



NBS SPECIAL PUBLICATION **363**

**SUPPLEMENT 1**

**U.S. DEPARTMENT OF COMMERCE / National Bureau of Standards**

**Bibliography  
on Atomic Energy Levels  
and Spectra**

**July 1971 through June 1975**

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<sup>2</sup> Located at Boulder, Colorado 80302.

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# Bibliography on Atomic Energy Levels and Spectra

July 1971 through June 1975

*to special agent in charge no. 3*

Lucy Hagan

Optical Physics Division  
Institute for Basic Standards  
National Bureau of Standards  
Washington, D.C. 20234



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U.S. DEPARTMENT OF COMMERCE, Elliot L. Richardson, Secretary

Edward O. Vetter, Under Secretary

Dr. Betsy Ancker-Johnson, Assistant Secretary for Science and Technology

*45* NATIONAL BUREAU OF STANDARDS, Ernest Ambler, Acting Director

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## **Foreword**

The National Standard Reference Data System was established in 1963 for the purpose of promoting the critical evaluation and dissemination of numerical data of the physical sciences. The program is coordinated by the Office of Standard Reference Data of the National Bureau of Standards but involves the efforts of many groups in universities, government laboratories, and private industry. The primary aim of the program is to provide compilations of critically evaluated physical and chemical property data. These tables are published in the *Journal of Physical and Chemical Reference Data*, in the NSRDS-NBS series of the National Bureau of Standards, and through other appropriate channels.

The task of critical evaluation is carried out in various data centers, each with a well-defined technical scope. A necessary preliminary step to the critical evaluation process is the retrieval from the world scientific literature of all papers falling within the scope of the center. Each center, therefore, builds up a comprehensive well-indexed bibliographical file which forms the base for the evaluation task. Bibliographies derived from these files are published when they appear to be of value to research workers and others interested in the particular technical area.

Further information on NSRDS and the publications which form the primary output of the program may be obtained by writing to the Office of Standard Reference Data, National Bureau of Standards, Washington, D.C. 20234.

DAVID R. LIDE, JR., *Chief*  
*Office of Standard Reference Data*

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# Bibliography on Atomic Energy Levels and Spectra

## July 1971 through June 1975

Lucy Hagan

This is the first supplement to the NBS Special Publication 363, "Bibliography on Atomic Energy Levels and Spectra, July 1968 through June 1971," and it covers the most recent literature from July 1971 through June 1975. It contains approximately 2150 references classified by subject for individual atoms and atomic ions. A number index identifies the references. An author index is included. References included contain data on energy levels, classified lines, wavelengths, Zeeman effect, Stark effect, hyperfine structure, isotope shift, ionization potentials, or theory which gives results for specific atoms or atomic ions.

**Key words:** Atomic energy levels; atomic spectra; bibliography; energy levels, atomic; spectra, atomic; wavelengths, atoms and ions.

## 1. Introduction

Since the publication of *Bibliography on Atomic Energy Levels and Spectra, July 1968 through June 1971* [1]<sup>1</sup> by the Atomic Energy Levels Data Center, over 2150 research papers have appeared which contain numerical data. This is twice the number of references included in the previous bibliography and represents an increase of approximately 170 per year compared to the years covered previously. This first supplement contains references to these new papers which have a journal publication date up to June 30, 1975 and were available to us as reprints or in journals in our library. In this supplement the format is the same as in the previously published bibliography.

### 1.1. Reference Classification Scheme and Scope of Bibliography

The references included contain numerical data on atomic energy levels and spectra. The reference classification categories are the same as used in the previous bibliography and are summarized below. One additional category, QF, has been added for papers containing numerical data on Lamb shifts, either experimental or theoretical results.

**EL Energy Levels.** Experimental energy differences, except Hfs or IS. Includes references that suggest the rejection of previously reported levels.

**ND New Designations.** New or changed designations or  $J$  values for known energy levels.

**CL Classified Lines.** Indicates the assignment of observed lines to transitions between energy levels that are specified by theoretical designations and/or by their positions in a known level scheme.

**W Wavelengths (or wavenumbers).** New measurements, or wavelengths newly assigned to a particular spectrum. References that list measurements of other entities corresponding to energy differences between levels may also be included.

**ZE Zeeman Effect data or interpretation.**

**SE Stark Effect data or interpretation.**

**Hfs Hyperfine Structure.** Observations and theory.

**IS Isotopic or Isomeric (Nuclear) Shifts.**

**QF Quantum Field effects.** Lamb shifts, experimental and theoretical results.

**IP Ionization Potential.**

**SF Series Formulae.** Evaluated series constants, including those appearing in polarization-theory formulae.

**TE Theoretical Energies.** Restricted to a few references that give calculated energy levels with accuracies about equal to or exceeding those now obtainable by observation.

<sup>1</sup> Figures in brackets refer to the literature references in section 1.3 on page

**PT Parametric Theory.** Evaluations of the usual energy parameters of Slater-Condon theory, or extensions thereof, based on fitting the theory to experimental levels, g-factors and/or other observed quantities.

**AT Ab initio Theory.** These references are mostly to Hartree-Fock type calculations of energy parameters or levels.

**OT Other Theory.** Predictions of energy levels by theoretical methods not primarily classifiable as PT or AT (for example, Z expansion techniques).

It is worth noting that this bibliography does not contain references to atomic transition probabilities, line intensities, or broadening. The NBS Data Center on Atomic Transition Probabilities and Atomic Line Shapes and Shifts publishes bibliographies on these subjects [2].

This bibliography is further restricted, with few exceptions, to original research papers or monographs; textbooks and extensive compilations of special interest that are not included in the classified references are given at the end of this introduction in section 1.4.

## 1.2. Arrangement of Bibliography and Handling of Special Types of References

Each reference has been assigned a number. In section 2.2 the appropriate reference numbers are given under headings for individual spectra (element and ionization stage). The reference numbers under each spectrum heading are listed separately for each of the content categories explained above. Reference numbers for papers reporting wavelengths of unknown ionization stage are given as the last group for the element.

The full references are given in order of the assigned numbers in section 3. Each such reference is followed by the spectra and category symbols appropriate to the content. Except for Russian titles, which are given in English, the titles of articles are given in the language in which they were published. References to articles from Russian journals that also appear in English translations are usually to the translation journals.

Section 2.1 is an index to the spectra for which there are references, and an author index (sec. 4) follows the listing of the complete references.

The main exception from the arrangement described above is for the references 3300 through 3533. Each of these papers gives theoretical results for a rather large number of elements and/or ionization stages and their numbers are followed by a "T" to indicate that the papers give theoretical results only. These references are included in section 4, along with the usual information on their content, and in the author index. However, they were omitted from the reference numbers for the individual spectra (sec. 2.2).

Most of the reference numbers followed by an "A" indicate abstracts of papers presented at meetings of the Optical Society of America, the American Physical Society, or the European Group for Atomic Spectroscopy. The assigned content categories for these abstracts are those thought to be applicable to the paper itself, as indicated by the abstract; the indicated results are not necessarily included in the abstracts. These abstracts frequently provide information about work in progress. A few of the "A" references are to abstracts of theses in Dissertation Abstracts. Some of the other references are to theses for which the AEL Data Center has obtained copies.

References to lanthanide and actinide atomic energy levels and spectra determined from solution or crystal data are included for atoms and atomic ions for which these data have not been determined for the free gaseous atom or ion. Papers older than 1971 have also been included for this particular subject to make the bibliography complete, since these references were not included in previous bibliographies. For these references the reference classification categories which apply are enclosed in parentheses to differentiate them from articles to atomic energy levels and spectra of free gaseous atoms and atomic ions.

Abbreviations of titles of publications cited in this bibliography are those given in the 1970 edition of Chemical Abstracts Source Index [3].

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I am grateful to Dr. W. C. Martin for helpful discussions and consultation. I am indebted to Dr. David Garvin, who suggested the original format for references, which has been used with his computer programs for this bibliography. James Koch has been especially helpful in resolving difficulties with the many computer programs used; I am grateful for his help. I thank Keith Draxl, who revised the author sort program and put it into operations with the modifications required. I thank the NSRDS staff, particularly Carla Messina, who revised the reformat program, and Robert Thompson for helpful comments about the programs. I especially thank Kathy Strine for the difficult job of key-boarding the references, putting the references in a consistent format, and for running many of the computer programs to put the bibliography onto magnetic tape. I thank Marsha Ahalt for her assistance in proofreading the bibliography.

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## 2. Classified References for Individual Spectra

### 2.1. Index to Spectra

Element	Z	Spectrum	Page	Element	Z	Spectrum	Page
Actinium	89	Ac I	45	Berkelium	97	Bk I Bk II Bk IV Bk V	46
Aluminum	13	Al <sup>-</sup> Al I Al II Al III Al IV Al V Al VI Al VII Al VIII Al IX Al X Al XI Al XII Al XIII	18	Beryllium	4	Be I Be II Be III Be IV	13
				Bismuth	83	Bi <sup>-</sup> Bi I Bi II Bi IV	45
				Boron	5	B <sup>-</sup> B I B II B III B IV B V	13
Americium	95	Am III Am IV Am V Am VI Am LXXXV	46				
Antimony	51	Sb <sup>-</sup> Sb I Sb II Sb VII	38	Bromine	35	Br <sup>-</sup> Br I Br XVI Br XIX Br XXIV Br XXV Br XXVI	34
Argon	18	Ar <sup>-</sup> Ar I Ar II Ar III Ar IV Ar V Ar VI Ar VII Ar VIII Ar IX Ar X Ar XI Ar XII Ar XIII Ar XIV Ar XV Ar XVI Ar XVII Ar XVIII Ar XIX Ar	21 22	Cadmium	48	Cd <sup>-</sup> Cd I Cd II Cd III	38
				Calcium	20	Ca <sup>-</sup> Ca I Ca II Ca III Ca VII Ca IX Ca X Ca XI Ca XII Ca XIII Ca XIV Ca XV Ca XVI Ca XVII Ca XVIII Ca XIX Ca XX	23
Arsenic	33	As <sup>-</sup> As I As II As XIV As XV As XVI As XVII As XVIII As XXI As XXII As XXIII	33 34	Californium	98	Cf I Cf II Cf IV	46
				Carbon	6	C <sup>--</sup> C <sup>-</sup> C I C II C III C IV C V C VI	13
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				Europium	63	Fm I Fm XCIV	41
				Fermium	100	F - F I F II F III F IV F V F VI F VII F VIII F IX	42
				Fluorine	9		15

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Germanium	32	Ge - Ge I Ge III Ge IV Ge V Ge VI Ge XIII Ge XIV Ge XV Ge XVI Ge XVII Ge XVIII Ge XIX Ge XX Ge XXI Ge XXII Ge XXIII Ge XXIV	33	Iridium	77	Ir I	44
				Iron	26	Fe -- Fe - Fe I Fe II Fe III Fe IV Fe V Fe VI Fe VII Fe VIII Fe IX Fe X Fe XI Fe XII Fe XIII Fe XIV Fe XV Fe XVI Fe XVII Fe XVIII Fe XIX Fe XX Fe XXI Fe XXII Fe XXIII Fe XXIV Fe XXV Fe XXVI	28
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Hafnium	72	Hf I Hf II Hf IV Hf V	44			Kr XIX Kr XX Kr XXI Kr XXII Kr XXIII Kr XXIV Kr XXV Kr XXVI	
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Vanadium	23	V I V II V III V IV V V V VI V VII V VIII V IX V X V XI V XII V XIII V XIV V XV V XVI V XVII V XVIII V XIX V XX V XXI V XXII	25	Yttrium	39	Y I Y III Y IV Y V Y VI Y VII Y XII Y XXX	36
Xenon	54	Xe - Xe I Xe II Xe III Xe IV Xe V Xe VI Xe VII Xe VIII Xe IX Xe X Xe XI Xe XII Xe XIII Xe XIV Xe XV	39	Zinc	30	Zn - Zn I Zn III Zn V Zn VI Zn VII Zn XIII Zn XIV Zn XV Zn XVI Zn XVII Zn XVIII Zn XIX Zn XX Zn XXI Zn XXII Zn XXIII	32
				Zirconium	40	Zr I Zr IV Zr V Zr VI Zr VII Zr XIII Zr XXIX Zr XXX Zr XXXI	36

## 2.2 Reference Numbers for Individual Spectra

H--	AT	1641, 2747	He I—Continued	
	EL	1898, 2405, 2639, 3005, 3051, 3097		SE 1855A, 2135, 3092A
	CL	2405, 3097		Hfs 1611, 1719, 1825, 1974, 2148A, 2737,
	W	2405		2746, 2757, 2860A
	TE	1713		QF 2194, 2239, 2971, 3155
	AT	2706, 2824, 3097, 3144		IP 2194
	OT	1658, 1668, 1713, 1717, 1730, 1737, 1849, 1928, 2230, 2268, 2397, 2444, 2572A, 2920, 2921, 2952, 2999, 3084, 3106, 3163		TE 1713, 2194, 2238, 2281
	EL	1382, 1384, 1385, 1386, 1387, 1390, 1403, 1426, 1435, 1488, 1498A, 1594A, 1615, 1889, 1890, 1955A, 2260, 2465A, 2752		AT 1355, 1469, 1612, 1645, 1782, 1804, 1830, 1894, 1922, 2015, 2128, 2154A, 2194, 2210, 2273, 2415, 2547, 2552, 2607, 2620, 2649, 2654, 2688, 2705, 2817, 2824, 2835, 2862A, 2887A, 2912, 2915, 3118, 3144
	CL	1426		OT 1416, 1447, 1451A, 1533, 1538A, 1602, 1616, 1627A, 1646, 1654, 1658, 1667, 1668, 1713, 1726, 1737, 1766, 1789, 1841, 1849, 1856A, 1866, 1874, 1875, 1922, 1954, 1980, 1988, 1989, 2024, 2140, 2155A, 2175, 2211, 2238, 2265, 2281, 2396, 2397, 2411, 2440, 2442, 2444, 2528A, 2651A, 2673, 2676, 2679, 2693, 2702, 2712, 2739, 2784, 2791, 2825, 2850, 2903, 2913, 2917, 2918, 2921, 2932, 2952, 2999, 3016, 3035, 3072, 3181A
	W	1382, 1426, 1890, 1955A, 1984, 2752		
H+	ZE	1378, 1394, 1397, 1442, 1729, 2159A, 2186, 2294, 2532A, 2567A, 2799, 3046, 3180A		
	SE	1435, 1441, 1864, 2383, 2504A, 2735		
	Hfs	1394, 1403, 1442, 1878, 1957, 2014, 2243, 2286, 2876, 2928, 3011, 3109		
	IS	2752		
	QF	1340, 1358, 1386, 1388, 1389, 1475, 1569, 1615, 1764, 1829, 1935, 2035, 2088A, 2146A, 2170, 2234, 2260, 2271, 2338A, 2438, 2465A, 2570A, 2642, 2828, 2886A, 2993, 3009, 3010, 3056, 3061		
	IP	1426		
	AT	1997, 2154A		
	OT	1395, 1396, 1826, 2606, 2712, 2735, 2784, 2822, 2836, 2854, 2997, 3107, 3162, 3164		
	EL	1393, 1424A, 1652A, 1784, 1818, 2010, 2028, 2219, 2524A, 2593, 2622, 2656, 2793, 2842, 3087, 3091, 3103, 3165		
	ND	2767		
He-	W	1323, 2219, 2524A		
	Hfs	1911A, 2028, 2656		
	OT	1583, 1851, 2207, 2333A, 2630, 2767, 2979, 3110		
	EL	1311, 1341, 1362, 1391, 1460, 1489, 1550, 1752, 1784, 1786, 1788, 1934, 2010, 2012, 2135, 2219, 2325A, 2524A, 2652, 2710, 2711, 2738, 2793, 2858A, 2861A, 2949, 2969, 3021, 3026, 3087, 3089, 3091, 3155, 3160		
	ND	1602		
	CL	1362, 1532A, 1654, 1784, 1786, 1788, 1992, 2012, 2033, 2140, 2325A, 2710, 2853A, 3160		
	W	1323, 1341, 1362, 1532A, 1752, 1784, 1786, 1788, 1992, 2012, 2033, 2219, 2325A, 2524A, 2710, 2853A, 3160		
	ZE	1311, 1364A, 1823, 2135, 2186, 2394, 2513A, 2565A, 3046, 3098, 3125		
	EL	1362, 1383, 1496A, 1501A, 1506, 1518, 1521, 1522, 1549, 1901, 2508A, 3156, 3222		
	CL	1362		
He+	W	1362, 1383, 1901		
	SE	2193		
	Hfs	1506, 1719, 1825, 3053		
	IS	1506		
	QF	1330, 1340, 1392, 1496A, 1501A, 1521, 1829, 2036, 2089A, 2477, 2508A, 2974, 3222		
	OT	1690A, 2756, 2833, 3016		
	EL	2158A, 2296, 2551, 2671		
	AT	1439, 2428		
	OT	1723, 1838, 2256, 2633, 2801, 3060		
	EL	1362, 1393, 1560, 1565A, 1595A, 1614, 1704A, 1796, 1992, 2571A, 2764, 2818, 2985, 3034, 3062, 3160		
Li+	CL	1362, 1560, 1614, 1796, 1992, 2369, 2571A, 3034, 3160		
	W	1362, 1560, 1614, 1796, 1992, 2571A, 2682, 3034, 3160		
	ZE	1747A, 2789		
	SE	1556, 1590, 1864, 1967, 2246, 3001		
	Hfs	1393, 1438, 1565A, 1595A, 1704A, 1912A, 1995, 2001, 2061A, 2237, 2246, 2629, 2789, 2845A, 3020, 3137		
	PT	2697		
	AT	1711, 1843, 1897, 1902, 2011, 2190, 2210, 2531A, 2620, 2648, 2649, 2692, 2731, 2862A, 2912, 2943, 2950, 3007		
	EL	1362, 1393, 1560, 1565A, 1595A, 1614, 1704A, 1796, 1992, 2571A, 2764, 2818, 2985, 3034, 3062, 3160		
	CL	1362, 1560, 1614, 1796, 1992, 2369, 2571A, 3034, 3160		
	W	1362, 1560, 1614, 1796, 1992, 2571A, 2682, 3034, 3160		
Li-	ZE	1747A, 2789		
	SE	1556, 1590, 1864, 1967, 2246, 3001		
	Hfs	1393, 1438, 1565A, 1595A, 1704A, 1912A, 1995, 2001, 2061A, 2237, 2246, 2629, 2789, 2845A, 3020, 3137		
	PT	2697		
	AT	1711, 1843, 1897, 1902, 2011, 2190, 2210, 2531A, 2620, 2648, 2649, 2692, 2731, 2862A, 2912, 2943, 2950, 3007		

## 2.2 Reference Numbers for Individual Spectra—Continued

**Li I—Continued**

OT 1438, 1456, 1485, 1610, 1723, 1742,  
1744, 1796, 1806, 1807, 1848, 1851,  
1992, 1993, 2237, 2410, 2630, 2676,  
2680, 2695, 2913, 2942, 2972, 2979,  
3143, 3220

**Li II**

EL	1460, 1560, 1614, 1992, 2090A, 2239, 2729, 2788, 3155, 3160
CL	1560, 1614, 1992, 2986, 3160
W	1560, 1614, 1992, 2682, 2986, 3160
ZE	1691A, 2513A, 2521A, 3158
Hfs	1689A, 1858A, 1944, 2090A, 2130, 2425, 2521A, 2729, 2737, 2788, 3155, 3158
QF	2194, 2239, 2729, 2971, 3155
IP	2194
TE	2194
AT	2194, 2340, 2406, 2547, 2692, 3007, 3144
OT	1646, 1658, 1726, 1841, 1980, 1992, 2265, 2396, 2440, 2444, 2932, 2952

**Li III**

QF	1419, 1829, 2336A, 2944
OT	1690A

**Be I**

EL	1790, 2031, 2041A, 2042A, 2301, 2305, 2311, 2771
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ND	1593
CL	1593, 1790, 2031, 2041A, 2042A, 2301, 2305, 2369, 2771
W	1790, 2031, 2041A, 2042A, 2301, 2305, 2771
ZE	2510A, 3080
SE	1864
Hfs	1700, 1859A, 2827, 3080
AT	1626, 1894, 2004, 2125, 2178, 2210, 2292, 2302, 2311, 2620, 2648, 2649, 2705, 2778, 2896, 2912, 2995, 3050, 3128
OT	1316, 1593, 1610, 1635, 1762, 1885, 1987, 2037, 2156A, 2184, 2245, 2256, 2290, 2295, 2770, 2913, 3159, 3161, 3174, 3220

**Be II**

EL	1790, 2031, 2041A, 2092A, 2212, 2301, 2305, 3034, 3080
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ND	1593
CL	1593, 1790, 2031, 2041A, 2301, 2305, 2369, 3034
W	1790, 2031, 2041A, 2301, 2305, 3034
ZE	2510A, 3080
Hfs	2510A, 3080
AT	2837
OT	1593, 1993, 2037, 2641

**Be III**

EL	1653, 1673A, 1940, 2683
CL	1653, 1673A, 1940, 2683
W	1653, 1673A, 1940, 2493A, 2683
Hfs	2091
QF	2194, 2239, 2683
IP	1653, 2194, 2683
SF	2683

**Be III—Continued**

TE	2194
AT	2194, 2547
OT	1653, 1726, 1841, 2440

**Be IV**

W	3100
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B <sup>-</sup>	EL 2296 AT 1320, 2199
B I	EL 1461, 1790, 2041A, 2166, 2893A, 3127
CL	1461, 1790, 2041A, 2166, 2369, 2645, 2893A, 3127.
W	1461, 1790, 2041A, 2166, 2893A, 3127
ZE	1746
Hfs	1746, 1842, 1861A, 2062A, 2066A, 2707, 2827
IP	2166
PT	2482A
AT	1320, 1591, 2004, 3050, 3086
OT	1591, 1610, 2741, 3086, 3174

**B II**

EL	1790, 2041A, 2393, 3160
CL	1790, 2041A, 2393, 3160
W	1790, 2041A, 2393, 3160
AT	2004, 2302, 2995
OT	2726

**B III**

EL	1893, 2393, 2558, 3034
CL	1893, 2393, 3034
W	1893, 2393, 3034
Hfs	2169A
OT	1993, 2630, 2986

**B IV**

EL	1893, 2393, 2419, 2493A, 2558, 2782
CL	1893, 2393, 2419, 2782
W	1893, 2393, 2419, 2782
QF	2194, 2239, 2493A, 2782
IP	2194, 2493A, 2782
SF	2782
TE	2194
AT	2194, 2547
OT	1726

**B V**

EL	2558
C <sup>--</sup>	AT 2199
C <sup>-</sup>	EL 2761, 3103
AT	1320
OT	2797

**C I**

EL	1790, 2761, 3172
CL	1790, 2138, 2235, 2309, 2369, 2761
W	1790, 2138, 2761
ZE	3172
Hfs	1842
AT	1320, 1354, 1446, 1517, 1537A, 1566, 1728, 1780, 1804, 1873, 2004, 3086
OT	1537A, 1610, 1728, 1811, 1832, 2313, 2957, 3086, 3154, 3174

**C II**

EL	3168
CL	3168

## 2.2 Reference Numbers for Individual Spectra—Continued

C II—Continued			
W	3168	N IV—Continued	Hfs 2503
PT	2482A		IP 1356
AT	1320, 3086		AT 2995
OT	3086		OT 2509, 2726, 3116, 3147
C III			
EL	3168	N V	EL 1356, 2575, 3170
CL	3168		CL 1356, 1578, 2575, 3170
W	1947, 3168		W 1356, 1578, 2575, 3170
AT	2302, 2995		IP 1356
OT	1579, 2184, 2509, 2726, 3116		OT 1844, 1993, 2986
C IV			
EL	1892, 2670, 3168	N VI	EL 1356, 2017, 2288, 2426, 2493A, 3170
CL	1892, 2670, 2875, 3168		CL 1356, 2017, 2288, 2426, 2575, 3170
W	1892, 1947, 2670, 2875, 3168		W 1356, 1474, 2017, 2288, 2426, 2575,
TE	2934		3170
OT	1844, 1851, 1993, 2630, 2934, 2986		QF 2194, 2426, 2493A
C V			
EL	2670, 3170		IP 1356, 2194, 2288, 2493A
CL	2670, 2847, 2875, 3170		TE 2194
W	1474, 1947, 2493A, 2670, 2847, 2875,		AT 2194, 2547
	3170		OT 1726, 1844
QF	2194, 2239	N VII	EL 1356, 3108, 3170
IP	2194		CL 1356, 3108, 3170
TE	2194		W 1356, 3108, 3170
AT	1780, 2194, 2547, 2989		IP 1356
OT	1726, 1844, 2545	O --	AT 1847, 2199
C VI			
EL	3170		OT 3085
CL	2847, 3170	O -	EL 1750A, 2151A, 2240, 2795, 2967
W	2150, 2846, 2847, 3170		ND 1852, 1990
QF	1440, 1846		AT 1320, 1423A, 1587A, 1716, 2007
N --			
AT	2199		OT 1852, 1853, 1990, 2242, 2797, 2904
N -			
AT	1320	O I	EL 2069, 2240, 2318, 2813, 2961
N I			
EL	1411, 1790, 1915A, 2172A, 2319,		ND 2961
	2430		CL 1867, 2069, 2309, 2318, 2369, 2813,
ND	1411		3048
CL	1411, 1790, 2309, 2319, 2369, 2430		W 2069, 2179, 2318, 2813, 2961, 3048
W	1411, 1459, 1601, 1790, 2319, 2430		ZE 2566A, 3098
ZE	1810, 1914A, 2567A		Hfs 1842, 3145
Hfs	1309, 1842, 2567A		PT 2961
IP	1411		AT 1320, 1534A, 1716, 2004, 2007
SF	1411, 2319		OT 1610, 2904, 2992
AT	1309, 1320, 1422A, 1769, 2004, 2704,	O II	CL 1970
	2762		W 1970, 2226
OT	1324, 1610, 1619, 1851, 2242, 2564		ZE 1828, 2443, 2445
N II			
EL	1661		AT 1320, 1534A, 2004
CL	1578, 2900		OT 1619
W	1578, 2900	O III	EL 1675A
AT	1320, 1728, 1777, 2004		CL 1675A, 1970
OT	1481, 1728		W 1675A, 1970, 2226
N III			
EL	2448A, 2580		ZE 2443, 2445
CL	1578, 2448A, 2580		AT 1320, 1534A, 1728
W	1578, 2448A, 2580		OT 1481, 1728, 2106, 2868
Hfs	2512A	O IV	EL 2215, 3234
PT	2482A		ND 3234
AT	1320		CL 2215, 2517A, 3234
N IV			
EL	1356, 2448A		W 2215, 2226, 2517A, 3234
CL	1356, 1578, 2448A, 2575		ZE 2443
W	1356, 1578, 2448A, 2575		IP 3234

## 2.2 Reference Numbers for Individual Spectra—Continued

O IV—Continued	PT	2482A	F II	PT	2597
	AT	1320, 1534A		AT	1320, 2004, 2597
O V	EL	1808, 2215, 3170, 3234	F III	EL	1331
	CL	1808, 2215, 2517A, 3170, 3234		CL	1331
	W	1808, 2215, 2226, 2517A, 3170, 3234		W	1331
	AT	1534A, 2995		AT	1320
O VI	OT	2184, 2509, 2726, 3116, 3147	F IV	EL	1672A, 2986
	EL	1662, 1714, 2201, 2215, 2216, 2267, 2864A, 2902, 3065, 3082, 3170, 3234		CL	1672A, 2986
	CL	1662, 1714, 2185, 2201, 2215, 2216, 2267, 2517A, 2864A, 2902, 3082, 3170, 3234		W	1672A, 2986
	W	1662, 2185, 2201, 2215, 2216, 2267, 2517A, 2864A, 2902, 3082, 3170, 3234		AT	1320, 1728, 2821
O VII	AT	1534A	F V	OT	1481, 1728
	OT	1714, 1844, 1977, 1993, 2214, 2986, 3111		EL	1331, 2215, 2986
O VIII	EL	1343, 1909A, 2017, 2201, 2216, 2267, 2288, 2861A, 2902, 2945, 3170, 3234		CL	1331, 2215, 2986
	CL	1343, 1625, 1909A, 2017, 2185, 2201, 2216, 2267, 2288, 2517A, 2545, 2902, 2945, 3170, 3234		W	1331, 2215, 2986
	W	1343, 1459, 1474, 1625, 1909A, 2017, 2185, 2201, 2216, 2267, 2288, 2517A, 2636, 2669, 2902, 2945, 3082, 3170, 3234		AT	1320
	QF	2194, 2426	F VI	OT	2726
O VIII	IP	2194, 2288		EL	1331, 1714, 2215, 2288, 2543, 2670, 2694, 2714, 2864A, 2902, 3082
	TE	2194		CL	1331, 1714, 2215, 2288, 2543, 2670, 2694, 2714, 2807, 2864A, 2902, 3082
	AT	2194, 2547, 2989		W	1331, 2215, 2288, 2543, 2670, 2694, 2714, 2807, 2864A, 2902, 2986, 3082
	OT	1726, 1844, 1977, 2545		OT	1714, 2214, 2986, 3111
O VIII	EL	1910A, 2173A, 2216, 2267, 2945, 3170	F VII	EL	1343, 2266, 2288, 2326A, 2543, 2668, 2670, 2694, 2714, 2902
	CL	2216, 2267, 2517A, 2945, 3170		CL	1343, 2266, 2288, 2326A, 2543, 2668, 2670, 2694, 2714, 2902
	W	1910A, 2150, 2216, 2267, 2517A, 2636, 2786, 2945, 3170		W	1343, 2266, 2288, 2326A, 2543, 2668, 2670, 2694, 2714, 2902, 3082
	QF	1722, 1824		QF	2194, 2426
F <sup>-</sup>	EL	1455, 2401		IP	2194, 2288
	CL	2401		TE	2194
	W	2401		AT	2194, 2547
	AT	1320, 1753A		OT	1726
F I	OT	1802, 2659	F IX	EL	2173A, 2543, 2670, 2714
	EL	2401, 2597		CL	2543, 2670, 2714
	ND	1899, 2597		W	2150, 2543, 2670, 2714
	CL	2401, 3057		ZE	2026
F I	W	2401, 3057		QF	2529A
	ZE	2597, 3057	F X	EL	2173A
	Hfs	1842, 2062A, 2707		EL	1724, 2219, 2701
	PT	1899, 2597, 2598		CL	1724
F I	AT	1320, 1425A, 1960, 2004, 2597, 2598		W	1724, 2219
	OT	1610, 1851		AT	1803
Ne <sup>-</sup>	Ne <sup>-</sup>			OT	2275
	Ne <sup>-</sup>		Ne I	EL	1407, 1724, 1752, 1784, 1788, 1819, 2219, 2259, 2329A, 2749, 2750,
	Ne <sup>-</sup>			ND	2796, 3120
	Ne <sup>-</sup>			ND	2599

## 2.2 Reference Numbers for Individual Spectra—Continued

Ne I—Continued	CL	1724, 1784, 1788, 1819, 1975, 2219, 2228, 2259	Ne VI	EL	1575, 2303, 2310, 2678, 2834, 2881, 2916, 2939, 2953
	W	1407, 1724, 1752, 1784, 1788, 1819, 1975, 2219, 2259, 2637, 2852A, 2901, 3225, 3230, 3232		CL	1575, 1760, 2303, 2310, 2678, 2939, 2953
	ZE	1805, 1951, 2077A, 2624		W	1575, 1760, 2303, 2310, 2678, 2939, 2953
	SE	2802, 2976		ZE	3157
	Hfs	1589, 2013, 2077A, 2082A, 2272, 2435, 3012, 3022		AT	1320, 1327, 2257
	IS	1361, 1372, 1375, 1377, 1450, 1452, 1453, 1454, 1547, 1589, 1701A, 1900, 2013, 2023, 2082A, 2414, 2435, 2675, 2713, 3102		Ne VII	EL 1808, 2303, 2310, 2481, 2834, 2881, 2916, 2939, 2953, 3170
	IP	1407		CL	1721, 1760, 1775, 1808, 2122, 2227, 2303, 2310, 2481, 2939, 2953, 3170
	PT	1985, 2599, 2653		W	1721, 1760, 1775, 1808, 2009, 2122, 2227, 2303, 2310, 2481, 2939, 2953, 3170
	AT	1320, 1321, 1448, 1605, 1683A, 1803, 1868, 1968, 1991, 2125, 2599, 2620, 2792, 2823, 2896, 2930, 3036, 3135		AT	2257
	OT	1610, 1834, 1841, 1968, 2008, 2313, 2432, 2550, 2672, 2823, 2904, 2978, 3101, 3129		OT	2509
Ne II	EL	1369A, 1406, 1502A, 1966A, 2329A, 2597, 2615, 2616, 2810, 2834, 2881, 2939, 2953	Ne VIII	EL	1313, 1650, 1808, 1822, 1845, 2176A, 2177A, 2303, 2407, 2604, 2834, 2881, 2916, 2939, 2953, 3082, 3170
	ND	1406, 1899, 2597, 2598		CL	1313, 1650, 1721, 1760, 1808, 1822, 1845, 2122, 2185, 2227, 2303, 2407, 2522A, 2604, 2939, 2953, 3082, 3170
	CL	1406, 1502A, 2615, 2616, 2939, 2953		W	1313, 1650, 1721, 1760, 1808, 1822, 1845, 2122, 2185, 2227, 2303, 2407, 2522A, 2604, 2939, 2953, 3082, 3170
	W	1369A, 1406, 1502A, 2615, 2616, 2637, 2939, 2953		AT	2257
	ZE	1359, 2597, 3157		OT	1808, 1844, 1977, 2120
	IS	1369A, 2589		Ne IX	EL 1343, 1845, 2176A, 2177A, 2303, 2407, 2834, 2881, 2916, 2953, 3170
	IP	1369A, 1406		CL	1343, 1845, 2185, 2303, 2407, 2522A, 2545, 2953, 3170
	PT	1899, 2597, 2598		W	1343, 1845, 2185, 2303, 2407, 2522A, 2636, 2786, 2953, 3082, 3170
	AT	1320, 1809, 2257, 2597, 2598, 2948		QF	2194, 2426
	OT	2841		IP	1845, 2194
Ne III	EL	1406, 2303, 2317, 2329A, 2834, 2881, 2939, 2953		TE	2194
	CL	1406, 2303, 2317, 2939, 2953		AT	2194, 2257, 2547, 2989
	W	1406, 2303, 2317, 2939, 2953		OT	1726, 1844, 1977, 1980, 2120, 2545
	ZE	1359, 3157		Ne X	EL 2303, 2407, 2916, 3170
	PT	2597		CL	2303, 2407, 3170
	AT	1320, 2257, 2597, 2948		W	2303, 2407, 2786, 3170
	OT	2841		AT	2257
	EL	2303, 2310, 2329A, 2677, 2834, 2881, 2939, 2953		Ne	W 2306, 2308
	ND	2677		Na <sup>-</sup>	EL 1749A, 2158A, 2296, 2551, 2671
	CL	2303, 2310, 2677, 2939, 2953		AT	1439
	W	2303, 2310, 2677, 2939, 2953		OT	2157A, 2241, 2530A, 2633, 2801, 3060
Ne IV	AT	1320, 2257		Na I	EL 1795, 2018, 2384, 2571A, 2584, 2600, 2661, 2764, 2855A, 2865A, 2870, 2871, 2981, 3008, 3018, 3025, 3073
	OT	1619		CL	1795, 2018, 2309, 2369, 2382, 2571A, 2865A, 3018
	EL	2009, 2303, 2310, 2329A, 2678, 2834, 2881, 2916, 2939, 2953		W	1795, 2018, 2382, 2571A, 2600, 2865A, 3018
	CL	1760, 2009, 2303, 2310, 2678, 2939, 2953			
	W	1760, 2009, 2303, 2310, 2678, 2939, 2953			
	AT	1320, 1728, 2257			
	OT	1481, 1728			

## 2.2 Reference Numbers for Individual Spectra—Continued

Na I—Continued	ZE	1367, 2160A, 2789, 2859A, 3223	Na XI	EL	2304, 2328A, 2560
	SE	1513, 1590, 1787, 2202, 2814, 2855A, 3001, 3015, 3025		CL	2304, 2328A, 2560
	Hfs	1367, 1535, 1567, 1709A, 1710A, 1761, 1913A, 1929, 1956, 2001, 2060A, 2080, 2093A, 2094A, 2096A, 2097A, 2164A, 2204, 2282, 2337A, 2339A, 2384, 2436, 2472, 2490, 2507A, 2523A, 2588, 2600, 2650, 2689A, 2789, 2803, 2804, 2845A, 2859A, 2870, 2871, 2914, 3083, 3096, 3119, 3137		Mg <sup>+</sup>	2983
	IS	3096		Mg I	EL 1790, 2098A, 2195, 2781, 2926, 3130, 3166 ND 2030 CL 1790, 2030, 2098A, 2195, 2309, 2369, 2781, 2926, 3130, 3166 W 1790, 2098A, 2195, 2781, 2926, 3130, 3166
	QF	2163A		Hfs	2515
	IP	2018		IS	1688A
	AT	1836, 1971, 2731, 2912, 2950, 2962		IP	2195, 2374, 2874, 3166
	OT	1456, 1573, 1742, 1834, 1918, 1971, 2117, 2410, 2972, 3220		AT	1449, 1572, 1626, 2016, 2030, 2688, 2730, 2769, 2872, 2873
				OT	1572, 1834, 2037, 2117, 2156A, 2290, 3161
Na II	ZE	1691A	Mg II	EL	1790, 2781, 2857A, 3130
	Hfs	2511A		CL	1790, 2369, 2781, 3130
	PT	2599		W	1790, 2781, 3130
	AT	1683A, 2273, 2599		AT	1836, 1971, 2872, 2873
	OT	1841, 3129		OT	1573, 1971, 2037
Na III	EL	1660, 1882, 1883, 2484A, 2909	Mg III	EL	1434, 2003, 2781, 3130
	ND	1660, 1882, 1899, 2909		ND	1434, 2149
	CL	1882, 1883, 2484A, 2909		CL	1434, 2003, 2781, 3130
	W	1882, 1883, 2484A, 2909		W	1434, 2003, 2781, 3130
	IP	2720, 2909		IP	1434, 2003
	PT	1882, 1899, 2598, 2909		PT	1434, 2149, 2599
	AT	2598		AT	1683A, 2599
Na IV	OT	1883, 2720		OT	3129
	EL	2109, 2484A, 2617	Mg IV	EL	1660, 1965, 2720
	CL	2109, 2387, 2484A, 2617		ND	1660, 1899, 1959, 1965
	W	2109, 2387, 2484A, 2617		CL	1660, 1959, 1965, 2720
Na V	EL	2109		W	1660, 1965, 2720
	CL	2109		IP	1660, 1965, 2720
	W	2109		PT	1660, 1899, 1959, 1965, 2598, 2720
Na VI	EL	1331, 2109, 2142, 2617	Mg V	AT	1660, 1959, 2039A, 2598, 2720
	CL	1331, 2109, 2617		EL	
	W	1331, 2109, 2617		CL	
	PT	2142		W	
	OT	1481		IP	
Na VII	EL	1808	Mg VI	OT	1619
	CL	1808		EL	1331
	W	1808		CL	1331
				W	1331, 1459
Na VIII	OT	1481		OT	1481
			Mg VII		
Na IX	EL	1331, 1808, 2560, 2743	Mg VIII	OT	
	CL	1331, 1808, 2560, 2743		EL	
	W	1331, 1808, 2560, 2743		CL	
	OT	1808		W	
Na X	EL	2328A, 2560, 2743	Mg IX	OT	
	CL	2328A, 2560, 2743		EL	
	W	2328A, 2560, 2743		CL	
				W	
Na XI			Mg X	OT	
				EL	1331, 1808, 2304, 2408, 2479, 2560, 2670, 2728, 2743
				CL	1331, 1808, 2304, 2408, 2479, 2560, 2670, 2728, 2743

## 2.2 Reference Numbers for Individual Spectra—Continued

Mg x—Continued	W	1331, 1428, 1808, 2304, 2408, 2479, 2560, 2636, 2670, 2728, 2743	Al v—Continued Al vi Al vii Al viii Al ix	PT	2577
	TE	2934		AT	2577
	OT	1808, 1844, 1977, 2479, 2934		EL	2877, 2940
	EL	1428, 1585, 2304, 2328A, 2408, 2479, 2560, 2602, 2670, 2743, 3123, 3226		CL	1785, 2277, 2877, 2940
	CL	1428, 1585, 2304, 2328A, 2408, 2479, 2545, 2560, 2602, 2670, 2743, 3123, 3226		W	1785, 2277, 2605, 2877, 2940
Mg xi	W	1428, 1585, 2304, 2328A, 2408, 2479, 2560, 2602, 2636, 2670, 2743, 3123, 3226	Al vii Al viii	EL	2940
	AT	2989		CL	1785, 2587, 2940
	OT	1428, 1844, 1977, 2479, 2545		W	1785, 2587, 2605, 2940
	EL	2304, 2328A, 2408, 2479, 2560, 2602, 2670, 3226		EL	1331
Mg xii	CL	2304, 2328A, 2408, 2479, 2560, 2602, 2670, 3226	Al viii	CL	1331, 1785
	W	1428, 2304, 2328A, 2408, 2479, 2560, 2602, 2636, 2670, 3226		W	1331, 1785, 2605
	OT	2479		OT	1481
	EL	3103	Al ix	EL	1471
Al i	EL	1790, 2628		ND	1471
	ND	2293		CL	1471, 1484, 1785
	CL	1790, 2309, 2369, 2628		W	1471, 1484, 1785
	W	1790, 2628, 2685		AT	1327
	SE	2395	Al x	EL	1331, 1471, 1808
	Hfs	1746, 2062A, 2395, 2707		CL	1331, 1471, 1785, 1808
	AT	1971, 2293, 3076		W	1331, 1471, 1785, 1808
Al ii	OT	1834, 1971, 2293, 3076	Al xi	EL	1331, 1471, 2081A, 2304, 2408, 2479, 2560, 2670, 2743, 2946
	EL	1790, 2134A, 2940		CL	1331, 1471, 1484, 2304, 2408, 2479, 2560, 2670, 2743
	ND	1523A, 2293		W	1331, 1471, 1484, 2304, 2408, 2479, 2560, 2670, 2743
	CL	1523A, 1790, 2134A, 2369, 2940		OT	1808, 2479
	W	1790, 2134A, 2940	Al xii	EL	2304, 2328A, 2408, 2479, 2560, 2670, 2743, 3123, 3226
	IP	2134A		CL	2304, 2328A, 2408, 2460, 2479, 2560, 2670, 2743, 3123, 3226
	AT	1572, 2293		W	1428, 2304, 2328A, 2408, 2460, 2479, 2560, 2636, 2670, 2743, 3123, 3226
Al iii	OT	1572, 2290		OT	2479
	EL	2940	Al xiii	EL	2304, 2328A, 2408, 2479, 2560, 3226
	CL	2940		CL	2304, 2328A, 2408, 2460, 2479, 2560, 3226
	W	2940		W	1428, 2304, 2328A, 2408, 2460, 2479, 2560, 2636, 3226
	AT	1836, 1971		OT	2479
Al iv	OT	1573, 1971	Si II	AT	2199
	EL	1607, 1674A, 1963, 2223, 2829, 2940		EL	2897, 3103
	ND	1963, 2223, 2829		Si I	EL 1790, 2167, 2533A, 2542
	CL	1607, 1674A, 1963, 2223, 2829, 2940		CL	1790, 2167, 2309, 2369, 2533A, 2542
	W	1607, 1674A, 1963, 2223, 2605, 2829, 2940		W	1459, 1790, 2533A, 2542
	IP	2829		IP	2167, 2542
	PT	1963, 2223, 2829		PT	2733
Al v	AT	1491, 1963		AT	2968
	OT	3129		OT	2167
	EL	1660, 2577, 2940	Si II	CL	2369, 2645
	ND	1630, 1660, 2181, 2577		W	2226
Al vi	CL	1630, 2577, 2940		AT	1971
	W	1630, 2577, 2605, 2940		OT	1971

## 2.2 Reference Numbers for Individual Spectra—Continued

Si III	W	2226		Si XIV	EL	2304, 2328A, 2479, 2560	
	AT	1572			CL	2304, 2328A, 2479, 2560	
	OT	1572			W	1428, 2304, 2328A, 2479, 2560, 2636	
Si IV	W	2226		Si XV	OT	2479	
	OT	1731, 2129			EL	2479	
Si V	ND	2223		Si XVIII	CL	2479	
	TE	2843			W	2479	
	AT	1491			OT	2479	
	OT	2843, 3129			EL	1334	
Si VI	ND	1660, 2181			CL	1334	
	AT	2004			W	1334	
Si VII	EL	1334, 2877		P--	AT	2199	
	CL	1334, 2277, 2877		P-	EL	2296	
	W	1334, 1459, 2277, 2877		P I	CL	2309, 2369, 2548	
	AT	2004			W	2548	
Si VIII	EL	2728			Hfs	2709	
	CL	2728			AT	2459A	
	W	1459, 2728		P II	EL	1778	
	AT	2004			ND	1778	
	OT	1619			CL	1778, 2369	
Si IX	EL	1331, 1334, 2479			W	1778	
	ND	1334			ZE	1778	
	CL	1331, 1334, 2479		P III	PT	1778, 2733	
	W	1331, 1334, 1428, 1459, 2479			AT	1777	
	AT	2004			EL	2608	
Si X	OT	2106, 2479			CL	2608	
	EL	2479			W	2608	
	CL	2479		P IV	AT	1971	
	W	1428, 2479, 2636			OT	1971	
	AT	1327, 2004			EL	1558, 2608, 3055	
Si XI	OT	2106, 2479			ND	1558	
	EL	1331, 1808, 2479, 2481			CL	1508, 2608, 3055	
	CL	1331, 1808, 2479, 2481			W	1508, 2608, 3055	
	W	1331, 1808, 2479, 2481		P V	IP	1558	
	AT	2004			EL	2608, 2613	
Si XII	OT	2479			CL	2608, 2613	
	EL	1331, 1808, 2081A, 2304, 2479, 2560, 2728, 2743, 2863A, 2946			W	2608, 2613	
	CL	1331, 1808, 2304, 2479, 2560, 2728, 2743, 2863A		P VI	IP	2613	
	W	1331, 1428, 1808, 2304, 2479, 2560, 2728, 2743, 2863A			SF	2613	
	TE	2934			ND	2223	
Si XIII	AT	2989		P VII	AT	1491	
	OT	1808, 1844, 2479, 2934			OT	3129	
	EL	1428, 1592, 2304, 2328A, 2479, 2560, 2722, 2743		P VIII	ND	1660, 2181	
Si XIII	CL	1428, 2285, 2304, 2328A, 2479, 2545, 2560, 2743			EL	2299, 2877	
	W	1428, 2304, 2328A, 2479, 2560, 2636, 2743			CL	2277, 2299, 2877	
	TE	2285			W	2277, 2299, 2877	
Si XIII	OT	1428, 1844, 2285, 2479, 2545, 2748		P IX	EL	1334, 2279, 2299	
					CL	2299	
Si XIII					W	2299	
				P X	EL	1334, 2279, 2299	
					ND	1334	
					CL	1334, 2279, 2299	
Si XIII					W	1334, 2279, 2299	

## 2.2 Reference Numbers for Individual Spectra—Continued

P XI	EL	2279, 2299	S VIII—Continued	
	CL	2279, 2299	CL	2577
	W	2279, 2299	AT	2039A
P XII	EL	1924, 2279, 2299	S IX	EL 1347, 2321, 2877
	CL	1924, 2279, 2299	ND	1334
	W	1924, 2279, 2299	CL	1334, 1347, 2277, 2321, 2877
	IP	1924	W	1334, 1347, 1459, 2277, 2321, 2877
	OT	1680, 1924, 3136	AT	1555, 2321
P XIII	EL	1924, 2299, 2560	S X	EL 1334, 1347, 2279, 2321, 2728
	ND	1924	CL	1334, 1347, 2279, 2321, 2728
	CL	1924, 2299, 2560	W	1334, 1347, 2279, 2321, 2728
	W	1924, 2299, 2560	AT	1555, 2321
	OT	1808, 1924		
P XIV	EL	2560, 3123	S XI	EL 1334, 1347, 2279
	CL	2560, 3123	ND	1334
	W	2560, 3123	CL	1334, 1347, 2279
P XV	EL	2560	W	1334, 1347, 1459, 2279
	CL	2560	AT	1555
	W	2560	OT	1481
S --	AT	2199	S XII	EL 1334, 1347, 2279, 2479
S I	EL	1500, 1982	CL	1334, 1347, 2279, 2479
	ND	2043A	W	1334, 1347, 1428, 2279, 2479
	CL	1500, 2309, 2369, 2645	TE	2934
	W	1500, 1982	AT	1327, 1555
	ZE	1817	OT	2479, 2934
	IP	1500	S XIII	EL 1347, 1808, 2279, 2315, 2479, 2481
	PT	2192	CL	1347, 1808, 2279, 2315, 2479, 2481
	AT	2043A, 2126, 2459A	W	1347, 1428, 1808, 2279, 2315, 2479,
	OT	2126		2481
			OT	2479, 3136
S II	CL	1927	S XIV	EL 1808, 2168A, 2279, 2304, 2315,
	W	1927, 2226, 2514A		2330A, 2404, 2421, 2479, 2560,
	PT	2192		2728, 2743
S III	CL	1927, 2645	CL	1808, 2279, 2304, 2315, 2421, 2479,
	W	1927, 2226, 2514A		2560, 2728, 2743
	PT	2733	W	1428, 1808, 2279, 2304, 2315, 2421,
S IV	EL	1329		2479, 2560, 2728, 2743
	CL	1329, 1927	TE	2934
	W	1329, 1927, 2226, 2514A	OT	1808, 1844, 1977, 2479, 2934, 3111
S V	EL	1329, 2514A, 3055	S XV	EL 1428, 1592, 2174A, 2304, 2330A,
	CL	1329, 1927, 2127, 2514A, 3055		2421, 2479, 2560, 2722, 3123
	W	1329, 1927, 2226, 2514A, 3055	CL	1428, 2304, 2421, 2479, 2545, 2560,
	IP	1558		3123
	OT	2290	W	1428, 2304, 2421, 2479, 2560, 3123
S VI	EL	1329, 2514A	OT	1428, 1844, 1977, 2479, 2545
	CL	1329, 2514A		
	W	1329, 1927, 2226, 2514A	S XVI	EL 2304, 2479, 2560
S VII	ND	1483	CL	1462, 2304, 2479, 2560
	TE	2843	W	1428, 1462, 2304, 2479, 2560
	AT	1491	SE	3121
	OT	1745, 2843	OT	2479
S VIII	EL	1660, 2577	Cl-	EL 2205
	ND	1660, 2181	ND	2206
			CL	2205
			W	2205
			AT	1516
			OT	1802, 2206, 2659

## 2.2 Reference Numbers for Individual Spectra—Continued

Cl I	EL	2069, 2379	Cl XII—Continued	CL	1334, 1481, 2267, 2279, 3105
	ND	2043A		W	1334, 1481, 2267, 2279, 3105
	CL	1505, 2069		OT	1481
	W	1505, 2069			
	ZE	2734			
	SE	1490		Cl XIII	EL 1334, 2267, 2279, 3105
	Hfs	2062A, 2707, 2734		CL	1334, 2267, 2279, 3105
	AT	2043A, 2459A, 2475, 2820		W	1334, 2267, 2279, 3105
Cl II	EL	1617, 2043A, 2940	Cl XIV	EL	1334, 2267, 2279, 3105
	ND	1617, 2043A		CL	1334, 2267, 2279, 3105
	CL	1617, 2043A, 2940		W	1334, 2267, 2279, 3105
	W	1617, 2043A, 2940		OT	3136
	SE	1490			
	IP	1617		Cl XV	EL 1642, 2330A, 2398, 2560, 2667, 2818, 3105, 3169
	PT	1617, 2043A		CL	2398, 2560, 2667, 3105, 3169
	AT	1617, 2043A		W	2398, 2560, 2667, 3105, 3169
Cl III	EL	2940		OT	1642, 1808, 2215, 3111
	CL	2940	Cl XVI	EL	2330A, 2398, 2446, 2560, 3105, 3169
	W	2940		CL	2398, 2446, 2560, 3105, 3169
Cl IV	EL	1401, 2258, 2940		W	2398, 2446, 2560, 3105, 3169
	CL	1401, 2258, 2645, 2940	Cl XVII	EL	3105
	W	1401, 2258, 2940		CL	3105
	PT	2733		W	3105
Cl V	EL	1401, 2258, 2940	Ar <sup>-</sup>	EL	1495, 2219, 2405, 2576, 2701, 3031
	CL	1401, 2258, 2940		CL	2405
	W	1401, 2940		W	2219, 2405
Cl VI	EL	1401, 2258, 2267, 2940		AT	2556
	CL	1401, 1941, 2258, 2267, 2381, 2940	Ar I	EL	1495, 1788, 1819, 1827, 2057A, 2131, 2162A, 2219, 2244, 2228, 2325A, 2427, 2429, 2576, 2578, 2634, 2640, 2749, 3031, 3236
	W	1401, 2258, 2267, 2381, 2940		ND	2899
	IP	1558, 2381		CL	1788, 1819, 1827, 2145, 2219, 2244, 2325A, 2427, 2429, 2634, 2958, 3236
Cl VII	EL	1401, 2258, 2267, 2863A, 2940		W	1788, 1819, 1827, 2057A, 2131, 2219, 2244, 2325A, 2427, 2429, 2578, 2634, 3236
	CL	1401, 2258, 2267, 2381, 2863A, 2940		ZE	1708A, 2121, 2644
	W	1401, 2258, 2267, 2381, 2666, 2667, 2863A, 2940		IP	2131
	IP	2381		PT	1319, 1985, 2191, 2599
				AT	1516, 1605, 1837, 1865, 1978, 1991, 2153A, 2274, 2599, 2620, 2736, 2823, 2899, 2908, 3182A
Cl VIII	EL	2258, 2267, 2940		OT	2213, 2399, 2427, 2823, 2899, 2904, 2908, 2910
	CL	2258, 2267, 2940	Ar II	EL	1334, 2258, 2267
	W	2258, 2267, 2381, 2940		ND	1334
	AT	1491		CL	1334, 2183, 2258, 2267
	OT	1745		W	1334, 2183, 2258, 2267
Cl IX	EL	2258, 2267, 2577, 2940		ZE	1708A, 2121, 2644
	ND	2181		IP	2131
	CL	2258, 2267, 2577, 2940		PT	1319, 1985, 2191, 2599
	W	2258, 2267, 2381, 2940		AT	1516, 1605, 1837, 1865, 1978, 1991, 2153A, 2274, 2599, 2620, 2736, 2823, 2899, 2908, 3182A
Cl X	EL	2183, 2258, 2267	Ar III	OT	2213, 2399, 2427, 2823, 2899, 2904, 2908, 2910
	ND	1334		EL	1317, 1845, 2057A, 2162A, 2634, 3236
	CL	1334, 2183, 2258, 2267		ND	1794
	W	1334, 2183, 2258, 2267		CL	1845, 2145, 2634, 2958, 3236
Cl XI	EL	1334, 2267, 2279		W	1317, 1845, 2057A, 2634, 3236
	CL	1334, 2267, 2279		ZE	1525, 1588, 1833
	W	1334, 2267, 2279		PT	1509, 1794
				AT	2740
Cl XII	EL	1334, 1481, 2267, 2279, 3105	Ar III	EL	1328, 2727, 2998
	ND	1334		CL	1328, 2145, 2727, 2958

## 2.2 Reference Numbers for Individual Spectra—Continued

Ar III—Continued			Ar xv—Continued			
W	1328, 2727		W	1334, 1428, 1808, 1845, 2479, 2481, 3221		
ZE	1525, 1588		OT	2479, 3136		
AT	2740					
Ar iv			Ar xvi			
EL	1328, 2727, 2998		EL	1642, 1808, 1845, 2304, 2331A, 2479, 2728, 2818		
CL	1328, 2145, 2727, 2958		CL	1808, 1845, 2304, 2331A, 2479, 2728		
W	1328, 2727		W	1428, 1808, 1845, 2304, 2331A, 2479, 2728		
Ar v			TE	2934		
EL	3055		OT	1642, 1808, 1844, 1977, 2215, 2479, 2934, 3111		
CL	3055					
W	3055					
PT	2733					
Ar vi			Ar xvii			
EL	3055		EL	1428, 1592, 1845, 2304, 2479, 2618, 2722, 2815		
CL	3055		CL	1428, 1845, 2304, 2479, 2545, 2815		
W	3055		W	1428, 1845, 2304, 2479, 2815		
Ar vii			IP	1845		
EL	3055, 3236		OT	1428, 1494, 1844, 1977, 2479, 2545		
CL	3055, 3236					
W	2885A, 3055, 3236					
IP	1558		Ar xviii			
OT	2290		EL	1845, 2479, 2722		
Ar viii			CL	1462, 1845, 2479		
EL	1650		W	1462, 1845, 2479		
CL	1458, 1650		OT	2479		
W	1458, 1650, 2885A					
OT	1731		Ar xix			
Ar ix			W	1428		
EL	1845		Ar	W	1334, 3055	
CL	1845, 2143					
W	1845, 2885A		K <sup>-</sup>			
TE	2843		EL	2158A, 2296, 2671, 3218		
AT	1491		OT	2157A, 2633, 3060		
OT	2843			K <sub>1</sub>		
Ar x			EL	1792, 2152A, 2996, 3069, 3131, 3183, 3218, 3219		
EL	1334, 3221		CL	1792, 2309, 2369, 2996, 3131, 3183, 3219, 3227		
CL	1334, 2143, 3221		W	1427, 1792, 1906A, 2996, 3131, 3183, 3219, 3227		
W	1334, 2885A, 3221		ZE	1747A, 1810, 2789		
OT	2181		SE	1418, 1590, 2202, 3001		
Ar xi			Hfs	1416, 1682A, 1703A, 1707A, 1748A, 1763, 1876, 1913A, 1961, 2001, 2203, 2254, 2505A, 2744, 2789, 2819, 2845A, 3137		
EL	1334, 3221		IS	1315		
CL	1334, 2029, 2754, 3221		IP	3131		
W	1334, 2885A, 3221		AT	2731, 2962		
AT	2029		OT	1456, 1742, 2332A, 2809, 3024		
Ar xii						
EL	1334, 1845, 2279, 3221, 3236		K <sub>II</sub>			
CL	1334, 1845, 2279, 3221, 3236		EL	2857A, 2940		
W	1334, 1845, 2279, 3221, 3236		ND	2191, 2760		
Ar xiii			CL	2940		
EL	1334, 1481, 2279, 3221		W	2940		
CL	1334, 1481, 2279, 3221		PT	2191, 2599, 2760, 2933		
W	1334, 1428, 1481, 2279, 3221		AT	1516, 1665, 1837, 2409, 2599, 2760		
OT	1481		OT	2809		
Ar xiv						
EL	1334, 1845, 2479, 3221		K <sub>III</sub>			
CL	1334, 1845, 2479, 3221		EL	2940		
W	1334, 1428, 1845, 2479, 3221		CL	2940		
AT	1327		W	2940		
OT	2479					
Ar xv			K <sub>IV</sub>			
EL	1334, 1808, 1845, 2479, 2481, 3221		EL	2940		
CL	1334, 1808, 1845, 2479, 2481, 3221		CL	2940		
			W	2940		

## 2.2 Reference Numbers for Individual Spectra—Continued

K v	EL	2940		Ca I—Continued	
	CL	2940		W	2182
	W	2940		ZE	2307, 2689A
K vi	EL	2940		SE	2307
	CL	2940		Hfs	2515
	W	2940		IS	1322
	PT	2733		IP	2182, 2374, 2874
K vii	EL	2940		PT	2808
	CL	2940		AT	1566, 1626, 1804, 2459A, 3076
	W	2940		OT	3076, 3220
K viii	EL	1558, 2940		Ca II	CL 2309, 2369
	CL	1558, 2940		Ca III	EL 1405, 2911
	W	1558, 2940			ND 2191, 2911
	IP	1558			CL 1405, 2911
	OT	1467			W 1405, 2911
K ix	EL	2940			IP 1405
	CL	2940			SF 1405
	W	2940			PT 1405, 1837, 2191, 2599, 2911
K x	AT	1491			AT 1665, 1837, 2599, 2911
K xi	EL	2039A, 2181		Ca VII	PT 2733
	CL	2039A, 2181		Ca IX	EL 1558
	W	2039A, 2181			CL 1558
	AT	2039A			W 1558
					IP 1558
K xii	EL	2183, 2563, 2877		Ca X	CL 1458
	CL	2183, 2277, 2563, 2877			W 1458
	W	2183, 2277, 2563, 2877		Ca XI	TE 2843
K xiii	EL	2563			AT 1491
	CL	2563			OT 2843
	W	2563		Ca XII	EL 2039A, 2181
K xiv	EL	2076, 2563			CL 2039A, 2181
	CL	2563			W 2039A, 2181
	W	2563			OT 3104
K xv	EL	2076, 2563		Ca XIII	EL 1333, 2183, 2563, 2877
	CL	2563			ND 2563
	W	2563			CL 1333, 2183, 2277, 2563, 2877
K xvi	EL	2563			W 1333, 2183, 2277, 2563, 2877
	CL	2563			OT 3104
	W	2563		Ca XIV	EL 1333, 2563, 3043
	OT	3136			ND 2563
K xvii	EL	1808, 1816, 2560, 3169			CL 1333, 2563, 3043
	CL	1808, 1816, 2560, 3169			W 1333, 2563, 3043
	W	1808, 1816, 2560, 3169			PT 3043
	IP	1816		Ca XV	EL 1333, 1808, 2076, 2563, 3043
	OT	1808, 1816			ND 2563
K xviii	EL	2479, 2560, 3169			CL 1333, 1808, 2563, 3043
	CL	2479, 2560, 3169			W 1333, 1808, 2563, 3043
	W	2479, 2560, 3169			AT 1728
	OT	2479			OT 1728, 1808, 3104
Ca-	EL	1687		Ca XVI	EL 1808, 2479, 2076, 2563, 3043
Ca I	EL	2182			CL 1808, 2479, 2563, 3043
	CL	2182, 2309, 2369			W 1428, 1808, 2479, 2563, 3043
					OT 1808, 2479

## 2.2 Reference Numbers for Individual Spectra—Continued

Ca XVII	EL	1808, 2479, 2481, 2487A, 2563, 3043, 3136	Sc VII	EL	1941
	CL	1808, 2479, 2481, 2487A, 2563, 3043, 3136		CL	1941
	W	1428, 1808, 2479, 2481, 2487A, 2563, 3043, 3136		W	1941
	OT	2479, 3136			
Ca XVIII	EL	1808, 1816, 2479, 2560, 2728, 3169	Sc X	EL	1558
	CL	1808, 1816, 2479, 2560, 2728, 3169		CL	1558
	W	1428, 1808, 1816, 2479, 2560, 2728, 3169		W	1558
	IP	1816		IP	1558
Ca XIX	TE	2934	Sc XII	OT	1745
	OT	1808, 1816, 1844, 1977, 2479, 2934		EL	1333, 2039A, 2181
Ca XX	CL	1428, 2479, 2560, 3169		ND	2180
	CL	1428, 2285, 2479, 2545, 2560, 3169		CL	1333, 2039A, 2181
	W	1428, 2479, 2560, 3169		W	1333, 2039A, 2181
	TE	2285		AT	2180
Sc I	OT	1428, 1844, 1977, 2285, 2479, 2545, 2748	Sc XIV	EL	1333, 2183, 2321, 2563, 2877
	EL	2479		ND	2563
	CL	2479		CL	1333, 2183, 2277, 2563, 2877
	W	1428, 2479		W	1333, 2183, 2277, 2563, 2877
Sc II	OT	2479	Sc XV	EL	1333, 2321, 2563
	EL	1473, 2110, 3140		ND	2563
	ND	2032		CL	1333, 2321, 2563
	CL	1473, 2110		W	1333, 2563
Sc III	W	1473, 2110	Sc XVI	EL	1333, 1481, 2076, 2563
	ZE	1380, 1473, 3140		ND	2563
	Hfs	1380, 2032, 2066A, 2708, 3066		CL	1333, 1481, 2563
	IP	1473, 2110		W	1333, 1481, 2563
Sc IV	AT	1983, 2423		OT	1481
	OT	1983	Sc XVII	EL	2076, 2563
	EL	1473		CL	2563
	CL	1473, 1608		W	2563
Sc V	W	1473, 1608	Sc XVIII	EL	2563
	ZE	1473		CL	2563
	EL	1884, 1891, 2123, 2625		W	2563
	CL	1608, 1884, 1891, 2123, 2625		OT	3136
Sc VI	W	1608, 1884, 1891, 2123, 2625	Sc XIX	EL	1816
	IP	1884, 1891, 2123, 2625		CL	1816
	SF	1884, 1891, 2123, 2625		W	1816
	EL	2826		IP	1816
Sc VII	CL	2826	Ti I	OT	1816
	W	2826		EL	1727A
	IP	2826		CL	1727A, 2645
	PT	2826		W	1727A
Sc VIII	AT	1837		ZE	1628
	EL	2826		Hfs	2101, 2708
	W	2826		IP	2374
	CL	1941		PT	2375
Sc IX	W	2826		AT	1586
	EL	1941	Ti II	OT	1586, 1831, 2375
	CL	1941		EL	1727A
	W	1941		CL	1727A, 2645

## 2.2 Reference Numbers for Individual Spectra—Continued

Ti II—Continued		Ti XVIII	EL	2076, 2412, 2563, 2935
W	1727A	ND	2563	
AT	1571, 1821, 1973	CL	2412, 2563, 2935	
OT	1571, 3028	W	2412, 2563, 2935	
Ti III	CL 2645 PT 1373, 1655 AT 1576, 1624	Ti XIX	EL 2412, 2487A, 2563, 3136 ND 2563 CL 2412, 2487A, 2563, 3136 W 2412, 2487A, 2563, 3136	
Ti IV	EL 2753 CL 2753 W 2753 IP 2753 SF 2753		OT 3136	
Ti V	PT 1837 AT 1837	Ti XX	EL 1816, 2560, 2561, 3122 CL 1816, 2560, 2561, 3122 W 1816, 2560, 2561, 3122 IP 1816, 2561 OT 1816	
Ti VI	EL 1559, 1941 CL 1559, 1941 W 1559	Ti XXI	EL 2479, 2560, 2618, 2991, 3027, 3122 CL 2479, 2560, 2991, 3027, 3122 W 1428, 2479, 2560, 2991, 3027, 3122 IP 3122 OT 2479, 2991	
Ti VII	EL 1559, 1941 CL 1559, 1941 W 1559	Ti XXII	EL 2991, 3027 CL 2991, 3027 W 2991, 3027 OT 2991	
Ti VIII	EL 1941 CL 1941	V I	ND 2032 Hfs 2032, 2075A, 2101, 2708 AT 2964, 3124	
Ti IX	EL 1941 CL 1941	V II	EL 2047A CL 2047A, 2645 W 2047A PT 2375 AT 1586	
Ti XI	EL 1558 CL 1558, 1941 W 1558 IP 1558	V III	OT 1586, 2049A, 2375	
Ti XII	OT 1731		CL 2645	
Ti XIII	TE 2843 OT 1745, 2843		PT 1373, 1655	
Ti XIV	EL 1333, 2039A, 2181, 2549 CL 1333, 2039A, 2181 W 1333, 2039A, 2181, 2549		AT 1983	
Ti XV	EL 1333, 2183, 2321, 2412, 2549, 2563, 2877 ND 2563 CL 1333, 2183, 2277, 2412, 2563, 2877 W 1333, 2183, 2277, 2412, 2549, 2563, 2877	V IV	OT 1983	
Ti XVI	EL 1333, 2412, 2549, 2563, 2937 ND 2563 CL 1333, 2412, 2549, 2563, 2937 W 1333, 2412, 2549, 2563, 2937 OT 2549	V V	PT 1373 AT 1576, 1624, 2320 OT 2320	
Ti XVII	EL 1481, 2076, 2277, 2412, 2563, 2877, 2937 ND 2563 CL 1481, 2277, 2412, 2563, 2877, 2937 W 1481, 2277, 2412, 2563, 2877, 2937 OT 1481, 2937	V VI	EL 2123, 2284, 2447 CL 2123, 2284, 2447 W 2123, 2284, 2447 IP 2123, 2284, 2447 SF 2123, 2447	
		V VII	PT 1837 AT 1837	
			EL 1941 CL 1941 W 1941	

## 2.2 Reference Numbers for Individual Spectra—Continued

V VIII	EL	1941		Vxx—Continued	
	CL	1941		AT	2076
	W	1941		OT	3136
V IX	EL	1468, 1941		V XXI	1816, 2560, 2561, 3122
	CL	1468, 1941		CL	1816, 2560, 2561, 3122
	W	1468, 1941		W	1816, 2341, 2560, 2561, 3122
V X	EL	1468, 1941		IP	1816, 2561
	CL	1468, 1941		OT	1816
	W	1468, 1941		V XXII	2560, 3122
V XI	EL	1669		CL	2560, 3122
	CL	1669		W	2560, 3122
	W	1669		IP	3122
V XII	EL	1669, 1941		Cr <sup>-</sup>	EL 2296
	CL	1669, 1941		Cr I	EL 2832
	W	1669, 1941		CL	2832
	IP	1558		W	2832
V XIII	EL	1669, 1941		Hfs	2708
	CL	1669, 1941		IP	2832
	W	1669, 1941		AT	2296
	IP	1941		OT	1768
	OT	1731, 2129		Cr II	AT 1821, 1973
V XIV	OT	1745		OT	OT 1467
V XV	EL	1333, 2039A, 2181, 2549		Cr III	CL 2645
	CL	1333, 2039A, 2181		PT	1373, 1655
	W	1333, 2039A, 2181, 2549		AT	1586
	AT	2039A		OT	1586
V XVI	EL	1333, 2183, 2341, 2549, 2563, 2877		Cr IV	EL 1932
	ND	2563		ND	1932
	CL	1333, 2183, 2277, 2341, 2563, 2877		CL	1932
	W	1333, 2183, 2277, 2341, 2549, 2563,		W	1932
		2877		AT	1571
V XVII	EL	1333, 2277, 2341, 2549, 2563, 2877,		OT	1571
		2937		Cr V	EL 1933
	ND	2563		CL	1933
	CL	1333, 2277, 2341, 2549, 2563, 2877,		W	1933
		2937		IP	1933
	W	1333, 2277, 2341, 2549, 2563, 2877,		AT	1576, 1624, 2320
		2937		OT	2320
V XVIII	OT	2549		Cr VI	EL 2229
	EL	1481, 2076, 2277, 2341, 2563, 2877,		CL	2229
		2937		W	2229
	ND	2563		IP	2229
	CL	1481, 2277, 2341, 2563, 2877, 2937		Cr VII	EL 1837
V XIX	W	1481, 2277, 2341, 2563, 2877, 2937		CL	1837
	OT	1481, 2937		W	1837
	EL	2076, 2277, 2341, 2563, 2877, 2935		PT	1837
	ND	2563		AT	1837
V XX	CL	2277, 2341, 2563, 2877		Cr VIII	EL 1941
	W	2277, 2341, 2563, 2877, 2935		CL	1941
	EL	2277, 2341, 2563, 2877		W	1941
V XX	ND	2563		Cr IX	EL 1468, 1941
	CL	2277, 2341, 2563, 2877		CL	1468, 1941
	W	2277, 2341, 2563, 2877		W	1468, 1941

## 2.2 Reference Numbers for Individual Spectra—Continued

Cr x	EL	1468, 1941		Cr xxii—Continued		
	CL	1468, 1941			IP 1816, 2561	
	W	1468, 1941			OT 1816	
Cr xi	EL	1468, 1941		Cr xxiii	EL 1476, 2479	
	CL	1468, 1941			CL 1476, 2479	
	W	1468, 1941			W 1428, 1476, 2479	
Cr xii	EL	1468, 1669		Cr xxiv	OT 1476, 2479	
	CL	1468, 1669			EL 1476	
	W	1468, 1669			CL 1476	
Cr xiii	EL	1669, 1941		Mn i	W 1476	
	CL	1669, 1941			OT 1476	
	W	1669, 1941			Hfs 1651, 1969, 2708	
	IP	1558			PT 1969	
Cr xiv	EL	1669, 1941			AT 1969	
	CL	1458, 1669, 1941	Mn ii	OT 2049A		
	W	1458, 1669, 1941		ND 2402		
	IP	1941	Mn iii	PT 1655, 2402		
	OT	1731				
Cr xv	EL	1476		Mn iv	AT 1571, 1586, 2732, 3014	
	CL	1476			OT 1571, 1586	
	W	1476		Mn vi	EL 2583A	
	TE	2843			CL 2583A	
	OT	1476, 1745, 2843			W 2583A	
Cr xvi	EL	1333, 1476, 2039A, 2181, 2549		Mn viii	AT 2320	
	CL	1333, 1476, 2039A, 2181			OT 2320	
	W	1333, 1476, 2039A, 2181, 2549				
	OT	1476				
Cr xvii	EL	1333, 1476, 2183, 2549, 2563		Mn viii	EL 1837	
	CL	1333, 1476, 2183, 2549, 2563			CL 1837	
	W	1333, 1476, 2183, 2549, 2563			W 1837	
	OT	1476, 2549			PT 1837	
Cr xviii	EL	1333, 1476, 2549, 2563, 2937		Mn ix	AT 1837	
	CL	1333, 1476, 2549, 2563, 2937			EL 1669	
	W	1333, 1476, 2549, 2563, 2937			CL 1669	
	OT	1476, 2549			W 1669	
Cr xix	EL	1476, 2076, 2563, 2937		Mn x	EL 1468, 1669	
	CL	1476, 2563, 2937			CL 1468, 1669	
	W	1476, 2563, 2937			W 1468, 1669	
	OT	1476, 2937				
Cr xx	EL	2563, 2935		Mn xii	EL 1468, 1669, 1941	
	CL	2563, 2935			CL 1468, 1669, 1941	
	W	2563, 2935			W 1468, 1669, 1941	
	TE	2076		Mn xiii	EL 1468, 1669	
	AT	2076			CL 1468, 1669	
Cr xi	EL	2481, 2563			W 1468, 1669	
	CL	2481, 2563	Mn xiv	EL 1468, 1669, 1941		
	W	2481, 2563		CL 1468, 1669, 1941		
	AT	2076		W 1468, 1669, 1941		
	OT	3136	Mn xv	IP 1558		
Cr xxii	EL	1816, 2561				EL 1669, 1941
	CL	1816, 2561				CL 1458, 1669, 1941
	W	1816, 2561				

## 2.2 Reference Numbers for Individual Spectra—Continued

Mn xv—Continued		Fe I—Continued
W 1458, 1669, 1941		W 1681, 2637
IP 1941		Hfs 2708
OT 1731		PT 1936, 2375, 2518
Mn xvi	EL 1476 CL 1476 W 1476 OT 1476, 2108	AT 1308, 1443, 1656, 1768, 2119, 2459A OT 1312, 2375, 2878
Mn xvii	EL 1333, 1476, 2039A, 2181, 2549 CL 1333, 1476, 2039A, 2181 W 1333, 1476, 2039A, 2181, 2549 OT 1476	Fe II EL 2479, 2719 ND 2719 CL 2479, 2645, 2719 W 1459, 1681, 2479, 2637, 2719 AT 1571, 1656, 1768, 1821, 1973 OT 1571, 2479, 2878
Mn xviii	EL 1333, 1476, 2183, 2277, 2549, 2563, 2877 CL 1333, 1476, 2183, 2277, 2549, 2563, 2877 W 1333, 1476, 2183, 2277, 2549, 2563, 2877 OT 1333, 1476, 2549	Fe III W 1459, 1681 PT 1655 AT 1571, 1656 OT 1571, 2049A, 2878
Mn xix	EL 1333, 1476, 2277, 2549, 2563, 2877, 2937 CL 1333, 1476, 2277, 2549, 2563, 2877, 2937 W 1333, 1476, 2277, 2549, 2563, 2877, 2937 OT 1333, 1476, 2549	Fe IV W 1767 AT 1656, 2699 OT 2878, 3029
Mn xx	EL 1476, 2076, 2563, 2937 CL 1476, 2076, 2563, 2937 W 1476, 2563, 2937 AT 2076 OT 1476, 2937	Fe V EL 2884 CL 2884 W 1370A, 1767, 2884 PT 2884 AT 1656, 3014 OT 2878, 2884
Mn xxi	EL 2563, 2935 CL 2563, 2935 W 2563, 2935 TE 2076 AT 2076	Fe VI EL 2278, 2327 ND 2278, 2327 CL 2278, 2327, 2884 W 1370A, 1767, 2278, 2327, 2884 PT 2327 AT 1656, 2278, 2327 OT 1467, 2878
Mn xxii	EL 2563 CL 2563 W 2563 AT 2076 OT 3136	Fe VII EL 2278 ND 2278 CL 2278 W 1370A, 1767, 2278 AT 2278
Mn xxiii	EL 1816 CL 1816 W 1816 IP 1816 OT 1816	Fe VIII W 1370A, 1767 OT 1312
Mn xxiv	EL 2479 CL 2479 W 1428, 2479 OT 2479	Fe IX EL 1837, 2546, 2754 CL 1837, 2546, 2754, 3151 W 1669, 1837, 2546 PT 1837 AT 1837
Fe <sup>++</sup> Fe <sup>-</sup> Fe I	AT 1656 AT 1656 EL 2637 ND 2518 CL 2637	Fe X EL 1468, 1669, 2546 CL 1458, 1468, 1669, 2546 W 1458, 1468, 1669, 1905A, 2546 AT 1458, 1669 OT 3104
		Fe XI EL 1468, 1669, 2546, 2728 CL 1458, 1468, 1669, 2546, 2728 W 1457, 1458, 1459, 1468, 1669, 2546, 2728 AT 1458, 1669 OT 3104

## 2.2 Reference Numbers for Individual Spectra—Continued

Fe XII	EL	1468, 1669	Fe xix—Continued	
	CL	1458, 1468, 1609, 1669	AT	2321, 2478, 2866A
	W	1457, 1458, 1459, 1468, 1609, 1669	OT	1333, 1476, 2321, 2534A, 2549, 2721, 2936
	PT	2609		
	AT	1458, 1669	Fe xx	EL 1333, 1476, 2277, 2321, 2519A, 2537,
Fe XIII	EL	1468, 1669		2549, 2563, 2636, 2877, 2937
	ND	2690	CL	1333, 1476, 2076, 2277, 2321, 2519A,
	CL	1458, 1468, 1669, 2557		2537, 2549, 2563, 2636, 2877, 2937
	W	1428, 1458, 1459, 1468, 1669	W	1333, 1428, 1462, 1476, 2277, 2519A,
	PT	2690		2537, 2549, 2563, 2636, 2877, 2937
	AT	1458, 1669, 2063	AT	2321
	OT	2107, 2557, 2635	OT	1333, 1476, 2321, 2479, 2549
Fe XIV	EL	1468, 1669, 1976, 3074	Fe xi	EL 1476, 2076, 2321, 2519A, 2534A,
	CL	1458, 1468, 1669, 1976, 3074		2537, 2563, 2636, 2936, 2937
	W	1457, 1458, 1468, 1669, 1976, 3074	CL	1476, 2076, 2321, 2519A, 2534A,
	AT	1458, 1669		2537, 2563, 2636, 2936, 2937
	OT	3104	W	1462, 1476, 2479, 2519A, 2534A,
Fe XV	EL	1468, 1476, 1669, 1808, 1976, 1999		2537, 2563, 2636, 2936, 2937
	CL	1468, 1476, 1669, 1808, 1941, 1976,	AT	2076, 2321, 2478
		1999	OT	1476, 2321, 2479, 2534A, 2936, 2937
	W	1468, 1476, 1669, 1808, 1976, 1999	Fe xxii	EL 2321, 2479, 2519A, 2537, 2563, 2636,
	IP	1558		2935
	AT	1999	CL	2076, 2321, 2479, 2519A, 2537, 2563,
	OT	1467, 1476, 1808		2636, 2935
Fe XVI	EL	1669, 1976	W	1428, 1462, 2479, 2519A, 2537, 2563,
	CL	1458, 1669, 1976		2636, 2935
	W	1458, 1669, 1976, 2034	TE	2076
	IP	1399	AT	1327, 2076, 2321, 2478
	AT	1399, 1622	OT	2321, 2479, 2936, 2937, 3136
Fe XVII	EL	1476, 2034, 2537, 2866A	Fe xxiii	EL 1797, 2304, 2321, 2479, 2534A, 2537,
	CL	1476, 2034, 2114, 2187, 2537, 2866A		2481, 2563, 2602, 2636
	W	1428, 1476, 2034, 2114, 2187, 2537,	CL	1797, 2076, 2304, 2321, 2479, 2534A,
		2786, 2866A, 3224		2481, 2537, 2563, 2602, 2636
	TE	2843	W	1462, 1797, 2304, 2479, 2481, 2534A,
	PT	1381		2537, 2563, 2602, 2636
	AT	2866A	AT	1797, 2076, 2321, 2478
	OT	1476, 2108, 2843	OT	1808, 2321, 2479, 2534A, 2936, 3136
Fe XVIII	EL	1333, 1476, 1663, 2039A, 2181, 2537,	Fe xxiv	EL 1797, 1808, 2304, 2321, 2479, 2602,
		2549, 2636, 2721, 2866A, 2936		2636, 2728, 3224
	ND	2180	CL	1797, 1808, 2304, 2321, 2479, 2602,
	CL	1333, 1476, 1663, 2039A, 2076, 2181,		2636, 2728, 3224
		2537, 2636, 2721, 2866A, 2936	W	1428, 1462, 1797, 1808, 2304, 2479,
	W	1333, 1476, 1663, 2039A, 2181, 2537,		2602, 2636, 2728, 3153, 3224
		2549, 2636, 2721, 2866A, 2936	TE	2934
	PT	2040A	PT	2040A
	AT	2039A, 2180, 2181, 2478, 2866A	AT	1797, 2321, 2478
	OT	1333, 1476, 2721, 2936	OT	1808, 1844, 1977, 2321, 2479, 2561,
Fe xix	EL	1333, 1476, 2321, 2519A, 2534A,		2934
		2537, 2549, 2563, 2636, 2721,	Fe xxv	EL 1428, 2479, 2602, 2636, 2991, 3027
		2866A, 2877, 2936	CL	1428, 2285, 2479, 2602, 2636, 2664,
	CL	1333, 1476, 2076, 2277, 2321, 2519A,		2665, 2991, 3027
		2534A, 2537, 2549, 2563, 2636,	W	1428, 1462, 2479, 2602, 2636, 2664,
		2721, 2866A, 2877, 2936		2665, 2991, 3027, 3153, 3224
	W	1333, 1476, 2277, 2519A, 2534A,	TE	2285
		2537, 2549, 2563, 2636, 2721,	PT	2040A
		2866A, 2877, 2936	AT	2989
	PT	2040A	OT	1428, 1844, 1977, 2285, 2479, 2748,

## 2.2 Reference Numbers for Individual Spectra—Continued

Fe xxvi	EL	2479, 2991, 3027	Co xx	EL	1476, 2519A, 2549
	CL	2479, 2991, 3027		CL	1476, 2519A, 2549
	W	1428, 2479, 2991, 3027		W	1476, 2519A, 2549
	OT	2479, 2991		PT	1430
Co i	Hfs	1738A, 2708		OT	1476, 2549
	AT	1768, 2964	Co xxi	EL	1476, 2519A, 2549
Co ii	EL	2115		CL	1476, 2519A, 2549
	CL	2645		W	1476, 2519A, 2549
	ZE	2115		OT	1476, 2549
	IP	2115	Co xxii	EL	1476, 2519A, 2937
	OT	2049A		CL	1476, 2519A, 2937
Co iii	PT	1655		W	1476, 2519A, 2937
Co iv	EL	2763		TE	2076
	CL	2763		OT	1476, 2937
	W	2763	Co xxiii	EL	2519A, 2935
Co x	EL	1941		CL	2519A, 2935
	CL	1941		W	2519A, 2935
	W	1639, 1941		TE	2076
	AT	1837	Ni i	CL	2645
Co xi	EL	1639, 1941		ZE	1712
	CL	1639, 1941		Hfs	1712, 2516A, 2708
	W	1639, 1941		AT	1768
Co xii	EL	1639, 1941		OT	1831
	CL	1639, 1941	Ni ii	EL	1398
	W	1639, 1941		ND	1398
Co xiii	EL	1639, 1941		CL	1398, 2645
	CL	1639, 1941		W	1398, 1459
	W	1639, 1941		PT	1631
Co xiv	EL	1639, 1941		OT	2049A, 2895
	CL	1639, 1941	Ni iii	EL	2048A, 2453A
	W	1639, 1941		CL	2048A
Co xv	EL	1639, 1941		W	2048A
	CL	1639, 1941		PT	1373, 1655, 2048A
	W	1639, 1941		OT	2049A
Co xvi	EL	1476, 1639, 1941	Ni iv	W	1767
	CL	1476, 1639, 1941	Ni v	EL	2763
	W	1476, 1639, 1941		CL	2763
	OT	1476		W	1767, 2763
Co xvii	EL	1639, 1941	Ni vi	W	1767
	CL	1458, 1639, 1941	Ni vii	W	1767
	W	1458, 1639, 1941	Ni viii	W	1767
	IP	1399	Ni xi	EL	1837, 1941
	AT	1399, 1622		CL	1837, 1941, 2754, 3151
Co xviii	EL	1476		W	1457, 1639, 1941
	CL	1476		TE	2754
	W	1476		PT	1837
	OT	1476, 2108		AT	1837
Co xix	EL	1476, 2039A, 2181, 2549	Ni xii	OT	2754
	CL	1476, 2039A, 2181, 2549		EL	1639, 1941
	W	1476, 2039A, 2181, 2549		CL	1639, 1941
	OT	1476, 2549		W	1639, 1941
			Ni xiii	EL	1639, 1941
				CL	1639, 1941
				W	1459, 1639, 1941

## 2.2 Reference Numbers for Individual Spectra—Continued

Ni xiv	EL	1639, 1941	Ni xxvi	TE	2934
	CL	1639, 1941		OT	1844, 2934
	W	1459, 1639, 1941	Ni xxvii	W	1428
	PT	2609		OT	1844
Ni xv	EL	1639, 1941	Ni xxviii	W	1428
	CL	1639, 1941		Cu <sup>-</sup>	EL 1470, 1916, 1996A
	W	1459, 1639, 1941		Cu I	EL 1418, 1923
Ni xvi	EL	1639, 1941		CL	1418, 1923, 2263
	CL	1639, 1941		W	1418, 1923, 2471
	W	1639, 1941		SE	2467, 2663
Ni xvii	EL	1639, 1941		Hfs	1904, 2708
	CL	1458, 1639, 1941		IP	1923
	W	1458, 1639, 1941		PT	3052
	AT	1458		AT	1516
	OT	1476, 1941	Cu II	EL	1408
Ni xviii	EL	1941		ND	1408
	CL	1458, 1941		CL	1408
	W	1458, 1941		W	1408
	IP	1399		Hfs	1408
	AT	1399, 1458, 1622		AT	1516, 1566, 1605, 1821, 1973
				OT	1664
Ni xix	EL	1476	Cu III	EL	2987
	CL	1476		CL	2987
	W	1476		W	2987
	OT	1476, 2108		IP	2987
Ni xx	EL	1476, 2549		PT	1373
	CL	1476, 2549		AT	1516
	W	1476, 2549	Cu IV	EL	2987
	OT	1476, 2549		W	1493
Ni xxi	EL	1476, 2519A, 2549, 2563	Cu V	EL	2840
	CL	1476, 2519A, 2549, 2563		CL	2840
	W	1476, 2519A, 2549, 2563		W	1493, 2840
	PT	1430	Cu VI	EL	2763, 2840
	OT	1476, 2549		CL	2763, 2840
Ni xxii	EL	1476, 2519A, 2549, 2563		W	1493, 2763, 2840
	CL	1476, 2519A, 2549, 2563	Cu XII	AT	1837
	W	1476, 2519A, 2549, 2563	Cu XIII	EL	2923
	OT	1476, 2549		CL	2923
Ni xxiii	EL	1476, 2519A, 2563, 2937		W	2923
	CL	1476, 2519A, 2563, 2937	Cu XIV	EL	2923
	W	1476, 2519A, 2563, 2937		CL	2923
	TE	2076		W	2923
	OT	1476, 2937	Cu XV	EL	2923
Ni xxiv	EL	2519A, 2563, 2935		CL	2923
	CL	2519A, 2563, 2935		W	2923
	W	2519A, 2563, 2935	Cu XVI	EL	2923
	TE	2076		CL	2923
	OT	2937		W	2923
Ni xxv	EL	2563	Cu XVII	EL	2923
	CL	2563		CL	2923
	W	2563		W	2923
	TE	2481	Cu XVIII	EL	2923
	OT	2481		CL	2923
				W	2923

## 2.2 Reference Numbers for Individual Spectra—Continued

Cu XVIII	EL	1476, 2923		Zn VII	OT	2763, 2840	
	CL	1476, 2923		Zn XIII	EL	2923	
	W	1476, 2923			CL	2923	
	OT	1476			W	2923	
Cu XX	EL	1476		Zn XIV	EL	2923	
	CL	1476			CL	2923	
	W	1476			W	2923	
	OT	1476, 2108		Zn XV	EL	2923	
Cu XXI	EL	1476			CL	2923	
	ND	2180			W	2923	
	CL	1476		Zn XVI	EL	2923	
	W	1476			CL	2923	
	AT	2180			W	2923	
	OT	1476		Zn XVII	EL	2923	
Cu XXII	EL	1476			CL	2923	
	CL	1476			W	2923	
	W	1476		Zn XVIII	EL	2923	
	PT	1430			CL	2923	
	OT	1476			W	2923	
Cu XXIII	EL	1476		Zn XIX	EL	2923	
	CL	1476			CL	2923	
	W	1476			W	2923	
	OT	1476		Zn XX	EL	2923	
Cu XXIV	EL	1476			CL	2923	
	CL	1476			W	2923	
	W	1476		Zn XXI	EL	2951	
	OT	1476			CL	2460, 2951	
Cu XXVII	OT	1844			W	2460, 2951	
	EL	2479, 2991, 3027			OT	2108	
	CL	2479, 2991, 3027		Zn XXII	CL	2460	
	W	1428, 2479, 2991, 3027			W	2460	
	OT	1844, 2479, 2991		Zn XXIII	CL	2460	
Cu XXIX	EL	2991, 3027			W	2460	
	CL	2991, 3027			Ga <sup>-</sup>	EL	2296
	W	2991, 3027			Ga I	Hfs	1466
	OT	2991			Ga III	EL	2051A, 3141
Zn <sup>-</sup> Zn I	EL	3112			ND	2051A	
	EL	1679, 2882, 3131			CL	2051A, 3141	
	ND	1779			W	2051A, 3141	
	CL	1679, 1886, 3131			IP	2051A	
	W	1679, 1886, 3131			PT	2051A	
	IP	3131			Ga IV	EL	2051A, 2716, 3042, 3141
	PT	1779, 1886				ND	2051A, 2716
	AT	2898				CL	2051A, 2716, 3042
						W	2051A, 2716, 3042, 3141
Zn III Zn V	PT	1373				IP	2051A
	EL	2289				PT	1373
	CL	2289			Ga V	EL	1964, 2051A, 2289, 2612, 2703
	W	2289				ND	2051A, 2703
	OT	2289				CL	1964, 2051A, 2289, 2612, 2703
Zn VI	EL	2289				W	1964, 2051A, 2289, 2612, 2703
	CL	2289				IP	2051A
	W	2289				OT	2289
	OT	2289, 2840					

## 2.2 Reference Numbers for Individual Spectra—Continued

Ga VI	EL	2051A, 2289	Ge IV—Continued Ge V	W	2051A
	ND	2051A		IP	2051A
	CL	2051A, 2289		EL	2051A, 2716, 3045
	W	2051A, 2289		ND	2051A, 2716
	IP	2051A		CL	2051A, 2716, 3045
	OT	2289		W	2051A, 2716, 3045
Ga VII	EL	2289	Ge VI	IP	2051A
	CL	2289		EL	2051A, 3044
	W	2289		ND	2051A
	OT	2289, 2840		CL	2051A, 3044
Ga VIII	OT	2840	Ge XIII	W	2051A, 3044
	EL	2923		IP	2051A
Ga XII	CL	2923	Ge XIV	EL	2923
	W	2923		CL	2923
Ga XIII	EL	2923		W	2923
	CL	2923	Ge XV	EL	2923
	W	2923		CL	2923
Ga XIV	EL	2923		W	2923
	CL	2923	Ge XVI	EL	2923
	W	2923		CL	2923
Ga XV	EL	2923		W	2923
	CL	2923	Ge XVII	EL	2923
	W	2923		CL	2923
Ga XVI	EL	2923		W	2923
	CL	2923	Ge XVIII	EL	2923
	W	2923		CL	2923
Ga XVII	EL	2923		W	2923
	CL	2923	Ge XIX	EL	2923
	W	2923		CL	2923
Ga XVIII	EL	2923		W	2923
	CL	2923	Ge XX	EL	2923
	W	2923		CL	2923
Ga XIX	EL	2923		W	2923
	CL	2923	Ge XXI	EL	2923
	W	2923		CL	2923
Ga XX	EL	2923		W	2923
	CL	2923	Ge XXII	EL	2923
	W	2923		CL	2923
Ga XXI	EL	2923		W	2923
	CL	2923	Ge XXIII	EL	2951
	W	2923		CL	2951
Ge <sup>-</sup>	EL	2296		W	2951
Ge I	PT	1643	Ge XXIV	EL	2296
Ge III	EL	2051A		As <sup>-</sup>	1351
	ND	2051A		As I	ND
	CL	2051A			
	W	2051A			
	IP	2051A			
Ge IV	EL	2051A			
	ND	2051A			
	CL	2051A			

## 2.2 Reference Numbers for Individual Spectra—Continued

As I—Continued	CL	1351, 2559	Se IV	EL	1427, 2611
	W	1351, 2559		CL	1427, 2611
	Hfs	2541, 2709		W	1427, 2611
	IP	1351		IP	1427
	AT	2541		OT	1427
				Se V	1427
As II	EL	1368A, 1480		CL	1427
	ZE	1368A, 1480		W	1427
	PT	1368A, 1777		IP	1427
	AT	1368A, 1777			
As XIV	EL	2923	Se XV	EL	2923
	CL	2923		CL	2923
	W	2923		W	2923
As XV	EL	2923	Se XVI	EL	2923
	CL	2923		CL	2923
	W	2923		W	2923
As XVI	EL	2923	Se XVIII	EL	2923
	CL	2923		CL	2923
	W	2923		W	2923
As XVII	EL	2923	Se XIX	EL	2923
	CL	2923		CL	2923
	W	2923		W	2923
As XVIII	EL	2923	Se XXII	EL	2923
	CL	2923		CL	2923
	W	2923		W	2923
As XXI	EL	2923	Se XXIII	EL	2923
	CL	2923		CL	2923
	W	2923		W	2923
As XXII	EL	2923	Se XXIV	EL	2923
	CL	2923		CL	2923
	W	2923		W	2923, 2951
As XXIII	EL	2923	Se XXV	EL	2951
	CL	2923		CL	2951
	W	2923		W	2951
Se <sup>-</sup> Se I	EL	1420A, 2247	Br <sup>-</sup>	EL	2880
	EL	1791, 2647		CL	2880
	ND	2647		W	2880
	CL	1791, 2647		OT	1802
	W	1557, 1791, 2647, 2888A		Br I	2069, 2379, 2880
	ZE	1643		CL	1505, 2069, 2880
	Hfs	1643		W	1505, 2069, 2880
	IP	2647		Hfs	2681
	PT	1643, 3095		PT	2933
	AT	3095		AT	2681
	OT	2647		OT	2647
Se II	CL	1427	Br XVI	EL	2923
	W	1427		CL	2923
Se III	EL	1427	Br XIX	W	2923
	CL	1427		EL	2923
	W	1427		CL	2923
	IP	1427		W	2923
	OT	1427			

## 2.2 Reference Numbers for Individual Spectra—Continued

Br xxiv	EL	2923	Kr XII	OT	2208
	CL	2923	Kr XIII	OT	2208
	W	2923	Kr XIV	OT	2208
			Kr XV	OT	2208
Br xxv	EL	2923	Kr XVI	OT	2208
	CL	2923	Kr XVII	OT	2208
	W	2923	Kr XVIII	OT	2208
	OT	2129	Kr XIX	OT	2208
			Kr XX	OT	2208
Br xxvi	EL	2951	Kr XXI	OT	2208
	CL	2951	Kr XXII	OT	2208
	W	2951	Kr XXIII	OT	2208
			Kr XXIV	OT	2208
Kr	EL	1545, 2200, 2219, 2700	Kr XXV	OT	2208
	CL	1545, 2200, 2219	Kr XXVI	OT	2208
	W	1545, 2200, 2219	Kr XXVII	OT	2208
			Kr XXVIII	OT	2208
Kr I	EL	1437, 1526, 1788, 1819, 2325A, 2385, 2427, 2429, 2524A, 2963	Kr XXIX	OT	2208
	CL	1437, 1526, 1788, 1819, 2325A, 2385, 2427, 2429, 2524A	Kr XXX	OT	2208
	W	1437, 1526, 1788, 1819, 2325A, 2385, 2427, 2429, 2524A, 3032	Kr XXXI	OT	2208
	SE	2220, 2619, 2905	Kr XXXII	OT	2208
	IP	2431	Kr XXXIII	OT	2208
	PT	1985, 2619	Kr XXXIV	OT	2208
	AT	1991, 2553, 2823	Kr XXXV	QF	2907A
	OT	2208, 2313, 2427, 2647, 2823, 2905	Kr XXXVI	OT	2208
			Rb-	EL	2158A, 2296, 2551, 2671
				OT	2157A, 2633
Kr II	EL	1526	Rb I	EL	2152A, 2660, 2751, 3058, 3219
	ND	2919		CL	2660, 3058, 3219
	PT	2919		W	2660, 3058, 3219
	OT	2208		ZE	1364A, 1747A, 1914A, 1950, 2113, 2160A, 2161A, 2291, 2390, 2394, 2532A, 2540, 2565A, 2755, 3046
Kr III	ND	2287, 2919		SE	1497A, 1590, 1707A, 1877, 2253, 2506A, 3001
	PT	2287, 2919		Hfs	1416, 1512, 1527A, 1529A, 1530A, 1531A, 1620, 1763, 1815, 1857A, 1908A, 1950, 1979, 1981, 2001, 2113, 2118, 2203, 2390, 2505A, 2506A, 2526A, 2540, 2751, 2755, 2851, 2927, 2954, 2956, 2984, 3000, 3137
	AT	2287		IS	1529A, 1698A, 1759
	OT	2208		IP	2660
Kr IV	EL	3055		AT	2731, 3058
	ND	2491A		OT	1456, 1742, 2647
	CL	3055			
	W	3055	Rb II	EL	1483, 2590, 2698
	OT	2208		ND	2590, 2698
Kr V	EL	3055		CL	1483, 2590, 2698
	CL	3055		W	1483, 2590, 2698
	W	3055		ZE	2161A, 2590, 2698
	OT	2208		Hfs	2291
Kr VI	OT	2208		IP	1483, 2590, 2698
Kr VII	EL	3055		PT	2044A, 2590, 2698
	CL	3055		AT	1665, 2044A, 2553, 2590, 2698
	W	3055			
	OT	2208	Rb III	EL	1677A, 1776, 1896, 2485A
Kr VIII	OT	2208		ND	1776, 1896, 2492A, 2933
Kr IX	W	2885A		CL	1677A, 1776, 2485A
	OT	2208		W	1677A, 1776, 2485A
Kr X	W	2885A		ZE	1776
	OT	2208			
Kr XI	OT	2208			

## 2.2 Reference Numbers for Individual Spectra—Continued

Rb III—Continued		Y IV—Continued	
IP 1776		W 1483, 1599, 1743A	
PT 1677A, 1776		IP 1483, 1599	
AT 1776, 2740		PT 1743A	
Rb IV	EL 2287, 2485A	AT 1599, 1665, 1743A	
ND 2287		Y V	EL 1577, 2492A, 2955
CL 2287, 2485A			CL 1577, 2492A, 2955
W 2287, 2485A			W 1577, 2492A, 2955
PT 2287			IP 1577, 2492A, 2955
AT 2287, 2740			PT 1577, 2492A, 2933
Sr I	EL 2631, 2800, 2812A	AT 1577	
CL 2631, 2800, 2812A		OT 2955	
W 1492, 2631, 2800, 2812A		Y VI	EL 1921
ZE 2066A, 2307			CL 1921
SE 1465, 2020, 2307			W 1921
Hfs 2066A, 2515			IP 1921
IP 2874		Y VII	EL 2491A
PT 2808			IP 2491A
AT 1626, 2800			
Sr II	CL 2631	Y XII	PT 1773
W 2631			OT 1773
AT 2800		Y XXX	EL 2562
Sr III	EL 1483, 1771, 2486A, 2596		CL 2562
ND 2596			W 2562
CL 1483, 1771, 2486A		Zr I	ND 3047
W 1483, 1771, 2486A			IS 3071
IP 1483, 1771			IP 2374
PT 1771, 2044A, 2596			PT 3047
AT 1665, 2044A, 2596			
Sr IV	EL 1676A, 2485A, 2486A	Zr IV	IP 2592
CL 1676A, 2485A, 2486A		Zr V	EL 1483
W 1676A, 2485A, 2486A			CL 1483
IP 2492A, 2955			W 1483
PT 1676A			IP 1479, 1483
AT 1676A		Zr VI	EL 1756, 2492A, 2933
OT 2955			ND 1756
Sr V	EL 2287, 2485A, 2486A		CL 1483, 1756, 2492A, 2933
ND 2287			W 1756, 2492A, 2933
CL 2287, 2485A, 2486A			IP 1756, 2492A, 2933
W 2287, 2485A, 2486A			PT 1756, 2492A, 2933
PT 2287			AT 1756
AT 2287		Zr VII	ND 1921
			IP 2491A
Y I	EL 2111	Zr XIII	PT 1773
CL 2111			OT 1773
W 2111		Zr XXIX	W 2951
ZE 1478		Zr XXX	W 2951
Hfs 1478		Zr XXXI	EL 2562, 2951
IP 2111, 2374			CL 2562, 2951
AT 2423			W 2562, 2951
Y III	EL 2592	Nb II	PT 2375
CL 2592			OT 2375
W 2592		Nb VI	EL 1483
IP 2592			CL 1483
Y IV	EL 1483, 1599, 1743A		
CL 1483, 1599, 1743A			

## 2.2 Reference Numbers for Individual Spectra—Continued

Nb VI—Continued			Ru I—Continued		
	W	1483		PT	2375
	IP	1479, 1483		OT	2375
Nb VII	EL	1757, 2492A, 2933	Ru III	EL	2050A
	ND	1757		CL	2050A
	CL	1757, 2492A, 2933		W	2050A
	W	1757, 2492A, 2933	Ru VIII	EL	1798, 2083
	IP	1757, 2492A, 2933		ND	2083
	PT	1757, 2492A, 2933		CL	1798, 2083
	AT	1757		W	1798, 2083
Nb IX	EL	1318		IP	1798
	ND	2491A		AT	2083
	CL	1318		OT	1798
	W	1318	Ru IX	EL	1798
Nb XIV	PT	1773		CL	1798
	OT	1773		W	1798
Nb XXXII	EL	2562	Ru X	EL	1798
	CL	2562		CL	1798
	W	2562		W	1798
Mo I	W	2471		PT	2933
	ZE	1640	Rh IX	EL	1798, 2083
	Hfs	1640, 2067A, 2068A, 2386, 2687, 3171		ND	2083
	IS	3071		CL	1798, 2083
Mo VII	EL	1483		W	1798, 2083
	CL	1483		IP	1798
	W	1483		AT	2083
	IP	1479, 1483		OT	1798
Mo VIII	EL	1758, 2492A	Rh X	EL	1798
	ND	1758		CL	1798
	CL	1758, 2492A		W	1798
	W	1758, 2492A		IP	1798
	IP	1758, 2492A	Rh XI	EL	1798
	PT	1758, 2492A, 2933		CL	1798
	AT	1758		W	1798
Mo XV	PT	1773		PT	2933
	OT	1773	Pd I	Hfs	1603, 2078A, 2655, 2811
Mo XXXIII	EL	2562		IS	2085A, 3071
	CL	2562	Pd X	EL	1798, 2083
	W	2562		ND	2083
Mo XLI	EL	2991, 3027		CL	1798, 2083
	CL	2991, 3027		W	1798, 2083
	W	2991, 3027		IP	1798
	OT	2991		AT	2083
Mo XLII	EL	2991, 3027		OT	1798
	CL	2991, 3027	Pd XI	EL	1798
	W	2991, 3027		CL	1798
	OT	2991		W	1798
Tc I	Hfs	2068A, 2071A		IP	1798
Ru I	ZE	2067A, 2787	Pd XII	EL	1798
	Hfs	2067A, 2787		CL	1798
	IS	3071		W	1798
				PT	2933

## 2.2 Reference Numbers for Individual Spectra—Continued

Ag <sup>-</sup> Ag I	EL	1916, 1996A	Sn <sup>-</sup> Sn I	EL	1470, 2296
	EL	1418, 2489		EL	3149A
	ND	2489		CL	3146, 3149A
	CL	1418, 2489		W	3146, 3149A
	W	1418, 2489		ZE	1352
	SE	1349, 2663		Hfs	1352, 1600, 1692A, 2022
	Hfs	1349, 1421A, 1696A, 1907A		IS	2021, 2022, 2623, 3071
	IS	1696A		PT	1643, 1692A
	PT	2488A		AT	1692A
Ag II	EL	3064	Sn II	EL	3149A
	ND	3047, 3064		CL	3149A
	CL	3064		W	3149A
	W	3064		Hfs	2022
	PT	3047, 3064		IS	1697A, 2022
Ag III	EL	3039	Sn IV Sn VI	IS	1410, 1417
	CL	3039		EL	1798
	W	3039		CL	1798
	PT	3039		W	1798
Ag XI	EL	1798	Sn XXI	EL	2468
	CL	1798		CL	2468
	W	1798		W	2468
	IP	1798		AT	2468
	OT	1798			
Ag XII	EL	1798	Sn XXII	EL	2468
	CL	1798		CL	2468
	W	1798		W	2468
	IP	1798		AT	2468
Cd <sup>-</sup> Cd I	EL	3112, 3152	Sn XXIII	EL	2468
	EL	1881, 1920, 2632		ND	2468
	ND	1779		CL	2468
	CL	1881, 1886, 1920, 2632		W	2468
	W	1881, 1886, 1920, 2632		AT	2468
	ZE	1514, 2501A, 2794			
	Hfs	2335A, 2568A, 2614, 2794			
	IS	2894A, 3071			
	PT	1685A, 1779, 1886			
	AT	1486, 1881, 3076			
	OT	3076			
Cd II	EL	2839	Sn XLV	AT	1728
	ZE	2601		OT	1728
	Hfs	2112, 2601			
	IS	1410, 1417, 1812			
	AT	2005, 2839			
Cd III	EL	2839	Sb <sup>-</sup> Sb I	EL	2296
	AT	2839		ZE	2280
				Hfs	1692A, 2497A, 2973
In <sup>-</sup> In I In III	EL	2296	Sb II Sb VII	PT	1692A
	Hfs	1466, 2709		AT	1692A
	CL	1949			
	W	1949			
In IV	EL	1869	Te <sup>-</sup> Te I	EL	2296
	CL	1869, 1949		EL	2104
	W	1869, 1949		CL	2104
	IP	1869		W	1557, 2104
	PT	1869		ZE	1409
				Hfs	1770
				IS	3071

## 2.2 Reference Numbers for Individual Spectra—Continued

Te I—Continued				Xe I—Continued			
	PT	1643, 3095			AT	1566, 1991, 2823	
	AT	3095			OT	1348, 1536, 2823, 2906	
Te II				Xe II			
	EL	2581			EL	1526	
	CL	2581			CL	2046A, 2145, 2958	
	W	2581			W	1404, 1926, 2046A, 3002	
Te VIII				Xe III			
	EL	1798			CL	2046A	
	CL	1798			W	1926, 2046A, 2765, 3002	
	W	1798					
I <sup>-</sup>				Xe IV			
	EL	2137, 2659, 3081			CL	2046A	
	CL	2137, 2659, 3081			W	1926, 2046A, 2765, 3002	
	W	2137, 2659, 3081					
	AT	1720					
	OT	1802					
I <sup>-</sup> I				Xe V			
	EL	2379			EL	2856A	
	CL	1504, 1505			Xe VI	2856A	
	W	1504, 1505			Xe VII	2856A	
	ZE	1699			Xe VIII	2856A	
	Hfs	1919, 2255, 2681			Xe IX	2856A	
	AT	2681			Xe X	2856A	
I <sup>-</sup> V					Xe XI	2856A	
	EL	1798			Xe XII	2856A	
	CL	1798			Xe XIII	2856A	
	W	1798			Xe XIV	2856A	
I <sup>-</sup> VI					Xe XV	2856A	
	EL	1798			Xe XVI	2856A	
	CL	1798			Xe XVII	2856A	
	W	1798			Xe XVIII	2856A	
	IP	1798			Xe XIX	2856A	
I <sup>-</sup> VII					Xe XX	2856A	
	EL	1798			Xe XXI	2856A	
	CL	1798			Xe	W 1412	
	W	1798					
	IP	1798					
I <sup>-</sup> VIII				Cs <sup>-</sup>			
	EL	1798			EL	2158A, 2296, 2551, 2671	
	CL	1798			OT	2157A, 2573A, 2633	
	W	1798			EL	2198, 2324A, 2574A, 2783, 2931, 2938, 3030	
	IP	1798			CL	2198, 2324A, 2574A, 2783, 2931, 2938	
					W	1314, 2198, 2324A, 2574A, 2783, 2931, 2938	
I <sup>-</sup> IX					ZE	1364A, 1613, 1659, 1774, 1840, 2059A, 2390, 2394, 2742, 2755, 2977, 3046	
	EL	1798			SE	1556, 1590, 1707A, 1877, 2165A, 2506A, 2627, 3001	
	CL	1798			Hfs	1416, 1613, 1684A, 1763, 1774, 1840, 1857A, 1863A, 1908A, 1942, 1943, 2001, 2118, 2197, 2203, 2390, 2505A, 2506A, 2574A, 2595, 2627, 2742, 2744, 2755, 2927, 2929, 2954, 2956, 2966, 2977, 3000, 3075, 3137, 3179	
	W	1798			IP	2931	
Xe <sup>-</sup>					PT	1943, 2931	
	EL	1545, 2219			AT	2124, 2731, 2931	
	CL	1545, 2219			OT	1417, 1456, 1742, 2994, 3148	
	W	1545, 2219					
Xe I				Cs II			
	EL	1437, 1526, 1788, 2429, 2691, 2924, 3115			EL	2925	
	CL	1437, 1526, 1788, 1975, 2046A, 2145, 2228, 2429, 2924, 2958, 3063			ND	2925	
	W	1437, 1526, 1788, 1926, 1975, 2046A, 2429, 2924, 2941, 3002, 3063, 3115			CL	2925	
	ZE	1360, 1487, 2121			W	2925	
	SE	1793, 2220, 2621, 2906, 3176			IP	2925	
	Hfs	1350, 1487, 1568, 1648, 1684A, 2662, 2779, 2848, 2959, 3041					
	IS	1444, 1472A, 1895, 2087A, 2779, 2849, 2959, 3041, 3071, 3077, 3078					
	PT	1985					

## 2.2 Reference Numbers for Individual Spectra—Continued

Ba I	EL	1739A, 2098A, 2218, 2473, 2766, 2775, 2844, 2926, 3132, 3133, 3134		Ce I—Continued	
	ND	2844, 3017		PT	2053A, 2188
	CL	1739A, 2098A, 2218, 2473, 2766, 2775, 2844, 2926, 3132, 3133, 3134		AT	1725, 1946, 1948, 2188
	W	1492, 1739A, 2098A, 2218, 2473, 2766, 2775, 2844, 2926, 3132, 3133, 3134		Ce II	ND 1946 CL 1636 W 1636 IS 1946, 1948 AT 1946, 1948
	ZE	1686, 2066A, 2261, 2307, 2689A, 3142		Ce III	EL 1734 ND 1751 CL 1734 W 1734 PT 1353 AT 1725, 1751
	SE	2307, 3067		Ce IV	EL 2323, 2342A, 2344, 2346, 2347, 2363, 2452A ND 1958 CL 2323, 2342A, 2346, 2347, 2363 W 2323, 2342A, 2344, 2346, 2347, 2363 IS 1417 PT 1597, 2346 AT 1582, 1725, 1958, 3177
	Hfs	1862A, 2066A, 2232, 2403, 2515		Ce V	EL 1507, 2925 CL 1507, 2925 W 1507, 2925 IP 2925 AT 3177
	IS	2232, 3071		Ce VI	EL 1507 CL 1507 W 1507
	IP	2218, 2374, 2766, 2775, 2844, 2874		Pr I	EL 1854, 2054A, 2136A CL 2054A, 2136A W 2054A, 2136A ZE 1854, 2054A, 2136A Hfs 2054A PT 2054A AT 1725, 2439
	PT	1733		Pr II	EL 2054A CL 2054A W 2054A ZE 2054A Hfs 2054A PT 2054A, 2469
Ba II	AT	1626, 2095, 2178, 2461, 2844, 2922, 3017, 3132, 3134		Pr III	EL 2469 ND 1376, 1751, 2469 CL 1376, 2466, 2469 W 2466 PT 1376, 2469 AT 1431, 1510, 1618, 1725, 1751
	OT	2674		Pr IV	EL 2342A, 2343, 2344, 2345, 2366, 2452A, 2457A, 2462A, 2520, 3228 ND 1325, 1751 CL 2342A, 2345, 2366, 2520, 3228
	ND	2773			
	Hfs	2511A			
Ba III	IS	2554			
	AT	2473, 2773			
	EL	2483A, 2925			
La I	CL	2483A, 2925			
	W	2483A, 2925			
	IP	2925			
	EL	2052A, 2105, 2536, 2889A			
La II	ND	1733, 2105, 2831			
	CL	2052A, 2536			
	W	2052A, 2536			
	ZE	2536			
	Hfs	1429, 1694A, 1715, 1755, 2052A, 2536			
	IS	1694A, 2831			
	IP	2374, 2869			
	PT	1733, 2052A, 2536			
	AT	1725, 2423			
	ND	1564			
La III	PT	1353, 1365, 1564			
	AT	1623			
	EL	1338			
La IV	CL	1338			
	W	1338			
	AT	1582, 1725			
	EL	1366A, 2925			
	ND	1958			
La V	CL	1366A, 2925			
	W	1366A, 2925			
	IP	1366A, 2925			
	PT	1366A, 1597, 1835			
	AT	1598, 1666, 1725, 1958, 2364, 3177			
	AT	3177			
	EL	2889A			
Ce I	ND	1946, 2188			
	CL	1636			
	W	1636			
	IS	1688A, 1946, 1948, 2496A, 3006			

## 2.2 Reference Numbers for Individual Spectra—Continued

Pr IV—Continued	W	2342A, 2343, 2344, 2345, 2366, 2520, 3228	Pm IV	EL	2262
	SE	2462A		CL	2262
	Hfs	2147, 3004		W	2262
	PT	1353, 1376, 1597, 3228		PT	2262
	AT	1431, 1510, 1561A, 1725, 1751, 1765, 2116, 2147, 2646		AT	1618, 1725
	OT	1325	Pm V	AT	1618
			Sm I	EL	1888A, 3054
				CL	1888A
				W	1492, 1888A
				ZE	1850
Nd I	EL	1335		Hfs	1850
	ND	1335		IS	1688A, 2496A
	CL	2217		AT	1540, 1543, 1570, 1725
	ZE	1335, 1814		OT	1994
	Hfs	1814	Sm II	AT	1570
	IS	1332, 1688A	Sm III	EL	2365, 2391, 2451A, 2458A, 2463A
	IP	2300		CL	2365, 2391
	PT	1335		W	2365, 2391
	AT	1539, 1725, 2300		IP	2316
				AT	1540, 1543, 1570, 1725, 1937
Nd II	EL	1335, 2141	Sm IV	EL	2342A, 2344, 2354, 2452A, 2455A
	ND	2084A, 2141		CL	2342A, 2354
	ZE	1335, 2141		W	2342A, 2344, 2354
	IS	2084A, 2353		PT	1870, 1887
	IP	2300		AT	1570, 1725
	PT	1335, 2141, 2469		OT	1432
	AT	2300, 2353	Sm V	AT	1618
			Sm XXXV	EL	2424
				CL	2424
				W	2424
Nd III	IP	2300		AT	2424
	AT	1618, 1725, 1937, 2300		OT	2424
			Eu I	EL	2252, 2502
				ND	2502
				CL	2252, 2502
				W	2502
				Hfs	1436, 1695A, 1972, 2314
				IP	2502
				SF	2502
				PT	2141
Nd IV	EL	2342A, 2343, 2347, 2366, 2377, 2452A, 2610, 2723, 2768, 3228		AT	1541, 1542, 1570, 1725, 1931, 1937
	CL	2342A, 2347, 2366, 2377, 2610, 2723, 2768, 3228	Eu II	CL	3178
	W	2342A, 2343, 2347, 2366, 2377, 2610, 2723, 2768, 3228		W	3178
	Hfs	2147		AT	1570, 1931, 1937
	IP	2300			
	PT	1740, 2610, 2723, 2768, 3228			
	AT	1618, 1725, 1751, 2147, 2300			
			Eu III	EL	2133, 2342A, 2350, 2354, 2367, 2413, 2464A, 2539, 2830
				ND	2349, 2539
				CL	2133, 2342A, 2349, 2350, 2354, 2367, 2413, 2539
Nd V	AT	2300		W	2133, 2342A, 2350, 2354, 2367, 2413, 2539
	CL	3059		Hfs	1436
	W	3059		IP	2539
	IP	2300		PT	2349, 2539, 2830
	PT	3059, 3113		AT	1541, 1542, 1570, 1725, 1931, 1937
Nd VI	AT	2300			
	IP	2300			
	AT	2300			
Nd VII	IP	2300			
	AT	2300			
	W	1741A			
	Hfs	1741A			
Pm I	AT	1725			
	W	1741A			
	Hfs	1741A			
	AT	1725			
Pm II	EL	1741A			
	CL	1741A			
	W	1741A			
	Hfs	1741A			
	AT	1725			
Pm III					
Pm IV	AT	1725			
Pm V					
Pm VI					
Pm VII					
Pm VIII					
Pm IX					
Pm X					
Pm XI					
Pm XII					
Pm XIII					
Pm XIV					
Pm XV					
Pm XVI					
Pm XVII					
Pm XVIII					
Pm XIX					
Pm XX					
Pm XXI					
Pm XXII					
Pm XXIII					
Pm XXIV					
Pm XXV					
Pm XXVI					
Pm XXVII					
Pm XXVIII					
Pm XXIX					
Pm XXX					
Pm XXXI					
Pm XXXII					
Pm XXXIII					
Pm XXXIV					
Pm XXXV					
Pm XXXVI					
Pm XXXVII					
Pm XXXVIII					
Pm XXXIX					
Pm XL					
Pm XLI					
Pm XLII					
Pm XLIII					
Pm XLIV					
Pm XLV					
Pm XLVI					
Pm XLVII					
Pm XLVIII					
Pm XLIX					
Pm L					
Pm LI					
Pm LII					
Pm LIII					
Pm LIV					
Pm LV					
Pm LX					
Pm LXI					
Pm LXII					
Pm LXIII					
Pm LXIV					

## 2.2 Reference Numbers for Individual Spectra—Continued

Eu IV	EL	2045, 2070, 2342A, 2344, 2345, 3228	Tb II	EL	2450
	CL	2045, 2070, 2342A, 2345, 2816, 3228		CL	2450
	W	2045, 2070, 2342A, 2344, 2345, 3228		Hfs	1433
	PT	1597, 3228		Tb III	EL 1820 ND 1820 PT 1820 AT 1725
	AT	1540, 1543, 1570, 1725, 1931, 1937		Tb IV	EL 2342A, 2343, 2344, 2354, 2356, 2452A, 2717, 2718, 2980, 3228 CL 2342A, 2354, 2356, 2717, 2718, 2980, 3228 W 2342A, 2343, 2344, 2354, 2356, 2717, 2718, 2980, 3228 PT 2980, 3228 AT 1540, 1543, 1725
	OT	1432		Tb V	ZE 2420 PT 2420, 3113
Gd I	EL	1337, 1414	Dy I	EL	1415, 1880, 1998, 2141, 2437
	ND	1337, 1414, 2141		ND	1337, 1415, 1554, 2141, 2437
	ZE	1414		CL	1880, 1998, 2141
	PT	1337, 1374, 1414, 2141		W	1880, 1998
	AT	1540, 1543, 1725, 1937		ZE	1880, 1998, 2141, 2437, 2780
	OT	1994		Hfs	1986, 2000, 2780
Gd II	EL	1413		IS	1433, 1552, 1554, 2141
	ND	1413		IP	2141
	CL	1413		PT	1337, 1554, 2141, 2437
	W	1413		AT	1539, 1725, 1937
	ZE	1413	Dy II	EL	1871, 1872, 2141
	PT	1413, 2141		ND	1871, 1872, 2141
Gd III	AT	1937		ZE	1871, 1872, 2141
	EL	2283		PT	1871, 1872, 2141
	CL	2283		Dy III	W 3004
	W	2283		AT	1346, 1725, 1765
	IP	2316	Dy IV	EL	2343, 2354, 2357, 2373, 2452A, 3004
	AT	1540, 1543, 1725, 1937		CL	2354, 2357, 2373, 3004
Gd IV	EL	2250, 2452A		W	2343, 2354, 2357, 2373, 3004
	CL	2250		PT	2141, 3004
	W	2250		AT	1725
	PT	1597, 2250		Dy V	EL 3113 CL 3113 W 3113
	AT	1541, 1542, 1725, 1937		PT	3113
	OT			Dy XXXIX	EL 2424 CL 2424 W 2424 AT 2424
Gd XXXVI	EL	2424		EL	2424
	AT	2424		CL	2424
	OT	2424		W	2424
	EL	2424		AT	2424
	CL	2424, 2460		OT	2424
	W	2424, 2460	Tb I	EL	1548, 2380
Gd XXXVII	AT	2424		ND	1337, 2380
	OT	2424		CL	1548
	EL	2424		W	1548
	CL	2424, 2460		ZE	1548
	W	2424, 2460		Hfs	1754, 2064A
	AT	2424		PT	1754
Gd XXXVIII	OT	2424		AT	1725
	EL	2424		OT	2424
	CL	2424, 2460		EL	1339, 1649, 1801, 2055A, 2141
	W	2424, 2460		ND	1801, 2141, 2370
	AT	2424		CL	2055A
	OT	2424		W	1339, 2055A
Gd XXXIX	EL	2424		ZE	1339, 1799, 1800, 2055A, 2388
	CL	2424, 2460		Hfs	1799, 1800, 2055A, 2065A, 2359,
	W	2424, 2460		2388	
	AT	2424			
	OT	2424			
	EL	2424			
Ho I	CL	2424			
	W	2424			
	ZE	2424			
	Hfs	2424			
	PT	2424			
	AT	2424			
Tb I	OT	2424			
	EL	1548, 2380			
	ND	1337, 2380			
	CL	1548			
	W	1548			
	ZE	1548			
Tb II	Hfs	1754, 2064A			
	PT	1754			
	AT	1725			
	OT	1994			
	EL	1339, 1649, 1801, 2055A, 2141			
	ND	1801, 2141, 2370			
Tb III	CL	2055A			
	W	1339, 2055A			
	ZE	1339, 1799, 1800, 2055A, 2388			
	Hfs	1799, 1800, 2055A, 2065A, 2359,			
	PT	2388			
	AT	2388			

## 2.2 Reference Numbers for Individual Spectra—Continued

Ho I—Continued	PT	1801, 2055A, 2141		Er V	IP	2300
	AT	1725			AT	2300
				Er VI	IP	2300
Ho II	EL	1339, 2450, 2535			AT	2300
	CL	2450		Er VII	EL	1637, 2006
	W	2450			CL	2006
	Hfs	2450			W	1492, 2006
	PT	2535		Tm I	ZE	1621, 1637, 2006
Ho III	EL	3004, 3049, 3114			Hfs	1621, 1783, 1945
	CL	3004			IP	2006
	W	3004			PT	1637
	ZE	3049, 3114			AT	1725
	Hfs	3004		Tm II	EL	1633, 1634, 2469
	PT	3004, 3114			CL	2469
	AT	1725			ZE	1633, 1634
Ho IV	EL	2345, 2360, 2368, 2452A, 3167, 3228			IP	1634
	CL	2345, 2360, 2368, 3167, 3228			PT	1633, 1634, 2469
	W	2345, 2360, 2368, 3167, 3228			AT	1623
	PT	1597, 3228		Tm III	PT	2469
	AT	1539, 1725			AT	1582, 1725
Er I	ND	2527A			OT	2470
	CL	1337, 1344, 1953A, 2139A, 2370, 2480A, 2527A, 2535		Tm IV	EL	2342A, 2344, 2354, 2361, 2452A, 2520, 2990, 3037, 3079
	W	1337, 1342, 1953A, 2139A, 2480A			ND	3037
	ZE	2139A, 2480A, 2527A, 2535			CL	2342A, 2354, 2361, 2520, 2990, 3037, 3079
	Hfs	1952			W	2342A, 2344, 2354, 2361, 2520, 2990, 3079
	IS	1552, 1939, 2582A			PT	1597, 1835, 2990, 3037, 3079
	IP	2300			AT	1670, 1725, 1962
	PT	1337, 2480A, 2535			OT	1670, 2470
	AT	1725, 2300		Yb I	EL	1337
					ND	1337, 1374
Er II	ND	2527A			CL	1374
	CL	1345, 1953A, 2139A, 2480A			Hfs	2433, 2759
	W	1342, 1953A, 2139A, 2480A			IS	1492, 2759
	ZE	2139A, 2480A, 2527A			PT	1337, 1374
	IS	1939			AT	1725
	IP	2300		Yb II	EL	2378
	PT	2480A, 2535			CL	2378
	AT	2300			W	2378
Er III	ND	2469			ZE	2378
	CL	1925			IP	2378
	W	1925			AT	1623
	IP	2300		Yb III	EL	2456A
	PT	1925, 2469			W	2391
	AT	1725, 2300			PT	1353, 2469
Er IV	ND	1925, 2469			AT	1582, 1725, 1735A, 1937
	CL	2469		Yb IV	EL	2344, 2376, 3038, 3173
	W	1925			CL	2376, 3038, 3173
	IP	2300			W	2344, 2376, 3038, 3173
	PT	1925, 2469			ZE	2970
	AT	1725, 2300			Hfs	2970
	ND	2328			PT	2348, 2970, 3038
	CL	2342A, 2345, 2368, 2376, 3228			AT	1582, 1725, 1962, 3177
	W	2342A, 2345, 2368, 2376, 3228				
	IP	2300				
	PT	1376, 1597, 1740, 1835, 3228				
	AT	1725, 1765, 1962, 2300, 2646				

## 2.2 Reference Numbers for Individual Spectra—Continued

Yb v Lu I	AT	3177		W VI—Continued	
	EL	1638, 1705		W	2056A, 2658
	ND	1638, 1705, 1880		IP	2658
	CL	1638		W VII	EL 2585A CL 2585A W 2585A AT 2585A
	W	1638		W	2805
	ZE	1705		Re VIII	EL 2585A CL 2585A W 2585A AT 2585A
	Hfs	1515, 1632, 2079A, 2276		Os I	ZE 2500A PT 2375 OT 2375
	IP	1638		Ir I	ND 2806 ZE 2189 Hfs 2067A, 2189, 2806 PT 2806
	PT	1374, 1705, 1880		Pt	EL 1917, 1996A Hfs 2073A, 2838 IS 2838
	AT	2423		Pt II	IS 2269
Lu II	PT	1365, 2025		Au+	EL 1917, 1996A
	EL	1402		Au I	EL 1336, 1502A, 2890A, 2891A ND 1336
	CL	1402			CL 1336, 1502A W 1336, 1418, 1502A
	W	1402			SE 1371
	Hfs	1402			Hfs 1371, 1482, 1502A, 2072A
Lu III	IP	1402, 2316			IP 1336
	EL	1553		Au II	EL 1336
	CL	1553			CL 1336
	W	1553			W 1336, 1502A
	IP	1553			Hfs 1502A
Lu IV	PT	1553, 2469		Au III	EL 1336
	AT	1735A, 3177			CL 1336
	EL	1553			W 1336, 1502A
	PT	1553			
	AT	3177			
Lu V	EL	1553		Au IV	EL 1336
	PT	1553			CL 1336
	AT	3177			W 1336, 1502A
Hf I	ZE	1584		Au V	EL 1336
	Hfs	1584, 2067A, 2099, 2100, 2196			CL 1336
	IP	2374			W 1336, 1502A
	PT	2025			
Hf II	EL	2056A, 2538, 2603		Au VI	EL 1336
	CL	2056A, 2538, 2603			CL 1336
	W	2056A, 2538, 2603			W 1336, 1502A
	IP	2538, 2603			
	PT	2538			
Hf V	EL	2538, 2585A		Au VII	EL 1336
	CL	2538, 2585A			CL 1336
	W	2538, 2585A			W 1336, 1502A
	IP	2538			Hfs 1502A
	PT	2469, 2538		Au VIII	EL 1336
	AT	2585A			CL 1336
Ta V	EL	1671A, 2236		Au IX	EL 1336
	CL	1671A, 2236			CL 1336
	W	1671A, 2236			W 1336, 1502A
	IP	1671A, 2236			
Ta VI	EL	2585A, 2591		Hg-	EL 2270, 3070
	ND	2591			CL 2270
	CL	2585A, 2591			W 2270
	W	2585A, 2591		Hg I	EL 1310, 2231, 2725
	IP	2591			ND 1779, 1839, 2441, 2879
W I	PT	2591			CL 1310, 2231, 2494, 2555, 2725
	AT	2585A, 2591			W 1310, 2058A, 2231, 2494, 2555, 2725
	Hfs	2434			ZE 1514, 1524, 1604, 2422, 2745, 2785
	IS	2434			SE 1580, 2038, 2441, 2785, 2879, 3033
W VI	EL	2056A, 2658			Hfs 1400, 1477, 1519, 1596, 1604, 1647,
	CL	2056A, 2658			1657A, 1702A, 1938A, 2086A,
					2400, 2422, 2569A, 2643, 2684,
					2696, 2965, 3013, 3117

## 2.2 Reference Numbers for Individual Spectra—Continued

Hg I—Continued	IS	1400, 1596, 1647, 1657A, 1702A, 1781, 2086A, 2400, 2422, 2569A, 2586, 2684, 3013, 3088, 3117, 3231	Bi I—Continued	IS	1499A, 2334A
	IP	2725		PT	1692A, 2498A
	PT	1310, 1779, 1839, 2441, 2879		AT	1692A
	AT	1839, 3023		OT	3099
	EL	2975		ND	2772
	ZE	3094A		Hfs	2772
	Hfs	1981, 2526A, 2657, 3094A		AT	1777, 2772
	AT	2975		Bi IV	ND 1839 PT 1839
	OF	1340		Ac I	AT 2423
	EL	2296		Th I	CL 2351 W 2351, 2982 IP 2312, 2374, 2392, 2758
Tl I	EL	1581, 3019, 3040, 3090		Th II	EL 2372 ND 2358, 2372 CL 2351, 2358, 2372 W 2351, 2358, 2372, 2982 ZE 2372 Hfs 2358 PT 2358, 2372
Tl II	CL	1581, 3019, 3040, 3090		Th III	EL 2362 CL 2362 W 2362 PT 1353 AT 1765
	W	1581, 2867A, 3019, 3040, 3090		Pa V	EL 2476, 2544, 3126, 3229 CL 2476, 2544, 3229 W 2476, 2544, 3126, 3184, 3229 ZE 2544, 3229 PT 2476, 2544, 3126, 3229
Tl III	SE	1464A		U I	EL 1379, 1463, 1879, 2774, 2892A ND 1379, 1879, 2209, 2774 CL 1379, 1813, 1879 W 1363, 1379, 1463, 1813, 1879 ZE 1379, 1879, 2774 Hfs 1904, 2352 IS 1379, 1879, 2352 IP 1379, 2374, 2392 AT 1379, 1463, 2638
	Hfs	1520, 1706A, 2883, 2966		U II	EL 1379, 1463, 1879, 2774 ND 1379, 2141, 2774 CL 1379, 1813, 1879 W 1363, 1379, 1813, 1879, 1903 ZE 1379, 1879, 2774 IS 1379, 1879, 1903 IP 1379, 1463 PT 2141, 2774
	IS	2883, 3093A		U IV	EL 2344, 3139, 3185 ND 2264 CL 3139, 3185 W 2344, 3139, 3185 ZE 3235 PT 2264, 3139
Pb I	IP	1581			
	PT	1581			
Pb II	OT	3148			
	ND	1839			
Pb III	PT	1839			
	OT	2027			
Pb IV	EL	3138			
	IP	3138			
	PT	3138			
Pb V	EL	1470			
Bi I	EL	3233A			
	CL	1551, 1930, 3233A			
Pb VI	W	1551, 1930, 3233A			
	ZE	1718			
Pb VII	Hfs	1692A, 1860A, 2233, 2798, 2966			
	IS	1528A, 1860A			
	PT	1692A			
	AT	1692A, 2922			
	EL	2579			
Pb VIII	CL	2579			
	W	2579			
Pb IX	EL	1839			
	ND	1839			
	PT	1839			
	AT	1839			
Pb X	EL	3138			
	IP	3138			
	PT	3138			
Pb XI	AT	1644			
Bi II	EL	2296			
	CL	1551			
Bi III	W	1551, 2715			
	ZE	1693A			
Bi IV	Hfs	1499A, 1511, 1692A, 1693A, 2002, 2074A, 2076A, 2334A, 2498A, 2499A, 2626, 2709			
	EL	2344, 3139, 3185			
	ND	2264			
	CL	3139, 3185			
	W	2344, 3139, 3185			
Bi V	ZE	3235			
	PT	2264, 3139			

## 2.2 Reference Numbers for Individual Spectra – Continued

U v	EL	2171, 2594, 2776, 3185, 3186, 3187, 3188, 3189, 3190, 3191	Am III	EL	2297, 3202
	CL	2171, 2594, 3185, 3187, 3188, 3190		ZE	3202
	W	2171, 2389, 2594, 3185, 3186, 3187, 3188, 3190, 3191		PT	3202
	ZE	2171, 2776, 3189		Am IV	EL 2251, 2344, 3196, 3203, 3214 CL 2251, 3196, 3203, 3214 W 2251, 2344, 3196, 3203, 3204, 3214 ZE 2371 PT 2251, 3196, 3203, 3214
U vi	EL	2474, 2476, 3192	Am V	EL	2222, 3201
	CL	2474, 2476, 3192		ND	3217
	W	2474, 2476, 3192		CL	2222
	PT	2474, 2476, 3192		W	2222
U	W	3068		ZE	3201
Np I	EL	1678A	Am VI	Hfs	3201
	CL	1678A		PT	3201, 3217
	W	1678A		EL	3205
	ZE	1678A		ND	3205
	Hfs	1678A, 1736A		CL	3205
	IP	2869		W	3205
	PT	1678A, 1736A		PT	3205
	AT	1736A		OT	2129
Np IV	EL	2322A, 2454A, 2988, 3193	Am LXXXV	Cm I	EL 1562A, 1563A, 2495A
	ND	2264		CL	2495A
	CL	2322A, 2988, 3193		W	2495A
	W	2322A, 2988, 3193		IP	1563A
	PT	2264, 3193		Cm II	EL 1562A
Np V	EL	3186	Cm IV	EL	3202, 3206, 3207
	W	3186		ND	3202, 3206
	PT	3186		CL	3206
Np VI	EL	3194	Cm V	ZE	3202, 3207
	CL	3194		PT	2264, 3202, 3206
	W	3194		EL	2221
	PT	3194		CL	2221
Np VII	W	3195	Bk I	W	2221
	ND	3196		EL	1562A
	Hfs	2132		OT	1994
	PT	3196		Bk II	EL 1562A
Pu IV	Hfs	2132	Bk IV	EL	2019, 2102, 2221, 2344, 3208, 3209
	EL	2222, 2248, 2355, 2790, 3175, 3197, 3198, 3199, 3200, 3201, 3216		CL	2019, 2102, 2221, 3209
	ND	3197, 3198, 3199, 3217		W	2019, 2102, 2221, 2344, 3208, 3209, 3210
	CL	2222, 2248, 2355, 3197, 3199		PT	2019, 2102, 3209
	W	2222, 2248, 2355, 2790, 3175, 3197, 3199		EL	2019, 2686, 3208, 3209
	ZE	2355, 2371, 3198, 3199, 3200, 3201		CL	2019, 2686, 3209
	Hfs	2355, 3201, 3215, 3216		W	2019, 2686, 3208, 3209, 3210
	PT	2248, 2264, 2355, 3197, 3198, 3199, 3201, 3217		PT	3209
	AT	1561A, 1765		Bk V	EL 2019, 2686, 3208, 3209
	EL	3175, 3186		CL	2019, 2686, 3209
Pu V	W	3175, 3186		W	2019, 2686, 3208, 3209, 3210
	PT	3186		PT	3209
	Cf I	EL 1562A		Cf II	EL 1562A
Pu VII	EL	3175, 3194		Cf IV	EL 2103, 2222, 2344, 2449A, 2970
	CL	3194		CL	2103, 2222
	W	3175, 3194		W	2103, 2222, 2344, 3211
	PT	3194		ZE	2970
	Hfs			Hfs	2970
	PT			PT	2103, 2970

## 2.2 Reference Numbers for Individual Spectra—Continued

Es I	EL	2225		Es IV—Continued		
	CL	2225		W	2224, 2249, 2344, 3038, 3150, 3212	
	W	2225		PT	2249, 3038	
	ZE	2525A, 2947		Fm I	EL	1326, 1357
	Hfs	2225, 2525A, 2947			ZE	1326
Es II	EL	1562A, 2225			PT	1326
	CL	2225			AT	1574, 1606
	W	2225		Fm XCV	AT	1728
	Hfs	2225			OT	1728
Es III	EL	3213		Md I	OT	1994
	ZE	3213		No III	EL	2298
	Hfs	3213		Lr I	AT	2423, 2777
	PT	3213		Trans Lr	AT	1445, 1544, 1546, 1629, 1732, 2724, 2777
Es IV	EL	2224, 2249, 2344, 3038, 3150			OT	1503, 1772
	CL	2224, 2249, 3038, 3150				

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Al I, II, IV, VI – XI, Si I – XII, XIV: OT  
P I – XIII, XV, S II – VII, X – XIV: OT  
Cl I – VIII, XII – XVI, Ar I, III – VII: OT  
Ar IX – XI, XIV, XV, K II – XVI, XIX: OT  
Ca III – VII, IX, X, XII, Sc III, V – XV: OT  
Ti III – XIII, V III – XV, Cr V, VI: OT  
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