40	Lu II	210	2619.88	Ir I	95	2626.64	Mn I
810	2607.06	Tm II	240	2613.41	Ne III	800	2619.94	Os I	100	2626.76	Ir I
250	2607.37	Mo I	230	2613.60	Hf II	300	2619.94	Ti I	10	2626.98	Eu III
320	2607.38	W I	75	2613.60	Rh	6	2619.98	Ar IV	20	2627.02	Au II
5	2607.47	Ga I	500 r	2613.655	Pb I	400	2620.25	W I	300	2627.07	Yb III
190	2607.52	Ir I	480	2613.82	W I	25	2620.35	Sr IV	100	2627.09	Tm III
2000	2607.96	Ce III	95	2613.99	Ho II	250	2620.56	Zr III	300	2627.41	Na II
5000 c	2608.01	La IV	900 r	2614.175	Pb I	230	2620.62	Os I	130	2627.44	Nb I
10	2608.06	Ar IV	1	2614.20	Sb III	20	2620.69	Fe II	320	2627.55	Mo I
350 h	2608.15	Br III	1500	2614.23	Tc I	10	2620.79	Eu III	700	2627.91	Bi I
40	2608.24	Pm II	100	2614.36	Co II	15	2620.82	Ca III	25	2627.95	Cs II
700	2608.25	Ir I	25	2614.53	Er III	140	2621.07	Mo I	20	2627.96	Te II
370	2608.32	W I	2	2614.73	Mg I	7	2621.11	Kr IV	1100	2628.03	Pt I
30	2608.34	Eu III	210	2614.98	Ir I	600	2621.11	Yb III	2000	2628.10	Gd III
2 c	2608.38	Pb II	500	2615.06	Ni II	1000	2621.12	Tm III	50	2628.24	Pd II
7	2608.44	Ar IV	100	2615.09	Ru I	20	2621.16	Sr IV	210	2628.26	W I
120	2608.45	Hf I	230	2615.12	W I	50	2621.28	Zr III	60	2628.26	Zr III
660	2608.50	Re II	21	2615.26	Yb II	400	2621.35	Tm III	160	2628.262	Pb I
200	2608.56	Zn I	8	2615.3	Kr IV	12	2621.36	Ar IV	150	2628.29	Fe II
110	2608.57	Tb II	130	2615.39	Mo I	1200	2621.52	Gd III	20 c	2628.46	Eu III
1400	2608.63	Ta I	18000	2615.42	Lu II	40	2621.67	Fe II	380	2628.48	Os I
300	2608.64	Zn I	70	2615.44	W II	530	2621.82	Os I	130	2628.49	Nb I
75	2608.69	Dy II	340	2615.46	Ta I	5	2621.92	Te II	3	2628.66	Mg I
500	2608.86	Tc I	310	2615.66	Ta I	400	2622.21	W I	50	2628.67	Nb III
25	2608.92	Pr II	12	2615.68	Ar IV	400	2622.31	Tm III	130	2628.69	Tb II
500	2608.96	Tm III	25	2615.75	Pr II	150	2622.58	Rh I	160	2628.74	Mo I
60	2608.99	Tl I	2000	2615.79	Ce III	35	2622.69	Sr III	100 p	2628.77	Co II
210	2609.00	Ta I	200	2615.87	Ne III	450	2622.74	Hf II	55	2628.812	Th II
370	2609.06	Ru I	1000	2615.87	Tc I	200	2622.76	Re I	10	2628.82	Eu III
30	2609.14	Yb III	50 c	2616.11	Eu III	35	2622.86	Cr I	100	2628.83	Tm III
210	2609.20	Os I	350 h	2616.26	Br III	140	2622.90	Mn I	50	2628.979	Cd I
500	2609.32	Cu III	20	2616.26	Eu III	80	2623.11	Ne II	1300	2628.99	Gd III
45	2609.43	Zr I	130	2616.27	Cs II	20	2623.33	Eu III	100	2629.	Bi IV
250	2609.44	Cs II	10	2616.33	Eu III	270	2623.448	Th II	20	2629.1	S II
10	2609.5	Kr IV	10	2616.35	Eu III	130	2623.51	Nb I	350 h	2629.23	Br III
380	2609.56	Os I	50	2616.40	Au II	1400	2623.52	Gd III	140	2629.70	F III
300	2609.66	Tm III	130	2616.48	Nb I	400	2623.53	Fe I	18	2629.82	Cr I
1800	2609.77	Gd III	80	2616.50	Cr III	70	2623.64	Ir II	2400	2629.83	Gd III

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
440	2629.85	Mo I	330	2636.67	Mo II	85	2641.89	Yb II	28	2647.46	Yb II
80	2629.89	Ne II	170	2636.67	Ru I	5	2642.11	I IV	2400	2647.47	Ta I
6	2630.05	Mg I	470	2636.67	Ta I	4	2642.11	I III	50	2647.50	Cr III
20	2630.07	Fe II	200	2636.68	Tm III	35	2642.12	Cr I	330	2647.50	Nb I
30	2630.26	Mn I	90	2636.76	P II	110	2642.15	Dy I	380	2647.73	Os I
100	2630.42	Rh I	350	2636.83	Rb III	20	2642.16	Sr IV	75	2647.74	W II
5	2630.56	Cd III	70	2636.9	S III	130	2642.21	V II	55	2647.78	Zr I
60	2630.57	Mn I	860	2636.90	Ta I	200	2642.24	Nb II	130	2648.07	Cs II
140	2630.67	V II	50 h	2636.94	Sn I	30 c	2642.27	Eu III	65	2648.46	Re II
150	2630.91	Zr II	160	2637.00	Hf I	100	2642.37	Tc I	25	2648.48	Pr II
250	2631.05	Fe II	200	2637.01	Po	1000	2642.56	Yb III	20	2648.48	Te II
27	2631.22	Os II	190	2637.01	Re II	160	2642.75	Hf I	30	2648.51	Sr III
190	2631.282	Si I	3800	2637.13	Os I	270	2642.75	Re I	160	2648.53	Na II
220	2631.30	Ru I	80	2637.14	Cs II	460	2642.96	Ru I	770	2648.64	Co I
250	2631.32	Fe II	1700	2637.15	Gd III	30	2642.96	Sr III	28	2648.80	Yb II
170	2631.54	Ti I	200	2637.30	Tm III	75	2643.00	Rh I	270	2649.05	Re I
80	2631.55	Al II	4	2637.52	Er III	70	2643.40	Zr II	4	2649.06	Mg I
50	2631.61	Fe II	110	2637.70	Al II	500	2643.58	Tm III	35	2649.17	Sm
1000	2631.75	Rb III	200	2637.77	Er III	100	2643.62	Yb III	300 c	2649.21	Tc I
5	2631.78	Ge IV	2100	2637.97	Gd III	2100	2643.71	Gd III	200	2649.27	Tm III
300	2631.81	Na II	2100	2638.06	Gd III	10	2643.73	Ra II	30	2649.30	Ti I
7	2631.90	Ar III	500	2638.06	Yb III	200	2643.79	Zr III	380	2649.34	Os I
10	2631.98	Eu III	130	2638.17	Mn II	200	2643.92	Cu III	2000	2649.38	Ce III
150	2632.00	Pm II	80	2638.29	Ne II	200	2643.998	Fe I	640	2649.46	Mo I
40	2632.190	Cd I	250	2638.30	Mo I	80	2644.10	Ne II	240	2649.52	Nb I
100	2632.237	Fe I	70	2638.46	Pm II	1900	2644.11	Os I	100	2649.66	Te II
100	2632.26	Co II	400 d	2638.62	W I	8	2644.184	Ge I	60	2649.68	Ho II
2100	2632.30	Gd III	200	2638.70	Ne III	210	2644.19	Ir I	50	2649.79	Yb II
190	2632.35	Mn II	1100	2638.71	Hf II	800	2644.26	Ti I	160	2650.27	Tm II
170	2632.42	Ti I	30	2638.74	Rh II	400	2644.295	P IV	110	2650.38	Zr II
400	2632.48	W I		2638.75	W I	110	2644.31	Yb II	100	2650.45	Be I
10	2632.66	Ga I	720	2638.76	Mo II	600	2644.35	Mo II	60	2650.55	Be I
500	2632.67	Cl III	1000	2638.77	Eu II	40	2644.50	Tc II	170	2650.583	Th II
400	2632.70	W I	210	2639.09	Zr II	1600	2644.52	Gd III	200	2650.62	Be I
300	2632.713	P III	130	2639.35	Pt I	20 w	2644.62	Pr III	60	2650.69	Be I
8	2632.87	Mg I	250	2639.42	Ir I	25	2644.69	Cs II	28	2650.73	Yb II
810	2633.13	W I	75	2639.420	Cd I	2	2644.80	Mg I	100	2650.76	Be I
80	2633.17	Nb III	45	2639.45	Yb II	100	2645.05	Tm III	100	2650.82	Tm III
500	2633.18	Cl III	350 h	2639.60	Br III	20	2645.22	Eu III	500	2650.86	Pt I
100	2633.22	Pd III	3500	2639.71	Ir I	150	2645.26	V I	20 c	2650.93	Eu III
1800	2633.32	Gd III	60	2639.76	Kr III	110	2645.35	Dy II	27	2650.99	Mn II
15	2634.14	Ca III	5	2639.78	Hg I	300	2645.36	Po I	340	2651.01	Ce II
700	2634.17	Ir I	80	2639.84	Mn II	9 p	2645.39	Fe III	100	2651.16	Hf II
4	2634.256	Pb II		2640.	Li	470	2645.47	U II	10000	2651.17	Cm II
55	2634.31	Yb II	80	2640.09	Ho I	80 h	2645.54	V IV	1200	2651.172	Ge I
300	2634.66	Tm III	90	2640.27	Sm	400	2645.58	Rb II	270	2651.22	Ta II
100	2634.78	Ba II	80	2640.30	Ho II	250	2645.65	N IV	110	2651.29	Ru I
440	2634.80	Dy II	100	2640.32	Tm III	210	2645.69	W I	200	2651.31	Na II
200	2634.91	Tc II	110	2640.33	Ru I	1800	2646.04	Gd III	1600	2651.48	Gd III
40	2634.99	Rh I	15	2640.34	Ar IV	300	2646.18	N IV	5	2651.49	Er III
5	2635.11	K III	300	2640.48	Yb III	650	2646.18	W I	400	2651.50	La III
170	2635.27	Ir I	2200	2640.53	Gd III	3	2646.21	Mg I	500	2651.568	Ge I
30	2635.37	Yb III	100	2640.73	Cr III	510	2646.22	Ta I	200	2651.71	Cs II
80	2635.42	Zr I	210	2640.76	Tm II	320	2646.26	Nb II	1000	2651.74	Yb III
30	2635.50	Eu II	4	2640.77	I III	600	2646.37	Ta I	330	2651.84	Ru I
610	2635.53	U II	4	2640.77	I IV	310	2646.42	Co I	660	2651.90	Re I
1200	2635.58	Ta II	11	2640.79	Si III	28	2646.44	Yb II	140	2651.90	V I
1400	2635.71	Gd III	410	2640.99	Mo I	130	2646.45	Tm II	250	2652.04	Hg I
300	2635.809	Fe I	90	2641.02	Re II	370	2646.49	Mo II	250	2652.043	Hg I
310	2635.83	Re II	200	2641.07	Ne III	950	2646.64	Ti I	8	2652.23	I IV
220	2635.86	Ru I	640	2641.10	Ti I	400	2646.73	W I	6	2652.25	I III
70	2635.92	Pd II	30	2641.26	Tc I	1800	2646.84	Gd III	700	2652.25	Yb III
100	2636.07	Co II	380	2641.27	Eu II	340	2646.89	Os I	100	2652.35	Tc II
90 w	2636.07	Ne II	1100	2641.41	Hf II	1000	2646.89	Pt I	150	2652.48	Al I
10000	2636.28	Cm II	250	2641.48	Au I	350	2646.96	N IV	200 r	2652.60	Sb I
80	2636.36	Tc I	270	2641.488	Th II	1000 c	2647.01	Tc II	400	2652.66	Rh I
1600	2636.44	Gd III	50	2641.646	Fe I	110	2647.28	Rh I	10	2653.19	Eu III
290	2636.54	W I	1600	2641.65	Gd III	670	2647.29	Hf II	2600	2653.27	Ta I
550	2636.64	Re I	20	2641.89	Te II	110	2647.32	Ru I	480	2653.35	Mo II

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
40	2653.42	W II	30	2659.01	Rh I	600	2665.54	Cl III	1000	2671.83	Na II
30	2653.57	Tc I	40	2659.23	Cd II	80	2665.57	Tl I	520	2671.84	Ir I
80	2653.57	W II	21	2659.27	Yb II	220	2665.60	Ta II	400	2671.93	Nb II
250	2653.59	Cr II	2800	2659.45	Pt I	440	2666.02	Cr II	390	2671.96	Yb I
40	2653.61	Eu II	400	2659.62	Ru I	2000	2666.13	Yb III	290	2672.00	V II
400	2653.683	Hg I	200	2659.81	Na II	80	2666.24	Ho II	1	2672.19	Si IV
400	2653.69	Hg I	640	2659.83	Os I	200	2666.291	Cu II	330	2672.25	Er II
100	2653.72	Co II	3	2659.87	Ga I	350	2666.46	Na II	10	2672.46	Mg I
990	2653.75	Yb II	100	2659.98	Yb III	75	2666.49	W II	20	2672.52	Pr II
170	2653.76	Ir I	250	2660.09	Tm II	110	2666.59	Nb II	110	2672.59	Mn II
10000	2653.80	Cm II	25	2660.24	Cs II	30	2666.64	Fe II	50	2672.62	Cd II
100	2654.05	Tm III	50 h	2660.325	Cd I	25	2666.70	Pr II	390	2672.66	Yb II
400	2654.12	Re I	200	2660.39	Al I	200	2666.73	Co II	280	2672.83	Cr II
100	2654.31	Tc I	60	2660.49	Ag II	30	2666.77	Mn II	720	2672.84	Mo II
330	2654.45	Nb I	640	2660.58	Mo II	300	2666.812	Fe I	40	2673.24	Cs II
10	2654.63	Ar III	8	2660.76	Mg II	20 c	2666.86	Eu III	250	2673.27	Mo II
35	2654.66	Sr III	8	2660.82	Mg II	1000	2666.93	Tm III	30	2673.33	Yb III
90 d	2654.70	In II	2200	2660.83	Gd III	60	2666.965	Fe I	55	2673.37	Mn II
30	2654.75	Pr II	120	2660.88	Tc I	2000	2666.99	Yb III	110	2673.42	Eu II
15	2654.93	Ti I	850	2661.00	Na II	45	2667.00	Mn I	200	2673.57	Nb II
560 h	2655.03	Mo I	80	2661.10	Te II	30	2667.03	Mn II	80	2673.59	W II
10	2655.09	Eu III	23	2661.17	Ru II	110	2667.30	Nb II	330	2673.61	Ir I
100	2655.13	Hg I	380	2661.18	Os I	30	2667.40	Ru II	8	2674.02	Ar III
100	2655.130	Hg I	200 r	2661.24	Sn I	20 w	2667.51	Pr III	200	2674.04	Na II
40	2655.28	Cr III	1500	2661.34	Ta I	55	2667.64	Tb II	40	2674.13	Tb II
50 h	2655.41	V IV	600	2661.40	Br IV	180	2667.80	Zr II	940	2674.34	Re I
14	2655.51	Si III	50	2661.40	Tb II	110	2667.94	Dy I	55	2674.43	Mn II
2000	2655.59	Gd III	180	2661.42	V I	220	2668.07	Ta I		2674.46	Li II
60	2655.91	Mn II	28	2661.50	Gd II	6	2668.12	Mg I	140 d	2674.56	In II
55	2655.96	Tb II	500	2661.51	Tm III	25	2668.20	Cd II	580	2674.57	Os I
310	2656.08	Nb II	330	2661.61	Ru II	140	2668.20	Tm II	40	2674.57	Pt I
35	2656.12	Yb II	24	2661.64	Tb II	20 c	2668.21	Eu III	40	2674.69	Tb II
150	2656.22	V I	70	2661.73	Cr II	130	2668.29	Nb I	400	2674.88	Os I
28	2656.25	Ru II	210	2661.88	Hf II	640	2668.34	Eu II	5	2674.91	Hg I
100	2656.30	Tm III	85	2661.97	Ti I	200	2668.59	Tm III	4	2675.12	Si IV
120	2656.44	F III	1800	2661.98	Ir I	600	2668.62	Ta I	120	2675.15	Sm
100	2656.46	Zr III	10	2662.24	Eu III	140 d	2668.65	In II	4	2675.25	Si IV
1600	2656.54	W I	100	2662.30	Tc I	100	2668.66	Tm III	100	2675.30	Tm III
12	2656.55	Sb II	70	2662.42	Sm	280	2668.71	Cr II	100	2675.35	Er II
1900	2656.55	Gd III	350	2662.63	Ir I	55	2668.75	Yb II	1800	2675.75	Gd III
1900	2656.61	Ta I	100 d	2662.63	In II	50	2668.86	Tb II	100	2675.85	Co II
490	2656.68	Os I	70000 w	2662.75	La IV	80	2668.98	Xe III	770	2675.90	Ta II
100	2656.68	Rb III	2000	2662.81	Ce III	140	2668.99	Ir I	200	2675.94	Nb II
100	2656.81	Ir I	810	2662.84	W I	160	2669.17	Al II	3400	2675.95	Au I
50 h	2656.87	V IV	1000	2663.00	Tm III	340	2669.17	U II	40 c	2676.09	Eu III
20 w	2656.88	Pr III	700	2663.154	Pb I	200	2669.18	Tm III	65	2676.11	Rh I
90	2657.05	Lu	700 h	2663.33	Po	140	2669.29	Tb II	30	2676.33	Mn I
10	2657.094	Pb I	320	2663.42	Cr II	210	2669.30	W I	1000	2676.64	Tm III
35	2657.19	Ti I	200	2663.46	Na II	20	2669.39	Sb III	120	2676.83	Ir I
2	2657.29	Li II	100	2663.53	Co II	55	2669.49	Zr II	55	2676.84	Dy II
3	2657.30	Li II	220	2663.63	Re I	8	2669.55	Mg I	500	2676.91	Tm III
400	2657.38	W I	70	2663.68	Cr II	95	2669.60	Ti I	750	2676.95	Cl II
160	2657.62	Nb I	150	2664.26	Zr III	130	2669.79	Cs II	100	2677.	Bi IV
45	2657.68	Sm	40	2664.29	Os II	520	2669.91	Ir I	110	2677.13	Te I
40	2657.70	Te II	60	2664.66	Fe II	40	2670.0	S II	440	2677.15	Pt I
2700	2657.80	Lu II	200	2664.76	Ru I	490	2670.26	Er II	1800	2677.16	Cr II
160	2657.84	Hf II	500	2664.76	Tm III	3	2670.49	Hg III	90 h	2677.25	Lu I
80	2657.99	Nb III	2700	2664.79	Ir I	200	2670.53	Zn I	650	2677.28	W I
400 d	2658.04	W II	500	2664.88	Tm III	300 r	2670.64	Sb I	50	2677.34	Dy II
290	2658.11	Mo I	70	2664.89	Yb III	120	2670.96	Zr II	500	2677.39	Yb III
20	2658.17	Pt I	2	2664.93	Sn II	100	2671.05	Pm II	100	2677.540	Cd I
	2658.18	W I	260	2664.97	W I	30	2671.06	Rh I	1	2677.57	Si IV
190	2658.48	Tm II	200	2665.04	Yb II	15	2671.17	Cs II	25	2677.748	Cd I
250	2658.59	Cr II	10	2665.05	Ga I	100	2671.42	Tm III	160 d	2677.79	W II
1900	2658.60	Os I	200	2665.05	Tm III	810	2671.47	W I	380	2677.80	V II
150	2658.663	Th II	110	2665.10	Mo I	350 h	2671.53	Br III	600	2677.90	Ne III
70	2658.69	Zr I	110	2665.25	Nb II	200	2671.67	Po I		2677.91	W I
950	2658.72	Cl II	220	2665.4	S III	350	2671.81	Cr II	8	2678.01	Sc IV
150	2658.75	Pd II	360	2665.5	Se IV	55	2671.83	Mo II	850	2678.09	Na II

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
29	2678.15	Tb II	1000	2684.10	Rb II	280	2691.04	Cr II	120	2696.99	V I
35	2678.16	Cr I	880	2684.14	Mo II	320	2691.04	U II	1000	2697.06	Nb II
100	2678.28	Tm III	300	2684.16	Zn I	210	2691.09	W I	2800	2697.39	Gd III
250	2678.29	Eu II	19	2684.23	Sc II	8	2691.29	Ga I	68	2697.42	Ta IV
9	2678.38	Ar III	600	2684.28	Ta I	340	2691.31	Ta I	5	2697.46	Be II
270	2678.57	V II	360	2684.288	Th II	500	2691.341	Ge I	170	2697.50	Tm II
1800	2678.63	Zr II	100	2684.42	Co II	160	2691.77	Nb II	10	2697.541	Pb I
500	2678.64	Ne III	55	2684.55	Mn II	110	2691.8	S III	20	2697.58	Be II
690	2678.76	Ru II	500	2684.75	Fe II	50	2691.90	Tb II	210	2697.71	W II
320	2678.79	Cr II	70	2684.75	Yb II	550	2692.03	Eu II	120	2697.74	V I
400	2678.88	W I	150	2684.76	La III	330	2692.06	Ru II	150	2697.75	C III
600	2679.062	Fe I	26	2684.80	Ti I	10	2692.16	Ti III	35	2697.91	Cr II
380	2679.32	V II	570 h	2685.08	Lu I	120	2692.25	Sb I	3	2698.08	Ge IV
1800	2679.44	Gd III	30	2685.14	Ti I	270	2692.34	Ir I	6	2698.14	Mg I
70 w	2679.47	Pr III	1500	2685.17	Ta II	260	2692.40	Ta I	400	2698.21	Tm III
310	2679.57	Tm II	30	2685.19	Pr II	480	2692.415	Th II	1000	2698.30	Ta I
1000	2679.85	Mo I	90 h	2685.54	Lu I	60	2692.60	Fe II	60	2698.31	Zr III
130	2679.93	Ti I	250	2685.66	Eu II	90	2692.60	Zr II	180	2698.41	Cr II
270	2680.06	Ta II	45	2685.70	Pr II	30	2692.61	Mo II	200	2698.43	Pt I
200	2680.133	P III	55	2685.94	Mn II	85	2692.66	Mn I	180	2698.69	Cr II
25	2680.28	Rh I	20	2686.13	Eu III	1600	2692.78	Gd III	50	2698.83	Hg I
30	2680.32	Kr III	75	2686.28	Zr III	120	2692.78	Sc I	50	2698.831	Hg I
18	2680.34	Cr II	220	2686.29	Ru I	85	2692.83	Dy II	320	2698.86	Nb II
45	2680.34	Mn II	30 h	2686.50	Rh	1900	2692.86	Gd III	50	2698.92	Pr II
21	2680.40	Yb II	130	2686.60	Cs II	22	2692.92	Zr I	27	2698.97	Mn II
100	2680.49	Tm III	12	2686.72	Ca III	12	2693.0	Bi II	350	2699.07	Sc III
70	2680.5	S III	30 h	2686.91	Rh	35	2693.05	Tb II	200	2699.106	Fe I
1700	2680.63	Gd III	230	2687.09	Cr II	80	2693.11	Tc I	3000	2699.22	Pa II
100	2680.63	Rh I	300	2687.14	Tm III	27	2693.19	Mn II	50	2699.38	Hg I
220	2680.66	Ta II	130	2687.15	Nb I	130	2693.34	Sm	55	2699.41	Mo II
30	2680.68	Mn II	200	2687.22	Hf III	55	2693.41	Tb II	1000	2699.49	Tm III
50	2680.692	Th I	28	2687.50	Ru II	40 c	2693.51	Eu III	510	2699.59	Os I
40	2681.19	Kr III	80	2687.53	O III	35	2693.52	Cr II	650	2699.59	W I
80	2681.19	Tc II	20	2687.63	Au II	160	2693.53	Zr II	95	2699.60	Zr II
30	2681.25	Mn II	20 c	2687.74	Eu III	3	2693.72	Mg I	1000	2699.80	Tm III
95	2681.36	Mo II	90	2687.75	Zr I	45	2693.74	Sm	20	2699.87	Eu III
2100	2681.42	W I	16	2687.76	Ca III	10	2693.98	F V	400	2700.01	W I
20	2681.65	Y I	35	2687.82	Tb II	100	2693.99	Th IV	8 h	2700.02	Fe III
40	2681.72	Mn I	1100	2687.96	V II	180	2694.06	Zr II	750	2700.13	Zr II
35	2681.76	Zr II	25	2687.98	Yb II	60	2694.21	Y I	60	2700.38	Pr II
30	2681.78	Rh I	560	2687.99	Mo II	3000	2694.23	Ir I	20	2700.47	Ga II
40	2681.89	Ba III	60	2688.04	Cr I	50	2694.31	Rh I	18	2700.60	Cr I
100	2682.16	Zr III	1200	2688.04	Cl II	1500	2694.43	Gd III	20 c	2700.78	Eu III
250 w	2682.18	N III	20	2688.16	Au II	470	2694.52	Ta II	18	2700.80	Yb II
10 h	2682.21	Si II		2688.16	Ru II	10	2694.80	Eu III	80	2700.89	Au I
5000	2682.32	Tm III	110	2688.25	Mn II	10 h	2695.13	Fe III	680	2700.94	V II
100	2682.34	La III	55	2688.29	Cr II	5	2695.18	Mg I	700	2700.962	Cu II
1800	2682.52	Gd III	220	2688.53	Re I	55	2695.22	Mo II	85	2701.00	Mn II
9	2682.63	Ar IV	100	2688.60	Sm	9 h	2695.34	Fe III	140	2701.03	Mo I
300	2682.64	Tm III	30	2688.71	Au I	55	2695.36	Mn II	8 h	2701.13	Fe III
200 r	2682.76	Sb I	170	2688.72	V II	26	2695.39	Y I	700	2701.14	Eu II
180	2682.87	V II	65	2688.82	Ti I	28	2695.43	Yb II	50	2701.17	Mn II
50 h	2682.90	Ac III	200 c	2688.98	I II	70	2695.43	Zr II	15	2701.19	Cs II
45	2683.02	Mn I	70	2689.03	Ho II	35	2695.46	Tb II	110	2701.34	Ru I
180	2683.09	V II	90	2689.20	N III	110	2695.49	O III	400	2701.36	Cl IV
25	2683.10	Er III	400	2689.212	Fe I	100	2695.553	Th II	480	2701.42	Mo II
80	2683.12	In II	750	2689.300	Cu II	650	2695.67	W I	40	2701.48	W II
60	2683.14	Tc I	85	2689.31	Dy II	300	2695.69	Tm III	160	2701.70	Mn II
20 c	2683.21	Eu III	25	2689.41	Cs II	120	2696.07	Ce II	4200	2701.71	Lu II
640	2683.23	Mo II	2100	2689.82	Os I	60	2696.08	Sm	30	2701.87	Mo II
470	2683.28	U II	150	2689.88	V II	50	2696.28	Fe I	800	2701.90	Eu II
290	2683.35	Hf II	5	2689.90	K III	200	2696.38	Cu III	12	2701.96	Ti III
290	2683.35	W I	350	2690.17	Br II	45	2696.49	Ni I	110	2701.99	Cr I
14	2683.42	Yb II	230	2690.24	V II	14	2696.62	Yb II	100	2702.02	Co II
23	2683.75	Mn I	26	2690.26	Cr I	50	2696.64	Tc I	160	2702.11	W II
80	2683.89	Tc I	70	2690.49	Zr III	280 c	2696.76	Bi I	380	2702.19	V II
1500	2683.91	Gd III	240	2690.79	V II	240	2696.81	Ta I	320	2702.20	Nb II
40	2683.97	Tb II	45	2690.90	Sm II	30	2696.83	Mo II	30	2702.25	Pr II
110	2684.04	Ir I	500	2691.01	Yb III	50	2696.83	Tb II	70	2702.27	Tc I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
10	2702.30	F V	170	2708.176	Th II	20	2714.16	Pr II	1500	2720.903	Fe I
2000	2702.40	Pt I	10 c	2708.25	Eu III	120	2714.20	V II	540	2721.19	Tm II
75	2702.46	Nd	110	2708.45	Mn II	140	2714.26	Zr II	110	2721.4	S III
150	2702.52	Nb II	60	2708.571	Fe I	80	2714.41	Fe II	7	2721.65	Ca I
210	2702.52	W I	400	2708.59	W I	75	2714.41	Rh I	200	2721.65	Lu III
18	2702.53	Cr I	1000	2708.78	Tc I	3000	2714.64	Os I	300	2721.677	Cu II
8	2702.63	Ba I	60	2708.79	Cr II	2600	2714.67	Ta I	230	2721.691	Th II
110	2702.8	S III	400 d	2708.80	W I	30	2715.20	Tc I	60	2721.77	Ag I
110	2702.83	Ru I	20 c	2708.84	Eu III	100	2715.31	Rh II	850	2721.86	Os I
1500	2702.91	Gd III	21	2708.84	Yb II	580	2715.36	Os I	30	2721.90	Pr II
40	2702.96	Tc II		2708.93	W I	1300	2715.47	Re I	470	2721.98	Nb II
650	2703.184	Cu II	20	2708.96	Ra II	400	2715.50	W I	30	2722.10	Mn II
2800	2703.28	Gd III	55	2709.01	Dy II	640	2715.69	V II	21	2722.20	Yb II
70	2703.48	Cr I	20	2709.05	Fe II	45	2715.76	Zr III	170	2722.380	Th II
	2703.55	Cr II	50	2709.05	Zr III	200	2715.81	Tm III	40	2722.47	Sr III
100	2703.63	Tm III	170	2709.20	Ru I	90 h	2715.91	Lu I	150	2722.56	V I
200	2703.68	Tm III	420	2709.23	Tl I	190	2715.99	Co I	1300	2722.61	Zr II
400	2703.73	Rh I	310	2709.27	Ta II	45	2716.18	Cr I	130	2722.65	Ru I
35	2703.86	Cr II	35	2709.31	Cr II	50	2716.22	Fe II	170	2722.75	Cr II
270	2703.958	Th II	80	2709.58	W II	26	2716.25	Ti II	95	2723.00	Y I
10	2703.96	F V	850	2709.624	Ge I	50	2716.257	Fe I	1	2723.19	He I
100	2703.98	Mn II	1000	2709.74	Tm III	80	2716.32	W II	400	2723.29	Er III
60	2703.99	Fe II	160	2709.84	N II	470	2716.62	Nb II	120	2723.38	Ce II
200	2704.03	Ge II	45	2709.96	Mn II	30	2716.80	Mn II	8	2723.52	Sc IV
110	2704.03	Ir I	180	2709.99	Eu I	700	2716.98	Eu II	30	2723.55	Tc I
190	2704.07	Tb II	1200	2710.13	Ta I	240	2717.18	Ta I	400	2723.578	Fe I
1600	2704.53	Gd III	40	2710.19	Mo II	100	2717.33	Xe III	3 h	2723.81	Si IV
75	2704.54	Nd	1600	2710.26	In I	1800	2717.35	Gd III	70	2723.96	Eu I
15	2704.86	Ca III	40 w	2710.30	Pr III	290	2717.35	Mo II	500	2724.03	Cl IV
30	2704.93	Mo II	100 p	2710.30	Y III	15	2717.44	Ge IV	100 w	2724.03	Pr III
100	2704.93	Tm III	80	2710.33	Mn II	55	2717.51	Cr II	18	2724.04	Cr II
500 c	2705.19	Pr IV	700	2710.37	Cl III	75	2717.51	Rh I	130	2724.21	Cs II
240	2705.28	Eu II	65	2710.54	Yb II	30	2717.53	Mn II	285	2724.3	Se IV
80	2705.36	Hg II	90 h	2710.54	Y III	300	2717.56	Tm III	2600	2724.35	W I
18	2705.43	Cr I	50 h	2710.67	Tl I	50	2717.786	Fe I	110	2724.41	Mo I
670	2705.61	Hf I	40	2710.78	W II	50	2717.87	Fe II	70	2724.43	Hg III
40	2705.63	Rh II	200	2710.79	Tm III	100	2718.02	Tm III	3000	2724.44	Tm III
130	2705.74	Mn II	580	2711.35	Sc I	80	2718.04	W II	30	2724.46	Mn II
1600	2705.89	Pt I	30	2711.49	Mo II	170	2718.35	Yb II	210	2724.62	W I
80	2706.012	Fe I	280	2711.51	Zr II	45	2718.43	Cr II	300	2724.764	P IV
530	2706.17	V II	110	2711.58	Mn II	250	2718.436	Fe I	10	2724.84	Ar III
100 s	2706.35	Am II	20	2711.58	Te II	180	2718.54	Rh I	110 l	2724.85	C III
700 r	2706.51	Sn I	200	2711.655	Fe I	250	2718.59	Hf I	30	2724.88	Fe II
400	2706.58	W I	170	2711.74	V II	20 w	2718.65	Pr III	150	2724.953	Fe I
400	2706.582	Fe I	1000	2711.76	Rb II	650	2718.778	Cu II	400	2725.03	W I
200	2706.62	Co II	25	2711.78	Yb II	220	2718.9	S III		2725.06	W I
470	2706.69	Ta I	10	2712.08	Eu III	150 r	2718.90	Sb I	85	2725.07	Ti I
580	2706.70	Os I	140	2712.31	Cr II	2100	2718.91	W I	180	2725.15	Mo I
150	2706.70	V II	400	2712.32	Yb III	30	2719.01	Mn II	150 l	2725.30	C III
110	2706.73	Hf II	50	2712.35	Mo II	4000	2719.027	Fe I	140	2725.47	Ru II
360	2706.77	Sc I	80 h	2712.40	Kr II	1300	2719.04	Pt I	140	2725.47	Zr I
120	2706.88	Ce II	200	2712.41	Ru II	180 d	2719.09	Lu I	50	2725.52	In III
370	2706.95	U II	210	2712.42	Hf II	3000	2719.30	Ce III	20 c	2725.54	Eu III
50	2707.00	Cd II	140	2712.42	Zr II	320	2719.33	W I	10000	2725.68	Cm II
2000	2707.03	Tm III	300	2712.49	Zn I	100	2719.420	Fe I	150 l	2725.90	C III
20	2707.17	F V	20	2712.50	Ac II	3000	2719.47	Tm III	80	2726.05	Fe I
300	2707.19	Tm III	75	2712.505	Cd I	690	2719.52	Ru I	80	2726.15	In III
40	2707.23	Rh I	55	2712.66	Yb II	3	2719.66	Ga I	10	2726.23	Ac II
200	2707.35	Co II	160	2712.74	Ir I	50	2719.74	Mn II	50	2726.235	Fe I
100 h	2707.37	Pr II	60	2713.13	Pt I	210	2719.86	W I	800	2726.49	Zr II
200	2707.44	Tm III	20	2713.3	Bi II	1300	2720.04	Os I	50	2726.50	Pr II
80	2707.53	Mn II	1000	2713.38	Tm III	40	2720.07	Zr III	420 h	2726.51	Cr I
500	2707.60	Tm III	700	2713.508	Cu II	65	2720.14	Rh I	1000	2726.69	Tc I
110	2707.86	V II	190	2713.51	Mo II	60	2720.17	Pr II	220	2726.8	S III
100	2707.90	Tc II	210	2713.65	Ho II	50	2720.197	Fe I	85	2726.97	Mo II
210	2707.95	Sc I	400	2713.77	Br I	70	2720.50	Gd II	55	2727.17	Dy II
85	2707.96	Sm	140	2713.84	Hf I	30	2720.52	Rh I	45	2727.26	Cr II
200 c	2708.01	Pr IV	100	2713.86	Rb III	50 c	2720.67	Eu III	25	2727.38	Fe II
30	2708.04	Yb III	300	2713.94	In I	470	2720.76	Ta I	75	2727.42	Ti I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
470	2727.44	Ta II	170	2733.26	Ti I	250	2739.872	P IV	10000	2748.04	Cm II
80	2727.54	Fe II	12	2733.30	He II	70	2740.10	Cr II	18	2748.04	Yb II
4000	2727.56	Tm III	300	2733.34	O II	200	2740.223	P IV	8	2748.18	Kr IV
100	2727.78	Co II	250	2733.39	Mo I	40	2740.426	Ge I	250	2748.23	Cs II
4200	2727.78	Eu II	10	2733.49	Mg I	110	2740.51	Zr II	1100	2748.25	Au I
410	2727.78	Ta I	1000	2733.581	Fe I	160	2740.62	Eu II	110 h	2748.29	Cr I
2	2727.82	Sn II	50	2733.820	Cd I	85	2740.70	Dy II	1000	2748.54	Cd II
2700	2727.89	Gd III	25	2733.88	Cs II	75	2740.79	W II	230	2748.66	Yb II
200	2728.020	Fe I	230	2733.95	Ho II	110	2741.0	S III	20	2748.71	Au II
200	2728.13	Tm III	1800	2733.96	Pt I	250	2741.01	Rb II	1200	2748.78	Ta I
0	2728.24	Li II	370	2733.97	U II	95	2741.07	Cr I	650	2748.84	W I
5	2728.29	Li II	60	2734.005	Fe I	5	2741.20	Li I	200	2748.85	Nb I
2	2728.32	Li II	230	2734.05	Sc III	350 l	2741.28	C II	4000	2748.90	Ce III
30 c	2728.47	Tc I	21	2734.09	Yb II	40	2741.32	Mo II	330	2748.98	Cr II
55	2728.61	Mn II	50	2734.268	Fe I	8	2741.41	Er III	40	2749.06	Ti I
240	2728.88	V II	50	2734.30	Pr II	140	2741.55	Zr II	100	2749.32	Fe II
100 s	2728.69	Am II	310	2734.35	Ru II	55	2741.62	Mo II	500	2749.48	Fe II
400	2728.770	P IV	80	2734.54	Co II	55	2741.71	Yb II	100	2749.530	Th II
50	2728.820	Fe I	22	2734.85	Y II	75	2741.75	Rh I	130 d	2749.75	In II
20	2728.88	Be II	1400	2734.86	Zr II	110	2741.96	Ce II	860	2749.83	Ta I
80	2728.90	Fe II	80	2735.25	Eu I	95	2742.03	Cr II	80	2749.84	Cs II
160	2728.94	Rh I	55	2735.29	Ti I	40	2742.12	Pr II	500	2749.91	Yb III
480 h	2728.95	Lu I	500	2735.475	Fe I	95	2742.17	Cr I	1200	2750.140	Fe I
200	2729.120	P IV	40	2735.61	Ti I	250	2742.254	Fe I	310	2750.19	Er II
250	2729.327	Th II	50	2735.612	Fe I	250	2742.32	Ti I	430	2750.22	Gd II
190	2729.33	Eu II	1800	2735.72	Ru I	800	2742.405	Fe I	270	2750.35	Ho II
380	2729.44	Eu II	75	2735.76	Zr III	70	2742.53	Y I	1300	2750.48	Yb II
85	2729.50	Dy II	55	2735.79	Dy I	1100	2742.56	Zr II	390	2750.73	Cr II
80	2729.62	W II	350 h	2735.83	Br III	240	2743.07	Mo I	100	2750.89	Ce II
140	2729.68	Mo II	28	2735.834	Th II	200	2743.20	Fe II	20	2751.13	Fe II
400	2729.78	Ge II	30	2736.09	Ge IV	70	2743.28	Eu I	500	2751.23	Cl IV
130	2729.92	Pt I	150	2736.23	Tc I	4	2743.55	K II	450	2751.24	Gd II
2000	2730.04	Ce III	130	2736.24	Tb II	150	2743.565	Fe I	20	2751.33	Cu III
25	2730.07	Cs II	310	2736.25	Ta II	210	2743.59	Ta I	85	2751.45	Yb II
22	2730.08	Y I	170 h	2736.47	Cr I	250	2743.64	Cr II	320	2751.47	Mo I
500	2730.12	I II	12	2736.53	Mg I	200	2743.64	Hf I	45	2751.60	Cr I
80	2730.20	Mo II	40	2736.76	Rh I	3000	2743.71	Ce III	360	2751.81	Hf II
3	2730.47	Li II	60 c	2736.83	Tc II	10	2743.94	Eu III	280	2751.87	Cr II
140 d	2730.50	Bi I	10000	2736.89	Cm II	140	2744.00	Ir I	20	2752.15	Fe II
500	2730.53	Tc I	160	2736.96	Mo II	200	2744.068	Fe I	410	2752.166	Th II
3	2730.55	Kr IV	1	2736.96	K III	200	2744.08	Tm II	90	2752.17	Eu II
1	2730.55	Li II	110	2737.09	Nb II	120	2744.26	Eu II	6	2752.20	Er III
580	2730.61	Os I	500	2737.310	Fe I	130	2744.45	Ru I	660	2752.21	Zr II
40	2730.73	Fe II	120	2737.342	Cu II	80	2744.527	Fe I	75	2752.45	Ru II
120	2730.85	Hf I	120	2737.83	Fe I	25	2744.66	Pr II	500	2752.46	Tm II
220	2731.1	S III	80 h	2737.88	Mo II	800	2744.74	Tm III	410	2752.49	Ta II
21	2731.13	Ti I	25	2737.90	Pr II	190	2745.10	Co I	10	2752.68	Eu III
180	2731.35	V I	100	2737.97	Tc I	270	2745.271	Cu II	75	2752.77	Ru II
40	2731.36	Os II	400	2737.98	Tm III	40	2745.61	Eu I	80	2752.78	Hg I
50	2731.37	Eu I	30	2738.05	Be I	30	2745.78	Ba III	80	2752.783	Hg I
1000	2731.38	Tm III	75 c	2738.17	Lu II	660	2745.86	Zr II	110 h	2752.88	Cr I
200	2731.56	Re II	70	2738.48	Pt I	400	2745.99	Tm III	190	2753.01	Nb I
40	2731.58	Ti I	100	2738.53	Er III	80	2746.03	Er III	400	2753.20	Tm II
12	2731.78	Pr II	50	2738.60	Mo II	35	2746.21	Cr II	100	2753.22	Co II
280 h	2731.91	Cr I	710	2738.76	Hf II	20	2746.28	Pr II	80	2753.29	Fe II
8	2731.99	Mg I	20 c	2738.83	Tc II	290	2746.30	Mo II	140	2753.40	V II
300	2732.11	Tm III	30	2738.86	Mn I	300	2746.48	Fe II	200 c	2753.47	Pr IV
220	2732.21	Re I	170	2739.22	Ru I	250	2746.49	C II	500	2753.60	Hf III
50	2732.42	Sm	210	2739.26	Ta II	350 h	2746.52	Br II	110 h	2753.64	Re II
40	2732.61	Eu I	500	2739.27	Er III	510	2746.68	Ta I	50	2753.69	Fe I
490	2732.72	Zr II	40	2739.30	Dy II	200	2746.91	Nb I	80	2753.86	Pt I
110	2732.74	Yb II	500	2739.309	P IV	520	2747.156	Th II	700	2753.88	In I
580	2732.80	Os I	10000	2739.31	Cf	70	2747.29	Eu II	150	2754.032	Fe I
250	2732.808	Th II	270	2739.31	Er II	110	2747.46	O II	470	2754.16	U II
300	2732.87	Tc I	70	2739.38	Cr I	55	2747.58	Yb II	3600	2754.17	Lu II
330	2732.88	Mo II	400	2739.55	Fe II	70	2747.61	Pt I	35	2754.28	Cr II
610	2733.04	Re II	100	2739.71	V II	80	2747.83	Eu I	100	2754.426	Fe I
25	2733.12	Pr II	85	2739.81	Ti I	35	2747.97	Ru II	650	2754.588	Ge I
310	2733.26	Nb II	35	2739.87	Sm	10000 s	2748.02	Bk II	4000	2754.87	Ce III

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
30	2754.89	Fe II	150	2761.81	Fe II	310	2767.74	Re I	980	2773.36	Hf II
22	2754.90	Cr I	150	2761.92	Er III	85	2767.85	Sm II	210	2773.70	W I
200	2754.92	Pt I	600	2761.92	Po I	4400 d	2767.87	Tl I	160	2773.78	Mo II
230	2755.01	Er II	80	2761.97	Cs II	240	2768.13	Nb II	220	2773.8	Se III
20	2755.12	Eu III	150	2762.026	Fe I	4000	2768.28	Ce III	70	2773.951	Th II
22	2755.27	Cr I	100	2762.13	Tc I	7	2768.34	Mg I	20	2774.00	Pt I
130	2755.55	F III	7	2762.23	Ar III	20 c	2768.38	Eu III	810	2774.00	W I
610	2755.63	Er II	29	2762.28	Sm	40	2768.51	Gd II	180	2774.02	Hf II
800	2755.73	Fe II	200	2762.34	Tc I	10 c	2768.54	Eu III	170 d	2774.04	Zr I
220	2755.75	Dy II	400	2762.34	W I	100	2768.72	Er III	50	2774.066	Th II
100	2755.76	Tc I	750	2762.59	Cr II	200 d	2768.73	Zr II	50	2774.16	Zr II
200	2755.94	Yb III	60	2762.66	Er III	270	2768.841	Th II	190	2774.39	Mo II
50	2756.06	Mo III	285	2762.77	Al III	220	2768.85	Re I	810	2774.48	W I
110	2756.07	Mo II	120	2762.772	Fe I	220	2768.85	Zr II	10000	2774.52	Cf
400	2756.15	Tm III	340	2762.85	U II	90	2768.93	Ru II	20	2774.69	Fe II
80	2756.20	Er III	220	2762.87	Al III	210	2768.98	W I	6	2774.70	Kr IV
250	2756.328	Fe I	80	2762.92	Ne II	6	2769.22	Hg III	50	2774.77	Pt II
200	2756.45	Zn I	22	2763.06	Cr I	50	2769.30	Fe I	60	2774.77	Sm
200 s	2756.55	Am II	1900	2763.09	Pd I	220	2769.32	Re I	60	2774.80	Er III
22	2756.75	Cr I	120	2763.109	Fe I	25	2769.35	Fe II	50	2774.958	Cd I
200	2756.76	Yb III	470	2763.27	Os I	270	2769.53	Tb II	100	2774.97	Co II
285	2756.9	S III	260	2763.42	Ru I	50	2769.60	Pr II	110	2775.2	S III
55	2757.08	Dy II	220	2763.62	Mo II	6	2769.65	Te I	25	2775.23	Zr III
150	2757.10	Cr I	20	2763.66	Fe II	800	2769.669	Cu II	40	2775.37	In I
100	2757.316	Fe I	210	2763.79	Re I	10	2769.71	Eu III	1700	2775.40	Mo II
65	2757.40	Ti I	2	2763.80	He I	400	2769.74	W I	20	2775.55	Er III
350	2757.72	Cr II	100 h	2763.894	Cd I	240	2769.76	Mo II	250	2775.55	Ir I
10	2757.75	Eu III	460	2764.08	Gd II	320	2769.81	Gd II	15	2775.82	V V
60	2757.81	Cs II	35	2764.18	Sm	30	2769.84	Pt I	770	2775.88	Ta I
14	2757.92	Ar IV	190	2764.19	Co I	270	2769.89	Ho II	50 d	2775.94	Pr II
220	2758.00	Re I		2764.2	Be II	250 h	2769.92	Cr I		2776.03	Pr II
95	2758.08	Ti I	50 h	2764.230	Cd I	700	2769.92	Tm III	85	2776.11	Sm
1000	2758.31	Ta I	400	2764.27	W II	400 r	2769.95	Sb I	30 h	2776.23	Mn I
280	2758.61	Nb I	80 h	2764.35	Cr I	510	2770.02	Er II	10	2776.26	Ar IV
65 d	2758.63	Mo II	35	2764.41	Yb II	390	2770.04	U II	170	2776.28	Yb II
530	2758.81	Zr II	75	2764.98	Nd I	230	2770.17	Gd II	160	2776.50	W II
60	2758.98	Cr II	340	2765.04	Os I	350	2770.42	Re I	38	2776.69	Mg I
21	2759.00	Yb II	100	2765.123	Th II	300	2770.50	Br III	150 h	2776.85	Pd II
10000 s	2759.10	Cf	25	2765.13	Fe II	50	2770.59	Ge II	15	2776.91	Fe II
400	2759.23	Er III	20	2765.15	I II	400	2770.64	Cl IV	300	2776.91	Os I
110 c	2759.35	Ho II	5	2765.22	Mg I	960	2770.71	Os I	250	2776.99	Cs II
80	2759.39	Cr II	35	2765.44	Ru II	200	2770.816	Th II	140	2777.10	Ho II
160	2759.47	Tb II	100	2765.50	Yb III	300	2770.86	Zn I	20	2777.31	Tc II
160	2759.63	F III	140	2765.67	V II	810	2770.88	W I	100	2777.43	Tm III
20	2759.71	Hg I	750 h	2765.74	Lu I	21	2770.98	Gd II	140	2777.73	V II
20	2759.710	Hg I	60	2765.95	Tc I	300	2770.98	Zn I	130	2777.74	Mo I
45	2759.73	Cr II	800	2765.98	Tm III	14	2771.28	Ca III	65	2777.86	Mo II
50	2759.81	Fe I	25	2766.10	Cs II	85	2771.32	Yb II	45	2778.06	Cr II
140	2760.10	Y I	10 c	2766.26	Eu III	18	2771.36	Ba II	50	2778.06	Rh I
10 h	2760.18	Ac II	110	2766.26	Mo I	30	2771.44	Mn I	60	2778.07	Fe I
20 c	2760.21	Eu III	2500 r	2766.37	Cu I	18	2771.45	Cr I	600	2778.220	Fe I
60	2760.35	Pr II	200	2766.39	Re I	100	2771.51	Rh I	32	2778.27	Mg I
130	2760.391	Th II	70	2766.50	Dy II	500	2771.67	Pt I	100	2778.38	Ru II
20	2760.53	Mo II	750	2766.54	Cr II	100	2772.	Bi IV	40	2778.69	W II
40 d	2760.74	W II	100	2766.70	Co II	60	2772.07	Er III	70	2778.706	Th II
65	2760.78	Yb II	110	2766.85	Ho II	300	2772.07	Fe I	45	2778.76	Gd I
45 h	2760.93	Mn I	500	2766.89	Tc I	75	2772.35	Ge II	40	2778.80	Pr II
15	2761.29	Ti II	80	2766.910	Fe I	70	2772.42	Dy II	150	2778.91	Tc I
65	2761.37	Yb II	160	2766.96	Hf I	330	2772.46	Ir I	230	2778.97	Er II
150	2761.42	Ce II	20	2766.99	Cd III	2000	2772.55	Lu III	22	2779.14	Cr I
690	2761.42	Os I		2766.99	Li II	110	2772.61	Dy II	45	2779.14	Gd II
190	2761.53	Mo I	100	2767.	Bi IV	200	2772.64	Tm III	85	2779.23	Sm II
80	2761.59	W II	15	2767.11	Er III	110	2772.83	Ho II	40	2779.30	Fe II
450	2761.63	Hf I	285	2767.2	Se III	170	2773.02	Hf I	390	2779.37	Hf I
430	2761.68	Ta II	250	2767.522	Fe I	8	2773.04	Sc IV	75	2779.54	Rh I
10	2761.72	Eu III	22	2767.54	Cr I	310	2773.20	Nb I	270	2779.55	Tm II
90 h	2761.76	Cr I	75	2767.54	Ag II	50	2773.23	Fe I	40	2779.58	Dy II
20	2761.78	Sn I	200 c	2767.60	Pr IV	40	2773.24	Pt I	150	2779.81	Sn I
120	2761.780	Fe I	50	2767.73	Rh I	8	2773.31	Fe III	90	2779.83	Mg I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
30	2780.00	Mn I	60	2787.96	Sn I	10	2795.21	Ra II	50	2802.05	Pr II
880	2780.04	Mo II	18	2787.96	Yb II	18	2795.29	Yb II	380	2802.07	Ta I
5	2780.11	Y III	210	2787.98	W I	1000	2795.53	Mg II	250	2802.50	Ti I
15	2780.15	Ga II	3000	2788.10	Fe I	600	2795.60	Yb III	230	2802.53	Er II
170 r	2780.22	As I	120	2788.15	F III	80	2795.65	Tc I	870	2802.56	U II
270	2780.24	Nb II	130	2788.24	Cs II	200	2795.78	Tc II	600	2802.70	Mg II
80	2780.30	Cr II	300	2788.24	Yb III	680	2796.34	Ta I	250	2802.75	Tb II
20 c	2780.48	Eu III	10	2788.37	Lu III	2700	2796.63	Lu II	140	2802.81	Ru I
360	2780.52	Bi I	30	2788.61	Ge IV	75	2796.63	Rh I	1000	2802.81	Tc I
2	2780.60	Er III	40	2788.89	Tc I	130 h	2796.70	Sm	1900	2802.84	Eu II
610	2780.70	Cr I	14	2788.96	Ar IV	530	2796.73	Os I	150	2803.02	Tc I
100	2780.82	Au I	30	2789.05	Pr II	160	2796.90	Zr II	140	2803.24	Pt I
1000	2781.01	O V	55	2789.20	Mn I	930	2796.93	Gd II	20	2803.27	Y III
400	2781.12	Tm III	500	2789.25	Tc I	7	2797.11	Ar IV	120	2803.28	Re II
20	2781.16	Lu III	150	2789.38	Sm II	730	2797.27	Tm II	400	2803.32	Yb III
25	2781.22	Tc I	100	2789.50	Hf II	540	2797.35	Ir I	15	2803.42	Bi I
520	2781.29	Ir I	140	2789.73	Hf II	70	2797.4	S III	1000	2803.43	Yb III
8	2781.29	Mg I	130	2789.80	Cs II	20	2797.59	Ac II	40	2803.46	Hg I
440	2781.40	Gd II	775	2789.85	O V	1600	2797.70	Ir I	120	2803.47	V II
10000	2781.40	Pu II	200	2790.14	Zr I	70	2797.737	Th II	40	2803.471	Hg I
32	2781.42	Mg I	20	2790.27	Sb III	680	2797.76	Ta II	11	2803.70	Bi II
10 h	2781.56	Ac II	20	2790.31	Li II	200	2797.78	Fe I	320	2804.07	Os I
480	2781.89	Eu II	60	2790.36	Mn I	35	2797.80	Yb II	10	2804.10	Er III
1000	2782.05	Tc I	100	2790.53	Ce II	240 d	2797.93	Mo I	70	2804.10	Mn I
130	2782.36	Nb I	13	2790.79	Mg II	16	2798.06	Mg II	300	2804.16	Br III
700	2782.47	Cl IV	5 h	2790.83	Ac IV	380	2798.18	Ir I	310	2804.35	Er II
740	2782.55	Os I	100	2791.00	Co II	100	2798.21	Yb II	30	2804.43	Hg I
36	2782.97	Mg I	60	2791.08	Mn I	5100	2798.27	Mn I	30	2804.438	Hg I
130	2783.03	Rh I	25	2791.16	Rh I	150	2798.65	Ni I	400	2804.521	Fe I
80	2783.11	Er III	12	2791.20	Y I	55	2798.67	Cr II	12	2805.3	Bi II
50	2783.31	Pr II	220	2791.29	Re I	60	2798.76	In II	2	2805.34	Hg I
550	2783.57	Re I	140	2791.42	Ce II	500	2798.86	Rb III	30	2805.59	Cd III
50	2783.69	Fe II	55	2791.44	Dy II	80	2799.03	W II	55	2805.70	Ti I
40	2783.88	Os II	70	2791.44	Y III	55	2799.114	Th II	100	2805.87	Er III
120	2784.27	Ce II	35	2791.496	Th I	110	2799.15	Zr II	130	2805.92	W II
410	2784.45	U II	40	2791.54	Mo II	110	2799.22	N II	10000	2806.11	Pu II
12	2784.47	Ar IV	15	2791.59	Ca III	30	2799.29	Fe II	60	2806.14	Mn I
10000	2784.48	Pu II	200	2791.795	Cu II	45	2799.38	Yb II	430	2806.30	Ta I
130	2784.49	Tb II	390	2791.96	Gd II	130	2799.41	Cs II	30	2806.50	Ti II
100	2784.66	Yb II	340	2791.96	W I	170	2799.528	Cu II	510	2806.58	Ta I
10000	2784.83	Cm II	90	2792.02	Ne II	220	2799.84	Mn I	100	2806.72	Ho II
400	2784.99	Mo II	120	2792.04	Zr I	400	2799.93	W I	35	2806.74	Ru II
80	2785.03	Sn I	90	2792.16	Cr II	40 h	2799.98	Pt II	20	2806.76	Ac II
350	2785.07	Tm II	20	2792.51	Eu III	100	2799.99	Ho II	2	2806.77	Hg I
30	2785.19	Fe II	35	2792.51	Pr II	50	2800.00	Yb II	2000	2806.77	Tm III
30	2785.21	Y II	500	2792.54	Er III	35	2800.06	Yb II	2800	2806.91	Os I
330	2785.22	Ir I	810	2792.70	W I	30	2800.11	Y II	1500	2806.98	Fe I
15	2785.28	Ba I	110	2793.05	Nb II	400	2800.26	Po I	100	2807.00	Y III
300 h	2785.28	Br III	50	2793.27	Pt I	150	2800.27	Rb III	630	2807.05	U II
100	2785.35	Ce II	45	2793.28	Yb II	120	2800.33	Dy II	10	2807.22	Yb III
160	2785.5	S III	25	2793.32	Cs II	180	2800.51	Tb II	85	2807.36	Sm
500	2785.59	Tc I	100	2793.73	Co II	110	2800.53	Dy II	300 h	2807.55	Br II
12	2785.59	Y II	20	2793.89	Fe II	50 h	2800.64	Pd II	500	2807.58	Rb III
70	2785.70	Cr II	50 h	2793.90	Ac IV	70	2800.77	Cr II	50 h	2807.59	Pd II
60	2785.79	Nd I	70	2793.925	Ge I	410	2800.82	Ir I	100	2807.74	Mo III
5	2785.87	Sb III	830	2793.94	U II	400	2800.87	Zn I	400	2807.76	Mo II
100	2786.	Bi IV	230	2793.99	Os I	500	2800.90	Lu III	110	2807.827	Th II
50	2786.00	Sr III	230	2794.19	Os I	30	2800.93	Au I	230	2808.00	Hf II
640	2786.31	Os I	100	2794.21	Pt II		2801.	Li I	55	2808.02	Mn I
85	2786.64	Sm	80	2794.22	Ne II	160 d	2801.05	W II	40	2808.05	Pm II
920	2786.99	O V	90	2794.255	Th II	3700	2801.06	Mn I	10	2808.09	Eu III
35	2787.63	Cr II	140	2794.41	Ho II	100	2801.06	Zn I	500	2808.36	Tc I
70	2787.68	Gd I	25	2794.44	Yb II		2801.17	W I	60	2808.38	Gd II
390	2787.69	Ta I	130	2794.50	Cs II	5	2801.17	Zn I	420	2808.39	La II
50 w	2787.72	Pm II	100	2794.53	Tc I	110	2801.41	Dy II	6	2808.44	Er III
180	2787.83	Mo I	680	2794.60	Tm II	220	2801.47	Mo I	10	2808.51	Pt I
110	2787.83	Ru II	100	2794.66	Gd II	100	2801.96	Zn II	50	2808.51	Yb III
35	2787.84	Cr I	6200	2794.82	Mn I	25000 r	2801.995	Pb I	200	2808.59	I II
100 h	2787.92	Pd II	21	2795.07	Yb II	1000	2802.04	Au II	650	2808.71	Na II

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
470	2808.94	Os I	10000	2815.77	Pu II	35	2822.15	Sc II	3	2829.60	Kr IV
440	2808.98	U II	300	2815.78	Os I	30 h	2822.27	Pt II	260	2829.82	W I
180	2808.998	Th II	40	2815.91	Xe III	180	2822.37	Cr II	600	2829.87	Na II
110	2809.11	Mn I	100 s	2815.98	Am II	100	2822.55	Au II	10	2830.25	Ar IV
40	2809.17	Ti I	45	2816.071	Th II	55	2822.55	Mn I	1400	2830.30	Pt I
250	2809.30	Tb II	1700	2816.15	Mo II	45	2822.56	Y I	150	2830.34	Er III
16	2809.44	Ar IV	550	2816.18	Eu II	160	2822.57	W II	300	2830.359	As II
100	2809.48	Ne II	650	2816.19	Al II	100	2822.58	Pb I	70	2830.442	Th II
150	2809.50	Sm	28	2816.32	Yb II	490	2822.68	Hf II	180	2830.47	Cr II
850	2809.52	Na II	30	2816.33	Mn II	3000	2822.79	Pa II	15	2830.53	Sr IV
140 c	2809.62	Bi I	300	2816.39	Dy II	30	2823.13	Au II	80	2830.79	Mn I
50 c	2809.65	Tc II	600	2816.92	Yb III	20	2823.17	Pr II	270	2830.90	Ce II
750	2809.72	Gd II	500	2816.94	Cs II	680	2823.18	Ir I	220	2830.94	Sm
3	2809.76	Mg I	90000	2817.04	Y III	14000 r	2823.189	Pb I	190	2830.99	Yb II
160 c	2809.99	Ho II	260	2817.10	Ta II	30	2823.19	Cd II	300	2831.164	As II
350	2810.03	Ru I	9	2817.11	Si III	300	2823.276	Fe I	60	2831.18	Tc II
75	2810.30	Ti II	85	2817.20	Sm II	110	2823.64	N II	100 l	2831.24	Am II
1700	2810.55	Ru I	30	2817.40	Ti I	250	2824.11	Po I	1600	2831.38	W I
14	2810.72	Yb II	220	2817.44	Mo II	20	2824.14	Pr II	40	2831.44	Mo II
100	2810.804	Cu II	10	2817.58	Eu III	10000	2824.20	Cm II	7	2831.49	Si III
120	2810.86	Sm II	230	2817.68	Hf I	300	2824.20	Ho II	200	2831.55	Tm II
180	2810.91	Zr II	65	2817.84	Ti I	1250 r	2824.37	Cu I	25	2831.56	Fe II
160	2810.93	Gd II		2817.87	Ti II	390	2824.37	U II	270 c	2831.69	Ho II
2	2811.11	Mg I	630	2817.96	U II	100 h	2824.39	Ag I	10	2831.75	Sc III
220	2811.36	Ho II	85	2817.97	Mn I	1200	2824.45	Ir I	1000	2831.843	Ge II
160	2811.45	F III	810	2818.06	W I	70	2824.57	B IV	1	2831.95	Er III
500	2811.61	Tc II	10	2818.2	He I	50	2824.75	Er III	920	2832.06	U II
10000	2811.62	Cm II	50	2818.25	Pt I	100	2824.97	Yb II	30	2832.07	Mo II
20	2811.75	Co III	350	2818.29	Na II	22	2825.37	Y II	3000 l	2832.14	Pa
220	2811.75	Eu II	60	2818.36	Cr II	140	2825.42	Dy II	130	2832.16	Ti II
1	2811.78	Mg I	350	2818.36	Ru I	100 h	2825.44	Au II	18	2832.20	Yb II
180	2812.00	Ho II	3	2818.45	I IV	2	2825.52	Sn II	5000 s	2832.26	Am II
80	2812.01	Cr II	250	2818.47	Tm II	600	2825.56	Fe I	800	2832.315	Th II
100 l	2812.10	Am II	2	2818.48	I III	530	2825.56	Zr II	1500	2832.436	Fe I
500	2812.15	Rb II	1000	2818.72	Yb III	50	2825.687	Fe I	100	2833.00	Kr II
40	2812.25	W II	390	2818.74	Zr II	285	2825.85	B IV	8	2833.03	Er III
28	2812.58	Mo II	40	2818.77	Mn I	15	2826.01	Yb III	30	2833.03	Au II
60	2812.59	Sn I	18	2818.86	Y I	50	2826.13	F IV	35000 r	2833.053	Pb I
180	2812.64	Tb II	140	2818.94	Hf I	280	2826.16	Tl I	110	2833.24	Ir II
60	2812.84	Mn I	90 d	2818.97	In II	45	2826.38	Y II	140	2833.26	Eu II
200 s	2812.92	Am II	100	2819.322	Th II	150	2826.43	Rh I	180	2833.28	Hf I
100	2812.94	Cu III	40	2819.46	Tc I	240	2826.54	Mo I	100	2833.31	Ce II
30	2812.98	Ti I	30	2819.54	Sc II	140	2826.64	Ho II	8	2833.47	Ac II
30	2813.08	Eu II	200	2819.74	Hf I	180	2826.68	Rh I	10000	2833.58	Cm II
10 p	2813.24	Fe III	75	2819.78	Re II	60	2826.68	Sc II	810	2833.63	W I
2500	2813.287	Fe I	300	2819.79	Au II	22	2826.75	Cr I	300	2833.75	Gd II
70	2813.47	Mn I	880	2819.95	Re I	170	2826.855	Th II	1800	2833.83	Gd III
80	2813.58	Sn I	100 h	2820.10	Pm II	250	2827.02	Tm II	270 d	2833.91	Er II
26	2813.64	Y I	410	2820.19	Er II	190	2827.08	Nb II	110	2833.91	Zr II
30	2813.76	Ra II	1200	2820.22	Hf II	30	2827.31	Rh I	100 l	2833.95	Am II
420	2813.84	Os I	25	2820.27	Cs II	30	2827.45	Xe III	140	2833.99	F III
230	2813.86	Hf II	100	2820.336	Th II	10000 s	2827.57	Bk II	130	2834.00	Ru I
16	2813.88	Ca III	40	2820.74	F IV	80	2827.74	Mo II	310	2834.08	Re I
3400	2813.94	Eu II	2000	2820.78	Eu II	200	2827.87	Ru I	75	2834.12	Rh I
45	2814.01	Gd II	700	2820.87	Br IV	580	2827.92	Tm II	110	2834.13	Hf I
740	2814.20	Os I	29	2820.96	Sm II	200	2828.04	Tc I	70	2834.26	Cr II
70	2814.319	Th II	300	2821.12	Tm III	65	2828.07	Ti I	50	2834.28	Ge II
30	2814.45	Xe III	870	2821.12	U II		2828.15	Ti II	270 c	2834.35	Lu II
170	2814.48	Hf II	140	2821.15	Yb II	20	2828.29	Pr II	80	2834.39	Mo II
65	2814.53	Yb II	35	2821.23	Lu II	400cw	2828.72	Eu II	70	2834.71	Pt I
24	2814.67	Mo II	250	2821.29	Ni I	120	2828.808	Fe I	28	2834.97	Yb II
220	2814.68	Re I	100	2821.35	Tc II	680	2828.90	U II	210	2834.99	Ho II
190	2814.74	Ho II	50	2821.42	Sr III	80	2829.008	Ge I	80	2835.33	Mo II
30	2814.86	Tc I	55	2821.45	Mn I	25	2829.04	Cs II	400	2835.4	Cl IV
620	2814.90	Zr I	450	2821.68	B IV	4	2829.08	He I	45	2835.44	Rh I
150	2814.93	Hg II	45	2822.01	Cr II	400	2829.16	Ru I	2500	2835.63	Cr II
60	2815.02	Mn II	100	2822.025	Th II	420	2829.27	Os I	80	2835.63	Co II
1000 l	2815.28	Am II	50	2822.03	Mo II	120	2829.30	Eu II	150	2835.63	F III
150	2815.56	Co I	110	2822.03	Ru I	25	2829.42	Cs II	210	2835.64	W I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
110	2835.66	Ir I	160	2842.28	Ir I	14	2848.42	Mg I	200	2855.22	V I
110	2835.85	Ho II	14	2842.59	Yb II	10 c	2848.44	Eu III	10000 s	2855.24	Cf
120	2835.950	Fe I	280	2842.65	Nb II	100	2848.44	Yb II	8	2855.29	Ar II
3	2836.08	Kr IV	320	2842.812	Th II	560	2848.52	Ta I	250	2855.41	Er II
40	2836.18	Zr III	260	2842.82	Ta I	350	2848.52	Zr I	80 h	2855.6	Bi III
150	2836.24	Nb I	7	2842.88	Ar III	270	2849.10	Ho II	880	2855.68	Cr II
160	2836.26	O IV	1000	2842.88	Br IV	60	2849.20	Tc I	70	2856.0	S III
27	2836.31	Mn I	300	2842.96	Yb III	270	2849.21	Hf II	50	2856.00	Mo II
820	2836.40	Ir I	20	2842.98	Pr I	45	2849.29	Cr I	650	2856.03	W I
45	2836.48	Cr II	220	2843.00	Re I	21	2849.34	Yb II	50	2856.16	Rh I
35	2836.69	Gd II	1700	2843.25	Cr II	160	2849.38	Mo I	26	2856.30	Y II
75	2836.69	Rh I	130	2843.52	Zr II	3000	2849.40	Ce III	25	2856.46	Cd II
1000	2836.71	C II	200	2843.631	Fe I	360	2849.48	U II	650	2856.51	Na II
200	2836.900	Cd I	24	2843.73	Mo II	200	2849.52	Tm III	60	2856.52	Gd II
180 c	2836.92	In I	80	2843.96	Eu II	6	2849.63	Er III	100	2856.74	Au II
70	2837.00	Gd II	1000	2843.977	Fe I	3800	2849.72	Ir I	90	2856.77	Cr II
360	2837.19	U II	20	2844.01	Pr II	10	2849.80	Tl II	30	2856.91	Fe II
710	2837.23	Zr I	110	2844.18	Ho II	1200	2849.84	Cr II	50	2856.939	Hg I
1200	2837.295	Th II	640	2844.25	Ta I	20	2850.39	Eu III	50	2856.94	Hg I
160	2837.33	Ir I	220	2844.39	Mo I	1500	2850.49	Ta I	500 h	2857.13	Tc I
350	2837.368	Cu II	2300	2844.40	Os I	20	2850.62	Pr I	70	2857.40	Cr II
230	2837.42	Os I	290	2844.46	Ta II	200	2850.62	Sn I	200 c	2857.46	Pm II
200	2837.55	Re I	660	2844.58	Zr II	1500	2850.76	Os I	110	2857.68	Tb II
800	2837.60	C II	310	2844.67	Tm II	270	2850.96	Hf I	100	2857.748	Cu II
300	2837.85	Au II	100	2844.68	Ho II	150	2850.96	Tc I	11	2857.87	Y II
90	2837.96	Al I	3	2844.76	Hg III	270	2850.98	Re I	30 c	2858.14	In I
200	2838.119	Fe I	20	2844.99	Eu III	1900	2850.98	Ta I	100	2858.29	Te II
470	2838.17	Os I	60	2845.04	Tc I	12	2851.09	Sb II	45	2858.33	Yb II
350	2838.51	Rb II	330 h	2845.13	Lu I	110	2851.10	Ti II	25	2858.34	Fe II
5100	2838.63	Os I	8	2845.29	Er III	100	2851.11	Sb I	220	2858.44	Ta II
390	2838.71	Er II	290 c	2845.35	Ta I	360	2851.13	Yb II	45	2858.46	Yb II
55	2838.79	Cr II	100	2845.44	Rb III	30	2851.16	Kr III	610	2858.91	Cr II
1100	2839.16	Ir I	1000	2845.527	Ge II	180	2851.21	Hf II	2000 c	2859.11	Tc I
120	2839.34	Zr II	100	2845.594	Fe I	270	2851.260	Th II	60 l	2859.16	N V
2	2839.44	I III	410	2845.83	Hf I	60	2851.35	Sm	3	2859.3	Kr IV
30	2839.51	Fe II		2846.	Li I	120	2851.36	Cr II	100	2859.39	Yb II
20 c	2839.56	Eu III	22	2846.02	Cr I	110	2851.45	Nb I	800	2859.49	Na II
800	2839.56	Na II	60	2846.08	Er III	16	2851.65	Mg I	260	2859.67	Eu II
5	2839.62	Si III	10	2846.15	Te II	16	2851.66	Mg I	19	2859.78	Gd II
75	2839.68	Ge II	130	2846.19	Cs II	800	2851.797	Fe I	430	2859.80	Yb II
20	2839.80	Fe II	160	2846.28	Nb II	55	2851.86	Yb II	310	2859.84	Er II
460	2839.89	U II	420	2846.39	Os I	350	2851.97	Zr II	180	2859.97	V I
1400 r	2839.99	Sn I	10	2846.39	Tc II	10000 l	2852.03	Cf	180	2860.02	Ru I
110	2840.02	Cr II	1	2846.42	Sn II	60	2852.05	Eu II	200	2860.12	Tm II
90	2840.10	Al I	120	2846.57	V I	6000	2852.13	Mg I	150	2860.33	F III
820	2840.22	Ir I	12	2846.72	Mg I	190	2852.14	Tb II	55	2860.39	Yb II
560	2840.23	Gd II	12	2846.75	Mg I	80	2852.42	Cs II	100 r	2860.44	As I
60	2840.30	Sm	100	2846.92	Au II	16	2852.81	Na I	390	2860.47	U II
200	2840.35	Re I	150 h	2847.16	Ac II	140	2852.87	V I	30	2860.490	Th I
50	2840.38	Tc II	230 h	2847.18	Yb II	5	2853.0	Kr IV	180	2860.56	Hf I
150	2840.54	Ru I	80	2847.35	Co II	15	2853.01	Na I	80 h	2860.68	Pt II
6	2840.557	Pb II	30 h	2847.4	Bi III	16	2853.11	Pt I	50 d	2860.68	Rh I
15	2840.65	Fe II	60	2847.49	Sm II	55	2853.22	Cr II		2860.76	Rh I
100 w	2840.82	Pm II	3000	2847.51	Lu II	370	2853.23	Mo II	440	2860.93	Cr II
110	2840.94	Nb I	110	2847.57	V II	21	2853.41	Yb II	1500	2860.96	Os I
30	2841.00	Kr III	40	2847.65	Xe III	18	2853.68	Yb II	20	2861.00	Te II
250	2841.15	Nb II	750	2847.675	Hg II	40	2853.91	Gd II	760	2861.01	Hf II
10	2841.17	Te II	750	2847.68	Hg II	40	2853.93	Ti II	350	2861.02	Na II
140	2841.33	Gd II	40	2847.7	S II	75	2853.97	Ge II	240	2861.09	Nb II
400	2841.57	W I	810	2848.02	W I	25	2853.99	Pr II	140	2861.21	Yb II
740	2841.60	Os I	100	2848.084	Th I	640	2854.07	Ru I	100	2861.23	Ho II
35	2841.68	Ru II	15	2848.11	Fe II	55	2854.14	Yb II	100	2861.34	Yb II
1000	2841.72	Na II	210	2848.19	Zr II	200	2854.17	Tm I	2000	2861.39	Ce III
150 w	2841.86	Pm II	1700	2848.23	Mo II	140	2854.34	V II	420	2861.41	Ru I
20 l	2841.94	Pr III	420	2848.25	Os I	50	2854.342	Th I	220	2861.42	Th II
190	2841.94	Ti II	50000 w	2848.30	La IV	70	2854.43	Y II	250	2861.49	Ho II
100	2842.	Bi IV	15	2848.32	Fe II	45	2854.49	Yb II	760	2861.70	Hf II
360	2842.09	U II	14	2848.34	Mg I	200	2854.59	Pd II	200	2861.74	Tm II
160	2842.15	Mo II	270	2848.37	Er II	55	2855.07	Cr II	100 l	2861.92	Am II

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
360	2861.98	Ta I	310	2868.65	Ta I	270	2876.95	Nb II	300	2884.406	As II
95	2862.32	Ti II	55	2868.74	Ti II	530	2877.03	Nb II	10000 l	2884.77	Bk II
30	2862.40	Xe III	40	2868.82	Te II	600	2877.100	Cu II	380	2884.78	V II
120	2862.48	Gd II	140	2869.13	V II	180	2877.44	Ti II	30	2884.89	Pr II
790	2862.57	Cr II	1600	2869.23	Tm II	100 h	2877.52	Pt II	360	2885.049	Th II
280	2862.57	Eu II	50	2869.307	Fe I	270	2877.68	Ir I	130	2885.14	La II
5	2862.60	Ti IV	1	2869.52	Er III	110	2877.69	V II	570 h	2885.14	Lu I
140	2862.70	Dy I	150	2869.77	Rb III	190	2877.88	Dy II	4	2885.15	I III
150	2862.72	Ho II	340	2869.81	Zr II	1000 r	2877.92	Sb I	160	2885.27	N II
120	2862.86	F III	130	2869.82	Hf II	180	2877.98	Cr II	120	2885.53	Dy I
280	2862.94	Rh I	70	2869.916	Th II	100 h	2878.01	Pd II	130	2885.60	Gd II
24	2863.20	Mo II	18	2869.95	Ca III	8	2878.24	Er III	75	2885.97	Rh I
12000 c	2863.30	La IV	3000	2870.01	Pa	300	2878.40	Os I	28	2885.97	Yb II
1000 r	2863.32	Sn I	25	2870.06	Yb II	70	2878.45	Cr II	850	2886.26	Na II
35	2863.37	Os II	60	2870.08	Mn II	10000 s	2878.57	Bk II	70	2886.26	Yb II
110	2863.5	S III	550	2870.406	Th II	1500	2878.63	I II	230	2886.29	Tb II
370	2863.81	Mo II	210	2870.44	Cr II	30	2878.657	Th I	190	2886.44	Co I
110	2863.84	Ir I	210	2870.55	V I	110	2878.66	Rh I	1	2886.45	Ga II
50	2863.95	Nd	50	2870.61	Kr III	230	2878.72	W I	95	2886.48	Y I
500	2864.02	Ni II	340	2870.97	U II	100	2878.87	Eu I	740	2886.54	Ru I
4	2864.24	Pb IV	80 w	2871.10	Xe III	220	2879.05	Mo II	70	2886.68	Mn II
160	2864.31	Mo I	80	2871.22	Co II	610	2879.11	W I	3	2886.96	Au I
100	2864.32	Nb I	60 w	2871.24	Xe III	110	2879.16	V II	170	2887.00	Cr I
240	2864.36	V I	750	2871.28	Na II	120	2879.27	Cr I	210	2887.14	Hf I
65	2864.40	Rh I	50	2871.35	Rh I	35	2879.39	Os II	460	2887.25	U II
25	2864.42	Eu II	100 h	2871.37	Pd II	610	2879.40	W I	3 c	2887.30	Pb II
500	2864.49	Tc I	100	2871.40	F II	140	2879.41	Ir I	10 h	2887.51	Si II
4	2864.50	Pb IV	3000 h	2871.42	Pa II	80	2879.49	Mn II	100	2887.54	Hf I
140	2864.66	Mo I	470	2871.42	Ta I	220	2879.76	Ru I	140	2887.58	F III
4	2864.67	I III	1700	2871.51	Mo II	380	2880.02	Ta I	2900	2887.68	Re I
6	2864.68	I IV	110	2871.63	Cr I	350	2880.03	V II	1000	2887.73	Tc I
200	2864.73	Xe II	30	2871.7	Xe III	30	2880.20	Os II	360	2887.817	Th II
40 h	2865.05	Pt II	40	2871.75	Gd II	360	2880.26	Ho II	80	2887.85	Eu II
60	2865.06	Gd II	210	2871.99	Ho II	100	2880.72	Nb II	200	2888.04	Yb II
750	2865.11	Cr II	10000 l	2872.11	Bk II	75	2880.76	Rh I	130 c	2888.06	Re II
55	2865.33	Cr II	50	2872.334	Fe I	200 r	2880.767	Cd I	65	2888.15	Mo II
50	2865.50	Ni I	3	2872.36	Au I	95	2880.87	Cr II	25	2888.20	Pt I
100	2865.61	Nb II	85	2872.88	Mo II	460	2880.98	Ho II	140	2888.25	V II
40	2865.62	Mo II	30	2872.94	Mn II	30	2881.14	Cr I	410	2888.26	U II
30	2865.64	Pr II	650	2872.95	Na II	900	2881.15	Na II	10	2888.31	Co III
80	2865.68	In II	14000 r	2873.311	Pb I	250	2881.19	Cs II	10	2888.40	Au I
970	2865.68	U II	270	2873.36	Ta I	50 r	2881.224	Cd I	100	2888.46	Tc I
300	2866.01	Po I	160	2873.48	Cr II	460	2881.33	Gd II	1000 l	2888.51	Am II
650	2866.06	W I	45	2873.49	Yb I	70	2881.34	Sm	55	2888.74	Cr II
120	2866.09	Sm II	260	2873.56	Ta I	1000	2881.579	Si I	280	2888.83	Nb II
100 s	2866.20	Am II	30	2873.62	Rh I	50	2881.60	Pr I	65	2888.93	Ti II
40	2866.33	Gd II	90	2873.82	Cr II	85	2881.68	Sm	45	2889.06	Sm
80	2866.37	Cs II	750	2873.88	Rb II	19	2881.78	Ca III	75	2889.11	Rh I
2100	2866.37	Hf I	230	2874.06	Ho II	700	2882.02	Tm III	30	2889.20	Tc II
17	2866.54	Ca III	250	2874.14	Ce II	55	2882.12	Ru II	700	2889.29	Cr I
170	2866.59	V I	210	2874.17	Ta I	40	2882.13	Gd II	150	2889.45	F III
550	2866.64	Ru I	80	2874.172	Fe I	30	2882.31	Pr II	160	2889.58	Mn II
220	2866.69	Mo II	6	2874.24	Ga I	140	2882.37	Rh I	800	2889.62	Hf I
610	2866.74	Cr II	6	2874.40	Ar IV	380	2882.50	V II	1200	2889.62	U II
200	2867.06	Yb II	160	2874.43	Ho II	40	2882.511	Th II	380	2889.62	V II
90	2867.10	Cr II	30	2874.86	Sr III	820	2882.64	Ir I	10000 s	2889.80	Bk II
240	2867.19	Re I	360	2874.96	Os I	490	2882.74	U II	55	2889.82	Cr II
480	2867.65	Cr II	1800	2874.98	Ru I	40	2882.90	Mn I	75	2889.84	Rh I
6000	2867.67	Y III	200	2875.28	Re I	60	2883.09	Sm	120 d	2890.18	In II
	2868.	Li I	800	2875.39	Nb II	570	2883.18	Nb II	120	2890.74	Dy II
100	2868.09	Tc I	380	2875.60	Ir I	200	2883.44	Re I	630	2890.94	Tm II
210	2868.10	V I	40 h	2875.85	Pt II	300	2883.45	Au I	1300	2890.99	Mo II
40	2868.11	Mo II	400	2875.86	Yb III	130	2883.60	Ru I	55	2891.07	Ti II
100	2868.180	Cd I	380	2875.98	Ir I	25	2883.74	Cs II	3000 h	2891.14	Pa II
110	2868.31	Ru I	490	2875.98	Zr I	280	2884.11	Ti II	95	2891.28	Mo II
40	2868.32	Mo II	320	2875.99	Cr II	9	2884.12	Ar III	60	2891.34	Sm
70	2868.40	Sm II	60	2876.06	Eu II	270	2884.196	Cu II	3600	2891.38	Yb II
35	2868.461	Th I	230	2876.24	Cr II	110	2884.28	Dy II	55	2891.42	Cr I
500	2868.52	Nb II	150	2876.33	Hf II	320	2884.289	Th II	25	2891.612	Ar II

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength
900	2891.64	V II	110	2897.88	La III	160	2905.27	Mo I	670	2910.59
770	2891.84	Ta I	10000	2897.97	Pu II	120	2905.30	F III	200	2910.594
300	2891.96	Au I	4000	2897.98	Bi I	180	2905.49	Cr I	70 s	2910.61
40	2892.172	Th II	20	2898.13	Be I	210	2905.58	Re I	10000 l	2910.65
100	2892.18	Kr III	10	2898.19	Be I	140	2905.65	Ru I	2	2910.77
120	2892.26	Zr I	20	2898.25	Be I	55	2905.66	Ti I	260	2910.90
55	2892.39	Mn II	1800	2898.26	Hf I	500	2905.69	Si II	4	2910.97
530	2892.44	V II	600	2898.30	Yb III	3	2905.74	Au I	3	2910.98
200	2892.54	Eu I	90	2898.54	Cr II	8 p	2905.80	Fe III	270	2911.00
180	2892.56	Ru I	50	2898.70	Mn II	30	2905.90	Au I	560	2911.06
10 c	2892.60	Eu III	130	2898.71	Hf II	60	2905.90	Pt I	200 l	2911.13
900	2892.66	V II	14	2898.82	Y II	150	2906.13	V I	250	2911.14
190	2892.81	Mo II	160	2898.86	Tb II	1000	2906.31	Yb III	80	2911.14
140	2893.03	Eu I	1	2898.90	K III	4	2906.36	Mg I	90	2911.320
160	2893.07	La II	10000	2898.94	Pu II	190	2906.39	Dy II	9000	2911.39
200	2893.16	Tc I	260	2899.04	Ta I	900	2906.46	V II	85	2911.52
25	2893.22	Pt I	80	2899.21	Cr I	80	2906.59	Ne II	45	2911.68
370	2893.25	Cr I	400	2899.24	Nb II	50	2906.6	Xe III	470	2911.74
100	2893.25	Au II	100	2899.29	Tm III	3200	2906.68	Eu II	50 s	2911.77
100 l	2893.29	Am II	55	2899.48	Cr II	780	2906.80	U II	40	2911.89
1400	2893.32	V II	200 l	2899.56	Am II	80	2906.82	Ne II	1100	2911.92
400 h	2893.40	Br II	110	2899.60	V I	21	2906.88	Yb II	90	2912.009
150	2893.45	Tc I	85	2899.70	Yb II	450	2906.93	Al III	410	2912.05
150	2893.598	Hg I	250	2899.720	Th II	3000 h	2906.93	Pa	450	2912.08
150	2893.60	Hg I	80	2899.75	Cs II	100	2907.04	Au II	120	2912.157
45	2893.62	Yb II	21	2899.79	Ca III	4000	2907.05	Ce III	40	2912.23
	2893.65	Ga II	10000	2899.90	Cm II	80	2907.12	Mo II	120	2912.26
10000 s	2893.66	Bk II	65	2899.96	Rh I	160	2907.21	Rh I	2100	2912.33
360	2893.83	Eu I	80	2900.16	Mn II	40	2907.22	Mn I	100	2912.33
600	2893.86	Pt I	4500	2900.30	Lu II	200	2907.24	Ir I	80 w	2912.36
700	2893.95	Na II	70	2900.80	Mo II	35	2907.44	Gd II	75	2912.62
320	2894.14	U II	120	2900.82	Dy II	60	2907.46	Ni I	40 c	2912.64
190	2894.17	Cr I	170	2900.84	Ho II	490	2907.47	V II	1	2912.80
200	2894.32	Tc I	900	2901.14	Na II	10	2907.50	Fe III	18	2912.86
950	2894.45	Mo II	110	2901.54	Tb II	12	2907.70	Fe III	10000	2912.97
160	2894.45	Tb II	110	2901.94	Ru I	1100 h	2907.71	Br IV	12	2913.00
50	2894.504	Fe I	260	2901.95	Ir I	85 d	2907.88	Sm	10	2913.04
410	2894.51	U II	560	2902.05	Ta I		2907.99	Sm II	60	2913.08
6300	2894.84	Lu II	100	2902.30	Zn II	470	2908.24	Nb II	1000	2913.15
340	2894.99	Ho II	18	2902.41	Yb II	780	2908.28	U II	140	2913.29
	2895.	Li I	9 p	2902.47	Fe III	28	2908.33	Yb II	6000	2913.41
8 p	2895.08	Fe III	830 c	2902.48	Re I	110	2908.42	Ce II	300	2913.52
3 h	2895.13	Si IV	2	2902.92	Mg I	50	2908.506	Th I	120	2913.54
8	2895.20	Ac II	21	2902.92	Yb II	2400	2908.82	V II	200	2913.54
150 h	2895.22	Xe II	300	2903.05	Lu I	370	2908.88	Ru I	60	2913.73
250	2895.241	P III	290	2903.07	Mo II	160	2908.99	Eu I	55	2913.81
150	2895.41	Te II	360	2903.08	V II	260	2909.05	Cr I	390	2913.95
160	2895.62	Ho II	45	2903.167	Th II	9600	2909.06	Os I	25	2914.01
490	2896.01	Re I	500	2903.69	Rb III	600	2909.12	Mo II	210	2914.12
440	2896.01	W I	40	2903.81	Tc I	30	2909.17	Kr III	170	2914.21
260	2896.06	Os I	26	2903.97	Cr II	35	2909.19	Yb II	320	2914.25
360	2896.21	V II	10000	2904.25	Pu II	570 c	2909.41	Ho II	3	2914.442
1000	2896.34	Tc I	300	2904.28	Si II	55	2909.48	Yb II	100 l	2914.49
1500	2896.44	W I	160	2904.3	S III	210	2909.58	Er II	140 h	2914.60
55	2896.46	Cr II	1200	2904.41	Hf I	550	2909.82	Re I	360	2914.63
30	2896.62	Xe III	12	2904.43	Fe III	100 l	2909.86	Am II	80	2914.65
210	2896.75	Cr I	1000	2904.47	Er II	140	2909.91	Hf II	200	2914.67
30	2896.82	Ac II	2 h	2904.47	Si IV	30	2909.92	Ti II	160	2914.75
28	2896.90	Yb II	160	2904.58	La III	710	2910.02	V II	3	2914.82
310	2896.96	Er II	110	2904.62	Dy II	90	2910.06	Ne II	380	2914.93
650	2897.15	Ir I	55	2904.68	Cr I	65	2910.17	Rh II	80	2915.12
320	2897.44	Tb II	800	2904.72	Na II	130	2910.28	Sm II	22	2915.23
390	2897.52	Er II	9000	2904.73	Gd III	110	2910.30	Tb II	140	2915.28
140	2897.63	Mo II	890	2904.75	Hf I	1500	2910.36	Er II	160	2915.30
55 d	2897.67	Cr II	260	2904.80	Ir I	530	2910.39	V II	90	2915.42
18	2897.69	Y II	25	2904.81	Rh I	10000	2910.40	Pu II	3	2915.45
	2897.73	Cr II	1100	2904.92	Na II	90	2910.41	Ne II	3	2915.45
470	2897.81	Nb II	10000	2904.94	Pu II	230	2910.48	W I	22	2915.46
300	2897.87	Pt I	160	2905.23	Zr II	170	2910.53	Gd II	310	2915.49

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
190	2915.60	Tb II	3	2922.86	Ge III	120	2929.007	Fe I	55	2935.11	Yb II
270	2915.62	Er II	30	2923.02	Ac II	130	2929.11	Rh I	90	2935.14	Cr II
170	2915.82	Ho II	30	2923.10	Rh I	200	2929.27	Cd II	65	2935.20	Mo II
300	2915.99	Zr II	360	2923.10	W I	350	2929.27	Er II	110	2935.87	V I
150	2916.227	Hg II	95	2923.32	Gd II	30	2929.34	Sr III	150	2935.94	Hg II
120	2916.24	Tb II	20 c	2923.34	Tc II	26	2929.44	Cr II	26	2935.96	Ti
1100	2916.26	Ru I	1300	2923.39	Mo II	360	2929.51	Os I	630	2935.99	Tm II
150	2916.27	Hg II	1000	2923.49	Na II	490	2929.63	Hf II	100	2936.	Bi IV
160	2916.34	F III	230	2923.54	W I	10000	2929.71	Pu II	100	2936.086	Th I
440	2916.36	Ir I	710	2923.62	V I	1700	2929.79	Pt I	300	2936.22	Br III
18	2916.43	Yb II	10000	2923.81	Ce III	450	2929.90	Hf I	160	2936.31	Zr II
2000	2916.48	Hf I	8	2923.90	Fe III	6	2929.96	Ti IV	3	2936.54	Mg II
40	2916.57	Cr III	100	2924.	Bi IV	18 h	2930.03	Y II	880	2936.68	Ir I
110	2916.64	Zr II	180	2924.02	Rh I	50	2930.06	Mo II	15	2936.7	Bi II
65 h	2916.73	Re II	2400	2924.02	V II	50 s	2930.19	Pr III	10	2936.74	Mg I
400 h	2917.18	Br II	120	2924.16	Tb II	100	2930.24	Co II	10	2936.74	Mg I
530	2917.26	Os I	45	2924.24	Yb II	1100	2930.50	Mo II	1200	2936.903	Fe I
5	2917.33	I IV	35	2924.25	Gd II	270	2930.61	Re I	200 l	2936.99	Am II
3	2917.35	I III	140	2924.32	Mo II	55	2930.77	Mo II	21	2937.19	Yb II
120	2917.37	V II	19	2924.33	Ca III	710	2930.81	V II	150	2937.32	Ti I
30	2917.44	Eu II	120	2924.53	Tb II	35	2930.85	Cr II	14	2937.33	Ti IV
1100	2917.52	Na II	180	2924.62	Hf I	750	2930.88	Na II	85	2937.48	Sm II
1500	2917.74	Y III	1700	2924.64	V II	10000	2930.98	Pu II	120	2937.66	Mo I
10000	2918.00	Pu II	4400	2924.79	Ir I	20 c	2931.00	Eu III	50	2937.71	Nb III
160	2918.08	B II	850	2925.04	Eu II	15	2931.03	Ti	950	2937.74	Na II
300	2918.24	Au II	250	2925.050	Th II	500	2931.09	Cs II	710	2937.80	Hf II
270	2918.24	Zr II	230	2925.13	W I	2	2931.11	I III	3200	2938.30	Bi I
360	2918.25	W I	410	2925.19	Ta I	510	2931.28	Os I	40	2938.30	Mo II
210	2918.27	Tm II	5000	2925.26	Ce III	50	2931.281	Th I	20 h	2938.42	Ag I
2800	2918.32	Tl I	110	2925.35	Ho II	580	2931.41	U II	5	2938.45	K III
100	2918.38	Co II	60	2925.41	Hg I	110	2931.47	Nb II	250	2938.47	Ir I
1800	2918.40	Gd III	60	2925.413	Hg I	10000	2931.54	Ce III	12	2938.47	Mg I
45	2918.52	Gd II	190 h	2925.57	Mn I	200	2931.83	Sr I	12	2938.47	Mg I
1600	2918.56	Y III	300	2925.57	Os I	130	2931.94	Rh I	10000	2938.54	Pu II
230	2918.57	Ir I	80	2925.62	Ne II	80 w	2932.10	Ne II	25	2938.95	Ba III
580	2918.58	Hf I	270	2925.65	Tm II	16	2932.19	Au	10000	2938.95	Pu II
50	2918.63	W II	10000	2926.08	Pu II	10000	2932.32	Pu II	100 l	2939.08	Am II
100	2918.67	Ce II	160	2926.09	Ho II	140	2932.49	F III	190	2939.27	Ir I
10000	2918.80	Pu II	80	2926.3	As III	440	2932.61	U II	1500	2939.30	Mn II
120	2918.83	Mo II	11	2926.33	Ar IV	1100	2932.63	In I	45	2939.53	Yb II
120	2918.89	Tb II	10000 s	2926.49	Bk	26	2932.70	Cr II	150	2940.05	Tb II
1100	2919.05	Na II	680	2926.74	Tm II	310	2932.70	Ta I	470	2940.06	Ta I
160	2919.05	Y I	10 h	2926.77	Ag I	160	2932.89	Tb II	95	2940.10	Mo II
400	2919.31	Po I	400	2926.96	Br III	100	2933.	Bi IV	40	2940.2	Xe III
70	2919.34	Pt I	320	2926.99	Zr II	1100	2933.06	Mn II	45	2940.22	Cr II
280	2919.35	Yb II	60	2927.08	Cr II	10	2933.27	Co III	1200	2940.22	Ta I
320	2919.59	Hf II	320	2927.38	U II	10000	2933.30	Pu II	530 p	2940.37	U II
150	2919.61	Ru I	830 c	2927.42	Re I	1700	2933.55	Ta I	250 h	2940.39	Mn I
300	2919.62	Ho II	200 l	2927.53	Am II	180	2933.55	Ti I		2940.48	Mn I
2100	2919.79	Os I	65	2927.54	Mo II	340	2933.86	U II	45	2940.52	Yb II
6	2919.82	Sn II	35	2927.54	Ru II	80	2933.89	Tc I	15	2940.53	Y III
140	2919.840	Th II	1100	2927.81	Nb II	55	2933.97	Cr II	140	2940.54	Ir I
1200	2919.85	Na II	25	2927.85	Yb II	2	2934.02	Li II	35	2940.589	Th II
30	2919.89	Te II	50	2927.87	Cd II	27	2934.02	Mn I	80	2940.65	Ne II
210	2919.99	V II	10000 s	2927.91	Bk	2	2934.07	Li II	30	2940.67	Au I
380	2920.38	V II	80	2928.15	Cr II	850	2934.08	Na II	2000	2940.77	Hf I
1000 s	2920.59	Am II	1000	2928.20	Tc I	5	2934.12	Li II	500	2940.95	Cs II
1300	2920.95	Na II	10000	2928.25	Pu II	55	2934.135	Th II	60	2941.04	Mn I
400	2921.08	Tm III	250	2928.254	Th II	1	2934.25	Li II	110	2941.05	Dy II
55	2921.12	Yb II	95	2928.30	Cr II	800	2934.30	Mo II	100	2941.05	In II
90	2921.24	Cr II	300 c	2928.30	Ho II	110	2934.31	Dy II	110	2941.22	Mo II
50	2921.26	Nd	35	2928.34	Gd II	35	2934.36	Yb I	200	2941.33	O V
30	2921.38	Pt I	340	2928.34	Ti I	210	2934.40	V II	60	2941.343	Fe I
160	2921.45	O IV	490	2928.60	U II	250	2934.52	Dy II	900	2941.37	V II
440	2921.52	Tl I	27	2928.68	Mn I	9	2934.60	Sr IV	10000	2941.39	Pu II
440 p	2921.68	U II	2	2928.75	Mg II	160	2934.61	Zr II	450	2941.49	V II
60	2921.82	Cr II	10	2928.91	Eu III	1200	2934.64	Ir I	870	2941.54	Nb II
500	2921.91	Tc I	10000	2928.92	Cm II	260	2934.64	Os I	210	2941.65	O V
520	2922.49	Pd I	300	2928.97	Yb III	690	2935.00	W I	10000 l	2941.71	Bk II

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
1300	2941.92	U II	480	2947.39	W I	10	2953.77	La III	270	2962.27	Re I
13	2942.00	Mg I	2 c	2947.43	Pb II	600	2953.940	Fe I	30	2962.48	Ba I
2	2942.00	Mg I	40	2947.5	Xe III	1100	2954.20	Hf I	65	2962.52	Yb I
1100	2942.00	Ti I	950	2947.50	Na II	100	2954.22	Au II	30000 c	2962.58	La I
28	2942.04	Yb II	1000	2947.72	Tm III	120	2954.33	V I	320	2962.68	Zr I
220	2942.05	Ho II	35	2947.80	Gd II	90 w	2954.40	Pr III	85	2962.74	Sm I
50	2942.11	Te II	1000	2947.876	Fe I	10000	2954.46	Pu II	410	2962.77	V I
240	2942.14	Ta I	70	2948.01	Gd II	150	2954.49	Ru I	55	2962.88	Nd I
80	2942.25	Cs II	340	2948.09	U II	30	2954.58	Ti	140	2962.89	Mo
230 d	2942.33	V I	40	2948.1	Xe III	100	2954.73	Co II	150	2962.99	Ir I
70 s	2942.43	Pr III	1100 h	2948.23	Os I	390	2954.77	U II	100 l	2963.02	Am
450	2942.66	Na II	1300	2948.26	Ti I	45	2955.32	Yb II	8	2963.23	Fe I
30	2942.76	Pt I	250	2948.31	Dy II	30	2955.41	Rh I	150	2963.24	Ne I
200	2942.85	Os I	8	2948.39	Fe III	9500	2955.53	Gd III	21	2963.26	Yb I
340	2942.860	Th II	390	2948.40	Y I	35	2955.60	Gd II	4200	2963.32	Lu I
200	2942.893	Ar II	20 p	2948.48	Y III	150	2955.72	Ne II	1500	2963.32	Ta I
440	2943.14	Re I	2000	2948.53	Ce III	60	2955.78	Lu II	12	2963.4	Bi II
2700	2943.15	Ir I	3 c	2948.53	Pb II	320	2955.78	Zr II	18	2963.40	Ru I
230	2943.20	V I	1	2948.94	K III	95	2955.84	Mo II	45	2963.46	Yb I
70	2943.49	Sm II	320	2948.94	Zr II	35	2955.849	Th II	10000	2963.47	Pu I
6	2943.64	Ga I	150	2949.068	Th II	1	2955.93	Er III	65	2963.58	Nd I
100	2943.729	Th I	1900	2949.20	Mn II	200	2955.93	Tc I	130	2963.60	Gd I
830	2943.90	U II	370	2949.50	Ru I	120	2955.94	Ce II	28	2963.607	Th I
500	2943.91	Ni I	1400	2949.53	Os I	240	2956.06	Mo II	250	2963.79	Mo I
30	2943.97	Pr II	150	2949.62	Rb III	580	2956.06	U II	450	2964.06	Os I
6	2944.17	Ga I	230	2949.63	V I	2000	2956.07	Rb III	1500	2964.52	Er II
140	2944.21	Mo I	270 h	2949.73	Lu I	1600	2956.13	Ti I	440	2964.52	W I
12	2944.40	Fe II	200	2949.76	Ir I	250	2956.21	Tb II	220	2964.60	Dy I
2400	2944.40	W I	30	2949.80	Cs II	20	2956.74	Eu III	130	2964.76	Yb I
300	2944.49	Ho II	210 d	2949.81	Os I	170	2956.80	Ti I	70	2964.8	S III
140	2944.56	Dy II	10000	2950.06	Pu II	10	2956.90	Eu III	110	2964.80	Ce II
1100	2944.57	V II	10 c	2950.20	Eu III	70	2956.90	Mo II	90 s	2964.85	Pr II
160	2944.71	Hf I	60	2950.24	Fe I	20 c	2957.01	In I	1400	2964.88	Hf I
30	2944.75	Pt I	170	2950.33	Dy II	100 s	2957.05	Am II	50	2964.96	Mo I
150	2944.82	Mo II	28	2950.33	Yb II	12	2957.31	Ti IV	350	2964.96	Y I
10	2945.11	He I	300	2950.35	V II	250	2957.364	Fe I	460	2965.03	U II
60	2945.2	Xe III	500 l	2950.39	Am II	260	2957.52	V II	720	2965.11	Re I
10000	2945.26	Pu II	20	2950.4	Bi II	170	2957.580	Th II	770	2965.13	Ta II
270	2945.28	Er II	80	2950.438	Th II	18	2957.63	Yb II	550	2965.16	Ru I
140	2945.66	Mo I	110	2950.50	La II	130 h	2957.91	Re II	150	2965.254	Fe I
180	2945.67	Ru II	1200	2950.68	Hf I	540	2958.02	Hf I	210	2965.27	Mo I
800	2945.70	Na II	7	2950.84	La III	100 l	2958.39	Am II	80	2965.43	Gd I
110 h	2945.88	Nb II	1100	2950.88	Nb II	1	2958.63	Er III	770	2965.54	Ta I
140	2945.91	Yb II	100	2951.01	Rb III	30	2958.77	Ti	170	2965.55	Ru II
	2945.95	Mo II	1200	2951.22	Ir I	30	2958.91	Eu I	600	2965.56	Cl III
10000	2946.00	Pu II	1200	2951.24	Na II	600	2958.92	Po I	170	2965.71	Ti I
190	2946.01	Mo I	350	2951.26	Tm II	25	2959.10	Pt I	450	2965.74	Na II
99000	2946.01	Y III	210	2951.48	Zr II	5	2959.15	Si III	1500	2965.76	Re I
90	2946.04	Ne II	160	2951.6	Se IV	35	2959.47	Eu II	340	2965.86	Sc I
110	2946.12	Nb II	10000	2951.62	Pu	615	2959.572	As II	430	2965.86	Tm I
45	2946.30	Yb II	1200	2951.69	Lu II	80	2959.68	O III	45	2966.05	Cr II
140	2946.42	Mo I	10000 l	2951.76	Bk II	26	2959.71	Ti I	12	2966.10	Sb II
110	2946.53	V I	510	2951.92	Ta I	28	2959.853	Th I	100	2966.15	Tm I
230	2946.62	Er II	640	2952.08	V II	80	2959.99	Fe I	60 d	2966.17	In II
50	2946.68	Te II	110	2952.12	Dy II	35	2959.99	Ti I	15	2966.460	Pb I
140	2946.69	Mo II	210	2952.29	W II	25	2960.05	Ba III	1000 l	2966.71	Am I
18	2946.76	Yb II	1100	2952.40	Na II	850	2960.12	Na II	10000	2966.84	Pu II
60	2946.84	Cr II	35	2952.43	Gd I	260	2960.21	Eu II	500	2966.85	Tm II
110	2946.90	Nb II	2000 h	2952.55	Ac III	95	2960.24	Mo II	1500	2966.898	Fe I
230	2946.97	Ir I	50	2952.56	Kr III	60	2960.75	Pt I	620	2966.93	Hf I
180	2946.99	Ru I	200cw	2952.68	Eu II	320	2960.87	Zr I	150	2967.18	Ne II
2400	2946.99	W I	250 c	2953.11	Ho II	70	2960.93	Gd II	400 h	2967.21	Br II
200	2947.02	Tm III	500	2953.18	Tm III	300	2961.00	P V	190	2967.22	Ti I
150	2947.06	Dy II	150	2953.19	Sm II	300	2961.01	Os I	140	2967.23	Hf II
400	2947.08	Hg II	55	2953.36	Cr II	2500 r	2961.16	Cu I	1200	2967.28	Hg I
150	2947.21	Dy II	340	2953.56	Ta I	200	2961.242	P IV	1200	2967.283	Hg I
95	2947.28	Mo II	70 s	2953.58	Pr III	55	2961.73	Cr II	70	2967.29	Te II
60	2947.29	Eu II	140	2953.70	Dy II	120	2961.80	Hf II	500 l	2967.45	Rb II
125	2947.32	Mo III	45	2953.71	Cr II	530	2962.15	Os I	10000	2967.54	Pu II

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
30	2967.58	Pr II	200	2973.65	Tc I	75	2979.96	Ru II	140	2985.48	Ho II
480	2967.64	Cr I	20	2973.67	Te II	560	2980.15	Gd II	13	2985.54	Fe II
1	2967.87	Mg II	5000	2973.72	Ce III	15	2980.157	Pb I	150	2985.80	Ir I
580	2967.94	U II	18	2973.91	Y II	10000	2980.23	Pu II	500 s	2985.82	Pr III
	2968.	Li I	1200	2974.01	Sc I	55	2980.334	Th II	480	2985.85	Cr I
150	2968.13	Rb III	220	2974.011	Th II	120	2980.41	Ce II	300 h	2985.87	Br II
26	2968.23	Ti I	25	2974.03	Rh I	5	2980.52	Si III	35	2985.88	Yb II
20	2968.38	Cs II	320	2974.10	Nb II	500 s	2980.54	Pr III	110	2985.97	Dy II
600	2968.38	V II	600	2974.24	Na II	30	2980.55	Y II	160	2986.0	S III
230	2968.66	Rh I	210	2974.47	Er II	1000 r	2980.620	Cd I	1500	2986.00	Cr I
270	2968.686	Th II	90 l	2974.52	N V	50	2980.63	Pd II	30	2986.06	Be I
410	2968.76	Er II	480	2974.59	Y I	1100	2980.63	Na II	30	2986.18	Pr II
710	2968.81	Hf I	15	2974.72	Ne I	440	2980.65	Ir I	5	2986.20	K III
150 s	2968.83	Pr III	5	2974.77	Ga II	1400	2980.75	Sc I	450	2986.20	Rh I
170	2968.87	Tb II	100	2974.85	Tm III	150 w	2980.78	N V	100	2986.335	Cu II
320	2968.96	Zr II	30	2974.93	Ti I	350	2980.79	Cr I	10	2986.42	Be I
90	2968.98	Re II	200	2974.95	Ir I	1100	2980.81	Hf I	2100	2986.47	Cr I
350	2969.00	Br III	750	2974.99	Na II	220	2980.82	Re I	350	2986.52	Tm II
160	2969.02	Sm II	80	2975.40	Mo II	15	2980.96	Sb II	300 h	2986.53	Br II
10000 l	2969.13	Bk II	1000	2975.42	Gd III	160	2981.02	Zr II	4	2986.876	Pb II
120	2969.19	Zr I	480	2975.48	Cr I	10000	2981.23	Pu II	10000	2986.95	Pu II
1000 l	2969.29	Am II	430	2975.56	Ta I	250 w	2981.31	N V	90	2986.99	Rh I
120	2969.36	Fe I	230	2975.68	Er II	200 r	2981.362	Cd I	110	2987.03	Tb II
3	2969.41	Ga II	890	2975.88	Hf I	600	2981.445	Fe I	690	2987.16	Co I
80 s	2969.41	Pr III	50	2975.90	Te II	180	2981.46	Ho II	1000 s	2987.24	Am II
340	2969.47	Ta I	50	2976.104	Th I	540	2981.48	Tm II	250	2987.40	Rb III
230	2969.63	Zr II	120	2976.20	V II	120	2981.52	Mo I	50	2987.45	Rh I
2400	2969.82	Lu II	310	2976.29	Re I	570	2981.65	Ni I	410	2987.64	Ho II
800	2970.099	Fe I	410	2976.35	U II	100 l	2981.65	Pr III	150	2987.645	Si I
55	2970.355	Si I	380	2976.52	V II	50	2981.845	Cd I	10000 l	2987.76	Bk II
75	2970.38	Ti I	140	2976.59	Ru II	300	2981.86	Br II	110	2987.92	Mo I
6000	2970.42	Y III	130	2976.61	Zr II	185	2982.0	As III	10000	2988.21	Pu II
80 w	2970.47	Xe III	30	2976.72	Cr II	200	2982.11	C III	360	2988.232	Th II
15	2970.52	Fe II	150 l	2976.86	Pr III	200	2982.11	Nb II	220	2988.47	Re I
2000	2970.56	Yb II	400	2976.91	Ce II	220	2982.19	Re I	110	2988.57	Tb II
500	2970.73	Na II	550	2976.92	Ru I	30 c	2982.29	Eu III	20	2988.63	Ca III
500	2970.74	Rb III	150 s	2977.06	Pr III	150 c	2982.42	Pr III	660	2988.65	Cr I
25	2970.85	Cs II	480	2977.11	W I	45	2982.49	Yb II	160	2988.68	Mo I
740	2970.97	Os I	1000	2977.13	Na II	21	2982.66	Yb II	1400	2988.95	Ru I
1	2971.01	Ga II		2977.21	W I	12	2982.67	Ne I	340	2988.95	Sc I
580	2971.06	U II	45	2977.23	Ru II	210	2982.72	Hf I	2800	2989.03	Bi I
480	2971.11	Cr I	110	2977.42	Dy II	320	2982.74	U II	160	2989.19	Cr II
30	2971.13	Pr II	150	2977.46	Ce II	100	2982.80	In III	18	2989.27	Ca III
40 d	2971.40	Pr II	240	2977.54	V I	510	2982.90	Os I	1800	2989.27	Lu I
	2971.46	Pr II	450	2977.64	Os I	30	2983.00	Sr III	690	2989.59	Co I
110	2971.481	Th II	210	2977.68	Nb II	170	2983.31	Ti I	190	2989.80	Mo I
1 h	2971.52	Si IV	160	2977.68	Rh I	100	2983.43	Sm II	30	2990.22	Pr II
3	2971.60	Ga II	170	2977.78	Tb II	340	2983.49	Os	330	2990.26	Nb II
1	2971.70	Mg II	10000	2977.81	Pu II	1000	2983.570	Fe I	100 h	2990.27	Au II
210	2971.91	Cr II	50	2977.84	Yb III	28	2983.70	Yb II	250	2990.27	Ho II
70	2971.91	Mo II	10	2978.01	Co III	35	2983.74	Gd II	45	2990.37	Yb II
120	2972.25	V II	320	2978.05	Zr II	250	2983.78	O III	630	2990.54	Tm II
500 h	2972.26	Br II	4	2978.14	Pb IV	270	2983.80	Er II	190	2990.62	Ir I
265	2972.29	O I	210	2978.15	Re I	75	2983.94	Mo III	250	2990.87	Ce II
10 c	2972.30	Eu III	180	2978.28	Mo I	200	2983.99	Yb II	3	2991.00	Sn II
10000	2972.50	Pu II	10000	2978.37	Pu II	1000	2984.10	Gd III	150	2991.062	Th II
400	2972.57	Nb II	450	2978.55	P V	250	2984.13	Ni I	10000	2991.31	Pu II
100	2972.58	Ce II	100	2978.87	Cu III	1300	2984.19	Na II	300	2991.33	Eu II
250	2972.61	Mo II	100	2979.050	Ar II	750	2984.26	Y I	40	2991.52	Gd II
400	2972.61	Tm III	230	2979.18	Zr II	530	2984.61	U II	60	2991.57	Sm II
29	2972.74	Gd II	150	2979.28	Hf I	22	2984.75	Ti III	35	2991.62	Ru II
15	2972.991	Pb I	400	2979.32	Xe I	60	2984.77	Fe I	65	2991.87	Yb II
390	2973.00	Ho II	100	2979.34	Tc I	50	2984.82	Fe II	480	2991.89	Cr I
100	2973.10	Ne II	100	2979.46	Ne II	50	2984.98	Pr II	20	2991.89	Co III
1200	2973.132	Fe I	410 c	2979.63	Ho II	90	2985.08	Yb II	40	2992.10	La III
490	2973.22	Tm I	1100	2979.66	Na II	160	2985.243	Th II		2992.12	K I
500	2973.235	Fe I	730 d	2979.71	W I	110	2985.32	Cr II	60	2992.22	Kr III
10	2973.33	Au I	190	2979.74	Cr II	150	2985.36	Tc I		2992.22	K I
110	2973.37	Hf I		2979.86	W I	820	2985.39	Zr I	1800	2992.36	Re I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
6	2992.42	K III	8	2999.64	Ca I	750	3007.44	Na II	430	3014.65	Tm II
500	2992.60	Ni I	170	3000.10	Hf II	40	3007.66	Mn I	40	3014.67	Mn I
800 h	2992.62	C II	20 c	3000.11	Eu III	360	3007.91	U II	710	3014.76	Cr I
410	2992.72	U II	10000	3000.31	Pu II	95	3007.97	Nd II	140	3014.82	V II
1	2992.84	Ga II	120	3000.451	Fe I	150 s	3008.04	Pr III	10000 b	3014.87	Cm II
95	2992.84	Mo II	150 l	3000.46	Pr III	100	3008.08	In III	1400	3014.92	Cr I
40	2992.87	Xe III	70	3000.46	Yb II	320 c	3008.10	Ho II	100 l	3015.13	Pr III
95	2993.04	Gd II	9	3000.86	Ca I	500	3008.14	Fe I	710	3015.19	Cr I
80	2993.20	Nd II	35	3000.87	Ti I	180	3008.497	Th II	1500	3015.30	Tm II
20 p	2993.21	Lu III	1100	3000.89	Cr I	400	3008.79	Ce II	2200	3015.36	Sc I
200	2993.26	Tm II	800	3000.948	Fe I	30	3008.82	In III	600	3015.40	Na II
110	2993.27	Ru I	350	3001.14	Re I	100	3008.85	Pm II	220	3015.68	Dy II
700	2993.34	Bi I	35	3001.17	Pt II	20	3008.86	Co II	500	3016.02	Re I
500 l	2993.51	Am II	260	3001.20	V II	190	3009.09	W I	230	3016.18	Tb II
50	2993.52	Mo II	100	3001.27	Cs II	750	3009.14	Na II	90 s	3016.26	Pr III
400	2993.61	W I	12	3001.62	Fe III	700 r	3009.14	Sn I	10 c	3016.39	Pb II
1000	2993.87	I II	60	3001.655	Fe I	9	3009.21	Ca I	120	3016.43	Ir I
28	2993.94	Yb II	150	3001.67	Ne II	15	3009.22	La III	60	3016.45	Mn I
400	2994.04	Br III	80	3001.84	Nb III	170	3009.30	Tb II	520	3016.47	W I
230	2994.07	Cr I	190	3002.21	Mo I	100	3009.39	Yb II	300 h	3016.48	Br II
200	2994.17	Ac II	220	3002.25	Ir I	450	3009.48	Na II	300	3016.49	Re I
140	2994.28	F III	220	3002.27	Pt I	70000 w	3009.51	La IV	540	3016.78	Hf I
110	2994.42	Ce II	1200	3002.41	Er II	120	3009.569	Fe I	180	3016.78	V II
1000	2994.427	Fe I	4000	3002.49	Ni I	10000	3009.57	Pu II	230	3016.84	Er II
7	2994.44	Sn II	100	3002.61	Sr III	45	3009.78	Pd I	1100	3016.94	Hf II
1000	2994.46	Ni I	25	3002.61	Yb II	10	3010.02	Ar III	270	3017.09	Tm II
250	2994.502	Fe I	15	3002.64	Fe II	2100	3010.13	Gd II	120	3017.19	Ti II
40	2994.73	Nd	310	3002.65	Er II	230	3010.59	Tb II	370	3017.20	Ce II
470	2994.73	Nb II	10	3002.65	Au I	150 l	3010.61	Pr III	300	3017.23	Tc I
300	2994.80	Au II	650	3002.65	Pd I	65	3010.62	Yb II	330	3017.24	Ru I
170	2994.80	Yb II	50	3002.686	Th I	50	3010.736	Th I	570	3017.25	Os I
9	2994.96	Ca I	370	3002.86	Gd II	100	3010.83	Tc I	270	3017.31	Ir I
460	2994.96	Ru I	150 s	3003.20	Pr III	2000	3010.84	Cu I	120	3017.31	Ne II
300	2995.10	Cr I	2500 w	3003.21	Po I	25	3010.92	Co III	450	3017.34	Na II
35	2995.22	Eu II	600	3003.63	Ir I	3000 l	3011.10	Pa II	100 h	3017.43	Xe II
240	2995.26	W I	2200	3003.63	Ni I	40	3011.16	Mn I	770	3017.44	W I
70	2995.26	Y I	320	3003.74	Zr II	40	3011.38	Mn I	160	3017.56	Yb II
320	2995.64	Ce II	300	3003.819	As II	160	3011.69	Ir I	2800	3017.57	Cr I
110	2995.86	Ho II	220	3004.14	Re I	820	3011.75	Zr I	50	3017.58	Te II
28	2995.86	Yb II	550	3004.15	Na II	210	3011.88	Ta I	60	3017.627	Fe I
130	2996.00	Tb II	30	3004.248	Th I	2	3011.90	Ga II	80	3017.63	O III
300	2996.08	Ir I	1000 s	3004.25	Am II	100	3012.	Bi IV	30	3017.88	Pt I
10000	2996.18	Cm II	30	3004.25	Xe III	3700	3012.00	Ni I	4400	3018.04	Os I
10000	2996.40	Pu II	40	3004.46	Mo II	15	3012.02	Te II	980	3018.31	Hf I
700	2996.58	Cr I	110	3004.46	Rh I	80	3012.04	Cs II	95	3018.35	Nd II
950	2996.65	Cl II	100	3004.59	Pm II	1	3012.18	Sn II	125	3018.36	Zn I
140	2996.94	Y I	750	3005.06	Cr I	130	3012.19	Gd II	10 c	3018.43	Eu III
110	2996.986	Th II	100	3005.09	Gd II	200	3012.32	Sr III	430	3018.50	Cr I
15	2997.04	Te II	70	3005.26	Y I	230	3012.47	Er II	20	3018.644	Th I
150 s	2997.12	Pr III	100	3005.37	Zr I	1800	3012.54	Ta II	240	3018.82	Cr I
120 h	2997.21	F III	160	3005.50	Zr I	1100	3012.90	Hf II	1500	3018.85	Y III
8	2997.31	Ca I	130	3005.52	Tb II	140	3013.03	Cr I	55	3018.95	Y I
2000	2997.36	Cu I	800	3005.56	Hf I	330	3013.07	Os I	60	3018.983	Fe I
180	2997.41	Ir I	2	3005.68	I III	5	3013.09	Si III	350	3019.14	Ni I
130	2997.53	F III	310	3005.77	Yb II	15	3013.17	Fe III	130	3019.17	Tb II
260	2997.65	Os I	3	3005.85	Au I	20 c	3013.28	Eu III	140	3019.23	Ir I
1800	2997.97	Pt I	500	3006.06	Cl II	100	3013.32	Zr II	10	3019.29	Sr IV
800	2998.00	Yb III	4	3006.19	La III	130	3013.39	Mo I	60	3019.33	Be I
1000	2998.28	Tm III	40	3006.26	Eu II	40	3013.7	He I	2700	3019.34	Sc I
60 w	2998.43	N V	20	3006.37	Eu III	710	3013.71	Cr I	480	3019.38	Os I
210	2998.79	Cr I	200	3006.42	Re I	230	3013.71	Tm II	30	3019.49	Be I
70 l	2998.79	Pr III	50	3006.43	Rh III	140 h	3013.76	Mo I	30	3019.53	Be I
110	2999.03	Tb II	60 l	3006.47	Pr III	360	3013.79	W I	50	3019.54	Rh I
1200	2999.04	Gd II	440	3006.59	Ru I	1400	3013.93	Y III	20	3019.60	Be I
10000	2999.39	Cm I	50	3006.739	Si I	95	3014.19	Nd II	160	3019.84	Zr II
110 c	2999.40	In II	220	3006.83	N II	20	3014.22	Ba III	30	3019.92	Mn II
120	2999.47	F III	10	3006.86	Ca I	55	3014.43	Yb II	75	3020.004	Si I
500	2999.512	Fe I	12 h	3007.28	Fe III	220	3014.60	Ho II	60	3020.01	Fe II
5500	2999.60	Re I	200	3007.282	Fe I	90 s	3014.60	Pr III	170	3020.29	Tb II

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
15	3020.37	Cs II	26	3026.49	Y II	2100	3032.84	Gd II	330	3039.26	Ir I
350	3020.47	Zr II	150	3026.575	Th II	28	3032.93	Cr II	160	3039.31	W I
500	3020.491	Fe I	85	3026.65	Cr II	50	3033.16	Tc I	8000	3039.36	In I
1200	3020.53	Hf I	310 d	3026.67	W I	490	3033.18	U II	100	3039.59	Ne II
3000	3020.54	Lu II	160	3026.67	Yb II	30	3033.25	Au I	200	3039.62	Rb III
1500	3020.639	Fe I	200 c	3026.79	Eu III	100 l	3033.31	Pr III	55	3039.67	Yb II
430	3020.67	Cr I		3026.79	W I	10	3033.44	Ra II	120	3039.75	F III
500	3020.76	Br III	300 w	3026.89	Tc I	240	3033.45	Ru I	80	3039.78	Cr I
310	3020.88	Ru I	300	3027.02	Ne II	270	3033.45	V II	30	3039.93	Sc II
100	3021.01	Sm	120	3027.29	Lu II	50	3033.508	Ar II	20 c	3039.98	Eu III
50	3021.056	Th I	170	3027.33	Tb II	160	3033.56	W I	70	3040.02	Pr III
600	3021.073	Fe I	290 d	3027.48	Ta I	3000 s	3033.59	Pa II	200	3040.31	Ru I
320	3021.22	U II	50	3027.49	Hg I	300	3033.63	Br III	95	3040.60	Mn I
300	3021.50	Hg I	50	3027.490	Hg I	290	3033.82	V II	30	3040.65	Yb III
300	3021.500	Hg I	1900	3027.60	Gd II	12	3034.01	Sb II	12	3040.67	Sb II
20 h	3021.55	Si II	95	3027.77	Mo II	1600	3034.05	Gd II	30	3040.77	Eu II
2800	3021.56	Cr I	1500	3027.91	Pd I	370	3034.065	Th II	550	3040.85	Cr I
150	3021.56	Tc I	500 s	3027.99	Am II	850 r	3034.12	Sn I	2900	3040.90	Os I
100	3021.73	Sr III	500	3028.04	Zr II	390	3034.19	Cr I		3040.91	Cr II
130	3021.73	Y I	320	3028.19	U II	160	3034.19	W I	9	3040.93	Si III
70 s	3021.77	Pr III	270	3028.27	Er II	90 l	3034.25	Pr III	60 c	3040.94	Pr III
20 c	3022.08	Eu III	50	3028.43	Rh I	120	3034.46	Ne II	500	3041.18	Br IV
35	3022.15	Eu I	350	3028.44	Nb II	60	3034.484	Fe I	150	3041.28	Al II
630	3022.21	U II	15	3028.59	Ca III	2	3034.54	Ca I	220	3041.3	Se II
90	3022.28	Y I	10000	3028.85	Pu II	80	3034.57	Tc I	200	3041.48	Rb III
50	3022.30	Kr III	100 l	3028.86	Am II	55	3034.64	Yb II	20 h	3041.57	Si II
60	3022.59	Co II	300	3028.86	Ne II	6	3034.73	Si III	80	3041.637	Fe I
100	3022.66	Tc I	120	3028.98	Gd II		3034.76	K I	300	3041.70	Mo I
50 c	3022.69	Eu III	5	3029.01	Tl II	150	3034.84	Sm II	440 d	3041.73	W I
10000	3022.75	Ce III	400	3029.07	Na II	60	3034.87	Bi I	55	3041.74	Cr II
70	3022.75	Mn I	3	3029.12	Li II		3034.92	K I	60 l	3041.78	Pr III
20	3023.31	Te II	3	3029.14	Li II	170	3035.110	Th II		3041.86	W I
20 c	3023.40	Eu III	170	3029.16	Cr I	30	3035.13	Co II	100	3042.	Bi IV
110	3023.43	Tb II	320	3029.20	Au I	30	3035.35	Mn II	290	3042.06	Ta II
80	3023.45	O III	380	3029.36	Ir I	10	3035.72	Cd III	30 h	3042.19	Si II
120	3023.47	Hg I	100 l	3029.38	Pr III	200	3035.78	Zn I	100 s	3042.35	Pr III
120	3023.476	Hg I	2000	3029.49	Yb III	100	3035.92	Ne II	280	3042.35	Tm II
350	3023.61	Rb III	880	3029.52	Zr I	2500	3036.10	Cu I	220	3042.48	Ru I
200	3023.68	Tc I	140	3029.73	Ti II	310	3036.22	Er II	10000	3042.61	Pu II
100	3023.81	Xe III	210	3029.81	Dy II	100	3036.31	Mo I	800	3042.64	Pt I
130	3023.91	Rh I	500 r	3029.83	Sb I	350 d	3036.39	Zr II	40	3042.64	Tc I
100 c	3023.93	Eu III	50 c	3029.92	Eu III	350	3036.45	Br III	35	3042.65	Ir II
8	3023.94	Sn II	100 h	3030.00	Si II	130	3036.45	Pt I	80	3042.65	Yb II
500	3024.032	Fe I	80	3030.148	Fe I	30	3036.59	Y II	27	3042.73	Mn I
12	3024.05	Ar III	710	3030.24	Cr I	40	3036.88	Tc I	120	3042.74	Os II
1100	3024.35	Cr I	380	3030.45	Re I	40	3036.96	Fe II	160	3042.80	F III
80	3024.45	Kr III	40	3030.487	Th I	20 c	3036.98	Eu III	130	3043.01	Gd I
110	3024.50	W II	50	3030.60	Cd II	550	3037.04	Cr I	80	3043.02	O III
320	3024.51	U II	1100	3030.70	Os I	400	3037.08	Na II	10000	3043.12	Pu II
2400	3024.64	Bi I	360	3030.76	Sc I	8	3037.29	Si III	230	3043.12	V I
10	3024.67	Au I	100	3030.79	Ne II	800	3037.389	Fe I	280	3043.13	Dy II
140	3024.74	Nb II	180	3030.92	Zr II	100	3037.72	Ne II	50	3043.29	Nd
210	3024.93	W I	55	3031.06	Mn II	210	3037.73	Ce II	500	3043.30	Ac II
2	3024.94	Ca I	920	3031.11	Yb II	20	3037.90	Tc II	85	3043.36	Mn I
250	3025.00	Mo I	410	3031.16	Hf II	1700	3037.94	Ni I	30	3043.42	Ba III
70 s	3025.26	Pr III	60	3031.214	Fe I	6	3037.98	Ar IV	210	3043.50	Os I
80	3025.26	Tc I	30 h	3031.22	Pt II	25	3037.99	Yb II	230	3043.56	V I
140	3025.29	Hf II	20 c	3031.24	Eu III	100	3038.23	Tc I	100 h	3043.69	Si II
10	3025.32	Eu III	370	3031.31	Er II	610	3038.28	Dy II	270	3043.80	W I
30	3025.608	Hg I	140	3031.35	Cr I	500 l	3038.36	Am II	10	3043.85	Pb III
30	3025.61	Hg I	50000	3031.58	Ce III	85	3038.598	Th II	10 h	3043.85	Si II
150	3025.638	Fe I	230	3031.60	Tb II	10	3038.64	Eu III	7	3043.93	Si III
110	3025.82	Ir I	100	3031.62	Yb III	270	3038.69	Ho II	3100	3044.00	Co I
500	3025.842	Fe I	120	3031.87	Ni I	220	3038.7	Se II	21	3044.00	Yb II
290	3025.95	Er II	630	3031.99	U II	50	3038.98	Nd II	100	3044.09	Ne II
330	3026.07	Tm II	110	3032.26	B II	10	3039.05	Eu III	490	3044.16	U II
10 c	3026.09	Eu III	300	3032.77	Nb II	750	3039.067	Ge I	330	3044.57	Mn I
390	3026.16	Dy II	200	3032.80	Sn I	100	3039.13	Sm II	100	3044.76	Nb II
80	3026.47	Nd II	40 c	3032.84	Eu III	130	3039.25	F III	45	3044.84	Y I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
10000	3044.85	Cm II	1000	3051.36	Rb II	950	3057.96	Cl II	110	3065.69	Tb II
230	3044.94	V I	100 h	3051.55	Tc I	170	3058.09	Ti II	170	3066.02	Mn I
230	3044.96	Tb II	200	3051.98	Ce II	8600	3058.66	Os I	60	3066.14	Al I
150	3045.01	Ni I	6	3052.07	K III	550	3058.72	Na II	230	3066.22	Er II
5	3045.08	Si III	80	3052.15	Nd II	200	3058.78	Re I	500	3066.22	Na II
190	3045.37	Y I	50	3052.44	Rh III	150 l	3058.90	Pr III	1300 d	3066.22	Ti II
100	3045.56	Ne II	20	3052.46	Te II	120	3058.98	Eu I		3066.35	Ti II
130	3045.564	Th II	40	3052.47	Tc I	1000	3059.086	Fe I	2400	3066.38	V I
120	3045.59	Mn I	4	3052.56	Pb IV	100	3059.11	Ne II	500	3066.54	Na II
400	3045.60	Na II	85	3052.93	Sc II	110	3059.30	O III	100	3066.60	Cs II
110	3045.71	Ru I	110	3053.09	Nb I	24	3059.52	Cr II	100 c	3066.60	Tc I
70	3045.72	Sc II	150 h	3053.18	Si II	85	3059.74	Ti II	150 l	3066.71	Pr III
2	3045.74	Ca I	130	3053.24	Tb II	30	3059.83	Sr III	220	3066.99	Dy II
30	3045.77	Rh I	180	3053.39	V II	100	3059.92	Gd I	600	3067.021	Ge I
10 h	3045.77	Si II	460	3053.55	Tb II	120	3059.99	F II	200	3067.12	V II
100 l	3045.81	Pr III	280	3053.57	Gd II	100 h	3060.08	Hf III	28	3067.16	Cr II
100	3045.83	Zr I	450	3053.65	V I	100	3060.11	Zr II	230	3067.20	Tb II
110	3046.08	Hf II	550	3053.67	Na II	700	3060.25	Na II	250	3067.244	Fe I
440	3046.44	W I	200 s	3053.69	Am II	290	3060.30	Os I	65	3067.30	Rh I
160	3046.48	Gd I	710	3053.88	Cr I	10000	3060.32	Pu II	1600	3067.40	Re I
45	3046.48	Yb II	410 c	3054.00	Ho II	1400	3060.46	V I	850	3067.41	Hf I
10	3046.52	Be II	10	3054.07	Eu III	280	3060.64	Dy II	150	3067.54	Sm
110	3046.68	Ti II	1500	3054.32	Ni I	100	3060.78	Mo II	9000 c	3067.72	Bi I
30	3046.69	Be II	100	3054.34	Ne II	15	3060.98	Cs II	450	3067.729	Th II
30	3046.76	Rh I	250	3054.36	Mn I	800	3061.35	Na II	100	3068.00	Mo I
340 d	3046.76	Tm II	210	3054.42	Er II	50	3061.43	Sr III	7	3068.24	Si III
150	3046.80	Mo I	60	3054.68	Al I	160	3061.59	Mo I	120 c	3068.34	Tc I
50	3046.93	Kr III	100	3054.68	Ne II	460	3061.62	U II	1000	3068.64	Gd II
120	3046.93	Sm II	12	3054.82	Ar III	220	3061.699	Th II	1600	3068.89	Ir I
70 l	3046.98	Pr III	690	3054.84	Zr II	1700	3061.82	Co I	270	3069.03	Tb II
70	3047.00	Te II	320cw	3054.94	Eu II	80	3062.11	Tc I	190	3069.09	Ir I
200	3047.04	Mn I	150	3054.94	Ru I	140	3062.12	Mn I	35	3069.11	Eu II
35	3047.05	Yb II	10 c	3054.97	Eu III	5	3062.18	K II	4	3069.17	I IV
22	3047.11	Y I	1000	3055.10	Er III	570	3062.19	Os I	3	3069.23	I III
200	3047.13	O III	60	3055.22	Y II	200	3062.36	Tc I	530	3069.24	Ta I
300	3047.16	Ir I	350	3055.24	Ce II	100	3062.49	Ne II	450	3069.31	Po I
240	3047.25	Re I	70 s	3055.30	Pr III	630	3062.54	U II	10000	3069.32	Pu II
210	3047.31	Mo I	3	3055.32	Ca I	390	3062.62	Dy II	200	3069.36	Ac II
12	3047.50	Sn II	210	3055.32	Mo I	130	3062.78	Tb II	140	3069.64	V I
210	3047.56	Dy II	550	3055.35	Na II	680	3063.01	Ce II	110	3069.68	Nb II
120	3047.56	Ne II	100	3055.52	Nb II	45	3063.12	Yb II	190	3069.71	Ir I
800	3047.604	Fe I	95000	3055.59	Ce III	500	3063.13	Cl IV	130	3069.73	Nd II
150	3048.10	Nb I	340	3056.07	Tm II	60	3063.13	Kr III	210	3069.94	Os I
100	3048.11	Tm III	550	3056.16	Na II	10	3063.16	Te II	320	3069.94	Re I
230	3048.22	V II	120 h	3056.31	Sc I	140	3063.25	V II	460	3070.05	Tb II
50 h	3048.30	Si II	1200	3056.33	V I	100	3063.30	Ne II	170	3070.27	Mn I
110	3048.66	W I	20000	3056.56	Ce III	2500	3063.41	Cu I	1000	3070.40	Er III
110	3048.78	Ru I	90000 c	3056.68	La IV	460	3063.42	O IV	250	3070.70	Rb III
40	3048.86	Mn I	30	3056.692	Th I	21	3063.67	Yb II	450	3070.74	Er II
420	3049.092	Th II	140	3056.71	Nd II	130	3063.78	Hf I	100	3070.89	Ne II
150	3049.14	F III	30	3056.72	Kr III	230	3064.09	Tb II	250	3070.90	Mo I
480 c	3049.38	Ho II	2100	3056.72	Lu II	800	3064.28	Mo I	100	3070.90	Nb II
300	3049.44	Ir I	130	3056.74	Ti II	90	3064.29	Al I	260	3071.16	Re I
230	3049.46	Os I	320	3056.78	Ce II	500	3064.38	Na II	3000 l	3071.24	Pa II
530	3049.56	Ta I	5	3056.84	K III	220	3064.53	Nb II	70	3071.24	Ti II
810	3049.69	W I	1100	3057.02	Hf I	500	3064.62	Ni I	120	3071.29	Sm II
360	3050.07	Al I	450	3057.14	Al I	100	3064.63	Zr II	1300	3071.32	Cl II
110	3050.14	Cr II	40000	3057.23	Ce III	300	3064.67	Tc I	65 d	3071.43	Nd II
580	3050.20	U II	300	3057.28	Ir I	130	3064.68	Hf II		3071.50	Nd II
120 l	3050.30	Pr III	550	3057.38	Na II	3200	3064.71	Pt I	100	3071.53	Ne II
210	3050.39	Os I	130	3057.40	Ti II	10	3064.77	Ar III	110	3071.56	Nb II
30	3050.65	Mn II	600	3057.446	Fe I	390	3064.84	Ru I	2	3071.57	Ca I
320	3050.73	Tm II	500 c	3057.45	Ho II	110	3064.93	W I	100 r	3071.58	Ba I
710	3050.76	Hf I	20000	3057.58	Ce III	250	3065.04	Mo II	410	3071.61	O IV
3500	3050.82	Ni I	1900	3057.64	Ni I	110	3065.04	Yb II	5	3071.84	Ge IV
170	3050.89	V I	1000	3057.86	Lu III	85	3065.07	Cr I	330	3071.91	Dy II
50	3051.11	Nd II	25	3057.89	Rh I	130	3065.11	Sc II	30	3071.94	Pt I
190	3051.13	Tb II	630	3057.91	U II	1100	3065.31	Pd I	200	3072.06	Zn I
8 d	3051.15	In I	550	3057.95	Na II	300	3065.42	Au I	600	3072.11	Ti II

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
370	3072.114	Th II	700	3078.87	Tm III	340	3088.76	Re I	320	3095.75	U II
300	3072.41	Pm II	40	3079.14	Ba III	4	3089.08	Pb III	110	3095.82	Zr I
560	3072.53	Er II	95	3079.38	Nd II	10 c	3089.09	Eu III	28	3095.86	Cr I
560	3072.56	Gd II	90	3079.63	Mn I	100	3089.10	Yb II	95	3095.88	Y II
270	3072.60	Tb II	150	3079.88	Mo I	100	3089.12	Mo I	15	3096.26	La III
580	3072.78	U II	390	3080.11	Lu I	170	3089.14	Ru I	330	3096.57	Ru I
2100	3072.88	Hf I	150 l	3080.20	Pr III	150	3089.34	Tc I	200	3096.76	Hf I
200	3072.96	Re I	480	3080.217	Th II	35	3089.35	Eu II	16	3096.83	Si III
1100	3072.97	Ti II	550	3080.25	Na II	180	3089.40	Ti II	120	3096.88	Sm II
580	3073.08	Tm II	110	3080.35	Nb II	480	3089.58	Tb II	14	3096.90	Mg I
160	3073.13	Mn I	210	3080.41	Mo I	100	3089.71	Mo I	40	3097.06	Mn I
100	3073.24	Nb II	150	3080.66	Hf II	120	3089.80	Ru I	260	3097.12	Ni I
180	3073.28	W I	420	3080.76	Ni I	280	3089.95	Gd II	100	3097.13	Ne II
610	3073.34	Er II	2	3080.79	Ca I	15	3090.05	Hg III	40	3097.16	Kr III
280	3073.54	Dy II	150	3080.822	Cd I	230	3090.08	Os I	180	3097.19	Ti II
15	3073.56	Te II	430	3080.84	Hf I	130	3090.093	Th II	140	3097.266	Th II
85	3073.68	Cr I	25	3080.87	Cs II	120	3090.19	Pm II	120	3097.45	Eu II
1400	3073.80	Cu I	95	3080.94	Nd II		3090.3	Be I	110	3097.5	S IV
170	3073.82	V I	360	3081.12	Tm I	200	3090.37	Ce II	120	3097.60	Ru I
360	3074.08	Os I	50	3081.33	Mn I	20	3091.08	Mg I	320	3098.01	U II
170	3074.10	Hf I	5100 h	3081.47	Lu I	50	3091.1	Xe III	80	3098.189	Fe I
230	3074.30	Ho II	25	3081.48	Cd II	10000	3091.33	Pu II	140	3098.48	Nd II
550	3074.33	Na II	2100	3081.99	Gd II	20	3091.56	Tl II	100	3098.49	Rb III
800	3074.37	Mo I	2	3082.02	Rb I	120	3091.577	Fe I	740	3098.60	Tm II
500	3074.42	Br III	23	3082.05	Mn I	55 h	3091.70	Y I	460	3098.64	Gd II
150	3074.64	Al II	720	3082.08	Er II	150	3091.86	Pm II	190	3098.90	Gd II
250	3074.79	Hf I	110	3082.11	Pr II	350	3091.94	Br III	20	3099.10	Ag I
290	3074.96	Os I	150	3082.11	V I	10000	3091.94	Pu II	1000	3099.10	Tc I
100	3075.17	La III	4500 r	3082.153	Al I	550	3092.04	Na II	210	3099.12	Ni I
1600	3075.22	Ti II	500 c	3082.34	Ho II	140	3092.06	Gd II	370	3099.19	Er II
100	3075.27	V I	480	3082.36	Tb II	190	3092.07	Mo II	140	3099.19	Nb II
160	3075.38	Nd II	550	3082.43	Re I	100	3092.09	Ne II	280	3099.23	Zr I
120	3075.719	Fe I	30	3082.593	Cd I	1400	3092.19	Cl II	830	3099.28	Ru I
100	3075.73	Ne II	3000 h	3083.19	Pa	100	3092.31	Cs II	2	3099.30	Ca I
150	3075.90	Zn I	320	3083.22	Ir I	100	3092.34	Cd II	55	3099.52	Nd II
18	3076.01	Yb II	40	3083.5	Xe III	3000	3092.50	Yb III	200	3099.52	Tc I
10	3076.06	Ta IV	320	3083.67	Ce II	10000	3092.59	Pu II	110 d	3099.80	In II
35	3076.07	Eu II	180	3083.96	Rh I	7200 r	3092.710	Al I	100	3099.895	Fe I
80	3076.24	Tc I	140	3084.01	Gd II	95	3092.73	Nd	1250	3099.93	Cu I
20	3076.43	Eu III	610	3084.02	Er II	550	3092.73	Na II	110	3099.93	Mo I
140	3076.66	Bi I	910	3084.36	Ho II	1800 r	3092.839	Al I	100	3099.968	Fe I
600	3076.68	Cl IV	250	3084.44	Ce II	120	3092.90	Ne II	130	3100.04	Pt I
170	3076.69	Ir I	180 d	3084.83	W I	240	3092.92	Nd II	510	3100.29	Ir I
400	3076.87	Nb II		3084.91	W I	22	3092.99	Mg I	60	3100.303	Fe I
640	3076.92	Gd II	40000	3085.10	Ce III	580	3093.01	U II	500	3100.40	Er III
2	3076.95	Ca I	110	3085.34	Zr I	25	3093.03	La III	510	3100.45	Ir I
150	3077.08	Gd II	4	3085.38	La III	3800	3093.11	V II	3500	3100.50	Gd II
360	3077.24	Ta I	800	3085.62	Mo I	3000 l	3093.23	Pa II	100	3100.665	Fe I
220	3077.36	Eu II	150	3086.02	Pm II	50	3093.402	Ar II	700	3100.67	Re I
8	3077.40	Ar IV	100	3086.04	Ac II	20	3093.42	Si III	180	3100.67	Ti I
290	3077.44	Os I	25	3086.24	Si III	370	3093.50	W I	28	3100.74	Yb I
110	3077.52	W II	240	3086.44	Ir I	270	3093.59	Os I	740	3100.84	Ru I
7500	3077.60	Lu II	100	3086.45	Sm II	200	3093.64	Re I	110	3100.88	Mo I
85	3077.66	Mo II	6	3086.46	Si III	5	3093.65	Si III	180	3100.94	V II
1100	3077.72	Os I	430 c	3086.54	Ho II	50	3093.711	Th I	120	3101.18	Gd II
55	3077.83	Cr I	120	3086.78	Tb II	22	3093.76	Y II	560	3101.34	Mo I
100	3078.07	Ac II	500	3086.84	Rb III	70	3093.87	Yb II	45	3101.36	Yb II
360	3078.11	Os I	60	3086.85	Y II	1500	3093.99	Cu I	340	3101.40	Hf II
10	3078.15	Ar III	550	3087.06	Na II	100	3094.01	Ne II	310	3101.53	Os I
90	3078.25	N IV	100	3087.37	Ac II	1800	3094.18	Nb II	2600	3101.55	Ni I
550	3078.32	Na II	29	3087.42	Rh I	200	3094.20	V II	4	3101.79	K I
230	3078.38	Os I	270	3087.62	Mo II	650	3094.45	Na II	180 c	3101.8	In II
2300	3078.64	Ti II	3600	3088.02	Ti II	560	3094.66	Mo I	5	3101.80	Ra I
220	3078.68	Dy II	390	3088.04	Ir I	6	3094.69	Sn II	1300	3101.88	Ni I
70 s	3078.68	Pr III	120	3088.17	Ne II	110	3094.80	Zr I	230	3101.91	Gd II
5000	3078.75	I II	450	3088.26	Na II	200	3095.06	Re I	280	3101.93	Dy II
670	3078.828	Th II	250	3088.43	Tb II	250	3095.07	Zr II	3	3102.04	K I
670	3078.86	Tb II	240	3088.470	Th II	100	3095.10	Ne II	28	3102.07	Yb II
210	3078.87	Er II	250	3088.58	Rb II	650	3095.55	Na II	20	3102.18	Yb III

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
100 h	3102.30	Sm II	7	3110.41	Ar III	310	3118.33	Os I	680	3124.95	U II
3000	3102.30	V II	30000	3110.53	Ce III	2000	3118.38	V II	380	3124.97	Ta I
580	3102.39	U II	50	3110.67	Ti II	3000	3118.43	Lu I		3125.02	Cr II
230	3102.54	Tb II	40	3110.68	Mn I	760	3118.50	Ho II	10	3125.18	Ca II
580	3102.55	Gd II	2600	3110.71	V II	120	3118.60	Gd II	600	3125.21	Na II
10	3102.63	Au I	10	3110.81	Be I	240	3118.65	Cr II	1500	3125.28	V II
200	3102.664	Th II	28	3110.86	Cr I	100	3118.76	Pm II	480	3125.507	Th II
4	3102.74	Pb III	340	3110.86	Re I	150	3118.894	Pb I	400	3125.67	Hg I
480	3102.96	Tb II	130	3110.87	Hf II	120	3118.92	Rb III	400	3125.670	Hg I
140	3103.06	Re II	210	3110.88	Zr II	120	3119.01	Gd I	320	3125.92	Zr II
220	3103.24	Dy II	10	3110.92	Gd I	80	3119.17	Tc I	120	3125.96	Ru I
560	3103.25	Ta I	20	3110.99	Be I	30	3119.22	Ba III	4000 h	3126.01	Yb III
370	3103.38	Ce II	250	3111.09	Os I	45	3119.25	Cr I	1400 h	3126.11	Cu I
500	3103.58	Na II	300	3111.17	Ce II	530	3119.35	U II	10	3126.199	Ne I
230	3103.80	Ti II	170	3111.19	Gd I	510	3119.526	Th II	260	3126.22	V II
30	3103.92	Ba III	100	3111.34	Pr II	290	3119.62	Tb II	3000 l	3126.23	Pa II
10000	3104.12	Pu II	500	3111.36	Rb III	40	3119.66	Tc I	6	3126.27	Si III
460	3104.15	U II	950	3111.43	Eu I	19	3119.67	Ca III	30	3126.86	Au II
30	3104.25	Sr III	150	3111.45	Nb I	40	3119.71	Cr I	30	3127.03	Au I
500	3104.40	Na II	450	3111.45	Na II	720	3119.72	Ti I	220	3127.53	Ce II
8	3104.44	Te II	970	3111.62	U II	50	3119.75	Nd II	270	3127.53	Nb II
600	3104.46	Cl III	45	3111.81	Y I		3119.80	Ti II	7	3127.90	Ar III
180	3104.59	La II	200	3111.97	La III	510	3119.94	Gd II	330	3128.41	Dy II
9	3104.71	Mg II	55	3112.04	Y II	130	3119.98	Hf I	130	3128.56	Gd II
8	3104.81	Mg II	1400	3112.12	Mo I		3120.	Be I	120	3128.70	Cr II
6	3105.00	K II	60	3112.25	Kr III	200	3120.15	Tm III	60	3128.77	Y II
10000	3105.04	Pu II	50	3112.48	Ti I	100	3120.16	Ac II	300	3128.87	Xe II
230	3105.08	Ti II	10	3112.57	Rb I	100	3120.18	Gd II	420	3128.94	Re I
10	3105.25	Eu III	200	3112.83	Ac II	260	3120.18	W I	500	3129.18	Zr II
130	3105.43	Nd II	3	3113.06	Rb I	430	3120.37	Cr II	10	3129.31	Eu III
220	3105.47	Ni I	160	3113.17	Gd II	2000 s	3120.49	Am II	600	3129.38	Na II
360	3105.99	Os I	310 d	3113.43	Er II	30	3120.61	Kr III	220	3129.44	O II
10000	3106.03	Pu		3113.54	Er II	350	3120.74	Zr I	500	3129.76	Zr II
320	3106.18	Eu I	140	3113.62	F III	340	3120.76	Ir I	80	3129.93	Y II
95	3106.18	Nd II	500	3113.69	Na II	380	3121.14	V II	30 h	3130.02	Ag I
260	3106.23	Ti II	2600	3114.04	Pd I	340	3121.36	Re I	530	3130.27	V II
30	3106.46	Xe III	270	3114.12	Ni I	180	3121.54	F III	200	3130.33	Ce II
250	3106.52	Sm II	22	3114.28	Y I	30000	3121.56	Ce III	480	3130.42	Be II
690	3106.58	Zr II	250 s	3114.82	Rb III	140	3121.58	Pr II	380	3130.58	Ta I
230	3106.78	Er II	70	3114.91	Rh I	80	3121.71	O III	120	3130.73	Eu II
70	3106.81	Ti I	35	3115.0	Bi III	140	3121.76	Rh I	1500	3130.79	Nb II
20000	3106.98	Ce III	260	3115.18	Nd II	200	3121.78	Ir I	35	3130.79	Rh I
240	3107.23	W I	85	3115.34	Yb II	230	3121.94	Tb II	240	3130.80	Ti II
200	3107.47	Ce II	100	3115.36	Pm II	290	3122.00	Mo II	130	3130.81	Gd II
55	3107.76	Yb II	50	3115.538	Th I	100	3122.50	Au II	240	3130.87	Ce II
170	3107.90	Yb II	160	3115.70	F III	28	3122.60	Cr II	300 c	3130.99	Ho II
65	3108.01	Nd II	200	3115.95	Po	160	3122.62	O II	320	3131.07	Be II
240	3108.02	W I	60	3115.98	Tc I	700	3122.64	Tc I	150	3131.070	Th II
150	3108.11	Pm II	190	3116.15	Nd II	770	3122.72	Er II	140	3131.11	Zr I
10 h	3108.21	Ba I	100	3116.263	Th I	1600	3122.78	Au I	480	3131.12	Os I
60	3108.25	Tc I	10000	3116.41	Cm I	150	3122.90	V II	1500	3131.23	Tc I
510	3108.296	Th II	300	3116.516	As II	400	3122.94	Na II	7400	3131.26	Tm II
200	3108.31	Ho II	1000	3116.59	Gd III	510	3122.963	Th II	110	3131.35	Tb II
130	3108.36	Gd II	10	3116.68	Co III	230	3123.05	Tb II	320	3131.55	Hg I
110	3108.37	Zr I	55	3116.70	Yb II	160	3123.06	Nd II	320	3131.551	Hg I
2000	3108.60	Cu I	50	3116.74	La III	190	3123.07	Ti I	710	3131.81	Hf I
150	3108.8	As IV	10 h	3117.01	Au I	240	3123.70	Rh I	320	3131.84	Hg I
700	3108.81	Re I	100	3117.22	Pm II	1200	3123.72	Cl II	320	3131.842	Hg I
310	3108.98	Os I	350	3117.29	Br III	10000	3123.87	Pu II	590	3132.06	Cr II
710	3109.12	Hf II	230	3117.57	W I	370	3123.99	Gd II	350	3132.07	Zr I
40	3109.15	Tc I	140	3117.67	Ti II	120	3124.25	Gd II	40	3132.16	Eu I
28	3109.34	Cr I	40	3117.7	S IV	370	3124.387	Th II	290	3132.52	Er II
620	3109.38	Os I	200	3117.72	Sm II	100	3124.39	Kr III	10	3132.58	Te II
10	3109.67	Eu III	190	3117.81	Yb II	1700	3124.42	Na II	14000	3132.59	Mo I
10000	3109.69	Cm I	290	3117.89	Tb II	160	3124.54	Tb II	8	3132.60	Ba I
410	3109.76	Dy II	100	3117.98	Ne II	190	3124.58	Nd II	270	3132.64	Ta I
200 c	3109.91	Ho II	2500	3118.04	Gd III	140	3124.79	F III	470	3132.77	Er II
220	3110.20	Sm II	120	3118.16	Ne II	20	3124.816	Ge I	110	3132.86	O III
320	3110.28	Ce II	340 c	3118.19	Re I	470	3124.94	Cr II	100	3133.09	Gd II

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
200	3133.167	Cd I	250	3141.38	Re I	5000 c	3148.90	Rb II	12	3158.05	Ba I
110	3133.23	Zr I	130	3141.42	W I	680	3149.24	U II	6000	3158.16	Mo I
3400	3133.32	Ir I	170	3141.46	Nd II	2000	3149.28	Na II	1	3158.18	Ga II
410	3133.33	V II	140	3141.54	Ti I	100	3149.29	Nd II	5	3158.26	Rb I
350	3133.48	Zr II	95	3141.67	Ti I	100	3149.51	Nd II	360 c	3158.31	Re I
290	3133.60	Nd II	80	3141.73	Yb II	7	3149.56	Si IV	100 c	3158.40	In II
460	3133.85	Gd II	60	3141.84	Sn I	65	3149.85	W II	12 h	3158.54	Ba I
160	3133.88	W I	3	3142.01	Kr IV	45	3149.88	Eu II	10000	3158.60	Cm I
2300	3133.89	Tm II	80	3142.26	Nb III		3150.	Be I	200	3158.63	Gd I
260	3134.02	Re I	170	3142.44	Nd II	40 c	3150.26	Tc I	170	3158.87	Ca II
2900	3134.11	Ni I	200	3142.48	V II	150	3150.455	Th II	190	3159.15	Ir I
140	3134.23	F III	10	3142.54	Eu III	190	3150.61	Ir I	10000	3159.21	Pu II
250	3134.26	Tb II	80 c	3142.75	In II	7	3150.75	Ca I	200 c	3159.67	Ho II
200 c	3134.39	Ho II	130	3142.76	La II	80 c	3150.82	Xe III	270	3159.82	Hf I
850	3134.72	Hf II	270	3142.81	Pd I	1900	3151.04	Tm II	290	3159.92	Ru I
450	3134.82	O II	420	3142.835	Th II	45	3151.36	Rh I		3160.6	Be I
220	3134.90	Nd II	230	3143.13	Gd II	2	3151.40	Co III	20	3160.66	Te II
210	3134.93	V II	100	3143.72	Ne II	100	3151.44	Yb III	140	3160.69	Gd II
210	3135.03	Gd II	220	3143.76	Ti II	120	3151.63	Hf I	1200	3161.00	Rb II
95	3135.17	Y II	220	3143.83	Dy II	440	3151.64	Re I	200	3161.03	I II
830	3135.38	Dy II	20000	3143.96	Ce III	140	3151.87	Nb I	90 h	3161.04	Mn I
2500	3135.48	Na II		3144.	Li I	180	3152.10	Sm II	500	3161.20	Ti II
8 h	3135.72	Ba I	250	3144.33	Er II	240	3152.25	Ti II	30	3161.364	Th I
	3136.	Be I	300 c	3144.36	Ho II	410	3152.52	Sm II	980	3161.37	Gd II
5	3136.02	Ca I	100	3144.55	Nd II	45	3152.60	Rh I	8	3161.61	Si III
100	3136.216	Th I	200	3144.60	Ce II	250	3152.67	Os I	300	3161.67	Tc I
270	3136.30	Sm II	160	3144.66	O V	30	3152.70	Ba III	10000	3161.73	Pu II
10 p	3136.43	Fe III	100	3144.82	Nd II	220	3152.82	Mo II	780	3161.77	Ti II
150	3136.51	V II	230	3144.90	Tm II	500 s	3153.09	Ac II	200 s	3161.83	Am II
140	3136.68	Cr II	410	3144.97	U II	530	3153.11	U II	35	3162.23	Pm I
50	3136.76	Yb II	930	3145.00	Gd II	28	3153.18	Yb II	28	3162.29	Yb I
190	3136.93	Gd I	80	3145.06	Yb II	140	3153.49	F II	150	3162.30	Sm II
180	3136.96	Zr I	230	3145.22	Tb II	290	3153.61	Os I	130	3162.42	Tb II
10000	3137.16	Cm I	290	3145.28	Ce II	330	3153.79	Re I	1000	3162.57	Ti II
100	3137.24	Nd II	220	3145.32	Hf II	120	3153.82	Ru I	710	3162.61	Hf II
190	3137.30	Gd I	150	3145.34	V II	3	3153.88	I III	100	3162.62	Nd II
130	3137.51	Hf I	390	3145.40	Nb II	90	3153.88	Yb II	670	3162.83	Dy II
10	3137.70	Ba I	370	3145.52	Gd II	12	3154.20	Fe II	290	3162.93	Tb II
95	3137.71	Rh I	28	3145.54	Yb II	240	3154.20	Ti II		3163.	Be I
10	3137.81	Pb III	490	3145.56	U II	410	3154.29	Er II	10000	3163.18	Pu II
1700	3137.86	Na II	950	3145.71	Na II	310	3154.300	Th II	1200	3163.40	Nb II
100 w	3138.3	Xe III	55	3145.72	Ni I	600 s	3154.41	Ac II	290	3163.42	W I
285	3138.44	O II	310	3146.044	Th II	190	3154.74	Ir I	6	3163.53	Tl III
1000	3138.58	Yb III	250	3146.16	Dy II	10000	3155.10	Cm I	140	3163.73	Pr II
130 c	3138.60	In II	230	3146.16	Tm II	100	3155.15	Cr I	2000	3163.74	Na II
690	3138.68	Zr II	3000 l	3146.28	Pa II	50	3155.18	Yb II	100	3163.76	Cr I
120	3138.71	Gd I	290	3146.41	Ce II	3	3155.31	Li II	70	3163.80	Yb II
110	3138.72	Mo II	150	3146.67	Tb II	4	3155.33	Li II	290	3164.15	Ce II
420	3139.306	Th II	130 d	3146.70	In II	10	3155.34	Ba I	540	3164.31	Zr II
800	3139.34	Cl III	50	3146.79	Cd II	120	3155.62	Tb II	100	3164.43	Ne II
320	3139.39	Pt I	230	3146.88	Gd II	55	3155.64	Mo II	130	3164.44	W I
530	3139.61	U II	140	3146.99	F III	10	3155.67	Ba I	220	3164.52	Re I
440	3139.64	Tb II	310	3147.04	Tb II	240	3155.67	Ti II	120	3164.53	Mo I
170	3139.65	Hf II	20000	3147.06	Ce III	290	3155.67	Zr II	200 s	3164.81	Ac II
150	3139.74	V II	310	3147.15	Tb II	150	3155.77	In II	10	3164.88	Au I
45	3139.75	Sc II	150	3147.19	Sm II	130	3155.78	Rh I	50	3165.21	Yb II
140	3139.80	Zr I	140	3147.23	Cr II	200	3156.18	Ho II	130	3165.38	W I
150	3139.97	Sm II	10000	3147.33	Cm I	3100	3156.25	Os I	150	3165.45	Zr II
190	3140.06	Tb II	220	3147.35	Mo I	1200	3156.52	Dy II	25	3165.60	Ba I
360	3140.64	Dy II	7	3147.37	Si III	980	3156.53	Gd II	100	3165.65	Ne II
120	3140.76	Hf II	300	3147.81	Br III	140	3156.56	Pt I	9	3165.71	Si IV
6	3140.79	Ca I	240	3148.04	Ti II	450	3156.63	Hf I	190	3165.74	Tb II
230	3140.94	Yb II	60 h	3148.18	Mn I	250	3156.78	Os I	880	3165.97	Zr II
410	3141.10	Er II	220	3148.41	Hf I	270	3156.97	Ho II	140	3166.099	Th II
500	3141.14	Dy II	85	3148.44	Cr I	150	3157.00	Zr II	1500	3166.25	Er III
	3141.15	Er II	100	3148.51	Nd II	50	3157.221	Th I	150	3166.26	Zr II
20000	3141.29	Ce III	100 p	3148.68	Ne II	1500	3157.34	Tm II	310	3166.51	Os I
300	3141.33	Ne II	310	3148.71	Tb II	25	3157.54	Rb I	580 c	3166.62	Ho II
60	3141.35	Kr III	180	3148.82	Zr I	320	3157.82	Zr I	380	3167.52	Tb II

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
100 s	3167.86	Am II	100	3175.14	Te I	2000	3182.37	Tc I	100	3188.74	Ne II
200	3167.87	Cl IV	80	3175.445	Fe I	50	3182.61	Sr III	150	3188.97	Si II
	3168.	Be I	420	3175.726	Th II	880	3182.86	Zr II	400	3189.02	Po I
140	3168.18	Ir I	50	3175.74	Er III	600	3182.87	Re I	140	3189.05	Rh I
270	3168.24	Pr II	7	3175.78	Mg II	370	3183.03	Mo I	100	3189.11	Kr III
140	3168.32	Tb II	150	3175.78	Nb II	2000	3183.11	Tc I	10000	3189.23	Pu II
700	3168.37	Re I	10	3175.99	Fe III	30	3183.16	Ba I	65	3189.24	W II
450	3168.39	Hf I	100	3175.99	Nd II	3200	3183.41	V I	310	3189.46	Os I
200	3168.52	Ru I	340	3176.21	U II	410	3183.42	Er II	130	3189.62	Hf I
1600	3168.52	Ti II	200	3176.29	Ta I	480	3183.52	Ce II	1700	3189.79	Na II
35	3168.82	Pm I	90 c	3176.30	In II	100	3183.73	Lu II	10	3189.83	Te II
490	3168.88	Ir I	10	3176.50	Pb III	50 c	3183.78	Eu III	240	3189.98	Ru I
6	3168.98	Mg II	320	3176.60	W I	390	3183.84	Ho II	5	3190.07	K II
120	3169.06	Yb II	4000	3176.66	Gd III	140	3183.88	Tb II	220	3190.28	Gd I
290	3169.18	Ce II	450	3176.86	Hf II	720	3183.92	Sm II	200	3190.34	Ce II
110	3169.328	Th II	270 c	3176.97	Ho II	15	3183.96	Ba I	750	3190.68	V II
100	3169.34	Rb III	60	3177.05	Ru II	5300	3183.98	V I	260	3190.78	Re I
230	3169.84	Tb II	340	3177.33	U II	130	3184.05	W I	1000	3190.87	Ti II
360	3169.88	Sm II	10000	3177.55	Cm I	100	3184.37	Ni I	300	3191.10	Nb II
10000	3169.98	Cm II	370	3177.58	Ir I	130	3184.42	W I	470	3191.19	Rh I
1000	3169.99	Dy II	440	3177.71	Re I	270cw	3184.48	Ho II	80	3191.21	Kr III
4	3170.11	I IV	400	3177.89	Dy II	240	3184.55	Ta I	540	3191.21	Zr I
3	3170.14	I III	10	3178.01	Fe III	120	3184.57	Mo I	85	3191.221	Th II
320	3170.29	Ta I	420	3178.06	Os I	1100	3184.76	Re I	70	3191.31	Y I
8700	3170.35	Mo I	10	3178.08	Eu III	200	3184.79	Dy II	800	3191.35	Yb III
10 h	3170.58	Ag I	190	3178.09	Zr II	150	3184.895	Fe I	110	3191.42	Pr I
3000 l	3170.89	Pa II	180	3178.12	Sm II	310	3184.948	Th II	150	3191.43	Nb II
50 c	3171.00	Eu III	220	3178.37	Dy II	370	3185.10	Mo I	900	3191.45	Cl III
2400	3171.36	Lu I	10000 l	3178.47	Bk II	10000	3185.12	Pu II	10 h	3191.46	Eu III
100	3171.45	Zn II	140 h	3178.50	Mn I	16	3185.13	Si III	390	3191.57	W I
3000 l	3171.54	Pa II	260	3178.61	Re I	40	3185.2	Xe III	250	3191.659	Fe I
290	3171.61	Ce II	20 h	3178.87	Eu III	250	3185.25	Er II	30	3191.76	Au I
1000	3171.63	La III	270	3179.048	Th II	230	3185.33	Os I	260	3191.80	Lu II
390dl	3171.72	Ho II	1000	3179.06	Na II	3800	3185.40	V I	210	3191.90	Zr II
1500	3171.74	La III	130	3179.06	W I	15	3185.51	Tl II	3100	3191.99	Ti I
95	3172.03	Mo II	10000	3179.10	Cm I	40	3185.54	Eu I	50	3192.25	Si II
100	3172.23	Zn II	70	3179.33	B II	1100	3185.57	Re I	260	3192.36	Re I
160	3172.31	Pr II	180	3179.33	Ca II	80	3185.59	Rh I	55	3192.585	Th I
10	3172.35	Au II	70	3179.34	Yb III	180	3185.71	Mo I	390	3192.88	Yb II
3	3172.47	Er III	10000	3179.41	Pu II	13	3186.02	Si III	360	3193.01	Sm II
450	3172.65	Tm I	220	3179.41	Y II	180	3186.04	Ru I	150	3193.09	Si II
50	3172.69	La III	70	3179.73	Rh I	240	3186.13	Ce II	500	3193.226	Fe I
6	3172.71	Mg II	1100	3180.193	Th II	250	3186.186	P III	800	3193.299	Fe I
160	3172.74	Mo II	390	3180.29	Nb II	200	3186.37	Ho I	330	3193.30	Dy II
100	3172.77	Pm II	200	3180.30	Tc I	330	3186.38	Dy II	360	3193.53	Hf II
2300	3172.83	Tm II	170	3180.35	Ir I	10000	3186.41	Cm I	10000	3193.54	Pu
890	3172.94	Hf I	5	3180.52	Ca I	2400	3186.45	Ti I	10000	3193.55	Pu II
110	3173.06	Y II	380	3180.54	Tb II	15	3186.56	Tl II	20	3193.81	Be I
3000	3173.30	Tc I	2	3180.64	Co III	50	3186.72	Ge II	10	3193.91	Ba I
1	3173.45	Er III		3180.7	Be II	310	3186.98	Os I	7600	3193.97	Mo I
380	3173.58	Tm II	240	3180.70	Cr II		3187.	Be I	1500	3194.10	Cu I
270	3173.59	Ta I	90	3180.70	Ag II	310	3187.01	Sm II	670	3194.19	Hf II
85	3173.61	Eu II	120	3180.92	Yb II	430	3187.22	Sm II	50	3194.21	Si II
15 h	3173.69	Ba I	80	3180.94	Cs II	480	3187.26	Tb II	310	3194.23	Os I
190	3173.76	Tb II	600	3180.95	Ta I	200	3187.49	Nb I	20 c	3194.34	Eu III
810	3173.78	Ho II	220	3181.01	Hf I	120 d	3187.59	Mo II	200	3194.50	Re I
180	3173.93	Os II	120	3181.15	Hf I	10000	3187.60	Pu II	10000	3194.56	Pu II
400	3174.08	Br III	150	3181.28	Ca II	240	3187.68	Dy II	120	3194.58	Ne II
10	3174.09	Fe III	30	3181.43	Cr II	410	3187.71	V II	50	3194.69	Si II
180	3174.17	F III	810 c	3181.50	Ho II	20	3187.74	He I	190	3194.69	Tb II
10000	3174.49	Pu II	50	3181.54	Nd II	15	3187.74	Tl II	100	3194.72	Au I
220	3174.61	Re I	190	3181.58	Zr II	360	3187.79	Sm II	710	3194.83	Ce II
380	3174.66	Tb II	4	3181.64	I IV	65 h	3188.01	Cr I	1000	3194.98	Nb II
170	3174.76	F III	3	3181.66	I III	290	3188.03	Tb II	25	3195.17	Ba III
390	3174.84	Ho II	55	3181.74	Ni I	10000	3188.11	Cm I	800 c	3195.20	Tc II
550 r	3175.05	Sn I	190	3181.82	W I	770	3188.233	Th II	230	3195.33	Tm II
1000	3175.07	I II	230	3181.88	Os I	240	3188.34	Ru I	100	3195.41	Si II
700	3175.09	P V	870	3181.92	Er II	530	3188.51	V II	55	3195.57	Ni I
700	3175.09	Na II	150	3181.92	Zr II	50	3188.73	Nd II	380	3195.60	Tb II

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
2300	3195.62	Y II	780	3202.54	Ti II	320	3210.82	Tm II	15 h	3217.99	Si II
55	3195.689	Th I	170	3202.76	F II	240	3210.97	Mo I	150	3218.19	Ne II
290	3195.96	Mo I	300 c	3202.83	Tc I	180	3210.98	Hf I	260	3218.27	Ti II
200 d	3195.99	Pr I	3	3202.96	He II	85	3211.00	Nd II	50	3218.32	Yb II
12	3196.08	Fe II	15	3203.10	He II	5	3211.21	Te II	200	3218.38	Ce II
360	3196.18	Sm II	100 l	3203.26	Am II	50	3211.67	Fe I	600	3218.61	Sm II
1	3196.26	Li II	2200	3203.32	Y II	600	3211.73	Sm II	40	3218.71	Sn I
300	3196.31	Zn II	120	3203.35	Nb II	35	3211.86	Ge III	1100	3218.93	Tb II
9	3196.33	Li II	110	3203.41	Gd I	100	3211.88	Fe I	710	3218.94	Ce II
4	3196.36	Li II	50	3203.44	Ti II	320	3212.01	Tm II	110	3219.21	Ti I
14	3196.50	Si III	150	3203.47	Nd II	540	3212.01	Zr I	300	3219.307	P III
180	3196.59	Ru I	25 h	3203.70	Ba I	1000	3212.02	Tc II	150	3219.43	Sm II
20	3196.84	La III	240	3203.83	Ti I	610	3212.12	Ir I	190	3219.48	Pr II
200	3196.928	Fe I	100 h	3203.87	Si II	1600	3212.19	Na II	370	3219.51	Ir I
200	3196.93	Hf I	320	3204.04	Pt I	410	3212.43	V I	80	3219.583	Fe I
220	3197.08	Cr II	520	3204.04	P V	1000	3212.81	Eu I	60	3219.766	Fe I
20	3197.10	Be II	3000	3204.16	Pa	220	3212.88	Mn I	1200	3219.98	Tb II
100	3197.10	Zn II	1100 c	3204.25	Re I	110	3213.14	Ti II		3220.	Be I
150	3197.11	Ni I	10000	3204.48	Pu II	13	3213.31	Fe II	10	3220.44	Si II
190	3197.13	Rh I	30	3204.74	Au I	150	3213.31	Os II	600	3220.528	Pb I
30	3197.15	Be II	50	3204.87	Ti I	6	3213.48	I IV	4	3220.60	K II
50	3197.52	Ti II	150	3204.90	Sm II	4	3213.49	I III	180	3220.61	Hf II
40 w	3197.53	Tc I	230	3205.15	Er II	120	3213.74	Ne II	870	3220.73	Er II
25	3197.56	Ge III	330	3205.22	Mo I	420	3213.75	Eu I	40	3220.74	Tc I
2	3197.62	Mg I	50	3205.398	Fe I	10 h	3213.84	Eu III	10000	3220.76	Cm II
390 c	3197.83	Ho II	450	3205.58	V I	200	3213.91	Ta II	5100	3220.78	Ir I
530	3198.01	V I	880	3205.88	Mo I	120	3214.00	F III	10000	3220.94	Pu II
24	3198.11	Cr I	340	3206.05	U II	200	3214.011	Fe I	880	3221.17	Ce II
90 d	3198.11	In II	310	3206.11	Hf I	180	3214.06	Ni I	4	3221.17	Pb IV
1400	3198.12	Lu II	10	3206.30	Eu III	150	3214.12	Sm II	140	3221.21	W I
10000	3198.47	Pu II	300	3206.34	Nb II	760	3214.19	Zr II	100	3221.27	Ni I
220	3198.58	Re I	240	3206.40	Dy II	260	3214.24	Ti I	100	3221.28	Ir I
500	3198.59	Ne II	10000	3206.80	Pu II	70	3214.32	Rh I	560	3221.292	Th II
70	3198.65	Yb II	200	3206.86	Ho II	150	3214.33	Ne II	110	3221.38	Ti I
200	3198.67	Ta I	220	3207.12	Dy II	55	3214.380	Th I	200 c	3221.42	Ho II
390	3198.84	W I	10000	3207.12	Cm II	200	3214.396	Fe I	240	3221.49	Dy II
120	3198.85	Mo I	360	3207.18	Sm II	270	3214.44	Er II	30	3221.63	Ba I
370	3198.92	Ir I	520	3207.25	W I	75	3214.66	Si II	100	3221.64	Ge II
110	3199.04	Pr II	450	3207.41	V I	190	3214.75	Ti II	150	3221.65	Ni I
200	3199.28	Ce II	10000	3207.71	Cm I	400	3214.95	Er III	350	3221.74	Mo I
220	3199.30	Gd I	100	3207.89	Pr II	25	3214.95	Ge III	1	3221.86	Au I
5	3199.33	Li II	10000	3207.97	Pu II	560	3215.07	Mo I	140	3221.91	W I
2	3199.43	Li II	180	3208.17	Sm II	10000	3215.08	Pu I	35	3222.04	Pm I
80	3199.500	Fe I	500	3208.20	Al IV	8	3215.17	Ca I	300	3222.045	Fe I
200	3199.51	Si II	400	3208.20	Hg II	470	3215.19	Dy II	40	3222.19	Ba I
480	3199.56	Tb II	1400	3208.23	Cu I	270	3215.26	Sm II	110	3222.47	Zr II
160	3199.58	Gd I	140	3208.28	W I	6	3215.34	Ca I	200	3222.60	Rb III
3800	3199.92	Ti I	30	3208.59	Cr II	1000	3215.56	W I	50	3222.62	Nd I
130	3199.99	Hf II	20	3208.60	Be I	390	3215.60	Nb II	1300	3222.84	Ti II
10000	3200.23	Pu II	3000	3208.83	Mo I	15 h	3215.67	Ag I	20	3223.01	Si II
2200	3200.27	Y II	290	3208.85	Dy II	60	3215.938	Fe I	30	3223.168	Th I
8	3200.37	Ar I	10	3208.95	Eu III	10000	3216.15	Pu II	180	3223.27	Ru I
30	3200.37	Au I	60	3208.96	Ne II	7	3216.25	Si III	290	3223.28	Dy II
60	3200.47	Fe I	170	3209.18	Cr II	50	3216.27	Yb III	610	3223.31	Er II
310	3200.58	Er II	6	3209.34	K III	830	3216.63	Dy II	220	3223.52	Ti I
50	3200.62	Nd II	120	3209.36	Ne II	3900	3216.69	Y II	690	3223.74	Gd II
120	3200.71	Pt I	160	3209.66	O IV	530	3216.85	Sm II		3223.78	Gd I
10000	3201.00	Pu II	10000	3209.89	Cm II	65	3216.95	Mn I	300	3223.83	Ta I
240	3201.16	Yb II	10000	3209.94	Cm I	1100	3217.06	Ti II	10000	3224.23	Cm I
40	3201.50	Mo II	7	3209.96	Ca I	210	3217.11	V II	240	3224.24	Ti II
10000	3201.66	Pu II	200 h	3210.03	Si II	100	3217.12	Nd II	20 l	3224.7	Ac IV
990	3201.71	Ce II	10000	3210.05	Cm II	7	3217.16	K I	120	3224.82	Ne II
390	3201.76	Ho II	4	3210.12	I IV	80	3217.18	Yb II	10000	3224.87	Pu II
150	3201.80	Sm II	3	3210.14	I III	180	3217.30	Hf II	6	3224.90	I IV
6	3201.95	K III	170	3210.308	Th II	50	3217.377	Fe I	4	3224.93	I III
55	3202.14	Ni I	270 c	3210.41	Ho II	140	3217.40	Cr II	6	3224.99	Kr IV
750	3202.38	V I	15	3210.55	Si III	6	3217.62	K I	210	3225.02	Ni I
20	3202.49	Si II	320	3210.56	Tm II	180	3217.83	Ni I	240	3225.08	Dy II
30	3202.520	Th I	420	3210.57	Eu I	110	3217.94	Ti I	10000	3225.11	Cm I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
10	3225.15	Ag I	630	3231.69	Zr II	330	3237.98	Er II	490	3245.12	Dy II
30	3225.25	Au I	10000	3231.86	Pu II	590	3238.116	Th II	510	3245.13	La II
110	3225.46	Gd II	150	3231.95	Sm II	220	3238.53	Ru I	10000	3245.25	Pu II
800	3225.48	Nb II	120	3232.02	Ne II	10000	3238.55	Cm II	100	3245.48	Pb II
330	3225.67	Ce II	250	3232.03	Er II	35	3238.55	Pm I	120	3245.54	Cr I
600	3225.78	Fe I	1900	3232.06	Os I	80	3238.57	O III	300	3245.69	Kr III
50	3225.88	Yb I	20	3232.11	Co III	290	3238.63	Os I	10000	3245.71	Pu
9	3225.90	Ca I	680	3232.16	U II	100	3239.	Bi IV	80	3246.005	Fe I
330	3225.95	Dy II	10000	3232.24	Pu	4100	3239.04	Ti II	45	3246.03	Eu I
140	3226.13	Ti I	240	3232.28	Ti II	45	3239.20	Yb II	35	3246.06	Yb II
6	3226.15	Ca I	150	3232.37	Ne II	100	3239.433	Fe I	10000	3246.25	Cm I
160	3226.32	Gd II	190	3232.49	W I	130	3239.44	Hf I	10000	3246.35	Pu II
110	3226.37	Ru I	600 r	3232.52	Sb I	40	3239.52	Kr III	200	3246.67	Ce II
10000	3226.41	Cm II	10000	3232.63	Pu II	35	3239.58	Yb I	320	3246.96	Tm I
270	3226.84	Sm II	17	3232.66	Li I	210 d	3239.60	Tb II	10000 s	3247.26	Bk II
710	3227.11	Ce II	220	3232.78	Gd I	60	3239.62	Pm II	45	3247.32	Eu II
210	3227.16	Er II	1100	3232.96	Ni I	720	3239.66	Sm II	420	3247.46	Tm II
13	3227.73	Fe II	80	3233.05	Fe I	220	3239.66	Ti II	200	3247.47	Nb II
80	3227.796	Fe I	1100	3233.14	Mo I	10000	3239.72	Bk I	10000	3247.50	Pu
100	3227.88	Ru I	15	3233.18	Ag I	250	3240.00	Tb II	10000 r	3247.54	Cu I
50	3227.98	Rb I	320	3233.34	Ho II	400	3240.186	Pb I	100	3247.55	Eu I
100	3227.99	Au III	20	3233.42	Pt I	1600	3240.23	Tm II	10000	3247.56	Pu II
50	3228.04	Nd II	2	3233.52	Be II	600	3240.24	Po I	360	3247.66	Hf I
1000	3228.09	Mn I	150	3233.536	P III	40	3240.44	Kr III	120	3248.00	Os I
880	3228.22	Mo I	400	3233.602	P III	3000 l	3240.58	Pa II	100	3248.34	Ne II
180	3228.50	Sm II	430	3233.68	Sm II	65	3240.71	Mo II	200	3248.36	Dy II
220	3228.53	Ru I	14	3233.95	Si III	190	3241.04	Os I	50 w	3248.39	Pb III
20000	3228.57	Ce III	50	3233.967	Fe I	760	3241.05	Zr II	100	3248.46	Ni I
2000	3228.58	Yb III	28	3234.06	Cr II	240	3241.108	Th II	650	3248.52	Mn I
530	3228.60	Ti II	630	3234.12	Zr I	530	3241.16	Sm II	1200	3248.60	Ti II
270	3228.78	Sm II	710	3234.16	Ce II	120	3241.24	Ru I	120	3248.94	Nb II
200	3228.81	Zr II	70	3234.2	S III	20	3241.28	Sb II	2	3249.24	Co III
560	3229.009	Th II	3000	3234.20	Ce III	10000	3241.39	Pu II	330	3249.34	Er II
6	3229.16	Rb I	100	3234.27	Pr II	95	3241.40	Eu I	260	3249.35	La II
780	3229.19	Ti II	6600	3234.52	Ti II	470	3241.52	Ir I	160	3249.52	Nb I
30	3229.20	Cr I	120	3234.613	Fe I	2300	3241.54	Tm II	220	3249.53	Hf I
230	3229.24	Ta I	60	3234.62	Nd	180	3241.59	Sm II	240	3249.75	Sm II
300	3229.28	Ir I	290	3234.65	Ni I	10	3241.62	Be II	100	3249.87	Li II
240	3229.36	Ce II	330	3234.89	Ce II	15	3241.62	Si III	100	3250.19	Gd II
530	3229.42	Ti II	700	3234.93	Na II	30	3241.83	Be II	150	3250.33	Cd II
730	3229.50	U II	25	3235.04	Ba III	100	3241.84	Tc I	100	3250.36	Ne II
140	3229.56	Nb II	45	3235.13	Eu I	2600	3241.99	Ti II	20	3250.36	Pt I
120	3229.57	Ne II	100	3235.39	Sr III	140	3242.03	W I	720	3250.37	Sm II
100	3229.613	Pb I	470	3235.44	Tm II	180	3242.04	Sm II	320	3250.39	Zr I
60	3229.63	Be I	480	3235.84	Th II	200	3242.05	Ta I	120	3250.74	Ni I
1200	3229.75	Tl I	490	3235.89	Dy II	6200	3242.28	Y II	100	3251.14	Mn I
600	3229.79	Mo I	380	3235.94	Re I	10000	3242.66	Cm II	1200	3251.27	Dy II
60	3230.02	Tc I	220	3236.12	Ti II	11000	3242.70	Pd I	990	3251.32	Sc II
250	3230.03	Tb II	300	3236.222	Fe I	200	3242.83	Ta I	2700	3251.64	Pd I
130	3230.06	Hf I	400	3236.40	Nb II	5	3242.84	Pb III	130	3251.84	Cr I
200	3230.07	Ne II	5200	3236.57	Ti II	100	3242.86	Xe III	950	3251.91	Ti II
10000	3230.28	Cm I	110	3236.58	Zr II	10000	3242.96	Pu II	280	3251.915	Th II
30	3230.29	Pt I	720	3236.64	Sm II	600	3243.06	Ni I	40	3251.98	Pt I
10000	3230.35	Cm II	290	3236.69	Dy II	1500 h	3243.16	Cu I	300	3252.05	Tc I
20	3230.42	Fe II	390	3236.74	Ce II	130	3243.35	Hf I	10000	3252.08	Pu I
120	3230.42	Ne II	10000	3236.74	Cm I	390	3243.37	Ce II	10000	3252.19	Bk I
12	3230.50	Si III	850	3236.78	Mn I	100	3243.40	Ne II	200	3252.19	Dy II
720	3230.56	Sm II	1200	3236.81	Tm II	10000	3243.40	Pu II	140	3252.29	W I
2300	3230.58	Er II	200	3236.90	Ho II	120	3243.50	Ru I	480	3252.32	Tb II
300 s	3230.59	Ac II	1000	3237.02	Tc II	20	3243.689	Ar II	300	3252.524	Cd I
300	3230.63	Au I	950	3237.08	Mo I	330	3243.78	Mn I	10000	3252.68	Cm I
300	3230.72	Mn I	140	3237.09	W I	100	3244.10	Ne II	1200	3252.91	Ti II
100	3230.76	Ir I	200	3237.40	Ho II	10000	3244.16	Pu I	310	3252.95	Mn I
110	3230.868	Th II	80	3237.66	Rh I	80	3244.187	Fe I	360	3253.40	Sm II
250	3231.06	Tb II	150 s	3237.70	Ac II	1 h	3244.19	Si IV	7	3253.40	Si III
480	3231.24	Ce II	65	3237.73	Cr I	500	3244.19	Tc I	400	3253.53	Gd III
110	3231.32	Ti II	150	3237.87	V II	400	3244.22	U II	890	3253.70	Hf II
230	3231.51	Tm II	150	3237.89	Sm II	110	3244.448	Th I	5	3253.74	Si III
360	3231.53	Sm II	40	3237.91	Nd II	150	3244.69	Sm II	10	3253.94	Au I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
270	3253.94	Sm II	3100	3262.29	Os I	100	3268.48	Kr III	750	3276.12	V II			
65	3254.04	Mn I	60 r	3262.34	Ba I	30	3268.77	Te II	10	3276.26	Si III			
320	3254.07	Nb II	550 r	3262.34	Sn I	300	3268.89	Re I	430	3276.75	Sm II			
100	3254.08	Nd II	200	3262.355	Pb I	80	3268.98	Xe III	25 l	3276.80	Y III			
1200	3254.25	Ti II	120	3262.47	Hf I	790	3268.99	Tm II	1100	3276.81	Tm II			
200	3254.28	Zr I	300	3262.63	Mo I	15	3269.02	Be I	200	3277.26	Tm III			
4800	3254.31	Lu II	910	3262.668	Th II	240	3269.11	Dy II	160	3277.28	Ir I			
60	3254.36	Fe I	380	3262.75	Os I	620	3269.21	Os I	210	3277.32	Tb II			
210	3254.36	W I	250	3262.97	Tb II	2	3269.23	Co III	100	3277.57	Ru I			
850	3254.38	Sm II	520	3263.14	Rh I	330	3269.41	Er II	160	3277.67	Nb I			
80	3254.70	Mo III	140	3263.24	V I	110	3269.489	Ge I	220	3277.69	O II			
140	3254.77	V II	160	3263.37	Nb II	190	3269.66	Zr I	210	3277.78	Eu II			
7	3254.80	Si III	10000 s	3263.47	Bk II	4400	3269.91	Sc I	330	3277.97	Os I			
190	3254.91	Os I	230 d	3263.87	Tb II	440	3270.12	U II	390 c	3278.15	Ho II			
40	3255.05	Ge III	200	3263.88	Ce II	6	3270.46	Si III	250	3278.22	Er II			
270	3255.28	Hf II	400	3264.06	Hg II	120	3270.47	Nb I	200	3278.29	Ti II			
110	3255.63	Sm II	140	3264.08	F II	180	3270.49	Sm II	30	3278.733	Th I			
1500	3255.69	Sc I	320	3264.10	Tm II	180	3270.68	Sm II	6	3278.79	K III			
160	3255.92	Pt I	480	3264.40	Mo I	100	3270.76	Nb I	40	3278.86	Zr III			
13000	3256.09	In I	120 d	3264.55	Ru I	800	3270.90	Mo I	260	3278.92	Ti II			
40	3256.10	Tc I	160	3264.59	Nb I	220	3270.98	O II	3800	3278.97	Lu I			
310	3256.14	Mn I	180	3264.71	Mn I	2000	3270.99	Rb II	270	3279.25	Ho II			
950	3256.21	Mo I	2700	3264.78	Er II	50	3271.000	Fe I	7	3279.26	Si III			
290	3256.26	Dy II	150	3264.81	Kr III	100	3271.12	Ni I	1300	3279.26	Zr II			
910	3256.274	Th II	230	3264.90	Tb II	900	3271.12	V II	720	3279.33	Er II			
60	3256.80	Te II	430	3264.94	Sm II	150	3271.13	Zr II	110	3279.53	Gd II			
50	3256.91	Nd II	80	3265.046	Fe I	520	3271.61	Rh I	200 h	3279.67	Hf III			
190	3256.92	Os I	10 h	3265.10	Au I	500	3271.63	Cs II	200	3279.84	Ce II			
180	3257.366	Th I	220	3265.12	Nd II	10	3271.63	Au I	110	3279.84	V II			
200 c	3257.45	Ho II	10000	3265.17	Pu	30	3271.65	Kr III	270	3279.98	Hf II			
130	3257.82	Cr I	50	3265.38	Nd II	310	3271.65	Ti II	890	3280.09	Dy II			
1500	3257.96	Na II	300	3265.46	O III	200	3271.69	Mo III	720	3280.22	Er II			
1900	3258.05	Tm II	50	3265.617	Fe I	110	3272.027	Th I	50	3280.26	Fe I			
220	3258.41	Mn I	550	3265.67	La II	200	3272.07	Nb I	760	3280.31	Tb II			
3000	3258.56	In I	340	3265.79	U II	310	3272.08	Ti II	10000	3280.45	Cm I			
12	3258.66	Si III	10000	3265.81	Cm I	190	3272.16	Os I	2300	3280.55	Rh I			
3500	3258.78	Pd I	800	3265.92	Cs II	540	3272.22	Zr II	55000 r	3280.68	Ag I			
600	3258.85	Re I	60	3266.11	Nb III	990	3272.25	Ce II	270	3280.84	Sm II			
560	3259.05	Er II	200	3266.21	Dy II	430 d	3272.48	Sm II	310	3280.91	Y II			
	3259.11	Er II	100	3266.39	Eu II		3272.60	Sm II	90 s	3280.92	Pr III			
220	3259.24	Nd II	400	3266.40	Tb II	200	3272.73	Dy II	50	3281.048	Th I			
110	3259.25	Gd II	390	3266.44	Ir I	150	3272.77	Eu II	760	3281.40	Tb II			
140	3259.43	W I	120	3266.44	Ru I	430	3272.81	Sm II	50	3281.49	Nd II			
600	3259.55	Re I	9	3266.52	Sr IV	1000	3273.05	Zr II	40	3281.50	Ba I			
210	3259.66	W I	210 d	3266.62	W I	200	3273.08	Ru I	100	3281.61	Gd II			
20	3259.68	Co III	1600	3266.64	Tm II	10000	3273.11	Pu II	25	3281.65	Ba III			
20	3259.90	Ge III	540	3266.73	Gd I	100	3273.18	Nd II	110	3281.70	Rh I			
95	3259.98	Cr I		3266.77	W I	10	3273.47	Au I	7600	3281.74	Lu I			
200	3260.11	Zr I	13	3266.88	Fe III	430	3273.48	Sm II	15	3281.77	Ba I			
650	3260.21	Na II	180	3267.003	Th II	220	3273.52	O II	150	3281.94	W I			
180	3260.23	Mn I	30 h	3267.07	Au I	5500	3273.63	Sc I	980 c	3281.97	Ho II			
190	3260.30	Os I	430	3267.10	Er II	180	3273.66	Hf II	25	3281.97	Pt I			
280	3260.35	Ru I	3	3267.10	Y III	10000 r	3273.96	Cu I	250	3282.25	Gd I			
10000	3260.54	Pu II	800	3267.13	Cs II	250	3274.14	Tb II		3282.30	Gd II			
230	3260.56	Nb II		3267.18	Er II	110	3274.18	Gd II	500 s	3282.32	Am II			
100	3260.66	Nd II	500	3267.21	Al IV	950	3274.22	Na II	220	3282.33	Ti II			
500	3260.91	Ac II	170	3267.25	Nd II	250	3274.33	Tb II	500 r	3282.33	Zn I			
200	3260.98	Ce II	80	3267.31	O III	3000	3274.46	Pa II	30	3282.63	Te II			
200	3260.98	O III	100	3267.35	Ag II	100	3274.58	Be II	120	3282.70	Ni I			
300	3261.055	Cd I	1200	3267.40	Tm II	30	3274.67	Be II	1400 h	3282.72	Cu I			
130	3261.51	Yb II	700 r	3267.51	Sb I	5	3274.67	Ca I	320 d	3282.73	Zr I			
200	3261.56	Re I	250	3267.64	Gd I	10000	3274.71	Pu II	490	3282.77	Dy II			
1200	3261.60	Ti II	1100	3267.70	V II	200	3274.71	Ru I	50	3282.78	Nd II			
400	3261.65	Tm II	4000	3267.76	Ce III	330	3274.86	Ce II	30	3282.91	Be I			
3	3261.70	Kr IV	3000	3267.94	Ce III	210	3274.95	Ta II	5	3283.02	Hg III			
40	3261.94	Tc I	3100	3267.94	Os I	530	3275.20	Os I	520	3283.10	Tb II			
50	3261.96	Ba I	200	3268.21	Ru I	320	3275.22	Nd II	50	3283.21	Sn II			
200	3262.01	Ir I	140	3268.34	Gd II	10000	3275.24	Pu I	1200	3283.40	Tm II			
360	3262.28	Sm II	25	3268.42	Pt I	11	3276.08	Fe III	200	3283.46	Nb II			

Intensity	Wavelength		Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength			
2300	3283.57	Rh I	430	3291.48	Gd I	80 w	3301.55	Xe III	24	3307.02	Cr II
50	3284.56	V IV	310	3291.56	Tb II	7600	3301.56	Os I	850	3307.02	Sm II
880	3284.71	Zr II	910	3291.739	Th II	370	3301.59	Ru I	320	3307.12	Mo I
240	3285.02	Mo I	160	3292.02	Nb II	280	3301.60	Re I	20	3307.228	Ar II
1000	3285.04	Tb II	290	3292.08	Ti I	240	3301.650	Th I	420 d	3307.44	Tb II
290	3285.10	Nd II	370	3292.21	Gd II	340	3301.68	Sm II	10000	3307.66	Pu II
600	3285.13	Al IV	190	3292.31	Mo II	300	3301.73	Sr I	2500 h	3307.95	Cu I
330	3285.22	Ce II	620	3292.520	Th II	10000	3301.76	Pu I	210	3308.01	Tm II
320	3285.36	Mo I	10000	3292.56	Pu I	500	3301.86	Pt I	10	3308.02	Ca II
1700	3285.60	Na II	90 l	3292.58	Pr III	20	3301.88	Ar III	140	3308.02	Eu II
1200	3285.61	Tm II	400	3292.87	Ni II	150	3301.95	Eu II	120	3308.05	Nb I
230	3285.66	Nb I	1500	3293.07	Tb II	3600	3302.13	Pd I	300	3308.30	Au I
180	3285.66	Sm II	240	3293.37	Sm II	240	3302.23	Re I	220	3308.39	Ti I
130	3285.752	Th I	30	3293.55	In III	10000 s	3302.35	Bk II	19	3308.47	Y II
25	3285.85	Ar III	10000	3293.61	Pu I	19	3302.37	Na I	210	3308.51	Tb II
140	3285.88	Zr II	25	3293.640	Ar II	2000	3302.46	Tm II	10000	3308.75	Pu I
30	3285.89	Kr III	150	3293.71	W I	800	3302.58	Zn I	440	3308.79	Dy II
6	3286.07	Ca I	70	3293.84	Nd II	30	3302.72	Sr III	220	3308.81	Ti II
430	3286.23	Sm II	200	3293.88	Dy II	700 r	3302.94	Zn I	1100	3308.88	Dy II
250	3286.38	Po I	430	3294.08	Gd I	18	3302.98	Na I	150	3308.92	P II
500	3286.41	Rb III	490	3294.11	Ru I	800	3303.11	La II	120	3309.19	Hf I
100	3286.62	Nd II	210	3294.28	Rh I	320	3303.21	Re II	130	3309.365	Th I
200 l	3286.67	Am II	70	3294.68	Nd II	280	3303.75	Re I	260	3309.50	Ti I
150	3286.75	Fe I	200	3294.83	Re I	330 d	3303.88	Er II	340	3309.52	Sm II
470	3286.77	Er II	240	3295.28	Ce II		3303.95	Er II	300	3309.64	Au I
20	3286.79	Ba III	210	3295.33	Tb II	480	3304.238	Th I	60	3309.73	Ti I
100	3287.14	Tc I	30	3295.43	Cr II	45	3304.50	Eu II	150	3309.74	Ne II
460	3287.25	Pd I	360	3295.44	Sm II	340	3304.52	Sm II	1200	3309.80	Tm II
100	3287.49	Mn III	430	3295.81	Sm II	30	3304.75	Kr III	100	3309.86	Au III
310	3287.55	Tb II	320	3296.01	Nb I	120	3304.83	Nb I	340	3310.27	Hf I
100	3287.59	Ir I	90 s	3296.10	Pr III	240	3304.84	Ce II	120	3310.47	Nb I
200	3287.59	Nb I	200	3296.30	Dy II	10000	3304.85	Cm I	160	3310.52	Ir I
360	3287.59	O II	75	3296.63	Pm I	210	3304.95	Tb II	640	3310.59	Tm II
530	3287.66	Ti II	280	3296.70	Re I	1500	3304.96	Na II	200	3310.65	Tc I
10	3287.68	Co III	10000	3296.71	Cm II	160	3305.15	O II	850	3310.66	Sm II
620	3287.789	Th II	45	3296.72	Rh I	540	3305.15	Zr II	50	3310.69	Rh III
30	3287.82	Xe III	200	3296.88	Ce II	200 c	3305.16	Ho II	620	3310.91	Os I
160	3287.92	Nb I	65	3296.88	Mn I	340	3305.18	Sm II	1100	3311.16	Ta I
200	3287.94	Dy II	10000	3296.91	Pu I	9	3305.22	Fe III	15	3311.25	Ar III
440	3288.21	U II	280	3296.99	Re I	130	3305.25	Yb I	440	3311.38	W I
390	3288.46	Ho II	500	3297.60	Ni II	15	3305.38	Co III	50	3311.47	Kr III
10000 l	3288.75	Bk I	150	3297.73	Ne II	200	3305.40	Dy II	60	3311.76	Pm II
150	3288.80	Zr II	240	3297.832	Th II	200	3305.51	Dy II	6200	3312.11	Lu I
10	3288.81	Fe III	10000	3297.87	Pu I	370	3305.56	Er II	200	3312.22	Ce II
190	3288.84	Os I	720	3298.10	Sm II	320	3305.56	Mo I	12	3312.28	Hg III
1100	3289.02	Mo I	10000	3298.14	Cf	10 h	3305.67	Ag I	80	3312.30	O III
6	3289.06	K III	140	3298.14	V I	400	3305.71	Ni II	2300	3312.42	Er II
70	3289.11	La III	65	3298.22	Mn I	140	3305.73	Yb II	600	3312.42	Sm II
280	3289.14	Rh I	10000	3298.47	Pu II	80	3305.89	Tc I	50	3312.56	Ge II
10000	3289.35	Bk I	70	3298.61	Nd	1100	3305.89	U II	400	3312.60	Nb I
18000	3289.37	Yb II	310	3298.66	Tb II	120	3305.97	Fe I	10000	3312.65	Pu II
50	3289.52	Nd	30	3298.84	Tc II	210	3306.01	Tm II	110	3312.69	Ti I
45	3289.64	Rh I	12	3299.05	Mg III	75	3306.01	Zn II	510	3312.72	Dy II
700	3289.80	Cl III	170	3299.41	Ti I	210	3306.12	Hf I	200	3312.75	Nd II
120	3290.22	Pt I	50	3299.42	Zn II	100 l	3306.14	Pr III	670	3312.86	Hf I
1200	3290.26	Os I	160	3299.61	Nb I	220	3306.17	Ru I	140	3313.33	Eu II
720 d	3290.28	Sm II	220	3300.15	Ce II	240	3306.19	Dy II	50	3313.38	Pm I
	3290.39	Sm II	300	3300.16	Nd II	250	3306.23	Os I	100	3313.62	Mo II
400	3290.418	Cu II	260	3300.46	Rh I		3306.28	Li II	150	3313.65	Tc I
1500 h	3290.54	Cu I	2	3300.47	I III	880	3306.28	Zr II	150	3313.70	Zr II
100	3290.65	Nd II	100	3300.77	Tc I	200	3306.343	Fe I	330	3313.73	Gd II
5	3290.65	K II	3	3300.80	Tl III	13	3306.39	Mg III	240	3313.95	Re I
180	3290.65	Sm II	730	3300.82	W I	1700	3306.39	Sm II	210	3314.38	Tb II
950	3290.82	Mo I	110	3300.881	Cu II	10000	3306.59	Pu I	840	3314.42	Ti I
270 c	3290.96	Ho II	170	3300.98	Sm II	160	3306.60	O II	210	3314.50	Zr II
2300	3291.00	Tm II	250	3301.229	Cu II	170	3306.61	Sm II	210	3314.52	Ti I
15	3291.01	Tl II	2000	3301.23	Er III	10000	3306.66	Pu I	240	3314.72	Ce II
160	3291.05	Hf I	1700	3301.35	Na II	170	3306.88	Ti I	50	3314.790	Th I
730	3291.33	U II	15	3301.48	La III	210	3306.91	Tm II	60	3315.05	Pt I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
50	3315.10	Yb II	2900	3322.94	Ti II	110	3330.62	Sn I	190	3338.41	Zr II
200	3315.22	Nb I	380	3322.99	Zr II	70	3330.67	Mn I	90 c	3338.50	In II
290	3315.23	Ru I	4200	3323.09	Rh I	60	3330.76	Kr III	330	3338.54	Rh I
290	3315.32	Ti II	40	3323.11	Te II	100	3330.77	Tc I	150	3338.648	Cu II
10000	3315.34	Pu II	110	3323.18	B II	200	3330.78	Mn II	45	3338.75	Eu II
120	3315.42	Os I	770	3323.19	Er II	330 d	3330.99	Ta II	390 c	3338.86	Ho II
1900	3315.43	Cl II	210	3323.38	Tb II	60	3331.09	Rh I	10000	3338.94	Pu I
200	3315.59	Gd II	10000	3323.48	Pu	45	3331.24	Rh I	250	3339.00	Tb II
660	3315.66	Ni I	7	3323.59	Ar III	1400	3331.38	Gd II	290	3339.07	Nd II
200	3316.276	Cu II	110	3323.60	B II	10000	3331.52	Pu II	9	3339.39	Fe III
780	3316.32	Dy II	75	3323.64	Ge II	200	3331.52	Re I	930	3339.55	Re I
560	3316.39	Er II	1000	3323.74	Ne II	250	3331.57	Nd II	130	3339.80	Cr II
290	3316.39	Ru I	340	3323.77	Sm II	75	3331.57	Pm I	500	3339.82	Si II
20	3316.51	Ca II	35	3323.80	Pt I	40	3331.6	Xe III	250	3340.03	Er II
410	3316.58	Sm II	210	3323.89	Tb II	440	3331.69	W I	240	3340.17	Mo I
400	3316.88	Tm II	640	3323.95	Mo I	2000	3331.88	Ni II	1100	3340.34	Ti II
10000	3316.96	Pu II	55	3324.06	Cr II	200	3331.93	Ho II	55	3340.38	Y I
240	3317.12	Dy II	250	3324.33	Os I	550	3332.11	Ti II	900	3340.42	Cl III
10000	3317.14	Cm I	3800	3324.40	Tb II	830	3332.13	Gd II	1200	3340.55	Rb II
200	3317.80	Ce II	390	3324.752	Th II	6	3332.15	Mg I	760	3340.56	Zr II
210	3317.93	Ta I	70	3324.9	S III	110	3332.16	Nb I	90 s	3340.58	Pr III
180	3317.99	Hf II	100	3325.00	Ru I	10000	3332.34	Pu I	850	3340.58	Sm II
100 s	3318.01	Ac II	840	3325.120	Th II	50	3332.47	Tc I	110	3340.74	O III
330	3318.02	Ti II	340	3325.26	Sm II	3000 l	3332.69	Pa II	780	3341.00	Dy II
1000	3318.04	Na II	170	3325.48	Sm II	770	3332.70	Er II	8	3341.00	Er III
30	3318.390	Th I	2000	3325.51	Yb III	890	3332.73	Hf I	500 s	3341.43	Pr III
210	3318.65	Tm II	200	3325.55	Tc I	10000	3333.03	Pu	80	3341.48	Hg I
680	3318.84	Ta I	360	3325.67	Mo I	50	3333.06	Yb II	80	3341.481	Hg I
200	3318.98	Nb I	200	3325.75	Kr III	450	3333.07	Br III	130	3341.60	Nb II
150	3319.02	Zr II	200	3325.90	Nd II	300	3333.14	Si II	240	3341.66	Ru I
120	3319.26	Nb I	270	3326.19	Dy II	60 s	3333.26	Pr III	440	3341.66	U II
7	3319.34	Ar I	440	3326.20	W I	170	3333.64	Sm II	70 s	3341.68	Pr III
80	3319.41	Yb I	28	3326.59	Cr I	130	3334.16	Ir I	290	3341.84	Er II
120	3319.58	Nb II	240	3326.62	Nb I	380	3334.25	Zr II	240	3341.87	Ce II
300	3319.72	Ne II	380	3326.76	Ti II	950	3334.33	Eu I	270	3341.88	Dy II
200	3319.87	Ho II	380	3326.80	Zr II	200	3334.46	Ce II	5700	3341.88	Ti I
1000	3319.88	Dy II	150 c	3327.10	Tc I	290	3334.48	Nd II	1300	3341.97	Nb I
65	3319.89	Eu II	150	3327.15	Ne II	210	3334.48	Tb II	30	3342.073	Th II
12	3319.91	Tl II	10000	3327.19	Pu I	620	3334.604	Th II	120	3342.15	Ti I
100	3320.12	Au I	360	3327.30	Mo I	210	3334.62	Zr II	1600	3342.24	Re I
430	3320.16	Sm II	310	3327.42	Os I	60	3334.79	V IV	50	3342.48	Kr III
230	3320.25	Ho II	35	3327.66	La III	200	3334.84	Ne II	11	3342.58	Mg III
330	3320.26	Ni I	950	3327.69	Na II	1800	3335.20	Ti II	110	3342.59	Cr II
700	3320.57	Cl III	340	3327.88	Sm II	10000	3335.26	Bk I	70	3342.90	Rh I
110	3320.59	Sm II	4700	3327.89	Y II	400	3335.64	Ni II	280 d	3342.93	Yb II
10000	3320.61	Pu I	130	3328.21	Hf II	120	3335.69	Ru I		3343.07	Yb II
65	3320.69	Mn I	55	3328.255	Th II	12	3335.90	Mg III	50	3343.21	Cd II
10000	3320.84	Pu I	410	3328.28	Nd II	170	3336.12	Sm II	110 d	3343.28	Sc II
190	3320.90	Mo II	30	3328.35	Cr II	25	3336.13	Ar III	30	3343.34	Cr I
30	3321.01	Be I	600	3328.60	Po I	960	3336.15	Os I	240	3343.49	Sm II
12	3321.04	Tl II	30	3329.05	Cr I	1100	3336.18	Gd II	980 c	3343.58	Ho II
300	3321.08	Br III	800	3329.06	Cl III	95	3336.33	Cr II	110	3343.64	Sm II
30	3321.09	Be I	520	3329.08	Tb II	100	3336.39	Mn II	1300	3343.71	Nb I
340 d	3321.15	Tb II	1200	3329.10	Cl II	20	3336.61	Sb III	260	3343.77	Ti II
1200	3321.18	Sm II	100	3329.16	Ne II	9	3336.68	Mg I	330	3343.86	Ce II
220	3321.34	Be I	50	3329.22	Pm I	250	3336.70	Tb II	100 l	3343.87	Am I
510	3321.450	Th II	60	3329.22	Te II	240	3337.17	Yb II	80	3344.20	Rh I
1500	3321.49	Rb II	170	3329.36	Nb I	630 c	3337.23	Ho II	810	3344.32	Re I
550	3321.70	Ti II	100	3329.43	Cs II	370	3337.25	Er II	240	3344.35	Sm II
95	3321.86	Eu II	2100	3329.46	Ti II	1500	3337.49	La II	150	3344.40	Ne II
40	3321.92	Te II	290	3329.66	Er II	10000	3337.71	Pu II	400	3344.46	Al IV
8	3322.25	Tl II	110	3329.86	V I	290	3337.79	Er II	200	3344.47	Ho II
85	3322.26	Eu I	17	3329.93	Mg I	390	3337.79	U II	10	3344.51	Ca I
420	3322.28	Tb II	300	3329.99	Sr I	1500	3337.84	Cu I	870	3344.56	La II
310	3322.31	Ni I	10000	3330.11	Pu	620	3337.870	Th II	20	3344.72	Ar III
6	3322.40	K III	100	3330.16	Rb III	310	3338.03	Tb II	1300	3344.75	Mo I
600	3322.48	Re I	430	3330.34	Gd II	500	3338.09	Ni II	440	3344.76	Ce II
200	3322.60	Ir I	400	3330.34	Gd III	2000	3338.18	Re I	380	3344.79	Zr II
50	3322.80	Ba I	250	3330.476	Th I	10000	3338.40	Pu II	800	3345.02	Zn I

Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength				
290	3370.87	Ho II	150	3377.46	Zr II	200	3383.68	Ce II	290 c	3390.75	Ho II
150	3371.04	W I	2900 d	3377.48	Ti I	5700	3383.76	Ti II	75	3390.78	Eu II
400	3371.05	Gd III		3377.58	Ti I	60	3383.978	Fe I	1300	3391.05	Ni I
400	3371.122	P IV	110	3377.62	V I	310	3384.00	Os I	100 s	3391.08	Pr III
200	3371.18	Ce II	90	3377.68	Pm II	2000	3384.01	Yb III	50	3391.10	Yb II
10000	3371.19	Pu I	80	3377.71	Rh I	80	3384.12	Xe III	150	3391.11	Sm II
340	3371.21	Sm II	240	3377.74	Re I	140	3384.14	Hf II	100	3391.28	Pm II
170	3371.33	Nb I	120	3378.02	Ru I	1900	3384.62	Mo I	380	3391.28	Tb II
4300	3371.45	Ti I	130	3378.06	O IV	510	3384.66	Sm II	100 h	3391.31	Au I
320	3371.50	Tb II	500	3378.22	Ne II	230	3384.70	Hf II	10000	3391.41	Pu II
640	3371.54	Ta I	55	3378.34	Cr II	6	3384.86	K II	95	3391.43	Cr II
100	3371.80	Ne II	390	3378.573	Th II	150	3384.86	Sm	160 h	3391.55	Lu I
100	3371.86	Ru I	50	3378.678	Fe I	100	3384.945	Cu II	15	3391.85	Ar III
100 I	3371.92	Pr III	120	3378.68	Os I	420 d	3384.99	Tm II	210	3391.96	Dy II
400	3371.99	Ni I	320	3378.73	Tb II	5300	3385.02	Dy II	5700	3391.98	Zr II
160	3372.08	Os I	520	3378.86	Tb II	360	3385.05	Ta I	190	3391.99	Eu II
6600	3372.15	Sc II	180	3378.93	Hf I	1700	3385.08	Er II	2300	3392.00	Er II
140	3372.21	Ti II	500	3378.97	Ni II	130	3385.14	Ru I	1300	3392.035	Th II
1100	3372.25	Rh I	320	3379.06	Re II	300	3385.25	Br III	10000	3392.22	Cf I
520	3372.36	Tb II	50 s	3379.13	Pr III	100	3385.25	Hg II	50	3392.23	Tc I
19	3372.67	Ca III	30	3379.17	Cr I	50	3385.49	Cd II	50	3392.304	Fe I
7700	3372.71	Er II	290	3379.22	Ti I	950	3385.50	Lu I	350	3392.34	Nb I
460 d	3372.72	Tb II	30	3379.37	Cr II	360	3385.52	O IV	1100	3392.53	Gd II
5700	3372.80	Ti II	10000	3379.51	Pu I	310	3385.531	Th II	370	3392.54	Ru I
5000	3373.00	Pd I	100	3379.60	Ru I	170	3385.66	Ti I	150	3392.56	Yb III
180	3373.42	Zr II	320	3379.70	Re I	200	3385.76	Re I	150	3392.651	Fe I
200	3373.46	Ce II	220	3379.76	Gd II	110	3385.78	Rh I	140	3392.71	Ti I
7	3373.47	Ar I	285	3379.8	Se III	190	3385.94	Os I	2000 h	3392.78	Ac III
6	3373.60	K II	95	3379.83	Cr II	1400	3385.95	Ti I	300	3392.80	Ne II
200	3373.73	Ce II	950	3379.97	Mo I	170	3386.21	Hf I	230	3392.81	Hf I
390	3373.75	W I	50	3380.110	Fe I	170	3386.24	Nb II	800	3392.89	Cl III
25	3374.10	Te II	130	3380.18	Ru I	310	3386.501	Th II	55	3392.99	Cr II
230	3374.16	Ho II	150 s	3380.21	Pr III	210	3386.57	Dy II	3300	3392.99	Ni I
970	3374.17	Er II	65	3380.25	Eu II	40	3386.67	Tc I		3393.	Li
260	3374.22	Ni I	1400	3380.28	Ti II	450	3387.2	Se III	1200	3393.03	Rb II
60	3374.35	Ti II	270	3380.41	Nb I	11	3387.37	Mg III	570	3393.12	Zr II
490	3374.50	Tm II	220	3380.52	Gd II	10000 s	3387.45	Bk II	800	3393.45	Cl III
130	3374.64	Ni I	500	3380.56	Br IV	140	3387.50	Yb I	3800	3393.57	Dy II
130	3374.65	Ru I	3300	3380.57	Ni I	150	3387.66	Sm II	290	3393.63	Nd II
220	3374.69	Gd II	6	3380.62	K II	80	3387.70	Co II	10000	3393.67	Pu I
10000	3374.70	Cm I	650	3380.71	Sr II	620	3387.84	Os I	7	3393.73	Ar I
380	3374.73	Zr II	200	3380.712	Cu II	1400	3387.84	Ti II	70	3393.84	Cr II
350	3374.92	Nb I	240	3380.85	Ni I	570	3387.87	Zr II	300	3394.18	Tc I
4	3374.94	Ga II	130	3380.859	Th I	110	3387.920	Th I	1000 w	3394.22	Pr III
300	3374.952	Cu II	130	3380.86	Nb I	12	3388.13	Fe II	55	3394.30	Cr II
40	3374.96	Kr III	1500	3380.91	La II	1100	3388.17	Co I	10000	3394.32	Pu I
250	3374.974	Th I	8	3381.00	Ti II	760	3388.30	Zr II	50 h	3394.44	Yb II
520	3375.03	Tb II	360	3381.20	O IV	150	3388.42	Ne II	3000 l	3394.49	Pa
200	3375.40	O IV	10	3381.24	Mg III	25	3388.531	Ar II	1100	3394.58	Ti II
240	3375.48	Yb II	150 s	3381.26	Pr III	85	3388.59	Y I	230	3394.59	Hf II
10000	3375.80	Pu I	290	3381.32	Er II	130	3388.71	Ru I	320 c	3394.60	Ho II
1	3375.95	Ga II	6	3381.80	Ti II	60	3388.76	Ti II	110	3394.62	Pr II
110	3376.27	Zr II	10000	3381.82	Pu I	610	3388.85	Dy II	340	3394.77	U II
200	3376.33	La II	300 s	3381.84	Pr III	30	3388.88	Cd II	140	3394.98	Hf II
30	3376.40	Cr I	10	3381.90	Au I	120	3388.94	Ne II	200 l	3395.01	Am I
25	3376.436	Ar II	10000	3381.97	Pu II	8	3389.01	Hg III	540	3395.12	Gd II
150	3376.48	Sm II	230	3382.06	Er I	410	3389.32	Sm II	130	3395.36	Mo II
6200	3376.50	Lu I	170	3382.31	Ti I	240	3389.43	Re I	2200	3395.38	Co I
75 c	3376.59	In II	1200	3382.40	Sm II	100	3389.50	Ru I	100	3395.40	Au I
50	3376.62	Yb II	320	3382.48	Mo I	450	3389.74	Er II	10000	3395.77	Ce III
10000	3376.76	Pu II	28	3382.54	Yb	800	3389.83	Hf II	170	3395.93	Nb I
10000	3376.94	Pu II	140	3382.68	Cr II	285	3390.25	O II	350	3396.07	Er II
60 r	3377.08	Ba I	10000	3382.70	Pu I	200	3390.25	Re I	600 d	3396.07	Pr III
480	3377.13	Ce II	320	3382.80	Tb II	50	3390.25	Yb II	1300	3396.16	Dy II
100 s	3377.14	Pr III	28000 r	3382.89	Ag I	10000	3390.33	Pu II	410	3396.19	Sm II
110	3377.14	Rh I	11	3382.90	Mg III	730	3390.38	U I	160	3396.33	Zr II
220	3377.20	O II	12	3383.09	Sb II	28	3390.42	Yb II	280	3396.58	Eu II
10000	3377.37	Pu II	100	3383.15	Sb I	210	3390.60	Tb II	300 s	3396.62	Pr III
20	3377.39	Ba I	200 s	3383.53	Ac II	140	3390.68	Ti I	200	3396.727	Th I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
270	3396.79	O IV	650	3404.72	Re I	250	3413.012	Th I	150 s	3420.07	Pr III
1400	3396.82	Lu I	100	3404.82	Ne II	250	3413.131	Fe I	60	3420.16	Rh I
5600	3396.82	Rh I	570	3404.83	Zr II	100	3413.15	Ne II	70 r	3420.32	Ba I
290	3396.84	Er II	200	3404.91	Ce II	500 c	3413.21	Pr III	400 d	3420.34	Tb II
60	3396.90	Tc I	11000	3405.12	Co I	220	3413.27	Gd II	6	3420.82	K III
45	3397.04	Y I	80	3405.33	Tc I	330	3413.48	Ni I	25	3421.01	Ba I
4100	3397.07	Lu II	230	3405.41	Nb I	150	3413.53	W I	210	3421.21	Cr II
550 c	3397.21	Bi I	200	3405.558	Th I	200	3413.543	P IV	390	3421.210	Th I
220 d	3397.22	Gd I	650	3405.6	Be II	230	3413.64	O IV	330	3421.22	Rh I
230	3397.26	Hf I	650	3405.89	Re I	520	3413.76	Tb II	13000	3421.24	Pd I
	3397.32	Gd I	1300	3405.94	Mo I	1300	3413.78	Dy II	30 h	3421.48	Ba I
300 l	3397.46	Pr III	240	3405.98	Ce II	200	3413.84	Ac II	1200	3421.63	Ho II
1700	3397.50	Tm II	130	3406.13	Nb I	450	3413.9	Se III	120	3421.69	Os I
230	3397.60	Hf I	160	3406.55	Rh I	330	3413.94	Ni I	4	3421.83	K III
100	3397.66	Yb III	150	3406.79	Te II	20	3414.27	Ge III	300 l	3422.22	Pr III
150	3397.76	Sm II	200	3406.92	Gd I	140	3414.65	F II	250	3422.31	Mo I
40	3397.83	Tc I	450	3406.94	Ta I	380	3414.66	Zr I	150	3422.42	W I
300	3398.33	Tc I	120	3406.95	Ne II	8200	3414.76	Ni I	6900	3422.47	Gd II
230	3398.33	Ta I	380	3407.16	Dy II	530	3414.82	Dy II	600	3422.71	Ce II
270	3398.35	Tb II	60	3407.20	Ti II	1400 c	3414.90	Ho II	270	3422.74	Cr II
250	3398.544	Th I	80	3407.28	Tc I	300 s	3415.15	Pr III	390	3422.75	Gd II
60	3398.63	Ti I	220	3407.38	O II	100	3415.40	Tm III	65	3423.09	Eu II
4000	3398.91	Ce III	500	3407.458	Fe I	750	3415.58	Rb II	1600	3423.71	Ni I
8100 c	3398.98	Ho II	2	3407.48	Sn II	30	3415.77	Co II	180	3423.76	Nb I
320	3399.10	Tb II	1100 d	3407.56	Gd II	100	3415.96	Tm III	350	3423.82	Br II
4000	3399.30	Re I	3407.61	Gd II	180	3415.97	Nb I	50	3423.84	Co II	
150	3399.333	Fe I	200	3407.73	Tm III	270	3416.24	Tb II	1100	3423.90	Gd I
380	3399.35	Zr II	140	3407.76	Hf II	150	3416.45	F II		3423.92	Gd II
120	3399.40	Nb I	5300	3407.80	Dy II	5400	3416.46	Ho II	270	3423.989	Th I
200	3399.41	Gd II	100	3408.06	Pm II	340	3416.59	Tm I	9	3424.25	Ar III
820	3399.70	Rh I	340	3408.13	Pt I	90	3416.68	Sc I	60	3424.284	Fe I
2300	3399.80	Hf II	420	3408.14	Dy II	140	3416.80	F II	120 d	3424.38	Rh I
150	3399.84	Sm II	10000	3408.28	Bk I	120	3416.91	Ne II	580	3424.56	U II
420	3399.95	Tm II	50	3408.33	Tc I	1400	3416.95	Gd II	830	3424.59	Gd II
540	3399.99	Gd II	270	3408.38	Nb I	160	3417.00	F II	8000	3424.62	Re I
2	3400.07	Xe I	240	3408.67	Re I	2700	3417.16	Co I	120	3424.78	Sm II
30	3400.12	Mn II	230	3408.68	Nb II	230	3417.34	Hf I	250 c	3424.99	I II
170	3400.21	Hf I	850	3408.68	Sm II	3100	3417.35	Ru I	100	3425.00	P II
170	3400.40	V I	360	3408.76	Cr II	290	3417.45	Ce II	150	3425.02	Eu II
270	3400.53	Tb II	120	3408.76	Os I	7	3417.49	Ar III	530	3425.06	Dy II
210 d	3400.86	Tb II	4500	3409.18	Co I	50	3417.49	Cd II	110	3425.07	V I
50	3401.01	Yb II	180	3409.19	Nb II	50	3417.497	Th I	6400	3425.08	Tm II
500	3401.05	Ni II	310	3409.28	Ru I	350	3417.63	Er II	2000 c	3425.34	Ho II
120	3401.17	Os I	250	3409.30	Gd II	120	3417.69	Ne II	230	3425.42	Nb II
310	3401.74	Ru I	130	3409.58	Ni I	500	3417.77	Ac II	950	3425.63	Tm II
390	3401.83	Er II	230	3409.66	O IV	320	3417.77	Re I	130	3425.85	Nb I
620	3401.86	Os I	95	3409.81	Ti II	50	3417.904	Ne I	390	3425.93	Gd II
540	3402.07	Gd II	320	3409.83	Re I	15	3418.006	Ne I	360	3426.04	Yb I
200	3402.10	Tc I	160	3409.84	O II	270	3418.15	Sm II	400	3426.19	Re I
420	3402.33	Tb II	850	3410.05	Tm I	40 c	3418.20	Tc I	170	3426.20	Sm II
30	3402.40	Cr II	230	3410.17	Hf II	2	3418.37	Xe I	390	3426.21	Ce II
60	3402.42	Ti II	760	3410.25	Zr II	140	3418.39	Yb I	50 c	3426.27	Pr III
600	3402.46	Sm II	810 c	3410.26	Ho II	430	3418.51	Sm II	45	3426.44	Eu II
180	3402.51	Hf I	210	3410.40	Tb II	130	3418.51	Sc I	230	3426.57	Nb II
250	3402.51	Os I	390 c	3410.65	Ho II	240	3418.52	Mo I	6	3426.86	Na I
400	3402.97	Gd III	210	3410.68	Tb II	1400	3418.73	Gd II	10000	3426.95	Bk I
50 l	3402.97	Pr III	220	3411.02	Gd I	10000	3418.88	Pu II	500 l	3427.02	Pr III
210	3403.09	Sm II	410	3411.69	O IV	100	3419.10	Tc I	500	3427.119	Fe I
170	3403.32	Cr II	40	3411.80	Tc I	410	3419.18	Hf I	30000	3427.36	Ce III
360	3403.52	O IV	10000 l	3412.13	Bk II	125	3419.34	P II	500	3427.40	Pm II
800	3403.652	Cd I	820	3412.27	Rh I	65	3419.36	Sc I	140	3427.44	Hf I
10 h	3403.78	Ag I	6700	3412.34	Co I	810	3419.41	Re I	230	3427.45	Nb I
200 c	3403.93	Tc I	50	3412.45	Yb I	780	3419.63	Dy II	300	3427.61	Re I
35	3404.10	Yb II	85	3412.47	Y I	20	3419.63	Te II	150	3427.67	Os I
6	3404.24	K II	340	3412.59	Tm I	200 s	3419.66	Am II	150	3427.71	W I
100 c	3404.28	In II	2200	3412.63	Co I	170	3419.77	Sm II	60	3427.85	Tc I
640	3404.34	Mo I	120	3412.74	Os I	45	3419.84	Eu II	35	3427.93	Pt I
80	3404.353	Fe I	230	3412.94	Nb II	2	3420.00	Xe I	2000 c	3428.13	Ho II
24000	3404.58	Pd I	150	3412.96	W I	250	3420.04	Mo I	4900	3428.31	Ru I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
200	3428.37	Hf II	150	3437.44	Tc I	1000	3443.876	Fe I	250	3452.60	Mo I
490	3428.39	Er II	10000 l	3437.47	Bk I	80	3444.10	O III	10	3452.66	Ca II
285	3428.4	Se III	100	3437.50	Ir I	60	3444.2	Xe III	3000 l	3452.82	Pa II
80	3428.46	Yb II	320	3437.71	Re I	890	3444.31	Ti II	1300	3452.89	Ni I
220	3428.47	Gd II	8	3438.04	Ar III	120	3444.46	Os I	10000	3452.92	Cm I
50	3428.622	Th I	170	3438.06	Sm II	320	3444.58	Tb II	3200	3453.14	Ho II
120	3428.69	Ne II	4700	3438.23	Zr II	70	3444.86	Al I	180	3453.17	La II
60	3428.748	Fe I	250	3438.24	Hf II	200	3445.149	Fe I	190	3453.33	Cr I
150	3428.92	Al II	260	3438.37	Ru I	45	3445.18	Eu II	21000	3453.50	Co I
130	3429.04	Nb I	110 d	3438.40	In II	50 l	3445.29	Pr III	240	3453.50	Re I
630 c	3429.18	Ho II	140	3438.43	Hf I	160	3445.55	Os I	360	3453.55	U II
200	3429.21	Sc I	50	3438.71	Yb II	3800	3445.57	Dy II	170	3453.56	Sm II
340	3429.33	Tm I	80	3438.73	Tc I	170	3445.62	Cr I	15	3453.61	Fe II
420	3429.44	Dy II	100	3438.85	Yb II	130	3446.08	Mo II	4900	3453.66	Tm II
200	3429.48	Sc I	250	3438.87	Mo I	200	3446.19	Am I	40	3453.74	Cr I
230	3429.59	W I	330	3438.94	Dy II	4800	3446.26	Ni I	10000 l	3453.90	Bk I
850	3429.96	Tm II	340	3438.949	Th II	11	3446.37	K I	70 s	3454.05	Pr III
1000	3430.53	Zr II	50	3438.97	Mn II	50	3446.39	Co II	810	3454.06	Tb II
210	3430.61	Tb II	1700	3439.21	Gd II	210	3446.40	Tb II	500	3454.08	Yb II
50	3430.76	Sr III	250	3439.26	Rb III	3	3446.46	Ga II	540	3454.14	Gd II
490	3430.77	Ru I	60	3439.30	Ti I	50	3446.547	Th I	50	3454.195	Ne I
10	3430.83	Bi II	70	3439.35	Al I	35	3446.89	Yb II	70	3454.2	Xe III
240	3431.11	Yb I	90	3439.41	Sc I	830	3446.99	Dy II	320	3454.23	U II
420	3431.19	Tm II	100	3439.46	Kr III	30	3447.02	Cr I	2700	3454.32	Dy II
12	3431.23	Bi II	270	3439.72	Tb II	3200	3447.12	Mo I	30000	3454.39	Ce III
270	3431.36	Sc I	830	3439.78	Gd II	2	3447.26	Ga II	440	3454.51	Dy II
2500	3431.58	Co I	2700	3439.99	Gd II	450	3447.36	Br III	880	3454.90	Gd II
40	3431.75	Tc I	7	3440.05	K II	600	3447.36	Zr I	80	3455.12	O III
320 c	3432.10	Ho II	65	3440.18	Sc I	10	3447.38	K I	40	3455.12	Te II
10000 l	3432.62	Bk I	220	3440.20	Ru I	170	3447.43	Cr I	300	3455.18	Be I
180	3432.70	Nb II	30 h	3440.36	Au I	2	3447.59	He I	400	3455.22	Rh I
310	3432.74	Ru I	520	3440.37	Tb II	60	3447.703	Ne I	1000	3455.23	Co I
80	3432.94	Yb III	240	3440.50	Sm II	120	3447.74	Rh I	200	3455.27	Gd I
690	3432.99	Gd II	1400	3440.53	Rh I	70	3447.76	Cr I	60	3455.42	Rh I
4500	3433.04	Co I	180	3440.59	Nb II	50	3448.41	V IV	130	3455.60	Cr I
320	3433.26	Tb II	250	3440.60	Os I	65	3448.49	Sc I	810 c	3455.70	Ho II
140	3433.31	Cr II	6000	3440.606	Fe I	60	3448.58	Rh I	100	3455.72	Ge II
5000	3433.45	Pd I	150 l	3440.62	Pr III	200	3448.82	Y II	200	3455.91	Zr I
2600	3433.56	Ni I	45	3440.82	Eu II	410	3448.97	Ir I	16000 c	3456.00	Ho II
270	3433.60	Cr I	560	3440.93	Dy II	640	3449.07	Mo I	40	3456.18	Yb III
170	3433.68	Sm II	2500	3440.989	Fe I	4100	3449.17	Co I	9	3456.34	Tl III
980	3433.998	Th II	150	3441.00	Eu II	310	3449.20	Os I	950	3456.39	Mo I
40	3434.03	Ge III	70	3441.12	Cr I	390	3449.35	Ho I	180	3456.39	Ti II
55	3434.11	Cr I	770	3441.13	Er II	400	3449.37	Re I	1300	3456.56	Dy II
1000	3434.18	Rb II	120	3441.15	Pm II	2100	3449.44	Co I	100	3456.61	Ne II
1900	3434.37	Dy II	290	3441.21	Ce II	270	3449.46	Tb II	200	3456.85	Tc I
45	3434.61	Yb II	6400	3441.40	Pd I	390	3449.62	Gd II	20	3456.88	Te II
200	3434.70	Tc I	140	3441.44	Cr I	400	3449.80	Pm II	85	3457.05	Eu I
380	3434.79	Mo I	250	3441.44	Mo I	440	3449.89	Dy II	200	3457.05	Gd II
8200	3434.89	Rh I	1300	3441.45	Dy II	120	3450.29	Rh I	320	3457.05	U II
45	3435.05	Eu II	4900	3441.50	Tm II	1400	3450.38	Gd II	50	3457.068	Th I
65	3435.20	Eu II	100	3441.84	Hf I	5	3450.77	Hg III	180	3457.07	Rh I
320	3435.45	Mo I	720	3441.99	Mn II	70	3450.95	Y I	400	3457.24	Tc I
580	3435.49	U I	50	3442.25	Te II	40 h	3451.0	Bi III	270	3457.45	Sc I
530	3435.56	Sc I	50	3442.42	Cd II	200	3451.05	Tc I	45	3457.56	Eu II
40	3435.68	Tc I	110	3442.578	Th I	60	3451.15	Rh I	410	3457.56	Zr II
40	3435.72	Eu II	35	3442.63	Rh I	1100	3451.23	Gd II	40	3457.60	Tc I
770	3435.976	Th II	10000	3442.66	Bk I	10	3451.25	Co III	320	3457.71	U II
160	3436.19	Cr I	3	3442.66	Xe I	450	3451.29	B II	450	3457.8	Se III
300 l	3436.36	Pr III	390	3442.68	Er I	5	3451.37	Be I	220	3457.93	Rh I
2	3436.66	Ga II	1600	3442.93	Co I	400	3451.69	Hg II	70	3458.22	Al I
6400	3436.74	Ru I	240	3443.00	W I	130	3451.702	Th I	190 d	3458.29	Yb II
100	3436.93	Tm III	250	3443.26	Mo I	300	3451.75	Mo I	10000	3458.34	Cm I
660	3437.02	Ir I	200 c	3443.47	Tc I	16000 c	3451.88	Re I	120	3458.38	Os I
150	3437.10	Sm II	35	3443.59	Yb	1000 l	3452.10	Am II	5000	3458.39	Yb I
380	3437.14	Zr II	40000	3443.63	Ce III	130	3452.18	La II	100 w	3458.47	Ni I
360	3437.15	N II	150	3443.64	Al I	100	3452.31	Hf I	200	3458.7	Xe III
640	3437.22	Mo I	8800	3443.64	Co I	85	3452.40	Yb I	200	3458.93	Zr II
990	3437.28	Ni I	30	3443.79	Cr I	60	3452.47	Ti II	170	3459.20	Sm II

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
100	3459.32	Ne II	360 c	3467.07	Ho II	500	3473.54	Al IV	10000	3481.15	Pd I
40000	3459.39	Ce III	100	3467.21	Au I	40	3473.61	Cr I	1300	3481.15	Zr II
120	3459.42	Sm II	95	3467.26	Ti I	10000	3473.64	Pu II	500 s	3481.16	Ac II
360	3459.92	U I	1700	3467.27	Gd II	380	3473.70	Dy II	2200	3481.28	Gd II
50	3460.03	Mn II	200	3467.50	Ni I	260	3473.75	Ru I	70	3481.30	Cr I
250	3460.25	Pm II	210	3467.51	Tm I	40	3473.8	Bi III	240	3481.30	Ru I
360	3460.27	Yb I	140	3467.60	Hf I	810 c	3473.91	Ho II	55	3481.54	Cr I
360	3460.33	Mn II	800	3467.655	Cd I	130	3473.96	Sm II	340	3481.75	Tm II
380	3460.38	Tb II	70	3467.72	Cr I	8000	3474.02	Co I	1700	3481.80	Gd II
100	3460.43	Cr I	250	3467.85	Mo I	360 h	3474.04	Mn II	200	3481.93	Ne II
55000 c	3460.46	Re I	170	3467.87	Sm II		3474.13	Mn II	300	3481.93	Np I
6 d	3460.48	Tl II	85	3467.88	Eu I	5400 c	3474.26	Ho II	120	3482.11	Os I
25	3460.524	Ne I	110	3467.88	Y II	70	3474.65	Kr III	240	3482.23	Re I
7700	3460.77	Pd I	400	3467.93	Tm III	11	3474.76	Ca I	240	3482.35	Ce II
640	3460.78	Mo I	400	3467.96	Re I	170	3474.78	F II	680	3482.49	U II
4400	3460.97	Dy II	620	3468.03	Tb II	4700	3474.78	Rh I	50	3482.56	Yb II
7	3461.07	Ar I	390	3468.219	Th II	120	3474.89	Sr II	490	3482.60	Gd II
240	3461.13	Sm II	40	3468.22	Xe III	80	3475.18	Tc I	60	3482.63	Al I
10000 s	3461.24	Bk II	6	3468.32	K III	2000	3475.450	Fe I	290	3482.91	Mn II
100 h	3461.26	Xe II	720	3468.43	Dy II	1000	3475.59	Tc I	500	3482.99	N IV
130	3461.38	Eu II	9	3468.48	Ca I	70	3475.82	Ag II	230	3483.04	Tb II
1500	3461.50	Rb II	1700	3468.99	Gd II	500	3476.30	Yb II	25	3483.08	Cd II
600	3461.50	Ti II	30	3469.16	Ag I	240	3476.44	Re I	10000	3483.20	Pu I
5000	3461.65	Ni I	320	3469.22	Mo I	20	3476.56	Be I	5000 l	3483.31	Am II
20	3461.87	Ca II	130	3469.44	Nb I	340	3476.69	Tm I	1900	3483.41	Co I
220	3461.95	Gd II	240	3469.49	Ni I	500	3476.702	Fe I	60	3483.43	Pt I
1600	3461.97	Ho II	490	3469.51	Er I	70	3476.747	Ar II	760	3483.54	Zr II
5900	3462.04	Rh I	45	3469.59	Cr I	480	3476.84	Ce II	40	3483.67	Te II
180	3462.19	Sc I	180	3469.62	Rh I	1300	3477.07	Dy II	230	3483.69	Tb II
8500	3462.20	Tm II	130 d	3469.65	Sc I	75	3477.07	Eu I	1250 h	3483.76	Cu I
320	3462.22	U I	4	3469.81	Xe I	600	3477.18	Ti II	550	3483.77	Ni I
35	3462.34	Yb II	1300	3469.920	Th II	10000 s	3477.62	Bk II	95	3484.04	Rh I
140	3462.64	Hf II	20	3469.98	Yb III	160	3477.94	W I	100	3484.05	Nb II
5100	3462.80	Co I	5	3470.34	Ga II	20	3478.232	Ar II	60	3484.62	Tc I
340	3462.850	Th II	150	3470.51	Tc I	120	3478.53	Os I	6300	3484.84	Ho II
200	3462.91	Pm II	4700	3470.66	Rh I	290	3478.69	Nb I	120 h	3484.88	Nd I
230 d	3462.97	Tb II	285	3470.81	O II	570	3478.71	N IV	400	3484.96	N IV
220	3463.00	Gd II	60000	3470.92	Ce III	200	3478.79	Zr I	710	3485.05	Ce II
820	3463.02	Zr II	110	3471.13	Sc I	500	3478.84	Yb II	160	3485.27	Pt I
90	3463.37	N IV	560	3471.14	Dy II	2100	3478.91	Rh I	35	3485.5	Bi III
150	3463.51	Yb III	100	3471.19	Nb I	60	3478.92	Ti I	10	3485.61	Ca II
460	3463.55	U I	600	3471.19	Zr I	200	3478.99	Hf II	60	3485.69	Ti I
40	3463.74	Ba I	170	3471.218	Th I	250	3479.173	Th II	170	3485.73	Y I
230	3463.77	Ta I	9	3471.32	Ar III	480	3479.28	Hf II	85	3485.76	Yb II
170	3463.81	Nb I	1	3471.46	Ga I	1200	3479.39	Zr II	970	3485.85	Er II
2700	3463.98	Gd II	560 d	3471.53	Dy II	610	3479.41	Er II	130	3485.89	Ni I
120	3464.07	Sm II	30	3471.61	Au I	150	3479.52	Ne II	110	3485.92	V II
10000 s	3464.13	Bk II	970	3471.71	Er II	2	3479.53	I III	240	3485.93	Mo I
30	3464.339	Ne I	270	3471.73	Tb II	130	3479.53	Sm II	20	3486.11	Te II
2400	3464.37	Yb I	10000 s	3472.02	Bk II	200	3479.56	Nb II	220	3486.20	Gd I
100	3464.43	Cd II	120	3472.25	Rh I	60	3479.81	Al I	1000 c	3486.23	Tc I
950	3464.46	Sr II	4	3472.36	Xe I	70	3480.052	Th I	200	3486.552	Th I
8	3464.59	Ge III	270	3472.37	Tb II	380	3480.17	Tb II	350	3486.82	Er II
40000 c	3464.73	Re I	710	3472.40	Hf I	130	3480.26	Sm II	15	3486.91	Si III
10000	3465.10	Pu II	10	3472.46	Sn II	20	3480.32	Te II	420	3487.38	Tm I
65	3465.25	Cr I	4800	3472.48	Lu II	360	3480.36	U I	170	3487.41	Sm II
120	3465.44	Os I	1	3472.52	Ga II	400	3480.38	Re I	120	3487.46	Os I
110	3465.74	Pr II	390	3472.52	U II	490	3480.52	Ta I	400	3487.58	Br III
5100	3465.80	Co I	1600	3472.54	Ni I	240	3480.53	Ti I	3000	3487.59	Ac III
180	3465.86	Nb I	60	3472.571	Ne I	200	3480.54	Er III	13	3487.60	Ca I
1200	3465.860	Fe I	16	3472.76	Cr I	20	3480.55	Ar III		3488.	Li I
130	3465.924	Th II	810 d	3472.79	Tb II	170	3480.56	Sm II	85	3488.43	Yb II
1000	3466.200	Cd I	24	3472.91	Cr I	200	3480.61	Pm II	100	3488.59	Kr III
5000 c	3466.28	Tc I	160	3472.96	F II	200	3480.72	Ne II	180	3488.68	Mn II
630	3466.30	U I	210	3473.00	Tb II	320	3480.85	Re I	40	3489.08	Ge III
30	3466.579	Ne I	140	3473.02	Nb I	340	3480.98	Tm I	100	3489.184	Th I
320	3466.83	Mo I	1400	3473.22	Gd II	10000	3481.07	Cf	1600	3489.37	U I
330	3466.95	Gd II	150	3473.31	F II	6	3481.11	K III	4800	3489.40	Co I
40	3467.02	Cr I	320	3473.43	U I	6	3481.11	K II	290 d	3489.51	Tb II

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
200	3489.53	Ac II	160	3498.54	Os I	7000	3506.32	Co I	830	3513.65	Gd I
490	3489.58	Ho II	130	3498.621	Th I	300	3506.47	Br III	320	3513.67	U I
60	3489.74	Ti II	500	3498.63	Nb I	120	3506.64	Ti I	250	3513.817	Fe I
2000	3489.77	Pd I	830	3498.71	Dy II	50	3506.645	Th I	5	3513.88	K III
300	3489.79	Po	1200	3498.73	Rh I	5	3506.74	Xe I	260	3513.93	Ni I
200	3489.83	O IV	810 c	3498.88	Ho II	1300	3506.81	Dy II	10	3514.23	Co II
100	3490.30	Tc I	200	3498.91	Sc I	410 c	3506.95	Ho II	80 h	3514.25	V IV
120	3490.33	Os	8300	3498.94	Ru I	100 c	3507.19	Tc I	70	3514.388	Ar II
2500	3490.574	Fe I	100	3498.98	Hf I	2800	3507.32	Rh I	500	3514.41	Ce III
230	3491.03	Nb I	6700	3499.10	Er II	780	3507.34	U I	640	3514.49	Ru I
480	3491.05	Ti II	95	3499.10	Ti I	8300 c	3507.39	Lu II	5	3514.60	Rn I
80	3491.07	Rh I	40	3499.14	Tc I	4	3507.41	Tl III	1600	3514.61	U I
50	3491.244	Ar II	300	3499.21	Ge II	200	3507.42	Kr III	100	3514.85	Pm II
100	3491.536	Ar II	9	3499.59	Fe III	570	3507.45	Tb II	490	3514.89	Er II
980	3491.95	Gd II	12	3499.67	Ar III	55	3507.69	Ni I	6600	3515.05	Ni I
210 d	3492.00	Tb II	220	3499.84	Sm II	50	3507.77	Co II	25	3515.191	Ne I
900	3492.23	Al IV	340	3499.95	Tm I	85	3507.83	Yb II	200	3515.42	Nb II
160	3492.24	O IV	25	3499.952	Cd I	210	3507.94	Ce II	300	3515.54	Be I
210	3492.58	Tm II	630	3500.08	U I	460	3507.96	Nb I	4100 c	3515.59	Ho II
100	3492.68	Rb III	9	3500.28	Fe III	20	3508.03	Ag I	220	3515.95	Ir I
5500	3492.96	Ni I	3	3500.35	Hg III	560	3508.12	Mo I	320	3516.65	Re I
580 c	3493.09	Ho II	1000	3500.70	Tc I	100	3508.27	Tc I	12000	3516.94	Pd I
390	3493.33	U II	810	3500.84	Tb II	390	3508.38	Er II	50	3517.00	Yb I
400	3493.39	Tc I	660	3500.85	Ni I	1600	3508.42	Lu I	500	3517.09	La III
270	3493.518	Th II	200 r	3501.11	Ba I	800	3508.46	Al IV	600	3517.22	La III
170	3493.61	Sm II	250	3501.16	Os I	160	3508.73	W I	560	3517.26	Dy II
200	3493.65	Po	30	3501.216	Ne I	320	3508.84	U II	560	3517.30	V II
340	3494.00	U I	200	3501.24	Tc I	30 h	3509.04	Au I	320	3517.33	Re I
270	3494.21	Tb II	190	3501.39	F II	5700	3509.17	Tb II	450	3517.36	Br III
1700	3494.40	Gd II	200	3501.45	F II	1000	3509.32	Zr I	600	3517.38	Ce II
110	3494.44	Rh I	400	3501.50	Dy II	320	3509.37	Ho II	30	3517.50	Co II
4400	3494.49	Dy II	300 h	3501.50	Np I	390	3509.66	U II	700	3517.56	Al IV
500	3494.62	Tc I	200	3501.57	F II	70	3509.778	Ar II	250	3517.60	Tm I
2500 c	3494.76	Ho II	50	3501.72	Co II	2900	3509.84	Co I	200	3517.67	Nb II
320	3494.84	U II	10	3501.76	Fe III	160	3510.02	W I	390	3518.18	Er II
55	3494.97	Cr I	20 h	3501.92	Ag I	380	3510.10	Tb II	4800	3518.35	Co I
10	3495.16	Ca II	9600	3502.28	Co I	5000	3510.13	Am I	140	3518.404	Th I
400	3495.24	W I	5900	3502.52	Rh I	200	3510.26	Nb II	310	3518.72	Os I
80	3495.28	Ag II	65	3502.60	Ni I	10000	3510.28	Cm I	130	3518.75	Hf II
270	3495.36	Tb II	800 c	3502.70	Tc I	2600	3510.34	Ni I	15	3519.06	Sb III
40	3495.38	Cr II	610	3502.78	Er I	1400	3510.43	Co I	20000	3519.24	Tl I
150	3495.44	Cd II	180	3502.84	F II	200	3510.46	Zr II	60	3519.54	Rh I
2400	3495.69	Co I	200	3502.96	F II	80	3510.54	Cr I	2000	3519.60	Zr I
250	3495.75	Hf II	560	3503.06	Re I	810	3510.73	Ho I	330	3519.64	Ru I
60	3495.75	Ti I	210	3503.11	F II	10	3510.82	Au I	570	3519.76	Tb II
140	3495.84	Mn II	15	3503.58	Ar III	600	3510.84	Ti II	660	3519.77	Ni I
100hw	3495.90	Yb II	70	3503.786	Th I	500 c	3510.85	Bi I	410 c	3519.94	Ho II
1700	3496.09	Y II	240	3503.87	Ta I	100	3510.91	Tc I	390	3519.96	U II
4100	3496.21	Zr II	320	3504.01	U I	490	3511.04	Ta I	120	3520.00	Os I
560	3496.34	Dy II	50	3504.07	Sb III	8	3511.12	Ar III	150	3520.02	V II
530	3496.41	U II	800	3504.41	Mo I	110	3511.157	Th I	200	3520.06	Nb I
50	3496.42	V IV	210	3504.44	V II	340	3511.23	Sm II	1300	3520.08	Co I
50	3496.81	Mn II	830	3504.53	Dy II	500	3511.28	Al IV	60	3520.25	Ti II
70	3496.810	Th I	60000	3504.64	Ce III	60	3511.78	Rh I	230	3520.29	Yb II
350	3496.86	Er II	620	3504.66	Os I	40	3511.84	Cr II	12	3520.47	Sb II
150	3497.13	Pm II	890	3504.89	Ti II	780	3512.22	Gd II	150	3520.472	Ne I
250	3497.16	Hf I	3000	3504.97	Pa I	100 c	3512.28	Re I	210	3520.52	Ce II
110	3497.3	S III	320	3505.07	U II	1100	3512.50	Gd II	70	3521.059	Th I
40	3497.33	Co II	1200	3505.23	Hf II	4800	3512.64	Co I	470cw	3521.09	Eu II
300 c	3497.41	I II	75 h	3505.30	Eu II	440	3512.99	Os I	50	3521.11	Te II
980	3497.49	Hf I	240	3505.32	Mo I	250	3513.02	Tm II	10	3521.12	Ag I
100	3497.54	Mn II	170	3505.37	F II	60	3513.10	Rh I	300	3521.261	Fe I
50000	3497.81	Ce III	60	3505.41	Rh I	320	3513.10	Tb II	3000	3521.39	Rb II
400	3497.81	Dy II	830	3505.45	Dy II	150	3513.28	Hf I	480	3521.41	Mo I
200	3497.81	Nb I	350	3505.48	Zr II	15 h	3513.38	Ag I	80	3521.53	Y I
500	3497.840	Fe I	1400	3505.51	Gd II	10000 l	3513.47	Cf	2700	3521.57	Co I
380	3497.85	Ta I	200	3505.52	F II	3800	3513.48	Co I	50	3521.77	Ga III
25	3498.064	Ne I	220	3505.63	F II	200	3513.61	Ta I	330	3521.88	Ce II
15	3498.46	Sb II	820	3505.67	Zr II	3200	3513.64	Ir I	410	3522.03	Ir I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
3500	3522.28	La IV	10000	3531.49	Cf I	410	3539.59	Er I	330	3548.18	Ni I
10000	3522.36	Cm I	3000 I	3531.55	Rb II	8	3540.08	Tl II	330	3548.19	Dy II
80	3522.83	Xe III	22000	3531.70	Dy II	500	3540.16	Br III	390	3548.20	Mn I
160	3522.89	F II	360	3531.85	Mn I	1100	3540.24	Tb II	310	3548.26	Er II
980	3523.02	Hf I		3532.00	Mn I	530	3540.47	U II	180	3548.81	Hf I
3	3523.34	Au II	1100	3532.12	Mn I	100	3540.52	Mn III	75	3548.87	Cu III
3800	3523.43	Co I	45	3532.23	Eu II	630	3540.76	Ho II	3900	3549.01	Y II
60	3523.51	Co II	220	3532.57	Sm II	15	3540.8	Bi III	320	3549.20	U I
480	3523.64	Os I	230	3532.80	Os I	250	3540.96	Nb II	3900	3549.36	Gd II
1300	3523.66	Tb II	240	3532.81	Ru I	10000	3540.98	Cf I	200	3549.42	Hg II
4400	3523.98	Dy II	1500	3533.05	Na II	500	3541.08	Al IV	7	3549.52	Mg II
100	3524.11	Cd II	100	3533.199	Fe I	300	3541.083	Fe I	1800	3549.54	Rh I
980	3524.20	Gd II	440	3533.22	Zr I	1000	3541.15	Rb II	170	3549.595	Th I
1250	3524.23	Cu I	200	3533.28	Tm III	15	3541.36	Ti IV	45	3549.71	Eu II
8200	3524.54	Ni I	1900	3533.36	Co I	200	3541.63	Ru I	6000 c	3549.72	Tc I
110	3524.72	V II	120	3533.41	Os I	160	3541.77	F II	210	3549.74	Zr I
610	3524.91	Er II	15	3533.45	Sb III	2000 c	3541.77	Tc I	100	3549.82	Yb II
10000	3524.94	Cm I	630	3533.57	U II	280	3541.91	Rh I	820	3549.84	Er II
80 h	3524.97	Ba I	560	3533.68	V I	10000	3542.06	Cm I	10	3549.86	Xe I
240	3524.98	Mo I	600	3534.05	Ce II	250	3542.075	Fe I	240	3549.89	Re I
380	3525.14	Tb II	320	3534.33	U I	150	3542.15	Eu II	4400	3550.22	Dy II
440	3525.61	Tb II	100	3534.63	Ac II	320	3542.17	Mo I	300	3550.45	Nb I
440	3525.81	Zr II	120	3534.82	Re I	10000 s	3542.19	Bk II	630	3550.46	Zr I
800	3525.83	Tc I	250	3534.85	Tm II	50	3542.3	Xe III	120	3550.64	Cr I
9	3525.94	Si III	150	3534.88	Tc I	1700	3542.33	Dy II	4000 c	3550.64	Tc I
120	3526.04	Os I	4400	3534.96	Dy II	320	3542.57	U I	1200	3550.82	U II
400	3526.040	Fe I	7	3535.04	Mg II	50	3542.61	Ag I	300	3550.87	Yb III
100	3526.166	Fe I	210	3535.16	Zr I	630	3542.62	Zr II	310 d	3551.03	Tb
300	3526.18	Tc I	2000	3535.30	Nb I	230	3542.71	Os I	300	3551.08	Br III
60	3526.237	Fe I	310	3535.41	Ti II	540	3542.77	Gd II	160	3551.29	Re I
2	3526.24	Co III	500	3535.51	Tc I	120	3542.85	Ne II	140	3551.401	Th I
60	3526.381	Fe I	1700	3535.52	Tm II	290	3543.35	Nd II	55	3551.53	Ni I
60	3526.467	Fe I	980	3535.54	Hf II	110	3543.50	V I	2200	3551.62	Dy II
70	3526.633	Th I	160	3535.54	W I	360	3543.6	Se III	130	3551.80	Y I
210	3526.68	Ce II	270	3535.65	Sm II	85	3543.85	Eu II	1800	3551.95	Zr II
6400	3526.85	Co I	100	3535.69	Cd II	810	3543.89	Tb II	320	3551.96	Tb II
160	3526.85	W I	10000 I	3535.73	Bk I	1200	3543.95	Rh I	50	3552.1	Xe III
500	3526.90	I II	2700	3535.73	Sc II	180	3544.018	Th I	320	3552.17	U II
400	3527.03	Al IV	40	3535.92	Co II	500	3544.02	Nb I	50	3552.19	Te II
200	3527.53	Nd II	5500	3536.02	Dy II	50000	3544.07	Ce III	100	3552.45	Ba II
110	3527.98	Ni I	490	3536.21	Tm II	400	3544.20	Dy II	180	3552.52	Eu II
8800	3528.02	Rh I	440	3536.32	Tb II	400	3544.35	Dy II	540	3552.69	Y I
430	3528.54	Gd II	200	3536.556	Fe I	250	3544.65	Nb I	540	3552.70	Hf II
1200	3528.60	Os I	850	3536.58	Tm II	80 h	3544.66	Ba I	240	3552.73	Ce II
200	3528.68	Ru I	760	3536.62	Hf I	50	3545.03	Co II	12000	3553.08	Pd I
10000	3528.72	Bk I	150	3536.87	F II	560	3545.20	V II	310	3553.20	Er II
2700	3529.03	Co I	640	3537.28	Mo I	650	3545.22	W I	110	3553.27	V I
100	3529.24	Ac II	160	3537.45	W I	70	3545.596	Ar II	8	3553.37	Mg II
200	3529.29	Tm III	320	3537.46	Re I	210	3545.60	Ce II	30	3553.57	Au I
5000	3529.43	Tl I	100	3537.47	Tm III	3	3545.61	Au I	10000	3553.60	Bk I
230	3529.74	V I	1300	3537.48	Nb I	50	3545.72	Yb II	160	3553.65	Re I
7300	3529.81	Co I	7	3537.57	Sn II	4300	3545.80	Gd II	80	3553.739	Fe I
100	3529.83	Tc I	18	3537.77	Ca III	70	3545.845	Ar II	150	3554.00	Hf I
900	3530.03	Cl III	420	3537.91	Tm I	45	3546.01	Y II	10	3554.04	Xe I
230	3530.06	Os I	570	3537.94	Tb II	1600	3546.05	Ho II	240	3554.15	Sm II
1	3530.17	Pb III	390	3537.95	Ru I	290	3546.19	Ce II	60	3554.19	Ge IV
2000	3530.38	Cu I	65	3538.08	Eu II	200	3546.81	Pm I	7	3554.306	Ar I
310	3530.60	Sm II	300	3538.12	Tc I	1400	3546.83	Dy II	4800	3554.43	Lu II
3000 s	3530.65	Pa II	880 d	3538.14	Rh I	4	3546.90	I IV	250	3554.52	Nb I
7	3530.75	K II		3538.26	Rh I	3	3546.92	I III	1000	3554.66	Nb I
230	3530.77	V II	4400	3538.52	Dy II	10000	3547.02	Cm I	400	3554.925	Fe I
100	3530.87	Hf I	800	3538.68	Tc I	190	3547.03	Ti I	200 s	3554.99	Ac II
1000 I	3530.95	Am I	8	3538.86	Mg II	10 h	3547.16	Ag I	10	3555.	Be I
390	3531.11	U II	4	3538.88	Hg III	390	3547.19	U II	420	3555.00	Ce II
75	3531.15	Eu II	770	3539.08	Ce II	20 h	3547.68	Ba I	200	3555.013	Th I
100	3531.23	Hf I	160	3539.33	Re I	1800	3547.68	Zr I	680	3555.32	U I
30 h	3531.35	Ba I	400	3539.37	Dy II	1300	3547.80	Mn I	200	3555.77	Nd II
10000 I	3531.40	Bk I	790	3539.37	Ru I	10000	3547.92	Cm I	210	3555.82	Tm I
140	3531.450	Th I	670	3539.587	Th II	1100	3548.03	Mn I	10000 s	3555.88	Bk I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
20	3555.93	Co II	270	3563.33	O IV	240	3570.65	Mo I	830	3577.98	Dy II
10000	3556.52	Bk I	110	3563.375	Th I	100	3570.65	Tc I	310	3578.24	Er I
200	3556.546	P III	100	3563.42	Tm III	240	3570.65	W I	390	3578.36	Gd II
2100	3556.60	Zr II	630	3563.50	Nb I	920	3570.75	Er II	19000	3578.69	Cr I
1100 c	3556.78	Ho II	630	3563.62	Nb I	4500	3571.16	Pd I	630	3578.72	U II
560	3556.80	V II	390	3563.66	U I	190	3571.43	Y I	810	3579.12	Ho I
200	3556.878	Fe I	560	3563.69	Dy II	3000	3571.82	Pa I	360	3579.12	Re I
10 h	3557.01	Ag I	420	3563.88	Tm I	990	3571.87	Ni I	1100	3579.20	Tb II
1400	3557.05	Gd II	50 h	3563.94	Yb II	690	3571.93	Gd II	80 h	3579.67	Ba I
160	3557.17	Ir I	200	3564.05	Gd II	120	3571.996	Fe I	100	3579.7	Xe III
5	3557.24	Hg III	240	3564.13	Rh I	320	3572.07	Tb II	100	3579.8	Li I
300	3557.36	Au I	100	3564.23	Kr III	2100	3572.47	Zr II	150	3579.90	Hf I
420	3557.79	Tm II	150	3564.31	Hf I	80	3572.48	W II	440	3580.04	Dy II
120	3557.80	Ne II	100	3565.11	Cs II	50	3572.50	Yb II	1000	3580.06	Tc I
1500	3558.02	Er I	310	3565.17	Er I	13000	3572.53	Sc II	150	3580.10	Pm II
520	3558.10	Mo I	100	3565.22	Tc I	35000	3572.729	Pb I	810 c	3580.15	Re II
540	3558.19	Gd II	200	3565.31	Pm II	10000	3572.95	Cm II	5000	3580.27	Nb I
10	3558.22	Au I	1000	3565.379	Fe I	210	3573.08	Zr II	1000	3580.52	Er II
440 h	3558.23	Dy II	10000	3565.41	Bk	410 c	3573.24	Ho II	410	3580.75	Ho II
430	3558.47	Gd II	1000 s	3565.59	Ac II	100	3573.393	Fe I	390	3580.94	Sm II
400	3558.515	Fe I	570	3565.74	Tb	130	3573.64	Cr I	7700	3580.94	Sc II
80	3558.52	Cr I	490	3565.91	Tm II	1200	3573.72	Ir I	650	3580.97	Re I
6600	3558.55	Sc II	30	3565.97	Au I	120	3573.74	Ti II	80	3581.19	Ga III
510	3558.71	Er I	300	3566.05	Mo I	60	3573.829	Fe I	4000	3581.19	Fe I
170	3558.76	Y I	1100	3566.10	Zr I	780	3573.83	Dy II	600	3581.26	Tc I
460 d	3558.77	Tb	130	3566.16	Cr I	320	3573.88	Mo I	10	3581.39	Ti IV
160	3558.94	Re I	110	3566.18	V I	60	3573.888	Fe I	25	3581.608	Ar II
320	3558.99	Ir I	40	3566.25	Sb III	80	3574.04	Cr I	410	3581.83	Ho II
35	3559.03	Yb I	5000	3566.37	Ni I	280	3574.06	Tm II	360	3581.84	U II
510	3559.10	Sm II	9	3566.43	Sr IV	120	3574.08	Os I	1400	3581.89	Mo I
40	3559.18	Sb III	1300	3566.47	Tm II	1400	3574.15	Dy II	980	3581.91	Gd II
440	3559.30	Dy II	2300	3566.59	U I	100	3574.18	Ne II	800	3582.08	Tc I
100	3559.43	Pm II	220	3566.84	Sm II	60	3574.24	Ti I	150	3582.199	Fe I
530	3559.451	Th II	20	3566.98	Co II	200	3574.43	La I	50	3582.355	Ar II
100	3559.508	Ar II	10000 l	3567.25	Bk II	200	3574.58	Ru I	3	3582.39	Sn II
300	3559.75	Tc I	810	3567.35	Tb II	50	3574.58	Yb II	2000	3582.63	Tc I
960	3559.79	Os I	270	3567.36	Hf I	200	3574.61	Ne II	810	3583.02	Re I
100	3559.80	Cs II	420	3567.36	Tm I	330	3574.74	Gd II	4700	3583.10	Rh I
1000	3559.90	Er II	5	3567.67	Ti II	320	3574.76	U I	100	3583.101	Th I
410	3560.15	Ho II	6100	3567.70	Sc II	330 h	3574.80	Cr I	110	3583.28	Hf I
800	3560.32	Tc I	200	3567.73	Ba II	630 c	3574.80	Ho II	310	3583.39	Sm II
200	3560.33	Yb II	4800	3567.84	Lu I	50	3574.94	Cr I	120	3583.53	Rh I
230	3560.39	O IV	160	3568.04	W I	50	3574.95	Co II	80	3583.6	Xe III
800	3560.68	Cl III	160	3568.23	Re I	1600	3574.96	Co I	2	3583.60	Ga II
9	3560.68	Ti II	4200	3568.27	Sm II	160	3575.22	W I	200	3584.21	Pr II
170	3560.70	Yb II	250	3568.50	Ne II	60	3575.32	Co II	160 h	3584.33	Cr I
410	3560.75	Nd II	4200	3568.52	Tb II	2500	3575.36	Co I	30 h	3584.37	Au I
1200	3560.80	Ce II	800	3568.85	Tc I	100	3575.42	Tc I	400	3584.42	Dy II
1200	3560.86	Os I	340	3568.87	Nd II	11	3575.45	Sn II	3300	3584.52	Y II
1100	3560.89	Co I	210	3568.88	Zr I	1100	3575.79	Zr I	150	3584.660	Fe I
340	3560.92	Tm I	1600	3568.98	Tb II	1500	3575.85	Nb I	3200	3584.88	U I
100	3561.030	Ar II	1100	3569.04	Hf II	260	3576.05	Y I	120	3584.929	Fe I
80	3561.07	Co II	530	3569.08	U I	210	3576.23	Ce II	5400	3584.96	Gd II
100	3561.20	Ne II	5000	3569.16	Am I	4400	3576.24	Dy II	500	3584.97	Nb I
40	3561.4	Xe III	8800	3569.38	Co I	100	3576.28	Ba II	710	3585.03	Tb II
320	3561.41	U I	2200	3569.49	Mn I	9900	3576.35	Sc II	3300	3585.06	Dy II
10000	3561.44	Cm I	8	3569.67	Si III	17	3576.44	Ti IV	1000	3585.16	Co I
1300	3561.66	Hf II	310	3569.78	Os I	200	3576.557	Th I	130	3585.30	Cr II
3200	3561.74	Tb II	720	3569.80	Mn I	70	3576.616	Ar II	300	3585.319	Fe I
65	3561.75	Ni I	70	3569.820	Th I	1300	3576.85	Zr II	360	3585.47	Yb II
1200	3561.80	U I	3570.04	Mn I	1700	3576.87	Dy II	150	3585.705	Fe I	
5	3562.32	In III	1200	3570.097	Fe I	1000	3577.45	Ce II	1400	3585.78	Dy II
120	3562.34	Os I	1200	3570.18	Rh I	200	3577.526	P III	10000	3585.87	Pu II
300	3562.41	Tm III	285	3570.2	Se III	30	3577.62	Ba I	10	3586.04	Fe III
500	3562.43	Br III	800	3570.25	Fe I	200	3577.72	Nb I	280	3586.07	Tm I
200 s	3562.68	Am II	240	3570.26	Re I	270	3577.79	Sm II	200	3586.103	Fe I
480	3562.90	Tb II	3000	3570.56	Pa I	1400	3577.88	Mn I	560	3586.11	Dy II
400	3563.14	Mo I	85	3570.57	Yb II	360	3577.92	U I	880	3586.29	Zr I
2200	3563.15	Dy II	690	3570.59	Ru I	60	3577.96	Co II	720	3586.54	Mn I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
450	3586.56	Al II	320	3594.39	Ir I	270	3602.94	Mo I	10000	3611.03	Bk
370	3586.60	Er I	300	3594.57	Tc I	10000 s	3603.20	Bk II	7800	3611.05	Y II
20 h	3586.67	Ag I	100	3594.633	Fe I	150	3603.20	Eu II	70	3611.30	Yb II
300	3586.73	Au I	1900	3594.87	Co I	150	3603.204	Fe I	320	3611.33	Tb II
400	3586.984	Fe I	1800	3595.04	Dy II	500	3603.41	Am I	75	3611.57	Eu II
100	3587.05	Rb I	290	3595.12	Mn I	85	3603.74	Cr I	100	3611.57	Au I
360	3587.07	Al II	100 w	3595.4	Xe III		3603.78	Cr II	100	3611.78	Te II
60	3587.13	Ti II	1000 c	3595.66	Tc I	11	3603.88	Fe III	690	3611.89	Zr II
6700	3587.19	Co I	410	3595.84	Er I	1700	3604.28	Sm II	10000 l	3611.93	Bk
390	3587.20	Ru I	10000	3595.88	Bk I	95	3604.48	Os II	130	3611.94	Pr II
1	3587.27	He I	240	3596.05	Ti II	10000	3604.78	Bk	60	3612.068	Fe I
120	3587.32	Os I	400	3596.06	Dy II	1100	3604.87	Gd I	10000	3612.11	Cf II
570	3587.44	Tb II	100 s	3596.07	Am II	510	3604.90	Er II	750	3612.36	Al III
290	3587.45	Al II	380 c	3596.11	Bi I	320	3604.90	Tb II	200	3612.427	Th I
470	3587.51	Nd II	6400	3596.18	Ru I	270	3605.26	Gd II	3100	3612.47	Rh I
200	3587.74	Tm III	4700	3596.19	Rh I	460	3605.27	U I	70	3612.61	Cr I
300	3587.75	Y I	340	3596.34	Lu I	10000	3605.32	Cf I	530	3612.74	Ni I
130	3587.93	Ni I	810	3596.38	Tb II	13000	3605.33	Cr I	800	3612.85	Cl III
4000	3587.94	Tc I	160	3596.39	Re I	200	3605.454	Fe I	800	3612.873	Cd I
440	3587.98	Zr II	200	3596.57	Ba II	250	3605.66	Gd II	8	3613.06	Xe I
400	3588.33	Po	5900	3597.15	Rh I	310	3605.86	Rh I	1100	3613.10	Zr II
70	3588.441	Ar II	210	3597.42	Hf II	240	3606.06	W I	340	3613.31	Ho II
30 h	3588.79	Au I	1300	3597.70	Ni I	100	3606.06	Xe III	540	3613.39	Gd II
750	3589.11	Nb I	340	3598.02	Nd II	1800	3606.12	Dy II	45	3613.4	Bi III
6400	3589.22	Ru I	30	3598.06	Au I	360	3606.32	U II	3	3613.64	He I
75	3589.27	Eu I	440	3598.06	Tb II	130	3606.48	Yb II	420	3613.70	Ce II
100	3589.34	Ga III	620	3598.11	Os I	7	3606.522	Ar I	80	3613.79	W II
500	3589.36	Nb I	270	3598.120	Th I	500	3606.680	Fe I	3	3613.81	I III
4000	3589.64	Sc II	170	3598.69	F II	110	3606.69	V I	28000	3613.84	Sc II
100	3589.69	Y I	190	3598.72	Ti I	300 h	3606.80	Br II	200	3613.89	Yb III
170	3589.750	Th I	10000	3598.77	Cf I	40	3607.0	Xe III	10000	3613.91	Bk
560	3589.76	V II	1100cw	3598.77	Ho II	1000 c	3607.32	Tc I	30 h	3614.00	Au I
7	3589.87	Pb III	210	3598.88	Mo I	750	3607.41	Ta I	270 d	3614.21	Gd II
360	3590.07	Dy II	1400	3599.13	Cu I	410	3607.42	Er I		3614.42	Gd I
10000	3590.32	Bk I	340	3599.48	Ho I	420	3607.54	Mn I	60	3614.453	Cd I
540	3590.47	Gd II	610	3599.50	Er II	200	3607.62	Tc I	320	3614.63	Tb II
20	3590.47	Si III	1300	3599.76	Ru I	390	3607.63	Ce II	1100	3614.77	Zr II
4000	3590.48	Sc II	1000	3599.83	Er II	100 h	3607.88	Kr II	240	3614.78	Rh I
320	3590.50	U II	540	3599.87	Hf I	2000 c	3608.27	Tc I	110	3615.04	Hf I
160	3590.52	F II	15	3600.169	Ne I	210	3608.37	Mo I	480	3615.133	Th I
330	3590.60	Ce II	560	3600.38	Dy II	170	3608.377	Th I	85	3615.64	Cr I
200	3590.74	Mo I	1600	3600.44	Tb II	40	3608.40	Cr I	320 d	3615.66	Tb II
610	3590.76	Er I	5000	3600.60	Rb II	10000 l	3608.49	Bk	370	3615.82	Nd II
45	3591.31	Eu II	10000	3600.62	Cm I	420	3608.49	Mn I	100 w	3615.9	Xe III
1100	3591.41	Dy II	10000	3600.64	Rb II	830	3608.75	Gd II	100	3616.00	Mn III
40	3591.57	Rb I	450	3600.71	Br III	2100	3608.77	Tm II	45	3616.15	Eu II
390	3591.74	U I	10000	3600.73	Y II	1500	3608.859	Fe I	320	3616.33	U I
560	3591.81	Dy II	300	3600.91	Nd II	5	3608.88	K II	3100	3616.56	Er II
490	3592.02	V II	11	3600.94	Fe III	980	3609.445	Th II	250	3616.57	Os I
560	3592.11	Dy II	540 c	3600.95	Ho II	40	3609.48	Cr I	320	3616.58	Tb II
630 c	3592.23	Ho II	540	3600.96	Gd II	3400	3609.49	Sm II	10000	3616.62	Bk
80	3592.42	W II	390	3601.034	Th II	250	3609.53	Tm II	320	3616.76	U II
560	3592.53	V I	10000	3601.12	Bk I	20000	3609.55	Pd I	800	3616.89	Hf I
300	3592.59	Nd II	3500	3601.19	Zr I	10000	3609.61	Bk	320	3617.08	Re I
4200	3592.60	Sm II	180	3601.39	F II	550	3609.69	Ce II	400	3617.118	Th II
1100	3592.71	Gd II	870	3601.63	Al III	220	3609.77	Ir I	430	3617.16	Gd II
270	3592.780	Th I	350	3601.67	Cr I	320	3609.79	Nd II	190	3617.21	Ir I
2800	3592.92	Y I	340	3601.69	Sm II	40	3610.05	Cr I	110	3617.43	Sc I
8	3592.96	Er III	150	3601.72	Mn III	250	3610.16	Fe I	10000	3617.49	Cf I
6900	3593.02	Ru I	190	3601.83	Os I	600	3610.16	Ti I	1900	3617.52	W I
270	3593.33	V II	6200	3601.92	Y II	50	3610.23	Yb II	50	3617.57	Te II
200	3593.44	Gd II	550	3601.93	Al III	360	3610.30	Mn I	110	3617.68	Hf I
200	3593.47	Tc I	1400	3602.03	Cu I	15	3610.32	Xe I	150	3617.788	Fe I
17000	3593.49	Cr I	1600	3602.08	Co I	1300	3610.46	Ni I	510	3617.85	Er II
460	3593.52	U II	900	3602.10	Cl III	160	3610.49	Re I	380	3617.86	Tb II
50	3593.526	Ne I	500	3602.56	Nb I	1000	3610.508	Cd I	600	3617.96	Tm III
30	3593.640	Ne I	40	3602.57	Cr I	830	3610.76	Gd II	15	3617.97	V V
500	3593.97	Nb I	360	3602.82	Dy II	200	3610.76	Pm II		3618.	Li I
6	3594.10	F I	190	3602.84	F II	220	3610.91	Gd II	3000	3618.07	Pa I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
410	3618.43	Ho I	430 c	3626.69	Ho II	28	3635.14	Mo II	170 d	3641.53	La I
6	3618.49	K II	370	3626.74	Ru I	3000 c	3635.15	Tc I		3641.66	La II
440	3618.51	Dy II	10000 s	3626.76	Cf II	95	3635.20	Ti I	670	3641.66	Tb II
1500	3618.768	Fe I	850	3627.01	Sm II	400	3635.27	Dy II	220	3641.83	Cr I
510	3618.92	Er II	130	3627.24	W I	100	3635.43	Hf I	500	3642.06	Ta I
200	3618.94	Tc I	490	3627.25	Ho II	1000	3635.43	Mo I	210	3642.248	Th I
300	3618.96	Nd II	1000 c	3627.36	Tc I	4800	3635.46	Ti I	6600	3642.68	Ti I
290	3619.28	Mn I	10000	3627.61	Bk I	270	3635.943	Th I	13000	3642.79	Sc II
10000	3619.37	Bk	95	3627.80	Rh I	10000 c	3636.07	Tc I	100	3643.	Bi IV
6600	3619.39	Ni I	1000	3627.81	Co I	220	3636.20	Ir I	70	3643.17	Pt I
120	3619.43	Os I	720	3628.04	Er I	680	3636.25	Lu I	80	3643.61	Co II
300	3619.51	Nb II	120	3628.11	Pt I	1	3636.31	Co III	950	3643.65	Tm II
380	3619.73	Tb II	660	3628.67	Ir I	10000	3636.52	Pa I	80	3643.717	Fe I
200	3619.80	Yb II	1900	3628.71	Y II	350	3636.59	Cr I	400	3643.92	Dy II
2	3620.08	Sn II	320	3628.83	La II	40 h	3636.83	Ba I	150	3643.93	Ne II
320	3620.08	U I	1000	3629.09	Tm III	240	3637.00	Nd II	420	3644.24	U I
560	3620.16	Dy II	310	3629.37	Er I	10000 l	3637.05	Bk I	800	3644.36	Hf II
390	3620.46	Gd II	1100	3629.42	Dy II	140	3637.06	Re I	20	3644.41	Ca I
200	3620.46	Rh I	380	3629.44	Tb II	120	3637.15	La II	40	3644.46	Te II
6	3620.54	Sn II	250	3629.51	Gd II	240	3637.23	Nd II	110	3644.71	V I
240	3620.58	Sm II	140	3629.74	Mn I	360	3637.28	Dy II	14	3644.77	Ca I
4300	3620.94	Y I	200	3629.84	Pm II	210	3637.47	Ru I	8	3644.99	Ca I
200	3621.03	Nb I	4000	3630.24	Dy II	450	3637.6	Se III	100 h	3645.02	Au I
100	3621.21	Co II	200	3630.39	Tc I	240	3637.76	Yb II	310	3645.03	U II
1700	3621.23	Sm II	40	3630.64	Ba I	25	3637.80	Sb II	6 h	3645.12	Si III
160	3621.46	Re I	460	3630.73	U II	250	3637.83	Sb I	360	3645.29	Sm II
200	3621.462	Fe I	17	3630.75	Ca I	810	3637.84	Re I	6600	3645.31	Sc II
10000 s	3621.81	Bk	20000	3630.75	Sc II	300	3637.90	Au I	300	3645.39	Sm II
150	3622.004	Fe I	320	3630.87	Hf II	120	3637.97	Ti I	11000	3645.40	Dy II
25	3622.138	Ar II	170	3630.96	Pr II	840	3638.20	U I	1000	3645.42	La II
440	3622.15	Ce II	14	3630.97	Ca I	1000	3638.22	Tc I	100	3645.55	Pr II
160	3622.34	W I	300	3631.02	Nd II	100	3638.298	Fe I	870	3645.62	Gd II
95	3622.54	Eu II	100	3631.096	Fe I	430 c	3638.30	Ho II	250	3645.66	Pr II
8 h	3622.54	Si III	850	3631.13	Sm II	380	3638.41	Tm I	240	3645.78	Nd II
700	3622.69	Cl III	200	3631.19	Ce II	670	3638.46	Tb II	360	3645.86	Dy II
320	3622.70	U I	1200	3631.27	Na II	70	3638.644	Th I	900	3645.94	Er II
30	3622.74	Au I	100 h	3631.31	Au I	1600	3638.68	Er I	45	3646.16	Cr I
390	3623.06	U II	1200	3631.463	Fe I	410	3638.77	Sm II	6100	3646.19	Gd II
40	3623.1	Xe III	430 c	3631.76	Ho II	70	3638.79	Pt I	180	3646.20	Ti I
150	3623.19	Fe I	200	3631.889	Kr II	200	3638.85	Tc I	400 c	3646.26	Rb II
200	3623.23	Mo I	320	3631.94	W I	110	3639.02	V I	250	3646.30	Pr II
240	3623.32	Sm II	160	3632.0	S III	220	3639.05	Gd II	80	3646.52	W II
10 h	3623.49	Ag I	60	3632.041	Fe I	200	3639.33	Nb I	110	3646.90	Sc I
380	3623.74	Ce II	95	3632.18	Eu II	900	3639.38	Tc I	350	3646.97	Ce II
220	3623.79	Mn I	10000	3632.21	Pu II	100	3639.42	Cu III	440	3647.06	Tb II
440	3623.84	Ce II	440	3632.78	Dy II	5 h	3639.45	Si III	350 c	3647.56	Rb II
1100	3623.86	Zr I	140	3632.831	Th I	310	3639.51	Rh I	240	3647.72	Tm II
270	3623.970	Th II	130	3632.84	Cr I	50000 r	3639.568	Pb I	260	3647.75	Ce II
800	3623.99	Lu II	6	3633.06	Xe I	630	3639.80	Cr I	570	3647.75	Tb II
110	3624.00	Hf II	7800	3633.12	Y II	600 c	3639.80	Rb II	2600	3647.77	Lu I
600	3624.08	Xe III	10	3633.22	Au II	20	3639.833	Ar II	1500	3647.842	Fe I
15	3624.11	Ca I	10000	3633.28	Bk	3	3639.87	Au I	260	3647.95	Ce II
470	3624.27	Dy II	670	3633.29	Tb II	10000	3639.94	Cm I	1000 c	3648.04	Tc I
1400	3624.46	Mo I	1000	3633.54	Er II	250	3640.18	Gd II	70	3648.15	Yb I
50 h	3624.68	Ag I	20	3633.665	Ne I	400	3640.23	Tc I	340	3648.20	Nd II
130	3624.73	Ni I	320	3634.15	Zr I	240	3640.24	Nd II	100	3648.30	Pr II
190	3624.82	Ti II	300	3634.20	Pm II	1100	3640.25	Dy II	85	3648.53	Cr I
270	3624.89	Gd II	1	3634.21	Co III	10000	3640.26	Bk I	1000	3648.78	Dy II
450	3624.90	Gd III	2	3634.23	He I	450	3640.33	Os I	3	3648.84	K I
350	3625.20	Ru I	3400	3634.29	Sm II	200	3640.389	Fe I	4	3648.98	K I
810	3625.54	Tb II	340	3634.30	Nd II	85	3640.39	Cr I	220	3649.00	Cr I
390	3625.627	Th II	110	3634.52	Yb	200	3640.64	Ru I	10	3649.09	Au I
160	3625.91	Re I	30	3634.53	Au I	310	3640.76	U II	320	3649.10	Hf I
330	3626.18	Mo I	510	3634.67	Er I	10000 s	3640.93	Bk II	25	3649.18	Ba III
160	3626.29	Ir I	20000	3634.70	Pd I	190	3641.33	Ti II	310	3649.44	Gd II
4	3626.42	K II	330	3634.76	Gd II	30	3641.34	Kr III	240	3649.46	Nd
570	3626.50	Tb II	240	3634.93	Sm II	330	3641.39	Gd II	250	3649.506	Fe I
1800	3626.59	Rh I	3100	3634.93	Ru I	240	3641.41	W II	660	3649.53	Sm II
980	3626.62	Ta I	10	3635.12	Au I	70	3641.47	Cr I	100	3649.55	Ra II

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
20	3649.558	Cd I	1000 c	3658.59	Tc I	120	3666.31	Os I	800	3674.72	Zr II
170	3649.735	Th I	50	3658.808	Th I	290	3666.54	Sc II	140	3674.76	Rh I
420	3649.85	Nb I	2000	3658.88	Tb II	95	3666.64	Cr I	450 c	3674.77	Ho II
2800	3650.15	Hg I	960	3659.15	U I	720	3666.65	Ho I	270	3674.78	Nb I
2800	3650.157	Hg I	440	3659.23	Ce II	290	3666.72	Mo I	200	3674.85	Pm I
390	3650.18	La II	300	3659.39	Pm II	350	3666.72	Rb II	320	3674.98	Ir I
340	3650.19	Sm II	10000	3659.46	Cf	400	3666.84	Dy I	140	3675.08	Yb II
80	3650.279	Fe I	200	3659.61	Nb II	180	3666.91	Rh I	55	3675.26	Sc II
290	3650.32	Ru I	100	3659.629	Th I	2	3667.52	Co III	5	3675.29	Ca I
2000	3650.40	La IV	120	3659.76	Ti II	250	3667.74	V I	120	3675.45	Os I
2300	3650.40	Tb II	30	3659.84	Yb III	340	3667.93	Sm II	160	3675.55	W I
520	3650.41	Er II	350	3659.97	Ce II	1400	3667.97	Ho I	700	3675.567	Th II
240	3650.42	Nd II	150 c	3660.36	Pr II	880	3667.98	Ce II	10000 l	3675.59	Bk I
100	3650.74	Au I	630	3660.37	Nb I	55	3668.03	Cr I	300	3675.66	Rb II
250	3650.81	Nb I	100	3660.40	Mn I	1100	3668.09	Tm II	280	3675.70	V I
450	3650.95	Gd II	380	3660.63	Ti I	140	3668.140	Th I	480	3675.74	Hf I
220	3651.06	Al II	880	3660.64	Ce II	12	3668.17	F I	20	3675.78	Yb III
15	3651.07	Cs II	140	3661.05	Hf II	100	3668.21	Hf I	100	3676.311	Fe I
110	3651.10	Al II	260	3661.20	Zr I	45	3668.49	Y II	65	3676.32	Cr I
400	3651.19	Nb II	6200	3661.35	Ru I	370	3668.83	Pr II	3800	3676.35	Tb II
200	3651.467	Fe I	2200	3661.36	Sm II	380	3668.97	Ti I	2200	3676.59	Dy II
600	3651.47	Tc I	400 c	3661.45	Tc I	150	3669.01	Kr II	50	3676.65	Ge IV
660	3651.54	U I	100	3661.62	Pr II	220	3669.01	Nb I	50	3676.67	Xe III
5300	3651.80	Sc II	300	3661.71	Ir I	470	3669.02	Er II	170	3676.68	V I
200	3651.84	Hf I	280	3661.86	Rh I	320	3669.05	Ho II	70	3676.96	Mn I
440	3651.97	Re I		3662.	Li I	300 r	3669.22	Pm I	2	3677.23	Co III
490	3652.06	U I	70	3662.0	S III	130	3669.24	Ni I	150	3677.629	Fe I
620	3652.54	Gd II	170	3662.08	La II	110	3669.41	V II	40	3677.68	Cr II
360	3652.58	Er II	190	3662.24	Ti II	650	3669.49	Ru I	340	3677.79	Sm II
500	3652.87	Er II	1400	3662.26	Gd II	450	3669.52	Ho I	55	3677.89	Cr II
420	3653.11	Ce II	470	3662.26	Nd II	240	3669.69	Yb II	300	3677.89	Tb II
410	3653.15	Nd II	1600 c	3662.29	Ho I	120	3669.78	Re I	410	3677.98	Tm II
7200	3653.50	Ti I	220	3662.69	Sm II	10	3669.91	Xe I	240	3678.18	Nd II
10	3653.53	Au I	10000	3662.70	Cf I	280	3669.968	Th I	6	3678.21	Ca I
180	3653.58	Pr III	1000 c	3662.74	Rb II	120	3670.024	Fe I	45	3678.26	Eu II
600	3653.61	Tm II	45	3662.84	Cr I	2800	3670.07	U II	240	3678.32	Ru I
660	3653.67	Ce II	80	3662.88	Hg I	150	3670.089	Fe I	40	3678.35	Sc II
170	3653.91	Cr I	80	3662.883	Hg I	700	3670.28	Cl III	640	3678.51	Dy I
250	3653.928	Kr II	430	3662.99	Ho I	180	3670.43	Ni I	200	3678.51	Pm II
240	3654.16	Nd	50	3663.10	Pt I	70	3670.52	Mn I	380	3678.75	U II
12	3654.2	Bi II	450	3663.12	Tb II	320	3670.53	Re I	450 d	3678.85	Tm II
310	3654.40	Ru I	220	3663.202	Th I	340	3670.66	Sm II	1000	3679.15	Tc I
230	3654.49	Os I	130	3663.21	Cr I	50	3670.69	Yb II	720	3679.19	Ho I
290	3654.59	Ti I	240	3663.28	Hg I	2200	3670.84	Sm II	350	3679.21	Gd I
3900	3654.62	Gd II	240	3663.281	Hg I	480	3670.89	Os I	20	3679.26	Te II
3	3654.69	Au I	830	3663.37	Ru I	2000	3671.20	Gd II	220	3679.42	Ce II
300	3654.839	Hg I	250	3663.59	V I	170	3671.20	V I	100	3679.559	Kr I
300	3654.84	Hg I	1100	3663.65	Zr I	390	3671.27	Zr II	670	3679.70	Ho I
350	3654.87	Rh I	30	3663.74	Yb III	200	3671.36	Po	40	3679.82	Cr I
810	3654.88	Tb II	900 c	3663.81	Rb II	20000	3671.491	Pb I	300 r	3679.85	Pm I
310	3654.97	Ce II	200	3664.07	Ne II	600	3671.67	Ti I	100	3679.86	V III
150	3654.98	Al II	200	3664.10	Ni I	80	3671.99	Pt I	1500	3679.913	Fe I
290	3655.00	Al II	110	3664.25	Sc II	220	3672.18	Ce I	15	3680.10	Cs II
10	3655.30	Au I	10000	3664.34	Cm I	200	3672.27	Hf I	300	3680.11	V I
90	3655.73	Yb I	360	3664.45	Er I	990	3672.30	Dy II	300	3680.32	Tc I
40	3655.78	Sn I	2700	3664.60	Gd II	540	3672.36	Nd II	1300	3680.60	Mo I
1800	3655.85	Ce II	3000	3664.61	Y II	420	3672.70	Dy II	3	3680.74	Co III
3100	3656.15	Gd II	700	3664.62	Dy II	350	3672.79	Ce II	560	3681.04	Rh I
340	3656.22	Sm II	300	3664.62	Ir I	590	3672.82	Mo I	10000 s	3681.22	Bk II
220	3656.26	Cr I	900	3664.70	Nb I	5000	3673.12	Am I	60	3681.35	Co II
10	3656.75	Co II	200	3664.74	Yb III	400	3673.14	Dy II	7 h	3681.40	Si III
10	3656.90	Au I	540	3664.81	Mo I	45	3673.19	Eu II	6	3681.54	K II
330	3656.90	Os I	200	3664.92	Tc I	280	3673.40	V I	19	3681.69	Cr I
700	3656.95	Cl III	540	3665.18	Nd II	580	3673.54	Nd II	270	3681.73	Sm II
400	3657.35	Mo I	80	3665.324	Kr I	80	3674.04	Pt I	100	3682.	Bi IV
80	3657.59	W II	220	3665.35	Hf II	1000	3674.05	Gd I	700	3682.05	Cl III
8200	3657.99	Rh I	500	3665.81	Tm II	1400	3674.08	Dy II	650	3682.08	W I
660	3658.10	Ti I	45	3665.98	Cr I	260	3674.15	Ni I	50	3682.09	Mn I
210	3658.19	Gd I	1300	3666.22	Rh I	45	3674.63	Eu II	5 h	3682.15	Si III

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
2200	3682.24	Hf I	120	3689.477	Fe I	300	3697.50	Pm II	1800	3704.70	V I
200	3682.242	Fe I	860 c	3689.50	Re I	410	3697.56	Nd II	300	3704.80	Tc I
20	3682.243	Ne I	410	3689.69	Nd II	300 r	3697.63	Pm I	330	3704.85	Tm II
810	3682.26	Tb II	100	3689.71	Pr II	380	3697.68	Er I	100	3704.92	Hf I
75	3682.46	Ag II	100	3689.73	Ta I	100	3697.71	Re I	240	3704.95	Nd II
150	3682.486	Th I	400	3689.79	Pm II	2000	3697.73	Gd II	220	3704.98	Ce II
30	3682.50	Ag I	600	3689.91	Ti I	1500	3697.85	Nb I	3	3705.00	He I
720	3682.65	Ho I	1000	3690.28	V I	150	3698.06	Pr II	100	3705.02	Re I
500	3682.70	Er II	5500	3690.34	Pd I	180	3698.105	Th I	570	3705.04	V I
120	3683.054	Fe I	50	3690.56	Yb II	960	3698.17	Zr II	10000	3705.26	Bk I
570	3683.13	V I	240	3690.59	Mo I	30	3698.18	Ti I	50 h	3705.35	V III
400	3683.30	W I	100	3690.624	Th I	990	3698.21	Dy II	120	3705.40	Hf II
80	3683.34	Ag II	580	3690.65	Ho I	280	3698.26	Rh I	600	3705.45	Cl III
	3683.39	W I	30	3690.65	Kr III	100	3698.40	Hf II	1200	3705.566	Fe I
70000 r	3683.462	Pb I	1900	3690.70	Rh I	60	3698.43	Ti I	320	3705.82	La II
30	3683.70	Ca II	610	3691.15	Tb II	380	3698.60	Rh I	2	3705.85	Ga II
160	3683.93	W I	1500 c	3691.48	Re I	70	3698.60	Yb II	3	3706.02	Pb III
320	3684.01	Er I	540	3691.92	U II	80	3698.70	O III	170	3706.03	Ca II
150	3684.107	Fe I	340	3691.95	Ho I	10000	3699.19	Pu II	210	3706.08	Mn I
2000	3684.13	Gd I	270	3692.22	Sm II	100	3699.48	Cs II	100	3706.11	Tm III
45	3684.22	Mo II	1500	3692.22	V I	10000 s	3699.49	Cf	140	3706.23	Ti II
380	3684.28	Er II	9400	3692.36	Rh I	2500 c	3699.58	Rb II	18	3706.53	Pt I
	3684.32	Li II	300	3692.50	Pm II	240	3699.72	Hf II	30	3706.55	Au II
60	3684.32	Lu I	170	3692.53	Y I	1300	3699.73	Gd II	120	3706.56	Os I
10000 l	3684.43	Bk I	170	3692.566	Th I	35	3699.91	Pt I	200	3706.70	Tc I
100 l	3684.57	Am II	180	3692.64	Mo II	410	3700.04	Ho I	10	3706.74	Mg III
5000	3684.74	Tc I	7900	3692.65	Er II	60	3700.08	Ti I	230	3706.75	Pr II
820	3684.85	Dy I	10000	3692.73	Bk I	450	3700.12	Tb I	480	3706.75	Sm II
430	3685.16	Ho II	300	3692.76	Tc I	4800	3700.26	Tm II	340	3706.767	Th I
3100	3685.20	Ti II	300	3692.95	Tb II	250	3700.47	Gd III	480	3706.98	Sm II
10000 s	3685.21	Bk I	40	3693.49	Xe I	540	3700.57	U II	60	3707.041	Fe I
120	3685.55	Cr I	250	3693.53	Br III	70	3700.58	Yb I	110	3707.24	O III
12	3685.736	Ne I	450	3693.58	Tb I	540	3700.72	Er II	600	3707.34	Cl III
1300	3685.78	Dy I	280	3693.67	Mn I	7600	3700.91	Rh I	330	3707.40	Dy II
1200	3685.80	Nd II	330	3693.70	U II	150	3701.086	Fe I	50	3707.53	Ti I
40	3685.90	Xe I	180 c	3693.91	In II	340	3701.15	Hf II	440	3707.57	Dy II
120	3685.96	Ti I	1	3693.93	Ga II	10	3701.225	Ne I	200	3707.63	Tc I
120	3685.998	Fe I	80	3693.93	Ni I	3800	3701.36	Tm II	520	3707.64	Er II
100	3686.18	Ta I	1100	3693.99	Sm II	30	3701.432	Hg I	150	3707.821	Fe I
80	3686.182	Kr II	150	3694.008	Fe I	30	3701.44	Hg I	100 l	3707.86	Am II
190	3686.26	V I	210	3694.03	Gd II	1100	3701.52	U II	300	3707.919	Fe I
720	3686.33	Gd II	40	3694.11	Ca II	540	3701.63	Dy II	810	3707.92	W I
1000	3686.555	Cu II	32000	3694.19	Yb II	70	3701.73	Mn I	95 c	3708.13	In II
10000 l	3686.74	Bk I	200	3694.21	Ne II	220	3702.03	Mo I	440	3708.22	Dy II
130	3686.80	Cr I	10	3694.36	Ca II	450	3702.11	Al III	200	3708.26	Tc I
250	3687.03	Pr II	140	3694.45	Ti I	120	3702.29	Ti I	480	3708.41	Sm II
200	3687.08	Ir I	410	3694.74	Tm II	490 c	3702.35	Ho II	930	3708.65	Sm II
150	3687.19	Pr II	4700	3694.81	Dy II	400	3702.63	Pm II	130	3708.72	V I
130	3687.25	Cr I	300	3694.81	Nd II	3000	3702.74	Pa I	120	3709.14	Os I
440	3687.30	Nd II	100	3694.88	Ac II	80	3702.75	O III	50 h	3709.20	Ag I
95	3687.35	Ti I	300	3694.91	Ce II	240	3702.84	Nd	600	3709.246	Fe I
500	3687.456	Fe I	1400	3694.94	Mo I	4700	3702.86	Tb II	720	3709.26	Zr II
470	3687.47	V I	60	3694.95	Rh I	500	3702.92	Cu III	1000	3709.29	Ce II
75	3687.54	Cr I	120	3695.051	Fe I	300	3703.12	Tb I	370	3709.30	Tb II
15	3687.64	Cs II	50	3695.32	Bi III	50	3703.229	Th I	110	3709.4	S III
200	3687.65	Pm II	5	3695.32	Co II	520	3703.24	Re I	10000	3709.43	Cm I
3100	3687.74	Gd II	450	3695.34	V I	190	3703.25	Os I	100	3709.62	Au I
570	3688.06	W I	10000	3695.37	Bk I	10000	3703.28	Bk I	150	3709.62	Ne II
1300	3688.07	V I	940	3695.52	Rh I	80	3703.37	O III	320	3709.76	Ho I
320	3688.15	Tb II	50	3695.68	Bi III	3800	3703.58	V I	1000	3709.93	Ce II
65	3688.31	Mo II	1000	3695.86	V I	800	3703.83	Tc I	240	3709.93	Re I
6400	3688.42	Eu II	450	3696.25	Er II	2400	3703.92	Tb II	290	3709.96	Ti I
160	3688.42	Ni I	1000 s	3696.42	Am II	10000 s	3704.02	Bk I	420	3710.07	Dy II
270	3688.42	Sm II	280	3696.51	Hf I	35	3704.17	Hg I	13000	3710.30	Y II
19	3688.46	Cr I	180	3696.57	Mn I	35	3704.170	Hg I	50	3710.34	Yb II
20 h	3688.47	Ba I	260	3696.59	Ru I	190	3704.30	Ti I	160	3710.35	F II
50	3688.658	Th I	320	3696.85	Tb II	80	3704.462	Fe I	60	3710.87	Eu II
250	3689.06	Os I	370	3697.31	Dy II	180	3704.53	F II	60	3710.95	Lu I
7	3689.31	Pb III	390	3697.46	Zr II	120	3704.54	La I	850	3711.07	Na II

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
170 c	3711.10	Pr II	410	3717.00	Ru I	410	3724.87	Nd II	360	3732.09	Ho I
10000 s	3711.14	Bk II	75 h	3717.10	Sc I	420	3724.90	Sm II	21	3732.20	Eu I
280	3711.305	Th II	360 c	3717.28	Re I	20000cw	3724.94	Eu II	140	3732.28	Re I
330	3711.34	Nb I	450	3717.40	Ti I	16	3724.94	Rh I	270	3732.32	Gd I
480	3711.54	Sm II	300	3717.42	U II	890	3725.06	Tm II	10000	3732.35	Cm I
330	3711.66	Dy II	2000	3717.48	Gd I	380	3725.16	Ti I	430	3732.39	Tb II
360	3711.7	Se III	35	3717.69	Eu II	140	3725.38	Ir I	150	3732.396	Fe I
800	3711.72	Pm II	160	3717.8	S III	10000	3725.39	Bk I	230	3732.45	Gd II
1000 d	3711.76	Tb II	1000	3717.80	Hf I	430	3725.47	Gd II	15	3732.54	Cs II
400	3711.91	Yb III	7700	3717.91	Tm I	60	3725.491	Fe I	350	3732.62	U II
1000	3712.26	Tc I	300 h	3718.02	Kr II	30	3725.66	Te II	230	3732.67	Gd I
520	3712.39	Er II	350	3718.11	U II	420	3725.68	Ce II	330 d	3732.71	Mo I
2700	3712.70	Gd II	60	3718.12	Y I	4000	3725.76	Re I	280	3732.76	V II
220	3712.75	O II	420	3718.19	Ce II	315 w	3725.93	O IV	270	3732.78	Nd II
350	3712.76	Sm II	35	3718.206	Ar II	10000	3725.98	Pu I	1	3732.86	He I
200	3712.81	Nd	120 c	3718.30	In II	500	3726.01	Pm I	120 c	3733.03	Pr II
300	3712.82	Tc I	420	3718.38	Ce II	550	3726.10	Ru I	350	3733.07	U II
430	3712.88	Ho I	410	3718.54	Nd II	10000	3726.11	Pu II	510	3733.08	Gd II
10000	3712.93	Bk I	200	3718.595	Kr II	2700	3726.24	Nb I	1200	3733.317	Fe I
75	3712.95	Cr II	3	3718.7	Li I	5000	3726.35	Tc I	200	3733.393	P IV
3300	3713.01	Nb I	160 c	3718.72	In II	140	3726.49	Hf I	50	3733.672	Th I
940	3713.02	Rh I	10000	3718.86	Tc I	20	3726.54	Cl I	460	3733.79	Hf I
250	3713.08	Ne II	930	3718.88	Sm II	10000	3726.79	Pu II	100	3734.	Bi IV
550	3713.12	Al III	1400	3718.91	Pd I	250	3726.90	Nd II	2400	3734.12	Tm II
60	3713.43	Rh I	130	3718.93	Mn I	8700	3726.93	Ru I	100	3734.34	Cs II
95	3713.45	Eu II	40	3719.16	Eu I	60	3727.093	Fe I	210 c	3734.41	Pr II
550	3713.54	La II	650	3719.28	Hf II	250	3727.11	Ne II	150	3734.43	V I
350	3713.55	U I	260	3719.33	Ru I	285	3727.33	O II	180	3734.69	Yb I
2000	3713.57	Gd I	320	3719.35	Er I	250	3727.34	V II	4	3734.85	Ga II
470	3713.70	Nd II	100	3719.39	W I	200	3727.36	Tc I	5000	3734.864	Fe I
230	3713.73	Os I	590	3719.435	Th I	10 h	3727.42	Ag I	240 c	3735.01	Re I
10	3713.982	Pb II	1800 d	3719.45	Gd II	500	3727.619	Fe I	650	3735.28	Rh I
1	3714.00	Li II	300	3719.45	Tb II	500	3727.69	Mo I	810	3735.31	Re I
290	3714.05	Pr II	210	3719.52	Os I	110	3727.902	Th I	120	3735.324	Fe I
5	3714.16	Li II	3719.53	Gd II	300	3728.00	Dy I	1000 d	3735.54	Nd II	
370	3714.20	Nd II	210	3719.80	Ce II	490	3728.02	Ce II	1000	3735.60	Nd II
6 d	3714.27	Li II	50	3719.836	Th I	11000	3728.03	Ru I	50	3735.67	Ti I
8	3714.29	Li II	8000	3719.935	Fe I	710	3728.13	Nd II	400	3735.75	Ba II
350	3714.30	Br II	230	3720.13	Os I	800	3728.42	Ce II	250	3735.76	Pr II
7 d	3714.40	Li II	100	3720.36	Be III	1600	3728.47	Sm II	1600	3735.98	Sm II
10	3714.41	Li II	800	3720.45	Cl III	5	3728.69	Pb III	50	3736.22	W II
1	3714.51	Li II	10000	3720.59	Pu I	55	3728.89	Mn I	100	3736.30	Be I
0	3714.58	Li II	450	3720.72	Ho I	10000	3729.00	Cm I	810	3736.35	Ho I
5	3714.73	Co II	3720.92	Be III	360	3729.03	O IV	190	3736.49	Pr II	
640 d	3714.73	Nd II	5	3721.34	K II	160	3729.10	Hf I	140	3736.76	Ta I
45	3714.83	Rh I	410	3721.35	Nd II	400 c	3729.18	Tc I	150	3736.81	Ni I
140	3714.87	La II	150	3721.350	Kr II	70	3729.309	Ar II	410	3736.85	O IV
95	3714.90	Eu II	140	3721.64	Ti II	1300	3729.52	Er II	180	3736.90	Ca II
250	3715.04	Nd II	200	3721.72	Pm II	45	3729.68	Eu II	440	3737.10	Nd II
110	3715.08	O III	770	3721.825	Th II	45	3729.74	Eu II	6000	3737.131	Fe I
6	3715.23	Sn II	930	3721.85	Sm II	2900	3729.82	Ti I	800	3737.14	Sm II
200	3715.39	Nd II	250	3722.07	Gd II	350	3729.82	U II	420	3737.27	Rh I
30	3715.40	Ti I	10000 l	3722.11	Cf II	650	3729.91	Tb II	280	3737.40	Ru I
320	3715.47	V II	220	3722.42	Nd II	7100	3730.43	Ru I	300	3737.42	Tc I
270	3715.53	La II	120	3722.48	Ni I	470	3730.58	Nd II	320	3737.48	Sm II
220	3715.65	Mo I	1500	3722.563	Fe I	130	3730.81	Cr I	160	3737.88	Hf II
600	3715.67	Er III	330	3722.57	Ti I	1500	3730.84	Gd II	50	3737.889	Ar II
470	3715.68	Nd II	20	3722.78	Sb II	130	3731.02	Ta I	600	3738.04	U II
200	3715.75	Pm II	200 r	3722.79	Sb I	10	3731.10	Ga III	1000	3738.06	Nd II
500	3715.94	Tc I	3722.98	Be III	450	3731.26	Er II	45	3738.08	Eu II	
60	3716.08	W II	160 c	3723.40	In II	2100	3731.26	Sm II	540	3738.16	Er II
380 w	3716.14	In II	780	3723.50	Nd II	270	3731.26	Zr II	100	3738.306	Fe I
1400	3716.36	Gd II	1500	3723.67	Tc I	200	3731.36	Ir II	270	3738.42	Nb I
1400	3716.37	Ce II	60	3724.21	Yb II	1100	3731.40	Ho I	200	3738.43	Pm I
120	3716.442	Fe I	120	3724.377	Fe I	500	3731.74	Tc I	130	3738.53	Ir I
40	3716.53	Cr I	2000	3724.40	Tc I	140	3731.87	Re I	60	3738.61	Y I
5	3716.60	K II	1600	3724.45	Dy II	130	3731.93	Mn I	450	3738.7	Se III
35	3716.94	Eu II	2	3724.51	Ge III	150	3732.03	Cr I	30	3738.90	Sb III
480	3716.99	Nb I	600	3724.57	Ti I	10000	3732.03	Pu II	60	3738.90	Ti I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
120	3739.04	Hf I	620	3744.83	Gd I	650	3752.569	Th II	1000	3758.54	Tc I
2900	3739.12	Sm II	230	3744.89	O IV	350	3752.66	U II	930	3758.95	Nd II
5	3739.13	K II	100	3744.98	Hf II	370	3752.67	Nd II	660	3758.97	Sm II
410	3739.18	Pr II	400	3745.01	Tc I	3000	3752.67	Pa I	820	3759.00	Gd II
	3739.20	Sm II	650	3745.04	Tb I	5200	3752.86	Ti I	2400	3759.08	La II
60	3739.23	Ni I	10000	3745.40	Bk I	20 h	3753.14	Ag I	350	3759.24	U II
930	3739.34	Dy I	300cw	3745.44	Re I	250	3753.18	Nb I	3300	3759.30	Ti II
10000	3739.35	Cf I	930	3745.46	Sm I	140	3753.22	Hf I	650	3759.35	Tb I
10	3739.38	Ca II	1100	3745.50	Co I	9	3753.34	Ca I	140	3759.60	Pr II
200	3739.43	Er III	6000	3745.561	Fe I	1400	3753.51	Dy II	300	3759.79	Nd II
410	3739.46	Ru I	2800	3745.59	Ru I	760	3753.54	Ru I	1200	3759.84	Ru I
160	3739.57	F II		3745.60	Sm II	10000	3753.63	Pu I	250	3759.87	O III
490	3739.76	Gd I	230	3745.80	V II	600	3753.64	Ti I	370	3760.03	Ru I
2700	3739.80	Nb I	500	3745.86	Pm II	20	3753.65	Rn I	350	3760.04	Sm II
10	3739.89	Rn I	1200	3745.899	Fe I	320 c	3753.73	Ho II	400	3760.05	Fe I
10000	3739.92	Bk I	560	3745.98	Zr II	1400	3753.75	Dy II	120	3760.08	Pr II
160	3739.92	O II	1000	3746.15	Tc I	240	3754.12	Rh I	680	3760.13	W I
25000	3739.935	Pb I	350	3746.33	Rb II	80	3754.245	Kr II	1000	3760.40	Rh I
330	3740.02	Gd II	130	3746.36	Ta I	380	3754.27	Rh I	1900	3760.69	Sm II
910	3740.10	Re I	12 d	3746.36	V V	4000	3754.37	Tc I	620	3760.71	Gd II
140	3740.41	Re I	680	3746.42	U II	2	3754.40	I III	290	3760.92	Gd II
300	3740.68	Pm I	180	3746.47	Os I	110	3754.52	Ta I	260	3761.12	Eu II
670	3740.73	Nb II	400	3746.80	Hf I	2	3754.55	I III	350	3761.14	Tb I
150	3740.99	Pr II	5000	3746.84	Tc I	150	3754.67	O III	2900	3761.32	Ti II
9	3741.05	Sr IV	300	3747.09	Pm II	90	3754.67	N III	6000	3761.33	Tm II
3300	3741.06	Ti I	350	3747.14	U II	20	3754.69	Co II	600	3761.51	Ru I
340	3741.10	Er II	870	3747.17	Tb II	250	3754.83	Nd II	200	3761.68	Pm I
1300	3741.183	Th II	530	3747.20	Ir I	310	3755.09	Ru I	2000	3761.81	Tc I
800	3741.29	Sm II	870	3747.34	Tb II	1100	3755.24	Tb II	680	3761.87	Pr II
350	3741.31	Eu II	900	3747.43	Er I	800	3755.28	Sm II	50	3761.89	Ti II
270	3741.42	Nd II	310	3747.539	Th I	200	3755.43	Ce II	4800	3761.91	Tm II
200	3741.638	Kr II	90	3747.54	N IV	350	3755.48	U II	870	3762.20	Gd I
330	3741.64	Ti II	1200	3747.55	Y II	490	3755.58	Rh I	8	3762.44	Si IV
120	3741.71	W I	480	3747.62	Sm II	370	3755.60	Nd II	1	3762.50	Co III
270	3741.78	Nb I	1200	3747.82	Dy II	20	3755.67	Ca II	660	3762.59	Sm II
100 h	3741.94	Hf III	10000	3747.86	Cm I	210	3755.77	Nb I	300	3762.98	Ce II
200	3742.14	I II	320	3748.06	Ce II	870	3755.93	Ru I	10000	3763.05	Cm I
130	3742.26	Re II	160	3748.10	Ti I	10000	3755.94	Pu I	330	3763.26	U I
240	3742.28	Mo I	3200cw	3748.17	Ho II	540	3756.05	Er I	210	3763.33	Gd II
3500	3742.28	Ru I	1200	3748.22	Rh I	800	3756.41	Sm I	930	3763.47	Nd II
1700	3742.39	Nb I	3000	3748.262	Fe I	300 s	3756.67	Ac II	530	3763.49	Nb I
300	3742.52	Pm II	400	3748.27	Cu III	110	3756.70	Lu I	1500	3763.788	Fe I
900	3742.64	Er II	6	3748.35	Ca I	110	3756.79	Lu I	680	3764.12	Ce II
870	3742.78	Ru I	55	3748.61	Cr I	310	3756.86	Tm II	370	3764.20	Gd II
95	3742.97	Cr I	950	3748.68	U II	1200	3757.05	Dy I	1100	3764.37	Sm II
300 r	3742.97	Pm I	800	3748.81	Cl III	100	3757.12	Os I	480	3764.39	Zr I
285	3743.0	Se III	80	3748.964	Fe I	50	3757.17	Cr I	490	3764.57	U II
10000	3743.05	Bk I	340	3749.00	Cr I	80	3757.21	O III	230	3764.77	Pr II
430	3743.09	Tb	3000	3749.485	Fe I	10000	3757.35	Bk I	200	3765.04	Ce II
400	3743.362	Fe I	360	3749.49	O II	4700	3757.37	Dy II	100	3765.05	Hf I
4500	3743.47	Gd II	200	3749.85	Nd II	430	3757.44	Tb II	350	3765.08	Nb I
80	3743.47	Fe I	50	3749.89	Y I	1200	3757.53	Sm II	2300	3765.08	Rh I
100	3743.56	Eu II	1200	3749.96	Cl II	230	3757.66	Cr I	1700	3765.14	Tb I
480	3743.58	Cr I	10000	3750.08	Bk I	140	3757.69	Ti II	110	3765.240	Th I
1200	3743.87	Sm II	500	3750.09	Pm II	140	3757.694	Th I	150	3765.270	Ar II
570	3743.88	Cr I	8	3750.29	Ca I	230	3757.74	Gd II	400	3765.54	Fe I
120	3743.98	Pr II	320	3750.31	Nd II	510	3757.82	Nd II	100	3765.56	Hf I
110	3744.00	O III	210	3750.87	V II	10000	3757.82	Pu I	300	3765.75	Pm I
5000	3744.06	Tm I	190	3750.98	Pr II	10000	3757.85	Bk I	95	3765.93	Eu II
420	3744.17	Rh I	600	3751.17	U I	430 d	3757.90	Tb II	50	3766.119	Ar II
280	3744.22	Ru I	15	3751.40	Cs II	510	3757.92	W I	250	3766.13	Nb I
300	3744.25	U II	250	3751.45	Ce II	1000	3757.94	Gd I	800	3766.26	Ne II
80	3744.37	Mo II	880	3751.60	Zr II	60	3758.04	Cr I	130	3766.30	Os I
410	3744.40	Ru I	1700	3751.81	Tm I	1500	3758.232	Fe I	60	3766.45	Ti I
5	3744.42	K II	10000	3751.91	Bk I	1400	3758.31	Gd II	140	3766.48	Re I
85	3744.49	Cr I	600	3752.06	Cu III	10000	3758.34	Pu I	300	3766.59	Nd II
800	3744.70	Cu III	1000	3752.13	Tc I	490	3758.35	U I	10	3766.61	Au I
10000	3744.78	Pu I	580	3752.49	Nd II	30	3758.39	Ca II	480	3766.72	Zr I
150	3744.80	Kr II	3700	3752.52	Os I	450	3758.45	Sm II	340	3766.82	Zr II

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
430	3766.89	U I	85	3776.271	Th I	430	3783.84	U II	130	3792.14	Cr I
170	3766.92	Hf II	40	3776.3	Xe III	500	3784.06	Tc I	1300	3792.18	Rh I
870	3767.04	Gd II	250	3776.34	Nd II	2400	3784.25	Nd II	390	3792.20	Tb I
600	3767.191	Fe I	60	3776.452	Fe I	3000	3784.29	Ce III	10000	3792.22	Pu I
600	3767.35	Ru I	300	3776.48	U I	270	3784.73	Nd II	300	3792.32	Ce II
6	3767.36	K II	2100	3776.49	Tb II	10000	3785.38	Bk I	490	3792.39	Gd II
480	3767.36	Sm II	1400	3776.56	Y II	330	3785.41	Dy II	70 h	3792.5	Bi II
24	3767.43	Cr I	250	3776.61	Ce II	350	3785.42	Cs II	210	3792.51	Pr II
640	3767.63	Dy I	10000	3776.71	Pu I	1400	3785.46	Hf I	170	3792.76	W I
480	3767.76	Sm II	210	3776.83	Gd I	150	3785.46	Pr II	500	3792.79	Er I
120	3768.14	Os I	1000	3776.97	Cu III	340	3785.600	Th II	570	3793.10	U II
260	3768.24	Cr I	290	3776.99	Os I	10000	3785.61	Cf I	3800	3793.22	Rh I
200	3768.25	Hf I	110	3777.10	Ta I	250	3785.95	Fe I	380	3793.26	U I
120	3768.26	Re I	1000	3777.13	Ne II	840	3786.04	Ti I	120	3793.29	Cr I
8700	3768.39	Gd II	500	3777.27	Tc I	3900	3786.06	Ru I	650	3793.37	Hf II
1000	3768.45	W I	5000 I	3777.50	Am II	200	3786.06	Tc I	600	3793.55	Tb
95	3768.73	Cr I	1500	3777.59	Ru I	3300	3786.18	Dy II	380	3793.57	U II
300	3768.76	Ce II	140	3777.62	Pr II	30 h	3786.18	Lu I	120	3793.79	Ir I
5000	3768.77	Tc I	1400	3777.64	Hf I	150	3786.270	Cu II	130	3793.88	Cr I
230	3768.94	Pr II	140	3777.66	Re I	860	3786.63	Ce II	370	3793.91	Os I
340	3769.09	Ho I	500	3778.089	Kr II	100	3786.68	Fe I	8	3793.95	Tl II
120	3769.21	W I	380	3778.13	Rh I	1800	3786.84	Er II	1600	3793.97	Sm II
620	3769.45	Gd II	1100	3778.14	Sm II	150	3786.86	Pr II	150	3794.34	Fe I
330	3769.53	U II	270	3778.68	V I	1700	3787.06	Nb I	85	3794.61	Cr I
510	3769.65	Nd II	330	3779.22	Tb	320	3787.20	Sm II	6	3794.72	Li I
120	3769.86	W I	500	3779.35	Cl III	410 d	3787.22	Tb II	3900	3794.78	La II
490	3769.97	Rh I	2000	3779.37	Tc I	700	3787.52	Re I	240	3794.92	Ru I
180	3770.056	Th I	710	3779.47	Nd II	1100	3787.56	Gd II	190	3794.93	Pr II
550	3770.10	Yb I	220	3779.77	Mo I	560	3787.86	Er II	1100	3794.96	V I
20	3770.369	Ar I	580	3780.40	Nd II	250	3787.880	Fe I	400	3795.002	Fe I
360	3770.45	Mo I	720	3780.54	Zr I	320	3788.08	Ho II	380	3795.16	Tm II
20	3770.520	Ar II	170	3780.66	Pr II	1500	3788.12	Sm II	170 w	3795.21	In II
1400	3770.69	Gd II	120	3780.67	La II	10000	3788.21	Bk I	20	3795.37	Ar III
210	3770.76	Ce II	3000 c	3780.68	Tc I	1600	3788.44	Dy II	85	3795.386	Th I
10	3770.76	Au I	380	3780.71	U II	1000	3788.47	Rh I	340	3795.45	Nd II
210	3770.97	V II	10000	3780.72	Bk I	7400	3788.70	Y II	400	3795.66	Pm II
3000	3771.03	Tc I	660	3780.76	Sm II	520	3788.75	Ce II	7100	3795.75	Tm II
120	3771.05	N III	300	3780.77	Pm I	40	3788.76	Eu II	70	3795.90	Ti I
10000 s	3771.06	Bk II	1000	3780.77	W I	95	3788.86	Cr I	100	3796.01	Au I
330	3771.11	Dy I	25	3780.840	Ar II	10000 I	3789.04	Cf II	25	3796.11	Si III
250	3771.26	Gd I	420	3780.93	Sm II	100	3789.167	Th I	10000	3796.21	Bk I
300	3771.60	Ce II	50	3780.966	Th I	120	3789.30	Ti I	5100	3796.37	Gd II
600	3771.66	Ti I	410	3781.01	Er II	410	3789.92	Tb I	160	3796.59	Re I
530	3771.85	Nb I	870	3781.01	Nb I	250	3790.092	Fe I	8900 c	3796.75	Ho II
50	3772.649	Th I	300	3781.02	Xe III	620	3790.14	Os I	3500	3796.81	Rb II
170 c	3772.82	Pr II	10000	3781.17	Bk I	1300	3790.15	Nb I	560	3797.06	Er II
640	3773.05	Dy I	1000	3781.17	Cl II	260	3790.22	Mn I	10000	3797.12	Bk
6	3773.15	Si IV	460	3781.18	Ru I	520	3790.32	V I	140	3797.13	Cr I
370 d	3773.33	Sm I	510	3781.32	Nd II	95	3790.45	Cr I	40	3797.22	Te II
	3773.42	Sm II	60	3781.40	Eu II	6000	3790.51	Ru I	420	3797.28	Sm II
540	3773.43	U I	200	3781.43	Pm I	200	3790.63	Gd I	250	3797.30	Mo I
210	3773.45	Gd I	420	3781.47	Dy I	180	3790.73	Os I	200	3797.44	Tc I
340	3773.71	W I	360	3781.59	Mo I	800	3790.80	Cu III	120	3797.518	Fe I
170	3774.06	Pr II	620	3781.62	Ce II	3700	3790.83	La II	160	3797.59	Re I
40	3774.10	Eu I	2100	3782.20	Os I	770	3791.17	Gd II	200	3797.72	Cr I
80	3774.32	Yb I	15	3782.27	Co III	3500	3791.21	Nb I	1600	3797.73	Sm II
10000	3774.33	Y II	50	3782.30	Y II	110	3791.26	O III	1000	3797.77	Tc I
10000	3774.38	Pu I	1000	3782.34	Gd II	500	3791.28	Tc I	170	3797.849	Cu II
120	3774.40	Os I	440	3782.52	Ce II	130	3791.38	Cr I	760	3798.05	Ru I
110	3774.62	Os I	600	3782.74	Ru I	560	3791.40	Zr I	2700	3798.12	Nb I
370	3774.71	Dy I	1900	3782.84	U II	20 c	3791.41	Si III	29000	3798.25	Mo I
300	3775.42	Pm I	2900	3783.05	Gd I	10000	3791.42	Bk I	60	3798.31	Ti I
1400	3775.50	Nd II	500	3783.095	Kr II	45	3791.50	Eu II	250	3798.511	Fe I
600	3775.57	Ni I	6	3783.19	K II	340	3791.50	Nd II	770	3798.54	Tm I
70	3775.72	Rh I	700	3783.53	Ni I	300	3791.73	Tc I	10000	3798.63	Bk I
12000cw	3775.72	Tl I	600	3783.53	Tb I	60 h	3791.74	Yb I	100	3798.66	Hf I
10000	3775.75	Cm I	260	3783.55	Tm II	560	3791.83	Er II	240	3798.75	Tm II
30	3776.06	Ti II	200	3783.58	Ce II	700	3791.87	Dy II	1500	3798.76	Cl II
120	3776.25	Os I	300	3783.78	Nd II	110	3792.02	Ta I	7600	3798.90	Ru I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
5	3799.00	Zn I	140	3805.83	F II	470	3812.27	Dy I	100	3819.38	Hf I
130	3799.01	Eu II	760	3805.92	Rh I	10000	3812.30	Pu II	180	3819.56	Cr I
1500	3799.19	Pd I	10000	3805.93	Pu I	95	3812.45	Rh I	10	3819.607	He I
230 c	3799.21	In II	250	3806.06	Pm II	200	3812.53	Nd II	39000cw	3819.67	Eu II
55	3799.26	Mn I	140	3806.07	Hf II	600	3812.72	Ru I	240	3819.70	Nd II
4900	3799.31	Rh I	580	3806.27	Dy II	600	3812.964	Fe I	1	3819.76	He I
7600	3799.35	Ru I	50	3806.34	Zn II	60	3813.059	Fe I	230	3819.96	V I
10000	3799.37	Pu I	100	3806.38	Hg II	340	3813.068	Th II	1700	3820.20	Cl II
100	3799.41	Tm III	30	3806.54	Si III	900 c	3813.25	Ho II	450	3820.26	Br III
500	3799.54	Sm II	10	3806.60	Ga III	700	3813.45	Be I	2500	3820.425	Fe I
400	3799.547	Fe I	80	3806.696	Fe I	1000	3813.49	V I	300	3820.53	Pm II
240	3799.55	Nd II	3200	3806.72	Mn I	480	3813.63	Sm II	1300	3820.73	Hf I
200	3799.82	Ac II	1300	3806.76	Rh I	470	3813.67	Dy II	930 d	3820.82	Sm
570	3799.91	V I	190	3806.80	V I	380	3813.79	U II	150	3821.179	Fe I
3100	3800.12	Ir I	110	3806.83	Cr I	3700	3813.97	Gd II	230	3821.49	V I
6	3800.14	K II	760 d	3806.85	Tb II	380	3814.06	U II	300	3821.73	Ho II
50	3800.197	Th I	700	3807.14	Ni I	200	3814.42	Ra II	310	3821.80	Pr II
310	3800.26	Ru I	470	3807.23	Nd II	420	3814.63	Sm II	10	3821.85	Au I
680	3800.30	Pr II	50	3807.273	Th I	200	3814.67	Tc I	570	3822.01	V I
850 d	3800.38	Hf I	300	3807.50	V I	710	3814.73	Nd II	60	3822.03	Ti I
110	3800.55	Mn I	95	3807.54	Eu II	430	3814.74	Gd II	650	3822.09	Ru I
150	3800.67	Lu I	600	3807.72	Tm I	470	3815.01	Rh I	3800	3822.26	Rh I
800	3800.89	Sm II	190	3807.74	Re I	10000	3815.29	Bk I	560	3822.41	Zr I
450	3800.9	Se III	110	3807.93	Cr I	180	3815.43	Cr I	410	3822.47	Nd II
20	3800.92	Te II	1000	3808.11	Ce II	120	3815.50	Eu II	450	3822.89	V I
280 r	3801.02	Sn I	420	3808.46	Sm II	530	3815.51	Nb I	10000 s	3823.10	Bk II
20	3801.05	Pt	520	3808.52	V I	1200	3815.65	Br I	150 c	3823.18	Pr II
10000	3801.08	Bk II	310	3808.68	Ru I	120	3815.66	Re I	300	3823.21	V I
370	3801.12	Nd II	540	3808.77	Nd II	20	3815.8	Bi II	120	3823.41	O I
720	3801.29	Gd II	380	3808.92	U I	1500	3815.840	Fe I	2100	3823.51	Mn I
270	3801.30	Nb I	440	3809.06	Nd II	490	3815.85	Ce II	70	3823.52	Cr I
70	3801.36	Eu	600	3809.18	Cu III	1300 h	3816.02	Pr II	390	3823.89	Mn I
200	3801.38	Nd II	140	3809.18	Pr II	10000	3816.30	Cm I	470	3823.90	Ce II
2500	3801.52	Ce II	300 r	3809.20	Pm I	760	3816.47	Rh I	10000 s	3824.08	Bk II
30	3801.66	Hg I	490	3809.21	Ce II	6	3816.56	K II	530	3824.18	Sm II
30	3801.660	Hg I	380	3809.22	U II	770	3816.64	Gd II	80	3824.306	Fe I
330	3801.80	Tb II	290	3809.22	W I	200	3816.69	Ba II	2500	3824.444	Fe I
290	3801.84	Mo I	3	3809.30	Kr IV	90	3816.75	Mn I	300	3824.47	Tc I
2500	3801.90	Rb II	50	3809.456	Ar II	1400	3816.76	Dy II	670	3824.88	Nb I
55	3801.91	Mn I	1300	3809.46	Cl I	4000	3816.78	Er III	550	3824.93	Ru I
30	3801.92	Au I	45	3809.50	Rh I	300	3816.89	Tc I	75	3825.133	Th I
340	3802.30	Nd II	700	3809.59	Mn I	100	3817.20	Hf II	10000	3825.14	Cm I
10000 s	3802.35	Bk I	230	3809.60	V I	230	3817.24	Ir I	10000	3825.19	Bk I
10000	3802.47	Bk I	320	3809.75	Sm II	60	3817.25	Pr III	700	3825.68	Dy II
2700	3802.92	Nb I	320	3809.88	Sm II	760	3817.27	Ru I	10	3825.70	Au I
590	3803.075	Th I	1600	3810.33	Er I	550	3817.39	Tm II	10000 s	3825.84	Bk II
800	3803.09	Ce II	190	3810.38	W I	470	3817.46	Ce II	1500	3825.880	Fe I
160	3803.14	O II	420	3810.43	Sm II	1400	3817.48	W I	350	3826.05	Gd II
25	3803.172	Ar II	580	3810.49	Nd II	7	3817.50	K II	1600	3826.20	Sm II
1200	3803.47	Nd II	670	3810.49	Nb I	210	3817.58	Zr II	290	3826.39	Tm I
570	3803.47	V I	55	3810.69	Mn I	120	3817.66	Pr II	130	3826.42	Cr I
15	3803.51	Hg III	380	3810.72	Tm II	140 d	3817.84	V I	1200	3826.42	Nd II
670	3803.88	Nb I	8900 c	3810.73	Ho II	1300	3818.19	Rh I	750	3826.51	U II
30	3804.01	Au II	260	3810.79	W I	70	3818.22	Ti I	1000	3826.66	Rb II
200	3804.10	Nd II	400	3810.93	Pm I	1300	3818.24	V I	120	3826.67	Pr II
600	3804.13	Cu III	200	3810.94	Ag I	680	3818.28	Pr II	120	3826.68	Eu II
510	3804.14	Dy II	530	3811.03	Nb I	1300	3818.35	Y II	520	3826.70	Mo I
210	3804.39	Gd I	240	3811.06	Nd II	100	3818.43	Ne II	140	3826.921	Cu II
530	3804.74	Nb I	12	3811.1	Bi II	70	3818.48	Cr I	230	3827.33	Gd II
530	3804.80	Cr I	120	3811.33	Eu I	50	3818.685	Th I	10000	3827.41	Bk I
290	3804.84	Pr II	10000	3811.40	Pu I	80	3818.69	Pt I	10000	3827.57	Pu I
210	3805.09	Gd II	270	3811.77	Nd II	430	3818.75	Gd II	2800	3827.59	Cl II
500	3805.10	Cs II	320	3811.78	Hf I	210	3818.86	Nb II	1200	3827.823	Fe I
1900	3805.18	Cl II	50	3811.78	Ag I	100	3818.879	Cu II	240	3828.00	Nd II
200	3805.345	Fe I	390	3811.84	Pr II	300	3819.02	Ce II	240	3828.19	Ti I
2500	3805.36	Nd II	490	3811.86	Ho I	760	3819.03	Ru I	450	3828.384	Th I
560	3805.52	Gd II	1900	3811.99	U I	120	3819.14	Pr II	2300	3828.48	Rh I
340	3805.55	Nd II	500	3812.07	Sm II	210	3819.15	Nb I	500	3828.54	Tc I
320	3805.63	Sm II	250	3812.20	Ce II	200	3819.26	Pm II	1700	3828.56	V I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
540	3828.85	Nd II	10000 s	3835.97	Bk II	270	3842.34	Pr II	550	3849.25	Zr I
940	3828.87	Mo I	250	3836.06	Os I	7	3842.46	Si III	110	3849.32	V I
75 h	3829.07	Lu I	270	3836.10	Ce II	920 d	3842.50	Tb II	140	3849.36	Cr I
110	3829.13	W I	120	3836.30	Re I	340	3842.60	As II	330	3849.39	Dy II
440	3829.16	Nd II	250	3836.45	Nb I	200	3842.80	Ba II	140	3849.52	Hf II
390	3829.27	Ho I	2300	3836.50	Dy II	200	3842.88	Pm II	300	3849.88	Ho I
140	3829.30	Mg I	740	3836.54	Nd II	300	3842.98	Pm II	540	3849.91	Er I
230	3829.46	Gd II	70	3836.584	Th I	550	3843.02	Zr II	10000	3849.92	Cm I
140	3829.67	Hf I	1300	3836.76	Zr II	610	3843.03	Sc II	190	3849.94	Os I
200	3829.68	Mn I	95	3836.78	Ti I	2500	3843.20	Cl II	200	3849.96	Fe I
120	3829.75	Ne II	970	3836.91	Gd II	120	3843.256	Fe I	260	3849.99	F II
280	3830.02	Hf I	10000	3836.96	Pu I	1400	3843.28	Gd I	290	3850.04	Cr I
130	3830.03	Cr I	1300cw	3837.51	Ho II	1600	3843.50	Sm II	20	3850.22	Sb II
1500	3830.26	Tb I	1500	3837.56	Tc I	75	3843.61	Lu I	470	3850.22	Nd II
530	3830.29	Sm II	10000	3837.59	Cm I	200	3843.76	Ce II	7	3850.40	Mg II
200	3830.35	Tc I	340	3837.91	Nd II	1100	3843.86	Ho II	760	3850.43	Ru I
510	3830.47	Nd II	310	3838.07	Ru I	350	3843.98	Mn I	70	3850.581	Ar II
3600	3830.48	Er II	1300	3838.20	Tm II	1400	3844.23	Eu II	3300	3850.69	Gd II
10000	3830.55	Bk I	500	3838.29	Mg I	330	3844.36	Dy I	1200	3850.79	Pr II
470	3830.55	Ce II	160	3838.3	S III	380	3844.44	V I	120	3850.817	Fe I
960	3830.72	Pr II	285	3838.37	N II	150 c	3844.54	Pr II	5100	3850.97	Gd II
490	3831.08	Ce II	290	3838.51	W I	1400	3844.58	Gd II	10000	3850.99	Cl II
2000	3831.46	U II	1100	3838.54	Ce II	30	3845.11	Ge II	10000	3851.01	Pu I
1100	3831.50	Sm II	10000	3838.92	Pu I	3100	3845.37	Cl II	300	3851.22	Tc I
10000 I	3831.57	Bk II	500	3838.94	Sm II	250	3845.38	Pm II	7900	3851.37	Cl II
110	3831.69	Ni I	1700	3838.98	Nd II	6900	3845.47	Co I	720 c	3851.55	Pr II
300	3831.73	Gd III	160	3839.00	V I	370 d	3845.61	Tb II	27	3851.57	W II
370	3831.80	Gd II	120	3839.257	Fe I	3900	3845.65	Cl II	320	3851.60	Er II
760	3831.80	Ru I	110	3839.38	V I	10	3845.8	Bi II	1200	3851.65	Cl II
320cw	3831.9	Ho II	340	3839.51	Nd II	1500	3845.80	Cl II	2400 d	3851.66	Nd II
1500	3832.29	Pd I	300	3839.52	Pm I	210	3845.90	Nb I	250	3851.67	F II
300	3832.30	Mg I	1200	3839.63	U I	800	3845.97	Tc I		3851.74	Nd II
10	3832.30	Tl II	1000	3839.64	Gd II	120	3846.00	La II	10000	3851.85	Pu I
200	3832.45	Tc I	930	3839.70	Ru I	730	3846.22	W I	420	3851.88	Sm II
600	3832.82	Tc I	840	3839.746	Th II	420	3846.34	Dy II	85	3852.135	Th I
4000	3832.88	Y II	350	3839.78	Mn I	60	3846.45	Ti I	140	3852.22	Cr I
210	3832.97	Gd I	170	3839.91	Yb I	220	3846.52	Ce II	320	3852.40	Ho II
270	3833.07	Sc II	100	3840.29	Zn II	580	3846.59	Pr II	4300	3852.45	Gd II
10000	3833.32	Cm I	150	3840.30	Os I	10000 I	3846.62	Bk I	960	3852.80	Pr II
4500	3833.35	Cl II	500	3840.437	Fe I	480	3846.68	Ru I	100	3852.82	In III
540	3833.42	Tb I	570	3840.44	V I	490 c	3846.73	Ho II	1	3852.98	Rh III
10000 s	3833.48	Bk	400	3840.45	Sm II	80	3846.800	Fe I	1200	3853.03	Dy II
95	3833.68	Ti I	600	3840.72	La II	100	3846.887	Th I	130	3853.05	Ti I
210	3833.74	Ta II	100 h	3840.74	Ag I	550	3847.01	Zr I	860	3853.15	Ce II
1700	3833.75	Mo I	2600	3840.75	V I	420	3847.02	Dy I	95	3853.29	Lu I
530	3833.83	Sm II	290	3840.87	Tm I	270	3847.09	F II	530	3853.30	Sm I
480	3833.86	Mn I	370	3840.89	Dy I	380	3847.25	Mo I	100 h	3853.66	Si II
2000	3833.89	Rh I	480	3840.99	Pr II	320	3847.33	V I	130	3853.73	Ti I
280	3834.22	V I	800	3841.047	Fe I	250	3847.49	W I	2	3853.96	Mg I
1000	3834.222	Fe I	670	3841.08	Mn I	530	3847.51	Sm II	1800 c	3854.07	Ho II
1300	3834.36	Mn I	2700	3841.18	Lu I	500	3847.60	Tc I	12	3854.08	Pb III
560	3834.48	Sm I	380	3841.28	Cr I	10000	3847.63	Bk I	10000	3854.11	Cm I
490	3834.55	Ce II	150	3841.29	Os I	15	3847.85	Ag I	1200	3854.18	Ce II
560	3834.60	Sm II	1400	3841.31	Dy II	70	3847.87	Y II	2700	3854.21	Sm II
250 c	3834.65	In II	800	3841.31	Tc I	8900	3848.02	Tm II	190	3854.22	Cr I
7	3834.679	Ar I	4	3841.44	Sn II	100	3848.05	Ta I	620	3854.22	U I
350	3834.69	Br II	100	3841.5	Xe III	250	3848.10	Ce II	1200	3854.31	Ce II
45	3834.75	Rh I	410 d	3841.82	Nd II	8	3848.24	Mg II	390	3854.511	Th II
140	3834.93	Pr II		3841.88	Nd II	1700 d	3848.24	Nd II	480	3854.56	Sm I
330	3834.99	Gd II	110	3841.89	V I		3848.31	Nd II	2400	3854.64	U II
220	3835.05	Ru I	280	3841.960	Th II	1500	3848.52	Nd II	100	3854.76	Ba II
1100	3835.06	W I	330	3842.00	Dy II	860	3848.59	Ce II	130	3854.91	La II
190	3835.08	La II	10000	3842.00	Cm I	490 p	3848.60	U II	1	3854.96	Mg I
350	3835.18	Nb I	1400	3842.05	Co I	3700	3848.73	Tb II	10000	3855.03	Bk I
410 c	3835.35	Ho II	410 c	3842.05	Ho II	640	3848.78	Sm II	620	3855.29	Ce II
5	3835.384	H I	10000	3842.10	Pu I	1	3848.91	Mg I	110	3855.29	Cr I
10000	3835.52	Pu I	200 c	3842.18	In II	190	3848.98	Cr I	1200	3855.37	V I
370	3835.72	Sm II	10000	3842.19	Bk I	1600	3849.02	La II	150	3855.55	W I
2200	3835.96	Zr I	1200	3842.20	Gd II	800	3849.18	Hf I	470	3855.56	Gd II

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
140	3855.57	Cr I	160	3864.137	Cu II	260	3873.52	Ru I	10000	3880.11	Bk I
3000	3855.84	V I	180	3864.34	W I	250	3873.57	Gd I	30	3880.25	Au I
680	3855.90	Er I	770	3864.34	Zr I	5	3873.74	K II	780	3880.38	Nd II
800	3855.90	Sm II	1300	3864.86	V I	150	3873.761	Fe I	680	3880.47	Pr II
500 h	3856.02	Si II	40	3865.13	Be I	2800	3873.96	Co I	60	3880.5	Xe III
2500	3856.372	Fe I	320	3865.24	Sm II	1200	3873.99	Dy II	1500	3880.61	Er II
480	3856.46	Ru I	80	3865.42	Be I	300	3874.03	Pm I	600 c	3880.72	Tc I
5900	3856.52	Rh I	480 c	3865.45	Pr II	620	3874.04	U II	800	3880.77	Sm II
500 c	3856.73	Tc I	230	3865.47	Os I	320 c	3874.09	Ho II	1200	3880.78	Nd II
390cw	3856.94	Ho II	1	3865.51	Be I	3500 w	3874.17	Tb II	380	3880.82	Hf II
390	3857.02	Ce II	150	3865.523	Fe I	30	3874.26	Sr III	12	3881.21	Ti III
230	3857.09	Os I	190	3865.57	Eu I	110	3874.41	W I	450	3881.38	Sm II
1300	3857.55	Ru I	170	3865.64	Ir I	70	3874.53	Cr I	730	3881.41	W I
260	3857.63	Cr I	6	3865.72	Be I	40	3874.61	Lu I	1000	3881.45	U II
370	3857.64	Ce II	1900	3865.92	U II	270	3874.68	Ce II	200	3881.59	Nd
720	3857.72	Ho II	100	3866.03	Be I	630	3874.68	Ho II	540	3881.61	Ho II
140	3857.84	Tm II	240	3866.44	Ti I	100	3874.73	Au I	300	3881.68	Cu III
480	3857.91	Sm II	240	3866.52	Nd II	1500	3875.08	V I	450	3881.79	Sm II
170	3858.14	Ti I	370	3866.58	Dy II	400	3875.19	Sm II	250	3881.86	Os I
120	3858.25	Pr II	380	3866.80	U II	240	3875.26	Re I	300	3881.99	Dy II
1200	3858.30	Ni I	220	3866.81	Nd II	260	3875.26	Ti I	170	3882.15	Ti I
600	3858.31	Hf I	500	3866.96	Y III	210	3875.374	Th I	170	3882.33	Ti I
10	3858.32	Ar III	1600	3866.99	Gd I	150 h	3875.44	Kr II	490	3882.36	U II
540	3858.39	Er II	60	3867.215	Fe I	220	3875.46	Gd II	1500	3882.45	Ce II
420	3858.40	Dy I	210	3867.52	Pr II	560	3875.54	Sm II	320	3882.50	Sm II
340	3858.55	Nd II	285	3867.6	S I	200	3875.66	Tc I	200	3882.52	Hf I
400	3858.74	Sm I	230	3867.60	V I	240	3875.74	Nd II	10	3882.58	Yb III
2	3858.86	Mg I	1300	3867.84	Ru I	12	3875.78	Ca I	10000 l	3882.60	Bk I
290	3858.95	Nb I	270	3867.92	Nb I	12	3875.80	Ca I	1200	3882.89	Er II
110	3859.14	Pr II	1800	3867.99	W I	470	3875.87	Nd II	500	3882.89	Ti I
150	3859.212	Fe I	100	3868.	Bi IV	420	3875.90	V I	6800	3883.13	Tm I
150	3859.30	W I	200	3868.13	Ce II	570	3876.09	V I	670	3883.14	Nb I
4900	3859.57	U II	1000	3868.24	Tc I	150 c	3876.143	Cs I	380	3883.28	U II
140	3859.840	Th II	170	3868.40	Ti I	350	3876.19	C II	660	3883.29	Cr I
10000 l	3859.89	Bk II	560	3868.45	Dy II	480	3876.19	Pr II	330	3883.34	Tb I
10000	3859.911	Fe I	35	3868.528	Ar II	350	3876.41	C II	50	3883.34	Zn I
5	3860.58	Kr IV	40 h	3868.70	Kr III	530	3876.65	Lu II	1800	3883.44	Tm II
220	3860.72	Ru I	1600	3868.81	Dy I	350	3876.66	C II	50	3883.66	Cr I
450	3860.74	Rb II	850	3869.07	Nd II	730	3876.77	Os I	150	3883.77	Hf II
25000	3860.83	Cl II	580	3869.08	Mo I	80	3876.82	Y I	280	3884.131	Cu II
230	3860.91	Hf I	6	3869.15	Ti II	240	3876.86	Re I	150	3884.75	Eu I
270	3860.94	Nd II	300	3869.42	Dy II	620	3876.97	Ce II	15	3884.78	Ge III
4400	3860.99	Cl II	100	3869.663	Th I	160	3877.10	Hf II	440 c	3885.19	Pr II
490	3861.17	U II	450 d	3869.75	Tb II	1700 c	3877.18	Pr II	100	3885.20	Ta I
1000	3861.37	Cl II	820	3869.86	Dy II	70	3877.27	Eu II	570	3885.22	Cr I
2700 c	3861.68	Ho II	240	3869.94	Re I	380	3877.34	Rh I	3700	3885.29	Sm II
60 l	3861.80	Pr III	490	3870.01	Rh I	530	3877.56	Nb I	1500	3885.42	Zr I
500	3861.93	Po I	15	3870.16	Cs II	990	3877.60	Zr I	1100	3885.44	Nb I
660	3862.05	Sm II	9	3870.48	Ca I	800	3877.62	Pm II	1	3885.50	K III
150	3862.22	V I	210	3870.72	Pr II	200	3877.8	Xe III	670	3885.68	Nb I
350	3862.23	Sm II	1500	3871.03	U I	10000 l	3877.94	Bk II	300 r	3885.79	Pm I
200	3862.46	Ce II	170	3871.08	V I	250	3878.018	Fe I	210	3886.07	Nb I
300	3862.52	Nd II	300	3871.21	Br II	620	3878.08	U II	4000	3886.282	Fe I
200 h	3862.60	Si II	3400	3871.64	La II	480	3878.28	Y II	1700	3886.37	La II
540	3862.62	Ho I	800	3871.78	Sm II	3	3878.31	Mg I	380	3886.79	Cr I
650	3862.69	Ru I	360	3872.05	Ho II	1100	3878.36	Ce II	580	3886.82	Mo I
7500	3862.85	Er I	7000	3872.11	Dy II	10000	3878.54	Pu I	100	3886.915	Th I
250	3863.05	Gd II	70	3872.39	Rh I	2000	3878.573	Fe I	200	3887.048	Fe I
200	3863.07	Tc I	12	3872.50	Ti III	1100	3878.58	Nd II	10	3887.15	Ti II
2000 s	3863.12	Ac II	250	3872.501	Fe I	4	3878.62	K II	20	3887.17	Yb III
3700 d	3863.33	Nd II	11	3872.54	Ca I	130	3878.71	V II	5400	3887.35	Tm I
350	3863.38	Nb I	200	3872.55	Hf II	870	3878.82	Nb I	30	3887.77	Y I
	3863.40	Nd II	11	3872.56	Ca I	200	3879.05	Zr I	540	3887.87	Nd II
450	3863.405	Th II	45	3872.72	Eu I	470	3879.11	Dy II	60 h	3888.02	Ti I
130	3863.87	V I	250	3872.84	W I	500 c	3879.16	Tc I	480	3888.22	Tb I
2900	3863.87	Zr I	340	3872.85	Yb I	270	3879.20	Pr II	70	3888.34	Rh I
30	3863.9	Bi II	5500	3873.12	Co I	1000	3879.55	Nd II	300	3888.513	Fe I
29000	3864.11	Mo I	120	3873.21	Ti I	140	3879.644	Th I	80 c	3888.608	Cs I
400	3864.11	Tc I	3000	3873.35	Pa I	20	3879.98	Yb III	500	3888.65	He I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
3000 c	3888.96	Ho II	10000	3895.89	Pu I	480	3902.51	Ir I	700	3909.89	V I
6	3889.049	H I	330	3895.99	Tb I	410	3902.55	U II	40	3909.91	Ba I
6	3889.10	Ca I	270	3896.13	Nd II	300	3902.71	Gd I	300	3910.24	Gd III
660	3889.16	Sm II	5200	3896.23	Er II	810	3902.76	Er II	1000	3910.26	Pm II
	3889.22	Sm II	10	3896.33	Ti III	360	3902.92	Cr I	100	3910.79	V I
200	3889.23	Hf I	150	3896.55	Yb III	400	3902.945	Fe I	2000	3911.16	Nd II
20	3889.33	Ba I	330	3896.58	Tb II	19000	3902.96	Mo I	110 h	3911.19	Ti I
200	3889.33	Hf I	440	3896.62	Tm I	110	3903.102	Th I	140	3911.27	Yb I
440 c	3889.34	Pr II	540	3896.76	Ho II	60	3903.16	Cr I	20 h	3911.40	Co II
30	3889.48	Au I	490	3896.77	U II	170	3903.177	Cu II	330	3911.67	U II
370 h	3889.66	Nd II	23	3896.78	Eu I	200	3903.34	Ce II	29	3911.77	Lu I
30	3889.67	Ni I	590	3896.80	Ce II	1300	3903.42	Sm II	320	3911.80	Ho I
100	3889.78	In II	1000	3896.98	Cs II	170	3903.82	F II	23000	3911.81	Sc I
1300	3889.93	Nd II	1600	3896.98	Sm II	4	3903.86	Mg I	120hd	3911.82	Cr I
70	3889.95	Ti I	190	3897.25	Pb II	200	3903.95	Br III	85	3911.909	Th I
1000	3889.98	Ce II	440	3897.63	Nd II	250	3903.98	Er I	450	3911.96	O II
610	3890.08	Sm II	40	3897.65	Cr I	10000	3904.06	Cm II		3912.00	Cr I
700	3890.18	V I	400	3897.86	Au I	29	3904.22	Rh I	10000 I	3912.16	Bk II
2900	3890.32	Zr I	330	3897.89	Tb I	240	3904.29	Gd I	230	3912.19	Ce II
2200	3890.36	U II	140 h	3897.91	W I	460	3904.30	U II	220	3912.21	V I
490	3890.42	Ho I	8	3897.92	K II	250	3904.34	Ce II	850	3912.23	Nd II
440	3890.53	Tm II	280 h	3898.02	V I	320	3904.44	Ho I	980	3912.44	Ce II
1300	3890.58	Nd II	490	3898.27	Ce II	250	3904.56	Er II	15	3912.75	Yb III
400	3890.61	Er II	5	3898.48	F I	60 h	3904.59	Y I	23	3912.83	Rh I
210	3890.75	Ce II	85	3898.49	Ti I	2600	3904.78	Ti I	630	3912.90	Pr II
1300	3890.94	Nd II	5800	3898.53	Dy II	50	3904.81	Yb II	20	3913.23	Yb III
250	3890.97	Pm I	300	3898.73	Pm I	200	3904.812	P III	500	3913.46	Ti II
210	3890.98	Ce II	190	3898.83	F II	170	3905.186	Th II	120	3913.51	Rh I
13000 c	3891.02	Ho II	210	3898.84	Pr II	1200	3905.40	Er I	310	3913.55	Pr II
320	3891.21	Sm II	270	3898.94	Ce II	300	3905.523	Si I	340	3913.69	Nd II
580	3891.30	Nb I	140	3899.13	V II	450	3905.65	Gd I	1500	3913.87	Cl II
2000	3891.38	Zr I	2400	3899.20	Tb II	20	3905.67	Te II	130	3913.92	Re I
580	3891.51	Nd II	1200	3899.707	Fe I	1300cw	3905.68	Ho II	300	3914.20	Br II
400	3891.63	Br II	400	3899.78	Pm II	1700	3905.89	Nd II	250	3914.314	P III
120 c	3891.71	Pr II	620	3899.78	U II	10000 s	3906.09	Bk II	140	3914.33	V II
1400 I	3891.78	Ba II	600	3899.83	Tc I	150	3906.177	Kr II	500	3914.34	Ti I
2	3891.91	Mg I	620	3899.94	Hf I	11000	3906.31	Er II	500	3914.38	Br II
60	3891.93	Cr I	23	3900.18	Eu I	60	3906.37	Hg I	50 h	3914.40	Ag I
470	3892.06	Nd II	140 h	3900.18	V I	60	3906.372	Hg I	100	3914.47	Ac II
300 w	3892.12	Tc I	2000	3900.21	Nd II	380	3906.45	U I	4000	3914.58	Y III
1000	3892.15	Pm II	10000	3900.25	Cm I	250	3906.479	Fe I	670	3914.70	Nb I
650	3892.21	Ru I	140	3900.39	Os I	100	3906.75	V I	500	3914.73	Ba II
100 h	3892.26	Au I	70	3900.51	Eu I	200	3906.92	Ce II	24	3914.74	Ti I
20	3892.65	Ba I	400	3900.52	Zr I	350	3906.93	Cs II	210	3914.76	Pr II
4200	3892.68	Er I	530	3900.54	Ti II	28000cw	3907.10	Eu II	540	3914.87	Dy II
620	3892.68	U II	450	3900.68	Al II	770	3907.29	Ce II	440	3915.13	Nd II
110	3892.72	W I	40	3900.73	Pt I	250	3907.29	Rb II	45	3915.24	Eu II
460	3892.86	V I	3000	3900.74	Y III	50 h	3907.41	Ag I	20	3915.30	Li I
150	3892.924	Cu II	680	3900.79	Tm II	20000	3907.49	Sc I	20	3915.35	Li I
200	3893.22	Tc I	340	3900.85	Yb I	200	3907.70	Nd II	480	3915.38	Ir I
10000 s	3893.23	Cf II	180	3900.96	Ti I	7	3907.84	Ar III	650	3915.43	Tb I
2	3893.30	Mg I	30	3901.09	Au I	510	3907.84	Nd II	15	3915.47	Ti III
12	3893.63	Ti III	140 h	3901.15	V I	100 I	3907.91	Xe II	390	3915.52	Ce II
260	3894.04	Cr I	300	3901.24	Br II	770 c	3908.05	Pr II	540	3915.59	Dy II
400	3894.05	Sm II	1600	3901.33	Tb I	480	3908.06	Tb I	120	3915.84	Cr I
7900	3894.08	Co I	50	3901.661	Th I	100	3908.21	Re I	380	3915.88	U II
490	3894.12	U I	190	3901.71	Os I	10000	3908.24	Cm II	310	3915.94	Zr II
2200	3894.20	Pd I	380	3901.77	Mo I	560	3908.41	Ce II	610	3915.95	Nd II
10000 I	3894.55	Bk II	1300	3901.84	Nd II	390	3908.54	Ce II	45	3916.00	Eu I
810	3894.63	Nd II	20	3901.867	Hg I	50	3908.750	Th I	1300	3916.05	La II
490	3894.64	Tb I	20	3901.87	Hg I	960	3908.76	Cr I	390	3916.14	Ce II
1500	3894.70	Gd II	180	3901.93	F II	210	3908.97	Nb I	190	3916.24	Cr I
90	3894.97	Sc I	285	3902.0	S I	760	3909.08	Ru I	10000 I	3916.37	Bk II
620	3895.11	Ce II	100 c	3902.07	In II	380	3909.14	Tb I	100	3916.41	V II
200 h	3895.25	Ti I	35	3902.11	Cr I	270	3909.31	Ce II	50	3916.417	Th I
340	3895.419	Th I	290	3902.23	Ho II	50	3909.31	Ag II	3500	3916.48	Tm I
3	3895.57	Mg I	2400	3902.25	V I	300	3909.38	Au I	2200	3916.51	Gd II
800	3895.656	Fe I	750	3902.40	Gd II	250	3909.50	Pm II	1100	3916.63	Cl II
450	3895.79	Gd II	250	3902.45	Pr II	330	3909.55	Tb I	80	3916.731	Fe I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
10	3917.20	Rn I	110	3922.96	Pt I	32000cw	3930.48	Eu II	140	3937.040	Th II
380 c	3917.27	Re I	5	3923.00	K II	240	3930.66	Y II	670	3937.44	Nb I
540 d	3917.29	Dy I	560	3923.11	Ce II	8	3930.69	F I	20	3937.87	Ba I
230	3917.29	Eu I	450	3923.25	Gd II	430	3930.98	U II	560	3938.09	Ce II
620	3917.44	Sm II	320	3923.38	Dy II	770	3931.09	Ce II	250	3938.30	Pr II
35	3917.60	Cr I	1500	3923.47	Ru I	500	3931.23	Yb III	6	3938.40	Mg I
230	3917.64	Ce II	6	3923.48	Ca I	150	3931.34	V I	90	3938.52	N III
340	3917.65	Nd II	45	3923.51	Sc II	310	3931.37	Ce II	250	3938.59	Os I
23	3917.70	Eu II	300 c	3923.66	Tc I	320	3931.38	Hf I	2100	3938.63	Er II
280	3918.05	Er I	200	3923.90	Hf II	30	3931.49	Te II	220	3938.85	Ho I
620	3918.09	Hf II	400	3924.09	Br II	2100	3931.52	Dy II	510	3938.86	Nd II
50 h	3918.25	Y I	9	3924.39	Ga II	600	3931.76	Ru I	120	3939.04	Hf I
770	3918.28	Ce II	20	3924.47	Si III	230	3931.83	Ce II	810 d	3939.52	Tb II
65	3918.32	Mn I	1100	3924.53	Ti I	3000	3931.83	Pa I	200	3939.67	Ba II
210	3918.35	Er II	450	3924.64	Ce II	60	3932.00	Al I	350	3939.69	Br II
210	3918.51	Ta I	240	3924.66	V I	35	3932.02	Ti II	770	3940.34	Ce II
40	3918.52	Eu I	10	3924.86	Ti III	2000	3932.02	U II	10 h	3940.43	Ag I
20	3918.54	Te II	140	3925.093	Th I	320	3932.22	Dy II	330	3940.48	U II
1300 c	3918.85	Pr II	150	3925.24	V I	810	3932.25	Er II	25000	3940.51	Rb II
50	3918.86	Lu I	760	3925.45	Tb II	25	3932.547	Ar II	320cw	3940.53	Ho II
100	3918.92	Hg II	960	3925.47	Pr II	200	3932.911	Th I	300 h	3940.80	Sr I
570	3918.98	C II	500	3925.58	Cs II	370	3933.00	Dy II	310	3940.97	Ce II
360	3919.00	N II	35	3925.719	Ar II	6	3933.05	Tl III	65	3941.48	Mo II
110	3919.023	Th I	500	3925.87	Cl III	120	3933.268	Cu II	410	3941.49	Cr I
100	3919.09	Eu II	3300	3925.92	Ru I	360	3933.3	S II	2000	3941.51	Nd II
1000	3919.10	Pm II	330	3926.21	U I	4400	3933.38	Sc I	55	3941.56	Eu II
1900	3919.16	Cr I	5000 I	3926.25	Am II	310	3933.55	Ru I	10	3941.72	Rn I
160	3919.29	O II	110	3926.32	Ti I	230	3933.66	Ca II	450	3941.80	Gd I
300	3919.38	Tc I	5	3926.36	K II	200	3933.70	Tc I	1300	3941.87	Sm II
320	3919.45	Ho I	120	3926.42	Hf I	310	3933.73	Ce II	10000	3942.03	Cm I
350	3919.51	Br II	2500 I	3926.44	Rb II	260	3934.01	V I	50	3942.072	Th I
480	3919.52	Tb II	120	3926.47	Mn I	200	3934.12	Zr II	2000	3942.15	Ce II
420	3919.63	Pr II	35 h	3926.62	Lu I	320	3934.21	Dy II	30 h	3942.21	Eu II
480	3919.81	Ce II	30	3926.65	Cr I	2000	3934.23	Rh I	540	3942.53	Dy II
35	3919.82	Ti I	330	3926.72	U I	70	3934.24	Ti I	6	3942.53	K II
220	3919.92	Nd II	25	3926.85	Ba III	5	3934.26	F I	590	3942.63	Gd I
200	3920.081	Kr II	510	3927.10	Nd II	5	3934.29	Kr IV	590	3942.72	Rh I
70	3920.10	Ag II	480	3927.46	Pr II	65 c	3934.40	In II	2700	3942.75	Ce II
530	3920.20	Nb I	160	3927.56	La I	1200	3934.79	Gd I	60	3942.94	Eu II
600	3920.258	Fe I	150	3927.57	Hf I	200	3934.79	Zr II	10 h	3942.97	Ag I
100	3920.49	V I	200	3927.57	Tc I	200	3934.82	Gd II	230	3943.04	Mo I
250	3920.53	Pr II	100	3927.69	Au I	610	3934.82	Nd II	120	3943.08	Eu II
140	3920.654	Cu II	420	3927.86	Dy I	400	3934.84	Ir I	270	3943.24	Gd I
800	3920.69	C II	1200	3927.920	Fe I	45	3934.98	Rh I	620	3943.24	Sm II
260	3920.92	Ru I	200	3927.93	V I	150	3935.03	W I	220	3943.62	Gd I
1100	3920.96	Nd II	10 h	3928.01	Ag I	150	3935.14	V I	150	3943.66	V I
600	3921.02	Cr I	10000 I	3928.05	Bk II	650	3935.24	Tb II	520	3943.67	Nb I
12	3921.38	Ti III	1900	3928.28	Sm II	9	3935.29	Ca I	1200	3943.82	U I
10000	3921.42	Bk I	10000	3928.53	Pu I	220	3935.38	Gd I	770	3943.89	Ce II
290	3921.42	Ti I	160	3928.6	S III	490	3935.38	U II	4500 r	3944.006	Al I
1100	3921.54	La II	50	3928.623	Ar II	120	3935.65	Hf II	10000	3944.15	Cm I
10	3921.61	Ti III	600	3928.64	Cr I	50	3935.72	Ba I	300	3944.21	Pm II
590	3921.73	Ce II	120	3928.66	Tm II	470	3935.76	Sm II	3200	3944.42	Er I
610	3921.79	Zr I	40	3928.87	Eu II	370	3935.82	Pr II	30	3944.59	Eu II
280	3921.88	Er II	2200	3929.22	La II	50	3935.84	Rh I	10000	3944.68	Dy II
100	3921.90	V I	200	3929.26	Nd II	1500	3935.97	Co I	110	3944.72	Re I
300	3922.10	Tb II	370	3929.29	Pr II	410	3936.11	Nd II	20	3944.82	Cl I
60 d	3922.12	In II	1200	3929.53	Zr I	180	3936.22	La II	1400	3945.54	Gd I
240	3922.19	Rh I	110	3929.54	Hf II	100	3936.28	V I	760	3945.57	Ru I
500	3922.20	Rb II	300	3929.55	Br II	30	3936.40	Sr III	30	3945.67	Eu II
2500	3922.40	Sm II	570	3929.58	Tm II	320 c	3936.44	Ho II	180	3945.91	Re I
230	3922.43	V I	590	3929.669	Th II	800	3936.48	Pm II	2	3946.02	Tl III
500	3922.55	Xe III	550	3929.85	Re I	10000	3936.67	Cm I	6	3946.04	Ca I
325	3922.6	As III	890	3929.88	Ti I	420	3936.70	Dy I	70	3946.097	Ar II
480	3922.74	Tb II	100	3930.00	Os I	30	3936.72	Sr III	120	3946.27	Ir I
140	3922.78	Ta I	260	3930.02	V I	800	3936.80	Ce III	500	3946.51	Sm II
1200	3922.911	Fe I	60 h	3930.11	Y I	140	3936.90	Re I	4000 c	3946.57	Tc I
140	3922.92	Ta I	540	3930.14	Dy I	120	3936.97	W I	650	3946.89	Tb II
12	3922.95	Ti III	2000	3930.296	Fe I	3200	3937.01	Er I	420	3946.93	Dy II

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
2000	3947.09	Tc I	900 c	3953.51	Pr II	600	3962.87	Er III	1500	3971.40	Sm II
185	3947.29	O I	320	3953.52	Nd II	1500	3963.00	Sm II	320	3971.67	Pr II
160	3947.48	O I	300	3953.58	U II	80 h	3963.10	Co II	450	3971.68	Ce II
6 h	3947.49	Si III	340	3953.66	Ce II	1400	3963.12	Nd II	450	3971.75	Gd II
7	3947.505	Ar I	150	3953.81	Cu III	3	3963.16	I III	210	3971.85	Nb I
140	3947.59	O I	16	3954.33	Fe III	30	3963.61	Eu I	30000cw	3971.96	Eu II
730 c	3947.63	Pr II	220	3954.37	O II	1000	3963.63	Os I	150	3972.04	F II
1100	3947.78	Ti I	420	3954.55	Dy II	220	3963.66	Gd II	270	3972.07	Ce II
310	3947.97	Ce II	100	3954.61	O I	1900	3963.69	Cr I	620 c	3972.14	Pr II
20	3947.98	Te II	360	3954.67	U II	6	3963.84	Si III	200	3972.155	Th I
120	3947.98	W I	300 r	3954.76	Pm I	270	3963.90	Nd II	35	3972.17	Ni I
50	3948.030	Th I	60 h	3955.09	Y I	350	3964.21	U I	8	3972.57	Ca I
550	3948.06	Er I	6	3955.21	K II	560	3964.26	Pr II	6	3972.58	K II
740	3948.11	Sm II	200	3955.30	W I	950	3964.27	Ti I	160	3972.67	F II
35	3948.40	Pt I	310	3955.36	Ce II	390	3964.50	Ce II	390	3972.71	Gd I
300	3948.44	U I	580	3955.73	Ho I	45	3964.54	Rh II	2700	3973.04	Er I
5	3948.56	F I	200	3955.73	Tc I	20	3964.729	He I	450	3973.26	O II
4500	3948.67	Ti I	10 h	3955.74	Si II	1600 c	3964.81	Pr II	1100	3973.30	Nd II
10000	3948.68	Cm I	60	3955.75	Eu I	10000	3964.83	Cm I	200	3973.48	Hf I
60	3948.774	Fe I	450	3955.85	N II	120	3964.90	Eu II	660	3973.50	Zr I
15	3948.90	Ca I	230	3956.06	Ce II	460	3964.90	Ru I	110	3973.56	Ni I
200	3948.964	Th II	980	3956.28	Ce II	100	3964.96	Os I	3200	3973.58	Er I
35	3948.979	Ar I	4500	3956.34	Ti I	160	3965.14	W I	100	3973.64	V II
9000	3949.10	La II	320	3956.42	Er I	500	3965.19	Cs II	740	3973.69	Nd II
30	3949.13	Eu II	60	3956.454	Fe I	15	3965.43	Zn I	18	3973.71	Ca I
1500	3949.27	Tm I	250	3956.68	Fe I	250	3965.69	Nb I	590	3973.98	Gd II
900 c	3949.43	Pr II	380	3956.75	Pr II	620	3966.04	Sm II	620	3974.66	Sm I
60	3949.43	Ag II	17	3957.05	Ca I	910 d	3966.09	Nb I	1400	3974.72	Er II
500	3949.51	Ba II	300	3957.10	Ce III	30	3966.23	Au I	170	3974.78	F II
60	3949.60	Eu I	240	3957.45	Nd II	590	3966.28	Gd I	300	3974.81	Gd I
100	3949.78	Os I	300	3957.641	P III	280	3966.35	Er I	320	3974.85	Pr II
60	3949.953	Fe I	1200	3957.67	Gd II	100	3966.36	Pt I	270	3975.07	Ce II
460	3950.21	Ru I	1000	3957.74	Pm II	600	3966.52	U II	200	3975.29	Zr I
100	3950.23	V I	800	3957.79	Dy II	560 c	3966.57	Pr II	380	3975.31	Rh I
4400	3950.36	Y II	10000 l	3957.85	Pa II	150	3966.59	Eu II	10000	3975.43	Pu II
540	3950.39	Dy II	40	3957.92	Eu II	60	3966.614	Fe I	110 h	3975.44	Os I
220	3950.56	Ho I	590	3958.00	Nd II	490	3966.66	Zr I	220	3975.88	Ho I
300	3950.59	Xe III	1500	3958.10	Tm II	6	3966.72	K II	55	3975.89	Mn I
350	3950.61	Br II	5200	3958.21	Ti I	770	3967.05	Ce II	25	3975.94	Te II
45	3950.76	Eu II	940	3958.22	Zr II	45	3967.18	Eu I	960	3976.27	Sm II
30	3951.10	Cr I	95	3958.24	Rh I	390	3967.392	Th I	590	3976.31	Ir I
2000	3951.16	Nd II	230	3958.27	Ce II	320	3967.51	Dy I	1000	3976.43	Sm II
50	3951.164	Fe I	350 d	3958.36	Tb II	470	3967.68	Sm II	30	3976.65	Au I
55	3951.33	Eu II	1500	3958.64	Pd I	160	3968.01	Hf I	1600	3976.66	Cr I
250	3951.48	Er I	30	3958.75	Sr III	590	3968.26	Gd II	280	3976.73	Er I
150	3951.60	Y II	3800	3958.86	Rh I	990	3968.26	Zr I	40 h	3976.74	Co II
410	3951.83	Hf I	230	3958.87	Ce II	14000	3968.39	Dy II	2200 d	3976.84	Tb II
470	3951.89	Sm I	10 h	3959.10	Au I	480	3968.46	Lu I	740	3976.85	Nd II
8	3951.92	Pb III	110	3959.300	Th I	220	3968.47	Ca II	390 c	3976.93	Ho I
140	3951.97	V II	750	3959.44	Gd II	130	3968.59	W I	810	3977.02	Er I
300	3952.00	Gd II	190	3959.44	Pr I	11	3968.72	Fe III	65	3977.08	Mn I
810	3952.20	Nd II	350	3959.50	Cs II	750	3969.00	Gd I	730	3977.23	Os I
45	3952.27	Sc I	230 c	3959.51	Ho II	120	3969.06	Cr I	10 h	3977.46	Si II
10	3952.36	Rn I		3959.52	Gd II	40	3969.22	Te II	80	3977.741	Fe I
40	3952.40	Cr I	370	3959.53	Sm II	100	3969.257	Fe I	150	3978.00	Cs II
120	3952.52	W I	490	3959.68	Ho I	600	3969.26	Sr I	1000 c	3978.15	Rb II
3100	3952.54	Ce II	8	3960.53	Ar III	270	3969.29	Gd II	350	3978.307	P III
1000 l	3952.58	Am II	770	3960.91	Ce II	9	3969.49	Fe III	60	3978.42	Eu I
50	3952.601	Fe I	200	3961.02	Os I	150	3969.67	Os I	600	3978.44	Ru I
3000 s	3952.62	Pa II	280	3961.04	Re I	1600	3969.75	Cr I	2700	3978.57	Dy II
310	3952.68	Ru I	9000 r	3961.520	Al I	300	3970.04	Sr I	770	3978.65	Ce II
50	3952.760	Th I	200	3961.59	O III	150bl	3970.05	HfO	85	3978.68	Cr I
65	3952.84	Mn I	510	3962.21	Nd II	3000 s	3970.07	Pa II	960	3979.20	Sm II
320	3952.87	Nd II	250 w	3962.35	In II	8	3970.072	H I	130	3979.29	W I
120	3952.90	W I	470	3962.45	Pr II	210	3970.10	Ta I	750	3979.33	Gd I
160	3953.15	W I	4	3962.48	Pb IV	740	3970.53	Sm II	20	3979.356	Ar II
35	3953.16	Cr I	350 c	3962.48	Re I	150 h	3970.80	W I	10 w	3979.42	Fe III
10000	3953.36	Cm I	370	3962.59	Dy I	500	3971.16	Pr II	600	3979.42	Ru I
590	3953.37	Gd I	950	3962.85	Ti I	85	3971.26	Cr I	740	3979.49	Nd II

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
30	3979.63	Eu II	280	3987.53	Er I	30	3995.66	Ba I	400	4005.241	Fe I
300	3979.64	Tc I	810	3987.66	Er I	3600	3995.75	La II	1900	4005.47	Tb II
30	3979.68	Au I	400	3987.78	Tc I	270	3995.83	Pr II	370	4005.64	Ce II
40	3979.80	Cr I	470	3987.84	Gd I	110	3995.86	Al II	170	4005.71	V II
150	3980.089	Th I	32000	3987.99	Yb I	55	3995.98	Eu II	420	4005.84	Dy I
110 h	3980.14	Al III	100	3988.18	Os I	280	3995.98	Ru I	35	4005.97	Ti I
500	3980.35	Tc I	40	3988.24	Eu II	380	3996.15	Rh I	320	4006.07	Dy I
500	3980.38	Br II	4400	3988.52	La II	210	3996.17	Ta I	50	4006.52	Te II
150	3980.51	Pr III	45	3989.06	Sc II	700	3996.32	Gd II	190	4006.84	Ta I
130	3980.64	W I	370	3989.44	Ce II	1800	3996.52	Tm II	250	4007.021	Th II
500	3980.74	Pm II	1300 c	3989.68	Pr II	20	3996.57	Pt I	500	4007.14	Tc I
560	3980.88	Ce II	5700	3989.76	Ti I	5500	3996.61	Sc I	50	4007.36	Yb I
85	3981.23	Cr I	160	3989.99	Cr I	1600	3996.69	Dy II	410	4007.43	Nd II
5	3981.24	Si III	1500	3990.00	Sm II	200	3996.97	Tc I	470	4007.48	Sm II
100 h	3981.58	Ag I		3990.02	Sm I	560 c	3997.04	Pr II	210	4007.59	Ce II
200 h	3981.60	Zr I	1400	3990.10	Nd II	200	3997.392	Fe I	200	4007.60	Zr I
4800	3981.76	Ti I	460	3990.42	U II	10	3997.67	Yb III	14000	4007.96	Er I
20	3981.77	Te II	540	3990.57	V I	320	3997.76	Gd II	70	4008.06	Ti I
40	3981.771	Fe I	930	3990.88	Yb I	100 h	3997.793	Kr II	230	4008.18	Er II
3000	3981.82	Pa I	960	3991.12	Cr I	970	3997.91	Co I	220	4008.210	Th I
1800	3981.87	Tb II	770	3991.13	Zr II	230	3997.96	Pr II	320	4008.33	Gd I
1400	3981.92	Dy II	230	3991.15	Er I	10 h	3998.01	Si II	1900	4008.69	Pr II
10	3981.926	Cd I	540	3991.32	Dy II	40	3998.053	Fe I	8600	4008.75	W I
220	3982.20	O II	30	3991.37	Au I	50	3998.061	Th I	300	4008.91	Gd II
10000	3982.23	Pa I	50	3991.38	Lu I	350	3998.24	U II	950	4008.93	Ti I
1100	3982.33	Er I	700	3991.50	Cl III	150	3998.63	N III	220	4009.056	Th I
320	3982.36	Nd II	160	3991.67	Cr I	7800	3998.64	Ti I	280	4009.16	Er II
570	3982.48	Ti I	110	3991.730	Th I	430	3998.73	V I	1	4009.27	He I
130	3982.58	Mn I	1000	3991.74	Nd II	300	3998.84	Tm III	190	4009.66	Ti I
3600	3982.60	Y II	10	3991.74	Yb III	1000 r	3998.96	Pm II	40	4009.70	Er III
560	3982.89	Ce II	15 h	3991.77	Si II	770	3998.97	Zr II	60	4009.713	Fe I
10	3983.02	Co II	230	3991.91	Pr II	320	3999.12	Pr II	500	4009.96	Pm II
740	3983.14	Sm II	460	3992.12	Ir I	2800	3999.24	Ce II	300	4010.04	Tb I
310	3983.29	Ce II	10 h	3992.15	Ag I	100	3999.28	Ta I	620	4010.60	Pr II
250	3983.29	W I	340	3992.16	Pr II	70	3999.36	Ti I	540	4011.29	Dy II
1600	3983.65	Dy II	1500	3992.36	Br I	350	3999.40	Tb II	180	4011.69	Eu II
200	3983.839	Hg II	700	3992.39	Ce II	380	3999.58	Ho I	20	4011.69	Te II
300	3983.85	Tb II	380	3992.53	U II	620 c	4000.17	Pr II	1000	4012.00	Tc I
960	3983.91	Cr I	320	3992.69	Gd I	200	4000.20	Pr III	5	4012.10	K II
50	3983.956	Fe I	260	3992.80	V I	8000	4000.45	Dy II	3700	4012.25	Nd II
200	3983.96	Hg II	190	3992.84	Cr I	410	4000.50	Nd II	200	4012.25	Zr I
800	3984.21	Dy II	370	3992.91	Ce II	7	4001.24	K II	2700	4012.39	Ce II
1	3984.21	Mg I	25	3993.06	Ba III	470	4001.26	Gd II	70	4012.39	Ti II
60	3984.33	Ti I	220	3993.21	Gd II	160	4001.44	Cr I	120	4012.47	Cr II
190	3984.34	Cr I	150	3993.302	Cu II	230	4001.56	Ce II	280	4012.495	Th I
240	3984.40	Rh I	740	3993.31	Sm II	350 d	4002.19	Tb II	3	4012.57	Au I
770	3984.68	Ce II	80	3993.40	Ba I	70	4002.49	Ti I	1100	4012.58	Er I
870	3984.86	Ru I	10000 l	3993.57	Cf II	160cw	4002.59	Ho II	540	4012.70	Nd II
10000 c	3984.97	Tc I	220	3993.73	Ho II	970	4002.59	Tb II	200	4012.72	Pm II
70	3985.19	Ag II	910	3993.82	Ce II	240	4003.309	Th II	760	4012.75	Tb II
150	3985.24	Mn I	30	3993.93	Eu II	220	4003.39	Ho I	3000 l	4012.96	Pa II
35	3985.25	Ti I	40	3993.97	Cr I	280	4003.46	Sm II	330	4013.26	Tb I
10	3985.48	Li I	300	3994.04	Tc I	140	4003.476	Cu II	110	4013.50	Ho I
10	3985.54	Li I	60	3994.114	Fe I	150	4003.48	Os I	180	4013.58	Ti I
100	3985.56	Yb III	650	3994.16	Gd II	200	4003.58	N III	300	4013.80	Gd II
60	3985.59	Ti I	2000	3994.51	Tc I	60	4003.71	Eu II	540	4013.82	Dy I
220cw	3985.71	Ho II	530	3994.549	Th II	910	4003.77	Ce II	50	4013.857	Ar II
1200	3985.79	U II	1100	3994.68	Nd II	70	4003.81	Ti I	140 d	4013.92	In II
470	3986.25	Nd II	35	3994.70	Ti I	540	4004.02	Nd II	320	4014.20	Ho II
55 h	3986.60	Eu I	1600	3994.79	Pr II	100	4004.02	Os I	250	4014.20	Pm II
740	3986.68	Sm II	35	3994.792	Ar II	230	4004.05	Er I	530	4014.49	Sc II
8	3986.75	Mg I	100	3994.840	Kr II	350	4004.06	U II	80	4014.53	Fe I
190	3986.83	Mn I	1000	3995.00	N II	120 c	4004.66	In II	30	4014.67	Cr I
300 l	3986.89	Np I	300	3995.05	Pm II	300	4004.69	Tc I	540	4014.70	Dy II
120	3987.024	Cu II	10000	3995.10	Cm I	730	4004.70	Pr II	910	4014.90	Ce II
150	3987.10	Mn I	6	3995.10	K II	100	4004.93	Re I	540	4015.22	W I
450	3987.21	Gd II	6000	3995.31	Co I	260	4004.94	Gd II	70	4015.38	Ti I
370	3987.43	Sm II	440	3995.58	Tm II	150	4005.16	Os I	180	4015.39	La I
40	3987.50	Y I	240	3995.61	Rh I	430	4005.21	U I	730	4015.39	Pr II

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
350	4015.57	Er II	400	4023.98	Zr I	730 c	4031.75	Pr II	120	4039.19	Eu I
200	4015.58	Gd I	300	4024.04	Br II	10000	4031.76	Cm I	310	4039.21	Ru I
250	4015.88	Ce II	220	4024.23	Tm I	180 c	4031.80	Ho I	1000	4039.25	Tc I
10	4016.07	Au II	840	4024.49	Ce II	1200	4031.82	Nd II	470	4039.34	Pr II
10000	4016.17	Cm I	1200	4024.57	Ti I	120	4031.83	V I	250	4039.53	Nb I
35	4016.28	Ti I	240	4024.73	F II	700	4032.13	Tm III	3800	4039.60	Y III
170 h	4016.52	W I	370	4024.77	Tb I	180	4032.27	Hf I	940	4039.83	Y I
400	4016.68	Tc I	340	4024.78	Nd II	870	4032.28	Tb I	140	4039.85	W I
300	4016.91	Gd III	770	4024.92	Zr I	150	4032.32	In III	4	4040.02	Co II
600	4017.22	Tc I	70	4025.01	Cr I	300	4032.38	Sr I	130	4040.08	Ir I
300	4017.25	Gd I	220	4025.01	F II	520	4032.47	Dy II	3000	4040.11	Y III
150	4017.58	Eu II	40	4025.14	Ti II	230	4032.47	Pr II	35 h	4040.32	Ti I
430	4017.71	Gd I	240	4025.15	Ce II	1100	4032.52	Nb I	50	4040.638	Fe I
570	4017.72	U II	110	4025.39	Ho I	100	4032.647	Cu II	2100	4040.76	Ce II
120 h	4017.77	Ti I	230	4025.49	F II	10	4032.99	Ga I	3000	4040.80	Nd II
160 c	4018.09	Ho II	360	4025.54	Pr II	2100	4033.03	Tb II	2700	4040.81	Ho I
1500	4018.10	Mn I	210	4025.656	Th II	10	4033.03	Yb III	120	4040.87	Ta I
3000 s	4018.21	Pa II	250	4025.88	La II	19000	4033.07	Mn I	400	4040.93	Au I
160	4018.26	Os I	200	4026.03	Tm III	220	4033.31	Re I	200	4041.06	Nd II
90	4018.36	Pr III	120	4026.17	Cr I	700	4033.49	Gd I	240	4041.204	Th II
600	4018.50	Cl III	50	4026.191	He I	200	4033.55	Sb I	550	4041.31	N II
370	4018.81	Nd II	5	4026.36	He I	20	4033.56	Sb II	5600	4041.36	Mn I
300	4018.99	U II	150	4026.44	Mn I	420	4033.65	Dy II	590	4041.68	Sm II
200	4019.04	Ce II	190 h	4026.54	Ti I	350	4033.76	Ir I	200	4041.78	Tc I
4200	4019.129	Th II	230	4026.83	Pr II	50	4033.809	Ar II	280	4041.92	Os I
370	4019.14	Tb II	190	4026.94	Ta I	960	4033.83	Pr II	320	4041.98	Dy II
220	4019.23	W I	140	4027.009	Th I	40	4033.91	Ti I	240	4042.22	Zr I
200	4019.34	Pm II	85	4027.10	Cr I	100	4034.23	Sc I	910	4042.58	Ce II
15000	4019.632	Pb I	990	4027.20	Zr I	230	4034.33	Pr II	6	4042.59	K II
300	4019.73	Gd I	320	4027.21	Ho I	11000	4034.49	Mn I	120	4042.64	V I
280	4019.98	Sm II	40	4027.48	Ti I	30	4034.91	Ti I	740	4042.72	Sm II
180	4020.03	Ir I	220	4027.61	Gd I	360	4035.08	N II	1000	4042.75	U I
100 s	4020.25	Am I	420	4027.78	Dy II	740	4035.11	Sm II	150	4042.894	Ar II
20000	4020.40	Sc I	2000	4028.14	Yb III	340	4035.40	Gd I	880	4042.90	Sm II
540	4020.47	Tb II	1100	4028.15	Gd I	10	4035.42	Fe III	3000	4042.91	La II
3000	4020.51	Er I	250	4028.20	Pm II	10000	4035.45	Cf	230	4043.01	Er II
2000	4020.76	Tc I	520 d	4028.32	Dy II	20	4035.460	Ar II	600	4043.484	Cu II
1000	4020.87	Nd II	40	4028.34	Ti II	150	4035.63	V II	360	4043.53	N II
350	4020.90	Co I	840	4028.41	Ce II	1500	4035.73	Mn I	610	4043.58	Zr I
620	4020.96	Pr II	180	4028.79	W I	100 s	4035.81	Am I	410	4043.59	Nd II
1000	4021.34	Nd II	270	4028.86	Ho I	110	4035.83	Ti I	410	4043.71	Gd I
450	4021.55	Er I	240	4028.95	Zr I	400	4035.89	Zr I	500	4043.751	Cu II
1000	4021.78	Nd II	230	4029.00	Pr II	250	4036.047	Th I	220	4043.80	Sc I
140	4021.83	Ti I	100	4029.12	Cd II	10 h	4036.14	Co II	240	4044.11	Sm II
100	4021.867	Fe I	1700	4029.49	Rb II	350	4036.22	Tb I	18	4044.14	K I
200	4021.92	Tm III	180	4029.60	Pr III	300	4036.26	Ba II	140 h	4044.28	W I
130	4022.12	W I	110 c	4029.63	Re I	420	4036.32	Dy II	520	4044.41	U II
1500	4022.16	Ru I	400	4029.68	Zr II	500 s	4036.37	Am II	50	4044.418	Ar I
85	4022.26	Cr I	360 c	4029.72	Pr II	240	4036.565	Th II	380	4044.47	Tm I
240	4022.27	Ce II	30	4029.73	Te II	260	4036.84	Gd I	490	4044.56	Zr I
300	4022.33	Gd II	140	4029.94	Ta I	180	4036.86	W I	1300	4044.81	Pr II
1250	4022.63	Cu I	490	4030.04	Zr I	185	4037.2	As III	1600	4045.01	Gd I
470	4022.71	Pr II	3000	4030.16	Pa II	140	4037.21	La I	560	4045.05	Sm II
160 c	4022.76	Ho II	250	4030.34	Ce II	1400	4037.33	Gd II	210 d	4045.13	Mn I
220	4022.88	Tb I	1300	4030.38	Sr I	20 h	4037.37	Co II	230	4045.21	Ce II
140	4022.96	Re I	410	4030.47	Nd II	110	4037.49	Re I		4045.21	Mn I
1200	4023.00	Nd II	190 h	4030.51	Ti I	100	4037.59	Xe II	200	4045.36	Pm II
1100	4023.14	Gd I	220	4030.67	Sc I	220	4037.62	Ho I	370	4045.39	Co I
120	4023.14	Rh I	85	4030.68	Cr I	340	4037.67	Ce II	5400 c	4045.44	Ho II
880	4023.23	Sm II	27000	4030.76	Mn I	100	4037.84	Os I	910	4045.59	W I
100	4023.31	Re I	250	4030.842	Th I	700	4037.90	Gd II	400	4045.61	Zr II
810	4023.35	Gd I	860	4030.88	Gd I	2 h	4038.06	Si IV	230	4045.70	Pr II
120	4023.39	V II	3	4031.16	Pb III	270	4038.12	Nd II	4000	4045.813	Fe I
6	4023.60	Ar III	840	4031.34	Ce II	230	4038.22	Pr II	12000	4045.97	Dy I
20000	4023.69	Sc I	140	4031.39	Sc I	730	4038.45	Pr II	440	4046.16	Sm II
370	4023.71	Dy I	1 h	4031.39	Si IV	55	4038.73	Mn I	620	4046.34	Ce II
100	4023.77	In III	20000 c	4031.63	Tc I	210	4038.86	Tb I	200	4046.48	Sc I
600	4023.83	Ru I	520	4031.66	Tb II	220 c	4038.87	Ho II	1800	4046.56	Hg I
160 c	4023.94	Ho II	2800	4031.69	La II	190	4039.10	Cr I	1800	4046.572	Hg I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
230	4046.63	Pr II	810	4053.29	Gd II	350	4060.79	Nb I	520	4068.35	Gd I
360	4046.7	Se III	40	4053.44	Rh I	220	4060.87	Tb II	760	4068.37	Ru I
270	4046.84	Gd II	700	4053.51	Ce II	4700	4061.09	Nd II	100	4068.66	Sc III
3000 s	4046.93	Pa II	2600	4053.64	Gd I	80	4061.21	Sc III	260	4068.74	Gd I
1000	4046.96	Er I	18 p	4053.71	Ba III	270	4061.30	Gd II	500	4068.77	Cs II
340	4047.08	Pr II	8100	4053.93	Ho I	410	4061.40	Ta I	210	4068.80	Pr II
270	4047.09	Gd I	200	4053.96	Cs II	330	4061.53	Zr I	420	4068.84	Ce II
740	4047.16	Sm II	710	4054.05	Ru I	1300	4061.58	Tb I	250	4068.91	C III
40	4047.17	Te II	430	4054.12	Tb I	400 s	4061.60	Ac II	300	4069.201	Th II
350	4047.18	Cs II	300	4054.30	U II	730	4061.74	Mn I	1100	4069.28	Nd II
17	4047.21	K I	670	4054.45	Lu I	1400	4062.08	Mo I	100	4069.461	Th I
220 c	4047.52	Ho I	540	4054.48	Ho II	14000	4062.136	Pb I	150	4069.79	W I
410	4047.61	U I	5500	4054.55	Sc I	280	4062.22	Ce II	2300	4069.88	Mo I
2400	4047.64	Y I	2	4054.69	Mg I	230	4062.22	Pr II	160	4069.90	O II
2700	4047.79	Sc I	810	4054.72	Gd I	50	4062.30	In III	370	4069.92	Ir I
100	4047.96	Hf II	2200	4054.88	Pr II	880	4062.54	U II	730	4069.95	W I
160	4048.05	Os I	450	4054.99	Ce II	650	4062.59	Gd II	285	4070.2	Se II
55	4048.287	Th I	290	4055.02	Ti I	2000	4062.64	Cu I	250	4070.26	C III
10000	4048.29	Cm I	770	4055.03	Zr I	20 h	4062.73	Co II	290	4070.28	Mn I
280	4048.34	Er II	520	4055.14	Dy II	3400	4062.81	Pr II	750	4070.29	Gd II
60	4048.41	Rh I	600 r	4055.20	Pm II	230	4062.84	Hf I		4070.39	Gd II
210	4048.62	Sm II	150	4055.21	Mn I	230	4062.94	Ce II	10000 s	4070.40	Pa II
610	4048.67	Zr II	940	4055.47	Er II	1900	4063.39	Gd II	340	4070.61	W I
1100	4048.76	Mn I	100 h	4055.48	Ag I	250	4063.407	Th I	150	4070.68	Ir I
160	4048.78	Cr I	1900	4055.54	Mn I	730	4063.53	Mn I	250	4070.86	Os I
410	4048.81	Nd II	600	4055.71	Zr I	560	4063.54	Sm II	410	4071.12	U II
30	4048.88	Te II	270	4056.01	Mo I	540	4063.59	Gd II	230	4071.54	V I
200	4048.99	Re I	150	4056.06	C III	1500	4063.594	Fe I	190	4071.56	Os I
80	4049.00	Mn I	200 c	4056.08	Tc I	220	4063.89	Tb II	100	4071.57	In III
23	4049.04	Rh I	10000 s	4056.20	Pa II	230	4063.93	V I	1200	4071.737	Fe I
10000 c	4049.11	Tc I	23	4056.34	Rh I	1500	4064.16	Zr I	1100	4071.81	Ce II
270	4049.20	Gd I	2200	4056.54	Pr II	200	4064.22	Ti I	270	4071.83	Ho I
1300	4049.43	Gd II	200 r	4056.56	Pm I	280	4064.32	Sm II	100	4071.93	W I
200	4049.49	Er II	220	4056.59	Sc I	370	4064.46	Ru I	200	4072.005	Ar II
10000	4049.65	Cm I	410 w	4056.94	In II	2 h	4064.50	Co II	285	4072.16	O II
4	4049.80	Pb IV	300	4057.037	Kr II	1400	4064.58	Sm II	70	4072.385	Ar II
590	4049.81	Sm II	280	4057.07	V I	210	4064.63	Ta I	2000	4072.70	Zr I
2200	4049.86	Gd II	200	4057.440	P III	160	4064.79	La I	270	4072.92	Ce II
120	4049.95	Sc I	200 l	4057.46	Xe II	180	4064.79	W I	100	4072.93	In III
1600	4050.04	U II	10	4057.50	Mg I	700	4065.07	Au I	200	4073.00	Ru I
200	4050.07	Xe III	270	4057.55	Ho I	80	4065.08	Mn I	2500	4073.12	Dy II
320	4050.08	La II	85	4057.62	Ti I	1700	4065.09	Ho II	270	4073.13	Ho I
5 h	4050.23	Co II	150	4057.76	N IV	200	4065.10	Ti I	650	4073.20	Gd II
200	4050.33	Zr II	95000	4057.807	Pb I	300	4065.128	Kr II	70	4073.36	Cs II
270	4050.37	Gd I	130	4057.82	V I	40	4065.72	Cr I	1800	4073.48	Ce II
200	4050.48	Zr I	210	4057.95	Mn I	260	4066.04	Gd I	15	4073.48	Te II
1600	4050.56	Dy II	85	4058.14	Ti I	140	4066.21	Hf I	290	4073.51	Ho I
110	4050.887	Th I	430	4058.19	U II	390	4066.22	Tb II	210	4073.74	Ce II
360	4050.96	V I	2600	4058.22	Gd I	350	4066.37	Co I	300	4073.76	Gd II
450	4051.13	Pr II	120	4058.77	Cr I	960	4066.69	Os I	5 h	4074.34	Co II
850	4051.15	Nd II	450	4058.80	Pr II	810	4066.74	Sm II	5000	4074.36	W I
360	4051.35	V I	440	4058.87	Sm II	85	4066.94	Cr I	300	4074.48	U II
1400	4051.40	Ru I	1100	4058.93	Mn I	50	4066.975	Fe I	250	4074.52	C II
210	4051.43	Ce II	16000 c	4058.94	Nb I	100	4067.24	Ta I	20	4074.53	Yb III
300	4051.54	Pm II	600	4059.07	Cl III	280	4067.28	Ce II	230	4074.68	Os I
55	4051.73	Mn I	140	4059.253	Th I	50	4067.37	Kr III	35	4074.86	Cr I
300	4051.86	Tb II	400	4059.312	P III	850	4067.39	La II	310	4074.93	Zr I
540	4051.91	U II	150	4059.39	Mn I	170	4067.57	Ho I	160 h	4074.97	Sc I
500	4051.95	Tc I	550	4059.51	Er I	200	4067.61	Ru I	3	4075.06	Mg I
200	4051.98	Po	210	4059.51	Nb I	520	4067.75	U II	710	4075.12	Nd II
210	4051.99	Ce II	690	4059.78	Er II	310	4067.91	Ta I	260	4075.22	Tb I
70	4052.28	Yb I	650	4059.88	Gd I	200	4067.94	C III	470	4075.28	Nd II
10 h	4052.40	Co II	850	4059.96	Nd II	500	4067.96	Cs II	20 h	4075.45	Si II
65	4052.47	Mn I	10	4060.21	Ti III	50	4067.977	Fe I	55	4075.503	Th I
30	4052.79	Au II	410	4060.26	Ti I	80	4068.00	Mn I	1500	4075.71	Ce II
300	4052.87	Tb II	220	4060.31	Ho I	720	4068.05	Ho I	600	4075.84	Pm II
100	4052.921	Ar II	220	4060.33	La I	120	4068.106	Cu II	810	4075.84	Sm II
11	4053.11	Fe III	410	4060.37	Tb I	210	4068.26	Nb I	1500	4075.85	Ce II
200	4053.18	Tc I	60	4060.4	Xe III	710	4068.33	Sm II	350 l	4075.85	C II

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
450	4075.87	O II	560	4082.78	Rh I	100	4090.49	Cu III	440	4100.40	Nb I
40	4076.06	Cr I	1100	4082.94	Mn I	1100	4090.58	V I	350	4100.56	Er II
100	4076.15	Tm III	150	4082.96	W I	20	4090.67	Yb III	2900 c	4100.72	Pr II
210	4076.24	Ce II	150	4083.18	P V	140	4091.64	Ho I	40	4100.737	Fe I
10	4076.35	Au II	220	4083.2	Se III	490	4091.82	Os I	6700	4100.92	Nb I
200	4076.53	Zr I	910	4083.23	Ce II	210	4092.19	Tb I	30	4101.04	Te II
25	4076.628	Ar II	3	4083.28	Au II	1000	4092.27	Sm II	30	4101.70	Au I
40	4076.629	Fe I	500	4083.34	Pr II	830	4092.39	Co I	15	4101.74	H I
280	4076.65	Sm II	180	4083.35	Hf I	180	4092.41	V I	350	4101.74	Ru I
330	4076.69	U II	10 h	4083.43	Ag I	100	4092.61	Ir I	17000	4101.76	In I
110	4076.71	La II	400	4083.54	Tc I	1800	4092.69	V I	450	4101.77	Ce II
980	4076.73	Ru I	280	4083.58	Sm II	1100	4092.71	Gd I	5 h	4101.86	Si III
15 h	4076.78	Si II	1100	4083.63	Mn I	210	4092.90	Er I	10000	4101.96	Pu I
40	4077.09	Cr I	230	4083.67	Ho I	460	4093.03	U II	250	4102.15	Mo I
3	4077.14	I III	520	4083.70	Gd I	40 h	4093.13	Sc I	590	4102.16	V I
85	4077.28	Yb II	2000	4083.71	Y I	540	4093.16	Hf II	200	4102.23	I I
2800	4077.35	La II	200	4083.77	Ba II	120	4093.50	V I	9900	4102.38	Y I
9400	4077.38	Y I	2500 c	4083.88	Rb II	5	4093.69	K II	8	4102.42	Si III
420	4077.47	Ce II	160	4083.91	F II	200	4093.69	Tc I	1000	4102.70	W I
70	4077.57	Rh I	80 d	4083.91	O II	260	4093.72	Gd I	70	4102.936	Si I
240	4077.62	Nd II	100	4084.10	Au I	30	4094.03	Sr III	190	4103.07	F II
40	4077.68	Cr I	19	4084.28	Rh I	290	4094.05	Sm II	170	4103.22	F II
46000	4077.71	Sr II	940	4084.38	Mo I	10000	4094.19	Tm I	3900	4103.30	Dy II
150	4077.83	Hg I	220	4084.40	Sm II	260	4094.37	Tb II	200	4103.43	N III
150	4077.838	Hg I	30 h	4084.86	Ba I	260	4094.48	Gd II	200	4103.51	F II
420	4077.88	Er I	270	4084.86	Nb I	260	4094.49	Tb I	180	4103.71	F II
7400	4077.96	Dy II	140	4085.09	Ho I	3	4094.54	Pb III	8900	4103.84	Ho I
45 h	4078.24	Eu I	450	4085.23	Ce II	700	4094.747	Th II	860	4103.87	Dy I
240	4078.31	Zr I	200 r	4085.31	Pm I	120	4094.78	Ho I	170	4103.87	F II
530	4078.32	Ce II	370	4085.34	Dy I	65	4094.85	Sc I	260	4103.90	Tb II
1300	4078.44	Gd II	120	4085.38	Eu II	110	4094.95	P V	150	4103.912	Ar II
840	4078.47	Ti I	310	4085.43	Ru I	890	4095.49	V I	240	4104.13	Sm II
270	4078.52	Ce II	85	4085.434	Th I	15000	4095.67	Tc I	500	4104.23	Cl III
160	4078.57	Sc I	1500	4085.56	Gd II	100	4095.69	W I	110	4104.23	Hf I
2800	4078.70	Gd I	240	4085.82	Nd II	390	4096.10	Dy I	2000 c	4104.28	Rb II
40 h	4079.1	Bi II	80	4085.91	Ag II	75bl	4096.13	LuO	230	4104.40	V I
120	4079.18	La I	500	4086.10	Pm II	270	4096.13	Nd II	140	4104.42	Re I
730	4079.24	Mn I	700	4086.520	Th II	1	4096.57	Co II	260	4104.78	V I
730	4079.42	Mn I	210	4086.60	Tb I	75	4096.80	Eu II	20	4104.79	Cl I
35	4079.574	Ar II	200	4086.67	Sc I	560	4096.82	Pr II	40	4104.87	Cr I
40	4079.72	Ti I	5500	4086.72	La II	30	4097.02	Sr III	110	4104.87	La I
12000	4079.73	Nb I	50 d	4087.14	O II	50	4097.10	Ca II	250	4105.00	Ce II
500 c	4079.77	Pr II	400	4087.16	Sc I	10000	4097.12	Pu I	220	4105.00	O II
300	4080.084	P III	200 c	4087.21	Pr II	10	4097.2	Bi II	120	4105.02	Ta I
120 c	4080.23	Ho II	290	4087.34	Pd I	110	4097.24	O II	120	4105.04	Ho I
470	4080.23	Nd II	170	4087.35	Ho I	250	4097.33	N III	2800	4105.17	V I
270	4080.44	Ce II	250	4087.36	Ce II	140	4097.52	Rh I	270	4105.330	Th II
240	4080.56	Sm II	200	4087.59	Ho I	930	4097.79	Ru I	55	4105.36	Mn I
6000	4080.60	Ru I	3500	4087.63	Er I	1100	4098.10	Er I	650	4105.37	Tb I
330	4080.60	U II	260	4087.69	Gd II	220	4098.18	Nd II	30	4105.63	Sr III
500 c	4080.98	Pr II	45	4087.79	Rh I	20	4098.23	Yb III	9500	4105.84	Tm I
12	4081.00	Fe III	130	4088.33	W I	55 h	4098.35	Sc I	10000	4105.95	Pu II
670	4081.22	Ce II	500	4088.337	Kr II	380	4098.40	Pr II	380	4106.38	U II
90 h	4081.22	Y I	3000 s	4088.44	Ac II	15	4098.53	Ca I	60 h	4106.39	Y I
2000	4081.22	Zr I	60	4088.50	Rh I	15	4098.57	Ca I	270	4106.50	Ho I
550	4081.24	Er II	2	4088.58	Er III	2600	4098.61	Gd II	140	4106.58	Hf I
390	4081.24	Tb I	150	4088.61	Al III	250	4098.729	Kr II	200	4106.59	Nd II
110	4081.368	Th I	10000	4088.71	Tc I	100 h	4098.89	Xe II	500	4106.83	Cl III
200	4081.37	Na II	70	4088.726	Th I	520	4098.90	Gd II	60	4106.88	Eu I
240	4081.43	Re I	230	4088.85	Ce II	10000	4099.12	Cf I	810	4107.28	Sm II
1300	4081.44	Mo I	10	4088.85	Si IV	85	4099.17	Ti I	100	4107.36	Ho I
15	4081.77	Ca III	150 d	4089.27	O II	280	4099.54	La II		4107.39	Sm II
2	4081.83	Mg I	5000 s	4089.29	Am II	2800	4099.80	V I	510	4107.42	Ce II
790	4081.85	Pr II	100 l	4089.32	Am II	140	4099.94	N I	35 h	4107.44	Lu I
25	4082.387	Ar II	180	4089.61	La I	230	4100.22	Ho I	730	4107.47	Mo I
6100	4082.40	Sc I	440	4089.68	Yb I	650	4100.26	Gd I	40	4107.489	Fe I
110	4082.45	Al III	65	4089.94	Mn I	120	4100.30	Os I	45	4107.49	Rh I
290	4082.46	Ti I	2200	4090.13	U II	65	4100.33	Sc I	40	4108.05	Hg I
410	4082.60	Sm II	650	4090.41	Gd I	150	4100.341	Th I	40	4108.057	Hg I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
120	4108.22	V I	200	4117.29	Ce II	410	4123.88	Nd II	600	4131.50	Er I
200	4108.40	Zr I	200	4117.59	Ce II	710	4123.96	Sm II	300	4131.724	Ar II
840	4108.421	Th II	3000	4117.62	Pa	100	4123.99	O V	150 c	4131.79	Lu I
2900	4108.62	Ho I	150	4118.05	W I	120	4124.07	V I	100	4132.00	Cs II
1400	4109.08	Nd II	770	4118.14	Ce II	8000	4124.22	Tc I	3100	4132.02	V I
100	4109.1	Xe III	180	4118.18	V I	180	4124.60	Os I	400	4132.058	Fe I
170	4109.16	F II	100	4118.19	W I	490	4124.63	Dy II	1100	4132.28	Gd II
100	4109.248	Kr II	1700 c	4118.46	Pr II	3100	4124.73	Lu I	20	4132.43	Ba I
410	4109.40	Sm II	150	4118.544	Fe I	410	4124.73	U II	10000 h	4132.50	Cl II
2500	4109.46	Nd II	320	4118.55	Er I	510	4124.79	Ce II	40	4132.56	Li I
40	4109.58	Cr I	1900	4118.55	Sm II	320	4124.92	Y II	40	4132.62	Li I
150	4109.75	W I	110	4118.60	Hf I	100	4125.16	W I	120	4132.69	Tm II
2300	4109.79	V I	180	4118.64	V I	1300	4125.65	Ho I	340	4132.753	Th II
60	4109.82	Ca II	110	4118.69	Pt I	140	4126.52	Cr I	160	4132.81	O II
7	4109.85	Tl III	2800	4118.77	Co I	150	4126.80	W I	440 h	4133.00	Sc I
185	4109.95	N I	250	4119.02	Ce II	4300	4127.16	Ho I	10000	4133.01	Pu I
280	4110.19	Sm II	10	4119.14	Ti III	75	4127.28	Eu I	470	4133.36	Nd II
1000	4110.22	Tc I	150	4119.21	F II	35	4127.30	Cr I	240cw	4133.42	Re I
30	4110.28	Ca II	285	4119.22	O II	70	4127.32	Te II	100	4133.48	W I
200	4110.38	Ce II	120 h	4119.25	Yb II	980	4127.37	Ce II	200	4133.61	Pr II
510	4110.48	Nd II	600	4119.27	Tc I	200	4127.411	Th I	20	4133.63	Sb II
550	4110.54	Co I	60	4119.29	Cs II	130	4127.54	Ti I	14	4133.78	Ti IV
5	4110.76	Pb II	45	4119.30	Eu II	40	4127.608	Fe I	2700	4133.80	Ce II
80	4110.81	Y I	230	4119.46	V I	40	4127.64	Cr I	390	4133.85	Dy I
240 c	4110.89	Re I	120	4119.68	Rh I	250	4127.74	Ce II	200	4134.067	Th I
200	4110.90	Mn I	310	4119.79	Ce II	150	4127.80	Hf II	100 d	4134.15	I I
10000	4111.07	Pu I	310	4119.88	Ce II	23	4127.92	Ir I	750	4134.16	Gd I
1500	4111.34	Dy II	260	4119.92	Tb I	200	4128.07	Ce II	2300	4134.49	V I
250	4111.39	Ce II	630	4120.10	Mo I	300 h	4128.07	Si II	300	4134.54	Ho I
390	4111.44	Gd II	1500	4120.20	Ho I	3100	4128.07	V I	80	4134.676	Fe I
8900	4111.78	V I	180	4120.54	V I	2	4128.11	Pb III	7	4134.72	K II
100	4111.82	W I	40	4120.61	Cr I	10000	4128.12	Pu I	200	4134.77	Cd II
300	4112.00	Ho I	450	4120.8	S I	390	4128.24	Dy II	300	4134.81	Tc I
1200	4112.02	Os I	12	4120.82	He I	1000	4128.27	Tc I	120	4135.04	Mn I
90 h	4112.04	Eu II	450	4120.83	Ce II	8900	4128.31	Y I	70	4135.09	Yb II
120	4112.33	V I	100	4120.85	W I	410	4128.34	U II	250	4135.14	Sm II
300	4112.50	Tb I	10	4120.90	Fe III	30	4128.59	Au I	2100	4135.27	Rh I
95 h	4112.67	Lu I	2	4120.99	He I	120	4128.86	V I	510	4135.33	Nd II
220	4112.71	Ti I	15	4121.06	Yb III	1500	4128.87	Rh I	270	4135.44	Ce II
100	4112.72	Ho I	500	4121.21	Cs II	180	4128.96	Os I	300	4135.66	Br II
1900	4112.74	Ru I	4400	4121.32	Co I	350	4129.12	Dy I	2500	4135.78	Os I
240	4112.754	Th I	410	4121.36	Sm II	250	4129.15	Pr II	10000	4135.97	Pu I
10	4113.21	Zn I	400	4121.46	Zr I	40	4129.17	Ti I	1700 c	4136.11	Rb II
10000	4113.29	Cm I	140	4121.53	Bi I	200	4129.21	I I	230	4136.20	Ta I
4	4113.35	Pb II	120 h	4121.61	Y III	280	4129.23	Sm II	1500	4136.22	Ho I
230	4113.52	V I	190	4121.64	Re I	3	4129.24	La III	1800	4136.45	Re I
110	4113.53	Hf II	1100	4121.68	Rh I	210	4129.38	Ta I	30	4136.59	Eu II
300	4113.70	Na II	40	4121.82	Cr I	990	4129.42	Dy II	40	4136.997	Fe I
300 h	4113.83	Nd II	140	4121.86	Bi I	670	4129.43	Nb I	110	4137.04	La I
270 c	4113.89	Pr II	285	4121.93	B II	33000cw	4129.70	Eu II	40	4137.07	Eu I
410	4113.90	Sm II	11	4122.02	Fe III	10000	4129.71	Cm I	410	4137.10	Gd II
10000	4114.91	Pu I	70	4122.07	Hg III	770	4129.93	Nb I	2300	4137.10	Nb I
6	4114.99	K II	35	4122.16	Cr I	10000	4129.93	Pu II	140	4137.29	Ti I
10000	4115.08	Tc I	85	4122.17	Ti I	350	4130.35	Dy I	5	4137.43	La III
4300	4115.18	V I	310	4122.49	Lu I	2200	4130.37	Gd II	540	4137.46	W I
420	4115.37	Ce II	280	4122.51	Sm II	1500 h	4130.66	Ba II	270	4137.47	Ce II
5 h	4115.50	Si III	11	4122.78	Fe III	530	4130.71	Ce II	2000	4137.65	Ce II
280	4115.758	Th I	250	4123.08	Na II	340	4130.77	Pr II	15	4137.76	Fe III
140	4115.78	Ir I	180	4123.19	V I	3	4130.88	Co II	150	4137.84	Os I
9	4116.10	Si IV	4400	4123.23	La II	500 h	4130.89	Si II	150	4138.02	W I
810	4116.10	U II	510	4123.24	Ce II	110	4131.002	Th I	270	4138.10	Ce II
70	4116.33	Rh I	40	4123.31	Ti I	480	4131.10	Ce II	1100	4138.33	Tm I
320	4116.36	Er I	40	4123.39	Cr I	150	4131.12	Mn I	210	4138.35	Ce II
1800	4116.47	V I	510	4123.49	Ce II	13	4131.22	Ti IV	300	4138.12	Tc I
160	4116.54	F II	85	4123.57	Ti I	40	4131.25	Ti I	130	4139.34	Ho I
1100	4116.713	Th II	2000	4123.57	V I	40	4131.33	Kr III	13	4139.35	Fe III
270	4116.73	Ho I	30	4123.600	Th I	40	4131.36	Cr I	440	4139.44	Nb I
310	4116.90	Nb I	5300	4123.81	Nb I	500	4131.363	Cu II	2700	4139.71	Nb I
250	4117.01	Ce II	980	4123.87	Ce II	270	4131.48	Gd II	800	4139.85	Tc I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
10000	4140.04	Pu I	80	4148.80	Mn I	200 l	4158.04	Xe II	240	4169.09	Tb I
300	4140.20	Br II	280	4148.86	Gd I	350	4158.53	Tb I	450	4169.1	Se III
220	4140.235	Th II	280	4148.90	Ce II	110	4158.535	Th I	240	4169.32	Tb I
530 h	4140.30	Sc I	230	4148.94	Mo I	400	4158.590	Ar I	85	4169.35	Ti I
10	4140.34	Hg III	290	4148.97	Ho I	120	4158.60	Tm I	500	4169.42	Ce III
250	4140.46	Pm II	470	4149.07	Yb I	350	4158.61	Cs II	230	4169.45	Pr II
9	4140.48	Fe III	120	4149.14	Tm I	24	4158.98	Lu I	810	4169.48	Sm II
15	4140.54	Sb II	7	4149.19	K II	450	4159.03	Ce II	1000	4169.68	Tc I
100 s	4140.96	Am I	1200	4149.20	Zr II	10000	4159.39	Pu II	320	4169.77	Ce II
30	4141.02	Eu II	420	4149.79	Ce II	85	4159.64	Ti I	100	4169.77	Te II
80	4141.06	Mn I	810	4149.83	Sm II	150	4159.69	V I	40	4169.84	Cr I
10000	4141.20	Pu II	650	4149.92	Al III	100	4160.26	La I	90	4169.84	Pd I
1500 c	4141.22	Pr II	980	4149.94	Ce II	340	4160.57	Nd II	320	4169.88	Ce II
460	4141.22	U II	140	4149.96	Re I	3 d	4160.67	Co II	35	4170.20	Cr I
400	4141.27	Tc I	450	4149.986	Th II	500	4161.140	Cu II	4000	4170.27	Tc I
50	4141.49	Cd II	10	4150.04	Yb III	400	4161.21	Zr II	160	4170.40	Re I
470	4141.50	Dy II	870	4150.12	Nb I	85	4161.42	Cr I	1200	4170.52	Po I
60	4141.72	Eu II	650	4150.17	Al III	200	4161.80	Sr II	160	4170.53	W I
550	4141.74	La II	420	4150.91	Ce II	90hd	4161.88	Sc I	10000	4170.95	Pu I
230	4142.19	Ho I	170	4150.96	Ti I	150	4162.36	Hf II	120	4171.03	Ti I
110	4142.25	W I	10000	4151.09	Pu I	110	4162.69	Hf I	240	4171.05	Tb I
280	4142.3	S II	6900	4151.11	Er I	450	4162.7	S II	450	4171.17	W I
110 h	4142.37	Al III	350	4151.27	Cs II	100	4162.72	Yb III	65 h	4171.56	Sc I
770	4142.40	Ce II	10000	4151.45	Pu I	540	4162.73	Gd II	410	4171.57	Sm II
90	4142.46	Pr III	30	4151.52	Eu II	150	4162.86	C III	1400	4171.59	U II
250	4142.701	Th II	45	4151.64	Eu II	8100	4163.03	Ho I	620	4171.82	Pr II
7500	4142.85	Y I	1400	4151.97	Ce II	280	4163.09	Gd II	400	4171.851	Cu II
550	4142.91	Er II	1100	4151.97	La II	870	4163.47	Nb I	40	4171.90	Ti II
200	4143.017	Cu II	1200	4152.21	Sm II	310	4163.52	Ce II	370	4171.93	Dy I
85	4143.05	Ti I	720	4152.36	Sc I	30	4163.55	Te II	10	4172.04	Ga I
1200	4143.10	Dy II	4400	4152.58	Nb I	140	4163.62	Cr I	90	4172.15	Pr III
2700	4143.11	Pr II	980cw	4152.61	Ho II	70	4163.65	Ti II	160	4172.23	Ho I
350	4143.21	Nb I	200	4152.64	Zr I	4400	4163.66	Nb I	730	4172.25	Pr II
200	4143.415	Fe I	30	4152.78	Cr I	350	4163.68	U II	5000	4172.53	Tc I
280	4143.51	Tb I	220	4152.78	La II	35	4164.14	Ti I	90	4172.56	Ir I
2900	4143.55	Mo I	10	4152.82	Pb II	1700 c	4164.16	Pr II	180	4172.57	Os I
3	4143.76	He I	450	4153.1	S II	50	4164.180	Ar I	240	4172.60	Tb I
800	4143.869	Fe I	15	4153.11	Yb III	370	4164.284	Cu II	50	4172.744	Fe I
2000	4144.16	Ru I	230	4153.13	Ce II	15	4164.31	Ca III	40	4172.77	Cr I
700	4144.36	Re I	220	4153.30	O II	80	4164.56	Pt I	110	4172.80	Eu II
1100	4144.41	Tb II	530	4153.33	Sm II	4000	4164.66	Nb I	240	4172.82	Tb I
120	4144.48	Pr III	15	4153.57	Ca III	18	4164.73	Fe III	60	4172.95	Yb III
390	4144.49	Ce II	300	4153.623	Cu II	9	4164.92	Fe III	2500	4173.23	Ho I
6000	4144.95	Tc I	120	4153.82	Cr I	4	4165.10	Mg I	1200	4173.23	Os I
670	4145.00	Ce II	40	4153.898	Fe I	1100 h	4165.19	Sc I	260	4173.47	Tb I
3000	4145.08	Tc I	880	4153.97	U I	70	4165.52	Cr I	100	4174.01	V I
360	4145.1	S II	460	4154.08	Lu I	1300	4165.61	Ce II	2000	4174.14	Y I
250	4145.122	Kr II	240	4154.37	Rh I	10000	4165.61	Tc I	13	4174.26	Fe III
3	4145.13	Co II	40	4154.46	Kr III	140	4165.766	Th I	1100	4174.34	Hf I
140	4145.16	W I	50	4154.500	Fe I	200	4166.00	Ba II	120	4174.56	Yb I
100	4145.7	Xe III	160	4154.66	W I	15	4166.04	Ir I	170	4174.80	Cr I
650	4145.74	Ru I	55 h	4154.72	Sc	40	4166.32	Ti I	60	4174.912	Fe I
140	4145.76	Hf I	9	4154.96	Fe III	400	4166.36	Zr I	30	4175.16	Eu II
110	4145.95	W I	560	4155.22	Sm II	13	4166.84	Fe III	210	4175.21	Ta I
990	4146.06	Dy I	250	4155.28	Mo I	620	4166.88	Ce II	360	4175.3	Se II
50	4146.06	O II	10000	4155.46	Pu I	280	4167.16	Gd II	250	4175.32	Pr II
480	4146.23	Ce II	27	4155.70	Ir I		4167.27	Gd I	2400	4175.54	Gd I
270 c	4146.50	Pr II	4	4155.75	Tl III	15	4167.27	Mg I	810	4175.61	Nd II
5	4146.70	Ar III	3000	4156.08	Nd II	500	4167.42	Tc I	250	4175.62	Pr II
260	4146.77	Ru I	35	4156.086	Ar II	870	4167.51	Ru I	620	4175.63	Os I
10000 l	4147.13	Bk II	290	4156.24	Zr II	2400	4167.52	Y I	50	4175.635	Fe I
65 h	4147.40	Sc I	510	4156.26	Nd II	10000	4167.77	Pu I	30	4175.94	Cr I
55	4147.53	Mn I	200	4156.50	Pr II	250	4167.80	Ce II	285	4176.16	N II
200	4147.62	Tc I	380	4156.65	U I	5700	4167.97	Dy I	3000 l	4176.18	Pa II
320	4147.71	Sm II	60	4156.799	Fe I	410	4168.00	Nd II	1000	4176.28	Tc I
90	4147.85	Pr III	200	4157.40	Mo I	10000	4168.033	Pb I	150	4176.60	Mn I
230	4147.89	Ta I	100 h	4157.63	Y I	270	4168.04	Pr II	340	4176.70	Ce II
200	4148.182	Th II	30	4157.72	Eu I	3500	4168.13	Nb I	600	4177.26	Gd III
270	4148.44	Pr II	10	4157.814	Pb I	3000 s	4168.40	Ac II	2400	4177.32	Nd II

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
8000	4177.54	Y II	120	4187.038	Fe I	15	4195.17	Sb II	60000cw	4205.05	Eu II
50	4177.593	Fe I	300	4187.16	Tb I	320	4195.19	Dy II	230	4205.06	Dy I
100	4177.92	Ta I	530	4187.32	Ce II	40	4195.329	Fe I	140 c	4205.14	In II
440	4178.02	Sm II	280	4187.32	La I	40	4195.36	Eu II	75	4205.20	Sc I
620	4178.060	Th II	660	4187.56	Zr I	1300	4195.66	Nb I	870	4205.31	Nb I
200	4178.27	Mo I	65 h	4187.62	Sc I	120	4195.76	N III	130	4205.32	Er I
10000	4178.28	Pu II	8800	4187.62	Tm I		4196.	Li I	470	4205.60	Nd II
100	4178.48	P II	120	4187.795	Fe I	40	4196.18	Eu II	300	4205.88	Ta I
200	4178.63	Pr II	1000 s	4188.12	Am II	10000	4196.20	Pu II	220	4206.00	Tm II
200	4178.64	Nd II	1000	4188.13	Sm II	630	4196.34	Ce II	1500	4206.02	Ru I
200	4178.96	Ge III	2500	4188.32	Mo I	330	4196.50	Rh I	660	4206.13	Sm II
170	4179.26	Cr I	40	4188.69	Ti I	1500	4196.55	La II	40	4206.18	Ca II
30	4179.29	Te II	300	4189.27	U II	390	4196.74	Tb I	120	4206.40	Ta I
35	4179.297	Ar II	2500	4189.48	Pr II	240	4197.01	Pr III	10000	4206.48	Pu I
5200	4179.39	Br II	10000 s	4189.69	Bk II	40	4197.23	Cr I	600	4206.49	Tb I
230	4179.42	V I	450	4189.79	O II	615	4197.40	As II	370	4206.54	Dy II
500	4179.512	Cu II	180	4189.84	V I	10000 s	4197.44	Bk II	160	4206.58	Hf II
640	4179.59	Nd II	10000	4189.90	Pu II	23	4197.54	Ir I	70	4206.62	Rh I
400	4179.63	Br II	320	4189.91	Os I	550	4197.58	Ru I	270	4206.62	Sm II
250	4179.714	Th II	280	4189.98	Er II	450	4197.68	Gd II	80	4206.696	Fe I
150	4179.77	Pr III	120	4189.99	Mn I	280	4198.00	Ce II	2500 c	4206.72	Pr II
100	4179.98	Ac I	10000	4190.06	Pu II	800	4198.02	Dy I	220	4207.05	W I
1000 h	4180.10	Xe II	715	4190.082	As II	100	4198.08	Ho I	140	4207.15	F II
340	4180.81	Yb II	35	4190.13	Cr I	50	4198.13	Si II	18	4207.24	Ca III
450	4180.9	Se II	1000	4190.70	Er I	150	4198.304	Fe I	10000	4207.66	Cm II
340	4181.08	Ce II	90	4190.71	Co I	200	4198.317	Ar I	10000	4208.23	Pu I
530	4181.10	Sm II	100	4190.713	Ar I	310	4198.51	Nb I	500	4208.32	Pr II
1	4181.13	Co II	100 h	4190.72	Si II	85	4198.52	Cr I	35	4208.36	Cr I
130	4181.15	Ta I	2200	4190.78	Gd I	280	4198.67	Ce II	300 h	4208.48	Xe II
120	4181.754	Fe I	1200	4190.88	Nb I	840	4198.72	Ce II	1	4208.61	Co II
50	4181.884	Ar I	320	4190.94	Dy I	10	4198.74	Yb III	620	4208.890	Th II
110	4182.22	Eu I	120	4190.95	Hf I	550	4198.88	Ru I	610	4208.98	Zr II
35	4182.47	Ir I	50	4191.029	Ar I	610	4199.09	Zr I	110	4209.37	Cr I
150	4182.59	V I	750	4191.07	Gd II	40	4199.095	Fe I	270	4209.41	Ce II
220	4182.90	Re I	85	4191.27	Cr I	120	4199.28	Y II	100 h	4209.47	Xe II
220	4183.06	Re I	80	4191.430	Fe I	270	4199.45	Sm II	65	4209.67	Cl I
20	4183.12	Ac I	180	4191.56	V I	7600	4199.90	Ru I	300 s	4209.69	Ac II
15 h	4183.21	Ir I	560 c	4191.60	Pr II	520	4199.92	Tm II	190	4209.70	Hf I
35	4183.30	Ti I	750	4191.63	Gd I	150	4200.10	N III	40	4209.76	Cr I
200	4183.32	Zr I	2200	4191.64	Dy I	20	4200.32	V V	230	4209.86	V I
210	4183.33	Sm I	300	4191.70	Ce III	400	4200.674	Ar I	80	4210.343	Fe I
10 h	4183.35	Si II	410	4191.93	Sm II	70	4200.75	Ti I	660	4210.35	Sm II
930	4183.72	Dy I	870	4192.07	Nb I	450	4201.00	Tb II	9	4210.67	Fe III
530	4183.76	Sm II	35	4192.10	Cr I	30	4201.13	Au I	130	4210.923	Th I
120	4184.13	Os I	280	4192.36	La II	290	4201.17	Pr II	90 h	4210.96	Rh I
30	4184.138	Th I	40	4192.43	Pt I	240	4201.24	Ce II	3300	4211.14	Ag I
180	4184.18	Pr III	300	4192.92	Pm II	680	4201.30	Dy I	440	4211.24	Dy I
15	4184.20	Ca III	130	4193.017	Th I	180	4201.45	Os I	470	4211.29	Nd II
2400	4184.25	Gd II	3500	4193.08	Rb II	610	4201.46	Zr I	100	4211.30	Ho II
1600	4184.25	Lu II	560	4193.09	Ce II	350	4201.52	Nb I	25	4211.31	Te II
310	4184.44	Nb I	500 h	4193.15	Xe II	65	4201.76	Mn I	40	4211.35	Cr I
50	4184.891	Fe I	60	4193.20	Cs II	1000	4201.80	Rb I	10000	4211.62	Cm I
35	4184.90	Cr I	370	4193.28	Ce II	300	4202.029	Fe I	16000	4211.72	Dy I
250	4184.98	Nd II	300	4193.45	Br II	250	4202.06	Os I	35	4211.73	Ti I
340	4185.33	Ce II	85	4193.66	Cr I	680	4202.24	Dy I	65	4211.75	Mn I
285	4185.46	O II	370	4193.87	Ce II	650	4202.92	Sm II	1200	4211.86	Os I
100	4185.48	Ag II	8	4194.09	Ra II	910	4202.94	Ce II	320	4211.86	Pr II
18	4185.66	Ir I	30	4194.34	Yb III	1100	4203.05	Sm II	500	4211.866	Cu II
200	4185.74	Pm II	540	4194.35	Ho I	130	4203.21	Ho I	200	4211.88	Zr II
480	4185.82	Mo I	20	4194.40	Ac I	85	4203.46	Ti I	1300	4212.00	Gd II
360	4186.12	Ti I	250	4194.56	Mo I	60	4203.59	Cr I	5400	4212.06	Ru I
240	4186.21	Tb I	200	4194.70	Pm II	6000	4203.73	Tm I	65	4212.34	Sc I
8	4186.24	K II	400	4194.76	Zr I	650	4203.74	Tb I	7 h	4212.41	Si IV
30	4186.36	Cr I	110	4194.79	B II	40	4203.984	Fe I	45	4212.49	Sc I
45 h	4186.45	Sc I	500	4194.83	Ce III	240	4204.04	La II	100	4212.82	Ag I
800	4186.51	Tc I	6800	4194.84	Dy I	160	4204.40	W I	2500	4212.95	Pd I
3500	4186.60	Ce II	70	4194.95	Cr I	40	4204.47	Cr I	80	4213.02	Y I
12000	4186.82	Dy I	100	4194.95	Yb III	380	4204.70	Y II	100 d	4213.04	In II
250 h	4186.90	C III	870	4195.09	Nb I	590	4204.86	Gd II	500	4213.13	Cs II

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
1800	4213.18	Dy I	40	4221.88	Sc I	15	4231.07	Yb III	680	4239.85	Dy I
300	4213.26	Ce III	110	4222.04	W I	130 h	4231.24	Ho I	980	4239.92	Ce II
300cw	4213.50	Tb I	200	4222.15	Pm II	180	4231.45	Pr III	270	4240.02	Pr II
40	4213.54	Y I	500	4222.195	P III	390	4231.74	Ce II	770	4240.34	Zr I
300	4213.64	Yb III	540	4222.21	Dy I	260	4231.89	Tb I	200	4240.37	Na II
300 h	4213.72	Xe II	50	4222.212	Fe I	180	4231.93	Sc I	15	4240.46	Ca I
120	4213.86	Os I	11	4222.27	Fe III	120	4231.97	Yb I	60	4240.70	Cr I
400	4213.86	Zr I	290	4222.29	Ho I	680	4232.02	Dy I	16	4240.74	Ca III
370	4214.04	Ce II	350	4222.37	U I	500	4232.19	Cs II	250	4240.90	Na II
300	4214.42	Tb II	1500	4222.60	Ce II	1300	4232.38	Nd II	960	4241.01	Pr II
760	4214.44	Ru I	25	4222.637	Ar II	170	4232.44	Hf II	760	4241.05	Ru I
350	4214.73	Nb I	380	4222.67	Tm I	75	4232.45	Eu II	20	4241.094	Th I
28	4214.828	Th I	40	4222.73	Cr I	360	4232.46	V I	770	4241.20	Zr I
970	4215.02	Gd II	3800	4222.93	Pr II	1500	4232.59	Mo I	150	4241.39	Re I
480	4215.09	Tb I	7	4222.97	K II	480	4232.82	Tb I	290	4241.44	W I
3700	4215.16	Ti I	300 h	4223.00	Xe II	180	4232.95	V I	1000	4241.67	U II
100	4215.16	Os I	8	4223.05	Tl II	320	4233.11	Pr II	1200	4241.69	Zr I
110	4215.38	W I	290	4223.47	Ho I	11	4233.17	Fe II	450	4241.78	N II
32000	4215.52	Sr II	40	4223.88	Eu II	250	4233.26	Na II	100	4241.80	Au I
11	4215.52	Ti III	1000	4223.89	Br II	80	4233.27	O I	100	4241.97	Cs II
500	4215.53	Rb I	10000	4224.20	Pu I	170	4233.46	Os I	3	4242.08	Na I
100	4215.60	Xe II	80	4224.25	Y I	100	4233.602	Fe I	9 c	4242.14	Pb II
500	4216.04	Ba II	260	4224.28	Tb I	200	4233.61	Sc I	3000	4242.15	Tm II
75 h	4216.10	Sc I	12	4224.6	Bi III	17	4233.74	Ca III	10000	4242.38	Cf I
400	4216.183	Fe I	40	4224.79	Ti I	100	4233.85	Ne II	390	4242.72	Ce II
40	4216.36	Cr I	320	4225.03	Gd I	180	4234.00	V I	40	4242.98	B III
100	4216.74	Hg III	2700	4225.16	Dy I	250	4234.19	Nd II	615	4242.982	As II
300	4217.13	Ce III	170 h	4225.16	F II	240	4234.21	Ce II	760	4243.06	Ru I
650	4217.20	Gd II	1000	4225.33	Sm II	150	4234.34	W I	340	4243.51	Pr II
10000 l	4217.23	Pa II	3800	4225.35	Pr II	350	4234.41	Cs II	70	4243.61	B III
930	4217.27	Ru I	90 d	4225.59	Sc I	620	4234.57	Sm II	12	4243.75	Fe III
300	4217.56	La II	7	4225.67	K II	140	4234.78	Er II	290	4243.78	Ho I
300	4217.56	Tb I	80	4225.73	Te II	370	4235.14	Mn I	150 h	4244.12	F II
310	4217.59	Ce II	4800	4225.85	Gd I	290 h	4235.24	Nd II	30 s	4244.25	Co II
85	4217.63	Cr I	50	4225.956	Fe I	510	4235.29	Mn I	540	4244.36	W I
27	4217.76	Ir I	10	4226.06	Rn I	300	4235.35	Tb I	520	4244.37	U II
160	4217.80	Y I	50	4226.42	Cl I	85	4235.463	Th I	90000	4244.40	Rb II
320	4217.81	Pr II	480cw	4226.45	Tb II	13	4235.56	Fe III	40	4244.44	Rh I
420	4217.94	Nb I	70	4226.562	Ge I	600	4235.73	Y II	620	4244.70	Sm II
4400	4218.09	Dy I	120	4226.62	V I	120	4235.76	V I	8	4244.72	Ra II
110 h	4218.26	Sc I	50	4226.73	Ca I	250	4235.936	Fe I	45	4244.74	Eu I
1400	4218.43	Er I	290	4226.81	Al II	2200	4235.94	Y I	20 c	4244.92	Pb II
150 d	4218.56	Yb II	25	4226.988	Ar II	200	4236.02	Ce II	130	4245.35	Ta I
300	4218.61	Tc I	2000	4227.04	Ho I	200	4236.06	Zr I	500 h	4245.38	Xe II
25	4218.665	Ar II	220	4227.14	Gd II	250	4236.13	Po	12	4245.41	Ge III
	4218.69	Yb I	55	4227.387	Th I	320 c	4236.15	Pr II	310	4245.89	Ce II
20	4219.07	Sb II	90 h	4227.40	Eu II	1200	4236.74	Sm II	440	4245.91	Dy I
260	4219.16	Tb I	200	4227.423	Fe I	300	4236.89	Br II	310	4245.98	Ce II
100	4219.360	Fe I	3600 c	4227.46	Re I	285	4236.91	N II	100	4246.12	Sc I
250	4219.37	W I	40	4227.65	Ti I	220	4237.05	N II	100	4246.17	Mn III
120	4219.45	Pr III	440	4227.73	Nd II	100	4237.220	Ar II	200	4246.23	F II
110 d	4219.66	In II	285	4227.74	N II	90	4237.51	Eu II	190	4246.39	F II
110 h	4219.73	Sc I	770	4227.75	Ce II	500	4237.66	Sm II	30	4246.47	Te II
150	4219.74	Ne II	2000	4227.76	Zr I	100	4237.82	Sc I	200	4246.57	Gd II
55	4220.065	Th I	30 h	4227.88	Au I	130	4237.89	Ti I	180	4246.59	F II
50	4220.07	Ca II	170	4228.08	Hf I	400	4238.05	Sc I	390	4246.72	Ce II
290	4220.25	Nd II	100	4228.158	Ar II	10000 c	4238.19	Tc I	350	4246.720	P III
280 h	4220.63	Y I	420	4229.15	Nb I	400 h	4238.25	Xe II	370	4246.73	Ru I
740	4220.66	Sm II	75	4229.33	Eu II	1600	4238.38	La II	170	4246.77	F II
370	4220.68	Ru I	390	4229.52	Ho II	9	4238.62	Fe III	15000	4246.83	Sc II
13	4220.80	Ir I	740	4229.70	Sm II	45	4238.69	Eu II	160	4246.84	F II
10	4220.83	Yb III	10000	4229.77	Pu II	650	4238.78	Gd II	45	4247.06	Eu II
200	4220.99	Er I	220	4229.80	Gd II	50	4238.809	Fe I	2000	4247.38	Nd II
45	4221.08	Eu II	320	4230.20	Er II	40	4238.96	Cr I	50	4247.425	Fe I
650	4221.08	Re I	29	4230.20	Rh I	2	4238.99	Na I	840 c	4247.63	Pr II
4400	4221.11	Dy I	550	4230.31	Ru I	2000	4239.31	Zr I	30	4247.989	Th II
200	4221.12	Cs II	320	4230.449	Cu II	90	4239.57	Sc I	10000 s	4248.08	Pa II
40	4221.57	Cr I	30	4230.824	Th I	190	4239.72	Mn I	1100	4248.68	Ce II
10000	4221.87	Pu I	200	4230.95	La II	290	4239.84	Nd II	85	4249.12	Ti I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
90 h	4249.14	Be III	170	4260.98	Hf I	2000 p	4270.76	La IV	470 c	4280.07	Pr II			
210	4249.55	Sm II	100	4261.11	Te II	30	4271.06	Cr I	300	4280.27	La I			
300	4249.656	P IV	60	4261.35	Cr I	250	4271.153	Fe I	85	4280.40	Cr I			
140	4249.99	La II	70	4261.60	Ti I	460	4271.55	V I	910	4280.49	Gd II			
200	4250.118	Fe I	410	4261.84	Nd II	270	4271.71	Tm I	2200	4280.79	Sm II			
150	4250.580	Kr II	10000	4261.88	Pu I	100	4271.74	Cs II	250	4281.03	Lu I			
120	4250.65	Ne II	40	4262.00	Ga II	1200	4271.759	Fe I	270	4281.10	Mn I			
300	4250.787	Fe I	770	4262.05	Nb I	300	4271.91	Lu III	10000	4281.17	Pu I			
4	4251.11	Ga II	1600	4262.09	Gd I	25	4272.0	Bi II	110	4281.38	Ti I			
20	4251.15	Te II	120	4262.16	V I	150	4272.169	Ar I	700	4282.042	Th II			
15	4251.16	Ga II	20000	4262.27	Tc I	790 c	4272.27	Pr II	550	4282.20	Zr I			
25	4251.185	Ar I	1300	4262.68	Sm II	8	4272.33	Co II	710	4282.21	Sm I			
300	4251.20	Y I	1000	4262.69	Tc I	85	4272.43	Ti I	110	4282.34	W I			
200	4251.44	Lu III	330	4263.13	Ti I	8	4272.66	Pb III	1200	4282.402	Fe I			
100 l	4251.57	Xe II	110	4263.14	Cr I	340	4272.79	Nd II	790 c	4282.42	Pr II			
1700	4251.73	Gd II	200	4263.30	W I	170	4272.85	Hf II	470	4282.44	Nd II			
250	4251.78	Sm II	200	4263.39	Hf I	40	4272.91	Cr I	240	4282.57	Nd II			
200	4251.94	Te II	7	4263.40	K II	20	4273.07	Li I	220	4282.71	Ti I			
120bl	4252.08	HfO	200	4263.43	Ce II	20	4273.13	Li I	470	4282.83	Sm I			
850	4252.44	Nd II	320	4263.59	La II	15000	4273.14	Rb II	20	4282.898	Ar II			
100	4252.68	In III	260	4263.66	Tb I	10000	4273.34	Pu II	100	4282.967	Kr I			
100	4253.05	Be I	270 c	4263.78	Pr II	280	4273.357	Th II	24	4283.01	Ca I			
390	4253.37	Ce II	490	4264.05	Ho I	12 h	4273.40	Fe III	100	4283.10	Ba I			
860	4253.37	Gd II	300 r	4264.32	Pm I	60	4273.43	Rh I	200	4283.40	Cu III			
110	4253.538	Th I	30	4264.36	Te II	60	4273.43	Te II	240	4283.50	Sm I			
360	4253.6	S III	60	4264.58	Cl I	100	4273.63	Ho II	55	4283.56	Sc			
650	4253.61	Gd II	100	4264.75	Os I	4	4273.64	Na I	430	4284.06	V I			
50 d	4253.74	O II	500	4265.08	Sm II	1000	4273.969	Kr I	65	4284.08	Mn I			
60	4253.76	Be I	40	4265.09	Sb III	300	4274.17	Gd I	760	4284.33	Ru I			
45	4253.80	Eu II	27	4265.30	Ir I	220	4274.55	W I	300 r	4284.37	Pm I			
50 d	4253.98	O II	1000	4265.55	Am I	240	4274.58	Ti I	15	4284.39	Ca III			
10 h	4254.04	Ga II	35	4265.71	Ti I	16000	4274.80	Cr I	710	4284.52	Nd II			
290	4254.29	Nd	290	4265.92	Mn I	800	4274.97	Tc II	400	4284.77	Ce III			
20000	4254.35	Cr I	420	4266.02	Nb I	20	4274.98	Ti II	160	4284.99	Ti I			
500	4254.40	Pr II	300	4266.04	Ho I	180	4275.07	Pr III	110	4285.0	S III			
1300cw	4254.43	Ho I	40	4266.22	Ti I	340	4275.09	Nd II	100	4285.08	Cd II			
10000	4254.76	Pu II	100	4266.286	Ar I	950	4275.11	Cu I	300	4285.13	Tb II			
370	4255.24	Tb I	650	4266.34	Tb I	220	4275.21	Tb I	280	4285.37	Ce II			
250	4255.44	Nb I	10000	4266.45	Cm I	170 h	4275.36	F II	430	4285.82	Gd I			
70	4255.50	Cr I	70	4266.527	Ar II	50 d	4275.47	O II	80	4285.85	Te II			
200	4255.635	Cu II	500	4266.58	Rb II	160	4275.49	W I	30	4285.9	Xe III			
4 h	4255.64	Ga II	650	4266.60	Gd I	240	4275.64	La II	100	4285.90	Os I			
5	4255.70	Ga II	340	4266.71	Nd II	120	4276.43	Ti I	890	4286.01	Ti I			
10	4255.77	Ga II	800	4267.00	C II	140	4276.48	Er II	110	4286.01	W I			
620	4255.79	Ce II	470	4267.00	Gd I	250	4276.69	Dy I	300	4286.12	Gd I			
130	4256.04	Ti I	1000	4267.26	C II	160	4276.74	W I	14 h	4286.16	Fe III			
70	4256.254	Th I	800	4267.95	Ba II	5	4276.79	Na I	120	4286.32	Pr III			
440	4256.33	Dy II	310	4268.02	Zr I	890	4276.91	Mo I	690	4286.56	Er I			
2100	4256.39	Sm II	260	4268.10	Ir I	460	4276.96	V I	23	4286.62	Ir I			
100	4257.37	V I	130	4268.26	Ta I	2000	4277.10	Cs II	350	4286.64	Sm II			
260 c	4257.60	Re I	560	4268.64	V I	1200	4277.24	Mo I	600	4286.97	La II			
290	4257.66	Mn I	320	4269.09	Pr II	480	4277.313	Th II	400	4286.99	Nb I			
480	4258.23	Tb II	270	4269.28	Mo I	150	4277.50	Lu I	840	4287.40	Ti I			
40	4258.315	Fe I	1400	4269.38	W I	550	4277.528	Ar II	300	4287.80	Ba II			
70	4258.54	Ti I	480	4269.50	La II	160 h	4277.53	F II	2	4287.84	Na I			
210	4258.58	Sm II	120	4269.61	Os I	70	4277.74	Yb I	2500 c	4287.97	Rb II			
130 c	4258.61	Ho II	330	4269.69	Tb I	120	4278.23	Ti I	30	4288.16	Ti I			
310	4258.99	Ru I	10000	4269.77	Pu I	760cw	4278.52	Tb II	1000	4288.18	Er III			
75	4259.11	Ir I	110	4269.77	W I	60	4278.60	Rh I	20 h	4288.25	Co II			
120	4259.31	V I	6	4269.81	Tl III	30	4278.81	Ti I	1000	4288.35	Cs II			
290	4259.35	W I	11	4269.84	Tl III	200	4278.86	Ce II	200	4288.60	P II			
200	4259.362	Ar I	28	4269.942	Th I	800	4278.90	Tc I	1400	4288.64	Mo I			
75 h	4259.4	Bi II	70	4270.14	Ti I	160 h	4278.93	F II	200	4288.66	Ce II			
810	4260.12	Gd I	620	4270.19	Ce II	1200	4279.68	Sm II	28	4288.669	Th I			
200	4260.29	W I	30	4270.24	Eu II	12	4279.72	Fe III	820	4288.71	Rh I			
110	4260.333	Th I	250 c	4270.25	Rb II		4279.75	Sm II	950	4289.07	Ti I			
800	4260.473	Fe I	240	4270.56	Nd II	240	4279.94	Sm II	10000	4289.08	Pu II			
200	4260.85	Ge III	290	4270.69	Nb I	400	4279.96	Gd III	5000	4289.26	Am I			
4900	4260.85	Os I	390	4270.72	Ce II	300	4279.962	Cu II	22	4289.36	Ca I			

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
200	4289.44	Ce II	90	4298.27	Pr III	40	4306.80	Tl II	360	4318.64	Ti I
20	4289.64	Yb III	25	4298.33	Zn I	160	4306.87	W I	22	4318.65	Ca I
300	4289.70	Tb I	370	4298.36	Tb I	100	4307.176	Th I	400	4318.80	Pm I
10000	4289.72	Cr I	150	4298.36	Tm I	240	4307.18	Tb I	2200	4318.83	Tb I
2000	4289.94	Ce II	9	4298.57	Sr IV	140	4307.18	V I	1900	4318.94	Sm II
40000	4290.06	Er III	2000	4298.66	Ti I	930	4307.60	Ru I	470	4319.53	Sm I
120	4290.23	Ti II	150	4298.73	Eu I	110	4307.64	W I	1000	4319.579	Kr I
840	4290.94	Ti I	320	4298.91	Er I	23	4307.74	Ca I	35	4319.64	Cr I
3	4291.01	Na I	450 c	4298.98	Pr II	80	4307.76	Rn I	550	4319.87	Ru I
120	4291.14	Ti I	22	4298.99	Ca I	200	4307.78	Nd II	110	4319.94	Er II
120 c	4291.17	Re I	200	4299.17	F II	180	4307.90	Ti II	370	4320.52	Gd I
3000 s	4291.34	Pa II	200	4299.23	Ti I	1200	4307.901	Fe I	560	4320.72	Ce II
300	4291.39	Br II	250	4299.234	Fe I	50	4307.94	Cs II	3300	4320.74	Sc II
80	4291.462	Fe I	430	4299.29	Gd I	35	4308.50	Ti I	40	4320.90	Te II
150	4291.71	Ge III	590	4299.36	Ce II	1000	4308.63	Dy II	250	4320.91	Na II
330	4291.84	V I	580	4299.60	Nb I	250	4308.81	Na II	750	4321.11	Gd II
40	4291.96	Cr I	200	4299.64	Ti I	880	4309.01	Sm II		4321.20	Gd I
200	4292.00	Cs II	85	4299.839	Th I	250	4309.04	Na II	6	4321.40	Na I
680	4292.13	Mo I	300	4299.90	Tb I	7	4309.10	K II	180	4321.66	Ti I
350	4292.18	Sm II	200	4300.05	Ti II	70	4309.239	Ar II	500 d	4321.84	I I
500	4292.470	Cu II	100	4300.101	Ar I	260	4309.29	Gd I	600	4322.23	Tb I
250	4292.48	Na II	770	4300.33	Ce II	800	4309.32	Ba II	440	4322.51	La II
250	4292.86	Na II	120	4300.44	La II	40	4309.47	Sc III	150 h	4322.98	Kr II
25	4292.88	Zn I	200	4300.49	Kr II	120	4309.56	Nb I	20 h	4323.00	Ba I
600	4292.923	Kr II	35	4300.51	Cr I	150	4309.57	Lu I	590	4323.28	Sm II
10000	4293.00	Cm I	2900	4300.56	Ti I	2800	4309.63	Y II	210	4323.55	Pr II
890	4293.21	Mo I	500	4300.64	Cs II	200 s	4309.65	Am II	50	4323.63	Mn II
220	4293.28	Ru I	25	4300.650	Ar II	390	4309.74	Ce II	9	4323.68	Fe III
7	4293.82	Pb II	580	4300.99	Nb I	170	4309.80	V I	500	4323.867	As II
360	4293.88	Mo I	4100	4301.09	Ti I	200	4309.991	Th II	240	4324.46	Sm I
560	4293.95	Os I	40	4301.14	Yb III	20 h	4310.36	Fe III	2000 s	4324.57	Am II
1500	4293.97	Rb II	50	4301.18	Cr I	450	4310.42	Tb I	7	4324.62	Na I
110	4294.10	W I	320	4301.60	Er II	500 h	4310.51	Xe II	2400	4325.01	Sc II
140	4294.12	Ti II	75	4301.60	Ir I	55	4310.59	Ir I	60	4325.08	Cr I
4100	4294.61	W I	70 h	4301.7	Bi II	200	4311.04	Ho I	190	4325.13	Ti I
1	4294.65	Sn II	90	4301.73	Pr III	50	4311.07	Ag I	30	4325.274	Th I
290	4294.77	Sc II	85	4301.93	Ti II	390	4311.27	Nb I	5	4325.42	Li II
320	4294.79	Hf I	2200	4302.11	W I	560	4311.40	Os I	5	4325.47	Li II
260	4294.79	Ru I	360 h	4302.30	Y I	220	4311.50	Ir I	1	4325.54	Li II
550	4294.79	Zr I	25	4302.53	Ca I	300	4311.56	Tb I	200	4325.56	C III
370 d	4294.93	Dy II	20	4302.81	Ca III	40	4311.65	Ti I	2600 d	4325.57	Gd II
	4295.04	Dy I	310	4302.89	Zr I	120	4312.45	Nb I		4325.69	Gd I
85	4295.76	Cr I	240	4302.95	Tb I	65	4312.55	Mn I	600	4325.73	Ba II
840	4295.76	Ti I	160 c	4302.98	Ta I	240	4312.85	Sm I	1100	4325.76	Nd II
550	4295.93	Ru I	5400	4303.58	Nd II	85	4312.87	Ti II	1500	4325.761	Fe I
330 d	4295.97	Lu I	290	4303.61	Pr II	370	4313.25	Tb I	600	4325.83	Tb II
600	4296.05	La II	50 d	4303.78	O II	1800	4313.84	Gd I	320	4325.86	Dy I
200	4296.07	Ce II	140	4303.81	Er II	4200	4314.09	Sc II	250	4325.92	Pm II
540	4296.08	Gd II	200	4303.89	Pm II	3	4314.10	Si IV	840	4326.14	Mo I
	4296.09	Lu I	20	4304.01	Yb III	300	4314.28	Gd III	110	4326.25	Os I
220	4296.11	V I	200	4304.40	Re I	20	4314.32	Sb II	350	4326.33	Nb I
500 h	4296.40	Xe II	340	4304.45	Nd II	85	4314.35	Ti I	160	4326.36	Ti I
6	4296.65	Pb II	300	4304.71	Ce III	520	4314.40	Gd I	3000	4326.43	Tb I
1500	4296.67	Ce II	18 h	4304.78	Fe III	470	4314.52	Nd II	200	4326.74	Ba II
11	4296.70	Ti III	320	4304.94	Sm II	1200	4314.80	Ti I	250	4326.74	Mo I
1600	4296.74	Sm I	7	4305.00	K II	150	4315.084	Fe I	18	4327.06	Pt I
70	4296.77	Rh I	420	4305.14	Ce II	200	4315.11	Au I	1900	4327.12	Gd I
420	4296.78	Ce II	30	4305.45	Cr I	55	4315.254	Th I	120	4327.38	Nb I
16 h	4296.85	Fe III	340	4305.45	Sr II	500	4315.657	As II	50	4327.58	Cs II
30000	4297.06	Tc I	200 r	4305.64	Pm I	520	4316.05	Gd II	25	4327.8	Bi III
220	4297.17	Gd II	350	4305.71	Sc II	50	4316.30	Y I	510	4327.93	Nd II
55	4297.306	Th I	1500	4305.76	Pr III	90	4316.34	Pr III	5	4328.18	Si IV
200	4297.60	Ba II	6000	4305.92	Ti I	70	4316.95	Yb II	340	4328.68	Os I
170	4297.68	V I	120	4305.97	Yb I	285	4317.14	O II	120	4328.7	Se I
3700	4297.71	Ru I	170	4306.21	V I	500 h	4317.81	Kr II	130	4328.81	Er I
70	4297.74	Cr I	500 c	4306.26	Rb II	120	4318.14	Hf I	3	4328.86	Co II
600	4297.78	Pm II	1100	4306.34	Gd I	110	4318.416	Th I	240	4328.90	Tb I
270	4297.80	Nd II	8	4306.672	Cd I	370	4318.43	Ru I	1800	4329.02	Sm II
170	4298.03	V I	770	4306.72	Ce II	400	4318.551	Kr I	10000	4329.03	Cf I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
15	4329.19	Ca III	540	4338.70	Nd II	285	4349.43	O II	300	4359.13	Ac II
90	4329.36	Eu I	360	4338.70	Pr II	100	4349.60	Rn I	200	4359.26	Tc I
270	4329.41	Pr II	100	4338.75	Os I	350	4349.70	Ru I	85	4359.372	Th I
10000 I	4329.58	Bk I	250	4339.22	Hg I	700	4349.79	Ce II	570	4359.63	Cr I
370	4329.58	Gd I	250	4339.224	Hg I	80	4350.33	Ba I	290	4359.74	Zr II
300	4329.62	Ba II	340	4339.31	Ce II	230	4350.34	Mo I	410 c	4359.79	Pr II
75	4329.97	Eu I	1100	4339.45	Cr I	340	4350.40	Pr II	2	4359.9	Tl I
440	4330.02	Sm I	380	4339.72	Cr I	560	4350.46	Sm II	2700	4359.93	Tm I
460	4330.02	V I	12 h	4339.8	Bi II	150	4350.51	Hf II	280	4360.16	Tb I
350	4330.24	Cs II	5	4340.03	K II	1300	4350.73	Ho I	95	4360.49	Ti I
160	4330.27	Hf I	60	4340.13	Cr I	15	4350.80	Yb III	300	4360.66	Be II
100	4330.3	Se I	200	4340.413	Pb I	380	4351.05	Cr I	560	4360.72	Sm II
310	4330.45	Ce II	30	4340.47	H I	680	4351.29	Nd II	310	4360.81	Zr I
1000 I	4330.52	Xe II	25 h	4340.5	Bi II	18	4351.30	Ir I	500	4360.99	Be II
60	4330.61	Eu II	700	4340.62	Tb I	100	4351.359	Kr I	30	4361.04	Au II
340	4330.61	Gd II	100	4340.64	Ra II	10000	4351.50	Bk I	220	4361.07	Sm II
250	4330.64	Ho II	140	4340.92	Er I	100	4351.53	Os I	870	4361.21	Ru I
110	4330.78	Y I	760	4341.01	V I	290	4351.57	Nb I	30	4361.28	Te II
10000	4330.82	Cm I	550	4341.13	Zr I	2300	4351.77	Cr I	27	4361.57	Eu II
28	4330.844	Th I	450	4341.28	Gd II	20	4351.91	Mg I	100	4361.81	W I
40	4331.18	Eu I	8	4341.40	Si III	500	4351.97	Cu III	810	4362.04	Sm II
200	4331.200	Ar II	4	4341.49	Na I	560	4352.10	Sm II	430	4362.05	U I
110	4331.36	Er I	680	4341.69	U II	500	4352.145	As II	25	4362.066	Ar II
390	4331.37	Nb I	29	4341.98	Lu II	50	4352.16	Sb III	500	4362.641	Kr I
240	4331.38	Gd I	30	4342.	Bi IV	50	4352.205	Ar II	440	4362.91	Sm I
50	4332.030	Ar II	550	4342.07	Ru I	60	4352.33	Y I	70	4363.13	Cr I
200	4332.05	Pm II	300	4342.12	Pm II	18	4352.56	Ir I	100	4363.27	Cl I
600	4332.12	Tb I	910	4342.18	Gd II	60	4352.70	Y I	2000	4363.28	Cs II
110	4332.13	W I	85	4342.256	Th II	560	4352.71	Ce II	220	4363.45	Sm II
200	4332.25	Re I	23	4342.44	Rh I	10000	4352.71	Pu II	10000	4363.64	Bk I
70	4332.7	S III	430cw	4342.53	Tb I	80	4352.734	Fe I	350 r	4363.92	Pm I
310	4332.71	Ce II	140	4342.82	Nb I	10	4352.74	Pb II	140	4363.93	Ho II
75	4332.72	Lu I	250	4344.11	Na II	1000	4352.80	Cu III	150	4364.00	Te II
510	4332.82	V I	24	4344.29	Ti II	425	4352.864	As II	110 h	4364.64	Al III
90	4332.91	N III	1000	4344.30	Gd II	1000	4352.87	V I	910	4364.66	Ce II
100	4333.561	Ar I	620cw	4344.30	Pr II	430 d	4353.20	Tb II	110	4364.67	La II
16	4333.57	Ca III	130	4344.326	Th II	35	4354.06	Ti I	150	4364.78	W I
4600	4333.74	La II	1900	4344.51	Cr I	710	4354.13	Ru I	28	4364.92	Sc I
1300	4333.97	Pr II	60	4344.65	Y I	60	4354.28	Pr III	2000	4365.14	Br I
1300	4334.15	Sm II	5	4344.74	Na I	550	4354.40	La II	400	4365.370	Cu II
30	4334.84	Ti I	12	4344.83	Sb II	55	4354.484	Th I	1000	4365.60	Br II
10000	4335.22	Cf I	25	4345.168	Ar I	6	4354.53	Mg I	210	4365.67	Os I
50	4335.338	Ar I	220	4345.56	O II	180	4354.61	Sc II	85	4365.930	Th I
200	4335.47	Tm III	120	4345.68	N III	450	4354.91	Pr II	100 d	4365.95	W I
200	4335.74	Pr II	10000	4345.69	Cm I	130	4354.98	V I	120	4366.03	Y I
7	4335.78	Rn I	560	4345.86	Sm II	20	4355.08	Ca I		4366.07	W I
35	4335.80	Sr III	70	4346.11	Ti I	240	4355.09	Eu II	240	4366.38	Nd II
880	4336.14	Sm I	600	4346.35	Ce III	110	4355.14	Ta I	350	4366.45	Zr I
240	4336.23	Ce II	2200	4346.46	Gd I	150	4355.17	W I	220	4366.90	O II
870	4336.43	Tb I	910	4346.62	Gd I	500	4355.24	Cu III	220	4367.30	Tb II
300	4336.54	Pm II	70	4346.83	Cr I	3000	4355.477	Kr II	10000	4367.41	Pu I
500	4336.64	As II	100cw	4346.84	Ho II	430 h	4355.74	U I	190	4367.58	Re I
180	4336.66	Hf II	1000	4346.96	Rb II	150	4355.94	V I	50	4367.832	Ar II
160	4336.86	O II	100	4347.00	W I	280	4356.09	Tb I	110	4367.90	Hf II
400 c	4336.86	Tc I	220	4347.31	Gd II	250	4356.33	Hf I	500	4368.03	Sm II
300	4337.13	Ho II	400	4347.49	Hg I	290	4356.73	Ho II	150	4368.04	V I
10000	4337.18	Pu II	470 c	4347.49	Pr II	870	4356.81	Tb I	100	4368.25	O I
130	4337.277	Th I	400	4347.496	Hg I	120	4357.73	Y I	1200	4368.33	Pr II
250	4337.29	Na II	200	4347.72	Pm I	40	4357.98	Re II	210	4368.43	Nb I
30	4337.29	Y I	1100	4347.80	Sm II	850	4358.17	Nd II	200	4368.60	Na II
200	4337.48	Pm II	1000	4347.89	Zr I	4000	4358.33	Hg I	340	4368.64	Nd II
780	4337.57	Cr I	10	4348.04	Ti III	4000	4358.337	Hg I	24	4368.94	Ti I
600	4337.64	Tb I	800	4348.064	Ar II	15	4358.38	Ca III	230	4369.04	Mo I
90	4337.68	Eu I	190	4348.34	Er I	200	4358.44	Dy II	200 h	4369.20	Xe II
980	4337.77	Ce II	28	4348.53	Sc I	400	4358.49	Tc I	110	4369.39	Er II
160	4337.92	Ti II	140	4348.65	Nb I	110	4358.64	Sc I	55	4369.47	Eu II
300	4338.24	Er III	440 h	4348.79	Y I	380	4358.69	Re I	100	4369.50	Cl I
1700	4338.41	Tb I	110	4349.03	Nb I	800	4358.73	Y II	300 r	4369.64	Pm I
9	4338.50	Si III	55	4349.072	Th I	55	4359.08	Sc I	95	4369.68	Ti I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
200	4369.69	Kr II	80	4379.33	Y I	300	4388.23	Tb I	1400	4400.58	V I
300	4369.77	Gd II	12 h	4379.4	Bi II	130	4388.36	Nb I	3000	4400.77	Pa
80	4369.771	Fe I	70	4379.40	Ne II	400 r	4388.49	Pm I	540	4400.83	Nd II
120	4369.86	Ne II	150	4379.55	Ne II	100	4388.76	Cs II	200	4400.986	Ar II
210	4369.92	Sm II	150	4379.667	Ar II	200	4388.76	Pm II	410	4401.17	Sm I
110	4370.66	Os I	240	4379.78	Zr II	45 h	4389.60	Sc I	120	4401.24	Ho II
200	4370.753	Ar II	90	4379.82	Pr III	100	4389.75	Cl I	110	4401.55	Ni I
500	4370.84	Cu III	100	4379.90	Cl I	400	4389.97	Ce III	55	4401.580	Th I
400	4370.91	Cl III	10000	4379.91	Pu II	4800	4389.97	V I	1400	4401.86	Gd I
180	4370.97	Hf II	95	4379.92	Rh I	8	4390.03	Na I	180	4402.50	Ta I
375	4371.17	As II	10	4380.07	Yb III	90	4390.40	Cl I	60	4402.54	Ba I
530	4371.28	Cr I	6	4380.38	Cl I	1700	4390.44	Ru I	160	4402.74	Os I
70	4371.329	Ar II	530	4380.42	Sm I	10	4390.59	Mg II	90	4403.03	Cl I
500	4371.40	Cu III	100	4380.55	V I	250	4390.66	Nd II	810 d	4403.06	Sm II
320	4371.62	Pr II	2	4380.57	Tl III	1600	4390.86	Sm II		4403.13	Sm I
110bl	4371.97	LaO	100	4380.69	Ga III	260	4390.91	Tb I	520	4403.14	Gd I
220	4372.02	Tb I	50	4381.11	Cr I	1100	4391.110	Th II	100	4403.17	Er II
9 h	4372.04	Fe III	90	4381.47	Pr III	140	4391.34	Re I	180	4403.27	Ho I
9 h	4372.14	Fe III	1900	4381.64	Mo I	1700	4391.66	Ce II	410	4403.36	Sm II
45 h	4372.20	Eu II	45	4381.70	Mn I	70	4391.75	Cr I	9	4403.45	Ti IV
2400	4372.21	Ru I	150	4381.76	Ga III	18	4391.83	Pt I	60	4403.50	Cr I
11 h	4372.31	Fe III	1300	4381.860	Th II	200	4391.99	Ne II	170	4403.60	Pr II
60	4372.38	Ti I	200	4381.88	Pm II	280	4392.06	Gd I	2 h	4403.73	Si IV
150	4372.52	W I	910	4382.17	Ce II	18	4392.59	Ir I	65	4403.78	Ir I
14 h	4372.53	Fe III	160	4382.17	Er I	160	4392.69	Nb I	350	4403.85	Cs II
18 h	4372.81	Fe III	330	4382.45	Tb I	250	4392.81	Na II	100	4403.95	W I
150 d	4372.87	In II	285	4382.9	Se II	55	4392.974	Th I	240	4404.28	Ti I
5000	4372.93	Cl II	75	4383.17	Eu II	500 h	4393.20	Xe II	120	4404.71	Pr III
500	4373.02	Cs II	280	4383.44	La I	9	4393.34	Na I	1200	4404.750	Fe I
45	4373.04	Rh I	3000	4383.544	Fe I	210	4393.35	Sm I	10000	4404.90	Pu I
140 d	4373.23	V I	2	4384.26	Co II	330	4393.59	U I	60	4404.90	Ti I
70	4373.25	Cr I	290	4384.29	Sm II	60 h	4393.69	Yb I	100	4405.12	Pr II
500	4373.43	Cu III	400	4384.43	Cs II	170	4393.92	Ti I	200	4405.12	Na II
440	4373.46	Sm II	20 l	4384.53	Ac I	10000	4393.93	Pu II	400	4405.23	Ba II
100 l	4373.78	Xe II	9	4384.64	Mg II	30	4394.01	Y I	1000	4405.25	Cs II
350	4373.82	Ce II	300	4384.70	Er II	360cw	4394.38	Re I	21 h	4405.27	Eu II
970	4373.83	Gd I	7000	4384.72	V I	200	4394.42	Tm I	30	4405.68	Ti I
85	4374.123	Th I	130	4384.81	Sc II	30	4394.67	Y I	430	4405.83	Pr II
110	4374.16	Cr I	180 c	4384.83	Ho II	520	4394.86	Os I	6 h	4405.90	Si III
320	4374.24	Dy II	180	4384.85	W I	330	4395.04	Ti II	17	4406.29	Ca III
2000	4374.46	Sc II	530	4384.98	Cr I	3600	4395.23	V I	110cw	4406.40	Re I
320	4374.76	Dy II	50	4385.057	Ar II	9	4395.76	Fe III	2300	4406.64	V I
4200	4374.80	Rh I	100	4385.06	Ne II	500 l	4395.77	Xe II	260	4406.67	Gd II
470 d	4374.93	Nd II	75	4385.10	Te II	220	4395.95	O II	8 h	4406.72	Si III
12000	4374.94	Y II	100	4385.20	La II	120	4395.96	Tm I	200 l	4406.88	Xe II
45	4374.95	Mn I	10000	4385.35	Pu II	60	4396.00	Te II	55	4407.07	Eu II
320	4374.98	Sm II	200	4385.35	P II	270	4396.08	Pr II	2800	4407.64	V I
	4375.04	Nd II	870	4385.39	Ru I	20	4396.23	Ag I	400	4407.94	Be I
200	4375.22	Na II	500	4385.41	Tm III	140	4396.50	Tm I	3600	4408.20	V I
100	4375.30	V I	30	4385.48	Y I	20	4396.71	Ac I	260	4408.25	Gd II
70	4375.33	Cr I	1300	4385.65	Ru I	200	4396.91	Cs II	200	4408.28	W I
150 h	4375.61	Y I	710	4385.66	Nd II	2 h	4396.94	Co II	4600	4408.51	V I
110bl	4375.84	LaO	150	4386.07	Ta I	160	4397.26	Os I	1700	4408.82	Pr II
530	4375.92	Ce II	300	4386.40	Er I	10	4397.33	Ti IV	85	4408.882	Th I
800	4375.929	Fe I	1000 l	4386.41	Ac II	290	4397.34	Sm I	220	4409.25	Gd I
50	4375.954	Ar II	200	4386.42	Cu III	150	4397.99	Ne II	150	4409.30	Ne II
800	4376.121	Kr I	1400	4386.43	Tm I	1800	4398.02	Y II	520	4409.33	Sm II
1000	4377.11	Cu III	20 c	4386.46	Pb II	110	4398.45	Ta I	810	4409.34	Er I
2500	4377.12	Rb II	300 h	4386.54	Kr II	100	4398.62	Hg II	540	4409.38	Dy II
30	4377.12	Te II	700	4386.84	Ce II	200	4398.79	Ce II	400 r	4409.42	Pm I
8 h	4377.63	Si III	20000	4386.86	Er III	510	4399.20	Ce II	1600	4410.03	Ru I
140	4377.96	Nb I	200	4387.49	Na II	160	4399.47	Ir I	350	4410.21	Cs II
110	4378.10	La II	60	4387.50	Cr I	350	4399.50	Cs II	330	4410.21	Nb I
880	4378.24	Sm II	100	4387.74	Y I	19	4399.59	Ca III	24	4410.30	Cr I
200	4378.48	W I	90	4387.88	Eu I	60	4399.77	Ti II	350	4410.64	Ce II
100	4378.82	Ta I	10	4387.929	He I	200	4399.965	Kr I	350	4410.76	Ce II
300	4379.11	N III	310	4388.01	Ce II	70	4400.097	Ar II	510	4411.06	Nd II
170	4379.14	Ho II	30	4388.08	Ti I	1100	4400.37	Sc II	60	4411.09	Cr I
12000	4379.24	V I	7	4388.16	K II	150	4400.55	Ho II	520	4411.16	Gd I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
12	4411.42	Sb II	160	4421.46	Ru I	615	4431.562	As II	2000 s	4441.36	Am II
2500	4411.57	Mo I	640	4421.57	V I	500	4431.685	Kr II	10000	4441.65	Pu II
290	4411.58	Sm I	120	4421.76	Ti I	120	4431.85	Pr III	830	4441.68	V I
1 h	4411.65	Si IV	50	4422.048	Th I	40	4431.89	Ba I	10000	4441.74	Br I
55	4411.88	Mn I	1400	4422.41	Gd I	50	4432.18	Cr I	530	4441.81	Sm I
140	4412.14	V I	110	4422.51	Er II	110	4432.28	Pr II	200	4442.20	Mo I
130	4412.19	W I	890	4422.59	Y II	120 h	4432.32	F III	440	4442.28	Sm I
35	4412.25	Cr I	120	4422.82	Ti I	100	4432.41	Os I	80	4442.55	Pt I
100	4412.41	Cd II	10000	4423.01	Bk I	400	4432.51	Pm II	80	4442.74	Tm I
500 r	4412.47	Pm I	350	4423.10	Tb I	30	4432.60	Ti I	140	4443.00	Zr II
210	4412.741	Th II	160bl	4423.17	LaO	110	4432.72	Tb I	100	4443.66	Y I
3	4412.989	Cd I	7	4423.25	Na I	285	4432.74	N II	230	4443.80	Ti II
190	4413.04	Zr I	210	4423.62	Mo I	250	4432.963	Th II	100	4444.00	Cs II
2000 h	4413.09	Ac III	200	4423.68	Ce II	160bl	4432.98	LaO	640	4444.21	V I
100	4413.22	Ne II	160	4423.90	La I	23	4433.32	Rh I	710	4444.26	Sm II
410	4413.77	Pr II	100	4424.05	Cs II	24	4433.58	Ti I	24	4444.27	Ti I
50	4413.87	Cr I	60	4424.28	Cr I	50	4433.838	Ar II	480	4444.39	Ce II
3	4413.91	Co II	2900	4424.34	Sm II	1600	4433.88	Sm II	150	4444.58	Dy I
860	4414.16	Gd I	24	4424.39	Ti I	11	4433.91	Ti III	130	4444.63	Ho I
700	4414.73	Gd I	320	4424.57	Er I	9	4433.99	Mg II	450	4444.70	Ce II
350	4414.88	Mn I	160	4424.58	Pr II	170	4434.00	Ti I	100	4444.831	Cu II
450	4414.91	O II	1500	4425.14	Br I	50	4434.2	Xe III	710	4445.15	Sm I
300	4415.122	Fe I	100	4425.189	Kr I	1800	4434.32	Sm II	500	4445.41	Pm II
880	4415.56	Sc II	25	4425.44	Ca I	120	4434.81	Eu II	14	4445.55	Pt I
200 h	4415.58	Po	30	4425.83	Ti I	990	4434.95	Mo I	300	4445.91	Gd III
1000	4415.63	Cd II	460	4426.00	V I	26	4434.96	Ca I	285	4446.0	Se II
130	4415.74	Ta I	400	4426.001	Ar II	40	4435.05	Rn I	580	4446.39	Nd II
180	4415.82	Re I	120	4426.06	Ti I	14000cw	4435.56	Eu II	12	4446.48	Sb II
150 l	4416.07	Xe II	110	4426.27	Ir I	25	4435.69	Ca I	160	4446.53	F II
200	4416.27	Tb II	370	4426.77	Er I	350	4435.71	Cs II	130	4446.63	Y I
640	4416.47	V I	310	4427.07	Ce II	250 r	4435.86	Pm I	200	4446.70	Na II
60	4416.54	Ti I	890	4427.10	Ti I	240 d	4436.10	Gd I	170	4446.72	F II
28	4416.845	Th I	615	4427.106	As II	240	4436.12	Tb I	600	4446.90	Pm II
310	4416.90	Ce II	120	4427.24	Zr I	3000	4436.13	Pa	650	4447.03	N II
285	4416.98	O II	600	4427.299	Fe I	430	4436.14	V I	290	4447.18	Nb I
220	4417.28	Ti I	120	4427.31	V I		4436.22	Gd II	180	4447.19	F II
120	4417.35	Hf II	120 h	4427.35	F III	20	4436.27	Ra II	230	4447.35	Os I
380	4417.58	Sm II	260	4427.55	La II	290	4436.32	Os I	200	4447.41	Na II
60	4417.72	Ti II	480	4427.92	Ce II	210	4436.35	Mn I	50	4447.58	Tm I
160	4417.91	Hf I	8	4428.00	Mg II	5	4436.49	Mg II	10000	4447.77	Cm I
1000	4417.96	Pm II	100bl	4428.10	LaO	300 r	4436.55	Pm I	150 w	4447.93	Pr III
220bl	4418.24	LaO	200	4428.171	P III	70	4436.59	Ti I	240	4448.04	Tb I
180	4418.70	Er I	310	4428.44	Ce II	4	4436.60	Mg II	500 h	4448.13	Xe II
980	4418.78	Ce II	330	4428.46	Ru I	600	4436.812	Kr II	160	4448.21	O II
340	4419.03	Gd II	24	4428.50	Cr I	160	4436.90	W I	600	4448.32	Ce III
160	4419.04	Pr II	100	4428.52	Ne II	230 c	4437.22	Nb I	35	4448.879	Ar II
470	4419.33	Sm I	310	4428.52	V I	120 h	4437.27	Au I	840	4449.15	Ti I
190	4419.44	Nb I	100	4428.63	Ne II	80	4437.34	Y I	220	4449.2	Se II
12	4419.60	Fe III	1200 c	4429.13	Pr II	55	4437.40	Tm II	770	4449.34	Ce II
570	4419.61	Er II	650	4429.27	Ce II	3	4437.55	He I	440	4449.34	Ru I
190	4419.65	Pr II	1000	4429.59	Tc I	110	4437.66	Er I	740	4449.70	Dy II
18	4419.66	Eu II	470	4429.66	Sm I	640	4437.84	V I	340	4449.74	Mo I
55	4419.78	Mn I	230	4429.80	V I	100bl	4438.01	LaO	730	4449.83	Pr II
6	4419.89	Na I	2000	4429.90	La II	200	4438.04	Hf I	180 w	4450.14	Pr III
120	4419.94	V I	21	4430.02	Ti I	350 h	4438.04	Sr I	15	4450.18	Ir I
140	4420.19	Tb I	150	4430.189	Ar II	30	4438.23	Ti I	30	4450.49	Ti II
140 h	4420.30	F III	60 h	4430.21	Yb I	100	4438.49	Cl I	620	4450.73	Ce II
240	4420.46	Zr I	85	4430.37	Ti I	300 r	4438.68	Pm I	190	4450.81	Lu I
4900	4420.47	Os I	190 c	4430.48	Lu I	35	4438.79	Lu I	550	4450.90	Ti I
1500	4420.53	Sm II	50	4430.49	Cr I	440	4439.19	Yb I	120 w	4451.00	Pr III
200	4420.56	Ho II	1100	4430.63	Gd I	110	4439.38	Tb I	1400	4451.57	Nd II
10	4420.61	Au II	150	4430.90	Ne II	20	4439.461	Ar II	800	4451.59	Mn I
28	4420.66	Sc II	150	4430.94	Ne II	100	4439.64	Os I	140	4451.90	Pr II
400	4420.71	P II	50	4430.996	Ar II	460	4439.76	Ru I	200	4451.99	Nd II
65 h	4420.96	Lu I	9	4431.02	Fe III	300	4440.10	Rb II	610	4452.01	V I
120	4421.10	Pr III	50	4431.28	Ti I	130	4440.35	Ti I	100	4452.15	La I
960	4421.14	Sm II	17	4431.30	Ca III	30	4440.45	Cd II	160	4452.38	O II
160 c	4421.22	Pr II	45	4431.36	Sc II	140	4440.866	Th II	100	4452.46	P II
100	4421.39	Ne II	160	4431.49	Zr I	50	4441.27	Ti I	25	4452.565	Th I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
1300	4452.73	Sm II	18	4462.46	Ni I	110	4472.85	B II	640	4484.19	W I
300	4452.86	I II	20	4462.73	Ac I	620	4473.02	Sm II	120	4484.57	Ho II
250	4452.95	Sm I	740	4462.99	Nd II	300	4473.23	Pm II	220	4484.70	Gd I
160	4453.00	Mn I	150	4463.00	P II	100	4473.50	Er II	120	4484.76	Os I
840	4453.32	Ti I	70	4463.38	Ti I	100	4473.59	Ho II	300 r	4485.05	Pm I
200	4453.44	Cs II	420	4463.41	Ce II	180	4473.59	Pd I	24	4485.15	Eu II
290	4453.71	Ti I	95	4463.54	Ti I	40	4473.89	Y I	500	4485.27	Ce III
600	4453.917	Kr I	200	4463.668	P III	190	4473.93	Ru I	2	4485.52	Be III
800	4453.95	Pm II	800	4463.689	Kr I	120	4474.04	V I	280	4486.90	Gd I
120	4454.03	Tm I	290	4464.68	Mn I	700	4474.13	Gd I	840	4486.91	Ce II
1200	4454.63	Sm II	300	4464.74	Gd I	500	4474.46	As II	220	4487.05	B III
140	4454.68	Pr II	75 h	4464.97	Eu II	630	4474.56	Mo I	3000	4487.06	Tc I
200	4454.74	Na II	20	4465.27	Y I	200	4474.63	Na II	110	4487.28	Y I
30	4454.78	Ca I	220	4465.341	Th II	200	4474.71	V I	100 h	4487.30	Be III
130	4455.01	Mn I	30	4465.36	Cr I	100	4474.759	Ar II	300	4487.47	Y I
200	4455.23	Na II	50	4465.45	O II	95	4474.85	Ti I	40	4488.05	Cr I
160	4455.32	Mn I	290	4465.81	Ti I	800	4475.014	Kr II	250	4488.25	Au I
950	4455.33	Ti I	100	4465.97	Pr II	150	4475.08	Re I	19	4488.32	Ti II
110	4455.60	Dy II	50 d	4466.28	O II	30	4475.221	Th I	380	4488.89	V I
100	4455.80	La II	140	4466.34	W I	200	4475.26	P II	60 h	4488.98	Ba I
110	4455.82	Mn I	715	4466.348	As II	90	4475.30	Cl I	260	4489.09	Ti I
28	4455.89	Ca I	10000	4466.46	Bk I	170	4475.72	Y I	2 h	4489.12	Co II
300	4456.40	Nd II	300	4466.55	Gd II	80	4476.017	Fe I	20	4489.18	Ca II
20	4456.61	Ca I	120	4466.551	Fe I	50 h	4476.04	Ag I	50	4489.47	Cr I
140	4456.80	Nb I		4466.60	Gd I	860	4476.12	Gd I	50	4489.664	Th I
55	4457.04	Mn I	5	4466.65	K II	25 h	4476.8	Bi II	80	4489.70	Tm II
120	4457.05	Ne II	140	4466.74	W I	180	4476.96	Y I	50	4489.739	Fe I
200	4457.21	Na II	110	4466.91	Zr I	140 c	4477.26	Pr II	400 h	4489.88	Kr II
140	4457.34	Hf I	520	4467.08	Gd I	160	4477.45	Y I	1500	4489.91	Cl II
480	4457.36	Mo I	2200	4467.34	Sm II	200	4477.46	Pm II	200	4490.00	Lu III
140	4457.42	Nb I	280	4467.54	Ce II	300	4477.64	Ho II	170	4490.08	Mn I
1100	4457.43	Ti I	285	4467.6	Se II	20000	4477.72	Br I	200	4490.15	Na II
110	4457.43	Zr I	110	4467.69	Tb I	120	4478.39	Re I	1000	4490.42	Br I
410	4457.48	V I	50	4467.83	O II	55	4478.48	Ir I	300 r	4490.50	Pm I
210	4457.55	Mn I	120	4467.98	P II	350 r	4478.58	Pm I	8	4490.77	Tl II
200	4457.68	Cs II	50	4467.98	Tm I	170	4478.63	Te II	200	4490.87	Na II
120	4457.76	V I	120	4468.01	V I	740	4478.66	Sm II	230	4491.28	Mo I
85	4458.002	Th I	250	4468.14	Dy II	220	4478.80	Gd II	30	4491.75	Y I
27c	4458.26	Mn I	250 r	4468.16	Pm I	200	4478.80	Na II	250	4492.05	Pm II
71:	4458.469	As II	240	4468.50	Ti II	10	4479.23	Ca II	60	4492.31	Cr I
1000	4458.52	Sm II	10000	4468.54	Pu II	700	4479.36	Ce II	25	4492.42	Y I
110	4458.54	Cr I	960	4468.66	Pr II	40	4479.40	Mn I	35	4492.47	Rh I
85	4459.04	Ni I	50	4469.41	O II	95	4479.70	Ti I	24	4492.55	Ti I
10000	4459.16	Cm I	1000	4469.47	Rb II	250	4479.776	P III	430	4493.07	Tb I
200	4459.18	Cs II	90	4469.56	Co I	650	4479.89	Al III	800	4493.21	Po I
100	4459.24	Er II	140	4469.71	Nb I	650	4479.97	Al III	50 h	4493.64	Ba I
50	4459.25	Rn I	380	4469.71	V I	140 h	4479.99	F III	100	4493.66	Cs II
250	4459.29	Sm I	200	4470.14	Mn I	150	4480.45	Ru I	10000	4493.78	Pu II
30	4459.74	Cr I	110	4470.31	Zr I	50	4480.59	Ti I	400 c	4493.92	Rb II
1000	4459.76	V I	55	4470.48	Ni I	500 l	4480.86	Xe II	6	4494.05	Si III
200	4459.97	Pm II	190	4470.56	Zr I	280	4481.06	Gd II	10	4494.18	Na I
80	4459.99	Tm I	15	4470.58	Hg III	14	4481.16	Mg II	800	4494.230	As II
1100	4460.04	Ru I	810	4470.89	Sm I	530	4481.26	Ti I	40	4495.01	Ti I
2400	4460.21	Ce II	1400	4471.24	Ce II	540	4481.26	Tm II	400	4495.03	Tc I
2000	4460.29	V I	240	4471.24	Ti I	13	4481.33	Mg II	1	4495.09	Be III
55	4460.38	Mn I	140	4471.29	Nb I	1000	4481.53	Tc I	16	4495.35	Ir I
140	4460.49	W I	200	4471.479	He I	300 r	4481.60	Pm I	11 h	4496.03	Ir I
120	4461.02	Pr III	200	4471.48	Pm II	200	4481.67	Na II	100	4496.06	V I
340	4461.075	As II	50 h	4471.55	Lu I	200	4481.811	Ar II	10	4496.15	Pb IV
150	4461.08	Mn I	25	4471.68	He I	80	4482.169	Fe I	240	4496.15	Ti I
450	4461.14	Ce II	20	4472.04	Ca II	75	4482.169	Th I	130	4496.39	Er I
140	4461.18	Hf I	110	4472.10	B II	200	4482.252	Fe I	1100	4496.46	Pr II
400	4461.652	Fe I	600	4472.33	U II	85 h	4482.42	Yb I	660	4496.86	Cr I
200	4461.81	Pr III	470	4472.43	Sm II	10	4482.50	Co II	200	4496.97	Zr II
510	4462.02	Mn I	140	4472.53	Nb I	95	4482.69	Ti I	500	4497.13	Gd I
21	4462.09	Ti I	10000	4472.61	Br I	30	4482.88	Cr I	220	4497.32	Gd I
100 w	4462.1	Xe III	450	4472.72	Ce II	200	4482.97	La III	4 h	4497.44	Co II
1000 h	4462.19	Xe II	130	4472.79	Mn I	220	4483.33	Gd II	11	4497.66	Na I
610	4462.36	V I	10000	4472.79	Pu II	700	4483.90	Ce II	360	4497.73	B III

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
34	4497.73	Ti I	100	4510.733	Ar I	100	4522.72	Ne II	130 c	4531.65	Ho II			
140 h	4497.8	Be III	140	4510.82	Ho I	500	4522.73	Re I	45 h	4531.83	Tb II			
250	4497.85	Ce II	90	4510.91	N III	130	4522.74	Er I	80	4532.15	Tm I			
350	4498.14	Ru I	360 c	4510.98	Ta I	1000	4522.80	Ti I	110	4532.49	Ce II			
50	4498.73	Cr I	50	4511.17	Ti I	300	4522.82	Gd II	30	4533.11	Ra II			
25	4498.76	Pt I	18000	4511.31	In I	10000	4522.84	Tc I	2 h	4533.22	Co II			
60 h	4498.85	Lu I	120	4511.33	Sm I	150	4522.85	Cs II	6000	4533.24	Ti I			
240	4498.90	Mn I	150 h	4511.52	Tb I	440	4523.04	Sm II	200	4533.32	Na II			
110	4498.940	Th I	560	4511.83	Sm II	770	4523.08	Ce II	500 l	4533.79	Rb II			
300	4499.05	La III	95	4511.90	Cr I	400 h	4523.14	Kr II	290	4533.80	Sm I			
370	4499.11	Sm I	140	4512.15	Mo I	60 h	4523.17	Ba I	240	4533.97	Ti II			
200	4499.24	P II	760	4512.56	Al III		4523.18	Sm I	45	4534.13	Tb I			
6	4499.34	Pb III	780	4512.74	Ti I	200	4523.32	Pm I	340 c	4534.15	Pr II			
370	4499.48	Sm II	130	4512.88	W I	530	4523.41	Nb I	6	4534.29	Mg II			
200	4499.62	Na II	45	4512.96	Tb II	120	4523.88	Re I	170	4534.58	Ho I			
19	4499.88	Ca III	120	4513.25	W I	650	4523.91	Sm II	16	4534.60	Pb IV			
600	4500.15	Pm II	2600	4513.31	Re I	150	4524.12	Gd I	3600	4534.78	Ti I			
70	4500.30	Cr I	170	4513.34	Nd II	140	4524.22	V I	50	4535.15	Cr I			
300 w	4500.31	Pr III	3000	4513.44	Br I	230	4524.34	Mo I	40	4535.255	Th I			
350 r	4500.33	Pm I	100	4513.56	Pm II	40	4524.74	Sn I	2400	4535.58	Ti I			
10 d	4500.54	Co II	50	4513.58	Y I	130	4524.93	Ba II	45 h	4535.59	Eu I			
200	4500.75	Er II	80	4514.01	Y I	200	4524.98	Na II	240	4535.72	Cr I			
150 c	4500.78	In II	75	4514.31	Tb II	45	4525.01	Tb II	1000	4535.73	Ce III			
50	4501.11	Cr I	12	4514.37	Cr I	600	4525.20	Pm II	610	4535.75	Zr I			
200	4501.27	Ti II	15	4514.50	Sb II	170	4525.31	La II	340	4535.92	Pr II			
1000	4501.52	Cs II	140	4514.50	Gd II	15000	4525.59	Br I	1200	4535.92	Ti I			
22	4501.79	Cr I	35	4514.53	Cr I		4526.10	Sr II	1200	4536.05	Ti I			
410	4501.82	Nd II	120	4514.86	N III	24	4526.11	Cr I	10000	4536.15	Pu II			
120	4501.95	V I	440	4515.09	Sm II	420	4526.12	La II	270	4536.51	Sm II			
240	4502.22	Mn I	85	4515.16	Yb II	250 r	4526.12	Pm I	400	4536.80	Mo I			
600	4502.353	Kr I	240	4515.28	U II	100 c	4526.14	Ho II	80	4537.07	Te II			
150	4503.04	Nb I	100	4515.50	Cs II	100	4526.19	Cl I	45	4537.14	Tb I			
240	4503.38	Sm I	19	4515.62	Ti I	380	4526.47	Cr I	45	4537.23	Tb I			
29	4503.78	Rh I	110	4515.86	Ce II		4526.6	Be I	24	4537.23	Ti I			
40	4503.78	Ti I	1000	4515.98	Tc I	1000	4526.72	Cs II	10	4537.754	Ne I			
160	4504.84	W I	150	4516.049	Cu II	250 r	4526.76	Pm I	910	4537.81	Gd I			
120	4504.90	Mo I	250	4516.36	Nd II	23	4526.94	Ca I	0 h	4537.95	Co II			
10000	4504.91	Pu II		4516.45	Li II	120	4527.25	Nd I	710	4537.95	Sm II			
180	4505.05	Sm II	18	4516.59	Ca III	890	4527.25	Y I	150	4538.53	Sm II			
55	4505.216	Th I	260	4516.64	Re I	780	4527.31	Ti I	800	4538.94	Cs II			
6	4505.33	K II	0	4516.65	Co II	70 d	4527.34	Cr I	110	4539.07	Ce II			
40	4505.92	Ba I	220	4516.89	Ru I	840	4527.35	Ce II	24	4539.10	Ti I			
500	4505.95	Y I	230	4517.13	Mo I		4527.47	Cr I	2000	4539.53	Tc I			
400	4506.002	Cu II	200	4517.31	Pm I	100 d	4527.58	Dy I	615	4539.74	As II			
430	4506.21	Gd I	200 c	4517.58	Pr II	400 r	4527.70	Pm I	840	4539.75	Ce II			
140	4506.33	Gd II	100	4517.58	Yb III		4527.76	Dy II	40	4539.79	Cr I			
21	4506.36	Ti I	220	4517.82	Ru I	440	4527.80	Y I	220	4540.02	Gd II			
100	4506.41	Ce I	1000	4518.03	Ti I	840	4528.47	Ce II	300	4540.06	Pm I			
350	4506.55	Br III	3300	4518.57	Lu I	50	4528.613	Fe I	290	4540.19	Sm II			
200	4506.59	Nd II	95	4518.70	Ti I	23	4528.72	Rh I	10	4540.22	Ti III			
200	4506.71	Cs II	700	4519.04	Rb II	550	4528.94	Al III	250	4540.288	P IV			
100	4506.83	Cs II	200	4519.21	Na II	870	4529.19	Al III	10	4540.380	Ne I			
250	4506.84	Pm I	100	4519.59	Ce II	800	4529.21	Pm II	240	4540.50	Cr I			
24	4506.85	Cr I	150	4519.60	Tm I	180	4529.38	Tm II	240	4540.72	Cr I			
12	4506.92	Sb II	880	4519.63	Sm II	120	4529.40	Mo I	400	4540.74	Rb II			
200	4506.97	Na II	1100	4519.66	Gd I	300	4529.60	Br II	140	4540.93	Hf I			
120 c	4507.04	Re I	45	4519.72	Tb II	45	4529.76	Tb	150	4541.032	Cu II			
350	4507.12	Zr I	200	4519.74	Br III	24	4529.85	Cr I	35	4541.07	Cr I			
1000 l	4507.20	Ac II	12	4520.90	Pt I	120	4529.95	Re I	250	4541.112	P IV			
850	4507.659	As II	110	4520.95	Ru I	170	4530.08	Ho II	340	4541.27	Nd II			
50	4508.48	Rn I	24	4521.14	Cr I	22	4530.319	Th I	300 r	4541.42	Pm I			
45 d	4509.04	Tb II	70	4521.194	Th I	3000	4530.34	Rb II	19	4541.51	Cr I			
100	4509.38	Pm II	100 l	4521.86	Xe II	360	4530.41	N II	7	4541.63	Na I			
5000 l	4509.45	Am II	1000	4521.92	Ce III	20	4530.552	Ar II	100	4541.66	Dy II			
40	4509.58	In III	40 h	4522.05	Y I	380	4530.74	Cr I	450 r	4541.75	Pm I			
200	4509.63	Ba II	20	4522.323	Ar I	120	4530.81	P II	300	4542.03	Gd I			
120	4510.10	Ru I	850	4522.37	La II	190	4530.85	Ta I	380	4542.06	Sm II			
290	4510.15	Pr II	3000	4522.57	Eu II	690	4530.96	Co I	400	4542.09	Tc I			
280	4510.527	Th II	260	4522.57	Tm II	170 c	4531.28	Ho I	490	4542.22	Zr I			

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
65	4542.55	Sc I	5400	4554.51	Ru I	120	4565.51	Cr I	210	4578.69	Tb II
340	4542.61	Nd II	200	4554.63	Pm I	140	4565.59	Co I	140	4578.73	V I
24	4542.62	Cr I	120	4554.83	P II	420	4565.84	Ce II	200	4578.89	Nd II
500	4542.92	Br II	24	4555.08	Ti I	170	4565.85	Ta I	10	4579.051	Pb II
715	4543.483	As II	200	4555.13	Zr I	250	4565.94	Hf I	1	4579.13	Sn II
150	4543.54	W I	400 c	4555.276	Cs I	470	4566.21	Sm II	200	4579.32	Nd II
620	4543.63	U II	500 r	4555.34	Pm I	150	4566.98	Cs II	400	4579.350	Ar II
810	4543.95	Sm II	10 d	4555.46	Ti III	40	4567.11	Tm II	300 r	4579.48	Pm I
500 r	4544.08	Pm I	720	4555.49	Ti I	25	4567.82	Si III	280	4579.59	Gd I
16	4544.27	Rh I	140	4555.52	Zr I	160	4567.91	La I	80	4579.64	Ba I
100	4544.32	Y I	100	4555.73	Th III	35	4568.09	Ir I	360	4580.06	Cr I
140	4544.62	Cr I	70	4555.812	Th I	300 r	4568.14	Pm I	200	4580.06	La II
90	4544.68	Sc I	500	4555.920	Cu II	130	4569.00	Rh I	1	4580.29	Sn II
720	4544.69	Ti I	20 h	4556.0	Ag I	100	4569.06	Ne II	640	4580.40	V I
100	4544.83	Sm II	200	4556.06	Pm I	100 w	4569.1	Xe III	120	4580.68	Re I
210	4544.96	Ce II	100	4556.14	Nd II	1	4569.26	Co II	300	4581.14	Pm I
400	4545.052	Ar II	50	4556.17	Cr I	95	4569.64	Cr I	410	4581.29	Gd I
200	4545.17	Pm I	110	4556.46	Tb I	3000 h	4569.87	Ac III	35	4581.32	Y I
100	4545.17	Re I	200 h	4556.61	Kr II	18	4570.02	Ir I	23	4581.40	Ca I
8	4545.19	Na I	40	4556.68	Tm II	200	4570.02	La I	23	4581.47	Ca I
24	4545.34	Cr I	300	4557.03	Pm I	100 w	4570.1	Xe III	290	4581.58	Sm I
360	4545.39	V I	1000	4557.05	Tc I	200	4570.37	Pm I	190	4581.60	Co I
55	4545.68	Ir I	120 h	4557.24	Sc I	140	4570.64	W I	480	4581.62	Nb I
30	4545.915	Th II	100	4557.78	Te II	140 c	4570.85	In II	120	4581.71	P II
600	4545.96	Cr I	19	4557.86	Ti I	35	4570.91	Ti I	440	4581.73	Sm I
150	4546.47	W I	120	4558.07	P II	65	4570.972	Th I	30	4581.77	Y I
480	4546.82	Nb I	120	4558.08	Gd II	28	4571.10	Mg I	10	4582.27	Pb II
170	4547.33	Ru I	110	4558.11	Mo I	7	4571.21	Pb III	100	4582.29	Zr I
110	4547.85	Ru I	19	4558.11	Ti I	14	4571.31	Rh I	200	4582.36	Yb I
	4548.	Be I	400	4558.46	La II	120	4571.68	Cr I	420	4582.50	Ce II
240	4548.00	Gd I	22	4558.66	Cr II	20000	4571.77	Rb II	130	4582.53	Gd II
150	4548.056	P IV	300	4559.21	Pm I	200	4571.78	V I	300	4582.978	Kr II
200	4548.449	P IV	1 h	4559.29	Co II	150	4571.79	Cs II	410	4583.07	Gd I
30	4548.48	Ir I	110	4559.29	La II	240	4571.98	Ti II	11	4583.83	Fe II
110	4548.60	Tm I	100	4559.37	Y I	18	4572.12	Ca III	1700	4584.44	Ru I
110	4548.66	Os I	170	4559.67	Nd I	300 r	4572.15	Pm I	560	4584.83	Sm II
35	4548.73	Rh I	60	4559.92	Ti I	15 d	4572.20	Ti III	65	4584.84	Tb II
950	4548.77	Ti I	110	4559.98	Ru I	1100	4572.28	Ce II	300 r	4585.49	Pm I
110 c	4549.01	In II	650	4560.28	Ce II	12	4572.66	Be I	150	4585.82	Al II
110	4549.07	Tb I	240	4560.43	Sm II	720	4573.08	Nb I	19	4585.84	Ti
240	4549.63	Ti II	280	4560.71	V I	55	4573.19	Tb II	24	4585.87	Ca I
100	4549.65	V I	30	4560.84	Bi III	60 h	4573.56	Y I		4585.91	Sr II
90	4549.66	Co I	19	4560.89	Rh I	130	4573.81	Gd I	24	4585.96	Ca I
45	4549.72	Tb II	24 b	4560.95	LuO	40	4573.85	Ba I	24	4586.14	Cr I
400 r	4549.78	Pm I	310	4560.96	Ce II	160 h	4573.99	Sc I	830	4586.36	V I
1500 w	4549.80	La IV	30	4561.54	Bi III	340	4574.31	Ta I	100	4586.62	Nd I
15	4549.84	Ti III	40	4561.86	Tm II	20	4574.76	Si III	160	4586.99	Gd I
540	4550.41	Os I	55	4562.24	Tb II	400	4574.88	La II	500	4588.04	P II
110	4550.45	Tb I	2100	4562.36	Ce II	22	4575.12	Cr I	110	4588.19	Al II
13	4550.78	Ir I	200	4562.52	Ho I	400 r	4575.27	Pm I	50	4588.426	Th I
250	4551.30	Ce II	50	4562.63	Ti I	24 b	4575.31	LuO	170	4588.73	W I
140	4551.30	Os I	200	4563.12	Pr II	490	4575.52	Zr I	70	4589.21	Yb I
200	4551.53	Na II	340	4563.22	Nd II	5000 I	4575.59	Am II	50	4589.28	Th III
40	4551.64	Rh I	160	4563.26	Er II	3000	4575.74	Br I	2100	4589.36	Dy I
150	4551.82	W I	35	4563.43	Ti I	260	4575.91	Gd I	500	4589.86	P II
130	4551.95	Ta I	40	4563.660	Th I	640	4576.21	Yb I	400	4589.898	Ar II
400	4552.20	Tc I	110	4563.69	Tb II	210	4576.50	Mo I	24	4589.95	Ti II
35	4552.42	Pt I	110	4563.77	Ti II	300	4576.90	Ce III		4590.	Li
950	4552.46	Ti I	85 h	4563.95	Yb I	510	4577.17	V I	140	4590.55	Zr I
30	4552.62	Si III	19	4564.17	Cr I	800	4577.209	Kr II	140	4590.83	Yb I
410	4552.66	Sm II	30	4564.39	Y I	590	4577.69	Sm II	160	4590.92	Na II
12	4552.84	Hg III	20	4564.405	Ar II	50	4577.72	Rn I	360	4590.97	O II
800	4552.85	Tc I	370	4564.53	Nb I	420	4577.78	Dy I	110	4591.10	Ru I
200	4553.01	Zr I	2000	4564.54	Tc I	180 w	4578.02	In II	130	4591.12	Ce II
35	4553.58	Yb II	80	4564.68	Tm I	300	4578.28	Pm I	170	4591.22	V I
8	4554.00	Si III	100	4564.83	Pm II	180 w	4578.40	In II	360	4591.39	Cr I
65000	4554.03	Ba II	30	4564.85	Tb II	200 r	4578.41	Pm I	65	4591.56	Tb II
300 r	4554.03	Pm I	140	4565.09	Dy I	1000	4578.45	Tc I	290	4591.82	Sm II
270	4554.45	Sm II	16	4565.19	Rh I	22	4578.55	Ca I	30	4591.89	Sb III

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
45	4592.38	Tb I	18	4604.48	Ir I	45 h	4615.92	Tb II	75 d	4626.32	Tb II
150	4592.52	Ru I	400	4604.59	Pm I	300	4615.94	Tm II	80	4626.33	Tm II
35	4592.53	Ni I	55 h	4604.72	Sc I	140 c	4616.08	In II	210	4626.41	Zr I
150 h	4592.80	Kr II	15	4604.77	Sb II	150	4616.13	Cs II	460	4626.47	Mo I
65 h	4592.94	Sc I	95	4604.80	Y I	600	4616.14	Cr I	50	4626.48	V I
200 c	4593.169	Cs I	40	4604.85	Tm I	170	4616.17	Nb I	80	4626.54	Mn I
1000 s	4593.31	Am II	65	4605.00	Ni I	5	4616.30	Co II	95	4626.56	Tm II
1000	4593.35	Tc I	80	4605.36	Mn I	75	4616.39	Ir I	300	4626.70	P II
380	4593.54	Sm II	85 c	4605.39	Lu I	170	4616.78	Os I	95	4626.94	Tb II
200	4593.82	Pm I	8	4605.40	Pb IV	1000	4616.86	Tc I	40	4626.97	Tm I
840	4593.93	Ce II	500	4605.45	Ac II	600 r	4617.02	Pm I	240	4627.07	U II
11000	4594.03	Eu I	600 r	4605.66	Pm I	170 c	4617.17	In II	9800	4627.22	Eu I
1300	4594.11	V I	120	4605.73	Re I	60	4617.26	Dy II	170 c	4627.30	In II
8 d	4594.42	Sc IV	160	4605.78	La II	950	4617.27	Ti I	100	4627.48	Mo I
170	4595.16	Mo I	100	4606.15	V I	27	4617.49	Tb I	500	4627.60	Ce III
560	4595.29	Sm II	18	4606.23	Ni I	15	4618.11	Ti IV	400 r	4627.60	Pm I
75	4595.421	Th I	90	4606.33	N IV	200	4618.40	Pm I	100	4627.98	Nd I
70	4595.59	Cr I	420	4606.40	Ce II	400 r	4618.49	Pm I	1700	4628.16	Ce II
5	4595.65	K II	290	4606.51	Sm II	100	4618.84	Ho I	3000	4628.19	Pa
400 r	4595.82	Pm I	1000	4606.61	Er I	35	4619.06	Tm II	100 c	4628.22	Ho I
15	4596.097	Ar I	1200	4606.77	Nb I	1000	4619.166	Kr II	25 h	4628.33	Ba I
285	4596.17	O II	450	4607.16	N II	30	4619.36	Tb II	7	4628.441	Ar I
1	4596.45	Pb III	65000	4607.33	Sr I	260	4619.51	Ta I	3 h	4628.62	Si IV
130	4596.55	Y I		4607.34	Li II	24	4619.52	Ti I	270 c	4628.74	Pr II
95	4596.63	Tm I	900 h	4607.51	Au I	70	4619.55	Cr I	290	4629.10	Ho II
240	4596.74	Sm I	29	4608.12	Rh I	7	4619.66	Si III	190	4629.34	Ti I
30	4596.90	Sb II	500	4608.21	Cl III	500 r	4619.75	Pm I	120	4629.38	Co I
100	4596.906	Cu II	10000	4608.40	Cm I	230	4619.77	V I	340	4629.787	As II
220	4596.98	Gd II	8	4608.45	K II	410	4619.88	La II	35	4629.81	Zn I
200	4597.02	Nd II	300 c	4609.16	Tc I	14	4619.91	Rh I	450	4630.11	Nb I
800	4597.55	Pm I	120cw	4609.32	Ho II	20 h	4619.92	Ba I	150	4630.21	Sm II
320	4597.91	Gd II	21	4609.37	Ti I	250	4619.98	N V	870	4630.54	N II
40	4598.36	Yb II	50	4609.38	Rn I	140	4620.03	Dy II	1000	4630.57	Tc I
65 h	4598.45	Sc I	80 d	4609.39	O II	80	4620.04	Ag II	70	4630.62	Te II
500 d	4598.80	Hf I	45	4609.53	Sc I	250 c	4620.14	In II	160	4630.88	Er II
410	4598.90	Gd I	550	4609.567	Ar II	300	4620.21	U I	200	4630.93	Pm I
270	4599.02	Tm I	30	4609.65	V I	50	4620.46	Ag II	9 h	4631.24	Si IV
330	4599.08	Ru I	500 r	4609.85	Pm I	100 h	4620.56	Au I	210	4631.62	U I
20	4599.09	Sb II	100	4609.87	Nd I	150 w	4620.70	In II	140	4631.761	Th II
60	4599.23	Ti I	360	4609.88	Mo I	230	4620.86	Hf I	140	4631.761	Th II
30	4599.75	Ba I	140	4609.89	W I	30	4621.163	Th I	170	4631.83	Os I
200	4599.77	I II	45	4609.95	Sc I	3	4621.30	Mg I	350 c	4631.89	Rb II
140	4599.94	W I	100	4609.99	Cs II	100	4621.38	Mo I	65	4632.07	Tb I
50	4600.10	Cr I	1 h	4611.27	Si IV	100	4621.38	Re I	24	4632.18	Cr I
500 r	4600.25	Pm I	350	4611.44	Po I	450	4621.39	N II	140	4632.28	Pr I
18	4600.37	Ni I	25	4611.74	V I	100	4621.42	Si II	170	4632.32	Ce I
480	4600.75	Cr I	30	4611.96	Tb I	500	4621.57	Pm I	300 c	4632.45	I II
80	4600.98	Cl I	450 w	4612.02	Pr III	150	4621.72	Si II	200	4633.15	Tc I
50	4601.02	Cr I	140	4612.08	Pr II	40	4621.72	Tm I	600 r	4633.45	Pm I
340	4601.05	Gd II	990	4612.26	Dy I	300	4621.94	Nd I	800	4633.885	Kr II
35	4601.29	Tm II	26	4612.554	Th II	85	4621.96	Cr I	700	4633.98	Zr I
300	4601.36	Br II	30	4612.93	Er III	3000 c	4622.42	Rb II	90	4634.14	N III
3000 s	4601.43	Pa II	40	4613.00	Y I	70	4622.49	Cr I	510	4634.24	Nd I
550	4601.48	N II	160	4613.30	W I	200 c	4622.69	Tc I	110	4634.26	Tm II
600	4602.08	P II	240	4613.37	Cr I	350	4622.70	Br II	50 d	4634.87	Ti
615	4602.427	As II	130	4613.37	Ho I	24	4622.76	Cr I	100	4635.18	V I
350	4602.57	Zr I	410	4613.39	La II	350	4623.09	Cs II	140	4635.68	Pr I
21	4602.63	Eu I	50	4613.83	Dy I	480	4623.09	Ti I	170	4635.69	Ru I
13	4602.83	Li I	360	4613.87	N II	500	4623.31	Pm I	65 h	4636.59	Tb I
13	4602.89	Li I	50	4613.97	Tm I	700 r	4623.68	Pm I	430	4636.64	Gd I
240	4602.93	Gd I	40	4614.47	Tm II	40	4623.938	Cl I	30	4636.99	Tb II
400 r	4602.96	Pm I	520	4614.50	Gd I	900	4624.41	Pm I	140 c	4637.04	In II
55	4603.43	Tm II	2500	4614.58	Br I	65	4624.41	V I	40	4637.18	Cr I
350	4603.73	N V	50	4614.82	Dy I	140	4624.42	Gd I	35	4637.233	Ar II
2500	4603.76	Cs II	500	4615.292	Kr II	420	4624.90	Ce II	3000	4637.50	Tc I
100	4603.82	Nd I	290	4615.44	Sm II	300	4624.96	Tc I	50	4637.77	Cr I
45 h	4604.10	Tb II	470	4615.69	Sm II	600 w	4625.18	Pr III	60	4637.88	Ti I
220	4604.18	Sm II	30 h	4615.69	Ag I	500 r	4625.29	Pm I	220	4637.9	Se III
140	4604.42	Zr I	100	4615.87	Pm II	550	4626.19	Cr I	380 c	4638.16	In II

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
7	4638.28	Si III	100 h	4648.21	Lu I	85 h	4659.03	Lu I	470 d	4670.75	Sm I
160	4638.85	O II	2000	4648.33	Tc I	500	4659.28	Rb II	60	4670.82	Y I
110	4639.00	Gd II	10000	4648.57	Rb II	5	4659.38	K II		4670.83	Sm I
40	4639.14	Yb III	170 d	4648.59	Gd I	300	4659.38	Pm I	140 h	4670.87	Gd I
240	4639.37	Ti I	75	4648.66	Ni I	640	4659.87	W I	500 r	4671.23	Pm I
50 d	4639.52	Cr I		4648.70	Gd I	2000 c	4660.21	Tc I	100	4671.40	U II
200	4639.55	Pr I	95 h	4648.85	Lu I	90	4660.28	Hg II	0	4671.51	Li II
220	4639.67	Ti I	24	4648.87	Cr I	25 h	4660.66	Co II	6	4671.65	Li II
	4639.70	Cr I	30	4648.89	V I	500 r	4660.79	Pm I	35	4671.69	Mn I
190	4639.95	Ti I	450	4648.95	Nb I	80	4661.208	Cl I	2	4671.70	Li II
8 d	4639.96	Sc IV	100 l	4649.12	Am I	130 c	4661.33	Ho II	320	4671.702	Cu II
170	4640.04	Gd I	450	4649.14	O II	120	4661.363	Cu II	400	4671.76	Pm I
65	4640.07	V I	110	4649.27	Nb I	360	4661.64	O II	160	4671.83	La II
110	4640.60	Er II	120	4649.271	Cu II	630bl	4661.75	LuO	130	4671.90	Mo I
120	4640.64	N III	10	4649.45	Ti III	8300	4661.88	Eu I	35	4671.99	Tm II
65	4640.74	V I	35	4649.46	Cr I	8	4662.352	Cd I	580	4672.09	Nb I
400 r	4640.96	Pm I	380	4649.49	Sm I	360	4662.51	La II	270 c	4672.09	Pr II
85	4641.00	Tb II	300	4649.67	Nd I	50	4662.72	Dy I	400	4672.17	Tc I
340	4641.10	Nd I	200 c	4649.77	Ho II	220	4662.76	Mo I	310bl	4672.31	LuO
100	4641.12	Te II	120	4650.02	Ti I	5000 l	4662.79	Am I	310	4673.16	Er I
30	4641.254	Th I	520	4650.25	C III	80	4662.79	Tb I	2 h	4673.30	Si IV
8	4641.29	Ra I	600 r	4650.42	Pm I	23	4663.202	Th I	700	4673.33	Be II
100 w	4641.4	Xe III	110	4650.51	Ce I	300 r	4663.26	Pm I	1000	4673.42	Be II
360	4641.81	O II	500	4650.52	Pm I	40	4663.33	Cr I	300	4673.577	Cu II
10	4641.88	K I	160	4650.84	O II	85	4663.41	Co I	85	4673.60	Dy II
210	4641.98	Tb II	2000	4651.12	Cu I	600 r	4663.46	Pm I	30	4673.62	Ba I
300	4642.02	Br II	570	4651.28	Cr I	290	4663.56	Sm I	30	4673.7	Xe III
880	4642.24	Sm II	375	4651.47	C III	230	4663.76	La II	10	4674.36	Ge III
11	4642.37	K I	200 c	4651.50	Pr II	140	4663.82	Os I	500 r	4674.42	Pm I
100	4642.53	W I	140	4651.558	Th II	70	4663.83	Cr I	1100	4674.60	Sm II
40	4642.96	Tm II	300	4651.98	Br II	450	4663.83	Nb I	140 c	4674.62	Ho II
550	4643.08	N II	840	4652.16	Cr I	1	4663.92	Au I	2000	4674.84	Y I
95	4643.12	Tm I	12	4652.86	Ti III	3	4663.97	Au I	150	4675.03	Rh I
23	4643.18	Rh I	400 r	4653.41	Pm I	140	4664.65	Pr II	35	4675.10	Tm I
500	4643.28	Tc I	100 l	4653.45	Am I	110	4664.66	Dy II	70	4675.12	Ti I
700 r	4643.36	Pm I	430	4653.54	Gd I	95	4664.80	Cr I	80	4675.31	Tm I
110 c	4643.49	Pr II	65 b	4654.03	LuO	400 r	4665.19	Pm I	530	4675.37	Nb I
2000	4643.70	Y I	50	4654.040	Cl I	110	4665.44	Er II	1000	4675.53	I II
700 r	4643.76	Pm I	120	4654.16	Pr III	50 c	4665.45	Tb I	570	4675.62	Er II
300	4644.10	Ba II	130	4654.29	Ce II	200	4665.86	C III	20	4675.74	Sb II
220 c	4644.58	In II	290	4654.32	Ru I	8	4665.87	Si III	65	4676.056	Th I
35	4644.58	Tm I	10 h	4654.32	Si IV	35	4665.90	Cr I	285	4676.23	O II
210	4644.83	Zr I	180	4654.37	Te II	30	4666.14	V I	80	4676.90	Tb I
200	4645.09	Ru I	400	4654.50	Pm I	22	4666.22	Cr I	680	4676.91	Sm II
140	4645.19	Ti I	200	4654.73	Nd I	340	4666.24	Nb I	200	4677.46	Pm I
110	4645.28	La II	35	4654.74	Cr I	500 d	4666.48	I II	30 h	4677.60	Ag I
260cw	4645.31	Tb II	500 r	4655.05	Pm I	70	4666.51	Cr I	40	4677.86	Tm II
290	4645.40	Sm I	120	4655.09	Tm I	35	4666.70	Tm II	500 r	4677.92	Pm I
95 h	4645.47	Lu I	150	4655.13	Sm II	550	4666.80	Al II	3	4678.06	Li II
250	4645.77	Nd II	210	4655.19	Hf I	140	4666.85	U II	400 r	4678.09	Pm I
400	4645.94	Pm I	540	4655.50	La II	1 h	4667.14	Si IV	200	4678.149	Cd I
170	4646.00	Gd I	360 c	4655.62	In II	240	4667.22	Nb I	1	4678.29	Li II
140	4646.05	Pr II	24	4656.04	Ti I	85	4667.47	Y I	60	4678.35	Y I
1600	4646.17	Cr I	26	4656.18	Ir I	840	4667.59	Ti I	110	4678.48	Nb I
200	4646.40	Nd I	19	4656.19	Cr I	60 h	4668.48	Ag I	500	4678.70	Br II
130	4646.40	V I	720	4656.47	Ti I	200	4668.91	La II	200	4678.90	Tc I
500	4646.51	Cs II	150	4656.54	Cs II	17 h	4668.99	Ir I	150	4679.06	Er II
220	4646.60	U II	320 w	4656.74	In II	130	4669.14	Ta I	170	4679.18	Gd I
290	4646.68	Sm II	3 h	4656.92	Si IV	2000	4669.30	Tc I	260	4680.04	Gd I
24	4646.81	Cr I	130	4657.42	W I	50	4669.34	Cr I	150	4680.13	Ce II
600 r	4647.03	Pm I	400	4657.901	Ar II	740	4669.40	Sm II	300	4680.14	Zn I
80	4647.23	Tb I	1000	4658.02	Lu I	40	4669.40	Tb I	500	4680.406	Kr II
30	4647.32	Sb II	200 w	4658.30	C IV	110	4669.50	Ce II	40 h	4680.49	Sc I
600	4647.42	C III	300	4658.31	P II	620	4669.65	Sm II	640	4680.51	W I
30	4647.433	Fe I	200 h	4658.32	Y I	50	4669.984	Th I	40	4680.54	Cr I
720	4647.61	Ru I	60	4658.38	Tb I	350	4670.28	Cs II	170	4680.74	Nd II
170	4647.64	Gd I	20	4658.73	Tb	350	4670.40	Sc II	19	4680.87	Cr I
24	4648.13	Cr I	2000	4658.876	Kr II	160	4670.49	V I	190 c	4681.11	In II
240	4648.16	Sm II	70	4658.89	Y I	130	4670.56	Nd II	210	4681.55	Sm I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
2000 l	4681.65	Am I	30 h	4693.39	Tb II	340	4707.586	As II	210	4719.12	Zr I
290	4681.79	Ru I	130	4693.63	Sm II	110	4707.79	Zr I	4000 c	4719.28	Tc I
70 c	4681.87	Tb I	40	4693.68	Ti I	110	4707.94	Tb II	350	4719.76	Br II
450	4681.88	Ta I	100	4693.72	W I	190bl	4708.00	LuO	270	4719.84	Sm II
160	4681.92	Tm I	60	4693.95	Cr I	190	4708.04	Cr I	140	4719.94	La II
950	4681.92	Ti I	140	4694.091	Th II	140cw	4708.07	Pr II	400 s	4720.16	Ac II
450	4681.994	Cu II	450	4694.1	S I	150	4708.22	Mo I	400	4720.36	Br II
50	4682.03	Dy II	300	4694.28	Tc I	260	4708.29	Nb I	65 b	4720.86	LuO
100	4682.28	Ra II	700	4694.33	Gd I	11	4708.83	Ca III	19	4721.00	Rh I
260	4682.32	Y II	200	4694.360	Kr II	35	4708.85	Y I	40	4721.03	Ca II
50	4682.52	Tb I	10	4694.69	Au I	12	4708.862	Ne I	85	4721.22	Dy I
25 c	4682.79	Tb II	24	4695.15	Cr I	21	4708.88	Ir I	40	4721.255	Cl I
700 r	4682.92	Pm I	285	4695.4	S I	800	4708.94	Ba II	110	4721.46	Gd I
9	4683.02	Si III	270bl	4695.46	LuO	120	4709.34	Sc I	40	4721.51	V I
430	4683.33	Gd I	170	4695.49	Gd I	6	4709.37	Be I	20	4721.591	Ar II
260	4683.42	Zr I	100	4695.61	Cs II	1400	4709.48	Ru I	30	4721.76	Rn I
310	4683.45	Nd I	290	4695.77	Pr I	140	4709.52	Pr I	250	4722.06	Pm II
60	4683.57	Xe III	160	4696.2	S I	190	4709.71	Nd II	400	4722.15	Na II
7	4683.80	Si III	100	4696.38	Te II	160	4709.72	Mn I	160	4722.23	Na II
35	4683.81	Yb II	190	4696.44	Nd I	200	4709.78	Gd I	3200	4722.28	Sr I
190	4684.02	Ru I	500 r	4696.80	Pm I	130	4709.84	Ho II	600 c	4722.52	Bi I
110	4684.04	Nd I	180	4696.81	Y I	10	4710.067	Ne I	65	4722.62	Ti I
420bl	4684.16	LuO	24	4696.94	Ti I	1900	4710.08	Zr I	230	4722.69	Er I
600	4684.25	Gd III	60	4697.06	Cr I	120	4710.19	Ti I	160	4722.72	U II
40	4684.27	Yb I	430	4697.42	Gd I	80	4710.56	V I	40	4722.86	V I
24	4684.45	V I	15	4697.44	Ba III	40	4711.26	Sb II	50	4723.10	Cr I
270	4684.61	Ce II	50	4698.29	Sc II	65	4711.39	Ho I	65	4723.17	Ti I
450 w	4684.8	In II	240 d	4698.46	Cr I	160	4711.92	Zr I	90	4723.438	Th I
9	4685.08	Sr IV		4698.62	Cr I	10	4712.066	Ne I	30	4723.60	Xe III
70	4685.11	Tm I	95	4698.68	Dy II	20	4712.841	Th I	110	4724.26	Tm I
320	4685.14	Nb I	190	4698.76	Ti I	270	4713.06	Sm II	190	4724.35	Nd II
20	4685.27	Ca I	120	4699.01	Hf I	30	4713.146	He I	50	4724.42	Cr I
6	4685.4	He II	220	4699.21	O II	4	4713.38	He I	110	4725.09	Ce II
30	4685.7	He II	8	4699.28	Ra I	150	4713.50	Nb I	300 w	4725.55	Pr III
10000	4685.70	Bk	120	4699.34	Sm II	30	4713.59	Eu I	60	4725.85	Y I
10	4685.829	Ge I	200	4699.51	Pm I	600 w	4713.70	Pr III	130	4726.02	Sm II
50	4686.195	Th I	2000 l	4699.70	Am II	200	4714.00	Ce II	190	4726.08	Yb II
23	4686.22	Ni I	20	4700.43	Ba I	65	4714.12	V I	65 h	4726.20	Lu I
200	4686.91	Te II	35	4700.61	Cr I	200	4714.22	Tc I	40	4726.44	Ba I
21	4686.92	Ti I	110	4701.15	Al III	110	4714.42	Ni I	550	4726.868	Ar II
35	4686.92	V I	50	4701.16	Mn I	100	4714.81	Ce II	300	4727.06	Pm I
370	4687.18	Sm II	70	4701.17	Ho II	40	4714.89	V III	70	4727.13	Dy II
180	4687.80	Pr I	150	4701.41	Al III	600	4715.06	Gd III	50	4727.15	Cr I
2300	4687.80	Zr I	80	4701.69	Ho II	130	4715.26	Sm II	180	4727.48	Mn I
140	4688.12	Gd I	500	4701.79	Cs II	24	4715.30	Ti I	40	4728.16	Tb II
130	4688.22	Mo I	15	4702.316	Ar I	15	4715.347	Ne I	300	4728.20	Br II
510	4688.45	Zr I	200	4702.41	Tb II	190	4715.59	Nd II	270	4728.21	Pr III
80	4688.63	Tb II	100	4702.51	U II	22	4715.78	Ni I	900 r	4728.36	Pm I
370	4688.73	Sm I	7	4702.99	Mg I	35	4715.89	V I	230	4728.42	La II
170	4689.07	U II	170	4703.13	Gd I	40 w	4716.07	Tb II	770	4728.42	Sm I
400	4689.36	Tc I	300	4703.14	Cl III	730	4716.10	Sm I	150	4728.47	Gd II
70	4689.37	Cr I	140	4703.28	La II	280	4716.2	S II	170	4728.53	Y I
50	4689.75	Dy II	130	4703.57	Nd II	11	4716.27	Ca III	400 r	4728.68	Pm I
85	4689.77	Y I	50	4703.990	Th I	170	4716.44	La II	35 c	4728.72	Ho II
75 h	4689.87	Ge II	15	4704.395	Ne I	10	4716.58	Ac I	200	4728.77	Sc I
50 h	4690.02	Ge II	530	4704.40	Sm II	16	4716.65	Si III	50	4728.86	Ir I
290	4690.11	Ru I	500	4704.85	Br II	30	4716.70	Lu I	150	4729.05	Er I
110	4690.35	Nd I	60 h	4705.3	Bi II	30	4716.74	Ca II	30	4729.128	Th I
24	4690.80	Ti I	285	4705.36	O II	270	4717.07	Sm I	100	4729.14	Mo I
120	4691.11	Tm I	130 c	4706.14	Nb I	130 c	4717.52	Ho I	490	4729.23	Sc I
100	4691.301	Kr II	55	4706.16	V I	120	4717.62	Zr I	40	4729.53	V I
190	4691.34	Ti I	100	4706.53	Te II	55	4717.69	V I	24	4729.72	Cr I
45	4691.523	Cl I	470	4706.54	Nd II	210	4717.72	Sm II	10	4730.03	Mg I
35	4691.62	Ba I	80	4706.57	V I	2000	4717.77	Tc I	30	4730.3	Bi II
130	4691.90	Ta I	1000 l	4706.80	Am I	220	4717.92	Mo I	27	4730.38	V I
230	4692.50	La II	1000	4706.92	Tc I	190	4718.33	Sm II	1000	4730.45	Rb II
30	4692.91	Sb III	140	4706.96	Nd I	240	4718.43	Cr I	7	4730.52	Si III
80	4693.11	Tb II	120	4706.97	Sc I	240	4719.02	Nd I	340	4730.67	As II
400	4693.17	Br II	640	4707.26	Mo I	500 c	4719.02	Tc I	180	4730.67	Pr I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
120	4730.71	Cr I	2200	4741.92	Sr I	500	4757.84	Ru I	230	4773.94	Ce II
500	4730.8	Se I	290	4742.04	Ho II	13	4757.96	Ir I	110	4774.15	Sm II
160	4731.10	Na II	22	4742.11	Ti I	310	4758.12	Ti I	50	4774.80	Dy I
55	4731.17	Ti I	300	4742.2	Se I	100	4758.433	Cu II	450 w	4775.30	Pr III
140	4731.33	Ru I	27	4742.63	V I	40	4758.44	Tb II	120 h	4775.79	Dy I
700	4731.44	Mo I	400	4742.64	Br II	320	4758.70	Gd I	30000	4775.95	Rb II
120	4731.59	U II	170	4742.79	Ti I	800 r	4759.00	Pm I	150	4776.34	Mo I
140	4731.77	Nd I	390	4743.09	La II	310	4759.28	Ti I	130	4776.36	V I
170	4731.84	Dy II	410	4743.65	Gd I	170	4759.65	Er II		4776.52	V I
21	4731.86	Ir I	1200	4743.81	Sc I	70	4759.90	Tm I	55	4777.48	Ho II
50	4732.053	Ar II	100	4744.16	Pr I		4760.	Li I	190	4777.85	Sm II
40 h	4732.30	Sc I	6	4744.35	K I	50	4760.04	Dy II	65	4778.16	Ir I
300	4732.33	Zr I	30	4744.69	Cd II	3	4760.17	Au II	65	4778.26	Ti I
60 h	4732.37	Y I	70	4745.11	Rh I	770	4760.19	Mo I	50	4778.294	Th I
100	4732.50	Na II	350 r	4745.13	Pm I	40	4760.19	Tb II	35	4778.36	Tb II
220	4732.60	Gd II	19	4745.31	Cr I	730	4760.27	Sm I	35	4778.80	Tb II
350	4732.98	Cs II	470	4745.68	Sm II	110	4760.74	Gd I	220	4779.35	Sc I
680	4733.34	Tm I	40	4745.73	Dy II	410	4760.98	Y I	400	4779.40	Br II
45	4733.43	Ti I	110	4745.82	Gd I	6	4761.12	Pb III	30	4779.42	Ho I
100	4733.52	Ce II	24	4746.63	V I	180	4761.53	Mn I	120	4779.46	Nd I
120	4733.52	Ru I	150	4746.92	Pr II	200	4762.36	Tc I	17	4780.18	Y I
110 c	4733.89	Nb I	300	4747.11	Pr III	30	4762.37	Tb II	4000	4780.31	Br I
590	4734.10	Sc I	160	4747.17	Ce II	750	4762.38	Mn I	15	4780.87	Sc III
600	4734.152	Xe I	22	4747.68	Ti I	35	4762.39	Ho II	120	4781.04	Y I
60cw	4734.20	Tb I	70	4747.80	Tb I	300	4762.435	Kr II	70 c	4781.19	Ho I
800 r	4734.27	Pm I	40	4748.52	V I	700 r	4762.57	Pm I	900 r	4781.29	Pm I
140	4734.38	F II	320	4748.73	La II	100	4762.72	Pr II	13000	4781.32	Cl II
18	4734.68	Ti I	35 c	4749.09	Ho II	190	4762.78	Zr I	45	4781.72	Ti I
100bl	4735.00	LuO	75bl	4749.11	LuO		4763.	Li II	170 h	4781.87	Yb I
60	4735.08	Sc	100	4749.13	Cs II	250	4763.31	I I	180	4781.92	Gd I
10000	4735.40	Pu I	500	4749.61	Tc I	35	4763.57	Ho II	160	4782.74	Hf I
300	4735.41	Br II	20	4749.7	Bi II	500	4763.62	Cs II	600	4782.79	Gd III
12	4735.44	Sb II	220 c	4749.70	Nb I	130	4763.82	Gd I	5000 c	4782.83	Rb II
15000	4735.56	Er III	100	4750.39	Mo I	15	4763.95	Ni I	65	4782.92	Ho I
260	4735.75	Gd I	150	4750.72	Sm I	40bl	4764.22	LuO	50	4782.991	Si I
300	4735.906	Ar II	35	4750.75	Tm II	50	4764.29	Cr I	580	4783.10	Sm I
200 c	4736.51	Tc I	45	4750.98	V I	25	4764.47	Tb II	2000	4783.12	Er III
250	4736.69	Pr I	35	4751.40	Ho I	800	4764.865	Ar II	110	4783.35	Pr II
30	4736.771	Fe I	130	4751.52	Er II	20	4765.36	Sb II	940	4783.42	Mn I
20	4737.05	Tl II	35	4751.56	V I	10000 l	4765.40	Bk	200	4783.92	Tc I
310	4737.28	Ce II	70	4752.08	Cr I	1000	4765.744	Kr II	30	4784.03	Sb II
140	4737.35	Cr I	2500	4752.28	Br I	300	4765.86	Mn I	70	4784.21	B II
2000 c	4737.62	Y III	140	4752.414	Th II	350	4766.00	Br II	1400	4784.32	Sr I
690	4737.65	Sc I	410cw	4752.53	Tb II	100	4766.05	Te II	300	4784.62	Gd I
200 r	4737.99	Pm I	1000	4752.72	Tc I	300	4766.07	Ce III	100	4784.87	Te II
35	4738.00	Ho II	10	4752.732	Ne I	45	4766.33	Ti I	210	4784.92	Zr I
400	4739.0	Se I	160	4752.79	Y I	500	4766.43	Mn I	1600	4785.19	Br I
3000	4739.002	Kr II	200	4753.16	Sc I	13	4766.600	Th I	150	4785.42	Lu II
100	4739.08	Pm II	5	4753.93	K I	22	4766.63	Cr I	500	4785.50	Br II
130	4739.11	Mn I	40	4753.93	V I	55	4766.63	V I	500	4785.60	Tc I
1400	4739.48	Zr I	1000	4754.04	Mn I	160	4766.89	La I	350	4785.86	Sm I
100	4739.53	Ce II	60	4754.99	Dy II	12	4766.91	Sb II	55 c	4786.29	Ho I
6	4739.59	Mg II	1000	4755.30	Rb II	470	4767.24	Gd I	200	4786.36	Cs II
350	4739.66	Cs II	12	4755.58	Rh I	30	4767.86	Cr I	5	4786.49	K I
5	4739.71	Mg II	100	4755.74	U II	4300	4768.65	Cl II	110	4786.51	V I
200	4739.78	Pm I	340	4756.11	Cr I	100	4768.77	Ce II	20	4786.531	Th I
80	4739.93	Tb I	26	4756.46	Ir I	160	4768.79	Na II	45	4786.54	Ni I
150	4740.16	Ta I	220	4756.51	Ta I	120	4768.98	Ta I	160	4786.58	Y II
500	4740.28	La II	30	4756.52	Ni I	28	4769.77	Ti I	170	4786.61	Yb II
27	4740.50	Eu I	150	4756.81	U I	110	4770.20	Sm I	110	4786.75	Gd I
190	4740.529	Th II	100 c	4757.01	Ho I	4000-	4771.54	Tc I	180	4786.78	Tb I
10000	4740.61	Tc I	100 w	4757.3	Xe III	70	4771.56	Te II	170	4786.89	Y I
45	4740.729	Cl I	7	4757.39	K I	200	4771.75	C I	75	4786.92	Dy II
4	4740.91	K I	65	4757.48	V I	300 w	4771.83	Pr III	285	4788.13	N II
10	4740.95	Sc III	140	4757.54	W I	60	4771.94	Dy I	55 h	4788.18	Pd I
790	4741.02	Sc I	500 r	4757.73	Pm I	870	4772.31	Zr I		4788.36	Li II
85	4741.40	Y I	20	4757.81	Sb II	100	4772.70	U II	100	4788.40	Ag II
160	4741.67	Na II	400 c	4757.82	Rb II	700 r	4773.46	Pm I	160	4788.67	Zr I
1000	4741.806	Ge II	110	4757.84	Ce II	200	4773.89	Tc I	100	4788.79	Na II

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
12	4788.927	Ne I	10	4807.14	Ir I	200	4824.06	La II	770	4839.87	Y I
190	4789.32	Cr I	220	4807.45	Gd I	50	4824.097	Ge II	100	4840.27	Co I
40	4789.387	Th I	27	4807.48	Tm I	280	4824.29	Zr I	25	4840.39	Tb I
170	4789.41	Nd II	130	4807.53	V I	85	4824.96	Dy I	40 h	4840.47	Eu I
40 _{cw}	4789.91	Tb II	50	4807.94	Dy I	300	4825.18	Kr II	40	4840.47	Sc I
27	4789.92	Tm II	45	4808.134	Th I	22	4825.46	Ti I	285	4840.6	Se II
160	4789.96	Sm I	45	4808.53	Ti I	350	4825.48	Nd II	10	4840.77	Ir I
10	4790.22	Ne I	35	4808.68	Tm I	100	4825.91	Ra I	50	4840.843	Th I
200 c	4790.48	Tc I	160	4809.01	La II	40	4826.700	Th I	470	4840.87	Ti I
7	4791.05	K I	4	4809.36	Pb V	1	4826.86	Pb III	100	4841.36	Tc I
95	4791.29	Dy I	100	4809.42	Tc I	27	4826.99	Tm II	970	4841.70	Sm I
190 c	4791.42	Re I	21	4809.47	Ir I	100	4827.14	Te II	75	4841.75	Dy I
35	4791.48	Ho II	140	4809.47	Zr I	100	4827.28	Sc I	21	4842.43	Rh I
90	4791.50	Sc I	700 r	4809.54	Pm I	10	4827.344	Ne I	30 c	4842.69	Tb II
230	4791.58	Sm II	29000	4810.06	Cl II	130	4827.45	V I	150	4842.90	Te II
250	4791.62	Tc I	40	4810.28	Dy I	400 r	4827.72	Pm I		4843.0	Li II
35	4792.212	Si I	23	4810.49	Rh I	190	4828.04	Zr I	300	4843.29	Xe I
80	4792.324	Si I	400	4810.53	Zn I	200	4828.16	Be II	800	4843.46	Ba II
110	4792.49	Ti I	22	4811.08	Ti I	75	4828.88	Dy I	790	4843.81	W I
95	4792.51	Cr I	240	4811.34	Nd II	18	4828.97	Si III	45	4843.99	Rh I
500	4792.58	Au I	100	4811.60	Au I	27	4828.97	Tm I	200	4844.01	Pm I
45	4792.59	Eu I	300	4811.76	Kr II	22 h	4829.03	Ni I	310	4844.21	Sm II
150	4792.619	Xe I	4800	4811.88	Sr I	9	4829.23	K II	25	4844.32	Mn I
110	4792.86	Co I	900 r	4811.96	Pm I	40 h	4829.30	Eu I	120	4844.56	Ru I
670	4793.99	Os I	300	4812.22	Ac II	110	4829.38	Cr I	350	4844.81	Br II
99000	4794.55	Cl II	40	4812.25	Ti I	130	4829.57	Sm II	30	4844.89	Tb II
250	4794.59	Pm I	220	4812.75	Ta I	50	4829.68	Dy II	360	4845.0	Se II
200	4795.43	Pm I	50	4812.80	Dy I	400	4829.71	Xe I	17	4845.38	Ir I
30	4795.67	Ir I	27	4812.92	Ho II	800	4830.16	Cs II	550	4845.68	Y I
35	4795.92	Ho II	400	4812.948	Cu II	60	4830.33	Eu I	700	4846.612	Kr II
20 h	4796.2	Ag I	15	4813.33	Si III	410	4830.51	Mo I	300	4847.14	Ba II
45	4796.22	Ti I	35	4813.50	Tm I	45	4831.121	Th I	180	4847.38	N I
100	4796.52	Mo I	100	4813.77	Tb I	10 d	4831.16	Co II	80	4847.68	Sc I
130	4796.92	V I	1000	4814.608	Ge II	19	4831.18	Ni I	140	4847.76	Sm II
50	4797.01	Hg III	50	4814.75	Na II	80	4831.20	Tm II	140	4847.77	Ce I
120	4797.15	Nd II	190	4815.04	Zr I	150	4831.28	Te II	150	4847.810	Ar II
40 h	4797.4	Bi III	85	4815.05	Lu I	300	4831.35	Tc I	30 h	4847.82	Ag I
35	4797.98	Ti I	450	4815.5	S II	150	4831.64	V I	110	4848.10	Gd I
4	4798.59	Pb III	260	4815.52	Ru I	800	4832.077	Kr II	270	4848.32	Sm I
45 h	4798.87	Ho I	700	4815.63	Zr I	3600	4832.08	Sr I	30	4848.362	Th I
700 r	4798.98	Pm I	430	4815.81	Sm II	130	4832.28	Nd II	110 c	4848.37	Nb I
180	4799.30	Y I	110	4816.38	Nb I	55	4832.31	Ho II	65	4848.47	Ti I
6	4799.75	K I	35	4816.43	Yb I	70	4832.38	Dy I	350	4848.75	Br II
19	4799.77	V I	500	4816.70	Br II	120	4832.43	V I	19	4848.81	V I
110	4799.80	Ti I	500	4816.79	Tc I	20	4832.82	Sb II	110	4849.06	Nd II
300	4799.912	Cd I	400 r	4817.12	Pm I	19	4833.02	V I	40	4849.16	Be I
40	4799.97	Ca II	85bl	4817.38	YO	30	4833.32	Ho I	60 h	4849.64	Eu I
300	4799.98	Tc I	45 h	4817.51	Pd I	100	4833.67	Sc I	7	4849.86	K I
8	4800.43	Si III	140bl	4818.20	YO	35	4833.75	Dy II	200	4850.84	Ba II
310	4800.50	Hf I	300	4818.46	Br II	1000	4834.37	Tc I	7	4851.10	Mg II
29	4800.64	Dy I	75	4819.04	Dy I	10	4834.93	Yb III	17	4851.15	Yb II
120	4801.03	Cr I	20	4819.193	Th I	130	4835.26	Gd I	120	4851.262	Cu II
140	4801.05	Gd II	410	4819.25	Mo I	50	4835.26	Na II	210	4851.36	Zr I
900 r	4801.36	Pm I	16000	4819.47	Cl II	1000	4835.39	Tc I	320	4851.48	V I
30	4801.87	Tb II	140	4819.64	Y I	35	4835.75	Tm I	60	4851.63	Rh I
20	4802.01	Sb II	16	4819.72	Si III	40	4836.13	Ti I	27 d	4851.76	Tm I
300	4802.33	Br II	40	4820.24	Yb II	14	4836.86	Cr I		4851.90	Tm II
450	4803.29	N II	140	4820.34	Nd II	500	4836.89	La IV	80	4852.68	Sc I
160	4804.04	La II	3000	4820.34	Pa	35	4836.96	Yb II	410	4852.69	Y I
50	4804.31	Y I	190	4820.35	Er II	40	4837.46	Yb I	350 r	4852.73	Pm I
8	4804.35	K I	200	4820.42	Ti I	60	4837.59	Tb II	15	4852.868	Th I
70	4804.81	Y I	10000	4820.74	Tc I	800 r	4837.66	Pm I	20000	4853.59	Tc I
28	4805.10	Ti II	320	4821.69	Gd I	10	4837.98	Eu III	120	4854.25	Y I
110	4805.43	Ti I	120	4822.13	Y I	110	4838.78	Zr I	120	4854.36	Sm II
100	4805.69	Tc I	110	4822.55	Ce I	400 r	4838.92	Pm I	30	4854.81	Tb I
260	4805.87	Zr I	26	4822.855	Th I	60	4839.15	Y I	890	4854.87	Y II
550	4806.020	Ar II	10	4822.96	Au I	170	4839.44	Sc I	300	4854.988	Cu II
22	4807.00	Ni I	190	4823.31	Y II	50 c	4839.62	Lu II	500	4855.04	Sr I
500	4807.02	Xe I	1000	4823.52	Mn I	300	4839.62	Pm I	2	4855.06	Pb III

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
300 c	4855.34	Rb II	9	4869.76	K I	40	4886.65	Y I	100	4906.11	Y I
45	4855.41	Ni I	400 r	4869.80	Pm I	380	4886.90	W I	80	4906.67	Sc I
30	4855.54	Ho II	10	4869.85	Hg III	130	4887.01	Cr I	55	4906.99	Ho II
80	4855.72	Hg II	800	4870.02	Cs II	500 r	4887.02	Pm I	110	4906.99	Pr I
290	4856.01	Ti I	250	4870.14	Ti I	95	4888.08	Dy I	20 h	4906.99	Si II
10	4856.07	Ra I	200	4870.77	Tc I	20	4888.21	Ag I	90 d	4907.06	In II
8	4856.09	K I	140	4870.80	Cr I	19	4888.53	Cr I	150	4907.18	Eu I
40	4856.24	Dy II	21	4871.26	V I	340	4888.557	As II	20	4907.209	Th I
20	4856.54	Tb II	120	4871.317	Fe I	100	4888.70	Tc I	120	4907.89	Ru I
50	4856.70	Y I	120	4871.50	Gd I	70	4889.042	Ar II	12	4908.2	Bi II
150	4857.20	Kr II	150	4872.09	Er II	140	4889.10	Nd II	1000	4908.51	Tc I
100	4857.21	Tc I	60	4872.136	Fe I	2200cw	4889.14	Re I	45	4909.00	Y I
600	4857.39	Pr III	2000 l	4872.22	Am II	40	4889.33	Dy II	2000	4909.57	Tc I
140	4857.44	Er I	19	4872.28	Tm II	27 c	4889.67	Ho II	1000	4909.734	Cu II
140ld	4857.79	ScO	700 r	4872.42	Pm I	5	4889.91	Hg I	24	4909.74	Tm I
	4858.09	ScO	3000	4872.49	Sr I	75	4890.10	Dy II	90	4909.76	Sc I
2 h	4858.22	Be II	40	4872.917	Th I	220	4890.70	Nd II	630	4910.40	Sm I
40	4858.333	Th II	100	4873.304	Cu II	100	4890.754	Fe I	180	4911.40	Eu I
90	4858.82	N III	17	4873.44	Ni I	150 c	4890.88	Tc I	800	4911.62	Zn II
30	4858.87	Tb II	10	4874.00	Ti III	240	4891.07	Nd I	27	4912.36	Yb I
280	4859.02	Nd II	100	4874.10	Ag I	250	4891.492	Fe I	500	4913.02	Tc I
10	4859.17	Ca III	35	4875.43	Pd I	27	4891.60	V I	350	4913.25	Sm II
130	4859.24	Hf I	620	4875.48	V I	27	4891.64	Tm I	190	4913.41	Nd I
170	4859.39	F II	80	4875.57	Tb II	8000	4891.92	Tc I	320	4913.62	Ti I
10	4859.41	Ra II	40	4875.93	Dy I	1000	4891.98	Sr I	140	4914.02	Pr I
50	4859.741	Fe I	600	4876.06	Sr I	30	4892.35	Ho I	170	4914.37	Nd II
330	4859.84	Y I	8	4876.07	Er III	150	4892.49	Tc I	150 c	4914.70	Tc I
45	4860.39	Ho I	25	4876.12	Tb II	700 r	4892.52	Pm I	160	4914.94	N I
400 r	4860.62	Pm I	400	4876.24	Po I	95	4893.44	Y I	55	4915.24	Ti I
700 r	4860.74	Pm I	2000	4876.32	Sr I	50	4893.68	Dy I	95	4915.90	Tb I
320	4860.91	La II	2	4877.22	Sn II	21	4894.21	V I	10	4916.00	Mg III
100	4860.99	U II	20	4877.24	Sb II	29	4894.33	Tb	80	4916.068	Hg I
17	4861.20	Cr I	30 h	4877.65	Ba I	40 h	4894.60	Yb I	80	4916.07	Hg I
80	4861.33	H I	25	4878.13	Ca I	90	4894.68	Eu I	55	4916.41	Dy I
3000 s	4861.49	Pa	30	4878.208	Fe I	45	4894.955	Th I	500	4916.51	Xe I
70	4861.84	Cr I	3	4878.37	In I	285	4895.11	N II	10	4916.6	Bi II
100 c	4862.19	Tc I	26	4878.733	Th I	160	4895.60	Ru I	200	4916.94	I I
1000	4862.32	I I	27	4879.19	Tm I	35	4896.44	Ho II	10 h	4917.5	Ag I
110	4862.59	Gd I	12	4879.53	Pt I	81000	4896.77	Cl II	26000	4917.73	Cl II
35	4862.61	V I	50	4879.65	Y I	280	4896.93	Nd I	400 r	4918.28	Pm I
100	4863.00	Ga III	800	4879.864	Ar II	110	4898.76	Al II	22	4918.36	Ni I
280	4863.163	Th II	85	4880.16	Dy I	24	4899.24	Dy I	500	4918.376	Cu II
8	4863.48	K I	55	4880.56	V I	380	4899.91	Ti I	430	4918.99	Sm I
100	4863.75	Cl III	28	4880.91	Ti I	850	4899.92	La II	150	4918.992	Fe I
35	4864.18	Ti I	80	4881.15	Tb II	400	4899.97	Ba II	240	4919.816	Th II
200	4864.42	P II	110	4881.24	Zr I	210	4900.08	Er II	130	4919.87	Ti I
480	4864.74	V I	4	4881.32	Li II	1100	4900.12	Y II	110	4920.11	Ta I
170	4865.02	Gd II	4	4881.39	Li II	400	4900.30	Pm I	500	4920.502	Fe I
130	4865.12	Te II	1	4881.49	Li II	55	4900.62	V I	200 c	4920.67	Tc I
300 r	4865.30	Pm I	740	4881.56	V I	60	4900.86	Eu I	330	4920.68	Nd II
18	4865.36	Lu II	50	4881.72	Cd II	150	4901.427	Cu II	1000	4920.98	La II
110	4865.60	Os I	45	4882.35	Ti I	120	4901.53	Nd I	260	4921.07	Ru I
500 r	4865.72	Pm I	180	4882.46	Ce II	210	4901.84	Nd I	400	4921.12	Br II
50	4865.910	Ar II	5	4883.00	Hg I	110	4902.03	Nd II	100	4921.27	Ta I
160	4866.06	Zr I	15 h	4883.20	Si II	110	4902.77	Al II	180	4921.77	Ti I
200	4866.24	Te II	110	4883.60	Zr I	15	4902.90	Ba I	1000	4921.79	La II
30	4866.27	Ni I	1900	4883.69	Y II	470	4903.05	Ru I	150	4921.87	Y I
10000	4866.73	Tc I	210	4883.77	Sm I	35	4903.24	Cr I	20	4921.931	He I
190	4866.74	Nd I	350	4883.81	Nd I	30	4903.309	Fe I	50	4922.22	Dy II
200	4867.12	Po	730	4883.97	Sm I	110 h	4904.10	Al III	260	4922.27	Cr I
150	4867.15	N III	40 h	4884.05	Eu I	300 r	4904.28	Pm I	45	4922.73	Ho I
110	4867.62	Eu I	40	4884.55	Dy I	95 d	4904.29	V I	90	4922.84	Sc I
150	4867.88	Co I	10	4884.917	Ne I		4904.34	V I	500	4923.152	Xe I
360	4868.00	Mo I	400	4885.08	Ti I	40	4904.41	Ni I	65	4923.16	Dy II
40	4868.05	Dy II	80	4885.22	Te II	80	4904.44	Te II	300	4923.60	Tc I
200	4868.26	Ti I	1500 c	4885.59	Rb II	20	4904.752	Ar II	55	4923.83	Tm I
600	4868.70	Sr I	35	4885.78	Cr I	47000	4904.78	Cl II	220	4923.90	Re I
550	4869.15	Ru I	19	4885.96	Cr I	460	4904.88	Lu I	12	4923.92	Fe II
40	4869.5	Xe III	50	4886.28	Y I	170	4904.97	Sm I	500	4924.03	Zn II

Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength				
110	4924.04	Sm I	500	4943.53	P II	55	4964.75	Ti I	15	4981.35	Tl II
35	4924.09	Tb I	5	4943.88	C V	35	4964.93	Cr I	5800	4981.73	Ti I
360	4924.1	S II	3	4944.31	Sn II	10	4965.03	K I	120	4982.13	Y II
470	4924.53	Nd I	130	4944.36	Er I	200	4965.080	Ar II	220	4982.59	W I
160	4924.60	O II	5	4944.56	C V	30	4965.731	Th I	80	4983.45	Sc I
200	4924.60	Pr I	200 w	4944.56	N V	35	4965.88	Mn I	45	4984.13	Ni I
70 h	4924.93	In II	260	4944.83	Nd I	21	4966.04	Ti I	24	4985.372	Th I
450	4925.3	S II	100	4945.18	Ac II	23	4966.12	V I	500	4985.506	Cu II
55	4925.41	Ti I	300	4945.51	Br II	55cw	4966.73	Ho II	40	4985.52	Dy I
85	4925.65	V I	300	4945.59	Kr II	140	4966.90	Yb I	50 h	4985.65	V IV
110	4926.00	Ta I	110	4946.47	La II	250 c	4967.21	Ho II	370	4986.83	La II
30	4926.16	Ti I	27 c	4946.80	Ho I	130 c	4967.78	Nb I	1000	4986.92	I II
200	4926.424	Cu II	450	4946.81	Po	1300	4967.94	Sr I	285	4987.37	N II
35	4926.83	Tb I	8	4947.35	Ba I	65	4968.58	Ti I	300	4988.77	Xe II
150	4927.20	P II	15	4947.40	Sb II	160	4968.90	Ru I	35 c	4988.96	Ho I
150	4927.41	Cu III	1 h	4947.45	Si IV	12	4969.7	Bi II	190	4988.97	Nb I
10	4927.53	Ra II	60	4947.575	Th II	300	4969.71	P II	150	4989.15	Ti I
18	4927.780	Th I	30	4947.607	Si I	10 h	4970.05	Co II	55	4989.32	Tm II
150	4928.34	Ti I	400	4948.06	Tc I	5	4970.37	Hg I	10000	4989.34	Pu I
400	4928.79	Br II	45	4948.18	Ho II	340	4970.39	La II	250	4989.94	Nd II
50	4928.93	Tb I	21	4948.19	Ti I	26	4970.48	Ir I	10 h	4990.47	Co II
230 w	4930.27	O V	170	4948.63	Sm II	40	4970.87	Tm II	11	4990.50	Fe II
15 w	4930.53	V V	370	4949.77	La I	29	4970.99	Tb II	200 l	4990.79	Am I
450	4930.66	Br II	10	4950.10	Ti III	10	4971.19	Ti III	4600	4991.07	Ti I
35	4930.93	Y I	3	4950.11	Si IV	27	4971.26	Tm I	100 l	4991.17	Xe II
900	4931.698	Cu II	160	4950.23	N I	100	4971.40	Pm II	140	4991.28	La II
65	4931.79	Tb I	110	4950.62	Mo I	29	4971.42	Tb I	140	4991.92	Sc I
35	4932.03	V I	45	4950.66	Y I	130	4971.50	Ce II	500	4992.02	Ni II
200	4932.05	C I	30 h	4950.82	Au I	10	4971.64	Cl III	120	4992.74	Ru I
20 h	4932.80	Si II	9	4950.82	K I	8	4971.66	Li I	50	4992.89	Sc III
600 r	4932.99	Pm I	380	4951.37	Pr I	200 l	4971.71	Xe II	20 h	4992.89	Ag I
35	4933.209	Ar II	180	4951.74	Er II	8	4971.75	Li I	285	4993.5	S I
160	4933.26	F II	120	4952.37	Sm II	500	4972.59	Cs II	20	4993.6	Bi II
20000	4934.09	Ba II	110	4952.47	Gd I	400	4972.71	Xe II	150	4993.78	Ga III
210	4934.11	Er II	4	4952.52	Th IV	29	4973.04	Tb I	27	4993.79	Tm II
280	4934.12	Gd I	800	4952.84	Cs II	75	4973.05	Ti I	85	4993.82	Tb II
90	4934.25	Sc I	55	4953.52	Eu I	110	4973.14	Nb I	800	4994.13	Lu II
140	4934.83	La II	700	4953.724	Cu II	28	4973.57	Dy I	450	4994.36	N II
55 c	4934.89	Ho I	170	4954.06	Sc I	80	4973.57	Hg III	130	4994.63	Ce I
210	4935.12	N I	300	4954.39	P II	120	4973.66	Sc I	19	4994.72	Tm II
710	4935.50	Yb I	50	4954.659	Th II	150 c	4973.77	In II	100	4994.76	Zr I
45	4935.74	Sc I	290	4954.78	Nd I	120	4974.30	Y I	400	4995.00	Tc I
10	4935.75	Ag I	110	4954.81	Cr I	40	4975.12	Tm II	90	4995.05	Ho I
16	4935.83	Ni I	9	4956.15	K I	120	4975.25	Hf I	30	4995.08	Ti I
140	4936.00	Pr I	400	4956.43	Lu III	120	4975.35	Ti I	10000	4995.48	Cl II
110	4936.33	Cr I	1000	4957.15	Ba II	110	4975.75	Pr I	50	4995.84	Tb II
150	4936.42	Ta I	140	4957.18	Tm I	45	4975.76	Eu I	20 h	4995.98	Co II
2	4937.09	Th IV	480	4957.34	Dy II	35	4975.950	Th II	500 r	4997.10	Pm I
24	4937.22	Yb II	150	4957.54	Mo I	170	4975.98	Sm I	140	4997.10	Ti I
30	4937.74	Ti I	1500	4957.597	Fe I	5000	4976.34	Tc I	300	4997.81	Ba II
50	4938.09	Ir I	100	4958.23	Ac II	130	4976.42	Er I	55	4997.95	Tb I
120	4938.10	Sm II	21	4958.25	Ti I	500	4976.45	Ce III	720	4999.47	La II
95	4938.29	Ti I	130	4958.79	Gd I	250	4976.72	Gd III	4000	4999.51	Ti I
180	4938.43	Ru I	290	4959.13	Nd II	65	4977.74	Ti I	25	4999.74	Ir I
220	4938.61	Gd I	65 c	4959.42	Ho II	60	4977.75	Rh I	110	4999.91	Mo I
290	4939.01	Ho I	700 r	4959.46	Pm I	120	4978.20	Ti I	100 s	5000.21	Am I
40	4939.642	Th I	24	4959.59	Dy I	50	4978.90	Tm I	16 h	5000.34	Ni I
320	4939.74	Pr I	55	4960.21	Eu I	210	4979.12	Mo I	60	5000.82	Te II
160	4940.30	Pr I	6	4960.65	F I	40	4979.18	Rh I	85	5000.95	Nb I
110	4940.38	B II	100	4960.87	Ac II	20	4979.73	Sn I	230	5001.01	Ti I
70	4941.33	Sc I	35	4961.03	Ho II	4000	4979.76	Br I	35	5001.02	Tm I
30	4941.58	Ti I	150	4961.39	Nd II	220	4979.97	Ho I	800	5001.14	Lu I
8	4942.02	K I	60	4961.88	Te II	45	4980.16	Ni I	70	5001.48	Ca II
180	4942.34	Lu I	170	4961.94	Sm II	29	4980.16	Tb II	650	5001.48	N II
70	4942.50	Cr I	8000	4962.26	Ru I	160	4980.35	Ru I	27	5001.59	Tm I
120	4943.026	Cu II	55	4962.55	Eu I	150	4980.37	Sc I	80	5001.862	Fe I
220	4943.06	O II	60	4963.71	Rh I	29	4980.56	Tb I	18	5001.91	Fe II
6	4943.29	K II	350	4963.98	N I	5	4980.64	Hg I	140	5002.00	F II
110	4943.44	Ce I	80 h	4964.18	Co II	40	4980.68	Tm II	50	5002.097	Th I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
50	5002.097	Th I	20 h	5016.45	Kr III	55	5032.95	Ho II	100	5047.71	Mo I
65	5002.25	Nb I	26	5016.78	Mo I	50	5033.00	Dy I	10	5047.74	He I
70	5002.33	V I	10	5016.88	Ge III	50	5033.12	Tb I	40	5047.96	Nb I
200	5002.67	Tc I	70	5017.163	Ar II	100	5033.38	Pr I	26	5048.21	Ti I
360	5002.70	N II	260	5017.255	Th II	150	5033.52	Nd II	16	5048.85	Ni I
25	5002.74	Ir I	50	5017.59	Ni I	90	5033.55	Eu I	10	5049.55	Ba III
50	5003.87	Dy I	230	5017.75	Nb I	160	5034.22	Tm II	240	5049.796	Th II
11	5004.20	Fe II	27	5017.87	Tm II	270	5034.41	Pr II	30	5049.819	Fe I
55	5004.28	Dy II	24	5017.98	Dy II	100	5035.37	Ni I	10	5050.07	Ca III
19	5004.91	Mn I	95	5018.20	Hf I	12	5035.71	Fe II	50 h	5050.21	Dy I
870	5005.15	N II	80	5018.39	Sc I	1200	5035.91	Ti I	210	5050.57	La I
4	5005.159	Ne I	12	5018.43	Fe II	200	5035.94	Er I	65	5050.88	Gd II
1000	5005.416	Pb I	120	5018.59	Pr I	840	5036.47	Ti I	30	5051.44	Ho II
8	5005.60	K II	40	5019.51	Nb I	200	5037.37	Ta I	28	5051.63	V I
30	5005.711	Fe I	200	5019.76	Pr I	65 c	5037.60	Ho I	30	5051.634	Fe I
100	5005.74	Tc I	20	5019.85	Mo I	10	5037.751	Ne I	900	5051.793	Cu II
40	5006.061	Si I	80	5019.97	Ca II	120	5037.78	Ce II	17	5051.90	Cr I
29	5006.10	Tb II	840	5020.03	Ti I		5037.92	Li II	200	5052.17	C I
100	5006.117	Fe I	70	5020.14	Sc I	740	5038.40	Ti I	500	5052.70	Cs II
330	5006.15	W I	1000 I	5020.96	Am II	300	5038.74	Br II	200	5052.76	Sm II
100	5006.572	Pb I	40	5021.14	Ca II	23	5038.91	Mo I	110	5052.87	Ti I
400	5006.801	Cu II	350	5021.279	Cu II	200	5039.016	Cu II	820	5053.28	W I
100	5006.97	Y I	80	5021.51	Sc I	210	5039.04	Nb I	30	5053.35	Dy I
3600	5007.21	Ti I	15	5021.75	Hf I	75	5039.09	Gd I	160	5053.40	Pr I
250	5007.25	Er I	70	5022.12	Dy I	45	5039.12	Os I	21	5054.08	Ti I
550	5007.32	N II	50	5022.16	Tb I	24	5039.230	Th I	55	5054.30	Tb I
110	5008.21	U II	200	5022.40	Kr II	1200	5039.95	Ti I	210	5054.60	W I
10	5008.95	Ca III	120	5022.87	Ce II	35	5040.35	Ru I	300	5054.64	Br II
210	5009.10	Ce I	840	5022.87	Ti I	75	5040.62	Ti I	30	5054.92	Ho II
17	5009.17	Ir I	170	5022.91	Eu I	35	5040.74	Ru I	15	5054.94	Yb III
50	5009.334	Ar II	55	5023.13	Gd II	55	5040.82	Hf II	50	5055.00	Mo I
24	5009.52	Yb II	30	5024.03	Dy I	120	5040.85	Ce I	300	5055.27	Tc I
120	5009.65	Ti I	29	5024.24	Tb II	27 h	5041.00	Tm II	85	5055.347	Th II
160	5009.77	Tm II	24	5024.54	Dy I	1000	5041.03	Si II	24	5055.46	Dy I
350	5009.851	Cu II	29	5024.65	Tb I	23	5041.62	Ca I	1000	5055.98	Si II
24	5010.60	Dy I	580	5024.84	Ti I	150	5041.755	Fe I	7	5056.27	K II
450	5010.62	N II	50	5025.50	Cd II	210	5042.05	Er II	170	5056.46	La I
20	5010.81	Mo I	300	5025.58	Ti I	50 w	5042.06	Tb II	10000 s	5056.73	Bk I
65	5010.82	Gd II	360	5025.66	N II	130	5042.37	Ho I	450	5057.33	Ru I
160	5011.23	Ru I	90	5026.18	Ru I	50	5042.58	Pb II	55 h	5057.60	Lu I
30	5011.46	Zr I	500	5026.24	Tc I	160	5042.63	Dy I	170	5058.01	Nb I
55	5011.74	Gd I	150	5026.36	Nb I	22	5043.50	Tm I	35	5058.07	Mo I
100	5011.77	Ce II	65	5026.53	Ho I	85	5043.59	Ti I	300 r	5058.31	Pm I
60	5012.067	Fe I	300	5026.79	Tc I	800	5043.80	Cs II	60	5058.33	Tc I
35 c	5012.42	Ho I	200	5026.96	Pr I	110	5043.83	Pr I	40	5058.56	Re I
18	5012.46	Ni I	80	5027.35	Ag II	130	5043.86	Er I	70	5058.562	Th II
150	5012.54	F III	170	5027.38	U I	180	5044.02	Ce II	400	5058.910	Cu II
400	5012.620	Cu II	40	5027.87	Dy I	14	5044.04	Pt I	65	5059.35	Nb I
1000	5013.00	Ba II	150	5027.89	Tc I	35	5044.27	Ti I	30	5059.48	Pt I
180	5013.17	Eu I	65	5028.16	Ru I	400	5044.28	Sm I	500	5059.87	Cs II
40	5013.27	Nb I	30	5028.17	Ho I	15	5044.56	Sb II	200	5059.88	Mo I
55	5013.28	Ho II	200	5028.280	Xe I	300 s	5044.66	Np I	85	5060.39	Zr I
230	5013.30	Ti I	140	5028.33	Er I	50	5044.719	Th I	27	5060.42	Tm II
60	5013.32	Cr I	140	5028.44	Sm II	35	5044.73	Ho I	500	5060.69	Tc I
3200 d	5014.19	Ti I	120	5028.91	Er II	130	5044.89	Er I	35 c	5060.75	Ho I
	5014.24	Ti I	80	5029.00	Mo I	200	5044.92	Xe II	150	5060.90	Tm I
200 c	5014.52	Tc I	110	5029.54	Eu I	550	5045.10	N II	70	5062.037	Ar II
35	5014.56	Tm II	20	5029.892	Th I	55	5045.41	Ti I	110	5062.11	Ti I
180	5014.60	Mo I	40	5030.13	Nb I	35	5045.41	Tm I	27	5062.25	Tm I
85	5014.62	V I	11	5030.64	Fe II	320	5045.52	Pr I	35	5062.52	Mo I
30	5014.941	Fe I	25	5030.77	Fe I	17	5046.06	Ir I	21	5062.64	Ru I
90	5014.95	Ru I	65	5030.78	Mo I	10	5046.12	Lu III	110	5063.73	Nd II
30	5014.98	Ir I	200 r	5030.80	Pm I	26	5046.52	Mo I	35	5064.07	Ti I
750	5015.04	Gd I	530	5031.02	Sc II	250	5046.58	Zr I	35	5064.12	V I
220	5015.30	W I	65	5031.29	Gd II	140	5046.88	La I	250	5064.32	Sc I
100	5015.678	He I	55	5031.83	Os I	24	5047.25	Dy I	30	5064.59	Au I
50	5015.889	Th II	60	5032.09	Sc III	65	5047.31	Ru I	29	5064.64	Mo I
580	5016.17	Ti I	80	5032.45	Tc I	300	5047.348	Cu II	1400	5064.66	Ti I
360	5016.39	N II	55	5032.74	Sc I	95	5047.45	Hf I	360	5064.91	Zr I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
3	5065.12	Pb III	750	5078.96	Nb I	40 c	5094.41	Nb I	80	5110.32	Dy I
110	5065.22	Zr I	35	5079.09	Os I	400 r	5094.83	Pm I	150	5110.357	Fe I
130	5065.25	Nb I	200	5079.20	Mn III		5095.	Li	360	5110.38	Pr II
400 c	5065.37	I II	45 h	5079.3	Bi III	420	5095.30	Nb I	30	5110.75	Cr I
500	5065.459	Cu II	30	5079.65	Hf II	40	5095.89	Mo I	560	5110.76	Pr II
55	5065.79	Tb I	470	5079.68	Ce II	65	5096.06	Gd II	55	5110.81	Os I
27	5065.88	Tm I	35	5079.87	Mo I	200	5096.18	Pm I	55	5110.81	Pd I
17	5065.91	Cr I	100	5080.02	Mo I	5000	5096.28	Tc I	50	5110.867	Th II
95	5065.99	Ti I	24	5080.05	Tb II	90 h	5096.44	Eu I	160	5110.99	F III
80	5066.67	Tm I	100	5080.52	Ni I	70	5096.50	Re I	9	5111.07	Fe III
450	5067.094	Cu II	150	5080.52	Pm II	400	5096.60	Cs II	10	5111.64	Pb II
17	5067.30	Yb II	1000	5080.62	Xe II	100	5096.65	Mo I	15	5112.13	Hf I
100	5067.35	Pm II	65	5081.11	Ni I	390	5096.73	Sc I	12	5112.25	K I
40	5067.71	Cr I	24	5081.11	Tb I	11	5097.17	K I	50	5112.27	Zr II
30	5067.80	Yb I	35	5081.26	Mo I	150	5097.30	Pm II	130	5112.70	Ce I
100	5067.87	Ta I	30	5081.446	Th I	130	5097.52	Mo I	150	5112.86	Sc I
75	5067.95	Eu I	2100	5081.56	Sc I	10	5097.54	Ba III	17	5113.13	Cr I
110	5067.974	Th I	100	5081.77	Cs II	10	5097.56	Ra I	190	5113.44	Ti I
35 h	5068.33	Ti I	55	5082.80	Gd I	35	5098.03	Mo I	7 h	5113.76	Si III
7	5068.66	Zn I	8	5083.0	Te I	50	5098.043	Th II	95	5113.97	Tm I
80	5068.86	Sc I	1200	5083.72	Sc I	130	5098.38	Gd II		5114.	Li
100	5068.98	As I	10	5083.80	Ti III	11	5099.20	K I	8 h	5114.12	Si III
210	5069.12	W I	26 h	5084.08	Ni I	620	5099.23	Sc I	170	5114.37	Eu I
70	5069.14	Yb I	10	5084.23	K I	18	5099.32	Ni I	50	5114.55	Tm II
65	5069.35	Ti I	35	5085.09	Tm I	30	5099.789	Cl I	470	5114.56	La II
170	5069.46	Sm II	85	5085.26	Zr I	26 h	5099.95	Ni I	80	5114.97	Mo I
15	5069.58	Zn I	40	5085.34	Ti I	150	5100.03	Mn III	30	5115.044	Th I
75	5070.21	Y I	14	5085.52	Rh I	350	5100.067	Cu II	100 w	5115.14	In II
530	5070.23	Sc I	1100	5085.55	Sc I	170	5100.16	Nb I	140	5115.24	Zr I
100	5070.26	Zr I	1000 h	5085.822	Cd I	170	5100.22	Sm II	21	5115.40	Ni I
10	5070.58	Pb II	250	5086.52	Kr II		5100.39	Sm I	110	5115.84	Ta I
95	5070.68	Dy I	750	5086.95	Sc I	18	5100.73	Fe II	320	5116.69	Sc I
30	5071.09	Sr III	4	5086.99	Tl III	400 r	5100.77	Pm I	140	5116.70	Sm II
2	5071.14	Sn II	130	5087.07	Ti I	55	5100.94	Gd II	35	5116.97	Mo I
540	5071.20	Sm I	180	5087.12	Pr I	15	5100.95	Fe II	75	5117.02	Pd I
130	5071.48	Ti I	390	5087.14	Sc I	24	5101.09	Tb I	100	5117.03	Mn III
120	5071.74	W I	1100	5087.42	Y II	370	5101.12	Sc I	510	5117.16	Sm I
120	5071.78	Ce I	80	5087.75	Be I	40	5101.130	Th I	160	5117.17	Ce II
75	5072.19	Y I	2	5087.987	Rb I	12 p	5102.25	Ba III	70	5117.24	U II
350	5072.302	Cu II	30	5088.18	Y I	180	5102.39	Nd II	140 c	5117.40	In II
27	5072.42	Tm I	450	5088.277	Cu II	20	5102.70	Hg I	60	5117.94	Mn I
2	5072.67	Sn II	75	5089.12	Tb II	7500	5102.88	Y III	10000 l	5118.24	Bk I
35	5072.88	Os I	150	5089.35	Pm II	260	5103.09	Sm II	35	5118.39	Tb I
40	5072.92	Cr I	50	5089.484	Pb I	21	5103.15	Ti I	210	5119.11	Y II
90	5072.97	Ru I	24	5089.66	Tb I	200 c	5103.24	Tc I	10000	5119.29	I I
55	5073.74	Gd I	150 h	5089.84	Nd II	910	5103.45	Gd I	130 h	5120.04	Dy I
75	5073.98	Zr I	270	5089.89	Sc I	90	5103.50	Os I	24	5120.18	Tb I
65	5074.34	Ho I	20	5090.01	Pb I	500	5104.32	Tc I	170	5120.30	Nb I
220	5074.34	Yb I	50	5090.051	Th I	140	5104.48	Sm II	20	5120.32	Re I
10	5074.53	Pb II	80	5090.38	Dy II	35	5105.14	V I	1300	5120.40	Y III
55 b	5074.74	HfO	20	5090.495	Ar II	150 d	5105.21	Nd II	270	5120.42	Ti I
25	5074.748	Fe I	70	5090.63	Rh I		5105.35	Nd I	50	5120.42	Zr I
35	5074.77	Os I	80	5090.74	Tc I	1500	5105.54	Cu I	100	5120.60	Tc I
30	5074.79	Mn I	40	5090.97	Mo I	340	5105.58	As II	40	5120.64	Hg I
240	5075.35	Ce II	35	5091.34	Mo I	200	5106.23	La I	22	5120.67	Tm I
250	5075.81	Sc I	10 h	5091.42	Si III	80	5107.07	Ru I	23	5120.69	Rh I
120	5076.32	Ru I	10	5091.6	Bi II	10	5107.242	Pb I	270 c	5120.80	In II
10	5076.35	Pb I	5000	5091.70	Gd III	70	5107.52	Al I	100	5121.34	As I
27	5076.36	Tm I	35	5092.16	Mo I	40	5107.53	Tm I	250	5121.47	Pm II
360	5076.59	Nd II	95	5092.25	Gd II	500	5107.55	As II	200 w	5121.75	In II
50	5076.74	Yb I	200	5092.42	Pm I	360	5107.59	Nd II	85	5121.80	Nb I
27	5077.18	Tm I	45	5092.46	Sc I	24	5108.56	Tb I	350	5122.14	Sm I
40	5077.40	Nb I	75 h	5092.69	Eu I	30 h	5108.84	Au I	22	5122.23	Os I
130	5077.59	Er II	360	5092.80	Nd II	180	5108.91	Gd II	300	5122.42	Xe II
120	5077.67	Dy I	80	5093.07	Ho I	180	5109.06	Sc I	470	5122.99	La II
110	5078.25	Tb I	420	5093.816	Cu II	80 h	5109.36	In II	450	5123.21	Y II
470	5078.25	Zr I	200	5093.83	Ru I	55	5109.44	Ti I	17	5123.46	Cr I
26000	5078.26	Cl II	55 b	5093.88	HfO	130	5109.71	Mo I	15 h	5123.50	Ag I
25	5078.54	Tl II	400	5094.28	Cu III	200	5109.81	Tc I	30	5123.66	Ir I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
24	5123.73	Ru I	100	5139.462	Fe I	210	5152.20	Ti I	80	5166.281	Fe I
340	5123.79	Nd II	25	5139.53	V I	100 c	5152.30	Pr II	12	5166.32	Sb II
29	5123.83	Mo I	190	5139.60	Dy II	75	5152.63	Nb I	210	5166.70	Eu I
300	5124.06	Gd III	50	5139.65	Cr I	55	5153.20	Ru I	21bl	5166.86	TiO
50 h	5124.3	Bi II	100	5139.81	Pr I	2000	5153.24	Cu I	75	5167.33	Mg I
250	5124.476	Cu II	22	5140.28	Tm II	400	5153.86	Pm II	55	5167.42	Hf I
120	5124.56	Er I	75	5140.58	Nb I	50	5154.243	Th I	2500	5167.487	Fe I
90	5124.77	Eu I	85	5140.84	Gd II	6	5154.660	Cd I	100	5167.76	Mo I
120	5125.56	Gd II	50 w	5141.08	Tb II	360	5155.03	Sm II	90 c	5167.88	Ho I
100	5125.70	Xe II	75	5141.50	Gd I	500	5155.14	Ru I	16	5168.66	Ni I
400 h	5125.73	Kr II	100	5141.62	Ta I	300	5155.45	Zr I	80	5168.897	Fe I
10	5125.950	Th I	100	5141.63	As I	60	5155.54	Rh I	20	5168.922	Th I
55	5127.26	Rb I	100	5141.783	Ar II	40 h	5155.76	Ni I	200	5168.97	Cu III
400 r	5127.34	Pm I	130	5142.59	Ho II	860	5155.84	Gd I	28	5168.98	Os I
9	5127.35	Fe III	75	5142.68	Gd I	800 h	5156.07	Sr I	12	5169.03	Fe II
130	5127.41	Er II	170	5142.76	Ru I	12	5156.12	Fe III	1	5169.65	Rb I
85	5127.66	Nb I	23 h	5142.77	Ni I	330	5156.56	Ta I	110	5169.69	Dy II
140	5127.81	Ho I	60	5143.11	Na II	110	5156.72	P V	300	5169.71	Pm II
100	5128.45	Hg II	110	5143.22	Ho II	180	5156.74	La II	23	5169.94	V I
19	5128.53	Hf II	95	5143.267	Th II	55	5156.76	Gd II	130bl	5170.11	LuO
110	5128.53	V I	350	5143.49	C II	14	5157.09	Rh I	29	5170.13	Tb I
170	5129.10	Eu I	100	5143.69	Ta I	180	5157.43	La II	75	5170.18	Hf I
30	5129.15	Ti II	60 h	5144.3	Bi II	30	5157.96	Hf I	10000	5170.61	Bk I
55	5129.27	Ho II	11	5144.36	Fe II	200	5158.00	Zr I	24	5170.61	Tb I
18 h	5129.38	Ni I	14	5144.67	Cr I	100	5158.093	Cu II	920	5171.03	Ru I
410	5129.52	Pr II	10	5144.938	Ne I	35	5158.26	Sr III	45 b	5171.06	ScO
170	5129.57	Ce I	400 r	5145.13	Pm I	8	5158.41	La III	160 d	5171.08	Mo I
200	5129.75	Pm I	570	5145.16	C II	75	5158.48	Gd I		5171.25	Mo I
80 d	5129.85	In II	70	5145.308	Ar II	85	5158.604	Th I	500	5171.58	Pm II
90	5130.08	Eu I	150	5145.38	Mo I	35	5158.67	Zr I	500	5171.595	Fe I
65	5130.28	Gd II	450	5145.42	La I	290	5158.69	La I	220	5172.68	Mg I
30	5130.34	Sr III	270	5145.47	Ti I	40	5158.69	Rh I	250	5172.74	Sm I
680	5130.60	Nd II	22	5145.54	Os I	40	5159.35	V I	130	5172.78	Er I
19	5130.76	Rh I	5	5145.73	La III	280	5159.69	Ce I	20	5172.90	Dy II
50 h	5130.78	V IV	150 c	5145.86	Lu III	20 h	5159.94	Ba I	230 h	5172.94	Mo I
120	5131.53	Er I	500 r	5146.30	Pm I	55	5160.00	Ru I	150	5173.25	F II
50 w	5131.69	Tb I	40 h	5146.48	Ni I	270	5160.07	Eu I	1100	5173.75	Ti I
100	5131.752	Ge II	35	5146.74	Co I	80	5160.32	U II	620	5173.90	Pr II
170	5132.33	Nd II	14	5147.02	Yb II	250	5160.33	Nb I	10000	5173.96	Cf I
2	5132.471	Rb I	250	5147.24	Ru I	70	5160.730	Th I	160 h	5174.18	Mo I
350	5132.94	C II	14	5147.31	Ti III	75	5160.99	Zr I	20	5174.54	Sn I
350	5133.28	C II	110	5147.39	Mo I	40	5161.03	Dy II	190	5174.55	Ce I
40	5133.34	Nb I	100	5147.44	Au I	3000 c	5161.20	I II	2000	5174.81	Tc I
85	5133.40	Zr I	230	5147.48	Ti I	280	5161.48	Ce I	240 c	5175.42	In II
270	5133.44	Pr I	75	5147.54	Nb I	25	5161.65	Re I	470	5175.42	Sm I
210	5133.52	Eu I	110	5147.57	Ce II	200	5161.74	Pr II	150	5175.87	Br III
70 b	5133.68	ScO	50	5147.58	Tb I	2000	5161.81	Tc I	60	5175.97	Rh I
40	5133.69	Fe I	120	5148.211	Th II	30	5162.27	Fe I	300	5176.19	I II
130	5133.83	Er II	7	5148.7	Te I	15	5162.285	Ar I	190	5176.28	Gd II
65	5133.89	Ru I	70	5148.72	V I	80	5163.19	Mo I	50	5176.51	Tb I
140	5134.05	Lu I	40	5149.40	Tm II	120	5163.62	La II	15	5176.55	Sb II
10	5134.54	Ba III	12	5149.46	Fe II	75	5163.70	Gd I	13	5176.56	Ni I
20	5134.746	Th I	160	5149.59	Ho II	160	5163.84	Pd I	70	5176.77	V I
18	5134.75	Ge III	200	5149.73	I II	110 h	5163.89	Al III	50	5176.961	Th I
210	5134.75	Nb I	140	5149.74	Os I	40	5164.12	Dy II	12	5177.27	Rh I
30	5135.02	Dy I	100	5149.99	Ce I	55	5164.14	U I	580	5177.31	La I
2700	5135.09	Lu I	10	5150.134	Rb I	24	5164.27	Tb I	35	5177.43	Cr I
270	5135.14	Pr II	500	5150.63	Tc I	400	5164.38	Br II	20	5177.95	Ir I
180	5135.20	Y I	40	5150.64	Nb I	250	5164.38	Nb I	200	5178.648	Ge II
10000 s	5135.53	Bk II	50	5150.89	Mn I	55	5164.54	Gd II	100	5178.82	Xe II
65	5135.59	Gd I	110 h	5151.01	Al III	300	5164.58	Rb II	40 c	5178.89	Re I
20	5135.98	Yb II	110	5151.07	Ru I	170	5164.77	Er II	17	5178.99	Zr I
75	5136.04	Gd I	400	5151.09	C II	1	5165.023	Rb I	10000	5179.08	Cf I
530	5136.55	Ru I	5	5151.391	Ar I	170	5165.14	Nd II	50	5179.97	Tb I
23	5137.08	Ni I	50	5151.612	Th I	2	5165.142	Rb I	300	5180.01	Br II
20	5137.94	Hg I	25	5151.910	Fe I	50	5165.34	Dy I	230	5180.31	Nb I
110	5138.42	V I	28	5152.01	Os I	25	5165.773	Ar II	130	5181.17	Nd II
40	5139.251	Fe I	10000	5152.08	Rb II	85	5165.96	Zr I	20	5181.74	Re I
500	5139.26	Tc I	25	5152.14	Tl II	70	5166.23	Cr I	230	5181.86	Hf I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
100	5181.90	Si II	40	5193.52	Os I	75	5207.87	Ti I	75	5220.30	Gd II
6	5181.95	Tl II	23	5193.62	V I	150	5207.90	Pr II	7	5221.271	Ar I
200	5181.98	Zn I	60	5193.74	Eu I	40	5207.97	Tb I	23000	5221.36	Cl II
130 c	5182.11	Ho I	300	5193.90	Br II	500	5208.09	Pm II	45	5221.54	Ho I
500	5182.35	Br II	85 h	5194.04	Ti I	500	5208.32	Kr II	30	5221.75	Cr I
120	5182.60	Nd II	300	5194.05	Pm II	400	5208.34	Cu III	40	5221.99	Tb I
19	5182.68	Tm I	120	5194.43	Pr I	65	5208.42	Ti	1400	5222.20	Sr I
6	5183.10	Tl II	3	5194.583	Ge I	11000	5208.44	Cr I	19	5222.66	Rh I
100	5183.367	Cu II	110	5194.83	V I	150	5208.51	Pr III	95	5222.69	Ti I
850	5183.42	La II	200	5194.941	Fe I	80	5208.55	Na II	260	5223.46	Ce I
400	5183.61	Mg I	180	5195.02	Ru I	1000	5209.08	Ag I	300	5223.49	Eu I
100	5183.70	Zr I	150	5195.11	Pr II	75 h	5209.2	Bi II	65	5223.55	Ru I
35	5183.990	Th II	18	5195.23	Ho I	85	5209.30	Zr I	85	5223.64	Ti I
20	5184.15	Yb II	15	5195.278	Rb I	1400	5210.39	Ti I	250	5224.32	Ti I
35	5184.19	Rh I	200	5195.31	Pr II	26	5210.44	Mo I	95	5224.56	Ti I
140 c	5184.44	In II	55	5195.36	V I	55	5210.49	Gd II	770	5224.66	W I
55	5184.57	U II	50 h	5195.814	Th I	390	5210.52	Sc I	85	5224.93	Zr I
70	5184.59	Cr I	150	5195.84	Nb I	30	5210.82	Hg III	85	5224.94	Cr I
50	5184.59	Tb I	60	5196.08	Yb I	50	5211.230	Th I	190	5224.95	Ti I
100 h	5185.25	Si II	120	5196.43	Y II	45	5211.28	Sc I	130	5225.05	Nd II
40	5185.25	Tm I	85	5196.44	Cr I	16	5211.52	Rh I	2000	5225.11	Sr I
80	5185.30	Dy I	50	5196.59	Mn I	85	5211.60	Yb I	250	5225.12	Pm II
85	5186.13	Tb I	170	5196.61	Lu I	720	5211.86	La I	65	5225.16	Nb I
40	5186.34	Ti I	5	5197.26	Si III	50	5211.86	Mo I	200	5225.55	Tc I
30	5186.84	Hf I	10000	5197.55	Bk I	190	5211.92	Ce I	35	5225.77	V I
110	5186.98	Nb I	95	5197.66	Dy II	65	5212.29	Ti I	12 d	5226.28	Ti III
30	5187.03	Zr I	410	5197.77	Gd I	310	5212.37	Nd II	65	5226.56	Ti II
55	5187.24	Gd II	50	5198.800	Th I	10000	5212.53	Bk I	60	5226.862	Fe I
370	5187.46	Ce II	50	5198.86	Tb I	50	5212.71	Co I	12	5226.89	Cr I
20	5187.746	Ar I	10	5199.08	Fe III	19	5212.73	Rh I	1500	5227.00	Cs II
30	5187.75	Hf I	95	5199.164	Th I	110	5212.74	Ta I	1000	5227.150	Fe I
55	5187.85	Ho I	200	5199.85	Eu I	60	5212.91	Er II	13	5227.49	Fe II
55	5187.88	Gd I	80	5199.87	Ru I	150	5213.23	Nd I	450	5227.5	Se II
300	5188.04	Xe II	330	5200.12	Nd II	80	5213.38	Tm I	35	5227.66	Pt I
260	5188.22	La II	110	5200.17	Mo I	45	5213.43	Ru I	110	5227.97	Pr I
40	5188.45	Dy II	35	5200.19	Cr I	19	5214.13	Cr I	120	5228.12	Tb I
50	5188.48	Tb I	960	5200.41	Y II	40	5214.28	Tb I	22	5228.23	Tm II
85	5188.70	Ti II	250	5200.59	Sm I	16	5214.79	Rh I	130	5228.43	Nd II
25	5188.85	Ca I	50	5200.74	Mo I	750	5215.10	Eu I	500 d	5228.97	I II
160	5188.90	Er II	110	5200.96	Eu I	30	5215.13	Er II	2000	5229.27	Sr I
190	5189.20	Nb I	65	5201.10	Ti I	25	5215.179	Fe I	45	5229.34	Er II
30	5189.58	Ti I	100	5201.15	Zr I	150	5215.96	Pm II	5	5229.37	Ge III
	5190.	Li	2000	5201.437	Pb I	200 I	5215.99	Am II	180	5229.75	Ce I
90	5190.11	Ho II	20	5201.5	Bi II	600	5216.27	I II	50	5230.22	Co I
50	5190.871	Th II	45	5202.12	Ru I	150	5216.274	Fe I	300	5230.26	Au I
55	5191.08	Gd II	500 h	5202.41	Si II	40	5216.59	V I	15	5230.41	F I
200	5191.32	Pr II	270	5202.63	Os I	95	5216.596	Th II	19	5230.62	Rh I
400	5191.37	Xe II	35 w	5202.77	Tb I	20	5216.814	Ar II	65	5231.06	Mo I
150	5191.41	P II	65	5203.22	Nb I	18	5216.85	Fe II	110	5231.160	Th I
40	5191.44	Mo I	35	5203.23	Os I	85	5217.48	Gd I	425	5231.38	As II
500	5191.45	Nd II	50	5203.33	Na II	56000	5217.94	Cl II	10	5231.82	Ca III
50	5191.454	Fe I	170	5204.15	La II	8	5218.12	Be II	26	5232.36	Mo I
4	5191.56	Pb III	45	5204.31	U II	2500	5218.20	Cu I	150	5232.81	Nb I
100	5191.60	Zr II	14	5204.51	Tm II	3	5218.21	Ga II	140	5232.92	Ce II
100	5191.65	Na II	5300	5204.52	Cr I	30	5218.26	Er II	250	5232.939	Fe I
210	5191.66	Ce II	40	5204.55	Tb I	20	5218.33	Be II	85	5233.225	Th II
70	5192.00	Cr I	30	5204.582	Fe I	110 d	5218.45	Ta I	85	5233.229	Th II
20	5192.01	V I	35	5205.13	Nb I	50	5218.528	Th II	35	5233.75	V I
100	5192.10	Xe II	1500	5205.72	Y II		5218.66	Ta I	130	5233.93	Gd I
80	5192.343	Fe I	10	5205.93	Ra I	360	5219.05	Pr II	2	5233.968	Rb I
630	5192.62	Nd II	8400	5206.04	Cr I	85 c	5219.10	Nb I	110	5234.07	V I
290	5192.86	Dy II	120	5206.08	Ti I	35	5219.110	Th I	450	5234.20	Nd II
200 h	5192.86	Si II	120	5206.44	Eu I	600	5219.21	Cu III	100	5234.26	Mo I
1300	5192.98	Ti I	90	5206.47	Lu I	10000	5219.24	Cf I	520	5234.27	La I
110	5192.99	V I	150	5206.52	Er I	280	5219.40	Gd I	35	5234.31	Re I
170	5193.08	Nb I	360	5206.55	Pr II	80	5219.40	Mo I	1000	5234.57	I I
95	5193.14	Rh I	100	5206.56	Tc I	280	5219.67	Sc I	55	5234.86	Pd I
8 h	5193.21	Ac III	20	5206.61	V I	150	5219.71	Ti I	40	5235.11	Tb I
12	5193.49	Cr I	16	5206.95	Rh I	560	5220.11	Pr II	45	5235.21	Co I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
150	5235.499	P IV	75	5253.03	Nb I	30	5265.16	Cr I	15	5276.48	Fe III
10	5235.66	Fe III	340	5253.46	La I	24	5265.56	Ca I	100	5276.525	Cu II
500	5236.26	Pm II	300	5253.52	P II	130	5265.71	Ce II	150	5276.88	Nd II
300	5236.66	Pm II	85	5253.93	Nb I	180	5265.72	Cr I	150 h	5277.04	Yb I
45	5237.16	Rh I	30	5254.32	In I	6	5265.892	Ge I	120	5277.41	Zr I
85 c	5237.43	Nb I	85	5254.75	Gd I	150	5265.98	Ti I	70	5277.501	Th II
9	5237.80	Rh I	60	5254.92	Cr I	26	5266.30	Co I	55	5277.71	Er I
10000	5238.10	Y III	60	5255.13	Cr I	200	5266.40	Eu I	17	5278.12	Ti III
460 h	5238.20	Mo I	85	5255.32	Mn I	40	5266.47	Ru I	100	5278.24	Re I
500	5238.23	Br II	360	5255.51	Nd II	45	5266.49	Co I	10	5278.70	Ti III
2800	5238.55	Sr I	10	5255.573	Th I	100	5266.555	Fe I	10000 s	5279.01	Cf
120	5238.58	Ti I	140	5255.80	Gd I	12	5266.710	Th I	12	5279.01	F I
22	5238.92	Ir I	45	5255.82	Os I	40	5266.83	Ru I	27	5279.34	Er II
20	5238.94	Sb II	75	5255.83	Ti I	20	5267.03	Ba I	29 c	5279.43	Nb I
19	5238.97	Cr I	3	5255.86	Be II	65	5267.11	Dy I	35	5279.53	Yb II
60	5239.0	Xe III	140	5255.93	Er II	24	5267.34	Tm II	65	5279.65	Mo I
120	5239.24	Eu I	22	5256.47	Er II	100	5268.01	Cd II	50	5279.70	Dy II
250	5239.79	Nd II	3	5256.61	Ge III	26	5268.52	Co I	75	5280.05	Zr I
350	5239.82	Sc II	20	5256.85	Yb III	200	5268.59	Cu III	11 h	5280.12	Rh I
20	5240.20	V I	4800	5256.90	Sr I	65	5268.78	Gd I	150	5280.21	Al II
29	5240.39	Nb I	27	5257.02	Er II	20	5268.95	Mo I	19	5280.29	Cr I
35	5240.51	Yb II	45	5257.04	U II	14	5269.27	Rh I	70	5280.38	U I
180	5240.81	Y I	40	5257.07	Ru I	500	5269.36	I II	45 h	5280.65	Co I
110	5240.87	V I	40	5257.49	Yb II	120	5269.48	Nd II	40	5280.82	Ru I
230 h	5240.88	Mo I	40	5257.71	Sr III	1200	5269.537	Fe I	210	5280.86	Mo I
40	5242.38	Ru I	280	5258.33	Sc I	10000	5269.86	Pu I	75	5281.05	Tb I
110 h	5242.81	Mo I	35	5258.360	Th I	50	5269.92	Nb I	15	5281.069	Th I
18	5243.31	Fe III	150	5259.04	Mo I	100	5269.991	Cu II	185	5281.20	N I
30	5243.40	Cr I	110	5259.39	La II	25	5270.27	Ca I	30	5281.789	Fe I
30	5243.47	Zr I	680	5259.73	Pr II	64	5270.28	Be II	55	5282.07	Dy I
110	5243.99	Hf I	70	5259.88	Dy I	40 h	5270.3	Bi II	16	5282.30	Fe III
100	5244.11	Yb I	55	5259.99	Ti I	800	5270.357	Fe I	40	5282.39	Ti I
35 c	5244.47	Ho I	20	5260.034	Rb I	200	5270.51	Rb II	55	5282.48	Gd I
100	5245.51	Mo I	16	5260.17	Mo I	500	5270.64	Pm II	150	5282.82	Eu I
3000 c	5245.71	I II	200 c	5260.22	Tc I	500	5270.81	Be II	250	5282.91	Sm I
260	5245.92	Ce I	1	5260.228	Rb I	1300	5270.95	Re I	280	5283.08	Gd I
21	5246.15	Ti I	18	5260.26	Fe II		5271.	Li I	10	5283.28	Ra I
400	5246.33	Pm II	13 l	5260.34	Fe III	370	5271.19	La I	140	5283.45	Ti I
55	5246.57	Ti I	25	5260.44	Hf II	400	5271.40	Sm I	60	5283.621	Fe I
65	5246.87	Gd I	500	5260.44	Xe II	270	5271.53	Nb I	290	5283.77	Al II
50	5246.94	Dy II	130	5260.56	Dy I	100	5271.60	Cd II	20	5283.84	Mo I
55	5247.10	Hf II	14	5260.93	Tm II	35	5271.80	Mo I	20	5283.89	Os I
75	5247.31	Ti I	17	5260.98	V I	10000	5271.95	Bk I	130	5284.08	Ru I
11	5247.37	Ca III	65	5261.14	Mo I	390	5271.96	Eu I	35	5284.39	Ti I
11	5247.49	Ti III	200 c	5261.44	Tc I	13	5271.98	Ca III	1500	5284.70	Pr III
290	5247.56	Cr I	150	5261.68	Pr III	35	5272.01	Cr I	12	5284.83	Fe III
95	5247.654	Th II	22	5261.71	Ca I	50	5272.25	Dy II	35	5284.97	Sc I
1	5247.71	Sb III	19	5261.75	Cr I	9	5272.37	Fe III	28	5284.99	Dy II
45	5247.75	U II	100 h	5261.76	Au I	110	5272.48	Eu I	800	5285.07	Tc I
50	5247.93	Co I	500	5261.95	Xe II	25	5272.48	Nb I	50	5285.26	Nb I
13	5247.95	Fe II	75 w	5262.11	Tb II	300	5272.68	Br II	60	5285.27	Ca II
75	5248.71	Tb I	50 h	5262.16	V IV	80	5272.91	Er I	210	5285.76	Sc I
200	5248.77	In III	30	5262.21	Sr III	55	5272.91	Gd I	150	5285.85	Al II
50	5248.86	Re I	23	5262.24	Ca I	14	5272.98	Fe III	22	5286.09	Hf I
800	5249.37	Cs II	150	5262.42	Pm II	590	5273.43	Nd II	10	5287.19	Cr I
720	5249.59	Nd II	12	5262.74	In I	30	5273.44	Cr I	55	5287.25	Eu I
20	5250.46	Os	55bl	5263.3	DyO	400	5274.04	Cs II	30	5288.32	Sr III
200	5250.82	Nd II	55	5263.50	Ti I	340	5274.23	Ce II	26	5288.81	Ti
21	5250.95	Ti I	3000	5263.58	Y III	24	5275.03	Tb I	60	5289.25	Eu I
320	5251.18	Gd I	180	5263.88	Pr II	55	5275.04	Hf I	60	5289.82	Y II
13	5251.23	Fe II	530	5264.15	Cr I	95 h	5275.17	Cr I	20	5290.74	Hg I
150 d	5251.62	Nb I	11	5264.18	Fe II	50	5275.29	Dy II	140	5290.84	La II
55	5251.67	Ru I	8	5264.21	Mg II	55	5275.48	Ho I	40	5291.14	Tm I
	5251.81	Nb I	22	5264.24	Ca I	1000	5275.51	Tc I	40	5291.16	Ru I
	5251.82	Ho I	7	5264.37	Mg II	1600cw	5275.56	Re I	120	5291.26	Eu I
260	5251.92	Sm I	1000	5264.44	Pr III	35 h	5275.69	Cr I	110	5291.67	Nd I
110	5252.11	Ti I	35	5264.77	Er II	70 h	5276.03	Cr I	340 c	5292.02	Pr II
120	5252.14	Gd II	30	5264.95	Hf II	130 c	5276.20	Nb I	55	5292.08	Mo I
100	5252.23	Mn III	55	5265.15	Os I	35	5276.28	Mo I	14	5292.14	Rh I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
2000	5292.22	Xe II	30	5305.56	Re I	25	5321.26	Zr I	1000	5337.48	Cd II
1650	5292.52	Cu I	55	5305.87	Tm II	35	5321.28	Re I	55	5337.53	Gd I
340	5292.62	Pr II	11	5306.18	Fe II	11	5321.29	Ca III	65 w	5337.90	Tb I
140	5292.68	N I	20	5306.26	Mo I	130	5321.50	Gd I	10000	5338.22	I II
680	5293.17	Nd II	110	5306.47	Nd II	280	5321.78	Gd I	1	5338.3	Ga II
35	5293.46	Mo I	350	5306.61	Cs II	3	5322.380	Rb I	12	5338.43	Zr I
60	5293.68	Eu I	55	5306.70	Gd I	10	5322.74	Fe III	35 d	5338.59	Tb I
200	5293.92	Pm II	10	5306.76	Fe III	430	5322.76	Pr II	35	5338.90	Tm I
40	5294.32	Tm I	15	5306.88	Ti III	400	5322.80	I II		5339.03	Tm I
10	5294.397	Th I	650	5307.12	Tm I	16	5322.99	Tm II	10000 s	5339.13	Cf
120	5294.64	Eu I	70	5307.22	Ca II	350	5323.23	Po I	50	5339.19	Ca II
60	5294.82	Zr I	280	5307.30	Gd I	12	5323.28	K I	2000	5339.33	Xe II
120	5294.87	Hf I	30	5307.466	Th II	150	5324.178	Fe I	95	5339.41	Sc I
30 h	5295.19	Si II	30	5307.82	Hf I	12	5324.26	Hf II	14	5339.59	Fe II
55	5295.47	Mo I	29	5308.19	Tb I	20	5324.47	Mo I	13	5339.69	K I
120	5295.63	Pd I	8	5308.65	Zn I	50	5324.69	Dy I	80	5339.928	Fe I
20	5295.65	Os I	200	5308.66	Kr II	60	5325.145	Th II	1500	5340.02	Pr III
65	5295.79	Ti I	100	5308.86	Pm II	50	5326.976	Th I	65	5340.30	Dy I
400	5296.13	P II	40	5309.02	Dy II	35	5327.06	Mo I	14	5340.44	Cr I
35	5296.34	Nb I	260	5309.27	Ru I	150	5327.18	N III	110	5340.67	La II
130	5296.56	Ce I	300	5309.27	Xe II	110	5327.32	Gd I	12	5340.74	Ir I
340	5296.69	Cr I	150 c	5309.45	In II	50	5327.46	Re I	50	5340.80	Nb I
120	5296.79	Zr I	29	5309.46	Tb I	800	5328.038	Fe I	500	5341.023	Fe I
120	5297.26	Ti I	1 h	5309.49	Si IV	10	5328.06	Ca III	120	5341.05	Sc I
70 h	5297.36	Cr I	45	5309.68	Hf I	130	5328.08	Ce I	140	5341.05	Ta I
30	5297.743	Th I	5	5310.24	K II	65	5328.30	Gd I	160	5341.06	Mn I
40	5297.82	Dy II	7	5310.24	Zn I	340 h	5328.34	Cr I	20	5341.094	Ne I
45	5298.06	Hf II	9	5310.88	Fe III	300	5328.531	Fe I	110	5341.29	Sm I
230	5298.09	Pr II	7	5311.02	Zn I	135	5329.10	O I	17	5341.50	Ti I
11	5298.12	Fe III	110	5311.40	Zr I	70 h	5329.17	Cr I	50	5342.71	Co I
660	5298.27	Cr I	220	5311.46	Nd II	160	5329.68	O I	95	5342.96	Sc I
12	5298.43	Ti III	55	5311.60	Hf II	17 h	5329.72	Cr I	12	5342.97	K I
65	5298.44	Ti I	35	5312.002	Th I	40 h	5329.74	Rh I	300	5343.00	Gd I
40	5298.78	Os I	110	5312.32	Al II	350 h	5329.82	Sr I	8	5343.283	Ne I
400	5299.78	I II	18	5312.57	Pd I	20	5330.080	Th I	26	5343.39	Co I
12	5299.93	Fe III	24	5312.88	Cr I	80	5330.11	Ho I	25	5343.58	Nb I
1500	5299.99	Pr III	1000	5313.87	Xe II	190	5330.54	Ce II	60	5343.581	Th I
35	5300.21	Tm I	55	5313.89	Mo I	400	5330.57	Br II	22	5343.94	Er II
85	5300.75	Cr I	90	5314.35	N III	190	5330.74	O I	460	5344.17	Nb I
17	5300.94	Yb II	14	5314.79	Rh I	25	5330.778	Ne I	30	5344.50	Er II
40	5301.02	Pt I	400	5314.96	Tc I	22	5330.84	Zr I	300	5344.75	P II
26	5301.06	Co I		5315.	Li I	35	5331.04	Tb I	10	5344.76	Cr I
16	5301.20	Ti III	35	5315.04	Mo I	14 h	5331.08	Rh I	15	5345.10	Pd I
90	5301.25	Ho I	13	5315.33	Ru I	500	5331.23	As II	85	5345.13	Gd I
10	5301.32	Ca III	50	5315.55	Nb I	20	5331.54	Yb III	5000 c	5345.15	I II
160	5301.58	Dy I	220	5316.07	Al II	70	5331.77	Sc I	30 d	5345.66	Yb II
280	5301.67	Gd I	250	5316.07	P II	20	5331.90	Re I	75	5345.68	Gd I
35	5301.94	Sc I	13	5316.23	Fe II	500	5332.05	Br II	780	5345.81	Cr I
60	5301.97	Zr I	5	5316.78	Hg I	10	5332.36	Sn II		5345.83	Yb II
370	5301.98	La II	17	5317.01	Nb I	20	5332.76	Re I	1	5345.98	Mg I
160	5302.28	Nd II	20	5317.28	Re I	100	5332.899	Fe I	11	5346.03	Os I
25	5302.299	Fe I	20	5317.494	Th I	40	5332.93	Ru I	9	5346.30	Hf II
45	5302.30	Er II	400	5317.78	Cu III	55	5333.06	Er I	80	5346.49	Tm II
13	5302.58	Os I	22	5318.35	Sc II	170	5333.30	Gd I	11	5346.88	Fe III
14 w	5302.60	Fe III	150	5318.58	Pm II	27	5333.33	Er II	30	5347.	Bi IV
140	5302.62	La II	250	5318.60	Nb I	500	5333.41	Kr II	60	5347.22	Yb II
35	5302.69	Tm I	24	5318.78	Cr I	10 h	5333.62	Ag I	24	5347.83	Tb II
220	5302.76	Gd I	110	5319.23	Tb I	20	5333.85	Re I	1800	5347.95	Gd III
	5303.13	Sr II	35	5319.24	Ho I	27	5334.23	Er II	90	5348.06	Er I
180	5303.55	La II	50	5319.49	Nb I	14	5334.23	Sc II	380	5348.32	Cr I
90	5303.85	Eu I	35	5319.65	Ho I	45 h	5334.70	Ru I	200	5348.67	Gd I
350	5304.10	Br II	500	5319.82	Nd II	200	5334.79	Tc I	80	5349.12	Lu I
17	5304.21	Cr I	20	5319.89	Mo I	75	5334.87	Nb I	350	5349.16	Cs II
40	5304.40	Lu I	10000 s	5320.09	Cf	170	5335.15	Yb II	350	5349.30	Sc I
65	5304.72	Tb I	600	5320.20	Tc I	110	5335.93	Ru I	9	5349.31	Rh I
80	5304.86	Ru I	10	5320.29	Ra I	18	5336.23	Os I	27	5349.47	Ca I
2 h	5304.97	Si IV	190	5320.60	Sm I	25	5336.81	Nb I	120	5349.71	Sc I
100	5305.31	Tc I	45	5320.78	Y II	26	5336.81	Ti II	19	5349.88	Mn I
360	5305.4	Se II	200	5320.82	N III	24	5337.43	Dy II	30	5350.09	Zr II

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
60	5350.30	Sc I	12	5363.35	Zr I	200	5381.89	Cd II	11	5397.87	V I
30	5350.35	Zr II	1	5363.5	Ga II	20	5382.37	Zr I	20 h	5398.26	DyO
300	5350.38	Gd I	30	5363.66	Yb I	60	5383.37	Fe I	20	5398.93	Ti IV
30 h	5350.41	Eu I	12	5363.76	Fe III	35	5383.43	V I	20	5399.175	Th I
18000	5350.46	Tl I	110hl	5364.28	Mo I	4000	5383.64	Y III	50	5399.49	Mn I
45	5350.47	Er I	35	5364.32	Ir I	30	5384.56	Ho I	10	5399.80	Ra I
340	5350.74	Nb I	25	5364.87	Fe I	30	5384.63	Hg I	24	5399.93	Dy II
25	5350.90	Zr I	95	5365.38	Gd I	15 d	5384.85	Tl II	20	5400.23	Ra I
75	5351.08	Ti I	100	5365.5	Se I	30	5384.97	Ho I	70	5400.46	Na II
14	5351.126	Th I	100	5365.59	Mn III	40	5385.14	V I	27	5400.46	Tm II
30 h	5351.29	Yb I	3000	5365.96	Gd III	270	5385.14	Zr I	50	5400.47	Mo I
75 h	5351.69	Eu I	26	5366.65	Ti I		5385.45	Sr II	60	5400.562	Ne I
25	5351.92	Zr I	30	5367.1	Xe III	20	5385.63	Dy II	40	5400.61	Cr I
50	5352.05	Co I	35hl	5367.11	Mo I	65	5385.88	Ru I	50	5401.0	Xe III
30	5352.11	Dy I	40	5367.47	Fe I	110	5385.90	Nd II	110 h	5401.04	Ru I
13	5352.25	Os I	10	5367.64	Pb II	55	5386.19	U II	40	5401.39	Ru I
60 h	5352.32	V IV	10	5368.06	Fe III	30	5386.65	Zr I	9	5401.54	Mg II
20	5352.35	Mo I	200	5368.07	Xe II	300	5386.88	P II	100	5401.93	V I
200	5352.40	Pr II	30	5368.20	Dy II	30	5386.98	Cr I	15	5402.06	Fe II
40	5352.84	Eu I	140	5368.36	Sm I	14	5387.06	Fe II	29 d	5402.06	Tb II
150	5352.95	Yb II	100	5368.383	Cu II	22	5387.57	Cr I	27	5402.23	Tm I
240	5353.26	Gd I	35	5368.85	Er I	17	5388.30	Nb I	200	5402.51	Ta I
40	5353.28	Nb I	12	5368.99	Pt I	14	5388.30	V I	500	5402.57	Lu I
40	5353.41	V I	20	5369.281	Th I	26	5388.69	Mo I	1000 s	5402.62	Am I
26	5353.48	Co I	17	5369.39	Zr I	40	5389.18	Ti I	450	5402.77	Eu I
500 c	5353.48	Tc I	35	5369.48	Re I	40	5389.34	Hf I	220	5402.78	Y II
2	5353.49	Ga I	35	5369.58	Co I	85	5389.50	Gd I	20	5403.04	Be II
450	5353.53	Ce II	55	5369.64	Ti I	85	5389.58	Dy II	70	5403.17	Ho I
12	5353.77	Fe III	75	5369.72	Tb I	17	5389.84	Yb II	16	5403.43	Os I
60	5354.05	Hg I	300	5369.79	Cu III	55	5389.99	Ti I	35	5404.02	Ti I
20	5354.24	Sb II	50 c	5369.80	Re I	10	5390.39	Cr I	60	5404.12	Fe I
130	5354.40	Rh I	1000 c	5369.86	I II	95	5390.44	Rh I	50	5404.19	Dy I
110	5354.73	Hf I	120	5369.9	Se I	70	5390.466	Th II	19	5404.47	Hf I
80	5354.88	Mo I	95	5369.92	Gd I	4	5390.568	Rb I	10000 l	5404.62	Bk I
160	5354.88	Tb I	50	5369.96	Fe I	60	5390.63	Na II	23 h	5404.73	Rh I
90	5355.10	Eu I	150	5370.63	Gd I	12	5390.79	Pt I	22	5405.00	Cr I
25	5355.31	Nb I	800	5370.97	Cs II	30	5391.03	Sr III	25	5405.13	Zr I
35	5355.51	Mo I	400	5371.489	Fe I	17	5391.18	Zr I	130	5405.23	Sm I
40	5355.70	Nb I	150	5371.84	Al II	19	5391.36	Hf II	45	5405.33	Eu I
210	5355.75	Sc I	150	5371.94	Nd II	1000	5391.60	Ba II	100 h	5405.34	Si II
8	5356.07	V V	10	5372.099	Pb II	14	5391.96	Tm II	800 c	5405.42	I II
530	5356.10	Sc I	500	5372.39	Xe II	10000	5392.03	Bk I	250	5405.774	Fe I
23	5356.47	Rh I	35	5372.40	Mo I	370	5392.08	Sc I	35	5405.79	Mo I
65	5356.48	Mo I	27	5372.98	Tm II	15000	5392.12	Cl II	14	5405.98	Tm II
200	5356.63	Tc I	110	5373.86	Hf I	50	5392.572	Th I	35	5406.39	Mo I
180	5356.98	Nd II	110	5374.1	Se I	100	5392.80	Xe I	20	5406.81	Ra I
14	5357.19	Sc II	500 h	5375.20	Tc I	120	5392.94	Eu I	100	5407.08	Ho I
540	5357.61	Eu I	40	5375.27	Nb I	40	5393.167	Fe I	800 c	5407.36	I II
110	5357.86	La I	270	5375.35	Sc I	300	5393.40	Ce II	95	5407.42	Mn I
30	5358.64	Yb II	11 l	5375.47	Fe III	18 h	5393.85	Ho I	85	5407.62	Zr I
300	5358.65	Tc I	75	5375.98	Tb I	10000	5394.24	Bk I	100	5408.13	As I
30	5358.707	Th I	100	5376.13	Th III	65	5394.52	Mo I	10000	5408.88	Cf I
29	5359.19	Nb I	110	5376.79	Os I	95	5394.67	Mn I	280	5409.23	Ce II
14	5359.57	K I	110	5376.94	Eu I		5395.	Li I	110	5409.61	Ti I
90	5359.99	Ho I	130	5377.09	La II	35	5395.24	Pd I	200	5409.72	P II
200	5360.14	Tc I	100 c	5377.10	Re I	1200	5395.48	Br I	1400	5409.79	Cr I
560hl	5360.56	Mo I	95	5377.63	Mn I	40	5395.57	Dy I	7	5409.92	Tl II
2	5360.6	Ga II	65	5377.84	Ru I	10	5395.69	Ti III	20	5410.21	Be II
60	5360.83	Eu I	1000	5378.13	Cd II	12	5395.86	Fe II	200	5410.45	Pm II
800	5361.35	Ba II	250	5378.20	P II	21	5395.86	Nb I	30	5410.91	Fe I
290	5361.47	Nd II	30	5378.836	Th I	35	5395.87	Er II	10	5410.97	Tl II
120	5361.61	Eu I	45	5379.10	Rh I	17	5395.88	Zr I	29	5411.24	Nb I
55	5361.66	Gd I		5379.13	Sr II	29	5396.33	Nb I	80	5411.41	In II
130	5361.77	Ru I	300	5380.34	C I	17	5396.60	Ti I	5	5411.52	He II
17	5362.01	Nb I	75	5380.62	Y I	85	5397.09	Ti I	45	5411.86	Eu I
4	5362.40	Tl III	140	5380.99	La II	300	5397.127	Fe I	13	5412.14	Os I
75	5362.56	Zr I	10000	5381.02	Pu I	35	5397.38	Mo I	1100	5412.62	Gd III
40	5362.601	Rb I	40	5381.34	Nb I	150	5397.64	Ce I	85	5413.20	Gd I
200	5363.20	Xe II	55	5381.40	Ho I	10	5397.8	Bi II	14	5413.62	Ho II

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
29	5413.65	Tb I	55	5427.59	Ru I	35 h	5445.23	Rh I	5600	5457.02	Cl II
35	5413.69	Mn I	100	5427.70	Pr III	30	5445.39	Ho I	22	5457.30	Os I
17	5413.93	Zr I	30	5427.83	Fe II	300	5445.45	Xe II	12	5457.47	Mn I
90	5414.55	Na II	25	5428.42	Zr I	270	5446.20	Sc I	40	5457.62	Eu I
60	5414.63	Er II	360	5428.6	S II	150	5446.38	Ac II	40	5458.04	Nb I
60	5415.20	Fe I	200	5428.79	Ba II	40	5446.64	Ti I	17	5458.12	V I
140	5415.26	V I	15 h	5428.92	Si II	100	5446.80	Br III	100	5458.31	P I
85	5415.69	Gd I	150	5429.04	Pm II	200	5446.871	Fe I	55	5459.81	Tb I
45	5416.12	Sc I	75	5429.15	Ti I	22	5446.93	Os I	400	5460.39	Xe II
29	5416.20	Tb I	45	5429.41	Sc I	50	5447.18	Th III	55	5460.51	Ti I
21	5416.30	Nb I	250	5429.695	Fe I	20 h	5447.26	Si II	26	5460.53	Mo I
120	5416.34	Os I	13	5429.99	Fe II	18	5447.39	Sc I	25	5460.64	Re I
45	5416.69	Os I	21	5431.26	Nb I	200	5447.40	Tc I	1100	5460.74	Hg I
3	5416.8	Ga II	160	5431.53	Nd II	11	5447.76	Os I	1100	5460.753	Hg I
24	5417.03	Y I	75	5431.532	Rb I	14	5447.92	Re I	125	5461.20	P II
15 h	5417.24	Si II	3	5431.830	Rb I	19	5448.31	Nb I	14	5461.95	Tm II
40	5417.38	Mo I	25	5431.90	Re I	11bl	5448.34	TiO	35	5462.43	Er II
24	5417.486	Th I	35	5432.55	Mn I	35	5448.57	Zr I	30	5462.615	Th II
28	5417.51	Os I	14	5432.71	Yb II	30	5448.90	Ti I	30	5463.38	Hf II
28	5418.09	V I	650	5432.8	S II	21	5449.16	Ti I	30	5463.90	Sr III
140 c	5418.45	In II	15 h	5432.89	Si II	140	5449.24	Ce I	19	5463.97	Cr I
350	5418.48	Cu III	35	5432.94	Sc I	40	5449.27	Yb II	15	5464.08	Sb II
40	5418.86	Ru I	55	5433.23	Sc I	20	5449.37	Os I	14	5464.14	Tm I
80	5419.13	Dy I	40	5434.18	V I	40	5449.479	Th II	2000 c	5464.62	I II
3000	5419.15	Xe II	16	5434.39	Ho II	75	5449.50	Ir I	18	5465.20	Sc I
130	5419.19	Ta I	100	5434.523	Fe I	10000	5449.63	Bk I	1000	5465.50	Ag I
70	5419.42	Lu III	300	5435.07	Br II	18	5449.8	Ho II	14	5465.54	Tm II
500	5419.69	Cs II	90	5435.18	O I	50	5449.84	Te II	23	5465.57	Mo I
85	5420.36	Mn I	55	5435.68	Mo I	200	5450.45	Xe II	16	5465.93	Fe II
110	5420.38	Ce I	12	5435.78	Hf I	40	5450.51	Mo I	5 c	5465.944	Cs I
3	5420.38	Th IV	110	5435.78	O I	400	5450.74	P II	1200	5466.22	Br I
200	5421.05	Ba II	3000	5435.83	I II	1500	5450.84	Sr I	500 h	5466.43	Si II
55	5421.07	Eu I	18	5435.87	Ho I	95	5451.11	Dy I	710	5466.46	Y I
5	5421.352	Ar I	8	5435.87	Ni I	110	5451.12	Nd II	140	5466.72	Sm I
1	5421.6	Ga II	50	5435.893	Th II	18 h	5451.30	Er I	500 h	5466.87	Si II
20	5421.86	Zr I	220 w	5436.70	In II	135	5451.32	As I	20	5466.94	Fe II
140 c	5421.90	Lu I	26	5436.73	Ti I	120	5451.34	Sc I	10000 l	5467.47	Bk I
65	5422.44	Nb I	135	5436.86	O I	6	5451.46	Si III	100	5467.64	Pm II
400	5422.78	Br II	14	5437.03	Re I	380	5451.51	Eu I	6	5467.81	La III
18	5422.81	Er II	110	5437.27	Nb I	10	5451.652	Ar I	19 h	5468.10	Nb I
150 c	5423.05	Tc I	11	5437.66	V I	30 h	5451.90	Ho I	23 h	5468.11	Rh I
99000	5423.23	Cl II	65	5437.75	Mo I	500 c	5451.90	Tc I	200	5468.17	Kr II
70	5423.32	Dy I	25	5437.76	Zr I	13	5452.71	Ru I	90	5468.32	Er I
10000	5423.51	Cl II	100	5437.88	Lu I	75	5452.92	Hf I	140	5468.37	Ce II
28	5424.02	Hf I	1000	5438.00	I II	260	5452.94	Eu I	55	5468.40	Sc I
60	5424.07	Fe I	45	5438.22	Sc I	220	5453.00	Sm I	100	5468.47	Y I
60 h	5424.07	Rh I	190	5438.24	Y I	20	5453.40	Os I	24	5469.10	Dy II
50	5424.08	V I	17	5438.32	Ti I	65	5453.46	Gd I	100 h	5469.21	Si II
50	5424.10	Tb II	100 h	5438.62	Si II	35	5453.57	Lu I	7	5469.40	Ir I
30	5424.27	Dy I	40	5438.74	Hf I	35	5453.65	Ti I	28	5470.00	Os I
90	5424.37	Y I	800	5438.96	Xe II	1000	5453.8	S II	6	5470.13	K II
200	5424.54	Pm II	55	5439.03	Sc I	14	5454.0	Ho II	29 w	5470.34	Tb II
100	5424.55	Ba I	26 l	5439.21	Ru I	150	5454.07	Mn III	60	5470.64	Mn I
1000 s	5424.70	Am I	12	5439.58	Rh I	35	5454.27	Er II	15	5470.759	Th I
19	5424.72	Rh I		5440.	Li I	15 h	5454.49	Si II	35 h	5470.85	Rh I
180	5424.79	Pm II	15	5440.41	Zr I	30	5454.50	Ir I	8	5470.98	Ti IV
350	5424.99	Br II	12 h	5441.36	Rh I	80 h	5454.82	Ru I	75	5471.21	Ti I
19 h	5425.45	Rh I	16	5441.82	Os I	500	5455.15	La I	13	5471.33	V
45	5425.57	Sc I	12	5442.41	Cr I	30	5455.21	Sc I	100	5471.55	Ag I
1	5425.6	Ga II	55 h	5442.60	Sc I	25	5455.45	Fe I	300	5471.96	Tc I
60	5425.678	Th II	55	5443.31	Os I	30	5455.47	Dy II	60	5472.19	Sc I
400	5425.91	P II	30	5443.34	Dy II	120	5455.609	Fe I	140	5472.29	Ce II
40	5426.26	Ti I	19000	5443.37	Cl II	100	5455.95	Tc I	90	5472.32	Eu I
15	5426.36	Zr I	35	5443.38	Tb I	90	5456.13	Ru I	1000	5472.61	Xe II
29 c	5426.43	Tb I	40	5443.48	Sr III	19	5456.19	Nb I	35	5472.70	Ti I
40	5426.70	Dy II	40	5443.56	Eu I	100 h	5456.45	Si II	7	5473.05	Si III
23	5426.89	Mo I	14	5444.07	Hf II	35	5456.46	Mo I	90	5473.39	Y II
90	5426.94	Eu I	10000	5444.21	Cl II	180	5456.62	Er I	40 h	5473.55	Ti I
600 c	5427.06	I I	9 h	5444.32	Rh I	29	5457.00	Tb I	1000	5473.6	S II

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
85	5474.23	Ti I	300	5488.79	Br II	28	5504.87	V I	10	5518.05	Zr I
30	5474.46	Ti I	25	5489.94	V I	40	5505.49	Yb I	1	5518.19	La III
13	5474.58	Os I	150	5490.15	Ti I	20	5505.66	Ta I	90	5518.91	Ta I
18	5474.64	Sc I	35	5490.28	Mo I	30	5505.87	Mn I	200	5519.05	Ba I
200	5474.68	Mn III	30 h	5490.32	Sb I	5	5506.113	Ar I	13	5519.38	Pr II
10	5474.92	Zr I	26	5490.84	Ti I	18	5506.20	Fe II	60	5519.88	Lu III
13	5475.13	Os I	13	5491.06	Nb I	7800	5506.49	Mo I	23	5520.04	Mo I
13 h	5475.18	Ru I	800	5491.50	I II	28	5506.52	Dy I	14 h	5520.05	Re I
20	5475.38	Ag I	55	5491.90	La III	500	5506.69	Br II	20 c	5520.31	Pr II
80	5475.70	U II	20	5492.17	Mo I	30	5506.778	Fe I	660	5520.50	Sc I
14	5475.77	Pt I	18	5492.51	Ti IV	80 c	5506.89	Tc I	26	5520.64	Mo I
35	5475.90	Mo I	160	5492.95	U II	140 c	5507.08	In II	25	5521.10	Re I
12	5476.12	Rh I	60	5493.17	Y I	200	5507.19	P II	9	5521.15	Ta I
2100	5476.69	Lu II	40	5493.23	Si I	70	5507.75	V I	120	5521.63	Y I
180	5476.91	Ni I	230	5493.72	Sm I	25	5507.87	Zr I		5521.70	Y II
9	5477.27	Os I	26 h	5493.80	Mo I	10	5508.61	W I	12	5521.78	Ru I
10	5477.40	Zr I	14	5493.83	Fe II	40	5508.79	Pr II	2600	5521.83	Sr I
18	5477.47	Er II	100 l	5494.86	Xe II	17	5509.12	Nb I	600 c	5522.06	I II
120 h	5477.71	Ti I	250 d	5494.94	Cu III	65	5509.15	Pr II	285	5522.4	Se II
200	5477.75	P I	300	5495.06	Br II	22	5509.33	Os I	5000	5522.78	Rb II
35	5478.33	Zr I	45	5495.20	Eu I	2	5509.60	Mg I	45 c	5522.79	Pr II
350	5478.47	Br II	150	5495.45	Pm II	55	5509.61	Tb I	250 w	5523.28	In II
14	5478.50	Pt I	35	5495.59	Y I	1000	5509.7	S II	270	5523.53	Os I
14	5478.50	Yb II	450	5495.67	N II	250	5509.90	Y II	50	5523.57	Nb I
55	5479.40	Ru I	25	5495.874	Ar I	35	5509.994	Th I	5	5523.97	Pb III
70	5480.26	U II	10	5496.137	Th I	6	5510.00	Ni I	10	5523.98	Ta I
300	5480.30	Ba II	200 h	5496.45	Si II	15	5510.12	Hf I	150	5524.11	Tc I
26	5480.30	Ru I	26	5496.69	Ru I	15	5510.45	Hf I	65	5524.12	Tb I
19	5480.50	Cr I	28	5496.83	Dy I	120	5510.52	Eu I	28 c	5524.15	Pr I
90	5480.74	Y II	1000 c	5496.94	I II	130	5510.71	Ru I	19	5524.35	Hf II
35	5480.83	Zr I	15	5497.30	Hf I	10000	5510.72	Pu I	40	5524.4	Xe III
7000	5480.84	Sr I	240	5497.41	Y II	12	5510.78	Fe II	17	5524.54	Yb I
40	5481.00	Nb I	27	5497.44	Er II	14	5511.18	V I	12	5524.584	Th I
10	5481.16	Zr I	130 c	5497.50	In II	16 c	5511.63	Pr II	200	5525.53	Xe II
70	5481.20	U II	25	5497.516	Fe I	2	5511.72	La III	24 c	5525.62	Tb I
40	5481.40	Mn I	340	5497.727	As II	40	5511.78	Ti I	45	5525.72	Nd I
12	5481.42	Rh I	26	5498.49	Mo I	260	5512.08	Ce II	28 c	5525.91	Pr II
110	5481.43	Ti I	10000	5498.50	Pu I	80	5512.10	Sm I	45	5526.06	Sc I
24	5481.45	Tb I	30 c	5498.57	Ho I	10000	5512.22	Bk II	40	5526.52	Mo I
16	5481.85	Os I	2	5499.4	Tl III	20	5512.37	Ru I	30	5526.63	Eu I
75	5481.87	Ti I	17	5499.53	Nb I	340	5512.53	Ti I	24	5526.76	Y I
60	5481.92	Yb I	200	5499.73	P II	500	5512.55	Rb II	5	5526.80	Lu III
750	5481.99	Sc I	16	5500.30	Tm II	35 c	5512.82	Nb I	660	5526.82	Sc II
8	5482.13	Ra I	27	5500.49	W I	23	5512.98	Ca I	14	5526.82	Tm II
16	5482.31	Fe II	18	5500.68	Ta I	320 c	5513.00	In II	40	5526.97	Mo I
45	5482.53	U II	15	5500.83	Eu I	6	5513.263	Ge I	740	5527.54	Y I
70	5483.01	Tc I	13	5501.02	Ru I	55	5513.58	Pr II	70	5527.82	U II
13	5483.09	Nb I	470	5501.34	La I	60	5513.64	Y I	16 c	5527.93	Pr I
45	5483.34	Co I	10	5501.43	Kr III	570	5514.22	Sc I	30	5528.01	Dy I
19	5483.49	Nb I	20	5501.464	Fe I	270	5514.35	Ti I	100	5528.23	Tc I
600 c	5483.55	Li II	35	5501.47	Nd I	50	5514.54	Tb I	24	5528.34	Tm I
200	5483.55	P II	16	5501.50	Pr I	320	5514.54	Ti I	13	5528.36	Ta I
24	5484.147	Th II	50	5501.54	Mo I	220	5514.68	W I	6	5528.41	Mg I
16	5484.23	Rh I	8	5501.74	Sc IV	28	5515.12	Pr II	75	5528.41	Zr I
80	5484.32	Ru I	23	5501.87	Mo I	16	5515.39	Sc I	12	5529.06	Fe II
10000 s	5484.58	Bk I	10	5501.98	Ra I	24	5515.41	Dy II	45	5529.54	La III
530	5484.62	Sc I	140	5502.12	Zr I	27	5515.56	Ho II	13	5530.21	Pr I
18	5484.64	Ru I	24	5502.79	Dy I	9	5516.01	Os I	26	5530.49	Ti
60	5485.37	Tc I	5	5502.884	Cs I	27	5516.02	Er I	17	5530.77	Co I
600 c	5485.65	Li II	27	5503.44	W I	230	5516.09	Sm I	12	5530.99	Ru I
170	5485.70	Nd II	300	5503.45	Y I	15 c	5516.27	Ta I	600	5531.07	Xe II
80	5485.97	Er II	26 h	5503.54	Mo I	100	5516.42	Pm II	45	5531.16	Pr I
30	5486.09	Zr I	110	5503.90	Ti I	18	5516.45	Ho II	15	5531.38	W I
1100	5486.12	Sr I	3500	5504.17	Sr I	50	5516.77	Mn I	40	5532.162	Cl I
25	5487.22	V I	19	5504.302	Th I	30	5517.11	Zr I	20	5532.30	Zr I
85	5487.92	V I	30	5504.51	Ho I	17	5517.39	Nb I	50 c	5532.68	Re I
50	5487.95	Te II	40	5504.58	Nb I	35	5517.535	Si I	12	5533.01	Ti III
85 h	5488.20	Ti I	9	5504.65	Rh I	10	5517.72	Ti IV	5200	5533.05	Mo I
120	5488.65	Eu I	1000	5504.72	I II	8	5517.86	Ru I	30	5533.25	Eu I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
90	5533.82	Nd I	100	5550.53	Tc I	285	5566.9	Se II	1000 l	5584.21	Am II
30	5534.33	Ho I	230	5550.60	Hf I	13	5566.91	Pr II	80	5584.44	Os I
2000	5534.81	Sr I	85	5551.35	Nb I	600	5567.27	Y III	140	5584.50	V I
180	5534.96	Pm II	22bl	5551.75	ZrO	60	5567.75	Y I	35bl	5584.7	HoO
29	5535.04	Rh I	21	5551.98	Mn I	8	5567.76	Mn I	25	5584.72	Re I
150	5535.17	Pr II	230	5552.12	Hf I	13	5568.09	W I	30 h	5585.68	Ti
55	5535.27	Nd II	5	5552.25	Sc II	20	5568.11	Yb I	23	5586.00	V I
285	5535.36	N II	10 c	5552.35	Bi I	15	5568.13	Sb II	90	5586.24	Eu I
1000 r	5535.48	Ba I	12	5552.43	F I	40	5568.62	Mo I	20	5586.36	Yb I
130 c	5536.50	In II	13	5552.88	Os I	11	5569.03	Ru I	14	5586.65	Tm II
200	5537.38	Pm I	27	5553.14	Ho I	26	5569.48	Mo I	120	5586.755	Fe I
45	5537.46	Zr I	25bl	5553.17	ZrO	30	5569.618	Fe I	75	5586.83	Eu I
10000	5537.59	Pu I	4000	5553.30	Gd III	2000	5570.288	Kr I	50	5586.97	Nb I
15	5537.72	W I	11	5553.42	Pr II	150	5570.33	Eu I	60	5587.026	Th I
40	5537.76	Mn I	10	5553.57	Ra I	2500	5570.45	Mo I	27	5587.61	Nd I
10000 l	5537.93	Bk I	35	5553.59	Sc I	11	5570.58	Ca III	9	5587.86	Ni I
45	5538.02	Hf I	190 w	5555.45	In II	18	5571.24	Sc I	3000	5587.88	Gd III
28	5538.26	Hf I	20	5555.85	Ra I	17 c	5571.44	Nb I	35	5588.20	Sm I
28	5538.37	Pr I	40 h	5556.10	Sb I	45	5571.83	Pr II	250	5588.34	P II
20	5538.78	Pr II	110	5556.25	Ce I	4000	5572.24	Y III	40	5588.45	Yb II
14	5539.03	Tm II	55	5556.28	Mo I	10	5572.541	Ar I	27	5588.76	Ca I
85 h	5539.05	Yb I	75	5556.43	Y I	60	5572.841	Fe I	25	5588.92	Sn II
50	5539.262	Th I	2400	5556.47	Yb I	7	5573.01	Mn I	3000 c	5589.02	Tc I
40	5539.41	Mo I	12	5556.52	Ru I	40	5573.354	Th I	160	5589.27	F II
70	5539.911	Th II	26	5556.72	Mo I	45	5573.42	Sm I	350	5589.94	Br II
2000	5540.05	Sr I	10000 l	5556.80	Bk I	25	5573.47	Re I	14	5589.94	Tm II
18	5540.52	F I	120	5556.88	Pm II	8	5573.68	Mn I	24	5590.12	Ca I
24	5540.66	Ru I	180	5557.06	Al I	50	5573.94	Cu III	10000	5590.54	Pu I
100 h	5540.74	Si II	10000 s	5557.09	Bk I	18	5573.96	Ho II	17 c	5590.95	Nb I
55	5541.04	Sc I	110	5557.95	Al I	11	5574.61	Pr II	21	5590.96	Y I
200	5541.14	P II		5558.	Be I	35	5575.19	Mo I	55 b	5591.1	HoO
25	5541.47	Nb I	425	5558.09	As II	27	5575.50	Nd I	110	5591.33	Sc I
35	5541.63	Y I	50	5558.342	Th I	55	5575.86	Hf I	20	5591.58	Mo I
200	5541.94	Tc I	150	5558.39	Pm II	800	5576.02	Pm II	55 d	5591.85	Gd I
30	5542.54	Eu I	25	5558.702	Ar I	35 c	5576.16	Nb I	18	5592.25	Eu I
55	5542.80	Pd I	35	5558.75	V I	150	5576.35	Te II	13	5592.28	Ni I
50	5543.12	Mo I	10 h	5559.58	Ag I	150 h	5576.66	Si II	55bl	5592.3	HoO
55	5543.24	Nd I	90	5559.75	Ru I	27	5576.70	Nd I	10000	5592.33	Pu I
250 h	5543.36	Sr I	11	5560.62	Os I	240 c	5576.90	In II	110	5592.37	O III
80	5543.63	Tc I	35 c	5560.94	Ho I	200	5577.14	Eu I	100	5592.42	V I
10 c	5544.25	Pb II	16	5561.10	Sc I	10	5577.33	F I	450	5593.23	Al II
40	5544.49	Mo I	55	5561.17	Nd I	120	5577.34	O I	35 h	5593.38	Sc I
120	5544.50	Y I	22	5561.46	Pr II	180	5577.42	Y I	80	5593.46	Er I
21 l	5544.58	Rh I	28	5561.66	V I	27	5577.70	Nd I	21	5594.12	Y I
	5544.61	Y II	200	5561.73	Pm II	35	5578.29	Nb I	240	5594.43	Nd II
13	5544.76	Fe II	20	5561.95	Sn II	21	5578.40	Ru I	26	5594.47	Ca I
55	5545.01	Pr II	45 c	5562.06	Pr I	6	5578.73	Ni I	13	5594.89	Nb I
10 l	5545.20	Ta I	35	5562.09	Yb I	6	5578.788	Rb I	22	5594.92	Pr I
50	5545.32	Zr I	500	5562.224	Kr I	11	5578.81	Pr I	24	5595.064	Th I
20 h	5545.67	Ag I	5	5562.766	Ne I	10	5579.06	Ca III	400	5595.48	Y III
23	5545.93	V I	6000	5562.81	Y III	13	5579.16	Ti	100	5595.88	Ce I
90	5546.02	Y II	29	5563.00	Nb I	75	5579.63	Eu I	2	5596.20	Sn II
800	5546.08	Pm II	1000	5563.02	Cs II	14	5579.76	Sc I	22	5597.29	Pr II
30	5546.40	Sc I	50 c	5563.24	Re I	120	5580.03	Eu I	65bl	5597.85	TiO
22	5546.82	Os I	35 b	5563.6	HoO	80	5580.386	Kr I	130	5597.91	O V
35	5547.02	Pd I	20	5564.05	Mo I	16	5580.66	Os I	1000 s	5598.13	Am I
70	5547.07	V I	70	5564.17	U I	24	5581.08	Y I	25	5598.49	Ca I
65	5547.27	Dy I	60	5564.203	Th II	10000	5581.21	Bk I	600 c	5598.52	I II
200	5547.44	Eu I	8	5564.741	Ge I	22	5581.37	Tm I	15	5598.75	Ta I
35	5548.176	Th I	70	5564.86	Sc I	45	5581.59	U II	3	5599.41	Bi I
20	5548.32	Ta I	280	5564.9	S II	100	5581.74	Pr III	160	5599.42	Rh I
20	5548.33	Pr II	170	5564.97	Ce I	620	5581.87	Y I	30	5599.52	Ta I
55	5548.47	Nd II	110	5565.49	Ti I	25	5581.97	Ca I	17 c	5599.59	Nb I
50	5548.95	Sm I	13	5565.52	Pr I	13	5582.35	Pr II	18	5599.80	Eu I
10000	5549.62	Pu I	35	5565.93	Tb I	21 h	5582.98	Ti	1000	5600.32	I II
30	5549.63	Hg I	130	5565.97	Ce I	200	5583.27	P II	8	5600.50	Os I
9	5549.79	Os I	27	5566.00	Tm I	55	5583.68	Gd II	40 d	5600.65	Dy II
140	5550.40	Sm I	70	5566.52	Ho I	11	5584.02	Pr II	14	5600.77	Hf I
18	5550.40	Sc I	100	5566.62	Xe I	30	5584.02	Ta I	50	5600.86	Sm II

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
45 d	5601.14	Er I	35	5620.08	Os I	35 c	5635.42	Nb I	100	5649.561	Kr I
240	5601.28	Ce I	120	5620.14	Zr I	13	5635.51	V I	4	5649.70	Ni I
24	5601.29	Ca I	20	5620.26	Pr I	20	5635.71	Ta I	230	5650.13	Mo I
13	5601.30	Pr II	20 h	5620.40	Ba I	65	5635.76	Nd I		5650.54	Sr II
	5601.32	Er I	2000 c	5620.45	Tc I	17	5635.84	Ti	20	5650.704	Ar I
28	5601.38	V I	220	5620.54	Nd I	5000 c	5635.99	Rb II	19	5650.83	Hf I
55	5601.43	Nd I	40	5620.68	Ta I	30	5636.20	Er I	500	5650.97	Ce III
300 l	5601.70	Np I	9	5620.72	Sc IV	290	5636.24	Ru I	15	5651.11	Eu I
45	5601.92	Nd I	55	5620.78	U I	22	5636.46	Pr II	425	5651.32	As II
3000	5602.08	Y III	7	5621.426	Ge I	200 w	5636.70	In II	60	5651.98	Yb II
30 l	5602.19	Sb I	50	5621.79	Sm I	9	5637.41	Os I	80	5652.01	Dy I
200	5602.23	Tc I	45 c	5621.89	Pr II	55 c	5638.79	Pr II	300 l	5652.75	Np I
110bl	5602.50	LaO	70	5622.01	Er I	29 c	5638.80	Tb I	7	5653.30	Ru I
40	5602.76	Mo I	30	5622.221	Si I	200 h	5639.48	Si II	35	5653.57	Nd I
24	5602.85	Ca I	60	5622.44	Eu I	100	5639.50	Dy I	20	5653.750	Rb I
21	5603.14	Ru I		5622.94	Sr II	45	5639.54	Nd I	17	5654.14	Nb I
40	5603.52	Nb I	110	5623.05	Pr II	70	5639.746	Th II	35	5654.23	Pr II
8	5603.55	Ru I	35	5623.53	Zr I	30	5639.75	Sb II	190	5655.14	Ce I
13	5603.93	Nb I	15	5623.91	Y I	450	5640.0	S II	20	5655.2	Bi II
22	5604.19	Sc I	20	5624.06	F I	40	5640.18	Ta I	14	5655.42	Pd I
13	5604.31	W I	13	5624.20	V I	450	5640.3	S II	100	5655.77	Au I
50	5604.515	Th II	90	5624.45	Pr II	90	5640.36	Er I	70bs	5655.9	HoO
70	5604.94	V I	20	5624.541	Fe I	16	5640.37	Pr II	8	5655.96	Ge I
9 c	5605.50	Ta I	200	5624.60	V I	55	5640.62	Ho I	100	5656.00	Tc I
24	5605.53	Dy I	70	5624.89	V I	80	5640.98	Sc II	10000 l	5656.54	Bk I
90	5605.65	Pr II	5 h	5625.33	Ni I	200	5641.29	Pm II	10	5656.659	Ne I
18	5605.86	Eu I	45	5625.55	Ir I	22	5641.42	Er I	110	5657.44	V I
1000	5606.1	S II	10000	5625.69	I II	11	5641.66	Ru I	130	5657.72	La I
120	5606.33	Y I	70	5626.01	Sm I	170	5642.11	Nb I	250	5657.88	Sc II
14	5606.64	Tm I	55	5626.01	V I	1500	5642.13	Tc I	12	5657.925	Th I
13	5606.68	Pr I	45 b	5626.4	HoO	7	5642.36	Cr I	70	5658.30	Tm I
13	5606.73	Ru I	80	5626.53	Er II	22	5642.56	Os I	60	5658.34	Sc II
35	5606.733	Ar I	12	5626.93	F I	40	5642.60	Tm I	22 h	5658.63	Er II
8	5607.010	Ge I	20	5627.49	Dy I	15	5642.69	Pd I	65 b	5658.9	HoO
30 b	5607.1	HoO	65	5627.60	Ho I	5	5642.73	K II	3000	5658.98	Gd III
10 h	5607.21	Re I	400	5627.64	V I	16cw	5643.16	Pr I	10000	5659.03	Bk I
7	5607.71	Rh I	13	5628.20	Ta I	260	5643.24	Gd I	15	5659.15	F I
16	5608.35	Rh I	30	5628.24	Ho II	85	5644.10	Sm I	300	5659.38	Xe II
23	5608.62	Mo I	25	5628.26	Nb I	250	5644.14	Ti I	140	5659.58	Ho I
20 c	5608.85	Pb II	8	5628.27	Hf I	120	5644.69	Y I	9	5659.62	Rh I
28	5608.93	Pr II	24	5628.64	Cr I	800	5644.94	Tc I	55	5659.84	Pr II
100	5609.00	Cu III	25bl	5629.02	ZrO	100	5645.15	In III	140	5659.86	Sm I
23	5609.23	Mo I	65	5629.17	Nb I	28	5645.25	Os I	650	5659.9	S II
45 h	5609.94	Er I	55bl	5629.28	TiO	35	5645.30	Nb I	9	5660.21	Os I
55	5610.22	Pr II	65	5629.55	Gd I	12	5645.40	Fe II	150 h	5660.66	Si II
100	5610.93	Mo I	25bl	5629.58	ZrO	27	5645.40	Tm I	35	5660.72	W I
60	5611.82	Er I	11	5629.79	Ru I	22	5645.41	Pr II	50	5660.81	Ra I
12	5612.11	Zr I	300	5629.94	Tc I	90	5645.611	Si I	26bl	5661.55	TiO
12 h	5612.27	Re I	560	5630.13	Y I	210	5645.80	Eu I	35 h	5661.57	Pr I
1500	5612.89	I II	7	5630.297	Th I	150	5645.91	Ta I	190	5662.16	Ti I
23	5613.07	Mo I	22	5631.02	Sc I	55 h	5645.99	Dy I	16	5662.19	Pr II
30	5613.23	Dy I	160	5631.22	La I	85	5646.11	V I	350	5662.47	C II
95	5613.27	Hf I	11	5631.27	W I	45	5646.36	Sc I	50	5662.515	Fe I
27	5613.64	Ho I	270	5631.41	Tm I	150	5646.80	Pr III	75	5662.91	Ti I
25	5614.01	Hf I	500	5631.71	Sn I	280	5647.0	S II	740	5662.94	Y II
9	5614.79	Ni I	27	5631.94	W I	17	5647.22	Co I	30 c	5664.018	Cs I
35	5615.320	Th I	100 l	5632.02	Sb I	16	5647.60	Sc I	5	5664.02	Ni I
200	5615.644	Fe I	110	5632.25	Gd I	40	5647.774	Rb I	24	5664.04	Cr I
6	5616.135	Ge I	24	5632.25	Y I	250	5648.07	C II	1000	5664.20	Ce III
10	5616.66	Ra I	13	5632.46	V I	240	5648.25	La I	6	5664.226	Ge I
300	5616.67	Xe II	330	5632.47	Mo I	65	5648.37	W I	160	5664.51	Zr I
9 c	5617.71	Ta I	75	5632.54	Eu I	120	5648.47	Y I	30	5664.66	Sr III
190	5617.91	Gd I	5	5632.77	Rh I	75	5648.58	Ti I	450	5664.7	S II
20	5618.45	Mo I	21	5632.89	Y I	7	5648.98	Os I	130	5664.71	Nb I
40	5618.81	Eu I	100 h	5632.97	Si II	7	5648.991	Th I	5	5664.842	Ge I
23	5619.38	Mo I	11 h	5633.03	Pr I	150	5649.26	Te II	9	5664.89	Lu II
27	5619.44	Pd I	10	5633.90	V I	12 h	5649.37	Cr I	130	5664.90	Ta I
10	5620.04	Ir I	50	5634.86	Mo I	7	5649.56	Ru I	70	5664.95	Er I
11	5620.06	Pr II	11	5635.212	Cs I	55	5649.56	Sc I	11	5665.20	Ru I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
45	5665.44	Er II	12	5682.20	Ni I		5698.03	Nb I	65	5711.88	Ti I
80	5665.554	Si I	7 h	5682.48	Cr I	40	5698.33	Cr I	10	5711.90	Ni I
170	5665.63	Nb I	5	5682.633	Na I	1200	5698.52	V I	10000	5712.39	Pu I
100	5666.20	Te II	35	5682.89	Mo I	28	5698.72	Dy II	12	5712.64	Cr I
20	5666.28	Zr I	20	5683.22	V I	180	5699.05	Ru I	24	5712.78	Cr I
650	5666.63	N II	14	5683.59	Tm I	3000 d	5699.15	Rb II	25	5713.28	Hf I
17	5666.86	Nb I	95	5684.20	Sc II	370	5699.23	Ce I	14	5713.49	Lu II
15	5667.128	Th I	27	5684.24	Eu I	40	5699.24	Ta I	22	5713.83	Pr II
55	5667.16	Sc II	120	5684.484	Si I	23	5699.28	Mo I	40 h	5713.92	Ti I
100	5667.34	Ag I	40	5684.76	Tm II	200	5699.61	Xe II	10	5715.09	Ni I
40	5667.53	F I	10	5685.192	Th I	1100	5700.21	Sc I	95	5715.13	Ti I
600	5667.56	Xe II	15	5685.42	Zr I	1500	5700.24	Cu I	30	5715.24	Ta I
100	5667.88	Re I	24	5685.58	Dy I	25	5700.82	F I	17	5715.59	Nb I
110	5668.36	V I	13	5685.60	Pr II	65	5700.918	Th II	22	5715.79	Tm I
65 c	5668.46	Pr I	29 c	5685.74	Tb II	90	5701.105	Si I	16	5716.08	Pr II
70	5668.87	Nd II	450	5686.21	N II	95	5701.35	Gd I	200	5716.10	Xe II
70	5669.04	Sc II	40	5686.38	Rh I	200 h	5701.37	Si II	11 h	5716.21	V I
45	5669.55	Pr II	40 c	5686.48	Tb I	30	5701.57	Nd I	8	5716.29	Si III
1000 h	5669.56	Si II	16	5686.52	Pr I	6	5701.776	Ge I	65	5716.35	Nb I
65	5669.77	Nd I	7	5686.53	Yb II	500	5702.05	I II	55	5716.48	Ti I
240	5669.96	Ce I	1200	5686.84	Sc I	75	5702.12	Cu III	8	5716.53	Ta I
35	5669.99	Pr II	22 h	5687.17	Pr II	10000	5702.24	Bk I	18	5716.95	Re I
75	5670.07	Pd I	200	5687.30	Tc I	130	5702.24	Nd II	230	5717.28	Sc I
310	5670.85	V I	9	5688.204	Na I	24	5702.31	Cr I	1	5717.3	Sb III
150	5670.91	Xe II	30	5688.25	Ta I	9 h	5702.47	Rh I	55	5717.48	Er I
65cw	5671.02	Nb I	65	5688.44	Pr II	75	5702.68	Ti I	5	5717.877	Ge I
100	5671.12	Mn III	220	5688.53	Nd II	24	5702.91	Dy I	80	5718.12	Nd II
90	5671.67	F I	300 h	5688.81	Si II	920	5703.56	V I	75bl	5718.21	ZrO
1500	5671.81	Sc I	200	5689.05	Tc I	15	5704.31	Ta I	70 h	5718.46	Dy I
70 c	5671.84	Ho	18	5689.14	F I	22	5704.38	Pr I	300	5718.71	Br II
85	5671.91	Nb I	460	5689.14	Mo I	7	5704.60	Si III	240	5719.03	Ce I
60	5672.15	Tc I	22	5689.21	Pr II	80	5705.72	Mo I	45	5719.08	Pr II
21	5673.42	Ti I	95	5689.47	Ti I	160	5706.1	S I	160	5719.18	Hf I
23	5673.63	Mo I	23	5689.51	Nd I	40	5706.16	Nb I	40 h	5719.2	Bi II
60	5673.85	Eu I	30	5689.72	Sr III	85	5706.20	Sm I	5	5719.225	Ne I
16	5674.14	Pr II	11	5690.14	Pd I	80	5706.21	Nd II	70	5719.55	Er I
7	5674.38	Os I	200 h	5690.35	Kr II	25	5706.28	Ta I	45 d	5719.63	Pr II
27	5674.39	W I	100	5690.425	Si I	100 h	5706.37	Si II	7	5719.82	Pr II
55	5674.47	Mo I	1	5690.8	Sb III	85	5706.48	Nb I	7	5719.82	Cr I
65	5674.70	Ho I	2000 c	5690.91	I II	160	5706.73	Y I	11	5719.88	Fe III
90	5675.27	Y I	55 h	5690.97	Pr II	10	5706.82	Sc IV	220	5719.99	Yb I
130	5675.44	Ti I	500	5691.08	Ce III	570	5706.98	V I	25bl	5720.16	HfO
55	5675.48	Er I	140 c	5691.47	Ho I	95	5707.103	Th II	50	5720.183	Th I
520	5675.84	Tm I	9	5691.954	Ge I	25	5707.31	F I	35	5720.48	Ti I
160	5675.86	Hg I	40	5692.346	Pb I	65	5707.61	Pr I	24	5720.61	Y I
160	5675.922	Hg I	120	5692.94	Ce I	200	5708.12	Te II	100 h	5721.36	Au I
140 d	5675.97	Nd I	25	5693.09	Nb I	35	5708.23	Ti I	100 c	5721.80	In II
550	5676.02	N II	18	5693.63	Y I	160	5708.28	Nd II	170	5721.93	Os I
55	5676.33	Nd I	28 h	5693.67	DyO	160	5708.397	Si I	6	5722.58	Rn I
13	5676.60	W I	24 h	5694.10	DyO	160 c	5708.50	In II	1000	5722.73	Al III
15	5676.90	W I	28cw	5694.54	DyO	190	5708.61	Sc I	210	5722.74	Mo I
16	5677.03	Pr II	24	5694.73	Cr I	30	5708.89	Zr I	40	5723.17	In III
20	5677.053	Th I	8	5695.00	Ni I	11	5708.95	V I		5723.70	Sr II
25	5677.47	Nb I	55 h	5695.09	Pd I	29	5709.33	Nb I	180	5724.08	Sc I
120	5677.75	Ce I	14	5695.53	Er II	11	5709.37	Os I	60	5724.121	Rb I
40	5677.89	Mo I	6	5695.71	Hg III	65	5709.42	Gd I	3	5724.614	Rb I
1000	5678.08	I II	100	5695.75	Xe I	23	5709.56	Ni I	13	5724.82	Ru I
870	5679.56	N II	22	5695.90	Pr II	50	5709.91	In I	700	5725.31	Tc I
16	5679.63	Ru I	450	5695.92	C III	35	5709.97	Tm II	70	5725.64	V I
30 h	5679.94	Ti I	390	5696.22	Gd I	4000 c	5710.53	I II	25	5725.66	Nb I
10	5680.18	Ba I	70bs	5696.3	HoO	300	5710.59	Ce III	13	5725.73	Ru I
28	5680.88	Os I	14	5696.42	Tm II	450	5710.77	N II	28 h	5725.84	DyO
55bl	5680.89	GdO	140 c	5696.57	Ho I	27	5710.87	Er II	10000	5726.05	Cf I
120	5680.90	Zr I	1200	5696.60	Al III	35	5710.93	Sm I	65	5726.83	Nd II
27	5681.10	Eu I	120	5696.73	Sm I	30	5711.09	Mg I	500	5726.91	Xe II
7 h	5681.20	Cr I	300	5696.99	Ce I	25	5711.43	Re I	55	5726.97	Er I
30 h	5681.44	Si II	15	5697.79	W I	40	5711.63	Pr II	850	5727.03	V I
400	5681.89	Kr II	35 d	5697.90	Nb I	880	5711.75	Sc I	6	5727.30	Rh I
55	5681.89	Pr II	40bl	5698.03	HfO	23	5711.80	Mo I	170	5727.66	V I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
50	5727.68	In I	8	5745.724	Cs I	160	5761.84	La I	60	5778.33	Sm I
100	5727.71	P II	16	5745.99	Ru I	40 h	5762.27	Ti I	17bl	5778.57	ZrO
11	5728.38	Pr I	85	5746.36	Gd I	24	5762.66	Tb I	5	5778.82	Tm II
55 h	5728.64	DyO	7	5746.43	Cr I	290	5762.80	Er I	45	5779.24	Sm I
23	5728.77	Mo I	23	5746.71	Ta I	45	5762.977	Si I	90	5779.28	Pr I
75	5728.89	Y II	18bl	5746.93	YO	20	5762.990	Fe I	40	5779.36	Mo I
130	5729.19	Nb I	20	5747.13	Pr II	6	5763.57	Pt I	3	5779.41	Pb III
100	5729.29	Nd I	285	5747.30	N II	24bl	5764.22	YO	25	5780.02	Ta I
26 d	5729.45	Mo I	16	5747.47	Ru I	190	5764.29	Tm I	7	5780.19	Mn I
	5729.59	Mo I	85 c	5747.58	Tb I	1000 d	5764.33	I I	17	5780.34	Nb I
150bl	5730.12	YO	45	5747.667	Si I	80	5764.419	Ne I	70	5780.384	Si I
200	5730.81	Pm I	17	5747.70	V I	55bl	5764.45	ScO	70	5780.59	U I
60	5730.87	Eu I	11	5747.74	Pr I	240	5764.75	N I	90	5780.71	Ta I
230	5731.25	V I	11	5747.95	Pr II	65	5764.99	Nb I	30	5780.78	Ti I
40	5731.88	Pr II	35bl	5748.17	ZrO	22	5765.05	Os I	170	5780.82	Os I
300 I	5732.05	Ac II	12	5748.298	Ne I	330	5765.20	Eu I	12 h	5781.20	Cr I
21	5732.09	Y I	60	5748.65	Er I	600	5765.27	Pr III	100	5781.69	Y II
50	5732.95	Sm I	5	5748.71	Lu III	75	5765.64	Y I	6 h	5781.81	Cr I
30	5732.975	Th II	12	5748.72	Hf I	55 h	5766.35	Ti I	45	5781.93	Sm II
22	5733.43	Er II	40	5748.87	V I	25	5766.56	Ta I	1500	5782.13	Cu I
7	5733.5	Te I	55	5749.19	Nd I	30	5766.64	Ho	19	5782.36	Tm II
14	5733.81	Tm II	13	5749.24	W I	14	5767.18	Hf II	16	5782.38	K I
120	5733.86	Gd II	30	5749.388	Th II	23	5767.33	Nd I	11	5782.61	V I
40	5734.01	V I	500	5749.47	Ce III	30 c	5767.91	Ta I	45	5782.82	Er I
27	5734.02	Ho I	22	5749.58	Ho I	11	5767.92	Ru I	24 h	5783.11	Cr I
23	5734.55	Nd	27	5749.66	Nd I	200	5768.16	Pm II	23 h	5783.33	Mo I
55	5735.09	W I	10	5749.91	Yb II	100	5768.56	Cu III	11	5783.50	V I
120	5735.70	Zr I	24	5750.48	Dy I	160	5769.07	La II	11	5783.63	Fe II
45	5736.4	HoO	500	5751.03	Xe II	22	5769.16	Pr II	180	5783.69	Eu I
550	5736.55	Lu I	620	5751.40	Mo I	370	5769.34	La I	30 h	5783.93	Cr I
22	5736.56	Er I	85	5751.44	Nb I	240	5769.598	Hg I	800	5784.18	Ba II
18	5736.61	Pd I	11	5752.02	Ru I	240	5769.60	Hg I	40 h	5784.38	V I
55bl	5736.85	ScO	700	5752.50	N I	16	5769.79	Pr II	300 I	5784.39	Np I
22	5736.94	Er I	55	5752.53	Er I	70	5769.92	Er I	22	5784.46	Tm II
230	5737.06	V I	17	5752.74	V I	10000	5770.26	Pu I	70	5784.66	Er I
11 d	5737.20	Tm II	21	5752.84	Ti I	29	5771.08	Nb I	45	5784.96	Nd I
	5737.25	Tm II	110 c	5752.93	Re I	500 c	5771.47	Tc I	24 h	5785.00	Cr I
21	5737.36	Nb I	22	5753.02	Pr II	14	5771.63	Sc IV	24	5785.18	Tb II
8	5737.89	Os I	140	5753.17	F III	27	5771.66	Yb II	65 c	5785.28	Pr II
13	5738.20	Nb I	15	5753.59	Sn I	10	5771.93	Ta I	5	5785.31	Mg I
1000	5738.27	I II	45	5753.625	Si I	4	5772.10	Zn I	4	5785.56	Mg I
7	5738.29	Mn I	7	5753.69	Cr I	70	5772.145	Si I	30 h	5785.73	Si II
24 h	5738.73	DyO	85 d	5754.17	Gd I	4	5772.32	K II	19 h	5785.82	Cr I
14 h	5738.92	Tm II	45	5754.220	Si I	70	5772.42	V I	75 h	5785.98	Ti I
60	5739.00	Eu I	16	5754.68	Ni I	95bl	5772.74	ScO	55 h	5786.16	V I
100	5739.19	Er I	30	5755.81	Ta I	140	5773.12	Ce I	65	5786.17	Pr II
55	5739.24	Ho I	150	5755.85	Te II	45	5773.16	Pr II	70	5786.46	Lu III
85	5739.51	Ti I	10 h	5755.89	Yb I	70	5773.77	Sm I	1800	5786.96	Gd III
10	5739.520	Ar I	11	5756.10	W I	15	5773.946	Th I	70 d	5786.98	Sm II
200	5739.64	Rb II	90	5756.17	Pr II	35	5773.95	Y I	500	5787.02	I II
8	5739.72	Os I	10	5756.38	Fe III	75 h	5774.05	Ti I	85	5787.54	Nb I
20	5739.73	Si III	11	5756.83	Ru I	23	5774.55	Mo I	60 h	5787.99	Cr I
40	5740.02	Ti I	19	5756.86	Ti I	500 c	5774.83	I II	120	5788.15	Ce I
50	5740.20	Dy I	70	5757.63	Er II	55bl	5775.32	ScO	45	5788.22	Nd I
35	5740.61	Er I	27	5758.02	Tm I	55	5775.40	Lu I	16 h	5788.29	Pr II
180	5740.66	La I	300	5758.65	Xe II	4	5775.50	Zn I	60	5788.38	Sm I
15	5740.83	Yb III	24	5758.79	Dy I	11	5775.91	Pr II	23	5788.56	V I
70	5740.86	Nd II	400	5758.97	Ac II	75	5776.02	Gd I	16	5788.92	Pr II
19	5741.22	Ti I	16	5759.40	Pr II	50 c	5776.07	Nb I	8	5789.1	Te I
24	5742.084	Th II	45	5759.52	Sm II	45	5776.12	Nd I	320	5789.24	La I
6	5742.55	Bi I	22	5760.20	Pr I	300	5776.39	Xe II	20	5789.645	Th I
50	5743.35	Sm II	55	5760.20	Tm I	35	5776.64	V I	100	5789.66	Hg I
110	5743.45	V I	110	5760.34	Nb I	130	5776.77	Ta I	17	5789.79	Nb I
90	5743.85	Y I	70	5760.551	Th I	110cw	5776.83	Re I	280	5790.66	Hg I
1	5744.09	La III	1000	5760.72	I II	200	5776.99	Pm I	280	5790.663	Hg I
9	5744.19	Fe III	8	5760.85	Ni I	10	5777.11	Zn I	16	5790.86	Pr II
160	5744.41	La I	120	5761.20	F III	16	5777.29	Pr II	180 h	5791.00	Cr I
300	5744.85	Po I	17	5761.41	V I	400	5777.62	Ba I	22	5791.15	Er II
55	5745.53	Dy I	15 h	5761.61	Ta I	200	5778.14	La III	450	5791.34	La I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
45	5791.36	Pr II	70bl	5809.84	ScO	60 h	5830.34	Sb I	50	5846.13	Si II
240	5791.38	Gd I	40	5810.58	Pr II	55 h	5830.72	V I	85 h	5846.30	V I
18	5791.60	Re I	130	5811.10	Ta I	300	5830.78	Br II	65	5847.13	Pr II
520	5791.85	Mo I	14	5811.19	Tm II	45	5830.94	Pr II	30	5847.32	Zr I
29	5792.66	Rh I	80	5811.57	Nd II	600cw	5830.98	Eu I	95bl	5847.73	ScO
15	5792.72	Eu I	70bl	5811.60	ScO	45	5831.02	Sm II	19	5847.77	Hf I
22	5792.95	Pr I	200	5811.98	C IV	500	5831.16	Cs II	40 h	5848.05	DyO
13	5793.06	W I	15	5812.15	K I	200	5831.48	Tc I	20	5848.25	Ga III
90	5793.071	Si I	120	5812.92	Ce I	35	5831.58	Rh I	9	5848.76	Fe III
50	5794.24	Nb I	2	5813.45	La III	17	5831.89	K I	20 h	5848.86	Mo I
100	5794.65	Tc I	16	5813.55	Pr II	80 h	5832.01	DyO	70bl	5849.07	ScO
30 h	5794.90	Si II	20	5813.63	Ra II	21	5832.27	Y I	45 b	5849.4	HoO
75	5795.64	Tb I	45	5813.89	Nd I	10	5832.370	Th I	13	5849.68	Ta I
23 h	5795.77	Mo I	350	5814.18	Cs II	100	5832.855	Kr I	55 h	5849.73	Mo I
9	5795.79	Rh I	100 c	5814.24	Tc I	16 h	5833.21	Ru I	100	5850.07	Er I
50 d	5796.305	Cl I	45	5814.89	Sm I	100	5833.515	Cu II	11	5850.32	V I
13	5796.49	W I	21bl	5814.96	TiO	13	5833.61	W I	65 c	5850.64	Pr II
65 h	5796.80	Gd I	65	5814.98	Ru I	55 h	5833.85	DyO	100	5850.72	Cu III
1	5797.20	Sn II	160 d	5815.17	Pr II	18	5833.93	Fe III	65	5851.07	Tb I
220	5797.58	La II	29 h	5815.33	Nb I	35	5833.99	Yb II	50 h	5851.52	Mo I
160	5797.74	Zr I		5815.33	Pr II	5	5834.263	Ar I	28	5851.58	W I
100	5797.859	Si I	65	5815.36	Tb I	550	5834.31	Re I	220	5851.63	Gd I
70	5798.53	U II	19	5815.422	Th II	40 h	5834.86	DyO	1800	5852.08	Br I
15	5799.18	Sn II	55	5815.85	Gd II	75	5834.90	Nb I	21	5852.34	Ti
80 c	5799.85	Tc I	10 c	5815.92	Re I	40	5835.13	Pr I	500	5852.488	Ne I
45	5799.914	Cl I	100	5815.96	Xe II	23	5835.59	Mo I	45	5852.63	Pr II
11	5799.97	Tm II	14 h	5816.46	Tm I	45	5835.84	Er I	210 c	5853.15	In II
15bl	5800.00	YO	25	5816.51	Ta I	45	5836.02	U I	110	5853.62	Al II
45	5800.09	Nd I	7	5816.84	Mn I	150 c	5836.33	Tc I	2800	5853.68	Ba II
100	5800.23	Ba I	23	5817.06	V I	45	5836.37	Sm II	235	5854.04	N I
60	5800.27	Eu I	10	5817.44	Ti III	35	5837.14	Yb II	15	5854.121	Th I
26	5800.46	Mo I	19	5817.47	Hf I	300	5837.37	Au I	11 c	5854.44	Pr I
150 h	5800.47	Si II	35 h	5817.53	V I	55	5837.68	U II	27	5854.51	Yb I
60	5800.52	Sm I	12	5818.3	Bi II	9 b	5838.07	YO	10	5854.62	Fe III
80	5800.59	Lu I	55	5818.57	Pr II	25	5838.15	Nb I	55	5855.24	Gd II
40	5800.60	Os I	15bl	5818.58	YO	130 d	5838.64	Nb I	120	5855.31	Er I
70	5800.79	Er I	170	5818.74	Eu II	35	5838.76	Tm II	40	5855.56	DyO
6	5801.029	Ge I		5819.00	Sr II	5 c	5838.835	Cs I	45	5856.07	Pr II
250	5801.33	C IV	45 b	5819.2	HoO	13	5838.97	W I	280	5856.22	Gd I
17	5801.75	K I	450	5819.2	S II	10000	5839.05	Pu I	11	5856.61	W I
9	5802.093	Ge I	10	5819.41	Yb II	22	5839.47	Ho I	30	5856.742	Cl I
35	5802.67	Mo I	110	5819.43	Nb I	10	5839.82	Mg III	55	5856.90	Pr II
65	5802.84	Sm I	100	5819.50	In III	20	5839.99	Mo I	30	5857.45	Ca I
55	5802.92	Gd I	65hs	5819.51	GdO	20	5840.12	Pt I	10	5857.76	Ni I
75	5803.13	Tb II	40	5820.156	Ne I	55	5840.47	Gd II	110	5857.76	Os I
9	5803.34	Rh I	27	5820.37	Nd I	21 h	5841.18	Ti	6	5857.96	Pb III
10	5803.44	Yb I	35	5820.62	Nb I	25	5842.23	Hf II	520	5858.27	Mo I
140	5803.78	Hg I	40	5820.62	Pr II	80	5842.39	Nd II	15	5858.83	YO
27 b	5803.8	HoO	16 h	5821.36	Pr I	50	5842.47	Nb I	55	5858.91	Nd I
160	5804.02	Nd II	6	5821.84	Rh I	8	5842.49	Os I	60	5859.25	Hg I
50	5804.03	Nb I	30	5821.87	Y I	29	5842.97	Tb I	90	5859.68	Pr II
35	5804.141	Th I	27 h	5821.90	Ho I	40	5843.30	Cd II	20	5860.2	Bi II
65hl	5804.26	Ti I	140	5821.99	La I	45 c	5843.94	Ta I	140 c	5860.28	Ho I
16	5804.39	Ru I	55	5822.59	Pr II	28 h	5844.41	DyO	10	5860.310	Ar I
12	5804.450	Ne I	40	5823.71	Ti I	1500	5844.41	Pr III	28	5860.64	Os I
45	5804.85	W I	90	5823.72	Pr II	35 c	5844.65	Pr II	55	5860.73	Gd II
20	5805.69	Ba I	300	5823.89	Xe I	30	5844.66	Nd I	35	5860.78	Sm I
160	5805.78	La II	500	5823.93	Pm II	8	5844.84	Pt I	40 h	5860.79	Lu I
150	5805.989	Cu II	150	5824.80	Xe I	40	5844.98	Pr II	27	5860.97	Eu I
13 d	5806.05	W I	23	5825.20	Mo I	30	5845.141	Cs I	20	5861.38	Mo I
22	5806.10	Er I	70	5825.87	Nd II	17	5845.27	W I	1500	5862.09	Gd III
	5806.24	W I	150	5826.28	Ba I	3	5845.5	Sb III	30	5862.353	Fe I
200	5806.74	Si II	150	5826.42	C III	24	5845.65	DyO	100 h	5862.93	Au I
40	5806.91	Rh I	30	5826.74	Nd I	27	5845.77	Eu I	27 h	5864.42	Ho I
35 h	5807.14	V I	430	5826.79	Er I	25	5845.87	Hf I	22	5864.63	W I
55hs	5807.72	Gd I	30	5827.80	Si II	10	5845.919	Th I	15	5864.77	Eu I
10	5808.28	Ga III	8	5828.06	Ru I	23	5845.95	Nd I	285	5866.3	Se II
55 h	5809.22	Gd I	10	5828.55	Ir I	10000	5846.07	Cm I	9	5866.30	Lu I
12	5809.50	Hf II	265	5829.54	N I	17	5846.09	Nb I	400	5866.46	Ti I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
65	5866.47	Nb I	15	5885.96	Ti IV	11	5903.98	Os I	15	5925.90	Ta I
15	5866.61	Ta I	23	5886.24	Nd I	55	5904.07	Gd II	200	5926.29	Tc I
35	5867.08	Nd I	27	5886.30	Er II	22	5904.29	Ho I	40 h	5926.36	Mo I
10	5867.48	Si II	55	5886.46	Gd I	45	5904.45	Pr II	15	5926.47	Hf I
65	5867.79	Sm I	7	5887.36	Ir I	110	5904.56	Gd I	27	5926.52	Eu I
55 h	5868.11	Dy II	70 b	5887.38	ScO	250	5904.71	Pm I	21	5926.87	Ru I
50	5868.27	Zr I	30	5887.91	Nd I	35	5904.71	Tb I	250 c	5927.17	Pm II
15	5868.373	Th I	820	5888.33	Mo I	200	5905.13	Xe II	29	5927.41	Nb I
300 h	5868.40	Si II	25	5888.584	Ar I	100	5905.90	Pm I	5	5927.8	Tl III
45	5868.61	Sm I	55	5888.62	La III	55	5906.06	Er I	360	5927.81	N II
300 c	5868.79	Pm II	21 h	5888.68	Ti	60	5906.429	Ne I	60bl	5928.10	ScO
80	5868.83	Pr II	60	5889.76	Lu III	11	5906.84	Os I	13	5928.58	W I
30	5868.90	Nd I	570	5889.77	C II	7	5907.31	Rh I	15	5928.813	Ar I
50	5869.33	Mo I	32	5889.950	Na I	15	5907.64	Ba I	160 h	5928.88	Mo I
110	5869.50	Zr I	7	5891.15	Ti IV	20	5908.36	Yb II	18 p	5929.69	Fe III
80	5869.71	Lu III	8	5891.451	Th I	30bl	5908.61	ZrO	85	5930.29	Gd I
65	5870.62	Tb I	350	5891.59	C II	40	5908.67	Pr II	320	5930.62	La I
45	5870.85	Ho I	13	5891.61	W I	7	5908.95	Os I	15	5930.62	Ta I
3000	5870.914	Kr I	15	5891.91	Fe III	45	5909.24	Er I	40	5930.66	Pr II
27	5871.04	Nd I	55	5892.23	Pr II	12	5909.94	Eu I	23	5931.05	Ta I
35	5871.06	Sm I	23	5892.29	Mo I	10000	5910.71	Bk I	24 b	5931.10	YO
60	5871.73	Hg II	35 c	5892.56	Ho I	1000	5910.85	Ac II	20	5931.68	Ta I
15	5871.83	Y I	10	5892.88	Ni I	170	5911.45	Gd II	11	5931.70	Tm I
20	5871.98	Hg I	300	5893.29	Xe II	50	5912.085	Ar I	550	5931.78	N II
140	5872.35	Er I	50 h	5893.38	Mo I	24 b	5912.19	YO	600 c	5931.93	Tc I
100	5872.828	Ne I	1000	5893.389	Ge II	8	5912.58	Tm I	26	5932.38	Ru I
90	5872.98	Eu II	40	5893.44	Nb I	65	5913.55	Gd II	3	5932.71	La III
40	5873.764	Si I	24 b	5893.94	YO	30	5914.114	Fe I	35	5933.50	Er I
22	5873.83	Pr II	2000	5894.03	I I	20	5914.387	Th II	60	5933.69	Hf I
50	5874.21	Sm I	35	5894.06	Ir I	2	5914.54	Pb IV	30 c	5933.71	Ho I
11	5874.22	W I	22	5894.22	Pr II	125	5914.96	Pm I	40 c	5934.16	Nb I
35	5874.70	Nb I	500	5894.33	Zn II	40	5915.16	Dy II	100	5934.17	Xe I
35	5874.72	Pr I	100	5894.99	Xe I	150	5915.22	Si II	100	5935.20	Zr I
100	5875.02	Xe I	15	5895.09	Sb II	11	5915.31	Pr I	18	5935.54	Ta I
200 c	5875.31	Pm II	15	5895.31	Eu I	230	5915.39	U I	27	5935.90	Tm I
500	5875.62	He I	200	5895.624	Pb I	260 w	5915.4	In II	50	5936.15	Te II
3	5875.63	La III	240	5895.63	Tm I	75	5915.74	Eu I	16	5936.33	Pr II
100	5875.97	He I	16	5895.924	Na I	11	5915.97	Pr I	8	5936.65	Ru I
24	5876.14	YO	8	5897.21	Yb II	7	5916.43	Mg II	85	5936.84	Gd I
9	5876.26	Fe III	45	5897.39	Sm II	30	5916.51	Ta I	10	5937.162	Th I
26	5876.59	Mo I	200	5897.971	Cu II	55	5916.77	Gd I	120	5937.577	Cu II
65	5877.26	Gd II	9	5898.68	Fe III	35bl	5918.04	ScO	65	5937.71	Gd I
240	5877.36	Ta I	20	5898.78	Mo I	6	5918.16	Mg II	75	5937.82	Ti I
17	5877.79	Nb I	10 h	5898.79	Si III	9	5918.54	Rh I	35	5938.90	Sm II
14	5877.79	Ti IV		5898.82	Mo I	120	5918.55	Ti I	90bl	5939.08	YO
300 l	5878.04	Np I	35	5898.84	Tb I	120 c	5918.78	In II	50 c	5939.38	Tb I
35	5878.10	Pr I	50	5898.96	Sm I	90	5918.95	Ta I	150	5939.66	Pm I
100 c	5878.76	Pm II	230	5899.32	Ti I	9	5918.96	Fe III	130	5939.76	Ta I
10	5878.933	Th I	35	5899.47	Tm I	30	5919.11	Sc I	160	5939.90	Pr II
35	5879.04	Pr I	150	5899.76	Pm II	55	5919.34	Ru I	40 h	5940.12	V IV
80	5879.25	Pr II	15	5899.844	Th I	10	5919.86	Re I	35	5940.17	Tb I
27 b	5879.6	HoO	190cw	5900.62	Nb I	10 p	5920.13	Fe III	285	5940.24	N II
340	5879.80	Zr I	50	5901.09	Zr I	40	5920.76	Pr I	1600	5940.48	Br I
24	5879.96	Y I	13	5901.20	W I	65 c	5920.78	Tb I	65	5940.72	Pr II
13	5880.21	W I	40	5901.47	Mo I	27	5921.22	Nd I	230	5940.86	Ce I
50	5880.22	Cd II	24	5901.57	Tm I	80	5921.45	Ru I	55 h	5940.95	GdO
65	5880.31	Ti I	90	5901.91	Ta I	70	5921.76	Ho I	400	5941.196	Cu II
120	5881.14	Er I	27	5902.08	Er II	150	5922.12	Ti I	7	5941.46	Rh I
100	5881.895	Ne I	24	5902.40	Tb I	10	5922.72	Ca II	650	5941.65	N II
10	5882.30	Ir I	60	5902.462	Ne I	150	5923.36	Tc I	22	5941.65	Pr I
130	5882.30	Ta I	40	5902.64	W I	10	5923.69	Ca II	120	5941.76	Ti I
15	5882.624	Ar I	16	5902.82	Fe II	1000 c	5924.47	Tc I	5	5942.669	Ar I
11	5882.92	Os I	35	5902.96	Y I	20	5924.56	Dy II	45	5942.72	Eu I
70 c	5882.99	Ho I	27	5902.97	Eu I	40	5924.57	V I	55 h	5942.78	GdO
30	5883.29	Nd I	40	5903.11	Pr II	140	5925.13	Zr I	60	5943.24	Re I
22	5883.66	Hf I	8000	5903.30	Er III	12	5925.30	Eu I	240	5944.02	Ta I
35 c	5884.72	Pr I	55	5903.33	Ti I	50	5925.44	Sn I	10	5944.648	Th I
13	5885.02	Fe II	490 w	5903.4	In II	500	5925.65	Cs II	100	5944.834	Ne I
85	5885.62	Zr I	40 c	5903.80	Nb I	19	5925.893	Th II	500	5945.53	Xe II

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
45	5945.72	Y I	70	5965.28	F I	150	5983.22	Nb I	300	5999.85	Ba II
70	5945.80	Dy I	100	5965.471	Ne I	11	5983.22	Os I	650	6000.120	Cu II
22	5946.37	Er I	13	5965.63	Fe II	10000	5983.35	Pu I	11	6000.18	Ce I
400 c	5946.49	Pm II	65	5965.71	Sm II	1000	5983.40	Ce III	65	6000.96	GdO
200	5946.65	Mn III	200	5965.84	Ti I	130	5983.60	Rh I	50	6001.05	Zr I
35	5947.16	Pr II	55	5965.86	W I	27	5983.78	Eu I	200	6001.13	C I
55	5947.57	W I	330	5966.07	Eu II	20	5983.82	W I	290	6001.76	Al II
200	5947.98	Pr III	480cw	5967.10	Eu I	690cw	5983.9	Lu II	2000	6001.862	Pb I
70cw	5948.03	Ho I	75	5967.34	Tb II	100	5984.23	Zr I	75 h	6001.87	GdO
200	5948.545	Si I	110	5967.82	Pr II	35	5984.29	Sm I	220	6001.88	Al II
100 d	5948.58	Cl I	400	5967.89	Pm I	200	5984.82	Pm I	55	6001.90	Ce I
10 d	5949.02	Yb III	60bl	5968.25	ScO	24	5984.86	Dy I	55	6002.04	Ho I
25	5949.48	Tl II	15 h	5968.43	Eu I	300	5984.86	I I	28	6002.31	V I
22 c	5949.76	Pr I	9	5968.48	Fe III	11	5984.87	Tm I	29	6002.44	Pr II
500	5949.83	Ce III	55	5968.68	Er I	65	5986.08	Nb I	3000	6002.63	Ce III
24	5950.02	Y I	35 h	5968.82	Sm II	40	5986.14	Pr I	55	6002.63	V I
12	5950.15	F I	35	5969.19	Sc I	30	5986.956	Fe I	740bl	6003.60	YO
10	5950.21	Re I	2	5969.64	K II	100 c	5987.13	Pm II	60	6004.36	Eu I
5000	5950.25	I II	18 h	5969.77	Re I	45 c	5987.14	Pr I	1400	6004.52	Lu I
8	5951.15	Ru I	200 h	5970.10	Sr I		5987.29	Pr II	55	6004.57	Gd II
24	5951.17	Tb I	100	5970.30	Sn I	7	5987.302	Ar I	120	6004.65	Y
55	5951.27	Pr II	300	5971.13	Xe II	1000bl	5987.64	YO	100	6005.21	Sb II
55	5951.60	Gd II	140	5971.26	Tm I	1500	5987.85	Gd III	27	6005.33	Ho I
20	5951.76	Pr II	55	5971.50	U I	80	5987.907	Ne I	15 h	6005.61	Eu I
25	5951.78	Ta I	30	5971.69	Eu I	110 h	5988.02	Gd I	24 h	6005.75	DyO
10	5952.31	Fe III	100	5971.70	Ba I	40	5988.17	Mo I	55	6005.86	Ce I
285	5952.39	N II	220	5971.94	Al II	90	5988.42	Sc I	250	6006.03	C I
10000	5952.41	Cm I	1300bl	5972.04	YO	140	5988.56	Dy I	15	6006.20	Ce I
300	5953.17	Ti I	27	5972.51	W I	16	5988.67	Ru I	90	6006.33	Pr II
27	5953.49	Eu I	170	5972.75	Eu I	85	5989.044	Th II	450	6006.42	Al II
14	5953.62	Fe III	70	5972.76	Ho I	12 h	5989.08	Fe III	24 h	6006.54	DyO
27	5953.84	Eu II	20	5973.0	Bi II	17	5989.33	Yb I	35	6006.79	Er II
13	5953.96	W I	20	5973.05	Yb III	150	5989.774	P IV	55	6006.82	Ce I
30	5954.28	Eu I	21 h	5973.38	Ru I	10	5989.99	Re I	24 h	6006.97	DyO
110	5955.35	Zr I	90	5973.52	Ho I	9	5991.19	Rh I	21	6007.072	Th I
14	5955.70	Fe II	30	5973.665	Th I	13	5991.27	Pr I	110	6007.18	C I
27	5955.87	Nd I	8	5974.17	Ru I	40	5991.51	Yb II	19	6007.37	Ce I
45	5955.98	Ho I	75	5974.28	Hf I	17	5991.88	Co I	45	6007.67	Nd I
7000 w	5956.05	Pr III	120	5974.49	Dy I	200	5992.22	Kr II	210	6008.47	N I
13	5956.19	W I	100	5974.627	Ne I	240	5992.83	Eu I	13	6008.54	Pr I
75 b	5956.41	YO	100	5974.68	Te II	25	5992.96	Hf I	55	6008.71	Gd I
800	5956.42	Pm I	25	5974.72	Hf I	100	5993.260	Cu II	22	6008.75	Er II
55	5956.48	Gd II	27	5975.02	Tm I	15	5993.51	Ga III	200	6008.92	Xe II
90	5956.60	Pr II	27	5975.49	Er I	35	5993.65	Ru I	30	6008.94	Dy I
200	5956.69	Pm I	120	5975.534	Ne I	60	5993.849	Kr I	13	6009.01	W I
	5956.70	Pr I	100	5976.32	U I	24	5994.129	Th I	120	6009.19	Y I
300 h	5956.96	Au I	2000	5976.46	Xe II	50	5994.43	F I	9 c	6009.58	Pb II
500	5957.56	Si II	13 c	5976.95	Pr I	30	5994.76	Nd I	25 h	6009.89	Ta I
8	5957.587	Th I	85	5977.25	Gd I	13 c	5994.89	Pr I	80 c	6010.490	Cs I
40	5957.70	Nb I	30bl	5977.80	ZrO	80	5995.28	O I	150	6010.68	C I
160	5958.39	O I	270	5978.56	Ti I	17	5995.37	Zr I	65	6010.82	Dy I
190	5958.58	O I	60	5978.66	Hf I	18 h	5995.73	Re I	300 s	6011.22	Np I
25	5959.19	F I	20	5978.86	W I	65	5996.00	Os I	500	6011.667	Pb I
13	5959.25	Pr I	13	5978.88	Pr I	11	5996.06	Pr I	60 h	6012.20	Eu I
100 c	5960.08	Pm II	28	5978.91	V I	27	5996.47	Nd I	110	6012.56	Eu I
18	5960.13	Ta I	500	5978.93	Si II	100	5997.09	Ba I	21	6012.73	Ti
27	5960.83	W I	12	5979.32	Fe III	400	5997.12	Pm I	10000	6012.78	Pu I
35	5961.49	Sc I	400	5979.56	Ce III	140	5997.13	Lu I	55	6012.78	W I
18	5961.71	Fe II	200	5979.73	Pm I	190 c	5997.23	Ta I	300	6013.22	C I
20	5962.18	Pr I	15	5980.47	Eu I	45	5997.31	U I	75	6013.42	Ce I
2000	5962.22	Ce III	20	5980.78	V I	85cw	5997.93	Nb I	140	6013.50	Mn I
30	5962.4	Fe II	9 h	5981.01	Fe III	10	5998.00	Ba III	55	6014.83	Er I
30 h	5962.68	Au I	65	5981.19	Pr I	900 w	5998.94	Pr III	250	6014.84	C I
500	5962.71	Ce III	800	5981.25	Ba II	5	5998.999	Ar I	30	6015.426	Th II
28	5963.00	Pr I	7	5981.36	Os I	340	5999.04	Ti I	60	6015.58	Eu I
150	5963.00	Pm II	22	5981.43	Ho I	85	5999.08	Gd I	35	6015.74	Er II
90	5963.76	Eu I	50	5981.86	Y I	160	5999.43	N I	20	6015.79	Os I
50 l	5964.46	Dy I	230 c	5982.90	Ho I	18	5999.54	Fe III	150	6015.83	F I
200	5965.25	Cu III	27	5983.14	Eu I	65	5999.68	Ti I	25	6015.90	Ta I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
28	6016.12	V I	3000 I	6035.78	Pa I	45	6054.85	Er I	100	6074.338	Ne I
55	6016.48	Pr II	620bl	6036.17	ScO	200	6054.86	Sn =	2000 c	6074.98	I II
23	6016.59	Ce I	1000	6036.20	Xe II	440	6055.03	Lu I	90	6075.58	Eu I
200	6016.64	Mn I	13	6036.56	Fe III	140	6055.13	Pr I	40	6075.74	Pb II
45 c	6016.79	Hf I	500bl	6036.60	YO	110	6055.21	Al III	100	6076.40	Pm II
160bl	6017.07	ScO	10 h	6037.17	Kr III	250	6055.50	P II	60	6076.45	Er II
2	6017.11	La III	17	6037.698	Th I	20	6055.84	La III	35	6076.61	Ce I
24	6017.26	Dy I	150	6037.70	Sn I	40	6055.85	Yb III	30	6077.106	Th I
28	6017.38	U II	80	6038.04	F I	450	6056.0	Se II	17	6077.16	Ce I
150	6017.80	Pr II	16	6038.97	Ho I	300	6056.09	Np I	90	6077.29	U I
420	6018.15	Eu I	29	6038.97	Tb I	60	6056.125	Kr I	30	6077.38	Eu I
100	6019.47	Ba I	29	6039.38	Tb I	9	6056.36	Fe III	6	6077.48	Sn II
50	6019.812	Cl I	450	6039.73	V I	29	6056.65	Nb I	10 h	6078.38	Kr III
28 c	6019.85	Pr I	8 c	6041.17	Pb II	140	6057.36	Eu I	150	6078.39	Ge II
620bl	6019.87	YO	35 h	6041.66	Lu I	23	6057.50	Ce I	620bl	6079.30	ScO
100	6020.72	Ta I	24bl	6042.49	DyO	100	6057.86	P II	20	6079.58	Mo I
17	6021.036	Th I	35	6042.87	Pr II	35	6058.00	Ce I	5	6079.70	Sn II
500	6021.041	Ge II	500	6043.12	P II	100	6058.14	V I	30	6079.80	Sb II
28 b	6021.12	HfO	25 b	6043.19	HfO	24	6058.18	Dy I	300 s	6080.05	Np I
55	6021.13	Gd I	35	6043.223	Ar I	10000	6058.90	Cm I	20 h	6080.06	Si II
500	6021.18	Zn II	20	6043.31	W I	15	6059.1	Bi II	100	6080.11	F I
35	6021.43	Ho I	110	6043.39	Ce II	500	6059.356	Pb I	150	6080.343	Cu II
40	6021.52	W I	500	6043.39	Pm I	20	6059.372	Ar I	17	6080.37	Ce I
290	6021.80	Mn I	24	6044.431	Th II	45	6060.31	Ho I	110	6080.44	B II
70	6022.56	Er I	60	6044.66	Eu I	10000	6060.91	Ce III	55	6080.65	Gd II
60	6023.15	Eu I	50	6045.00	Sm I	150	6061.11	Al II	10	6081.27	Mo I
100	6023.264	Cu II	45	6045.39	Sm I	70	6061.25	Er I	17	6081.28	Ce I
120	6023.41	Y I	250	6045.39	Ta I	5	6061.536	Th I	40	6081.409	Pb II
2000 d	6024.08	I I	28	6045.42	Ce I	500	6061.79	Ce III	22	6081.44	W I
500	6024.18	P II	50	6045.50	Nb I	10	6061.92	Rn I	480	6081.44	V I
110	6024.20	Ce I	22	6045.63	Er II	140	6062.84	Zr I	120	6081.79	Ho I
5	6025.150	Ar I	170	6045.85	Zr I	130 c	6062.9	In II	1000	6082.43	I I
30	6025.36	Zr I	160	6046.23	O I	200	6063.12	Ba I	17	6082.44	Co I
20	6025.41	V I	190	6046.44	O I	490bl	6064.31	ScO	35	6082.61	Cl I
19	6025.44	Tm I	110	6046.49	O I	110	6064.63	Ti I	150	6083.409	P III
35	6025.49	Mo I	55	6046.66	Pr II	13	6065.08	W I	10 h	6083.78	Ag I
150	6025.72	Pr II	100	6047.25	Ta I	200	6065.09	Tc I	240	6083.84	Eu I
6	6026.04	Pt I	55	6047.40	Ce I	40	6065.482	Fe I	45	6084.12	Sm I
7	6026.10	Ir I	900	6047.54	F I	55	6066.03	Nd I	30	6085.06	Dy I
60	6026.18	Sc I	20	6047.83	Mo I	23	6066.75	Ce I	800	6085.23	Tc I
200	6027.11	Pm II	60	6047.99	Tc I	100 c	6067.00	Pm II	120	6085.23	Ti I
15	6027.16	Ce I	22	6048.14	Er II	45	6067.22	U II	200	6085.41	Pm II
16	6027.27	Mo I	11	6048.72	Fe III	20	6067.26	V I	13	6085.81	Pr I
20	6028.32	W I	25	6048.72	Nb I	13	6067.27	Pr II	28	6086.16	Pr II
170	6029.00	Eu I	100	6049.24	Zr I	10 h	6067.45	Si II	10 h	6086.67	Si II
50	6029.75	Nb I	35	6049.26	Pr I	11	6067.78	Tm II	30	6087.262	Th II
100	6029.997	Ne I	420	6049.51	Eu II	12	6067.83	Ir I	28	6087.34	U II
300	6030.06	Pm I	13	6049.92	W I	290	6068.43	Al II	65	6087.52	Pr II
1300	6030.66	Mo I	28	6050.04	Pr II	110	6068.53	Al II	350	6087.82	P II
24	6030.98	Dy I	27	6050.71	Ho I	500	6068.93	I II	50	6088.00	Y I
9	6031.02	Fe III	11	6050.88	Pr I	250	6069.00	Sn I	140	6088.26	Dy I
11	6031.26	Ce I	2000	6051.15	Xe II	500	6069.06	Pm I	19	6088.86	Ce I
35	6031.27	Nd II	55	6051.74	U II	19	6069.46	Ce I	19	6088.96	Ce I
400	6031.32	Pm I	19	6051.80	Ce II	35	6069.48	Ce I	210bl	6089.35	YO
50	6031.84	Nb I	150 c	6052.57	Pm II	13	6069.98	Ca III	9000 w	6090.02	Pr III
22	6032.12	Er II	450	6052.7	S I	50	6070.06	Sm I	1300	6090.22	V I
70	6032.127	Ar I	10	6052.723	Ar I	75	6070.755	Rb I	20	6090.38	Pr II
60	6032.36	Tc I	10	6052.88	Yb II	900	6071.09	Pr III	30	6090.82	Ta I
10000	6032.54	Ce III	1500 w	6053.01	Pr III	27	6071.70	Nd I	120	6091.17	Ti I
16	6032.59	Fe III	10	6053.381	Th I	35	6072.00	Ce I	35 h	6091.40	Sm I
85	6032.61	Zr I	20	6053.41	Sb II	250	6072.218	Cu II	150	6091.82	F III
27	6033.29	Nd I	25	6053.70	Ta I	440bl	6072.65	ScO	18	6092.06	Ta I
23	6033.58	Ce II	420bl	6053.81	YO	20	6072.713	Hg I	40	6092.81	Ti I
400	6034.04	P II	25	6054.17	Hf I	20	6072.72	Hg I	28	6093.09	Pr II
30	6034.089	Cs I	11	6054.18	Fe III	130bl	6072.78	YO	35	6093.19	Ce I
35	6034.20	Ce II	10	6054.57	Yb I	450	6073.23	Al II	600	6093.50	Xe II
45	6034.24	Nd II	7	6054.63	Os I	100	6073.46	Sn I	1900	6094.69	Cl II
23	6034.41	Ce I	10000 I	6054.64	Am I	300 s	6073.90	Np I	250 c	6095.95	In II
35	6035.49	Ce II	20	6054.81	Mo I	30	6073.97	Nd I	80	6096.163	Ne I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
18	6096.28	Pr I	6	6116.15	Rh I	11	6140.71	Lu I	13	6159.10	Pr II
160bl	6096.78	YO	18	6116.77	Ru I	35	6141.51	Pr II	100	6159.53	Pm II
500	6097.35	Ce III	22 c	6118.02	Pr I	20000	6141.72	Ba II	45 h	6159.56	Sm I
1500	6097.59	Xe II	15	6118.56	Ce I	120	6141.99	La III	30 c	6159.626	Rb I
150	6097.68	P I	120	6118.78	Eu I	140 h	6142.01	Be III	19	6159.82	Ce I
45	6098.34	Ce II	17	6118.90	Ce I	100	6142.487	Si I	10	6159.89	Pb II
95	6098.67	Hf I	35	6119.25	La III	40	6142.51	Nb I	150	6159.94	Lu II
40 h	6098.67	Ti I	600	6119.52	V I	150	6142.605	P IV	25	6160.20	Zr I
7	6098.803	Ar I	8	6120.27	K II	15	6142.92	Ce I	5000	6160.24	Pr III
500	6098.87	Ce III	300 l	6120.49	Np I	100	6143.063	Ne I	80	6161.15	In II
24	6099.083	Th I	30	6120.557	Th II	440	6143.20	Zr I	190	6161.18	Pr II
300	6099.142	Cd I	1000	6120.68	Tc I	90	6143.23	In II	1500 w	6161.22	Pr III
240	6099.35	Eu I	50	6120.83	Zr I	35	6143.36	Ce II	22	6161.29	Ca I
300	6099.39	Tc I	35 h	6121.01	Ti I	13	6143.94	W I	10	6161.354	Th I
11	6099.80	Ce I	170	6121.91	Zr I	20	6144.53	Os I	300	6161.74	Br II
150	6099.990	Cu II	2400	6122.14	Br I	65	6144.56	Ta I	19	6162.14	Ce I
900	6100.21	Pm I	22 c	6122.15	Pr I	100	6145.015	Si I	30	6162.17	Ca I
30	6100.87	Cu III	29	6122.22	Ca I	10	6145.441	Ar I	30bl	6162.23	TiO
400	6101.43	Xe II	45	6123.67	Ce I	35 c	6145.81	Re I	180 w	6162.45	In II
100	6101.58	Ta I	10	6124.480	Th I	30	6146.22	Ti I	3000	6162.56	Pa I
40	6101.87	Mo I	60	6124.67	Eu I	23	6146.43	Ce I	400	6163.16	Pm I
320bl	6101.87	ScO	85	6124.84	Zr I	100	6146.45	Xe II	120	6163.594	Ne I
13	6101.99	Ba III	90	6125.021	Si I	50	6146.82	Re I	22	6163.76	Ca I
30	6102.159	Fe I	35	6125.32	Er I	30	6147.73	Fe II	50	6164.32	Nb I
500	6102.49	Zn II	140	6125.50	F III	19	6147.84	Ce I	600 l	6164.75	Ac II
27	6102.72	Ca I	120	6126.22	Ti I	140 c	6148.10	In II	820bl	6165.08	YO
35	6102.72	Rh I	24	6127.15	Dy I	50	6148.13	Nb I	18	6165.38	Pr I
500 c	6102.96	Tc I	75bl	6127.38	YO	65	6148.23	Pr I	19	6165.45	Ce I
320	6103.54	Li I	680	6127.44	Zr I		6148.24	Pr II	350	6165.59	P II
320	6103.65	Li I	2000 c	6127.49	I II	1100bl	6148.36	YO	270	6165.94	Pr II
24	6104.29	Tb II	15	6128.0	Bi II	40000	6148.60	Br I	24	6166.44	Ca I
30	6104.580	Th I	8	6128.06	Rh I	180 b	6148.70	ScO	23	6166.67	Nd II
10	6105.635	Ar I	22	6128.25	W I	20	6149.24	Fe II	285	6167.76	N II
100	6106.27	O I	20	6128.34	V I	27	6149.28	Nd I	200 l	6167.83	Ac II
400	6106.40	Pm I	60	6128.450	Ne I	190 w	6149.5	In II	100	6168.43	Dy I
22	6106.72	Pr II	400	6128.62	Cs II	1000	6149.50	Hg II	26	6169.06	Ca I
28	6106.98	V I	230 w	6128.7	In II	400	6149.71	Sn I	28	6169.56	Ca I
160	6107.412	Cu II	240 w	6129.4	In II	21	6149.74	Ti I	9	6169.74	Fe III
29	6107.71	Nb I	50	6130.04	Sb II	800	6149.76	F I	60	6169.822	Th I
130bl	6107.82	YO	10	6130.63	Mo I	9	6149.99	Fe III	30	6170.06	Er II
10	6108.12	Ni I	1000	6130.80	Tc I	180	6150.15	V I	7	6170.174	Ar I
60	6108.15	Eu I	16	6131.53	Tm I	600	6150.384	Cu II	500	6170.27	As II
210 c	6108.66	In II	85	6131.574	Si I	23	6151.72	Ce I	85	6170.36	V I
28	6108.74	Ce II	90	6131.850	Si I	120	6151.72	YO	15	6170.46	Ta I
18	6109.08	Pr I	19	6132.00	Ce II	400 h	6151.76	Pm I	35	6170.49	Nd II
370bl	6109.93	ScO	1400bl	6132.06	YO	14	6151.993	Th I	150	6171.50	Sn I
425	6110.07	As II	320 w	6132.1	In II	30	6152.54	Ta I	40	6171.86	U I
50	6110.520	Pb I	19	6132.18	Ce I	60	6152.57	Yb II	500	6172.037	Cu II
45	6110.66	Sm II	150 c	6132.23	Tc I	20	6153.72	W I	150	6172.278	Ar II
20	6110.67	Ir I	23 d	6133.47	Nd II	150 b	6153.93	ScO	330	6173.05	Eu II
300	6110.78	Ba I	70cw	6133.60	Ho I	750	6154.222	Cu II	10	6173.096	Ar I
100	6111.49	Cd I	24	6133.64	Dy I	130	6154.50	Ta I	10	6173.22	Ca III
100	6111.53	Zn II	340	6134.55	Zr I	200	6154.60	Sn I	15	6175.16	Fe II
13	6111.66	W I	6	6134.82	Bi I	20	6154.87	W I	60	6175.25	Na II
280	6111.67	V I	120	6135.04	Y I	20	6154.94	Sb II	19	6175.28	Ce I
40	6112.837	Th I	500	6135.10	Ce III	27	6155.06	Nd I	14	6175.29	Tm I
430	6114.07	Gd I	200	6135.27	Rb II	160	6155.134	Si I	35	6175.39	U I
30	6114.22	Re I	280	6135.38	V I	30	6155.61	Zr I	10	6176.81	Ni I
65	6114.38	Pr II	11	6135.45	Ce I	400	6155.98	O I	2000	6177.39	Br I
160	6114.43	Cl I	400	6135.83	Ba II	35	6156.38	Ho I	150	6178.30	Xe I
300	6114.493	Cu II	40	6136.614	Fe I	27	6156.58	Ho I	45	6178.59	Nd I
130bl	6114.73	YO	40	6137.694	Fe I	450	6156.77	O I	110	6178.76	Eu I
100	6114.90	Pm II	19	6138.38	Ti I	75	6157.71	Zr I	120	6179.66	Xe I
100	6114.923	Ar II	150	6138.43	Y I	22	6157.82	Pr II	10	6179.98	Tl II
100	6115.08	Xe II	23	6139.03	Ce I	35	6157.83	Nd II	55	6180.42	Gd II
13	6115.52	W I	150 c	6140.0	In II	11	6158.03	Os I	14	6181.41	Tm II
180 w	6115.9	In II	25	6140.07	Ta I	490	6158.18	O I	110	6181.57	Al II
370bl	6115.97	ScO	200	6140.245	Cl I	24	6158.28	Dy I	150	6181.68	Al II
35	6116.01	Er I	100	6140.46	Zr I	40	6158.84	Ta I	250	6182.146	Ne I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
560bl	6182.23	YO	35	6200.81	Pr II	130	6224.50	V I	125	6243.813	Si I
290	6182.28	Al II	110bl	6200.86	GdO	12	6224.528	Th I	35	6244.08	Nd I
55	6182.34	Pr II	6	6201.37	Fe III	26	6225.20	Ru I	600 c	6244.18	Tc I
300	6182.42	Xe I	450	6201.52	Al II	290	6226.18	Al II	45	6244.35	Pr II
220	6182.45	Al II	360	6201.70	Al II	27	6226.50	Nd I	125	6244.468	Si I
50	6182.622	Th I	5 s	6203.04	Fe III	170bl	6226.51	ZrO	800	6244.48	I I
110bl	6182.68	GdO	18	6203.24	Re I	35	6227.70	Os I	120	6245.63	Sc II
27	6183.21	Er II	12	6203.493	Th I	35	6228.14	Lu II	20	6246.317	Fe I
450 h	6183.42	Al II	20	6203.51	W I	280 w	6228.3	In II	6	6246.59	K II
27	6183.91	Nd II	470	6204.261	Cu II	35	6228.94	Ce I	17	6246.65	Ti IV
100	6184.52	Pm II	1000	6204.86	I II	10	6229.11	Be I	5	6246.7	Sb III
100	6184.70	Tc I	13	6205.63	Pr II	19	6229.13	Ce I	45	6246.76	Sm II
95	6185.13	Hf I	60	6205.97	Xe III	30cw	6229.42	Re I	30	6246.97	Yb II
9	6185.26	Fe III	75 c	6206.309	Rb I	500	6229.64	Pm I	80	6247.56	Fe II
35	6186.15	Ti I	15 h	6207.60	Eu I	15	6230.51	Eu I	11	6247.74	Ti IV
35	6186.17	Ce I	27	6208.24	Nd I	40	6230.726	Fe I	140	6247.90	F II
7	6186.56	Fe III	25	6208.37	Ta I	430	6230.74	V I	16 h	6248.80	Lu I
550	6186.884	Cu II	450	6208.457	Cu II	35	6230.90	Er I	60	6248.95	Hf II
8	6186.89	Rh I	70	6208.65	Ho I	140 w	6231.1	In II	40	6249.79	Ta I
13	6187.96	Pr I	200	6208.91	Pm II	200	6231.21	Mn III	720	6249.93	La I
15	6187.97	Ce I	35	6208.98	Ce I	55bl	6231.62	GdO	110	6249.96	Sc I
150 b	6188.09	ScO	13	6210.59	Pr I	6	6231.62	Ti IV	55	6250.47	Eu I
260cw	6188.13	Eu I	620	6210.68	Sc I	360	6231.78	Al II	45	6251.05	Y I
300	6188.59	Np I	55	6210.70	Hf I	100	6232.29	P II	40 c	6251.76	Nb I
400	6188.676	Cu II	400	6210.87	F I	23	6232.45	Ce II	280	6251.82	V I
23	6189.35	V I	110bl	6211.71	GdO	100	6233.20	V I	55 b	6252.12	GdO
35	6189.40	Zr I	10	6212.503	Ar I	130	6233.57	F III	30	6252.554	Fe I
15	6189.66	Ta I	22	6212.73	Pr I	90 h	6233.73	Eu I	15	6253.65	Ce I
10	6191.18	Ni I	85	6213.05	Zr I	18	6234.17	Ho I	16	6253.72	Rh I
40	6191.558	Fe I	29	6213.06	Nb I	30	6234.40	Hg I	180	6254.188	Si I
55	6191.68	Ho I	500	6213.10	I I	30	6234.402	Hg I	20	6254.28	W I
1200	6191.73	Y I	120	6213.100	Cs I	70	6234.68	Na II	35	6255.10	Pr II
800	6191.88	I I	100 s	6213.11	Mn III	24 h	6234.856	Th I	45 c	6255.75	Ho I
12	6191.906	Th I	30	6213.429	Fe I	100	6235.266	Pb I	80	6256.01	Sc III
800	6192.66	Tc I	130	6213.87	V I	80	6235.36	Lu II	13	6256.36	Ni I
10000	6192.80	Pu I	12	6213.98	Ca III	270bl	6236.72	YO	45	6256.54	Sm I
150 b	6192.90	ScO	100	6214.22	Yb III	20 h	6236.80	Pr I	45	6256.66	Sm II
60	6192.96	Zr I	500	6214.61	Zn II	160	6237.320	Si I	150	6256.68	Ta I
15	6193.11	Ta I	100	6214.69	Zr I	28	6237.45	Ce I	15	6256.75	Mg III
24	6193.858	Th II	95 h	6215.28	Ti I	400	6237.79	Pm I	80	6256.83	O I
500	6194.07	Xe II	300 s	6215.90	Np I	8	6237.90	Zn I	85	6256.90	V I
160	6194.757	Cl I	5	6215.938	Ar I	60	6238.2	Xe III	100	6257.26	Zr I
7	6194.79	Fe III	3000	6216.35	Pa	40	6238.287	Si I	10	6257.424	Th I
100	6195.05	Pr III	450	6216.37	V I	20	6238.37	Fe II	900 c	6257.49	I II
140	6195.07	Eu I	11	6216.82	Ce I	23	6238.50	Nd II	23	6257.49	Nd I
15	6195.23	Ce I	28	6216.82	Hf I	45	6238.58	Hf I	13	6257.99	Ce I
6	6195.43	Fe III	750	6216.939	Cu II	100	6238.64	Mn III	380	6258.10	Ti I
19	6195.53	Ce I	150	6217.281	Ne I	13	6238.71	Ce I	85	6258.57	V I
2000	6195.63	Pr III	15	6217.599	Cs I	8 d	6239.03	Tl II	380	6258.70	Ti I
20	6196.23	Dy II	20	6217.89	Mo I	8	6239.17	Zn I	27	6258.73	Nd II
35	6197.45	Pr II	450bl	6217.96	YO	90	6239.41	Sc I	250	6258.96	Sc I
10	6197.66	Mo I	25	6217.97	Re I	13000	6239.65	F I	60	6259.05	Xe III
200	6197.72	In III	18	6218.06	Pr I	320	6239.78	Sc I	270	6259.09	Dy I
300	6197.96	Lu III	28 h	6218.31	V I	55	6240.13	V I	5	6259.81	Fe III
19	6198.05	Ce I	30	6219.279	Fe I	8	6240.954	Th I	80	6260.01	Na II
300	6198.092	Cu II	700	6219.844	Cu II	20 h	6241.05	Pr I	35 d	6260.02	Re I
600	6198.13	Lu III	55	6220.00	La III	75bl	6241.66	GdO		6260.24	Re I
100	6198.26	Xe I	100	6220.02	Xe II	7	6241.70	Os I	30	6260.36	Dy I
180	6199.01	P I	25	6220.35	Hg III	11	6241.87	Ce I	21	6260.77	Nb I
1000 c	6199.08	Rb II	75 h	6220.49	Ti I	160	6242.34	Lu II	50 b	6261.05	ZrO
450	6199.19	V I	110bl	6220.93	GdO	170	6242.81	V I	21	6261.063	Th I
70	6199.26	Na II	360	6221.02	Er I	400	6242.83	Ac II	300	6261.10	Ti I
26	6199.42	Ru I	65 h	6221.41	Ti I	13	6242.91	Ce I	55	6261.22	V I
160	6199.66	Lu II	25	6221.7	Xe III	50	6242.95	Th III	21	6261.418	Th I
590bl	6199.82	YO	2100	6221.87	Lu II	710	6243.10	V I	100	6261.55	O I
14	6199.99	Rh I	75	6221.96	Nb I	25	6243.120	Ar II	500	6261.848	Cu II
300 l	6200.00	Np I	300	6222.59	Y I	35cw	6243.24	Re I	240	6262.25	Eu I
30	6200.30	Ra I	45	6223.39	Nd I	10000	6243.35	Cm I	60	6262.25	Sc I
6	6200.75	Rn I	100 c	6224.28	In II	450	6243.36	Al II	260 d	6262.30	La II

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
40	6262.55	Pr II	400	6286.06	Pm I	450	6305.5	S II	21	6327.278	Th I
55	6262.56	Er I	280	6286.4	S II	750	6305.67	Sc I	70	6327.47	Sm II
55bl	6262.64	GdO	10	6286.41	Re I	550	6305.972	Cu II	200	6328.52	Yb III
100	6263.25	Pm II	11	6286.83	Os I	13	6306.64	Ce I	30	6330.013	Cd I
15	6264.27	Ce I	30	6286.86	Er I	22	6306.68	Ho I	35	6330.10	Cr I
10	6264.27	Mo I	450	6287.1	S II	35	6307.06	Sm II	800	6330.37	I I
18	6264.54	Pr II	15	6287.36	Ta I	7	6307.29	K II	13	6330.62	Ru I
16	6265.88	Mo I	3	6287.6	Sb III	60	6307.60	Sc III	40	6331.35	Gd I
85	6266.32	V I	300	6287.79	Ce III	15	6307.657	Ar I	35	6331.68	Tb II
150	6266.495	Ne I	40	6287.91	Ta I	200	6307.70	Re I	45	6331.954	Si I
55	6266.95	Eu I	12	6288.28	Ir I	14	6308.15	Yb II	12	6331.97	Fe II
35	6267.06	Zr I	350	6288.696	Cu II	500	6308.16	Ce III	50	6332.91	Ta I
50	6267.14	Ge II	18 c	6289.02	Pr I	500	6308.29	Pm I	400	6333.50	I I
100	6267.28	Sm II	40	6289.34	Ta I	130	6308.77	Er I	17	6333.75	Gd I
45	6267.93	Er I	85	6289.73	Gd II	50	6309.06	Ta I	10	6334.2	Ga II
150	6268.07	Ge II	15	6290.74	Mo I	30	6309.11	Gd II	100	6334.428	Ne I
100	6268.34	Ge II	8	6291.192	Th I	150	6309.58	Ta I	7	6334.44	Ir I
10 h	6268.50	Ag I	60	6291.34	Eu I	26	6309.90	Sc II	24	6334.91	Tb II
150	6268.70	Ta I	50	6291.82	Sm II	35	6310.01	Ce I	15	6335.40	Ce I
130	6268.82	V I	45	6292.02	W I	10	6310.22	Kr III	1500	6335.48	Br I
60	6268.87	Er I	15	6292.41	Ti IV	200	6310.36	Pr III	450	6335.74	Al II
300	6269.40	Rb II	24 c	6292.43	Tb I	55	6310.49	Nd I	75	6335.82	Eu I
22	6269.41	Os I	200	6292.83	V I	100	6310.78	Sn I	30	6336.10	Ti I
500	6270.82	Xe II	23	6292.84	Nd II	60	6310.80	Na II	9	6336.12	Ru I
18 c	6271.37	Re I	45bl	6292.84	ZrO	28 h	6311.50	V I	17	6336.34	Gd I
45	6272.05	Ce II	30	6292.87	Gd I	25 h	6311.85	Hf I	100	6336.377	Ge II
400	6272.69	Pm I	6	6293.38	Rh I	100	6312.18	Tc I	10 p	6336.90	Ra I
45 b	6273.00	GdO	1000	6293.98	I I	25 c	6312.22	Ta I	11	6337.21	Ce I
1000	6273.349	Cu II	6 p	6294.50	Fe III	55	6312.24	Ti I	2000	6337.85	I I
8 d	6273.5	Te I	11	6294.89	Ca III	400	6312.492	Cu II	30	6338.10	Hf I
100	6273.71	Mn III	18	6295.22	Ru I	450	6312.7	S II	24 b	6338.10	YO
50	6274.116	Th II	60 b	6295.46	YO	300	6313.02	Zr I	55	6339.09	V I
50	6274.117	Th II	35	6295.58	Ce I	500	6313.13	I I	1000	6339.44	I I
170	6274.65	V I	180	6296.09	La II	24 h	6313.78	Eu I	22	6340.36	Zr I
22 c	6274.66	Pr II	170	6296.49	V I	100	6314.20	Pm II	13	6340.70	Ce I
80	6274.74	Na II	7	6296.872	Ar I	7	6314.46	Si III	65	6341.17	Ta I
60	6274.78	Yb II	23	6297.07	Nd I	10	6314.66	Ni I	300 l	6341.38	Np I
	6274.81	Pr II	11 c	6298.01	Pr I	30	6314.71	Zr I	27	6341.51	Nd II
35	6274.94	Er I	120 c	6298.325	Rb I	24 b	6316.20	YO	150	6341.68	Ba I
11	6274.94	Os I	5	6299.224	Rb I	8	6317.185	Th I	300	6341.75	Ce III
120bl	6275.01	YO	45	6299.42	Er I	27	6317.19	Gd I	35	6342.860	Th I
55	6276.31	Sc I	14	6299.46	Tm II	300 s	6317.84	Np I	14	6343.32	Dy I
15	6276.47	Ce I	28	6299.51	Ce II	26	6318.03	Ti I	22 h	6343.88	Pr I
5	6276.66	Rh I	22 h	6299.54	Hf I	500	6318.06	Xe I	35	6343.95	Ce II
23	6277.29	Nd II	120	6299.66	Zr I	11 h	6318.13	Pr II	400	6343.96	Xe II
8	6277.46	Rh I	170	6299.77	Eu I	19	6318.33	Hf I	26	6344.83	Sc I
400	6277.54	Xe II	23	6300.21	Ce I	7	6318.37	Pt I	50bl	6345.10	ZrO
600	6278.17	Au I	18	6300.70	Sc II	15	6318.58	Eu I	75	6345.22	Zr I
50	6278.34	Ta I	250	6300.86	Xe II	10	6318.72	Mg I	70 h	6345.35	Lu I
40	6278.68	Pr II	900	6301.009	Cu II	9	6319.24	Mg I	250 h	6345.75	Sr I
18	6278.76	Re I	13	6301.75	Mo I	7	6319.49	Mg I	30	6346.02	Ta I
30	6279.172	Th II	11	6302.05	Pr I	29	6319.53	Rh I	27	6346.65	Gd II
16	6279.43	Be II	35	6302.35	Pr II	160	6320.39	La II	10	6346.74	Mg II
30	6279.73	Be II	12	6302.76	Sb II	16	6320.85	Sc II	9	6346.96	Mg II
45	6279.76	Sc II	20	6303.21	W I	50	6321.35	Zr I	1000	6347.10	Si I
28	6280.18	U II	10	6303.251	Th II	200	6321.90	Re I	28	6347.11	Pr II
110	6281.28	Pr II	230	6303.41	Eu II	30	6321.94	Ho	22	6347.16	Er II
65	6281.33	Ta I	10	6303.42	Re I	45 c	6322.36	Pr I	60	6348.21	La III
17 h	6282.33	V I	65	6303.75	Ti I	11	6323.54	Mo I	10000	6348.51	F I
17	6282.63	Co I	285	6303.8	Se III	700	6323.84	Pm I	50	6349.48	V I
75	6283.452	Ge II	16	6304.05	Pr I	14	6324.66	V I	8 h	6349.7	Te I
100	6284.41	Xe II	15	6304.34	Zr I	75	6325.08	Ta I	120cw	6350.04	Eu I
9	6284.49	Ru I	10000	6304.66	Pu I	100	6325.166	Cd I	60000	6350.73	Br I
200	6285.16	V I	60	6304.789	Ne I	200	6325.6	Se I	80 d	6350.75	Re I
70	6285.47	B II	270 w	6304.8	In II	110	6325.91	La I	18 c	6350.98	Pr I
27	6285.79	Nd I	75	6305.15	Gd II	55	6326.13	Er I	27 h	6351.72	Gd I
27	6285.88	W I	35	6305.23	Pr II	120	6326.466	Cu II	27	6352.66	Tm I
15 h	6285.95	Eu I	15	6305.32	Fe II	8	6326.58	Pt I	60	6352.83	Na II
100	6286.01	Xe I	70 c	6305.36	Ho I	70	6326.84	V I	400	6352.94	Br II

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
30 c	6354.35	Ho I	28	6378.52	U II	400	6403.384	Cu II	23	6431.63	V I
40	6354.35	Sn I	75bl	6378.56	ZrO	35	6404.21	W I	45	6431.84	Pr II
50 c	6354.555	Cs I	16	6378.59	Pr I	1000 l	6405.11	Am I	500 h	6431.93	Pm I
400	6354.72	Cd II	60	6378.82	Sc I	8	6405.9	Te I	15	6431.969	Cs I
18 h	6354.85	Lu I	500	6378.91	Ba II	40	6406.11	Eu I	22	6432.53	Er I
100	6354.86	Tc I	60	6378.91	Ba II	35	6407.00	Zr I	20	6432.73	Yb II
14	6355.58	V I	15	6379.07	Ta I	55bl	6408.41	ScO	14	6433.18	V I
60	6355.89	Eu I	3000	6379.25	Pa I	9000	6408.47	Sr I	50 c	6433.22	Nb I
50	6355.911	Th II	23	6379.36	V I	22	6408.55	Gd I	35	6434.33	Zr I
75	6356.16	Ta I	360	6379.62	N II	100	6408.83	Tc I	19	6434.39	Ce I
600	6356.35	Xe II	19 h	6380.19	Hf I	26	6409.11	Mo I	150	6434.833	Cl I
100	6356.73	Tc I	6	6380.45	Rn I	150	6409.204	P III	1000	6435.00	Y I
22 c	6357.20	Pr I	1000	6380.75	Sr I	19 h	6409.52	Hf I	11	6435.16	V I
40	6357.22	Mo I	150	6380.77	N IV	180	6410.04	Eu I	250	6435.32	P II
50	6357.30	V I	40	6380.95	Gd II	2500	6410.32	Br I	130	6436.31	P II
5	6357.81	Fe III	23	6382.07	Nd II	10 h	6410.69	Pr I	23	6436.40	Ce I
60	6358.05	Na II	17	6382.19	Gd II	210	6410.99	La I	13 h	6436.55	Dy I
3000 l	6358.61	Pa I	55	6382.73	Eu I	55	6411.23	Pr I	100	6436.57	Pm II
25	6358.82	V I	16 h	6382.94	Re I	140	6411.32	Eu I	26 b	6437.08	ScO
55 c	6359.03	Pr I	120	6382.992	Ne I	14	6411.47	Re I	24	6437.18	Y I
500	6359.16	I I	15	6383.75	Fe II	20	6411.647	Fe I	13	6437.36	Ta I
28	6359.29	U I	10	6383.76	Ba III	185	6411.65	N I	830	6437.64	Eu II
15 b	6359.48	YO	75	6383.86	Eu I	30	6411.899	Th I	185	6437.68	N I
20	6359.86	Ac I	7	6384.67	Mn I	10	6412.39	Mo I	15	6437.762	Th I
500	6359.98	Cd II	20	6384.717	Ar I	50 b	6412.39	ZrO	2000	6438.470	Cd I
65	6360.84	Ta I	280	6384.9	S II	90	6413.35	Sc I	3000 l	6438.97	Pa I
70	6361.15	Na II	65	6385.20	Nd II	22 h	6413.41	Ho I	35	6439.07	Ca I
35	6361.27	V I	60	6386.23	Hf I	1000	6413.44	Ga I	18	6439.93	Eu I
100	6361.65	Pr III	13	6386.47	W I	24	6413.615	Th I	14	6440.54	Tm I
290 w	6362.3	In II	900 h	6386.50	Sr I	8000	6413.65	F I	235	6440.94	N I
1000 h	6362.34	Zn I	40	6386.80	Dy I	40	6413.68	Pr II	17	6440.97	Mn I
22	6362.87	Cr I	28	6386.84	Ce I	360	6413.7	S II	22	6441.14	Lu I
140	6363.05	F III	10	6387.55	Ca III	12	6414.72	Rh I	7 h	6442.78	Pr II
17	6363.23	Gd I	45	6388.19	Er I	10	6415.43	Pr I	200	6442.965	Cu II
9 h	6363.41	Ru I	600 h	6388.24	Sr I	70	6416.307	Ar I	9 h	6443.91	Pr II
11 h	6363.62	Pr II	16	6389.11	Mo I	20	6416.90	Fe II	360	6444.2	Se II
250 h	6363.94	Sr I	90	6389.45	Ta I	8	6417.57	Ru I	40	6444.61	Ta I
9	6365.79	Lu I	11	6389.57	Pr I	35 h	6417.91	Yb I	300	6444.74	Pr III
10	6365.88	Yb III	80	6389.87	Tc I	35	6418.98	Hg III	26 h	6444.84	Ru I
16	6366.00	Lu I	16	6390.23	Ru I	11	6419.10	Ti I	11	6444.89	Lu I
100	6366.34	O I	500	6390.31	Pm I	5	6419.4	Ga II	40	6445.12	W I
35	6366.35	Ti I	170	6390.48	La II	100	6419.54	Cs II	60	6445.74	Zr I
70	6366.41	Na II	11	6391.12	Mo I	300	6420.18	Kr II	30	6445.87	Ta I
50	6367.13	Te II	18 c	6391.99	Pr I	210	6420.64	N I	19	6446.12	Ce I
200	6367.27	P II	23 h	6392.21	Ta I	100	6421.026	Kr I	20	6446.20	Ra I
14	6369.140	Th I	28	6392.77	U I	20	6421.349	Fe I	55bl	6446.24	ScO
60	6369.25	Eu I	23	6393.02	Ce II	50	6421.92	Dy I	20	6446.34	Mo I
50	6369.27	Cu III	40	6393.18	Pr I	22	6422.42	Gd II	20	6446.43	Fe II
7	6369.575	Ar I	14	6393.28	V I	210	6423.02	N I	250	6446.68	Sr I
15	6369.87	YO	20	6393.602	Fe I	850	6423.884	Cu II	24	6446.87	Tb II
350 h	6369.96	Sr I	450	6394.23	La I	100	6424.37	Mo I	9	6448.13	Os I
11	6370.11	Ca III	11	6395.16	Ce I	12	6424.51	Ca III	750	6448.559	Cu II
35	6371.11	Ce II	90	6395.42	U I	17	6424.52	Gd I	110	6449.16	U I
1000	6371.36	Si II	2000	6396.56	Ga I	11	6425.29	Ce II	10000	6449.75	Pu I
55	6372.46	U I	24	6396.60	Dy II	12	6426.17	Zr I	30	6449.81	Ca I
30 c	6372.59	Ho I	280	6397.3	S II	45	6426.64	Sm II	15	6450.005	Th I
40	6373.06	Ta I	45	6397.96	Pr II	5	6427.96	K II	45	6450.24	Co I
400	6373.268	Cu II	100	6397.99	Xe II	55	6428.29	Eu I	200	6450.36	Ta I
14 h	6373.86	Ho I	280	6398.0	S II	210	6428.32	N I	90	6450.85	Ba I
100	6374.32	O I	160	6398.66	Cl I	65	6428.60	Ta I	20	6451.62	Zr I
200	6375.28	Xe II	9	6398.86	Os I	300	6429.26	Pr III	70	6452.34	V I
9	6376.45	Ru I	30	6399.999	Fe I	45	6429.63	Pr II	16 c	6453.44	Pr I
10000	6376.71	Cm I	35 h	6400.35	Yb I	100	6429.64	Pm II	70	6453.50	Sn II
40	6376.931	Th I	120cw	6400.93	Eu I	35	6430.07	Ce I	320	6453.60	O I
10	6377.11	Ba III	35	6401.07	Mo I	85 c	6430.46	Nb I	90	6454.11	N III
16	6377.61	Pr I	22	6401.44	Tm I	35	6430.47	V I	360	6454.44	O I
750	6377.840	Cu II	75	6402.01	Y I	250	6430.79	Ta I	9	6454.84	Pr II
10	6378.32	Tl II	200	6402.246	Ne I	30	6430.844	Fe I	21	6455.00	Co I
150	6378.33	Yb III	22	6403.15	Os I	8	6430.94	Tm II	22	6455.60	Ca I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
20	6455.83	Ta I	360	6482.70	N I	18 h	6502.43	Ta I	110	6531.43	V I
1000	6455.90	Tc I	150	6482.91	Ba I	50	6503.26	Zr I	15	6532.39	W I
400	6455.98	O I	18	6483.02	Eu I	11	6503.27	Ce II	60	6532.882	Ne I
250	6455.99	La I	25	6483.082	Ar II	600	6503.46	P II	7	6533.14	Os I
9	6456.18	Pr I		6483.17	Sr II	5500	6504.00	Sr I	100	6533.16	Xe I
200	6456.288	Kr I	1800	6483.56	Br I	9	6504.09	Pr I	8	6534.52	Pr I
3	6456.3	Ga II	20	6483.59	Dy II	55	6504.17	V I	285	6535.0	Se II
200	6456.38	Fe II	300	6483.75	N I	200 h	6504.18	Xe I	10000	6535.27	Pu I
7 h	6456.7	Te I	100	6484.181	Ge II	65	6505.52	Ta I	22 b	6535.30	ScO
80	6456.87	Ca II	11	6484.35	Zr I	185	6506.31	N I	18 h	6535.84	YO
60	6457.283	Th I	400	6484.421	Cu II	50	6506.36	Zr I	200	6536.44	Cs II
20	6457.63	Zr I	150	6484.440	P III	150	6506.528	Ne I	13	6538.11	W I
26 b	6457.78	ScO	35	6484.52	Sm II	11	6507.16	Ce II	15	6538.112	Ar I
185	6457.90	N I	325	6484.80	N I	600	6507.97	P II	40 h	6538.15	Gd I
120	6457.96	Eu I	12	6485.35	Ca III	11	6508.05	W I	11	6538.30	Os I
35	6458.03	Ce I	380	6485.37	Ta I	19	6508.14	Ti I	90	6538.60	Y I
10000	6458.33	Rb II	35 b	6485.40	ScO	50bl	6508.15	ZrO	10	6538.78	Ca III
30	6459.92	Ta I	35	6485.69	Nd I		6509.20	Sr II	11 h	6538.99	Ho I
600	6459.99	P II	27	6485.87	Er I	10000	6510.16	Cm I	16	6540.47	Pr I
9 h	6460.19	Pr I	150	6486.381	P III	400	6510.34	Pm I	210 c	6541.20	In II
200	6460.26	Tm I	45	6486.55	Pr I	16	6510.41	Rh I	22	6541.57	Er I
8	6460.83	Dy I	28	6486.59	Dy I	50	6511.47	Re I	500	6542.20	Pm I
600 c	6461.93	Tc I	10000	6486.71	Pu I	300	6511.74	As II	10	6542.24	Ca III
34	6462.57	Ca I	9 h	6486.97	Pr II	20	6512.364	Th I	50	6542.76	Sm II
50	6462.614	Th I	20	6487.32	Ra I	20	6512.54	Cu III	30bl	6542.90	ZrO
1100	6463.12	Lu II	400	6487.61	Pm I	300	6512.83	Xe II	130	6543.16	La I
17 h	6463.15	Yb II	120	6487.76	Xe I	23	6513.59	Ce II	28	6543.51	V I
400	6464.94	Cd II	11	6488.05	V I	90	6514.21	Na II	130	6544.04	Na II
35	6464.98	U I	10000	6488.86	Pu I	100	6514.39	Ta I	500 l	6544.16	Am I
250 h	6465.79	Sr I	10000	6488.89	Pu	1000	6514.62	Br I	10000	6544.21	Pu I
170	6466.246	Cu II	340	6489.06	Yb I	14	6515.25	Re I	20000	6544.57	Br I
25	6466.33	Yb III	110	6489.64	Zr I	11	6515.30	Ho I	65	6544.61	Nb I
5	6466.717	Th I	285	6490.5	Se II	20	6516.05	Fe II	12	6544.91	Re I
19	6466.88	Ce II	14	6490.70	Tm I	100	6516.10	Ta I	130	6545.75	Na II
120	6467.02	N III	14	6490.738	Th I	8	6517.14	Pr I	11	6545.97	Mg II
28	6467.39	Ce I	17	6490.97	Ce I	500	6517.25	Pm I	20	6546.239	Fe I
18	6467.72	Pr II	160	6491.22	N I	19	6517.31	Ce I	55	6546.28	Ti I
300	6468.44	N I	200 c	6491.68	Tc I	220	6517.317	Cu II	1000	6546.79	Sr I
10	6468.58	Dy II	24	6491.71	Mn I	18 h	6518.33	YO	60	6547.89	Be II
300 w	6469.0	In II	40 h	6491.75	Pr I	35cw	6518.68	Tb I	9	6548.03	Sc IV
300	6469.70	Xe I	55	6492.35	Er I	16	6518.79	Pr II	1500	6548.09	Br I
950	6470.168	Cu II	22	6493.10	Zr I	200	6519.43	Pm II	8 h	6549.12	Eu I
110	6470.21	Zr I	10	6493.13	Mo I	60	6519.59	Eu I	22	6549.25	Gd I
100	6470.27	Tc I	9	6493.49	Pr I	19	6519.70	Rh I	16 h	6549.84	Tl I
19 h	6470.29	Gd I	32	6493.78	Ca I	14	6519.78	Tm I	1700	6550.26	Sr I
12	6470.70	Eu I	11	6494.89	Pr I	23	6519.84	Mo I	35	6550.54	Zr I
20	6471.20	Mo I	60	6494.981	Fe I	1000 d	6520.45	Pm I	70	6550.97	Ho I
29	6471.66	Ca I	200	6495.53	Cs II	6	6520.85	Os I	120	6551.286	Cu II
27 c	6471.77	Ho I	26 b	6495.90	ScO	80	6521.13	Hg II	19	6551.70	Ce I
45	6472.34	Sm II	8	6496.44	Ru I	5	6522.044	Th I	80	6552.43	Na II
15	6472.623	Cs I	12000	6496.90	Ba II	15	6522.72	Eu I	7 h	6553.30	Pr I
150	6472.84	Xe I	22 c	6497.11	Pr I	55 c	6523.18	Lu I	12 h	6553.84	YO
30	6473.54	Be I	17	6497.69	Ti I	9	6523.45	Pt I	6	6554.160	Th I
35	6473.72	Ce I	15	6497.7	Bi II	6 h	6524.36	Si III	65	6554.23	Ti I
60bl	6473.79	ZrO	17	6497.84	Nb I	80	6524.68	Na II	10000	6554.41	Cm I
20	6473.99	Mo I	35	6498.67	Sm II	55 b	6525.62	ScO	11 h	6554.83	Ti
11	6474.91	Dy I	100	6498.72	Xe I	8	6526.17	Ba III	45	6555.462	Si I
9 h	6475.26	Pr II	300	6498.76	Ba I	45	6526.609	Si I	1000	6555.62	Rb II
50	6475.29	Na II	18	6498.94	Pr II	200	6526.82	Tc I	45	6555.65	Ce I
3	6475.73	Bi I	210	6499.54	N I	110	6526.99	La II	75	6556.07	Ti I
3	6476.24	Bi I	28	6499.65	Ca I	45	6527.199	Si I	15 h	6556.50	Hf I
29	6477.67	Lu I	600	6500.04	Pr III	150	6527.31	Ba I	70	6557.39	Y I
35cw	6478.02	Pr II	130	6500.24	O V	200	6528.65	Xe II	6	6557.488	Ge I
13	6479.17	Ho I	22	6500.72	Pr I	11	6528.74	Ru I	10	6557.49	Rn I
10	6479.18	Zn I	18 h	6501.23	YO	7	6528.87	Os I	45 b	6557.84	ScO
15	6480.11	Gd II	40	6501.38	Hg III	400	6530.083	Cu II	20	6558.02	Dy I
750	6481.437	Cu II	300	6501.49	Pr III	130	6530.70	Na II	17	6558.02	V I
265	6481.71	N I	45	6501.55	Eu I	50 h	6531.342	Th I	60	6558.36	Be II
750	6482.05	N II	5	6501.992	Th I	150	6531.43	Cl I	100 h	6558.48	Pm II

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
5	6558.876	Th I	10	6585.13	Ta I	6	6610.12	Hg III	40 h	6632.28	Sm II
50000 c	6559.80	Br I	40 h	6585.21	Sm II	750	6610.56	N II	15	6632.44	Co I
15	6560.08	Ho I	1000	6585.27	I I	15 h	6611.20	Mo I	13	6633.26	V I
8	6560.10	He II	30	6586.02	Cs I	35cw	6611.28	Lu II	50	6634.36	Gd II
4	6560.45	Ru I	100	6586.39	Pm II	12	6611.38	Ti III	2 h	6636.44	Be II
5000	6560.81	Rb II	200	6586.510	Cs I	20	6611.49	Sb I	19 h	6636.49	Y I
25 h	6561.60	Ta I	15 c	6587.16	Ta I		6611.58	Lu II	185	6636.94	N I
100	6562.68	Au I	28	6587.23	Hf I	17	6611.62	W I	10 c	6637.25	Re I
120	6562.72	H I	200	6587.61	C I		6611.80	Lu II	35	6637.96	Nd II
180	6562.852	H I	24	6588.540	Th I		6611.95	Lu II	25	6638.221	Ar II
13	6563.20	W I	110	6589.72	Sm II	110	6611.95	Ta I	20	6639.740	Ar II
15	6563.42	Co I	19cw	6591.00	Nb I		6612.04	Lu II	35	6640.08	Gd I
25cw	6564.26	Ta I	30	6591.60	Gd I	22	6612.06	Ce I	10000	6640.17	Cm I
30	6564.52	Be I	50	6591.99	Zr I	8 h	6613.4	Te I	800	6641.396	Cu II
22	6564.62	Pr II	100	6592.29	Pm II	95	6613.75	Y II	10	6642.76	Gd I
55	6564.78	Gd I	40cw	6592.52	Re I	35	6614.15	Nb I	15	6643.37	Dy I
3	6565.070	Th I	20	6592.913	Fe I	8	6614.56	Os I	800	6643.54	Sr I
19 h	6565.62	Ti I	10	6593.34	Ra II	4	6615.43	Os I	20	6643.55	Yb I
11	6565.88	V I	15	6593.42	Gd I	100	6616.46	Pr III	16	6643.64	Ni I
300 l	6566.11	Np I	9 h	6593.74	Pr II	55	6616.67	Pr I	50	6643.698	Ar II
1000	6566.49	I I	4	6593.74	Ru I	3000	6617.26	Sr I	13	6643.79	V I
45	6566.77	Pr II	45	6593.79	Eu I	18bl	6617.94	ScO	30	6643.98	Gd I
35 b	6566.88	ScO	24	6593.940	Th I	9	6618.20	Ru I	20	6644.13	Cu III
25	6567.65	Cd II	14	6594.14	Dy II	11	6618.34	Pr II	45	6644.60	Hf II
75	6567.87	Eu I	2	6595.00	K II	230	6619.13	Mo I	21	6644.650	Th II
10	6568.00	Gd II	1000	6595.01	Xe II	11	6619.15	Lu II	235	6644.96	N I
140	6569.31	Sm II	3000	6595.33	Ba I	5000	6619.66	I I	18bl	6645.08	ScO
30	6569.43	Zr I	11	6595.48	Pr I	24	6619.946	Th II	1400	6645.11	Eu II
450	6569.69	F I	100	6595.56	Xe I	24	6619.947	Th II	185	6646.50	N I
150	6570.07	Kr II	10	6596.71	Zr I	5	6620.44	Mg II	10	6646.85	Gd I
35 h	6570.67	Sm II	50	6597.20	V III	1500	6620.47	Br I	19	6647.06	Hf II
7	6571.03	Pr I	400	6597.25	Xe II	15	6620.56	Zr I	14	6647.12	Pr I
1000	6571.31	Br I	900	6598.15	Pm I	6	6620.57	Mg II	30	6647.44	Sb II
12 h	6572.58	Y	800	6598.66	Pm I	20	6621.08	Ag I	14	6647.47	Ti III
23	6572.78	Ca I	100	6598.84	Xe II	75	6621.30	Ta I	10	6648.58	Te II
10	6573.80	Gd I	10	6598.84	Zr I	18	6621.58	Ti III	700	6649.81	Pm I
20	6573.93	W I	150	6598.953	Ne I	11	6621.74	W I	50	6650.38	Mo I
24 c	6574.04	Tb II	35	6599.11	Ti I	14	6622.49	Y I	400	6650.41	F I
15	6574.73	Nb I	50	6599.39	Th III	185	6622.54	N I	45	6650.57	Nd II
100	6574.84	Ta I	40 h	6600.2	Bi II	10000	6622.83	Cf I	40	6650.61	Y I
14 h	6575.18	Ti I	35 d	6600.58	Ho I	10	6623.00	Ce I	13	6650.89	Ce I
8	6575.54	Tm I	70	6601.11	Er I	12	6623.4	Bi III	5	6650.99	Pb V
18 b	6575.85	ScO	40	6601.83	Sm II	10	6623.54	V I	18bl	6651.46	TiO
20	6576.56	Zr I	50	6603.27	Zr I	30 c	6623.91	Re I	70	6652.093	Ne I
11	6576.83	Os I	18 h	6603.55	Eu I	750	6624.292	Cu II	27cw	6652.39	Re I
35	6576.85	Y I	95	6604.56	Sm II	10	6624.57	Mo I	22	6652.72	Ce II
200	6577.080	Cu II	60	6604.60	Sc II	5	6624.73	Ir I	30	6652.89	Au I
35 c	6577.11	Re I	15	6604.853	Ar I	50	6624.85	V I	9 h	6652.98	Ho I
10	6577.2	Bi II	80	6604.91	O I	800 w	6625.23	Pm I	235	6653.46	N I
5	6577.215	Th I	260	6604.94	Ho I	100 h	6625.54	Pm II	10	6653.55	Gd I
6	6578.00	Pr I	95	6604.96	Tm I	500 c	6625.57	Tc I	100	6653.83	O I
800	6578.05	C II	100cw	6605.19	Re I	19	6626.98	Nb I	150	6654.10	Ba I
30 b	6578.06	ZrO	24	6605.416	Th II	15	6627.23	Rn I	22bl	6654.42	ScO
140	6578.51	La I	50	6605.97	V I	8	6627.25	Tm I	30	6655.67	Nd I
200	6578.90	Pr III	19	6606.16	Nb I	9	6627.80	Rh I	210	6656.51	N I
23	6579.10	Ce I	15	6606.35	Ce I	13	6628.35	Ho I	75	6656.83	Pr II
1800	6579.14	Br I	700	6606.37	Pm I	35	6628.660	Cs I	35	6657.72	Tm I
150	6579.24	Tc I	10	6606.43	Rn I	7	6628.80	V V	22	6658.36	Dy I
160	6579.37	Dy I	15	6606.86	Ce II	30	6628.93	Ce I	11	6658.64	Tm I
300	6580.39	F I	11	6607.13	W I	120	6628.99	Ho I	6	6658.678	Th II
35	6581.82	Tb I	30	6607.17	Tb II	10	6629.37	Ti III	400	6659.05	Pm II
20000	6582.17	Br I	19	6607.28	Nb I	45	6630.14	Nd I	11	6659.40	Hf I
570	6582.88	C II	55	6607.47	Ho I	19	6630.16	Rh I	13	6659.68	Mo I
60	6583.48	Er I	15	6607.83	V I	2	6630.83	Mg I	8	6660.2	Te I
2000	6583.75	I I	10000	6608.95	Pu I	7 h	6631.00	Pr I	50 c	6660.20	Pb II
24	6583.907	Th I	11	6609.05	W I	10000	6631.26	Cf I	50 h	6660.52	Si II
10	6584.26	Hg III	15	6609.86	Pr I	50000 c	6631.62	Br I	5	6660.676	Ar I
6	6584.56	Pr II	26bl	6609.99	ScO	13 h	6632.06	Pr I	210cw	6660.84	Nb I
23	6584.87	Y I	10	6610.04	Gd II	15	6632.24	Ho I	450	6660.962	Cu II

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
26bl	6661.01	ScO	30	6684.00	Ta I	400	6708.28	F I	13	6736.79	Pr I
19	6661.08	Cr I	35	6684.293	Ar II	30	6709.29	Hg III	25	6737.79	Nd II
500	6661.11	I I	26	6685.21	Eu I	25	6709.39	Ta I	65	6737.87	Sc I
100	6661.25	Pm II	500	6685.55	Pm I	180	6709.50	La I	18	6739.22	Tm I
10	6661.41	Ce I	500	6685.68	Pm I	17	6709.61	Zr I	35	6739.40	Sc I
29	6661.64	Dy I	1300	6686.02	Cl II	10	6710.42	Pt I	75	6739.88	Nb I
1400	6661.67	Cl II	10	6686.08	Ir I	12 h	6710.45	Eu I	40	6740.11	Nd II
500	6661.68	Pm I	15	6686.60	Ce I	9 c	6711.30	Re I	3	6740.37	Th IV
7	6661.81	Os I	10000	6686.87	Cm I	2	6711.87	Th IV	75 c	6740.73	Ta I
15cw	6662.24	Ta I	100	6687.10	Tc I	35	6713.20	Y I	55	6741.47	Sm II
30	6662.269	Th I	5 h	6687.51	Pr II	150	6713.28	P II	30	6741.64	Si I
15	6662.52	Ho I	150	6687.58	Y I	1200	6713.41	Cl II	25	6742.54	Nd I
21	6663.14	Ru I	15	6688.01	Sb II	30	6713.48	Hf I	5	6742.884	Th I
10000	6663.25	Cm I	22	6688.18	Zr I	6 h	6713.80	Tl I	80	6743.12	Ti I
400	6663.76	Pm I	8 h	6690.00	Te I	150	6713.939	P IV	160	6743.6	S I
5	6664.051	Ar I	55	6690.00	Ru I	10	6714.44	Ta I	600	6743.71	Pm I
21	6664.40	Y I	150	6690.09	Pm II	700	6714.67	Pm I	150	6744.38	C III
15	6665.00	Si II	18	6690.47	Mo I	120	6715.906	P IV	15	6744.70	Ce II
13	6665.59	Ce I	1800	6690.48	F I	160	6716.429	Hg I	30	6744.88	Eu I
600	6665.96	I II	22 b	6691.21	TiO	160	6716.43	Hg I	40	6745.05	Ho I
50	6666.35	Eu III	20 l	6691.27	Ac I	26	6716.68	Ti I	22	6745.52	Ti I
25	6666.359	Ar II	14 h	6691.83	Y I	50 h	6717.04	Si II	21	6746.08	Mo I
18 h	6666.55	Ti I	10000	6692.13	Br I	20	6717.043	Ne I	50	6746.27	Mo I
800 c	6667.51	Pm I	8	6692.724	Th II	500	6717.26	Pm I	5	6746.56	W I
5	6667.56	Si IV	10	6692.86	Gd I	120	6717.42	P I	10	6746.90	Ce I
22 h	6667.74	Ti	11	6692.93	Tm I	30	6717.69	Ca I	35 c	6747.09	Pr I
180	6667.82	Yb I	15	6693.08	W I	27	6717.88	Zr I	29	6747.93	Dy I
75	6667.86	Dy I	70	6693.55	Sm II	14	6718.14	Gd II	285	6748.8	S I
18	6667.99	Ti III	15	6693.61	Ta I	15	6718.30	Ru I	19 c	6749.19	Pr I
9	6668.39	Ti	8	6693.66	V I	300	6718.83	I II	900	6749.91	Pm I
150	6668.92	Xe I	1800	6693.84	Ba I	10	6719.32	Ra II	20 h	6750.28	Si II
11	6669.26	Cr I	95	6693.96	Eu I	300 l	6720.68	Np I	900	6750.48	Pm I
6	6669.60	Rn I	55cw	6694.32	Ho I	500	6720.71	Pm I	30	6751.22	Re I
50	6671.51	Sm I	300	6694.32	Xe II	30	6721.36	Tm I	300 s	6751.32	Np I
100	6671.88	Si II	7	6694.75	Y I	100	6721.853	Si I	20	6751.81	Rn I
10000	6672.72	Pu I	360	6696.02	Al I	27	6721.91	Er I	190 c	6751.88	In II
55	6673.41	Pr II	500 c	6697.29	I I	15cw	6722.34	Ho I	40	6752.35	Rh I
300 c	6673.66	Tc I	5	6697.712	Th I	185	6722.62	N I	50	6752.67	Gd II
100	6673.73	Ta I	230	6698.67	Al I	40 d	6723.07	Sm I	40	6752.73	Zr I
75	6673.78	Pr II	60	6699.228	Kr I	200 c	6723.284	Cs I	150	6752.834	Ar I
15	6674.19	Ti III	4 h	6699.25	Pr I	15 h	6723.61	Ta I	65 c	6753.00	V I
6	6674.697	Th I	16 h	6699.26	Y I	130 c	6723.62	Nb I	4	6753.20	Pb V
1500	6675.27	Ba I	20	6699.38	Si II	16bl	6723.95	TiO	14	6753.91	Gd II
180	6675.53	Ta I	600	6700.33	Pm I	12	6724.80	Ti III	35	6753.97	Mo I
10	6675.54	Ce II	18 b	6700.48	ScO	500	6725.78	Cd II	17	6754.61	Hf II
23 c	6677.14	Lu I	10	6700.64	Dy II	9	6726.34	Tm I	40	6754.91	Ta I
18	6677.18	Ti I	26	6700.66	Ce I	10000	6726.68	Cm I	13 c	6755.85	Ta I
100	6677.282	Ar I	70	6700.71	Y I	16	6727.459	Th I	5	6756.163	Ar I
150cw	6677.33	Nb I	7 h	6701.06	Eu I	700	6727.50	Pm I	200	6756.45	Pm II
700 h	6677.47	Pm I	65	6701.20	Nb I	25	6727.61	Yb II	20	6756.453	Th I
10000	6677.90	Cf I	7	6701.21	Si IV	100	6727.63	Pr III	7	6756.54	Ru I
90	6677.94	Tb II	11	6702.12	Zr I	17	6727.83	Gd II	1	6756.72	Be II
40	6677.989	Fe I	40cw	6702.61	Tb I	9	6727.94	Tm II	2	6757.13	Be II
11	6678.01	Zr II	10	6704.18	Gd II	200	6728.01	Xe I	450	6757.2	S I
100	6678.15	He I	35	6704.27	Ce I	8000	6728.28	Br I	10	6757.62	Dy I
15	6678.17	Yb I	8	6704.28	Rn I	15	6728.71	Ce I	100	6759.19	Cd II
90	6678.276	Ne I	13	6704.52	Ce II	27	6729.56	Os I	70	6759.87	Er I
13	6678.42	W I	18 b	6705.93	ScO	15	6729.57	Ce I	20	6760.02	Pr I
150	6678.43	Cl I	10	6706.04	Ce II	15	6730.45	Ru I	2000	6760.06	Br I
70	6679.21	Sm II	100	6706.27	Pm II	85	6730.73	Gd I	10	6760.12	V I
10	6679.56	Gd II	15	6706.46	Ta I	120 d	6731.84	Sm II	5 c	6761.19	Re I
19 c	6680.46	Ho I	600	6706.70	Pr III	400	6732.03	I I	8	6761.45	Sn II
200	6680.89	Pm II	20 c	6706.79	Tb II	110	6733.98	Mo I	75	6762.38	Zr I
35	6681.23	Gd II	10000	6706.85	Cm I	70 d	6734.06	Sm II	22	6762.92	Er I
24 c	6681.62	Ho I	11	6707.52	Ru I	16	6734.10	Ti III	13	6763.50	Mo I
15 h	6682.02	Ho	3600	6707.76	Li I	40 d	6734.81	Sm II	5	6764.45	W I
20000	6682.28	Br I	14	6707.76	Ti III	3	6735.126	Th I	6	6765.677	Th I
15 h	6683.28	Re I	3600	6707.91	Li I	9 h	6735.76	Lu I	45	6765.89	Dy I
3	6683.367	Th I	8	6708.07	V I	40	6735.99	Y I	180 c	6765.9	In II

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
50 c	6766.49	V I	35	6790.85	Zr I	8	6819.27	Mg II	9	6844.39	Pr I
15	6766.612	Ar I	35	6790.92	Er I	20	6819.36	Ta I	18	6844.64	Ti
13	6766.74	Ho I	1800	6791.05	Sr I	50	6819.52	Sc I	55	6844.71	Sm II
21	6766.95	Ru I	6	6791.236	Th I	13 h	6820.27	Tm I	17 h	6844.83	Eu I
9 h	6767.48	Tm I	1600 c	6791.48	Br I	9	6820.27	W I	45	6845.24	Y I
22	6767.77	Ni I	18	6791.53	Os I	15cw	6820.38	Ho I	13	6845.33	Zr I
25	6768.70	Yb I	3000 h	6792.75	Pa I	17	6820.90	Gd I	9 h	6845.47	Pr II
85	6769.16	Zr I	10000	6793.15	Cm I	24	6821.64	Ho I	80	6845.76	Tm I
1000	6769.62	Ba II	50	6793.20	Cu III	320	6823.202	Cu II	17	6846.34	Zr I
11	6769.95	Hf I	13	6793.7	Ho I	5	6823.509	Th I	9	6846.59	Pr II
100	6770.362	Cu II	190	6793.71	Y I	15	6823.88	Ru I	35	6846.60	Gd II
13	6770.37	Ta I	30 c	6793.77	Lu I	21	6824.17	Ru I	25	6846.72	Nd II
75	6771.74	Ta I	95	6794.20	Sm II	100	6824.652	Cs I	100	6846.97	Zr I
300	6772.29	Pm II	130	6794.58	Tb II	18 c	6824.96	Ta I	14 h	6847.04	Eu I
9	6772.32	Ni I	300 s	6795.21	Np I	22	6825.44	Er I	13	6847.25	Ce I
27	6772.89	Zr I	25	6795.31	Nb I	13	6825.63	Mo I	8 h	6847.44	In I
27	6773.37	Er I	70 h	6795.41	Y II	17 c	6825.72	Ho I	70	6848.10	Er I
7000	6773.98	F I	1500	6795.53	F I	22	6825.98	Er I	400	6848.37	Pm I
40cw	6774.25	Ta I	9	6796.65	Rh I	15	6826.56	Hf I	30	6848.568	Si I
120	6774.26	La II	100	6796.87	Pm II	11	6826.59	Lu II	c	6848.91	Cs I
30	6774.28	Ce II	55cw	6798.60	Pr I	8 h	6826.62	Ho	16	6848.92	Mo I
23	6774.54	Pd I	70	6798.63	Tc I	90	6826.92	U I	27	6849.26	Zr I
28 c	6774.68	Ho I	3	6798.747	Th I	14	6826.95	Tm I	25 c	6849.35	Nb I
30	6775.02	Ru I	13	6799.27	Ta I	200	6827.32	Xe I	13	6850.07	Hf I
3000 l	6775.07	Rb II	690	6799.60	Yb I	13	6827.33	Rh I	17 c	6850.46	Pr II
35	6775.59	Ce I	10 h	6799.88	Mo I	35cw	6827.60	Pr II	15	6850.83	Ta I
9	6777.93	Tm I	10	6802.62	Mo I	200	6827.96	Pr III	7 h	6851.65	Si III
30	6778.116	Cd I	300 l	6802.62	Np I	85	6828.11	Nb I	13	6852.56	Zr I
10	6778.28	Ce I	140	6802.72	Eu I	100	6828.25	Gd I	11	6852.77	Pr I
15	6778.313	Th I	12 h	6803.15	Y I	8	6828.43	W I	80	6852.96	Dy I
40 h	6778.61	Sm II	30	6804.00	Nd II	45	6828.78	Zr I	8 h	6852.97	Ho
400	6778.78	Pm I	7	6805.31	W I	18 d	6828.87	Mo I	4	6853.74	W I
2000	6779.48	Br I	1000	6805.74	Xe II	11	6829.036	Th I	18	6854.12	Tm I
110	6779.77	Tm I	300 l	6805.81	Np I	14	6829.05	Mo I	100	6854.63	Pr III
15	6780.413	Th I	300	6806.216	Cu II	29	6829.12	Tm II	20 h	6854.7	Te I
50	6780.51	Ge II	14	6806.61	Os I	29	6829.54	Sc I	15	6855.18	Fe I
7	6781.45	Mg II	6	6806.67	Sb II	10	6829.73	Ce II	50000	6856.03	F I
14 h	6782.00	Tm I	6	6806.79	Rn I	50	6829.82	Si II	75	6856.03	Sm II
30 h	6782.54	Eu I	18	6807.81	Ce I	260	6829.90	Re I	22	6856.46	Dy I
100	6783.09	Pm II	50 h	6808.6	Bi II	9 c	6829.94	V I	12	6856.55	Ce I
14	6783.39	Gd I	10	6808.82	Ce I	5	6830.01	Ir I	60	6856.90	Tc I
100 c	6783.72	In II	3	6809.511	Th I	19	6830.50	Pr II	30	6857.13	Gd II
250	6783.90	C II	400	6809.647	Cu II	23	6831.09	Tm I	200	6857.30	Pr III
65	6784.52	Pd I	40 c	6810.46	Ta I	150	6831.3	Se I	11	6857.68	Rh I
10000	6784.66	Pu I	13cw	6811.04	Ho I	7	6831.52	Ru I	14	6858.24	Y II
40	6784.98	V I	200	6811.68	Pm II	6 h	6831.56	Si III	50	6858.58	Pm II
7 c	6784.99	Pr II	11	6811.76	Pr II	13	6832.00	Ta I	35	6858.70	Hf I
30	6785.12	Tb II	10	6812.03	Mo I	15	6832.44	V I	18	6860.39	Ti
55 c	6785.43	Ho I	26	6812.40	V I	14	6832.49	Y II	120	6860.93	Sm I
80	6786.00	Tc I	4000	6812.57	I II	45	6832.89	Zr I	1800	6861.15	Br I
15	6786.32	V I	7	6812.86	Mg II	800	6833.30	Pm I	20	6861.269	Ar II
26	6786.33	Gd II	17cw	6812.87	Pr II	4 h	6833.42	Pd I	35	6861.47	Ti I
30	6786.56	Be I	160 c	6813.25	Ta I	9000	6834.26	F I	15	6862.26	Ti III
2200	6786.74	Br I	180 c	6813.41	Re I	11 h	6834.30	Eu I	40	6862.82	Sm II
15	6787.15	Zr II	8	6813.51	Ru I	14	6834.925	Th I	4	6862.873	Th I
10	6787.18	Gd I	13	6814.04	Pr II	50	6835.03	Sc I	15	6864.25	Gd I
13	6787.23	Ru I	12	6814.56	Gd I	180	6835.42	Dy I	360	6864.54	Eu I
14 h	6787.48	Eu I	9	6814.92	W I	8	6836.95	Rn I	55	6865.13	Er I
8	6787.85	Mg II	14	6814.94	Co I	8	6837.57	Rn I	15	6865.13	Ta I
18	6788.52	Tm I	21	6815.16	Y I	20 h	6837.6	Te I	300 l	6865.45	Np I
150	6788.71	Xe II	35	6816.06	Eu I	40	6838.88	Mo I	600	6865.69	Ba I
40cw	6788.99	Ta I	300 s	6816.44	Np I	12	6839.58	V I	17cw	6865.85	Ho I
85	6789.27	Hf I	26	6816.49	Gd I	150	6840.29	Cl I	210	6866.23	Ta I
10 h	6790.0	Te I	35	6817.08	Sc I	17	6840.93	Eu I	5	6866.367	Th I
60	6790.00	Sm II	9	6817.61	Pr I	12	6841.90	V I	1000	6866.80	Pr III
6500	6790.04	Br I	12	6818.20	Dy I	60	6842.60	Pt I	3	6867.48	He I
13 c	6790.06	Ta I	15	6818.23	Ce I	25	6844.05	Sn II	300 h	6867.85	Ba I
30	6790.37	Nd II	30	6818.45	Si II	250	6844.157	Cu II	320	6868.791	Cu II
100	6790.37	Xe II	160	6818.94	Hf I	120	6844.26	Tm I	8000	6870.22	F I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
11 c	6870.44	Pr I	4 h	6900.13	In I	18	6934.05	Yb II	10	6966.5	Tl II
100	6870.455	Cs I	40	6900.43	Nd II	13	6934.10	Mo I	8	6969.49	Ta I
10 c	6870.88	V I	40	6900.55	Ta I	9	6934.23	W I	8 h	6970.38	Pr
19	6870.92	Nb I	29	6900.59	Zr I	150 w	6934.55	Pr III	500	6970.96	Pr III
150	6871.289	Ar I	14	6900.73	Gd II	12	6936.28	K I	8 c	6971.31	Ta I
8	6871.56	V I	50	6901.16	Th IV	5	6936.652	Th I	85	6971.53	Re I
100	6872.11	Xe I	4	6901.58	Os I	10	6937.37	Tm I	9	6971.53	Ta I
270	6872.231	Cu II	40	6901.98	Tb I	220	6937.553	Cu II	15	6971.66	Gd II
14	6872.40	Co I	150	6902.10	Ta I	50	6937.664	Ar I	3000 s	6972.09	Np I
9	6873.92	Ti I	15000	6902.48	F I	8	6938.47	Zn I	17	6972.49	Nb I
1000	6874.0	Ba II	25 c	6902.89	Nb I	20	6938.77	K I	8	6972.91	Rh I
40	6874.18	Tb II	500	6903.52	Pr III	8 h	6939.33	Ta I	200	6973.297	Cs I
12	6874.35	Ti III	60 h	6903.67	Eu I	10	6939.45	Ce I	19	6973.50	Ce II
8	6874.754	Th I	15 h	6903.80	Ho I	40cw	6939.49	Ho I	12	6974.50	V I
180	6875.27	Ta I	20	6904.36	Zr I	24	6941.39	Nd II	10	6975.91	Zr I
4	6876.01	W I	100	6904.678	Kr I	800 h	6942.11	Xe II	100	6976.18	Xe I
40	6876.36	Nb I	22	6906.53	Dy II	14 h	6942.52	Mn I	12	6976.35	Gd II
35	6876.74	U II	300 s	6907.13	Np I	3	6943.20	Zn I	80	6976.523	Y I
40	6877.49	Ta I	29	6907.37	Zr I	35	6943.611	Th I	5 h	6976.69	Tm II
4800	6878.38	Sr I	250	6907.461	Hg I	14 h	6943.70	Ti I	19	6976.7	Ho II
5	6878.70	Os I	250	6907.52	Hg I	8	6943.96	Lu II	150	6977.572	Cu II
270	6879.404	Cu II	35	6908.07	Nb I	1000	6944.94	Ce III	10	6978.27	Gd II
5	6879.582	Ar I	13	6908.20	Mo I	15	6945.21	Fe I	30 h	6978.48	Cr I
20	6879.94	Rh I	9	6908.26	Y I	10000	6945.72	Pa I	15	6978.51	Ti IV
27	6879.98	Er I	5	6908.29	W I	17	6945.98	Gd II	16	6978.71	Mo I
10000	6880.16	Pu I	3	6908.988	Th I	17	6946.07	Nb I	16	6979.15	Rh I
5 h	6881.62	Cr I	6000	6909.82	F I	20 c	6946.87	Ta I	19	6979.59	Hf I
300	6882.16	Xe I	7000	6910.14	Pr III	10	6947.39	Mo I	11 h	6979.82	Cr I
10 h	6882.38	Cr I	14 h	6910.17	Eu I	29	6948.46	Zr I	100	6979.83	Pr III
21 h	6883.03	Cr I	80	6910.22	Xe II	5	6949.54	Tm I	24	6979.88	Y I
9	6883.36	Ho I	19	6911.08	K I	29	6950.28	Dy II	8 c	6980.12	Pr I
1 h	6884.22	Be I	24	6911.227	Th I	24 h	6950.31	Y I	20	6980.22	Ra I
6 h	6884.44	Be I	45	6911.40	Hf I	45cw	6950.39	Ho I	26 h	6980.86	Gd I
7	6884.66	Pr I	26	6911.48	Ru I	30	6950.51	Sm II	21	6980.91	Hf II
21	6886.28	Mo I	300 h	6912.91	Np I	65	6951.26	Ta I	3	6981.086	Th I
29	6887.22	Y I	12	6913.19	Ti I	11	6951.42	Dy I	300	6981.886	Cl I
21	6887.63	Gd II	15cw	6913.47	Ho I	7	6951.478	Ar I	26	6982.01	Ru I
10	6888.174	Ar I	12	6913.85	Ti IV	10	6951.68	Y II	13 h	6982.44	Dy I
120	6888.29	Zr I	35	6914.01	Mo I	150	6952.871	Cu II	100	6982.75	Be I
13	6888.50	Ho I	10	6914.56	Ni I	150	6953.84	Zr I	35	6983.491	Cs I
22	6888.83	Dy I	30 h	6914.82	Eu I	45	6953.88	Ta I	23	6983.52	Ta I
20	6889.303	Th II	6	6915.86	Tm I	5	6954.657	Th I	10	6983.82	Ce II
10	6891.16	Rn I	5	6916.129	Th I	120	6955.29	Sm II	13	6984.27	W I
10000	6891.38	Pu I	100	6916.57	Gd I	13hl	6955.3	Ho I	6	6984.95	Os I
320 w	6891.5	In II	9	6916.70	Ho I	400	6955.52	Cs II	10	6985.11	Ho
10	6892.11	Pb I	20	6916.87	Zr I	500 s	6955.58	Am I	20	6985.15	Yb III
16	6892.36	Mo I	45	6917.31	Lu I	11	6956.02	Os I	50	6985.89	Gd II
1200	6892.59	Sr I	40	6918.32	Nb I	15	6957.74	Gd II	30	6986.02	Ce I
8	6892.71	Pr I	21	6920.62	Gd II	10	6958.04	Y I	25	6986.09	Nb I
15 c	6892.96	Ho I	110	6923.23	Ru I	40	6958.08	Dy I	10	6988.75	Gd II
10	6893.66	Ce I	27 h	6924.13	Cr I	1000	6958.78	I II	26	6988.94	Mo I
7	6894.00	V I	30	6924.81	Ce I	15	6959.24	Gd II	55	6989.656	Th I
10000	6894.59	Cf I	15	6924.99	Gd II	3000	6960.09	Pa I	500	6989.78	I I
4	6894.90	Mg I	17 h	6925.20	Cr I	7	6960.250	Ar I	12	6989.96	Mn I
c	6895.01	Cs I	100	6925.53	Xe I	10	6960.64	Mo I	85	6990.32	Nb I
21	6896.00	Y II	10	6926.19	Hf I	3000 h	6961.78	Pa I	5bl	6990.68	ScO
10	6896.12	Ti III	21	6926.49	Gd I	5 b	6963.12	ScO	120	6990.690	Se I
55	6896.37	Tb II	10000	6927.10	Cf II	300 l	6963.63	Np I	150	6990.84	Zr I
15	6896.77	Ta I	140	6927.38	Ta I	8	6964.12	W I	2000	6990.88	Xe II
17	6897.95	Ho I	15	6928.32	Zn I	7	6964.18	K I	4 h	6991.12	Bi I
15	6897.97	Dy II	140	6928.54	Ta I	14	6964.33	Gd I	13	6991.30	Dy I
10	6898.01	Mo I	100	6929.467	Ne I	12	6964.67	K I	100	6991.792	Se I
21	6898.21	Eu I	15	6929.55	Dy I	6	6965.40	Mg I	75	6991.92	Gd I
10	6898.45	Ce II	5	6929.88	Ir I	10000	6965.431	Ar I	150	6992.690	P III
6	6898.56	Tm I	1000 s	6930.31	Np I	65	6965.67	Rh I	3000 s	6992.73	Pa I
10	6898.98	Mo I	16	6932.38	Zr I	15	6965.947	Th I	24	6993.038	Th II
1000	6899.06	Pr III	300	6932.903	Cl I	180	6966.13	Ta I	21	6993.18	Gd I
65	6899.32	Dy II	14 h	6933.15	Ti I	4000	6966.35	F I	8	6993.27	W I
45 h	6899.95	Tb I	14	6933.52	Y I	60	6966.44	Zr I	4	6994.06	W I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
80	6994.32	Zr I	17	7024.58	Nd II	7	7054.74	Nd II	300 s	7080.01	Np I
9	6994.38	Ho	50	7025.03	Ta I	13 b	7054.80	LaO	13	7081.22	Mo I
110 d	6995.22	Ta I	5bl	7025.72	ScO	16	7054.97	Sm II	15 h	7081.30	Ta I
	6995.49	Ta I	21	7026.07	V I	200	7055.42	Rn I	250	7081.90	Hg I
17 c	6996.11	Nb I	3	7026.462	Th I	35	7055.95	Dy II	150	7082.15	Xe II
23	6996.63	Ti I	100	7027.40	Zr I	10	7056.43	Tm II	90	7082.37	Sm II
60	6996.76	Gd II	26	7027.98	Ru I	25	7057.36	Zr I	17	7082.85	Tb II
45	6998.10	Dy I	3	7028.68	W I	14	7057.96	Zr I	8	7082.93	Nd II
3 h	6998.36	Si IV	6 h	7029.40	Tm I	10	7058.02	Gd II	60	7083.97	Al I
10	6998.90	Rn I	70	7030.20	B II	12	7058.55	Er I	100	7083.99	Pr III
12	6999.13	Mo I	150	7030.251	Ar I	11	7058.68	Ce II	30	7084.171	Th I
20	6999.88	Yb II	7	7030.33	Hf II	80	7059.107	Ne I	18	7084.57	Ti III
1	7000.0	Ga II	5000	7030.39	Pr III	10000	7059.23	Pu I	70	7084.64	Al I
20	7000.21	Ta I	23	7031.24	Lu I	6000	7059.94	Ba I	45	7084.99	Co I
14 h	7000.71	Ho	13	7031.51	Ta I	11	7060.00	Ce I	200 c	7085.21	I II
17	7000.75	Gd II	40	7031.90	B II	22	7060.21	Mo I	21bl	7085.40	LaO
18	7000.806	Th I	26	7032.05	La I	8	7060.41	Mg I	20	7085.40	Ta I
18	7000.806	Th I	100	7032.413	Ne I	6	7060.654	Th I	40 d	7085.52	Sm II
22	7001.40	Er I	12	7033.	Bi II	15	7060.67	Os I	9	7086.06	Ru I
16	7001.58	Rh I	10	7033.21	Nd	5	7060.97	Tm I	500 c	7086.18	Tc I
16	7001.60	Mo I	12	7034.34	Tm I	7	7061.47	Nd II	35	7086.35	Ce II
360	7001.92	O I	250	7034.903	Si I	35	7061.75	Ce II	600	7086.814	Cl I
450	7002.23	O I	7	7035.13	Hf I	11	7061.90	Hf I	140	7087.30	Zr I
150	7002.37	Tc I	19 h	7035.18	Y I	300	7062.065	Se I	12	7087.35	Ru I
180	7003.567	Si I	8 b	7035.77	ScO	15	7062.87	Hf I	45bl	7087.89	TiO
15	7004.66	Ti I	14 h	7035.86	Ti I	13	7063.34	Mo I	26	7088.30	Sm I
40	7005.07	Ta I	2	7036.15	Bi I	7	7063.69	V I	11	7089.22	Tb II
10000	7005.19	Br I	7	7036.281	Th I	160	7063.83	Hf I	24	7089.339	Th II
10	7005.46	Zr I	13	7036.73	Sm II	11	7064.49	Ce I	25	7089.43	Zr I
180	7005.883	Si I	10	7037.04	Yb III	12 h	7065.04	Er I	12 h	7089.71	Nd II
9	7005.99	Tb II	150 h	7037.25	C III	200	7065.19	He I	16	7091.16	Sm I
45	7006.16	Gd II	21	7037.26	Gd II	30	7065.71	He I	200	7091.86	Hg I
35cw	7006.63	Re I	35	7037.30	Nd II	160	7066.23	La II	11 h	7092.08	V I
75	7006.96	Ta I	45000	7037.47	F I	8	7066.41	Nb I	12 h	7092.09	Nd
14	7008.35	Ti I	22	7037.98	Mo I	40	7066.89	Nd II	300	7092.27	As II
13 h	7008.97	Y I	17	7038.04	Nb I	10000	7067.218	Ar I	10000	7092.46	Pu I
10	7009.93	Y I	11	7038.76	Rh I	20	7067.44	Fe II	12 h	7092.74	Nd II
5	7010.79	Tm I	40	7038.80	Ti I	10	7068.09	Gd II	12 h	7092.94	Nd
17 h	7010.80	Nd II	40	7039.07	Ta I	65	7068.37	La I	23	7093.02	Ta I
200	7010.809	Se I	10	7039.13	Te II	4 h	7068.41	Si IV	60	7093.12	Tc I
14	7010.94	Ti I	300 s	7039.14	Np I	100	7068.736	Ar I	17 h	7093.98	Nd I
13 b	7011.22	LaO	90	7039.22	Sm II	10000	7068.90	Pu I	5 b	7094.38	ScO
150	7013.875	Se I	120	7040.20	Eu I	23	7069.11	Ti I	11 h	7094.40	Hf I
300	7014.02	Np I	26 b	7040.84	LaO	14	7069.84	Mn I	35	7094.46	Zr I
6 h	7014.31	Tm II	10000 l	7040.85	Bk I	5500	7070.10	Sr I	11 c	7095.18	Pr I
3	7015.319	Th I	90	7042.24	Sm II	21bl	7070.79	LaO	20 h	7095.42	Nd I
12	7015.38	Ti III	13	7042.40	Pr I	11	7070.99	Er II	8	7095.49	Ba III
10	7016.06	Te II	10	7043.78	Yb II	18	7071.00	Gd I	30	7095.50	Sm I
11	7016.44	Pd I	8	7044.45	Pr II	10	7071.93	Ti III	50	7095.59	Zr I
100	7016.57	Tc I	30	7045.795	Th II	23	7072.05	Ti	16	7096.33	Sm I
10	7016.60	Gd I	110	7045.96	La I	5 b	7072.37	ScO	14 c	7096.34	Lu I
30	7017.28	Si I	190 c	7046.81	Nb I	20	7072.64	Ti III	540	7097.70	Zr I
20	7017.42	Dy I	6 h	7047.94	Si IV	18	7073.63	Gd I	14	7098.11	Gd I
90	7017.646	Si I	13	7049.15	Sm II	10000 l	7074.52	Cf I	3	7098.22	W I
8	7017.88	W I	50	7049.369	Ge II	12	7074.54	Eu I	12	7098.58	Ho
10	7017.90	Tm I	14	7050.65	Ti I	19	7074.67	Sm I	14	7098.73	Gd I
10	7018.569	Th I	14	7051.00	Gd II	23	7074.79	U I	40 c	7098.94	Nb I
8	7018.85	Nd II	7	7051.07	Pr I	9	7075.13	Y I	10	7100.512	Th II
300 l	7018.91	Np I	3 h	7051.24	Ga I	24	7075.14	Dy II	15	7100.54	Hf I
7	7019.25	Hf I	50	7051.292	Ne I	100	7075.21	Pr III	3000 h	7100.94	Pa I
90	7020.44	Sm II	90	7051.52	Sm II	8	7075.23	Nb I	26bl	7101.02	LaO
17	7020.92	Nd II	7	7052.14	Nd II	24	7075.333	Th II	18	7101.27	Er I
40	7021.51	Pr II	21	7052.89	Co I	3000	7076.27	Pa I	27	7101.61	U I
200	7022.860	Cu II	29	7052.94	Y I	13	7076.38	La I	18	7101.64	Rh I
21	7023.48	Nb I	15	7053.619	Th II	4500	7076.62	Pr III	17cw	7102.01	Nb I
75	7023.67	La I	13 h	7054.28	Y I	330	7077.10	Eu II	6	7102.58	V I
90	7024.050	Ne I	12	7054.51	Ce I	10	7079.07	Ho	300	7102.72	As II
65cw	7024.15	Re I	40bl	7054.51	TiO	6	7079.78	Tm II	280	7102.91	Zr I
10	7024.53	Pr I	13	7054.62	Gd II	10	7079.99	Pr I	170	7103.72	Zr I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
15	7104.45	Rh I	17	7130.06	Nb I	25	7164.443	Fe I	20	7193.60	Pb II
30	7104.54	Sm I	6	7130.12	Ge I	6	7164.66	Eu I	30	7193.90	Si I
11	7105.04	Ce II	15	7130.94	Fe I	70	7164.69	Si I	570	7194.81	Eu II
10	7106.14	Tm I	19bl	7131.58	LaO	1000	7164.79	I I	300	7194.896	Cu II
19	7106.23	Sm I	13	7131.80	Sm I	500	7164.83	Xe II	600	7195.24	Ba I
100	7106.48	Eu I	570	7131.81	Hf I	100	7165.45	P I	10 h	7195.89	Tb II
5 h	7106.82	Ga I	3	7132.613	Th I	200	7165.545	Si I	10 h	7195.93	Y I
25	7107.478	Er I	12	7132.95	Zr I	100 w	7165.64	Pr III	14 h	7197.00	Er I
10000	7107.85	Bk I	27	7134.08	Mo I	8	7165.94	Lu II	5	7197.02	Ni I
8	7108.05	Ta I	13	7135.73	Gd II	26	7167.13	Ti	13	7197.08	Gd II
17	7109.26	Dy II	10	7136.01	Sm I	250 h	7167.24	Sr I	5	7198.62	W I
8	7109.67	Er I	7	7137.33	Pr II	7	7167.77	Pr II	7	7198.7	Ga II
3	7109.861	Th I	12 h	7138.14	Sc I	170	7168.37	Gd I	10	7199.00	Nd II
110	7109.87	Mo I	26	7138.91	Ti I	30	7168.896	Th I	7	7200.046	Th I
5	7110.90	Ni I	12	7139.39	Sm II	590	7169.09	Zr I	11	7200.16	W I
4 h	7111.18	W I	15	7140.52	W I	14	7169.13	Sc I	13	7201.41	Gd II
140	7111.68	Zr I	16	7140.74	Zr I	23	7171.53	Ti	11	7201.56	Ce II
500	7112.53	Pr III	50	7141.21	Ra I	3000 h	7171.55	Pa I	50	7201.62	Zr I
11	7112.69	Tb I	200	7141.28	Tc I	11	7171.79	Ti III	16	7201.89	Ce I
40	7112.82	Zr I	16	7141.42	Ce I	21	7172.26	Gd II	31	7202.19	Ca I
250	7113.18	C I	10000	7141.66	Pu I	10	7172.67	Sm I	15000	7202.36	F I
18	7113.52	Zr I	4	7141.72	Ru I	2 h	7172.9	Ga I	10	7203.55	Ce I
20	7113.73	Pr I	12 h	7142.04	Nd II	110	7172.90	Ta I	26 b	7203.64	TiO
20	7114.55	Pr I	2000	7142.06	I I	15	7173.373	Th I	65	7204.28	Tb I
10000 s	7114.89	Pa I	6	7142.55	Rh I	100	7173.938	Ne I	10	7206.33	Os I
11	7115.08	Ce II	9	7142.79	Lu I	300 l	7174.83	Np I	70	7206.980	Ar I
250	7115.19	C I	7	7143.10	Lu I	13 c	7174.91	Ta I	30	7207.381	Fe I
250	7115.63	C II	10	7143.72	Nd	13	7175.11	Dy II	35	7208.006	Th I
26	7115.96	Sm I	40 d	7143.98	Sm II	150	7175.12	P I	10 c	7208.85	Pr II
1 h	7116.3	Ga I	12	7144.47	Zr I	30	7175.55	Eu I	19 c	7208.94	Nb I
10 h	7116.77	Gd II	30	7145.390	Ge II	10	7175.92	Ti III	100	7209.13	Be I
10 h	7116.8	La II	22	7145.54	Os I	10000 l	7176.22	Bk I	260	7209.44	Ti I
10000	7116.88	Pu I	1000	7147.042	Ar I	120	7176.66	P I	5	7209.96	Os I
10 h	7116.90	Pr I	18	7147.31	Gd II		7177.	Fr I	12	7210.67	Ce I
200	7116.99	C I	50 s	7147.50	Xe II	10000	7177.14	Pu I	9	7210.95	Sm I
23	7117.51	Sm II	16	7147.89	U I	130	7179.90	F II	130 h	7211.79	F II
15 c	7117.52	Ta I	33	7148.15	Ca I	6	7182.00	Ni I	11	7212.69	Th I
11	7118.24	Pr II	24	7148.15	V I	7	7182.08	V I	250	7213.13	Kr II
20	7118.50	Ra I	5	7148.560	Th I	380 w	7182.9	In II	150	7213.20	Ne II
21	7118.86	Gd II	150	7148.63	Ta I	4	7183.71	Ir I	11	7213.27	Dy I
19	7119.31	Nb I	200	7149.03	Xe II	4	7184.10	Os I	23	7213.82	Sm I
55	7119.52	Hf I	85 d	7149.60	Sm II	12	7184.25	Mn I	60	7216.20	Ti I
500	7119.60	Xe I	10	7149.77	La I	70	7184.89	Si I	5	7216.35	W I
26 h	7119.81	Sm II	10	7149.89	Os I	300 l	7184.93	Np I	19	7217.36	Ce I
350	7119.90	C II	19	7150.23	Ce II	6 h	7185.01	Nd	10	7217.50	Ti III
500	7120.05	I I	8	7151.03	Nd II	7	7185.52	Cr I	570	7217.55	Eu II
2400 h	7120.33	Ba I	7	7151.36	V I	80	7187.313	Fe I	10	7217.755	Th II
11	7120.81	Dy II	10	7151.67	Ce I	10	7187.48	Tb I	11	7218.054	Th I
20	7121.27	Ta I	6	7153.09	Nd I	10	7189.09	Nd II	26 d	7218.09	Sm II
1200	7122.05	I I	60	7153.09	Sr I	16	7189.40	Ce II	9	7219.06	Rh I
26	7122.20	Ni I	6 h	7154.40	Be I	24	7189.42	Nd II	6	7219.26	Ru I
12	7122.40	Sm II	40 h	7154.65	Be I	28	7189.57	Gd II	21	7219.91	La I
35	7122.57	Gd I	10	7154.954	Th I	10	7189.57	Sm II	13	7220.07	Sm I
15	7122.95	Nb I	16	7155.25	Ce I	55	7189.89	Ti I	30	7221.84	Eu III
15	7124.13	Ti III	11	7155.40	Er II	7 h	7189.95	Pr I	100	7224.104	Kr I
11	7124.562	Th I	210	7156.70	O I	15 h	7191.1	Te I	12	7224.51	Fe II
10	7124.73	Ce I	16	7156.99	Ce II	40	7191.132	Th II	11 h	7224.68	Eu I
30 b	7124.9	TiO	200 c	7157.62	Tc I	5 h	7191.33	W I	20	7225.16	Ra I
23 h	7125.11	Sm II	15	7157.72	Yb III	13	7191.35	Ta I	9	7225.55	Ti III
40bl	7125.61	TiO	40 h	7158.08	La I	17	7191.37	Nb I	4	7226.06	W I
40	7125.72	Ta I	13	7158.28	Gd I	20	7191.40	Sn II	100	7226.206	Si I
25	7125.820	Ar I	15	7158.839	Ar I	400 d	7191.66	I I	8 h	7227.01	Nd I
45	7125.84	Lu II	130	7159.43	Nb I	35	7191.66	Y I	3000	7227.13	Pa I
35	7126.17	Nb I	10 h	7159.88	Pr I	10	7191.72	Ce I	700	7227.30	I I
30000	7127.89	F I	50	7161.25	La I	20	7192.01	Nd II	24	7227.70	Pr II
11	7127.92	Y I	5	7161.91	Er I	100	7192.8	Br III	10	7228.02	Gd I
30	7128.90	U I	10	7162.60	LaO	10	7193.17	Mg I	200	7228.536	Cs I
5	7128.94	Pb I	9	7162.64	W I	65	7193.58	Si I	600 h	7228.84	Ba I
29	7129.35	Nd II	10000	7162.69	Cm I	5 h	7193.6	Ga I	20000	7228.965	Pb I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
17 h	7230.04	Dy I	4	7257.72	Tm I	7	7284.904	Th I	700	7314.30	F I
10000	7231.09	Pu I	40	7257.73	Tb I	9	7285.29	Nd II	5	7315.067	Th I
800	7231.32	C II	10000	7258.06	Pu I	15	7285.81	W I	15	7315.56	Ti I
5 h	7231.33	Tm I	12	7258.17	Zr I	11 h	7286.16	Tm I	25	7316.005	Ar I
13	7231.53	Pr I	15	7258.72	Eu I	9	7286.36	Ta I	14	7316.30	Ti III
250	7231.62	Pr III	7 c	7259.21	Pr I	80	7287.258	Kr I	300 c	7316.52	Rb II
200	7232.27	Sr I	2000	7260.45	Br I	7 c	7287.61	Pr I	10	7316.68	Ti III
25	7233.45	Gd I	9 d	7261.52	Sm II	9	7288.56	Nd II	12	7316.81	Nd II
8	7233.45	Ta I	7 h	7261.64	Nd II	16	7288.92	Sm II	13	7317.03	Nb I
5	7233.74	Tm II	5	7261.93	Ni I	400	7289.173	Si I	5 h	7317.63	Fe III
19 h	7234.98	Tb I	100 w	7262.32	Pr III	7 h	7289.19	Pr I	90	7318.08	Zr I
150	7235.19	Ne II	6	7262.62	Hf I	10	7289.26	Te II	26	7318.39	Ti I
100	7235.326	Si I	12	7262.64	Ce I	3 h	7289.6	Ga I	3000	7318.79	Pa I
16	7235.71	Ce II	28	7262.66	Gd I	400	7289.78	Kr II	20	7319.84	Ta I
60	7235.82	Si I	30	7262.77	Eu I	13	7290.23	Sm I	75	7320.05	Hf I
6 h	7236.20	Cr I	19	7263.40	Ti	55	7290.26	Si I	6 h	7320.14	Fe III
1000	7236.42	C II	20 h	7263.5	Te I	6	7290.40	Ac I	40	7320.70	Fe II
15	7236.54	Nd II	35	7264.17	Y II	20	7291.00	Rn I	10	7320.91	La I
10	7236.62	Te II	14	7264.29	V I	10	7291.06	Mg I	6	7320.98	Rn I
1000	7236.78	I I	35	7264.76	Zr I	14	7291.35	Gd I	7 h	7321.43	Nd I
50	7237.01	Cd II	7 h	7264.82	Er II	6	7291.38	Nd II	8	7321.44	V I
13	7237.02	Sm II	11 h	7264.82	Ta I	5	7291.45	Ni I	16	7321.76	Hf I
650	7237.10	Hf I	15	7265.172	Ar I		7291.47	Ca II	10000	7322.23	Pu I
8	7237.12	W I	19	7266.29	Ti I	300 l	7292.29	Np I	100	7322.38	Tc I
500	7237.84	I I	7	7266.96	Ru I	13cw	7292.72	Re I	11 c	7322.72	Ta I
14ch	7237.98	Lu I	10	7267.58	Hf IV	9 h	7293.08	Y I	7	7323.12	Nd II
100 w	7238.26	Pr III	22	7267.62	Mo I	11	7296.17	Ce I	8	7323.56	Ru I
22	7238.36	Ce II	100	7268.11	Rn I	13 c	7296.32	Ta I		7323.89	Ca II
35	7238.92	Ru I	18	7268.18	Rh I	15	7296.55	W I	17 c	7323.92	Nb I
250	7240.21	Pr III	19 b	7269.05	TiO	6 h	7297.56	Eu I	7cw	7324.42	Pr I
410	7240.87	Hf I	26	7270.09	La I	5	7298.143	Th I	7	7324.808	Th I
60	7240.90	Sm II	10	7270.30	La I	3	7298.25	W I	18	7324.89	Gd II
12	7241.73	Ce I	3	7270.558	Th I	7	7298.72	Nd II	13	7325.95	Ta I
9	7242.08	Ho I	7	7270.664	Ar I	17	7300.19	Mo I	10000	7325.97	Pu I
3	7242.355	Th I	12	7270.67	Ti III	3 h	7300.62	Sc I	400	7326.008	Cu II
150	7242.50	Mo I	35	7270.82	Rh I	26 h	7300.72	Sm II	33	7326.15	Ca I
7 c	7243.26	Pr I	12	7271.94	Rh I	540	7301.17	Eu II	50	7326.51	Mn I
9 h	7244.41	Yb I	6	7272.29	Ta I	19	7301.42	Ce II	13	7327.08	Sm II
130	7244.86	Ti I	17	7272.62	Tm I	140	7301.74	Ta I	10	7327.82	Zr I
100	7245.167	Ne I	2000	7272.936	Ar I	200	7301.80	Xe II	29cw	7328.38	Nb I
40	7245.85	Mo I	5	7273.03	Rh I	35 h	7302.89	Mn I	7	7328.47	Pr I
65cw	7246.67	Re I	5	7274.47	W I	180 c	7303.4	In II	80	7329.14	Tc I
10	7247.82	Mn I	15	7274.81	Nb I	5	7304.68	Pb I	14	7329.73	Er II
10000	7249.26	Bk	160	7275.294	Si I	8 h	7305.22	Yb I	25	7329.91	Ce I
13	7250.01	Dy I	8	7275.57	Sc I	11	7305.405	Th II	8	7330.15	Pb I
30 h	7250.27	Ta I	210 c	7276.5	In II	20	7306.21	Zr I	7	7330.38	Ge I
9	7250.60	Ho I	30	7276.96	Ta I	10000	7306.94	Bk I	9 h	7330.62	Y I
180	7250.625	Si I	5	7277.54	Ta I	10000 s	7307.90	Cf I	300	7331.694	Cu II
9	7251.16	Os I	11 h	7277.90	Ce I	50	7307.97	Fe II	10000	7331.81	Pu I
10 h	7251.4	Ga I	10	7278.24	W I	14	7308.55	Ho	5000	7331.96	F I
130	7251.72	Ti I	13	7279.25	Sm I	10	7308.69	Ca III	300 l	7332.52	Np I
50	7252.35	Nb I	60	7279.90	Cs I	1000	7309.03	F I	13	7332.65	Sm I
10000	7252.50	Bk I	200	7279.957	Cs I	2500	7309.41	Sr I	5	7332.96	Y II
14	7252.70	Gd II	100 l	7279.997	Rb I	100	7309.95	Lu III	110cw	7334.18	La I
25	7252.75	Ce I	3000	7280.30	Ba I	13 h	7310.06	Pd I	6	7334.54	Nd I
6	7253.49	Os I	8	7280.9	Te I	200	7310.25	Lu III	16	7334.68	Ce II
400	7254.15	O I	50	7281.35	He I	10	7310.27	Ra I	50	7335.97	Zr I
450	7254.45	O I	26	7281.47	Sm II	11	7310.46	Eu I	55cw	7336.18	Eu I
16	7254.45	U I	11 h	7281.53	Eu I	14	7310.51	Tm I	11	7336.63	Tm II
320	7254.53	O I	8	7282.21	Sm I	15000	7311.02	F I	120	7336.77	F III
2000 h	7254.58	Y III	110cw	7282.34	La II	10	7311.02	Yb III	8	7338.04	Sm I
180 c	7255.0	In II	40	7282.81	Si I	17	7311.57	Tb I	40	7338.92	V I
5	7255.354	Th I	19	7283.33	Sm II	25	7311.62	Zr I	200	7339.30	Xe II
70	7256.08	Tc I	24 h	7283.82	Mn I	35	7311.716	Ar I	5	7339.606	Th I
7500	7256.62	Cl I	7 h	7283.95	Er I	10 h	7313.05	Yb I	11cw	7340.19	Ta I
9	7257.11	Sm II	300 l	7284.28	Np I	21	7313.28	Gd I	150 w	7340.69	Pr III
10 b	7257.16	LaO	8	7284.30	Tm I	19	7313.45	Ce II	8	7341.152	Th I
10000 l	7257.21	Bk I	100	7284.34	Xe II	12	7313.63	Eu I	25	7341.43	Ho I
12	7257.57	Sc I	100	7284.38	Cd II	35	7313.72	Zr I	12	7343.44	Ce I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
350	7343.70	Pr III	14	7376.41	Gd I	200	7405.36	Tc I	11 c	7435.19	Ta I
150	7343.94	Ne II	20	7376.46	Fe II	375	7405.774	Si I	25	7435.368	Ar I
50	7343.96	Zr I	26	7376.69	Sm II	160	7406.12	N I	200	7435.78	Kr II
120	7344.72	Ti I	13	7377.27	Gd II	265	7406.24	N I	15	7436.02	Nb I
7	7344.86	Pr	50bl	7379.71	LaO	10	7406.62	Nd II	10	7436.297	Ar I
17	7345.13	Dy II	12	7379.96	Ti III	400	7407.02	Kr II	21 h	7436.59	Eu I
65	7345.34	La I	85bl	7380.08	LaO	16	7407.56	Pr II	25	7437.56	Hf I
1000	7345.670	Cd I	13	7380.28	Gd I	11	7407.59	Dy I	11	7438.56	Ce I
4	7346.25	Eu I	20	7380.426	Ar I	160	7407.89	Ta I	110	7439.86	Zr I
40	7346.30	Hg II	10 h	7381.	Bi III	9	7407.95	Os I	5	7439.95	Tm II
160	7346.41	Ta I	10 h	7381.	Bi II	10	7408.13	Ti III	23	7440.17	Ta I
50	7346.46	Y I	300 l	7381.03	Np I	150	7408.173	Rb I	26	7440.60	Ti I
10	7346.676	Pb I	300 l	7381.65	Np I	1	7408.62	Sn II	11 c	7441.52	Lu I
26	7347.30	Sm I	7	7381.79	Nd II	200	7409.082	Si I	35	7441.85	Gd I
13	7348.49	Mo I	250	7382.277	Cu II	16	7409.35	Ni I	785	7442.29	N I
10000	7348.51	Br I	35	7382.73	La I	5	7409.70	Lu II	18 h	7442.39	Rh I
45	7348.88	Tb II	25	7383.63	Zr I	80	7410.01	Yb III	30 b	7442.92	LaO
5 h	7349.3	Ga I	10000	7383.980	Ar I	1000	7410.50	I I	200	7443.657	P IV
200	7349.75	Pr III	5	7384.175	Th I	6	7411.20	Nd II	12	7444.44	Ce I
16 h	7350.04	Yb I	7	7384.208	Ge I	50 b	7411.34	LaO	30	7444.56	Sm I
320 c	7350.6	In II	7	7385.08	W I	10	7411.39	Zr I	3	7444.749	Th I
300 w	7350.61	Pr III	4	7385.24	Ni I	15	7412.337	Ar I	10	7445.39	Te II
5	7350.814	Ar I	18	7385.501	Th I	24	7412.37	Dy I	26	7445.41	Sm I
500	7351.35	I II	9	7385.95	V I	5000	7414.11	Cl I	30	7445.746	Fe I
11	7352.16	Ti I	100	7386.00	Xe I	5	7414.51	Ni I	7	7446.77	Rh I
140 c	7352.86	Ta I	5 h	7386.64	Rh I	40	7415.35	Si I	13	7447.34	Mo I
65 c	7353.16	Nb I	5	7387.00	Mg I	275	7415.946	Si I	10000	7447.99	Pu I
70	7353.293	Ar I	4	7387.36	Eu I	500	7416.48	I I	25	7448.28	Yb I
5	7353.334	Ge I	12	7387.69	Mg I	8	7417.38	Co I	9	7448.71	Nd II
130	7354.94	F III	10	7387.79	Sn II	300	7417.53	Ba I	90	7449.16	Sc III
18	7355.37	Er I	12	7389.16	Eu I	12	7417.94	Ce II	300	7450.00	Rn I
100 w	7355.52	Pr III	18	7389.40	Ho	10	7418.18	Nd II	29	7450.30	Y II
85	7355.90	Cr I	20	7390.70	Hf I	3	7418.550	Th I	4	7451.39	W I
6	7356.10	Hf I	40	7391.36	Mo I	10	7419.04	Rn I	20 c	7451.74	Pr II
11	7356.34	Er I	27	7391.92	Pd I	13	7419.83	Nb I	600	7452.49	Tc I
35	7356.54	V I	1200	7392.41	Ba I	23	7422.28	Ni I	13 h	7452.85	Mo I
4	7356.65	Eu I	20	7392.980	Ar I	10	7422.75	Zr I	26 d	7453.03	Sm II
100	7356.96	Ta I	3	7393.431	Th II	425	7423.497	Si I	3	7456.37	W I
6	7357.10	Nd I	6 h	7393.49	V	685	7423.64	N I	15	7456.86	Yb III
90	7357.74	Ti I	16	7393.60	Ni I	6	7423.69	Hf I	8	7456.96	Lu II
11	7358.66	V I	150	7393.79	Xe I	15 h	7424.24	Tb II	20	7457.05	Dy II
20	7359.96	Ag I	16	7393.93	Ru I	85	7424.60	Si I	10	7457.85	Ti III
5	7361.349	Th I	13	7393.98	Sm II	11	7424.70	CeO	55	7459.55	Er I
24	7361.39	V I	10000	7394.26	Bk	10	7425.294	Ar I	900 h	7459.78	Ba I
110	7361.57	Al I	13	7394.90	Gd II	23	7425.50	U I	9	7460.42	Er I
13	7361.65	Mo I	100	7396.80	Tc I	60	7425.541	Kr I	12	7460.98	Te II
11	7362.25	Eu I	25	7397.77	Ce I	4000	7425.65	F I	60	7461.59	Tc I
140	7362.30	Al I	10	7398.27	Tb II	2000	7426.48	Pr III	50	7461.59	Th III
12	7362.49	V I	20 h	7398.6	Sn I	300	7426.57	Eu II	5 h	7461.89	Si III
24	7363.16	V I	210	7398.64	N I	55	7426.86	Dy II	150	7462.31	Cr I
60	7364.11	Ti I	10000	7398.69	F I	60	7427.15	Tc I	550	7462.370	Cl I
10 h	7364.41	Mo I	11 h	7398.77	Y I	9	7427.41	Nd II	20	7462.38	Fe II
6	7365.28	Hf I	10	7399.98	Yb III	18	7428.67	Er I	8 h	7462.62	Si III
75	7368.12	Pd I	130	7400.21	Cr I	21	7428.940	Th I	2	7462.993	Th I
10000 l	7368.25	Pa I	14	7400.90	Zr I	4000	7429.05	Pr III	50 h	7463.08	La I
90cw	7369.09	Ta I	3	7401.20	Be II	10 h	7429.62	Tb II	13	7463.86	Hf I
55cw	7369.60	Eu I	11	7401.27	Ce I	13	7430.19	Gd I	100	7463.96	Pr III
720	7370.22	Eu II	9	7401.31	Nd I	10	7430.254	Th I	30 h	7464.0	Ga I
11	7370.23	Dy II	2	7401.43	Be II	9	7430.80	Rh I	40	7464.36	Gd I
300 s	7370.60	Np I	5000	7402.06	I I	10000	7431.18	Pu I	50bl	7465.25	LaO
200	7372.118	Ar I	5	7402.252	Th I	14	7432.18	Tm I	95bl	7465.48	LaO
190cw	7372.50	Nb I	100 c	7402.61	Tc I	12	7433.08	Ce I	9 h	7466.32	Si III
35	7373.00	Si I	6	7402.64	Ge I	10	7433.10	Zr I	18	7467.57	Zr I
20	7373.50	Zr I	300 l	7402.70	Np I	10	7434.10	Mo I	30	7467.75	Ta I
14	7373.81	Gd I	20 h	7403.0	Ga I	150	7434.12	Tc I	900	7468.31	N I
6	7374.04	Nd II	110bl	7403.52	LaO	270	7434.156	Cu II	15	7468.75	Te II
6	7375.07	Os I	210bl	7403.75	LaO	65bl	7434.28	LaO	18	7468.91	Ru I
9	7375.57	Rh I	1000	7404.354	Cu II	110bl	7434.36	LaO	5000	7468.99	I I
20	7376.04	Dy I	11 h	7404.41	Eu I	5	7434.51	Tm II	120	7469.51	Er I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
8	7470.53	Eu I	2	7502.33	Bi I	10	7538.26	Nd II	9	7566.25	Ti III
13	7470.76	Sm I	23 h	7502.39	Sm II	6 h	7539.18	Er I	18	7567.740	Th I
8	7470.89	Rn I	20000	7503.869	Ar I	85	7539.23	La I	6	7569.23	Ta I
3000 h	7471.89	Pa I	7	7504.13	W I	800	7540.26	Tc I	17	7569.92	W I
9	7472.15	Tb I	13	7504.47	Mo I	20 h	7540.62	Zr I	23	7570.95	Sm II
10	7472.41	Ce I	100	7505.76	P I	5	7540.97	Nd II	10000	7571.87	Pu I
40	7472.439	Ne I	30 b	7506.79	LaO	14	7541.02	Pr II	23	7572.29	Sm II
9	7474.94	Ti I	15	7506.87	Ti III	23 h	7541.42	Sm II	11	7572.64	Mo I
12	7475.40	Ru I	10 h	7507.28	Tm I	8	7542.02	Rh I	10000	7572.93	Pu I
12	7475.74	Rh I	17	7507.68	Ti III	80	7543.39	Tc I	5000	7573.38	F I
210	7476.44	O I	10000	7507.80	Pu I	55	7543.73	Dy I	200	7574.02	Tc I
100	7477.24	O I	10	7509.00	W I	60	7544.044	Ne I	8	7574.05	Ni I
19	7478.20	Nb I	600	7510.73	Au I	12	7544.29	Ti III	6 h	7574.21	Er I
200	7478.8	Zn II	10 h	7510.74	Ho I	20	7544.59	Zr I	15 h	7574.44	Sc I
120	7479.08	O I	60	7511.045	Fe I	9	7544.74	Sm I	170 c	7574.58	Nb I
16	7479.58	Zr I	12	7511.16	Nd II	14	7545.78	Tm I	6	7574.86	Pr I
120	7480.67	O I	100	7511.17	Pr III	300 l	7546.05	Np I	200	7575.1	Se I
75	7481.08	Tm I	10000 l	7511.26	Bk I	10	7546.57	Sm I	30	7575.81	Ca II
10	7481.26	Te II	27	7511.40	Tb I	7	7547.00	Nd II	11	7576.95	Hf I
5	7481.28	Nd II	7	7511.57	Ge I	11000	7547.072	Cl I	8	7577.22	Rh I
10	7481.355	Th I	300 s	7512.22	Np I	6	7547.32	Eu I	20 h	7577.46	Dy II
26	7481.99	Sm II	40000	7512.96	Br I	10000	7547.45	Pu I	5	7577.54	Nd II
2200	7482.72	F I	17	7513.73	Nd II	70	7548.15	Sc III	10000	7577.80	Cm I
8	7483.13	Rn I	8	7514.13	Rn I	300	7548.45	Xe II	19	7578.09	Sm II
8	7483.35	W I	7 h	7514.44	Nd II	100 w	7549.20	Pr III	40cw	7578.73	Re I
75cw	7483.50	La II	15000	7514.652	Ar I	7	7549.314	Th I	12 h	7578.75	V I
22	7484.54	Tb I	900	7514.92	F I	9	7550.48	W I	450	7579.0	S I
7	7484.56	Hf I	300 l	7515.15	Np I	12	7551.	Bi III	500	7579.26	Tc I
140	7485.74	Mo I	14 h	7515.70	Zr I	10000	7551.12	Bk I	10000	7579.77	Bk I
26	7485.79	Ru I	65	7515.93	Nb I	10	7551.25	Ce I	12	7580.55	Ti I
100	7485.87	Hg II	7	7516.02	Nd II	29	7551.46	Zr I	17 h	7580.61	Tm I
12 h	7485.90	V I	17	7516.61	Dy II	10	7551.90	Be I	4	7580.76	Mg II
23	7486.01	Ta I	8	7516.92	Rn I	5000	7552.24	F I	60	7581.11	Ca II
16	7486.57	Ce II	10 h	7517.00	Sm II	17 h	7553.00	Dy I	27 h	7582.03	Tb II
100	7486.862	Kr I	12	7517.46	Hg III	14 h	7553.96	Sc I	5	7582.88	W I
16	7486.90	Pd I	12	7517.95	Zr I	2000	7554.18	I I	17 c	7583.21	Nb I
250	7487.40	Pr III	29 c	7519.77	Nb I	40	7554.70	Zr I	250	7583.4	Se I
600	7488.08	Ba I	9	7519.77	Tb II	140	7555.09	Ho I	160	7583.91	Eu I
12 h	7488.08	V I	30	7520.56	Ta I	19	7555.60	Ni I	200	7584.68	Xe I
90	7488.871	Ne I	3	7520.66	W I	27	7556.26	Er I	12	7585.69	Th I
2500	7489.16	F I	13	7522.76	Ni I	15	7556.37	Hf I	12	7585.792	Th I
550	7489.47	Cl I	150	7522.82	Ne II	6 h	7556.6	Ga I	30	7585.85	Sm II
26	7489.61	Ti I	10	7523.85	Ti III	500 d	7556.65	I I	15	7586.04	Fe I
75	7490.20	Tm I	6	7523.93	Rn I	10	7556.8	Te I	1000	7587.411	Kr I
500 c	7490.52	I I	12 h	7524.13	Sc I	6	7557.59	Tb II	27	7587.49	Tb I
5 h	7491.00	Eu I	300	7524.46	Kr II	11	7557.67	Rh I	7	7587.65	Nd II
9	7491.37	Ti IV	9	7525.12	Ni I	3000 h	7558.26	Pa I	10	7588.20	Gd I
100	7492.10	Ne II	50	7525.508	Th II	140	7558.33	Tm I	23	7588.31	Sm II
700	7492.118	Cl I	9	7526.45	Nd II	25	7558.45	Zr I	300	7588.5	Zn II
12 h	7492.44	V	10000	7526.93	Pu I	9000	7558.71	Y III	150 w	7588.64	Pr III
10000 h	7493.15	Pa I	11	7527.46	Ce I	10	7558.97	Pb II	18	7589.20	Ho I
200	7493.20	Pr III	30 h	7527.46	Yb I	26	7559.61	Ru I	9bl	7589.62	TiO
2	7493.427	Th I	11	7527.68	Ce I	27	7559.78	Dy I	9	7590.22	Ta I
3	7493.6	Ti I	19bl	7528.21	LaO	12 h	7560.03	Sm II	45	7590.24	Tb I
8	7494.77	Ti IV	50bl	7528.39	LaO	35bl	7560.09	LaO	5 h	7590.51	Er I
17	7494.88	Y I	50cw	7528.70	Eu I	12	7560.09	Zr I	6	7590.75	Nd II
40	7495.059	Fe I	12	7528.99	Nd II	500	7562.015	Cu II	9 h	7591.24	V I
12	7495.24	Rh I	500	7529.11	Pr III	12	7562.12	Zr I	27 h	7591.30	Dy I
9	7495.45	Tb I	7	7532.07	Ru I	12	7562.44	Ce I	1600	7591.61	Br I
11 h	7495.59	Pr I	22	7532.34	Er I	10	7562.86	Ce I	25	7591.87	Ho I
45	7496.12	Tb I	5 h	7533.02	Eu I	75	7562.93	Hf I	150	7592.2	Se I
19	7496.12	Ti I	30	7533.59	La I	19	7562.94	Sm II	35bl	7592.26	LaO
5 h	7496.20	Ho I	10	7533.73	Ce I	40	7562.96	Dy II	11	7592.96	Hf I
40bl	7496.50	LaO	45	7533.93	U I	55	7562.97	Gd I	9 h	7593.64	Ho I
95bl	7496.78	LaO	50	7534.27	Lu III	35	7563.13	Y I	20 h	7593.74	Tm I
50	7498.83	La I	80	7534.95	Tc I	10	7563.19	Gd II	7 h	7594.35	Ho I
6 h	7499.42	Pr I	80	7535.774	Ne I	10 h	7563.60	Ce I	1800	7595.07	Br I
17	7499.69	Tb II	7 h	7536.71	Y I	15	7564.22	Hf I	17	7595.07	Tm II
70	7499.75	Ru I	9	7537.45	W I	10000	7564.50	Pu I	11 h	7595.16	Mo I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
3	7595.51	V V	18	7621.50	Ru I	22	7654.45	Er II	8	7690.16	Mg I
300	7596.41	Pr III	500	7621.50	Sr I	4 h	7654.56	Si IV	20	7690.43	Ho I
65	7596.44	Tb I	21	7621.96	Gd I	3	7654.81	W I	20	7690.44	Eu III
14 h	7596.92	V I	19 h	7622.94	Y I	17	7655.00	Tm I	18	7690.83	Zr I
11	7597.33	Er I	6	7623.48	Er I	10	7655.78	Sm II	15	7691.55	Mg I
6	7597.55	Rn I	22 h	7624.05	Tb I	17 h	7656.76	Mo I	50 c	7693.15	Ho I
25	7598.	Bi III	360	7624.40	Hf I	10	7657.48	Rn I	13	7694.45	Gd I
10	7598.01	Sm I	90	7624.53	Tc I	20	7657.60	Mg I	1200	7694.538	Kr I
4	7598.204	Th I	24	7624.81	V I	12 h	7658.05	Er I	8 h	7694.74	Tb II
12 h	7598.28	V I	300 l	7624.83	Np I	4	7658.324	Th I	10 h	7695.78	Sm I
17 h	7601.18	Tb II	19 b	7624.99	LaO	29	7658.60	Zr I	12	7696.56	Nd II
8	7601.28	Rn I	100 w	7625.63	Pr III	19	7659.15	Mg I	450	7696.7	S I
80	7601.30	Ca II	10000	7626.79	Pa I	22	7659.25	Er I	500	7697.37	Tc I
2000	7601.544	Kr I	300	7626.85	Np I	17	7659.90	Mg I	30	7697.73	Sc I
11	7601.84	Mo I	5	7627.176	Th I	150	7660.26	Al III	8 h	7698.00	Y I
12	7602.31	Ho II	30	7627.81	Tb I	4	7660.32	Tm I	80 c	7698.19	Tc I
20	7602.32	Ca II	14	7627.98	Ho I	80	7662.36	Dy I	24	7698.96	K I
26	7602.95	Os I	40 c	7628.42	Ho I	6	7663.52	Nd II	750	7699.48	Yb I
10	7603.10	Ce I	450	7629.8	S I	21	7664.34	La I	2000 c	7700.20	I I
6	7603.73	Nd II	5	7629.85	Tm I	70	7664.41	Yb III	4	7701.01	W I
16	7605.35	Ho I	2 h	7630.50	Si IV	1000	7664.648	Cu II	5	7701.37	V I
5	7605.92	Nd II	3	7631.29	W I	25	7664.90	K I	4	7701.46	Os I
60	7606.16	Al I	10 h	7631.77	Sm II	4	7665.64	Er I	8 h	7701.46	Tm I
120	7606.8	Se I	10	7632.56	Pb II	14 h	7665.72	Sc I	450	7702.828	Cl I
80	7607.15	Zr I	100 c	7632.7	In II	7 h	7666.24	Tm I	25	7703.33	Nb I
7000	7607.17	F I	25000	7635.106	Ar I	11	7666.78	Dy II	14	7704.27	Zr I
6	7607.23	Er I	10000 s	7635.18	Pa I	19	7667.20	Sm II	8	7704.81	V I
23 d	7607.48	Sm II	220 h	7635.37	Al III	12 c	7667.30	Ho I	7	7704.98	Pr II
	7607.74	Sm I	3	7636.176	Th I	10000	7669.34	Pa I	11bl	7705.21	TiO
2	7607.824	Th I	450 h	7636.90	Ba I	100 w	7670.65	Pr III	22 h	7706.16	Tb II
10000 h	7608.20	Pa I	10 h	7637.	Bi II	200	7670.66	Xe II	100	7706.75	O I
13	7608.59	Hf I	10 h	7637.	Bi III	1800	7672.09	Ba I	8 h	7706.85	Ti IV
185	7608.80	N I	23	7637.94	Sm II	2300	7672.42	Cl I	10	7708.42	Zr I
150 c	7608.903	Cs I	9 h	7639.05	Tb II	8	7672.49	Sm II	4	7708.269	Th I
10000	7609.77	Pu I	9	7639.79	Nd II	25	7672.56	Gd I	15	7711.71	Fe II
13 h	7611.55	Dy I	13	7639.81	Nb I	8	7672.72	Tb II	23	7712.04	Sm II
10	7611.78	Gd I	7ch	7640.08	Lu I	400 h	7673.06	Sr I	10	7712.42	Mn I
13	7611.89	Re I	50cw	7640.94	Re I	100	7673.1	Br III	8	7712.68	Co I
14	7612.08	Zr I	35 h	7641.09	Dy I	10000	7673.79	Cm I	16	7714.32	Ni I
3	7612.18	W I	9 c	7641.14	Ho I	200 w	7674.65	Pr III	40cw	7715.06	Ho I
12 h	7612.36	Si III	150	7641.16	Kr II	8	7676.04	Tm II	35	7715.33	Dy I
150	7612.65	C III	500	7642.02	Xe I	10	7676.06	Gd I	5 h	7715.58	Ni I
100	7612.9	Zn II	600 h	7642.91	Ba I	7	7676.219	Th I	7000	7717.581	Cl I
19 h	7612.94	La II	100	7643.91	Xe I	4 h	7678.75	Si IV	6	7718.20	Nd II
5	7612.94	Ru I	45	7645.09	Sm II	10 h	7678.79	Sm II	5 h	7718.79	Si IV
11	7613.52	Er I	20	7645.64	Hf I	2	7678.93	Tl I	16	7719.05	Ho I
12	7613.94	Sm II	20	7645.66	Pr II	3000	7679.20	Pa I	19	7719.89	Y I
17	7614.15	W I	16 h	7645.67	Er I	13	7679.49	Mo I	10000	7720.47	Cm I
15	7614.50	Ti I	12	7645.82	Sm I	35	7680.01	Er I	27	7720.77	Mo I
5	7614.72	Nd I	17	7645.86	Dy I	12	7680.20	Mn I	16	7721.84	Pr I
90	7614.82	Al I	8	7646.00	Nd II	100	7680.267	Si I	11 h	7722.02	Ta I
17	7616.01	Tb II	12	7646.08	Ce I	300 s	7681.01	Np I	9	7722.14	Er I
25	7616.11	Ce II	13	7646.64	Dy I	150	7681.788	Cu II	1	7722.61	Mg I
2000	7616.41	Br I	30	7647.380	Th I	220	7681.97	Al III	18	7722.87	Ru I
23	7617.00	Ni I	13	7647.71	Nb I	12	7682.47	Ce I	15000	7723.761	Ar I
12	7617.05	Ho I	10	7647.88	Ce I	100 c	7682.9	In II	6 h	7723.82	Si IV
11	7617.45	Sc I	19	7648.02	Sm II	100	7684.45	Tc I	19	7724.08	Y I
11 h	7617.70	Dy I	4	7648.16	Ho I	1000	7685.244	Kr I	10000	7724.207	Ar I
8 h	7617.72	Y I	30 h	7648.28	Sb I	300 s	7685.25	Np I	100	7724.628	Ne I
60 w	7618.46	N V	100 w	7648.34	Pr III	30	7685.30	Sn I	2 h	7725.64	Si IV
80	7618.57	Xe II	5 h	7648.76	Tm II	21	7685.305	Th I	8	7726.19	Er II
10 h	7618.68	Be I	6	7649.62	Ta I	285	7686.1	S I	90 w	7726.2	C IV
20 h	7618.88	Be I	21	7650.32	Gd I	320	7687.78	Ag I	75 c	7726.68	Nb I
200 l	7618.933	Rb I	8	7650.63	Er I	6	7688.61	Te II	22 h	7726.97	Tb II
9	7619.21	Ni I	5 h	7652.12	Ti IV	13	7688.97	W I	19	7727.61	Ni I
16	7619.35	U I	700	7652.333	Cu II	25	7689.17	Ce II	30	7728.56	Sm II
7cw	7620.25	Re I	7	7652.89	Y I	10000	7689.40	Pu I	20	7728.82	Hg I
10 h	7620.5	Ga I	14 c	7653.80	Ho I	5	7689.49	Y I	4	7728.951	Th I
20	7621.17	Zr I	23	7654.44	Ti I	11	7690.05	Rh I	18	7729.72	Sc I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
45	7729.76	Dy II	4	7762.16	Er I	10	7799.36	Zn I	5 h	7833.39	Ru I
5	7729.91	Ru I	450	7762.24	N II	30	7800.008	Si I	10	7833.575	Ge I
10000 l	7729.93	Bk I	11	7763.11	Ta I	100 h	7800.01	Ga I	6	7834.32	Ir I
1 h	7730.47	Si IV	120	7764.03	Pd I	15000	7800.21	F I	8	7834.459	Th II
80	7731.53	Tm I	10 h	7764.72	Mn I	90000 c	7800.27	Rb I	40 w	7835.08	Sm II
10	7731.72	Th II	1000 l	7765.75	Np I	30	7800.44	Sc I	110	7835.25	B III
10	7732.33	Ce I	10	7766.48	Gd II	10	7801.54	Sm I	230	7835.31	Al I
300	7732.5	Zn II	10	7766.55	Zr I	4 h	7801.6	Ga I	290	7836.13	Al I
4	7732.96	Pb II	2200	7769.16	Cl I	6	7802.52	Y I	26	7837.27	Sm II
80	7733.50	Gd I	6 h	7771.06	Sc I	100	7802.65	Xe I	7	7837.63	Ge I
50 h	7734.77	Ga I	650	7771.09	Cl I	30000	7803.02	Br I	20	7838.12	Ra I
1000 l	7735.14	Np I	870	7771.94	O I	8 h	7803.32	Eu I	3	7838.70	Bi I
250	7735.69	Kr II	4	7771.948	Th I	17	7803.93	Tm I	9	7838.80	Er I
30	7736.26	Sm II	18	7772.90	Rh I	750	7805.184	Cu II	300	7839.055	Ne I
30	7737.63	Tb I	6	7773.06	Nd II	70 c	7806.8	In II	180 h	7839.57	Ba I
10	7738.43	Rn I	810	7774.17	O I	4	7806.82	Ru I	2	7840.33	Bi I
16 h	7738.98	Ho I	750	7775.39	O I	8	7807.33	Tb II	90 c	7840.9	In II
700	7739.04	Ce III	300 s	7776.07	Np I	1500	7807.659	Cu II	6cw	7841.27	Pr I
110	7740.17	Hf I	5	7776.20	Ge I	7	7808.10	Hg III	70	7841.41	B III
210 c	7740.7	In II	3	7776.73	W I	10	7808.47	Nd II	15 h	7841.80	Lu I
120	7740.74	Ne II	100 c	7776.96	In II	7	7808.96	W I	6 h	7841.90	Ra I
55 h	7741.17	Sc I	4 h	7778.27	Tm I	20	7809.259	Pb I	12	7842.59	Ce I
13	7741.80	Sn II	800	7778.738	Cu II	4	7809.78	Na I	20 c	7842.76	Ta I
500	7742.34	Pr III	9 c	7779.67	Ta I	100	7809.82	Rn I	10	7843.06	Ca III
60cw	7742.57	Eu I	1200	7780.48	Ba I	3	7810.24	Na I	60	7843.38	Ca II
40	7742.71	Si I	30	7780.59	Fe I	4	7810.625	Th I	11	7844.00	Er I
8	7743.57	Hf I	3000	7781.98	Pr III	3	7811.14	Mg I	80	7844.44	Sb I
4	7743.90	Nd II	12 h	7782.35	Tm I	35	7812.06	Dy I	10	7844.82	Sm II
450	7744.097	Cu II	11	7784.15	W I	17	7812.16	Y I	11 h	7844.87	Gd I
10000	7744.97	Cl I	15	7785.17	Sc I	8 h	7812.75	Sm II	22	7844.94	Ce II
250 w	7745.59	Pr III	8 h	7785.51	Tm I	3	7813.43	Ru I	310	7845.35	Hf I
70	7746.19	Eu I	7	7785.90	Tm I	70 c	7814.5	In II	250	7845.63	P II
1	7746.34	Mg I	6 h	7786.16	Pr II	35	7814.55	Hf I	10	7845.80	Gd I
20	7746.64	Rn I	5	7786.50	Mg II	200 w	7814.74	Pr III	35	7846.35	Gd II
150	7746.827	Kr I	27	7786.67	Pd I	60cw	7815.48	Ho I	15	7846.50	Rh I
11 h	7747.44	Er I	60	7787.04	Xe II	10	7815.80	Tl I	7	7846.56	Hf I
16	7748.35	Ce I	6	7787.11	Nb I	7 h	7815.9	Lu I	15	7847.540	Th I
19	7748.89	Ni I	300	7787.46	Np I	1	7816.15	He I	16	7847.55	Er I
4	7748.92	Nd II	15	7787.79	Th II	12	7816.32	Zr I	30	7847.80	Ru I
10000 h	7749.19	Pa I	13	7788.42	Y I	60	7816.74	Tc I	400	7848.80	Si II
35	7749.30	Gd I	15	7788.937	Th I	800	7817.72	Tc I	90	7849.35	Zr I
30	7749.30	Sm II	10	7788.94	Ni I	21	7817.771	Th I	500	7849.72	Si II
10	7750.	Bi II	180 c	7789.0	In II	5	7817.97	Pb I	30	7849.967	Si I
5 h	7750.37	Sc I	7	7789.96	Os I	8	7818.21	Eu I	50 h	7850.00	Sr I
10	7750.95	Nd II	40	7790.90	Hf I	8	7818.79	Te II	16	7850.02	Ce II
20	7751.29	Hf IV	4	7790.98	Mg II	7	7818.83	Nd II	16	7851.18	Ce II
20	7751.62	Dy II	1000 l	7791.38	Np I	110	7819.35	Zr I	8 h	7851.18	V
8 c	7752.01	Ho I	29	7791.61	Rh I	16	7820.15	Sm II	300 l	7851.44	Np I
5	7752.72	Sc I	22	7791.86	Ru I	40	7820.78	Ca II	7	7852.17	Os I
1 h	7752.91	Si IV	7	7792.22	Nd II	2200	7821.36	Cl I	6	7853.77	Ge I
500	7754.31	Pr III	2	7793.0	Ga I	11	7821.64	Sc I	15	7854.45	Mo I
22	7754.63	Er I	800 c	7793.04	Tc I	35	7822.94	Zr I	800	7854.821	Kr I
18000	7754.70	F I	22	7793.20	Tb I	40cw	7823.63	Ho I	29	7855.52	Y I
100	7754.97	Sn I	10	7794.50	Sm I	2	7823.82	W I	30	7855.79	Tb II
23	7755.20	Sm II	8	7794.68	Sc I	55	7824.91	Rh I	40	7856.08	Tm I
100 w	7755.48	Pr III	13	7796.32	Y I	5	7825.20	Nd II	100	7856.38	Tc I
10	7755.97	Gd I	6	7796.40	Nd II	1000	7825.654	Cu II	35	7856.93	Gd I
25	7757.31	Nb I	9	7796.69	Er I	40	7826.72	Zr I	22	7857.54	Ce II
300	7757.651	Rb I	7	7796.81	Hf I	500	7826.80	Ce III	6	7859.53	Sm I
5	7757.89	Hf II	8	7797.32	Nd II	1200	7827.23	Br I	350	7860.577	Cu II
200	7757.9	Zn II	35	7797.47	Er I	6	7829.01	Pb I	200	7860.89	C I
10000	7758.20	Pu I	13	7797.59	Ni I	4	7829.22	Tm I	200	7861.44	Tc I
300	7758.27	Ce III	10	7797.70	Ce I	17	7829.65	Mo I	8	7861.61	Te II
7cw	7758.30	Lu I	4	7797.89	Ru I	4	7829.81	Ru I	3	7861.67	Tm I
15	7759.1	Te I	60	7798.28	Tc I	15	7830.05	Rh I	12	7863.04	Nd II
1	7759.30	Mg I	5	7798.32	Nd II	1700	7830.75	Cl I	4	7863.47	W I
60	7759.436	Rb I	5	7798.360	Th I	10	7831.40	Sm II	19	7863.65	Sm II
5	7761.16	W I	10000	7798.54	Pu I	40	7832.22	Fe I	4	7864.023	Th I
300 l	7761.61	Np I	500	7798.98	I II	16	7832.91	Tb II	12	7864.49	Ce I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
6000	7864.53	Y III	10	7897.98	Zr I	2100	7933.89	Cl I	40	7964.83	La I
15	7864.99	Tb I	12	7898.46	Ca III	10	7934.50	Ce II	20	7965.	Bi II
14bl	7865.51	VO	500	7898.59	F I	1700	7935.012	Cl I	70	7965.45	Tc I
12	7865.95	Th I	14 h	7898.81	V	350	7936.31	F I	12	7965.73	Nd II
10	7866.04	Ce I	16	7898.96	Ce II	70 l	7936.45	Lu III	500	7967.34	Xe I
6 l	7866.10	Ac I	2300	7899.31	Cl I	700	7936.996	Ne I	450	7967.4	S I
1500 w	7866.14	Pr III	18	7899.55	Er I	19	7937.09	Sm II	450	7967.4	S II
30 h	7866.90	Sr I	11	7900.31	Th I	80	7937.131	Fe I	9	7967.84	Ru I
2	7867.04	W I	9	7900.40	Nd II	4	7937.732	Th I	11	7968.63	Dy I
70	7868.65	Sc III	300 l	7901.71	Np I	30	7937.84	Er I	500	7969.48	I I
14	7869.72	Gd I	700	7902.553	Cu II	24	7937.92	V I	40 h	7969.55	Sb I
35	7869.99	Zr I	10000 s	7903.90	Bk I	29	7938.06	Hf I	35	7970.306	Si I
400 d	7871.25	Tc I	3	7904.00	Sn II	30000 c	7938.68	Br I	18	7970.46	U I
14	7871.67	Pr I	290	7905.51	Al III	25	7938.89	Nb I	100	7971.46	Yb III
5 h	7872.03	Nd I	1500	7905.75	Ba I	20	7940.47	Zr I	6	7971.56	Tm I
3000	7872.95	Pa I	5 h	7906.03	Nd I	9	7940.92	W I	400	7972.033	Cu II
13cw	7873.41	Nb I	16	7908.46	Zr I	11	7941.72	Th I	7	7972.598	Th I
20 h	7874.00	Sr I	7	7908.71	Co I	11 h	7942.04	Cr I	1000 w	7972.75	Pr III
60 c	7874.76	Tc I	27	7909.38	Dy I	15	7943.14	Te II	20	7972.9	Te I
5	7875.36	Er I	75bl	7910.19	LaO	100	7943.15	O I	120	7973.62	Kr II
14	7876.25	Zr I	150bl	7910.54	LaO	2000	7943.181	Ne I	1500	7974.72	Cl I
21 b	7876.87	LaO	600	7911.34	Ba I	300	7943.882	Cs I	300 l	7975.98	Np I
12	7877.05	Mg II	65cw	7912.94	Re I	140	7944.001	Si I	1300	7976.97	Cl I
75bl	7877.22	LaO	8	7913.08	Er I	400	7944.438	Cu II	8000	7978.44	Br I
7	7878.12	Ge I	6	7913.11	Tb I	50 b	7944.61	LaO	10000	7978.57	Br I
3000	7878.22	Cl I	200	7913.423	Kr I	160	7944.61	Zr I	60	7978.88	Ti I
300	7879.18	F I	11	7913.52	Ce I	100	7944.66	Hg II	24	7978.974	Th I
8 h	7879.22	Ho I	1000	7914.00	Pr III	110bl	7944.95	LaO	8	7979.03	Er II
5	7879.36	Er I	26	7914.96	Sm II	3000 l	7945.56	Pa I	9	7979.07	Ti I
10 h	7880.01	Sm II	1800	7915.08	Cl I	60	7945.984	Fe I	35 b	7979.34	LaO
4	7880.40	W I	6	7915.19	Pr II	25	7946.75	Hg III	75bl	7979.70	LaO
6	7881.09	Pr I	45	7915.80	Pd I	100	7947.17	O I	600	7980.60	Cl I
100	7881.32	Xe I	8000	7916.71	Y III	235	7947.55	O I	35cw	7980.77	Re I
2500 s	7881.45	Br I	12	7917.01	Nd II	45000 c	7947.60	Rb I	8	7980.87	Er I
80	7881.49	Ru I	2	7917.44	Ni I	5	7947.93	Nd II	6	7981.20	Os I
2500	7881.57	Br I	5	7918.10	Tm I	3000	7947.94	Br I	110	7981.94	O I
2	7881.67	Mg I	90	7918.386	Si I	16	7948.12	Sm II	15	7982.09	Nd II
360	7881.79	Al III	130	7920.71	Hf I	5	7948.15	Ru I	135	7982.40	O I
110	7881.90	Y II	5 w	7921.17	Fe III	20000	7948.176	Ar I	100	7982.401	Kr I
50	7881.94	U I	15	7921.69	Te II	300	7948.64	Ce III	12	7982.68	Nd II
16	7882.18	Zr I	35	7921.85	Er I	30	7949.17	Ti I	12	7982.85	Dy II
100	7882.37	Ta I	11	7923.15	Mo I	10	7949.68	Nd II	5	7983.33	Ge I
150	7882.52	Al III	100	7923.16	Pr III	3000	7950.18	Br I	50	7984.51	Hg III
35	7885.31	Nb I	1000	7924.0	S I	30	7950.19	Ta I	11 h	7985.93	Tm I
6 h	7885.70	Tb I	16	7924.43	Ru I	10	7950.34	Te II	15	7986.60	Mo I
80	7886.27	O I	3000	7924.645	Cl I	210	7950.80	O I	190	7986.98	O I
6	7886.284	Th I	200	7924.65	Sb I	5	7952.07	Ta I	135	7987.33	O I
5	7886.48	W I	10	7925.03	Nd II	185	7952.16	O I	9	7987.38	Co I
7	7886.60	Nd II	5 l	7925.26	Rb I	650	7952.52	Cl I	11	7987.97	Th I
300	7887.40	Xe I	4	7925.54	Rb I	8	7952.93	Er I	1200	7988.163	Cu II
300 l	7887.88	Np I	2500	7925.81	Br I	10000	7953.17	Pu I	400	7989.41	Y III
35	7887.99	Eu I	120	7926.20	Ne II	5	7954.594	Th I	30000	7989.94	Br I
1000	7888.12	Pr III	400	7927.118	Ne I	8	7954.76	Nb I	340	7990.53	As II
6cw	7888.56	Pr II	10	7927.30	CeO	13	7955.31	Tb I	60 s	7990.68	Cs I
16	7890.37	Ru I	55	7927.51	Tm I	5	7955.37	K I	500	7991.01	Ce III
300	7890.567	Cu II	10	7927.72	Ce I	5 h	7955.38	Nd II	10000	7991.43	Y III
10	7891.075	Ar I	27	7927.90	Tb II	300	7956.32	F I	60	7993.05	Al I
80	7892.39	Yb III	90	7928.14	Sm II	80	7956.66	Zr I	5	7993.680	Th I
20	7893.10	Yb III	180	7928.597	Kr I	4	7956.83	K I	250	7994.73	Hf I
220	7893.34	Cl I	160	7928.8	S I	3	7957.06	W I	250	7995.07	O I
60	7894.64	Ho I	25	7930.25	Gd II	12	7958.95	Nd I	30	7996.53	Ti I
7	7895.08	Yb I	285	7930.3	S I	80	7959.98	Zr I	2900	7997.85	Cl I
16	7895.96	Sm I	7	7930.81	Mg I	500	7960.31	Ce III	11	7998.03	Tb I
13	7896.37	Mg II	110	7930.84	Tm I	18	7961.08	Pd I	6	7998.75	Ta I
12	7896.40	V	450	7931.7	S I	26 h	7961.58	Ti I	80	7998.939	Fe I
4 h	7896.50	Nd II	9	7931.92	Sm I	5	7962.26	Ge I	10 h	7999.33	Y I
5	7896.737	Pb I	120	7932.349	Si I	600	7962.62	Po I	500	7999.73	Tc I
400	7897.09	Pr III	1500	7933.13	Cu I	20	7963.63	Zr I	12	8000.76	Nd II
600	7897.98	I I	200	7933.22	Kr II	12	7964.51	Er I	4	8001.	Tl III

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
300	8001.0	Se I	7	8041.29	Os I	120	8081.1	Se I	9	8125.12	Sm II
17	8001.04	Tb I	10	8043.24	Nd I	2000	8082.458	Ne I	48	8126.23	Li I
250	8001.14	Pr III	99000	8043.74	I I	10 h	8082.5	Te I	48	8126.45	Li I
19 w	8001.61	Sm II	6	8044.165	Ge I	300	8084.12	Ce III	200	8126.55	Tc I
35 h	8001.89	La I	29	8045.36	Rh I	100	8084.34	Ne II	350	8126.56	F I
15 h	8002.55	Ga I	14 h	8045.71	V	1700	8084.51	Cl I	13	8128.76	Ta I
90	8003.19	Al I	60	8046.047	Fe I	30	8085.06	Tb II	600	8128.911	Ne I
7 h	8003.55	Ti	25	8046.05	Zr I	50	8085.176	Fe I	600	8129.26	F I
1000	8003.63	I I	3	8047.73	Mg I	5	8085.220	Th I	5	8129.407	Th I
160	8005.27	Zr I	40	8048.70	Sm II	2200	8085.56	Cl I	8	8130.0	Tl I
25	8005.4	Ag II	20	8049.00	Rn I	75	8086.05	La I	8	8130.39	Te II
20000	8006.157	Ar I	5	8049.85	Mg I	3000	8086.67	Cl I	10000	8130.86	Pu I
13	8007.27	Co I	12 h	8050.	Bi II	1300	8087.73	Cl I	30000	8131.52	Br I
9	8007.70	Nd I	20 h	8050.78	In I	60	8090.06	Be I	400	8132.23	Pr III
40	8008.	Bi III	400	8051.07	Cl I	1000	8090.76	I I	55	8132.82	Pd I
3	8008.59	Lu III	8	8051.33	Nd II	2000	8092.63	Cu I	60	8132.967	Kr I
13 h	8010.16	Tb II	35hc	8051.39	La I	150	8093.2	Se I	390	8132.99	Zr I
7	8010.58	Hf I	12	8051.89	V	70	8093.241	Si I	70	8133.05	Ca II
21 b	8014.43	LaO	16	8053.06	Zr I	14	8093.48	V I	40	8135.20	Nb I
2	8014.502	Th I	7	8053.308	Ar I	5	8093.626	Th I	2	8135.96	La III
14 h	8014.77	Tm I	60 s	8053.35	Cs I	9	8093.96	Co I	15	8136.20	Rh I
25000	8014.786	Ar I	6	8053.80	Tb I	10	8094.43	Ce I	3000	8136.406	Ne I
65bl	8014.79	LaO	8	8053.93	Ta I	250	8094.67	Cl I	11 h	8136.79	V I
19 w	8014.92	Sm II	7	8054.23	Mg I	150	8094.7	Se I	100	8138.34	Pr III
7	8015.47	Eu I	7	8054.89	W I	5	8095.29	Ge I	11	8138.477	Th I
2200	8015.61	Cl I	20	8055.29	Zr I	1000	8096.75	Ni II	11	8141.10	Pr I
100	8015.724	Cs I	6	8055.43	Pr I	10	8098.72	Mg I	10000	8141.29	Cf I
80	8016.01	F II	22	8055.64	W I	10	8099.17	Nd I	12	8141.75	Nd II
22	8017.19	W I	20	8055.76	Zr I	100	8099.51	Rn I	18	8143.139	Th I
20	8017.50	Ca II	20	8056.02	Yb III	10000 h	8099.84	Pa I	5	8143.19	W I
95	8017.90	Tm I	6	8056.15	Te II	20	8100.	Bi III	12	8143.27	Nd II
30 b	8019.48	LaO	25	8056.52	Hf I	5	8100.11	Ta I	29	8144.59	V I
50	8019.70	Ra II	200	8057.26	Xe I	100	8101.98	Xe I	10	8145.06	Au I
4 h	8020.07	Nd	60	8058.08	Zr I	8	8102.44	V I	18	8146.15	Gd I
20	8020.50	Ca II	200	8058.62	C I	10000	8102.54	Pu I	13	8147.29	Dy I
3 h	8021.33	Tm I	1500	8059.503	Kr I	9 h	8102.86	Si III	180	8149.3	Se I
6	8022.09	Ta I	5	8060.38	W I	3000	8102.90	Pr III	5	8151.64	Hg III
5	8023.03	Er I	120	8060.9	Se I	11 h	8103.45	Si III	150 h	8151.80	Xe I
1100	8023.33	Cl I	150	8061.34	Xe I	20000	8103.693	Ar I	150	8152.0	Se I
5	8024.253	Th II	30 h	8061.4	Te I	4000	8104.364	Kr I	20	8152.58	Zr I
55	8024.84	Ti I	11	8062.64	Th I	50	8105.14	Th III	1000 c	8152.65	Br I
23	8025.12	Sm II	150	8063.09	Zr I	12	8108.59	V I	10000	8153.75	Br I
30	8025.42	Tb II	7	8063.50	Rh I	9 h	8109.07	V I	25000	8154.00	Br I
30	8025.56	Ce II	5	8064.00	Nd II	9	8112.47	Ru I	8	8154.47	Te II
23 w	8026.32	Sm II	16	8065.16	Sm I	6000	8112.899	Kr I	9	8154.55	V I
2000	8026.35	Br I	120	8065.3	Se I	150	8113.528	P III	1	8154.64	Mg I
8	8026.35	Nd	300 d	8065.70	I I	200	8114.09	Sn I	300	8155.11	Np I
75	8026.50	Ta I	70	8065.97	Al I	500	8114.21	Ni II	2 d	8156.91	Pb II
2500	8026.54	Br I	50	8066.99	Cd II	10	8114.28	Zr I	200	8157.7	Se I
29 c	8027.39	V I	19	8067.35	Tb II	3	8114.42	La III	9	8158.54	Ta I
14	8028.13	V I	14	8067.44	Pr I	9	8115.22	Mg II	5 h	8158.99	Be I
5	8029.04	Ta I	30	8068.24	Ti I	35000	8115.311	Ar I	15 b	8159.02	LaO
100	8029.67	Xe I	45	8068.46	Sm II	120cw	8116.80	V I	2	8159.13	Mg I
21	8029.91	Rh I	15	8068.98	Ta I	9 w	8117.16	Sm II	10 h	8159.24	Be I
100 h	8030.5	Sn I	50	8070.	Bi III	10	8117.44	Yb III	300	8159.51	F I
400	8030.80	Ce III	790	8070.08	Zr I	1000	8118.549	Ne I	12	8159.729	Th I
10	8031.039	Ge I	16	8070.71	Ce I	250	8119.54	Pr III	70 c	8161.07	V I
6	8031.92	Pr I	20 h	8074.25	Ga I	20	8120.17	Zr I	26	8161.82	Sm II
16	8032.03	Sm II	110	8075.35	Al I	16	8120.36	Ce I	180	8163.1	Se I
11	8032.433	Th I	900	8075.52	F I	8	8120.43	Mg II	10	8163.125	Th II
14 h	8035.38	V	350	8077.52	F I	10	8120.93	Nd II	5 h	8163.18	Cr I
35	8035.619	Si I	13	8077.59	Gd I	30 h	8121.0	Sn I	27	8164.17	Tb I
12	8035.91	Er I	7	8078.11	K I	700	8121.48	Ni II	7 h	8164.97	Nd I
11 h	8036.09	Rh I	60	8078.92	Cs I	12	8122.07	Nd II	3	8165.72	W I
200	8036.4	Se I	350	8079.033	Cs I	15 b	8122.20	LaO	300 l	8167.42	Np I
15	8039.08	Ta I	10	8079.07	Eu III	10	8122.44	Te II	3 h	8167.5	Ga I
30 h	8039.3	Sn I	6	8079.62	K I	10cw	8122.78	Pr II	10	8168.001	Pb I
0000	8039.34	Pa I	25	8080.32	Hf I	13	8123.82	W I	800 c	8169.38	I I
1000	8040.93	F I	300 h	8080.32	Np I	300 s	8124.59	Np I	7	8169.788	Th I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
200	8170.55	Tc I	35	8203.07	V I	1 h	8240.61	Si IV	100	8275.39	La III
100	8171.02	Xe I	12	8203.199	Th II	16	8240.98	Sm II	10	8275.42	Gd I
14	8171.35	V I	7 h	8203.38	La I	15	8241.13	Sc I	18	8275.629	Th I
8000	8171.41	Y III	800	8203.78	Cl I	10	8241.55	Ce II	10	8276.6	Te I
5 h	8171.6	Ga I	130	8204.58	Hf I	24	8241.61	V I	55	8276.95	Hf I
13	8171.70	Tb I	150	8205.27	Tc I	10000	8241.77	Cf I	500	8277.560	Cu II
10 h	8172.21	Ti III	7 h	8205.38	Nd II	400	8242.39	N I	120	8278.07	P I
8	8172.56	Nd II	6	8206.30	Sm II	290 h	8243.59	Al III	5	8280.09	Ge I
9 h	8173.37	Ti III	700	8206.34	Xe I	250 w	8244.89	Pr III	7000	8280.116	Xe I
6	8173.84	Rn I	100	8206.49	Tc I	22 h	8245.06	Mo I	5 h	8280.39	V I
16	8173.89	Hf I	350	8208.63	F I	5000	8246.86	Br I	6	8281.04	Ge I
300	8174.51	As II	24cw	8209.80	Eu I	50	8247.44	La I	1500	8281.050	Kr I
16	8174.66	U I	10	8209.84	Mg I	300 l	8247.82	Np I	75	8281.62	Ta I
6	8177.31	Ra I	5	8210.22	W I	4	8248.76	Nd II	19	8282.37	V I
400	8177.33	Ce III	900 h	8210.24	Ba I	110	8248.80	Ca II	800	8283.160	Cu II
9 h	8178.00	Ti III	300	8210.72	N I	7	8248.81	Hf I	40	8283.81	Zr I
9 c	8178.16	Lu I	150	8211.31	Tc I	13 c	8248.95	Ta I	10 h	8287.07	Be I
600	8179.34	F I	5 c	8211.93	Pr I	5 h	8249.68	Nd II	300 l	8287.11	Np I
9	8179.83	Nd II	18000	8212.04	Cl I	9	8250.18	K I	200	8287.75	La III
7	8180.21	V I	280	8212.53	Zr I	10	8251.5	Te I	300 s	8287.75	Np I
5 c	8180.74	Ta I	95	8212.57	Tb I	8	8251.74	K I	19 w	8289.26	Sm II
5	8181.34	Pr II	20	8213.03	Mg I	5	8252.395	Th I	6	8289.93	Pr I
12	8181.85	Er I	10	8213.99	Mg II	250	8252.60	La III	10	8291.1	Te I
9	8182.41	Nd II	11	8214.33	Tb I	29 c	8253.51	V I	3	8292.529	Th I
10	8182.42	Ti III	2500	8214.73	F I	4	8254.07	Be I	5	8294.52	Tm I
150	8182.9	Se I	570	8216.34	N I	15	8254.7	Ag II	5000	8298.107	Kr I
300 l	8183.06	Np I	10 l	8217.20	Ca III	70	8254.73	Ca II	2000	8298.58	F I
5	8183.256	Na I	5	8217.711	Pb I	8	8255.61	Pb I	6000	8300.326	Ne I
400	8184.87	N I	11	8218.08	Gd I	29	8255.88	V I	45	8300.83	Pd I
100	8185.0	Se I	80	8218.365	Kr I	10	8256.013	Ge I	10	8300.88	Sm II
4	8185.58	Nd II	11	8218.62	Dy II	14	8256.67	Ca I	600	8302.40	F I
300	8186.03	Ce III	26 w	8218.76	Sm II	8	8259.08	Tb I	4 h	8302.74	Nd II
20	8186.44	Te II	150	8220.41	Fe I	2500	8259.379	Ne I	7	8303.31	Mg I
35	8186.71	V I	3000	8220.45	Cl I	3	8259.512	Th I	9	8305.60	Mg I
15	8186.914	Th I	20000	8221.74	Cl I	12	8261.09	Ce I	40 w	8305.79	Sm II
24	8187.33	V I	400	8221.82	O I	18	8262.06	U I	140	8305.90	Zr I
400	8188.02	N I	300	8222.16	Ce III	9 h	8262.57	Si III	13	8305.91	Hf II
300 l	8188.61	Np I	500 d	8222.57	I I	4 h	8262.80	Nd II	300 l	8306.22	Np I
12	8188.77	Zr I	7	8222.92	Mg II	3000	8263.240	Kr I	14 h	8306.31	Ti I
3000	8190.054	Kr I	400	8223.14	N I	9 h	8263.67	Ti III	9 h	8307.41	Ti I
7 h	8190.43	Si III	10	8224.74	Pt I	5	8264.15	Ge I	10	8307.72	Nd II
6	8190.94	Te II	5	8225.22	Ge I	10000	8264.522	Ar I	200	8308.15	Tc I
6 h	8191.16	Si III	7	8226.09	Ge I	100	8264.81	Ne II	8	8308.69	Ba III
300	8191.24	F I	15cw	8226.81	Eu I	20 d	8264.85	Ta I	200	8309.16	Tc I
8 h	8191.68	Si III	240 c	8227.0	In II	15000	8264.96	Br I	10000	8309.61	Pu I
6	8191.886	Pb I	265	8227.65	O I	18	8264.96	Ru I	10	8310.26	Mg I
9 h	8192.68	Ti III	265	8230.02	O I	20	8265.53	Dy I	9 h	8311.76	Ti I
7 h	8193.67	Rh I	9	8230.33	Sm I	5 h	8265.64	Si III	100 h	8311.86	Ga I
14	8194.19	Tm I	35	8230.642	Si I	2500	8266.077	Ne I	35	8312.82	Er I
2500	8194.42	Cl I	3000	8230.77	F I	500	8266.52	Xe I	8 h	8312.85	Ti I
120	8194.6	Se I	5 w	8230.88	Fe III	7 h	8266.72	Nd II	300 s	8313.66	Np I
40	8194.73	Zr I	2	8231.408	Th I	800	8267.117	Ne I	8	8314.51	Rn I
9 h	8194.75	Ti III	10	8231.52	Nd II	15 h	8267.32	Ti III	450	8314.7	S II
65	8194.82	Tb II	10000	8231.635	Xe I	8	8267.62	Ti	450	8314.7	S I
9	8194.824	Na I	5 w	8231.79	Fe III	8 h	8269.32	Si III	15 h	8314.92	In I
19 w	8195.50	Sm II	500	8232.19	F I	100	8270.96	Rn I	100	8315.00	Ne II
300 h	8196.48	C III	325	8233.00	O I	5 h	8271.38	Si III	10	8315.45	Sm I
11 h	8196.98	Sc I	7	8233.19	Mg II	40 l	8271.41	Rb I	60	8315.50	Tc I
27	8198.77	Dy II	11	8234.64	Mg II	30	8271.71	Rb I	13 h	8316.04	La I
29	8198.87	V I	150 w	8235.33	Pr III	10000	8271.87	Pa I	16	8318.35	U I
10000	8199.04	Pa I	120	8235.35	O I	6 h	8271.94	Si III	15	8320.857	Th I
2200	8199.13	Cl I	9 w	8235.45	Fe III	100	8272.353	Kr I	29cw	8320.93	Nb I
2200	8200.21	Cl I	8 w	8236.75	Fe III	75000 c	8272.44	Br I	250	8321.11	La III
5	8200.309	Cd I	500 c	8237.08	Tc I	40	8272.690	Pb I	4	8322.05	W I
250	8200.36	N I	30 h	8238.66	In I	4	8272.79	Nd II	20	8324.4	Ag II
100	8201.57	Dy II	6 w	8238.98	Fe III	500	8273.52	Ag I	8	8324.42	V I
100	8201.72	Ca II	13cw	8240.00	Nb I	15	8273.53	Te II	6	8324.50	Nd II
60	8201.73	Zr I	4000	8240.05	I I	1500	8274.62	F I	85	8324.69	La I
200	8202.72	Kr II	20	8240.37	Zr I	360 h	8275.11	Al III	35	8326.10	Dy I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
10	8326.86	Yb III	100	8372.11	Ne II	19	8416.98	Ti I	2200	8467.34	Cl I
120	8327.053	Fe I	10	8372.12	Te II	40	8417.13	Re I	8 h	8467.62	La I
30	8327.88	Yb III	9	8372.84	Co I	1000	8417.159	Ne I	30	8468.404	Fe I
15	8328.	Bi II	3000	8372.88	Np I	2	8417.54	K I	45	8468.50	Ti I
40 h	8328.44	Mo I	20	8373.6	Tl I	16	8418.23	Ce II	5	8468.84	Mg I
18	8328.57	Er II	4	8375.16	Nd II	4000	8418.427	Ne I	7	8469.8	Te I
9	8329.61	Y I	4	8375.33	Nd II	10 h	8419.91	Ga I	27	8472.01	Tm II
30	8330.451	Th I	99900	8375.94	Cl I	1	8420.00	K I	35	8472.42	Er I
14 h	8331.23	V I	8000	8377.606	Ne I	12	8421.227	Th I	19 w	8473.54	Sm II
20	8331.908	Fe I	100	8377.85	Ti I	300	8422.72	Sn I	11	8473.64	Ru I
4	8332.01	Nd II	15	8379.5	Ag II	200 h	8422.80	Sr I	7	8473.69	Mg I
14	8332.44	Zr I	8 h	8379.80	La I	10000	8423.49	Cf II	10	8474.27	Tl I
150	8332.99	C III	6	8379.84	Pr I	15	8424.41	Ti I	4	8475.14	W I
18000	8333.31	Cl I	5	8380.06	Hf I	20000	8424.648	Ar I	17cw	8475.98	Nb I
10000	8333.85	Cf II	10	8381.05	Rn I	8	8425.59	Rh I	10000	8476.13	Pu I
12	8334.37	Ti I	18	8381.87	U I	120	8426.16	O I	26	8476.48	La I
20000	8334.70	Br I	17	8382.08	Lu I	170	8426.52	Ti I	4000	8477.45	Br I
5	8335.07	Ra I	100	8382.54	Ti I	6 h	8427.82	Pr I	18	8478.360	Th I
520	8335.15	C I	180	8382.67	Cl II	15000	8428.25	Cl I	10	8478.492	Pb I
6	8335.54	Pb II	55	8382.82	Ti I	100	8428.91	As I	10 d	8478.50	Lu I
16	8337.50	U II	3	8382.94	W I	5	8429.42	Ge I	10	8482.21	Ge I
10	8338.04	Ca I	5	8382.98	Hf I	30 w	8432.64	Sm II	10 h	8482.67	Ho I
10	8338.08	W I	19	8383.71	Sm I	300	8433.87	Po I	45 h	8483.39	Mo I
10	8338.54	Ti III	1200	8384.04	Br I	50 c	8434.55	In II	11	8483.56	Ru I
12	8339.12	Ca I	200 h	8386.49	Ga I	490	8434.94	Ti I	800	8484.444	Ne I
1000 I	8339.12	Np I	6	8387.104	Th II	10000	8435.47	Pu I	45 w	8485.99	Sm II
14	8342.03	V I	19	8387.77	Sm II	240	8435.70	Ti I	1000	8486.11	I I
10000	8343.70	Br I	120	8387.770	Fe I	4	8435.77	Ru I	10	8487.48	Rn I
25	8344.25	Hf I	15	8388.	Bi II	24	8438.58	Dy II	30	8489.90	Yb III
24	8344.43	Y I	11	8389.06	Ta I	550	8438.74	N II	8	8492.2	Te I
29	8346.08	Nb I	10 h	8389.30	Ga I	40	8438.93	Ti I	15	8492.5	Ag II
15	8346.12	Mg I	45 h	8389.32	Mo I	17	8439.77	Nb I	10	8494.89	Rn I
12	8346.36	Nd II	120	8389.41	Zr I	150	8440.47	Se I	100 w	8494.99	Pr III
95	8346.53	La I	3	8390.22	K I	3000 h	8441.04	Pa I	5000	8495.360	Ne I
2000	8346.82	Xe I		8391.44	K I	16	8441.21	U I	10000	8495.75	Pu
100	8347.24	Xe II	7	8391.70	Ge I	40	8443.982	Si I	11	8495.82	Ce I
9	8348.28	Cr I	35	8392.01	Dy II	35	8445.39	U I	15	8496.04	Ti I
19 w	8348.68	Sm II	100	8392.02	Cl II	10	8445.47	Gd I	130	8498.02	Ca II
4	8348.81	W I	20	8392.27	Ar I	8	8445.8	Tl II	40	8498.44	Zr I
11	8348.98	Ru I	10000	8392.37	Cm I	810	8446.25	O I	12	8499.52	V I
30	8349.35	Sn I	10000 c	8393.30	I I	1000	8446.36	O I	300	8500.32	C III
10	8349.73	Gd I	12	8394.20	Ti III	21	8446.509	Th I	8	8500.8	Te I
6	8349.74	Rn I	4	8394.71	Nd II	40000	8446.55	Br I	40	8501.547	Si I
10	8350.04	Nb I	10	8395.68	Pb II	935	8446.76	O I	60	8502.221	Si I
10	8352.39	Ca I	5	8396.36	Ge I	25cw	8447.62	Ta I	13	8502.70	Tb I
6	8352.94	Ru I	75	8396.87	Ti I	18	8450.03	U I	250	8503.396	Cu II
14	8353.15	Ti I	11	8398.30	Gd I	40	8450.06	Tb II	11	8503.45	K I
9 h	8353.58	Pd I	20	8400.01	Yb III	6	8450.26	Cr I	10	8505.11	K I
15	8355.8	Te I	7	8400.85	Nd II	17	8450.36	Y I	120	8505.69	Sr II
300	8356.79	Np I	4	8402.60	W I	40	8450.89	Se I	8	8506.70	Ge I
80	8357.04	Sn I	7	8402.81	V I	150	8450.89	Ti I	13 h	8507.37	La I
11	8357.17	Ca I	18	8403.767	Th II	50	8453.17	Zr I	5	8507.66	Ge I
7	8358.72	W I	25	8403.8	Ag II	8 b	8453.55	LaO	29 c	8508.08	Lu I
4	8358.726	Th I	12	8405.85	Dy II	3	8455.24	Cr I	3000	8508.870	Kr I
3000 s	8358.98	Pa I	400	8406.199	Cl I	5 h	8456.87	Nd II	5	8510.621	Th I
1000	8360.71	Cl II	15000	8408.210	Ar I	9 h	8457.10	Ti I	30 w	8510.90	Sm II
2	8361.69	He I	100	8409.10	Pr III	35	8459.19	Lu II	750	8511.061	Cu II
560	8361.84	Cl II	2000	8409.19	Xe I	35	8460.01	Hf I	30 h	8511.80	Tb I
75	8364.24	Ti I	20	8409.384	Pb I	7	8460.79	Tm II	50	8512.94	Ho I
8 h	8365.64	Y I	55	8409.90	Er I	1500	8463.358	Ne I	1500	8513.38	Br I
1500	8365.749	Ne I	60	8411.69	Sb I	5	8464.230	Th I	13 h	8513.57	La I
7	8365.75	Tm I	120	8412.36	Ti I	50	8464.65	Zr I	15	8514.069	Fe I
300 I	8367.11	Np I	100	8412.430	Kr I	10 h	8464.66	Ho I	8 h	8514.65	La II
5	8367.58	Er II	70	8414.00	Zr I	6 h	8464.71	Eu I	50 h	8515.19	Xe II
8	8367.81	Ge I	150	8414.60	I II	8 h	8465.80	Tb II	5	8516.557	Th I
150	8367.84	P I	7 h	8415.51	Ga I	11	8466.18	Er II		8517.37	Li II
3000 s	8369.60	Pa I	5	8415.73	Ta I	2	8466.48	Mg I	14	8517.71	Er II
5 h	8369.67	Rh I	20	8416.64	Dy II	20	8466.87	Ti III	19 h	8518.05	Ti I
50	8370.23	Zr I	15	8416.729	Th I	19 h	8467.15	Ti I	40	8518.32	Ti I

Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength	Intensity	Wavelength				
20	8520.95	Rn I	750	8578.02	Cl I	250	8648.54	Xe I	4000	8698.53	Br I
1000 c	8521.122	Cs I	1	8579.74	Bi I	7	8649.92	Na I	110 h	8699.00	N II
18	8521.37	Er II	5	8582.03	Nd II	6	8650.89	Na I	5	8699.85	Ti III
12	8521.4	Te I	300	8583.45	La III	6	8652.42	Ge I	50	8700.25	In I
15000	8521.442	Ar I	45	8583.45	Tb II	25	8653.	Bi II	9	8700.60	Ge I
17 b	8526.59	LaO	18	8584.21	Zr I	3000 h	8653.51	Pa I	500 c	8700.80	I I
25	8526.99	Nb I	27	8585.11	W I	100	8654.14	As I	12 h	8701.05	Mn I
29cw	8527.73	Re I	450	8585.6	S I	15000	8654.383	Ne I	12	8701.09	Te I
13 h	8527.88	Gd I	75000	8585.97	Cl I	4000	8655.522	Ne I	2	8701.127	Th I
8 h	8528.94	Y I	9 h	8590.94	La I	500	8655.89	N J	11 h	8702.38	Ce II
3000	8529.96	Np I	4000	8591.259	Ne I	27	8655.94	Dy II	500	8703.25	N I
4	8530.53	Nd II	5	8591.53	Nd II	17	8657.68	Dy II	17 h	8703.76	Mn I
100	8531.06	Tc I	12	8591.838	Th I	60	8661.898	Fe I	2000	8704.112	Ne I
100	8531.46	P I	570	8594.00	N I	160	8662.14	Ca II	10 h	8704.85	Ag I
30	8532.	Bi II	10	8594.42	W I	10	8664.1	Tl II	13	8706.32	Sm II
8	8532.17	Pb I	7	8594.87	Nd II	1500 c	8664.95	I I	100 c	8707.21	Tc I
10000 h	8532.66	Pa I	10cw	8595.84	Ta I	10000	8665.02	Pu I	45 w	8708.43	Sm II
18 h	8532.74	Pd I	10000	8597.26	Pu I	10	8665.487	Th I	5	8709.236	Th I
6	8534.49	V I	9 h	8598.18	Ti I	5	8667.07	Nd II	7	8709.90	Pb II
10	8535.68	Te II	16 h	8599.10	Pd I	20	8667.22	B I	10	8710.18	Mg I
40	8536.165	Si I	6	8599.27	Ge I	4500	8667.944	Ar I	160 h	8710.54	N II
12	8539.08	Ce II	100	8600.07	Rn I	4	8668.116	Th I	100	8710.74	Ba II
14	8539.38	Ti I	9 b	8600.81	LaO	100	8668.26	Ne II	18	8710.76	U I
5	8539.795	Th I	18	8601.84	Ho II	70	8668.57	B I	22	8710.84	Ru I
170	8542.09	Ca II	5000 w	8602.74	Pr III	21	8668.63	Gd I	40	8711.24	Hf I
23	8543.22	Sm II	30	8603.40	Tb I	5	8669.60	Ge I	570	8711.70	N I
17 c	8543.46	La I	2000	8603.96	Rb II	40	8670.19	Ho I	12	8712.69	Mg I
100	8543.61	Tc I	50 h	8604.23	Xe II	10 h	8670.92	Mn I	6	8712.82	Nd II
2	8544.54	Bi I	10	8604.63	Te II	15	8671.	Bi III	5	8712.90	Ge I
600	8544.696	Ne I	6 h	8605.27	Pr II	12 h	8672.06	Mn I	10	8714.59	Pr II
7 c	8544.95	Pb II	7	8605.776	Ar I	19hw	8672.11	La I	6	8715.03	Nd I
65	8545.44	La I	75	8607.95	U I	15	8672.95	Te II	11 h	8715.95	Dy II
20	8545.61	Ho II	200	8609.134	Cu II	10 h	8673.97	Mn I	50 h	8716.19	Xe II
7 h	8546.07	Tm II	35 c	8610.98	Lu I	40	8674.43	La I	13	8717.83	Mg I
150	8546.48	Hf I	10	8612.64	Ce I	90	8675.39	Ti I	30 w	8717.89	Sm II
13 c	8547.25	Nb I	8	8613.27	W I	15	8675.83	Rn I	500	8718.83	N II
30	8547.36	Be I	100	8613.85	P I	220	8676.08	N II	5	8719.39	Pb II
60	8547.67	Be I	3	8614.50	W I	5	8677.48	Nd	30	8719.56	Sr II
40	8548.12	Ti I	23 w	8617.03	Sm II	12 w	8677.81	Sm II	13 h	8720.41	La I
6	8548.86	Cr I	500	8618.26	Po I	9	8678.25	Tb I	5	8722.810	Pb I
2200	8550.44	Cl I	100	8619.55	Sb I	17	8678.49	Dy II	14	8724.98	Ru I
11 h	8550.49	Ta I	3	8621.325	Th I	30	8678.95	In I	7	8727.77	Eu I
400	8552.60	Sn I	8	8621.68	Te II	5000	8679.492	Ne I	40	8728.011	Si I
6	8554.946	Th I	7 h	8624.22	La I	700	8680.28	N I	250	8728.89	N I
120	8556.780	Si I	6bl	8624.86	VO	285	8680.5	S I	3000	8729.82	Pu I
1000	8557.73	Br I	450	8628.54	Cl I	50 h	8681.7	Sn I	8	8732.401	Th II
1800 h	8559.97	Ba I	650	8629.24	N I	5000	8681.921	Ne I	10	8733.81	Te I
17 c	8560.54	Nb I	11	8630.12	Dy I	20	8682.63	In I	19	8734.69	Ti II
5	8563.49	Fe III	7 h	8632.1	Te I	30 h	8682.7	Sb I	6	8734.78	Ge I
15 b	8563.54	LaO	23 w	8632.82	Sm II	45	8682.99	Ti I	10	8734.86	Zr I
100	8564.71	As I	8	8632.9	Tl II	650	8683.40	N I	10	8734.99	Mg II
8	8564.89	Ge I	10	8633.95	Ca I	500	8686.15	N I	10000	8735.27	Pa I
11	8565.73	Tm II	6000	8634.647	Ne I	3500	8686.26	Cl I	17	8736.02	Mg I
1000	8566.28	Br I	150	8637.62	P I	110	8687.43	N II	100	8737.71	Ba II
200 w	8567.63	Pr III	3	8638.363	Th I	150	8688.621	Fe I	100 c	8737.93	Tc I
500	8567.74	N I	15	8638.47	La I	200	8688.91	Sr II	300	8739.39	Xe I
10000	8568.83	Cf II	20000	8638.66	Br I	23	8691.28	U I	30 h	8740.93	Mn I
9	8569.77	Ti I	10	8639.76	Rn I	6	8691.29	Nd II	21	8740.96	Nb I
16	8570.52	U I	3000 h	8639.91	Pa I	500	8691.58	Pr III	250	8741.54	P I
1000	8571.352	Ne I	160	8640.06	Hf I	10000	8691.94	Pu I	150	8742.33	Se I
150	8572.64	Sb I	290	8640.70	Al II	100	8692.20	Xe I	75	8742.451	Si I
10000 s	8572.96	Pa I	300	8641.71	Cl I	23	8692.33	Ti I	11	8745.66	Mg II
11	8573.122	Th I	21cw	8642.67	Eu I	450	8694.7	S I	200	8747.36	N I
20000	8575.24	Cl I	8 c	8643.43	Nd II	6	8695.07	Nd II	12	8747.6	Ag II
4	8575.35	Co I	4000	8645.09	Y III	1000 s	8696.23	Np I	18	8748.033	Th I
12	8575.78	Te II	30 h	8645.70	Ag I	11	8696.83	Dy II	250 d	8748.22	I I
17	8575.87	Nb I	3000	8647.041	Ne I	200	8696.86	Xe I	35	8748.38	La I
15	8575.92	Ta I	10 h	8647.66	Ce I	8 h	8697.32	Ho	12	8749.48	Zr I
200	8576.01	Xe I	50	8648.462	Si I	21 c	8697.55	Nb I	20	8750.40	Dy II

Intensity	Wavelength	Ion	Intensity	Wavelength	Ion	Intensity	Wavelength	Ion	Intensity	Wavelength	Ion
100	8752.009	Si I	15000	8819.96	Br I	6	8897.92	Te II	1000 I	9006.31	Np I
18	8753.69	U I	325	8820.43	O I	1000 d	8898.50	I I	10000 I	9016.18	Np I
2	8754.88	Bi I	135	8821.73	As I	60	8899.52	Zr I	3	9017.10	Ti III
30	8757.76	U I	15 h	8823.8	Sc I	1000	8900.92	F I	1 h	9018.16	Si IV
205	8758.18	Te I	12	8824.23	Fe I	13	8902.19	K I	30 h	9018.95	Sn I
100	8758.20	Xe I	10	8824.32	Mg II	12	8904.02	K I	300	9021.77	Rb II
15	8758.244	Th I	25000	8825.22	Br I	35	8905.78	Nb I	5000	9022.40	I I
30 w	8758.28	Sm II	35	8825.82	La I	1000 s	8906.02	Np I	350	9024.42	Br II
65	8761.35	Pd I	110	8828.91	Al I	2	8907.038	Th I	350	9025.49	F I
19 h	8761.40	Sc I	50	8829.78	Sc III	2	8907.81	Bi I	5	9031.819	Th I
200 c	8761.415	Cs I	200 c	8829.82	Tc I	100	8908.70	Pr III	160	9035.9	S I
3	8761.54	Bi I	500	8830.907	Ne I	200	8908.73	Xe I	3	9038.4	Ti I
4	8763.96	K I	12	8831.52	Te I	15	8909.18	Ca I	200	9038.61	Se I
150	8764.110	Kr I	21 h	8832.06	Gd II	100	8912.07	Ca II	2000	9038.982	Cl I
65	8765.74	Tb II	80 c	8832.6	In II	300	8912.78	F I	400	9042.10	F I
23	8766.64	Ti I	13	8833.08	Dy II	90	8912.90	Al I	18	9043.39	Te I
3	8767.05	K I	30 h	8834.35	Sc I	2200	8912.92	Cl I	2500	9045.43	Cl I
21	8767.97	Nb I	20 c	8834.49	Ho I	95	8913.66	Sm II	400	9045.45	Xe I
22	8768.64	Er I	11	8835.08	Mg II	450	8914.99	Ba I	25	9048.252	Th I
11	8770.36	Gd I	19 h	8835.85	Y II	90	8915.98	Ho II	10	9050.82	Pb II
500	8771.38	Pr III	70	8836.09	Zr I	300	8918.86	Se I	300	9056.53	Ce III
4000	8771.656	Ne I	3000	8836.16	Pu I	3000	8919.501	Ne I	160 d	9057.01	O I
20	8771.860	Ar II	17	8839.10	Nd II	60 c	8919.85	V I	15000	9058.33	I I
25	8772.14	Ce II	21	8839.63	La I	70 h	8922.56	Yb II	250	9061.43	C I
360	8772.87	Al I	5	8841.185	Th I	5	8923.31	K I	200	9062.47	C I
450	8773.90	Al I	180	8841.28	Al I	140	8923.56	Al I	2	9063.27	He I
11 h	8774.8	Sc	18	8842.073	Th II	20	8923.57	Mg I	10	9063.43	Pb II
8	8775.573	Th I	12	8842.61	Ca I	4	8925.44	K I	5	9063.953	Th I
11 h	8776.63	Er II	14 h	8849.14	Gd I	110	8927.36	Ca II	5	9068.785	Ge I
6000	8776.748	Kr I	180	8849.91	Ar I	2000	8928.692	Kr I	1000	9069.656	Cl I
9	8777.36	Ru I	24	8850.37	Dy II	200	8930.83	Xe I	2000	9073.17	Cl I
15 h	8778.71	Ti I	4	8850.4	Tl I	6000	8932.40	Br I	20	9075.394	Ar I
16 w	8780.59	Sm II	18	8851.15	Te I	29 c	8932.93	V I	200	9078.28	C I
12000	8780.621	Ne I	1000	8853.24	I I	20	8934.	Bi III	100	9079.46	Ne II
12	8780.83	Dy I	2000	8853.80	I I	1000	8942.70	Np I	300	9079.58	Ce III
6	8782.46	Eu I	7000	8853.867	Ne I	600 c	8943.46	Cs I	80	9083.14	Se I
10000	8783.753	Ne I	1000	8854.05	Pr III	30 h	8944.33	Ga I	250	9088.51	C I
13	8784.85	Gd I	20 h	8856.37	Ga I	40	8947.15	Cr I	120	9088.79	Se I
10	8786.23	Zr I	10	8857.457	Pb I	3000	8948.06	Cl I	60	9089.91	Al I
23 w	8788.83	Sm II	3000	8857.50	I I	1800	8949.39	Br I	10	9093.67	U I
6	8789.88	Ge I	26	8859.76	Sm II	16	8951.96	U I	450	9094.83	C I
35	8790.389	Si I	300	8860.98	Ba I	1000	8952.25	Xe I	6	9094.831	Th I
12cw	8790.88	Eu I	300	8862.32	Xe I	5	8955.848	Th I	5	9095.957	Ge I
45	8791.39	Dy II	9	8862.55	Ni I	2 h	8957.25	Si IV	1000	9098.86	I I
4	8792.058	Th I	25	8863.	Bi II	15	8957.97	Th II	16	9099.10	Ca I
12	8793.38	Fe I	1000	8865.306	Ne I	9000	8964.00	Br I	250	9099.98	Pr III
10000 c	8793.47	Br I	13	8865.53	W I	400	8964.69	I I	13	9105.62	Ca I
15 h	8794.72	Sc I	1000	8865.755	Ne I	12	8967.47	Ca I	3	9107.225	Th I
10	8795.76	Gd I	30	8865.89	Sc III	40	8967.641	Th I	12	9108.82	Ca I
10000	8796.21	Y III	9	8866.84	Er II	100	8969.69	Se I	300	9111.80	C I
300 h	8799.76	Ba I	20	8866.96	Fe I	12	8971.62	V I	12000	9113.91	I I
95	8800.62	Y I	18 h	8867.31	Gd I	5	8976.75	Tl I	8000	9116.59	Y III
300	8801.37	Be I	40 I	8868.512	Rb I	19	8976.83	Cr I	2	9118.140	Th I
3	8804.590	Th I	15	8868.834	Th I	300	8978.88	Rb II	120	9118.29	O I
16	8804.98	Zr I	30	8868.852	Rb I	100	8981.05	Xe I	7500	9121.15	Cl I
16 h	8805.48	Ho II	100	8869.66	As I	3	8987.408	Th I	35000	9122.967	Ar I
14	8806.76	Mg I	18	8870.30	Eu I	200	8987.57	Xe I	600	9128.03	I I
900	8807.58	F I	50	8872.17	P I	2000	8988.57	Ne I	20	9130.	Tl II
10	8807.75	Rn I	360	8874.5	S I	7	8989.03	Mg I	20	9130.5	Tl I
20 h	8808.75	Ga I	4	8875.233	Th I	16	8989.92	U I	250	9131.90	Pr III
2	8809.42	Ni I	15	8881.58	Sc III	9	8991.69	Mg I	30	9132.21	Sb I
12	8810.84	Ce I	6	8882.18	Be I	400	8993.13	I I	80	9134.71	O I
100 w	8813.5	In II	110	8882.5	S I	10	8997.16	Mg I	10	9139.56	U I
30 h	8813.56	Ga I	220	8884.2	S I	15	8999.56	Fe I	70	9139.95	Al I
35	8814.29	Sc III	125	8886.17	Pr III	15	9000.9	Ag II	80	9140.83	Se I
29cw	8815.56	Nb I	4000	8888.98	Br I	200	9001.97	Se I	3000 I	9141.30	Np I
19	8818.93	La I	30	8891.20	Ce II	81	9004.37	Te I	6000	9148.67	Ne I
3	8819.15	Co I	40	8894.47	In I	65	9004.73	Hf I	80	9150.14	O I
5000	8819.41	Xe I	30000	8897.62	Br I	1000 s	9004.75	Np I	80	9151.48	O I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
4	9153.88	Na I	40000	9265.42	Br I	175	9388.56	Pr III	25	9505.30	F I
235	9156.01	O I	250 w	9265.56	Pr III	300	9391.36	Rb II	10	9505.392	Th I
500	9162.65	Xe I	490	9265.94	O I	40	9392.74	Be I	235	9505.59	O I
30000	9166.06	Br I	640	9266.01	O I	570	9392.79	N I	40	9509.4	Tl I
100	9167.52	Xe I	10	9266.208	Th I	1500	9393.862	Cl I	200	9513.38	Xe I
40	9170.00	Sr I	135	9267.28	As I	6	9398.868	Ge I	4	9516.60	He I
10	9170.08	In I	60	9271.12	Se I	15	9399.085	Th I	400	9518.68	Sb I
3	9170.825	Th I	1000	9275.52	Ne I	185	9399.19	O I	8	9521.76	Ba III
10	9171.14	Ca I	10	9276.276	Th I	200 h	9402.82	Kr II	210	9521.96	O I
350	9172.322	Cs I	10	9276.44	U I	800	9405.73	C I	30 l	9522.65	Rb I
15000	9173.63	Br I	20	9283.90	Sr I	50 h	9410.86	Sn I	5	9523.05	Rb I
20000	9178.16	Br I	200	9287.56	Ne II	40 h	9411.25	Sr I	120	9523.36	O I
350	9178.68	F I	4000	9288.86	Cl I	100	9412.72	Si II	120	9523.96	O I
60	9181.88	Se I	10	9289.563	Th I	285	9413.5	S I	30	9525.78	P I
2 h	9183.1	Tl I	150	9290.65	Al II	100	9413.506	Si I	3	9526.17	He I
120	9184.38	La III	110	9290.75	Al II	25	9414.96	Mg I	100	9528.28	O I
40	9190.45	Be I	400	9291.531	Ar I	80 h	9415.37	Sn I	1	9529.27	He I
3000	9191.731	Cl I	20	9292	Cd I	25	9416.97	Ca I	3000	9533.07	Pu I
550	9194.638	Ar I	10000	9293.25	Cm I	285	9421.9	S I	5000	9534.16	Ne I
30	9195.30	I II	8	9293.476	Pb I	5000	9425.38	Ne I	10	9534.88	Ca I
12	9196.80	Te I	500 h	9293.82	Kr II	4000	9426.71	I I	20 l	9540.18	Rb I
500	9197.596	Cl I	100	9294.10	Sr I	3000	9427.15	I I	5	9545.97	H I
120 c	9197.7	In II	200	9300.61	As I	20	9427.99	In I	3000	9547.40	Ne I
10	9201.51	U I	6000	9300.85	Ne I	10000 s	9429.13	Bk I	11	9548.38	Ca I
6000	9201.76	Ne I	15	9306.60	Sr I	17	9429.81	Mg I	175	9549.77	Pr III
120 c	9202.0	In II	300	9308.08	Ba I	10	9431.603	Th I	10	9561.24	Th I
10	9203.963	Th I	1500	9310.58	Ne I	100	9432.50	Se I	10000	9567.08	Cm I
30	9204.50	Sr I	90	9312.00	Ca II	19	9432.76	Mg I	300	9567.37	Ce III
15	9206.78	Te I	3000	9313.97	Ne I	200	9433.67	F I	100	9567.97	Ca II
17	9207.64	Te I	4	9317.722	Th I	300	9434.04	Br II	290	9571.52	Al III
100	9208.538	Cs I	30	9319.20	Sr I	285	9437.1	S I	120	9577.01	Ne II
2	9210.34	He I	10000 s	9319.30	Bk I	15	9438.05	Pb I	500	9577.52	Kr II
100	9212.63	La III	100	9319.56	Ca II	20	9438.78	Mg I	100	9579.74	Pr III
450	9212.9	S I	125	9320.54	Pr III	400 h	9448.95	Sr I		9581.42	Li II
220 w	9213.0	In II	110	9320.65	Ca II	3500	9452.10	Cl I	1000	9584.801	Cl I
110	9213.90	Ca II	15000	9320.86	Br I	300	9455.92	Ba I	300 h	9589.36	Ga I
14	9218.25	Mg II	200 h	9320.99	Kr II	10	9456.80	Ca I	450	9589.37	Ba I
300	9219.69	Ba I	300 h	9324.58	Ba I	3000	9459.21	Ne I	50 h	9591.35	Xe II
4000	9220.06	Ne I	6000	9326.51	Ne I	250	9460.68	N I	3500	9592.22	Cl I
2000	9221.58	Ne I	50	9327.02	Rn I	15	9461.030	Th I	25	9593.54	P I
200	9222.32	Pr III	10	9327.54	Mg II	10	9463.61	He I	20 h	9594.25	Ga I
15000	9224.499	Ar I	400	9328.20	Ce III	6	9465.94	Na I	15	9595.70	K I
3	9224.64	Rb I	250	9334.33	Pr III	3000 l	9468.66	Np I	600	9596.00	Sr I
4	9225.	Tl II	1000	9335.05	I I	12	9469.00	Te I	14	9597.83	K I
2000	9226.69	Ne I	10000	9337.70	Cf	200 h	9470.93	Kr II	230	9597.95	As I
600	9227.74	I I	300	9338.87	Rb II	15	9474.882	Th I	2000	9598.22	I I
250	9227.87	Po	10	9340.54	Mg II	20	9474.993	Ge II	110	9599.24	Ca II
450	9228.1	S I	7	9340.706	Th I	20	9475.645	Ge II	80	9601.82	Ca II
10000 l	9228.52	Cf	1 h	9343.89	Be II	2	9476.43	Be II	150	9603.03	C I
2	9234.25	Rb I	7	9347.24	K I	16	9477.03	Be II	1	9603.42	He I
450	9237.5	S I	3	9349.25	K I	1000	9479.32	Rb II	10	9604.28	Ca I
500	9238.48	Kr II	40 h	9349.83	In I	10 c	9480.33	I II	15	9604.297	Pb I
160 d	9241.1	In II	6	9351.59	K I	120	9481.16	O I	500 h	9605.80	Kr II
20 h	9243.92	Be I	1600	9354.220	Ar I	120 d	9482.88	O I	360	9605.99	Al III
13	9244.27	Mg II	300	9361.95	Kr II	5000	9486.68	Ne I	6	9608.73	Pb I
2 d	9245.28	Pb II	100	9362.082	Kr I	500	9486.964	Cl I	900	9608.88	Ba I
500 c	9246.41	Rb II	300	9367.03	Ce III	235	9487.43	O I	300	9612.99	Rb II
12	9246.50	Mg I	1500	9370.06	Ba I	4	9492.559	Ge I	8	9613.689	Th II
2 h	9252.6	Tl I	60 h	9370.27	In I	140	9492.71	O I	150	9616.40	Sn I
3	9254.	Tl II	2000	9373.31	Ne I	200 h	9492.92	Ga I	400 h	9619.61	Kr II
10	9254.28	Au I	200 w	9373.50	Rb II	200 h	9493.12	Ga I	250	9620.80	C I
30	9255.78	Mg I	100	9374.76	Xe I	700 l	9493.72	Rb II	100	9622.13	O I
450	9260.81	O I	175	9377.44	Pr III	15	9495.501	Th I	300	9624.70	Sr I
490	9260.84	O I	3000 s	9379.33	Np I	15	9497.191	Th I	120	9625.29	O I
450	9260.94	O I	60	9380.45	Sr I	265	9497.97	O I	7	9625.664	Ge I
400	9262.58	O I	5	9384.35	Pb I	160	9499.30	O I	290	9626.70	As I
540	9262.67	O I	5	9385.89	Pb I	8	9502.45	Mg I	12	9631.89	Mg II
590	9262.77	O I	10	9385.90	U I	7	9503.11	Mg I	11	9632.43	Mg II
10	9265.34	U I	500	9386.80	N I	5	9503.43	Mg I	250	9632.509	Cl I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
12	9632.647	Th I	500	9813.213	Cu II	689	9956.30	Te I	400	10123.602	Cs I
100	9638.10	Sr I	10	9819.00	U I	285	9958.9	S I	10000	10126.20	Bk I
300 h	9645.72	Ba I	10	9819.05	U I	37	9959.93	Te I	110 h	10126.27	N II
100 h	9647.70	Sr II	15	9822.11	F I	500	9960.354	Cu II	750	10131.16	I I
10000	9649.51	Cf	60	9825.58	Se I	7	9961.28	Na I	15	10133.56	Th II
2000	9649.61	I I	10	9826.45	Th I	160 h	9961.86	N II	1	10138.50	He I
650	9649.9	S I	40	9827.78	Bi I	10	9964.11	U I	15	10138.8	Bi I
3000 d	9653.06	I I	250	9827.978	Cu II	220 h	9969.34	N II	2000	10139.75	Hg I
10	9653.26	U I	1500 h	9830.37	Ba I	325	9977.13	Te I	3000	10140.08	Br I
2000 d	9657.04	Bi I	200	9830.798	Cu II	100	9977.86	In I	296	10151.06	Te I
10000	9657.12	Cm I	20	9833.42	Th I	136	9979.31	Te I	50	10157.91	U I
25000	9657.786	Ar I	230	9833.76	As I	15	9983.20	Mg I	500	10160.33	Pr III
300	9658.44	C I		9839.25	Th IV	45	9985.85	Te I	10000 I	10186.58	Bk I
12	9662.04	F I	109	9842.30	Te I	17	9986.47	Mg I	4	10200.952	Ge I
200	9663.34	Kr II	20	9847.32	Be I	500 w	9991.16	Pr III	15	10216.32	Fe I
12	9663.65	Ca I	500	9850.52	Sn I	18	9993.21	Mg I	200	10217.25	Se I
10	9664.41	Ca I	80	9854.74	Ca II	160	9995.31	O I	1000	10221.46	Kr II
10	9664.700	Th I	500	9856.314	Kr I	900	10001.08	Ba I	100	10223.04	Ca II
1000	9665.42	Ne I	600	9861.280	Cu II	500	10003.05	I I	1200 h	10233.23	Ba I
300	9671.54	Rb II	10000 I	9862.39	Bk II	450	10006.588	Cu II	6000	10237.74	Br I
450	9672.3	S I	200	9863.33	N I	100	10010.63	As I	500	10238.63	Pr III
15	9674.351	Pb I	10	9863.4	Tl I	30	10011.9	Tl I	1000	10238.82	I I
4	9676.106	Th I	600	9864.137	Cu II	550	10022.969	Cu II	200	10257.03	In I
14	9676.30	Ca I	160 h	9865.41	N II	285 h	10023.27	N II	50	10259.55	U I
160	9677.38	O I	30	9866.78	Sb I	290	10024.04	As I	300	10261.01	Sb I
3000 s	9679.13	Np I	110 h	9868.21	N II	350	10024.359	Cs I	140	10284.79	La III
450	9680.8	S I	10	9868.36	U I	6	10027.73	He I	15	10285.45	F I
150	9685.32	Xe I	532	9868.92	Te I	500	10031.10	Pr III	200	10290.458	Pb I
14	9688.67	Ca I	400	9875.970	Cl I	2	10031.16	He I	10000	10292.44	Bk I
2000 c	9689.05	Rb II	10000 I	9879.29	Bk I	600	10032.10	Ba I	800	10295.42	Ne I
450	9693.7	S I	200	9883.969	Cu II	220 h	10035.45	N II	1000	10299.62	Br I
80	9694.66	O I	100	9886.05	As I	300	10036.66	Sr II	397	10300.56	Te I
65	9694.91	O I	160 h	9887.39	N II	550	10038.093	Cu II	20	10300.6	Bi I
285	9697.3	S I	110	9890.63	Ca II	15	10039.364	Th I	500	10301.58	Pr III
50 I	9698.68	Xe II	220 h	9891.09	N II	5	10039.436	Ge I	377	10307.45	Se I
15	9700.564	Th I	10000 I	9892.38	Bk I	3000	10046.75	Pu I	10000 s	10308.41	Cf
13	9701.94	Ca I	10 h	9895.63	Be I	80 h	10047.98	F II	10000	10310.83	Cm I
1000	9702.439	Cl I	20 h	9895.96	Be I	7	10049.4	H I	10	10311.23	He I
3	9702.60	He I	10000	9896.40	Br I	5950	10051.41	Te I	2	10311.54	He I
200 h	9711.60	Kr II	140	9900.55	As I	180	10052.06	Ar I	205	10323.05	Te I
100	9718.16	Xe I	500 w	9900.92	Ni II	650	10054.938	Cu II	500	10324.59	Pr III
5660	9722.74	Te I	118	9902.61	Te I	220 h	10065.15	N II	900	10327.26	Se I
5000	9731.73	I I	12	9902.65	F I	160 h	10070.12	N II	1000	10327.31	Sr II
25	9734.34	F I	120	9909.05	O I	35 I	10075.282	Rb I	80	10331.03	Be I
20	9734.74	P I	170	9915.71	As I	30 I	10075.708	Rb I	30	10332.72	Ar I
285	9739.7	S I	550	9916.419	Cu II	150	10076.29	Al II	20	10343.81	Ca I
50	9741.1	Sn I	500	9917.954	Cu II	200	10078.49	Sb I	10000	10351.73	Cm I
235	9741.50	O I	290	9923.05	As I	450	10080.354	Cu II	50	10364.33	Sb I
110	9741.9	S I	3000	9923.19	Xe I	25	10084.22	P I	20	10370.34	La III
100 h	9742.8	Sn I	80	9923.99	La III	15	10089.138	Th I	30	10371.269	Si I
250	9744.426	Cl I	550	9925.594	Cu II	4097	10091.01	Te I	400	10375.20	I I
15	9746.46	Th I	20	9930.4	Tl I	10000 I	10091.99	Np I	1500	10377.65	Br I
25	9750.73	P I	3000 I	9930.55	Np I	14	10092.16	Mg II	10	10382.427	Ge I
2000	9751.758	Kr I	90	9931.39	Ca II	16	10095.52	Be II	640	10386.36	Se I
235	9760.65	O I	5	9932.21	Ra I	20	10095.73	Be II	400	10391.74	I I
200	9776.06	Rb II	285	9932.3	S I	104	10099.57	Te I	5	10391.76	Mg II
4500	9784.503	Ar I	10	9932.76	U I	20	10104.5	Bi I	6	10392.23	Mg II
185	9785.54	Te I	200	9934.76	Rb II	250	10105.13	N I	331	10392.549	Cl I
6000	9793.48	Br I	140	9936.98	O I	279	10106.05	Te I	10	10404.913	Ge I
50	9796.79	P I	2	9937.4	Tl I	5	10106.13	Rn I	6	10405.49	I II
2000	9799.70	Xe I	450	9938.998	Cu II	300	10108.89	N I	15	10419.57	Th II
10000 I	9801.18	Bk I	80	9939.78	Be I	200	10110.60	Yb III	120 d	10421.18	O I
150	9802.98	Pr III	120	9940.41	O I	350	10112.48	N I	10000	10424.49	Cm I
500	9803.14	Kr II	6	9948.57	Rn I	400	10114.64	N I	38	10432.83	Cl II
300 h	9805.38	Sn I	400	9949.14	Sb I	381	10118.08	Te I	5	10434.32	Pb I
175	9806.37	Pr III	6	9949.67	K I	60	10119.92	Be II	100	10453.09	As I
200	9807.057	Cl I	285	9949.8	S I		10120.	Li II	285	10455.5	S I
100	9808.86	Ne II	15	9953.20	Mg I	100	10123.414	Cs I	25	10456.47	Sn I
10	9812.70	Th I	5	9954.14	K I	15	10123.6	He II	70	10456.8	S I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
30000	10457.96	Br I	3000	10755.92	Br I	80	10979.308	Si I	240	11303.04	Ba I
400	10458.37	Ce III	30	10759.16	Ar I	30	10982.061	Si I	33	11318.13	Ge I
285	10459.5	S I	5	10759.41	Pb I	10	10984.00	Sr I	3	11333.08	Pb I
5000	10466.54	I I	7	10759.74	Pb I	298	11007.80	Te I	20	11334.72	In I
100	10467.177	Ar II	110	10768.36	Al I	180 h	11012.69	Ba I	17	11336.97	Sn I
13	10469.65	Fe I	140	10782.04	Al I	300	11012.79	Sb I	20	11354.719	Th I
1600	10470.054	Ar I	30	10784.550	Si I	80	11017.965	Si I	265	11358.69	O I
300	10471.26	Ba I	80	10786.856	Si I	17	11019.87	K I	14	11374.08	Fe I
13	10478.034	Ar I	120 h	10791.25	Ba I	16	11022.67	K I	11	11381.45	Na I
9	10479.63	K I	10000	10792.25	Cm I	15	11032.10	Mg I	100	11384.13	U I
5	10482.15	K I	80	10794.11	Sb I	14	11033.66	Mg I	1600	11390.434	Ne I
8	10487.11	K I	1500	10798.07	Ne I	15	11051.90	Th I	231	11392.62	Cl I
50 h	10488.3	Sb I	50	10799.78	U I	100	11054.25	Zn I	12	11403.78	Na I
40	10488.80	Tl I	9	10801.47	Cl II	6	11059.22	Pb I	1100	11409.134	Ne I
745	10493.57	Te I	11	10807.58	Sn I	30	11066.46	Be I	269	11409.69	Cl I
400	10494.42	Ce III	35	10811.08	Mg I	50	11072.44	Bi I	25	11410.43	U I
100	10498.965	Pb I	7	10812.896	Ar II	11	11078.869	Ar I	52	11422.32	Fe I
180	10506.50	Ar I	10000 s	10817.45	Np I	40 h	11079.95	Sb I	1000	11436.33	Cl I
10	10506.62	Cl II	25	10823.93	U I	1	11084.68	I II	87	11439.12	Fe I
10000	10508.11	Cm I	140	10827.091	Si I	30 h	11084.98	Sb I	12	11441.832	Ar I
14	10509.12	Cl II	300	10829.09	He I	10200	11089.56	Te I	200	11454.59	Sn I
197	10509.86	Te I	1000	10830.25	He I	25	11095.77	U I	500	11457.481	Kr I
19	10512.46	Cl II	2000	10830.34	He I	5	11101.61	Tl I	55	11459.05	Ge I
25	10514.17	Cl II	100	10830.36	Yb III	20	11103.51	Ga I	2 d	11479.49	Pb II
10000 I	10527.71	Bk I	8	10834.87	Na I	50 h	11104.84	Sb I	4	11483.7	Tl I
6	10529.45	P I	100	10838.37	Xe I	30	11106.46	Ar I	150	11483.77	Ge I
300	10534.36	Ce III	13	10838.97	Ca I	50 h	11108.52	Sb I	6620	11487.23	Te I
20	10536.19	Bi I	600	10839.73	Sb I	150 h	11114.42	Ba I	400	11488.109	Ar I
250	10539.57	N I	60	10843.854	Si I	3000	11114.82	Pu I	2	11488.76	Pb I
10000	10542.98	Cm I	2000	10844.48	Ne I	21	11119.80	Fe I	120	11496.39	Be I
100	10554.93	U I	13	10861.58	Ca I	300	11123.05	Cl I	10000 I	11500.30	Bk I
15	10556.45	Th I	20	10862.31	F I	10	11125.130	Ge I	50	11503.38	U I
2000	10562.41	Ne I	13	10863.87	Ca I	3000	11143.020	Ne I	10000	11507.45	Cm I
10000 I	10568.83	Cf	200	10868.58	Sb I	508	11163.74	Te I	1000	11512.82	Tl I
10000 I	10570.53	Bk I	30	10868.79	Si I	75	11167.84	U I	3000	11522.746	Ne I
3	10572.28	Na I	14	10869.50	Ca I		11173.	Be II	1500	11525.020	Ne I
100	10575.02	As I	130	10869.541	Si I	1	11173.73	Be II	950	11536.344	Ne I
8	10581.52	P I	7	10872.70	Sr II	3500	11177.528	Ne I	15	11551.6	Bi I
120	10585.141	Si I	110	10872.98	Al I	100	11187.108	Kr I	350	11558.46	I I
200	10585.60	Sb I		10875.05	Th IV	13	11187.60	Si I	25	11568.81	U I
3000	10594.38	Pa	400	10879.55	Sb I	30	11189.61	Sb I	10000 s	11575.34	Bk I
120	10603.431	Si I	14	10879.87	Ca I	70	11191.85	Sn I	5	11592.9	Tl I
170	10614.07	As I	30	10882.802	Si I	13	11224.57	Sr II	91	11593.59	Fe I
10000 s	10614.84	Cf	30	10885.336	Si I	30	11230.259	Th I	500	11601.537	Ne I
50	10649.249	Pb I	5	10885.42	Cl II	400	11236.56	I I	255	11607.57	Fe I
124	10650.30	Se I	15	10886.688	Pb I	700	11241.25	Sr I	12	11611.09	Si I
120	10660.975	Si I	230	10891.73	Al I	230	11252.83	Ge I	1200	11614.081	Ne I
3	10667.65	He I	54	10894.00	Sn I	450	11253.19	Al I	175	11614.81	Ge I
200	10673.565	Ar I	10000	10897.45	Cm I	570	11254.88	Al I	200	11616.26	Sn I
1000	10677.41	Sb I	60 h	10898.10	Ga I	5	11255.93	Mg II	12	11619.29	C I
11	10681.773	Ar I	100 h	10905.95	Ga I	4	11256.35	Mg II	2 h	11625.16	Be II
7	10683.034	Ar II	9	10913.05	He I	200	11257.711	Kr I	4	11626.4	He II
200	10683.08	C I	11	10914.23	Mg II	150	11259.126	Kr I	5	11627.91	Pb II
400	10684.46	Ce III	200	10914.88	Sr II	150	11266.23	Sb I	23	11628.83	C I
300	10691.25	C I	7	10915.27	Mg II	56	11277.66	Sn I	160	11638.26	Fe I
30	10694.251	Si I	3	10917.10	He I	590	11286.34	O I	3000	11646.78	Pa
500	10716.58	Pr III	1880	10918.34	Te I	640	11286.91	O I	15	11655	Cd I
60 h	10717.42	In I	3000	10923.32	Pa I	490	11287.02	O I	13	11658.85	C I
15	10723.92	Th II	12	10937.90	La III	490	11287.32	O I		11659.	Be II
20	10726.93	Th I	12	10938.1	H I	240	11287.40	Hg I	47	11659.68	C I
30	10727.408	Si I	20	10942.24	Th II	240	11287.407	Hg I	800	11660.04	B I
30	10733.87	Ar I	8	10947.416	Ge I	12	11289.84	Si I	2	11660.25	Be II
8	10734.068	Ge I	10	10951.78	Mg II	10000 I	11293.14	Bk I	570	11662.47	B I
800	10741.94	Sb I	25	10953.32	Mg I	24	11293.40	Ge I	200	11668.710	Ar I
1000	10742.14	Br I	1	10955.71	Cl II	50	11294.13	U I	24	11669.63	C I
100 h	10744.31	In I	27	10957.30	Mg I	490	11295.10	O I	76	11670.77	Sn I
10	10746.44	Na I	28	10965.45	Mg I	540	11297.68	O I	10000	11681.85	Cf
9	10749.29	Na I	10	10968.27	Ga I	10000	11300.19	Cf	300	11688.002	Ne I
60	10749.384	Si I	40	10969.53	Pb I	590	11302.38	O I	230	11689.98	Fe I

tensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
17	11690.21	K I	600	11997.105	Kr I	100	12456.12	Ar I	187	12981.7	Sn I
25	11694.45	Sn I	40	11999.49	Bi I	800	12459.389	Ne I	2	12984.89	He I
0000 I	11695.15	Np I	48	12009.50	Sn I	510	12461.25	N I	120	12990.77	O I
120 h	11697.45	Ba I	100	12014.76	Sr II	490	12464.02	O I	20	13000.3	Sn I
15	11703.46	Th I	10000	12017.85	Cm I	10000	12464.99	Cm I	10000	13004.56	Cm I
0000	11707.73	Cm I	15	12018.72	Th I	2	12466.75	Sb I	200	13008.264	Ar I
1500 d	11710.37	Bi I	172	12021.7	Cl I	920	12469.62	N I	700	13013.2	Tl I
600	11714.76	Ge I	10	12025.64	Ge I	15	12477.30	Th I	187	13018.5	Sn I
12	11719.488	Ar I	440	12031.51	Si I	20	12479.60	Sr I	15	13028.64	Ge I
180	11720.56	Cl I	300	12033.69	I I	200	12487.663	Ar I	30	13033.57	Ca I
20	11731.48	In I	10	12055.49	Ge I	15	12491.8	Tl I	100	13053.63	Zn I
258	11739.78	Sn I	30	12061.41	Ge I	40	12495.00	Sr I	50	13057.50	Ga I
90	11742.01	Xe I	45	12065.76	Ge I		12522.11	K I	10000	13061.13	Bk I
85	11748.22	C I	3000	12066.334	Ne I	20	12527.52	He I	160	13076.91	O I
142	11753.32	C I	1300	12069.20	Ge I	42	12530.87	Sn I	68	13081.5	Sn I
114	11754.76	C I	200	12074.51	N I	42	12536.5	Sn I	21	13086.44	Ca I
2000	11766.792	Ne I	160	12077.224	Kr I	48	12540.41	Ge I	25	13088.28	U I
16	11769.62	K I	30	12083.66	Mg I	10	12551.0	Ag I	400	13104.18	Te I
17	11772.83	K I	100	12095.36	Be II	1	12561.37	Pb I	235	13107.61	Ge I
0000 I	11776.64	Np I	30	12098.18	Be II	188	12566.24	Te I	570	13123.41	Al I
11	11777.54	C I	150	12103.53	Si I	450	12570.04	O I	100	13123.80	Sr II
320	11778.34	I I	200	12109.78	Ga I	389	12589.19	Te I	24	13134.95	Ca I
0000	11780.95	Cm I	200	12112.326	Ar I	300	12590.20	Xe I	15	13145.90	Th II
160	11783.26	Fe I	5	12116.06	Sb I	26	12614.10	C I	60	13149.16	I I
20	11784.72	U II	20	12127.30	Th I	2500	12623.391	Xe I	100	13150.59	Zn I
1500	11789.044	Ne I	50	12139.738	Ar I	15	12636.80	Ge I	450	13150.76	Al I
500	11789.889	Ne I	3000	12144.46	Pu I	15	12638.71	Fe I	700	13163.89	O I
10000	11791.73	Pa I	10000 s	12148.18	Np I	20	12646.54	Th I	750	13164.85	O I
150	11792.425	Kr I	10000 s	12159.05	Bk I	15	12652.20	Sr I	640	13165.11	O I
10000 s	11793.09	Bk I	200	12165.08	Bi I	150	12676.58	Ge I	11	13176.90	Si I
1500	11819.377	Kr I	10000 I	12183.05	Cf	40	12681.28	Ge I	1100	13177.412	Kr I
96	11825.18	Sn I	380	12186.82	N I	1000	12689.201	Ne I	100	13185.16	U I
45	11828.18	Mg I	20	12194.16	Th II	200	12690.04	Bi I	20	13196.61	Zn I
10000	11834.28	Cm I	30	12198.88	Ge I	150	12702.281	Ar I	120	13207.30	Ba I
106	11835.82	Sn I	15	12206.89	Th I	30	12733.418	Ar I	120	13209.95	Hg I
20	11838.99	Ca II	20	12207.73	Ge I	150	12736.4	Tl I	200	13213.99	Ar I
10	11839.77	Ge I	3000	12231.22	Pu I	12	12746.232	Ar I	1700	13217.17	Br I
100	11859.42	U I	20	12231.94	Th I	15	12756.96	Ce III	700	13219.241	Ne I
30	11863.37	Sb I		12232.	Li I		12782.	Li I	200	13228.107	Ar I
15	11864.25	Th I	375	12235.24	Xe I	50	12784.99	He I	100	13230.90	Ar I
195	11866.76	Cl I	20	12236.20	Sr I	10000 I	12787.41	Cf	3000	13234.09	Pa
580	11882.84	Fe I	100	12250.46	U I	37	12788.2	Sn I	100	13235.17	Rb I
225	11884.08	Fe I	100	12257.76	Xe I	20	12790.57	He I	350	13243.8	Cl I
17	11892.91	C I	120	12270.68	Si I	115	12800.66	Ge I	1580	13247.75	Te I
30	11895.75	C I	2	12276.6	Sb I	200	12802.739	Ar I	10000	13258.18	Cm I
100	11908.83	U I	3000	12279.01	Pa	161	12805.50	Te I	500	13272.64	Ar I
55	11917.01	Ge I	60	12286.75	Ge I	25	12816.04	Ca I	10000	13289.84	Cm I
254	11932.99	Sn I	225	12288.97	N I	100	12817.8	Bi I	310	13296.0	Cl I
125	11934.56	Se I	150	12304.58	I I	20	12818.1	H I	75	13306.23	U I
15	11940.64	Th I	111	12313.24	Sn I	12	12821.62	Ce III	1000	13313.210	Ar I
10000	11941.33	Cf	290	12328.76	N I	24	12823.86	Ca I	483	13316.63	Te I
275	11946.87	Se I	33	12335.6	Sn I	175	12836.38	Ge I	10000 I	13329.98	Cf
100	11947.92	Se I	15	12338.00	Th I	7	12845.96	He I	10000	13344.62	Cm I
400	11949.12	Ga I	55	12338.76	Ge I	12	12847.92	Ge I	550	13346.8	Cl I
10	11949.72	Ca II	50	12343.393	Ar I	100	12861.892	Kr I	10000 s	13362.98	Cf
105	11952.27	Se I	10000 s	12352.72	Cf	15	12866.64	Th I	1000	13367.111	Ar I
170	11952.64	Se I	10	12374.64	Bi I	14	12879.76	Fe I	10000 I	13376.89	Cf
1	11957.7	Sb I	10000 s	12377.42	Np I	40	12885.05	Ga I		13377.86	K I
100	11966.04	Se I	310	12381.65	N I	89	12888.5	Sn I		13397.09	K I
30	11969.12	He I	1050	12391.58	Ge I	25	12909.10	Ca I	140	13426.57	Hg I
205	11972.93	Se I	10000	12394.16	Cm I	1100	12912.014	Ne I	500	13429.61	N I
1030	11973.05	Fe I	200	12402.827	Ar I	10	12912.59	In I	9	13429.96	In I
115	11973.07	Se I	10000 I	12407.99	Np I	50	12933.195	Ar I	20	13442.81	Rb I
280	11978.96	Te I		12432.24	K I	15	12940.65	Th II	30	13443.57	Rb I
370	11984.19	Si I	10000 s	12437.48	Cf	120	12955.73	Ge I	378	13460.2	Sn I
20	11984.67	Th II	180	12438.40	N I	500	12956.659	Ar I	60	13468.38	Hg I
1000	11984.912	Ne I	200	12439.321	Ar I	15	12959.82	Th I	10000 I	13474.44	Cf
220	11991.57	Si I	60	12445.90	Sr II	10	12968.45	He I	10000	13480.54	Cm I
450	11996.86	I I	10000	12454.98	Cm I	75	12974.70	Sr II	20	13492.28	Ge I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
	13495.3	Pb I	24	14285.11	Fe I	50	14982.75	Ga I	80	15712	Cd I
	13498.2	Pb I	200	14287.02	I I	60	14996.64	Ga I	14	15723.59	Fe I
10000	13498.36	Bk I	14	14292.38	Fe I	120	15000.40	Ba I	1487	15730.1	Cl I
30	13499.41	Ar I	42	14297.15	Ge I	15	15001.75	Ge I	6	15740.71	Mg I
20	13502.27	C I	16	14308.69	Fe I	120	15005.307	Kr I	8	15748.99	Mg I
1000	13504.191	Ar I	6	14316.25	In I	10000	15018.13	Cm I	10000	15757.23	Cm I
80	13505.58	Hg I	200	14330.5	Bi I	13	15018.2	Sn I	10	15765.84	Mg I
	13512.6	Pb I	5000	14332.88	Gd III	35	15024.99	Mg I	41	15769.42	Fe I
10000	13522.40	Pa	10000	14334.52	Cm I	225	15032.57	I I	10000	15793.31	Cm I
15	13522.80	Sr I	434	14335.74	Te I	30	15040.24	Mg I	28	15813.13	Fe I
42	13534.85	Ge I	10000	14344.76	Pa I	13	15041.21	Ge I	193	15818.4	Cl I
250	13544.15	Xe I	1800	14354.57	Br I	100	15046.50	Ar I	120	15820.09	Kr I
17	13565.04	Fe I	375	14364.99	Xe I	25	15047.70	Mg I	15	15831.75	Th I
15	13565.67	Th I	148	14369.7	Cl I	37	15051.77	Fe I	80	15847.58	Ce III
	13566.	Li I	38	14399.65	C I	12	15083.64	He I	2780	15869.7	Cl I
500	13570.21	Hg I	96	14400.56	Fe I	100	15099.72	Xe I	277	15883.3	Cl I
11	13573.617	Ar I	180	14402.22	Kr I	269	15108.0	Cl I	190	15888.39	Si I
840	13581.33	N I	16	14403.25	C I	10000	15136.10	Bk I	342	15928.9	Cl I
180	13587.73	N I	220	14417.46	Te I	500	15151.44	Se I	80	15956.79	Ce III
140	13588.31	Cs I	3	14419.20	In I		15163.08	K I	735	15960.0	Cl I
10000	13590.01	Cm I	61	14420.12	C I		15168.40	K I	40	15960.04	Si I
30	13599.333	Ar I	15	14424.54	Th I	25	15172.69	Ar I	12	15960.59	Ce III
180	13602.27	N I	2000	14426.793	Kr I	28	15207.55	Fe I	283	15970.5	Cl I
15	13602.57	Cs I	12	14429.03	C I	140	15209.526	Kr I	250	15979.54	Xe I
144	13608.2	Sn I	13	14442.24	C I	10000	15222.27	Cm I	30	15989.49	Ar I
1000	13622.415	Kr I	20	14442.28	Fe I	800	15230.714	Ne I	50	16001.5	Br I
400	13622.659	Ar I	100	14460.00	I I	1700	15239.615	Kr I	10000	16008.41	Cm I
290	13624.18	N I	35	14491	Cd I	15	15240.24	Th II	150	16037.33	I I
2400	13634.220	Kr I	72	14512.23	Fe I	10000 s	15281.32	Cf	100	16039.90	Xe I
10000	13644.77	Cm I	1050	14513.51	Te I	800	15288.43	Rb I	1000	16053.28	Xe I
2000	13657.055	Xe I	100	14517.84	Kr I	150	15289.48	Rb I	95	16060.03	Si I
800	13658.394	Kr I	129	14554.68	Te I	94	15294.58	Fe I	129	16077.6	Cl I
75	13665.01	Rb I	50	14555.06	Fe I	500	15295.82	Hg I	20	16094.80	Si I
450	13673.51	Hg I	10000	14563.41	Cm I		15314.8	Pb I	87	16128.75	Ce III
200	13678.550	Ar I	14	14565.95	Fe I	130	15326.480	Kr I	20	16150.77	Ca I
200	13711.036	Kr I	40	14569.84	Ge I		15327.6	Pb I	22	16157.36	Ca I
1000	13718.577	Ar I	10000	14580.23	Cm I	10	15329.34	Ar I	200	16157.72	Be I
28	13724.48	Ge I	15	14618.98	Th I		15331.0	Pb I	60	16163.71	Si I
600	13738.851	Kr I	100	14643.92	Be I	1500	15334.958	Kr I	21	16197.04	Ca I
15	13758.83	Cs I	60	14644.75	Be I	16	15335.40	Fe I	259	16198.5	Cl I
10000	13789.52	Cm I	15	14654.91	Th I		15349.6	Pb I	160	16212.06	O I
120	13810.50	Ba I	140	14660.81	Xe I	700	15372.037	Kr I	11	16215.68	Si I
525	13821.7	Cl I	12	14667.52	Ge I	3000	15377.31	Pu I	200	16240.38	B I
5	13824.48	In I	6	14668.66	In I	2500	15418.394	Xe I	250	16244.67	B I
10	13825.715	Ar I	350	14694.93	Cs I	15	15429.78	Th I	16	16381.55	Si I
10000 I	13834.33	Np I	7	14719.08	In I	1480	15452.45	Te I	3760	16403.90	Te I
10000	13840.18	Cm I		14722.8	Pb I	30	15464.2	Sn I	14	16424.77	Ge I
10	13907.478	Ar I	3000	14732.806	Xe I	381	15465.1	Cl I	13	16444.82	Fe I
10000	13908.46	Cm I	1600	14734.436	Kr I	169	15467.6	Cl I	20	16483.45	Zn I
200	13950.55	Hg I		14742.1	Pb I	115	15469.06	Se I	20	16486.69	Fe I
140	13958.27	I I		14743.0	Pb I	320	15471.00	Se I	20	16491.98	Zn I
100	13961.58	U I	1000	14752.41	Rb I	200	15474.026	Kr I	2	16504.31	In I
10000	13964.14	Cm I	250	14757.07	N I	20	15504.34	Ge I	20	16505.23	Zn I
150	13974.027	Kr I	550	14762.672	Kr I	1094	15520.3	Cl I	30	16519.86	Ar I
217	14037.09	Te I	450	14765.472	Kr I	265	15520.97	Se I	125	16554.49	Xe I
100	14038.70	Zn I	115	14767.48	Na I	105	15528.65	I I	12	16559.66	C I
550	14045.657	Kr I	10000 I	14772.49	Cf	2430	15546.23	Te I	12	16626.64	Ge I
144	14072.53	Te I	315	14817.93	Se I	150	15557.13	Xe I	360	16659.44	Se I
120	14077.90	Ba I	470	14822.38	Ge I	180	15582.27	N I	29	16680.77	Si I
15	14090.25	Th I	40	14826.43	Fe I	10000	15587.12	Cf	70	16699.29	Ge I
200	14093.640	Ar I	100	14868.87	N I	395	15618.40	Se I	230	16718.96	Al I
140	14104.298	Kr I	28	14877.62	Mg I	115	15620.38	Se I	200	16726.513	Kr I
42	14116.70	Ge I	1250	14888.70	Br I	30	15621.67	Fe I	1500	16728.15	Xe I
1250	14142.444	Xe I	410	14917.47	Se I	125	15629.08	B I	1800	16731.19	Br I
15	14168.67	Th I	16	14921.97	Ge I	25	15631.97	Fe I	300	16750.56	Al I
10000 s	14196.93	Bk I	294	14931.7	Cl I	10000	15642.59	Cm I	10000	16759.06	Cf
10000	14235.27	Cm I	15	14940.49	Th II	10000	15675.92	Cf	150	16759.79	Ge I
30	14236.25	Fe I	400	14961.894	Kr I	20	15680.29	Zn I	140	16763.36	Al I
800	14240.96	Xe I	160	14966.60	N I	180	15681.02	Kr I	2000	16785.128	Kr I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
505	16813.78	Se I	590	18021.21	O I	30	19046.14	Ca I	20	20622.2	Sn I
165	16817.76	Se I	400	18035.80	Ne I	10000 h	19068.71	Cf	1000	20624.67	Br I
60	16819.5	Ag I	120	18041.48	O I	35	19070.17	I I	10	20634.36	Th I
1000	16853.488	Kr I	120	18042.19	O I	100	19089.38	He I	10	20648.69	I I
205	16866.54	Se I	120	18046.23	O I	110	19105.12	I I	28	20673.64	Ge I
100	16881.48	Hg I	10000	18069.02	Cm I	25	19113.68	Fe I	30	20685.63	Ce III
50	16890.38	C I	1000	18083.21	Ne I	55 d	19125	Cd I	10	20690.64	U I
2400	16890.441	Kr I	50	18130.38	Hg I	38	19141.29	Ce III	10	20692.06	Th II
1600	16896.753	Kr I	50	18136.65	U I	15	19145.60	Th II	120	20700.70	Sr I
3000	16897.38	Pu I	13	18139.80	C I	25	19162.53	Cs I	120	20712.00	Ba I
50	16906.00	U I	100	18143.54	Be I	20	19163.20	Cs I	40	20764.50	Sr I
400	16920.16	Hg I	2600	18167.315	Kr I	10000 l	19273.87	Bk I	10	20772.19	U I
1800	16935.806	Kr I	350	18221.11	Ne I	62	19279.24	Ge I	15	20778.70	Sr I
500	16940.58	Ar I	250	18227.02	Ne I		19290.	Li I	10000	20853.49	Cm I
300	16942.00	Hg I	140	18229.23	O I	48	19309.20	Ca I	40	20861.7	Sn I
115	16972.71	Se I	540	18243.63	O I	10000 l	19336.96	Cf	10000 s	20869.98	Cf
20	17000.5	Sn I	15	18275.71	I I	15	19338.98	Th II	10000	20911.52	Cm I
200	17002.47	He I	2500	18276.68	Ne I	50	19370.02	I I	12	20917.13	Si I
500	17072.79	Hg I	2000	18282.62	Ne I	227	19370.3	Cl I	10000	20968.11	Cm I
600	17098.771	Kr I	2780	18291.59	Te I	27	19377.15	Ce III	30	20985.81	Sc
30	17108.66	Mg I	1200	18303.97	Ne I	15	19385.94	Si I	30	20986.11	Ar I
400	17109.93	Hg I	15	18307.9	Ag I	48	19432.97	Si I	10	21008.38	U I
20	17116.75	Hg I	20	18348.52	I I	49	19452.99	Ca I	1200	21041.295	Ne I
15	17140.90	Sr I	10000	18352.31	Bk	26	19466.14	Ce III	1020	21043.73	Te I
10000	17148.22	Cm I	250	18359.12	Ne I	13	19493.38	Si I	300	21093.04	Al I
400	17161.930	Ne I	50	18366.96	U I	20	19498.14	Ce III	10	21099.98	U I
30	17170.50	Sr I	15	18382.3	Ag I	47	19505.72	Ca I	10	21112.14	U I
20	17198.67	Hg I	1200	18384.85	Ne I	55	19524.18	Ce III	80	21120.07	He I
20	17208.22	Th II	2000	18389.95	Ne I	20	19543.08	He I	10	21121.43	He I
20	17213.20	Hg I	100	18399.786	Kr I	10000	19572.62	Cm I	20	21132.03	He I
135	17214.34	Ge I	1000	18402.84	Ne I	10000 l	19576.84	Cf	20	21144.90	U II
1960	17303.54	Te I	1200	18422.39	Ne I	269	19623.52	Te I	360	21163.75	Al I
15	17307.66	Th I	12	18427.76	Ar I	10000 s	19653.22	Bk I	600	21165.471	Kr I
1500	17325.77	Xe I	16	18428.30	Ge I	40	19700.17	Hg I	10000	21241.06	Cm I
28	17327.29	Si I	300	18458.65	Ne I	23	19721.99	C I	800	21259.44	Gd III
70	17329.41	Hg I	400	18475.79	Ne I	110	19722.50	Si I	50	21311.46	Cs I
10	17338.56	C I	3000	18478.61	Pa I	3500	19733.62	Br I	45	21312.29	Cs I
700	17367.606	Kr I	35	18495.54	Ge I	717	19755.3	Cl I	21	21354.24	Si I
15	17381.91	Th I	1	18555.55	He I	15	19759.60	Sr I	235	21374.24	Se I
120	17404.443	Kr I	1200	18568.31	Br I	185	19766.8	Cl I	12	21380.23	Ce III
20	17416.7	Ag I	42	18579.82	Ce III	10	19774.30	Th II		21389.00	Ca II
30	17436.18	Hg I	150	18580.896	Kr I	50	19776.79	Ca I	10000	21393.23	Cm I
50	17447.40	Sr I	900	18591.55	Ne I	22	19791.88	Fe I		21428.90	Ca II
11	17448.60	C I	1600	18597.70	Ne I	35	19853.10	Ca I	680	21442.56	Se I
50	17451.11	U I	350	18618.96	Ne I	34	19862.22	Ca I	250	21470.09	Xe I
10000	17453.18	Cm I	550	18625.16	Ne I	23	19917.19	Ca I	415	21473.48	Se I
2000	17474.78	Gd III	75	18634.43	U I	31	19928.88	Si I	4	21518.30	Ge I
15	17481.04	Th I	6	18636.8	He II	24	19933.70	Ca I	464	21602.50	Te I
120 s	17516.58	N I	500	18685.34	He I	10000	19975.98	Cm I	5	21655.3	H I
	17552.	Li I	300	18696.294	Kr I	800	19996.34	Gd III	10	21674.51	U I
15	17584.52	Th I		18697.	Li I	239	20147.54	Te I	8	21686.2	Sn I
100 l	17584.86	N I	200	18697.23	He I	150	20187.19	Xe I	10	21693.38	U I
150	17616.854	Kr I	10000 l	18718.69	Cf	227	20199.4	Cl I	750	21708.145	Ne I
10000	17619.28	Cm I	26	18722.90	Si I	10	20201.13	U I	270	21716.36	Se I
4	17626.00	Sr II	40	18751.0	H I	140	20209.878	Kr I	240	21730.60	Se I
10000 s	17626.25	Cf	10	18764.11	Ge I	230	20261.40	Sr I	1200	21787.24	Br I
30	17743.00	Sr I	394	18777.30	Te I	3000	20262.242	Xe I	37	21799.64	Te I
20	17757.91	Ga I	170	18785.460	Kr I	10	20271.41	U I	1800	21902.513	Kr I
10	17807.5	Sn I	350	18788.13	Xe I	1000	20281.73	Br I	75	21910.22	U I
650	17842.737	Kr I	200	18797.703	Kr I	85	20370.1	Cl I	60	22016.81	Ga I
80	17855.38	Be I	70	18811.86	Ge I	10	20374.13	U I	400	22051.86	Sc I
120	17856.63	Be I	15	18811.88	Th I	10000 l	20393.38	Cf	30	22056.44	Na I
10	17868.96	Ga I	105	18856.65	Fe I	300	20423.964	Kr I	12	22062.71	Si I
100	17878.26	N I	20	18925.47	Ca I	140	20446.971	Kr I	150	22065.05	Sc I
12	17923.62	Cs I	24	18970.14	Ca I	10	20517.29	U I	27	22083.67	Na I
9	17924.21	Cs I	15	18982.41	I I	10000	20526.32	Cm I	9	22091.84	Ge I
15	17936.43	Th II	47	18987.01	Fe I	1000	20581.30	He I	10	22110.73	U I
120	17966.70	O I	235	18994.33	B I	50	20616.23	Ar I	4	22131.7	Sn I
700	18002.229	Kr I	25	19029.39	U I	70	20616.32	Sc	220	22183.03	I I

Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength		Intensity	Wavelength	
150	22226.53	I I	375	24385.99	Se I	200	31778.70	Be I	6	74578	H I
300	22247.35	Ne I	160	24413.67	Se I		32148.06	Hg I	3	123685	H I
10	22264.35	Th II	32	24420.82	I I	100	32293.08	Xe I			
6	22291.06	In I	400	24447.85	Ne I	120	32693.90	Br I			
30	22309.21	I I	700	24459.4	Ne I	1800	32739.26	Xe I			
14	22380.82	Fe I		24467.	Li I	250	33173.09	Ne I			
350	22428.13	Ne I	100	24470.0	Cl I	450	33352.35	Ne I			
120	22485.775	Kr I	225	24471.17	Se I	3500	33666.69	Xe I			
	22493.28	Hg I	4	24738.2	Sn I	1300	33901.	Ne I			
600	22493.33	Gd III	300	24776.46	Ne I	2200	33912.10	Ne I			
20	22529.65	Rb I	1800	24824.71	Xe I	150	34014.67	Xe I			
2250	22530.40	Ne I	550	24928.88	Ne I	600	34131.31	Ne I			
60	22551.6	Bi I	255	25017.51	Se I	150	34181.87	Br I			
74	22555.29	Te I	510	25127.43	Se I	10	34295.73	I I			
70	22568.71	Ga I	175	25145.84	Xe I	450	34335.27	Xe I			
20	22607.93	Ca I	250	25161.69	Ne I	100	34471.44	Ne I			
21	22619.85	Fe I	600	25233.820	Kr I	9	34513.11	I I			
25	22624.93	Ca I	35	25455	Cd I	170	34744.00	Xe I			
30	22651.23	Ca I	150	25515.70	Ba I	5000	35070.25	Xe I			
400	22661.81	Ne I	650	25524.37	Ne I	110	35246.92	Xe I			
48	22755.66	Te I	100	25763.49	Cs I	120	35834.78	Ne I			
4000	22865.65	Br I	90	25764.70	Cs I	250	36209.21	Xe I			
10	22932.47	Rb I	30	26023.60	Sr I	150	36231.74	Xe I			
3	22997.2	Sn I	140	26173.56	O I		36303.03	Hg I			
600	23100.51	Ne I	38	26222.04	Fe I	450	36508.36	Xe I			
20	23133.20	Ar I	8	26251.5	H I	850	36788.83	Xe I			
105	23133.66	Se I	2000	26269.08	Xe I	150	38345.75	Br I			
10	23156.76	U I	5	26392.90	Mg I	140	38685.98	Xe I			
1250	23193.33	Xe I	13	26428.62	Te I	175	38737.82	Xe I			
250	23253.07	Hg I	2500	26510.86	Xe I		38831.1	Pb I			
1000	23260.30	Ne I	38	26539.17	Te I	270	38939.60	Xe I			
110	23279.54	Xe I	15	26553.74	Te I		38950.1	Pb I			
27	23294.94	Te I	17	26659.22	Fe I		38958.6	Pb I			
180	23340.416	Kr I	7	27179.26	Te I		39039.4	Pb I			
24	23348.41	Na I	4	27314.31	Rb I	500	39300.6	Kr I			
1050	23373.00	Ne I	12	27365.42	I I	200	39421.22	Cs I			
24	23379.13	Na I	9	27573.05	I I	180	39424.08	Cs I			
150	23388.85	Se I	2	27905.37	Rb I	1100	39486.52	Kr I			
1000	23513.15	Br I	500	28346.50	Br I	220	39557.25	Kr I			
850	23565.36	Ne I	250	28381.54	Xe I	100	39572.60	Kr I			
110	23628.17	Se I	125	28386.21	Ne I	1400	39588.4	Kr I			
3500	23636.52	Ne I	750	28582.25	Xe I	1100	39589.6	Kr I			
300	23701.64	Ne I	180	28610.55	Kr I		39603.7	Cl I			
1100	23709.2	Ne I	1000	28655.72	Kr I		39615.3	Cl I			
7	23879.13	In I	150	28769.71	Kr I		39716.0	Cl I			
10000 s	23902.85	Bk I	140	28822.49	Kr I		39744.0	Cl I			
5	23921.92	Ge I	150	29223.90	Ba I		39750.9	Cl I			
10	23948.19	U I	300	29236.69	Kr I		39875.3	Cl I			
1800	23951.42	Ne I	300	29384.41	Xe I		39881.0	Cl I			
600	23956.46	Ne I	150	29448.06	Xe I	500	39954.8	Kr I			
20	23966.52	Ar I	10	29557.07	U I	120	39955.14	Xe I			
1000	23978.12	Ne I	100	29649.58	Xe I	120	39964.36	Br I			
17	23978.70	Te I	100	29813.62	Xe I	300	39966.6	Kr I			
5	24044.16	Zn I	150	30200.	Ne I		39985.7	Cl I			
25	24059.04	Te I	600	30253.14	Xe I		40085.5	Cl I			
200	24098.54	Ne I	10	30361.93	I I		40089.5	Cl I			
265	24148.18	Se I	500	30380.85	Br I		40158.37	K I			
170	24159.23	Se I	8	30383.88	I I		40171.0	Cl I			
500	24161.42	Ne I	1500	30475.46	Xe I	3	40228.54	I I			
10000 s	24192.62	Bk I	100	30504.12	Xe I	1300	40306.1	Kr I			
185	24204.44	Se I	300	30663.54	Kr I		40310.3	Cl I			
600	24249.64	Ne I	500	30794.18	Xe I		40335.4	Cl I			
120	24260.506	Kr I	3	30908.5	He II		40475.	Li I			
180	24292.221	Kr I	300	30979.16	Kr I	4	40478.90	He I			
4	24327.2	Sn I	6000	31069.23	Xe I	15	40511.6	H I			
1500	24365.05	Ne I	125	31336.01	Xe I		40532.2	Cl I			
800	24371.60	Ne I	550	31607.91	Xe I	250	40685.16	Kr I			
10	24375.02	Zn I	600	31630.13	Br I	2	41633.80	I I			
25	24378	Cd I	160	31775.05	Be I	4	46525.1	H I			

Part II. Transition Probabilities

W. L. Wiese and G. A. Martin

These tables were prepared under the auspices of the Committee on Line Spectra of the Elements of the National Academy of Sciences—National Research Council. They contain critically evaluated atomic transition probabilities for about 5000 selected lines of all elements for which reliable data are available on an absolute scale. The material is largely for neutral and singly ionized spectra, but includes a number of prominent lines of more highly charged ions.

Many of the data are obtained from comprehensive compilations of the National Bureau of Standards Data Center on Atomic Transition Probabilities. Specifically, data have been taken from critical compilations on V [1], Cr [1], Mn [1], Fe [2], Co [2], and Ni [2] without changes. Material from earlier compilations for the elements H through Ne [3], Na through Ca [4], and Sc and Ti [5] was supplemented by more recent material taken directly from the original literature. For the higher ions, many data were derived from studies of the systematic behavior of transition probabilities [6–8]. The original literature is cited in a recent bibliography [9]; thus, individual literature references are not cited here.

The wavelength range for the neutral species has normally been restricted to the visible or shorter wavelengths; only the very prominent near infrared lines are included. For the higher ions, most of the strong lines are located in the far uv. The tabulation is limited to electric dipole—including intercombination—lines and comprises essentially the fairly strong transitions with estimated uncertainties of 50% or less. With the exception of hydrogen, helium, and the alkalis, most transitions are between states with low principal quantum numbers.

The transition probability, A , is given in units of 10^8 s^{-1} and is listed to as many digits as is consistent with the indicated accuracy. A number in parentheses following the tabulated value of the transition probability indicates the power of ten by which this value has to be multiplied. The estimated uncertainties of the A -values are indicated by code letters as follows: AA—

for uncertainties within 1%; A—within 3%; B—within 10%; C—within 25%; D—within 50%.

Each transition is identified by the wavelength, λ , in Ångstroms; the energy level of the upper atomic state, $E_{k\alpha}$ in cm^{-1} ; and the statistical weights, g_i and g_k , of the lower (i) and upper (k) states (the product $g_k A$ (or $g_i f$) is needed in many applications). Whenever the wavelengths of individual lines within a multiplet are extremely close, an average wavelength for the multiplet is given, and is indicated by an asterisk (*) to the right of the g_k value. This has also been done when the transition probability for an entire multiplet has been taken from the literature and values for individual lines cannot be determined because of insufficient knowledge of the coupling of electrons. Wavelength and energy level data have been taken either from recent compilations or from the original literature cited in bibliographies published by the National Bureau of Standards Atomic Energy Levels Data Center [10,11]. Wavelength values are consistent with those given in Part I of this publication.

In the table for hydrogen, the energy level and uncertainty columns have been eliminated since the transition probabilities and energy levels are known very precisely for this element. Because of the hydrogen degeneracy, a “transition” is actually the sum of all transitions between the principal quantum numbers listed in the transition column, and the tabulation represents the properly weighted A values.

In addition to the transition probability A , the atomic oscillator-strength f and the line-strength S are often used in the literature. The conversion factors between these quantities are:

$$g_i f = 1.499 \times 10^{-8} \lambda^2 g_k A = 303.8 \lambda^{-1} S,$$

where λ is in Ångstroms, A is in 10^8 s^{-1} , and S is in atomic units, which are $a_0^2 e^2 = 7.188 \times 10^{-59} \text{ m}^2 \text{ C}^2$ for electric dipole transitions.

We acknowledge the valuable preparatory work by D. Trahan, W. Croom, and F. Farley in arranging and compiling the numerical data.

TABLE 1a. Transition probabilities for allowed lines of hydrogen

Wavelength $\lambda[\text{\AA}]$	Transition	Statistical weights		Average transition probability $A [10^8 \text{ s}^{-1}]$
		g_i	g_k	
914.039	1-20	2	800	3.928(-5)
914.286	1-19	2	722	5.077(-5)
914.576	1-18	2	648	6.654(-5)
914.919	1-17	2	578	8.858(-5)
915.329	1-16	2	512	1.200(-4)
915.824	1-15	2	450	1.657(-4)
916.429	1-14	2	392	2.341(-4)
917.181	1-13	2	338	3.393(-4)
918.129	1-12	2	288	5.066(-4)
919.351	1-11	2	242	7.834(-4)
920.963	1-10	2	200	1.263(-3)
923.150	1- 9	2	162	2.143(-3)
926.226	1- 8	2	128	3.869(-3)
930.748	1- 7	2	98	7.568(-3)
937.803	1- 6(L ϵ)	2	72	1.644(-2)
949.743	1- 5(L δ)	2	50	4.125(-2)
972.537	1- 4(L γ)	2	32	1.278(-1)
1025.72	1- 3(L β)	2	18	5.575(-1)
1215.67	1- 2(L α)	2	8	4.699
3682.81	2-20	8	800	2.172(-5)
3686.83	2-19	8	722	2.809(-5)
3691.55	2-18	8	648	3.685(-5)
3697.15	2-17	8	578	4.910(-5)
3703.85	2-16	8	512	6.658(-5)
3711.97	2-15	8	450	9.210(-5)
3721.94	2-14	8	392	1.303(-4)
3734.37	2-13	8	338	1.893(-4)
3750.15	2-12	8	288	2.834(-4)
3770.63	2-11	8	242	4.397(-4)
3797.90	2-10	8	200	7.122(-4)
3835.38	2- 9	8	162	1.216(-3)
3889.05	2- 8	8	128	2.215(-3)
3970.07	2- 7(H ϵ)	8	98	4.389(-3)
4101.73	2- 6(H δ)	8	72	9.732(-3)
4340.46	2- 5(H γ)	8	50	2.530(-2)
4861.32	2- 4(H β)	8	32	8.419(-2)
6562.80	2- 3(H α)	8	18	4.410(-1)
8392.40	3-20	18	800	1.517(-5)
8413.32	3-19	18	722	1.964(-5)
8437.96	3-18	18	648	2.580(-5)
8467.26	3-17	18	578	3.444(-5)
8502.49	3-16	18	512	4.680(-5)
8545.39	3-15	18	450	6.490(-5)
8598.40	3-14	18	392	9.211(-5)
8665.02	3-13	18	338	1.343(-4)

TABLE 1a. Transition probabilities for allowed lines of hydrogen—Continued

Wavelength $\lambda[\text{\AA}]$	Transition	Statistical weights		Average transition probability $A [10^8 \text{ s}^{-1}]$
		g_i	g_f	
8750.48	3-12	18	288	2.021(-4)
8862.79	3-11	18	242	3.156(-4)
9014.91	3-10	18	200	5.156(-4)
9229.02	3- 9	18	162	8.905(-4)
9545.97	3- 8(P ϵ)	18	128	1.651(-3)
10049.4	3- 7(P δ)	18	98	3.358(-3)
10938.1	3- 6(P γ)	18	72	7.783(-3)
12818.1	3- 5(P β)	18	50	2.201(-2)
16407.2	4-12	32	288	1.620(-4)
16806.5	4-11	32	242	2.556(-4)
17362.1	4-10	32	200	4.235(-4)
18174.1	4- 9	32	162	7.459(-4)
18751.0	3- 4(P α)	18	32	8.986(-2)
19445.6	4- 8	32	128	1.424(-3)
21655.3	4- 7	32	98	3.041(-3)
26251.5	4- 6	32	72	7.711(-3)
27575	5-12	50	288	1.402(-4)
28722	5-11	50	242	2.246(-4)
30384	5-10	50	200	3.800(-4)
32961	5- 9	50	162	6.908(-4)
37395	5- 8	50	128	1.388(-3)
40511.5	4- 5	32	50	2.699(-2)
43753	6-12	72	288	1.288(-4)
46525	5- 7	50	98	3.253(-3)
46712	6-11	72	242	2.110(-4)
51273	6-10	72	200	3.688(-4)
59066	6- 9	72	162	7.065(-4)
74578	5- 6	50	72	1.025(-2)
75004	6- 8	72	128	1.561(-3)
123680	6- 7	72	98	4.561(-3)

For hydrogen-like ions of nuclear charge Z , the following scaling laws hold:

$$A_Z = Z^4 A_{\text{Hydrogen}}; f_Z = f_{\text{H}}; S_Z = Z^{-2} S_{\text{H}}$$

(For wavelengths $\lambda_Z = Z^{-2} \lambda_{\text{H}}$).

For very highly charged ions, relativistic effects need to be taken into account [12].

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TABLE 1b. Transition probabilities for selected atomic and ionic species

Wavelength ($\lambda[\text{\AA}]$)	Upper energy level ($E_k[\text{cm}^{-1}]$)	Stat. weights g_i g_k	Transition Probability ($A[10^8 \text{ s}^{-1}]$)	Unc.	Wavelength ($\lambda[\text{\AA}]$)	Upper energy level ($E_k[\text{cm}^{-1}]$)	Stat. weights g_i g_k	Transition Probability ($A[10^8 \text{ s}^{-1}]$)	Unc.
Aluminum					Al III				
Al I					Al X				
2263.5	44166	2 4	.66	C	1935.9	167613	10 14*	12.2	C
2269.1	44169	4 6	.79	C	3601.6	143714	6 4	1.34	C
2269.2	44166	4 4	.13	C	3601.9	143714	4 4	.149	C
2367.1	42234	2 4	.72	C	3612.4	143633	4 2	1.5	C
2373.1	42238	4 6	.86	C	Al XI				
2373.4	42234	4 4	.14	C	36.675	2726700	2 6*	1500.	C
2568.0	38929	2 4	.23	C	39.091	2734100	2 4	2600.	C
2575.1	38934	4 6	.28	C	39.180	2734500	4 6	3100.	C
2575.4	38929	4 4	.044	C	39.530	2705700	2 2	180.	D
2652.5	37689	2 2	.133	C	39.623	2705700	4 2	370.	D
2660.4	37689	4 2	.264	C	48.298	2070520	2 4	3090.	B
3082.2	32435	2 4	.63	C	48.338	2068770	2 2	3080.	B
3092.7	32437	4 6	.74	C	52.299	2088100	2 4	8100.	C
3092.8	32435	4 4	.12	C	52.446	2088530	4 6	9600.	C
3944.0	25348	2 2	.493	C	52.458	2088100	4 4	1600.	C
3961.5	25348	4 2	.98	C	54.217	2020450	2 2	480.	C
6696.0	40278	2 4	.0169	C	54.388	2020450	4 2	960.	C
6698.7	40272	2 2	.0169	C	99.083	3029700	2 6*	220.	C
7835.3	45195	4 6	.057	D	103.6	3033700	2 4	420.	C
7836.1	45195	6 8	.062	D	103.8	3033700	4 6	500.	C
Al II					Argon				
1047.9	132823	1 3	.36	D	Ar I				
1048.6	132823	3 5	.48	D	3554.3	121271	5 5	.0029	D
1539.8	124794	3 5	8.8	D	3567.7	121165	5 7	.0012	D
1670.8	59852	1 3	14.6	B	3606.5	121470	3 1	.0081	D
1719.4	95551	1 3	6.79	B	3649.8	122791	3 1	.0085	D
1764.0	94269	5 5	9.8	C	3834.7	121470	3 1	.0080	D
1772.8	150493	1 3	9.5	D	Al III				
1777.0	150544	5 7	17.	D	560.36	178458	2 6*	.40	D
1819.0	150525	15 15*	5.6	D	695.83	143714	2 4	.74	C
1855.9	91275	1 3	.832	B	696.22	143633	2 2	.72	C
1858.0	91275	3 3	2.48	B	1352.8	189876	10 14*	4.40	C
1862.3	91275	5 3	4.12	B	1379.7	126164	2 2	4.59	C
1931.0	111637	3 1	10.8	C	1384.1	126164	4 2	9.1	C
1990.5	110090	3 5	14.7	C	1605.8	115959	2 4	12.2	B
2816.2	95351	3 1	3.83	C	1611.8	115959	4 4	2.42	B
4663.1	106921	5 3	.53	C	1611.9	115956	4 6	14.5	B
6226.2	121484	1 3	.62	D	1854.7	53917	2 4	5.40	B
6231.8	121484	3 5	.84	D	1862.8	53683	2 2	5.33	B
6243.4	121484	5 7	1.1	D	Al III				
6335.7	125869	5 3	.14	D	560.36	178458	2 6*	.40	D
6823.4	120093	3 3	.34	D	695.83	143714	2 4	.74	C
6837.1	120093	5 3	.57	D	696.22	143633	2 2	.72	C
6920.3	121367	3 1	.96	D	1352.8	189876	10 14*	4.40	C
7042.1	105471	3 5	.59	C	1379.7	126164	2 2	4.59	C
7056.7	105442	3 3	.58	C	1384.1	126164	4 2	9.1	C
7471.4	123471	5 7	.94	D	1605.8	115959	2 4	12.2	B
Al III					Argon				
560.36	178458	2 6*	.40	D	Ar I				
695.83	143714	2 4	.74	C	3554.3	121271	5 5	.0029	D
696.22	143633	2 2	.72	C	3567.7	121165	5 7	.0012	D
1352.8	189876	10 14*	4.40	C	3606.5	121470	3 1	.0081	D
1379.7	126164	2 2	4.59	C	3649.8	122791	3 1	.0085	D
1384.1	126164	4 2	9.1	C	3834.7	121470	3 1	.0080	D
1605.8	115959	2 4	12.2	B	Al III				
1611.8	115959	4 4	2.42	B	560.36	178458	2 6*	.40	D
1611.9	115956	4 6	14.5	B	695.83	143714	2 4	.74	C
1854.7	53917	2 4	5.40	B	696.22	143633	2 2	.72	C
1862.8	53683	2 2	5.33	B	1352.8	189876	10 14*	4.40	C

TABLE 1b. Transition probabilities for selected atomic and ionic species—Continued

Wavelength (λ [Å])	Upper energy level (E_k [cm ⁻¹])	Stat. weights g_i g_k	Transition Probability (A [10 ⁸ s ⁻¹])	Unc.	Wavelength (λ [Å])	Upper energy level (E_k [cm ⁻¹])	Stat. weights g_i g_k	Transition Probability (A [10 ⁸ s ⁻¹])	Unc.
Ar I					Ar I				
3949.0	118460	5 3	.00467	C	5639.1	124783	1 3	.0022	D
4044.4	118469	3 5	.00346	C	5641.4	123809	3 5	9.1 (-4)	D
4158.6	117184	5 5	.0145	C	5648.7	123936	5 3	.0013	D
4164.2	117151	5 3	.00295	C	5650.7	121794	3 1	.0333	C
4181.9	118460	1 3	.0058	C	5659.1	123903	5 5	.0027	D
4190.7	116999	5 5	.00254	C	5681.9	123832	5 7	.0021	D
4191.0	118407	1 3	.0056	C	5683.7	123827	5 5	.0021	D
4198.3	117563	3 1	.0276	C	5700.9	123774	5 7	.0061	D
4200.7	116943	5 7	.0103	C	5739.5	123505	3 5	.0091	D
4259.4	118871	3 1	.0415	C	5772.1	123557	5 7	.0021	D
4266.3	117184	3 5	.00333	C	5774.0	124604	5 5	.0011	D
4272.2	117151	3 3	.0084	C	5783.5	123373	3 5	8.4 (-4)	D
4300.1	116999	3 5	.00394	C	5802.1	123468	5 3	.0044	D
4333.6	118469	3 5	.0060	C	5834.3	123373	5 5	.0052	C
4335.3	118460	3 3	.00387	C	5860.3	121161	3 3	.00285	C
4345.2	118407	3 3	.00313	C	5882.6	121097	3 1	.0128	C
4510.7	117563	3 1	.0123	C	5888.6	122440	7 5	.0134	C
4768.7	125066	3 5	.0090	D	5912.1	121012	3 3	.0105	C
4836.7	124772	3 5	.00106	C	5928.8	122479	5 3	.011	D
4876.3	124604	3 5	.0081	D	5940.9	123882	1 3	.0012	D
4887.9	124555	3 3	.014	D	5942.7	122440	5 5	.0019	D
4894.7	124527	3 1	.019	D	5949.3	123936	3 3	.0016	D
5048.8	123903	3 5	.0048	D	5968.3	123882	3 3	.0019	D
5054.2	123882	3 3	.0047	D	5971.6	123873	3 1	.011	D
5056.5	123873	3 1	.0059	D	5987.3	122160	7 7	.0013	D
5118.2	125150	5 7	.0028	D	5988.1	123827	3 5	6.4 (-4)	D
5151.4	123509	3 1	.0249	C	5999.0	122282	5 5	.0015	D
5152.3	123505	3 5	.0011	D	6005.7	123936	5 3	.0015	D
5162.3	123468	3 3	.0198	C	6013.7	122087	7 5	.0015	D
5177.5	124772	7 5	.0025	D	6025.2	123882	5 3	.0094	D
5187.7	123373	3 5	.0138	C	6032.1	122036	7 9	.0246	C
5194.1	125335	3 1	.0081	D	6043.2	122160	5 7	.0153	C
5210.5	124650	7 7	.0011	D	6052.7	120619	3 5	.0020	D
5214.8	124788	5 3	.0022	D	6059.4	120601	3 5	.00423	C
5216.3	124783	5 3	.0014	D	6064.8	123774	5 7	6.0 (-4)	D
5221.3	124610	7 9	.0092	D	6090.8	123468	1 3	.0031	D
5241.1	124692	5 5	.0014	D	6098.8	122479	3 3	.0054	D
5252.8	124650	5 7	.0056	D	6101.2	123882	3 3	.0034	D
5373.5	124692	3 5	.0028	D	6104.6	123873	3 1	.0035	D
5394.0	124772	5 5	.0010	D	6105.6	123505	3 5	.0126	C
5410.5	124715	5 7	.0021	D	6127.4	121933	5 3	.0011	D
5421.4	123903	7 5	.0062	D	6128.7	123809	3 5	9.0 (-4)	D
5440.0	122479	3 3	.0020	D	6145.4	123557	5 7	.0079	C
5442.2	123832	7 7	9.7 (-4)	D	6155.2	122479	5 3	.0053	D
5451.7	122440	3 5	.0049	D	6165.1	123505	5 5	.00103	C
5457.4	123936	5 3	.0037	D	6170.2	122440	5 5	.0052	C
5467.2	123903	5 5	7.9 (-4)	D	6173.1	122282	3 5	.0070	C
5473.5	123882	5 3	.0021	D	6212.5	122330	5 7	.0041	D
5490.1	123827	5 5	8.9 (-4)	D	6215.9	123373	5 5	.0059	D
5495.9	123653	7 9	.0176	C	6248.4	122087	3 5	7.1 (-4)	D
5506.1	123774	5 7	.0037	D	6296.9	123373	3 5	.0094	D
5525.0	123557	7 7	.0018	D	6307.7	122087	5 5	.0063	D
5534.5	125353	5 3	.0028	D	6364.9	121794	3 1	.0058	D
5558.7	122087	3 5	.0148	C	6369.6	121933	5 3	.0044	D
5559.7	125113	3 5	.0023	D	6384.7	119760	3 3	.00439	C
5572.5	123557	5 7	.0069	C	6416.3	119683	3 5	.0121	C
5588.7	123505	5 5	.0016	D	6466.6	122514	1 3	.0016	D
5606.7	121933	3 3	.0229	C	6481.1	122479	1 3	9.8 (-4)	D
5618.0	123882	3 3	.0022	D	6538.1	120753	7 7	.0011	D
5620.9	123873	3 1	.0038	D	6604.0	120601	7 5	.0029	D
5623.8	125066	5 5	.0015	D	6660.7	121097	3 1	.0081	D
5635.6	123827	3 5	.0010	D	6664.1	120619	5 5	.0016	D

TABLE 1b. Transition probabilities for selected atomic and ionic species—Continued

Wavelength (λ [Å])	Upper energy level (E_k [cm ⁻¹])	Stat. weights g_i g_k	Transition Probability (A [10 ⁸ s ⁻¹])	Unc.	Wavelength (λ [Å])	Upper energy level (E_k [cm ⁻¹])	Stat. weights g_i g_k	Transition Probability (A [10 ⁸ s ⁻¹])	Unc.
Ar I					Ar II				
6677.3	108723	3 1	.00241	C	3000.4	192712	4 4	1.5	D
6698.9	121161	5 3	.0017	D	3028.9	192712	2 4	2.3	D
6719.2	121933	1 3	.0025	D	3093.4	192557	4 6	4.4	D
6752.8	118907	3 5	.0201	C	3139.0	186891	6 6	1.0	D
6754.4	121933	3 3	.0022	D	3161.4	192712	2 4	1.8	D
6756.2	122087	5 5	.0038	D	3169.7	186891	4 6	.82	D
6766.6	121012	5 3	.0042	D	3181.0	186470	6 4	.63	D
6779.9	123468	1 3	.00126	C	3236.8	190592	2 4	.52	D
6827.2	121933	5 3	.0025	D	3243.7	186171	4 2	2.0	D
6851.9	122087	3 5	7.0 (-4)	D	3249.8	186470	2 4	1.0	D
6871.3	118651	3 3	.0290	C	3293.6	190592	4 4	1.7	D
6879.6	120619	3 5	.0019	D	3307.2	189935	2 2	3.4	D
6887.1	120753	5 7	.0014	D	3350.9	200235	6 6	1.5	D
6888.2	120601	3 5	.0026	D	3376.4	200139	8 8	1.5	D
6925.0	121933	3 3	.0012	D	3388.5	190592	2 4	1.9	D
6937.7	118512	3 1	.0321	C	3454.1	183986	6 4	.45	D
6951.5	120619	5 5	.0023	D	3464.1	187589	6 6	.37	D
6960.3	120601	5 5	.0025	D	3476.7	183797	6 6	1.34	C
6965.4	107496	5 3	.067	C	3491.2	183986	4 4	2.2	D
6992.2	121794	3 1	.0078	D	3509.8	184192	2 2	2.5	D
7030.3	119683	7 5	.0278	C	3514.4	183797	4 6	1.23	C
7067.2	107290	5 5	.0395	C	3520.0	186074	6 6	.80	D
7068.7	119760	5 3	.021	D	3521.3	185625	8 8	.23	D
7086.7	121161	1 3	.0016	D	3535.3	183986	2 4	.82	D
7107.5	119683	5 5	.0047	D	3545.6	187589	4 6	3.4	D
7125.8	121161	3 3	.0063	D	3545.8	198595	6 8	3.9	D
7147.0	107132	5 3	.0065	C	3548.5	186341	4 4	1.1	D
7158.8	121097	3 1	.022	D	3559.5	186816	6 8	3.9	D
7207.0	121161	5 3	.0258	C	3565.0	186470	2 4	1.1	D
7229.9	119445	5 5	6.9 (-4)	D	3576.6	185625	6 8	2.77	C
7265.2	119848	3 3	.0018	D	3581.6	186341	2 4	1.8	D
7270.7	119213	7 7	.0011	D	3582.4	186074	4 6	3.72	C
7272.9	107496	3 3	.0200	C	3588.4	185093	8 10	3.39	C
7285.4	121012	5 3	.0013	D	3600.2	199525	4 4	2.2	D
7311.7	119760	3 3	.018	D	3622.1	182951	4 2	.64	D
7316.0	121161	3 3	.010	D	3639.8	199680	4 6	1.4	D
7350.8	121097	3 1	.012	D	3655.3	187589	4 6	.23	D
7353.3	119213	5 7	.010	D	3671.0	199447	4 2	.71	D
7372.1	119024	7 9	.020	D	3680.1	199982	2 4	1.2	D
7384.0	107290	3 5	.087	C	3718.2	200235	4 6	2.0	D
7393.0	119760	5 3	.0075	D	3724.5	200235	6 6	.34	D
7412.3	120619	3 5	.0041	D	3729.3	161049	6 4	.60	D
7422.3	120601	3 5	6.9 (-4)	D	3737.9	200139	6 8	2.3	D
7425.3	120753	5 7	.0032	D	3765.3	181594	6 6	.98	D
7435.4	119683	5 5	.0094	D	3770.5	182222	2 4	.41	D
7436.3	118907	7 5	.0028	D	3780.8	183676	8 8	.94	D
7484.3	119445	3 5	.0035	D	3796.6	199680	4 6	.25	D
7503.9	108723	3 1	.472	C	3803.2	199680	6 6	1.5	D
7510.4	120601	5 5	.0047	D	3809.5	181594	4 6	.44	D
7514.7	107054	3 1	.430	C	3825.7	199525	6 4	.76	D
7618.3	120619	3 5	.0030	D	3850.6	161049	4 4	.47	D
7628.9	120601	3 5	.0030	D	3868.5	186891	4 6	1.9	D
7635.1	106238	5 5	.274	C	3925.7	195867	6 4	1.4	D
7670.0	118651	5 3	.0029	D	3928.6	161049	2 4	.30	D
7704.8	119213	5 7	6.6 (-4)	D	3932.5	186470	4 4	1.1	D
7723.8	106087	5 3	.057	C	3946.1	195865	8 6	1.4	D
7724.2	107496	1 3	.127	C	3952.7	186341	4 4	.35	D
7798.6	118907	3 5	9.1 (-4)	D	3979.4	186171	4 2	1.3	D
7868.2	119760	1 3	.00365	C	4033.8	182951	4 2	.98	D
7891.1	118907	5 5	.0099	C	4042.9	173348	4 4	1.4	D
7916.4	119760	3 3	.0013	D					
7948.2	107132	1 3	.196	C					

TABLE 1b. Transition probabilities for selected atomic and ionic species—Continued

Wavelength (λ [Å])	Upper energy level (E_k [cm ⁻¹])	Stat. weights g_i g_k	Transition Probability (A [10 ⁸ s ⁻¹])	Unc.	Wavelength (λ [Å])	Upper energy level (E_k [cm ⁻¹])	Stat. weights g_i g_k	Transition Probability (A [10 ⁸ s ⁻¹])	Unc.
Ar II					Ar III				
4072.0	173393	6 6	.57	C	3336.1	226646	7 9	2.0	D
4076.6	182951	2 2	.80	D	3344.7	226503	5 7	1.8	D
4076.9	183915	4 2	.99	D	3352.1	226503	7 7	.22	D
4079.6	173348	6 4	.26	D	3358.5	226356	3 5	1.6	D
4131.7	172816	4 2	1.4	D	3361.3	226356	5 5	.30	D
4156.1	182222	4 4	.39	D	3472.6	225403	5 7	.20	D
4179.3	181594	6 6	.13	D	3480.6	225403	7 7	1.6	D
4218.7	183091	4 4	.36	D	3499.7	225155	3 3	1.3	D
4222.6	183915	4 2	.69	D	3500.6	225148	3 5	.26	D
4227.0	195865	4 6	.41	D	3502.7	225155	5 3	.43	D
4266.5	157673	6 6	.156	C	3503.6	225148	5 5	1.2	D
4275.2	183091	2 4	.26	D	3511.7	225148	7 5	.26	D
4277.5	172214	6 4	1.0	D	Ar IV				
4331.2	158168	4 4	.56	C	840.03	119044	4 2	2.73	C
4337.1	195867	2 4	.34	D	843.77	118515	4 4	2.70	C
4348.1	157234	6 8	1.24	C	850.60	117564	4 6	2.63	C
4370.8	173348	4 4	.65	C	Ar VI				
4371.3	155351	6 4	.233	C	292.15	342286	2 2	69.	C
4379.7	158428	2 2	1.04	C	294.05	342286	4 2	136.	C
4401.0	155043	8 6	.322	C	Ar VII				
4426.0	157673	4 6	.83	C	250.41	514083	9 3*	278.	C
4430.2	158168	2 4	.53	C	477.54	324151	9 15*	99.2	B
4448.9	195865	6 6	.65	D	585.75	170720	1 3	78.3	B
4481.8	173393	6 6	.494	C	637.30	271657	9 9*	67.	C
4545.1	160239	4 4	.413	B	Ar VIII				
4547.8	182222	4 4	.077	D	158.92	629237	2 4	110.	C
4589.9	170401	4 6	.82	C	159.18	628240	2 2	111.	C
4609.6	170530	6 8	.91	C	229.44	575910	2 2	112.	C
4637.2	170401	6 6	.090	D	230.88	575910	4 2	221.	C
4657.9	159707	4 2	.81	C	337.09	629237	4 4	12.	D
4726.9	159393	4 4	.50	C	337.26	629237	6 4	100.	C
4735.9	155351	6 4	.58	C	338.22	628240	4 2	110.	C
4764.9	160239	2 4	.575	B	519.43	332576	2 4	63.	C
4806.0	155043	6 6	.79	C	526.46	332727	4 6	72.	C
4847.8	155708	4 2	.85	C	526.87	332576	4 4	12.	D
4865.9	181594	4 6	.15	D	700.24	142776	2 4	25.5	C
4879.9	158730	4 6	.78	C	713.81	140058	2 2	24.	C
4965.1	159393	2 4	.347	C	Ar IX				
5009.3	155043	4 6	.147	C	48.739	2051750	1 3	1690.	B
5017.2	170401	4 6	.231	C	Ar XIII				
5062.0	155351	2 4	.221	C	162.96	698650	5 3	340.	C
5141.8	170530	6 8	.095	C	163.08	628610	9 3*	530.	C
6638.2	158168	6 4	.129	C	184.90	625840	5 5	166.	C
6643.7	157234	10 8	.167	C	186.38	698650	1 3	88.	C
6684.3	157673	8 6	.113	C	207.89	496450	9 9*	95.	C
Ar III					245.10	423420	9 15*	37.	C
769.15	144023	5 3	6.0	D	Ar XIV				
871.10	114798	5 3	1.59	C	180.29	554660	2 4	45.	C
875.53	115328	3 1	3.74	C	183.41	545230	2 2	169.	C
878.73	113801	5 5	2.79	C	187.95	554660	4 4	197.	C
879.62	114798	3 3	.92	C	191.35	545230	4 2	75.	C
883.18	114798	1 3	1.22	C	194.39	514430	2 2	46.	C
887.40	113801	3 5	.90	C	203.35	514430	4 2	78.	C
3024.1	240292	5 7	2.6	D	Ar XV				
3027.2	240258	5 5	.64	D	25.05	3992000	1 3	1.7 (+4)	B
3054.8	240258	3 5	1.9	D	221.10	452280	1 3	95.5	B
3064.8	240151	3 3	1.0	D	265.3	621500	9 9*	81.	C
3078.2	240151	1 3	1.4	D					
3285.9	204797	5 7	2.0	D					
3301.9	204649	5 5	2.0	D					
3311.3	204564	5 3	2.0	D					

TABLE 1b. Transition probabilities for selected atomic and ionic species—Continued

Wavelength ($\lambda[\text{\AA}]$)	Upper energy level ($E_k[\text{cm}^{-1}]$)	Stat. weights g_i g_k	Transition Probability ($A[10^8 \text{ s}^{-1}]$)	Unc.	Wavelength ($\lambda[\text{\AA}]$)	Upper energy level ($E_k[\text{cm}^{-1}]$)	Stat. weights g_i g_k	Transition Probability ($A[10^8 \text{ s}^{-1}]$)	Unc.
Ar XVI					Ba I				
23.52	4251000	2 6*	1.43(+4)	B	4406.8	36200	5 5	.10	D
24.96	4281000	6 10*	4.4(+4)	B	4431.9	34823	1 3	1.2	D
353.88	282580	2 4	15.	B	4467.1	35894	5 7	.066	D
389.11	257000	2 2	11.	B	4489.0	35785	5 7	.42	D
1268.	4254000	2 4	1.9	B	4493.6	35762	5 5	.36	D
1401.	4246000	2 2	1.4	B	4505.9	34823	3 3	1.1	D
2975.	4280000	2 4	.090	C	4523.2	35617	5 5	.96	D
3514.	4281000	4 6	.065	C	4573.9	34494	3 1	2.9	D
Arsenic					4579.6	35344	5 5	1.8	D
As I					4591.8	30987	5 5	.016	D
1890.4	52898	4 6	2.0	D	4599.8	34371	3 1	1.0	D
1937.6	51610	4 4	2.0	D	4605.0	30744	3 1	.077	D
1972.6	50694	4 2	2.0	D	4619.9	33905	1 3	.093	D
2288.1	54605	6 4	2.8	D	4628.3	30816	5 3	.060	D
2344.0	60835	2 4	.35	D	4673.6	30987	7 5	.065	D
2349.8	53136	4 2	3.1	D	4691.6	34823	5 3	1.6	D
2369.7	60835	4 4	.60	D	4700.4	33905	3 3	.24	D
2370.8	60815	4 6	.42	D	4726.4	32547	5 3	.46	D
2456.5	51610	6 4	.072	D	5519.1	30751	3 5	.50	D
2492.9	50694	4 2	.12	D	5535.5	18080	1 3	1.15	B
2745.0	54605	2 4	.26	D	5777.6	30818	5 7	.64	D
2780.2	54605	4 4	.78	D	5800.2	30751	5 5	.099	D
2860.4	53136	2 2	.55	D	5805.7	26816	7 7	.011	D
2898.7	53136	4 2	.099	D	5826.3	28554	5 3	.56	D
Barium					5907.6	25957	3 5	.036	D
Ba I					5971.7	25957	5 5	.29	D
2409.2	41494	1 3	8.6(-4)	C	5977.1	25704	3 3	.27	D
2414.1	41411	1 3	.0015	C	6019.5	25642	3 1	1.4	D
2420.1	41308	1 3	.0023	C	6063.1	25704	5 3	.57	D
2427.4	41184	1 3	.0056	C	6110.8	25957	7 5	1.0	D
2432.5	41097	1 3	.0072	C	6341.7	24980	5 7	.19	D
2438.8	40991	1 3	.0014	C	6450.9	24532	3 5	.11	D
2444.6	40893	1 3	.0045	C	6482.9	26816	5 7	.44	D
2452.4	40764	1 3	8.1(-4)	C	6498.8	24980	7 7	.86	D
2473.2	40421	1 3	.0046	C	6527.3	24532	5 5	.59	D
2500.2	39985	1 3	.015	D	6595.3	24192	3 3	.39	D
2543.2	39309	1 3	.041	D	6675.3	24192	5 3	.19	D
2596.6	38500	1 3	.12	D	6693.8	24532	7 5	.28	D
2646.5	37775	1 3	.011	D	6865.7	25957	5 5	.078	D
2702.6	36990	1 3	.025	D	7059.9	23757	7 9	.71	D
2739.2	36496	1 3	.0091	D	7120.3	23074	3 5	.21	D
2785.3	35893	1 3	.028	D	7195.2	26160	1 3	.24	D
3071.6	32547	1 3	.41	C	7280.3	22947	5 7	.53	D
3501.1	28554	1 3	.19	D	7392.4	26160	3 3	.50	D
3889.3	25704	1 3	.0088	D	7417.5	23074	7 5	.025	D
3909.9	34603	3 5	.49	D	7488.1	22947	7 7	.10	D
3935.7	34617	5 7	.47	D	7672.1	22065	3 5	.31	D
3937.9	34603	5 5	.11	D	7780.5	22065	5 5	.13	D
3993.4	34631	7 9	.55	D	7905.8	26160	5 3	.63	D
3995.7	34617	7 7	.088	D	7911.3	12637	1 3	.00298	C
4132.4	24192	1 3	.0071	D	Ba II				
4239.6	37095	5 3	.24	D	1413.4	76429	6 8	.017	D
4242.6	36200	3 5	.056	D	1417.1	75438	4 6	.038	D
4264.4	35709	1 3	.15	D	1444.9	74091	4 6	.081	D
4283.1	34736	5 7	.64	D	1461.5	74109	6 8	.087	D
4323.0	35762	3 5	.15	D	1487.0	72143	4 6	.14	D
4325.2	36629	5 7	.071	D	1503.9	72170	6 8	.15	D
4332.9	35709	3 3	.15	D	1554.4	69212	4 6	.26	D
4350.3	35617	3 5	.60	D	1572.7	69260	6 8	.24	D
4402.5	35344	3 5	.70	D	1573.9	69212	6 6	.016	D
					1630.4	61336	2 2	.017	D

TABLE 1b. Transition probabilities for selected atomic and ionic species—Continued

Wavelength (λ [Å])	Upper energy level (E_k [cm ⁻¹])	Stat. weights g_i g_k	Transition Probability (A [10 ⁸ s ⁻¹])	Unc.	Wavelength (λ [Å])	Upper energy level (E_k [cm ⁻¹])	Stat. weights g_i g_k	Transition Probability (A [10 ⁸ s ⁻¹])	Unc.
Ba II					Ba II				
1674.5	64596	4 6	.22	D	5999.9	66674	4 4	.026	D
1694.4	64697	6 8	.21	D	6135.8	65683	2 2	.085	D
1697.2	64596	6 6	.017	D	6141.7	21952	6 4	.37	B
1761.8	61636	4 4	.0039	D	6363.2	73102	6 4	.0029	D
1771.0	61336	4 2	.034	D	6372.9	61636	4 4	6.7 (-4)	D
1786.9	61636	6 4	.044	D	6378.9	65683	4 2	.099	D
1892.7	73102	2 4	.090	D	6457.7	61636	6 4	.0030	D
1904.2	57391	4 6	.011	D	6496.9	20262	4 2	.332	C
1906.8	72705	2 2	.051	D	7556.8	70620	6 4	.0016	D
1924.7	57632	6 8	.031	D	7678.2	70652	8 6	6.6 (-4)	D
1954.2	73122	4 6	.13	D	8710.7	57632	6 8	.80	D
1955.1	73102	4 4	.018	D	8737.7	57391	4 6	.93	D
1970.2	72705	4 2	.067	D	Beryllium				
1985.6	70620	2 4	.25	D	Be I				
1999.5	50011	2 4	.10	D	1491.8	67035	1 3	.013	D
2009.2	70015	2 2	.086	D	1661.5	60187	1 3	.20	D
2052.7	70652	4 6	.20	D	2348.6	42565	1 3	5.56	B
2054.6	70620	4 4	.029	D	2494.7	62054	9 15*	1.6	C
2080.0	70015	4 2	.10	D	2650.6	59696	9 9*	4.31	C
2153.9	66674	2 4	.53	D	4572.7	64428	3 5	.79	C
2200.9	65683	2 2	.20	D	Be II				
2232.8	66725	4 6	.29	D	1197.1	115464	2 2	.47	D
2235.4	66674	4 4	.044	D	1197.2	115464	4 2	.94	D
2286.0	65683	4 2	.13	D	1512.3	98055	2 4	9.2	C
2528.5	59800	2 4	.71	D	1512.4	98055	4 6	11.	C
2634.8	59895	4 6	.76	D	1776.1	88232	2 2	1.4	C
2641.4	59800	4 4	.12	D	1776.3	88232	4 2	2.9	C
2647.3	58025	2 2	.20	D	2453.8	128972	2 6*	.142	C
2771.4	58025	4 2	.40	D	3046.5	129310	2 4	.48	C
3816.7	72143	4 6	.0023	D	3046.7	129310	4 6	.59	C
3842.8	72170	6 8	.0022	D	3130.4	31935	2 4	1.14	B
3891.8	45949	2 4	1.67	B	3131.1	31929	2 2	1.15	B
4024.1	73102	6 4	.0053	D	3241.6	127335	2 2	.141	C
4057.5	73122	8 6	.012	D	3241.8	127335	4 2	.28	C
4130.7	46155	4 6	1.80	B	3274.6	118761	2 4	.19	C
4166.0	45949	4 4	.37	D	3274.7	118761	2 2	.19	C
4216.0	73102	2 4	.058	D	4360.7	119421	2 4	.92	C
4287.8	72705	2 2	.024	D	4361.0	119421	4 6	1.1	C
4325.7	73122	4 6	.059	D	5255.9	134485	2 6*	.0256	C
4329.6	73102	4 4	.0088	D	5270.3	115464	2 2	.330	C
4405.2	72705	4 2	.039	D	5270.8	115464	4 2	.66	C
4470.7	70620	6 4	.014	D	6279.4	134681	2 4	.12	C
4509.6	70652	8 6	.012	D	6279.7	134681	4 6	.143	C
4524.9	42355	2 2	.72	D	6756.7	133556	2 2	.051	C
4554.0	21952	2 4	1.17	A	6757.1	133556	4 2	.102	C
4708.9	70620	2 4	.097	D	7401.2	128972	2 4	.030	C
4843.5	70652	4 6	.093	D	7401.4	128972	2 2	.030	C
4847.1	70015	2 2	.041	D	Bismuth				
4850.8	70620	4 4	.014	D	Bi I				
4900.0	42355	4 2	.775	B	1954.5	51159	4 6	1.2	D
4934.1	20262	2 2	.955	B	2021.2	49461	4 4	.060	D
4997.8	70015	4 2	.061	D	2061.7	48490	4 6	.99	D
5185.0	61636	2 4	.018	D	2110.3	47373	4 2	.91	D
5361.4	64596	4 6	.048	D	2177.3	45916	4 2	.026	D
5391.6	64697	6 8	.052	D	2228.3	44865	4 4	.89	D
5413.6	66725	6 6	8.4 (-4)	D	2230.6	44817	4 6	2.6	D
5421.1	64596	6 6	.0019	D	2276.6	43913	4 4	.25	D
5428.8	66674	6 4	.023	D	2515.7	51159	4 6	.043	D
5480.3	66725	8 6	.018	D	2627.9	49461	4 4	.47	D
5784.2	66674	2 4	.20	D					
5853.7	21952	4 4	.048	B					
5981.3	66725	4 6	.16	D					

TABLE 1b. Transition probabilities for selected atomic and ionic species—Continued

Wavelength ($\lambda[\text{\AA}]$)	Upper energy level ($E_k[\text{cm}^{-1}]$)	Stat. weights $g_i \quad g_k$	Transition Probability ($A[10^8 \text{ s}^{-1}]$)	Unc.	Wavelength ($\lambda[\text{\AA}]$)	Upper energy level ($E_k[\text{cm}^{-1}]$)	Stat. weights $g_i \quad g_k$	Transition Probability ($A[10^8 \text{ s}^{-1}]$)	Unc.
Bi I					Br I				
2696.8	48490	4 6	.064	D	8446.6	76743	4 4	.12	D
2780.5	47373	4 2	.309	C	8638.7	75009	6 4	.097	D
2798.7	51159	6 6	.036	D	Br II				
2898.0	45916	4 2	1.53	C	4704.9	115176	5 7	1.1	D
2938.3	49461	6 4	1.23	C	4785.5	114818	5 5	.94	D
2989.0	44865	4 4	.55	C	4816.7	114683	5 3	1.1	D
2993.3	44817	4 6	.16	C	Cadmium				
3024.6	48490	6 6	.88	C	Cd I				
3067.7	32588	4 2	2.07	C	2288.0	43692	1 3	5.3	C
3076.7	43913	4 4	.035	D	2836.9	65354	1 3	.28	D
3397.2	44865	6 4	.181	C	2880.8	65359	3 5	.42	D
3402.9	44817	6 6	.016	D	2881.2	65353	3 3	.24	D
3510.9	43913	6 4	.068	D	2980.6	65367	5 7	.59	D
3596.1	49461	2 4	.198	C	2981.4	65359	5 5	.15	D
3888.2	47373	2 2	.069	D	3261.1	30656	1 3	.00406	C
4121.5	45916	2 2	.164	C	3403.7	59486	1 3	.77	C
4308.5	44865	2 4	.016	D	3466.2	59498	3 5	1.2	D
4493.0	43913	2 4	.015	D	3467.7	59486	3 3	.67	D
4722.5	32588	4 2	.117	C	3610.5	59516	5 7	1.3	D
6134.8	49461	4 4	.018	D	3612.9	59498	5 5	.35	D
Boron					4140.5	67838	3 5	.047	D
B I					4662.4	65135	3 5	.055	C
1378.6	72535	2 4	3.50	C	4678.1	51484	1 3	.13	C
1378.9	72523	2 2	14.0	C	4799.9	51484	3 3	.41	C
1378.9	72535	4 4	17.5	C	5085.8	51484	5 3	.56	C
1379.2	72523	4 2	7.0	C	6438.5	59220	3 5	.59	C
1465.5	97000	2 4	3.34	C	Cd II				
1465.7	97000	4 4	6.7	C	2144.4	46619	2 4	2.8	C
1465.8	97000	6 4	10.0	C	2265.0	44136	2 2	3.0	C
1825.9	54767	2 4	2.0	C	2572.9	82991	2 2	1.7	C
1826.4	54767	4 6	2.4	C	2748.5	82991	4 2	2.8	C
2088.9	47857	2 4	.28	D	4415.6	69259	4 6	.014	B
2089.6	47857	4 6	.33	D	Calcium				
2496.8	40040	2 2	.85	C	Ca I				
2497.7	40040	4 2	1.69	C	2275.5	43933	1 3	.301	C
Bromine					2995.0	48538	1 3	.367	C
Br I					2997.3	48564	3 5	.241	C
1488.5	67184	4 4	1.2	D	2999.6	48538	3 3	.279	C
1540.7	64907	4 4	1.4	D	3000.9	48524	3 1	1.58	C
1574.8	67184	2 4	.20	D	3006.9	48564	5 5	.75	C
1576.4	63436	4 6	.021	D	3009.2	48538	5 3	.430	C
1633.4	64907	2 4	.081	D	3344.5	45049	1 3	.151	C
4365.1	89786	2 4	.0075	D	3350.2	45050	3 5	.178	C
4425.1	87499	4 2	.0042	D	3361.9	45052	5 7	.223	C
4441.7	85944	6 4	.0075	D	3624.1	42743	1 3	.212	C
4472.6	87259	4 4	.0093	D	3630.8	42745	3 5	.297	C
4477.7	85763	6 8	.013	D	3631.0	42743	3 3	.153	C
4513.4	85586	6 4	.0028	D	3644.4	42747	5 7	.355	C
4525.6	85527	6 6	.0072	D	3644.8	42745	5 5	.094	C
4575.7	89032	4 4	.016	D	3870.5	46165	3 5	.072	D
4614.6	88848	4 6	.0054	D	3957.1	40474	3 3	.098	C
4979.8	87259	4 4	.0026	D	3973.7	40474	5 3	.175	C
5245.1	85944	2 4	.0031	D	4092.6	44763	3 5	.11	D
5345.4	85586	2 4	.0076	D	4094.9	44763	5 7	.12	D
7348.5	78512	4 6	.12	D	4098.5	44763	7 9	.13	D
7513.0	76743	6 4	.12	D	4108.5	46182	5 7	.90	D
7803.0	79696	2 4	.053	D	4226.7	23652	1 3	2.18	B
7938.7	88483	6 6	.19	D	4283.0	38552	3 5	.434	C
8131.5	79178	2 4	.038	D	4289.4	38465	1 3	.60	C
8343.7	78866	2 2	.22	D					

TABLE 1b. Transition probabilities for selected atomic and ionic species—Continued

Wavelength (λ [Å])	Upper energy level (E_k [cm ⁻¹])	Stat. weights g_i g_k	Transition Probability (A [10 ⁸ s ⁻¹])	Unc.	Wavelength (λ [Å])	Upper energy level (E_k [cm ⁻¹])	Stat. weights g_i g_k	Transition Probability (A [10 ⁸ s ⁻¹])	Unc.
Ca I					Ca II				
4299.0	38465	3 3	.466	C	2197.8	70678	2 2	.31	C
4302.5	38552	5 5	1.36	C	2208.6	70678	4 2	.62	C
4307.7	38418	3 1	1.99	C	3158.9	56839	2 4	3.1	C
4318.7	38465	5 3	.74	C	3179.3	56858	4 6	3.6	C
4355.1	44805	5 7	.19	D	3181.3	56839	4 4	.58	C
4425.4	37748	1 3	.498	C	3706.0	52167	2 2	.88	C
4435.0	37752	3 5	.67	C	3736.9	52167	4 2	1.7	C
4435.7	37748	3 3	.342	C	3933.7	25414	2 4	1.47	C
4454.8	37757	5 7	.87	C	3968.5	25192	2 2	1.4	C
4455.9	37752	5 5	.20	C	Ca III				
4526.9	43933	5 3	.41	D	357.97	279354	1 3	880.	D
4578.6	42170	3 5	.176	C	439.69	227432	1 3	.19	D
4581.4	42171	5 7	.209	C	490.55	203852	1 3	.016	D
4585.9	42171	7 9	.229	C	Ca V				
4685.3	44990	3 5	.080	D	558.60	197845	5 3	22.	D
4878.1	42344	5 7	.188	C	637.93	156760	5 3	3.9	D
5041.6	41679	5 3	.33	D	643.12	157901	3 1	9.1	D
5188.9	42919	3 5	.40	D	646.57	154671	5 5	6.9	D
5261.7	39335	3 3	.15	D	647.88	156760	3 3	2.3	D
5262.2	39333	3 1	.60	D	651.55	156760	1 3	2.9	D
5264.2	39340	5 5	.091	D	656.76	154671	3 5	2.1	D
5265.6	39335	5 3	.44	D	Ca VII				
5270.3	39340	7 5	.50	D	550.20	203616	5 5	18.	D
5582.0	38259	5 7	.060	D	624.39	160158	1 3	3.3	D
5588.8	38259	7 7	.49	D	630.54	160220	3 5	4.5	D
5590.1	38219	3 5	.083	D	630.79	160158	3 3	2.2	D
5594.5	38219	5 5	.38	D	639.15	160529	5 7	5.7	D
5598.5	38192	3 3	.43	D	640.41	160220	5 5	1.3	D
5601.3	38219	7 5	.086	D	Ca VIII				
5602.9	38192	5 3	.14	D	182.71	547322	2 2	160.	C
5857.5	40720	3 5	.66	D	184.16	547322	4 2	320.	C
6102.7	31539	1 3	.096	C	Ca IX				
6122.2	31539	3 3	.287	C	163.23	758974	5 3	376.	C
6161.3	36575	5 5	.033	D	371.89	410514	1 3	88.	C
6162.2	31539	5 3	.477	C	373.81	410627	3 5	116.	C
6163.8	36555	3 3	.056	D	378.08	410841	5 7	150.	C
6166.4	36548	3 1	.22	D	395.03	467631	3 5	220.	D
6169.1	36555	5 3	.17	D	466.24	214482	1 3	112.	B
6169.6	36575	7 5	.19	D	498.01	343908	3 5	24.9	C
6439.1	35897	7 9	.53	D	506.18	343908	5 5	72.	C
6449.8	35835	3 5	.090	D	515.57	340308	5 3	37.5	C
6462.6	35819	5 7	.47	D	Ca X				
6471.7	35819	7 7	.059	D	110.96	901200	2 4	290.	C
6493.8	35730	3 5	.44	D	111.20	899290	2 2	292.	C
6499.7	35730	5 5	.081	D	151.84	832790	2 2	230.	C
Ca II					153.02	832790	4 2	450.	C
1341.9	74522	2 4	.015	D	206.57	901200	4 4	29.	D
1342.5	74485	2 2	.015	D	206.75	901200	6 4	260.	C
1649.9	60611	2 4	.0032	D	207.39	899290	4 2	280.	C
1652.0	60533	2 2	.0031	D	411.70	417112	2 4	83.	C
1673.9	84934	2 4	.224	C	419.75	417522	4 6	95.	C
1680.1	84936	4 6	.265	C	420.47	417112	4 4	16.	D
1680.1	84934	4 4	.0441	C	557.76	179287	2 4	35.0	C
1807.3	80522	2 4	.354	C	574.01	174213	2 2	32.	C
1814.5	80526	4 6	.42	C	Ca XI				
1814.7	80522	4 4	.070	C	30.448	3284300	1 3	6200.	D
1843.1	79448	2 2	.16	C	30.867	3239700	1 3	4.9 (+4)	D
1850.7	79448	4 2	.308	C	35.212	2839940	1 3	2000.	D
2103.2	72722	2 4	.82	C					
2112.8	72731	4 6	.97	C					
2113.2	72722	4 4	.16	C					

TABLE 1b. Transition probabilities for selected atomic and ionic species—Continued

Wavelength (λ [Å])	Upper energy level (E_k [cm $^{-1}$])	Stat. weights g_i g_k	Transition Probability (A [10 8 s $^{-1}$])	Unc.	Wavelength (λ [Å])	Upper energy level (E_k [cm $^{-1}$])	Stat. weights g_i g_k	Transition Probability (A [10 8 s $^{-1}$])	Unc.
					C I				
Ca XII					1561.3	64091	5 5	.36	D
140.05	709000	4 2	370.	C	1561.4	64087	5 7	1.4	D
147.27	709000	2 2	160.	C	1656.3	60393	3 5	.80	D
Ca XV					1656.9	60353	1 3	1.1	D
141.69	814370	5 3	408.	C	1657.0	60393	5 5	2.4	D
142.23	728910	9 3*	630.	C	1657.4	60353	3 3	.80	D
161.00	729720	5 5	190.	C	1657.9	60333	3 1	3.2	D
Ca XVII					1658.1	60353	5 3	1.3	D
19.558	5113000	1 3	3.8 (+4)	C	1751.8	78731	1 3	.57	D
21.198	5236000	3 5	4.9 (+4)	C	1763.9	78340	1 3	.022	D
192.82	518620	1 3	121.	C	1765.4	78293	1 3	.0071	D
218.82	726450	3 5	27.6	C	1930.9	61982	5 3	3.7	D
223.02	706680	1 3	34.4	C	2478.6	61982	1 3	.18	D
228.72	706680	3 3	23.7	C	2902.3	105799	1 3	.0066	D
232.83	726450	5 5	65.	C	2903.3	105799	3 3	.017	D
244.06	706680	5 3	32.8	C	2905.0	105799	5 3	.022	D
Ca XVIII					4269.0	85400	3 5	.0032	D
18.71	5346000	2 6*	2.31(+4)	B	4371.4	84852	3 3	.0097	D
19.74	5383000	6 10*	7.0 (+4)	B	4762.3	81326	1 3	.0052	D
302.19	330920	2 4	20.	B	4762.5	81344	3 5	.0038	D
344.76	290060	2 2	13.	B	4766.7	81326	3 3	.0039	D
Carbon					4770.0	81311	3 1	.015	D
C I					4771.8	81344	5 5	.012	D
945.19	105799	1 3	6.2	D	4775.9	81326	5 3	.0062	D
945.34	105799	3 3	18.	D	4812.9	81105	1 3	9.7 (-4)	D
945.58	105799	5 3	31.	D	4817.4	81105	3 3	.0028	D
1260.7	79319	1 3	.40	D	4826.8	81105	5 3	.0047	D
1260.9	79323	3 1	1.2	D	4932.1	82252	3 1	.046	D
1261.0	79319	3 3	.31	D	5052.2	81770	3 5	.017	D
1261.1	79311	3 5	.30	D	5380.3	80563	3 3	.016	D
1261.4	79319	5 3	.50	D	5793.1	81344	7 5	.0033	D
1261.6	79311	5 5	.93	D	5794.5	81344	5 5	5.8 (-4)	D
1274.1	78530	5 7	.0068	D	5800.2	81326	3 3	9.7 (-4)	D
1277.2	78293	1 3	.88	D	5800.6	81326	5 3	.0029	D
1277.3	78308	3 5	1.2	D	5805.2	81311	3 1	.0039	D
1277.5	78293	3 3	.65	D	6587.6	84032	3 3	.024	D
1277.6	78318	5 7	1.5	D	C II				
1277.7	78308	5 5	.39	D	687.35	145551	4 6	27.0	C
1278.0	78293	5 3	.042	D	858.09	116538	2 2	.369	C
1279.2	78216	5 7	.11	D	858.56	116538	4 2	1.11	C
1279.9	78148	3 5	.21	D	903.62	110666	2 4	6.6	C
1280.1	78117	1 3	.27	D	903.96	110624	2 2	26.3	C
1280.3	78148	5 5	.62	D	904.14	110666	4 4	33.0	C
1280.4	78117	3 3	.20	D	904.48	110624	4 2	13.3	C
1280.6	78105	3 1	.81	D	1009.9	142027	2 4	5.8	C
1280.8	78117	5 3	.35	D	1010.1	142027	4 4	11.5	C
1328.8	75254	1 3	.49	D	1010.4	142027	6 4	17.3	C
1364.2	83498	5 5	.047	D	1036.3	96494	2 2	8.0	C
1431.6	103587	5 7	1.5	D	1037.0	96494	4 2	15.9	C
1432.1	103563	5 5	1.4	D	1323.9	150467	4 4	4.53	C
1432.5	103542	5 3	1.3	D	1324.0	150462	6 6	4.71	C
1459.0	78731	5 3	.37	D	1334.5	74933	2 4	2.41	C
1463.3	78530	5 7	2.1	D	1335.7	74930	4 6	2.89	C
1467.4	78340	5 3	.46	D	2509.1	150467	2 4	.54	C
1468.4	78293	5 3	.019	D	2511.7	150467	4 4	.106	C
1470.1	78216	5 7	.0088	D	2512.1	150462	4 6	.64	C
1472.2	78117	5 3	.0051	D	6578.1	131736	2 4	.36	C
1481.8	77680	5 5	.33	D	6582.9	131724	2 2	.36	C
1560.3	64090	1 3	.82	D	7231.3	145549	2 4	.36	C
					7236.4	145551	4 6	.44	C
					7237.2	145549	4 4	.072	C

TABLE 1b. Transition probabilities for selected atomic and ionic species—Continued

Wavelength (λ [Å])	Upper energy level (E_u [cm ⁻¹])	Stat. weights g_i g_k	Transition Probability (A [10 ⁸ s ⁻¹])	Unc.	Wavelength (λ [Å])	Upper energy level (E_u [cm ⁻¹])	Stat. weights g_i g_k	Transition Probability (A [10 ⁸ s ⁻¹])	Unc.
C III					Cs I				
310.17	322404	1 3	18.	C	3288.6	30399	2 4	1.0 (-4)	C
386.20	258931	1 3	32.2	B	3289.3	30393	2 2	2.7 (-6)	C
459.46	270011	1 3	55.	C	3313.1	30175	2 4	1.6 (-4)	C
459.52	270012	3 5	75.	C	3314.0	30166	2 2	5.2 (-6)	C
459.63	270015	5 7	98.	C	3347.5	29865	2 4	2.2 (-4)	C
574.28	276483	3 5	63.	C	3348.8	29853	2 2	1.1 (-5)	C
977.03	102352	1 3	17.5	B	3397.9	29421	2 4	4.0 (-4)	C
1174.9	137502	3 5	3.42	C	3400.0	29404	2 2	2.4 (-5)	C
1175.3	137454	1 3	4.55	C	3476.8	28754	2 4	6.6 (-4)	C
1175.6	137454	3 3	3.41	C	3480.0	28727	2 2	6.6 (-5)	C
1175.7	137502	5 5	10.2	C	3611.4	27682	2 4	.0015	C
1176.0	137426	3 1	13.6	C	3617.3	27637	2 2	2.5 (-4)	C
1176.4	137454	5 3	5.7	C	3876.1	25792	2 4	.0038	C
1247.4	182520	3 1	18.6	C	3888.6	25709	2 2	9.7 (-4)	C
2296.9	145876	3 5	1.46	C	4555.3	21946	2 4	.0188	C
4647.4	259724	3 5	.73	C	4593.2	21765	2 2	.0080	C
4650.3	259711	3 3	.74	C	Chlorine				
4651.5	259706	3 1	.74	C	Cl I				
C IV					1188.8	84120	4 6	2.33	C
312.43	320071	2 6*	44.9	B	1188.8	84122	4 4	.271	C
384.13	324886	6 10*	180.	C	1201.4	84122	2 4	2.39	C
1548.2	64592	2 4	2.66	B	1335.7	74866	4 2	1.74	C
1550.8	64484	2 2	2.64	B	1347.2	74226	4 4	4.19	C
5801.3	320082	2 4	.319	B	1351.7	74866	2 2	3.23	C
5812.0	320050	2 2	.316	B	1363.4	74226	2 4	.75	C
C V					4323.3	95612	4 4	.011	D
34.973	2859375	1 3	2554.	AA	4363.3	95401	4 6	.0068	D
40.268	2483371	1 3	8873.	AA	4379.9	95313	4 4	.014	D
227.19	2851418	3 9*	136.3	AA	4389.8	94732	6 8	.014	D
247.31	2859375	1 3	127.9	AA	4526.2	96313	4 4	.051	C
248.70	2857310	9 15*	425.	A	4601.0	96594	2 2	.042	C
260.19	2839562	9 3*	66.83	AA	4661.2	96313	2 4	.012	D
267.27	2857529	3 5	396.	A	7256.6	85735	6 4	.15	D
2273.9	2455225	3 9*	.5650	AA	7414.1	85442	6 4	.047	D
3526.7	2483371	1 3	.1663	AA	7547.1	85735	4 4	.12	D
8432.2	2851418	3 9*	.06870	AA	7717.6	85442	4 4	.030	D
Cesium					7745.0	85735	2 4	.063	D
Cs I					7769.2	95787	6 6	.060	D
3203.5	31207	2 4	7.6 (-6)	C	7821.4	95701	6 8	.098	D
3205.3	31189	2 4	7.9 (-6)	C	7830.8	95898	4 4	.097	D
3207.5	31168	2 4	8.5 (-6)	C	7878.2	84648	6 6	.018	D
3210.0	31144	2 4	9.4 (-6)	C	7899.3	95787	4 6	.051	D
3212.8	31116	2 4	1.19(-5)	C	7924.6	85442	2 4	.021	D
3216.2	31084	2 4	1.49(-5)	C	7935.0	96731	6 8	.039	D
3220.1	31046	2 4	1.7 (-5)	C	7997.9	84988	4 4	.021	D
3220.2	31045	2 2	1.07(-7)	C	Cl II				
3224.8	31001	2 4	2.0 (-5)	C	3329.1	161798	5 7	1.5	D
3225.0	30999	2 2	1.43(-7)	C	3522.1	174855	7 7	1.4	D
3230.5	30946	2 4	2.5 (-5)	C	3798.8	172652	5 7	1.6	D
3230.7	30944	2 2	1.97(-7)	C	3805.2	172743	7 9	1.8	D
3237.4	30880	2 4	2.8 (-5)	C	3809.5	172575	3 5	1.5	D
3237.6	30878	2 2	2.63(-7)	C	3851.0	154624	5 7	1.8	D
3245.9	30799	2 4	3.45(-5)	C	3851.4	154621	5 5	1.6	D
3246.2	30796	2 2	3.7 (-7)	C	3854.7	184660	3 5	2.2	D
3256.7	30698	2 4	4.25(-5)	C	3861.9	184657	5 7	2.4	D
3257.1	30694	2 2	7.0 (-7)	C	3868.6	184630	7 9	2.7	D
3270.5	30568	2 4	5.6 (-5)	C	3913.9	172743	9 9	.82	D
3271.0	30563	2 2	9.8 (-7)	C	3990.2	174855	5 7	.84	D
					4132.5	153259	5 5	1.6	D
					4276.5	170577	9 7	.76	D

TABLE 1b. Transition probabilities for selected atomic and ionic species—Continued

Wavelength ($\lambda[\text{\AA}]$)	Upper energy level ($E_k[\text{cm}^{-1}]$)	Stat. weights g_i g_k	Transition Probability ($A[10^8 \text{ s}^{-1}]$)	Unc.	Wavelength ($\lambda[\text{\AA}]$)	Upper energy level ($E_k[\text{cm}^{-1}]$)	Stat. weights g_i g_k	Transition Probability ($A[10^8 \text{ s}^{-1}]$)	Unc.
Cl II					Cr I				
4768.7	158771	3 5	.77	D	2780.7	44259	9 7	1.4	C
4781.3	158788	5 7	1.0	D	2871.6	42909	7 9	.12	D
4794.6	128731	5 7	1.04	C	2879.3	42648	5 7	.21	D
4810.1	128644	5 5	.99	C	2887.0	42439	3 5	.27	D
4819.5	128623	5 3	1.00	C	2889.3	42909	9 9	.66	C
4904.8	147128	5 7	.81	D	2899.2	42293	3 3	.15	D
4917.7	147056	3 5	.75	D	2909.1	42293	5 3	.68	C
5078.3	146471	7 7	.77	D	2967.6	41782	7 9	.39	D
5219.1	131765	3 9*	.86	C	2971.1	41575	5 7	.71	C
5392.1	147607	5 7	1.0	D	2975.5	41409	3 5	.89	C
Cl III					Cr I				
2298.5	248528	4 4	4.2	D	2980.8	41289	1 3	.85	D
2340.6	248658	6 6	4.2	D	2988.7	41043	5 7	.52	C
2370.4	258886	8 6	2.8	D	2991.9	41225	3 1	3.0	D
2531.8	248528	2 4	4.4	D	2995.1	40971	5 5	.43	D
2532.5	248658	4 6	5.3	D	2996.6	41289	5 3	2.0	C
2577.1	243828	4 6	4.3	D	2998.8	40930	5 3	.59	D
2580.7	244685	6 8	4.7	D	3000.9	41409	7 5	1.6	C
2601.2	239506	2 4	4.6	D	3005.1	41575	9 7	.92	C
2603.6	239730	4 6	5.0	D	3013.7	40983	3 5	.83	C
2609.5	240075	6 8	5.7	D	3020.7	40906	3 3	1.5	D
2617.0	240568	8 10	6.6	D	3021.6	41393	9 11	3.2	C
2661.6	241685	4 6	3.4	D	3024.4	40983	5 5	2.3	C
2665.5	242046	6 8	4.8	D	3030.2	41086	7 7	1.1	C
2691.5	243081	4 4	3.5	D	3034.2	41043	7 7	.35	D
2710.4	242823	4 6	3.5	D	3037.0	41225	9 9	.54	C
3340.4	204541	6 6	1.5	D	3040.9	40971	7 5	.74	D
3392.9	217913	4 4	1.9	D	3053.9	41043	9 7	1.2	C
3393.5	217850	6 6	1.9	D	3148.4	55686	9 11	.59	C
3530.0	216710	6 8	1.8	D	3155.2	55741	11 13	.54	C
3560.7	216525	4 6	1.7	D	3163.8	55799	13 15	.52	C
3602.1	202368	6 8	1.7	D	3237.7	54811	9 9	1.3	D
3612.9	201765	4 6	1.2	D	3238.1	54930	11 11	.20	D
3720.5	205947	4 6	1.7	D	3578.7	27935	7 9	1.48	B
Chromium					Cr I				
2000.0	58293	9 9	1.4	D	3593.5	27820	7 7	1.50	B
2383.3	50253	9 11	.41	D	3605.3	27729	7 5	1.62	B
2385.7	50211	9 9	.17	D	3639.8	47986	13 11	1.8	D
2389.2	49653	3 5	.23	D	3768.7	47047	7 5	.22	D
2408.6	49812	9 7	.67	D	3804.8	50558	9 9	.69	D
2408.7	49598	7 5	.29	D	3879.2	50058	3 5	.56	D
2492.6	47918	3 5	.45	C	3963.7	45741	13 15	1.3	D
2496.3	47975	5 7	.56	C	3969.8	45707	11 13	1.2	D
2502.5	48043	7 9	.22	D	3981.2	46968	3 5	.11	D
2504.3	48014	7 9	.45	C	3983.9	45615	7 9	1.05	C
2549.5	47022	3 3	.48	D	4001.4	56362	9 11	.65	D
2560.7	46968	5 5	.43	D	4030.7	56155	3 5	.79	D
2577.7	46879	7 7	.26	D	4039.1	55799	15 15	.68	C
2591.9	46879	9 7	.65	C	4048.8	55741	13 13	.65	D
2622.9	46422	9 9	.13	D	4058.8	55686	11 11	.69	D
2702.0	45306	9 11	.21	C	4161.4	59957	13 15	.80	D
2726.5	44259	5 7	.75	C	4165.5	59884	11 13	.75	D
2731.9	44187	5 5	.78	C	4211.4	48043	7 9	.085	D
2736.5	44126	5 3	.75	D	4224.5	48562	9 9	.067	D
2752.9	44126	3 3	.87	D	4239.0	47866	9 9	.071	D
2757.1	44187	5 5	.68	C	4254.4	23499	7 9	.315	B
2761.8	44126	5 3	.68	D	4274.8	23386	7 7	.306	B
2764.4	44259	7 7	.37	D	4280.4	54405	13 15	.47	D
2769.9	44187	7 5	1.1	C	4289.7	23305	7 5	.313	B
					4297.7	54317	11 13	.49	D
					4344.5	31106	7 9	.11	C
					4351.8	31280	9 11	.12	C
					4374.2	47055	13 11	.10	C
					4375.3	46905	11 9	.072	D

TABLE 1b. Transition probabilities for selected atomic and ionic species—Continued

Wavelength (λ [Å])	Upper energy level (E_k [cm ⁻¹])	Stat. weights g_i g_k	Transition Probability (A [10 ⁸ s ⁻¹])	Unc.	Wavelength (λ [Å])	Upper energy level (E_k [cm ⁻¹])	Stat. weights g_i g_k	Transition Probability (A [10 ⁸ s ⁻¹])	Unc.
Cr I					Cr II				
4381.1	44667	5 3	.10	D	2727.3	67876	10 8	1.7	D
4387.5	46986	13 11	.066	D	2740.1	48632	6 8	.11	D
4413.9	51287	7 5	.41	D	2745.0	66727	4 6	.85	D
4432.2	45719	1 3	.17	D	2768.6	74424	6 8	2.8	D
4458.5	46705	9 11	.13	D	2774.4	75717	8 8	1.7	D
4482.9	49477	3 3	.30	D	2778.1	75810	10 10	3.2	D
4488.1	56210	7 7	.63	D	2782.4	69348	6 4	1.6	D
4506.9	55945	13 11	.27	D	2785.7	69506	10 8	2.1	D
4511.9	47055	9 9	.13	D	2787.6	66727	6 6	1.5	D
4526.5	42606	13 13	.20	D	2792.2	69498	12 10	2.3	D
4530.7	42589	11 11	.20	D	2800.8	69388	12 14	2.2	D
4544.6	42515	5 5	.26	D	2818.4	68993	8 10	2.2	D
4595.6	55517	13 13	.47	D	2822.0	68844	6 8	2.3	D
4632.2	46688	7 7	.071	D	2832.5	70108	12 10	1.3	D
4639.5	46637	5 7	.095	D	2838.8	73486	8 8	2.7	D
4646.2	29825	9 7	.087	C	2840.0	65420	10 12	2.7	D
4689.4	46525	7 5	.23	D	2843.3	47465	8 10	.64	D
4708.0	46783	11 9	.37	D	2849.8	47228	6 8	.92	D
4718.4	46959	13 11	.42	D	2851.4	65218	8 10	2.2	D
4723.1	46000	7 7	.093	D	2856.8	54626	4 6	.43	D
4724.4	46058	9 9	.063	D	2857.4	54785	6 8	.28	D
4727.2	45349	13 13	.051	D	2860.9	46906	2 4	.69	D
4729.7	46077	5 3	.17	D	2862.6	47228	8 8	.63	D
4730.7	45966	7 5	.28	D	2866.7	46906	4 4	1.2	D
4737.4	46000	9 7	.24	D	2867.1	54500	4 4	1.1	D
4789.3	41393	13 11	.076	D	2867.7	46824	2 2	1.1	D
4792.5	45966	7 5	.26	D	2870.4	54626	6 6	1.3	D
4801.0	46000	9 7	.23	D	2873.8	54418	4 2	.88	D
4870.8	45359	7 9	.35	D	2878.5	47228	10 8	.074	D
4887.0	45354	9 11	.32	D	2880.9	54500	6 4	.79	D
4922.3	45349	11 13	.40	D	2888.7	70880	10 12	.88	D
4936.3	45359	7 9	.14	D	2898.5	65710	10 12	1.2	D
4954.8	45354	9 11	.12	D	2921.8	65384	8 10	.90	D
5139.7	47048	7 7	.13	D	2927.1	72717	10 10	2.8	D
5177.4	46959	9 11	.061	D	2930.9	64062	2 4	1.1	D
5184.6	46783	7 9	.11	D	2935.1	64924	6 8	1.8	D
5192.0	46637	5 7	.14	D	2953.4	63802	2 2	1.8	D
5196.6	47055	11 9	.12	D	2953.7	68477	10 10	.92	D
5200.2	46525	3 5	.16	D	2966.1	64924	10 8	.54	D
5204.5	26802	5 3	.55	D	2971.9	64031	14 14	2.0	D
5206.0	26796	5 5	.53	D	2979.7	63849	12 12	1.8	D
5208.4	26788	5 7	.51	D	2985.3	63707	10 10	2.2	D
5243.4	46449	5 3	.20	D	2989.2	63601	8 8	2.2	D
5261.8	48825	7 9	.13	D	3040.9	67506	10 12	4.8	D
5272.0	46783	7 9	.11	D	3041.7	68477	10 10	3.1	D
5287.2	46637	5 7	.078	D	3050.1	67589	12 14	1.8	D
5304.2	46783	9 9	.066	D	3093.5	70880	10 12	.67	D
5312.9	46637	7 7	.11	D	3096.1	70852	10 8	.75	D
5318.8	46525	5 5	.13	D	3107.6	70679	8 10	.62	D
5328.3	42261	9 11	.60	D	3118.7	51584	2 4	1.7	D
5340.4	46449	5 3	.16	D	3120.4	51670	4 6	1.5	D
5400.6	45734	5 5	.16	D	3122.6	65710	12 12	.44	D
5409.8	26788	9 7	.062	D	3128.7	51584	4 4	.81	D
					3136.7	51670	6 6	.64	D
					3152.2	67070	4 4	1.8	D
2653.6	49706	4 6	.35	D	3180.7	51943	12 10	.70	D
2658.6	49565	2 4	.58	D	3183.3	67012	8 6	.87	D
2666.0	49646	6 8	.59	D	3209.2	51670	8 6	.68	D
2668.7	49493	4 2	1.4	D	3217.4	51584	6 4	.77	D
2671.8	49565	6 4	1.0	D	3234.1	65543	10 8	.92	D
2672.8	49706	8 6	.55	D	3238.8	65680	12 10	.54	D
2693.5	67334	10 8	1.4	D	3295.4	64031	12 14	.32	D

TABLE 1b. Transition probabilities for selected atomic and ionic species—Continued

Wavelength (λ [\AA])	Upper energy level (E_k [cm ⁻¹])	Stat. weights g_i g_k	Transition Probability (A [10 ⁸ s ⁻¹])	Unc.	Wavelength (λ [\AA])	Upper energy level (E_k [cm ⁻¹])	Stat. weights g_i g_k	Transition Probability (A [10 ⁸ s ⁻¹])	Unc.
Cr II					Co I				
3336.3	49493	2 2	.42	D	3395.4	34134	6 8	.26	C
3339.8	49565	4 4	.49	D	3405.1	32842	10 10	.98	C
3342.6	49706	6 6	.39	D	3409.2	33467	8 8	.42	C
3347.8	49493	4 2	.52	D	3412.3	33440	8 10	.64	C
3358.5	49565	6 4	1.1	D	3412.6	29295	10 8	.12	C
3360.3	54785	8 8	1.3	D	3417.2	33946	6 6	.32	C
3368.1	49706	8 6	1.4	D	3431.6	29949	8 6	.11	C
3378.3	54626	8 6	.41	D	3433.0	34196	4 4	1.1	C
3379.4	54626	4 6	.48	D	3442.9	30444	6 4	.12	C
3382.7	49352	6 6	.45	D	3443.6	33173	8 8	.63	C
3391.4	49006	2 4	.19	D	3449.2	33674	6 6	.73	C
3393.0	54500	2 4	.46	D	3449.4	32465	10 10	.16	C
3393.8	54500	4 4	.66	D	3455.2	30743	4 2	.18	C
3394.3	54500	6 4	.75	D	3462.8	33946	4 6	.87	C
3402.4	54418	2 2	.80	D	3465.8	28845	10 12	.097	C
3408.8	49352	8 6	.95	D	3483.4	32842	8 10	.062	C
3421.2	48750	2 2	1.7	D	3489.4	36092	8 6	1.6	C
3422.7	49006	6 4	1.4	D	3491.3	30444	4 4	.053	C
3433.3	48750	4 2	1.3	D	3495.7	33674	4 6	.45	C
3511.8	48491	8 6	.079	D	3496.7	32733	8 8	.036	C
4242.4	54785	10 8	.12	D	3518.4	36875	6 4	1.7	C
Cr XXI					Co I				
149.90	667110	1 3	160.	C	3520.1	29216	8 6	.034	C
Cr XXII					Co I				
8.51	11800000	2 6*	1.2 (+4)	C	3521.6	31871	10 8	.12	C
9.493	10534000	2 6*	2.5 (+4)	C	3523.4	33449	4 2	1.2	C
9.809	10553000	2 4	4.1 (+4)	B	3526.9	28346	10 10	.12	C
9.865	10590000	4 6	4.9 (+4)	B	3529.0	29735	6 8	.090	C
12.620	7924000	2 4	5.13(+4)	B	3529.8	32465	8 10	.48	C
12.662	7898000	2 2	5.28(+4)	B	3533.4	30103	4 6	.091	C
13.147	7964000	2 4	1.3 (+5)	B	3550.6	29563	6 4	.042	C
13.294	7966000	4 6	1.6 (+5)	B	3560.9	33151	4 4	.24	C
13.306	7964000	4 4	2.6 (+4)	C	3564.9	32733	6 8	.086	C
25.2	11800000	2 6*	3750.	C	3564.9	35451	8 8	1.6	C
36.93	10534000	2 6*	7000.	C	3569.4	32655	6 6	.18	C
37.52	10580000	6 10*	1.7 (+4)	B	3575.4	28777	8 8	.094	C
223.00	448430	2 4	33.	B	3585.2	32028	8 8	.076	C
279.69	357540	2 2	17.	B	3587.2	36330	6 6	1.9	C
Cr XXIII					Co I				
2.182	45830000	1 3	3.3 (+6)	B	3587.2	29216	6 6	.086	C
Cobalt					Co I				
Co I					Co I				
2987.2	33467	10 8	.050	C	3602.1	29563	4 4	.10	C
2989.6	33440	10 10	.037	C	3605.4	31871	8 8	.039	C
3013.6	33173	10 8	.016	C	3627.8	31700	8 10	.052	C
3017.5	33946	8 6	.072	C	3631.4	28346	8 10	.0065	C
3042.5	33674	8 6	.020	C	3647.7	29216	4 6	.012	C
3044.0	32842	10 10	.19	C	3652.5	28777	6 8	.0095	C
3048.9	34196	6 4	.078	C	3704.1	35451	6 8	.18	C
3061.8	33467	8 8	.15	C	3745.5	34134	8 8	.077	C
3064.4	33440	8 10	.0068	C	3842.1	33463	8 6	.31	C
3082.6	32431	10 12	.026	C	3845.5	33440	8 10	.49	C
3086.8	34196	4 4	.19	C	3873.1	29295	10 8	.12	C
3089.6	33173	8 8	.024	C	3874.0	29949	8 6	.12	C
3098.2	33674	6 6	.027	C	3881.9	30444	6 4	.11	C
3139.9	32655	8 6	.028	C	3894.1	34134	6 8	.81	C
3147.1	33173	6 8	.045	C	3895.0	30743	4 2	.11	C
3149.3	33151	6 4	.031	C	3909.9	25569	10 12	.0019	C
					3936.0	32842	8 10	.15	C
					3995.3	32465	8 10	.36	C
					3997.9	33467	6 8	.079	C
					4020.9	28346	10 10	.0092	D
					4092.4	31871	8 8	.14	D
					4118.8	32733	6 8	.34	C
					4121.3	31700	8 10	.24	C

TABLE 1b. Transition probabilities for selected atomic and ionic species—Continued

Wavelength (λ [Å])	Upper energy level (E_k [cm ⁻¹])	Stat. weights g_i g_k	Transition Probability ($A[10^8$ s ⁻¹])	Unc.	Wavelength (λ [Å])	Upper energy level (E_k [cm ⁻¹])	Stat. weights g_i g_k	Transition Probability ($A[10^8$ s ⁻¹])	Unc.
Copper					Dy I				
Cu I					4221.1	27818	15 17	1.52	C
2024.3	49383	2 6*	.098	C	4225.2	30712	13 15	4.5	D
2165.1	46173	2 4	.51	B	4268.3	27556	15 15	.036	D
2178.9	45879	2 4	.913	B	4276.7	30427	13 13	.73	D
2181.7	45821	2 2	1.0	C	4292.0	27427	15 15	.058	D
2225.7	44916	2 2	.46	C	4577.8	21839	17 19	.022	D
2244.3	44544	2 4	.0119	B	4589.4	21783	17 15	.13	D
2441.6	40944	2 2	.020	C	4612.3	21675	17 15	.082	D
2492.2	40114	2 4	.0311	B	5077.7	19689	17 17	.0057	D
2618.4	49383	6 4	.307	C	5301.6	18857	17 15	.011	D
2766.4	49383	4 4	.096	C	5547.3	18022	17 17	.0027	C
2824.4	46598	6 6	.078	C	5639.5	17727	17 19	.0047	C
2961.2	44963	6 8	.0376	C	5974.5	16733	17 17	.0040	C
3063.4	45879	4 4	.0155	C	5988.6	16694	17 15	.0053	C
3194.1	44544	4 4	.0155	C	6010.8	20766	15 15	.026	D
3247.5	30784	2 4	1.39	B	6088.3	20555	15 13	.035	D
3274.0	30535	2 2	1.37	B	6168.4	20341	15 17	.025	D
3337.8	41153	6 8	.0038	C	6259.1	15972	17 19	.0085	C
4022.6	55388	2 4	.190	C	6579.4	15195	17 15	.0075	D
4062.6	55391	4 6	.210	C	Erbium				
4249.0	64472	2 2	.195	C	Er I				
4275.1	62403	6 8	.345	C	3862.9	25880	13 13	2.5	D
4480.4	52849	2 2	.030	C	4008.0	24943	13 15	2.6	D
4509.4	64472	4 2	.275	C	4151.1	24083	13 11	1.8	D
4530.8	52849	4 2	.084	C	Europium				
4539.7	63585	6 4	.212	C	Eu I				
4587.0	62948	8 6	.320	C	2372.9	42131	8 6	.19	D
4651.1	62403	10 8	.380	C	2375.3	42087	8 8	.20	D
4704.6	62403	8 8	.055	C	2379.7	42010	8 10	.20	D
5105.5	30784	6 4	.020	C	2619.3	38167	8 10	.0070	D
5153.2	49935	2 4	.60	C	2643.8	37813	8 8	.0066	D
5218.2	49942	4 6	.75	C	2659.4	37591	8 10	.012	D
5220.1	49935	4 4	.150	C	2682.6	37266	8 6	.012	D
5292.5	62403	8 8	.109	C	2710.0	36890	8 10	.14	D
5700.2	30784	4 4	.0024	C	2724.0	36700	8 8	.12	D
5782.1	30535	4 2	.0165	C	2731.4	36601	8 8	.031	D
Cu II					2732.6	36584	8 6	.037	D
2489.7	66419	5 5	.015	D	2735.3	36549	8 10	.047	D
2544.8	108015	9 7	1.1	D	2738.6	36505	8 10	.013	D
2689.3	108015	7 7	.41	D	2743.3	36442	8 6	.11	D
2701.0	110366	5 5	.67	D	2745.6	36411	8 6	.050	D
2703.2	110084	3 3	1.2	D	2747.8	36382	8 8	.052	D
2713.5	108336	5 5	.68	D	2772.9	36053	8 6	.010	D
2769.7	108015	7 7	.61	D	2878.9	34726	8 10	.028	D
Dysprosium					2892.5	34562	8 8	.10	D
Dy I					2893.0	34556	8 6	.10	D
2862.7	34922	17 15	.065	D	2909.0	34366	8 10	.069	D
2964.6	33722	17 17	.065	D	2958.9	33787	8 6	.016	D
3147.7	35894	15 17	.11	D	3059.0	32681	8 8	.038	D
3263.2	34770	15 13	.14	D	3067.0	32596	8 10	.0091	D
3511.0	32608	15 13	.31	D	3106.2	32185	8 10	.055	D
3571.4	32126	15 13	.20	D	3111.4	32130	8 10	.30	D
3757.1	34175	17 19	3.0	D	3168.3	31554	8 10	.069	D
3868.8	33406	17 17	3.1	D	3185.5	31383	8 10	.0058	D
3967.5	32763	17 19	.87	D	3210.6	31138	8 8	.11	D
4046.0	24709	17 15	1.5	D	3212.8	31116	8 8	.29	D
4103.9	31411	13 11	1.7	D	3213.8	31107	8 6	.18	D
4186.8	23878	17 17	1.32	C	3235.1	30902	8 10	.010	D
4194.8	23832	17 17	.72	D	3241.4	30842	8 8	.023	D
4211.7	23737	17 19	2.08	C	3246.0	30798	8 6	.014	D
4218.1	27835	15 15	1.85	C					

TABLE 1b. Transition probabilities for selected atomic and ionic species—Continued

Wavelength ($\lambda[\text{\AA}]$)	Upper energy level ($E_k[\text{cm}^{-1}]$)	Stat. weights g_i g_k	Transition Probability ($A[10^8 \text{ s}^{-1}]$)	Unc.	Wavelength ($\lambda[\text{\AA}]$)	Upper energy level ($E_k[\text{cm}^{-1}]$)	Stat. weights g_i g_k	Transition Probability ($A[10^8 \text{ s}^{-1}]$)	Unc.
Eu I					Ga I				
3247.6	30784	8 8	.023	D	2259.2	45076	4 6	.031	C
3322.3	30091	8 6	.035	D	2294.2	43575	2 4	.070	C
3334.3	29983	8 6	.34	D	2297.9	44332	4 2	.058	C
3350.4	29839	8 10	.015	D	2338.2	43581	4 6	.098	C
3353.7	29809	8 8	.0058	D	2371.3	42159	2 2	.057	C
3457.1	28918	8 8	.0084	D	2418.7	42159	4 2	.10	C
3467.9	28828	8 8	.010	D	2450.1	40803	2 4	.28	C
3589.3	27853	8 6	.0069	D	2500.2	40811	4 6	.34	C
4594.0	21761	8 10	1.4	D	2659.9	37585	2 2	.12	C
4627.2	21605	8 8	1.3	D	2719.7	37585	4 2	.23	C
4661.9	21445	8 6	1.3	D	2874.2	34782	2 4	1.2	C
5645.8	17707	8 6	.0054	D	2943.6	34788	4 6	1.4	C
5765.2	17341	8 8	.011	D	2944.2	34782	4 4	.27	C
6018.2	16612	8 10	.0085	D	4033.0	24789	2 2	.49	C
6291.3	15891	8 6	.0018	D	4172.0	24789	4 2	.92	C
6864.5	14564	8 10	.0058	D					
7106.5	14068	8 8	.0026	D					
Fluorine					Ga II				
					829.60	120540	1 3	.22	D
					1414.4	70700	1 3	18.8	C
F I					Germanium				
806.96	123921	4 6	3.3	C	Ge I				
809.60	123922	2 4	2.8	C	1944.7	51978	3 1	.70	C
951.87	105056	4 2	2.6	C	1955.1	51705	3 3	.28	C
954.83	104731	4 4	6.4	C	1988.3	51705	5 3	.25	C
955.55	105056	2 2	5.1	C	1998.9	51438	5 5	.55	C
958.52	104731	2 4	1.3	C	2041.7	48963	1 3	1.1	C
6239.7	118428	6 4	.25	D	2065.2	48963	3 3	.85	C
6348.5	118428	4 4	.18	D	2068.7	48882	3 5	1.2	C
6413.7	118428	2 4	.11	D	2086.0	48480	3 5	.40	C
6708.3	117309	6 4	.014	D	2094.3	49144	5 7	.97	C
6774.0	117164	6 6	.10	D	2105.8	48882	5 5	.17	C
6795.5	117392	4 2	.052	D	2256.0	51438	5 5	.032	C
6834.3	117309	4 4	.21	D	2417.4	48480	5 5	.96	C
6856.0	116987	6 8	.42	D	2498.0	40021	1 3	.13	C
6870.2	117392	2 2	.38	D	2533.2	40021	3 3	.10	C
6902.5	117164	4 6	.32	D	2589.2	40021	5 3	.051	C
6909.8	117309	2 4	.22	D	2592.5	39118	3 5	.71	C
6966.4	119082	4 2	.11	D	2651.2	39118	5 5	2.0	C
7037.5	118937	4 4	.30	D	2651.6	37702	1 3	.85	C
7127.9	119082	2 2	.38	D	2691.3	37702	3 3	.61	C
7309.0	137599	6 8	.47	D	2709.6	37452	3 1	2.8	C
7311.0	118405	4 2	.39	D	2754.6	37702	5 3	1.1	C
7314.3	137590	4 6	.48	D	3039.1	40021	5 3	2.8	C
7332.0	116041	6 4	.31	D	3124.8	39118	5 5	.031	C
7398.7	115918	6 6	.31	D	3269.5	37702	5 3	.29	C
7425.7	116144	4 2	.34	D	4226.6	40021	1 3	.21	C
7482.7	116041	4 4	.056	D	4685.8	37702	1 3	.095	C
7489.2	118405	2 2	.11	D					
7514.9	116144	2 2	.052	D	Ge II				
7552.2	115918	4 6	.078	D	999.10	100090	2 4	1.9	D
7573.4	116041	2 4	.10	D	1016.6	100131	4 6	2.1	D
7607.2	117873	4 4	.070	D	1017.1	100090	4 4	.35	D
7754.7	117623	4 6	.30	D	1055.0	94784	2 2	.69	D
7800.2	117873	2 4	.21	D	1075.1	94784	4 2	1.3	D
Gallium					1237.1	80837	2 4	19.	D
Ga I					1261.9	81013	4 6	22.	D
2195.4	45537	2 2	.019	C	1264.7	80837	4 4	3.5	D
2199.7	46274	4 2	.033	C	1602.5	62403	2 2	3.4	D
2214.4	45972	4 6	.012	C	1649.2	62403	4 2	6.5	D
2235.9	45537	4 2	.043	C	4741.8	100090	2 4	.46	D
2255.0	44332	2 2	.031	C	4814.6	100131	4 6	.51	D
					4824.1	100090	4 4	.086	D

TABLE 1b. Transition probabilities for selected atomic and ionic species—Continued

Wavelength (λ [Å])	Upper energy level (E_k [cm ⁻¹])	Stat. weights g_i g_k	Transition Probability (A [10 ⁸ s ⁻¹])	Unc.	Wavelength (λ [Å])	Upper energy level (E_k [cm ⁻¹])	Stat. weights g_i g_k	Transition Probability (A [10 ⁸ s ⁻¹])	Unc.
Ge II					He I				
5131.8	100318	4 6	1.9	D	10830.	169087	3 9*	.1022	AA
5178.5	100318	6 6	.13	D	10913.	195262	15 21*	.0212	B
5178.6	100317	6 8	2.0	D	10917.	195262	5 7	.0212	B
5893.4	79367	2 4	.92	D	10997.	195193	15 9*	.0013	B
6021.0	79007	2 2	.84	D	11013.	193943	1 3	.0100	A
6336.4	94784	2 2	.44	D	11045.	195261	3 5	.0185	A
6484.2	94784	4 2	.85	D	11226.	195115	3 1	.0108	A
Gold					11969.	193917	9 15*	.0358	A
Au I					12528.	191217	3 9*	.00710	A
2428.0	41174	2 4	1.5	D	12756.	193943	5 3	.0012	B
2676.0	37359	2 2	1.1	D	12785.	193921	15 21*	.0462	B
Helium					12791.	193921	5 7	.0461	B
He I					12846.	193347	9 3*	.0289	A
510.00	196079	1 3	.462	B	12968.	193918	3 5	.0343	A
512.10	195275	1 3	.717	B	12985.	193801	15 9*	.0025	B
515.62	193943	1 3	1.3	B	Indium				
522.21	191493	1 3	2.46	A	In I				
537.03	186209	1 3	5.66	A	2710.3	39098	4 6	.4	D
584.33	171135	1 3	17.99	AA	2713.9	39048	2 4	.4	D
2696.1	196935	3 9*	.00550	B	3256.1	32915	4 6	1.3	D
2723.2	196567	3 9*	.00780	B	3258.6	32892	2 4	1.2	D
2763.8	196027	3 9*	.0111	B	4101.8	24373	2 2	.56	C
2829.1	195193	3 9*	.017	B	4511.3	24373	4 2	1.02	C
2945.1	193801	3 9*	.0320	A	In II				
3187.7	191217	3 9*	.05639	AA	2941.1	97025	3 1	1.4	D
3354.6	196079	1 3	.0130	B	Iodine				
3447.6	195275	1 3	.0232	A	I I				
3554.4	197213	9 15*	.0131	A	1782.8	56093	4 4	2.71	C
3587.3	196955	9 15*	.0205	C	1830.4	54633	4 6	.16	D
3613.6	193943	1 3	.0390	A	Iron				
3634.2	196595	9 15*	.0261	A	Fe I				
3705.0	196070	9 15*	.0444	C	1934.5	51692	9 7	.25	C
3819.6	195260	9 15*	.0636	A	1937.3	51619	9 7	.22	C
3833.6	197213	3 5	.00971	B	1940.7	51945	7 5	.26	C
3867.5	194936	9 3*	.025	B	2084.1	47967	9 7	.37	C
3871.8	196956	3 5	.0126	C	2102.4	47967	7 7	.088	C
3888.7	185565	3 9*	.09478	AA	2113.0	48290	1 3	.19	C
3926.5	196596	3 5	.0195	A	2132.0	46889	9 9	.076	C
3964.7	191493	1 3	.0719	A	2166.8	46137	9 7	2.7	C
4009.3	196070	3 5	.0279	C	2191.8	46314	5 5	1.2	C
4026.2	193917	9 15*	.116	A	2196.0	46410	3 3	1.2	C
4120.8	193347	9 3*	.0444	A	2200.7	46314	3 5	.28	C
4143.8	195261	3 5	.0485	A	2259.5	44244	9 11	.070	C
4387.9	193918	3 5	.0894	A	2276.0	43923	9 7	.17	C
4437.6	193664	3 1	.033	B	2277.1	51630	7 5	37.	C
4471.5	191445	9 15*	.246	A	2287.3	44411	5 3	.34	C
4713.2	190298	9 3*	.0955	A	2294.4	44459	3 1	.61	C
4921.9	191447	3 5	.198	A	2300.1	44166	5 7	.080	C
5015.7	186210	1 3	.1338	AA	2309.0	44184	3 5	.15	C
5047.7	190940	3 1	.0675	A	2313.1	43923	5 7	.14	C
5875.7	186102	9 15*	.7053	AA	2320.4	43499	7 9	.12	C
6678.2	186105	3 5	.6339	AA	2373.6	42533	7 7	.067	C
7065.2	183237	9 3*	.2786	AA	2374.5	43079	1 3	.29	C
7281.4	184865	3 1	.1829	AA	2462.2	41018	7 5	.15	C
8361.7	195193	3 9*	.00334	A	2462.6	40594	9 9	.58	C
9463.6	193801	3 9*	.00501	A	2479.8	41018	5 5	1.8	C
9603.4	195275	1 3	.00610	A	2483.3	40257	9 11	4.9	C
9702.6	195868	9 3*	.00858	B	2488.1	40594	7 9	4.7	C
10311.	195260	9 15*	.0201	A					
10668.	194936	9 3*	.0152	A					

TABLE 1b. Transition probabilities for selected atomic and ionic species—Continued

Wavelength (λ [Å])	Upper energy level (E_k [cm ⁻¹])	Stat. weights g_i g_k	Transition Probability (A [10 ⁸ s ⁻¹])	Unc.	Wavelength (λ [Å])	Upper energy level (E_k [cm ⁻¹])	Stat. weights g_i g_k	Transition Probability (A [10 ⁸ s ⁻¹])	Unc.	
	Fe I					Fe I				
2490.6	40842	5 7	3.8	C	3225.8	50342	11 13	1.0	C	
2491.2	41018	3 5	3.0	C	3231.0	50699	7 5	.39	C	
2501.1	39970	9 7	.68	C	3233.1	57028	13 15	.55	C	
2510.8	40231	7 5	1.3	C	3234.0	50475	9 9	.20	C	
2518.1	40405	5 3	1.9	C	3248.2	50534	7 7	.22	C	
2522.8	39626	9 9	2.9	C	3253.6	56951	7 9	.18	C	
2524.3	40491	3 1	3.4	C	3254.4	57070	11 13	.51	C	
2527.4	39970	7 7	1.9	C	3265.6	48163	7 5	.39	C	
2529.1	40231	5 5	.98	C	3271.0	48290	5 3	.67	C	
2535.6	40405	1 3	.97	C	3280.3	57104	9 11	.55	C	
2541.0	40231	3 5	.92	C	3282.9	56859	3 5	.31	C	
2546.0	39970	5 7	.67	C	3292.0	56593	7 9	.62	C	
2549.6	39626	7 9	.36	C	3292.6	48290	3 3	.31	C	
2584.5	45608	11 13	.46	C	3306.0	47967	5 7	.48	C	
2719.0	36767	9 7	1.4	C	3307.2	56334	13 13	.20	C	
2720.9	37158	7 5	1.1	C	3314.7	56783	5 7	.70	C	
2723.6	37410	5 3	.64	C	3323.7	52916	5 5	.31	C	
2737.3	37410	3 3	.85	C	3328.9	56383	11 11	.27	C	
2742.4	37158	5 5	.63	C	3337.7	51668	11 9	.067	C	
2744.1	37410	1 3	.35	C	3355.2	56423	9 9	.33	C	
2750.1	36767	7 7	.39	C	3369.5	51668	9 9	.25	C	
2756.3	37158	3 5	.20	C	3370.8	51374	11 11	.34	C	
2788.1	42784	11 13	.63	C	3380.1	51826	7 7	.24	C	
2894.5	52916	5 5	.63	C	3384.0	47093	7 7	.11	C	
2899.4	52858	5 3	.61	C	3392.7	47017	7 7	.26	C	
2923.3	60549	11 11	1.7	C	3399.3	47136	5 5	.39	C	
2925.4	56423	7 9	.19	C	3402.3	55490	13 13	.29	C	
2936.9	34040	9 9	.14	C	3406.4	55754	3 5	.30	C	
2954.7	52213	5 7	.12	C	3407.5	46889	7 9	.60	C	
2966.9	33695	9 11	.272	B	3410.2	56859	3 5	.48	C	
2980.5	55791	7 7	.22	C	3411.4	51305	9 9	.065	C	
2983.6	33507	9 7	.280	B	3413.1	47017	5 7	.37	C	
2990.4	55430	9 11	.40	C	3417.8	47177	3 3	.52	C	
2996.4	52916	3 5	.19	C	3418.5	47171	3 1	1.3	C	
2999.5	40257	11 11	.23	C	3424.3	46745	7 7	.21	C	
3000.9	34017	5 3	.642	B	3425.0	53763	9 7	.29	C	
3008.1	34122	3 1	1.07	B	3427.1	46721	7 9	.56	C	
3009.1	52613	13 11	.079	C	3428.2	46889	5 5	.22	C	
3009.6	40594	9 9	.18	C	3445.1	46745	5 7	.28	C	
3011.5	55446	7 9	.48	C	3447.3	46727	5 5	.11	C	
3019.0	40842	7 7	.15	C	3450.3	46902	3 3	.24	C	
3037.4	33802	3 5	.32	C	3495.3	49243	9 7	.13	C	
3042.7	40842	5 7	.066	C	3497.1	46137	7 7	.15	C	
3047.6	33507	5 7	.284	B	3521.8	46314	3 5	.11	C	
3053.1	52297	3 5	.18	C	3524.1	49243	7 5	.091	C	
3057.4	39626	11 9	.45	C	3527.8	51335	9 9	.20	C	
3059.1	33096	7 9	.18	C	3529.8	51567	3 3	.78	C	
3067.2	39970	9 7	.35	C	3536.6	51461	5 7	.80	C	
3075.7	40231	7 5	.30	C	3540.1	51350	7 9	.12	C	
3083.7	40405	5 3	.35	C	3541.1	51229	9 11	.64	C	
3098.2	53983	11 11	.11	C	3542.1	51335	7 9	.76	C	
3100.7	39970	7 7	.16	C	3552.8	51331	5 5	.17	C	
3119.5	51668	11 9	.096	C	3553.7	56951	11 9	.83	C	
3120.4	51826	9 7	.10	C	3556.9	51103	9 11	.45	C	
3160.7	51192	9 9	.19	C	3559.5	52858	3 3	.22	C	
3161.9	50968	11 13	.12	C	3560.7	54301	7 9	.077	C	
3166.4	52213	9 7	.14	C	3565.4	35768	7 9	.39	C	
3175.4	50833	11 11	.13	C	3570.1	35379	9 11	.677	B	
3199.5	50808	9 9	.27	C	3572.0	50833	11 11	.25	C	
3205.4	51208	3 3	1.2	C	3581.2	34844	11 13	1.02	B	
3215.9	50999	5 5	.81	C	3582.2	54014	13 11	.25	C	
3217.4	50423	11 9	.23	C	3587.0	35856	5 5	.17	C	

TABLE 1b. Transition probabilities for selected atomic and ionic species—Continued

Wavelength ($\lambda[\text{\AA}]$)	Upper energy level ($E_k[\text{cm}^{-1}]$)	Stat. weights g_i g_k	Transition Probability ($A[10^8 \text{ s}^{-1}]$)	Unc.	Wavelength ($\lambda[\text{\AA}]$)	Upper energy level ($E_k[\text{cm}^{-1}]$)	Stat. weights g_i g_k	Transition Probability ($A[10^8 \text{ s}^{-1}]$)	Unc.
Fe I					Fe I				
3594.6	50808	9 9	.28	C	3799.5	34040	7 9	.0732	B
3599.6	56593	11 9	.19	C	3804.0	53155	11 9	.052	C
3603.2	49461	11 11	.27	C	3805.3	52899	9 11	1.0	C
3605.5	49727	9 9	.65	C	3806.2	53808	3 3	.25	C
3606.7	49434	11 13	.84	C	3806.7	52613	11 11	.55	C
3608.9	35856	3 5	.814	B	3807.5	44184	3 5	.097	C
3610.2	50342	13 13	.50	C	3810.8	52858	5 3	.24	C
3612.1	50523	11 13	.077	C	3813.0	33947	7 5	.0792	B
3617.8	51969	5 7	.66	C	3813.9	55526	13 11	.091	C
3618.8	35612	5 7	.73	C	3815.8	38175	9 7	1.3	C
3621.5	49604	9 11	.52	C	3820.4	33096	11 9	.668	B
3622.0	49851	7 7	.53	C	3821.2	52514	11 13	.70	C
3623.2	46982	13 13	.076	C	3821.8	47197	5 5	.089	C
3631.5	35257	7 9	.52	C	3825.9	33507	9 7	.598	B
3632.0	52297	3 5	.50	C	3827.8	38678	7 5	1.1	C
3638.3	49727	7 9	.27	C	3833.3	46721	9 9	.059	C
3640.4	49461	9 11	.39	C	3834.2	33802	7 5	.453	B
3645.8	52512	1 3	.58	C	3836.3	52683	5 5	.39	C
3647.8	34782	9 11	.292	B	3839.3	50614	9 9	.29	C
3649.5	49109	11 9	.43	C	3840.4	34017	5 3	.470	B
3651.5	49628	7 9	.64	C	3841.0	38996	5 3	1.4	C
3655.5	50187	5 5	.12	C	3843.3	50587	9 7	.48	C
3659.5	47106	9 9	.068	C	3846.8	52213	7 7	.67	C
3669.5	49243	9 7	.30	C	3850.0	34122	3 1	.606	B
3670.1	51023	11 13	.078	C	3859.2	45295	13 11	.087	C
3676.3	47835	9 11	.061	C	3859.9	25900	9 9	.0970	B
3677.6	49433	7 5	.82	C	3865.5	34017	3 3	.155	B
3682.2	55754	5 5	1.7	C	3867.2	50187	5 5	.35	C
3684.1	49135	9 7	.34	C	3871.8	49604	11 11	.070	C
3686.0	50833	9 11	.26	C	3872.5	33802	5 5	.105	B
3687.5	34040	11 9	.0801	B	3873.8	45428	11 9	.082	C
3690.7	55907	11 11	.28	C	3878.0	33507	7 7	.0772	B
3694.0	51570	5 7	.70	C	3883.3	51969	7 7	.17	C
3697.4	51219	7 7	.21	C	3884.4	47453	11 9	.042	C
3701.1	51192	7 9	.49	C	3888.5	38678	5 5	.27	C
3704.5	48703	11 9	.14	C	3891.9	53230	3 3	.40	C
3709.2	34329	9 7	.156	B	3893.4	49461	11 11	.14	C
3719.9	26875	9 11	.163	B	3900.5	51771	7 7	.086	C
3724.4	45221	5 7	.13	C	3902.9	38175	7 7	.24	C
3727.6	34547	7 5	.225	B	3903.9	49727	9 9	.097	C
3730.4	51374	9 11	.13	C	3916.7	51630	13 11	.12	C
3732.4	44512	5 5	.28	C	3919.1	49628	9 9	.045	C
3734.9	33695	11 11	.902	B	3942.4	48305	3 5	.11	C
3737.1	27167	7 9	.142	C	3951.2	51708	3 5	.36	C
3738.3	53094	11 13	.38	C	3952.6	47008	11 11	.052	C
3740.2	52954	7 7	.19	C	3953.2	49628	7 9	.043	C
3742.6	50423	9 9	.11	C	3963.1	51705	3 5	.17	C
3744.1	51208	5 3	.38	C	3967.4	51826	9 7	.24	C
3745.6	27395	5 7	.115	B	3969.3	37163	9 7	.24	C
3749.5	34040	9 9	.764	B	3971.3	46889	11 9	.068	C
3753.6	44184	7 5	.11	C	3973.7	53763	5 7	.080	C
3756.9	55430	11 11	.25	C	3977.7	42860	5 5	.082	C
3758.2	34329	7 7	.634	B	3981.8	47106	9 9	.046	C
3760.1	45978	13 15	.057	C	3984.0	47093	9 7	.089	C
3763.8	34547	5 5	.544	B	3985.4	51708	5 5	.082	C
3765.5	52655	13 15	.99	C	3997.0	54811	9 9	.074	C
3767.2	34692	3 3	.640	B	3997.4	47008	9 11	.16	C
3787.2	55754	5 5	.12	C	3998.1	46721	11 9	.075	C
3787.9	34547	3 5	.129	B	4005.2	37521	7 5	.22	C
3794.3	46136	9 11	.046	C	4014.5	53722	11 11	.24	C
3795.0	34329	5 7	.115	B	4017.2	49461	9 11	.053	C
3798.5	33695	9 11	.0323	B	4021.9	47106	7 9	.10	C

TABLE 1b. Transition probabilities for selected atomic and ionic species—Continued

Wavelength (λ [Å])	Upper energy level (E_k [cm ⁻¹])	Stat. weights g_i g_k	Transition Probability (A [10 ⁸ s ⁻¹])	Unc.	Wavelength (λ [Å])	Upper energy level (E_k [cm ⁻¹])	Stat. weights g_i g_k	Transition Probability (A [10 ⁸ s ⁻¹])	Unc.
Fe I					Fe I				
4032.0	51201	3 5	.086	C	4872.1	43764	3 3	.24	C
4045.8	36686	9 9	.75	C	4878.2	43764	1 3	.11	C
4062.4	47556	3 3	.23	C	4890.8	43634	5 5	.21	C
4063.6	37163	7 7	.69	C	4891.5	43435	9 7	.30	C
4068.0	50475	9 9	.17	C	4903.3	43634	3 5	.054	C
4070.8	50699	7 5	.14	C	4919.0	43435	7 7	.17	C
4071.7	37521	5 5	.80	C	4920.5	43163	11 9	.36	C
4073.8	50880	5 3	.19	C	4966.1	47006	11 11	.037	C
4074.8	49109	9 9	.056	C	4973.1	52040	3 3	.12	C
4076.6	50423	9 9	.20	C	4989.0	53546	7 7	.058	C
4084.5	51350	11 9	.12	C	5001.9	51294	9 7	.40	C
4085.3	50611	7 7	.12	C	5014.9	51740	7 5	.31	C
4098.2	50534	7 7	.082	C	5022.2	52040	5 3	.27	C
4107.5	47177	5 3	.25	C	5074.7	53739	9 11	.15	C
4109.8	47272	3 3	.19	C	5090.8	53967	7 5	.21	C
4113.0	58002	11 13	.15	C	5121.6	54067	5 5	.086	C
4127.6	47272	1 3	.16	C	5137.4	53155	11 9	.11	C
4132.9	47136	3 5	.11	C	5208.6	45334	7 5	.060	C
4134.7	47017	5 7	.18	C	5232.9	42816	9 11	.15	C
4137.0	51708	3 5	.23	C	5242.5	48383	13 11	.032	C
4143.9	36686	7 9	.16	C	5263.3	45334	5 5	.061	C
4149.4	50968	11 13	.043	C	5266.6	43163	7 9	.088	C
4153.9	51462	7 9	.24	C	5281.8	43435	5 7	.038	C
4154.8	51229	9 11	.15	C	5302.3	45334	3 5	.073	C
4156.8	46889	5 5	.19	C	5324.2	44677	9 9	.15	C
4170.9	48305	5 5	.072	C	5339.9	45061	5 7	.071	C
4172.1	50187	7 5	.12	C	5367.5	54237	7 9	.59	C
4175.6	46889	3 5	.17	C	5370.0	53874	9 11	.48	C
4184.9	46727	5 5	.12	C	5383.4	53353	11 13	.59	C
4187.0	43634	7 5	.23	C	5393.2	44677	7 9	.037	C
4187.8	43435	9 7	.16	C	5410.9	54555	7 9	.49	C
4196.2	51219	7 7	.11	C	5415.2	53841	11 13	.68	C
4210.3	43764	3 3	.20	C	5463.3	54067	9 9	.33	C
4217.6	51370	3 5	.24	C	5473.9	51771	7 7	.057	C
4219.4	52514	11 13	.38	C	5569.6	45509	5 3	.21	C
4222.2	43435	7 7	.063	C	5572.8	45334	7 5	.22	C
4224.2	50833	9 11	.14	C	5586.8	45061	9 7	.19	C
4225.5	51219	5 7	.17	C	5615.6	44677	11 9	.17	C
4233.6	43634	3 5	.20	C	5624.5	45334	5 5	.062	C
4238.8	50980	7 9	.22	C	5658.8	45061	7 7	.042	C
4246.1	52916	7 5	.069	C	5753.1	51740	3 5	.072	C
4250.1	43435	5 7	.23	C	5763.0	51294	5 7	.10	C
4282.4	40895	7 5	.13	C	Fe II				
4307.9	35768	7 9	.35	C	2029.2	65110	10 8	.076	D
4315.1	40895	5 5	.090	C	2040.7	64832	10 10	.46	D
4325.8	36079	5 7	.51	C	2051.0	65110	8 8	.42	D
4327.1	51708	5 5	.094	C	2296.7	65110	10 8	.037	D
4369.8	47453	9 9	.074	C	2303.3	64832	12 10	.054	D
4383.5	34782	9 11	.46	C	2369.2	64832	10 10	.026	D
4388.4	51837	7 7	.13	C	2379.0	64832	8 10	.064	D
4401.3	51771	7 7	.069	C	2388.4	62662	10 12	.14	D
4404.8	35257	7 9	.25	C	2433.5	62662	10 12	.091	D
4415.1	35612	5 7	.13	C	2555.0	65110	8 8	.019	D
4443.2	45552	1 3	.13	C	2559.8	65110	6 8	.22	D
4466.6	45221	5 7	.13	C	2561.6	64832	10 10	.0081	D
4469.4	51837	5 7	.27	C	2573.2	64832	8 10	.11	D
4528.6	39626	7 9	.063	C	2591.5	46967	6 6	.52	C
4547.9	50587	5 7	.078	C	2592.8	71433	14 16	2.25	C
4736.8	47006	9 11	.050	C	2598.0	64832	10 10	.020	D
4789.7	49477	5 5	.084	C	2598.4	38859	8 6	1.3	C
4859.7	43764	5 3	.15	C	2599.4	38459	10 10	2.22	C
4871.3	43634	7 5	.22	C					

TABLE 1b. Transition probabilities for selected atomic and ionic species—Continued

Wavelength (λ [Å])	Upper energy level (E_k [cm ⁻¹])	Stat. weights g_i g_k	Transition Probability (A [10 ⁸ s ⁻¹])	Unc.	Wavelength (λ [Å])	Upper energy level (E_k [cm ⁻¹])	Stat. weights g_i g_k	Transition Probability (A [10 ⁸ s ⁻¹])	Unc.
Fe II					Kr I				
2623.1	70987	14 14	.092	D	4425.2	108438	3 3	.0097	D
2625.5	70987	12 14	2.04	C	4453.9	103363	3 5	.0078	D
2625.7	38459	8 10	.34	C	4463.7	103314	3 3	.023	D
2664.7	64832	8 10	1.50	C	4502.4	103121	3 5	.0092	D
2666.6	65110	6 8	1.62	C	5562.2	97945	5 5	.0028	D
2684.9	62662	12 12	.0043	D	5570.3	97919	5 3	.021	D
2712.4	62662	10 12	.11	D	5649.6	102887	1 3	.0037	D
2753.3	62662	10 12	1.71	C	5870.9	97945	3 5	.018	D
2879.2	65110	10 8	.029	D	6904.7	105648	3 5	.013	D
2902.5	64832	10 10	.038	D	7224.1	105007	3 5	.014	D
2910.8	65110	8 8	.0055	D	7587.4	94093	3 1	.51	D
3002.3	65110	6 8	.018	D	7601.5	93123	5 5	.31	D
3044.8	64832	8 10	.011	D	7685.2	98855	3 1	.49	D
3131.7	64832	12 10	.012	D	7694.5	92964	5 3	.056	D
3162.8	65110	8 8	.042	D	7854.8	97919	1 3	.23	D
3186.7	45044	4 4	.039	C	8059.5	97596	1 3	.19	D
3187.3	64832	10 10	.028	D	8104.4	92307	5 5	.13	D
3213.3	44785	4 6	.065	C	8112.9	92294	5 7	.36	D
3277.3	38459	8 10	.0023	D	8190.1	93123	3 5	.11	D
3360.1	62662	12 12	.0084	D	8263.2	97945	3 5	.35	D
4515.3	45080	6 6	.0018	D	8281.1	97919	3 3	.19	D
4520.2	44754	10 8	.0010	D	8298.1	92964	3 3	.32	D
4583.8	44447	10 8	.0063	C	8508.9	97596	3 3	.24	D
4629.3	44233	10 10	.0013	D	8776.7	92307	3 5	.27	D
4923.9	43621	6 4	.030	C	8928.7	91169	5 3	.37	D
4954.0	65110	6 8	.0016	D	Kr II				
5018.4	43239	6 6	.026	C	4250.6	141996	4 4	.12	D
5019.5	64832	8 10	.0015	D	4292.9	138381	4 4	.96	D
Fe XVI					4355.5	135783	6 8	1.0	D
50.350	1986100	2 4	2120.	B	4431.7	140163	2 2	1.8	D
50.555	1978040	2 2	2100.	B	4436.8	140137	2 4	.66	D
62.879	1867530	2 2	1110.	B	4577.2	149705	6 8	.96	D
63.719	1867530	4 2	2140.	B	4583.0	157885	6 4	.76	D
335.41	298140	2 4	77.5	B	4615.3	140137	4 4	.54	D
360.80	277160	2 2	62.3	B	4619.2	140119	4 6	.81	D
Fe XVIII					4633.9	149173	4 6	.71	D
93.931	1064610	4 2	690.	D	4658.9	134288	6 4	.65	D
103.95	1064610	2 2	260.	D	4739.0	133926	6 6	.76	D
Fe XXI					4762.4	141996	2 4	.42	D
98.37	1265800	5 3	700.	D	4765.7	136071	4 6	.67	D
99.43	1095500	9 3*	1000.	D	4811.8	138381	2 4	.17	D
113.34	1132280	5 5	470.	D	4825.2	141723	2 4	.19	D
Fe XXIII					4832.1	135783	4 2	.73	D
132.83	752840	1 3	195.	B	5208.3	134288	4 4	.14	D
Fe XXIV					5308.7	133926	4 6	.024	D
10.619	9417100	2 4	7.28(+4)	B	7407.0	133926	6 6	.070	D
10.663	9378200	2 2	7.51(+4)	B	Lead				
11.124	9467100	6 10*	2.18(+5)	B	Pb I				
192.04	520720	2 4	43.	B	2022.0	49440	1 3	.052	D
255.10	392000	2 2	18.	B	2053.3	48687	1 3	.12	D
Krypton					2170.0	46068	1 3	1.5	D
Kr I					2401.9	49440	3 3	.19	D
4274.0	103363	5 5	.026	D	2446.2	48687	3 3	.25	D
4351.4	108822	3 1	.032	D	2476.4	48189	3 5	.28	D
4362.6	102887	5 3	.0084	D	2577.3	49440	5 3	.50	D
4376.1	103762	3 1	.056	D	2613.7	46068	3 3	.27	D
4400.0	108568	3 5	.020	D	2614.2	46061	3 5	1.9	D
4410.4	108514	3 3	.0044	D	2628.3	48687	5 3	.031	D
					2657.1	45443	3 5	9.8 (-4)	D
					2663.2	48189	5 5	.71	D

TABLE 1b. Transition probabilities for selected atomic and ionic species—Continued

Wavelength (λ [Å])	Upper energy level (E_u [cm ⁻¹])	Stat. weights g_i g_k	Transition Probability (A [10 ⁸ s ⁻¹])	Unc.	Wavelength (λ [Å])	Upper energy level (E_u [cm ⁻¹])	Stat. weights g_i g_k	Transition Probability (A [10 ⁸ s ⁻¹])	Unc.
Pb I					Mg II				
2802.0	46329	5 7	1.6	D	2802.7	35669	2 2	2.6	C
2823.2	46061	5 5	.26	D	2928.8	69805	2 2	1.2	C
2833.1	35287	1 3	.58	D	2936.5	69805	4 2	2.3	C
2873.3	45443	5 5	.37	D	3104.8	103690	10 14*	.81	C
3572.7	49440	5 3	.99	D	3848.2	97469	6 4	.028	C
3639.6	35287	3 3	.34	D	3848.3	97469	4 4	.0030	D
3671.5	48687	5 3	.44	D	3850.4	97455	4 2	.030	C
3683.5	34960	3 1	1.5	D	4481.2	93800	10 14*	2.23	C
3739.9	48189	5 5	.73	D	9218.3	80650	2 4	.36	C
4019.6	46329	5 7	.035	D	9244.3	80620	2 2	.36	C
4057.8	35287	5 3	.89	D	Mg IV				
4062.1	46068	5 3	.92	D	320.99	311532	4 2	120.	D
4168.0	45443	5 5	.012	D	323.31	311532	2 2	59.	D
5005.4	49440	1 3	.27	D	1219.0	679098	6 6	5.9	D
5201.4	48687	1 3	.19	D	1375.5	677361	4 4	4.5	D
7229.0	35287	5 3	.0089	D	1459.6	612231	6 4	4.6	D
Lithium					1495.5	679098	4 6	6.4	D
Li I					1510.7	678426	4 4	6.7	D
2741.2	36470	2 6*	.013	D	1683.0	603137	6 8	5.8	D
3232.7	30925	2 6*	.012	B	1698.8	604002	4 6	3.9	D
4602.8	36623	2 4	.197	C	1893.9	596521	6 6	2.8	D
4602.9	36623	4 6	.24	C	Mg VI				
6103.5	31283	2 4	.60	C	269.92	424600	10 6*	310.	D
6103.7	31283	4 6	.71	C	292.53	424600	6 6*	90.	D
6103.7	31283	4 4	.12	C	314.64	400600	6 2*	180.	D
6707.8	14904	2 4	.372	B	349.15	340600	10 10*	61.	C
6707.9	14904	2 2	.372	B	387.94	340600	6 10*	13.	D
Lutetium					399.29	250445	4 2	28.	C
Lu I					400.68	249578	4 4	28.	C
3376.5	29608	4 4	2.23	B	403.32	247945	4 6	27.	C
3567.8	28020	4 6	.59	C	Mg VII				
3620.3	29608	6 4	.011	D	277.01	362128	3 3	95.	C
3841.2	28020	6 6	.25	C	278.41	362128	5 3	150.	C
4518.6	22125	4 4	.21	B	280.74	397700	5 3	200.	D
Magnesium					319.02	354900	5 5	89.	C
Mg I					366.42	274922	9 9*	44.	C
2025.8	49347	1 3	.84	D	433.04	232934	9 15*	16.	C
2779.8	57854	9 9*	5.2	C	1334.3	1125850	5 5	5.3	C
2850.0	56968	9 15*	.23	C	1410.0	1196770	5 5	2.57	C
2852.1	35051	1 3	5.3	D	1487.0	1192185	3 5	3.02	C
3094.9	54192	9 15*	.52	C	1487.9	1193061	5 7	3.66	C
3329.9	51873	1 3	.033	C	Mg VIII				
3332.2	51873	3 3	.097	C	74.976	1335965	6 10*	4300.	D
3336.7	51873	5 3	.16	C	315.02	320742	4 4	120.	C
3835.3	47957	9 15*	1.68	B	342.29	524437	10 6*	63.	D
4703.0	56308	3 5	.255	C	353.86	414380	4 4	38.9	C
5167.3	41197	1 3	.116	B	356.00	414380	6 4	57.	C
5172.7	41197	3 3	.346	B	428.52	465654	10 10*	32.4	C
5183.6	41197	5 3	.575	B	434.62	232290	6 10*	16.	C
5528.4	53135	3 5	.199	C	489.33	524437	6 6*	39.	D
Mg II					686.92	465654	6 10*	9.4	D
1239.9	80650	2 4	.014	C	Mg IX				
1240.4	80620	2 2	.014	C	62.751	1593600	1 3	2870.	B
2660.8	109062	10 14*	.38	D	67.189	1631500	9 15*	6200.	C
2790.8	71491	2 4	4.0	C	71.965	1532700	9 3*	1220.	C
2795.5	35761	2 4	2.6	C	72.312	1654583	3 5	4430.	C
2797.9	71491	4 4	.79	D	77.737	1558076	3 1	392.	C
2798.1	71490	4 6	4.8	C	368.07	271687	1 3	52.7	B
					438.69	499640	3 1	79.	C

TABLE 1b. Transition probabilities for selected atomic and ionic species—Continued

Wavelength (λ [Å])	Upper energy level (E_k [cm ⁻¹])	Stat. weights g_i g_k	Transition Probability (A [10 ⁸ s ⁻¹])	Unc.	Wavelength (λ [Å])	Upper energy level (E_k [cm ⁻¹])	Stat. weights g_i g_k	Transition Probability (A [10 ⁸ s ⁻¹])	Unc.
Mg IX					Mn I				
443.74	368500	9 9*	41.9	C	3268.7	64410	6 8	.33	D
749.55	405100	3 5	8.2	C	3270.4	64820	12 12	.26	D
1639.8	1654583	3 5	2.1	D	3273.0	64888	10 10	.27	D
2814.2	1593600	1 3	.335	C	3278.6	47775	8 8	.0091	D
Mg X					Mn I				
57.876	1727832	2 4	2090.	B	3298.2	57512	6 4	.28	D
57.920	1726519	2 2	2090.	B	3420.8	63364	14 14	.12	D
63.152	1743410	2 4	5600.	B	3463.7	66600	8 8	.32	C
63.295	1743880	4 6	6700.	B	3470.0	66600	6 8	.24	C
609.79	163976	2 4	7.53	B	3511.8	65887	12 12	.27	C
624.94	159929	2 2	7.01	B	3535.3	65909	10 10	.17	C
2212.5	1727832	2 4	.964	B	3559.8	65873	6 6	.21	C
2278.7	1726519	2 2	.882	B	3577.9	44994	10 8	.94	C
5918.7	1743410	2 4	.0320	C	3601.3	65769	12 10	.23	C
6229.6	1743880	4 6	.0330	C	3607.5	44994	8 8	.23	C
Mg XI					Mn I				
7.310	13680600	1 3	1.15(+4)	B	3608.5	45156	6 6	.36	C
7.473	13381100	1 3	2.27(+4)	B	3610.3	45259	4 4	.42	C
7.850	12738400	1 3	5.50(+4)	B	3635.7	65617	10 8	.21	C
9.169	10907300	1 3	1.97(+5)	B	3660.4	64732	12 14	.91	C
Manganese					Mn I				
2794.8	35770	6 8	3.7	C	3667.0	64820	10 12	.73	C
2798.3	35726	6 6	3.6	C	3680.2	64585	12 10	.19	C
2801.1	35690	6 4	3.7	C	3682.1	64888	8 10	.76	D
3007.7	58520	6 8	.18	D	3684.9	64920	6 8	.26	C
3011.4	58486	8 10	.31	D	3706.1	61226	12 14	1.4	C
3016.5	58427	10 12	.29	D	3718.9	61226	10 12	.96	C
3043.4	58137	8 8	.59	D	3729.5	61744	10 12	.066	D
3044.6	49888	10 8	.57	D	3731.9	61211	8 10	1.0	C
3045.6	58110	10 10	.67	D	3746.6	60934	12 12	.16	C
3045.8	58110	8 10	.17	D	3756.6	60956	10 10	.14	C
3046.6	67753	10 12	.13	D	3767.7	60957	8 8	.14	C
3047.0	58075	12 12	.61	D	3768.2	61469	10 12	.071	C
3054.4	50013	8 6	.46	D	3771.4	69561	14 14	.19	C
3066.0	49888	8 8	.16	D	3773.9	69630	12 12	.25	C
3073.1	50099	4 4	.37	D	3800.6	57306	6 8	.27	C
3082.7	66569	14 14	.29	D	3801.9	51561	12 12	.064	C
3110.7	59340	6 8	.27	D	3806.7	43314	10 12	.38	C
3113.8	66356	12 10	.26	D	3809.6	43524	8 8	.20	C
3122.9	66356	10 10	.19	D	3823.5	43429	8 10	.44	C
3126.9	66395	8 6	.23	D	3823.9	43596	6 6	.36	C
3132.3	66855	10 10	.21	D	3833.9	43644	4 4	.52	C
3132.8	66334	8 8	.27	D	3834.4	43524	6 8	.52	D
3160.2	66574	10 12	.14	D	3839.8	43673	2 2	.58	C
3175.6	66523	8 10	.18	D	3844.0	43644	2 4	.29	C
3175.7	66419	10 12	.12	D	3872.1	63449	10 12	.077	C
3190.0	66454	6 8	.16	D	3873.2	63548	8 10	.11	C
3201.1	66395	4 6	.22	D	3889.5	68843	12 14	.31	C
3212.9	48168	10 10	.16	D	3898.4	59470	6 8	.17	C
3228.1	48021	10 12	.64	D	3899.3	60102	4 6	.24	C
3230.2	65887	10 12	.19	D	3911.1	56562	6 6	.13	D
3230.7	48226	8 8	.35	D	3919.3	66738	8 8	.088	D
3238.7	65909	8 10	.12	D	3923.3	59732	12 10	.13	C
3243.8	48271	6 6	.53	D	3924.1	56602	2 4	.94	D
3256.1	48271	4 6	.50	D	3926.5	56462	6 8	.54	C
3258.4	48318	2 2	.97	D	3929.7	59784	10 8	.092	C
3260.2	48301	2 4	.38	D	3931.5	63548	10 10	.082	C
3264.7	47904	8 10	.14	D	3936.8	59818	8 6	.12	C
3267.8	64732	14 14	.35	D	3952.8	59117	6 6	.41	D
					3975.9	59990	2 4	.18	D
					3977.1	59600	4 6	.16	D
					3980.1	66149	10 8	.13	D
					3982.2	59568	4 2	.35	D
					3982.6	50383	6 4	.23	D
					3982.9	66504	6 4	.55	D

TABLE 1b. Transition probabilities for selected atomic and ionic species—Continued

Wavelength ($\lambda[\text{\AA}]$)	Upper energy level ($E_k[\text{cm}^{-1}]$)	Stat. weights g_i g_k	Transition Probability ($A[10^8 \text{ s}^{-1}]$)	Unc.	Wavelength ($\lambda[\text{\AA}]$)	Upper energy level ($E_k[\text{cm}^{-1}]$)	Stat. weights g_i g_k	Transition Probability ($A[10^8 \text{ s}^{-1}]$)	Unc.
Mn I					Mn I				
3986.8	50341	12 10	.11	D	4502.2	45754	6 8	.078	D
3987.1	50359	10 8	.10	D	4503.9	59617	12 14	.083	D
4003.3	62393	12 10	.11	D	4605.4	59828	10 12	.36	D
4011.9	66149	8 8	.23	D	4626.5	59617	12 14	.36	D
4018.1	41933	10 8	.33	C	4709.7	44523	8 8	.077	D
4026.4	50095	12 14	.089	D	4727.5	44696	6 6	.084	D
4030.8	24802	6 8	.19	C	4754.0	39431	6 8	.38	D
4031.8	50081	10 12	.073	D	4761.5	44815	2 4	.28	D
4033.1	24788	6 6	.18	C	4762.4	44289	8 10	.57	D
4034.5	24779	6 4	.18	C	4765.9	44696	4 6	.28	D
4041.4	41789	10 10	1.0	C	4766.4	44523	6 8	.45	D
4048.8	42144	6 4	.75	C	4783.4	39431	8 8	.39	D
4052.5	59784	6 8	.38	D	4823.5	39431	10 8	.45	D
4055.5	41933	8 8	.61	C	Mn II				
4058.9	42199	4 2	1.0	C	2933.1	43557	5 3	1.7	C
4061.7	49415	8 6	.19	D	2939.3	43485	5 5	1.8	C
4063.5	42054	6 6	.22	C	2949.2	43370	5 7	1.7	C
4065.1	58843	12 14	.25	D	3439.0	38543	5 7	.0041	D
4066.2	65617	10 8	.22	D	3442.0	43370	9 7	.43	C
4079.4	42144	2 4	.38	C	3460.3	43485	7 5	.32	C
4082.9	42054	4 6	.37	C	3474.0	43370	7 7	.079	C
4083.6	41933	6 8	.28	C	3474.1	43557	5 3	.15	C
4089.9	58867	8 10	.17	D	3482.9	43485	5 5	.20	C
4092.4	59470	8 8	.14	D	3488.7	43557	3 3	.25	C
4099.4	65617	8 8	.11	D	3495.8	43557	1 3	.11	C
4105.4	59290	10 8	.17	D	3496.8	43370	5 7	.016	C
4107.9	61485	12 10	.097	D	3497.5	43485	3 5	.051	C
4114.4	59340	8 8	.15	D	Mn XXIII				
4116.6	62075	6 6	.12	D	12.03	8687000	2 4	1.5 (+5)	B
4125.8	65262	10 10	.070	D	12.158	8708000	4 6	1.8 (+5)	B
4132.3	68716	8 10	.15	D	Mercury				
4135.0	58427	12 12	.30	D	Hg I				
4141.1	58486	10 10	.26	D	2536.5	39412	1 3	.13	D
4147.5	51305	6 6	.066	D	2752.8	73961	1 3	.057	D
4148.8	58520	8 8	.23	D	2856.9	74405	3 1	.012	D
4176.6	58075	14 12	.21	D	2893.6	73961	3 3	.16	D
4182.3	61913	12 14	.092	D	2925.4	78216	5 3	.077	D
4190.0	58110	12 10	.20	D	2967.3	71336	1 3	.45	D
4201.8	58137	10 8	.23	D	3125.7	71396	3 5	.51	D
4220.6	57512	6 4	.16	D	3341.5	73961	5 3	.27	D
4239.7	47299	4 2	.39	D	4046.6	62350	1 3	.18	D
4257.7	47299	2 2	.37	D	4077.8	63928	3 1	.041	D
4261.3	61469	12 12	.081	D	4108.1	78404	3 1	.030	D
4265.9	47155	4 4	.35	D	4339.2	77108	3 5	.080	D
4278.7	61485	10 10	.068	D	4358.3	62350	3 3	.40	D
4281.1	46901	6 6	.23	D	4916.1	74405	3 1	.13	D
4300.2	60668	12 10	.087	D	5460.7	62350	5 3	.56	D
4381.7	61485	8 10	.14	D	5769.6	71396	3 5	.61	D
4411.9	60668	12 10	.26	D	6234.4	79964	1 3	.0053	D
4414.9	45941	8 6	.18	D	6716.4	78813	1 3	.0043	D
4419.8	60739	10 8	.21	D	6907.5	76824	3 5	.028	D
4451.6	45754	8 8	.71	D	7728.8	76863	1 3	.0097	D
4452.5	59617	14 14	.059	D	Neodymium				
4455.8	47216	4 6	.17	D	Nd II				
4457.0	47218	6 4	.20	D	3780.4	30247	16 18	.14	D
4457.6	47216	6 6	.38	D	3805.4	28857	14 16	.69	D
4458.3	47212	6 8	.28	D	3807.2	26772	10 12	.049	D
4461.1	47212	8 8	.17	D	3863.3	25877	8 10	.15	D
4462.0	47207	8 10	.43	D	3941.5	25877	10 10	.61	D
4464.7	45941	6 6	.26	D					
4479.4	63548	8 10	.34	D					
4498.9	45941	4 6	.11	D					

TABLE 1b. Transition probabilities for selected atomic and ionic species—Continued

Wavelength (λ [Å])	Upper energy level (E_k [cm ⁻¹])	Stat. weights g_i g_k	Transition Probability (A [10 ⁸ s ⁻¹])	Unc.	Wavelength (λ [Å])	Upper energy level (E_k [cm ⁻¹])	Stat. weights g_i g_k	Transition Probability (A [10 ⁸ s ⁻¹])	Unc.
Nd II					Ne I				
3951.2	26772	12 12	.60	D	3466.6	163657	1 3	.013	D
3973.3	30247	18 18	.63	D	3472.6	162831	5 7	.017	D
3979.5	26772	10 12	.27	D	3498.1	163038	3 5	.0051	D
3990.1	28857	16 16	.52	D	3501.2	163013	3 3	.012	D
4012.3	30002	18 20	.55	D	3510.7	162518	5 3	.0022	D
4061.1	28419	16 18	.44	D	3515.2	162899	3 5	.0069	D
4106.6	28857	14 16	.068	D	3520.5	164286	3 1	.093	D
4109.5	26913	14 16	.37	D	3593.5	163709	3 5	.0099	D
4133.4	26772	14 12	.15	D	3593.6	163708	3 3	.0066	D
4156.1	25524	12 14	.34	D	3600.2	163657	3 3	.0043	D
4205.6	28857	18 16	.18	D	3633.7	163401	3 1	.011	D
4284.5	28419	18 18	.085	D	3682.2	163038	3 5	.0016	D
4303.6	23230	8 10	.47	D	3685.7	163013	3 3	.0039	D
4325.8	26913	16 16	.16	D	3701.2	162899	3 5	.0022	D
4358.2	25524	14 14	.15	D	4536.3	170296	3 3	.0050	D
4382.7	25877	12 10	.040	D	4702.5	169517	3 3	.0021	D
4400.8	23230	10 10	.068	D	4708.9	169488	3 3	.042	D
4451.6	25524	12 14	.25	D	4955.4	170296	3 3	.0033	D
4456.4	28419	16 18	.064	D	5113.7	167808	3 3	.010	D
4463.0	26913	14 16	.18	D	5120.5	170296	3 3	.0056	D
4958.1	23230	12 10	.012	D	5154.4	169517	3 3	.019	D
5130.6	30002	22 20	.16	D	5191.3	170296	3 3	.013	D
5192.6	28419	20 18	.17	D	5326.4	167027	3 3	.0068	D
5249.6	26913	18 16	.18	D	5333.3	169517	3 3	.0053	D
5276.9	25877	12 10	.12	D	5341.1	166975	3 3	.11	D
5293.2	25524	16 14	.12	D	5400.6	152971	3 1	.0090	B
5302.3	30247	20 18	.11	D	5418.6	169488	3 3	.0052	D
5311.5	26772	14 12	.11	D	5433.7	166657	3 3	.00283	B
5319.8	23230	12 10	.16	D	5652.6	167808	3 3	.0089	D
5357.0	28857	18 16	.18	D	5662.5	165913	3 3	.0069	D
5371.9	30002	20 20	.051	D	5852.5	152971	3 1	.682	B
5485.7	28419	18 18	.057	D	5868.4	167808	3 3	.014	D
5594.4	26913	16 16	.070	D	5881.9	151038	5 3	.115	B
5620.6	30247	18 18	.13	D	5913.6	167027	3 3	.048	D
5688.5	25524	14 14	.059	D	5939.3	166657	5 3	.00200	B
5718.1	28857	16 16	.087	D	5944.8	150859	5 5	.113	B
5726.8	25877	10 10	.056	D	5961.6	167808	3 3	.033	D
5740.9	26772	12 12	.072	D	5975.5	150772	5 3	.0351	B
5804.0	23230	10 10	.046	D	6030.0	151038	3 3	.0561	B
5865.1	28419	16 18	.013	D	6046.1	166657	3 3	.00226	B
6051.9	25877	12 10	.011	D	6074.3	150917	3 1	.603	B
	Neon				6096.2	150859	3 5	.181	B
	Ne I				6118.0	166657	5 3	.00609	B
					6128.5	150772	3 3	.0067	B
615.63	162436	1 3	.38	C	6143.1	150316	5 5	.282	B
618.67	161637	1 3	.93	C	6150.3	167027	3 3	.015	D
619.10	161524	1 3	.33	C	6163.6	151038	1 3	.146	B
626.82	159535	1 3	.74	C	6217.3	150122	5 3	.0637	B
629.74	158796	1 3	.48	C	6266.5	150772	1 3	.249	B
735.90	135889	1 3	6.11	B	6273.0	166975	3 3	.0097	D
743.72	134459	1 3	.486	B	6293.7	166657	3 3	.00639	B
3369.8	163709	5 5	.0010	D	6304.8	150316	3 5	.0416	B
3369.9	163708	5 3	.0076	D	6328.2	166657	5 3	.0339	B
3375.6	163657	5 3	.0022	D	6330.9	165913	3 3	.023	D
3417.9	163709	3 5	.0092	D	6334.4	149824	5 5	.161	B
3418.0	163708	3 3	.0022	D	6351.9	166657	1 3	.00345	B
3423.9	163657	3 3	.0010	D	6383.0	150122	3 3	.321	B
3447.7	163038	5 5	.021	D	6401.1	166657	3 3	.0139	B
3450.8	163013	5 3	.0049	D	6402.2	149657	5 7	.0514	B
3454.2	163401	3 1	.037	D	6506.5	149824	3 5	.300	B
3460.5	163708	1 3	.0070	D	6532.9	150122	1 3	.108	B
3464.3	162899	5 5	.0067	D	6599.0	151038	3 3	.232	B

TABLE 1b. Transition probabilities for selected atomic and ionic species—Continued

Wavelength ($\lambda[\text{Å}]$)	Upper energy level ($E_k[\text{cm}^{-1}]$)	Stat. weights g_i g_k	Transition Probability ($A[10^8 \text{ s}^{-1}]$)	Unc.	Wavelength ($\lambda[\text{Å}]$)	Upper energy level ($E_k[\text{cm}^{-1}]$)	Stat. weights g_i g_k	Transition Probability ($A[10^8 \text{ s}^{-1}]$)	Unc.
Ne I					Ne II				
6602.9	165913	3 3	.0059	D	2916.2	280474	6 4	.096	D
6652.1	150917	3 1	.0029	B	2925.6	280769	2 2	.56	D
6678.3	150859	3 5	.233	B	2933.7	280269	6 6	.069	D
6717.0	150772	3 3	.217	B	2955.7	252954	6 4	1.2	D
6721.1	165913	3 3	4.9 (-4)	D	3001.7	252954	4 4	.87	D
6929.5	150316	3 5	.174	B	3017.3	279325	6 4	.35	D
7024.1	150122	3 3	.0189	B	3027.0	279219	6 6	1.4	D
7032.4	148258	5 3	.253	B	3028.7	279423	4 2	.85	D
7051.3	162436	3 3	.030	D	3028.9	252954	2 4	.47	D
7059.1	162420	3 5	.068	C	3034.5	279138	6 8	3.1	D
7173.9	149824	3 5	.0287	B	3037.7	279325	4 4	2.1	D
7245.2	148258	3 3	.0935	B	3045.6	279423	2 2	2.5	D
7304.8	166657	1 3	.00255	B	3047.6	279219	4 6	1.8	D
7438.9	148258	1 3	.0231	B	3054.7	279325	2 4	.94	D
7472.4	161637	3 3	.040	D	3092.9	306687	6 6	1.3	D
7535.8	161524	3 3	.43	D	3097.1	306688	8 8	1.3	D
7937.0	162420	5 5	.0078	C	3118.0	281171	8 6	.042	D
8082.5	148258	3 3	.0012	B	3134.1	306263	6 4	.26	D
8118.5	162436	3 3	.049	D	3140.4	306243	8 6	.24	D
8128.9	162420	3 5	.0072	C	3151.1	281171	6 6	.048	D
8259.4	162420	5 5	.0203	C	3154.8	280797	8 6	.018	D
8571.4	162436	3 3	.055	D	3164.4	280701	8 8	.16	D
8582.9	162420	3 5	.0100	C	3165.7	281026	6 6	.12	D
8647.0	162420	5 5	.0391	C	3173.6	280947	6 4	.045	D
8681.9	161637	3 3	.21	D	3176.1	281171	4 6	.060	D
8767.5	161524	3 3	.0011	D	3187.6	251011	4 6	.014	D
8771.7	162436	3 3	.16	D	3188.7	280797	6 6	.39	D
8783.8	162420	3 5	.313	C	3190.9	281026	4 6	.15	D
8865.3	159535	3 3	.0094	D	3194.6	280990	4 4	.52	D
9201.8	161637	3 3	.091	D	3198.6	280701	6 8	1.7	D
9433.0	161637	3 3	.0011	D	3198.9	280947	4 4	.23	D
9486.7	158796	3 3	.025	D	3209.0	280262	8 8	.16	D
9534.2	161524	3 3	.063	D	3209.4	280990	2 4	.60	D
10621.	159535	3 3	.0024	D	3213.7	280947	2 4	1.7	D
11409.	159535	3 3	.042	D	3214.3	280797	4 6	2.2	D
11525.	158796	3 3	.084	D	3218.2	280173	8 10	3.6	D
11767.	159535	3 3	.069	D	3224.8	305365	6 8	3.5	D
12459.	158796	3 3	.015	D	3229.5	305365	8 8	.13	D
					3229.6	305364	8 10	3.6	D
Ne II					3230.1	277344	6 6	1.8	D
357.03	280351	6 10*	38.	C	3230.4	277344	4 6	.14	D
361.77	276677	6 2*	16.	C	3232.0	277326	6 4	.27	D
406.28	246395	6 10*	18.	C	3232.4	277326	4 4	1.6	D
446.37	224291	6 6*	40.7	C	3243.4	280269	6 6	.23	D
460.73	217048	4 2	47.	B	3244.1	280262	6 8	1.5	D
462.39	217048	2 2	23.	B	3248.1	280474	4 4	.24	D
1907.5	276512	4 2	.28	D	3255.4	281720	6 4	.038	D
1916.1	276277	4 4	.69	D	3263.4	280474	2 4	.39	D
1930.0	276512	2 2	.57	D	3269.9	280269	4 6	.51	D
1938.8	276277	2 4	.13	D	3270.8	249696	6 4	.057	D
2858.0	281171	6 6	.79	D	3297.7	249446	6 6	.43	D
2870.0	281026	6 6	.17	D	3309.7	254292	4 2	.31	D
2873.0	280990	6 4	.38	D	3310.5	281720	4 4	.069	D
2876.3	281171	4 6	.78	D	3311.3	249840	4 2	.26	D
2876.5	280947	6 4	.33	D	3314.7	281171	6 6	.044	D
2878.1	281333	2 2	.069	D	3319.7	276512	4 2	1.6	D
2888.4	281026	4 6	.070	D	3320.2	279219	8 6	.21	D
2891.5	280990	4 4	.061	D	3323.7	254165	4 4	1.6	D
2897.0	280701	6 8	.052	D	3327.2	249696	4 4	.91	D
2906.8	280990	2 4	.55	D	3329.2	279138	8 8	.88	D
2910.1	280769	4 2	1.7	D	3330.7	281026	6 6	.039	D
2910.4	280947	2 4	.59	D	3334.8	249109	6 8	1.8	D

TABLE 1b. Transition probabilities for selected atomic and ionic species—Continued

Wavelength (λ [\AA])	Upper energy level (E_k [cm^{-1}])	Stat. weights g_i g_k	Transition Probability (A [10^8 s^{-1}])	Unc.	Wavelength (λ [\AA])	Upper energy level (E_k [cm^{-1}])	Stat. weights g_i g_k	Transition Probability (A [10^8 s^{-1}])	Unc.
Ne II					Ne II				
3336.1	306243	4 6	1.1	D	3697.1	281333	2 2	.28	D
3344.4	249840	2 2	1.5	D	3701.8	281171	4 6	.27	D
3345.5	276277	6 4	1.4	D	3709.6	246598	4 2	1.1	D
3345.8	276277	4 4	.22	D	3713.1	251011	4 6	1.3	D
3353.6	281333	4 2	.12	D	3721.8	281026	4 6	.20	D
3355.0	249446	4 6	1.3	D	3726.9	280990	4 4	.12	D
3356.3	280797	6 6	.20	D	3727.1	251522	2 4	.98	D
3357.8	279219	6 6	.50	D	3734.9	246415	4 4	.19	D
3360.3	306263	2 4	.86	D	3744.6	280990	2 4	.26	D
3360.6	249696	2 4	.82	D	3751.2	246598	2 2	.18	D
3362.9	279423	4 2	.35	D	3753.8	280797	4 6	.45	D
3371.8	281171	4 6	.22	D	3766.3	246192	4 6	.29	D
3374.1	279325	4 4	.30	D	3777.1	246415	2 4	.42	D
3378.2	254292	2 2	1.7	D	3800.0	280474	4 4	.37	D
3379.3	279423	2 2	.30	D	3818.4	280474	2 4	.61	D
3386.2	279219	4 6	.055	D	3829.8	280269	4 6	.84	D
3388.4	281026	4 6	2.2	D	3942.3	249446	4 6	.010	D
3390.6	279325	2 4	.077	D	Ne V				
3392.8	254165	2 4	.44	D	142.61	701945	9 9*	670.	C
3404.8	306687	4 6	1.9	D	143.32	698517	9 15*	1200.	C
3407.0	306688	6 8	2.3	D	147.13	709956	5 7	1500.	C
3411.4	305582	4 2	.61	D	151.23	691540	5 5	338.	C
3413.2	305567	4 4	1.8	D	154.50	711210	1 3	700.	C
3414.9	280797	4 6	.018	D	167.69	597083	9 9*	150.	C
3416.9	280269	6 6	.64	D	358.93	279365	9 3*	210.	C
3417.7	280262	6 8	1.6	D	365.59	303812	5 3	135.	C
3438.9	305582	2 2	1.4	D	482.15	208161	9 9*	30.1	C
3440.7	305567	2 4	.35	D	571.04	175876	9 15*	10.	C
3453.1	280474	4 4	.46	D	2259.6	640868	3 5	1.9	D
3454.8	306263	4 4	1.6	D	2265.7	641646	5 7	2.4	D
3456.6	281720	2 4	.96	D	Ne VII				
3457.1	306243	4 6	.099	D	97.502	1025600	1 3	1070.	B
3459.3	306243	6 6	1.6	D	115.46	978320	9 3*	480.	C
3475.2	281720	4 4	.012	D	116.69	1071920	3 5	1600.	C
3477.6	280269	4 6	.43	D	127.66	998280	3 1	190.	C
3481.9	252798	4 2	1.4	D	465.22	214952	1 3	40.9	B
3503.6	281333	2 2	2.0	D	558.61	290740	3 5	8.11	B
3522.7	281333	4 2	.023	D	559.95	289850	1 3	10.7	B
3538.0	305582	4 2	.76	D	561.38	289850	3 3	7.99	B
3539.9	305567	4 4	.036	D	561.73	290740	5 5	23.9	B
3542.2	305567	6 4	.60	D	562.99	289340	3 1	31.7	B
3542.9	281171	4 6	1.2	D	564.53	289850	5 3	13.1	B
3546.2	280990	2 4	.063	D	Ne VIII				
3551.6	280947	2 4	.037	D	88.09	1135000	2 6*	840.	B
3557.8	252798	2 2	.19	D	98.208	1147500	6 10*	2770.	B
3561.2	281026	4 6	.21	D	770.41	129800	2 4	5.90	B
3565.8	280990	4 4	.62	D	780.32	128150	2 2	5.69	B
3568.5	274409	6 8	1.4	D	2820.7	1135000	2 4	.720	B
3571.2	280947	4 4	.63	D	2860.1	1135000	2 2	.688	B
3574.2	274365	6 6	.10	D	Nickel				
3574.6	274365	4 6	1.3	D	Ni I				
3590.4	280797	4 6	.036	D	1976.9	50790	7 9	1.1	C
3594.2	280769	4 2	1.3	D	1990.3	51125	5 7	.83	C
3612.3	280474	2 4	.26	D	2007.0	50689	5 5	.17	C
3628.0	281720	4 4	.60	D	2014.3	51344	3 5	.93	C
3632.7	280474	4 4	.13	D	2026.6	49328	9 7	.24	C
3643.9	251522	4 4	.32	D	2047.4	49033	7 7	.13	C
3644.9	281720	2 4	.99	D	2055.5	50851	5 3	.33	C
3659.9	280269	4 6	.067	D	2124.8	50458	5 3	.38	C
3664.1	246415	6 4	.70	D					
3679.8	281333	4 2	.32	D					
3694.2	246192	6 6	1.0	D					

TABLE 1b. Transition probabilities for selected atomic and ionic species—Continued

Wavelength (λ[Å])	Upper energy level ($E_k[\text{cm}^{-1}]$)	Stat. weights g_i g_k	Transition Probability ($A[10^8 \text{ s}^{-1}]$)	Unc.	Wavelength (λ[Å])	Upper energy level ($E_k[\text{cm}^{-1}]$)	Stat. weights g_i g_k	Transition Probability ($A[10^8 \text{ s}^{-1}]$)	Unc.
Ni I					Ni I				
2147.8	47425	5 3	.47	C	4817.9	54251	7 7	.070	D
2158.3	46523	7 5	.69	C	4838.7	54251	9 7	.22	D
2190.2	46523	5 5	.30	C	4855.4	49159	5 5	.57	D
2197.4	47208	3 3	.78	C	4980.2	49159	9 11	.19	D
2201.6	48818	5 3	.73	C	5017.6	48467	11 11	.20	D
2244.5	45419	5 5	.38	C	5080.5	49159	9 11	.32	D
2253.6	44565	7 7	.19	C	5129.4	49159	7 5	.12	D
2258.2	44475	7 5	.17	C	5371.3	54251	7 7	.16	D
2290.0	43655	9 7	2.1	C	5664.0	54251	5 7	.11	D
2300.8	43655	7 7	.75	C	6176.8	49159	9 11	.047	D
2303.0	45122	3 3	.45	C	6314.7	31442	5 5	.0057	D
2312.3	44565	7 7	5.5	C	6767.8	29501	1 3	.0033	D
2317.2	44475	7 5	3.8	C	7714.3	28569	5 5	.0014	D
2320.0	43090	9 11	6.9	C	Ni II				
2325.8	44315	7 9	3.5	C	2053.3	57081	10 8	.041	D
2330.0	45122	5 3	5.3	C	2080.8	58706	4 4	.13	D
2345.5	42621	9 7	2.2	C	2090.1	58493	4 6	.11	D
2943.9	34163	7 5	.11	C	2093.6	57081	8 8	.11	D
3012.0	36601	5 5	1.5	C	2125.1	56371	8 8	.10	D
3037.9	33112	7 7	.32	C	2125.9	55418	10 8	.073	D
3064.6	33501	5 7	.075	C	2128.6	57081	6 8	.40	D
3080.8	34163	3 5	.093	C	2138.6	56075	8 6	.28	D
3101.6	33112	5 7	.72	C	2158.7	56424	6 4	.57	D
3101.9	35639	5 7	.49	C	2161.2	56371	6 8	.32	D
3134.1	33611	3 5	.71	C	2165.6	54557	10 10	3.8	D
3225.0	34409	5 3	.11	C	2169.1	55418	8 8	2.3	D
3233.0	30923	9 11	.053	C	2174.7	55300	8 10	2.4	D
3271.1	31442	5 5	.0072	C	2175.2	56075	6 6	2.8	D
3315.7	31031	5 7	.053	C	2184.6	56424	4 4	4.7	D
3320.3	31442	7 5	.048	C	2188.1	55019	8 6	.090	D
3361.6	30619	5 5	.045	C	2201.4	56075	4 6	2.1	D
3369.6	29669	9 7	.17	C	2206.7	55418	6 8	2.5	D
3380.6	32982	5 3	1.2	C	2210.4	54557	8 10	.64	D
3393.0	29669	7 7	.24	C	2216.5	53496	10 12	5.5	D
3413.5	30619	7 5	.038	C	2220.4	68131	6 8	3.7	D
3414.8	29481	7 9	.55	C	2223.0	53365	10 10	1.6	D
3423.7	30913	3 3	.35	C	2224.4	58493	8 6	.51	D
3433.6	29321	7 7	.17	C	2224.9	54263	8 8	2.5	D
3446.3	29889	5 5	.44	C	2226.3	55019	6 6	2.0	D
3452.9	29833	5 7	.098	C	2253.9	55019	4 6	3.2	D
3458.5	30619	3 5	.61	C	2264.5	54263	6 8	2.4	D
3461.7	29084	7 9	.27	C	2270.2	53365	8 10	2.5	D
3472.5	29669	5 7	.12	C	2278.8	57420	8 6	4.5	D
3483.8	30913	5 3	.14	C	2287.1	58706	6 4	4.5	D
3493.0	29501	5 3	.98	C	2296.6	57081	8 8	3.2	D
3510.3	30192	3 1	1.2	C	2297.1	53635	6 4	4.6	D
3515.1	29321	5 7	.44	C	2297.5	54176	4 2	5.3	D
3519.8	30619	5 5	.041	C	2298.3	58493	6 6	4.5	D
3524.5	28569	7 5	1.0	C	2303.0	52738	8 6	4.7	D
3566.4	31442	5 5	.56	C	2316.0	51558	10 8	4.9	D
3571.9	29321	7 7	.052	C	2326.4	53635	4 4	1.0	D
3597.7	29501	3 3	.14	C	2334.6	56371	8 8	1.3	D
3610.5	28569	5 5	.072	C	2356.4	57420	6 6	.45	D
3619.4	31031	5 7	.73	C	2367.4	51558	8 8	.13	D
3664.1	29501	5 3	.019	D	2375.4	57081	6 8	1.1	D
3807.1	29669	5 7	.043	C	2387.8	55418	8 8	.23	D
3831.7	29501	5 3	.015	C	2394.5	55300	8 10	2.9	D
3858.3	29321	5 7	.069	C	2413.0	56424	6 4	.13	D
4295.9	54251	9 7	.17	D	2416.1	56371	6 8	3.3	D
4401.6	48467	9 11	.38	D	2433.6	56075	6 6	.12	D
4714.4	48467	13 11	.46	D	2437.9	54557	8 10	.87	D
4786.5	48467	11 11	.18	D					

TABLE 1b. Transition probabilities for selected atomic and ionic species—Continued

Wavelength ($\lambda[\text{\AA}]$)	Upper energy level ($E_k[\text{cm}^{-1}]$)	Stat. weights g_i g_k	Transition Probability ($A[10^8 \text{ s}^{-1}]$)	Unc.	Wavelength ($\lambda[\text{\AA}]$)	Upper energy level ($E_k[\text{cm}^{-1}]$)	Stat. weights g_i g_k	Transition Probability ($A[10^8 \text{ s}^{-1}]$)	Unc.
Ni II					N I				
2510.9	53365	8 10	.94	D	5856.0	112565	4 2	.0076	C
2545.9	54263	6 8	.26	D	6606.2	109927	4 6	7.9 (-4)	C
Nitrogen					6622.5	109927	6 6	.0071	C
N I					6627.0	109857	2 4	.00197	C
1163.9	105144	6 6	.43	D	6636.9	109857	4 4	.0125	C
1164.0	105144	4 6	.032	D	6645.0	109927	8 6	.0311	C
1164.2	105120	6 4	.048	D	6646.5	109812	2 2	.0194	C
1164.3	105120	4 4	.43	D	6653.5	109857	6 4	.0244	C
1167.4	104881	6 8	1.1	D	6656.5	109812	4 2	.0193	C
1168.4	104810	6 6	.095	D	6926.7	109927	4 6	.0064	C
1168.5	104810	4 6	1.3	D	6945.2	109927	6 6	.0149	C
1169.7	104717	6 8	.030	D	6951.6	109857	2 4	.0088	C
1176.5	104222	6 4	.95	D	6960.5	109857	4 4	.00281	C
1176.6	104222	4 4	.11	D	6973.1	109812	2 2	.00350	C
1177.7	104145	4 2	1.3	D	6979.2	109857	6 4	.0094	C
1199.6	83365	4 6	5.5	D	6982.0	109812	4 2	.0174	C
1200.2	83318	4 4	5.3	D	7423.6	96751	2 4	.052	C
1200.7	83284	4 2	5.5	D	7442.3	96751	4 4	.106	C
1310.5	105144	4 6	1.3	D	7468.3	96751	6 4	.161	C
1316.3	104810	4 6	.025	D	N II				
1492.6	86221	6 4	5.3	D	474.89	210705	5 5	4.5	D
1492.8	86221	4 4	.58	D	475.65	210240	1 3	14.	D
1494.7	86137	4 2	5.0	D	475.70	210266	3 5	20.	D
4099.9	110521	2 4	.034	D	475.76	210240	3 3	11.	D
4110.0	110545	4 6	.040	D	475.80	210302	5 7	26.	D
4114.0	110521	4 4	.0068	D	475.88	210266	5 5	6.8	D
4137.6	107446	2 4	.0039	D	508.70	196712	5 5	2.8	D
4143.4	107446	4 4	.0078	D	510.76	211104	5 7	31.	D
4151.5	107446	6 4	.013	D	513.85	209926	5 5	6.8	D
4214.8	107037	4 6	.022	D	529.36	188909	1 3	6.5	D
4216.1	106996	2 4	.031	D	529.41	188937	3 1	20.	D
4218.9	106980	2 2	.012	D	529.49	188909	3 3	4.9	D
4222.1	106996	4 4	.0098	D	529.64	188857	3 5	4.9	D
4223.1	107037	6 6	.051	D	529.72	188909	5 3	8.1	D
4224.9	106980	4 2	.061	D	529.87	188857	5 5	15.	D
4230.5	106996	6 4	.033	D	533.51	187438	1 3	20.	D
4385.5	120566	2 2	.0052	C	533.58	187462	3 5	27.	D
4392.4	120566	4 2	.0102	C	533.65	187438	3 3	15.	D
4914.9	106478	2 2	.00759	B	533.73	187492	5 7	36.	D
4935.1	106478	4 2	.0158	B	533.82	187462	5 5	9.1	D
5169.6	107446	6 4	.00209	C	547.82	197859	5 3	5.2	D
5181.4	107446	4 4	.00144	C	559.76	211336	1 3	12.	D
5186.6	107446	2 4	7.3 (-4)	C	574.65	189335	5 7	35.	D
5199.8	112808	2 2	.023	D	582.16	187091	5 5	13.	D
5201.6	112801	2 4	.023	D	635.20	190120	1 3	18.	D
5281.2	107037	6 6	.00282	C	644.63	155127	1 3	12.	C
5292.7	106996	6 4	.00167	C	644.84	155127	3 3	35.	C
5293.5	107037	4 6	.00113	C	645.18	155127	5 3	58.	C
5309.4	106980	4 2	.00273	C	660.29	166766	5 3	40.	C
5310.5	106996	2 4	.00137	C	671.02	149077	3 5	2.9	D
5344.0	106814	6 6	6.2 (-4)	C	671.39	149077	5 5	8.9	D
5356.6	106814	4 6	.00189	C	671.41	148940	1 3	3.6	D
5367.0	106778	4 4	.00118	C	671.63	148940	3 3	2.7	D
5372.6	106778	2 4	.00107	C	671.77	148909	3 1	12.	D
5378.3	106759	2 2	.00210	C	672.00	148940	5 3	4.4	D
5816.5	112681	4 6	.00278	C	745.84	166766	1 3	10.	C
5829.5	112681	6 6	.0064	C	746.98	149188	5 3	40.	C
5834.6	112610	2 4	.00383	C	748.37	148940	5 3	2.0	D
5840.9	112610	4 4	.00122	C	775.97	144188	5 5	35.	C
5849.7	112565	2 2	.00152	C	915.61	109217	1 3	3.6	C
5854.0	112610	6 4	.00409	C	915.96	109224	3 1	11.	C

TABLE 1b. Transition probabilities for selected atomic and ionic species—Continued

Wavelength (λ [\AA])	Upper energy level (E_k [cm^{-1}])	Stat. weights g_i g_k	Transition Probability (A [10^8 s^{-1}])	Unc.	Wavelength (λ [\AA])	Upper energy level (E_k [cm^{-1}])	Stat. weights g_i g_k	Transition Probability (A [10^8 s^{-1}])	Unc.
N II					N III				
1084.0	92252	1 3	2.0	C	374.20	267238	2 4	101.	C
1085.5	92250	5 5	.90	C	451.87	221302	2 2	8.9	C
1085.7	92237	5 7	3.6	C	452.23	221302	4 2	17.8	C
2139.5	211336	3 3	.29	D	685.00	145986	2 4	9.3	C
3593.6	196712	3 5	.24	D	685.51	145876	2 2	37.1	C
3609.1	196592	3 3	.24	D	685.82	145986	4 4	46.8	C
3615.9	196540	3 1	.24	D	686.34	145876	4 2	19.0	C
3829.8	196712	3 5	.15	D	763.34	131004	2 2	9.6	C
3838.4	196712	5 5	.45	D	764.36	131004	4 2	18.7	C
3842.2	196592	1 3	.20	D	771.54	186797	2 4	8.2	C
3847.4	196592	3 3	.15	D	771.90	186797	4 4	16.5	C
3855.1	196540	3 1	.60	D	772.39	186797	6 4	24.7	C
3856.1	196592	5 3	.25	D	772.89	230409	6 4	20.3	C
3919.0	190120	3 3	1.00	C	772.98	230404	4 2	22.7	C
3995.0	174212	3 5	1.3	D	979.84	203089	4 4	8.9	C
4114.4	188909	3 3	.0019	D	979.92	203075	6 6	9.3	C
4447.0	187091	3 5	1.30	C	989.79	101031	2 4	4.15	C
4477.7	188909	5 3	.035	D	991.51	101031	4 4	.82	C
4507.6	188857	7 5	.038	D	991.58	101024	4 6	4.96	C
4601.5	170666	3 5	.270	C	1747.8	203089	2 4	1.31	C
4607.2	170608	1 3	.340	C	1751.2	203089	4 4	.258	C
4613.9	170608	3 3	.196	C	1751.7	203075	4 6	1.57	C
4621.4	170573	3 1	.90	C	4097.3	245701	2 4	.82	C
4630.5	170666	5 5	.84	C	4103.4	245665	2 2	.82	C
4643.1	170608	5 3	.466	C	4634.1	267238	2 4	.65	C
4774.2	187462	3 5	.054	C	4640.6	267244	4 6	.78	C
4779.7	187438	3 3	.269	C	4641.9	267238	4 4	.130	C
4781.2	187492	5 7	.040	C					
4788.1	187462	5 5	.248	C					
4793.7	187438	5 3	.089	C					
4803.3	187492	7 7	.313	C	247.20	404522	1 3	114.	C
4810.3	187462	7 5	.055	C	283.52	420053	9 15*	290.	C
4987.4	188937	3 1	.63	C	322.64	377285	9 3*	84.	C
4994.4	188909	3 3	.74	C	335.05	429160	3 5	185.	C
5001.1	186512	3 5	1.02	C	387.35	388855	3 1	28.	D
5001.5	186571	5 7	1.08	C	765.15	130694	1 3	24.0	B
5002.7	168892	1 3	.085	C	923.16	175669	9 9*	18.	B
5005.2	186652	7 9	1.22	C	955.34	235369	3 1	30.	C
5007.3	188857	3 5	.77	C	1718.6	188883	3 5	2.37	C
5010.6	168892	3 3	.268	C	3480.8	406005	3 9*	1.1	C
5025.7	186571	7 7	.134	C	4057.8	429160	3 5	.68	C
5040.7	186512	7 5	.0053	C	6380.8	404522	1 3	.14	B
5045.1	168892	5 3	.410	C	7116.7	420053	9 15*	.12	C
5452.1	188909	1 3	.14	D					
5454.2	188937	3 1	.41	D					
5462.6	188909	3 3	.10	D	209.29	477817	2 6*	118.	B
5478.1	188857	3 5	.10	D	247.66	484418	6 10*	430.	C
5480.1	188909	5 3	.17	D	1238.8	80722	2 4	3.41	B
5495.7	188857	5 5	.30	D	1242.8	80463	2 2	3.38	B
5666.6	166582	3 5	.423	C	4603.7	477842	2 4	.412	B
5676.0	166522	1 3	.310	C	4620.0	477766	2 2	.408	B
5679.6	166679	5 7	.56	C					
5686.2	166522	3 3	.231	C					
5710.8	166582	5 5	.137	C					
5927.8	187438	1 3	.315	C	24.898	4016390	1 3	5158.	AA
5931.8	187462	3 5	.425	C	28.787	3473840	1 3	180.9(+2)	AA
5940.2	187438	3 3	.235	C	161.22	4006180	3 9*	285.9	AA
5941.7	187492	5 7	.56	C	173.29	4016390	1 3	269.7	AA
5952.4	187462	5 5	.140	C	173.92	4013460	9 15*	876.	A
6482.1	164611	3 3	.37	D	185.19	4013820	3 5	824.	A
6610.6	189335	5 7	.59	D	1901.5	3438490	3 9*	.6777	AA
					2896.4	3473840	1 3	.2080	AA

TABLE 1b. Transition probabilities for selected atomic and ionic species—Continued

Wavelength (λ[Å])	Upper energy level ($E_k[\text{cm}^{-1}]$)	Stat. weights g_i g_k	Transition Probability ($A[10^8 \text{ s}^{-1}]$)	Unc.	Wavelength (λ[Å])	Upper energy level ($E_k[\text{cm}^{-1}]$)	Stat. weights g_i g_k	Transition Probability ($A[10^8 \text{ s}^{-1}]$)	Unc.
Oxygen					O II				
O I					4069.9	231350	4 6	1.49	C
1028.2	97488	1 3	.20	D	4072.2	231428	6 8	1.70	C
1152.2	102662	5 5	5.5	D	4075.9	231530	8 10	1.98	C
1217.6	115918	1 3	1.8	C	4085.1	231350	6 6	.478	C
1302.2	76795	5 3	3.3	C	4087.2	255756	4 6	2.24	C
1304.9	76795	3 3	2.0	C	4089.3	255978	10 12	2.62	C
1306.0	76795	1 3	.66	C	4095.6	255759	6 8	2.23	C
5435.2	105019	3 5	.0061	C	4097.2	255828	8 10	2.37	C
5435.8	105019	5 5	.0102	C	4104.7	232748	4 6	1.04	C
5436.9	105019	7 5	.0142	C	4105.0	232746	4 4	.80	C
6453.6	102117	3 5	.0142	B	4108.8	255759	8 8	.349	C
6454.4	102117	5 5	.0237	B	4119.2	232754	6 8	1.48	C
6456.0	102117	7 5	.0331	B	4120.3	232748	6 6	.443	C
6653.8	130943	3 1	.600	B	4132.8	232536	2 4	.84	C
7156.7	116631	5 5	.473	B	4153.3	232463	4 6	.77	C
7471.4	127292	5 3	.0114	B	4276.7	256123	6 8	1.82	C
7473.2	127288	5 5	.102	B	4277.4	256084	2 4	1.49	C
7476.4	127283	5 7	.408	B	4277.9	256123	8 8	.302	C
7477.2	127292	3 3	.170	B	4281.4	255813	6 6	.60	C
7479.1	127288	3 5	.306	B	4282.8	255913	4 4	1.06	C
7480.7	127292	1 3	.226	B	4283.0	256088	4 6	1.58	C
7771.9	86631	5 7	.340	B	4283.1	256088	6 6	.51	C
7774.2	86628	5 5	.340	B	4283.8	256084	4 4	.59	C
7775.4	86626	5 3	.340	B	4294.8	255813	4 6	1.39	C
7886.3	128595	3 5	.370	B	4303.8	255691	6 8	1.97	C
7939.5	113727	7 5	.00165	C	4328.6	255622	4 2	1.21	C
7943.2	113721	7 7	.0417	C	4340.4	255829	6 8	2.23	C
7947.2	113727	5 5	.058	C	4347.4	229968	4 4	.94	C
7947.6	113714	7 9	.373	C	4349.4	208484	6 6	.74	C
7950.8	113721	5 7	.331	C	4351.3	229947	6 6	.97	C
7952.2	113727	3 5	.313	C	4396.0	234454	6 6	.398	C
7981.9	101155	3 3	.12	D	4414.9	211713	4 6	1.15	C
7982.4	101155	1 3	.16	D	4417.0	211522	2 4	.95	C
7987.0	101148	3 5	.21	D	4443.1	251224	6 6	.57	C
7987.3	101148	5 5	.072	D	4448.2	251221	8 8	.57	C
7995.1	101135	5 7	.29	D	4489.5	255812	2 4	1.51	C
O II					4491.3	255690	4 6	1.81	C
429.92	232603	4 2	39.	D	4596.2	228723	4 6	1.03	C
430.04	232536	4 4	39.	D	4602.1	256126	4 6	1.70	C
430.18	232463	4 6	39.	D	4609.4	256143	6 8	1.82	C
483.75	233544	4 2	.84	D	4641.8	206878	4 6	.79	C
483.98	233430	6 4	.76	D	4661.6	206786	4 4	.52	C
484.03	233430	4 4	.084	D	4701.2	253792	4 4	.87	C
485.09	232959	6 8	25.	D	4703.2	251224	4 6	.82	C
485.47	232796	6 6	1.6	D	4705.4	232959	6 8	1.38	C
485.52	232796	4 6	23.	D	4871.6	253048	4 6	.435	C
3007.1	265999	8 10	.84	C	4906.9	232536	4 4	.68	C
3007.7	265985	6 8	.72	C	4924.6	232463	4 6	.67	C
3013.4	265639	6 8	.74	C	4941.1	234402	2 4	.83	C
3032.1	265930	8 10	.85	C	4943.1	234454	4 6	1.06	C
3032.5	265763	6 8	.82	C	5206.7	233430	4 4	.391	C
3134.8	238893	8 6	1.23	C	6627.6	248514	4 4	.089	C
3273.5	259286	8 6	1.14	C	6666.9	248425	4 2	.0349	C
3377.2	233544	2 2	1.88	C	6678.2	248514	2 4	.0173	C
3390.3	233430	2 4	1.86	C	6718.1	248425	2 2	.068	C
3407.4	259286	6 6	.75	C	6721.4	203942	4 2	.189	C
3749.5	212162	6 4	.90	C	6810.6	246029	6 8	.00180	C
3882.2	232754	8 8	.493	C	6844.1	245903	4 6	.00325	C
3912.0	232527	6 4	1.27	C	6847.0	246029	8 8	.0347	C
3919.3	232480	4 2	1.40	C	6869.7	245903	6 6	.059	C
3973.3	214229	4 4	1.27	C	6885.1	245816	4 4	.067	C
4069.6	231296	2 4	1.39	C	6895.3	246029	10 8	.298	C

TABLE 1b. Transition probabilities for selected atomic and ionic species—Continued

Wavelength (λ [Å])	Upper energy level (E_k [cm ⁻¹])	Stat. weights g_i g_k	Transition Probability (A [10 ⁸ s ⁻¹])	Unc.	Wavelength (λ [Å])	Upper energy level (E_k [cm ⁻¹])	Stat. weights g_i g_k	Transition Probability (A [10 ⁸ s ⁻¹])	Unc.
O II					O III				
6906.5	245903	8 6	.272	C	3405.7	329582	1 3	.27	D
6908.1	245768	4 2	.332	C	3408.1	329643	3 1	.81	D
6910.8	245816	6 4	.267	C	3415.3	329582	3 3	.20	D
O III					O IV				
262.88	380706	5 5	40.	D	238.36	419534	2 4	288.	C
263.69	379232	1 3	52.	D	238.57	419551	4 6	346.	C
263.73	379293	3 5	73.	D	238.58	419534	4 4	58.	C
263.77	379232	3 3	40.	D	279.63	357614	2 2	23.7	C
263.82	379356	5 7	96.	D	279.94	357614	4 2	47.7	C
263.86	379293	5 5	24.	D	279.94	357614	4 2	47.7	C
277.38	380782	5 7	110.	D	553.33	180724	2 4	12.0	C
279.79	377687	5 5	26.	D	554.08	180481	2 2	47.3	C
295.94	381086	1 3	48.	D	554.51	180724	4 4	60.	C
303.41	329582	1 3	34.	D	555.26	180481	4 2	25.0	C
303.46	329643	3 1	100.	D	608.40	164366	2 2	12.5	C
303.52	329582	3 3	26.	D	609.83	164366	4 2	23.6	C
303.62	329468	3 5	25.	D	616.95	289024	6 4	25.5	C
303.69	329582	5 3	42.	D	617.01	289024	4 4	2.93	C
303.80	329468	5 5	76.	D	617.04	289015	4 2	28.6	C
305.60	327228	1 3	100.	D	624.62	231538	2 4	10.7	C
305.66	327277	3 5	140.	D	625.13	231538	4 4	21.5	C
305.70	327228	3 3	76.	D	625.85	231538	6 4	32.2	C
305.77	327351	5 7	180.	D	779.73	255185	6 4	1.53	C
305.84	327277	5 5	46.	D	779.82	255185	4 4	13.1	C
320.98	331820	5 7	190.	D	779.91	255156	6 6	13.7	C
328.45	324734	5 5	61.	D	780.00	255156	4 6	1.0	C
345.31	332777	1 3	99.	D	787.71	126950	2 4	5.9	C
374.08	267633	5 5	26.	D	790.11	126950	4 4	1.15	C
395.56	273080	5 3	49.	D	790.20	126936	4 6	7.1	C
507.39	197087	1 3	16.	C	921.30	289024	2 4	2.11	C
507.68	197087	3 3	47.	C	921.37	289015	2 2	9.2	C
508.18	197087	5 3	79.	C	923.37	289024	4 4	11.4	C
525.80	210459	5 3	88.	C	923.43	289015	4 2	4.48	C
597.82	210459	1 3	18.	C	1338.6	255185	2 4	2.22	C
599.60	187049	5 5	55.	C	1343.0	255185	4 4	.428	C
702.33	142383	1 3	5.7	C	1343.5	255156	4 6	2.64	C
702.82	142397	3 1	17.	C	O V				
832.93	120059	1 3	3.2	C	172.17	580825	1 3	296.	B
835.10	120053	5 5	1.4	C	192.85	600766	9 15*	690.	B
835.29	120025	5 7	5.7	C	215.17	546973	9 3*	170.	C
1109.5	381086	3 3	2.8	D	220.35	612616	3 5	440.	C
1679.1	357111	3 5	.94	D	248.46	561276	3 1	65.	D
1686.9	356838	3 3	.94	D	629.73	158798	1 3	28.0	B
1760.4	357111	3 5	.60	D	758.68	213887	3 5	5.68	B
1764.5	357111	5 5	1.8	D	759.44	213618	1 3	7.55	B
1766.3	356838	1 3	.78	D	760.23	213618	3 3	5.64	B
1772.3	356732	3 1	2.3	D	760.45	213887	5 5	16.9	B
1773.0	356838	5 3	.98	D	761.13	213463	3 1	22.5	B
2390.4	332777	3 3	2.2	D	762.00	213618	5 3	9.34	B
2959.7	324734	3 5	2.1	D	774.52	287910	3 1	35.4	C
2996.5	327228	3 3	.51	D					
3004.4	327277	5 5	.47	D					
3017.6	327351	7 7	.59	D					
3115.7	329643	3 1	1.5	D					
3121.7	329582	3 3	1.5	D					
3132.9	329468	3 5	1.4	D					
3261.0	324658	5 7	1.8	D					
3265.5	324836	7 9	2.1	D					
3267.3	324462	3 5	1.7	D					
3281.9	324462	5 5	.32	D					
3284.6	324658	7 7	.23	D					

TABLE 1b. Transition probabilities for selected atomic and ionic species—Continued

Wavelength (λ [Å])	Upper energy level (E_k [cm ⁻¹])	Stat. weights g_i g_k	Transition Probability (A [10 ⁸ s ⁻¹])	Unc.	Wavelength (λ [Å])	Upper energy level (E_k [cm ⁻¹])	Stat. weights g_i g_k	Transition Probability (A [10 ⁸ s ⁻¹])	Unc.
O V					P III				
1371.3	231721	3 5	3.29	C	1334.8	74917	2 4	.55	D
2784.0	582882	3 9*	1.6	D	1344.3	74946	4 6	.64	D
3144.7	612616	3 5	.93	C	1344.8	74917	4 4	.11	D
5114.1	580825	1 3	.17	B	4057.4	141514	4 4	.10	D
5589.9	600766	9 15*	.15	C	4059.3	141514	6 4	.90	D
					4080.1	141377	4 2	.99	D
O VI					Potassium				
150.10	666218	2 6*	254.	B	K I				
173.03	674656	6 10*	885.	B	4044.1	24720	2 4	.0124	C
1031.9	96908	2 4	4.15	B	4047.2	24701	2 2	.0124	C
1037.6	96375	2 2	4.08	B	5084.2	32648	2 2	.00350	C
3811.4	666270	2 4	.513	B	5099.2	32648	4 2	.0070	C
3834.2	666113	2 2	.505	B	5323.3	31765	2 2	.0063	C
O VII					K II				
18.627	5368550	1 3	9362.	AA	5339.7	31765	4 2	.0126	C
21.602	4629200	1 3	330.9(+2)	AA	5343.0	31696	2 4	.0040	D
120.33	5355670	3 9*	533.5	AA	5359.6	31696	4 6	.0046	D
128.20	5368550	1 3	505.3	AA	5782.4	30274	2 2	.0123	C
128.46	5364420	9 15*	1620.	A	5801.8	30274	4 2	.0246	C
135.82	5365470	3 5	1530.	A	5812.2	30186	2 4	.0028	D
1630.2	4585980	3 9*	.7935	AA	5831.9	30185	4 6	.0032	D
2450.0	4629200	1 3	.2514	AA	6911.1	27451	2 2	.0272	C
Phosphorus					K III				
P I					607.93	164496	1 3	.013	D
1671.7	59820	4 2	.39	D	K XVI				
1674.6	59716	4 4	.40	D	206.27	484800	1 3	94.	C
1679.7	59535	4 6	.39	D	K XVII				
1775.0	56340	4 6	2.17	C	22.020	4814800	2 4	4.7 (+4)	C
1782.9	56090	4 4	2.14	C	22.163	4818000	4 6	5.6 (+4)	C
1787.7	55939	4 2	2.13	C	22.18	4814800	4 4	9300.	C
2135.5	58174	4 4	.211	C	22.60	4699000	2 2	2500.	D
2136.2	58174	6 4	2.83	C	22.76	4699000	4 2	4700.	C
2149.1	57877	4 2	3.18	C	Praseodymium				
2152.9	65156	2 4	.485	C	Pr II				
2154.1	65156	4 4	.173	C	3997.0	28010	15 15	.187	C
2154.1	65157	4 6	.58	C	4062.8	28010	13 15	1.00	C
2534.0	58174	2 4	.200	C	4100.7	28816	17 19	.84	C
2535.6	58174	4 4	.95	C	4143.1	27128	15 17	.58	C
2553.3	57877	2 2	.71	C	4179.4	25569	13 15	.52	C
2554.9	57877	4 2	.300	C	4222.9	24116	11 13	.391	C
P II					4241.0	28010	17 15	.230	C
1301.9	76813	1 3	.50	C	4359.8	28010	15 15	.11	D
1304.5	76824	3 1	1.5	C	4405.8	27128	17 17	.090	D
1304.7	76813	3 3	.37	C	4429.3	25569	15 15	.228	C
1305.5	76765	3 5	.38	C	4449.8	24116	13 13	.124	C
1309.9	76813	5 3	.62	C	4468.7	24116	11 13	.154	C
1310.7	76765	5 5	1.1	C	4510.2	25569	13 15	.116	C
4475.3	127889	5 7	1.3	D					
4499.2	130143	5 7	1.4	D					
4530.8	127368	3 5	1.0	D					
4554.8	127951	3 5	.96	D					
4588.0	125130	5 7	1.7	D					
4589.9	124948	3 5	1.6	D					
4602.1	125392	7 9	1.9	D					
4943.5	123892	7 5	.63	D					
5253.5	107924	3 5	1.0	D					
5425.9	105550	5 5	.69	D					
6024.2	103340	3 5	.51	D					
6043.1	103669	5 7	.68	D					

TABLE 1b. Transition probabilities for selected atomic and ionic species—Continued

Wavelength ($\lambda[\text{\AA}]$)	Upper energy level ($E_k[\text{cm}^{-1}]$)	Stat. weights $g_i \quad g_k$	Transition Probability ($A[10^8 \text{ s}^{-1}]$)	Unc.	Wavelength ($\lambda[\text{\AA}]$)	Upper energy level ($E_k[\text{cm}^{-1}]$)	Stat. weights $g_i \quad g_k$	Transition Probability ($A[10^8 \text{ s}^{-1}]$)	Unc.
Pr II					Sc I				
4534.2	27128	15 17	.049	D	4020.4	24866	4 4	1.65	C
4734.2	24116	15 13	.025	D	4023.7	25014	6 6	1.44	C
4879.1	25569	15 15	.018	D	4753.2	21033	4 6	.010	C
4886.0	25569	15 15	.013	D	4779.4	21086	6 8	.0084	C
4912.6	28010	17 15	.057	D	4791.5	21033	6 6	.0023	C
5034.4	28816	19 19	.11	D	5301.9	18856	4 4	.0013	C
5110.8	28816	21 19	.278	C	5343.0	18711	4 2	.0051	C
5135.1	27128	17 17	.125	C	5349.7	18856	6 4	.0040	C
5173.9	27128	19 17	.318	C	6210.7	16097	4 4	.012	C
5219.1	25569	15 15	.095	D	6239.8	16022	4 4	.0065	C
5220.1	25569	17 15	.235	C	6305.7	16023	6 6	.015	C
5251.7	24116	15 13	.011	D	6378.8	15673	4 4	.0016	C
5259.7	24116	15 13	.224	C	6448.1	15673	6 4	2.6 (-4)	C
5292.6	24116	13 13	.093	D	Sc II				
5810.6	28816	17 19	.023	D	2273.1	55716	1 3	7.7	D
5879.3	28010	15 15	.076	D	3353.7	32350	5 7	2.0	D
6200.8	27128	15 17	.018	D	3372.2	29824	7 5	1.2	D
6278.7	25569	13 15	.026	D	3535.7	30816	5 3	.83	D
6398.0	24116	11 13	.019	D	3572.5	28161	7 7	1.8	D
Rubidium					3576.4	28021	5 5	1.4	D
Rb I					3613.8	27841	7 9	1.9	D
3022.5	33076	2 4	4.13(-5)	C	3630.8	27602	5 7	1.6	D
3032.0	32972	2 4	4.93(-5)	C	3642.8	27444	3 5	1.5	D
3044.2	32840	2 4	8.2 (-5)	C	4246.8	26081	5 5	1.5	D
3060.2	32668	2 4	1.05(-4)	C	4314.1	28161	9 7	.41	D
3082.0	32437	2 4	1.49(-4)	C	4374.5	27841	9 9	.14	D
3112.6	32119	2 4	2.5 (-4)	C	4670.4	32350	5 7	.18	D
3113.1	32114	2 2	1.3 (-4)	C	5031.0	30816	5 3	.49	D
3157.5	31661	2 4	3.38(-4)	C	5239.8	30816	1 3	.14	D
3158.3	31654	2 2	2.0 (-4)	C	5526.8	32350	9 7	.42	D
3228.0	30970	2 4	6.4 (-4)	C	5657.9	29824	5 5	.13	D
3229.2	30959	2 2	3.8 (-4)	C	Silicon				
3348.7	29854	2 4	.00137	C	Si I				
3350.8	29835	2 2	8.9 (-4)	C	1977.6	50566	1 3	.18	D
3587.1	27870	2 4	.00397	C	1979.2	50602	3 1	.51	D
3591.6	27835	2 2	.0029	C	1980.6	50566	3 3	.13	D
4201.8	23793	2 4	.018	C	1983.2	50500	3 5	.14	D
4215.5	23715	2 2	.015	C	1986.4	50566	5 3	.21	D
7800.3	12817	2 4	.370	B	1989.0	50500	5 5	.41	D
7947.6	12579	2 2	.340	B	2208.0	45276	1 3	.311	C
Scandium					2210.9	45294	3 5	.416	C
Sc I					2211.7	45276	3 3	.232	C
2113.5	47315	4 6	.032	C	2216.7	45322	5 7	.55	C
2263.0	44189	4 4	.058	C	2218.1	45294	5 5	.138	C
2267.3	44105	4 2	.48	C	2506.9	39955	3 5	.466	C
2271.6	44189	6 4	.46	C	2514.3	39760	1 3	.61	C
2335.4	42819	4 2	.17	C	2516.1	39955	5 5	1.21	C
2346.8	42780	6 4	.13	C	2519.2	39760	3 3	.456	C
2439.4	41163	6 6	.21	C	2524.1	39683	3 1	1.81	C
2439.9	41153	6 4	.022	C	2528.5	39760	5 3	.77	C
2711.4	37040	6 6	.29	C	2532.4	54871	1 3	.26	D
2739.8	36666	6 6	.0056	C	2631.3	53387	1 3	.97	D
2974.0	33615	4 4	.45	C	2881.6	40992	5 3	1.89	C
2980.8	33707	6 6	.44	C	3905.5	40992	1 3	.118	C
3015.4	33154	4 6	.66	C	4738.8	60857	3 3	.010	D
3019.3	33278	6 8	.81	C	4783.0	60857	5 3	.017	D
3269.9	30573	4 2	3.1	C	4792.3	60816	5 5	.017	D
3273.6	30707	6 4	2.7	C	4818.1	60705	5 7	.011	D
3907.5	25585	4 6	1.28	C	4821.2	60496	3 5	.0080	D
3911.8	25725	6 8	1.37	C	4947.6	61198	3 1	.042	D

TABLE 1b. Transition probabilities for selected atomic and ionic species—Continued

Wavelength (λ[Å])	Upper energy level ($E_k[\text{cm}^{-1}]$)	Stat. weights g_i g_k	Transition Probability ($A[10^8 \text{ s}^{-1}]$)	Unc.	Wavelength (λ[Å])	Upper energy level ($E_k[\text{cm}^{-1}]$)	Stat. weights g_i g_k	Transition Probability ($A[10^8 \text{ s}^{-1}]$)	Unc.
Si I					Si III				
5006.1	60962	3 5	.028	D	1328.8	228700	1 3	27.	D
5622.2	57542	3 3	.016	D	1417.2	153444	3 1	26.0	C
5690.4	57329	3 3	.012	D	1435.8	235414	5 7	21.	D
5708.4	57468	5 5	.014	D	1589.0	228700	5 3	11.	D
5754.2	57329	5 3	.015	D	1778.7	199164	7 9	4.4	D
5772.1	58312	3 1	.036	D	1783.1	199026	5 7	3.8	D
5948.5	57798	3 5	.022	D	3241.6	206176	5 3	2.3	D
7226.2	59111	3 5	.0079	D	3486.9	230270	15 21*	1.8	D
7405.8	58775	3 5	.037	D	3590.5	204331	3 5	3.9	D
7409.1	58787	5 7	.023	D	4552.6	175336	3 5	1.26	C
7680.3	60301	3 5	.046	D	4554.0	248773	5 3	.76	D
7918.4	60645	3 5	.052	D	4567.8	175263	3 3	1.25	C
7932.3	60705	5 7	.051	D	4683.0	248168	5 5	.95	D
7944.0	60849	7 9	.058	D	4716.7	225526	5 7	2.8	D
7970.3	60645	5 5	.0071	D	5451.5	244866	3 5	.60	D
Si II					Si IV				
989.87	101023	2 4	6.7	D	5473.1	245087	5 7	.79	D
992.68	101025	4 6	8.0	D	5716.3	227089	9 7	.19	D
1020.7	97972	2 2	1.3	D	5739.7	176487	1 3	.47	D
1190.4	84005	2 4	6.9	D	7462.6	214995	5 3	.49	D
1193.3	83802	2 2	28.	D	7466.3	214989	7 5	.54	D
1194.5	84005	4 4	36.	D	7612.4	227665	3 5	1.1	D
1197.4	83802	4 2	14.	D	Si IV				
1248.4	123034	4 4	13.	D	457.82	218429	2 4	3.6	D
1251.2	123034	6 4	19.	D	458.16	218267	2 2	3.6	D
1260.4	79339	2 4	20.	D	515.12	265418	2 2	4.1	D
1264.7	79355	4 6	23.	D	516.35	265418	4 2	8.2	D
1304.4	76666	2 2	3.6	D	560.50	250008	6 10*	1.0	D
1309.3	76666	4 2	7.0	D	749.94	293719	10 14*	14.5	C
1526.7	65501	2 2	3.73	C	815.05	193979	2 2	12.3	C
1533.5	65501	4 2	7.4	C	818.13	193979	4 2	24.4	C
1808.0	55310	2 4	.037	D	860.74	276554	10 6*	1.8	D
2904.3	113761	4 6	.67	D	1066.6	254128	10 14*	39.1	C
2905.7	113760	6 8	.71	D	1122.5	160376	2 4	20.5	C
3210.0	112395	4 6	.46	D	1128.3	160376	4 4	4.03	C
4128.1	103556	4 6	1.32	C	1128.3	160374	4 6	24.2	C
4130.9	103556	6 8	1.42	C	1393.8	71749	2 4	7.73	B
5041.0	101023	2 4	.98	D	1402.8	71288	2 2	7.58	B
5056.0	101025	4 6	1.2	D	1724.1	218375	10 6*	5.5	C
5957.6	97972	2 2	.42	D	Si V				
5978.9	97972	4 2	.81	D	96.439	1036915	1 3	480.	D
6347.1	81252	2 4	.70	C	97.143	1029407	1 3	2000.	D
6371.4	81192	2 2	.69	C	117.86	848511	1 3	300.	D
7848.8	113761	4 6	.39	D	Si VI				
7849.7	113760	6 8	.42	D	246.00	406497	4 2	170.	C
Si III					Si VII				
883.40	235414	5 7	63.	D	249.12	406497	2 2	85.	C
994.79	153377	3 3	7.89	B	Si VII				
997.39	153377	5 3	13.1	B	217.83	506080	5 3	430.	D
1141.6	217440	3 5	30.	D	272.64	366780	5 3	51.	C
1144.3	217489	5 7	39.	D	274.18	368760	3 1	120.	C
1161.6	216190	5 5	16.	D	275.35	363170	5 5	89.	C
1206.5	82884	1 3	25.9	B	275.67	366780	3 3	30.	C
1206.5	165765	3 5	48.9	B	276.84	366780	1 3	39.	C
1207.5	205029	5 5	19.	D	278.45	363170	3 5	29.	C
1294.5	130101	3 5	5.42	B	Si VIII				
1296.7	129842	1 3	7.19	B	214.76	534810	4 2	410.	D
1298.9	129842	3 3	5.36	B	216.92	530420	6 4	360.	D
1299.0	130101	5 5	16.1	B	232.86	534810	2 2	80.	D
1301.2	129708	3 1	21.3	B	235.56	530420	4 4	97.	D
1303.3	129842	5 3	8.85	B	250.45	504630	2 2	77.	D

TABLE 1b. Transition probabilities for selected atomic and ionic species—Continued

Wavelength (λ [Å])	Upper energy level (E_k [cm ⁻¹])	Stat. weights g_i g_k	Transition Probability (A [10 ⁸ s ⁻¹])	Unc.	Wavelength (λ [Å])	Upper energy level (E_k [cm ⁻¹])	Stat. weights g_i g_k	Transition Probability (A [10 ⁸ s ⁻¹])	Unc.
Si VIII					Sodium				
250.79	504630	4 2	160.	D	Na I				
314.31	318160	4 2	52.	D	3302.4	30273	2 4	.0281	C
316.20	316250	4 4	50.	D	3303.0	30267	2 2	.0281	C
319.83	312670	4 6	49.	D	4390.0	39729	2 4	.0077	D
Si IX					4393.3	39729	4 4	.0016	D
223.73	446967	1 3	42.	C	4393.3	39729	4 6	.0092	D
225.03	446967	3 3	120.	C	4494.2	39201	2 4	.012	C
227.01	446967	5 3	200.	C	4497.7	39201	4 6	.014	C
227.30	492890	5 3	230.	D	4497.7	39201	4 4	.0024	D
258.10	440390	5 5	104.	C	4664.8	38387	2 4	.0233	C
294.37	344100	9 9*	59.	C	4668.6	38387	4 4	.0041	D
347.36	292301	9 15*	22.	C	4668.6	38387	4 6	.025	C
Si X					4747.9	38012	2 2	.0063	D
253.77	394040	2 4	29.	C	4751.8	38012	4 2	.0127	C
256.57	390050	2 2	110.	C	4978.5	37037	2 4	.041	C
258.35	394040	4 4	140.	C	4982.8	37037	4 4	.0082	D
261.05	390050	4 2	54.	C	4982.8	37037	4 6	.0489	C
272.00	367670	2 2	30.	C	5148.8	36373	2 2	.0117	C
277.26	367670	4 2	57.	C	5153.4	36373	4 2	.0233	C
287.08	510300	2 4	26.	C	5682.6	34549	2 4	.103	C
289.19	510300	4 4	50.	C	5688.2	34549	4 6	.12	C
292.22	510300	6 4	73.	C	5688.2	34549	4 4	.021	D
347.73	575450	10 10*	43.	D	5890.0	16973	2 4	.622	A
353.09	287870	6 10*	21.	C	5895.9	16956	2 2	.618	A
Si XI					6154.2	33201	2 2	.026	C
43.763	2285040	1 3	6110.	B	6160.8	33201	4 2	.052	C
49.116	2210220	9 3*	2450.	C	8183.3	29173	2 4	.453	C
49.222	2361010	3 5	8900.	C	8194.8	29173	4 6	.54	C
52.296	2241590	3 1	760.	C	8194.8	29173	4 4	.090	D
303.30	329690	1 3	64.2	B	11381.	25740	2 2	.089	C
358.29	608790	3 1	103.	C	11404.	25740	4 2	.176	C
358.63	451000	3 5	13.8	C	Na II				
361.41	446510	1 3	18.0	C	300.15	333163	1 3	30.	D
364.50	446510	3 3	13.2	C	301.44	331745	1 3	49.	D
365.42	451000	5 5	39.0	C	372.08	268763	1 3	34.	D
368.28	443690	3 1	51.	C	Na III				
371.48	446510	5 3	20.7	C	378.14	264455	4 2	77.	C
604.14	495210	3 5	11.2	C	380.10	264455	2 2	37.	C
2300.8	2285040	1 3	.434	C	1991.0	465399	4 6	8.3	D
Si XII					2004.2	466788	2 4	4.6	D
40.924	2443500	2 6*	4420.	B	2011.9	463971	6 8	8.4	D
44.118	2464130	6 10*	1.4 (+4)	B	2151.5	465018	2 4	4.4	D
499.43	200290	2 4	9.56	B	2174.5	464390	4 6	5.3	D
520.72	191900	2 2	8.47	B	2230.3	410977	6 8	3.7	D
1862.	2444300	2 4	1.15	B	2232.2	418418	4 4	3.3	D
1949.	2441900	2 2	1.0	B	2246.7	411536	4 6	2.4	D
4620.	2463540	2 4	.046	C	2459.3	414282	4 6	3.0	D
4942.	2464530	4 6	.045	C	2468.9	415172	2 4	2.4	D
Silver					2497.0	406190	6 6	1.7	D
Ag I					Na V				
2061.2	48501	2 4	.031	D	307.89	372400	10 6*	200.	C
2069.9	48297	2 2	.015	D	333.46	372400	6 6*	56.	C
3280.7	30473	2 4	1.4	B	369.01	568100	10 6*	120.	D
3382.9	29552	2 2	1.3	B	400.72	297100	10 10*	50.	C
5209.1	48744	2 4	.75	D	445.14	297100	6 10*	7.1	C
5465.5	48764	4 6	.86	D	459.90	217440	4 2	23.	D
5471.6	48744	4 4	.14	D	461.05	216896	4 4	23.	D
					463.26	215860	4 6	22.	D
					510.10	569200	2 2	56.	D
					511.19	567600	4 4	68.	D

TABLE 1b. Transition probabilities for selected atomic and ionic species—Continued

Wavelength ($\lambda[\text{\AA}]$)	Upper energy level ($E_k[\text{cm}^{-1}]$)	Stat. weights g_i g_k	Transition Probability ($A[10^8 \text{ s}^{-1}]$)	Unc.	Wavelength ($\lambda[\text{\AA}]$)	Upper energy level ($E_k[\text{cm}^{-1}]$)	Stat. weights g_i g_k	Transition Probability ($A[10^8 \text{ s}^{-1}]$)	Unc.
Na VI					Sr I				
313.75	320589	5 3	130.	C	2428.1	41172	1 3	.17	C
361.25	312175	5 5	77.	C	2569.5	38907	1 3	.053	C
416.53	241341	9 9*	37.	C	2931.8	34098	1 3	.019	C
492.80	204187	9 15*	13.	C	4607.3	21698	1 3	2.01	B
1550.6	873287	5 5	4.35	C	Sr II				
1567.8	872577	5 3	2.68	C	2018.7	73237	2 2	.12	D
1608.5	934745	3 1	2.6	C	2051.9	73237	4 2	.24	D
1649.4	933915	5 5	2.05	C	2282.0	67523	2 4	.83	D
1741.5	929999	3 5	2.59	C	2322.4	67563	4 6	.91	D
1747.5	930510	5 7	3.1	C	2324.5	67523	4 4	.15	D
Na VII					2423.5	64964	2 2	.24	D
94.409	1060651	6 10*	2700.	C	2471.6	64964	4 2	.48	D
105.27	951347	6 2*	450.	C	3464.5	53373	4 6	3.1	D
353.29	285189	4 4	100.	C	3474.9	53286	4 4	.51	D
381.30	264400	4 2	40.	C	4077.7	24517	2 4	1.42	C
397.49	367500	4 4	35.	C	4161.8	47737	2 2	.65	D
399.18	367500	6 4	52.	C	4215.5	23715	2 2	1.27	C
483.28	412345	10 10*	29.	C	4305.5	47737	4 2	1.4	D
486.74	205448	2 4	11.	C	4414.8	78702	4 6	.11	D
491.95	205412	4 6	13.	C	4417.5	78689	4 4	.018	D
555.80	465111	4 4	23.	D	4585.9	77858	4 2	.070	D
777.83	412311	4 6	6.8	D	5303.1	74621	2 4	.19	D
Na VIII					5379.1	74643	4 6	.22	D
83.34	1327500	9 15*	3940.	C	5385.5	74621	4 4	.037	D
89.88	1240300	9 3*	809.	C	5723.7	73237	2 2	.071	D
90.536	1347756	3 5	2860.	C	5819.0	73237	4 2	.14	D
411.15	243223	1 3	44.2	C	8688.9	67563	4 6	.55	D
1239.4	1432991	3 3	3.02	C	8719.6	67523	4 4	.097	D
1802.7	1481521	3 1	2.70	C	Sulfur				
1867.7	1347756	3 5	2.01	C	S I				
2059.1	1474598	3 5	1.80	C	1295.7	77181	5 5	4.9	D
2558.2	1513677	5 3	.0226	C	1296.2	77150	5 3	2.7	D
2772.0	1469055	3 5	.419	C	1302.3	77181	3 5	1.8	D
3021.0	1507690	5 7	.490	C	1302.9	77150	3 3	1.6	D
3108.9	1513677	1 3	.258	C	1303.1	77136	3 1	6.6	D
3182.3	1294214	1 3	.292	C	1303.4	76721	5 3	1.9	D
Na IX					1305.9	77150	1 3	2.4	D
70.615	1416130	2 4	1350.	B	1401.5	71351	5 3	.91	D
70.653	1415368	2 2	1350.	B	1409.3	71351	3 3	.50	D
77.764	1429980	2 4	3600.	B	1412.9	71351	1 3	.16	D
77.911	1430204	4 6	4300.	B	1425.0	70174	5 7	4.5	D
681.72	146688	2 4	6.63	B	1425.2	70166	5 5	1.2	D
694.17	144038	2 2	6.30	B	1433.3	70166	3 5	3.3	D
2487.7	1416130	2 4	.832	B	1433.3	70165	3 3	1.9	D
2535.8	1415368	2 2	.789	B	1437.0	70165	1 3	2.4	D
6841.8	1429980	2 4	.0259	C	1448.2	78288	5 3	7.3	D
7103.4	1430204	4 6	.0278	C	1473.0	67890	5 7	.42	D
Strontium					1474.0	67843	5 7	1.6	D
Sr I					1474.4	67825	5 5	.50	D
2206.2	45312	1 3	.0066	C	1474.6	67816	5 3	.062	D
2211.3	45208	1 3	.0085	C	1481.7	67888	3 5	.17	D
2217.8	45075	1 3	.012	C	1483.0	67825	3 5	1.2	D
2226.3	44904	1 3	.016	C	1483.2	67816	3 3	.75	D
2237.7	44676	1 3	.023	C	1487.2	67816	1 3	.87	D
2253.3	44366	1 3	.037	C	1666.7	69238	5 5	6.3	C
2275.3	43937	1 3	.067	C	1687.5	81438	1 3	.94	D
2307.3	43328	1 3	.12	C	1782.3	78288	1 3	1.9	D
2354.3	42462	1 3	.18	C	1807.3	55331	5 3	3.8	C
					1820.3	55331	3 3	2.2	C
					1826.2	55331	1 3	.72	C

TABLE 1b. Transition probabilities for selected atomic and ionic species—Continued

Wavelength (λ [Å])	Upper energy level (E_k [cm ⁻¹])	Stat. weights g_i g_k	Transition Probability (A [10 ⁸ s ⁻¹])	Unc.	Wavelength (λ [Å])	Upper energy level (E_k [cm ⁻¹])	Stat. weights g_i g_k	Transition Probability (A [10 ⁸ s ⁻¹])	Unc.
S I					S II				
4694.1	73921	5 7	.0067	D	5647.0	130641	2 4	.57	D
4695.4	73915	5 5	.0067	D	5659.9	127976	6 4	.46	D
4696.2	73911	5 3	.0065	D	5664.7	127825	4 2	.58	D
6403.6	79058	3 5	.0057	D	5819.2	130641	4 4	.085	D
6408.1	79058	5 5	.0095	D	6305.5	130134	8 6	.18	D
6415.5	79058	7 5	.013	D	6312.7	130641	6 4	.30	D
6751.2	78271	15 25*	.079	D	S III				
7679.6	76464	3 5	.012	D	2496.2	210698	7 5	2.5	D
7686.1	76464	5 5	.020	D	2508.2	209926	5 3	2.3	D
7696.7	76464	7 5	.028	D	2636.9	210698	3 5	.45	D
S II					2665.4	210698	5 5	1.4	D
1124.4	113461	2 4	1.0	D	2680.5	209926	1 3	.62	D
1125.0	113461	4 4	4.6	D	2691.8	209926	3 3	.46	D
1131.0	112937	2 2	3.5	D	2702.8	209773	3 1	1.9	D
1131.6	112937	4 2	1.4	D	2718.9	206539	3 3	1.2	D
1250.5	79968	4 2	.46	C	2721.4	209926	5 3	.77	D
1253.8	79758	4 4	.42	C	2726.8	210698	3 5	.60	D
1259.5	79395	4 6	.34	C	2731.1	206672	5 5	1.1	D
4463.6	150996	8 6	.53	D	2756.9	206911	7 7	1.4	D
4483.4	150531	6 4	.31	D	2785.5	209926	3 3	.61	D
4486.7	150258	4 2	.66	D	2856.0	205071	5 7	5.1	D
4524.7	143623	4 4	.093	D	2863.5	205561	7 9	5.7	D
4525.0	143623	6 4	1.2	D	2872.0	204579	3 5	4.7	D
4552.4	143489	4 2	1.2	D	2950.2	206672	3 5	3.0	D
4656.7	131029	2 4	.09	D	2964.8	206911	5 7	4.0	D
4716.2	131029	4 4	.29	D	3662.0	174036	3 3	.64	D
4815.5	131029	6 4	.88	D	3717.8	174036	5 3	1.0	D
4885.6	133400	2 4	.17	D	3778.9	173192	3 5	.44	D
4917.2	133269	2 2	.66	D	3831.8	172786	1 3	.56	D
4924.1	130134	4 6	.22	D	3837.8	172786	3 3	.42	D
4925.3	129858	2 4	.24	D	3838.3	173192	5 5	1.3	D
4942.5	129788	2 2	.15	D	3860.6	172631	3 1	1.6	D
4991.9	129858	4 4	.15	D	3899.1	172786	5 3	.67	D
5009.5	129788	4 2	.70	D	4253.6	170649	5 7	1.2	D
5014.0	133400	4 4	.84	D	4285.0	170067	3 5	.90	D
5027.2	125485	4 2	.26	D	S IV				
5032.4	130134	6 6	.81	D	551.17	181432	2 2	20.6	C
5047.3	133269	4 2	.36	D	554.07	181432	4 2	40.8	C
5103.3	129858	6 4	.50	D	3097.5	213717	2 4	2.6	D
5142.3	125485	2 2	.19	D	3117.7	213507	2 2	2.5	D
5201.0	140750	4 4	.75	D	S V				
5201.3	140750	6 4	.065	D	437.37	311700	1 3	11.2	C
5212.6	140709	4 6	.098	D	438.19	311700	3 3	33.3	C
5212.6	140709	6 6	.85	D	439.65	311700	5 3	55.	C
5320.7	140319	6 8	.92	D	661.52	235000	9 15*	64.4	B
5345.7	140230	4 6	.88	D	679.01	348100	9 15*	86.	D
5345.7	140230	6 6	.11	D	690.75	345600	9 9*	50.	D
5428.6	127976	2 4	.42	D	786.48	127149	1 3	52.5	B
5432.8	128233	4 6	.68	D	854.85	200800	9 9*	41.8	C
5453.8	128599	6 8	.85	D	S VI				
5473.6	127825	2 2	.73	D	248.99	401621	2 4	31.	C
5509.7	127976	4 4	.40	D	249.27	401164	2 2	31.	C
5526.2	128599	8 8	.081	D	388.94	362983	2 2	45.	C
5536.8	128233	4 6	.066	D	390.86	362983	4 2	88.	C
5556.0	127825	4 2	.11	D	706.48	247420	2 4	41.7	C
5564.9	128233	6 6	.17	D	712.68	247452	4 6	48.5	C
5578.8	128233	6 6	.11	D	712.84	247420	4 4	8.1	D
5606.1	128599	10 8	.54	D	933.38	107137	2 4	17.	C
5616.6	127976	4 4	.12	D	944.52	105874	2 2	16.	C
5640.0	131187	4 6	.66	D					
5645.6	127976	6 4	.018	D					

TABLE 1b. Transition probabilities for selected atomic and ionic species—Continued

Wavelength ($\lambda[\text{Å}]$)	Upper energy level ($E_u[\text{cm}^{-1}]$)	Stat. weights g_i g_k	Transition Probability ($A[10^8 \text{ s}^{-1}]$)	Unc.	Wavelength ($\lambda[\text{Å}]$)	Upper energy level ($E_u[\text{cm}^{-1}]$)	Stat. weights g_i g_k	Transition Probability ($A[10^8 \text{ s}^{-1}]$)	Unc.
S VII					Tl I				
60.161	1662210	1 3	9460.	B	2609.8	46099	4 4	.019	C
60.804	1644630	1 3	510.	B	2665.6	45297	4 2	.057	C
72.029	1388330	1 3	861.	B	2709.2	44693	4 6	.17	C
S VIII					Thulium				
198.55	503590	4 2	250.	C	2710.7	44673	4 4	.037	C
202.61	503590	2 2	120.	C	2767.9	36118	2 4	1.26	C
S XI					Tm I				
189.90	535250	9 3*	430.	C	2826.2	43166	4 2	.080	C
190.37	592500	5 3	280.	C	2918.3	42049	4 6	.42	C
215.95	530180	5 5	140.	C	2921.5	42011	4 4	.076	C
217.63	592500	1 3	72.	C	3229.8	38746	4 2	1.73	C
239.81	417040	1 3	26.	D	3519.2	36200	4 6	1.24	C
242.57	417420	3 5	19.	D	3529.4	36118	4 4	.220	C
242.82	417040	3 3	19.	D	3775.7	26478	2 2	.625	B
246.90	417420	5 5	54.	D	5350.5	26478	4 2	.705	B
247.12	417040	5 3	30.	D	Thulium				
288.49	355260	9 15*	29.	C	Tm I				
S XII					2513.8	39769	8 10	.069	D
212.14	471480	2 4	37.	C	2527.0	39560	8 8	.17	D
215.18	464750	2 2	140.	C	2596.5	38502	8 10	.16	D
218.20	471480	4 4	170.	C	2601.1	38434	8 6	.17	D
221.44	464750	4 2	64.	C	2622.5	38121	8 10	.061	D
227.50	439540	2 2	37.	C	2841.1	43958	6 6	.20	D
234.48	439540	4 2	68.	C	2854.2	35026	8 6	.27	D
S XIII					2914.8	34297	8 8	.077	D
32.236	3102150	1 3	1.09(+4)	B	2933.0	34085	8 6	.10	D
37.600	3049260	3 1	1300.	C	2973.2	33624	8 8	.23	D
256.66	389660	1 3	87.	C	3046.9	32811	8 8	.18	D
299.89	537520	3 5	17.8	C	3081.1	32446	8 8	.19	D
303.37	529420	1 3	22.8	C	3122.5	40787	6 6	.52	D
307.36	529420	3 3	16.4	C	3142.4	40585	6 6	.088	D
308.91	537520	5 5	48.2	C	3172.7	31510	8 8	.18	D
312.68	523880	3 1	63.	C	3233.7	30915	8 10	.051	D
316.84	529420	5 3	25.0	C	3247.0	39560	6 8	.30	D
500.42	3012200	3 5	14.3	C	3251.8	39515	6 4	.52	D
S XIV					3380.7	38343	6 8	.20	D
30.434	3285500	2 6*	8280.	B	3406.0	38123	6 8	.15	D
32.517	3309780	6 10*	2.6(+4)	B	3410.1	29317	8 10	.10	D
417.67	239460	2 4	12.	B	3416.6	29261	8 8	.057	D
445.71	224330	2 2	10.	B	3418.6	38014	6 6	.11	D
1550.	3287000	2 4	1.4	B	3563.9	28051	8 6	.098	D
1663.	3282640	2 2	1.2	B	3567.4	28024	8 10	.042	D
3967.	3307840	2 4	.054	C	3744.1	26701	8 8	.95	D
4153.	3311070	4 6	.057	C	3751.8	26646	8 10	.19	D
Thulium					3798.5	35090	6 4	1.2	D
Tl I					3807.7	35026	6 6	.39	D
2104.6	47500	2 4	.040	D	3883.1	25745	8 6	1.0	D
2118.9	47179	2 2	.020	D	3887.4	25717	8 8	.38	D
2129.3	46950	2 4	.058	D	3916.5	34297	6 8	1.5	D
2151.9	46457	2 2	.031	D	3949.3	34085	6 6	1.0	D
2168.6	46099	2 4	.098	D	4022.6	33624	6 8	.040	D
2237.8	44673	2 4	.19	D	4044.5	33489	6 4	.29	D
2316.0	43166	2 2	.078	D	4094.2	24418	8 6	.90	C
2379.7	42011	2 4	.44	C	4105.8	24349	8 10	.60	C
2507.9	47655	4 2	.011	C	4138.3	32929	6 4	.70	D
2538.2	47179	4 2	.016	C	4158.6	32811	6 8	.055	D
2580.1	38746	2 2	.18	D	4187.6	23873	8 8	.61	C
2609.0	46110	4 6	.10	C	4203.7	23782	8 10	.25	C
Thulium					4222.7	32446	6 8	.15	D
Tl I					4271.7	32174	6 6	.11	D
2104.6	47500	2 4	.040	D	4359.9	22930	8 6	.13	D
2118.9	47179	2 2	.020	D	4386.4	22791	8 8	.042	D
2129.3	46950	2 4	.058	D	4394.4	31521	6 4	.11	D
2151.9	46457	2 2	.031	D					
2168.6	46099	2 4	.098	D					
2237.8	44673	2 4	.19	D					
2316.0	43166	2 2	.078	D					
2379.7	42011	2 4	.44	C					
2507.9	47655	4 2	.011	C					
2538.2	47179	4 2	.016	C					
2580.1	38746	2 2	.18	D					
2609.0	46110	4 6	.10	C					

TABLE 1b. Transition probabilities for selected atomic and ionic species—Continued

Wavelength (λ [\AA])	Upper energy level (E_k [cm ⁻¹])	Stat. weights g_i g_k	Transition Probability (A [10 ⁸ s ⁻¹])	Unc.	Wavelength (λ [\AA])	Upper energy level (E_k [cm ⁻¹])	Stat. weights g_i g_k	Transition Probability (A [10 ⁸ s ⁻¹])	Unc.
Tm I					Sn I				
4643.1	30302	6 6	.034	D	6069.0	51113	1 3	.046	D
4681.9	30124	6 8	.039	D	6073.5	51375	3 1	.063	D
4691.1	30082	6 6	.039	D	6171.5	51113	3 3	.049	D
5307.1	18837	8 10	.023	D	Sn II				
5658.3	26439	6 8	.010	D	2368.3	46464	4 2	.0044	D
5675.8	17614	8 10	.013	D	2449.0	99663	4 6	.37	D
5760.2	26127	6 6	.013	D	2487.0	99659	6 8	.55	D
Tin					3283.2	89292	4 6	1.0	D
Sn I					3352.0	89286	6 8	1.0	D
2073.1	48222	1 3	.036	D	3472.5	100285	2 4	.16	D
2199.3	47146	3 5	.29	D	3575.5	100339	4 6	.13	D
2209.7	48670	5 5	.56	D	5332.4	90242	2 4	.86	D
2246.1	44509	1 3	1.6	D	5562.0	90354	4 6	1.2	D
2268.9	47488	5 7	1.2	D	5588.9	89292	4 6	.85	D
2286.7	47146	5 5	.31	D	5596.2	90242	4 4	.15	D
2317.2	51755	5 7	2.0	D	5797.2	89292	6 6	.28	D
2334.8	44509	3 3	.66	D	5799.2	89286	6 8	.81	D
2354.8	44145	3 5	1.7	D	6453.5	72377	2 4	1.2	D
2380.7	43683	3 5	.031	D	6761.5	86280	2 2	.32	D
2408.2	50126	5 3	.18	D	6844.1	71494	2 2	.66	D
2421.7	49894	5 7	2.5	D	Titanium				
2429.5	44576	5 7	1.5	C	Ti I				
2433.5	44509	5 3	.0080	D	2276.7	44080	7 5	1.3	C
2455.2	44145	5 5	.011	D	2299.9	43468	5 5	.69	C
2476.4	48982	5 3	.011	D	2384.5	42311	9 7	.090	C
2483.4	43683	5 5	.21	D	2424.2	41624	9 9	.17	C
2491.8	57282	1 3	.17	D	2441.0	41342	9 11	.072	C
2495.7	48670	5 5	.62	D	2520.5	39662	5 3	.38	C
2523.9	48222	5 3	.074	D	2529.9	39686	7 5	.38	C
2546.6	39257	1 3	.21	D	2541.9	39715	9 7	.43	C
2558.0	56244	1 3	.34	D	2599.9	38451	5 5	.67	C
2571.6	47488	5 7	.45	D	2605.2	38544	7 7	.64	C
2594.4	47146	5 5	.30	D	2611.3	38671	9 9	.64	C
2636.9	55074	1 3	.11	D	2611.5	38451	7 5	.33	C
2661.2	39257	3 3	.11	D	2632.4	37977	5 5	.27	C
2706.5	38629	3 5	.66	D	2641.1	37852	5 3	1.8	C
2761.8	39626	5 5	.0037	D	2644.3	37977	7 5	1.4	C
2779.8	44576	5 7	.18	D	2646.6	38160	9 7	1.5	C
2785.0	44509	5 3	.14	D	2662.0	37555	5 7	.089	C
2788.0	53021	1 3	.14	D	2669.6	37618	7 9	.10	C
2812.6	52707	1 3	.23	D	2679.9	37690	9 11	.13	C
2813.6	44145	5 5	.12	D	2735.3	45041	3 1	4.1	D
2840.0	38629	5 5	1.7	D	2912.1	41585	5 7	1.3	D
2850.6	43683	5 5	.33	D	2933.6	34079	5 7	.096	C
2863.3	34914	1 3	.54	D	2942.0	33981	5 5	1.0	C
2913.5	51475	1 3	.83	D	2948.3	34079	7 7	.93	C
3009.1	34914	3 3	.38	D	2956.1	34205	9 9	.97	C
3032.8	50126	1 3	.62	D	2967.2	34079	9 7	.11	C
3034.1	34641	3 1	2.0	D	2983.3	33680	7 7	.11	C
3141.8	48982	1 3	.19	D	3000.9	33701	9 9	.12	C
3175.1	34914	5 3	1.0	D	3186.5	31374	5 7	.80	C
3218.7	48222	1 3	.047	D	3192.0	31489	7 9	.85	C
3223.6	39626	5 5	.0012	D	3199.9	31629	9 11	.94	C
3262.3	39257	5 3	2.7	D	3203.8	31374	7 7	.072	C
3330.6	38629	5 5	.20	D	3214.2	31489	9 9	.065	C
3655.8	44509	1 3	.041	D	3341.9	29915	5 7	.65	C
3801.0	34914	5 3	.28	D	3354.6	29971	7 9	.64	C
4524.7	39257	1 3	.26	D	3370.4	29661	5 3	.76	C
5631.7	34914	1 3	.024	D	3371.5	30039	9 11	.67	C
5970.3	55374	5 3	.096	D	3377.6	29769	7 5	.69	C
6037.7	55187	5 5	.050	D					

TABLE 1b. Transition probabilities for selected atomic and ionic species—Continued

Wavelength (λ[Å])	Upper energy level (E _k [cm ⁻¹])	Stat. weights g _i g _k	Transition Probability (A[10 ⁸ s ⁻¹])	Unc.	Wavelength (λ[Å])	Upper energy level (E _k [cm ⁻¹])	Stat. weights g _i g _k	Transition Probability (A[10 ⁸ s ⁻¹])	Unc.
Ti I					Ti II				
3385.7	29915	9 7	.052	C	2752.8	69081	8 10	1.1	D
3635.5	27499	5 7	.72	C	2800.6	66997	10 8	1.8	D
3642.7	27615	7 9	.67	C	2805.0	65185	6 8	4.6	D
3653.5	27750	9 11	.66	C	2810.3	65307	8 10	5.1	D
3654.6	27355	5 3	.087	C	2817.9	65446	10 12	3.8	D
3671.7	27615	9 9	.048	C	2827.2	65094	8 10	1.0	D
3689.9	27480	9 7	.045	C	2828.2	65589	12 14	4.4	D
3717.4	26893	5 7	.043	C	2828.9	65307	10 10	.92	D
3724.6	38959	9 9	.91	D	2834.1	65242	10 12	.79	D
3729.8	26803	5 5	.40	C	2836.6	64978	8 8	1.2	D
3741.1	26893	7 7	.38	C	2839.7	65446	12 12	.83	D
3752.9	27026	9 9	.47	C	2846.1	65094	10 10	1.2	D
3771.7	26893	9 7	.066	C	2856.2	65242	12 12	1.5	D
3786.0	33661	5 3	1.4	D	2931.3	65313	6 6	3.2	D
3924.5	25644	7 7	.073	C	2936.2	64885	4 6	2.7	D
3929.9	25439	5 5	.075	C	2938.7	64978	6 8	2.4	D
3948.7	25318	5 3	.53	C	2942.0	65094	8 10	1.8	D
3958.2	25644	9 7	.43	C	2943.1	65459	8 8	1.1	D
3981.8	25107	5 5	.38	C	2945.5	65242	10 12	2.7	D
3989.8	25227	7 7	.36	C	2954.8	68582	10 12	4.0	D
3998.6	25388	9 9	.39	C	2959.0	68329	10 10	4.0	D
4008.9	25107	7 5	.071	C	3081.6	62410	10 8	1.1	D
4024.6	25227	9 7	.063	C	3088.0	32767	10 8	1.3	C
4065.1	33085	3 1	.70	D	3089.4	47625	8 6	1.3	C
4186.1	36000	9 9	.28	D	3103.8	47467	10 8	1.1	C
4285.0	37359	5 5	.32	D	3127.9	63168	6 6	1.6	D
4295.8	29829	3 1	1.3	D	3128.6	63445	8 8	1.2	D
4393.9	41040	9 11	.33	D	3190.9	40075	6 8	1.3	C
4417.3	37852	11 9	.36	D	3202.5	39927	4 6	1.1	C
4449.2	37690	11 11	.97	D	3224.2	43781	12 10	.70	C
4455.3	34079	7 7	.48	D	3234.5	31301	10 10	1.3	C
4457.4	34205	9 9	.56	D	3236.6	31114	8 8	1.1	D
4481.3	36415	7 7	.57	D	3287.7	45674	8 10	1.4	C
4527.3	28639	3 5	.22	D	3341.9	34543	6 8	.96	D
4544.7	28596	5 3	.33	D	3349.0	34749	8 10	1.0	D
4656.5	21469	5 7	.022	C	3349.4	30241	10 12	1.3	D
4667.6	21588	7 9	.023	C	3361.2	29968	8 10	1.2	D
4681.9	21740	9 11	.025	C	3372.8	29734	6 8	1.1	C
4981.7	26911	11 13	.59	C	3383.8	29544	4 6	1.1	C
4991.1	26773	9 11	.50	C	3483.8	63445	10 8	.97	D
4999.5	26657	7 9	.50	C	3492.4	63168	8 6	.98	D
5007.2	26564	5 7	.48	C	3504.9	43781	10 10	.82	D
5014.2	26494	3 5	.68	C	3510.8	43741	8 8	.93	D
5022.9	26564	7 7	.15	C	3759.3	31491	8 8	.96	D
5024.8	26494	5 5	.15	C	3761.3	31207	6 6	1.0	D
5040.0	20006	7 5	.036	C	Ti III				
5064.7	20126	9 7	.043	C	2375.0	83797	5 3	4.0	D
5173.8	19323	5 5	.037	C	2414.0	83117	5 7	3.8	D
5193.0	19422	7 7	.032	C	2516.1	78159	7 9	3.4	D
5210.4	19574	9 9	.034	C	2527.8	77746	5 7	2.2	D
5866.5	25644	5 7	.046	C	2540.1	77422	3 5	2.0	D
5899.3	25439	3 5	.031	C	2563.4	77424	7 7	2.1	D
6258.1	27615	7 9	.091	C	2565.4	77167	5 5	1.6	D
7251.7	25318	5 3	.072	C	2567.6	77000	3 3	2.3	D
8024.8	27615	9 9	.0083	C	2576.5	77000	5 3	.92	D
8068.2	27499	7 7	.0077	C	2984.8	75198	5 5	1.9	D
Ti II					Ti XIX				
2635.6	68768	4 4	1.9	D	169.33	590580	1 3	129.	C
2638.7	68845	6 6	1.7	D	Ti XX				
2642.2	68950	8 8	1.8	D	11.452	8732000	2 6*	1.7 (+4)	C
2646.1	69081	10 10	2.7	D					

TABLE Ib. Transition probabilities for selected atomic and ionic species—Continued

Wavelength ($\lambda[\text{Å}]$)	Upper energy level ($E_u[\text{cm}^{-1}]$)	Stat. weights g_i g_k	Transition Probability ($A[10^8 \text{ s}^{-1}]$)	Unc.	Wavelength ($\lambda[\text{Å}]$)	Upper energy level ($E_u[\text{cm}^{-1}]$)	Stat. weights g_i g_k	Transition Probability ($A[10^8 \text{ s}^{-1}]$)	Unc.
Ti XX					U I				
11.872	8749000	2 4	2.8 (+4)	C	3590.7	32295	9 7	.022	C
11.958	8751000	4 6	3.4 (+4)	C	3591.7	28454	11 9	.053	C
15.211	6574000	2 4	3.50(+4)	B	3593.0	28445	11 11	.014	C
15.253	6556000	2 2	3.58(+4)	B	3593.2	32098	13 15	.042	C
15.907	6612000	2 4	8.8 (+4)	C	3593.7	33581	11 11	.072	C
16.049	6619000	4 6	1.1 (+5)	C	Vanadium				
16.067	6612000	4 4	1.7 (+4)	C	V I				
Uranium					3050.4	43874	10 8	.47	D
U I					3053.7	32738	4 4	1.1	D
3553.0	32413	13 13	.020	C	3056.3	32847	6 6	1.0	D
3553.0	32591	9 7	.014	C	3060.5	32989	8 8	1.1	D
3553.4	31935	15 13	.022	C	3066.4	33155	10 10	1.6	D
3554.5	28746	11 9	.0084	C	3088.1	42010	4 6	.43	D
3554.9	31923	15 17	.0079	C	3089.1	41999	4 4	.45	D
3555.3	28119	13 15	.027	C	3093.8	42138	6 6	.36	D
3555.8	28115	13 11	.0041	C	3112.9	41752	4 2	.43	D
3556.9	32382	13 11	.0075	C	3183.4	31541	6 8	1.3	D
3557.8	28099	13 13	.029	C	3185.4	31937	10 12	1.4	D
3558.0	33860	11 13	.016	C	3198.0	31398	6 6	.31	D
3558.6	32546	9 7	.039	C	3202.4	31541	8 8	.29	D
3559.4	31955	7 9	.015	C	3205.6	42079	8 10	1.1	D
3560.3	34071	9 7	.064	C	3212.4	42221	10 12	1.2	D
3561.4	31872	15 13	.055	C	3218.9	41950	8 6	.31	D
3561.5	34062	9 9	.025	C	3233.2	42021	10 8	.28	D
3561.8	28068	13 11	.057	C	3273.0	41437	8 8	.24	D
3563.7	28053	13 13	.029	C	3284.4	41539	10 10	.24	D
3563.8	31920	7 7	.011	C	3309.2	39847	4 4	.28	D
3565.0	32318	13 11	.029	C	3329.9	39847	6 4	.69	D
3566.0	32310	13 15	.017	C	3356.4	39423	4 6	.27	D
3566.6	28650	11 11	.24	B	3365.6	39249	2 4	.41	D
3568.8	32289	13 13	.038	C	3376.1	39249	4 4	.28	D
3569.1	35656	17 15	.11	C	3377.4	39237	4 2	.80	D
3569.4	32462	9 9	.015	C	3377.6	39423	6 6	.53	D
3570.1	32278	13 11	.013	C	3400.4	38116	8 8	.22	D
3570.2	28622	11 9	.0053	C	3529.7	37960	4 6	.36	D
3570.6	35004	13 15	.027	C	3533.7	38116	6 8	.44	D
3570.7	31798	15 15	.012	C	3533.8	37835	2 4	.32	D
3571.2	28614	11 11	.0063	C	3543.5	37757	2 2	.58	D
3571.6	38338	17 15	.13	C	3545.3	37835	4 4	.32	D
3572.9	32256	13 15	.015	C	3663.6	43649	4 6	2.7	D
3573.9	27973	13 11	.040	C	3667.7	43707	6 8	2.4	D
3574.1	34977	13 15	.035	C	3671.2	38124	8 10	.18	D
3574.8	27966	13 15	.019	C	3672.4	44140	12 12	.79	D
3577.1	35594	17 15	.043	C	3673.4	43788	8 10	2.4	D
3577.5	31745	15 13	.0078	C	3676.7	44327	14 14	1.1	D
3577.8	28563	11 11	.0083	C	3680.1	43894	10 12	1.9	D
3577.9	27941	13 13	.023	C	3686.3	38221	10 12	.20	D
3578.3	27938	13 11	.020	C	3687.5	44028	12 14	2.6	D
3580.0	32379	9 9	.012	C	3688.1	29418	8 8	.28	D
3580.2	28543	11 9	.029	C	3690.3	29203	2 4	.37	D
3580.4	28542	11 13	.0075	C	3692.2	29296	6 6	.46	D
3580.9	32194	13 13	.021	C	3695.3	44190	14 16	2.5	D
3582.6	32180	13 13	.029	C	3695.9	29203	4 4	.54	D
3584.6	31757	7 5	.024	C	3703.6	29418	10 8	.79	D
3584.9	27887	13 15	.18	B	3704.7	29296	8 6	.58	D
3585.4	28503	11 11	.019	C	3705.0	29203	6 4	.31	D
3585.8	28500	11 9	.028	C	3706.0	42079	10 10	.46	D
3587.8	32318	9 11	.013	C	3708.7	42221	12 12	.39	D
3588.3	31729	7 9	.018	C	3790.5	37475	10 8	.20	D
3589.7	28470	11 13	.021	C	3795.0	28768	10 10	.21	D
3589.8	31650	15 13	.059	C	3806.8	37362	10 10	.22	D

TABLE 1b. Transition probabilities for selected atomic and ionic species—Continued

Wavelength (λ [\AA])	Upper energy level (E_k [cm^{-1}])	Stat. weights g_i g_k	Transition Probability (A [10^8 s^{-1}])	Unc.	Wavelength (λ [\AA])	Upper energy level (E_k [cm^{-1}])	Stat. weights g_i g_k	Transition Probability (A [10^8 s^{-1}])	Unc.
V I					V I				
3818.2	26183	4 2	.56	C	4468.0	37285	8 10	.20	D
3828.6	26249	6 4	.431	C	4469.7	37316	10 12	.53	D
3840.1	36926	8 8	.18	D	4474.0	38116	10 8	.41	D
3840.8	26353	8 6	.46	D	4490.8	37211	10 12	.10	D
3855.4	25931	4 4	.28	D	4496.1	37960	8 6	.35	D
3855.8	26480	10 8	.451	C	4514.2	37835	6 4	.29	D
3863.9	36766	8 6	.27	D	4524.2	37362	12 10	.26	D
3864.3	36763	8 6	.17	D	4525.2	37757	4 2	.36	D
3864.9	26004	6 6	.208	C	4529.6	37175	10 8	.21	D
3871.1	36926	10 8	.24	D	4545.4	37765	10 12	.67	D
3875.1	26122	8 8	.17	D	4560.7	37644	8 10	.62	D
3886.6	36823	10 8	.14	D	4571.8	37556	6 8	.53	D
3902.3	26172	10 10	.217	C	4578.7	37499	4 6	.59	D
3921.9	33967	4 2	.23	D	4579.2	37556	8 8	.13	D
3922.4	34066	6 6	.23	D	4706.2	36815	6 4	.21	D
3930.0	36539	10 10	.29	D	4706.6	38483	12 14	.15	D
3934.0	34128	8 8	.56	D	4710.6	38405	10 12	.17	D
3992.8	40039	12 10	1.1	D	4746.6	37423	4 4	.17	D
3998.7	40064	14 12	.92	D	4751.0	37615	8 8	.15	D
4051.0	41861	10 10	1.2	D	4754.0	37758	10 10	.13	D
4051.4	41918	12 12	1.2	D	4757.5	37375	4 2	.65	D
4090.6	33155	8 10	.77	D	4766.6	37423	6 4	.48	D
4092.7	26738	8 10	.21	D	4776.4	37503	8 6	.43	D
4095.5	32989	6 8	.54	D	4786.5	37615	10 8	.40	D
4099.8	26605	6 8	.39	D	4796.9	37758	12 10	.42	D
4102.2	32847	4 6	.50	D	4807.5	37931	14 12	.51	D
4104.8	40126	10 8	1.9	D	5193.0	37931	12 12	.35	D
4105.2	26506	4 6	.42	D	5195.4	37615	8 8	.21	D
4109.8	26438	2 4	.47	D	5234.1	38124	10 10	.41	D
4111.8	26738	10 10	.91	D	5240.9	38221	12 12	.39	D
4113.5	34128	6 8	.15	D	5415.3	37606	12 14	.27	D
4115.2	26605	8 8	.59	D	5487.9	37362	12 10	.25	D
4116.5	26506	6 6	.24	D	5507.8	37175	10 8	.30	D
4123.6	26397	4 2	.94	D	5559.9	31786	6 2*	.14	D
4128.1	26438	6 4	.70	D	5698.5	26122	6 8	.28	D
4132.0	26506	8 6	.52	D	5703.6	26004	4 6	.19	D
4134.5	26605	10 8	.27	D	5707.0	25931	2 4	.19	D
4232.5	39391	10 10	.86	D	5725.6	36539	8 10	.18	D
4233.0	39342	8 8	.67	D	5727.0	26172	8 10	.18	D
4268.6	38483	14 14	1.0	D	6090.2	25131	8 6	.13	D
4271.6	38405	12 12	.84	D	V II				
4277.0	38324	10 10	.84	D	2503.0	48580	5 7	.23	C
4284.1	38246	8 8	1.0	D	2506.2	48731	7 9	.23	C
4291.8	40536	12 14	.78	D	2514.6	48853	9 11	.24	C
4296.1	40452	10 12	.69	D	2672.0	37521	5 7	.18	D
4297.7	40379	8 10	.61	D	2677.8	37369	3 5	.29	D
4298.0	40315	6 8	.70	D	2679.3	37521	7 7	.26	D
4342.8	38124	10 10	.13	D	2688.0	37531	9 9	.60	D
4355.0	38221	12 12	.11	D	2690.8	37259	5 3	.43	D
4379.2	25254	10 12	1.2	D	2700.9	37352	9 11	.29	C
4384.7	25112	8 10	.97	D	2702.2	37205	7 7	.20	D
4390.0	24993	6 8	.70	D	2706.2	37151	7 9	.29	C
4395.2	24899	4 6	.48	D	2728.6	36673	3 5	.20	C
4400.6	24830	2 4	.33	D	2768.6	48731	11 9	.82	C
4406.6	25112	10 10	.19	D	2774.3	48580	9 7	.88	C
4407.6	24993	8 8	.38	D	2799.5	49202	5 5	.60	C
4408.2	24899	6 6	.51	D	2802.8	49211	7 7	.46	C
4416.5	24789	4 2	.21	D	2803.5	49269	9 9	.58	C
4452.0	37518	14 16	.80	D	2836.5	48853	9 11	.25	C
4457.8	37530	10 12	.24	D	2841.0	48731	7 9	.27	C
4460.3	24839	10 8	.26	D	2877.7	49202	7 5	.67	C
4462.4	37404	12 14	.66	D					

TABLE 1b. Transition probabilities for selected atomic and ionic species—Continued

Wavelength (λ[Å])	Upper energy level (E _k [cm ⁻¹])	Stat. weights g _i g _k	Transition Probability (A[10 ⁸ s ⁻¹])	Unc.	Wavelength (λ[Å])	Upper energy level (E _k [cm ⁻¹])	Stat. weights g _i g _k	Transition Probability (A[10 ⁸ s ⁻¹])	Unc.
V II					V XXI				
2880.0	37521	7 7	.15	D	9.704	10722000	4 6	1.91(+4)	C
2882.5	37369	5 5	.27	D	10.413	9603400	2 6*	2.0 (+4)	C
2888.3	49269	11 9	.54	C	10.768	9627300	2 4	3.5 (+4)	B
2889.6	37201	3 1	1.4	D	10.853	9630600	4 6	4.2 (+4)	B
2891.6	37259	5 3	.92	D	13.828	7231700	2 4	4.26(+4)	B
2893.3	37521	9 7	.70	D	13.870	7209800	2 2	4.37(+4)	B
2903.1	37041	3 5	.21	D	14.435	7268900	2 4	1.1 (+5)	B
2906.5	37205	7 7	.53	D	14.578	7276300	4 6	1.3 (+5)	B
2907.5	37352	9 11	.19	C	14.592	7268900	4 4	2.1 (+4)	C
2908.8	37531	11 9	1.1	D	27.95	10693000	2 6*	3000.	C
2910.0	37041	5 5	.72	D	28.59	10722000	6 10*	6700.	C
2910.4	36955	3 3	.87	D	40.20	9603400	2 6*	5800.	C
2911.1	37151	7 9	.30	C	41.58	9629300	6 10*	1.4 (+4)	B
2924.6	37151	9 9	.91	C	48.32	11673000	6 10*	1060.	C
2930.1	48580	7 7	.27	C	58.39	11316000	6 10*	1660.	C
2944.6	36919	9 7	.65	C	89.40	10722000	6 10*	2900.	C
2950.4	36489	3 3	.34	C	240.0	416600	2 4	29.	B
2952.1	36673	7 5	.58	C	293.7	340500	2 2	16.	B
2957.5	36489	5 3	.44	C	V XXII				
3048.9	49211	9 7	.54	C	2.382	41986020	1 3	2.9 (+6)	B
3093.1	35483	11 13	1.8	D	Xenon				
3100.9	48580	7 7	1.0	C	Xe I				
3102.3	35193	9 11	1.6	D	1043.8	95801	1 3	.59	D
3110.7	34947	7 9	1.5	D	1047.1	95499	1 3	1.3	D
3118.4	34746	5 7	1.5	D	1050.1	95229	1 3	.085	D
3121.1	35193	11 11	.22	D	1056.1	94686	1 3	2.45	C
3125.3	34593	3 5	1.6	D	1061.2	94229	1 3	.19	D
3126.2	34947	9 9	.41	D	1068.2	93619	1 3	3.99	C
3130.3	34746	7 7	.50	D	1085.4	92129	1 3	.410	C
3133.3	34593	5 5	.48	D	1099.7	90933	1 3	.434	C
3187.7	40002	5 5	.85	D	1110.7	90033	1 3	1.5	C
3188.5	40196	7 7	.80	D	1129.3	88550	1 3	.044	C
3190.7	40430	9 9	.88	D	1170.4	85441	1 3	1.6	C
3208.4	40002	7 5	.17	D	1192.0	83890	1 3	6.2	C
3232.0	49202	3 5	.23	C	1250.2	79987	1 3	.14	D
3267.7	39234	5 7	1.2	C	1295.6	77186	1 3	2.5	C
3271.1	39404	7 9	1.1	C	1469.6	68046	1 3	2.8	B
3276.1	39613	9 11	1.1	C	4501.0	89279	5 3	.0062	D
3321.5	49211	9 7	.15	C	4524.7	89163	5 5	.0021	D
3517.3	37521	9 7	.14	D	4624.3	88687	5 5	.0072	D
3530.8	36955	5 3	.19	D	4671.2	88470	5 7	.010	D
3545.2	37041	7 5	.18	D	4807.0	88843	3 1	.024	D
3556.8	37205	9 7	.20	D	7119.6	92445	7 9	.066	D
3589.8	36489	5 3	.37	D	7967.3	88745	1 3	.0030	D
3592.0	36673	7 5	.23	D	8409.2	78957	5 3	.010	D
3715.5	39613	13 11	.16	C	Xe II				
3727.3	40430	9 9	.22	C	4180.1	135708	4 4	2.2	D
3732.8	39404	11 9	.16	C	4330.5	136598	6 8	1.4	D
3745.8	39234	9 7	.17	C	4414.8	132208	6 6	1.0	D
3750.9	40196	7 7	.20	C	4603.0	116783	4 4	.82	D
3771.0	40002	5 5	.22	C	4844.3	113705	6 8	1.1	D
V XX					4876.5	130064	6 8	.63	D
14.360	6964000	1 3	6.9 (+4)	C	5260.4	123255	2 4	.22	D
160.0	625000	1 3	150.	C	5262.0	131924	4 4	.85	D
V XXI					5292.2	111959	6 6	.89	D
8.843	11308000	2 6*	6000.	C	5372.4	113673	4 2	.71	D
8.882	11675000	4 6	6400.	C	5419.2	113512	4 6	.62	D
9.111	11316000	2 4	8900.	C	5439.0	121180	4 2	.74	D
9.175	11316000	4 6	1.04(+4)	C	5472.6	113705	8 8	.099	D
9.352	10693000	2 6*	1.0 (+4)	C	5531.1	113512	8 6	.088	D
9.633	10721000	2 4	1.63(+4)	C					

TABLE 1b. Transition probabilities for selected atomic and ionic species—Continued

Wavelength (λ [Å])	Upper energy level (E_k [cm ⁻¹])	Stat. weights g_i g_k	Transition Probability (A [10 ⁸ s ⁻¹])	Unc.	Wavelength (λ [Å])	Upper energy level (E_k [cm ⁻¹])	Stat. weights g_i g_k	Transition Probability (A [10 ⁸ s ⁻¹])	Unc.
Xe II					Zinc				
5719.6	113512	4 6	.061	D	Zn I				
5976.5	111792	4 4	.28	D	748.29	133638	1 3	.060	C
6036.2	111959	6 6	.075	D	765.60	130617	1 3	.076	C
6051.2	111959	8 6	.17	D	792.05	126255	1 3	.057	C
6097.6	111792	6 4	.26	D	793.85	125968	1 3	.18	C
6270.8	128867	4 6	.18	D	809.92	123470	1 3	.26	C
6277.5	111959	4 6	.036	D	1109.1	90158	1 3	.305	C
6805.7	113512	8 6	.061	D	2138.6	46745	1 3	7.09	B
6990.9	113705	10 8	.27	D	3075.9	32501	1 3	3.29(-4)	B
Ytterbium					3282.3	62769	1 3	.90	B
Yb I					3302.6	62772	3 5	1.2	B
2464.5	40564	1 3	.91	C	3302.9	62769	3 3	.67	B
2672.0	37415	1 3	.118	C	3345.0	62777	5 7	1.7	B
3464.4	28857	1 3	.62	C	3345.6	62772	5 5	.40	B
3988.0	25068	1 3	1.76	C	3345.9	62769	5 3	.045	B
5556.5	17992	1 3	.0114	C	6362.3	62459	3 5	.474	C
Yb II					11054.	55789	3 1	.243	C
3289.4	30392	2 4	1.8	C	Zn II				
3694.2	27062	2 2	1.4	C	2025.5	49355	2 4	3.3	C
					2064.2	96910	2 4	4.6	D
					2099.9	96960	4 6	5.6	D
					2102.2	96910	4 4	.93	D
					4911.6	117264	4 6	1.6	D

U.S. DEPT. OF COMM. BIBLIOGRAPHIC DATA SHEET	1. PUBLICATION OR REPORT NO. NSRDS-NBS 68	2. Gov't Accession No.	3. Recipient's Accession No.
4. TITLE AND SUBTITLE Wavelengths and Transition Probabilities for Atoms and Atomic Ions Part I. Wavelengths Part II. Transition Probabilities		5. Publication Date Dec. 1980	
7. AUTHOR(S) Part I. -- Joseph Reader and Charles H. Corliss Part II. -- W. L. Wiese and G. A. Martin		6. Performing Organization Code	
9. PERFORMING ORGANIZATION NAME AND ADDRESS NATIONAL BUREAU OF STANDARDS DEPARTMENT OF COMMERCE WASHINGTON, DC 20234		8. Performing Organ. Report No.	
12. SPONSORING ORGANIZATION NAME AND COMPLETE ADDRESS (Street, City, State, ZIP) Same as item 9		10. Project/Task/Work Unit No.	
15. SUPPLEMENTARY NOTES Library of Congress Catalog Card Number: 80-607997 <input type="checkbox"/> Document describes a computer program; SF-185, FIPS Software Summary, is attached.		11. Contract/Grant No.	
16. ABSTRACT (A 200-word or less factual summary of most significant information. If document includes a significant bibliography or literature survey, mention it here.) Wavelengths for about 47,000 spectral lines of atoms and atomic ions, as well as transition probabilities A for about 5000 lines, are tabulated. The data were selected in such a way as to include the prominent lines over a wide spectral region. Part I contains wavelengths of lines of neutral through quadruply ionized atoms in the range 40 to 40,000 Å. This information is presented in two different ways: 1) separate line lists grouped according to chemical element and further subdivided according to stage of ionization; and 2) a general table of wavelengths ordered numerically, with relative intensity, chemical element, and stage of ionization indicated for each line. Part II contains transition probability data for atoms in various stages of ionization, with emphasis on the neutral and singly ionized species. This table is arranged according to the chemical element and is further subdivided according to stage of ionization. Estimates of the accuracies of the A-values are provided. Wavelengths, energy levels, and statistical weights serve to identify the lines and to provide useful data for plasma spectroscopy applications.		13. Type of Report & Period Covered N/A	
17. KEY WORDS (six to twelve entries; alphabetical order; capitalize only the first letter of the first key word unless a proper name; separated by semicolons) Atom; atomic ion; intensities; line strengths; oscillator strengths; spectral lines; transition probabilities; wavelengths.		14. Sponsoring Agency Code	
18. AVAILABILITY <input checked="" type="checkbox"/> Unlimited <input type="checkbox"/> For Official Distribution. Do Not Release to NTIS <input checked="" type="checkbox"/> Order From Sup. of Doc., U.S. Government Printing Office, Washington, DC 20402 <input type="checkbox"/> Order From National Technical Information Service (NTIS), Springfield, VA. 22161		19. SECURITY CLASS (THIS REPORT) UNCLASSIFIED	21. NO. OF PRINTED PAGES 415
		20. SECURITY CLASS (THIS PAGE) UNCLASSIFIED	22. Price \$14.00