Hello,

I presume your either a chemist, astronomer, researcher or spectroscopist.

For quite a while now I have been collecting, searching and researching ultraviolet spectra (higher the resolution the better) of SOLAR, ATOMIC and MOLECULAR species from the region of:

2900-2960 Angstroms (A) or
290 -296 Nanometers (nm)

FOR A BETTER EXAMPLE PLEASE SEE THE PDF's IN THIS FOLDER
ESPECIALLY : Pearse & Gaydon Identification Molecular Spectra.pdf

24 THE IDENTIFICATION OF MOLECULAR SPECTRA

	Ab.	F.	A(a).	A(r).	D+.	D−.		System.	App.	Occ.
3548·7 R		6			6		SO			
3545·9 R	—	—	—			9	CO_2			e.
3541 M	10						HNO_3 ?			
*3536·7 V	—	—			8		N_2	2nd Positive	CT.	
*3535·0 R				4	4		SiN		D.	N.
3533·8 R	—	—	—			7	CO_2			e.
3525·5 R			7				BO	α	CD.	N.
3517·7 R	—	—	—			9	O_2^+	2nd Negative		He.
3516·1 R	—	—		8			O_2	Schumann-Runge		
3516 R				5			AgH			
3514·3 R					10		SiTe			
3511·7 V	—	—	—			7	CO^+	Baldet-Johnson	wr.	He.
3511·4 R	10						ClO_2			
3510·8 R	—	—	—			6	CO_2			e.
3508·2 R					8		CP	A.		A.
3507·3 R	—	—				10	HCl^+			
3503·8 R			10				SrO			

These have been the best resources available along with some private sources some researchers have provided to me:

The Identification of Molecular Spectra, RWB Pearse & AGG Gaydon, 1976, QC454.M6P4 (molecular spectra by wavelength and molecule)

Tables of Spectral Line Intensities Part II - Arranged by Wavelengths, WF Meggers et al, QC453.M4 (atomic spectra from 2000-9000A)

Tables de Constantes et Donnees Numeriques, RF Barrow, 1962, QC453.R6 (molecular spectra by wavelength with references - in French)

Tables of Band Features of Diatomic Molecules in Wavelength Order (Version A, 1974 & Complement A1, 1977),
Ingvar Kopp et al, QC454.M6K66 (molecular spectra by wavlength)

If you have any similar resources of Ultraviolet spectra ESPECIALLY molecular species containing Carbon, Nitrogen, Hydrogen and/or Oxygen please contact me.

thank you

George R Lewycky
New York City, USA
grlewycky@yahoo.com

THE IDENTIFICATION OF MOLECULAR SPECTRA

By

R. W. B. PEARSE
D.Sc., F.R.A.S.
Reader in Spectroscopy,
Imperial College, London

and

A. G. GAYDON
D.Sc., F.R.S.
Professor of Molecular Spectroscopy
in the University of London,
Warren Research Fellow of the Royal Society,
Imperial College, London

THIRD EDITION,
REPRINTED WITH SUPPLEMENT

LONDON
CHAPMAN & HALL LTD
11 NEW FETTER LANE, E.C.4
1965

	Ab.	F.	A(s).	A(r).	D+.	D−.		System.	App.	Occ.
2984 R	—	8	8				O_2	Schumann-Runge		
*2979 R	9	—	—		—		SO_2			
*2977·4 V	—	—	—		9		CO	3rd Positive	F.	
*2976·8 V	—	—			6		N_2	2nd Positive	CT. S.	
2976·2 R	1				10		ZnCl			hf.
2973·4 V					8		SnCl			
2970·4 V					8		SiCl			
2970·0 R	—	—	—			8	O_2^+	2nd Negative		He.
2969·8 R					5		P_2			He.
2967·8 R			2				ZrO			
2967·1 V					6		SiF	β	D.	
2967·0 V	—	—			6		N_2	Gaydon-Herman		c.
*2960·2 R	10	—	—		—		SO_2			
2958·7 V					7		SiBr			
2956 V	8						ZnCl ?			
2954·2 M					10		BBr			hf.
2954·0 R	10	7	8		8		S_2		wv.	
2953·6 R					7		P_2			
2952·6 R					10		PS		D.	He.
2952·2 R						6	CN^+			He.
2950·0 R			2				ZrO			
2948·2 R		7					CHO	Hydrocarbon flame		
2948·1 V					10		BBr			
2944·2 R					9		BBr			
2943 V					10		COS ?			
*2943·0 R	9	—	—		—		SO_2			
2942·6 R	5				10		ZnCl		S.	hf.
2942·2 V					8		SiCl			
2940·9 R			2				ZrO			
*2936·7 R	8	—	—		—		SO_2			
2935·8 V					10		SnCl			
2935·7 R					9		N_2	Vegard-Kaplan		
2935·7 R					7		BBr		S.	hf.
2934·9 R			9				BO	β		N.
2934 V	10						ZnCl ?			
2933·2 R			4		4		SbO			
2931·8 R	10						PbI			hf.
2931 R	10						CH_2O	Formaldehyde		
2928·3 V					10		GeF			hf.
2927·9 V	?						SnF			
2926·2 V	10						CaF	E.		
2926·1 R	8				10		SiS		S.	
2925·5 R	?						CdF			
2925 V	—	—	—		2		CO	Knauss		r.
2924·4 V					8		SiCl			
*2923 R	8	—	—		—		SO_2			
2921·7 R	2			10			SnO	Loomis & Watson		
2920·2 R	10	7	8		8		S_2		wv.	
2919·8 R	—	—	—			9	O_2^+	2nd Negative		He.
2915·0 R	10						PbI			hf.

	Ab.	F.	A(s).	A(r).	D+.	D−.		System.	App.	Occ.
2912·0 R					7		SbN		CD.	
2911 V					10		COS ?			
2906·6 V	9						PbBr			
*2905·5 R	8	—	—		—		SO_2			
2904·3 R					10		SbN		CD. S.	
2903·9 V	—	—	—		1		N_2	4th Positive	F.	c.
2903·0 R					7		P_2			He.
2901·9 R	—	—	—			8	O_2^+	2nd Negative		He.
2900·4 M	1	10			10		Br_2			
2898·7 R	10						PbI			hf.
*2898·4 R			3		3		SiO			
2898·1 R	—				4		C_6H_6	Benzene	S.	t.
2897·2 R	—	—	—			3	CO^+	1st Negative		He.
2895 R					7		O_2	Herzberg (Night-sky)		
*2896 M	—	—	—			10	CO_2^+			
2894·4 V					6		SiF	β	D.	
2893 R	10						SeO_2			
2892·3 R	10	7	8		8		S_2			
2892·2 R			10				BO	β		N.
2891·2 R			4		4		SbO			
2890·3 R	—	—	—			8	O_2^+	2nd Negative		He.
2889·5 V	10						PbBr			
2887·9 R	10	7	8		8		S_2			
*2886·7 R	9	—	—				SO_2			
*2885·2 R	—	—			10		NO	β	D.	N.
2885 R	—	—				10	NH^+			
2883·2 R	7				8		SiS			
*2883 M	—	—	—			10	CO_2^+			
2882·9 V					8		SiCl			
2882·9 V	9						PbCl			
2881·7 R	10		10		10		GeO		S.	
2880·6 R	?						CdF			
2880 V					7		COS ?			
2879·5 O					2		CN	Douglas & Routly		He.
2877·9 R	—	—			7		N_2	Gaydon-Herman		c.
2875·3 R	10				10		HgBr		S.	hf.
*2875 R		2		2	2		OH			
2873·2 V	10						SrF	G.	S.	
2872·6 V	9						PbBr			
2872 R	10						SeO_2			
*2871·6 R			4		4		SiO			
2871·4 V	10						SnF			He. he.
2868·7 R					6		AsN		CD.	
*2867 R	8	—	—		—		SO_2			
2866·2 R	5						PbO	E.		
2865·8 V					8		SiCl			
2863·7 R	8				8		SiS		S.	
2861·5 V		4			4		CCl			
2860·0 R	9	5	7		7		S_2		wv.	
*2859·5 V	0	6	6		6		NO	γ	DCD.	

C_6H_6, Benzene (*contd.*)

The bands form three strong and one weak group; they are probably shaded to the red. The following are the approximate wave-lengths of the shorter wave-length edges of the strong bands; the intensities are our own estimates from the published photograph:

λ	I	λ	I
4990	?	4255	10
4645	4	4237	5
4600	7	4010	5
4595	3	3970	9
4307	6	3940	3

CHO

Vaidya's Hydrocarbon Flame Bands

Occurrence. In inner cones of hydrocarbon and other flames, especially in low-temperature flames. First observed in C_2H_4/air flames and known as "Ethylene flame bands". Also in short-wave fluorescence of formaldehyde, and high-frequency discharge through methyl formate (by Dr. D. W. G. Style).

Appearance. Degraded to the red. Fairly definite heads, but complex rotational structure. Most of the strong bands fall into two progressions, denoted A_0 and A_1 below.

References. W. M. Vaidya, *P.R.S.*, 147, 513 (1934)†.
W. M. Vaidya, *Proc. Phys. Soc.* A, 64, 428 (1951).
A. G. Gaydon, *The Spectroscopy of Flames*, Chapman and Hall (1957)†.
G. A. Hornbeck and R. C. Herman, *Nat. Bur. Stand. Circular* 523, 9 (1954)†.

The following table is compiled from the work of Vaidya, Hornbeck and Herman and Gaydon. The letter B in the intensity column indicates that the head is absent from low-temperature flames but occurs in hotter flames.

λ	I	Prog.	λ	I	Prog.	λ	I	Prog.	λ	I	Prog.
2420·5	1		2658·8	4	A_0	3014·8	8	A_1	3539·9	2	
2436·5	2		2672·3	1		3114·9	9	A_0	3569·2	B	
2447·8	1		2704·5	B		3186·1	9	A_1	3588·6	8	A_1
2463·8	1		2716·0	5	A_1	3215·5	7		3635·6	3	
2480·0	1		2751·5	4		3290·2	10	A_0	3676·0	1	
2495·0	1		2774·6	1		3359·0	B		3697·7	B	
2517·5	1		2780·4	B		3377·4	10	A_1	3730·5	5	A_0
2532·4	2	A_0	2797·1	5	A_0	3417·4	3		3802·7	B	
2550·3	2		2858·0	6	A_1	3458·4	1		3824·9	4	A_1
2585·5	3	A_1	2948·2	7	A_0	3472·5	0B		3987·5	2	A_0
2618·0	3		3001·5	B		3502·7	8	A_0	4092·0	3	A_1
2640·5	1										

Flash Photolysis Bands 4500–7500 Å

Occurrence. Observed in absorption following the flash photolysis of acetaldehyde, glyoxal, etc.

CHO (*contd.*)

Appearance. Degraded to the red. Some bands show double heads and apparently simple rotational structure. Some bands are diffuse.

Reference. G. Herzberg and D. A. Ramsay, *P.R.S.*, 233, 34 (1956)†.

R heads	Q heads	v_1', v_2', v_3'	I	R heads	Q heads	v_1', v_2', v_3'	I
7551·6	7560·9	0, 6, 0	4	5570·0	—	0, 8, 1	3
6766·3	6774·1	0, 8, 0	7	5195·6	5201·0	0, 14, 0	5
6436	—	0, 9, 0	5d	5148·2	5152·7	0, 10, 1	4
6138·0	6144·7	0, 10, 0	10	4833·3	4838·3	0, 16, 0	4
5906/5860	—	0, 11, 0	5d	4791·1	4796·5	0, 12, 1	3
5624·0	5629·2	0, 12, 0	8				

CH_2O, Formaldehyde

Absorption Spectrum

Reference. V. Henri and S. A. Schou, *Z.P.*, 49, 774 (1928)†.

The absorption spectrum of formaldehyde vapour is very complex and not readily identified except by comparison of spectrograms. Henri and Schou give excellent reproductions of the spectrum; the following measurements and intensity estimates are based on these. Some of the bands are degraded to the red, and when there is a definite edge this is given. The wave-length of the strongest line of the structure is also given where available. See Plate 10.

Limits of Strong Part of Band	Strongest Line	Edge (Deg. R)	Int.
3456–3418	3430·9	—	2
3416–3377	3389·3	3387	4
3306–3288	3294·7	3288	6
3274–3249	3260·4	—	7
3215–3198	3203·3	3198	3
3185–3164	3170·4	3164	9
3160–3133	3143·4	—	8
3102–3082	3088·7	—	5
—	—	3057	3
3075–3049	3054·2	3051	5
3048–3028	3035·8	3033 ?	7
2985–2974	2978·9	2978·9	6
2954–2948	2951·9	2948	6
2945–2931	2935·0	2931	10
2898–2874		2874 ?	6
2855–2835		2839	9
2801–2787		2787	7
2766–2756		2756	5
2756–2747		2747	5
2716–2706		—	3
2675–2667		2667	1

CH_2O, Formaldehyde (contd.)

EMELÉUS'S COOL FLAME SPECTRUM; FORMALDEHYDE FLUORESCENCE

Occurrence. In the cool flame of ether, acetaldehyde, hexane and other organic substances. Also in fluorescence by formaldehyde and Tesla discharge.

Appearance. A number of narrow approximately equally spaced bands; probably degraded to the red. See Plate 8.

References. H. J. Emeléus, *J. Chem. Soc.*, 2948 (1926)†.
J. C. D. Brand, *J. Chem. Phys.*, 19, 377 (1951); *J. Chem. Soc.*, 858 (1956).
A. G. Gaydon, *Spectroscopy of Flames*, Chapman and Hall (1957).

The following are based on Brand's measurements, but with Gaydon's estimates of intensity:

λ	I	λ	I	λ	I
5227	1	4434	8	3846·5	8
5097	1	4347	8	3777–63	5
4947	1	4240–20	10	3698–79	8
4821	3	4121	8	3544	4
4695–73	5	4044	6	3405	2
4569–51	8	3952	10		

CH_3O

Reference. D. W. G. Style and J. C. Ward, *Trans. Faraday Soc.*, 49, 999 (1953).

Bands believed to be due to the methoxy radical have been observed in the short-wave fluorescence of methyl nitrite, dimethyl carbonate, methyl formate or methyl chloroformate. Diffuse narrow bands, possibly shaded to the red. They have been arranged into three progressions, and Professor Style has kindly provided the following wave-lengths; intensities are our estimates from his photograph.

λ	I	λ	I	λ	I	λ	I
4205	1	3886	4	3609	6	3361	2
4134	1	3837	8	3570	6	3322	4
4072	4	3777	7	3514	10	3282	2
4036	4	3736	2	3978	6	3249	1
3985	7	3698	8	3438	6	3214	1
3910	4	3642	10	3399	7		

CHOOH, Formic Acid

Reference. B. Sugarman, *Proc. Phys. Soc.*, 55, 429 (1943)†.

The absorption spectrum shows a number of diffuse bands without well-defined heads in the range λλ2600–2260. Below λ2260 the absorption becomes continuous at least to λ1900.

Centres of bands:

λ	I	λ	I	λ	I
2500·0	1	2394·7	5	2340·3	10
2461·2	4	2391·2	4	2335·8	6
2443·4	4	2382·2	9	2325·2	9
2420·8	6	2377·2	6	2318·9	7
2414·3	4	2372·8	5	2302·9	8
2408·4	4	2361·5	9	2284·9	10
2398·3	10	2354·0	6	2273·3	5
		2350·7	3		

C_2H_4O, Acetaldehyde

Occurrence. Absorption by acetaldehyde vapour.

Appearance. Strong absorption with maximum at 2900 Å, with a complex structure of discrete bands from 3400 Å to 3200 Å, after which they become diffuse and finally merge into continuum around 2800 Å. Some of the bands appear to be shaded to the red.

Reference. S. A. Schou, *Jour. de Chim. Phys.*, 26, 27 (1929).

The following are the limits of the outstanding bands as taken from Schou's list:

λ	I	λ	I	λ	I	λ	I
3399·3	3	3320·0	6	3254·4	6	3207·3	6
3381·1		3314·7		3247·3		3202·0	
3376·6	2	3305·1	4	3241·1	6	3199·0	7
3363·0		3299·9		3234·1		3196·1	
3359·0	4	3296·2	6	3231·4	5	3190·9	9
3344·5		3289·9		3228·7		3180·2	
3341·7	3	3281·3	5	3222·1	5	3177·5	8
3328·9		3274·4		3216·9		3172·2	
		3267·6	7	3215·6	6	Diffuse bands extend to 2800, after which absorption is continuous.	
		3258·3		3212·7			

C_2H_5CHO, Propionaldehyde

Occurrence. Absorption by the vapour.

Appearance. Complex system of diffuse bands from 3400 Å, merging into a continuum at 3250 Å, this continuum extending to about 2500 Å.

Reference. S. A. Schou, *Jour. de Chim. Phys.*, 26, 39 (1929).

The following are the limits of the strongest bands:

λ	I	λ	I	λ	I
3370·8	4	3322·0	8	3276·7	8
3363·9		3316·4		3272·3	
3343·6	5	3298·1	9	3269·0	7
3339·6		3294·2		3262·0	
3336·1	6	3288·7	8	3258·7	8
3332·3		3284·8		3248·9	
3331·4	6				
3324·9					

C_3H_6O, Acetone

Occurrence. Absorption by the vapour.

Reference. E. J. Bowen and H. W. Thompson, *Nature, Lond.*, 133, 571 (1934).

Acetone shows continuous absorption from 3200 Å to 2400 Å, with a maximum at about 2800 Å. At low pressure this continuum breaks up into four groups each of about 25 diffuse bands; these groups have maxima at 3150, 2900, 2710 and 2570 Å.

UNITED STATES DEPARTMENT OF COMMERCE · Luther H. Hodges, *Secretary*
NATIONAL BUREAU OF STANDARDS • A. V. Astin, *Director*

Tables of Spectral-Line Intensities

Part II

Arranged by Wavelengths

The intensity, character, wavelength, and spectrum of 39,000 lines between 2000 A and 9000 A observed in copper arcs containing 0.1 atomic percent of each of 70 elements.

William F. Meggers, Charles H. Corliss, and Bourdon F. Scribner

National Bureau of Standards Monograph 32 — Part II

Issued October 2, 1961

For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C. - Price $1

Table 2. All Observed Lines in Order of Wavelength

Intensity and Character	Wave-length in A	Element and Spectrum
6	2908.69	Tm II
320	2908.82	V II
12	2908.88	Nb II
40	2908.88	Ru I
20	2908.91	Ta I
16	2908.99	Eu I
30	2909.05	Cr I
900	2909.06	Os I
75	2909.12	Mo II
11	2909.12	W I
5	2909.19	Yb II
3.5	2909.22	Ru I
8	2909.25	U
5	2909.36	Dy II
50 c	2909.41	Ho II
8	2909.47	Yb II
20	2909.55	Er II
5	2909.56	Ir I
10	2909.67	Os I
2.5	2909.72	Dy II
2.0	2909.77	Th II
50	2909.82	Re I
2.5	2909.89	Dy II
16	2909.91	Hf II
3.0	2909.92	Ti II
95	2910.02	V II
5	2910.08	Re I
5	2910.17	Rh II
10	2910.25	Zr II
9	2910.28	Sm II
11	2910.30	Tb II
150	2910.36	Er II
3.0	2910.36	Tm II
70	2910.39	V II
5	2910.40	Ho II
28	2910.48	W I
15	2910.53	Gd II
100	2910.59	Nb II
18	2910.59	Th II
7	2910.82	U
30	2910.90	Cr I
34	2911.00	W I
7	2911.05	Er II
75	2911.06	V II
28	2911.14	Cr I
8	2911.32	Th II
3.5	2911.34	Os I
600	2911.39	Lu II
12	2911.52	Yb II
4	2911.55	U
5	2911.68	Cr II
70	2911.74	Nb II
8	2911.80	Tb II
5	2911.87	Tm II
140	2911.92	Mo II
8	2912.01	Th II
42	2912.08	Ti I
20	2912.16	Fe I
12	2912.26	Pt I
3.0	2912.27	Er II
200	2912.33	Os I
6	2912.58	U
6	2912.62	Rh I
4	2912.65	Tb II
8 d	2912.66	Th II
	2912.75	Th II
4	2912.75	U
4	2912.79	Er II
2.5	2912.86	Yb II
2.5	2912.91	Ce II
5	2913.08	Gd II
6	2913.15	Re I
4	2913.17	Ru I
4	2913.32	Ta I
4	2913.41	Tb II
6	2913.44	U
4	2913.45	Ta II
9	2913.52	Mo I
12	2913.54	Pt I
24 h	2913.54	Sn I
7	2913.73	Cr I
2.5	2913.73	Dy II
7	2913.81	Mo II
13	2913.84	Os I
28	2913.96	Dy II
13	2913.96	Tm II
2.0	2914.01	Ni I
6	2914.09	Ho II
24	2914.12	Ta I
24	2914.21	Yb II
13	2914.25	U II
4	2914.30	Ru I
7	2914.30	V I
18 h	2914.60	Mn I
15	2914.63	U II
10	2914.65	Er I
7	2914.71	Os I
17	2914.80	Tb II
17	2914.83	Tm I
4	2914.84	U
50	2914.93	V I
3.0	2914.94	Ta I
11	2915.11	W I
4	2915.12	Ho II
2.5	2915.23	Cr II
6	2915.26	Mo I
20	2915.27	Yb II
17	2915.33	Tb II
8	2915.33	V I
20	2915.34	Ta I
7	2915.38	Mo I
7	2915.42	Rh I
2.5	2915.46	Cr II
36	2915.49	Ta I
9 d	2915.54	U
2.5	2915.56	Ce II
11	2915.59	W I
20	2915.60	Tb II
26	2915.61	Er II
15	2915.82	Ho II
34	2915.99	Zr II
6 h	2916.02	V I
6	2916.10	Mo I
3.0	2916.25	Zr I
120	2916.26	Ru I
13	2916.27	Tb II
32	2916.36	Ir I
3.5	2916.37	Th I
2.5	2916.43	Yb II
9	2916.46	U
220	2916.48	Hf I
13	2916.52	Tm II
12	2916.64	Zr II
3.5	2916.68	Ce II
6 h	2916.73	Re II
4	2917.03	Th II
10	2917.05	Nb II
4	2917.12	Ta I
50	2917.26	Os I
16	2917.37	V II
14	2917.41	Th II
3.0	2917.44	Eu II
3.5	2917.49	Hf II
4	2917.56	Ta II
6	2917.67	W I
3.0	2917.77	Ru I
5	2917.78	Th II
12	2917.83	Os I
4	2917.90	Th II
8	2917.93	V I

TABLES OF SPECTRAL LINES OF NEUTRAL AND IONIZED ATOMS

By A. R. Striganov and N. S. Sventitskii
Atomic Spectroscopy Laboratory
I. V. Kurchatov Institute of
Atomic Energy

Translated from Russian

IFI/PLENUM • NEW YORK – WASHINGTON • 1968

λ	Symbol	I	λ	Symbol	I
3006,05	Cl II	20	2995,94	O II	1
3006,01	O II	2	2995,75	Ti II	5
3005,62	O II	2	2995,524	Al II	1,5
3004,486	Ar II	2	2995,34	Cs	20
3004,39	Cl II	10	2994,958	Ca I	5
3004,35	O III	4	2994,69	Xe III	8
3004,32	Xe III	30	2994,4281	Fe I	100
3003,98	Xe II	40	2994,385	Fe I	5
3003,15	F III	2	2994,280	Al II	1
3003,0323	Fe I	10	2994,273	F III	8
3002,964	Ar II	6	2994,250	Ne I	3
3002,93	O II	1	2994,13	Cu I	5
3002,88	Cs	6	2993,27	Kr III	2
3002,730	Ti I	3	2993,09	Cl II	8
3002,649	Fe II	13	2992,91	Xe III	40
3002,48	Kr II	2	2992,618	C II	18
3002,330	Fe II	5	2992,438	Ne I	200
3002,281	Cu I	10	2992,420	Ne I	200
3002,24	Kr III	6	2992,24	K III	6
3001,920	F III	3	2992,223	K I	1
3001,85	Xe III	10	2992,22	Kr III	60
3001,82	Al II	3	2992,118	K I	1
3001,774	Cu I	2	2992,11	O III	2
3001,663	Ne II	6	2991,82	Cl III	3
3001,617	Fe III	12	2991,780	Cu I	15
3001,271	Cs II	10	2991,73	Xe II	3
3001,24	Cu I	5	2991,637	Fe I	5
3000,9489	Fe I	100	2991,45	Xe III	8
3000,892	Ti I	20	2991,25	Xe III	10
3000,863	Ca I	5	2990,981	Ti I	3
3000,4527	Fe I	8	2990,85	Cs II	2
3000,442	Ar II	9	2990,843	Ar II	2
3000,110	Ar II	5	2990,54	Xe II	12
3000,097	F III	4	2990,488	Ti I	3
3000,059	Fe II	5	2990,3933	Fe I	6
2999,84	Kr II	40	2990,17	Ti II	10
2999,641	Ca I	4	2990,036	Ti I	3
2999,513	Cs	8	2989,30	Ca III	6
2999,5125	Fe I	30	2989,010	Cu I	2
2999,465	F III	6	2988,69	Kr II	3
2999,21	Xe II	15	2988,61	Ca III	7
2999,110	Ar II	2	2988,45	F III	4
2998,43	N V	5	2988,45	F II	3
2998,384	Cu I	150	2987,6453	Si I	150
2998,20	Cs	2	2987,2923	Fe I	10
2998,174	Al II	2	2986,89	Cs	2
2997,74	O II	2	2986,82	Xe II	8
2997,71	O III	2	2986,4569	Fe I	3
2997,513	F III	6	2986,33	Cu II	2
2997,364	Cu I	2000	2986,20	K III	5
2997,309	Ca I	5	2986,18	Xe II	10
2997,301	Fe II	7	2985,926	Cu I	10
2997,2	Cs	2	2985,550	Fe II	13
2997,168	F III	6	2985,464	Ti I	3
2996,63	Cl II	40	2985,33	Kr II	4
2996,60	Kr III	20	2985,3	Cs	2
2996,60	Kr II	20	2985,04	Ar IV	—
2996,51	O III	3			
2996,15	Cs	2			

λ	Symbol	I	λ	Symbol	I
2984,830	Fe II	15	2976,971	N II	4
2984,785	Fe I	10	2976,81	Cs	2
2984,76	Ti III	10	2976,39	Xe II	8
2984,63	Xe III	15	2976,28	Kr II	3
2984,479	F III	5	2976,131	Fe I	5
2984,267	Cu I	5	2975,938	Fe II	5
2984,183	Na II	7	2975,92	Kr II	3
2983,94	Kr II	2,	2975,65	Cs	2
2983,91	Cs	2	2975,518	Ne I	35
2983,82	Ne	5	2975,13	Cs	2
2983,78	O III	9	2974,991	Na II	6
2983,765	F III	4	2974,926	Ti I	4
2983,66	O III	1	2974,86	Xe II	20
2983,58	N III	6	2974,714	Ne I	300
2983,5714	Fe I	125	2974,675	Cu I	10
2983,290	Ti I	20	2974,65	N II	2
2983,22	Kr IV	2	2974,527	Ne	1
2983,038	Cu I	3	2974,52	N V	6
2982,78	Cl II	18	2974,236	Na II	2
2982,765	Cu I	8	2974,04	Kr II	25
2982,663	Ne I	300	2973,601	N II	3
2982,5	Cs	2	2973,46	Cl II	2
2982,34	Kr II	1	2973,2368	Fe I	60
2982,23	Xe II	2	2973,1336	Fe I	60
2982,123	Cu I	3	2973,07	Ne II	1
2982,106	C III	8	2972,8	Cs	2
2982,07	N III	1	2972,63	Cl II	5
2982,062	Fe II	8	2972,60	N III	4
2982,03	Cs	2	2972,34	Kr II	2
2981,854	Fe I	6	2972,31	Xe II	8
2981,4459	Fe I	20	2972,279	Fe I	3
2981,31	N V	10	2971,80	Kr II	4
2980,922	Ne I	50	2971,839	Mg II	1
2980,90	Cl II	4	2971,522	Si IV	1
2980,78	N V	8	2971,24	Xe III	8
2980,642	Ne I	40	2970,851	Cs II	5
2980,622	Na II	3	2970,725	Na II	1
2980,538	Fe I	5	2970,682	Fe II	5
2980,519	Si III	5	2970,67	Cl III	4
2980,47	Cl II	2	2970,554	Ti I	4
2979,81	Kr II	20	2970,513	Fe II	5
2979,806	Ne I	50	2970,372	Ti I	10
2979,662	Na II	5	2970,3547	Si I	55
2979,380	Cu I	25	2970,106	Fe I	40
2979,352	Fe II	8	2969,934	Fe II	8
2979,32	Xe II	300	2969,80	Xe II	12
2979,20	Ti II	10	2969,59	C II	0
2979,054	Ar II	15	2969,4759	Fe I	10
2979,050	Na II	2	2969,45	Xe III	4
2978,87	Kr II	25	2969,3606	Fe I	5
2978,87	N III	3	2969,23	Xe II	3
2978,48	Cl II	7	2969,145	Mg II	0
2978,295	Cu I	30	2969,0	Cs	8
2978,145	F III	4	2968,836	C II	2
2977,90	Xe II	5	2968,56	Xe III	10
2977,80	Ti II	7	2968,383	Cs II	5
2977,32	N III	3	2968,31	Kr III	20
2977,258	Cs II	3	2968,226	Ti I	4
2977,222	Fe III	6			
2977,132	Na II	3			

FINDING LIST

I A	Type	Element	Multiplet No.
2951.40		Cr II	59
2951.95		Cr II	88
2952.07		V II	2
2953.358		Cr II	27
2953.706		Cr II	66
2953.774		Fe II	2
2953.940		Fe I	10
2954.059		Fe II	61
2954.332		V I	18
2954.67		Cr II	104
2955.12		Cr II	59
2955.71		Cr II	58
2956.133		Ti I	30
2956.60		Cr II	58
2956.797		Ti I	30
2957.28		Cr I	
2957.33		V I	18
2957.365		Fe I	10
2957.520		V II	2
2957.58		Cr II	104,141
2958.30		Cr II	49
2958.536		Fe II	150
2958.84		Cr II	97
2959.601		Fe II	62
2959.841		Fe II	180
2959.97		Cr II	50
2959.992		Fe I	316
2960.302		Fe I	148
2960.926		Gd II	25
2961.119		Fe II	180
2961.273		Fe II	2
2961.732		Cr II	27,69
2962.11		Fe I	57
2962.167		Rh II	4
2962.772		V I	18
2962.938		Fe II	150
2963.249		V II	154
2963.40		Cr II	56
2963.605		Gd II	
2963.73		Cr I	
2963.997		Fe II	
2964.131		Fe II	60
2964.629		Fe II	8
2964.88		Hf I	4
2964.98		Y I	11
2965.036		Fe II	8
2965.19		Cr II	58,160
2965.231		Ti I	94
2965.25	P	Fe I	316
2965.255		Fe I	10
2965.395		Fe II	59
2965.438		Gd II	29
2965.64		Ta I	2
2965.664		Ru II	4
2965.68		Ti I	94
2965.707		Ti I	94
2965.88		Sc I	11
2966.061		Cr II	33
2966.20		Fe I	104
2966.27		Zr II	148
2966.901		Fe I	10
2967.226		Ti I	30
2967.642		Cr I	28
2968.112		Fe II	160
2968.21		Cr II	96
2968.231		Ti I	29
2968.373		V II	28
2968.67		Cr II	58
2968.738		Fe II	61
2968.82		Hf II	12
2968.906		Fe II	
2968.95		Zr II	14
2969.267		Gd II	28
2969.364		Fe I	11
2969.474		Fe I	30
2969.67		Cr II	65
2969.934		Fe II	70
2970.105		Fe I	10,11
2970.35		Si I	1
2970.364		Ti I	39
2970.510		Fe II	2
2970.556		Ti I	94
2970.66		Cr II	57
2970.882		Fe II	68
2971.112		Cr I	35
2971.616		Fe II	60
2971.906		Cr II	28
2972.016		Fe II	150
2972.17		Gd II	77
2972.263		V II	87
2972.277		Fe I	104
2972.54		Cr II	28
2972.742		Gd II	25
2972.769		Fe II	159
2973.137		Fe I	10
2973.236		Fe I	10
2973.975		V II	218
2974.008		Sc I	11
2974.59		Y I	10
2974.78		Fe I	335
2974.934		Ti I	94
2975.110		Gd II	77
2975.16		Zr II	64
2975.483		Cr I	39
2975.680		V II	28
2975.89		Hf II	10
2975.938		Fe II	2
2976.126		Fe I	146
2976.197		V II	28
2976.50	P	Fe I	58
2976.517		V II	28
2976.568		Ru II	4
2976.61		Zr II	77
2976.718		Cr II	27
2976.905		Ce II	188
2976.922		Fe I	324
2977.226		Ru II	4
2977.539		V I	18
2978.07		Zr II	14
2978.18		Y II	45
2978.288		V II	87
2978.850		Fe II	68
2979.05		A II	19
2979.086		Fe II	100,180
2979.102		V II	44
2979.18		Zr II	14
2979.189		Ti II	123
2979.349		Fe II	3
2979.362		Rh II	4
2979.663		Sc II	44
2979.725		Ru II	5
2979.741		Cr II	26
2979.957		Rh II	4
2980.154		Gd II	12
2980.205		Ti I	94
2980.532		Fe I	317
2980.60	P	Fe I	201
2980.69		Y II	54
2980.752		Sc I	11
2980.791		Cr I	28
2980.82		Hf I	2
2980.863		Fe II	61
2981.02		Zr II	24
2981.200		V II	87
2981.446		Fe I	11
2981.448		Ti I	29
2981.651		Ni I	26
2981.852		Fe I	104
2981.924		V II	114
2982.059		Fe II	139
2982.130		Cb II	2
2982.234		Fe I	460
2982.239		Fe II	70
2982.75		V II	29
2982.78		Cl II	53
2983.009		V II	22,28
2983.060		Gd II	77
2983.306		Ti I	29
2983.558		V II	26
2983.574		Fe I	9
2983.66		C III	7
2983.78		O III	5
2984.131		Ni I	12
2984.183		Na II	2
2984.25		Y I	10
2984.35	P	Ti II	26
2984.59		Cr II	27
2984.785		Fe I	29
2984.82		Cr I	15
2984.831		Fe II	8
2984.89	P	Fe II	60
2985.02		Cr II	56
2985.184		V II	218
2985.29	P	Fe II	69
2985.326		Cr II	28
2985.35		Zr I	22
2985.43		La II	145
2985.477		Ti I	29
2985.521		Gd II	77
2985.545		Fe II	8
2985.840		Cr I	28
2985.98		S III	14
2985.985		Cr I	28
2986.127		Cr I	28
2986.456		Fe I	11
2986.473		Cr I	28
2986.517		Fe II	62
2986.555		Fe I	200
2986.91	P	Fe II	86
2987.074		Gd II	67
2987.165		Co I	11
2987.27	P	Fe II	86
2987.292		Fe I	30
2987.40		Ti II	28
2987.542		Fe II	223
2987.65		Si I	1
2987.72		Ca II	11
2987.80		Zr II	96
2988.027		V II	27
2988.05		Ni II	6
2988.058		Cr II	28
2988.267		Rh II	3
2988.466		Fe I	56
2988.61		Ca III	2
2988.649		Cr I	14
2988.74		Zr II	146
2988.942		Fe I	318
2988.952		Sc I	11
2988.962		Sc II	34
2989.01	P	Fe II	86
2989.079		Fe II	150
2989.194		Cr II	28
2989.30		Ca III	4
2989.306		V II	87
2989.367		Fe II	86
2989.42		Ca II	11
2989.590		Co I	13
2989.594		V II	28
2989.731		Fe II	86
2989.74		V II	87
2990.10		Zr II	27
2990.15		Ti II	123
2990.33	P	Fe I	334
2990.34	P	Fe I	450
2990.392		Fe I	316
2990.873		Ce II	72
2990.946		V I	38
2991.085		Ni I	14,60
2991.244		Fe II	60
2991.33		Ru II	3
2991.40		Zr II	6
2991.520		Gd II	25
2991.626		Ru II	6
2991.632		Fe I	
2991.817		Fe II	150
2991.886		Cr I	28
2992.11		O III	10
2992.24		K III	2
2992.378		V II	114
2992.40		Cr II	36
2992.595		Ni I	25
2992.63		C II	6
2993.038		Gd II	42
2993.306		Fe II	139
2994.05		Zr II	
2994.069		Cr I	14
2994.259	P	Al II	14
2994.427		Fe I	9
2994.460		Ni I	27
2994.50		Fe I	11
2994.540		V II	218
2994.725		Cb II	
2994.787		Cr II	28
2994.956		Ca I	17
2995.10		Cr I	15
2995.28		Y I	11
2995.530	P	Al II	14
2995.548	P	Al II	14
2995.644		Ce II	153
2995.836		Fe I	450
2995.999		V II	27
2996.386		Fe I	148
2996.51		O III	10
2996.549		Co I	77
2996.580		Cr I	29
2996.63		Cl II	22
2996.70		V II	38
2996.85	P	Ti II	29
2996.94		Y I	9
2997.08		V I	116

λ	El.	B		λ	El.	B		λ	El.	B	
		A	S (E)			A	S (E)			A	S (E)
2947,49	Cr II	—	25	2944,75	Pt I	15	2	2941,75	Fe I	2	—
2947,45	Ni II	—	10	2944,71	Hf I	20	1	2941,54	Nb II	50	300
2947,44	Na II	6	(40)	2944,64	Nb	4	2	2941,49	V II	12	150R
2947,38	W I	12	10	2944,57	V II	50	300R	2941,39	Ti (II)	*	
2947,36	Fe I	30	20	2944,57	Ta II	*		2941,37	V II	40	300R
2947,29	Mo II	2	25	2944,51	Fe	2	—	2941,34	Fe I	600	300
2947,25	Ca	—	2	2944,40	Fe II	70	600	2941,24	W I	8	4
2947,14	Ce	4	—	2944,40	W I	30	20	2941,21	Mo II	2	40
2947,13	Fe	4	2	2944,34	Ce III	18	—	2941,19	Ce	5	—
2947,13	Hf II	15	15	2944,28	Bi	5	4	2941,11	V I	2	—
2947,08	Hg II	—	20	2944,21	Mo I	25	2	2941,09	Pt	2	—
2946,98	W I	20	18	2944,20	Zr II	2	3	2941,04	Mn I	25	1
2946,98	Ru I	60	12	2944,18	Ga I	10	15R	2941,00	In II	—	(80)
2946,91	Ta I	150	10	2943,98	Mo II	—	3	2940,97	Mo I	10	1
2946,90	Nb II	3	30	2943,98	Ce	6	—	2940,97	Cr II	—	10
2946,85	Ce	4	—	2943,95	W I	5	4	2940,95	Cs II	—	(8)
2946,81	Cr II	5	30	2943,92	Ru I	50	5	2940,94	W I	5	3
2946,69	Mo II	3	25	2943,91	Ni I	50R	20	2940,88	Nb II	—	5
2946,68	Te II	*		2943,89	Mn II	2	2	2940,87	Ce	5	—
2946,52	V I	10	5	2943,89	Cd II	—	(5)	2940,78	Ce II	15	—
2946,51	W I	5	—	2943,82	V I	7	—	2940,76	Hf I	60	12
2946,42	W II	—	12	2943,67	Ce	8	—	2940,68	Au I	*	
2946,42	Mo (I)	10	6	2943,64	Ga I	10	20R	2940,66	Ce II	4	—
2946,38	Ce II	8	—	2943,63	V II	2	4	2940,59	Fe I	200	80
2946,12	Nb II	4	20	2943,62	Sn II	—	2	2940,48	Mn I	40	—
2946,10	Ce	2	—	2943,57	Fe	12	6	2940,39	Mn I	40	—
2946,10	Fe	3	1	2943,48	Co I	30	—	2940,35	Ru I	50	3
2946,05	Ce	10	—	2943,36	Mo II	1	25	2940,34	Cr (I)	8	—
2945,95	Y III	2	100	2943,32	W I	7	6	2940,22	Cr II	—	30
2945,95	Mo II	20	40	2943,21	Ce	6	—	2940,22	Ta I	150	50
2945,89	Nb II	2	100	2943,20	V I	30	25R	2940,20	W II	4	18
2945,88	Fe	2	—	2943,15	Co II	—	100	2940,09	Mo II	2	40
2945,85	Ce	2	—	2943,15	Ir I	30	20	2940,06	Ta I	100	40
2945,74	Nb I	3	—	2943,14	Re I	50	40	2940,02	Mo	3	—
2945,70	Fe	10	5	2943,14	Mn II	1	3	2939,90	Mn I	12	—
2945,69	Na II	2	(20)	2943,13	Ti II	—	60	2939,77	Ce	2	—
2945,67	W	4	1	2943,00	O	—	(5)	2939,76	W II	2	12
2945,66	Mo I	20	2	2942,88	O	—	(5)	2939,53	Ce	12	—
2945,66	Ru II	60	300	2942,85	Mo I	10	1	2939,51	Fe II,III	3	30
2945,59	Ta II	*		2942,76	Pt I	20	3	2939,45	Cr I, II	6	20
2945,58	Ce	3	—	2942,74	Mn I	10	1	2939,36	In	—	10
2945,52	P	—	(5)	2942,68	K I	5R	—	2939,30	Mn II	50	—
2945,47	Ti II	—	100	2942,63	Fe	10	5	2939,28	Ta I	200	40
2945,46	Zr II	4	10	2942,61	W II	2	10	2939,17	W I	8	2
2945,42	Mo I	5	1	2942,44	W I	8	3	2939,08	Fe I	80	20
2945,38	Ce	4	—	2942,35	V I, II	80R	20	2939,04	W I	9	4
2945,30	Ti	2	—	2942,25	W II	2	10	2939,03	Hg	—	(10)
2945,26	Fe II	1	3	2942,24	Ru II	30	100	2938,87	Mo (II)	—	3
2945,10	Ru II	6	50	2942,22	Mo II	—	3	2938,85	W II	1	9
2945,05	Fe (I)	100	30	2942,14	Ta I	150	40	2938,83	Cr I	6	—
2945,04	Ti I	50	25	2942,13	W I, II	6	10	2938,81	Pt	15	2
2944,83	Ta (II)	*		2942,11	Te II	—	(100)	2938,76	Mo	2	5
2944,81	Mo II	2	50	2942,00	Mg I	20	2	2938,73	Fe	2	—
2944,77	Ce	4	—	2941,99	Ti I, II	100	150	2938,71	In	—	10
2944,75	V I	2	—	2941,96	Cr II	12	25	2938,70	Ti II	—	100

λ	El.	B		λ	El.	B		λ	El.	B	
		A	S (E)			A	S (E)			A	S (E)
2938,68	Ce	3	—	2935,66	Mn I	20	—	2932,09	Ce	4	—
2938,66	V I	12	2	2935,62	W I	8	2	2932,03	W I	4	1
2938,65	Mo II	1	10	2935,53	Cr (I)	8	—	2931,98	Fe	5	3
2938,55	Ag II	200	200	2935,52	Ru II	10	80	2931,94	Rh I	80	20
2938,53	Ti	2	—	2935,34	W II	5	10	2931,90	Zr II	—	5
2938,5	Cs	—	(20)	2935,28	Nb II	2	15	2931,90	W II	2	10
2938,49	W	8	6	2935,19	Mo II	2	10	2931,85	V II	2	15
2938,47	Mg I	25	—	2935,12	Cr II	8	40	2931,83	Sr I	30	8
2938,43	Ta I	50	3	2934,99	W I	15	12	2931,81	Fe I	10	6
2938,31	Ce	2	—	2934,97	Nb I	2	2	2931,72	J II	—	(20)
2938,30	Bi I	300	300	2934,9	к B	100	—	2931,62	V II	4	20
2938,30	Mo II	1	30	2934,84	Mo I	5	1	2931,60	Fe	—	15
2938,26	V II	2	60	2934,76	V I	5	—	2931,53	W II	—	12
2938,22	Ce	5	—	2934,64	V I	2	—	2931,46	Nb II	3	50
2938,07	Nb I	3	5	2934,64	Ir I	15	6	2931,43	Fe I	10	3
2938,05	Ce	5	—	2934,61	Zr II	4	6	2931,26	Ti II	—	150
2938,05	Fe	2	1	2934,49	Fe II	—	8	2931,14	Cd	—	(5)
2938,02	Ta II	*		2934,45	Cr (I)	25	—	2931,11	Cs II	—	(20)
2937,81	Fe I	300	150	2934,42	Mn II	*		2931,08	Mo I	15	1
2937,78	Hf II	50	100	2934,4	Ca	—	2	2931,06	Zr II	3	15
2937,73	Zr II	1	2	2934,39	V II	10	50	2930,87	V I	4	—
2937,72	Na II	6	(40)	2934,37	Fe I	7	3	2930,88	Na II	1	(2)
2937,70	Nb II	—	20	2934,34	Ce II	10	—	2930,85	Nb (II)	—	5
2937,70	Ce	6	—	2934,32	Cr II	—	6	2930,85	Cr II	—	50
2937,68	V I	20	10	2934,29	Mo II	30	50	2930,80	V II	30	150R
2937,66	Mo (I)	20	1	2934,23	Ag II	10	200	2930,78	Pt	15	3
2937,56	W I, II	6	10	2934,15	Cd	—	(2)	2930,77	Mo II	5	25
2937,33	Nb II	2	15	2934,06	Na II	1	(5)	2930,66	Fe I	2	—
2937,30	Ti I	35	5	2934,02	Mn I	25	—	2930,64	Nb (II)	—	10
2937,14	W I	8	12	2933,97	Cr II	2	40	2930,61	Re I	50	—
2937,04	V II	2	25	2933,83	V II	2	35	2930,51	W	2	5
2936,95	Ta II	*		2933,81	Fe	3	1	2930,48	Mo II	25	50
2936,93	Cr II	4	18	2933,55	Ta I	400	150	2930,43	Co II	—	150
2936,90	Fe I	700R	500R	2933,53	Ti I	4	8	2930,40	Mo	5	—
2936,78	Mo II	2	25	2933,52	Ce	6	—	2930,26	Nb III	—	20
2936,74	Mg I	12	—	2933,47	Cr (I)	5	—	2930,25	Mn I, II	25	—
2936,72	Ca	—	4	2933,44	Mn I	4	—	2930,16	Ca	—	2
2936,7	Bi II	—	(3)	2933,27	In	—	3	2930,14	W I	10	6
2936,68	Ir I	15	5	2933,23	Ru II	20	150	2930,12	V II	4	35
2936,67	W II	10	20	2933,22	V I	2	—	2930,06	Mo II	1	20
2936,67	Nb II	—	30	2933,20	Mo II	—	8	2929,99	W II	5	3
2936,54	Mg II	20	—	2933,06	Mn II	80	15	2929,90	Hf I	5	3
2936,50	Nb (II)	1	2	2932,98	W II	2	6	2929,79	Pt I	800R	200
2936,45	Fe	5	5	2932,86	W II	1	10	2929,71	Ca	—	4
2936,38	Mn II	*		2932,70	Cr II	2	25	2929,64	Hf II	30	50
2936,30	Zr II	10	15	2932,70	Ta I	400	80	2929,62	Fe I	50	10
2936,17	Ti II	—	100	2932,66	Nb II	1	80	2929,51	Co I	75	—
2936,15	Mn I	10	—	2932,62	In I	500	300	2929,49	Mo II	—	5
2936,02	Fe II	5	10	2932,62	Ni	10	—	2929,44	Cr II	—	40
2936,00	W I	10	3	2932,32	V II	12	80	2929,44	Ca	—	2
2935,94	Hg II	—	(2)	2932,27	Ce	10	—	2929,35	Ag II	20	40
2935,87	V I	30	15	2932,21	W	4	2	2929,27	Cd II	—	50
2935,75	Ce	3	—	2932,19	Au	8	40	2929,24	Fe	3	1
2935,75	W II	—	10	2932,18	Mo II	—	15	2929,12	Fe I	10	10
2935,69	Mo II	1	15	2932,13	Nb II	—	50	2929,11	Zr II	2	2

PART ONE

Table of spectrum lines in order of wave-lengths

ERSTER TEIL

Spektrallinien-Tabelle nach Wellenlängen geordnet

PREMIÈRE PARTIE

Table des raies spectrales, rangées suivant les longueurs d'ondes

(25a) MTK 370/99/61

λ	El.	I B	I F (E)	λ	El.	I B	I F (E)	λ	El.	I B	I F (E)
2953,358	Cr	4	50	2948,857	Ce	4	—	2945,385	Ce	4	—
2953,2	Cd	—	(5)	2948,735	Ce	4	—	2945,303	Ti	2	—
2953,076	Ce	4	—	2948,726	Fe I	10	7	2945,262	Fe II	1	3
2953,008	Mn	10	—	2948,433	Fe	80	70	2945,055	Fe	100	30
2952,99	Ta	30	100	2948,385	Ce	10	—	2945,04	Ti I	50	25
2952,459	Cr	—	20	2948,255	Ti I	100	30	2944,821	Mo	2	50
2952,395	Na II	—	(12)	2948,16	Cd	—	35	2944,773	Ce	4	—
2952,288	W II	12	30	2948,14	P	—	(5)	2944,755	V I	2	—
2952,244	Zr II	8	8	2948,075	V	2	70	2944,754	Pt I	15	2
2952,081	Ti II	—	25	2947,876	Fe I	600 R	200	2944,644	Nb	4	2
2952,075	V II	35	150 R	2947,742	Ce	3	—	2944,571	V II	50	300 R
2951,918	Ta	400	200	2947,72	W	—	8	2944,51	Fe	2	—
2951,82	Cd	—	25	2947,719	Ti I	8	—	2944,398	Fe II	70	600
2951,814	Mo	—	4	2947,658	Fe II	10	100	2944,395	W	30	20
2951,793	W	6	3	2947,497	Cr	—	25	2944,346	Ce	18	—
2951,777	Ce	4	—	2947,453	Ni II	—	10	2944,287	Bi	5	4
2951,687	Ce	4	—	2947,441	Na II	6	(40)	2944,213	Mo	25	2
2951,562	V	—	9	2947,384	W	12	10	2944,20	Zr II	2	3
2951,56	Fe	10	4	2947,363	Fe	30	20	2944,175	Ga	10	15 R
2951,489	Ce	4	—	2947,285	Mo	2	25	2943,989	Mo	—	3
2951,479	Zr II	15	15	2947,25	Ca	—	2	2943,987	Ce	6	—
2951,407	W	5	3	2947,149	Ce	4	—	2943,959	W	5	4
2951,379	Fe	4	2	2947,13	Fe	4	2	2943,914	Ni I	50 R	20
2951,291	Ce	10	—	2947,08	Hg II	—	(25)	2943,908	Mn	2	2
2951,26	Cu I	3	—	2946,981	W	20	18	2943,89	Cd II	—	(5)
2951,24	Ca	1	2	2946,910	Ta	150	10	2943,827	V I	7	—
2951,231	Na II	40	(100)	2946,898	Nb	3	30	2943,673	Ce	8	—
2951,218	Pt	2	—	2946,859	Ce	4	—	2943,637	Ga I	10	20 R
2951,160	Mn	4	4	2946,842	Cr	5	30	2943,636	V	2	4
2951,098	Fe II	—	3	2946,690	Mo	3	25	2943,62	Sn II	—	2
2950,93	Fe	2	—	2946,527	V I	10	5	2943,57	Fe	12	6
2950,878	Nb	150	200	2946,514	W	5	—	2943,484	Co I	30	—
2950,69	W	4	—	2946,429	W	—	12	2943,380	Mo	1	25
2950,687	Cr	—	5	2946,422	Mo	10	6	2943,326	W	7	6
2950,498	Ce	2	—	2946,382	Ce	8	—	2943,215	Ce	6	—
2950,44	W	—	20	2946,116	Nb	4	20	2943,196	V I	30	25 R
2950,4	Bi II	—	(3)	2946,101	Ce	2	—	2943,15	Co II	—	100
2950,348	V II	25	100 R	2946,10	Fe	3	1	2943,144	Re I	60	—
2950,304	Ce	12	—	2946,056	Ce	10	—	2943,132	Mn	1	3
2950,243	Fe	700	300	2946,009	Mo	20	40	2943,13	Ti II	—	60
2949,96	Ca	—	2	2945,95	Y	2	100	2943,00	O	—	(5)
2949,904	V I	2	—	2945,883	Nb	2	100	2942,88	O	—	(5)
2949,83	Zr	—	3	2945,88	Fe	2	—	2942,850	Mo	10	1
2949,70	Fe	10	5	2945,856	Ce	2	—	2942,755	Pt I	20	3
2949,626	V I	30	15 R	2945,748	Nb	3	—	2942,745	Mn	10	1
2949,502	Nb	—	5	2945,70	Fe	10	5	2942,63	Fe	10	5
2949,44	Cr	—	18	2945,695	Na II	2	(20)	2942,610	W II	2	10
2949,205	Fe II	2	—	2945,67	W	4	1	2942,445	W	8	3
2949,205	Mn	100	30	2945,668	Ru	60	300	2942,352	V I	80 R	20
2949,20	Ca	1	2	2945,665	Mo	20	2	2942,256	W II	2	10
2949,168	V	6	80	2945,582	Ce	3	—	2942,250	Ru	30	100
2949,119	W	5	4	2945,52	P	—	(5)	2942,222	Mo	—	3
2948,95	Fe I	10	4	2945,47	Ti II	—	100	2942,139	W II	6	10
2948,945	Zr II	12	20	2945,463	Zr II	4	10	2942,137	Ta	150	40
2948,89	Cr I	8	—	2945,428	Mo	5	1	2942,11	Mg I	20	2

λ	El.	I B	I F (E)	λ	El.	I B	I F (E)	λ	El.	I B	I F (E)
2941,995	Ti I,II	100	150	2938,59	Mo	1	10	2935,139	Cr	8	40
2941,880	Cr I	12	25	2938,55	Ag II	200	200	2934,991	W	15	12
2941,75	Fe	2	—	2938,539	Ti	2	—	2934,976	Nb	2	2
2941,543	Nb	50	300	2938,538	Mg I	25	—	2934,9	к B	100	—
2941,492	V II	12	150 R	2938,499	W	8	6	2934,840	Mo	5	1
2941,369	V II	40	300 R	2938,317	Ce	2	—	2934,76	V I	5	—
2941,343	Fe I	600	300	2938,300	Mo	1	30	2934,648	V I	2	—
2941,245	W	8	4	2938,298	Bi I	300	300	2934,638	Ir	15	6
2941,222	Mo	2	40	2938,254	V I	2	60	2934,610	Zr II	4	6
2941,197	Ce	5	—	2938,220	Ce	5	—	2934,493	Cr	25	—
2941,11	V I	2	—	2938,073	Nb	3	5	2934,493	Fe II	—	8
2941,090	Pt	2	—	2938,051	Ce	5	—	2934,401	V II	10	50
2941,050	In II	—	(80)	2938,05	Fe	2	1	2934,4	Ca	—	2
2941,041	Mn	25	1	2937,924	Mn	25	—	2934,37	Fe I	7	3
2940,978	Mo	10	1	2937,811	Fe	300	150	2934,345	Ce	10	—
2940,978	Cr	—	10	2937,795	Hf II	50	100	2934,32	Cr	—	6
2940,949	W	5	3	2937,730	Zr II	1	2	2934,299	Mo	30	50
2940,877	Ce	5	—	2937,725	Na II	6	(40)	2934,23	Ag II	10	200
2940,85	Nb	—	5	2937,707	Nb	—	20	2934,15	Cd	—	(2)
2940,785	Ce	15	—	2937,707	Ce	6	—	2934,065	Na II	1	(5)
2940,772	Hf I	60	12	2937,687	V I	20	10	2934,022	Mn	25	—
2940,663	Ce	4	—	2937,665	Mo	20	1	2933,970	Cr	2	40
2940,591	Fe	200	80	2937,661	W	6	10	2933,835	V II	2	35
2940,483	Mn	40	—	2937,333	Nb	2	15	2933,81	Fe	3	1
2940,392	Mn	40	—	2937,316	Ti I	35	5	2933,550	Ta	400	150
2940,340	Cr	8	—	2937,141	W	8	12	2933,546	Ti I	4	8
2940,225	Cr	—	30	2937,040	V	2	25	2933,529	Ce	6	—
2940,215	Ta	150	50	2936,93	Cr	4	18	2933,442	Mn	4	—
2940,199	W II	4	18	2936,905	Fe I	700 R	500 R	2933,43	Cr	5	—
2940,101	Mo	2	40	2936,895	Mg I	12	—	2933,27	In	—	3
2940,06	Ta	100	40	2936,781	Mo	2	25	2933,245	Ru	20	150
2940,022	Mo	3	—	2936,72	Ca	—	4	2933,228	V I	2	—
2939,904	Mn	12	—	2936,7	Bi II	—	(3)	2933,204	Mo	—	8
2939,770	Ce	2	—	2936,682	Ir I	15	5	2933,063	Mn	80	15
2939,743	W II	2	12	2936,672	W	10	20	2932,982	W	2	6
2939,538	Ce	12	—	2936,66	Nb	—	30	2932,86	W	1	10
2939,508	Fe II	3	30	2936,537	Mg II	20	—	2932,705	Cr	2	25
2939,45	Cr	6	20	2936,457	Nb	1	2	2932,695	Ta	400	80
2939,36	In	—	10	2936,449	Fe	5	5	2932,662	Nb	1	80
2939,304	Mn	50	—	2936,308	Zr II	10	15	2932,623	Ni	10	—
2939,28	Ta	200	40	2936,17	Ti II	—	100	2932,624	In I	500	300
2939,177	W	8	2	2936,156	Mn	10	—	2932,323	V	12	80
2939,080	Fe I	80	20	2936,024	Fe II	5	10	2932,274	Ce	10	—
2939,043	W	9	4	2936,002	W	10	3	2932,213	W	4	2
2939,03	Hg	—	(10)	2935,92	Hg II	—	(2)	2932,19	Au I,II	8	40
2938,886	Mo	—	3	2935,874	V I	30	15	2932,189	Mo	—	15
2938,852	W II	1	9	2935,757	Ce	3	—	2932,13	Nb	—	50
2938,85	Cr	6	—	2935,75	W	—	10	2932,090	Ce	4	—
2938,813	Pt	15	2	2935,695	Mo	1	15	2932,037	W	4	1
2938,768	Mo	2	5	2935,656	Mn	20	—	2931,98	Fe	5	3
2938,73	Fe	2	—	2935,621	W	8	2	2931,90	Zr II	—	5
2938,71	In	—	10	2935,538	Cr	8	—	2931,869	W	2	10
2938,70	Ti II	—	100	2935,347	W II	5	10	2931,857	V	2	15
2938,682	Ce	3	—	2935,287	Nb	2	15	2931,830	Sr I	30	8
2938,666	V I	12	2	2935,195	Mo	2	10	2931,81	Fe	10	6