

N-2363A
0.1

AD-A278 130



N-2-2-2
①

ATOMIC ENERGY LEVELS

As Derived From the Analyses of Optical Spectra

Volume I, Section 1

The Spectra of Hydrogen, Deuterium, Helium, Lithium
Beryllium, Boron, Carbon, Nitrogen, Oxygen, and Fluorine

DISTRIBUTION STATEMENT A
Approved for public release;
Distribution is unlimited.



CIRCULAR 467

94-10765



240800

DTIC QUALITY INSPECTED 3

DTIC
ELECTE
APR 14 1994
S B D



UNITED STATES DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS

94 4 7 101

UNITED STATES DEPARTMENT OF COMMERCE, W. Averell Harriman, Secretary
NATIONAL BUREAU OF STANDARDS, E. U. Condon, Director

ATOMIC ENERGY LEVELS

As Derived From the Analyses of Optical Spectra

Volume I, Section 1

The Spectra of Hydrogen, Deuterium, Helium, Lithium
Beryllium, Boron, Carbon, Nitrogen, Oxygen, and Fluorine

By CHARLOTTE E. MOORE



Accession For:	
NTIS GRA&I	☒
DTIC TAB	☐
Unannounced	☐
Justification	
By	
Distribution	
Availability Codes	
Dist	Special
A-1	

Circular of the National Bureau of Standards 467

Issued April 15, 1948

DTIC QUALITY INSPECTED 3

For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.
Price 50 cents

Foreword

This pamphlet is the first of a series being prepared at the National Bureau of Standards as part of a program on the critical compilation of all energy levels derived from observations of atomic spectra (exclusive of hyperfine structure ascribed to atomic nuclei). The collected results will finally appear in bound volumes of approximately 500 pages each, made up of these sections.

The project was undertaken after the authors of "Atomic Energy States", R. F. Bacher and S. Goudsmit, stated that they had no intention of revising their extremely useful book published in 1932. That book gave data for 231 spectra, most of which were incompletely described and analyzed 15 years ago. Now structure has been recognized in 460 spectra, and the former analysis in almost every case has been greatly extended. The purpose of these pamphlets is to make all present information available to scientific workers.

Details of the work were discussed at a meeting of the National Research Council Committee on Line Spectra of the Elements called by the chairman, H. N. Russell, and held in Washington in May 1946. It was then decided to send to interested workers in various fields a questionnaire regarding the most useful form of presentation of the data on atomic energy levels. The present form represents the majority vote resulting from that inquiry.

A text describing details of the tables will form the introduction to volume I. It will also contain numerous indices and cross references to facilitate the use of the books. In addition, charts of predicted terms in the spectra of leading isoelectronic sequences will be given.

Even without the detailed introduction, it is hoped that the advance distribution of the individual sections as they are completed may stimulate further spectroscopic research.

The generous response with unpublished material and the many helpful conferences with scientific workers are a great inspiration in carrying out this extensive task. The cordial cooperation and personal interest of the numerous scientists who have been participating in this project are greatly appreciated. In particular, the many suggestions by W. F. Meggers have been invaluable.

E. U. CONDON, *Director.*

WASHINGTON, D. C., January 1948.

Contents

Element	Z	Spectrum	Page	Element	Z	Spectrum	Page
Hydrogen	1	H I.....	1	Nitrogen	7	N I.....	32
		D.....	3			N II.....	35
Helium	2	He I.....	4			N III.....	38
		He II.....	7			N IV.....	40
Lithium	3	Li I.....	8			N V.....	42
		Li II.....	10			N VI.....	43
		Li III.....	11			N VII.....	44
Beryllium	4	Be I.....	12	Oxygen	8	O I.....	45
		Be II.....	14			O II.....	47
		Be III.....	14			O III.....	50
		Be IV.....	15			O IV.....	53
Boron	5	B I.....	16			O V.....	56
		B II.....	17			O VI.....	58
		B III.....	19			O VII.....	59
		B IV.....	19			O VIII.....	59
		B V.....	20	Fluorine	9	F I.....	60
Carbon	6	C I.....	21			F II.....	62
		C II.....	24			F III.....	64
		C III.....	26			F IV.....	66
		C IV.....	29			F V.....	69
		C V.....	30			F VI.....	71
		C VI.....	31			F VII.....	74
						F VIII.....	75

HYDROGEN

H I

1 electron

$Z=1$

Ground state $1s\ ^1S_1$

$1s\ ^1S_1$ 109679.041 cm^{-1}

I. P. 13.595 volts

The term values through $n=38$ have been calculated by J. E. Mack, using $R_H = 109677.581$ and taking into account the fine structure of the individual lines. Mack's calculations have been extended to include $n=39$ and $n=40$. Details of the spectrum are given by Fowler and by Paschen-Götze. The wavelengths calculated by J. E. Mack have been published in the Revised Multiplet Table.

W. E. Lamb, Jr. and R. C. Retherford have recently been studying "The Fine Structure of the Hydrogen Atom by a Microwave Method", and have kindly furnished their preliminary results in advance of publication. They state that the $2s\ ^1S_1$ level is higher than the $2p\ ^1P_1$ level by about $0.033\ \text{cm}^{-1}$ and that this value almost certainly lies between $0.027\ \text{cm}^{-1}$ and $0.043\ \text{cm}^{-1}$.

REFERENCES

- A Fowler, *Report on Series in Line Spectra*, p. 89 (Fleetway Press, London, 1922). (T) (C L)
F. Paschen und R. Götze, *Seriengesetze der Linienspektren*, p. 22 (Julius Springer, Berlin, 1922). (T) (C L)
H. E. White, *Introduction to Atomic Spectra*, p. 33 (McGraw-Hill Book Co., Inc., New York, N. Y., 1934). (G D)
T. Suga, *Sci. Papers Inst. Phys. Chem. Res. (Tokyo)* **34**, No. 740, 16 (1937). (C L)
R. T. Birge, *Rev. Mod. Phys.* **13**, 233 (1941). (R_H)
J. E. Mack, Unpublished material (1942). (I P) (T) (C L)
C. E. Moore, *Princeton Obs. Contr. No. 20*, 1 (1945). (C L)
W. F. Meggers, *J. Opt. Soc. Am.* **36**, 431 (1946). (Summary hfs)
W. E. Lamb, Jr., and R. C. Retherford, *Phys. Rev.* **72**, 241 (1947); Letter (July 1947). (T)
H. A. Bethe, *Phys. Rev.* **72**, 339 (1947).

H I

H I

Config.	Desig.	J	Level	Interval	Config.	Desig.	J	Level	Interval
1s	1s ² S	$\frac{1}{2}$	0. 000		19s, etc.	19s ² S, etc.	$\frac{1}{2}$, etc.	109375. 22	
2s, 2p	2s ² S, 2p ² P ^o	$\frac{1}{2}$	82259. 190	0. 365	20s, etc.	20s ² S, etc.	$\frac{1}{2}$, etc.	109404. 85	
2p	2p ² P ^o	$1\frac{1}{2}$	82259. 555		21s, etc.	21s ² S, etc.	$\frac{1}{2}$, etc.	109430. 34	
3s, 3p	3s ² S, 3p ² P ^o	$\frac{1}{2}$	97492. 481	0. 108	22s, etc.	22s ² S, etc.	$\frac{1}{2}$, etc.	109452. 43	
3p, 3d	3p ² P ^o , 3d ² D	$1\frac{1}{2}$	97492. 589	0. 036	23s, etc.	23s ² S, etc.	$\frac{1}{2}$, etc.	109471. 711	
3d	3d ² D	$2\frac{1}{2}$	97492. 625		24s, etc.	24s ² S, etc.	$\frac{1}{2}$, etc.	109488. 629	
4s to 4f	4s ² S to 4f ² F ^o	$\left\{ \begin{array}{l} \frac{1}{2} \\ \text{to} \\ 3\frac{1}{2} \end{array} \right\}$	102824. 118 to . 186	0. 068	25s, etc.	25s ² S, etc.	$\frac{1}{2}$, etc.	109503. 557	
5s to 5g	5s ² S to 5g ² G	$\left\{ \begin{array}{l} \frac{1}{2} \\ \text{to} \\ 4\frac{1}{2} \end{array} \right\}$	105291. 898 to . 936	0. 038	26s, etc.	26s ² S, etc.	$\frac{1}{2}$, etc.	109516. 796	
6s to 6h	6s ² S to 6h ² H ^o	$\left\{ \begin{array}{l} \frac{1}{2} \\ \text{to} \\ 5\frac{1}{2} \end{array} \right\}$	106632. 418 to . 441	0. 023	27s, etc.	27s ² S, etc.	$\frac{1}{2}$, etc.	109528. 592	
7s, etc.	7s ² S, etc.	$\frac{1}{2}$, etc.	107440. 708 to . 722	0. 014	28s, etc.	28s ² S, etc.	$\frac{1}{2}$, etc.	109539. 146	
8s, etc.	8s ² S, etc.	$\frac{1}{2}$, etc.	107965. 319 to . 329	0. 010	29s, etc.	29s ² S, etc.	$\frac{1}{2}$, etc.	109548. 628	
9s, etc.	9s ² S, etc.	$\frac{1}{2}$, etc.	108324. 990 to . 997	0. 007	30s, etc.	30s ² S, etc.	$\frac{1}{2}$, etc.	109557. 177	
10s, etc.	10s ² S, etc.	$\frac{1}{2}$, etc.	108582. 26		31s, etc.	31s ² S, etc.	$\frac{1}{2}$, etc.	109564. 912	
11s, etc.	11s ² S, etc.	$\frac{1}{2}$, etc.	108772. 61		32s, etc.	32s ² S, etc.	$\frac{1}{2}$, etc.	109571. 934	
12s, etc.	12s ² S, etc.	$\frac{1}{2}$, etc.	108917. 39		33s, etc.	33s ² S, etc.	$\frac{1}{2}$, etc.	109578. 327	
13s, etc.	13s ² S, etc.	$\frac{1}{2}$, etc.	109030. 06		34s, etc.	34s ² S, etc.	$\frac{1}{2}$, etc.	109584. 164	
14s, etc.	14s ² S, etc.	$\frac{1}{2}$, etc.	109119. 46		35s, etc.	35s ² S, etc.	$\frac{1}{2}$, etc.	109589. 508	
15s, etc.	15s ² S, etc.	$\frac{1}{2}$, etc.	109191. 58		36s, etc.	36s ² S, etc.	$\frac{1}{2}$, etc.	109594. 413	
16s, etc.	16s ² S, etc.	$\frac{1}{2}$, etc.	109250. 61		37s, etc.	37s ² S, etc.	$\frac{1}{2}$, etc.	109598. 926	
17s, etc.	17s ² S, etc.	$\frac{1}{2}$, etc.	109299. 53		38s, etc.	38s ² S, etc.	$\frac{1}{2}$, etc.	109603. 087	
18s, etc.	18s ² S, etc.	$\frac{1}{2}$, etc.	109340. 53		39s, etc.	39s ² S, etc.	$\frac{1}{2}$, etc.	109606. 932	
					40s, etc.	40s ² S, etc.	$\frac{1}{2}$, etc.	109610. 493	
						$\infty = \text{Limit}$		109679. 041	

April 1946.

DEUTERIUM

D

1 electron

 $Z=1$ Ground state $1s\ ^1S_{1/2}$ $1s\ ^1S_{1/2}$ 109708.879 cm^{-1}

I. P. 13.598 volts

The term values have been calculated by J. E. Mack, using $R_D=109707.419$ and taking into account the fine structure of the individual lines. The wavelengths calculated by J. E. Mack have been published in the Revised Multiplet Table.

REFERENCES

- R. T. Birge, Rev. Mod. Phys. **13**, 233 (1941). (R_D)
 J. E. Mack, Unpublished material (1942). (I P) (T) (C L)
 C. E. Moore, Princeton Obs. Contr. No. 20, 1 (1945). (C L)
 W. F. Meggers, J. Opt. Soc. Am. **36**, 431 (1946). (Summary hfs)

D

D

Config.	Desig.	<i>J</i>	Level	Interval	Config.	Desig.	<i>J</i>	Level	Interval
1s	1s ¹ S	½	0. 000		6s to 6h	6s ¹ S to 6h ¹ H°	½ to 5½	106661. 427 to . 450	0. 023
2s, 2p	2s ¹ S, 2p ¹ P°	½	82281. 568	0. 365	7s, etc.	7s ¹ S, etc.	½, etc.	107469. 937 to . 951	0. 014
2p	2p ¹ P°	1½	82281. 933						
3s, 3p	3s ¹ S, 3p ¹ P°	½	97519. 004	0. 108	8s, etc.	8s ¹ S, etc.	½, etc.	107994. 691 to . 701	0. 010
3p, 3d	3p ¹ P°, 3d ¹ D	1½	97519. 112	0. 036					
3d	3d ¹ D	2½	97519. 148						
4s to 4f	4s ¹ S to 4f ¹ F°	½ to 3½	102852. 091 to . 159	0. 068	-----			109708. 879	
5s to 5g	5s ¹ S to 5g ¹ G	½ to 4½	105320. 542 to . 580	0. 038	∞ = Limit -----				

April 1946.

HELIUM

He I

2 electrons

Z=2

Ground state $1s^2\ ^1S_0$ $1s^2\ ^1S_0$, $198305 \pm 15\text{ cm}^{-1}$

I. P. 24.580 volts

Most of the terms are taken from Paschen-Götze with the term values subtracted from Paschen's limit as quoted by Robinson in 1937. Higher members of the $^1F^\circ$ and $^3F^\circ$ series are taken from Meggers and Dieke. The term $2p\ ^3P^\circ$ has been calculated from its combination with $2s\ ^3S_1$, using the resolved triplet as observed by Meggers, the intervals being -0.078 cm^{-1} and -0.996 cm^{-1} . The components of $3p\ ^3P^\circ$ are based on Paschen's value of $3p\ ^3P_2$ and the intervals observed by Gibbs and Kruger; -0.165 cm^{-1} and -0.192 cm^{-1} .

Some doubt exists regarding the correct classifications of lines attributed to doubly excited helium, such as those observed at 309.04 Å and 320.38 Å by Compton and Boyce, and at 320.392 Å and 357.507 Å by Kruger. Approximate theoretical computations of the energies of doubly excited levels have been made by a number of authors and are summarized by Wu. His classification of the line observed at 320.4 Å as $2p\ ^3P^\circ - 2p^2\ ^3P$ has been adopted and used for the calculation of $2p^2\ ^3P$.

Several references deal with intercombinations in He I, namely, those by Lyman, Hopfield, Paschen, Suga, and others. The term values based on the excellent long series have been adopted in the table, since it is believed that they are the most accurate.

REFERENCES

- F. Paschen und R. Götze, *Seriengesetze der Linienspektren* p. 22 (Julius Springer, Berlin, 1922). (T) (C L)
 T. Lyman, *Astroph. J.* **60**, 1 (1924). (T) (C L)
 K. T. Compton and J. C. Boyce, *J. Franklin Inst.* **205**, 497 (1928). (C L)
 F. Paschen, *Sitz. Berlin Akad. Wiss.* **30**, 662 (1929). (T) (C L)
 J. J. Hopfield, *Astroph. J.* **72**, 133 (1930). (T) (C L)
 P. G. Kruger, *Phys. Rev.* **36**, 855 (1930). (C L)
 R. C. Gibbs and P. G. Kruger, *Phys. Rev.* **37**, 1559 (1931). (T)
 W. F. Meggers and G. H. Dieke, *Bur. Std. J. Research* **9**, 121, RP462 (1932). (T) (C L)
 F. Paschen and R. Ritschl, *Ann. der Phys.* [5] **18**, 888 (1933). (T) (C L)
 H. E. White, *Introduction to Atomic Spectra* p. 209 (McGraw-Hill Book Co., Inc., New York, N. Y., 1934). (G D)
 W. F. Meggers, *J. Research Nat. Bur. Std.* **14**, 487, RP781 (1935). (C L)
 T. Suga, *Sci. Papers Inst. Phys. Chem. Research (Tokyo)* **34**, No. 740, 16 (1937). (C L)
 H. A. Robinson, *Phys. Rev.* **51**, 14 (1937). (I P)
 P. Jacquinot, *Compt. Rend.* **208**, 1896 (1939). (C L)
 T.-Y. Wu, *Phys. Rev.* **66**, 291 (1944). (C L)
 W. F. Meggers, *J. Opt. Soc. Am.* **36**, 431 (1946). (Summary hfs)

He I

He I

Config.	Desig.	<i>J</i>	Level	Config.	Desig.	<i>J</i>	Level
1s ²	1s ² ¹ S	0	0 ± 15	1s 7s	7s ¹ S	0	195973. 19
1s 2s	2s ² S	1	159850. 318	1s 7p	7p ³ P°	2, 1, 0	196021. 72
1s 2s	2s ¹ S	0	166271. 70	1s 7d	7d ³ D	3, 2, 1	196064. 00
1s 2p	2p ³ P°	2	169081. 111	1s 7d	7d ¹ D	2	196064. 31
		1	169081. 189	1s 7f	7f ¹ F°	3	196065. 4
		0	169082. 185	1s 7f	7f ³ F°	4, 3, 2	196065. 51
1s 2p	2p ¹ P°	1	171129. 148	1s 7p	7p ¹ P°	1	196073. 41
1s 3s	3s ² S	1	183231. 08	1s 8s	8s ² S	1	196455. 79
1s 3s	3s ¹ S	0	184859. 06	1s 8s	8s ¹ S	0	196529. 03
1s 3p	3p ³ P°	2	185558. 92	1s 8p	8p ³ P°	2, 1, 0	196561. 08
		1	185559. 085	1s 8d	8d ³ D	3, 2, 1	196589. 42
		0	185559. 277	1s 8d	8d ¹ D	2	196589. 73
1s 3d	3d ³ D	3, 2, 1	186095. 90	1s 8f	8f ¹ F°	3	196590. 3
1s 3d	3d ¹ D	2	186099. 22	1s 8f	8f ³ F°	4, 3, 2	196590. 42
1s 3p	3p ¹ P°	1	186203. 62	1s 8p	8p ¹ P°	1	196595. 56
1s 4s	4s ² S	1	190292. 46	1s 9s	9s ² S	1	196856. 37
1s 4s	4s ¹ S	0	190934. 50	1s 9s	9s ¹ S	0	196907. 13
1s 4p	4p ³ P°	2, 1, 0	191211. 42	1s 9p	9p ³ P°	2, 1, 0	196929. 68
1s 4d	4d ³ D	3, 2, 1	191438. 83	1s 9d	9d ¹ D	2	196949. 49
1s 4d	4d ¹ D	2	191440. 71	1s 9d	9d ³ D	3, 2, 1	196949. 63
1s 4f	4f ¹ F°	4, 3, 2	191446. 61	1s 9f	9f ¹ F°	3	196950. 3
1s 4f	4f ³ F°	3	191447. 24	1s 9f	9f ³ F°	4, 3, 2	196950. 36
1s 4p	4p ¹ P°	1	191486. 95	1s 9p	9p ¹ P°	1	196953. 95
1s 5s	5s ² S	1	193341. 33	1s 10s	10s ² S	1	197139. 76
1s 5s	5s ¹ S	0	193657. 78	1s 10s	10s ¹ S	0	197176. 36
1s 5p	5p ³ P°	2, 1, 0	193795. 07	1s 10p	10p ³ P°	2, 1, 0	197192. 63
1s 5d	5d ³ D	3, 2, 1	193911. 48	1s 10d	10d ¹ D	2	197207. 08
1s 5d	5d ¹ D	2	193912. 54	1s 10d	10d ³ D	3, 2, 1	197207. 30
1s 5f	5f ¹ F°	3	193914. 31	1s 10f	10f ¹ F°	4, 3, 2	197208. 0
1s 5f	5f ³ F°	4, 3, 2	193915. 79	1s 10p	10p ¹ P°	1	197210. 41
1s 5p	5p ¹ P°	1	193936. 75	1s 11s	11s ² S	1	197347. 05
1s 6s	6s ² S	1	194930. 46	1s 11p	11p ³ P°	2, 1, 0	197386. 98
1s 6s	6s ¹ S	0	195109. 17	1s 11d	11d ¹ D	2	197397. 62
1s 6p	6p ³ P°	2, 1, 0	195187. 21	1s 11d	11d ³ D	3, 2, 1	197397. 75
1s 6d	6d ³ D	3, 2, 1	195254. 37	1s 11f	11f ¹ F°	4, 3, 2	197398. 6
1s 6d	6d ¹ D	2	195255. 02	1s 11p	11p ¹ P°	1	197400. 18
1s 6f	6f ¹ F°	3	195256. 7	1s 12s	12s ² S	1	197503. 69
1s 6f	6f ³ F°	4, 3, 2	195256. 82	1s 12s	12s ¹ S	0	197524. 26
1s 6p	6p ¹ P°	1	195269. 17				
1s 7s	7s ² S	1	195862. 63				

He I—Continued

He I—Continued

Config.	Desig.	<i>J</i>	Level	Config.	Desig.	<i>J</i>	Level
1s 12p	12p ³ P°	2, 1, 0	197534. 44	1s 16d	16d ³ D	3, 2, 1	197876. 41
1s 12d	12d ¹ D	2	197542. 54	1s 16p	16p ¹ P°	1	197877. 04
1s 12d	12d ³ D	3, 2, 1	197542. 67	1s 17p	17p ³ P°	2, 1, 0	197922. 51
1s 12p	12p ¹ P°	1	197544. 56	1s 17d	17d ³ D	3, 2, 1	197925. 33
1s 13s	13s ³ S	1	197624. 98	1s 17p	17p ¹ P°	1	197925. 87
1s 13p	13p ³ P°	2, 1, 0	197649. 07	1s 18p	18p ³ P°	2, 1, 0	197964. 02
1s 13s	13s ¹ S	0	197649. 78	1s 18d	18d ³ D	3, 2, 1	197966. 75
1s 13d	13d ¹ D	2	197655. 19	1s 18p	18p ¹ P°	1	197966. 80
1s 13d	13d ³ D	3, 2, 1	197655. 47	1s 19p	19p ³ P°	2, 1, 0	197999. 12
1s 13p	13p ¹ P°	1	197656. 95	1s 19d	19d ³ D	3, 2, 1	198001. 43
1s 14s	14s ³ S	1	197721. 13	1s 19p	19p ¹ P°	1	198001. 44
1s 14p	14p ³ P°	2, 1, 0	197739. 90	1s 20p	20p ³ P°	2, 1, 0	198029. 07
1s 14d	14d ¹ D	2	197744. 918	1s 20p	20p ¹ P°	1	198031. 02
1s 14d	14d ³ D	3, 2, 1	197744. 94	1s 20d	20d ³ D	3, 2, 1	198031. 41
1s 14p	14p ¹ P°	1	197746. 15	1s 21p	21p ³ P°	2, 1, 0	198054. 83
1s 15s	15s ³ S	1	197796. 63	1s 21d	21d ³ D	3, 2, 1	198056. 50
1s 15p	15p ³ P°	2, 1, 0	197813. 11	1s 22p	22p ³ P°	2, 1, 0	198077. 15
1s 15d	15d ³ D	3, 2, 1	197817. 05	-----			-----
1s 15p	15p ¹ P°	1	197818. 12	He II (³ S _{1/2})	Limit	-----	198305
1s 16p	16p ³ P°	2, 1, 0	197872. 95	2p ³	2p ³ ³ P	2, 1, 0	481198

August 1946.

(H I sequence; 1 electron)

 $Z=2$ Ground state $1s^2S_1$ $1s^2S_1$ 438912.425 cm^{-1}

I. P. 54.403 volts

The term values have been calculated by J. E. Mack, using $R_{\text{He}}=109722.263$ and taking into account the fine structure of the individual lines. Details of the spectrum are given by Fowler and by Paschen-Götze. The wavelengths calculated by J. E. Mack have been published in the Revised Multiplet Table.

REFERENCES

- A. Fowler, *Report on Series in Line Spectra*, p. 95 (Fleetway Press, London, 1922). (T) (C L)
 F. Paschen und R. Götze, *Seriengesetze der Linienspektren*, p. 25 (Julius Springer, Berlin, 1922). (T) (C L)
 H. E. White, *Introduction to Atomic Spectra*, p. 33 (McGraw-Hill Book Co., Inc., New York, N. Y., 1934). (G D)
 T. Suga, *Sci. Papers Inst. Phys. Chem. Research (Tokyo)* **34**, No. 740, 20 (1937). (C L)
 R. T. Birge, *Rev. Mod. Phys.* **13**, 233 (1941). (R_{He})
 J. E. Mack, Unpublished material (1942). (I P) (T) (C L)
 C. E. Moore, *Princeton Obs. Contr. No. 20*, 1 (1945). (C L)
 J. E. Mack and N. Austern, *Phys. Rev.* **72**, 972; *Bul. Am. Phys. Soc.* **22**, No. 6, p. 23 (1947). (Fine structure).

He II

He II

Config.	Desig.	J	Level	Interval	Config.	Desig.	J	Level	Interval
1s	1s ^2S	$\frac{1}{2}$	0.000		12s, etc.	12s ^2S , etc.	$\frac{1}{2}$, etc.	435864.534 to .583	0.049
2s, 2p	2s ^2S , 2p $^2P^\circ$	$\frac{1}{2}$	329182.858	5.843	13s, etc.	13s ^2S , etc.	$\frac{1}{2}$, etc.	436315.409 to .447	0.038
2p	2p $^2P^\circ$	$1\frac{1}{2}$	329188.701		14s, etc.	14s ^2S , etc.	$\frac{1}{2}$, etc.	436673.163 to .194	0.031
3s, 3p	3s ^2S , 3p $^2P^\circ$	$\frac{1}{2}$	390144.376	1.733	15s, etc.	15s ^2S , etc.	$\frac{1}{2}$, etc.	436961.781 to .807	0.026
3p, 3d	3p $^2P^\circ$, 3d ^2D	$1\frac{1}{2}$	390146.109	0.576	16s, etc.	16s ^2S , etc.	$\frac{1}{2}$, etc.	437197.994 to 8.015	0.021
3d	3d ^2D	$2\frac{1}{2}$	390146.685		17s, etc.	17s ^2S , etc.	$\frac{1}{2}$, etc.	437393.761 to .778	0.017
4s, 4p	4s ^2S , 4p $^2P^\circ$	$\frac{1}{2}$	411480.673	0.729	18s, etc.	18s ^2S , etc.	$\frac{1}{2}$, etc.	437557.815 to .829	0.014
4p, 4d	4p $^2P^\circ$, 4d ^2D	$1\frac{1}{2}$	411481.402	0.242	19s, etc.	19s ^2S , etc.	$\frac{1}{2}$, etc.	437696.654 to .666	0.012
4d, 4f	4d ^2D , 4f $^2F^\circ$	$2\frac{1}{2}$	411481.644	0.122	20s, etc.	20s ^2S , etc.	$\frac{1}{2}$, etc.	437815.191 to .202	0.011
4f	4f $^2F^\circ$	$3\frac{1}{2}$	411481.766		21s, etc.	21s ^2S , etc.	$\frac{1}{2}$, etc.	437917.202 to .212	0.010
5s, 5p	5s ^2S , 5p $^2P^\circ$	$\frac{1}{2}$	421356.227	0.374	22s, etc.	22s ^2S , etc.	$\frac{1}{2}$, etc.	438005.620 to .629	0.009
5p, 5d	5p $^2P^\circ$, 5d ^2D	$1\frac{1}{2}$	421356.601	0.122					
5d, 5f	5d ^2D , 5f $^2F^\circ$	$2\frac{1}{2}$	421356.723	0.065					
5f, 5g	5f $^2F^\circ$, 5g ^2G	$3\frac{1}{2}$	421356.788	0.038					
5g	5g ^2G	$4\frac{1}{2}$	421356.826						
6s to 6h	6s ^2S to 6h $^2H^\circ$	$\left\{ \begin{array}{l} \frac{1}{2} \\ \text{to} \\ 5\frac{1}{2} \end{array} \right\}$	426720.683 to 1.043	0.360					
7s, etc.	7s ^2S , etc.	$\frac{1}{2}$, etc.	429955.263 to .496	0.233					
8s, etc.	8s ^2S , etc.	$\frac{1}{2}$, etc.	432054.618 to .778	0.160					
9s, etc.	9s ^2S , etc.	$\frac{1}{2}$, etc.	433493.924 to 4.039	0.115					
10s, etc.	10s ^2S , etc.	$\frac{1}{2}$, etc.	434523.448 to .532	0.084					
11s, etc.	11s ^2S , etc.	$\frac{1}{2}$, etc.	435285.179 to .241	.0062					
						Limit		438912.425	

LITHIUM

Li I

3 electrons

 $Z=3$ Ground state $1s^2 2s \ ^2S_{1/2}$ $2s \ ^2S_{1/2} \ 43486.76 \pm 0.28 \text{ cm}^{-1}$

I. P. 5.390 volts

The analysis is from Fowler and Paschen-Götze. Meissner has generously furnished in advance of publication preliminary results of level splittings derived from observed hyperfine-structure of selected lines. These data are as follows:

Term	Interval (cm^{-1})	Line resolved (Å)	Term	Line resolved (Å)
$2p \ ^2P^\circ$	$0.3366 \pm 0.0005^*$	6707.912, .761	$3s \ ^2S$	8126.452, .231
$3d \ ^1D$	0.037 ± 0.001	6103.649, .538	$4s \ ^2S$	4971.745, .661
$4d \ ^1D$	0.017 ± 0.002	4602.894, .826	$5s \ ^2S$	4273.127, .066
$5d \ ^1D$	0.010 ± 0.002	4132.191, .136	$6s \ ^2S$	3985.538, .485
$6d \ ^1D$	0.008 ± 0.003	3915.346, .295		

*Average of 6 determinations.

The values in the table for the above terms have been calculated from these wavelengths. Jackson and Kuhn state that the multiplet splitting of $2p \ ^2P^\circ = 0.3372 \pm 0.0005 \text{ cm}^{-1}$.

The remaining terms given to two decimals have been calculated from the measures by France. All other term values are from Fowler's Report.

REFERENCES

- N. A. Kent, *Astroph. J.* **40**, 337 (1914). (T) (Z E)
 A. S. King, *Astroph. J.* **44**, 169 (1916). (T)
 A. Fowler, *Report on Series in Line Spectra*, p. 96 (Fleetway Press, London, 1922). (T) (C L)
 F. Paschen und R. Götze, *Seriengesetze der Linienspektren*, p. 54. (Julius Springer, Berlin, 1922). (T) (C L)
 R. W. France, *Proc. Roy. Soc. (London)* [A] **129**, 354 (1930). (I P) (T) (C L)
 H. E. White, *Introduction to Atomic Spectra*, p. 77, 87, (McGraw-Hill Book Co., Inc., New York, N. Y., 1934). (G D)
 D. A. Jackson and H. Kuhn, *Proc. Roy. Soc. (London)* [A] **173**, 278 (1939). (I S)
 W. F. Meggers, *J. Opt. Soc. Am.* **36**, 431 (1946). (Summary hfs).
 K. W. Meissner, L. G. Mundie, and P. Stetson, unpublished material (Dec. 1947). (T) (C L)

Li I

Li I

Config.	Desig.	J	Level	Config.	Desig.	J	Level
2s	2s ¹ S	$\frac{1}{2}$	0. 00	15p	15p ¹ P°	$\frac{1}{2}, 1\frac{1}{2}$	42995. 51
2p	2p ¹ P°	$\frac{1}{2}$ $1\frac{1}{2}$	14903. 66 14904. 00	16p	16p ¹ P°	$\frac{1}{2}, 1\frac{1}{2}$	43055. 34
3s	3s ¹ S	$\frac{1}{2}$	27206. 12	17p	17p ¹ P°	$\frac{1}{2}, 1\frac{1}{2}$	43105. 42
3p	3p ¹ P°	$\frac{1}{2}, 1\frac{1}{2}$	30925. 38	18p	18p ¹ P°	$\frac{1}{2}, 1\frac{1}{2}$	43146. 96
3d	3d ¹ D	$1\frac{1}{2}$ $2\frac{1}{2}$	31283. 08 31283. 12	19p	19p ¹ P°	$\frac{1}{2}, 1\frac{1}{2}$	43181. 84
4s	4s ¹ S	$\frac{1}{2}$	35012. 06	20p	20p ¹ P°	$\frac{1}{2}, 1\frac{1}{2}$	43211. 39
4p	4p ¹ P°	$\frac{1}{2}, 1\frac{1}{2}$	36469. 55	21p	21p ¹ P°	$\frac{1}{2}, 1\frac{1}{2}$	43237. 16
4d	4d ¹ D	$1\frac{1}{2}$ $2\frac{1}{2}$	36623. 38 36623. 40	22p	22p ¹ P°	$\frac{1}{2}, 1\frac{1}{2}$	43259. 14
4f	4f ¹ F°	$2\frac{1}{2}, 3\frac{1}{2}$	36630. 2	23p	23p ¹ P°	$\frac{1}{2}, 1\frac{1}{2}$	43278. 96
5s	5s ¹ S	$\frac{1}{2}$	38299. 50	24p	24p ¹ P°	$\frac{1}{2}, 1\frac{1}{2}$	43296. 03
5p	5p ¹ P°	$\frac{1}{2}, 1\frac{1}{2}$	39015. 56	25p	25p ¹ P°	$\frac{1}{2}, 1\frac{1}{2}$	43311. 45
5d	5d ¹ D	$1\frac{1}{2}$ $2\frac{1}{2}$	39097. 42 39097. 44	26p	26p ¹ P°	$\frac{1}{2}, 1\frac{1}{2}$	43324. 81
5f	5f ¹ F°	$2\frac{1}{2}, 3\frac{1}{2}$	39104. 5	27p	27p ¹ P°	$\frac{1}{2}, 1\frac{1}{2}$	43336. 40
6s	6s ¹ S	$\frac{1}{2}$	39987. 64	28p	28p ¹ P°	$\frac{1}{2}, 1\frac{1}{2}$	43346. 39
6p	6p ¹ P°	$\frac{1}{2}, 1\frac{1}{2}$	40390. 84	29p	29p ¹ P°	$\frac{1}{2}, 1\frac{1}{2}$	43354. 91
6d	6d ¹ D	$1\frac{1}{2}$ $2\frac{1}{2}$	40437. 31 40437. 32	30p	30p ¹ P°	$\frac{1}{2}, 1\frac{1}{2}$	43363. 71
7s	7s ¹ S	$\frac{1}{2}$	40950. 7	31p	31p ¹ P°	$\frac{1}{2}, 1\frac{1}{2}$	43372. 06
7p	7p ¹ P°	$\frac{1}{2}, 1\frac{1}{2}$	41217. 35	32p	32p ¹ P°	$\frac{1}{2}, 1\frac{1}{2}$	43378. 31
7d	7d ¹ D	$1\frac{1}{2}, 2\frac{1}{2}$	41248. 9	33p	33p ¹ P°	$\frac{1}{2}, 1\frac{1}{2}$	43384. 9
8p	8p ¹ P°	$\frac{1}{2}, 1\frac{1}{2}$	41751. 63	34p	34p ¹ P°	$\frac{1}{2}, 1\frac{1}{2}$	43390. 3
8d	8d ¹ D	$1\frac{1}{2}, 2\frac{1}{2}$	41787. 3	35p	35p ¹ P°	$\frac{1}{2}, 1\frac{1}{2}$	43395. 4
9p	9p ¹ P°	$\frac{1}{2}, 1\frac{1}{2}$	42118. 27	36p	36p ¹ P°	$\frac{1}{2}, 1\frac{1}{2}$	43400. 5
9d	9d ¹ D	$1\frac{1}{2}, 2\frac{1}{2}$	42141. 1	37p	37p ¹ P°	$\frac{1}{2}, 1\frac{1}{2}$	43404. 7
10p	10p ¹ P°	$\frac{1}{2}, 1\frac{1}{2}$	42379. 16	38p	38p ¹ P°	$\frac{1}{2}, 1\frac{1}{2}$	43408. 6
11p	11p ¹ P°	$\frac{1}{2}, 1\frac{1}{2}$	42569. 1	39p	39p ¹ P°	$\frac{1}{2}, 1\frac{1}{2}$	43412. 4
12p	12p ¹ P°	$\frac{1}{2}, 1\frac{1}{2}$	42719. 14	40p	40p ¹ P°	$\frac{1}{2}, 1\frac{1}{2}$	43416. 9
13p	13p ¹ P°	$\frac{1}{2}, 1\frac{1}{2}$	42832. 92	41p	41p ¹ P°	$\frac{1}{2}, 1\frac{1}{2}$	43420. 9
14p	14p ¹ P°	$\frac{1}{2}, 1\frac{1}{2}$	42923. 39	42p	42p ¹ P°	$\frac{1}{2}, 1\frac{1}{2}$	43424. 3
				Li II (S ₀)	Limit		43486. 76

December 1947.

Li II

(He I sequence; 2 electrons)

Z=3

Ground state $1s^2 {}^1S_0$ $1s^2 {}^1S_0$ 610079 $\pm$ 25 cm^{-1} I. P. 75.6193 $\pm$ 0.0031 volts

Singlet series have been published by both Schüller and Werner, the longer ones by Schüller. In the term list Schüller's rounded off values have been used for the terms $4s$ to $7s$ ${}^1S$, $5d$ to $8d$ ${}^1D$ and $8f$ ${}^1F^\circ$. The limit is from Robinson and the $2p$ to $4p$ ${}^1P^\circ$ terms are from Edlén. All the remaining terms are from Werner, who gives also an extrapolated value of $2s$ ${}^1S_0$, entered in brackets in the table.

Intersystem combinations have not been observed, but the long series should give a reliable determination of the relative positions of the singlet and triplet terms.

REFERENCES

- H. Schüller, Zeit. Phys. **37**, 568 (1926). (T) (C L)
 S. Werner, Nature **116**, 574 (L) (1925); **118**, 154 (L) (1926). (T) (C L)
 B. Edlén, Nova Acta Reg. Soc. Sci. Uppsala [IV] **9**, No. 6, 31 (1934). (T) (C L)
 H. E. White, *Introduction to Atomic Spectra* p. 209 (McGraw-Hill Book Co., Inc., New York, N. Y., 1934). (G D)
 H. A. Robinson, Phys. Rev. **51**, 14 (1937). (I P) (T) (C L)
 W. F. Meggers, J. Opt. Soc. Am. **36**, 431 (1946). (Summary hfs)

Li II

Li II

Author	Config.	Desig.	<i>J</i>	Level	Author	Config.	Desig.	<i>J</i>	Level
$1s^2 {}^1S$	$1s^2$	$1s^2 {}^1S$	0	0	4S	$1s 4s$	$4s {}^1S$	0	581590
$2s$	$1s 2s$	$2s {}^1S$	1	476046	4p	$1s 4p$	$4p {}^1P^\circ$	2, 1, 0	581897
$2s$	$1s 2s$	$2s {}^1S$	0	[490079]	4d	$1s 4d$	$4d {}^1D$	3, 2, 1	582612
$2p$	$1s 2p$	$2p {}^1P^\circ$	2, 1, 0	494273	4D	$1s 4d$	$4d {}^1D$	2	582631
$1s 2p {}^1P$	$1s 2p$	$2p {}^1P^\circ$	1	501816	4f	$1s 4f$	$4f {}^1F^\circ$	4, 3, 2	582644
$3s$	$1s 3s$	$3s {}^1S$	1	554761	4F	$1s 4f$	$4f {}^1F^\circ$	3	582645
$3S$	$1s 3s$	$3s {}^1S$	0	558779	$1s 4p {}^1P$	$1s 4p$	$4p {}^1P^\circ$	1	582832
$3p$	$1s 3p$	$3p {}^1P^\circ$	2, 1, 0	559501	5s	$1s 5s$	$5s {}^1S$	1	591184
$3d$	$1s 3d$	$3d {}^1D$	3, 2, 1	561245	5S	$1s 5s$	$5s {}^1S$	0	591984
$3D$	$1s 3d$	$3d {}^1D$	2	561276	5p	$1s 5p$	$5p {}^1P^\circ$	2, 1, 0	592141
$1s 3p {}^1P$	$1s 3p$	$3p {}^1P^\circ$	1	561749	5d	$1s 5d$	$5d {}^1D$	3, 2, 1	592505
$4s$	$1s 4s$	$4s {}^1S$	1	579982	5D	$1s 5d$	$5d {}^1D$	2	592508

Li II—Continued

Li II—Continued

Author	Config.	Desig.	<i>J</i>	Level	Author	Config.	Desig.	<i>J</i>	Level
5F	1s 5f	5f ¹ F°	3	592523	7S	1s 7s	7s ¹ S	0	600925
5f	1s 5f	5f ³ F°	4, 3, 2	592527	7d	1s 7d	7d ³ D	3, 2, 1	601115
5P	1s 5p	5p ¹ P°	1	592639	7D	1s 7d	7d ¹ D	2	601115
6s	1s 6s	6s ¹ S	1	597122	7f	1s 7f	7f ³ F°	4, 3, 2	601121
6S	1s 6s	6s ¹ S	0	597574	7F	1s 7f	7f ¹ F°	3	601123
6p	1s 6p	6p ³ P°	2, 1, 0	597666	8D	1s 8d	8d ¹ D	2	603214
6d	1s 6d	6d ³ D	3, 2, 1	597876	8f	1s 8f	8f ³ F°	4, 3, 2	603221
6D	1s 6d	6d ¹ D	2	597877	8F	1s 8f	8f ¹ F°	3	603221
6f	1s 6f	6f ³ F°	4, 3, 2	597886					
6F	1s 6f	6f ¹ F°	3	597886		Li III (² S _{1/2})	Limit		610079
7s	1s 7s	7s ¹ S	1	600641					

May 1946.

Li III

(H I sequence; 1 electron)

Z=3Ground state 1s ²S_{1/2}1s ²S_{1/2} 987677 cm⁻¹

I. P. 122.423 volts

Edlén has calculated from the Penney series formula the positions of the first three lines of the Lyman series, 1s ²S—*np* ²P° (*n*=2, 3, 4), at 134.994 Å, 113.903 Å, and 107.997 Å, respectively. These lines are clearly visible on his spectrograms, but there is a discordance between the observed and calculated wavelengths, which he attributes to the unsymmetrical broadening of the lines.

Gale and Hoag report that they have observed 5 lines of this series and the first line of the Balmer series. The calculated position of the latter is 729.05 Å, according to Edlén.

The term values listed have been derived from Edlén's calculated wavelengths.

REFERENCES

W. G. Penney, Phil. Mag. [7] **9**, 661 (1930).H. G. Gale and J. B. Hoag, Phys. Rev. **37**, 1703 (A) (1931). (C L)B. Edlén, Nova Acta Reg. Soc. Sci. Uppsala [IV] **9**, No. 6, 28, 152 (1934). (I P) (T) (C L)

Li III

Li III

Config.	Desig.	<i>J</i>	Level	Config.	Desig.	<i>J</i>	Level
1s	1s ² S	½	0	4p	4p ³ P°	½, 1½	925952
2p	2p ³ P°	½, 1½	740774				
3p	3p ³ P°	½, 1½	877940		Limit		987677

October 1946.

BERYLLIUM

Be I

4 electrons

 $Z=4$ Ground state $1s^2 2s^2 {}^1S_0$ $2s^2 {}^1S_0$, 75192.29 cm^{-1}

I. P. 9.320 volts

All but four of the terms are from the work of Paschen or Paschen and Kruger. According to Paschen no intersystem combinations have been observed. The relative positions of the singlet and triplet terms are, however, excellently determined by long series with a relative uncertainty $\pm 2 \text{ cm}^{-1}$.

The predicted position of the resonance line, $2s^2 {}^1S_0 - 2p {}^3P^{\circ}$, is 4548.29 Å. Paton and Nusbaum have observed a line at 4553.07 Å to which they assign this classification, but their result has not been confirmed.

The term values of higher series members, calculated from the series formula but not substantiated by observation, are in brackets in the table.

Four terms are from Edlén's work: $2p^2 {}^1D$, $3p {}^3P^{\circ}$, $2p^2 {}^1S$, and $3p {}^3P$.

REFERENCES

- R. F. Paton and R. E. Nusbaum, *Phys. Rev.* **33**, 1093 (A) (1929). (C L)
 F. Paschen and P. G. Kruger, *Ann. der Phys.* [5] **8**, 1005 (1931). (T) (C L)
 F. Paschen, *Ann. der Phys.* [5] **12**, 514 (1932). (I P) (T) (C L)
 B. Edlén, *Nova Acta Reg. Soc. Sci. Uppsala* [IV] **9**, No. 6, 51 (1934). (T) (C L)
 H. E. White, *Introduction to Atomic Spectra*, p. 179 (McGraw-Hill Book Co., Inc., New York, N. Y., 1934). (G D)
 W. F. Meggers, *J. Opt. Soc. Am.* **36**, 431 (1946). (Summary hfs)

Be I

Be I

Config.	Desig.	J	Level	Interval	Config.	Desig.	J	Level	Interval
$2s^2$	$2s^2 {}^1S$	0	0.00		$2s({}^3S)3p$	$3p {}^1P^{\circ}$	1	[60187]	
$2s({}^3S)2p$	$2p {}^3P^{\circ}$	0	21979.43 + x	0.68	$2s({}^3S)3d$	$3d {}^3D$	1, 2, 3	62054.8 + x	
		1	21980.11 + x	2.35	$2s({}^3S)3d$	$3d {}^1D$	2	64428.15	
		2	21982.46 + x		$2s({}^3S)4s$	$4s {}^3S$	1	64507.7 + x	
$2s({}^3S)2p$	$2p {}^1P^{\circ}$	1	42565.3		$2s({}^3S)4s$	$4s {}^1S$	0	65245.4	
$2s({}^3S)3s$	$3s {}^3S$	1	52082.07 + x		$2s({}^3S)4p$	$4p {}^3P^{\circ}$	0, 1, 2	[66949] + x	
$2s({}^3S)3s$	$3s {}^1S$	0	54677.2		$2s({}^3S)4p$	$4p {}^1P^{\circ}$	1	[67228]	
$2p^2$	$2p^2 {}^1D$	2	56432.5		$2s({}^3S)4d$	$4d {}^3D$	1, 2, 3	67943.6 + x	
$2s({}^3S)3p$	$3p {}^3P^{\circ}$	0, 1, 2	58791.6 + x		$2s({}^3S)4d$	$4d {}^1D$	2	68781.2	
$2p^2$	$2p^2 {}^3P$	0	59694.61 + x	1.40	$2s({}^3S)5s$	$5s {}^3S$	1	69009.3 + x	
		1	59696.01 + x	2.03					
		2	59698.04 + x						

Be I—Continued

Be I—Continued

Config.	Desig.	<i>J</i>	Level	Interval	Config.	Desig.	<i>J</i>	Level	Interval
2s (S) 5s	5s ¹ S	0	69322. 3		2s (S) 9d	9d ¹ D	1, 2, 3	73803. 2 + <i>x</i>	
2s (S) 5p	5p ³ P°	0, 1, 2	[69634. 5] + <i>x</i>		2s (S) 9d	9d ¹ D	2	73866. 9	
2s (S) 5d	5d ¹ D	1, 2, 3	70606. 7 + <i>x</i>		2s (S) 10s	10s ¹ S	0	73930. 4	
2s (S) 5d	5d ¹ D	2	71002. 3		2s (S) 10d	10d ¹ D	1, 2, 3	74070. 6 + <i>x</i>	
2s (S) 6s	6s ¹ S	1	71161. 9 + <i>x</i>		2s (S) 10d	10d ¹ D	2	74116. 7	
2s (S) 6s	6s ¹ S	0	71320. 7		2s (S) 11s	11s ¹ S	0	74163. 4	
2s (S) 6p	6p ³ P°	0, 1, 2	[71482. 9] + <i>x</i>		2s (S) 11d	11d ¹ D	1, 2, 3	74268. 6	
2p ³	2p ³ ¹ S	0	71498. 9		2s (S) 11d	11d ¹ D	2	74301. 4	
2s (S) 6d	6d ¹ D	1, 2, 3	72030. 6 + <i>x</i>		2s (S) 12d	12d ¹ D	1, 2, 3	74416. 3 + <i>x</i>	
2s (S) 6d	6d ¹ D	2	72251. 1		2s (S) 12d	12d ¹ D	2	74443. 2	
2s (S) 7s	7s ¹ S	1	72355. 4 + <i>x</i>		Be II (S _{1/2})	Limit	-----	75192. 29	
2s (S) 7s	7s ¹ S	0	72448. 3		2p (P°) 3s	3s ³ P°	0	85554. 96 + <i>x</i>	2. 05
2s (S) 7d	7d ¹ D	1, 2, 3	72881. 9 + <i>x</i>				1	85557. 01 + <i>x</i>	3. 02
2s (S) 7d	7d ¹ D	2	73017. 2				2	85560. 93 + <i>x</i>	
2s (S) 8s	8s ¹ S	1	73089. 1 + <i>x</i>		2p (P°) 3p	3p ³ P	0		
2s (S) 8s	8s ¹ S	0	73146. 7				1		
2s (S) 8d	8d ¹ D	1, 2, 3	73429. 6 + <i>x</i>				2	91901. 8 + <i>x</i>	
2s (S) 8d	8d ¹ D	2	73519. 7		2p (P°) 3d	3d ³ D°	1	[94189. 51] + <i>x</i>	0. 60
2s (S) 9s	9s ¹ S	0	73608. 5				2	94190. 11 + <i>x</i>	1. 15
							3	94191. 26 + <i>x</i>	
					2p (P°) 3d	3d ³ P°	0	95182. 1 + <i>x</i>	1. 0
							1	95183. 1 + <i>x</i>	1. 9
							2	95185. 0 + <i>x</i>	

May 1946.

Be I OBSERVED TERMS*

Config. 1s ² +	Observed Terms		
2s ²	2s ² ¹ S		
2s(S)2p	{ 2p ³ P° 2p ¹ P°		
2p ³	{ 2p ³ ¹ S 2p ³ ³ P 2p ³ ¹ D		
	ns (n ≥ 3)	np (n ≥ 3)	nd (n ≥ 3)
2s(S)nz	{ 3- 8s ¹ S 3-11s ¹ S	3p ³ P°	3-12d ³ D 3-12d ¹ D
2p(P°)nz	3s ³ P°	3p ³ P	3d ³ P° 3d ³ D°

*For predicted terms in the spectra of the Be I isoelectronic sequence, see Introduction.

Be II

(Li I sequence; 3 electrons)

Z=4Ground state $1s^2 2s^2 S_{1/2}$ $2s^2 S_{1/2}$ 146881.7 cm^{-1}

I. P. 18.206 volts

The analysis has been taken from the paper by Paschen and Kruger.

REFERENCES

F. Paschen and P. G. Kruger, Ann. der Phys. [5] **8**, 1014 (1931). (I P) (T) (C L)H. E. White, *Introduction to Atomic Spectra* p. 98, (McGraw-Hill Book Co., Inc. New York, N. Y., 1934). (G D)W. F. Meggers, J. Opt. Soc. Am. **36**, 431 (1946). (Summary hfs)

Be II					Be II				
Config.	Desig.	<i>J</i>	Level	Interval	Config.	Desig.	<i>J</i>	Level	Interval
2s	2s ^2S	$\frac{1}{2}$	0.0		5f	5f $^2F^\circ$	$2\frac{1}{2}, 3\frac{1}{2}$	129321.9	
2p	2p $^2P^\circ$	$\frac{1}{2}$ $1\frac{1}{2}$	31928.8 31935.4	6.6	6s	6s ^2S	$\frac{1}{2}$	133559.1	
3s	3s ^2S	$\frac{1}{2}$	88231.2		6p	6p $^2P^\circ$	$\frac{1}{2}$ $1\frac{1}{2}$	134485.6	
3p	3p $^2P^\circ$	$\frac{1}{2}$ $1\frac{1}{2}$	96496.4 96498.2	1.8	6d	6d ^2D	$1\frac{1}{2}, 2\frac{1}{2}$	134682.0	
3d	3d ^2D	$1\frac{1}{2}, 2\frac{1}{2}$	98053.2	• •	6f	6f $^2F^\circ$	$2\frac{1}{2}, 3\frac{1}{2}$	134688.1	
4s	4s ^2S	$\frac{1}{2}$	115465.2	• •	7s	7s ^2S	$\frac{1}{2}$	137226.0	
4p	4p $^2P^\circ$	$\frac{1}{2}$ $1\frac{1}{2}$	118760	• •	7p	7p $^2P^\circ$	$\frac{1}{2}$ $1\frac{1}{2}$	137796	
4d	4d ^2D	$1\frac{1}{2}, 2\frac{1}{2}$	119422.2	• •	7d	7d ^2D	$1\frac{1}{2}, 2\frac{1}{2}$	137920.0	
4f	4f $^2F^\circ$	$2\frac{1}{2}, 3\frac{1}{2}$	119444.6	• •	7f	7f $^2F^\circ$	$2\frac{1}{2}, 3\frac{1}{2}$	137923.1	
5s	5s ^2S	$\frac{1}{2}$	127336.1	• •	8d	8d ^2D	$1\frac{1}{2}, 2\frac{1}{2}$	140020.4	
5p	5p $^2P^\circ$	$\frac{1}{2}$ $1\frac{1}{2}$	128970.2	• •	Be III ($^1S_0$)		Limit	146881.7	
5d	5d ^2D	$1\frac{1}{2}, 2\frac{1}{2}$	129311.3						

April 1946.

Be III

(He I sequence; 2 electrons)

Z=4Ground state $1s^2 ^1S_0$ $1s^2 ^1S_0$ 1241225 $\pm 100 \text{ cm}^{-1}$ I. P. 153.850 ± 0.012 volts

Both Robinson and Edlén report six lines of the singlet series observed, although the earlier members have also been measured by others. The range is between 81 Å and 100 Å. The singlet terms have been taken from Robinson's paper.

The relative absolute values of the triplet and singlet terms have been determined by extrapolation of $3d ^3D$ from He I and Li II, according to Edlén, who has generously furnished his unpublished term values of the triplets. Apparently no intersystem combinations have been observed in Be III, but the existence of the observed line $1s^2 ^1S_0 - 2p ^3P_1^\circ$ in the related spectra from B IV to Al XII, within the errors of measurement of the predicted positions, indicates that the uncertainty α is small.

Be III—Continued

REFERENCES

- B. Edlén, Nova Acta Reg. Soc. Sci. Uppsala [IV] 9, No. 6, 31 (1934). (T) (C L)
 H. A. Robinson, Phys. Rev. 51, 14 (1937). (I P) (T) (C L)
 B. Edlén, unpublished material (Sept. 1947). (T)

Be III					Be III				
Config.	Desig.	<i>J</i>	Level	Interval	Config.	Desig.	<i>J</i>	Level	Interval
1s ²	1s ² 1S	0	0		1s 4p	4p 1P°	1	1179830	
1s 2s	2s 3S	1	956496 + <i>x</i>		1s 5p	5p 1P°	1	1201894	
1s 2p	2p 1P°	0	983348 + <i>x</i>	15	1s 6p	6p 1P°	1	1213931	
		1	983363 + <i>x</i>		1s 7p	7p 1P°	1	1221135	
		2							
1s 2p	2p 1P°	1	997466						
1s 3p	3p 1P°	1	1132323		BeIV (3S _{1/2})	Limit		1241225	

September 1947.

Be IV

(H I sequence; 1 electron)

Z = 4Ground state 1s 3S_{1/2}1s 3S_{1/2} 1756065 cm⁻¹

I. P. 217.664 volts

For the lines of BeIV that have been observed, 1s 3S—*np* 1P° (*n* = 2 to 7), Robinson lists wavelengths derived from the Penney series formula. The range is from 58 Å to 75 Å. The terms listed for this spectrum have been calculated from his data.

Tyrén also reports the first three members of the series as observed.

REFERENCES

- W. G. Penney, Phil. Mag. [7] 9, 661 (1930).
 B. Edlén, Nova Acta Reg. Soc. Sci. Uppsala [IV] 9, No. 6, 28, 152 (1934). (I P) (T) (C L)
 H. A. Robinson, Phys. Rev. 50, 99 (1936). (C L)
 F. Tyrén, Zeit. Phys. 98, 771 (1936). (C L)

Be IV				Be IV			
Config.	Desig.	<i>J</i>	Level	Config.	Desig.	<i>J</i>	Level
1s	1s 3S	3/2	0	6p	6p 1P°	3/2, 1 1/2	1707292
2p	2p 1P°	3/2, 1 1/2	1317087	7p	7p 1P°	3/2, 1 1/2	1720235
3p	3p 1P°	3/2, 1 1/2	1580966				
4p	4p 1P°	3/2, 1 1/2	1646324		Limit		1756065
5p	5p 1P°	3/2, 1 1/2	1685832				

October 1946.

BORON

B I

5 electrons

Z=5

Ground state $1s^2 2s^2 2p \ ^1P_1^0$ $2p \ ^1P^0$ 66930 cm^{-1}

I. P. 8.296 volts

The spectrum is incompletely observed, but 34 lines have been classified in the interval between 1378 Å and 2498 Å. The terms for which there is an entry in the column of the table headed "Authors", are from Edlén, but a correction of 90 cm^{-1} has been added to the limit as quoted from Selwyn (66840 cm^{-1}). Whitelaw and Mack have recalculated the limit and derived the value $B \text{ I } 2s^2 2p \ ^1P_1^0 - B \text{ II } 2s^2 \ ^1S_0 = 66930 \text{ cm}^{-1}$, using the ^3D series alone because of extra-configurational perturbations in the ^3S series. Selwyn averaged the limits from both the ^3S and ^3D series.

The remaining terms are from an unpublished manuscript kindly furnished by Clearman, who has extended the doublet series by further observations and confirmed the correction to the limit mentioned above. Clearman has also found two quartet terms. No intersystem combinations have been observed, as indicated by x in the table. Edlén estimates that $2p \ ^3P_1^0 - 2p \ ^3P_2^0 = 28800 \text{ cm}^{-1}$, by analogy with the observed intersystem combinations in C II and N III. The corresponding value of $2p^2 \ ^4P_1$ is entered in brackets in the table and has been added to all of Clearman's values of quartet terms.

REFERENCES

- I. S. Bowen, *Phys. Rev.* **29**, 231 (1927). (T) (C L)
 E. W. H. Selwyn, *Proc. Phys. Soc. (London)* **41**, 401 (1929). (T) (C L)
 B. Edlén, *Nova Acta Reg. Soc. Sci. Uppsala* [IV] **9**, No. 6, 74 (1934). (T)
 H. E. White, *Introduction to Atomic Spectra* p. 115 (McGraw-Hill Book Co., Inc., New York, N. Y., 1934). (G D)
 N. G. Whitelaw and J. E. Mack, *Phys. Rev.* **47**, 677 (1935). (I P) (T)
 B. Edlén, *Zeit. Phys.* **98**, 564 (1936). (C L)
 W. Opeschowski and D. A. DeVries, *Physica* **6**, No. 9, 913 (1939). (I S)
 W. F. Meggers, *J. Opt. Soc. Am.* **36**, 431 (1946). (Summary hfs)
 H. E. Clearman Jr., unpublished material (Aug. 1947). (T) (C L)

B I

B I

Authors	Config.	Desig.	J	Level	Interval	Authors	Config.	Desig.	J	Level	Interval
$2p\ ^3P_1$ $\ ^3P_2$	$2s^2(^1S)2p$	$2p\ ^3P^o$	$\frac{1}{2}$ $1\frac{1}{2}$	0 16	16	$5d\ ^1D$	$2s^2(^1S)5d$	$5d\ ^1D$	$\left\{ \begin{matrix} 1\frac{1}{2} \\ 2\frac{1}{2} \end{matrix} \right\}$	62481	
	$2s\ 2p^2$	$2p^2\ ^1P$	$\frac{1}{2}$ $1\frac{1}{2}$ $2\frac{1}{2}$	$[28805] + x$ $28810 + x$ $28816 + x$	5 6		$2s\ 2p^2$	$2p^2\ ^1S$	$\frac{1}{2}$	63561	
$2p'\ ^1P_1$						$6d\ ^1D$	$2s^2(^1S)6d$	$6d\ ^1D$	$\left\{ \begin{matrix} 1\frac{1}{2} \\ 2\frac{1}{2} \end{matrix} \right\}$	63847	
$3s\ ^3S_1$	$2s^2(^1S)3s$	$3s\ ^3S$	$\frac{1}{2}$	40040			$2s^2(^1S)7s$	$7s\ ^3S$	$\frac{1}{2}$	64156	
$2p'\ ^3D$	$2s\ 2p^2$	$2p^2\ ^3D$	$\left\{ \begin{matrix} 1\frac{1}{2} \\ 2\frac{1}{2} \end{matrix} \right\}$	47857			$2s^2(^1S)7d$	$7d\ ^3D$	$\left\{ \begin{matrix} 1\frac{1}{2} \\ 2\frac{1}{2} \end{matrix} \right\}$	64664	
$3d\ ^3D$	$2s^2(^1S)3d$	$3d\ ^3D$	$\left\{ \begin{matrix} 1\frac{1}{2} \\ 2\frac{1}{2} \end{matrix} \right\}$	54765			$2s^2(^1S)8d$	$8d\ ^3D$	$\left\{ \begin{matrix} 1\frac{1}{2} \\ 2\frac{1}{2} \end{matrix} \right\}$	65195	
$4s\ ^3S_1$	$2s^2(^1S)4s$	$4s\ ^3S$	$\frac{1}{2}$	55009			$2s^2(^1S)9s$	$9s\ ^3S$	$\frac{1}{2}$	65553	
$4d\ ^3D$	$2s^2(^1S)4d$	$4d\ ^3D$	$\left\{ \begin{matrix} 1\frac{1}{2} \\ 2\frac{1}{2} \end{matrix} \right\}$	59989			B II ($^1S_0$)	<i>Limit</i>	-----	66930	
$5s\ ^3S_1$	$2s^2(^1S)5s$	$5s\ ^3S$	$\frac{1}{2}$	60146			$2s\ 2p^2$	$2p^2\ ^3P$	$\frac{1}{2}$ $1\frac{1}{2}$	72535 72547	12
	$2s^2(^1S)6s$	$6s\ ^3S$	$\frac{1}{2}$	62098			$2p^2$	$2p^2\ ^3S^o$	$1\frac{1}{2}$	97037 + x	

August 1947.

B I OBSERVED TERMS*

Config. $1s^2 +$	Observed Terms	
$2s^2(^1S)2p$	$2p\ ^3P^o$	
$2s\ 2p^2$	{	$2p^2\ ^3S$ $2p^2\ ^4P$ $2p^2\ ^3D$
$2p^2$		$2p^2\ ^3P$ $2p^2\ ^1S^o$
	$ns\ (n \geq 3)$	$nd\ (n \geq 3)$
$2s^2(^1S)nx$	3-7s, 9s ^3S	3-8d ^3D

*For predicted terms in the spectra of the B I isoelectronic sequence, see Introduction.

B II

(Be I sequence; 4 electrons)

 $Z=5$ Ground state $1s^2\ 2s^2\ ^1S_0$ $2s^2\ ^1S_0\ 202895\ \text{cm}^{-1}$

I. P. 25.149 volts

The terms are from Edlén, who remarks that the observed series, especially in the singlet system, are too short for the precise determination of the limits. By analogy with Be I, C III, and N IV, he interpolates the value of $2s^2\ ^1S_0 - 2p\ ^3P_1^o$ as $37340\ \text{cm}^{-1}$, which places the limit $2s^2\ ^1S_0$ at $202895.0\ \text{cm}^{-1}$. The absolute values of the singlet terms as published in Edlén's Monograph have therefore been increased by $249\ \text{cm}^{-1}$. The relative uncertainty x is probably less than this. No intersystem combinations have been observed.

An extrapolated value of $3s\ ^1S_0$ is given in brackets.

B II—Continued

REFERENCES

B. Edlén, Nova Acta Reg. Soc. Sci. Uppsala [IV] 9, No. 6, 51 (1934). (T) (C L)
 B. Edlén, Zeit. Phys. 98, 561 (1936). (I P) (C L)

B II

B II

Edlén	Config.	Desig.	J	Level	Interval	Edlén	Config.	Desig.	J	Level	Interval
$2s\ ^1S_0$	$2s^2$	$2s^2\ ^1S$	0	0.0		$4p\ ^1P$	$2s(^2S)4p$	$4p\ ^1P^\circ$	0, 1, 2	$171544.7+x$	
$2p\ ^3P_0$	$2s(^2S)2p$	$2p\ ^3P^\circ$	0	$37333.6+x$	6.4	$4d\ ^1D$	$2s(^2S)4d$	$4d\ ^1D$	1, 2, 3	$174072.6+x$	
$\ ^3P_1$			1	$37340.0+x$	16.4	$4f\ ^1F$	$2s(^2S)4f$	$4f\ ^1F^\circ$	2, 3, 4	$174902.5+x$	
$\ ^3P_2$			2	$37356.4+x$		$4f\ ^1F_2$	$2s(^2S)4f$	$4f\ ^1F^\circ$	3	174921.5	
$2p\ ^1P_1$	$2s(^2S)2p$	$2p\ ^1P^\circ$	1	73396.7		$4d\ ^1D_2$	$2s(^2S)4d$	$4d\ ^1D$	2	175546.0	
$2p'\ ^3P_0$	$2p^2$	$2p^2\ ^3P$	0	$98910.3+x$	8.4	$5s\ ^1S_1$	$2s(^2S)5s$	$5s\ ^1S$	1	$180896.5+x$	
$\ ^3P_1$			1	$98918.7+x$	14.0	$3s'\ ^3P_0$	$2p(^2P^\circ)3s$	$3s\ ^3P^\circ$	0	$181645.2+x$	
$\ ^3P_2$			2	$98932.7+x$		$\ ^3P_1$			1	$181655.0+x$	
$2p'\ ^1D_1$	$2p^2$	$2p^2\ ^1D$	2	102362.1		$\ ^3P_2$			2	$181675.9+x$	9.8 20.9
$2p'\ ^1S_0$	$2p^2$	$2p^2\ ^1S$	0	127662.0		$5d\ ^1D$	$2s(^2S)5d$	$5d\ ^1D$	1, 2, 3	$184633.1+x$	
$3s\ ^1S_1$	$2s(^2S)3s$	$3s\ ^1S$	1	$129772.9+x$		$5f\ ^1F$	$2s(^2S)5f$	$5f\ ^1F^\circ$	2, 3, 4	$184908.2+x$	
$3s\ ^1S_0$	$2s(^2S)3s$	$3s\ ^1S$	0	[135946]		$3p'\ ^1P_1$	$2p(^2P^\circ)3p$	$3p\ ^1P$	1	189126.6	
$3p\ ^3P_{01}$	$2s(^2S)3p$	$3p\ ^3P^\circ$	0, 1	$143989.7+x$	3.7	$3d'\ ^3F_{23}$	$2p(^2P^\circ)3d$	$3d\ ^3F^\circ$	2, 3	$194748? +x$	
$\ ^3P_2$			2	$143993.4+x$		$\ ^3F_4$			4	$194760? +x$	12
$3p\ ^1P_1$	$2s(^2S)3p$	$3p\ ^1P^\circ$	1	144102.0		$3d'\ ^1D_2$	$2p(^2P^\circ)3d$	$3d\ ^1D^\circ$	2	197721.0	
$3d\ ^1D$	$2s(^2S)3d$	$3d\ ^1D$	1, 2, 3	$150649.0+x$		$3d'\ ^1D$	$2p(^2P^\circ)3d$	$3d\ ^1D^\circ$	1, 2, 3	$200484.6+x$	
$3d\ ^1D_2$	$2s(^2S)3d$	$3d\ ^1D$	2	154686.9							
$4s\ ^1S_1$	$2s(^2S)4s$	$4s\ ^1S$	1	$166344.4+x$							
$4s\ ^1S_0$	$2s(^2S)4s$	$4s\ ^1S$	0	167934.2							
							B III ($^2S_{1/2}$)	Limit		202895	

May 1946.

B II OBSERVED TERMS*

Config. $1s^2+$	Observed Terms			
$2s^2$	$2s^2\ ^1S$			
$2s(^2S)2p$	{ $2p\ ^3P^\circ$ $2p\ ^1P^\circ$			
$2p^2$	{ $2p^2\ ^3S$ $2p^2\ ^3P$ $2p^2\ ^1D$			
	$ns\ (n \geq 3)$	$np\ (n \geq 3)$	$nd\ (n \geq 3)$	$nf\ (n \geq 4)$
$2s(^2S)nx$	{ $3-5s\ ^1S$ $4s\ ^1S$	$3, 4p\ ^3P^\circ$ $3p\ ^1P^\circ$	$3-5d\ ^1D$ $3, 4d\ ^1D$	$4, 5f\ ^3F^\circ$ $4f\ ^1F^\circ$
$2p(^2P^\circ)nx$	{ $3s\ ^3P^\circ$	$3p\ ^1P$	$3d\ ^1D^\circ$ $3d\ ^3F^\circ$ $3d\ ^1D^\circ$	

*For predicted terms in the spectra of the Be I isoelectronic sequence, see Introduction.

B III

(Li I sequence; 3 electrons)

Z=5Ground state $1s^2 2s^2 {}^4S_{3/2}$ $2s^2 {}^4S_{3/2}$ 305931.1 cm^{-1}

I. P. 37.920 volts

The terms are from Edlén. The absolute values are based on the assumption that n^* for $5g {}^2G$ equals that of the corresponding term in C IV, where $5g {}^2G - 6h {}^2H^\circ$ has been observed. The precision of this term in B III is estimated to be within $\pm 1 \text{ cm}^{-1}$. The series are well represented by a Ritz formula.

Edlén gives four extrapolated term intervals, which are entered in brackets in the table

REFERENCES

A. Ericson and B. Edlén, Zeit. Phys. **59**, 676 (1930). (T) (C L)B. Edlén, Nova Acta Reg. Soc. Sci. Uppsala [IV] **9**, No. 6, 37 (1934). (I P) (T) (C L) (G D)**B III****B III**

Edlén	Config.	Desig.	J	Level	Interval	Edlén	Config.	Desig.	J	Level	Interval
$2s {}^2S_1$	$2s$	$2s {}^2S$	$\frac{1}{2}$	0.0		$5p {}^2P_1$	$5p$	$5p {}^2P^\circ$	$\frac{1}{2}$		
$2p {}^3P_1$	$2p$	$2p {}^3P^\circ$	$\frac{1}{2}$	48358.5	34.1				$1\frac{1}{2}$	265719.7	[2.2]
$2p {}^3P_2$			$1\frac{1}{2}$	48392.6		$5d {}^2D_1$	$5d$	$5d {}^2D$	$1\frac{1}{2}$	266389.5	
$3s {}^2S_1$	$3s$	$3s {}^2S$	$\frac{1}{2}$	180201.8		$5f {}^2F$	$5f$	$5f {}^2F^\circ$	$\left\{ \begin{smallmatrix} 2\frac{1}{2} \\ 3\frac{1}{2} \end{smallmatrix} \right\}$	268416.5	
$3p {}^3P_1$	$3p$	$3p {}^3P^\circ$	$\frac{1}{2}$	192949.2	10.2	$5g {}^2G$	$5g$	$5g {}^2G$	$\left\{ \begin{smallmatrix} 3\frac{1}{2} \\ 4\frac{1}{2} \end{smallmatrix} \right\}$	266427.2	
$3p {}^3P_2$			$1\frac{1}{2}$	192959.4							
$3d {}^2D_1$	$3d$	$3d {}^2D$	$1\frac{1}{2}$	196071.2	[3.4]	$6d {}^2D_1$	$6d$	$6d {}^2D$	$1\frac{1}{2}$	278473.7	
$4s {}^2S_1$	$4s$	$4s {}^2S$	$\frac{1}{2}$	237695.5		$6f {}^2F$	$6f$	$6f {}^2F^\circ$	$\left\{ \begin{smallmatrix} 2\frac{1}{2} \\ 3\frac{1}{2} \end{smallmatrix} \right\}$	278491.7	
$4p {}^3P_1$	$4p$	$4p {}^3P^\circ$	$\frac{1}{2}$	242832.4	[4.3]	$6g {}^2G$	$6g$	$6g {}^2G$	$\left\{ \begin{smallmatrix} 3\frac{1}{2} \\ 4\frac{1}{2} \end{smallmatrix} \right\}$	278497.5	
$4p {}^3P_2$			$1\frac{1}{2}$								
$4d {}^2D_1$	$4d$	$4d {}^2D$	$1\frac{1}{2}$	244138.9	[1.4]						
$4f {}^2F$	$4f$	$4f {}^2F^\circ$	$\left\{ \begin{smallmatrix} 2\frac{1}{2} \\ 3\frac{1}{2} \end{smallmatrix} \right\}$	244199.2							
$5s {}^2S_1$	$5s$	$5s {}^2S$	$\frac{1}{2}$	263156.2							
							B IV (${}^1S_0$)	Limit	-----	305931.1	

April 1946.

B IV

(He I sequence; 2 electrons)

Z=5Ground state $1s^2 {}^1S_0$ $1s^2 {}^1S_0$ 2091960 $\pm$ 200 cm^{-1} I. P. 259.298 $\pm$ 0.025 volts

The singlet terms are from Tyrén and the observed singlet combinations are in the range from 48 to 60 Å. The unit adopted by Tyrén, 10^3 cm^{-1} , has here been changed to cm^{-1} .

Relative absolute values of the triplet terms were derived by the extrapolation of $3d {}^3D$ from He I and Li II, according to unpublished material generously furnished by Dr. Edlén. These calculations have confirmed the classification by Tyrén of a line at 61 Å as the inter-system combination $1s^2 {}^1S_0 - 2p {}^3P_1$. The triplet terms have been taken from Edlén's 1947 manuscript.

B IV—Continued

REFERENCES

- B. Edlén, Nova Acta Reg. Soc. Sci. Uppsala [IV] 9, No. 6, 31 (1934). (T) (C L)
 H. A. Robinson, Phys. Rev. 51, 14 (1937). (I P) (T) (C L)
 F. Tyrén, Nova Acta Reg. Soc. Sci. Uppsala [IV] 12, No. 1, 24 (1940). (I P) (T) (C L)
 B. Edlén, unpublished material (Sept. 1947). (T)

B IV					B IV				
Config.	Desig.	<i>J</i>	Level	Interval	Config.	Desig.	<i>J</i>	Level	Interval
1s ³	1s ³ S	0	0		1s 4p	4p ¹ P°	1	1988750	
1s 2s	2s ³ S	1	1601505		1s 5p	5p ¹ P°	1	2022000	
1s 2p	2p ³ P°	0	1636888	-16 52	1s 6p	6p ¹ P°	1	2045580	
		1	1636888						
		2	1636934						
1s 2p	2p ¹ P°	1	1658020		B v (2S _{1/2})	Limit		2091960	
1s 3p	3p ¹ P°	1	1898180						

September 1947.

B V

(H I sequence; 1 electron)

Z=5

Ground state 1s ²S_{1/2}1s ²S_{1/2} 2744207 cm⁻¹

I. P. 340.144 volts

Edlén has calculated the positions of the first three members of the Lyman series, 1s ²S—*np* ²P° (*n*=2, 3, 4), using Penney's formula. These wavelengths, 48.585 Å, 40.995 Å and 38.869 Å, respectively, have been used to compute the term values listed here. The lines have all been observed by Tyrén.

REFERENCES

- W. G. Penney, Phil. Mag. [7] 9, 661 (1930).
 B. Edlén, Nova Acta Reg. Soc. Sci. Uppsala [IV] 9, No. 6, 28, 152 (1934). (I P) (T) (C L)
 F. Tyrén, Zeit. Phys. 98, 771 (1936). (C L)

B V				B V			
Config.	Desig.	<i>J</i>	Level	Config.	Desig.	<i>J</i>	Level
1s	1s ² S	½	0	4p	4p ² P°	½, 1½	2578744
2p	2p ² P°	½, 1½	2058247				
3p	3p ² P°	½, 1½	2439322		Limit		2744207

October 1946.

CARBON

C I

6 electrons

Z=6

Ground state $1s^2 2s^2 2p^2 \ ^1P_0$ $2p^2 \ ^1P_0$, 90878.3 cm^{-1}

I. P. 11.264 volts

The term assignments are taken from Edlén, who has revised and extended the earlier work on the analysis of this spectrum. Two extrapolated term values, derived from the irregular doublet law, are entered in brackets in the table.

The singlet and triplet terms are well connected by intersystem combinations. Only two quintet terms are known. They are connected with the rest by intersystem combinations based on the measures of the resonance lines by Shenstone.

One term, $5p \ ^1S$, has been revised as suggested in the 1939 reference listed below.

Selected term values of C I have been improved from a study of the lines that have been clearly identified in the Infrared Solar Spectrum. Such precision cannot be expected from terms based on lines in the ultraviolet. As a starting point the value of $3s \ ^1P_1^o = 60353.00 \text{ cm}^{-1}$ was adopted as correct, to agree with Shenstone's recent measures. Excellent agreement was found between the laboratory measures of Kiess (8335 Å to 11330 Å) and solar wave-numbers of lines identified as C I in the solar spectrum. Further to the red solar wavelengths surpass laboratory values in accuracy and give consistent internal separations within the multiplets.

In the course of this work all term values have been recalculated. Consequently, most of the listed values differ slightly from those published by Edlén. No changes have been made in his analysis, but the level $3d \ ^1P_0^o$, calculated from solar wave-numbers, has been added to his list.

REFERENCES

- A. Fowler and E. W. H. Selwyn, *Proc. Roy. Soc. (London)* [A] **118**, 34 (1928). (T) (C L)
 S. B. Ingram, *Phys. Rev.* **34**, 421 (1929). (T) (C L)
 F. Paschen and G. Kruger, *Ann. der Phys.* [5] **7**, 1 (1930). (T) (C L)
 B. Edlén, *Nova Acta Reg. Soc. Sci. Uppsala* [IV] **9**, No. 6, 104 (1934). (I P) (T) (C L)
 H. E. White, *Introduction to Atomic Spectra* p. 266 (McGraw-Hill Book Co., Inc., New York, N. Y., 1934). (G D)
 C. C. Kiess, *J. Research Nat. Bur. Std.* **38**, 33, RP1062 (1938). (C L)
 W. F. Meggers, *J. Opt. Soc. Am.* **36**, 431 (1936). (Summary hfs)
 Y. Ishida, T. Tamura, and M. Fukushima, *Sci. Papers Inst. Phys. Chem. Research (Tokyo)* **36**, No. 936, 417 (1939). (T) (C L)
 H. D. Babcock and C. E. Moore, *Carnegie Inst. Wash. Publ.* 579 (1947). (Solar data)
 B. Edlén, *Nature* **159**, No. 4030, 129 (1947). (C L)
 A. G. Shenstone, *Phys. Rev.* **72**, 411 (1947). (T) (C L)

Cl

Cl

Edlén	Config.	Desig.	J	Level	Interval	Edlén	Config.	Desig.	J	Level	Interval
2p ¹ P ₀ ¹ P ₁ ¹ P ₂	2s ² 2p ³	2p ³ ¹ P	0 1 2	0.0 16.4 43.5	16.4 27.1	4d ¹ D ₂ ¹ D ₁ ¹ D ₀	2s ² 2p(² P°) 4d 2s ² 2p(² P°) 4d	4d ¹ D° 4d ¹ F°	2 2 3 4	83500 83761	
2p ¹ D ₂	2s ² 2p ³	2p ³ ¹ D	2	10193.70		4d ¹ D ₂ ¹ D ₁ ¹ D ₀	2s ² 2p(² P°) 4d	4d ¹ D°	1 2 3	83830 83837 83847	7 10
2p ¹ S ₀	2s ² 2p ³	2p ³ ¹ S	0	21648.4		5s ¹ P ₁	2s ² 2p(² P°) 5s	5s ¹ P°	1	83882.5	
	2s 2p ³	2p ³ ¹ S°	2	33735.2		4d ¹ F ₄	2s ² 2p(² P°) 4d	4d ¹ F°	3	83949	
3s ¹ P ₀ ¹ P ₁ ¹ P ₂	2s ² 2p(² P°) 3s	3s ¹ P°	0 1 2	60333.80 60353.00 60393.52	19.20 40.52	4d ¹ P ₁	2s ² 2p(² P°) 4d	4d ¹ P°	1	84032	
3s ¹ P ₁	2s ² 2p(² P°) 3s	3s ¹ P°	1	61982.20		4d ¹ P ₂ ¹ P ₁ ¹ P ₀	2s ² 2p(² P°) 4d	4d ¹ P°	2 1 0	84102.6 84112	-9
2p' ¹ D ₂ ¹ D ₁ ¹ D ₀	2s 2p ³	2p ³ ¹ D°	3 2 1	64088.56 64093.19 64092.01	-4.63 1.18	5p ¹ P ₁	2s ² 2p(² P°) 5p	5p ¹ P	1	84852.13	
3p ¹ P ₁	2s ² 2p(² P°) 3p	3p ¹ P	1	68858		5p ¹ D ₂ ¹ D ₁	2s ² 2p(² P°) 5p	5p ¹ D	1 2 3	84952 84986.2	34
3p ¹ D ₁ ¹ D ₂ ¹ D ₀	2s ² 2p(² P°) 3p	3p ¹ D	1 2 3	69689.79 69710.99 69744.40	21.20 33.41	5p ¹ D ₂	2s ² 2p(² P°) 5p	5p ¹ D	2	85400.38	
3p ¹ S ₁	2s ² 2p(² P°) 3p	3p ¹ S	1	70744.26		5p ¹ S ₀	2s ² 2p(² P°) 5p	5p ¹ S	0	85625.84	
3p ¹ P ₀ ¹ P ₁ ¹ P ₂	2s ² 2p(² P°) 3p	3p ¹ P	0 1 2	71352.81 71365.23 71385.70	12.42 20.47	5d ¹ D ₂	2s ² 2p(² P°) 5d	5d ¹ D°	2	86187	
3p ¹ D ₂	2s ² 2p(² P°) 3p	3p ¹ D	2	72611.06		5d ¹ F ₂ ¹ F ₁	2s ² 2p(² P°) 5d	5d ¹ F°	2 3 4	86319 86326.9	8
3p ¹ S ₀	2s ² 2p(² P°) 3p	3p ¹ S	0	73976.23		5d ¹ D ₂ ¹ D ₁	2s ² 2p(² P°) 5d	5d ¹ D°	1 2 3	86371.3 86396	25
2p' ¹ P	2s 2p ³	2p ³ ¹ P°	2, 1, 0	75256.3		6s ¹ P ₁	2s ² 2p(² P°) 6s	6s ¹ P°	1	86413.98	
3d ¹ D ₂	2s ² 2p(² P°) 3d	3d ¹ D°	2	77680.5		5d ¹ F ₄	2s ² 2p(² P°) 5d	5d ¹ F°	3	86450	
4s ¹ P ₀ ¹ P ₁ ¹ P ₂	2s ² 2p(² P°) 4s	4s ¹ P°	0 1 2	78105.23 78117.06 78148.36	11.83 31.30	5d ¹ P ₁	2s ² 2p(² P°) 5d	5d ¹ P°	1	86491	
3d ¹ F ₂ ¹ F ₁ ¹ F ₀	2s ² 2p(² P°) 3d	3d ¹ F°	2 3 4	78199.34 78215.82 78250.22	16.48 34.40	5d ¹ P ₂ ¹ P ₁	2s ² 2p(² P°) 5d	5d ¹ P°	2 1 0	86504 86517	-13
3d ¹ D ₁ ¹ D ₂ ¹ D ₀	2s ² 2p(² P°) 3d	3d ¹ D°	1 2 3	78300.8 78307 78316	6 9	6d ¹ D ₂	2s ² 2p(² P°) 6d	6d ¹ D°	2	87632	
4s ¹ P ₁	2s ² 2p(² P°) 4s	4s ¹ P°	1	78338		6d ¹ F ₂ ¹ F ₁	2s ² 2p(² P°) 6d	6d ¹ F°	2 3 4	87706 87713	7
3d ¹ F ₂	2s ² 2p(² P°) 3d	3d ¹ F°	3	78531		6d ¹ D ₂ ¹ D ₁	2s ² 2p(² P°) 6d	6d ¹ D°	1 2 3	87752 87773	21
3d ¹ P ₁	2s ² 2p(² P°) 3d	3d ¹ P°	1	78727.91		7s ¹ P ₁	2s ² 2p(² P°) 7s	7s ¹ P°	1	87795.3	
3d ¹ P ₂ ¹ P ₁	2s ² 2p(² P°) 3d	3d ¹ P°	2 1 0	79311.10 79319.06 79323.32	-7.96 -4.26	6d ¹ F ₂	2s ² 2p(² P°) 6d	6d ¹ F°	3	87807	
4p ¹ D ₁ ¹ D ₂ ¹ D ₀	2s ² 2p(² P°) 4p	4p ¹ D	1 2 3	80173.29 80192.49 80222.74	19.20 30.25	6d ¹ P ₂ ¹ P ₁	2s ² 2p(² P°) 6d	6d ¹ P°	2 1 0	87830 87839	-9
4p ¹ P ₁	2s ² 2p(² P°) 4p	4p ¹ P	1	80563.57		6d ¹ P ₁	2s ² 2p(² P°) 6d	6d ¹ P°	1	87831.3	
4p ¹ S ₁	2s ² 2p(² P°) 4p	4p ¹ S	1	81105.70		7d ¹ F ₂ ¹ F ₁ ¹ F ₀	2s ² 2p(² P°) 7d	7d ¹ F°	2 3 4	88541.8 88547	5
4p ¹ P ₀ ¹ P ₁ ¹ P ₂	2s ² 2p(² P°) 4p	4p ¹ P	0 1 2	81311.52 81326.33 81344.48	14.81 18.15	2s ² 2p(² P°) 7d	2s ² 2p(² P°) 7d	7d ¹ D°	1 2 3	88607	
4p ¹ D ₂	2s ² 2p(² P°) 4p	4p ¹ D	2	81770.36							
4p ¹ S ₀	2s ² 2p(² P°) 4p	4p ¹ S	0	82252.31							

C I—Continued

C I—Continued

Edlén	Config.	Desig.	J	Level	Interval	Edlén	Config.	Desig.	J	Level	Interval
7d ¹ F ₃	2s ² 2p(³ P°) 7d	7d ¹ F°	3	88624	-1		2s ² 2p(³ P°) 9d	9d ³ D°	1		
7d ¹ P ₁	2s ² 2p(³ P°) 7d	7d ¹ P°	1	88632. 44		9d ³ D ₃			2	89514	
7d ³ P ₂	2s ² 2p(³ P°) 7d	7d ³ P°	2	88639		9d ¹ F ₃	2s ² 2p(³ P°) 9d	9d ¹ F°	3	89517	
			1				2s ² 2p(³ P°) 10d	10d ³ D°	1		
			0						2		
8d ³ F ₂	2s ² 2p(³ P°) 8d	8d ³ F°	4			10d ³ D ₃			3	89779	
³ F ₂			3	89081			2s ² 2p(³ P°) 11d	11d ³ D°	1		
			2	89082					2		
	2s ² 2p(³ P°) 8d	8d ³ D°	1			11d ³ D ₃			3	89968. 4	
			2								
8d ³ D ₃			3	89146			C II (³ P° ₂)	Limit	-----	90878. 3	
8d ¹ F ₃	2s ² 2p(³ P°) 8d	8d ¹ F°	3	89155		2p' ¹ D ₂	2s 2p ³	2p ³ ¹ D°	2	[97878]	
8d ³ P ₂	2s ² 2p(³ P°) 8d	8d ³ P°	2	89158			2s 2p ³ (⁴ P) 3s	3s ⁴ P	1	103541. 8	20. 7 24. 8
			1						2	103562. 5	
			0						3	103587. 3	
	2s ² 2p(³ P°) 9d	9d ³ F°	4			2p' ³ S ₁	2s 2p ³	2p ³ ³ S°	1	105800. 5	
9d ³ F ₂			3			2p' ¹ P ₁	2s 2p ³	2p ³ ¹ P°	1	[119878]	
			2	89450							

September 1947.

C I OBSERVED TERMS*

Config. 1s ² +	Observed Terms		
2s ² 2p ³	{ 2p ³ ¹ S 2p ³ ³ P 2p ³ ¹ D		
2s 2p ³	{ 2p ³ ³ S° 2p ³ ³ P° 2p ³ ³ D° 2p ³ ¹ S°		
	ns (n ≥ 3)	np (n ≥ 3)	nd (n ≥ 3)
2s ² 2p(³ P°) n _z	{ 3, 4s ³ P° 3-7s ¹ P°	3, 4p ³ S 3, 4p ³ P 3-5p ³ D 3-5p ¹ S 3-5p ¹ P 3-5p ¹ D	3-8d ³ P° 3-11d ³ D° 3-9d ³ F° 3-7d ¹ P° 3-6d ¹ D° 3-9d ¹ F°
2s 2p ³ (⁴ P) n _z			
	3s ⁴ P		

*For predicted terms in the spectra of the C I isoelectronic sequence, see Introduction.

C II

(B I sequence; 5 electrons)

Z=6

Ground state $1s^2 2s^2 2p^1 P_1^0$ $2p^1 P_1^0$ 196659.0 cm^{-1}

I. P. 24.376 volts

The term values for the doublets are taken from Edlén's Monograph. He has since rejected his $5p^1 D$ term. Intersystem combinations have been observed by Edlén (1936) and the resulting correction to the quartet terms as published in his Monograph, $+19.3 \text{ cm}^{-1}$, has been applied.

REFERENCES

- A. Fowler and E. W. H. Selwyn, Proc. Roy. Soc. (London) [A] 120, 312 (1928). (T) (C L)
 B. Edlén, Nova Acta Reg. Soc. Sci. Uppsala [IV] 9, No. 6, 74 (1934). (I P) (T) (C L) (G D)
 B. Edlén, Zeit. Phys. 98, 561 (1936). (C L)
 B. Eldén, private communication (Dec. 1947). (T)

C II

C II

Edlén	Config.	Desig.	J	Level	Interval	Edlén	Config.	Desig.	J	Level	Interval
$2p^1 P_1^0$ $2p^1 P_2^0$	$2s^2 (1S) 2p$	$2p^1 P^0$	$\frac{1}{2}$ $1\frac{1}{2}$	0.0 64.0	64.0	$5s^1 S_1$	$2s^2 (1S) 5s$	$5s^1 S$	$\frac{1}{2}$	173348.18	
$2p^1 P_1^0$ $2p^1 P_2^0$ $2p^1 P_3^0$	$2s^2 2p^2$	$2p^2 P$	$\frac{1}{2}$ $1\frac{1}{2}$ $2\frac{1}{2}$	43000.2 43021.8 43050.7	21.6 28.9	$5p^1 P_1^0$ $5p^1 P_2^0$	$2s^2 (1S) 5p$	$5p^1 P^0$	$\frac{1}{2}$ $1\frac{1}{2}$	175287.9 175295.2	7.3
$2p^1 D_1$ $2p^1 D_2$	$2s^2 2p^2$	$2p^2 D$	$2\frac{1}{2}$ $1\frac{1}{2}$	74930.9 74933.2	-2.3	$3s^1 P_1^0$ $3s^1 P_2^0$	$2s^2 2p^1 (P^0) 3s$	$3s^1 P^0$	$\frac{1}{2}$ $1\frac{1}{2}$	178194.1 178220.8	26.7
$2p^1 S_1$	$2s^2 2p^2$	$2p^2 S$	$\frac{1}{2}$	96494.1		$5d^1 D_1$	$2s^2 (1S) 5d$	$5d^1 D$	$1\frac{1}{2}$ $2\frac{1}{2}$	178494.8	
$2p^1 P_1^0$ $2p^1 P_2^0$	$2s^2 2p^2$	$2p^2 P$	$\frac{1}{2}$ $1\frac{1}{2}$	110625.1 110666.3	41.2	$5f^1 F$	$2s^2 (1S) 5f$	$5f^1 F^0$	$\left\{ \begin{array}{l} 2\frac{1}{2} \\ 3\frac{1}{2} \end{array} \right\}$	178956.46	
$3s^1 S_1$	$2s^2 (1S) 3s$	$3s^1 S$	$\frac{1}{2}$	116537.88		$6s^1 S_1$	$2s^2 (1S) 6s$	$6s^1 S$	$\frac{1}{2}$	181258	
$3p^1 P_1^0$ $3p^1 P_2^0$	$2s^2 (1S) 3p$	$3p^1 P^0$	$\frac{1}{2}$ $1\frac{1}{2}$	131724.68 131735.81	11.13	$3p^1 D_1$ $3p^1 D_2$ $3p^1 D_3$ $3p^1 D_4$	$2s^2 2p^1 (P^0) 3p$	$3p^1 D$	$\frac{1}{2}$ $1\frac{1}{2}$ $2\frac{1}{2}$ $3\frac{1}{2}$	181694.50 181709.20 181734.21 181770.48	14.70 25.01 36.27
$2p^1 S_1$	$2p^2$	$2p^2 S^0$	$1\frac{1}{2}$	142024.4		$3p^1 P_1^0$ $3p^1 P_2^0$	$2s^2 2p^1 (P^0) 3p$	$3p^1 P$	$\frac{1}{2}$ $1\frac{1}{2}$	182025.0 182044.5	19.5
$3d^1 D_1$ $3d^1 D_2$	$2s^2 (1S) 3d$	$3d^1 D$	$1\frac{1}{2}$ $2\frac{1}{2}$	145549.99 145551.44	1.45	$6d^1 D_1$	$2s^2 (1S) 6d$	$6d^1 D$	$1\frac{1}{2}$ $2\frac{1}{2}$	184064.9	
$2p^1 S_1$ $2p^1 S_2$	$2p^2$	$2p^2 S^0$	$2\frac{1}{2}$ $1\frac{1}{2}$	150462.8 150467.9	-5.1	$6f^1 F$	$2s^2 (1S) 6f$	$6f^1 F^0$	$\left\{ \begin{array}{l} 2\frac{1}{2} \\ 3\frac{1}{2} \end{array} \right\}$	184376.20	
$4s^1 S_1$	$2s^2 (1S) 4s$	$4s^1 S$	$\frac{1}{2}$	157234.43		$3p^1 S_1$	$2s^2 2p^1 (P^0) 3p$	$3p^1 S$	$1\frac{1}{2}$	184688.69	
$4p^1 P_1^0$ $4p^1 P_2^0$	$2s^2 (1S) 4p$	$4p^1 P^0$	$\frac{1}{2}$ $1\frac{1}{2}$	162518.70 162524.62	5.92	$3p^1 P_1^0$ $3p^1 P_2^0$ $3p^1 P_3^0$	$2s^2 2p^1 (P^0) 3p$	$3p^1 P$	$\frac{1}{2}$ $1\frac{1}{2}$ $2\frac{1}{2}$	186425.02 186441.32 186463.75	16.30 22.43
$3s^1 P_1^0$ $3s^1 P_2^0$ $3s^1 P_3^0$	$2s^2 2p^1 (P^0) 3s$	$3s^1 P^0$	$\frac{1}{2}$ $1\frac{1}{2}$ $2\frac{1}{2}$	166964.70 166988.46 167033.43	23.76 44.97	$3p^1 D_1$ $3p^1 D_2$	$2s^2 2p^1 (P^0) 3p$	$3p^1 D$	$1\frac{1}{2}$ $2\frac{1}{2}$	188579.3 188612.7	33.4
$4d^1 D_1$ $4d^1 D_2$	$2s^2 (1S) 4d$	$4d^1 D$	$1\frac{1}{2}$ $2\frac{1}{2}$	168123.92 168124.33	0.41	$3p^1 S_1$	$2s^2 2p^1 (P^0) 3p$	$3p^1 S$	$\frac{1}{2}$	194571.9	
$2p^1 S_1$ $2p^1 S_2$	$2p^2$	$2p^2 S^0$	$\frac{1}{2}$ $1\frac{1}{2}$	168731.6 168750.2	18.6	$3d^1 F_1$ $3d^1 F_2$ $3d^1 F_3$ $3d^1 F_4$	$2s^2 2p^1 (P^0) 3d$	$3d^1 F^0$	$1\frac{1}{2}$ $2\frac{1}{2}$ $3\frac{1}{2}$ $4\frac{1}{2}$	195750.8 195765.1 195784.7 195812.3	14.3 19.6 27.6
$4f^1 F$	$2s^2 (1S) 4f$	$4f^1 F^0$	$\left\{ \begin{array}{l} 2\frac{1}{2} \\ 3\frac{1}{2} \end{array} \right\}$	168979.05							

C II—Continued

C II—Continued

Edlén	Config.	Desig.	<i>J</i>	Level	Interval	Edlén	Config.	Desig.	<i>J</i>	Level	Interval
3d' ⁴ D ₁ ⁴ D ₂ ⁴ D ₃ ⁴ D ₄	2s 2p(⁴ P°)3d	3d ⁴ D°	$\frac{1}{2}$ $1\frac{1}{2}$ $2\frac{1}{2}$ $3\frac{1}{2}$	196556. 2 196561. 8 196570. 5 196580. 8	5. 6 8. 7 10. 3	4d' ⁴ F ₄ 4f' ⁴ G ₃ ⁴ G ₄ ⁴ G ₅ ⁴ G ₆	2s 2p(⁴ P°)4d 2s 2p(⁴ P°)4f	4d ⁴ F° 4f ⁴ G	$2\frac{1}{2}$ $3\frac{1}{2}$ $2\frac{1}{2}$ $3\frac{1}{2}$ $4\frac{1}{2}$ $5\frac{1}{2}$	221502 221543. 0 221553. 2 221574. 5 221603. 6	10. 2 21. 3 29. 1
	C III (⁴ S ₀)	Limit	-----	196659. 0							
3d' ³ D ₂ ³ D ₃	2s 2p(³ P°)3d	3d ³ D°	$1\frac{1}{2}$ $2\frac{1}{2}$	198426. 4 198437. 2	10. 8	4f' ³ G ₄ ³ G ₅	2s 2p(³ P°)4f	4f ³ G	$3\frac{1}{2}$ $4\frac{1}{2}$	221585 221628	43
3d' ⁴ P ₂ ⁴ P ₃ ⁴ P ₁	2s 2p(⁴ P°)3d	3d ⁴ P°	$2\frac{1}{2}$ $1\frac{1}{2}$ $\frac{1}{2}$	198842. 0 198863. 5 198877. 7	-21. 5 -14. 2	4f' ⁴ D ₁ ⁴ D ₂ ⁴ D ₃	2s 2p(⁴ P°)4f	4f ⁴ D	$3\frac{1}{2}$ $2\frac{1}{2}$ $1\frac{1}{2}$ $\frac{1}{2}$	221696. 5 221727. 4 221746. 3	-30. 9 -18. 9
3d' ³ F ₃ ³ F ₄	2s 2p(³ P°)3d	3d ³ F°	$2\frac{1}{2}$ $3\frac{1}{2}$	199941. 4 199984. 2	42. 8	4f' ³ D ₂ ³ D ₃	2s 2p(³ P°)4f	4f ³ D	$2\frac{1}{2}$ $1\frac{1}{2}$	221707. 9 221752. 9	-45. 0
3d' ³ P ₂ ³ P ₁	2s 2p(³ P°)3d	3d ³ P°	$1\frac{1}{2}$ $\frac{1}{2}$	202180. 3 202204. 4	-24. 1	4d' ³ P ₂ ³ P ₁	2s 2p(³ P°)4d	4d ³ P°	$1\frac{1}{2}$ $\frac{1}{2}$	222259. 1 222286. 0	-26. 9
4s' ⁴ P ₁ ⁴ P ₂ ⁴ P ₃	2s 2p(⁴ P°)4s	4s ⁴ P°	$\frac{1}{2}$ $1\frac{1}{2}$ $2\frac{1}{2}$	209550. 26 209574. 28 209620. 36	24. 02 46. 08		2s 2p(⁴ P°)5s	5s ⁴ P°	$\frac{1}{2}$ $1\frac{1}{2}$ $2\frac{1}{2}$	225813	
4p' ³ P ₁ ³ P ₂	2s 2p(³ P°)4p	4p ³ P	$\frac{1}{2}$ $1\frac{1}{2}$	214406. 6 214429. 7	23. 1	5s' ⁴ P ₃					
4p' ⁴ D ₁ ⁴ D ₂ ⁴ D ₃ ⁴ D ₄	2s 2p(⁴ P°)4p	4p ⁴ D	$\frac{1}{2}$ $1\frac{1}{2}$ $2\frac{1}{2}$ $3\frac{1}{2}$	214758. 3 214772. 6 214794. 6 214828. 0	14. 3 22. 0 33. 4	5p' ³ P	2s 2p(³ P°)5p	5p ³ P	$\frac{1}{2}$ $1\frac{1}{2}$	227901	
4p' ⁴ S ₂	2s 2p(⁴ P°)4p	4p ⁴ S	$1\frac{1}{2}$	215765. 6			2s 2p(⁴ P°)5d	5d ⁴ D°	$\frac{1}{2}$ $1\frac{1}{2}$ $2\frac{1}{2}$ $3\frac{1}{2}$	230763	
4p' ⁴ P ₂ ⁴ P ₃	2s 2p(⁴ P°)4p	4p ⁴ P	$\frac{1}{2}$ $1\frac{1}{2}$ $2\frac{1}{2}$	216378. 0 216397. 7	19. 7	5d' ⁴ P ₃	2s 2p(⁴ P°)5d	5d ⁴ P°	$2\frac{1}{2}$ $1\frac{1}{2}$ $\frac{1}{2}$	231050	
4p' ³ D ₂	2s 2p(³ P°)4p	4p ³ D	$1\frac{1}{2}$ $2\frac{1}{2}$	216927		5f' ³ F	2s 2p(³ P°)5f	5f ³ F	$2\frac{1}{2}$ $3\frac{1}{2}$	231221	
4d' ⁴ F ₃ ⁴ F ₄ ⁴ F ₅ ⁴ F ₆	2s 2p(⁴ P°)4d	4d ⁴ F°	$1\frac{1}{2}$ $2\frac{1}{2}$ $3\frac{1}{2}$ $4\frac{1}{2}$	219553. 8 219568. 5 219589. 2 219617. 0	14. 7 20. 7 27. 8	5f' ⁴ F ₅	2s 2p(⁴ P°)5f	5f ⁴ F	$1\frac{1}{2}$ $2\frac{1}{2}$ $3\frac{1}{2}$ $4\frac{1}{2}$	231226. 8	
4d' ⁴ D ₂ ⁴ D ₃ ⁴ D ₄	2s 2p(⁴ P°)4d	4d ⁴ D°	$\frac{1}{2}$ $1\frac{1}{2}$ $2\frac{1}{2}$ $3\frac{1}{2}$	220127. 8 220137. 0 220147. 6	9. 2 10. 6	5f' ⁴ G ₅	2s 2p(⁴ P°)5f	5f ⁴ G	$2\frac{1}{2}$ $3\frac{1}{2}$ $4\frac{1}{2}$ $5\frac{1}{2}$	231499. 3	
4d' ³ D ₂ ³ D ₃	2s 2p(³ P°)4d	4d ³ D°	$1\frac{1}{2}$ $2\frac{1}{2}$	220601. 1 220614. 2	13. 1	5f' ⁴ D ₄	2s 2p(⁴ P°)5f	5f ⁴ D	$3\frac{1}{2}$ $2\frac{1}{2}$ $1\frac{1}{2}$ $\frac{1}{2}$	231520. 4	
4d' ⁴ P ₂ ⁴ P ₃ ⁴ P ₁	2s 2p(⁴ P°)4d	4d ⁴ P°	$2\frac{1}{2}$ $1\frac{1}{2}$ $\frac{1}{2}$	220808. 47 220828. 97 220840. 87	-20. 50 -11. 90		2s 2p(⁴ P°)6d	6d ⁴ D°	$\frac{1}{2}$ $1\frac{1}{2}$ $2\frac{1}{2}$ $3\frac{1}{2}$	236444	
4f' ³ F ₃ ³ F ₄	2s 2p(³ P°)4f	4f ³ F	$2\frac{1}{2}$ $3\frac{1}{2}$	221089. 6 221098. 8	9. 2	6d' ⁴ D ₄					
4f' ⁴ F ₄ ⁴ F ₅	2s (2p(⁴ P°)4f	4f ⁴ F	$1\frac{1}{2}$ $2\frac{1}{2}$ $3\frac{1}{2}$ $4\frac{1}{2}$	221106. 3 221107. 4	1. 1	6d' ⁴ P ₃	2s 2p(⁴ P°)6d	6d ⁴ P°	$2\frac{1}{2}$ $1\frac{1}{2}$ $\frac{1}{2}$	236606	

December 1947.

C II OBSERVED TERMS*

Config. 1s ² +	Observed Terms			
2s ² (¹ S)2p	2p ³ P°			
2s 2p ²	{ 2p ² ³ S 2p ² ¹ P 2p ² ³ P 2p ² ¹ D			
2p ³	{ 2p ³ ⁴ S° 2p ³ ² P° 2p ³ ² D°			
	ns (n ≥ 3)	np (n ≥ 3)	nd (n ≥ 3)	nf (n ≥ 4)
2s ² (¹ S)nx	3-6s ³ S	3-5p ³ P°	3-6d ³ D	4-6f ³ F°
2s 2p(³ P°)nx	{ 3-5s ⁴ P° 3s ³ P°	{ 3, 4p ⁴ S 3, 4p ⁴ P 3, 4p ⁴ D 3p ³ S 3, 5p ³ P 3, 4p ³ D	{ 3-6d ⁴ P° 3-6d ⁴ D° 3, 4d ⁴ F° 3, 4d ⁴ P° 3, 4d ⁴ D° 3, 4d ⁴ F°	{ 4, 5f ⁴ D 4, 5f ⁴ F 4, 5f ⁴ G 4f ³ D 4, 5f ³ F 4f ³ G

*For predicted terms in the spectra of the B I isoelectronic sequence, see Introduction.

C III

(Be I sequence; 4 electrons)

Z=6

Ground state 1s² 2s² ¹S₀

2s² ¹S₀ 386159.7 cm⁻¹

I. P. 47.864 volts

All but three terms are from Edlén's Monograph. For the terms 7d ³D, 8d ³D, and 9d ³D the revised values of Whitelaw and Mack have been used. Edlén has since rejected his 4d' ¹P term.

No intersystem combinations have been found with certainty. The long D-series determine the limits to about ±25 cm⁻¹. The uncertainty x in the relative positions of the singlets and triplets is, therefore, less than ±50 cm⁻¹ according to Edlén. No trace of the line predicted at 1910.7 ± 2 Å, 2s² ¹S₀ - 2p ³P₁^o, is visible on his plates. A line observed at 339 Å (294314.1 cm⁻¹) agrees within 4 cm⁻¹ with the calculated combination 2p ³P₁^o - 5d ¹D₂. This identification is uncertain, since it is not confirmed by other intersystem combinations.

REFERENCES

- B. Edlén, Nova Acta Reg. Soc. Sci. Uppsala [IV] 9, No. 6, 51 (1934). (I P) (T) (C L) (G D)
 N. G. Whitelaw and J. E. Mack, Phys. Rev. 47, 677 (1935). (T)
 B. Edlén, private communication (Dec. 1947). (T)

C III

C III

Edlén	Config.	Desig.	J	Level	Interval	Edlén	Config.	Desig.	J	Level	Interval
2s ¹ S ₀	2s ²	2s ² ¹ S	0	0.0		2p' ¹ D ₂	2p ²	2p ² ¹ D	2	145875.1	
2p ³ P ₀	2s(³ S)2p	2p ³ P°	0	52315.0+x	23.0	2p' ¹ S ₀	2p ²	2p ² ¹ S	0	182520.2	
³ P ₁			1	52338.0+x	56.8	3s ³ S ₁	2s(³ S)3s	3s ³ S	1	238160.7+x	
³ P ₂			2	52394.8+x		3s ¹ S ₀	2s(³ S)3s	3s ¹ S	0	247169.5	
2p ¹ P ₁	2s(³ S)2p	2p ¹ P°	1	102351.4		3p ¹ P ₁	2s(³ S)3p	3p ¹ P°	1	258931.4	
2p' ³ P ₀	2p ²	2p ² ³ P	0	137374.0+x	29.4						
³ P ₁			1	137403.4+x	47.1						
³ P ₂			2	137450.5+x							

C III—Continued

C III—Continued

Edlén	Config.	Desig.	J	Level	Interval	Edlén	Config.	Desig.	J	Level	Interval
3p ³ P ₀ ³ P ₁ ³ P ₂	2s(³ S)3p	3p ³ P°	0 1 2	259653.8+x 259659.3+x 259672.1+x	5.5 12.8		2s(³ S)5d	5d ³ D	1 2 3		
3d ³ D ₁ ³ D ₂ ³ D ₃	2s(³ S)3d	3d ³ D	1 2 3	269957.6+x 269959.7+x 269962.9+x	2.1 3.2	5d ³ D ₃				345444 +x	
3d ¹ D ₂	2s(³ S)3d	3d ¹ D	2	276482.7		5g ¹ G ₄ ¹ G ₃	2s(³ S)5g	5g ¹ G	3 4 5	346525.1+x 346526.0+x	0.9
3s' ³ P ₀ ³ P ₁ ³ P ₂	2p(³ P°)3s	3s ³ P°	0 1 2	308162.9+x 308196.2+x 308264.8+x	33.3 68.6	5g ¹ G ₄	2s(³ S)5g	5g ¹ G	4	346577.5	
4s ³ S ₁	2s(³ S)4s	4s ³ S	1	309404.5+x		5d ¹ D ₃	2s(³ S)5d	5d ¹ D	2	346656.0	
3s' ¹ P ₁	2p(³ P°)3s	3s ¹ P°	1	310005.2		3d' ¹ P ₁	2p(³ P°)3d	3d ¹ P°	1	346713.1	
4s ¹ S ₀	2s(³ S)4s	4s ¹ S	0	311720.7		5f ³ F ₂ ³ F ₃ ³ F ₄	2s(³ S)5f	5f ³ F°	2 3 4	347099.5+x 347101.3+x 347103.7+x	1.8 2.4
4p ³ P ₀₁ ³ P ₂	2s(³ S)4p	4p ³ P°	0, 1 2	317743 +x 317748 +x	5	5f ¹ F ₃	2s(³ S)5f	5f ¹ F°	3	348859.5	
3p' ¹ P ₁	2p(³ P°)3p	3p ¹ P	1	319719.4		6s ³ S ₁	2s(³ S)6s	6s ³ S	1	354796 +x	
4d ³ D ₁ ³ D ₂ ³ D ₃	2s(³ S)4d	4d ³ D	1 2 3	321358.8+x 321375.1+x 321398.6+x	16.3 23.5	6p ¹ P ₁	2s(³ S)6p	6p ¹ P°	1	357088	
4f ³ F ₂ ³ F ₃ ³ F ₄	2s(³ S)4f	4f ³ F°	2 3 4	321949.1+x 321955.8+x 321964.7+x	6.7 8.9		2s(³ S)6d	6d ³ D	1 2 3	358046 +x	
4p ¹ P ₁	2s(³ S)4p	4p ¹ P°	1	322403.1		6g ³ G ₄ ³ G ₃	2s(³ S)6g	6g ³ G	3 4 5	358638.3+x 358639.0+x	0.7
4f ¹ F ₃	2s(³ S)4f	4f ¹ F°	3	322701.1		6g ¹ G ₄	2s(³ S)6g	6g ¹ G	4	358688.9	
3p' ³ D ₁ ³ D ₂ ³ D ₃	2p(³ P°)3p	3p ³ D	1 2 3	323024.0+x 323049.4+x 323088.2+x	25.4 38.8	6d ¹ D ₂	2s(³ S)6d	6d ¹ D	2	358725.5	
4d ¹ D ₂	2s(³ S)4d	4d ¹ D	2	324212.0			2s(³ S)6f	6f ³ F°	2 3 4	358800 +x	
3p' ³ S ₁	2p(³ P°)3p	3p ³ S	1	327225.7+x		6f ¹ F ₃	2s(³ S)6f	6f ¹ F°	3	359122.2	
3p' ³ P ₀ ³ P ₁ ³ P ₂	2p(³ P°)3p	3p ³ P	0 1 2	329633.1+x 329654.2+x 329690.9+x	21.1 36.7	7s ³ S ₁	2s(³ S)7s	7s ³ S	1	363561 +x	
3d' ¹ D ₂	2p(³ P°)3d	3d ¹ D°	2	332690.3		7p ¹ P ₁	2s(³ S)7p	7p ¹ P°	1	364896	
3p' ¹ D ₂	2p(³ P°)3p	3p ¹ D	2	333116.4		7d ³ D	2s(³ S)7d	7d ³ D	1, 2, 3	365585 +x	
3d' ³ F ₂ ³ F ₃ ³ F ₄	2p(³ P°)3d	3d ³ F°	2 3 4	333333.4+x 333358.4+x 333395.0+x	25.0 36.6	7d ¹ D ₂	2s(³ S)7d	7d ¹ D	2	366027.0	
3d' ³ D ₁ ³ D ₂ ³ D ₃	2p(³ P°)3d	3d ³ D°	1 2 3	337602.9+x 337616.4+x 337636.7+x	13.5 20.3	8p ¹ P ₁	2s(³ S)8p	8p ¹ P°	1	369926	
5s ³ S ₁	2s(³ S)5s	5s ³ S	1	339881 +x		8d ³ D	2s(³ S)8d	8d ³ D	1, 2, 3	370438 +x	
3d' ³ P ₂ ³ P ₁ ³ P ₀	2p(³ P°)3d	3d ³ P°	2 1 0	340049.5+x 340075.8+x 340090.3+x	-26.3 -14.5	9d ³ D	2s(³ S)9d	9d ³ D	1, 2, 3	373748 +x	
3d' ¹ F ₃	2p(³ P°)3d	3d ¹ F°	3	341368.5			2p(³ P°)4s	4s ³ P°	0 1 2	376657 +x	
5p ¹ P ₁	2s(³ S)5p	5p ¹ P°	1	343255.7		4s' ³ P ₂					
5p ³ P ₂			0 1 2	344181 +x		4p' ¹ P ₁	2p(³ P°)4p	4p ¹ P	1	381104.8	
3p' ¹ S ₀	2p(³ P°)3p	3p ¹ S	0	345093.9		4p' ³ D ₂ ³ D ₃	2p(³ P°)4p	4p ³ D	1 2 3	381919 +x 381958 +x	39
						4p' ³ P ₁ ³ P ₂	2p(³ P°)4p	4p ³ P	0 1 2	384313 +x 384350 +x	37
						4p' ¹ D ₂	2p(³ P°)4p	4p ¹ D	2	385637.5	
						4d' ¹ D ₂	2p(³ P°)4d	4d ¹ D°	2	385816.2	
						C IV (³ S _{1/2})	Limit	-----		386159.7	

C III—Continued

C III—Continued

Edlén	Config.	Desig.	J	Level	Interval	Edlén	Config.	Desig.	J	Level	Interval
	$2p(^3P^o)4d$	$4d\ ^3D^o$	1			$5d'\ ^3P_1$	$2p(^3P^o)5d$	$5d\ ^3P^o$	2	410841 +x	
$4d'\ ^3D_1$			2						1		
			3	387648 +x					0		
$4d'\ ^3P_1$	$2p(^3P^o)4d$	$4d\ ^3P^o$	2	388448 +x			$2p(^3P^o)6p$	$6p\ ^3D$	1		
			1						2		
			0			$6p'\ ^3D_1$			3	421380 +x	
$4d'\ ^1F_1$	$2p(^3P^o)4d$	$4d\ ^1F^o$	3	388772. 2			$2p(^3P^o)6p$	$6p\ ^3P$	0		
$5p'\ ^1P_1$	$2p(^3P^o)5p$	$5p\ ^1P$	1	407430. 4		$6p'\ ^3P_1$			1		
	$2p(^3P^o)5p$	$5p\ ^3D$	1				$2p(^3P^o)6d$	$6d\ ^3D^o$	2	421967 +x	
			2						1		
$5p'\ ^3D_1$			3	407774 +x		$6d'\ ^3D_1$			3	422881 +x	
	$2p(^3P^o)5p$	$5p\ ^3P$	0			$6d'\ ^3P_1$	$2p(^3P^o)6d$	$6d\ ^3P^o$	2	423058 +x	
$5p'\ ^3P_1$			1						1		
			2	408873 +x					0		
$5p'\ ^1D_1$	$2p(^3P^o)5p$	$5p\ ^1D$	2	409505. 0			$2p(^3P^o)7p$	$7p\ ^3D$	1		
$5d'\ ^1D_1$	$2p(^3P^o)5d$	$5d\ ^1D^o$	2	409682. 1		$7p'\ ^3D_1$			2		
									3	429345 +x	
	$2p(^3P^o)5d$	$5d\ ^3D^o$	1				$2p(^3P^o)7p$	$7p\ ^3P$	0		
			2			$7p'\ ^3P_1$			1		
$5d'\ ^3D_1$			3	410534 +x					2	429712 +x	

December 1947.

C III OBSERVED TERMS*

Config. $1s^2+$	Observed Terms				
$2s^2$	$2s^2\ ^1S$				
$2s(^3S)2p$	{ $2p\ ^3P^o$ $2p\ ^1P^o$				
$2p^2$	{ $2p^2\ ^3S$ $2p^2\ ^3P$ $2p^2\ ^1D$				
	$ns\ (n \geq 3)$	$np\ (n \geq 3)$	$nd\ (n \geq 3)$	$nf\ (n \geq 4)$	$ng\ (n \geq 5)$
$2s(^3S)nx$	{ $3-7s\ ^3S$ $3, 4s\ ^1S$	$3-5p\ ^3P^o$ $3-8p\ ^1P^o$	$3-9d\ ^3D$ $3-7d\ ^1D$	$4-6f\ ^3F^o$ $4-6f\ ^1F^o$	$5, 6g\ ^3G$ $5, 6g\ ^1G$
$2p(^3P^o)nx$	{ $3, 4s\ ^3P^o$ $3s\ ^1P^o$	$3p\ ^3S$ $3-7p\ ^3P$ $3-7p\ ^3D$ $3p\ ^1S$ $3-5p\ ^1P$ $3-5p\ ^1D$	$3-6d\ ^3P^o$ $3-6d\ ^3D^o$ $3d\ ^3F^o$ $3d\ ^1P^o$ $3-5d\ ^1D^o$ $3, 4d\ ^1F^o$		

*For predicted terms of the Be I isoelectronic sequence, see Introduction.

Cv

(He I sequence; 2 electrons)

 $Z=6$ Ground state $1s^2 {}^1S_0$ $1s^2 {}^1S_0$ $3162450 \pm 300 \text{ cm}^{-1}$ I. P. $391.986 \pm 0.037 \text{ volts}$

The singlet terms are from Tyrén, who has reported (1940) nine lines visible on his spectrograms. His limit has been calculated from the series members $n=2$ to 6. The remaining singlet terms have been calculated from three classified lines at 32 Å given in his 1936 paper. He has also classified a line at 40.731 Å as the intersystem combination $1s^2 {}^1S_0 - 2p {}^3P_1^o$. His unit, 10^3 cm^{-1} has here been changed to cm^{-1} .

The triplet terms are from an unpublished manuscript kindly furnished by Edlén, who states that the absolute term values of the triplets are based on an extrapolation of $3d {}^3D$ from He I and Li II. The relative positions of the singlet and triplet terms thus determined confirm the intersystem combination reported by Tyrén.

REFERENCES

- B. Edlén, Nova Acta Reg. Soc. Sci. Uppsala [IV] 9, No. 6, 31 (1934). (C L)
 F. Tyrén, Zeit. Phys. 98, 774 (1936). (C L)
 H. A. Robinson, Phys. Rev. 51, 14 (1937). (I P) (T) (C L)
 F. Tyrén, Nova Acta Reg. Soc. Sci. Uppsala [IV] 12, No. 1, 24 (1940). (I P) (T) (C L)
 B. Edlén, unpublished material (Sept. 1947). (T)

Cv

Cv

Config.	Desig.	J	Level	Interval	Config.	Desig.	J	Level	Interval
$1s^2$	$1s^2 {}^1S$	0	0		$1s 4p$	$4p {}^1P^o$	1	2991680	
$1s 2s$	$2s {}^1S$	1	2411266		$1s 5p$	$5p {}^1P^o$	1	3053080	
$1s 2p$	$2p {}^3P^o$	0	2455165	-13 136	$1s 6p$	$6p {}^1P^o$	1	3086420	
		1	2455152		$1s 7p$	$7p {}^1P^o$	1	3106750	
		2	2455288		$1s 8p$	$8p {}^1P^o$	1	3118760	
$1s 2p$	$2p {}^1P^o$	1	2483240						
$1s 3d$	$3d {}^3D$	3, 2, 1	2857308						
$1s 3p$	$3p {}^1P^o$	1	2859350		C VI (${}^2S_{1/2}$)	Limit		3162450	

September 1947.

C VI

(H I sequence; 1 electron)

 $Z=6$ Ground state $1s\ ^2S_{\frac{1}{2}}$ $1s\ ^2S_{\frac{1}{2}}\ 3952252\ \text{cm}^{-1}$

I. P. 489.882 volts

Edlén has calculated the positions of the first three members of the Lyman series, $1s\ ^2S - np\ ^2P^{\circ}$ ($n=2, 3, 4$), using Penney's formula. These wavelengths, 33.734, 28.464, and 26.988 Å, respectively, have been used to compute the term values listed here. The lines have all been observed by Tyrén.

REFERENCES

W. G. Penney, Phil. Mag. [7] 9, 661 (1930).

B. Edlén, Nova Acta Reg. Soc. Sci. Uppsala [IV] 9, No. 6, 28, 152 (1934). (I P) (T) (C L)

F. Tyrén, Zeit. Phys. 98, 771 (1936). (C L)

C VI

C VI

Config.	Desig.	J	Level	Config.	Desig.	J	Level
$1s$	$1s\ ^2S$	$\frac{1}{2}$	0	$4p$	$4p\ ^2P^{\circ}$	$\frac{1}{2}, 1\frac{1}{2}$	3705350
$2p$	$2p\ ^2P^{\circ}$	$\frac{1}{2}, 1\frac{1}{2}$	2964370				
$3p$	$3p\ ^2P^{\circ}$	$\frac{1}{2}, 1\frac{1}{2}$	3513210		Limit		3952252

October 1946.

NITROGEN

N I

7 electrons

Z=7

Ground state $1s^2 2s^2 2p^3 \text{ } ^4\text{S}_{1/2}$ $2p^3 \text{ } ^4\text{S}_{1/2}$ 117345 cm^{-1}

I. P. 14.54 volts

The terms have been taken chiefly from the list prepared by Ekefors with extensions calculated from the classifications published in Tokyo. Unfortunately, no term list was included in the Tokyo papers. Consequently, considerable editing has been done in compiling terms from all the observational material. Revised values are suggested for a few levels and tentative values not in the literature are listed for $5d \text{ } ^4\text{F}_{3/2}$, $5d \text{ } ^4\text{F}_{1/2}$, $5d \text{ } ^4\text{D}_{3/2}$, and $6d \text{ } ^4\text{D}_{3/2}$. Further study is needed to verify the numerous blends resulting from practically coincident levels.

Intersystem combinations have been observed.

Kiess has generously furnished his unpublished g -values derived from the observed Zeeman effects of 18 infrared lines.

REFERENCES

- O. S. Duffendack and R. A. Wolfe, Phys. Rev. **34**, 409 (1929). (C L)
 S. B. Ingram, Phys. Rev. **34**, 421 (1929). (T) (C L)
 E. Ekefors, Zeit. Phys. **63**, 437 (1930). (I P) (T) (C L)
 H. E. White, *Introduction to Atomic Spectra* p. 260 (McGraw-Hill Book Co., Inc., New York, N. Y., 1934). (G D)
 B. Edlén, Bergstrand's Festschrift p. 135 (1938). (C L)
 M. Kamiyama, Sci. Papers Inst. Phys. Chem. Research (Tokyo) **36**, No. 933, 375 (1939). (C L)
 M. Kamiyama and T. Sugiura, Sci. Papers Inst. Phys. Chem. Research (Tokyo) **37**, Nos. 982 and 983, 479 (1940). (C L)
 M. Kamiyama and H. Noguchi, Sci. Papers Inst. Phys. Chem. Research (Tokyo) **39**, No. 1100, 475 (1942). (C L)
 J. R. Holmes, Phys. Rev. **63**, 41 (1943). (I S)
 W. F. Meggers, J. Opt. Soc. Am. **36**, 431 (1946). (Summary hfs)
 C. C. Kiess and G. Shortley, J. Research Nat. Bur. Std. **41** (1948) (in press). (Z E)

N I

N I

Config.	Desig.	J	Level	Interval	Obs. g	Config.	Desig.	J	Level	Interval	Obs. g
$2s^2 2p^3$	$2p^3 \text{ } ^4\text{S}^\circ$	$1\frac{1}{2}$	0			$2s^2 2p^4$	$2p^4 \text{ } ^4\text{P}$	$2\frac{1}{2}$	88109.5	-43.9	
$2s^2 2p^3$	$2p^3 \text{ } ^4\text{D}^\circ$	$2\frac{1}{2}$	19223	-8				$1\frac{1}{2}$	88153.4	-19.6	
		$1\frac{1}{2}$	19231					$\frac{1}{2}$	88173.0		
$2s^2 2p^3$	$2p^3 \text{ } ^4\text{P}^\circ$	$\left\{ \begin{array}{l} 1\frac{1}{2} \\ \frac{1}{2} \end{array} \right\}$	28840			$2s^2 2p^3(^4\text{P})3p$	$3p \text{ } ^4\text{S}^\circ$	$\frac{1}{2}$	95582.3		
$2s^2 2p^3(^4\text{P})3s$	$3s \text{ } ^4\text{P}$	$\frac{1}{2}$	83285.5	33.8	2.670	$2s^2 2p^3(^4\text{P})3p$	$3p \text{ } ^4\text{D}^\circ$	$\frac{1}{2}$	94772.2	22.6	0.002
		$1\frac{1}{2}$	83319.3	46.7	1.735			$1\frac{1}{2}$	94794.8	37.3	1.19
		$2\frac{1}{2}$	83366.0		1.603			$2\frac{1}{2}$	94832.1	51.0	1.36
								$3\frac{1}{2}$	94883.1		1.44
$2s^2 2p^3(^4\text{P})3s$	$3s \text{ } ^4\text{P}$	$\frac{1}{2}$	86131.4	91.8		$2s^2 2p^3(^4\text{P})3p$	$3p \text{ } ^4\text{P}^\circ$	$\frac{1}{2}$	95476.5	18.4	2.671
		$1\frac{1}{2}$	86223.2					$1\frac{1}{2}$	95494.9	38.3	1.737
								$2\frac{1}{2}$	95533.2		1.598

N I—Continued

Config.	Desig.	J	Level	Interval	Obs. g	Config.	Desig.	J	Level	Interval	Obs. g
$2s^2 2p^3(^3P)3p$	$3p\ ^3S^\circ$	$1\frac{1}{2}$	96751.7		2.004	$2s^2 2p^3(^3P)4d$	$4d\ ^4P$	$\frac{1}{2}$	110325	26	
$2s^2 2p^3(^3P)3p$	$3p\ ^3D^\circ$	$1\frac{1}{2}$	96788.2	76.0				$1\frac{1}{2}$	110351	52	
		$2\frac{1}{2}$	96864.2					$2\frac{1}{2}$	110403		
$2s^2 2p^3(^3P)3p$	$3p\ ^1P^\circ$	$\frac{1}{2}$	97770.1	35.7		$2s^2 2p^3(^3P)4d$	$4d\ ^3D$	$1\frac{1}{2}$	110448.3	22.2	
		$1\frac{1}{2}$	97805.8					$2\frac{1}{2}$	110470.5		
$2s^2 2p^3(^1D)3s$	$3s'\ ^3D$	$2\frac{1}{2}$	99665	-7		$2s^2 2p^3(^1D)3p$	$3p'\ ^3D^\circ$	$1\frac{1}{2}$	110521.9	23.9	
		$1\frac{1}{2}$	99658					$2\frac{1}{2}$	110545.8		
$2s^2 2p^3(^3P)4s$	$4s\ ^4P$	$\frac{1}{2}$	103618.1	50.0		$2s^2 2p^3(^1D)3p$	$3p'\ ^1P^\circ$	$\frac{1}{2}$	112294.8	26.0	
		$1\frac{1}{2}$	103668.1	68.7				$1\frac{1}{2}$	112320.8		
		$2\frac{1}{2}$	103736.8			$2s^2 2p^3(^3P)6s$	$6s\ ^4P$	$\frac{1}{2}$	112565.9	44.7	
$2s^2 2p^3(^3P)4s$	$4s\ ^3P$	$\frac{1}{2}$	104142.2	85.2				$1\frac{1}{2}$	112610.6	72.0	
		$1\frac{1}{2}$	104227.4					$2\frac{1}{2}$	112682.6		
$2s^2 2p^3(^3P)3d$	$3d\ ^3P$	$1\frac{1}{2}$	104615.4	-39.5		$2s^2 2p^3(^3P)6s$	$6s\ ^3P$	$\frac{1}{2}$	112735	88	
		$\frac{1}{2}$	104654.9					$1\frac{1}{2}$	112823		
$2s^2 2p^3(^3P)3d$	$3d\ ^4F$	$1\frac{1}{2}$	104665	19		$2s^2 2p^3(^3P)5d$	$5d\ ^4F$	$1\frac{1}{2}$	112751?	12	
		$2\frac{1}{2}$	104684	34				$2\frac{1}{2}$	112763?	36	
		$3\frac{1}{2}$	104718	49				$3\frac{1}{2}$	112799	63	
		$4\frac{1}{2}$	104767					$4\frac{1}{2}$	112862		
$2s^2 2p^3(^3P)3d$	$3d\ ^3F$	$2\frac{1}{2}$	104810.9	71.8		$2s^2 2p^3(^3P)5d$	$5d\ ^3P$	$1\frac{1}{2}$	112801	-15	
		$3\frac{1}{2}$	104882.7					$\frac{1}{2}$	112816		
$2s^2 2p^3(^3P)3d$	$3d\ ^4P$	$\frac{1}{2}$	104864	26		$2s^2 2p^3(^3P)5d$	$5d\ ^3F$	$2\frac{1}{2}$	112820	70	
		$1\frac{1}{2}$	104890	67				$3\frac{1}{2}$	112890.2		
		$2\frac{1}{2}$	104957			$2s^2 2p^3(^3P)5d$	$5d\ ^4D$	$\frac{1}{2}$			
$2s^2 2p^3(^3P)3d$	$3d\ ^4D$	$\frac{1}{2}$	104987	11				$1\frac{1}{2}$			
		$1\frac{1}{2}$	104998	13				$2\frac{1}{2}$	112825	67	
		$2\frac{1}{2}$	105011	9				$3\frac{1}{2}$	112892?		
		$3\frac{1}{2}$	105020			$2s^2 2p^3(^3P)5d$	$5d\ ^4P$	$\frac{1}{2}$	112855	19	
$2s^2 2p^3(^3P)3d$	$3d\ ^3D$	$1\frac{1}{2}$	105120.8	23.5				$1\frac{1}{2}$	112874	38	
		$2\frac{1}{2}$	105144.3					$2\frac{1}{2}$	112912		
$2s^2 2p^3(^3P)4p$	$4p\ ^3S^\circ$	$\frac{1}{2}$	106478.6			$2s^2 2p^3(^3P)5d$	$5d\ ^3D$	$1\frac{1}{2}$	112929.2	18.3	
								$2\frac{1}{2}$	112947.5		
$2s^2 2p^3(^3P)4p$	$4p\ ^4D^\circ$	$\frac{1}{2}$	106760.5	19.6		$2s^2 2p^3(^3P)7s$	$7s\ ^4P$	$\frac{1}{2}$	114015?	57	
		$1\frac{1}{2}$	106780.1	36.0				$1\frac{1}{2}$	114072?	74	
		$2\frac{1}{2}$	106816.1	54.6				$2\frac{1}{2}$	114146		
		$3\frac{1}{2}$	106870.7			$2s^2 2p^3(^3P)7s$	$7s\ ^3P$	$\frac{1}{2}$	114130	33	
$2s^2 2p^3(^3P)4p$	$4p\ ^4P^\circ$	$\frac{1}{2}$	106982.7	15.6				$1\frac{1}{2}$	114163		
		$1\frac{1}{2}$	106998.3	40.7							
		$2\frac{1}{2}$	107059.0			$2s^2 2p^3(^3P)6d$	$6d\ ^4F$	$\left\{ \begin{array}{l} 1\frac{1}{2} \\ \text{to} \\ 4\frac{1}{2} \end{array} \right\}$	114160		
$2s^2 2p^3(^3P)4p$	$4p\ ^3S^\circ$	$1\frac{1}{2}$	107447.2			$2s^2 2p^3(^3P)6d$	$6d\ ^4D$	$\frac{1}{2}$			
$2s^2 2p^3(^3P)5s$	$5s\ ^4P$	$\frac{1}{2}$	109813.5	44.3				$1\frac{1}{2}$			
		$1\frac{1}{2}$	109857.8	70.1				$2\frac{1}{2}$	114182	66	
		$2\frac{1}{2}$	109927.9					$3\frac{1}{2}$	114248?		
$2s^2 2p^3(^3P)5s$	$5s\ ^3P$	$\frac{1}{2}$	110029.2	79.3		$2s^2 2p^3(^3P)6d$	$6d\ ^3P$	$1\frac{1}{2}$	114193	-16	
		$1\frac{1}{2}$	110108.5					$\frac{1}{2}$	114209		
$2s^2 2p^3(^3P)4d$	$4d\ ^4F$	$1\frac{1}{2}$	110196	18		$2s^2 2p^3(^3P)6d$	$6d\ ^3F$	$2\frac{1}{2}$	114196	79	
		$2\frac{1}{2}$	110214	34				$3\frac{1}{2}$	114275		
		$3\frac{1}{2}$	110248	56		$2s^2 2p^3(^3P)6d$	$6d\ ^3D$	$1\frac{1}{2}$	114232.2	58.3	
		$4\frac{1}{2}$	110304					$2\frac{1}{2}$	114290.5		
$2s^2 2p^3(^3P)4d$	$4d\ ^4D$	$\frac{1}{2}$	110221	54		$2s^2 2p^3(^3P)6d$	$6d\ ^4P$	$\frac{1}{2}$			
		$1\frac{1}{2}$	110275	13				$1\frac{1}{2}$	114259	15	
		$2\frac{1}{2}$	110288	51				$2\frac{1}{2}$	114274		
		$3\frac{1}{2}$	110339			$2s^2 2p^3(^3P)6s$	$8s\ ^4P$	$\frac{1}{2}$	114809	81	
$2s^2 2p^3(^3P)4d$	$4d\ ^3P$	$1\frac{1}{2}$	110221.7	-22.9				$1\frac{1}{2}$	114890	52	
		$\frac{1}{2}$	110244.6					$2\frac{1}{2}$	114942		
$2s^2 2p^3(^3P)4d$	$4d\ ^3F$	$2\frac{1}{2}$	110311	62							
		$3\frac{1}{2}$	110373								

N I—Continued

N I—Continued

Config.	Desig.	J	Level	Interval	Obs. g	Config.	Desig.	J	Level	Interval	Obs. g
$2s^2 2p^2(^3P)8s$	$8s\ ^3P$	$\left\{ \begin{smallmatrix} \frac{1}{2} \\ 1\frac{1}{2} \end{smallmatrix} \right\}$	114950			$2s^2 2p^2(^3P)11s$	$11s\ ^3P$	$\left\{ \begin{smallmatrix} \frac{1}{2} \\ 1\frac{1}{2} \end{smallmatrix} \right\}$	116107		
$2s^2 2p^2(^3P)7d$	$7d\ ^4D$	$\left\{ \begin{smallmatrix} \frac{1}{2} \\ \text{to} \\ 3\frac{1}{2} \end{smallmatrix} \right\}$	114988			$2s^2 2p^2(^3P)11s$	$11s\ ^1P$	$\left\{ \begin{smallmatrix} \frac{1}{2} \\ \text{to} \\ 2\frac{1}{2} \end{smallmatrix} \right\}$	116124		
$2s^2 2p^2(^3P)7d$	$7d\ ^1F$	$\left\{ \begin{smallmatrix} 2\frac{1}{2} \\ 3\frac{1}{2} \end{smallmatrix} \right\}$	115004			$2s^2 2p^2(^3P)10d$	$10d\ ^3P$	$\left\{ \begin{smallmatrix} 1\frac{1}{2} \\ \frac{1}{2} \end{smallmatrix} \right\}$	116155		
$2s^2 2p^2(^3P)7d$	$7d\ ^3P$	$\left\{ \begin{smallmatrix} 1\frac{1}{2} \\ \frac{1}{2} \end{smallmatrix} \right\}$	115017			$2s^2 2p^2(^3P)10d$	$10d\ ^1F$	$\left\{ \begin{smallmatrix} 2\frac{1}{2} \\ 3\frac{1}{2} \end{smallmatrix} \right\}$	116159		
$2s^2 2p^2(^3P)7d$	$7d\ ^1D$	$\begin{smallmatrix} 1\frac{1}{2} \\ 2\frac{1}{2} \end{smallmatrix}$	$\begin{smallmatrix} 115057.5 \\ 115100.1 \end{smallmatrix}$	42.6		$2s^2 2p^2(^3P)10d$	$10d\ ^1D$	$\left\{ \begin{smallmatrix} \frac{1}{2} \\ \text{to} \\ 3\frac{1}{2} \end{smallmatrix} \right\}$	116164		
$2s^2 2p^2(^3P)7d$	$7d\ ^4P$	$\begin{smallmatrix} \frac{1}{2} \\ 1\frac{1}{2} \\ 2\frac{1}{2} \end{smallmatrix}$	115103			$2s^2 2p^2(^3P)10d$	$10d\ ^3D$	$\left\{ \begin{smallmatrix} 1\frac{1}{2} \\ 2\frac{1}{2} \end{smallmatrix} \right\}$	116240		
$2s^2 2p^2(^3P)9s$	$9s\ ^3P$	$\left\{ \begin{smallmatrix} \frac{1}{2} \\ 1\frac{1}{2} \end{smallmatrix} \right\}$	115480			$2s^2 2p^2(^3P)10d$	$10d\ ^4P$	$\left\{ \begin{smallmatrix} \frac{1}{2} \\ \text{to} \\ 2\frac{1}{2} \end{smallmatrix} \right\}$	116259		
$2s^2 2p^2(^3P)9s$	$9s\ ^1P$	$\left\{ \begin{smallmatrix} \frac{1}{2} \\ \text{to} \\ 2\frac{1}{2} \end{smallmatrix} \right\}$	115483			$2s^2 2p^2(^3P)12s$	$12s\ ^3P$	$\left\{ \begin{smallmatrix} \frac{1}{2} \\ 1\frac{1}{2} \end{smallmatrix} \right\}$	116305		
$2s^2 2p^2(^3P)8d$	$8d\ ^4D$	$\left\{ \begin{smallmatrix} \frac{1}{2} \\ \text{to} \\ 3\frac{1}{2} \end{smallmatrix} \right\}$	115524			$2s^2 2p^2(^3P)12s$	$12s\ ^1P$	$\left\{ \begin{smallmatrix} \frac{1}{2} \\ \text{to} \\ 2\frac{1}{2} \end{smallmatrix} \right\}$	116312		
$2s^2 2p^2(^3P)8d$	$8d\ ^3P$	$\left\{ \begin{smallmatrix} 1\frac{1}{2} \\ \frac{1}{2} \end{smallmatrix} \right\}$	115530			$2s^2 2p^2(^3P)11d$	$11d\ ^3P$	$\left\{ \begin{smallmatrix} 1\frac{1}{2} \\ \frac{1}{2} \end{smallmatrix} \right\}$	116351		
$2s^2 2p^2(^3P)8d$	$8d\ ^1F$	$\left\{ \begin{smallmatrix} 2\frac{1}{2} \\ 3\frac{1}{2} \end{smallmatrix} \right\}$	115535			$2s^2 2p^2(^3P)11d$	$11d\ ^1F$	$\left\{ \begin{smallmatrix} 2\frac{1}{2} \\ 3\frac{1}{2} \end{smallmatrix} \right\}$	116359		
$2s^2 2p^2(^3P)8d$	$8d\ ^3D$	$\begin{smallmatrix} 1\frac{1}{2} \\ 2\frac{1}{2} \end{smallmatrix}$	$\begin{smallmatrix} 115597 \\ 115622 \end{smallmatrix}$	25		$2s^2 2p^2(^3P)11d$	$11d\ ^1D$	$\left\{ \begin{smallmatrix} \frac{1}{2} \\ \text{to} \\ 3\frac{1}{2} \end{smallmatrix} \right\}$	116367		
$2s^2 2p^2(^3P)8d$	$8d\ ^4P$	$\left\{ \begin{smallmatrix} \frac{1}{2} \\ \text{to} \\ 2\frac{1}{2} \end{smallmatrix} \right\}$	115618			$2s^2 2p^2(^3P)11d$	$11d\ ^3D$	$\left\{ \begin{smallmatrix} 1\frac{1}{2} \\ 2\frac{1}{2} \end{smallmatrix} \right\}$	116436		
$2s^2 2p^2(^3P)10s$	$10s\ ^3P$	$\left\{ \begin{smallmatrix} \frac{1}{2} \\ 1\frac{1}{2} \end{smallmatrix} \right\}$	115842			$2s^2 2p^2(^3P)11d$	$11d\ ^4P$	$\left\{ \begin{smallmatrix} \frac{1}{2} \\ \text{to} \\ 2\frac{1}{2} \end{smallmatrix} \right\}$	116441		
$2s^2 2p^2(^3P)10s$	$10s\ ^1P$	$\left\{ \begin{smallmatrix} \frac{1}{2} \\ \text{to} \\ 2\frac{1}{2} \end{smallmatrix} \right\}$	115855			$2s^2 2p^2(^3P)13s$	$13s\ ^3P$	$\left\{ \begin{smallmatrix} \frac{1}{2} \\ 1\frac{1}{2} \end{smallmatrix} \right\}$	116467		
$2s^2 2p^2(^3P)9d$	$9d\ ^4D$	$\left\{ \begin{smallmatrix} \frac{1}{2} \\ \text{to} \\ 3\frac{1}{2} \end{smallmatrix} \right\}$	115887			$2s^2 2p^2(^3P)12d$	$12d\ ^3P$	$\left\{ \begin{smallmatrix} 1\frac{1}{2} \\ \frac{1}{2} \end{smallmatrix} \right\}$	116502		
$2s^2 2p^2(^3P)9d$	$9d\ ^3P$	$\left\{ \begin{smallmatrix} 1\frac{1}{2} \\ \frac{1}{2} \end{smallmatrix} \right\}$	115889			$2s^2 2p^2(^3P)12d$	$12d\ ^4P$	$\left\{ \begin{smallmatrix} \frac{1}{2} \\ \text{to} \\ 2\frac{1}{2} \end{smallmatrix} \right\}$	116581		
$2s^2 2p^2(^3P)9d$	$9d\ ^1F$	$\left\{ \begin{smallmatrix} 2\frac{1}{2} \\ 3\frac{1}{2} \end{smallmatrix} \right\}$	115902			$2s^2 2p^2(^3P)12d$	$12d\ ^3D$	$\left\{ \begin{smallmatrix} 1\frac{1}{2} \\ 2\frac{1}{2} \end{smallmatrix} \right\}$	116625		
$2s^2 2p^2(^3P)9d$	$9d\ ^3D$	$\begin{smallmatrix} 1\frac{1}{2} \\ 2\frac{1}{2} \end{smallmatrix}$	$\begin{smallmatrix} 115973 \\ 115991 \end{smallmatrix}$	18							
$2s^2 2p^2(^3P)9d$	$9d\ ^4P$	$\left\{ \begin{smallmatrix} \frac{1}{2} \\ \text{to} \\ 2\frac{1}{2} \end{smallmatrix} \right\}$	115990			N II ($^3P_0$)	Limit	-----	117345		

October 1947.

N I OBSERVED TERMS*

Config. $1s^2 +$	Observed Terms					
$2s^2 2p^2$	{ $2p^2 \ ^1S^0$ $2p^2 \ ^3P^0$ $2p^2 \ ^3D^0$					
$2s 2p^3$	$2p^3 \ ^4P$					
	$ns \ (n \geq 3)$		$np \ (n \geq 3)$		$nd \ (n \geq 3)$	
$2s^2 2p^2(^3P)nx$	{ $3-12s \ ^4P$ $3-13s \ ^3P$		$3, 4p \ ^4S^0$ $3, 4p \ ^2S^0$	$3, 4p \ ^4P^0$ $3p \ ^3P^0$	$3, 4p \ ^4D^0$ $3p \ ^3D^0$	$3-12d \ ^4P$ $3-12d \ ^3P$ $3-11d \ ^4D$ $3-12d \ ^3D$ $3-6d \ ^4F$ $3-11d \ ^4F$
$2s^2 2p^2(^1D)nx'$	$3s' \ ^3D$		$3p' \ ^3P^0$ $3p' \ ^3D^0$			

*For predicted terms in the spectra of the N I isoelectronic sequence, see Introduction.

N II

(C I sequence; 6 electrons)

$Z=7$

Ground state $1s^2 2s^2 2p^2 \ ^3P_0$

$2p^2 \ ^3P_0$ 238846.7 cm^{-1}

I. P. 29.605 volts

Edlén has revised and extended the earlier analysis of this spectrum. The terms are all taken from his Monograph, except those from the $4f$ configuration, which are from his 1936 paper, and his $3s' \ ^3P$ and $5f$ -terms, which he has generously furnished in a private communication.

The singlet and triplet terms are well connected by intersystem combinations but the quintets are not so connected with the others. Edlén also suggests that by analogy with C I and O III the published absolute values of the quintet terms should be decreased by about 500 cm^{-1} . This correction has been applied in the table and should diminish the uncertainty $\pm$ appreciably.

REFERENCES

- A. Fowler and L. J. Freeman, Proc. Roy. Soc. (London) [A] **114**, 662 (1927). (T) (C L)
 L. J. Freeman, Proc. Roy. Soc. (London) [A] **124**, 666 (1929). (T) (C L)
 B. Edlén, Nova Acta Reg. Soc. Sci. Uppsala [IV] **9**, No. 6, 109 (1934). (I P) (T) (C L) (G D of singlets)
 B. Edlén, Zeit. Phys. **98**, 564 (1936). (T) (C L)
 J. B. Green and H. N. Maxwell, Phys. Rev. **51**, 243 (1937). (Z E)
 B. Edlén, unpublished material (Dec. 1947). (T).

N II

N II

Edlén	Config.	Desig.	J	Level	Interval	Edlén	Config.	Desig.	J	Level	Interval
2p ¹ P ₀ ¹ P ₁ ¹ P ₂	2s ² 2p ³	2p ³ ¹ P	0 1 2	0.0 49.1 131.3	49.1 82.2	4p ¹ S ₁ 4p ¹ D ₂	2s ² 2p(³ P°) 4p	4p ¹ S 4p ¹ D	1 2	203532.8 205350.7	
2p ¹ D ₂	2s ² 2p ³	2p ³ ¹ D	2	15315.7		3s' ¹ P ₁ ¹ P ₂ ¹ P ₃	2s 2p ² (¹ P) 3s	3s ¹ P	1 2 3	205982.1+x 206038.1+x 206108.7+x	56.0 70.6
2p' ¹ S ₀	2s ² 2p ³	2p ³ ¹ S	0	32687.1		4p ¹ S ₀	2s ² 2p(³ P°) 4p	4p ¹ S	0	206327.5	
2p' ¹ S ₂	2s 2p ³	2p ³ ¹ S°	2	47167.7+x		4d ¹ F ₂ ¹ F ₃ ¹ F ₄	2s ² 2p(³ P°) 4d	4d ³ F°	2 3 4	208675.3 208739.5 208825.3	64.2 85.8
2p' ¹ D ₂ ¹ D ₁ ¹ D ₀	2s 2p ³	2p ³ ¹ D°	3 2 1	92237.9 92251.3 92252.9	-13.4 -1.6	4d ¹ D ₂ 4d ¹ D ₁ ¹ D ₀	2s ² 2p(³ P°) 4d	4d ¹ D°	2 1 2 3	209228.92 210239.8 210266.3 210301.9	
2p' ¹ P ₁₂ ¹ P ₀	2s 2p ³	2p ³ ¹ P°	2, 1 0	109218.2 109224.8	-6.6	4d ¹ P ₂ ¹ P ₁ ¹ P ₀	2s ² 2p(³ P°) 4d	4d ¹ P°	2 1 0	210705.4 210751.5 210777.0	-46.1 -25.5
2p' ¹ D ₂	2s 2p ³	2p ³ ¹ D°	2	144189.1		4f ¹ F ₃ 4f ¹ F ₂ ¹ F ₃ ¹ F ₄	2s ² 2p(³ P°) 4f	4f ¹ F	3 2 3 4	211030.90 211033.71 211057.07 211061.03	23.36 3.96
3s ¹ P ₀ ¹ P ₁ ¹ P ₂	2s ² 2p(³ P°) 3s	3s ¹ P°	0 1 2	148909.37 148940.97 149077.33	31.60 136.36	4d ¹ F ₃ 4f ¹ G ₃ ¹ G ₄ ¹ G ₅	2s ² 2p(³ P°) 4d	4d ¹ F°	3 3 4 5	211104.8 211288.02 211295.65 211390.77	
3s ¹ P ₁	2s ² 2p(³ P°) 3s	3s ¹ P°	1	149188.74		4d ¹ P ₁ 4f ¹ G ₄	2s ² 2p(³ P°) 4d	4d ¹ P°	1 4	211335.5 211402.89	
2p' ¹ S ₁	2s 2p ³	2p ³ ¹ S°	1	155129.9		4f ¹ D ₂ ¹ D ₁ ¹ D ₀	2s ² 2p(³ P°) 4f	4f ¹ D	3 2 1	211411.25 211416.20 211487.28	-4.95 -71.08
3p ¹ P ₁	2s ² 2p(³ P°) 3p	3p ¹ P	1	164611.60		4f ¹ D ₂ 3s' ¹ P ₀ ¹ P ₁ ¹ P ₂	2s ² 2p(³ P°) 4f	4f ¹ D	2 0 1 2	211491.16 211750.2 211780.6 211828.8	
3p ¹ D ₁ ¹ D ₂ ¹ D ₃	2s ² 2p(³ P°) 3p	3p ¹ D	1 2 3	166522.48 166583.26 166679.45	60.78 96.19	5s ¹ P ₀ ¹ P ₁ ¹ P ₂	2s ² 2p(³ P°) 5s	5s ¹ P°	0 1 2	214212.4 214258.2 214385.3	45.8 127.1
2p' ¹ P ₁	2s 2p ³	2p ³ ¹ P°	1	166765.7		5s ¹ P ₁	2s ² 2p(³ P°) 5s	5s ¹ P°	1	214828.0	
3p ¹ S ₁	2s ² 2p(³ P°) 3p	3p ¹ S	1	168893.04		5d ¹ D ₃	2s ² 2p(³ P°) 5d	5d ¹ D°	1 2 3	220717	
3p ¹ P ₀ ¹ P ₁ ¹ P ₂	2s ² 2p(³ P°) 3p	3p ¹ P	0 1 2	170573.38 170608.63 170667.00	35.25 58.37	5f ¹ F ₂ ¹ F ₃ ¹ F ₄	2s ² 2p(³ P°) 5f	5f ¹ F	2 3 4	221070.2 221074.3	4.1
3p ¹ D ₂	2s ² 2p(³ P°) 3p	3p ¹ D	2	174212.93		5d ¹ F ₁	2s ² 2p(³ P°) 5d	5d ¹ F°	3	221137.6	
3p ¹ S ₀	2s ² 2p(³ P°) 3p	3p ¹ S	0	178274.17		5f ¹ G ₃ ¹ G ₄ ¹ G ₅	2s ² 2p(³ P°) 5f	5f ¹ G	3 4 5	221227.7 221232.7 221302.2	5.0 69.5
3d ¹ F ₂ ¹ F ₃ ¹ F ₄	2s ² 2p(³ P°) 3d	3d ¹ F°	2 3 4	186512.38 186571.80 186653.35	59.42 81.55	5f ¹ G ₄	2s ² 2p(³ P°) 5f	5f ¹ G	4	221312.1	
3d ¹ D ₂	2s ² 2p(³ P°) 3d	3d ¹ D°	2	187092.20		3p' ¹ D ₀ ¹ D ₁ ¹ D ₂ ¹ D ₃	2s 2p ² (¹ P) 3p	3p ¹ D°	0 1 2 3 4	224027.1+x 224042.9+x 224072.3+x 224115.4+x 224169.3+x	15.8 29.4 43.1 53.9
3d ¹ D ₁ ¹ D ₂ ¹ D ₃	2s ² 2p(³ P°) 3d	3d ¹ D°	1 2 3	187436.34 187462.38 187492.72	24.04 30.34						
3d ¹ P ₂ ¹ P ₁ ¹ P ₀	2s ² 2p(³ P°) 3d	3d ¹ P°	2 1 0	188858.09 188909.89 188937.95	-51.80 -28.06						
3d ¹ F ₃	2s ² 2p(³ P°) 3d	3d ¹ F°	3	189336.0							
3d ¹ P ₁	2s ² 2p(³ P°) 3d	3d ¹ P°	1	190121.15							
4s ¹ P ₀ ¹ P ₁ ¹ P ₂	2s ² 2p(³ P°) 4s	4s ¹ P°	0 1 2	196541.09 196592.88 196712.17	51.79 119.29						
4s ¹ P ₁	2s ² 2p(³ P°) 4s	4s ¹ P°	1	197859.28							
4p ¹ P ₁	2s ² 2p(³ P°) 4p	4p ¹ P	1	202169.9							
4p ¹ D ₁ ¹ D ₂ ¹ D ₃	2s ² 2p(³ P°) 4p	4p ¹ D	1 2 3	202714.94 202765.86 202862.06	50.92 96.20						
4p ¹ P ₀ ¹ P ₁ ¹ P ₂	2s ² 2p(³ P°) 4p	4p ¹ P	0 1 2	203164.7 203188.8 203259.7	24.1 70.9						

N II—Continued

N II—Continued

Edlén	Config.	Desig.	<i>J</i>	Level	Interval	Edlén	Config.	Desig.	<i>J</i>	Level	Interval
$3p' \ ^1P_1$ $\ ^1P_2$ $\ ^1P_3$	$2s \ 2p^2(^1P)3p$	$3p \ ^1P^\circ$	1	225987.1 + <i>x</i>	24.1 44.0	$3d' \ ^1P_3$ $\ ^1P_2$ $\ ^1P_1$	$2s \ 2p^2(^1P)3d$	$3d \ ^1P$	3	244737.4 + <i>x</i>	-38.5 -26.1
			2	226011.2 + <i>x</i>					2	244775.9 + <i>x</i>	
			3	226065.8 + <i>x</i>					1	244802.0 + <i>x</i>	
$3p' \ ^1S_2$	$2s \ 2p^2(^1P)3p$	$3p \ ^1S^\circ$	2	230223.0 + <i>x</i>		$3d' \ ^1D_3$ $\ ^1D_1$ $\ ^1D_2$ $\ ^1D_3$ $\ ^1D_4$	$2s \ 2p^2(^1P)3d$	$3d \ ^1D$	0	245319.8 + <i>x</i>	3.6 7.9 11.6 14.0
									1	245323.4 + <i>x</i>	
$3d' \ ^1F_1$ $\ ^1F_2$ $\ ^1F_3$ $\ ^1F_4$ $\ ^1F_5$	$2s \ 2p^2(^1P)3d$	$3d \ ^1F$							2	245331.3 + <i>x</i>	
			1	243355.5 + <i>x</i>					3	245342.9 + <i>x</i>	
			2	243371.2 + <i>x</i>					4	245356.9 + <i>x</i>	
			3	243396.6 + <i>x</i>	15.7 25.4 33.6 40.6						
	$N \ III \ (^1P)$	<i>Limit</i>		238846.7							

December 1947.

N II OBSERVED *g*-VALUES

Desig.	<i>J</i>	Obs. <i>g</i>	Desig.	<i>J</i>	Obs. <i>g</i>	Desig.	<i>J</i>	Obs. <i>g</i>
$3s \ ^1P^\circ$	1	1.455	$3p \ ^1S$	1	2.015	$3d \ ^1D^\circ$	2	0.986
	2	1.502						
$3s \ ^1P^\circ$	1	1.051	$3p \ ^1P$	1	1.530	$3d \ ^1D^\circ$	1	0.494
				2	1.497		2	1.114
$3p \ ^1P$	1	1.005	$3p \ ^1D$	2	1.002		3	1.329
						$3d \ ^1P^\circ$	2	1.504
$3p \ ^1D$	1	0.494	$3d \ ^1F^\circ$	3	1.079		1	1.487
	2	1.166		4	1.250	$3d \ ^1P^\circ$		
	3	1.330					1	1.026

N II OBSERVED TERMS*

Config. $1s^2+$	Observed Terms			
$2s^2 \ 2p^2$	{ $2p^2 \ ^1S$ $2p^2 \ ^1P$ $2p^2 \ ^1D$ }			
$2s \ 2p^3$	{ $2p^3 \ ^1S^\circ$ $2p^3 \ ^1P^\circ$ $2p^3 \ ^1D^\circ$ $2p^3 \ ^1S^\circ$ $2p^3 \ ^1P^\circ$ $2p^3 \ ^1D^\circ$ }			
	$ns \ (n \geq 3)$	$np \ (n \geq 3)$	$nd \ (n \geq 3)$	$nf \ (n \geq 4)$
$2s^2 \ 2p(^1P^\circ)_{nx}$	{ $3-5s \ ^1P^\circ$ $3-5s \ ^1P^\circ$ }	{ $3, 4p \ ^1S$ $3, 4p \ ^1P$ $3, 4p \ ^1D$ $3, 4p \ ^1S$ $3, 4p \ ^1P$ $3, 4p \ ^1D$ }	{ $3, 4d \ ^1P^\circ$ $3-5d \ ^1D^\circ$ $3, 4d \ ^1F^\circ$ $3, 4d \ ^1P^\circ$ $3, 4d \ ^1D^\circ$ $3-5d \ ^1F^\circ$ }	{ $4f \ ^1D$ $4, 5f \ ^1F$ $4, 5f \ ^1G$ $4f \ ^1D$ $4f \ ^1F$ $4, 5f \ ^1G$ }
$2s \ 2p^2(^1P)_{nx}$	{ $3s \ ^1P$ $3s \ ^1P$ }	{ $3p \ ^1S^\circ$ $3p \ ^1P^\circ$ $3p \ ^1D^\circ$ }	{ $3d \ ^1P$ $3d \ ^1D$ $3d \ ^1F$ }	

*For predicted terms in the spectra of the C I isoelectronic sequence, see Introduction.

N III

(B I sequence; 5 electrons)

Z=7

Ground state $1s^2 2s^2 2p^2 P_{1/2}^0$ $2p^2 P_{1/2}^0$ 382625.5 cm^{-1}

I. P. 47.426 volts

All of the terms except those with a 4f-electron, have been taken from Edlén's Monograph. In 1936 Edlén published a revised and extended list of 4f-terms and the corresponding classified lines, including intersystem combinations. The observed correction to his previously published quartet terms -396.4 cm^{-1} , connecting them with the doublet terms has been incorporated into the present list.

REFERENCES

- L. J. Freeman, Proc. Roy. Soc. (London) [A] **121**, 318 (1928). (T) (C L)
 B. Edlén, Nova Acta Reg. Soc. Sci. Uppsala [IV] **9**, No. 6, 78 (1934). (I P) (T) (C L) (G D)
 B. Edlén, Zeit. Phys. **98**, 561 (1936). (T) (C L)

N III

N III

Edlén	Config.	Desig.	J	Level	Interval	Edlén	Config.	Desig.	J	Level	Interval
$2p^2 P_{1/2}$	$2s^2(^1S)2p$	$2p^2 P^0$	$\frac{1}{2}$	0. 0	174. 5	$3s^2 P_{1/2}$	$2s^2 2p(^3P^0)3s$	$3s^2 P^0$	$\frac{1}{2}$	287535. 6	62. 5
$2p^2 P_{3/2}$			$\frac{3}{2}$	174. 5		$3s^2 P_{3/2}$			$\frac{3}{2}$	287598. 1	
$2p^2 P_{3/2}$			$\frac{3}{2}$		59. 9	$3s^2 P_{3/2}$			$\frac{3}{2}$	287713. 9	115. 8
$2p^2 P_{3/2}$			$\frac{3}{2}$			$3s^2 P_{3/2}$			$\frac{3}{2}$		
$2p^2 P_{3/2}$			$\frac{3}{2}$		81. 2	$3s^2 P_{3/2}$			$\frac{3}{2}$		112. 9
$2p^2 P_{3/2}$			$\frac{3}{2}$			$3s^2 P_{3/2}$			$\frac{3}{2}$		
$2p^2 P_{3/2}$			$\frac{3}{2}$		-7. 7	$4s^2 S_1$	$2s^2(^1S)4s$	$4s^2 S$	$\frac{1}{2}$	301088. 2	53. 2
$2p^2 P_{3/2}$			$\frac{3}{2}$			$3p^2 P_{1/2}$	$2s^2 2p(^3P^0)3p$	$3p^2 P$	$\frac{1}{2}$	309132. 6	
$2p^2 P_{3/2}$			$\frac{3}{2}$		110. 4	$3p^2 P_{1/2}$			$\frac{1}{2}$	309185. 8	35. 5
$2p^2 P_{3/2}$			$\frac{3}{2}$			$3p^2 P_{1/2}$			$\frac{1}{2}$	309662. 8	
$2p^2 P_{3/2}$			$\frac{3}{2}$		-16. 7	$3p^2 P_{1/2}$			$\frac{1}{2}$	309698. 3	62. 2
$2p^2 P_{3/2}$			$\frac{3}{2}$			$3p^2 P_{1/2}$			$\frac{1}{2}$	309760. 5	
$2p^2 P_{3/2}$			$\frac{3}{2}$		4. 1	$3p^2 P_{1/2}$			$\frac{1}{2}$	309856. 7	96. 2
$2p^2 P_{3/2}$			$\frac{3}{2}$			$3p^2 P_{1/2}$			$\frac{1}{2}$		
$2p^2 P_{3/2}$			$\frac{3}{2}$		36. 0	$4p^2 P_{1/2}$	$2s^2(^1S)4p$	$4p^2 P^0$	$\frac{1}{2}$	311691. 3	24. 8
$2p^2 P_{3/2}$			$\frac{3}{2}$			$4p^2 P_{1/2}$			$\frac{1}{2}$	311716. 1	
$2p^2 P_{3/2}$			$\frac{3}{2}$		5. 9	$3p^2 P_{1/2}$	$2s^2 2p(^3P^0)3p$	$3p^2 S$	$\frac{1}{2}$	314224. 0	43. 5
$2p^2 P_{3/2}$			$\frac{3}{2}$			$3p^2 P_{1/2}$			$\frac{1}{2}$	317299. 9	
$2p^2 P_{3/2}$			$\frac{3}{2}$		31. 0	$3p^2 P_{1/2}$	$2s^2 2p(^3P^0)3p$	$3p^2 P$	$\frac{1}{2}$	317343. 4	58. 9
$2p^2 P_{3/2}$			$\frac{3}{2}$			$3p^2 P_{1/2}$			$\frac{1}{2}$	317402. 3	
$2p^2 P_{3/2}$			$\frac{3}{2}$		31. 0	$4d^2 D_1$	$2s^2(^1S)4d$	$4d^2 D$	$\frac{1}{2}$	317750. 8	31. 0
$2p^2 P_{3/2}$			$\frac{3}{2}$			$4d^2 D_1$			$\frac{1}{2}$	317781. 8	
$2p^2 P_{3/2}$			$\frac{3}{2}$		31. 0	$4d^2 D_1$	$2s^2(^1S)4f$	$4f^2 F^0$	$\frac{1}{2}$	320287. 5	31. 0
$2p^2 P_{3/2}$			$\frac{3}{2}$			$4d^2 D_1$			$\frac{1}{2}$		

N III—Continued

N III—Continued

Edlén	Config.	Desig.	<i>J</i>	Level	Interval	Edlén	Config.	Desig.	<i>J</i>	Level	Interval
3p' ² D ₂ ² D ₁	2s 2p(² P°)3p	3p ² D	1½ 2½	320977. 4 321065. 8	88. 4	4p' ² D ₂ ² D ₁	2s 2p(² P°)4p	4p ² D	1½ 2½	377883. 7 377970. 8	87. 1
3p' ² S ₁	2s 2p(² P°)3p	3p ² S	¾	327056. 8		4p' ² S ₂	2s 2p(² P°)4p	4p ² S	1½	378440. 5	
3d' ⁴ F ₂ ⁴ F ₁ ⁴ F ₃ ⁴ F ₄	2s 2p(² P°)3d	3d ⁴ F°	1½ 2½ 3½ 4½	330238. 4 330273. 5 330325. 3 330396. 7	35. 1 51. 8 71. 4	4p' ⁴ P ₁ ⁴ P ₂ ⁴ P ₃	2s 2p(² P°)4p	4p ⁴ P	¾ 1½ 2½	379307. 3 379352. 1 379405. 0	44. 8 52. 9
3d' ⁴ D ₁ ⁴ D ₂ ⁴ D ₃ ⁴ D ₄	2s 2p(² P°)3d	3d ⁴ D°	¾ 1½ 2½ 3½	332796. 6 332810. 0 332832. 0 332860. 3	13. 4 22. 0 28. 3	N IV (¹ S ₀) Limit				382625. 5	
5s ² S ₁	2s²(¹ S)5s	5s ² S	¾	333713. 1		4d' ⁴ F ₂ ⁴ F ₁ ⁴ F ₃	2s 2p(² P°)4d	4d ⁴ F°	1½ 2½ 3½ 4½	384016 384065 384139	49 74
3d' ² D ₂ ² D ₁	2s 2p(² P°)3d	3d ² D°	1½ 2½	334542. 2 334568. 9	26. 7	4d' ² D	2s 2p(² P°)4d	4d ² D°	1½ 2½	385126	
3d' ⁴ P ₂ ⁴ P ₁ ⁴ P ₃ ⁴ P ₄	2s 2p(² P°)3d	3d ⁴ P°	2½ 1½ ¾	336213. 4 336268. 0 336303. 1	-54. 6 -35. 1	4d' ⁴ D ₂ ⁴ D ₁ ⁴ D ₃ ⁴ D ₄	2s 2p(² P°)4d	4d ⁴ D°	¾ 1½ 2½ 3½	385296 385323 385352	27 29
3d' ² F ₂ ² F ₁	2s 2p(² P°)3d	3d ² F°	2½ 3½	339744. 4 339865. 7	111. 3	4d' ⁴ P ₂	2s 2p(² P°)4d	4d ⁴ P°	2½ 1½ ¾	386246	
5d ² D ₂ ² D ₁	2s²(¹ S)5d	5d ² D	1½ 2½	341946. 2 341947. 9	1. 7	4f' ² F ₂ ² F ₁	2s 2p(² P°)4f	4f ² F	2½ 3½	386953. 4 386974	21
3d' ² P ₂ ² P ₁	2s 2p(² P°)3d	3d ² P°	1½ ¾	342693. 0 342763. 7	-70. 7	4f' ⁴ F ₂ ⁴ F ₁ ⁴ F ₃ ⁴ F ₄	2s 2p(² P°)4f	4f ⁴ F	1½ 2½ 3½ 4½	387000. 8 387010. 3 387042. 3	9. 5 32. 0
5f ² F ₄	2s²(¹ S)5f	5f ² F°	2½ 3½	342752. 0		4d' ² F ₂ ² F ₁	2s 2p(² P°)4d	4d ² F°	2½ 3½	387728. 7 387811. 5	82. 8
5g ² G	2s²(¹ S)5g	5g ² G	{ 3½ 4½ }	343116		4f' ⁴ G ₂ ⁴ G ₁ ⁴ G ₃ ⁴ G ₄	2s 2p(² P°)4f	4f ⁴ G	2½ 3½ 4½ 5½	388039. 2 388082. 9 388134. 8 388198	43. 7 51. 9 63
6d ² D ₂	2s²(¹ S)6d	6d ² D	1½ 2½	354517		4f' ² G ₂ ² G ₁	2s 2p(² P°)4f	4f ² G	3½ 4½	388190. 3 388290. 0	99. 7
6f ² F ₄	2s²(¹ S)6f	6f ² F°	2½ 3½	354955. 7		4f' ⁴ D ₂ ⁴ D ₁ ⁴ D ₃ ⁴ D ₄	2s 2p(² P°)4f	4f ⁴ D	3½ 2½ 1½ ¾	388273. 4 388310. 9 388359. 2 388386. 6	-37. 5 -48. 3 -27. 4
6g ² G	2s²(¹ S)6g	6g ² G	{ 3½ 4½ }	355214		4f' ² D ₂ ² D ₁	2s 2p(² P°)4f	4f ² D	2½ 1½	388376. 9 388442. 4	-65. 5
4s' ⁴ P ₁ ⁴ P ₂ ⁴ P ₃ ⁴ P ₄	2s 2p(² P°)4s	4s ⁴ P°	¾ 1½ 2½	368525. 6 368588. 3 368704. 8	62. 7 116. 5	3d' ² D ₂ ² D ₁	2s 2p(² P°)3d	3d' ² D°	1½ 2½	396574. 9 396584. 8	9. 9
3p' ² D ₂ ² D ₁	2s 2p(² P°)3p	3p' ² D	1½ 2½	373342 373376	34	5d' ⁴ D ₄	2s 2p(² P°)5d	5d ⁴ D°	¾ 1½ 2½ 3½	409017	
4p' ² P ₁ ² P ₂	2s 2p(² P°)4p	4p ² P	¾ 1½	374747. 4 374805. 3	57. 9						
4p' ⁴ D ₁ ⁴ D ₂ ⁴ D ₃ ⁴ D ₄	2s 2p(² P°)4p	4p ⁴ D	¾ 1½ 2½ 3½	376756. 6 376803. 3 376863. 8 376953. 3	46. 7 60. 5 89. 5						
3p' ² P ₁ ² P ₂	2s 2p(² P°)3p	3p' ² P	¾ 1½	377591 377608	17						

June 1946.

N III OBSERVED TERMS*

Config. $1s^2 +$	Observed Terms		
$2s^2 (1S)2p$	$2p^3 {}^3P^o$		
$2s 2p^3$	{ $2p^3 {}^1S$ $2p^3 {}^4P$ $2p^3 {}^3P$ $2p^3 {}^1D$		
$2p^3$	{ $2p^3 {}^4S^o$ $2p^3 {}^3P^o$ $2p^3 {}^1D^o$		
	$ns (n \geq 3)$	$np (n \geq 3)$	$nd (n \geq 3)$
$2s^2 (1S)nz$	$3-5s {}^1S$	$3, 4p {}^3P^o$	$3-6d {}^1D$
$2s 2p({}^3P^o)nz$	{ $3, 4s {}^4P^o$ $3s {}^3P^o$	$3, 4p {}^4S$ $3, 4p {}^4P$ $3, 4p {}^4D$	$3, 4d {}^4P^o$ $3-5d {}^4D^o$ $3, 4d {}^4F^o$ $3d {}^3P^o$ $3, 4d {}^3D^o$ $3, 4d {}^3F^o$
$2s 2p({}^1P^o)nz'$		$3p' {}^3P$ $3p' {}^3D$	
	$nf (n \geq 4)$	$ng (n \geq 5)$	
$2s^2 (1S)nz$	$4-6f {}^3F^o$	$5, 6g {}^3G$	
$2s 2p({}^3P^o)nz$	{ $4f {}^4D$ $4f {}^4F$ $4f {}^4G$ $4f {}^3D$ $4f {}^3F$ $4f {}^3G$		

*For predicted terms in the spectra of the B I isoelectronic sequence, see Introduction.

N IV

(Be I sequence; 4 electrons)

$Z=7$

Ground state $1s^2 2s^2 {}^1S_0$

$2s^2 {}^1S_0$ 624851 cm^{-1}

I. P. 77.450 volts

The terms are from Edlén's papers. The absolute values of the singlet terms are uncertain, since only two members of the ${}^1D$ -series have been observed. No intersystem combinations have been found. By analogy with N III, Edlén (1936) estimates that $2s^2 {}^1S_0 - 2p {}^3P^o = 67200 \text{ cm}^{-1}$, which gives the absolute value of $2s^2 {}^1S_0$ as 624851 cm^{-1} instead of the earlier value 624499 cm^{-1} . The relative uncertainty x , therefore probably does not exceed $\pm 300 \text{ cm}^{-1}$.

The terms $4p {}^3P^o$, $4f {}^3F^o$, $5g {}^3G$, and $3d {}^3F^o$ are from the 1936 reference. Edlén obtains the $4f {}^3F^o$ term by assuming that $5g {}^3G$ is hydrogen-like (absolute value 70500 cm^{-1}) and adopting Freeman's identification of the $4f {}^3F^o - 5g {}^3G$ group of lines. The listed value of $5g {}^3G$ has been adjusted to fit Edlén's adopted value of $4f {}^3F^o$.

The estimated value of $3d {}^3F^o$ is included in the table in brackets.

REFERENCES

- L. J. Freeman, Proc. Roy. Soc. (London) [A] **127**, 330 (1930). (T) (C L)
 B. Edlén, Nova Acta Reg. Soc. Sci. Uppsala [IV] **9**, No. 6, 62 (1934). (T) (C L)
 B. Edlén, Zeit. Phys. **98**, 561 (1936). (I P) (C L)

N IV

N IV

Edlén	Config.	Desig.	J	Level	Interval	Edlén	Config.	Desig.	J	Level	Interval
2s ¹ S ₀	2s ¹	2s ¹ ¹ S	0	0		3d' ¹ F	2p(¹ P°)3d	3d ¹ F°	2, 3, 4	[499851] +x	
2p ¹ P ₀	2s(¹ S)2p	2p ¹ P°	0	67136.4+x	63.2	4p ¹ P	2s(¹ S)4p	4p ¹ P°	0, 1, 2	503625 +x	
¹ P ₁			1	67199.6+x	144.2	3d' ¹ D ₁	2p(¹ P°)3d	3d ¹ D°	1	505487 +x	31
¹ P ₂			2	67343.8+x		¹ D ₂			2	505518 +x	43
2p ¹ P ₁	2s(¹ S)2p	2p ¹ P°	1	130695		¹ D ₃			3	505561 +x	
2p' ¹ P ₀	2p ¹	2p ¹ ¹ P	0	175463.5+x	73.2	3d' ¹ F ₁	2p(¹ P°)3d	3d ¹ F°	3	506292	
¹ P ₁			1	175536.7+x	124.8	4p ¹ P ₁	2s(¹ S)4p	4p ¹ P°	1	507022	
¹ P ₂			2	175661.5+x			2s(¹ S)4d	4d ¹ D	1		
2p' ¹ D ₁	2p ¹	2p ¹ ¹ D	2	188885					2		
2p' ¹ S ₀	2p ¹	2p ¹ ¹ S	0	235370		4d ¹ D ₁			3	511384 +x	
3s ¹ S ₁	2s(¹ S)3s	3s ¹ S	1	377206+x		3d' ¹ P ₂	2p(¹ P°)3d	3d ¹ P°	2	511440 +x	-53
3s ¹ S ₀	2s(¹ S)3s	3s ¹ S	0	388858		¹ P ₁			1	511493 +x	
3p ¹ P ₁	2s(¹ S)3p	3p ¹ P°	1	404521					0		
3p ¹ P ₀	2s(¹ S)3p	3p ¹ P°	0	405893.2+x	15.8	4d ¹ D ₂	2s(¹ S)4d	4d ¹ D	2	514638	
¹ P ₁			1	405909.0+x	35.4	4f ¹ F ₁	2s(¹ S)4f	4f ¹ F°	2	516631 +x	8
¹ P ₂			2	405944.4+x		4f ¹ F ₂			3	516639 +x	11
						4f ¹ F ₃			4	516650 +x	
3d ¹ D ₁	2s(¹ S)3d	3d ¹ D	1	419967.8+x	3.5	3d' ¹ P ₁	2p(¹ P°)3d	3d ¹ P°	1	519414	
¹ D ₂			2	419971.3+x	8.1	4f ¹ F ₂	2s(¹ S)4f	4f ¹ F°	3	521868	
¹ D ₃			3	419979.4+x		5p ¹ P ₁	2s(¹ S)5p	5p ¹ P°	1	550218	
3d ¹ D ₂	2s(¹ S)3d	3d ¹ D	2	429158			2s(¹ S)5d	5d ¹ D	1		
3s' ¹ P ₀	2p(¹ P°)3s	3s ¹ P°	0	465223.0+x	77.6	5d ¹ D ₁			2		
¹ P ₁			1	465300.6+x	162.8				3	552731 +x	
¹ P ₂			2	465463.4+x		5g ¹ G	2s(¹ S)5g	5g ¹ G	3, 4, 5	554419 +x	
3s' ¹ P ₁	2p(¹ P°)3s	3s ¹ P°	1	473032			2s(¹ S)6d	6d ¹ D	1		
3p' ¹ P ₁	2p(¹ P°)3p	3p ¹ P	1	480880					2		
	2p(¹ P°)3p	3p ¹ D	1			6d ¹ D ₁			3	574940 +x	
3p' ¹ D ₁			2	484394 +x	131	4p' ¹ D ₂	2p(¹ P°)4p	4p ¹ D	2	591043	
¹ D ₂			3	484525 +x		4d' ¹ D _{1,2}	2p(¹ P°)4d	4d ¹ D°	1, 2	593665 +x	39
3p' ¹ S ₁	2p(¹ P°)3p	3p ¹ S	1	487542 +x		¹ D ₃			3	593704 +x	
	2p(¹ P°)3p	3p ¹ P	0				N v (¹ S _{1/2})	Limit	-----	624851	
3p' ¹ P ₁			1	494240 +x	98		2p(¹ P°)5d	5d ¹ D°	1		
¹ P ₂			2	494338 +x		5d' ¹ D ₁			2		
3d' ¹ D ₂	2p(¹ P°)3d	3d ¹ D°	2	498315					3	634198 +x	
3p' ¹ D ₂	2p(¹ P°)3p	3p ¹ D	2	499708							

May 1946.

N IV OBSERVED TERMS*

Config. 1s ² +	Observed Terms				
2s ²	2s ² 1S				
2s(2S)2p	{ 2p 3P ^o 2p 1P ^o				
2p ²	{ 2p ² 1S 2p ² 3P 2p ² 1D				
	ns (n≥3)	np (n≥3)		nd (n≥3)	nf (n≥4) ng (n≥5)
2s(2S)nx	{ 3s 3S 3s 1S	3, 4p 3P ^o 3-5p 1P ^o		3-6d 3D 3, 4d 1D	4f 3F ^o 4f 1F ^o 5g 3G
2p(3P ^o)nx	{ 3s 3P ^o 3s 1P ^o	3p 3S	3p 3P 3p 3D 3p 1P 3, 4p 1D	3d 3P ^o 3-5d 3D ^o 3d 1P ^o 3d 1D ^o 3d 1F ^o	

*For predicted terms in the spectra of the Be I isoelectronic sequence, see Introduction.

N V

(Li I sequence; 3 electrons)

$Z=7$

Ground state $1s^2\ 2s\ ^3S_{3/2}$

$2s\ ^3S_{3/2}\ 789532.9\ \text{cm}^{-1}$

I. P. 97.863 volts

Both Edlén and Cady have published analyses of this spectrum. Edlén has recently extended the earlier work and has generously furnished his revised term list in manuscript form. The observed term values in the table are from this unpublished list.

Edlén's extrapolated intervals and the term values for higher series members based on his calculations from the series formula are entered in brackets in the table. These have been taken from his 1933 and 1934 papers.

REFERENCES

- W. Cady, Phys. Rev. **44**, 821 (1933). (T) (C L)
 B. Edlén, Zeit. Astroph. **7**, 378 (1933). (T) (C L)
 B. Edlén, Nova Acta Reg. Soc. Sci. Uppsala [IV] **9**, No. 6, 41 (1934). (T) (C L)
 B. Edlén, unpublished material (Sept. 1947). (I P) (T)

N v						N v					
Edlén	Config.	Desig.	<i>J</i>	Level	Interval	Edlén	Config.	Desig.	<i>J</i>	Level	Interval
2s ² S ₁	2s	2s ² S	$\frac{1}{2}$	0.0		6GH	6g, 6h	6g ² G, etc.	$\left\{ \begin{smallmatrix} 3\frac{1}{2} \\ \text{to} \\ 5\frac{1}{2} \end{smallmatrix} \right\}$	[713335]	
2p ² P ₁ ² P ₃	2p	2p ² P°	$\frac{1}{2}$ $1\frac{1}{2}$	80464.9 80723.3	258.4	7S	7s	7s ² S	$\frac{1}{2}$	[731432]	
3s ² S ₁	3s	3s ² S	$\frac{1}{2}$	456134		7P	7p	7p ² P°	$\left\{ \begin{smallmatrix} \frac{1}{2} \\ 1\frac{1}{2} \end{smallmatrix} \right\}$	732993	
3p ² P ₁ ² P ₃	3p	3p ² P°	$\frac{1}{2}$ $1\frac{1}{2}$	477777.2 477851.4	74.2	7D	7d	7d ² D	$\left\{ \begin{smallmatrix} 1\frac{1}{2} \\ 2\frac{1}{2} \end{smallmatrix} \right\}$	[733516]	
3d ² D ₂ ² D ₃	3d	3d ² D	$1\frac{1}{2}$ $2\frac{1}{2}$	484403 484427	[24]	7F	7f	7f ² F°	$\left\{ \begin{smallmatrix} 2\frac{1}{2} \\ 3\frac{1}{2} \end{smallmatrix} \right\}$	[733547]	
4s ² S ₁	4s	4s ² S	$\frac{1}{2}$	606337		7GHI	7g, etc.	7g ² G, etc.	$\left\{ \begin{smallmatrix} 3\frac{1}{2} \\ \text{to} \\ 6\frac{1}{2} \end{smallmatrix} \right\}$	[733552]	
4p ² P ₁	4p	4p ² P°	$\left\{ \begin{smallmatrix} \frac{1}{2} \\ 1\frac{1}{2} \end{smallmatrix} \right\}$	615150	[32]	8S	8s	8s ² S	$\frac{1}{2}$	[745260]	
4d ² D ₂	4d	4d ² D	$\left\{ \begin{smallmatrix} 1\frac{1}{2} \\ 2\frac{1}{2} \end{smallmatrix} \right\}$	617903	[10]	8P	8p	8p ² P°	$\left\{ \begin{smallmatrix} \frac{1}{2} \\ 1\frac{1}{2} \end{smallmatrix} \right\}$	[746311]	
	5s	5s ² S	$\frac{1}{2}$	673882		8D	8d	8d ² D	$\left\{ \begin{smallmatrix} 1\frac{1}{2} \\ 2\frac{1}{2} \end{smallmatrix} \right\}$	[746649]	
5p ² P ₁	5p	5p ² P°	$\left\{ \begin{smallmatrix} \frac{1}{2} \\ 1\frac{1}{2} \end{smallmatrix} \right\}$	678297	[16]	8F	8f	8f ² F°	$\left\{ \begin{smallmatrix} 2\frac{1}{2} \\ 3\frac{1}{2} \end{smallmatrix} \right\}$	[746670]	
5d ² D ₂	5d	5d ² D	$\left\{ \begin{smallmatrix} 1\frac{1}{2} \\ 2\frac{1}{2} \end{smallmatrix} \right\}$	679725	[5]	8GHIK	8g, etc.	8g ² G, etc.	$\left\{ \begin{smallmatrix} 3\frac{1}{2} \\ \text{to} \\ 7\frac{1}{2} \end{smallmatrix} \right\}$	[746674]	
6S	6s	6s ² S	$\frac{1}{2}$	[709947]							
6p ² P	6p	6p ² P°	$\left\{ \begin{smallmatrix} \frac{1}{2} \\ 1\frac{1}{2} \end{smallmatrix} \right\}$	712464							
6d ² D	6d	6d ² D	$\left\{ \begin{smallmatrix} 1\frac{1}{2} \\ 2\frac{1}{2} \end{smallmatrix} \right\}$	713289							
6F	6f	6f ² F°	$\left\{ \begin{smallmatrix} 2\frac{1}{2} \\ 3\frac{1}{2} \end{smallmatrix} \right\}$	[713327]							
							N vi (¹ S ₀)	Limit		789532.9	

September 1947.

N VI

(He I sequence; 2 electrons)

Z=7Ground state 1s² ¹S₀1s² ¹S₀ 4452800 ± 500 cm⁻¹.

I. P. 551.925 ± 0.062 volts

Tyrén has observed the first three members of the singlet series. They are in the region from 23 Å to 28 Å. He lists also one intersystem combination—a line at 29.084 Å classified as 1s² ¹S₀—2p ³P₁. His unit, 10³ cm⁻¹, has here been changed to cm⁻¹.

Edlén has generously furnished his unpublished manuscript containing absolute values of the triplet terms extrapolated along the He I isoelectronic sequence. The relative positions of the singlet and triplet terms thus determined confirm the intersystem combination reported by Tyrén. The 2s ³S—2p ³P° combination has apparently not been observed, but Edlén regards the extrapolation from the irregular doublet law as very reliable. Brackets are used in the table to indicate extrapolated values not yet confirmed by observation.

REFERENCES

- F. Tyrén, Nova Acta Reg. Soc. Sci. Uppsala [IV] 12, No. 1, 24 (1940). (I P) (T) (C L)
B. Edlén, unpublished material (Sept. 1947). (T)

N VI

N VI

Config.	Desig.	<i>J</i>	Level	Interval	Config.	Desig.	<i>J</i>	Level	Interval
1s ²	1s ² 1S	0	0		1s 3p	3p 1P°	1	4016390	
1s 2s	2s 2S	1	[3385890]		1s 4p	4p 1P°	1	4206810	
1s 2p	2p 1P°	0	[3438270]	[10] [290]	-----				
		1	3438280		N VII (2S _{1/2})	Limit	-----	4452800	
		2	[3438570]						
1s 2p	2p 1P°	1	3473790						

September 1947.

N VII

(H I sequence; 1 electron)

 $Z=7$ Ground state 1s 2S_{1/2}1s 2S_{1/2} cm⁻¹

I. P. volts

Tyrén has observed the Lyman line 1s 2S—2p 1P°. The calculated position of this line 24.779 Å, has been used to obtain the listed value of the 2p 1P° term.

REFERENCE

F. Tyrén, Nova Acta Reg. Soc. Sci. Uppsala [IV] 12. No. 1, 24 (1940). (C L)

N VII

Config.	Desig.	<i>J</i>	Level
1s	1s 2S	½	0
2p	2p 1P°	½, 1½	4035675

November 1946.

OXYGEN

OI

8 electrons

Z=8

Ground state $1s^2 2s^2 2p^4 {}^3P_2$ $2p^4 {}^3P_2$, 109836.7 cm^{-1}

I. P. 13.614 volts

Edlén has published a detailed analysis of this spectrum in which he has revised and extended the earlier work by others. The terms have all been taken from his paper. For the higher series members not included in his main term table, $ns {}^4S^\circ$ and $ns {}^3S^\circ$ ($n=8$ to 11), and $nd {}^4D^\circ$ and $nd {}^3D^\circ$ ($n=8$ to 10) the observed values taken from his discussion of the series formulas (p. 15), in which he compares observed and calculated values, are listed below.

Two terms not derived from observed lines are entered in brackets: $11s {}^4S^\circ$, which is calculated from the series formula and $2s 2p^4 {}^1P^\circ$, which is extrapolated.

Intersystem combinations connect the terms of the singlet, triplet, and quintet systems.

Kiess and Shortley have observed g values for four levels as follows:

Desig.	Obs. g
$3s {}^4S^\circ$	1.999
$3p {}^4P_1$	2.506
${}^3P_2$	1.836
${}^3P_1$	1.666

REFERENCES

- A. Fowler, *Report on Series in Line Spectra* p. 166 (Fleetway Press, London, 1922). (T) (C L)
 R. Frerichs, *Phys. Rev.* **34**, 1239 (1929); **36**, 398 (1930). (T) (C L)
 H. E. White, *Introduction to Atomic Spectra* p. 266 (McGraw-Hill Book Co., Inc., New York, N. Y., 1934). (G D)
 K. R. More and C. A. Rieke, *Phys. Rev.* **50**, 1054 (1936). (Standard wavelengths)
 B. Edlén, *Kungl. Svenska Vetenskapsakad. Handl.* [3] **20**, No. 10, 31 pp. (1943). (I P) (T) (C L)
 W. F. Meggers, *J. Opt. Soc. Am.* **36**, 431 (1946). (Summary hfs)
 C. C. Kiess and G. Shortley, *J. Research Nat. Bur. Std.* **41** (1948) (in press). (Z E)

OI

OI

Config.	Desig.	J	Level	Interval	Config.	Desig.	J	Level	Interval
$2s^2 2p^4$	$2p^4 {}^3P$	2 1 0	0.0 158.5 226.5	-158.5 -68.0	$2s^2 2p^3 ({}^4S^\circ) 4s$	$4s {}^4S^\circ$	1	96225.5	
$2s^2 2p^4$	$2p^4 {}^1D$	2	15867.79		$2s^2 2p^3 ({}^4S^\circ) 3d$	$3d {}^4D^\circ$	4 3,2 2,1,0	97420.24 97420.37 97420.50	-0.13 -0.13
$2s^2 2p^4$	$2p^4 {}^1S$	0	33792.4		$2s^2 2p^3 ({}^4S^\circ) 3d$	$3d {}^3D^\circ$	3,2,1	97488.14	
$2s^2 2p^3 ({}^4S^\circ) 3s$	$3s {}^4S^\circ$	2	73767.81		$2s^2 2p^3 ({}^4S^\circ) 4p$	$4p {}^4P$	1 2 3	99092.64 99093.31 99094.52	0.67 1.21
$2s^2 2p^3 ({}^4S^\circ) 3s$	$3s {}^3S^\circ$	1	76794.69		$2s^2 2p^3 ({}^4S^\circ) 4p$	$4p {}^3P$	2,1,0	99680.4	
$2s^2 2p^3 ({}^4S^\circ) 3p$	$3p {}^4P$	1 2 3	86625.35 86627.37 86631.04	2.02 3.67	$2s^2 2p^3 ({}^3D^\circ) 3s$	$3s' {}^3D^\circ$	3 2 1	101135.04 101147.21 101155.10	-12.17 -7.89
$2s^2 2p^3 ({}^4S^\circ) 3p$	$3p {}^3P$	2 1 0	88630.84 88630.30 88631.00	0.54 -0.70	$2s^2 2p^3 ({}^4S^\circ) 5s$	$5s {}^4S^\circ$	2	102118.21	
$2s^2 2p^3 ({}^4S^\circ) 4s$	$4s {}^4S^\circ$	2	95476.43		$2s^2 2p^3 ({}^4S^\circ) 5s$	$5s {}^3S^\circ$	1	102411.65	

O I—Continued

Config.	Desig.	J	Level	Interval	Config.	Desig.	J	Level	Interval
$2s^2 2p^3(^1D^o)3s$	$3s' ^1D^o$	2	102661. 63		$2s^2 2p^3(^1D^o)3p$	$3p' ^1D$	2	116630. 51	
$2s^2 2p^3(^1S^o)4d$	$4d ^1D^o$	4 3 2 1 0	102865. 09		$2s^2 2p^3(^1D^o)4s$	$4s' ^1D^o$	2	122798. 7	
					$2s^2 2p^3(^1D^o)3d$	$3d' ^1P^o$	2 1 0	123296. 6 123355. 2 123386. 9	-58. 6 -31. 7
$2s^2 2p^3(^1S^o)4d$	$4d ^1D^o$	3, 2, 1	102908. 14		$2s^2 2p^3(^1D^o)3d$	$3d' ^1F^o$	4 3 2	124213. 18	
$2s^2 2p^3(^1S^o)5p$	$5p ^1P$	2, 1, 0	103869. 4						
$2s^2 2p^3(^1S^o)6s$	$6s ^1S^o$	2	105019. 0		$2s^2 2p^3(^1D^o)3d$	$3d' ^1G^o$	4	124238. 21	
$2s^2 2p^3(^1S^o)6s$	$6s ^1S^o$	1	105164. 90		$2s^2 2p^3(^1D^o)3d$	$3d' ^1G^o$	5 4 3	124239. 66 124258. 37 124252. 52	-18. 71 5. 85
$2s^2 2p^3(^1S^o)5d$	$5d ^1D^o$	4 to 0	105385. 3						
$2s^2 2p^3(^1S^o)5d$	$5d ^1D^o$	3, 2, 1	105408. 58		$2s^2 2p^3(^1D^o)3d$	$3d' ^1F^o$	3	124326. 32	
$2s^2 2p^3(^1S^o)6p$	$6p ^1P$	2, 1, 0	105911. 3		$2s^2 2p^3(^1D^o)4p$	$4p' ^1D$	3 2 1	125774. 51 125782. 09 125787. 14	-7. 58 -5. 05
$2s^2 2p^3(^1S^o)7s$	$7s ^1S^o$	2	106545. 1						
$2s^2 2p^3(^1S^o)7s$	$7s ^1S^o$	1	106627. 9		$2s 2p^5$	$2p^5 ^1P^o$	2 1 0	126266. 48 126339. 92 126383. 44	-73. 44 -43. 52
$2s^2 2p^3(^1S^o)6d$	$6d ^1D^o$	4 to 0	106751. 2						
$2s^2 2p^3(^1S^o)6d$	$6d ^1D^o$	3, 2, 1	106765. 8		$2s^2 2p^3(^1P^o)3p$	$3p'' ^1D$	3 2 1	127281. 85 127287. 62 127290. 93	-5. 77 -3. 31
$2s^2 2p^3(^1S^o)8s$	$8s ^1S^o$	2	107445. 4						
$2s^2 2p^3(^1S^o)8s$	$8s ^1S^o$	1	107497. 1		$2s^2 2p^3(^1P^o)3p$	$3p'' ^1P$	1	127667. 85	
$2s^2 2p^3(^1S^o)7d$	$7d ^1D^o$	4 to 0	107573. 1		$2s^2 2p^3(^1P^o)3p$	$3p'' ^1D$	2	128595. 02	
$2s^2 2p^3(^1S^o)7d$	$7d ^1D^o$	3, 2, 1	107582. 7		$2s^2 2p^3(^1D^o)5s$	$5s' ^1D^o$	2	129134. ±	
$2s^2 2p^3(^1S^o)9s$	$9s ^1S^o$	2	108021. 4		$2s^2 2p^3(^1D^o)4d$	$4d' ^1F^o$	4 3 2	129666. 55	
$2s^2 2p^3(^1S^o)9s$	$9s ^1S^o$	1	108057. 6						
$2s^2 2p^3(^1S^o)8d$	$8d ^1D^o$	4 to 0	108105. 7		$2s^2 2p^3(^1D^o)4d$	$4d' ^1G^o$	4	129679. 49	
$2s^2 2p^3(^1S^o)8d$	$8d ^1D^o$	3, 2, 1	108116. 6		$2s^2 2p^3(^1D^o)4d$	$4d' ^1G^o$	5 4 3	129680. 14 129699. 16 129693. 08	-19. 02 6. 08
$2s^2 2p^3(^1S^o)10s$	$10s ^1S^o$	2	108412. 0						
$2s^2 2p^3(^1S^o)10s$	$10s ^1S^o$	1	108436. 1		$2s^2 2p^3(^1D^o)4d$	$4d' ^1F^o$	3	129736. 60	
$2s^2 2p^3(^1S^o)9d$	$9d ^1D^o$	4 to 0	108470. 2		$2s^2 2p^3(^1D^o)4d$	$4d' ^1P^o$	2 1 0	129969. 60 129979. 04 129984. 15	-9. 44 -5. 11
$2s^2 2p^3(^1S^o)9d$	$9d ^1D^o$	3, 2, 1	108477. 8						
$2s^2 2p^3(^1S^o)11s$	$11s ^1S^o$	2	[108688. 4]		$2s^2 2p^3(^1P^o)3p$	$3p'' ^1S$	0	130943. 21	
$2s^2 2p^3(^1S^o)11s$	$11s ^1S^o$	1	108707. 3		$2s^2 2p^3(^1D^o)6s$	$6s' ^1D^o$	2	131927. ±	
$2s^2 2p^3(^1S^o)10d$	$10d ^1D^o$	4 to 0	108731. 5		$2s^2 2p^3(^1D^o)5d$	$5d' ^1F^o$	4 3 2	132190. 7 ±	
$2s^2 2p^3(^1S^o)10d$	$10d ^1D^o$	3, 2, 1	108734. 4						
O II ($^1Si_{11}$)	Limit		109836. 7		$2s^2 2p^3(^1D^o)5d$	$5d' ^1G^o$	4	132197. 6 ±	
$2s^2 2p^3(^1D^o)3p$	$3p' ^1D$	3 2 1	113294. 42 113294. 55 113298. 01	-0. 13 -3. 46	$2s^2 2p^3(^1D^o)5d$	$5d' ^1G^o$	5 4 3	132198. 1 132217. 3	-19. 7
$2s^2 2p^3(^1D^o)3p$	$3p' ^1F$	4 3 2	113714. 06 113721. 06 113726. 81	-7. 00 -5. 75					
$2s^2 2p^3(^1P^o)3s$	$3s'' ^1P^o$	2 1 0	113910. 20 113920. 63 113926. 80	-10. 43 -6. 17	$2s^2 2p^3(^1D^o)5d$	$5d' ^1P^o$	2, 1 0	132310. ±	
$2s^2 2p^3(^1D^o)3p$	$3p' ^1F$	3	113995. 81		$2s^2 2p^3(^1D^o)7s$	$7s' ^1D^o$	2	133413. ±	
$2s^2 2p^3(^1P^o)3s$	$3s'' ^1P^o$	1	115918. 30		$2s^2 2p^3(^1D^o)6d$	$6d' ^1P^o$	2, 1 0	133618. ±	
					$2s 2p^5$	$2p^5 ^1P^o$	1	[139837]	

August 1947.

O I OBSERVED TERMS*

Config. 1s ² +	Observed Terms		
2s ² 2p ⁴	{ 2p ⁴ ¹ S 2p ⁴ ³ P 2p ⁴ ¹ D		
2s 2p ⁵	2p ⁵ ³ P ^o		
	ns (n ≥ 3)	np (n ≥ 3)	nd (n ≥ 3)
2s ² 2p ³ (⁴ S ^o) n π	{ 3-10s ⁴ S ^o 3-11s ⁴ S ^o	3, 4p ⁴ P 3-6p ⁴ P	3-10d ⁴ D ^o 3-10d ⁴ D ^o
2s ² 2p ³ (² D ^o) n π '	{ 3s' ³ D ^o 3-7s' ¹ D ^o	3, 4p' ³ D 3p' ³ F 3p' ¹ D 3p' ¹ F	3-6d' ³ P ^o 3-5d' ³ F ^o 3-5d' ³ G ^o 3, 4d' ¹ F ^o 3-5d' ¹ G ^o
2s ² 2p ³ (² P ^o) n π ''	{ 3s'' ³ P ^o 3s'' ¹ P ^o	3p'' ¹ S 3p'' ¹ P 3p'' ³ D 3p'' ¹ D	

*For predicted terms in the spectra of the O I isoelectronic sequence, see Introduction.

O II

(N I sequence; 7 electrons)

Z=8

Ground state 1s² 2s² 2p³ ⁴S_{1/2}

2p³ ⁴S_{1/2} 283550.9 cm⁻¹

I. P. 35.146 volts

The terms are from Edlén's publications. He has summarized the earlier work on analysis by others and extended it by his observations in the far ultraviolet.

Edlén states that a number of the 5f-terms are very uncertain. These are followed by a "?" in the table. His estimated values of three terms from the (¹S) limit in O III are given in brackets.

Mihul lists the observed Zeeman effects for 111 lines, which in general agree well with the theoretical patterns for the adopted classifications. From his data a number of g-values could be calculated, but many of the observed patterns are unresolved.

Although the analysis of O II is fairly complete, the measures by different observers are discordant. The term values could be greatly improved by a set of homogeneous observations. A monograph containing all classified lines of this spectrum is also needed.

The doublet and quartet terms are connected by intersystem combinations, but the sextet terms are not so connected with the rest. The relative uncertainty, $\pm$, may be a few hundred cm⁻¹.

REFERENCES

- I. S. Bowen, Phys. Rev. **29**, 231 (1927). (T) (C L)
A. Fowler, Proc. Roy. Soc. (London) [A] **110**, 476 (1926). (T) (C L)
C. Mihul, Ann. de Phys. [10] **9**, 294 (1928). (T) (C L) (Z E)
H. N. Russell, Phys. Rev. **31**, 27 (1928). (T) (C L)
B. Edlén, Nova Acta Reg. Soc. Sci. Uppsala [IV] **9**, No. 6, 136 (1934). (I P) (T) (C L) (G D)
B. Edlén, Zeit. Phys. **93**, 728 (1935). (T) (C L)

O II

O II

Edlén	Config.	Desig.	J	Level	Interval	Edlén	Config.	Desig.	J	Level	Interval
2p ¹ S ₁	2s ² 2p ³	2p ³ ¹ S°	1½	0. 0		3d ¹ P ₁	2s ² 2p ³ (¹ P)3d	3d ¹ P	1½	233430. 10	-113.99
2p ¹ D ₃	2s ² 2p ³	2p ³ ¹ D°	2¼	26808. 4	-21. 0	3d ¹ D ₃	2s ² 2p ³ (¹ P)3d	3d ¹ D	1½	234402. 48	51. 97
2p ¹ P ₁	2s ² 2p ³	2p ³ ¹ P°	1¼	40466. 9	-1. 5	4s ¹ P ₁	2s ² 2p ³ (¹ P)4s	4s ¹ P	¼	238626. 32	105. 22
2p' ¹ P ₂	2s 2p ⁴	2p ⁴ ¹ P	2¼	119837. 7	-163. 4	4s ¹ P ₂	2s ² 2p ³ (¹ P)4s	4s ¹ P	1½	238731. 54	161. 42
2p' ¹ P ₃	2s 2p ⁴	2p ⁴ ¹ P	1½	120001. 1	-82. 4	4s ¹ P ₃	2s ² 2p ³ (¹ P)4s	4s ¹ P	2¼	238892. 96	
2p' ¹ D ₁	2s 2p ⁴	2p ⁴ ¹ D	2¼	165987. 7	-8. 3	4s ¹ P ₂	2s ² 2p ³ (¹ P)4s	4s ¹ P	¼	240328. 75	187. 53
2p' ¹ D ₃	2s 2p ⁴	2p ⁴ ¹ D	1½	165996. 0		3s' ¹ S ₁	2s 2p ³ (¹ S°)3s	3s''' ¹ S°	2¼	245595. 5 + x	
3s ¹ P ₁	2s ² 2p ³ (¹ P)3s	3s ¹ P	½	185235. 36	105. 32	4p ¹ D ₁	2s ² 2p ³ (¹ P)4p	4p ¹ D°	¼	245767. 80	48. 49
3s ¹ P ₂	2s ² 2p ³ (¹ P)3s	3s ¹ P	1½	185340. 68	158. 52	4p ¹ D ₂	2s ² 2p ³ (¹ P)4p	4p ¹ D°	1¼	245816. 29	86. 56
3s ¹ P ₃	2s ² 2p ³ (¹ P)3s	3s ¹ P	2¼	185499. 20		4p ¹ D ₃	2s ² 2p ³ (¹ P)4p	4p ¹ D°	2¼	245902. 85	126. 10
3s ¹ P ₁	2s ² 2p ³ (¹ P)3s	3s ¹ P	½	188888. 38	179. 99	4p ¹ D ₂	2s ² 2p ³ (¹ P)4p	4p ¹ D°	1¼	248009. 1	176. 2
3s ¹ P ₂	2s ² 2p ³ (¹ P)3s	3s ¹ P	1½	189068. 37		4p ¹ D ₃	2s ² 2p ³ (¹ P)4p	4p ¹ D°	2¼	248185. 8	
2p' ¹ S ₁	2s 2p ⁴	2p ⁴ ¹ S	¼	195710. 4		4p ¹ P ₁	2s ² 2p ³ (¹ P)4p	4p ¹ P°	¼	248125. 35	88. 88
3p ¹ S ₁	2s ² 2p ³ (¹ P)3p	3p ¹ S°	¼	203942. 21		4p ¹ P ₂	2s ² 2p ³ (¹ P)4p	4p ¹ P°	1¼	248514. 23	
3p ¹ D ₁	2s ² 2p ³ (¹ P)3p	3p ¹ D°	¼	206730. 80	55. 54		2s ² 2p ³ (¹ S)3p	3p'' ¹ P°	½	[250251]	
3p ¹ D ₂	2s ² 2p ³ (¹ P)3p	3p ¹ D°	1¼	206786. 34	91. 56		2s ² 2p ³ (¹ S)3p	3p'' ¹ P°	1½		
3p ¹ D ₃	2s ² 2p ³ (¹ P)3p	3p ¹ D°	2¼	206877. 90	124. 62	3d ¹ F ₁	2s ² 2p ³ (¹ D)3d	3d' ¹ F	3¼	251220. 9	-3. 2
3p ¹ D ₁	2s ² 2p ³ (¹ P)3p	3p ¹ D°	3¼	207002. 52		3d ¹ F ₂	2s ² 2p ³ (¹ D)3d	3d' ¹ F	2¼	251224. 1	
3s' ¹ D ₁	2s ² 2p ³ (¹ D)3s	3s' ¹ D	2¼	206971. 3	-1. 0	3d ¹ G ₁	2s ² 2p ³ (¹ D)3d	3d' ¹ G	4½	252607. 7	-1. 2
3s' ¹ D ₂	2s ² 2p ³ (¹ D)3s	3s' ¹ D	1½	206972. 3		3d ¹ G ₂	2s ² 2p ³ (¹ D)3d	3d' ¹ G	3½	252608. 9	
3p ¹ P ₁	2s ² 2p ³ (¹ P)3p	3p ¹ P°	¼	208346. 17	46. 10	3d ¹ D ₁	2s ² 2p ³ (¹ D)3d	3d' ¹ D	1½	253046. 23	2. 12
3p ¹ P ₂	2s ² 2p ³ (¹ P)3p	3p ¹ P°	1¼	208392. 27	91. 97	3d ¹ D ₂	2s ² 2p ³ (¹ D)3d	3d' ¹ D	2¼	253048. 35	
3p ¹ P ₃	2s ² 2p ³ (¹ P)3p	3p ¹ P°	2¼	208484. 24		3d ¹ D ₃	2s ² 2p ³ (¹ D)3d	3d' ¹ D	1½	253789. 51	2. 36
3p ¹ D ₁	2s ² 2p ³ (¹ P)3p	3p ¹ D°	1¼	211521. 98	190. 68	3d ¹ P ₁	2s ² 2p ³ (¹ D)3d	3d' ¹ P	¼	253791. 87	
3p ¹ D ₂	2s ² 2p ³ (¹ P)3p	3p ¹ D°	2¼	211712. 66		3d ¹ P ₂	2s ² 2p ³ (¹ D)3d	3d' ¹ P	1¼		
3p ¹ S ₁	2s ² 2p ³ (¹ P)3p	3p ¹ S°	1½	212161. 94			2s ² 2p ³ (¹ P)4d	4d ¹ F	1½		
2p' ¹ P ₂	2s 2p ⁴	2p ⁴ ¹ P	1½	212593. 2	-169.2	4d ¹ F ₁	2s ² 2p ³ (¹ P)4d	4d ¹ F	2¼	254481. 5	109. 2
2p' ¹ P ₃	2s 2p ⁴	2p ⁴ ¹ P	¼	212762. 4		4d ¹ F ₂	2s ² 2p ³ (¹ P)4d	4d ¹ F	3¼	254590. 7	
3p ¹ P ₁	2s ² 2p ³ (¹ P)3p	3p ¹ P°	¼	214169. 74	59. 74		2s ² 2p ³ (¹ P)4d	4d ¹ D	4¼		
3p ¹ P ₂	2s ² 2p ³ (¹ P)3p	3p ¹ P°	1¼	214229. 48		4d ¹ D ₁	2s ² 2p ³ (¹ P)4d	4d ¹ D	½		
	2s ² 2p ³ (¹ S)3s	3s'' ¹ S	¼	[226851]			2s ² 2p ³ (¹ P)4d	4d ¹ D	1½	254895. 2	
3p ¹ F ₁	2s ² 2p ³ (¹ D)3p	3p' ¹ F°	2¼	228723. 3	23. 6	3s' ¹ S ₁	2s 2p ³ (¹ S°)3s	3s''' ¹ S°	2¼	254982. 2	
3p ¹ F ₂	2s ² 2p ³ (¹ D)3p	3p' ¹ F°	3¼	228746. 9		4d ¹ P ₁	2s ² 2p ³ (¹ P)4d	4d ¹ P	1½	255104. 6	-36. 3
3p ¹ D ₁	2s ² 2p ³ (¹ D)3p	3p' ¹ D°	2¼	229946. 6	-21. 6	4d ¹ P ₂	2s ² 2p ³ (¹ P)4d	4d ¹ P	¼	255140. 9	-21. 7
3p ¹ D ₂	2s ² 2p ³ (¹ D)3p	3p' ¹ D°	1¼	229968. 2		4d ¹ P ₃	2s ² 2p ³ (¹ P)4d	4d ¹ P	1½	255162. 6	
3d ¹ F ₁	2s ² 2p ³ (¹ P)3d	3d ¹ F	1½	231296. 05	54. 03	4d ¹ P ₁	2s ² 2p ³ (¹ P)4d	4d ¹ P	¼	255172. 5	-108. 9
3d ¹ F ₂	2s ² 2p ³ (¹ P)3d	3d ¹ F	2¼	231350. 08	77. 91	4d ¹ P ₂	2s ² 2p ³ (¹ P)4d	4d ¹ P	1½	255281. 4	
3d ¹ F ₃	2s ² 2p ³ (¹ P)3d	3d ¹ F	3¼	231427. 99	102. 27	4d ¹ F ₁	2s ² 2p ³ (¹ P)4d	4d ¹ F	2¼	255301. 3	163. 9
3d ¹ F ₄	2s ² 2p ³ (¹ P)3d	3d ¹ F	4¼	231530. 26		4d ¹ F ₂	2s ² 2p ³ (¹ P)4d	4d ¹ F	3¼	255465. 2	
3d ¹ P ₁	2s ² 2p ³ (¹ P)3d	3d ¹ P	2¼	232462. 83	-73. 23	3d ¹ S ₁	2s ² 2p ³ (¹ D)3d	3d' ¹ S	¼	255622. 4	
3d ¹ P ₂	2s ² 2p ³ (¹ P)3d	3d ¹ P	1½	232536. 06	-66. 51	4f ¹ D ₁	2s ² 2p ³ (¹ P)4f	4f ¹ D°	2¼	255689. 6	-122. 6
3d ¹ P ₃	2s ² 2p ³ (¹ P)3d	3d ¹ P	¼	232602. 57		4f ¹ D ₂	2s ² 2p ³ (¹ P)4f	4f ¹ D°	1½	255682. 2	
3p ¹ P ₁	2s ² 2p ³ (¹ D)3p	3p' ¹ P°	¼	232480. 1	46. 6	4f ¹ D ₃	2s ² 2p ³ (¹ P)4f	4f ¹ D°	3¼	255691. 4	-121. 7
3p ¹ P ₂	2s ² 2p ³ (¹ D)3p	3p' ¹ P°	1½	232526. 7		4f ¹ D ₁	2s ² 2p ³ (¹ P)4f	4f ¹ D°	2¼	255813. 1	-100
3d ¹ D ₁	2s ² 2p ³ (¹ P)3d	3d ¹ D	¼	232711. 70	34. 28	4f ¹ D ₂	2s ² 2p ³ (¹ P)4f	4f ¹ D°	1½	255913. ±	1
3d ¹ D ₂	2s ² 2p ³ (¹ P)3d	3d ¹ D	1½	232745. 98	1. 53	4f ¹ D ₃	2s ² 2p ³ (¹ P)4f	4f ¹ D°	¼	255912. 0	
3d ¹ D ₃	2s ² 2p ³ (¹ P)3d	3d ¹ D	2¼	232747. 51	6. 35						
3d ¹ D ₄	2s ² 2p ³ (¹ P)3d	3d ¹ D	3¼	232753. 86							
3d ¹ F ₁	2s ² 2p ³ (¹ P)3d	3d ¹ F	2¼	232796. 27	162. 99						
3d ¹ F ₂	2s ² 2p ³ (¹ P)3d	3d ¹ F	3¼	232959. 26							

O II—Continued

O II—Continued

Eldén	Config.	Desig.	J	Level	Interval	Eldén	Config.	Desig.	J	Level	Interval
4f ⁴ G ₅ ⁴ G ₄ ⁴ G ₃ ⁴ G ₂	2s ² 2p ² (³ P) 4f	4f ⁴ G°	2½ 3½ 4½ 5½	255755.8 255759.4 255827.6 255977.5	3.6 68.2 149.9	5f ⁴ G ₄ ⁴ G ₃	2s ² 2p ² (³ P) 5f	5f ⁴ G°	3½ 4½	265763.0 265930.2	167.2
4f ⁴ G ₄ ⁴ G ₃	2s ² 2p ² (³ P) 4f	4f ⁴ G°	3½ 4½	255829.4 255983.6	154.2	5d ⁴ D ₃	2s ² 2p ² (³ P) 5d	5d ⁴ D	1½ 2½	265856	
4d ⁴ D ₃ ⁴ D ₂	2s ² 2p ² (³ P) 4d	4d ⁴ D	1½ 2½	255843.1 255897.2	54.1	5f ⁴ F ₂ ⁴ F ₁ ⁴ F ₃	2s ² 2p ² (³ P) 5f	5f ⁴ F°	1½ 2½ 3½ 4½	265928? 265961? 265985 265999	33 24 14
4f ⁴ F ₂ ⁴ F ₁ ⁴ F ₃ ⁴ F ₄	2s ² 2p ² (³ P) 4f	4f ⁴ F°	1½ 2½ 3½ 4½	256083.5 256087.6 256123.1 256136.2	4.1 35.5 13.1	5f ⁴ F ₃ ⁴ F ₄	2s ² 2p ² (³ P) 5f	5f ⁴ F°	2½ 3½	265988? 265999?	11
4f ⁴ F ₃ ⁴ F ₄	2s ² 2p ² (³ P) 4f	4f ⁴ F°	2½ 3½	256125.8 256143.3	17.5	3p' ³ P ₂ ³ P ₁ ³ P ₀	2s 2p ² (³ S°) 3p	3p''' ³ P	1½ 2½ 3½	267763.39+x 267770.85+x 267783.40+x	7.46 12.55
5s ⁴ P ₁ ⁴ P ₂ ⁴ P ₃	2s ² 2p ² (³ P) 5s	5s ⁴ P	½ 1½ 2½	257693.7 257797.9 257963.8	104.2 165.9	4d ⁴ F ₃ ⁴ F ₄	2s ² 2p ² (¹ D) 4d	4d' ⁴ F	2½ 3½	274739.2 274782.4	43.2
5s ⁴ P ₁ ⁴ P ₂	2s ² 2p ² (³ P) 5s	5s ⁴ P	½ 1½	258408.6 258601.7	193.1	4d ⁴ D ₃	2s ² 2p ² (¹ D) 4d	4d' ⁴ D	{ 1½ 2½ }	274920	
4s ⁴ D ₃ ⁴ D ₂	2s ² 2p ² (¹ D) 4s	4s' ⁴ D	2½ 1½	259286.2 259287.0	-0.8	4d ⁴ P ₁	2s ² 2p ² (¹ D) 4d	4d' ⁴ P	{ ½ 1½ }	275611?	
5p ⁴ D ₃ ⁴ D ₂ ⁴ D ₁	2s ² 2p ² (³ P) 5p	5p ⁴ D°	1½ 2½ 3½	260959 261042 261180	83 138	4f ⁴ G	2s ² 2p ² (¹ D) 4f	4f' ⁴ G°	{ 3½ 4½ }	275841.3	
5p ⁴ P ₂ ⁴ P ₃	2s ² 2p ² (³ P) 5p	5p ⁴ P°	½ 1½ 2½	261261.7 261354.3	92.6	4f ⁴ F	2s ² 2p ² (¹ D) 4f	4f' ⁴ F°	{ 2½ 3½ }	275879.6	
5p ⁴ D ₂ ⁴ D ₃	2s ² 2p ² (³ P) 5p	5p ⁴ D°	1½ 2½	261697.5 261869.4	171.9		2s ² 2p ² (³ S) 3d	3d'' ⁴ D	{ 1½ 2½ }	[275951]	
5d ⁴ D ₃	2s ² 2p ² (³ P) 5d	5d ⁴ D	½ { 1½ 2½ 3½ }	265220.3		4d ⁴ S ₁	2s ² 2p ² (¹ D) 4d	4d' ⁴ S	½	275997?	
5d ⁴ P ₃ ⁴ P ₁	2s ² 2p ² (³ P) 5d	5d ⁴ P	2½ { 1½ ½ }	265431.5 265468.2	-36.7	4f ⁴ D	2s ² 2p ² (¹ D) 4f	4f' ⁴ D°	{ 1½ 2½ }	276066.3	
5d ⁴ F ₄	2s ² 2p ² (³ P) 5d	5d ⁴ F	2½ 3½	265578?		4f ⁴ H	2s ² 2p ² (¹ D) 4f	4f' ⁴ H°	{ 4½ 5½ }	276109.1	
5f ⁴ D ₄ ⁴ D ₃ ⁴ D ₂ ⁴ D ₁	2s ² 2p ² (³ P) 5f	5f ⁴ D°	3½ 2½ 1½ ½	265639 265705? 265762? 265859?	-66 -57 -97	4f ⁴ P	2s ² 2p ² (¹ D) 4f	4f' ⁴ P°	{ ½ 1½ }	276263.9?	
5f ⁴ G ₃ ⁴ G ₄ ⁴ G ₅ ⁴ G ₆	2s ² 2p ² (³ P) 5f	5f ⁴ G°	2½ 3½ 4½ 5½	265665? 265691 265761 265925	26 70 164	5s ⁴ D ₃	2s ² 2p ² (¹ D) 5s	5s' ⁴ D	{ 1½ 2½ }	278140	
						O III (³ P ₀)	Limit			283550.9	
						3d' ⁴ D ₅ ⁴ D ₄ ⁴ D ₃ ⁴ D ₂ ⁴ D ₁	2s 2p ² (³ S°) 3d	3d''' ⁴ D°	4½ 3½ 2½ 1½ ½	291895.90+x 291896.78+x 291898.01+x 291899.11+x 291899.81+x	-0.88 -1.23 -1.10 -0.70
						4s' ⁴ S ₃	2s 2p ² (³ S°) 4s	4s''' ⁴ S°	2½	298849.2 +x	

December 1947.

O II OBSERVED TERMS*

Config. $1s^2+$	Observed Terms	
$2s^2 2p^3$	{ $2p^3 {}^4S^\circ$ $2p^3 {}^2P^\circ$ $2p^3 {}^2D^\circ$	
$2s 2p^4$	{ $2p^4 {}^1S$ $2p^4 {}^1P$ $2p^4 {}^1D$ $2p^4 {}^3S$ $2p^4 {}^3P$ $2p^4 {}^3D$	
	ns ($n \geq 3$)	np ($n \geq 3$)
$2s^2 2p^2({}^1P)nx$	{ $3-5s {}^4P$ $3-5s {}^2P$ $3-5s' {}^2D$	$3p {}^4S^\circ$ $3, 5p {}^4P^\circ$ $3-5p {}^4D^\circ$ $3p {}^2S^\circ$ $3, 4p {}^2P^\circ$ $3-5p {}^2D^\circ$
$2s^2 2p^2({}^1D)nx'$		$3p' {}^2P^\circ$ $3p' {}^2D^\circ$ $3p' {}^2F^\circ$
$2s 2p^3({}^4S^\circ)nx'''$	{ $3, 4s''' {}^4S^\circ$ $3s''' {}^4S^\circ$	$3p''' {}^4P$
	nd ($n \geq 3$)	nf ($n \geq 4$)
$2s^2 2p^2({}^3P)nx$	{ $3-5d {}^4P$ $3-5d {}^4D$ $3, 4d {}^4F$ $3, 4d {}^2P$ $3-5d {}^2D$ $3-5d {}^2F$	$4, 5f {}^4D^\circ$ $4, 5f {}^4F^\circ$ $4, 5f {}^4G^\circ$ $4f {}^2D^\circ$ $4, 5f {}^2F^\circ$ $4, 5f {}^2G^\circ$
$2s^2 2p^2({}^1D)nx'$		$4f' {}^2P^\circ$ $4f' {}^2D^\circ$ $4f' {}^2F^\circ$ $4f' {}^2G^\circ$ $4f' {}^2H^\circ$
$2s 2p^3({}^4S^\circ)nx'''$	{ $3d''' {}^4D^\circ$	

*For predicted terms in the spectra of the N I isoelectronic sequence, see Introduction.

O III

(C I sequence; 6 electrons)

 $Z=8$ Ground state $1s^2 2s^2 2p^2 {}^3P_0$ $2p^2 {}^3P_0$ 443193.5 cm^{-1}

I. P. 54.934 volts

The terms are from the papers by Edlén. The singlet, triplet and quintet terms are connected by intersystem combinations. Edlén has kindly furnished some unpublished results for inclusion here, namely, that intersystem combinations with quintet terms indicate that his published absolute values of these terms should be decreased by 418 cm^{-1} . This correction has been incorporated into the tabular values of the quintet terms.

REFERENCES

- C. Mihul, Ann. de Phys. [10] 9, 326 (1928). (T) (C L) (Z E)
 A. Fowler, Proc. Roy. Soc. (London) [A] 117, 317 (1928). (T) (C L)
 B. Edlén, Nova Acta Reg. Soc. Sci Uppsala [IV] 9, No. 6, 115 (1934). (I P) (T) (C L) (G D)
 B. Edlén, Zeit. Phys. 33, 726 (1935). (T) (C L)
 B. Edlén, Naturwiss. 30, 279 (1942). (T) (C L)
 B. Edlén, unpublished material (Dec. 1947). (T)

O III

O III

Edlén	Config.	Desig.	J	Level	Interval	Edlén	Config.	Desig.	J	Level	Interval
$2p\ ^1P_0$ $\ ^1P_1$ $\ ^1P_2$	$2s\ 2p^3$	$2p^3\ ^1P$	0 1 2	0.0 113.4 306.8	113.4 193.4	$3s'\ ^1P_0$ $\ ^1P_1$ $\ ^1P_2$	$2s\ 2p^2(^1P)3s$	$3s\ ^1P$	0 1 2	350026.1 350122.9 350302.3	96.8 179.4
$2p\ ^1D_2$	$2s\ 2p^3$	$2p^3\ ^1D$	2	20271.0		$4s\ ^1P_0$ $\ ^1P_1$ $\ ^1P_2$	$2s\ 2p(^3P^o)4s$	$4s\ ^1P^o$	0 1 2	356732 356833 357111	106 273
$2p'\ ^1S_2$	$2s\ 2p^3$	$2p^3\ ^1S^o$	2	60312.1		$4s\ ^1P_1$	$2s\ 2p(^3P^o)4s$	$4s\ ^1P^o$	1	358667.4	
$2p'\ ^1D_2$ $\ ^1D_3$ $\ ^1D_1$	$2s\ 2p^3$	$2p^3\ ^1D^o$	3 2 1	120025.4 120052.6 120058.5	-27.2 -5.9	$3p'\ ^1S_1$	$2s\ 2p^2(^1P)3p$	$3p\ ^1S^o$	1	363266.8	
$2p'\ ^1P_2$ $\ ^1P_1$ $\ ^1P_0$	$2s\ 2p^3$	$2p^3\ ^1P^o$	2 1 0	142381.7 142382.8 142396.9	-1.1 -14.1	$3p'\ ^1D_0$ $\ ^1D_1$ $\ ^1D_2$ $\ ^1D_3$ $\ ^1D_4$	$2s\ 2p^2(^1P)3p$	$3p\ ^1D^o$	0 1 2 3 4	365515.76 365550.60 365619.12 365719.16 365846.46	34.84 68.52 100.04 127.30
$2p'\ ^1D_2$	$2s\ 2p^3$	$2p^3\ ^1D^o$	2	187049.4		$4p\ ^1P_1$	$2s^2\ 2p(^3P^o)4p$	$4p\ ^1P$	1	365723.9	
$2p'\ ^1S_1$	$2s\ 2p^3$	$2p^3\ ^1S^o$	1	197086.7		$4p\ ^1D_1$ $\ ^1D_2$ $\ ^1D_3$	$2s^2\ 2p(^3P^o)4p$	$4p\ ^1D$	1 2 3	366486.91 366594.01 366801.04	107.10 207.03
$2p'\ ^1P_1$	$2s\ 2p^3$	$2p^3\ ^1P^o$	1	210458.5		$4p\ ^1S_1$	$2s^2\ 2p(^3P^o)4p$	$4p\ ^1S$	1	367952.20	
$3s\ ^1P_0$ $\ ^1P_1$ $\ ^1P_2$	$2s^2\ 2p(^3P^o)3s$	$3s\ ^1P^o$	0 1 2	267257.29 267376.65 267632.59	118.36 256.94	$3p'\ ^1P_1$ $\ ^1P_2$ $\ ^1P_3$	$2s\ 2p^2(^1P)3p$	$3p\ ^1P^o$	1 2 3	368526.37 368583.63 368684.75	57.26 101.12
$3s\ ^1P_1$	$2s^2\ 2p(^3P^o)3s$	$3s\ ^1P^o$	1	273080.07		$4p\ ^1P_0$ $\ ^1P_1$ $\ ^1P_2$	$2s^2\ 2p(^3P^o)4p$	$4p\ ^1P$	0 1 2	370326.7 370415.7 370524.2	89.0 108.5
$2p''\ ^1P_2$ $\ ^1P_1$ $\ ^1P_0$	$2p^4$	$2p^4\ ^1P$	2 1 0	283758.9 283976.6 284073.3	-217.7 -96.7	$4p\ ^1D_2$	$2s^2\ 2p(^3P^o)4p$	$4p\ ^1D$	2	370900.6	
$3p\ ^1P_1$	$2s^2\ 2p(^3P^o)3p$	$3p\ ^1P$	1	290956.62		$4p\ ^1S_0$	$2s^2\ 2p(^3P^o)4p$	$4p\ ^1S$	0	373046.2	
$3p\ ^1D_1$ $\ ^1D_2$ $\ ^1D_3$	$2s^2\ 2p(^3P^o)3p$	$3p\ ^1D$	1 2 3	293865.26 294001.60 294221.65	136.34 220.05	$3p'\ ^1D_1$ $\ ^1D_2$ $\ ^1D_3$	$2s\ 2p^2(^1P)3p$	$3p\ ^1D^o$	1 2 3	374575 374662.5 374798.6	88 136.1
$3p\ ^1S_1$	$2s^2\ 2p(^3P^o)3p$	$3p\ ^1S$	1	297557.50		$3p'\ ^1S_2$	$2s\ 2p^2(^1P)3p$	$3p\ ^1S^o$	2	376067.66	
$2p''\ ^1D_2$	$2p^4$	$2p^4\ ^1D$	2	298289.4		$4d\ ^1F_2$	$2s^2\ 2p(^3P^o)4d$	$4d\ ^1F^o$	2 3 4	377375	
$3p\ ^1P_0$ $\ ^1P_1$ $\ ^1P_2$	$2s^2\ 2p(^3P^o)3p$	$3p\ ^1P$	0 1 2	300228.21 300310.31 300440.85	82.10 130.54	$4d\ ^1D_2$	$2s^2\ 2p(^3P^o)4d$	$4d\ ^1D^o$	2	377687	
$3p\ ^1D_2$	$2s^2\ 2p(^3P^o)3p$	$3p\ ^1D$	2	306584.8		$3p'\ ^1P_2$ $\ ^1P_1$ $\ ^1P_0$	$2s\ 2p^2(^1P)3p$	$3p\ ^1P^o$	2 1 0	378408.5 378420.9 378438.1	-12.4 -17.2
$3p\ ^1S_0$	$2s^2\ 2p(^3P^o)3p$	$3p\ ^1S$	0	313801.07		$4d\ ^1D_1$ $\ ^1D_2$ $\ ^1D_3$	$2s^2\ 2p(^3P^o)4d$	$4d\ ^1D^o$	1 2 3	379232 379293 379356	61 63
$3d\ ^1F_2$ $\ ^1F_3$ $\ ^1F_4$	$2s^2\ 2p(^3P^o)3d$	$3d\ ^1F^o$	2 3 4	324462.49 324658.25 324836.41	195.79 178.16	$4d\ ^1P_2$	$2s^2\ 2p(^3P^o)4d$	$4d\ ^1P^o$	2 1 0	380706	
$3d\ ^1D_2$	$2s^2\ 2p(^3P^o)3d$	$3d\ ^1D^o$	2	324734.22		$4d\ ^1F_3$	$2s^2\ 2p(^3P^o)4d$	$4d\ ^1F^o$	3	380782	
$3d\ ^1D_1$ $\ ^1D_2$ $\ ^1D_3$	$2s^2\ 2p(^3P^o)3d$	$3d\ ^1D^o$	1 2 3	327227.94 327277.18 327350.90	49.24 73.72	$4d\ ^1P_1$	$2s^2\ 2p(^3P^o)4d$	$4d\ ^1P^o$	1	381086	
$3d\ ^1P_2$ $\ ^1P_1$ $\ ^1P_0$	$2s^2\ 2p(^3P^o)3d$	$3d\ ^1P^o$	2 1 0	329467.98 329581.98 329643.43	-114.00 -61.45	$5s\ ^1P_2$	$2s^2\ 2p(^3P^o)5s$	$5s\ ^1P^o$	0 1 2	392221	
$3d\ ^1F_3$	$2s^2\ 2p(^3P^o)3d$	$3d\ ^1F^o$	3	331820.2		$5s\ ^1P_1$	$2s^2\ 2p(^3P^o)5s$	$5s\ ^1P^o$	1	392778	
$3d\ ^1P_1$	$2s^2\ 2p(^3P^o)3d$	$3d\ ^1P^o$	1	332777.1		$3s'\ ^1D_1$ $\ ^1D_2$ $\ ^1D_3$	$2s\ 2p^2(^1D)3s$	$3s'\ ^1D$	1 2 3	394090 394126 394195	36 69
$3s'\ ^1P_1$ $\ ^1P_2$ $\ ^1P_3$	$2s\ 2p^2(^1P)3s$	$3s\ ^1P$	1 2 3	338565.87 338690.34 338851.50	124.47 161.16						
$2p''\ ^1S_0$	$2p^4$	$2p^4\ ^1S$	0	343302.67							

O III—Continued

O III—Continued

Edlén	Config.	Desig.	<i>J</i>	Level	Interval	Edlén	Config.	Desig.	<i>J</i>	Level	Interval
3d' ¹ F ₁ ¹ F ₂ ¹ F ₃ ¹ F ₄ ¹ F ₅	2s 2p ³ (¹ P)3d	3d ¹ F	1 2 3 4 5	394516.45 394555.15 394612.70 394688.44 394780.47	38.70 57.55 75.74 92.03	7d ¹ F ₃ $\overline{3p}'$ ¹ F ₃ $\overline{3p}'$ ¹ D ₃	2s ² 2p(³ P°)7d 2s 2p ³ (³ D)3p 2s 2p ³ (³ D)3p	7d ¹ F° 3p' ¹ F° 3p' ¹ D°	3 3 2	422977 424998 426338	
3d' ³ D ₁ ³ D ₂ ³ D ₃ ³ D ₄	2s 2p ³ (¹ P)3d	3d ³ D	0 1 2 3 4	398135.0 398131.4 398127.3 398137.4 398218.8	—3.6 —4.1 10.1 81.4	4s' ³ P ₁ ³ P ₂ ³ P ₃ $\overline{3p}'$ ¹ P ₁	2s 2p ³ (¹ P)4s 2s 2p ³ (³ D)3p	4s ³ P 3p' ¹ P°	1 2 3 1	428487 428606 428769 430025	119 163
3d' ¹ P ₁ ¹ P ₂ ¹ P ₃	2s 2p ³ (¹ P)3d	3d ¹ P	3 2 1	398474.3 398544.3 398582.8	—70.0 —38.5	4p' ³ S ₁ 4p' ³ D ₀ ³ D ₁ ³ D ₂ ³ D ₃ ³ D ₄	2s 2p ³ (¹ P)4p 2s 2p ³ (¹ P)4p	4p ³ S° 4p ³ D°	1 0 1 2 3 4	437015.0 438241.0 438303.2 438395.2 438517.5	62.2 92.0 122.3
3d' ³ F ₂ ³ F ₃ ³ F ₄	2s 2p ³ (¹ P)3d	3d ³ F	2 3 4	400354.8 400464.7 400518.4	—109.9 —53.7	4p' ¹ P ₁ ¹ P ₂ ¹ P ₃ ¹ P ₄	2s 2p ³ (¹ P)4p	4p ¹ P°	1 2 3	439278.1 439329.5 439427.6	51.4 98.1
5d ¹ F ₃	2s ² 2p(³ P°)5d	5d ¹ F°	2 3 4	401630		4p' ³ D ₃	2s 2p ³ (¹ P)4p	4p ³ D°	1 2 3	442710	
5d ¹ D ₃	2s ² 2p(³ P°)5d 2s ² 2p(³ P°)5d	5d ¹ D° 5d ³ D°	2 1 2 3	401787 402530			O IV (³ P ₂)	Limit	-----	443193.5	
5d ³ D ₃	2s ² 2p(³ P°)5d	5d ³ F°	3	403374		4i' ⁴ P ₁ ⁴ P ₂ ⁴ P ₃	2s 2p ³ (¹ P)4d	4d ⁴ P	3 2 1	450167 450237 450291	—70 —54
5d ¹ F ₃	2s ² 2p(³ P°)5d	5d ¹ F°	3	403526		$\overline{3d}'$ ³ F	2s 2p ³ (³ D)3d	3d' ³ F	2, 3, 4	452855	
5d ¹ P ₁	2s ² 2p(³ P°)5d	5d ¹ P°	1	405805.1 405834.1 405883.0	29.0 48.9	$\overline{3d}'$ ³ D	2s 2p ³ (³ D)3d	3d' ³ D	1, 2, 3	454174	
3d' ³ D ₁ ³ D ₂ ³ D ₃	2s 2p ³ (¹ P)3d	3d ³ D	1 2 3			$\overline{3d}'$ ³ P	2s 2p ³ (³ D)3d	3d' ³ P	0, 1, 2	457634	
6d ¹ D ₃	2s ² 2p(³ P°)6d 2s ² 2p(³ P°)6d	6d ¹ D° 6d ³ D°	2 1 2 3	414675 415181		5d' ⁴ P ₃	2s 2p ³ (¹ P)5d	5d ⁴ P		473750	

December 1947.

O III OBSERVED TERMS*

Config. 1s ² +	Observed Terms		
2s ² 2p ³	{ 2p ³ ¹ S 2p ³ ³ P 2p ³ ¹ D		
2s 2p ³	{ 2p ³ ³ S° 2p ³ ¹ P° 2p ³ ³ D° 2p ³ ³ S° 2p ³ ¹ P° 2p ³ ¹ D°		
2p ⁴	{ 2p ⁴ ¹ S 2p ⁴ ³ P 2p ⁴ ¹ D		
	ns (n ≥ 3)	np (n ≥ 3)	nd (n ≥ 3)
2s ² 2p(³ P°)nx	{ 3-5s ³ P° 3-5s ¹ P°	3, 4p ³ S 3, 4p ³ P 3, 4p ³ D 3, 4p ¹ S 3, 4p ¹ P 3, 4p ¹ D	3, 4d ³ P° 3-6d ³ D° 3-5d ³ F° 3-5d ¹ P° 3-6d ¹ D° 3-5, 7d ¹ F°
2s 2p ³ (¹ P)nx	{ 3, 4s ³ P 3s ³ P	3p ³ S° 3, 4p ³ P° 3, 4p ³ D° 3, 4p ³ S° 3p ³ P° 3, 4p ³ D°	3-5d ³ P 3d ³ D 3d ³ F 3d ³ P 3d ³ D 3d ³ F
2s 2p ³ (³ D)nx'	{ 3s' ³ D	3p' ¹ P° 3p' ¹ D° 3p' ¹ F°	3d' ³ P 3d' ³ D 3d' ³ F

* For predicted terms in the spectra of the C I isoelectronic sequence, see Introduction.

O IV

(B 1 sequence; 5 electrons)

Z=8

Ground state $1s^2 2s^2 2p^3 {}^4P_{3/2}^{\circ}$ $2p^3 {}^4P_{3/2}^{\circ}$ 624396.5 cm^{-1}

I. P. 77.394 volts

Most of the terms are from Edlén's Monograph, corrected to agree with his 1935 paper, in which he adds several terms from $2p^2({}^1D)$ and relabels his $2p^2({}^3P)3s {}^3P$ term as $2p^2({}^1D)3s {}^3D$. He also lists a combination in the visible, $3s' {}^2P^{\circ} - 3p' {}^3D$, from which a revised value of $3s' {}^2P^{\circ}$ has been calculated. A few other additions and corrections kindly communicated by Edlén have been incorporated into the table.

The term $6f {}^2F^{\circ}$ is from the paper by Whitelaw and Mack.

No intercombinations between the doublet and quartet terms have been observed, but the limits adopted by Edlén are based on well-established series, and the relative positions of the two groups of terms differ by probably only a small constant x .

REFERENCES

- L. J. Freeman, Proc. Roy. Soc. (London) [A] **127**, 330 (1930). (T) (C L)
 B. Edlén, Nova Acta Reg. Soc. Uppsala [IV] **9**, No. 6, 87 (1934). (I P) (T) (C L) (G D)
 P. G. Kruger and W. E. Shoupp, Phys. Rev. **44**, 105 (1933). (T) (C L)
 E. Edlén, Zeit. Phys. **93**, 726 (1935). (T) (C L)
 N. G. Whitelaw and J. E. Mack, Phys. Rev. **47**, 677 (1935). (T)
 B. Edlén, unpublished material (Dec. 1947). (T)

O IV

O IV

Edlén	Config.	Desig.	J	Level	Interval	Edlén	Config.	Desig.	J	Level	Interval
$2p^3 {}^4P_{3/2}$	$2s^2({}^1S)2p$	$2p^3 {}^4P^{\circ}$	$\frac{1}{2}$ $1\frac{1}{2}$	0. 0 386. 5	386. 5	$3s' {}^2P_{1/2}$	$2s^2 2p({}^1P^{\circ})3s$	$3s' {}^2P^{\circ}$	$\frac{1}{2}$ $1\frac{1}{2}$	452808. 0 453073. 0	265. 0
$2p' {}^4P_{3/2}$ ${}^4P_{1/2}$ ${}^4P_{3/2}$	$2s^2 2p^3$	$2p^3 {}^4P$	$\frac{1}{2}$ $1\frac{1}{2}$ $2\frac{1}{2}$	71177. 0+x 71308. 4+x 71492. 9+x	131. 4 184. 5	$3p' {}^2P_{1/2}$ ${}^2P_{3/2}$	$2s^2 2p({}^1P^{\circ})3p$	$3p {}^2P$	$\frac{1}{2}$ $1\frac{1}{2}$	467231. 1 467346. 5	115. 4
$2p' {}^3D_{3/2}$ ${}^3D_{5/2}$	$2s^2 2p^3$	$2p^3 {}^3D$	$2\frac{1}{2}$ $1\frac{1}{2}$	126936. 3 126950. 3	-14. 0	$3p' {}^1D_{3/2}$ ${}^1D_{5/2}$ ${}^1D_{3/2}$ ${}^1D_{5/2}$	$2s^2 2p({}^1P^{\circ})3p$	$3p {}^1D$	$\frac{1}{2}$ $1\frac{1}{2}$ $2\frac{1}{2}$ $3\frac{1}{2}$	468075. 4+x 468154. 2+x 468289. 7+x 468499. 4+x	78. 8 135. 5 209. 7
$2p' {}^3S_1$	$2s^2 2p^3$	$2p^3 {}^3S$	$\frac{1}{2}$	164366. 9		$3p' {}^3S_1$	$2s^2 2p({}^1P^{\circ})3p$	$3p {}^3S$	$1\frac{1}{2}$	474217. 8+x	
$2p' {}^3P_{1/2}$ ${}^3P_{3/2}$	$2s^2 2p^3$	$2p^3 {}^3P$	$\frac{1}{2}$ $1\frac{1}{2}$	180481. 3 180724. 6	243. 3	$3p' {}^1P_{1/2}$ ${}^1P_{3/2}$ ${}^1P_{1/2}$	$2s^2 2p({}^1P^{\circ})3p$	$3p {}^1P$	$\frac{1}{2}$ $1\frac{1}{2}$ $2\frac{1}{2}$	478587. 7+x 478682. 2+x 478811. 3+x	94. 5 129. 1
$2p'' {}^4S_3$	$2p^3$	$2p^3 {}^4S^{\circ}$	$1\frac{1}{2}$	231275. 1+x							
$2p'' {}^3D_{3/2}$ ${}^3D_{5/2}$	$2p^3$	$2p^3 {}^3D^{\circ}$	$2\frac{1}{2}$ $1\frac{1}{2}$	255156. 7 255186. 0	-29. 3	$3p' {}^3D_{3/2}$ ${}^3D_{5/2}$	$2s^2 2p({}^1P^{\circ})3p$	$3p {}^3D$	$1\frac{1}{2}$ $2\frac{1}{2}$	482667. 5 482923. 1	255. 6
$2p'' {}^3P_{1/2}$ ${}^3P_{3/2}$	$2p^3$	$2p^3 {}^3P^{\circ}$	$\frac{1}{2}$ $1\frac{1}{2}$	289016. 1 289024. 0	7. 9	$4s {}^2S_1$	$2s^2({}^1S)4s$	$4s {}^2S$	$\frac{1}{2}$	485823. 1	
$3s {}^3S_1$	$2s^2({}^1S)3s$	$3s {}^3S$	$\frac{1}{2}$	357614. 8		$3p' {}^3S_1$	$2s^2 2p({}^1P^{\circ})3p$	$3p {}^3S$	$\frac{1}{2}$	492880	
$3p {}^3P_{1/2}$ ${}^3P_{3/2}$	$2s^2({}^1S)3p$	$3p {}^3P^{\circ}$	$\frac{1}{2}$ $1\frac{1}{2}$	390161. 1 390248. 2	87. 1	$3d' {}^4F_{3/2}$ ${}^4F_{5/2}$ ${}^4F_{3/2}$ ${}^4F_{5/2}$	$2s^2 2p({}^1P^{\circ})3d$	$3d {}^4F^{\circ}$	$1\frac{1}{2}$ $2\frac{1}{2}$ $3\frac{1}{2}$ $4\frac{1}{2}$	494907. 5+x 494986. 3+x 495098. 7+x 495262. 8+x	78. 8 112. 4 154. 1
$3d {}^3D_{3/2}$ ${}^3D_{5/2}$	$2s^2({}^1S)3d$	$3d {}^3D$	$1\frac{1}{2}$ $2\frac{1}{2}$	419533. 5 419550. 2	16. 7	$3d' {}^1D_{3/2}$ ${}^1D_{5/2}$ ${}^1D_{3/2}$ ${}^1D_{5/2}$	$2s^2 2p({}^1P^{\circ})3d$	$3d {}^1D^{\circ}$	$\frac{1}{2}$ $1\frac{1}{2}$ $2\frac{1}{2}$ $3\frac{1}{2}$	499506. 4+x 499535. 3+x 499582. 0+x 499646. 6+x	28. 9 46. 7 64. 6
$3s' {}^4P_{1/2}$ ${}^4P_{3/2}$ ${}^4P_{3/2}$	$2s^2 2p({}^1P^{\circ})3s$	$3s {}^4P^{\circ}$	$\frac{1}{2}$ $1\frac{1}{2}$ $2\frac{1}{2}$	438588. 5+x 438723. 6+x 438970. 5+x	135. 1 246. 9						

O IV—Continued

Edlén	Config.	Desig.	<i>J</i>	Level	Interval	Edlén	Config.	Desig.	<i>J</i>	Level	Interval
3d' ¹ D ₂ ¹ D ₃	2s 2p(¹ P°)3d	3d ¹ D°	1½ 2½	501511. 3 501568. 4	55. 1	4d' ¹ D ₂ ¹ D ₃	2s 2p(¹ P°)4d	4d ¹ D°	1½ 2½	593627 593708	81
3d' ¹ P ₂ ¹ P ₃ ¹ P ₁	2s 2p(¹ P°)3d	3d ¹ P°	2½ 1½ ½	503834. 5+x 503947. 9+x 504021. 7+x	-113. 4 -73. 8	4f' ¹ F ₂ ¹ F ₄	2s 2p(¹ P°)4f	4f ¹ F	2½ 3½	594007 594080	73
4d ¹ D ₂ ¹ D ₃	2s ² (¹ S)4d	4d ¹ D	1½ 2½	510560 510567	7	4f' ¹ D ₂ ¹ D ₃	2s 2p(¹ P°)4f	4f ¹ D	1½ 2½	594337 594542	205
3d' ¹ F ₂ ¹ F ₄	2s 2p(¹ P°)3d	3d ¹ F°	2½ 3½	510746. 1 510978. 6	232. 4	4d' ¹ F ₂ ¹ F ₄	2s 2p(¹ P°)4d	4d ¹ F°	2½ 3½	596299 596477	178
3d' ¹ P ₂ ¹ P ₁	2s 2p(¹ P°)3d	3d ¹ P°	1½ ½	514217 514368	-151	3p'' ¹ S ₁	2p ² (¹ P)3p	3p'' ¹ S°	½	597264	
3s' ¹ P ₂ ¹ P ₁	2s 2p(¹ P°)3s	3s' ¹ P°	½ 1½	518684 518690	6	8f ¹ F	2s ² (¹ S)8f	8f ¹ F°	2½ 3½	597352	
5s ¹ S ₁	2s ² (¹ S)5s	5s ¹ S	½	539368		4d' ¹ P ₂ ¹ P ₁	2s 2p(¹ P°)4d	4d ¹ P°	1½ ½	597726 597863	-137
3p' ¹ D ₂ ¹ D ₃	2s 2p(¹ P°)3p	3p' ¹ D	1½ 2½	547311 547336	25	3s'' ¹ D ₂ ¹ D ₃	2p ² (¹ D)3s	3s'' ¹ D	1½ 2½	600092 600106	14
3p' ¹ P ₂ ¹ P ₁	2s 2p(¹ P°)3p	3p' ¹ P	½ 1½	549792 549855	63		2p ² (¹ P)3p	3p'' ¹ D°	½ 1½ 2½ 3½	602977	+x
	2s ² (¹ S)5d	5d ¹ D	1½ 2½	552034		3p'' ¹ D ₄		3p'' ¹ P°	½ 1½ 2½	606434	+x
5f ¹ F	2s ² (¹ S)5f	5f ¹ F°	2½ 3½	552490		3p'' ¹ P ₂	2p ² (¹ P)3p	3p'' ¹ D°	2½ 1½	615431 615460	-29
3p' ¹ S ₁	2s 2p(¹ P°)3p	3p' ¹ S	½	554461		3p'' ¹ D ₂ ¹ D ₃	2p ² (¹ P)3p	3p'' ¹ S°	1½	616588	+x
4s' ¹ P ₂ ¹ P ₃ ¹ P ₁	2s 2p(¹ P°)4s	4s ¹ P°	½ 1½ 2½	568638 +x 568773 +x 569020 +x	135 247	3p'' ¹ S ₂	2p ² (¹ P)3p				
	2s 2p(¹ P°)3d	3d' ¹ F°	2½ 3½	570791			O v (¹ S ₆)	Limit		624396. 5	
3d' ¹ F ₂	2s 2p(¹ P°)4s	4s ¹ P°	½ 1½	573696 573907	211	3p'' ¹ F	2p ² (¹ D)3p	3p'' ¹ F°	2½ 3½	624882	
4s' ¹ P ₂ ¹ P ₁	2s ² (¹ S)6d	6d ¹ D	1½ 2½	574373		5p' ¹ P ₂	2s 2p(¹ P°)5p	5p ¹ P	½ 1½	628496	
6d ¹ D ₂	2s ² (¹ S)6d	6d ¹ D	1½ 2½	574373		3d'' ¹ F ₂	2p ² (¹ P)3d	3d'' ¹ F	2½ 3½	630095	
4p' ¹ P ₂ ¹ P ₁	2s ² 2p(¹ P°)4p	4p ¹ P	½ 1½	575204 575373	169	5p' ¹ D ₂ ¹ D ₃	2s 2p(¹ P°)5p	5p ¹ D	1½ 2½	630703 630879	176
3d' ¹ D ₂ ¹ D ₃	2s 2p(¹ P°)3d	3d' ¹ D°	1½ 2½	575819 575853	34	3d'' ¹ D ₂ ¹ D ₃	2p ² (¹ P)3d	3d'' ¹ D	2½ 1½	632426 632594	-168
3s'' ¹ P ₂ ¹ P ₃ ¹ P ₁	2p ² (¹ P)3s	3s'' ¹ P	½ 1½ 2½	576591 +x 576735 +x 576947 +x	144 212		2s 2p(¹ P°)5d	5d ¹ D°	½ 1½ 2½ 3½	633896	+x
3d' ¹ P ₂ ¹ P ₁	2s 2p(¹ P°)3d	3d' ¹ P°	½ 1½	581721 581743	22	5d' ¹ D ₄		5d ¹ P°	2½ 1½ ½	634245. 5+x	
4p' ¹ D ₂ ¹ D ₃	2s 2p(¹ P°)4p	4p ¹ D	1½ 2½	584552 584768	216	5d' ¹ P ₂	2s 2p(¹ P°)5d				
	2s ² (¹ S)7f	7f ¹ F°	2½ 3½	587850		5d' ¹ F ₂ ¹ F ₄	2s 2p(¹ P°)5d	5d ¹ F°	2½ 3½	636024 636236	212
4p' ¹ S	2s 2p(¹ P°)4p	4p ¹ S	½	590071		5d' ¹ P ₂	2s 2p(¹ P°)5d	5d ¹ P°	1½ ½	636492?	
	2s 2p(¹ P°)4d	4d ¹ D°	½ 1½ 2½ 3½	591767 +x		3d'' ¹ P ₂ ¹ P ₃ ¹ P ₁	2p ² (¹ P)3d	3d'' ¹ P	2½ 1½ ½	636851 +x 636950 +x 637012 +x	-99 -62
4d' ¹ D ₄	2s 2p(¹ P°)4d	4d ¹ P°	2½ 1½ ½	592999 +x		3d'' ¹ D	2p ² (¹ D)3d	3d'' ¹ D	1½ 2½	646859	

O V

(Be I sequence; 4 electrons)

Z=8

Ground state $1s^2 2s^2 {}^1S_0$ $2s^2 {}^1S_0$ 918702 cm^{-1}

I. P. 113.873 volts

Edlén has revised and extended his published analysis and has generously furnished a manuscript copy of his complete term list in advance of publication, for inclusion here. He states that no intersystem combinations have been observed and that the relative uncertainty x in the position of the triplet terms with respect to the singlets may be $\pm 100 \text{ cm}^{-1}$.

In the published papers Edlén has used a prime to designate the terms from the ${}^3P^\circ$ limit in O VI.

REFERENCES

B. Edlén, Nova Acta Reg. Soc. Sci. Uppsala [IV] 9, No. 6, 62 (1934). (I P) (T) (C L)

B. Edlén, unpublished material (Dec. 1947). (I P) (T)

O V

O V

Config.	Desig.	J	Level	Interval	Config.	Desig.	J	Level	Interval
$2s^2$	$2s^2 {}^1S$	0	0		$2p({}^3P^\circ)3p$	$3p {}^3S$	1	684124 +x	
$2s({}^3S)2p$	$2p {}^3P^\circ$	0	82121. 2+x	136. 7	$2p({}^3P^\circ)3p$	$3p {}^3P$	0	689585. 6+x	114. 0
		1	82257. 9+x	306. 2			1	689699. 6+x	190. 7
		2	82564. 1+x				2	689890. 3+x	
$2s({}^3S)2p$	$2p {}^1P^\circ$	1	158798		$2p({}^3P^\circ)3d$	$3d {}^1D^\circ$	2	694846	
$2p^2$	$2p^2 {}^3P$	0	213641. 7+x	155. 7	$2p({}^3P^\circ)3p$	$3p {}^1D$	2	697170	
		1	213797. 4+x	268. 8	$2p({}^3P^\circ)3d$	$3d {}^3D^\circ$	1	704360 +x	64
		2	214066. 2+x				2	704424 +x	103
$2p^2$	$2p^2 {}^1D$	2	231722				3	704527 +x	
$2p^2$	$2p^2 {}^1S$	0	287909		$2p({}^3P^\circ)3p$	$3p {}^1S$	0	707630	
$2s({}^3S)3s$	$3s {}^1S$	1	547150. 0+x		$2p({}^3P^\circ)3d$	$3d {}^3P^\circ$	2	708154 +x	-142
$2s({}^3S)3s$	$3s {}^1S$	0	561278				1	708296 +x	-83
$2s({}^3S)3p$	$3p {}^1P^\circ$	1	580826				0	708379 +x	
$2s({}^3S)3p$	$3p {}^3P^\circ$	0	582983. 6+x	36. 3	$2p({}^3P^\circ)3d$	$3d {}^1F^\circ$	3	712967	
		1	583019. 9+x	77. 3	$2p({}^3P^\circ)3d$	$3d {}^3P^\circ$	1	719277	
		2	583097. 2+x		$2s({}^3S)4s$	$4s {}^1S$	1	722666 +x	
$2s({}^3S)3d$	$3d {}^1D$	1	600925. 5+x	10. 8	$2s({}^3S)4s$	$4s {}^1S$	0	731667	
		2	600936. 3+x	19. 8	$2s({}^3S)4p$	$4p {}^3P^\circ$	0	736108 +x	18
		3	600956. 1+x				1	736126 +x	
$2s({}^3S)3d$	$3d {}^1D$	2	612617		$2s({}^3S)4p$	$4p {}^1P^\circ$	1	737883	
$2p({}^3P^\circ)3s$	$3s {}^3P^\circ$	0	653099. 7+x	162. 5	$2s({}^3S)4d$	$4d {}^1D$	1	742401 +x	6
		1	653262. 2+x	342. 8			2	742407 +x	14
		2	653605. 0+x				3	742421 +x	
$2p({}^3P^\circ)3s$	$3s {}^1P^\circ$	1	664486		$2s({}^3S)4d$	$4d {}^1D$	2	746280	
$2p({}^3P^\circ)3p$	$3p {}^1P$	1	672695		$2s({}^3S)4f$	$4f {}^1F^\circ$	3	749857	
$2p({}^3P^\circ)3p$	$3p {}^3D$	1	677333 +x	199	$2s({}^3S)5s$	$5s {}^1S$	1	796263 +x	
		2	677532 +x	315					
		3	677847 +x						

O v—Continued

O v—Continued

Config.	Desig.	<i>J</i>	Level	Interval	Config.	Desig.	<i>J</i>	Level	Interval
2s(² S)5p	5p ¹ P°	1	802452		2s(² S)7p	7p ¹ P°	1	860874	
2s(² S)5d	5d ¹ D	1 2 3	806625 +x		2s(² S)7d	7d ¹ D	1 2 3	861975 +x	
2s(² S)5d	5d ¹ D	2	808351		2s(² S)7d	7d ¹ D	2	862419	
2p(² P°)4s	4s ¹ P°	1	824280		2s(² S)8p	8p ¹ P°	1	874447	
2p(² P°)4p	4p ¹ P	1	829588		2s(² S)8d	8d ¹ D	1 2 3	875365 +x	
2p(² P°)4p	4p ¹ D	1 2 3	831047 +x 831213 +x 831504 +x	166 291	2p(² P°)5p	5p ¹ P	1	898580	
2p(² P°)4p	4p ³ S	1	832251 +x		2p(² P°)5p	5p ¹ D	1 2 3	899671 +x	
2p(² P°)4p	4p ¹ P	0 1 2	835151 +x 835321 +x	170	2p(² P°)5p	5p ³ P	0 1 2	901344 +x	
2p(² P°)4d	4d ¹ D°	2	837834		2p(² P°)5p	5p ¹ D	2	902442	
2p(² P°)4p	4p ¹ D	2	837864		2p(² P°)5d	5d ¹ D°	2	902592	
2s(² S)6p	6p ¹ P°	1	839616		2p(² P°)5d	5d ³ D°	1 2 3	904497 +x	
2s(² S)6f	6f ¹ F°	3	840832		2p(² P°)5d	5d ¹ F°	3	906404	
2s(² S)6d	6d ¹ D	1 2 3	841220 +x		O vi (² S _{1/2})	Limit		918702	
2p(² P°)4d	4d ³ D°	1 2 3	841280 +x 841374 +x 841497 +x	94 123	2p(² P°)6p	6p ¹ P	1	935093	
2s(² S)6d	6d ¹ D	2	842105		2p(² P°)6p	6p ¹ D	1 2 3	935945 +x	
2p(² P°)4d	4d ³ P°	2 1 0	843290 +x 843397 +x 843449 +x	-107 -52	2p(² P°)6p	6p ³ P	0 1 2	936805 +x	
2p(² P°)4d	4d ¹ F°	3	847129		2p(² P°)6p	6p ¹ D	2	937341	
2p(² P°)4d	4d ¹ P°	1	847465						

December 1947.

O v OBSERVED TERMS*

Config. 1s ² +	Observed Terms			
2s ²	2s ² ¹ S			
2s(² S)2p	{	2p ³ P° 2p ¹ P°		
2p ²		2p ² ³ P 2p ² ¹ S 2p ² ¹ D		
		ns (n ≥ 3)	np (n ≥ 3)	nd (n ≥ 3) nf (n ≥ 4)
2s(² S)nz		3-5s ³ S 3, 4s ¹ S	3, 4p ³ P° 3-8p ¹ P°	3-8d ¹ D 3-7d ¹ D
2p(² P°)nz		3s ³ P° 3, 4s ¹ P°	3, 4p ³ S 3-6p ³ P 3-6p ³ D 3p ¹ S 3-6p ¹ P 3-6p ¹ D	3, 4d ³ P° 3-5d ³ D° 3, 4d ¹ P° 3-5d ¹ D° 3-5d ¹ F°

*For predicted terms in the spectra of the Be I isoelectronic sequence, see Introduction.

O VI

(Li I sequence; 3 electrons)

Z=8

Ground state $1s^2 2s^2 S_1$ $2s^2 S_1$, 1113999.5 cm^{-1}

I. P. 138.080 volts

This spectrum has been analyzed by Edlén. The observed term values have all been taken from a manuscript generously furnished by him in advance of publication. He remarks that the $np^2 P^\circ$ and $nd^2 D$ series have been observed in the vacuum spark further than given in the table. For series members beyond $n=6$ he states that the term values calculated from a Ritz formula are probably to be preferred.

In the table, extrapolated intervals and calculated term values are entered in brackets. They have been taken from the 1933 and 1934 references below, as have also the entries in column one.

REFERENCES

- B. Edlén, Zeit. Astroph. 7, 378 (1933). (T) (C L)
 B. Edlén, Nova Acta Reg. Soc. Sci. Uppsala [IV] 9, No. 6, 44 (1934). (T) (C L)
 F. Tyrén, Nova Acta Reg. Soc. Sci. Uppsala [IV] 12, No. 1, 24 (1940). (C L)
 B. Edlén, unpublished material (Sept. 1947). (T)

O VI

O VI

Edlén	Config.	Desig.	J	Level	Interval	Edlén	Config.	Desig.	J	Level	Interval
$2s^2 S_1$	2s	$2s^2 S$	$\frac{1}{2}$	0.0		6 F	6f	$6f^2 F^\circ$	$\left\{ \begin{smallmatrix} 2\frac{1}{2} \\ 3\frac{1}{2} \end{smallmatrix} \right\}$	[1004265]	
$2p^2 P_1$ $^2 P_2$	2p	$2p^2 P^\circ$	$\frac{1}{2}$ $1\frac{1}{2}$	96375.0 96907.5	532.5	6 GH	6g, 6h	$6g^2 G$, etc.	$\left\{ \begin{smallmatrix} 3\frac{1}{2} \\ \text{to} \\ 5\frac{1}{2} \end{smallmatrix} \right\}$	[1004276]	
$3s^2 S_1$	3s	$3s^2 S$	$\frac{1}{2}$	640039.8		7 S	7s	$7s^2 S$	$\frac{1}{2}$	1030780	
$3p^2 P_1$ $^2 P_2$	3p	$3p^2 P^\circ$	$\frac{1}{2}$ $1\frac{1}{2}$	666113.2 666269.8	156.6	7 P	7p	$7p^2 P^\circ$	$\left\{ \begin{smallmatrix} \frac{1}{2} \\ 1\frac{1}{2} \end{smallmatrix} \right\}$	1032630	
$3d^2 D_2$ $^2 D_3$	3d	$3d^2 D$	$1\frac{1}{2}$ $2\frac{1}{2}$	674625.7 674676.8	51.1	7 D	7d	$7d^2 D$	$\left\{ \begin{smallmatrix} 1\frac{1}{2} \\ 2\frac{1}{2} \end{smallmatrix} \right\}$	1033324	
$4s^2 S_1$	4s	$4s^2 S$	$\frac{1}{2}$	852696		7 F	7f	$7f^2 F^\circ$	$\left\{ \begin{smallmatrix} 2\frac{1}{2} \\ 3\frac{1}{2} \end{smallmatrix} \right\}$	[1033382]	
$4p^2 P_1$ $^2 P_2$	4p	$4p^2 P^\circ$	$\frac{1}{2}$ $1\frac{1}{2}$	863333.8 863397.7	63.9	7 GHI	7g, etc.	$7g^2 G$, etc.	$\left\{ \begin{smallmatrix} 3\frac{1}{2} \\ \text{to} \\ 6\frac{1}{2} \end{smallmatrix} \right\}$	[1033389]	
$4d^2 D_2$ $^2 D_3$	4d	$4d^2 D$	$1\frac{1}{2}$ $2\frac{1}{2}$	866880.1 866901.5	21.4	8 S	8s	$8s^2 S$	$\frac{1}{2}$	[1050543]	
$4f^2 F_2$ $^2 F_4$	4f	$4f^2 F^\circ$	$2\frac{1}{2}$ $3\frac{1}{2}$	867077.7 867087.5	9.8	8 P	8p	$8p^2 P^\circ$	$\left\{ \begin{smallmatrix} \frac{1}{2} \\ 1\frac{1}{2} \end{smallmatrix} \right\}$	1051724	
	5s	$5s^2 S$	$\frac{1}{2}$	948690		8 F	8f	$8f^2 F^\circ$	$\left\{ \begin{smallmatrix} 2\frac{1}{2} \\ 3\frac{1}{2} \end{smallmatrix} \right\}$	[1052280]	
$5p^2 P_1$	5p	$5p^2 P^\circ$	$\left\{ \begin{smallmatrix} \frac{1}{2} \\ 1\frac{1}{2} \end{smallmatrix} \right\}$	954080	[33]	8 GHIK	8g, etc.	$8g^2 G$, etc.	$\left\{ \begin{smallmatrix} 3\frac{1}{2} \\ \text{to} \\ 7\frac{1}{2} \end{smallmatrix} \right\}$	[1052285]	
$5d^2 D_2$	5d	$5d^2 D$	$\left\{ \begin{smallmatrix} 1\frac{1}{2} \\ 2\frac{1}{2} \end{smallmatrix} \right\}$	955856	[11]	8 D	8d	$8d^2 D$	$\left\{ \begin{smallmatrix} 1\frac{1}{2} \\ 2\frac{1}{2} \end{smallmatrix} \right\}$	1052296	
6 S	6s	$6s^2 S$	$\frac{1}{2}$	1000080							
6 P	6p	$6p^2 P^\circ$	$\left\{ \begin{smallmatrix} \frac{1}{2} \\ 1\frac{1}{2} \end{smallmatrix} \right\}$	1003130							
$6d^2 D_2$	6d	$6d^2 D$	$\left\{ \begin{smallmatrix} 1\frac{1}{2} \\ 2\frac{1}{2} \end{smallmatrix} \right\}$	1004178							
							O VII ($^2 S_1$)	Limit		1113999.5	

September 1947.

O VII

(He I sequence; 2 electrons)

 $Z=8$ Ground State $1s^2 {}^1S_0$ $1s^2 {}^1S_0$ 5963000 $\pm$ 600 cm^{-1} I. P. 739.114 $\pm$ 0.074 volts

Five singlet lines have been observed by Tyrén in the interval 17 Å to 21 Å. He has also observed one intersystem combination—a line at 21.804 Å classified as $1s^2 {}^1S_0-2p {}^1P_1^o$. His unit 10^3 cm^{-1} has here been changed to cm^{-1} .

The triplet terms are from Edlén, who has kindly furnished them in advance of publication. He remarks that the extrapolated absolute term values of the triplets relative to those of the singlets confirm the intersystem combination reported by Tyrén. The $2s {}^3S-2p {}^3P^o$ combination has apparently not been observed, but Edlén regards the extrapolation from the irregular doublet law as very reliable. Brackets are used in the table to indicate extrapolated values not yet confirmed by observation.

REFERENCES

F. Tyrén, Nova Acta Reg. Soc. Sci. Uppsala [IV] 12, No. 1, 25 (1940). (I P) (T) (C L)

B. Edlén, unpublished material (Sept. 1947). (T)

O VII

O VII

Config.	Desig.	<i>J</i>	Level	Interval	Config.	Desig.	<i>J</i>	Level	Interval
1s ²	1s ² ¹ S	0	6		1s 3 <i>p</i>	3 <i>p</i> ¹ P ^o	1	5368550	
1s 2s	2s ³ S	1	4525340		1s 4 <i>p</i>	4 <i>p</i> ¹ P ^o	1	5628100	
1s 2 <i>p</i>	2 <i>p</i> ³ P ^o	0	[4586170]	[60] [550]	1s 5 <i>p</i>	5 <i>p</i> ¹ P ^o	1	5748450	
		1	4586230		1s 6 <i>p</i>	6 <i>p</i> ¹ P ^o	1	5813950	
		2	[4586780]						
1s 2 <i>p</i>	2 <i>p</i> ¹ P ^o	1	4629200		-----				
1s 3 <i>p</i>	3 <i>p</i> ³ P ^o	0, 1, 2	5356380		O VIII (³ S _{1/2})	Limit	-----	5963000	
1s 3 <i>d</i>	3 <i>d</i> ³ D	3, 2, 1	5364990						

September 1947.

O VIII

(H I sequence; 1 electron)

 $Z=8$ Ground state $1s {}^2S_{1/2}$ $1s {}^2S_{1/2}$ cm^{-1}

I. P. volts

Tyrén has observed the Lyman line $1s {}^2S-2p {}^2P^o$ of O VIII. The calculated position of this line, 18.967 Å, places the $2p {}^2P^o$ term at 5272315 cm^{-1} above the ground term $1s {}^2S_{1/2}=0$.

REFERENCE

F. Tyrén, Nova Acta Reg. Soc. Sci. Uppsala [IV] 12, No. 1, 24 (1940). (C L)

November 1946.

FLUORINE

F I

9 electrons

Z=9

Ground state $1s^2 2s^2 2p^5 {}^2P_{1/2}^o$ $2p^5 {}^2P_{1/2}^o$ 140553.5 cm^{-1}

I. P. 17.42 volts

This spectrum is incompletely analyzed, but the terms from the ${}^3P$ limit in F II are fairly well established. The terms listed have been taken from Edlén's later paper, supplemented by unpublished levels from further analysis by Lidén. The new levels have been generously furnished in manuscript form by Edlén, for inclusion here.

Intersystem combinations have been observed, connecting the doublet and quartet terms.

Edlén remarks that it is impossible to assign term designations to the levels labeled $3d$ X and $4d$ X, because of the departure from LS -coupling. He also states that the terms from ${}^1D$ in F II need further confirmation. They are connected with the rest by only two ultraviolet lines, those observed by Bowen at 806.92 Å and 809.60 Å.

REFERENCES

- G. H. Carragan, *Astroph. J.* **63**, 145 (1926). (Z E)
 I. S. Bowen, *Phys. Rev.* **29**, 231 (1927). (T) (C L)
 B. Edlén, *Zeit. Phys.* **93**, 447 (1935). (C L)
 B. Edlén, *Zeit. Phys.* **98**, 445 (1936). (I P) (T) (C L)
 W. F. Meggers, *J. Opt. Soc. Am.* **36**, 431 (1946). (Summary hfs)
 B. Edlén, unpublished material (Dec. 1947). (T)
 K. Lidén, *Ark. Mat. Astr. Fys.* (Stockholm) in press (1947). (T)

F I

F I

Edlén	Config.	Desig.	J	Level	Interval	Edlén	Config.	Desig.	J	Level	Interval
$2p {}^2P_3$ ${}^2P_1$	$2s^2 2p^5$	$2p^5 {}^2P^o$	$1\frac{1}{2}$ $\frac{1}{2}$	0. 0 404. 0	-404. 0	$3p {}^3D_3$ ${}^3D_1$	$2s^2 2p^4({}^3P)3p$	$3p {}^3D^o$	$2\frac{1}{2}$ $1\frac{1}{2}$	117623. 73 117873. 75	-250. 02
$3s {}^4P_3$ ${}^4P_2$ ${}^4P_1$	$2s^2 2p^4({}^3P)3s$	$3s {}^4P$	$2\frac{1}{2}$ $1\frac{1}{2}$ $\frac{1}{2}$	102406. 50 102681. 24 102841. 20	-274. 74 -159. 96	$3p {}^3S_1$	$2s^2 2p^4({}^3P)3p$	$3p {}^3S^o$	$\frac{1}{2}$	118406. 09	
$3s {}^3P_2$ ${}^3P_1$	$2s^2 2p^4({}^3P)3s$	$3s {}^3P$	$1\frac{1}{2}$ $\frac{1}{2}$	104731. 86 105057. 10	-325. 24	$3p {}^3P_2$ ${}^3P_1$	$2s^2 2p^4({}^3P)3p$	$3p {}^3P^o$	$1\frac{1}{2}$ $\frac{1}{2}$	11893. 07 119082. 68	-145. 02
$3p {}^4P_3$ ${}^4P_2$ ${}^4P_1$	$2s^2 2p^4({}^3P)3p$	$3p {}^4P^o$	$2\frac{1}{2}$ $1\frac{1}{2}$ $\frac{1}{2}$	115918. 70 116041. 69 116144. 39	-122. 99 -102. 70	$3s {}^3D_3$ ${}^3D_1$	$2s^2 2p^4({}^1D)3s$	$3s {}^3D$	$2\frac{1}{2}$ $1\frac{1}{2}$	123925. 50 123926. 56	-1. 06
$3p {}^4D_3$ ${}^4D_2$ ${}^4D_1$ ${}^4D_1$	$2s^2 2p^4({}^3P)3p$	$3p {}^4D^o$	$3\frac{1}{2}$ $2\frac{1}{2}$ $1\frac{1}{2}$ $\frac{1}{2}$	116988. 21 117164. 83 117309. 37 117392. 77	-176. 62 -144. 54 -83. 40	$3d {}^4D_3$ ${}^4D_2$ ${}^4D_1$ ${}^4D_1$	$2s^2 2p^4({}^3P)3d$	$3d {}^4D$	$3\frac{1}{2}$ $2\frac{1}{2}$ $1\frac{1}{2}$ $\frac{1}{2}$	128064. 90 128088. 63 128123. 51 128185. 80	-23. 73 -34. 88 -62. 29

F I—Continued

F I—Continued

Edlén	Config.	Desig.	<i>J</i>	Level	Interval	Edlén	Config.	Desig.	<i>J</i>	Level	Interval
3d X ₆	2s ² 2p ⁴ (P) 3d	3d Z ₄		128141. 27			2s ² 2p ⁴ (P) 4d	4d F	4½ 3½ 2½ 1½	133606. 39 133923. 83 133932. 56 133972. 06	—317. 44 —8. 73 —39. 50
3d F ₁	2s ² 2p ⁴ (P) 3d	3d F	4½	128219. 92	—295. 63						
3d F ₂			3½	128515. 55	—10. 60						
3d F ₃			2½	128526. 15	—86. 58		2s ² 2p ⁴ (P) 4d	4d Z ₁		133607. 33	
3d F ₄			1½	128612. 73			2s ² 2p ⁴ (P) 4d	4d Z ₂		133624. 61	
3d X ₇	2s ² 2p ⁴ (P) 3d	3d Z ₂		128220. 65			2s ² 2p ⁴ (P) 4d	4d Z ₁		133644. 4	
3d X ₈	2s ² 2p ⁴ (P) 3d	3d Z ₃		128221. 16			2s ² 2p ⁴ (P) 4d	4d Y ₂		133911. 08	
3d X ₉	2s ² 2p ⁴ (P) 3d	3d Y ₃		128339. 53			2s ² 2p ⁴ (P) 4d	4d Y ₁		133920. 20	
3d X ₁₀	2s ² 2p ⁴ (P) 3d	3d Y ₂	1½	128524. 09			2s ² 2p ⁴ (P) 4d	4d Y ₁		133966. 47	
3d X ₁₁	2s ² 2p ⁴ (P) 3d	3d Y ₁		128606. 88			2s ² 2p ⁴ (P) 4d	4d X ₂		134085. 53	
3d X ₁₂	2s ² 2p ⁴ (P) 3d	3d X ₁		128698. 68			2s ² 2p ⁴ (P) 4d	4d X ₁		134092. 03	
3d X ₁₃	2s ² 2p ⁴ (P) 3d	3d X ₁		128713. 12			2s ² 2p ⁴ (P) 4d				
	2s ² 2p ⁴ (P) 5s	5s P	2½ 1½ ½	132596. 26 132745. 77 133009. 96	—149. 51 —264. 19	3p ² F ₃ 3p ² F ₄	2s ² 2p ⁴ (D) 3p	3p ² F°	2½ 3½	137594. 63 137603. 44	8. 81
	2s ² 2p ⁴ (P) 5s	5s P	1½ ½	132999. 16 133224. 10	—224. 94	3p ² D ₂ 3p ² D ₃	2s ² 2p ⁴ (D) 3p	3p ² D°	1½ 2½	138700. 15 138708. 01	7. 86
	2s ² 2p ⁴ (P) 4d	4d D	3½ 2½ 1½ ½	133545. 27 133558. 14 133578. 15 133614. 10	—12. 87 —20. 01 —35. 95		F II (P ₂)	Limit	-----	140553. 5	
	2s ² 2p ⁴ (P) 4d	4d Z ₁		133584. 35		2p ² S ₁	2s 2p ⁴	2p ⁴ S	½	[168554]	

December 1947.

F I OBSERVED TERMS*

Config. 1s ² +	Observed Terms			
2s ² 2p ³	2p ³ P°			
	ns (n ≥ 3)	np (n ≥ 3)		nd (n ≥ 3)
2s ² 2p ⁴ (P) nx	{ 3, 5s P 3, 5s P	3p S° 3p S°	3p P° 3p P°	3p D° 3p D°
2s ² 2p ⁴ (D) nx'	3s' D	3p' D°		3p' F°

*For predicted terms in the spectra of the F I isoelectronic sequence, see Introduction.

F II

(O I sequence; 8 electrons)

Z=9

Ground state $1s^2 2s^2 2p^4 {}^3P_2$ $2p^4 {}^3P_2$, 282190.2 cm^{-1}

I. P. 34.98 volts

Bowen, Dingle, and Edlén have all contributed to the analysis of this spectrum. The singlet and triplet terms are taken from Edlén, who has revised and extended the earlier work. The quintet terms, except $5f {}^5F$, are from Dingle's paper. The term $5f {}^5F$ derived by Edlén agrees well with the $4f {}^5F$ term and Dingle's series limit.

The singlet and triplet terms are connected by intersystem combinations. The relative position of the quintets is determined by the series with the uncertainty $\pm$ probably not exceeding 200 cm^{-1} .

Edlén lists a number of combinations that probably involve $2s^2 2p^3 ({}^3D^\circ) 4f$ terms at about $288600 \pm \text{cm}^{-1}$ above the ground state.

In a private communication Edlén has stated that his term published as $3d {}^3D$ should have the designation $4s {}^3P$. He has also revised his published value of $3d' {}^1S^\circ$.

REFERENCES

H. Dingle, Proc. Roy. Soc. (London) [A] **128**, 600 (1930). (T) (C L)I. S. Bowen, Phys. Rev. **45**, 82 (1934). (T) (C L)B. Edlén, Zeit. Phys. **93**, 433 (1935). (I P) (T) (C L)

B. Edlén, private communication (Dec. 1947). (T)

F II

F II

Edlén	Config.	Desig.	J	Level	Interval	Edlén	Config.	Desig.	J	Level	Interval
$2p {}^3P_2$ ${}^3P_1$ ${}^3P_0$	$2s^2 2p^4$	$2p^4 {}^3P$	2 1 0	0.0 341.8 490.6	—341.8 —148.8		$2s^2 2p^3 ({}^1S^\circ) 3d$	$3d {}^1D^\circ$	4 3 2 1 0	$231158.08+x$ $231158.99+x$ $231160.19+x$ $231160.87+x$ $231161.59+x$	—0.91 —1.20 —0.68 —0.52
$2p {}^1D_2$	$2s^2 2p^4$	$2p^4 {}^1D$	2	20873							
$2p {}^1S_0$	$2s^2 2p^4$	$2p^4 {}^1S$	0	44919		$3d {}^1D_1$ ${}^1D_2$ ${}^1D_3$	$2s^2 2p^3 ({}^1S^\circ) 3d$	$3d {}^1D^\circ$	1 2 3	232064.18 232064.98 232067.06	0.80 2.08
$2p' {}^3P_2$ ${}^3P_1$ ${}^3P_0$	$2s^2 2p^4$	$2p^4 {}^3P^\circ$	2 1 0	164797.7 165107.1 165281.0	—309.4 —173.9		$2s^2 2p^3 ({}^1S^\circ) 4s$	$4s {}^1S^\circ$	2	$235311.15+x$	
	$2s^2 2p^3 ({}^1S^\circ) 3s$	$3s {}^1S^\circ$	2	$176654.2+x$		$3p {}^1P_1$	$2s^2 2p^3 ({}^1D^\circ) 3p$	$3p' {}^1P$	1	235643.1	
$3s {}^3S_1$	$2s^2 2p^3 ({}^1S^\circ) 3s$	$3s {}^3S^\circ$	1	182865.2		$3p {}^1D_1$ ${}^1D_2$ ${}^1D_3$	$2s^2 2p^3 ({}^1D^\circ) 3p$	$3p' {}^1D$	1 2 3	236170.35 236173.07 236195.57	2.72 22.50
	$2s^2 2p^3 ({}^1S^\circ) 3p$	$3p {}^3P$	1 2 3	202609.65+x 202620.98+x 202640.53+x	11.33 19.55	$4s {}^3S_1$	$2s^2 2p^3 ({}^1S^\circ) 4s$	$4s {}^3S^\circ$	1	236961.63	
$3p {}^3P_0$ ${}^3P_1$ ${}^3P_2$	$2s^2 2p^3 ({}^1S^\circ) 3p$	$3p {}^3P$	0 1 2	207702.91 207699.91 207704.61	—3.00 4.70	$3p {}^3F_4$ ${}^3F_3$ ${}^3F_2$	$2s^2 2p^3 ({}^1D^\circ) 3p$	$3p' {}^3F$	4 3 2	237507.91 237508.72 237509.37	—0.81 —0.65
$3s {}^3D_3$ ${}^3D_2$ ${}^3D_1$	$2s^2 2p^3 ({}^1D^\circ) 3s$	$3s' {}^3D^\circ$	3 2 1	211866.62 211887.69 211900.72	—21.07 —13.03	$3p {}^3F_1$	$2s^2 2p^3 ({}^1D^\circ) 3p$	$3p' {}^3F$	3	238323.6	
$3s {}^1D_2$	$2s^2 2p^3 ({}^1D^\circ) 3s$	$3s' {}^1D^\circ$	2	215069.8		$2p' {}^1P_1$	$2s^2 2p^4$	$2p^4 {}^1P^\circ$	1	239605.0	
$3s {}^1P_1$	$2s^2 2p^3 ({}^1P^\circ) 3s$	$3s'' {}^1P^\circ$	1	227228.2		$3p {}^3P_2$ ${}^3P_1$ ${}^3P_0$	$2s^2 2p^3 ({}^1D^\circ) 3p$	$3p' {}^3P$	2 1 0	240093.10 240153.34 240179.91	—60.24 —26.57
$3s {}^3P_2$ ${}^3P_1$ ${}^3P_0$	$2s^2 2p^3 ({}^1P^\circ) 3s$	$3s'' {}^3P^\circ$	2 1 0	229550.83 229552.44 229555.10	—1.61 —2.66	$3p {}^1D_2$	$2s^2 2p^3 ({}^1D^\circ) 3p$	$3p' {}^1D$	2	246283.9	
						$4p {}^3P_0$ ${}^3P_1$ ${}^3P_2$	$2s^2 2p^3 ({}^1S^\circ) 4p$	$4p {}^3P$	0 1 2	246655.10 246662.55 246682.67	7.45 20.12
						$3p {}^3S_1$	$2s^2 2p^3 ({}^1P^\circ) 3p$	$3p'' {}^3S$	1	253313.2	

F II—Continued

Edlén	Config.	Design.	J	Level	Interval
$4d\ ^1D_2$	$2s^2\ 2p^3(^4S^o)4d$	$4d\ ^1D^o$	1 2 3	254016	
$4f\ ^1F$	$2s^2\ 2p^3(^4S^o)4f$	$4f\ ^1F$	4, 3, 2	254547.3	
$\overline{3p}\ ^1D_2$	$2s^2\ 2p^3(^1P^o)3p$	$3p''\ ^1D$	3 2 1	254702.30 254717.36 254723.96	-15.06 -6.60
$\overline{3p}\ ^1D_1$	$2s^2\ 2p^3(^4S^o)4f$	$4f\ ^1F$	5 to 1	$254703.1+x$	
$\overline{3p}\ ^1P_1$	$2s^2\ 2p^3(^1P^o)3p$	$3p''\ ^1P$	1	255606.0	
$\overline{3p}\ ^1P_2$	$2s^2\ 2p^3(^1P^o)3p$	$3p''\ ^1P$	0 1 2	257253.9 257268.8 257292.7	14.9 23.9
$\overline{3p}\ ^1D_3$	$2s^2\ 2p^3(^1P^o)3p$	$3p''\ ^1D$	2	258930.1	
$5f\ ^1F$	$2s^2\ 2p^3(^4S^o)5f$	$5f\ ^1F$	5 to 1	$264610.1+x$	
$\overline{3d}\ ^1F_2$	$2s^2\ 2p^3(^1D^o)3d$	$3d'\ ^1F^o$	2 3 4	264953.12 264958.63 264965.91	5.51 7.28
$\overline{3d}\ ^1F_1$	$2s^2\ 2p^3(^1D^o)3d$	$3d'\ ^1F^o$	0	264994.9	
$\overline{3d}\ ^1S_0$	$2s^2\ 2p^3(^1D^o)3d$	$3d'\ ^1S^o$	5 4 3	265255.8 265267.8 265282.3	-12.0 -21.5
$\overline{3d}\ ^1G_2$	$2s^2\ 2p^3(^1D^o)3d$	$3d'\ ^1G^o$	4	265310.1	
$\overline{3d}\ ^1D_2$	$2s^2\ 2p^3(^1D^o)3d$	$3d'\ ^1D^o$	3 2 1	265472.70 265498.74 265517.14	-26.04 -18.40
$\overline{3d}\ ^1D_1$	$2s^2\ 2p^3(^1D^o)3d$	$3d'\ ^1D^o$	2	266270.2	
$\overline{3p}\ ^1S_0$	$2s^2\ 2p^3(^1P^o)3p$	$3p''\ ^1S$	0	266338.4	
$\overline{3d}\ ^1S_1$	$2s^2\ 2p^3(^1D^o)3d$	$3d'\ ^1S^o$	1	266360.69	
$\overline{3d}\ ^1P_2$	$2s^2\ 2p^3(^1D^o)3d$	$3d'\ ^1P^o$	2 1 0	266454.27 266499.12 266516.35	-44.85 -17.23
$\overline{3d}\ ^1F_2$	$2s^2\ 2p^3(^1D^o)3d$	$3d'\ ^1F^o$	3	266548.7	
$\overline{3d}\ ^1P_1$	$2s^2\ 2p^3(^1D^o)3d$	$3d'\ ^1P^o$	1	267400.3	
$4s\ ^1D_2$	$2s^2\ 2p^3(^1D^o)4s$	$4s'\ ^1D^o$	3 2 1	269548.7 269564.2 269574.5	-15.5 -10.3
$4s\ ^1D_1$	$2s^2\ 2p^3(^1D^o)4s$	$4s'\ ^1D^o$	2	270508.4	
$\overline{3d}\ ^1F_1$	F III ($^1S_{1/2}$)	Limit	-----	282190.2	
$\overline{3d}\ ^1F_2$	$2s^2\ 2p^3(^1P^o)3d$	$3d''\ ^1F^o$	4 3 2	282544.7 282569.7 282586.9	-25.0 -17.2
$\overline{3d}\ ^1D_2$	$2s^2\ 2p^3(^1P^o)3d$	$3d''\ ^1D^o$	2	282774.7	
$\overline{3d}\ ^1P_0$	$2s^2\ 2p^3(^1P^o)3d$	$3d''\ ^1P^o$	0 1 2	282897.0 282915.4 282947.9	16.4 34.5
$\overline{3d}\ ^1F_2$	$2s^2\ 2p^3(^1P^o)3d$	$3d''\ ^1F^o$	3	283409.4	
$\overline{3d}\ ^1P_1$	$2s^2\ 2p^3(^1P^o)3d$	$3d''\ ^1P^o$	1	284224.8	
$\overline{3d}\ ^1D_2$	$2s^2\ 2p^3(^1P^o)4s$	$4s''\ ^1P^o$	2 1 0	286701.9 286706.6 286707.3	-4.7 -0.7

December 1947.

F II OBSERVED TERMS*

Config. $1s^+$	Observed Terms	$ns\ (n \geq 3)$	$np\ (n \geq 3)$	$nd\ (n \geq 3)$	$n'f\ (n \geq 4)$ $4, 5f\ ^1F$ $4f\ ^1F$
$2s^2\ 2p^4$	$2p^4\ ^1S$	$2p^4\ ^1S$	$2p^4\ ^1P$		
$2s^2\ 2p^4$	$2p^4\ ^1S$	$2p^4\ ^1P^o$ $2p^4\ ^1P^o$	$2p^4\ ^1D$		
$2s^2\ 2p^3(^4S^o)ns$	$\{3, 4s\ ^1S^o$ $\{3, 4s\ ^1S^o$	$3p\ ^1P$ $3, 4p\ ^1P$	$3p'\ ^1P$ $3p'\ ^1P$ $3p'\ ^1D$ $3p''\ ^1D$ $3p''\ ^1D$	$3d\ ^1D^o$ $3, 4d\ ^1D^o$ $3d'\ ^1D^o$ $3d'\ ^1D^o$ $3d''\ ^1D^o$	$3d'\ ^1G^o$ $3d'\ ^1G^o$ $3d'\ ^1F^o$ $3d'\ ^1F^o$ $3d''\ ^1F^o$ $3d''\ ^1F^o$
$2s^2\ 2p^3(^1D^o)ns'$	$\{3, 4s\ ^1S^o$ $\{3, 4s\ ^1S^o$	$3p\ ^1P$ $3p'\ ^1P$ $3p'\ ^1D$ $3p''\ ^1D$ $3p''\ ^1D$	$3p'\ ^1P$ $3p'\ ^1P$ $3p'\ ^1D$ $3p''\ ^1D$ $3p''\ ^1D$	$3d\ ^1D^o$ $3, 4d\ ^1D^o$ $3d'\ ^1D^o$ $3d'\ ^1D^o$ $3d''\ ^1D^o$	$3d'\ ^1G^o$ $3d'\ ^1G^o$ $3d'\ ^1F^o$ $3d'\ ^1F^o$ $3d''\ ^1F^o$ $3d''\ ^1F^o$
$2s^2\ 2p^3(^1P^o)ns''$	$\{3, 4s\ ^1S^o$ $\{3, 4s\ ^1S^o$	$3p\ ^1P$ $3p'\ ^1P$ $3p'\ ^1D$ $3p''\ ^1D$ $3p''\ ^1D$	$3p'\ ^1P$ $3p'\ ^1P$ $3p'\ ^1D$ $3p''\ ^1D$ $3p''\ ^1D$	$3d\ ^1D^o$ $3, 4d\ ^1D^o$ $3d'\ ^1D^o$ $3d'\ ^1D^o$ $3d''\ ^1D^o$	$3d'\ ^1G^o$ $3d'\ ^1G^o$ $3d'\ ^1F^o$ $3d'\ ^1F^o$ $3d''\ ^1F^o$ $3d''\ ^1F^o$

* For predicted terms in the spectra of the O I isoelectronic sequence, see Introduction.

F III

(N I sequence; 7 electrons)

Z=9

Ground state $1s^2 2s^2 2p^3 {}^4S_{1/2}$ $2p^3 {}^4S_{1/2}$ 505410 cm^{-1}

I. P. 62.646 volts

The terms are from the paper by Edlén. With the aid of observations in the extreme ultra-violet he has extended the analysis by Bowen and Dingle and derived improved values of the series limits. He has found the sextet terms and estimated their position relative to the other terms. The value of x is somewhat uncertain. Bowen found 14 intersystem combinations connecting the doublet and quartet terms.

The term $3p'' {}^2P^\circ$ depends upon the combination with $3s'' {}^2S$, assigned to a pair of lines at 2920 Å. According to Edlén this classification is somewhat uncertain.

REFERENCES

H. Dingle, Proc. Roy. Soc. (London) [A] **122**, 144 (1929). (T) (C L)I. S. Bowen, Phys. Rev. **45**, 82 (1934). (T) (C L)B. Edlén, Zeit. Phys. **93**, 433 (1935). (I P) (T) (C L)

F III

F III

Edlén	Config.	Desig.	J	Level	Interval	Edlén	Config.	Desig.	J	Level	Interval
$2p {}^4S_2$	$2s^2 2p^3$	$2p^3 {}^4S^\circ$	$1\frac{1}{2}$	0		$3s {}^2P_1$	$2s^2 2p^2({}^3P)3s$	$3s {}^2P$	$\frac{1}{2}$	324489. 9	384. 5
$2p {}^2D_3$	$2s^2 2p^3$	$2p^3 {}^2D^\circ$	$2\frac{1}{2}$	34084	-36	$3s {}^2P_2$			$1\frac{1}{2}$	324874. 4	
$2p {}^2D_1$			$1\frac{1}{2}$	34120		$3s {}^2D_3$	$2s^2 2p^2({}^1D)3s$	$3s {}^2D$	$2\frac{1}{2}$	344016. 2	-3. 3
						$3s {}^2D_1$			$1\frac{1}{2}$	344019. 5	
$2p {}^2P_{1/2}$	$2s^2 2p^3$	$2p^3 {}^2P^\circ$	$\left\{ \begin{array}{l} 1\frac{1}{2} \\ \frac{1}{2} \end{array} \right\}$	51558		$3p {}^2S_1$	$2s^2 2p^2({}^3P)3p$	$3p {}^2S^\circ$	$\frac{1}{2}$	344438. 4	
$2p' {}^4P_3$	$2s 2p^4$	$2p^4 {}^4P$	$2\frac{1}{2}$	151897. 9	-337. 4	$3p {}^4D_1$	$2s^2 2p^2({}^3P)3p$	$3p {}^4D^\circ$	$\frac{1}{2}$	348700. 5	114. 9
$2p' {}^4P_2$			$1\frac{1}{2}$	152235. 3		$3p {}^4D_2$			$1\frac{1}{2}$	348815. 4	
$2p' {}^4P_1$			$\frac{1}{2}$	152410. 0	-174. 7	$3p {}^4D_3$			$2\frac{1}{2}$	349005. 1	189. 7
						$3p {}^4D_4$			$3\frac{1}{2}$	349264. 0	258. 9
$2p' {}^2D_3$	$2s 2p^4$	$2p^4 {}^2D$	$2\frac{1}{2}$	210240	-16	$3p {}^4P_1$	$2s^2 2p^2({}^3P)3p$	$3p {}^4P^\circ$	$\frac{1}{2}$	351234. 1	94. 3
$2p' {}^2D_1$			$1\frac{1}{2}$	210256		$3p {}^4P_2$			$1\frac{1}{2}$	351328. 4	
$2p' {}^2S_1$	$2s 2p^4$	$2p^4 {}^2S$	$\frac{1}{2}$	248260		$3p {}^4P_3$			$2\frac{1}{2}$	351517. 1	188. 7
$2p' {}^2P_2$	$2s 2p^4$	$2p^4 {}^2P$	$1\frac{1}{2}$	266559	-384	$3p {}^2D_1$	$2s^2 2p^2({}^3P)3p$	$3p {}^2D^\circ$	$1\frac{1}{2}$	355979. 6	390. 4
$2p' {}^2P_1$			$\frac{1}{2}$	266943		$3p {}^2D_3$			$2\frac{1}{2}$	356370. 0	
$3s {}^4P_1$	$2s^2 2p^2({}^3P)3s$	$3s {}^4P$	$\frac{1}{2}$	316707. 3	211. 3	$3p {}^4S_2$	$2s^2 2p^2({}^3P)3p$	$3p {}^4S^\circ$	$1\frac{1}{2}$	357477. 0	
$3s {}^4P_2$			$1\frac{1}{2}$	316918. 6							
$3s {}^4P_3$			$2\frac{1}{2}$	317237. 5	318. 9						

F III—Continued

F III—Continued

Edlén	Config.	Desig.	J	Level	Interval	Edlén	Config.	Desig.	J	Level	Interval
$3p\ ^1P_1$ $\ ^1P_2$	$2s^2\ 2p^2(^1P)3p$	$3p\ ^1P^\circ$	$\frac{1}{2}$ $1\frac{1}{2}$	360346. 2 360433. 1	86. 9	$4p\ ^4D_1$ $\ ^4D_2$ $\ ^4D_3$ $\ ^4D_4$	$2s^2\ 2p^2(^1P)4p$	$4p\ ^4D^\circ$	$\frac{1}{2}$ $1\frac{1}{2}$ $2\frac{1}{2}$ $3\frac{1}{2}$	426426. 0 426556. 4 426730. 7 426987. 5	130. 4 174. 3 256. 8
$\overline{3s}\ ^1S_1$	$2s^2\ 2p^2(^1S)3s$	$3s''\ ^1S$	$\frac{1}{2}$	372673. 0		$4p\ ^4P_1$ $\ ^4P_2$ $\ ^4P_3$	$2s^2\ 2p^2(^1P)4p$	$4p\ ^4P^\circ$	$\frac{1}{2}$ $1\frac{1}{2}$ $2\frac{1}{2}$	427456. 7 427542. 4 427729. 3	85. 7 186. 9
$3p\ ^1F_3$ $\ ^1F_4$	$2s^2\ 2p^2(^1D)3p$	$3p'\ ^1F^\circ$	$2\frac{1}{2}$ $3\frac{1}{2}$	376806. 2 376871. 0	64. 8	$4p\ ^3D_2$ $\ ^3D_3$	$2s^2\ 2p^2(^1P)4p$	$4p\ ^3D^\circ$	$1\frac{1}{2}$ $2\frac{1}{2}$	429105. 3 429500. 6	395. 3
$3p\ ^1D_3$ $\ ^1D_2$	$2s^2\ 2p^2(^1D)3p$	$3p'\ ^1D^\circ$	$2\frac{1}{2}$ $1\frac{1}{2}$	380242. 9 380299. 1	-56. 2	$4p\ ^3P_1$ $\ ^3P_2$	$2s^2\ 2p^2(^1P)4p$	$4p\ ^3P^\circ$	$\frac{1}{2}$ $1\frac{1}{2}$	431057. 1 431224. 2	167. 1
$3p\ ^1P_1$ $\ ^1P_2$	$2s^2\ 2p^2(^1D)3p$	$3p'\ ^1P^\circ$	$\frac{1}{2}$ $1\frac{1}{2}$	384350. 9 384485. 2	134. 3	$3p'\ ^3P_3$ $\ ^3P_2$ $\ ^3P_1$	$2s\ 2p^3(^1S^\circ)3p$	$3p''' ^3P$	$2\frac{1}{2}$ $1\frac{1}{2}$ $\frac{1}{2}$	434546. 3 434567. 0 434581. 6	-20. 7 -14. 6
$3d\ ^1F_2$ $\ ^1F_3$ $\ ^1F_4$ $\ ^1F_5$	$2s^2\ 2p^2(^1P)3d$	$3d\ ^1F$	$1\frac{1}{2}$ $2\frac{1}{2}$ $3\frac{1}{2}$ $4\frac{1}{2}$	387257. 3 387366. 2 387521. 8 387725. 5	108. 9 155. 6 203. 7	$\overline{4s}\ ^1D_{23}$	$2s^2\ 2p^2(^1D)4s$	$4s'\ ^1D$	$\left\{ \begin{array}{l} 2\frac{1}{2} \\ 1\frac{1}{2} \end{array} \right\}$	440830	
$3d\ ^1P_2$ $\ ^1P_1$	$2s^2\ 2p^2(^1P)3d$	$3d\ ^1P$	$1\frac{1}{2}$ $\frac{1}{2}$	389523. 5 389735. 7	-212. 2	$4d\ ^1P_2$ $\ ^1P_1$	$2s^2\ 2p^2(^1P)4d$	$4d\ ^1P$	$1\frac{1}{2}$ $\frac{1}{2}$	441159 441384	-225
$3d\ ^1D_1$ $\ ^1D_2$ $\ ^1D_3$ $\ ^1D_4$	$2s^2\ 2p^2(^1P)3d$	$3d\ ^1D$	$\frac{1}{2}$ $1\frac{1}{2}$ $2\frac{1}{2}$ $3\frac{1}{2}$	390118. 4 390078. 3 390075. 7 390208. 4	-40. 1 -2. 6 132. 7	$4d\ ^1P_3$ $\ ^1P_2$ $\ ^1P_1$	$2s^2\ 2p^2(^1P)4d$	$4d\ ^1P$	$2\frac{1}{2}$ $1\frac{1}{2}$ $\frac{1}{2}$	442153 442300 442378	-147 -78
$3d\ ^1P_3$ $\ ^1P_2$ $\ ^1P_1$	$2s^2\ 2p^2(^1P)3d$	$3d\ ^1P$	$2\frac{1}{2}$ $1\frac{1}{2}$ $\frac{1}{2}$	390832. 3 390974. 0 391045. 2	-141. 7 -71. 2	$4d\ ^1F_3$ $\ ^1F_4$	$2s^2\ 2p^2(^1P)4d$	$4d\ ^1F$	$2\frac{1}{2}$ $3\frac{1}{2}$	442280 442634	354
$3d\ ^1F_3$ $\ ^1F_4$	$2s^2\ 2p^2(^1P)3d$	$3d\ ^1F$	$2\frac{1}{2}$ $3\frac{1}{2}$	391255. 6 391625. 5	369. 9	$\overline{3d}\ ^1D_{23}$	$2s^2\ 2p^2(^1S)3d$	$3d''\ ^1D$	$\left\{ \begin{array}{l} 1\frac{1}{2} \\ 2\frac{1}{2} \end{array} \right\}$	442760	
$3s'\ ^1S_2$	$2s\ 2p^3(^1S^\circ)3s$	$3s''' ^1S^\circ$	$2\frac{1}{2}$	391910. 0 +x		$4d\ ^1D_2$ $\ ^1D_3$	$2s^2\ 2p^2(^1P)4d$	$4d\ ^1D$	$1\frac{1}{2}$ $2\frac{1}{2}$	444960 445008	48
$3d\ ^1D_2$ $\ ^1D_3$	$2s^2\ 2p^2(^1P)3d$	$3d\ ^1D$	$1\frac{1}{2}$ $2\frac{1}{2}$	395266. 1 395384. 1	118. 0	$3d'\ ^1D_5$ $\ ^1D_4$ $\ ^1D_3$ $\ ^1D_2$ $\ ^1D_1$	$2s\ 2p^3(^1S^\circ)3d$	$3d''' ^1D^\circ$	$4\frac{1}{2}$ $3\frac{1}{2}$ $2\frac{1}{2}$ $1\frac{1}{2}$ $\frac{1}{2}$	462930. 1+x 462932. 7+x 462936. 5+x 462939. 9+x 462942. 4+x	-2. 6 -3. 8 -3. 4 -2. 5
$2p''\ ^1P_2$ $\ ^1P_1$	$2p^5$	$2p^5\ ^1P^\circ$	$1\frac{1}{2}$ $\frac{1}{2}$	401203 401721	-518	$5d\ ^1P_3$ $\ ^1P_{12}$	$2s^2\ 2p^2(^1P)5d$	$5d\ ^1P$	$2\frac{1}{2}$ $\left\{ \begin{array}{l} 1\frac{1}{2} \\ \frac{1}{2} \end{array} \right\}$	465409 465541	-132
$3s'\ ^1S_2$	$2s\ 2p^3(^1S^\circ)3s$	$3s''' ^1S^\circ$	$1\frac{1}{2}$	404778		$5d\ ^1D_{23}$	$2s^2\ 2p^2(^1P)5d$	$5d\ ^1D$	$\left\{ \begin{array}{l} 1\frac{1}{2} \\ 2\frac{1}{2} \end{array} \right\}$	466293	
$\overline{3p}\ ^1P_1$ $\ ^1P_2$	$2s^2\ 2p^2(^1S)3p$	$3p''\ ^1P^\circ$	$\frac{1}{2}$ $1\frac{1}{2}$	406899. 2 406903. 3	4. 1	$4d\ ^1F_{34}$	$2s^2\ 2p^2(^1D)4d$	$4d'\ ^1F$	$\left\{ \begin{array}{l} 3\frac{1}{2} \\ 2\frac{1}{2} \end{array} \right\}$	466810	
$3d\ ^1F_4$ $\ ^1F_3$	$2s^2\ 2p^2(^1D)3d$	$3d'\ ^1F$	$3\frac{1}{2}$ $2\frac{1}{2}$	413136. 1 413187. 1	-51. 0	$4d\ ^1D_{23}$	$2s^2\ 2p^2(^1D)4d$	$4d'\ ^1D$	$\left\{ \begin{array}{l} 1\frac{1}{2} \\ 2\frac{1}{2} \end{array} \right\}$	466964	
$3d\ ^1G_4$ $\ ^1G_3$	$2s^2\ 2p^2(^1D)3d$	$3d'\ ^1G$	$4\frac{1}{2}$ $3\frac{1}{2}$	414887. 0 414890. 1	-3. 1	$4d\ ^1P_{12}$	$2s^2\ 2p^2(^1D)4d$	$4d'\ ^1P$	$\left\{ \begin{array}{l} 1\frac{1}{2} \\ 1\frac{1}{2} \end{array} \right\}$	467798	
$4s\ ^1P_1$ $\ ^1P_2$ $\ ^1P_3$	$2s^2\ 2p^2(^1P)4s$	$4s\ ^1P$	$\frac{1}{2}$ $1\frac{1}{2}$ $2\frac{1}{2}$	415188 415714		$3d'\ ^1D_4$ $\ ^1D_3$ $\ ^1D_{12}$	$2s\ 2p^3(^1S^\circ)3d$	$3d''' ^1D^\circ$	$3\frac{1}{2}$ $2\frac{1}{2}$ $\left\{ \begin{array}{l} 1\frac{1}{2} \\ \frac{1}{2} \end{array} \right\}$	467868. 9 467869. 3 467870. 3	-0. 4 -1. 0
$3d\ ^1D_2$ $\ ^1D_3$	$2s^2\ 2p^2(^1D)3d$	$3d'\ ^1D$	$1\frac{1}{2}$ $2\frac{1}{2}$	416160. 7 416178. 1	17. 4	$\overline{3s'}\ ^1D_3$ $\ ^1D_2$	$2s\ 2p^3(^1D^\circ)3s$	$3s^{1V}\ ^1D^\circ$	$2\frac{1}{2}$ $1\frac{1}{2}$	474369 474413	-44
$4s\ ^1P_1$ $\ ^1P_2$	$2s^2\ 2p^2(^1P)4s$	$4s\ ^1P$	$\frac{1}{2}$ $1\frac{1}{2}$	417581 417968	387	$\overline{5d}\ ^1F_{34}$	$2s^2\ 2p^2(^1D)5d$	$5d'\ ^1F$	$\left\{ \begin{array}{l} 3\frac{1}{2} \\ 2\frac{1}{2} \end{array} \right\}$	489494	
$3d\ ^1P_1$ $\ ^1P_2$	$2s^2\ 2p^2(^1D)3d$	$3d'\ ^1P$	$\frac{1}{2}$ $1\frac{1}{2}$	418180. 6 418240. 9	60. 3	$\overline{5d}\ ^1D_{23}$	$2s^2\ 2p^2(^1D)5d$	$5d'\ ^1D$	$\left\{ \begin{array}{l} 1\frac{1}{2} \\ 2\frac{1}{2} \end{array} \right\}$	490140	
$3d\ ^1S_1$	$2s^2\ 2p^2(^1D)3d$	$3d'\ ^1S$	$\frac{1}{2}$	420997. 9							
$3p'\ ^1P_2$ $\ ^1P_3$ $\ ^1P_4$	$2s\ 2p^3(^1S^\circ)3p$	$3p''' ^1P$	$1\frac{1}{2}$ $2\frac{1}{2}$ $3\frac{1}{2}$	425239. 6 +x 425261. 3 +x 425297. 4 +x	21. 7 36. 1						
$4p\ ^1S_1$	$2s^2\ 2p^2(^1P)4p$	$4p\ ^1S^\circ$	$\frac{1}{2}$	425388. 9							
							F IV($^1P_0$)	Limit		505410	

F III Observed Terms*

Config. $1s^2+$	Observed Terms		
$2s^2 2p^3$	{ $2p^3 {}^4S^\circ$ $2p^3 {}^2P^\circ$ $2p^3 {}^2D^\circ$		
$2s 2p^4$	{ $2p^4 {}^2S$ $2p^4 {}^4P$ $2p^4 {}^2P$ $2p^4 {}^2D$		
$2p^5$	$2p^5 {}^2P^\circ$		
	$ns (n \geq 3)$	$np (n \geq 3)$	$nd (n \geq 3)$
$2s^2 2p^3 ({}^4P) n\pi$	{ $3, 4s {}^4P$ $3, 4s {}^2P$	$3p {}^4S^\circ$ $3, 4p {}^4P^\circ$ $3, 4p {}^4D^\circ$ $3, 4p {}^2S^\circ$ $3, 4p {}^2P^\circ$ $3, 4p {}^2D^\circ$	$3-5d {}^4P$ $3d {}^4D$ $3d {}^4F$ $3, 4d {}^2P$ $3-5d {}^2D$ $3, 4d {}^2F$
$2s^2 2p^3 ({}^2D) n\pi'$	$3, 4s' {}^2D$	$3p' {}^2P^\circ$ $3p' {}^2D^\circ$ $3p' {}^2F^\circ$	$3d' {}^2S$ $3, 4d' {}^2P$ $3-5d' {}^2D$ $3-5d' {}^2F$ $3d' {}^2G$
$2s^2 2p^3 ({}^2S) n\pi''$	$3s'' {}^2S$	$3p'' {}^2P^\circ$	$3d'' {}^2D$
$2s 2p^4 ({}^2S^\circ) n\pi'''$	{ $3s''' {}^4S^\circ$ $3s''' {}^2S^\circ$	$3p''' {}^4P$ $3p''' {}^2P$	$3d''' {}^4D^\circ$ $3d''' {}^2D^\circ$
$2s 2p^2 ({}^2D^\circ) n\pi^{IV}$	$3s^{IV} {}^2D^\circ$		

*For predicted terms in the spectra of the N I isoelectronic sequence, see Introduction.

F IV

(C I sequence; 6 electrons)

 $Z=9$ Ground state $1s^2 2s^2 2p^3 {}^4P_0$ $2p^3 {}^4P_0$ 703766.4 cm^{-1}

I. P. 87.23 volts

The first work on this spectrum was by Bowen. Edlén has greatly extended the earlier analysis. About 250 lines in the intervals 140 to 679 Å and 2171 to 3176 Å are now classified. The terms are from Edlén, who has rejected two terms in his published list, $4d' {}^2S$ and $\overline{3s'} {}^2S$. Extrapolated values are entered in brackets in the table.

The singlet and triplet terms are connected by intersystem combinations. No such combinations involving quintet terms have been observed. The uncertainty $\pm$ may reach 50 to 100 cm^{-1} .

REFERENCES

- B. Edlén, Zeit. Phys. **92**, 19 (1934). (I P) (T) (C L)
 B. Edlén, private communication (Dec. 1947). (T)

F IV

F IV

Edlén	Config.	Desig.	J	Level	Interval	Edlén	Config.	Desig.	J	Level	Interval
$2p^1 P_0$	$2s^1 2p^1$	$2p^1 P$	0	0.0	225.2	$3p^1 P_1$	$2s^1 2p^1(^1P)3p$	$3p^1 P^\circ$	1	542578.5+x	114.9
$^1P_1$			1	225.2	388.2	$^1P_2$			2	542693.2+x	202.0
$^1P_2$			2	613.4		$^1P_3$			3	542895.2+x	
$2p^1 D_1$	$2s^1 2p^1$	$2p^1 D$	2	25241		$3p^1 D_1$	$2s^1 2p^1(^1P)3p$	$3p^1 D^\circ$	1	550918	180
$2p^1 S_0$	$2s^1 2p^1$	$2p^1 S$	0	53544		$^1D_2$			2	551098	268
$2p^1 S_2$	$2s^1 2p^1$	$2p^1 S^\circ$	2	74506 +x		$^1D_3$			3	551366	
$2p^1 D_2$	$2s^1 2p^1$	$2p^1 D^\circ$	3	147841.8	-47.1	$3p^1 P_1$	$2s^1 2p^1(^1P)3p$	$3p^1 P^\circ$	0	556061	265
$^1D_2$			2	147888.9	-12.7	$^1P_2$			1	556316	
$^1D_1$			1	147901.6		$4s^1 P_0$	$2s^1 2p^1(^1P^\circ)4s$	$4s^1 P^\circ$	0	559747	134
$2p^1 P_1$	$2s^1 2p^1$	$2p^1 P^\circ$	2	175237.0	-5.0	$^1P_1$			1	559881	423
$^1P_1$			1	175242.0	-22.1	$^1P_2$			2	560304	
$^1P_0$			0	175264.1		$4s^1 P_1$	$2s^1 2p^1(^1P^\circ)4s$	$4s^1 P^\circ$	1	561267	
$2p^1 D_1$	$2s^1 2p^1$	$2p^1 D^\circ$	2	228908		$3s^1 D_1$	$2s^1 2p^1(^1D)3s$	$3s^1 D$	1	567900	119
$2p^1 S_1$	$2s^1 2p^1$	$2p^1 S^\circ$	1	238297.2		$^1D_2$			2	568019	156
$2p^1 P_1$	$2s^1 2p^1$	$2p^1 P^\circ$	1	257390		$^1D_3$			3	568175	
$2p^1 P_2$	$2p^1$	$2p^1 P$	2	348327.0	-443.0	$3d^1 F_1$	$2s^1 2p^1(^1P)3d$	$3d^1 F$	1	[576581] +x	[75]
$^1P_1$			1	348770.0	-193.0	$^1F_2$			2	576656.1+x	112.1
$^1P_0$			0	348963.0		$^1F_3$			3	576768.2+x	148.4
$3s^1 P_0$	$2s^1 2p^1(^1P^\circ)3s$	$3s^1 P^\circ$	0	416417.3	222.5	$^1F_4$			4	576916.6+x	183.5
$^1P_1$			1	416639.8	503.6	$^1F_5$			5	577100.1+x	
$^1P_2$			2	417143.4		$3d^1 D_0$	$2s^1 2p^1(^1P)3d$	$3d^1 D$	0	581806.1+x	5.4
$3s^1 P_1$	$2s^1 2p^1(^1P^\circ)3s$	$3s^1 P^\circ$	1	423606.4		$^1D_1$			1	581811.5+x	17.1
$3p^1 D_1$	$2s^1 2p^1(^1P^\circ)3p$	$3p^1 D$	1	451819.6	261.5	$^1D_2$			2	581828.6+x	43.7
$^1D_2$			2	452081.1	436.0	$^1D_3$			3	581872.3+x	105.3
$^1D_3$			3	452517.1		$^1D_4$			4	581977.6+x	
$3p^1 S_1$	$2s^1 2p^1(^1P^\circ)3p$	$3p^1 S$	1	456884.3		$3d^1 P_1$	$2s^1 2p^1(^1P)3d$	$3d^1 P$	3	583547 +x	-150
$3p^1 P_0$	$2s^1 2p^1(^1P^\circ)3p$	$3p^1 P$	0	460215.2	170.6	$^1P_2$			2	583697 +x	-101
$^1P_1$			1	460385.8	254.8	$^1P_0$			1	583798 +x	
$^1P_2$			2	460640.6		$3d^1 P_2$	$2s^1 2p^1(^1P)3d$	$3d^1 P$	2	585201	-224
$3p^1 D_2$	$2s^1 2p^1(^1P^\circ)3p$	$3p^1 D$	2	469644.2		$^1P_1$			1	585425	-106
$3d^1 F_2$	$2s^1 2p^1(^1P^\circ)3d$	$3d^1 F^\circ$	2	492395.1	463.7	$^1P_0$			0	585531	
$^1F_3$			3	492858.8	347.4	$3s^1 D_2$	$2s^1 2p^1(^1D)3s$	$3s^1 D$	2	586263	
$^1F_4$			4	493206.2		$4d^1 F_2$	$2s^1 2p^1(^1P^\circ)4d$	$4d^1 F^\circ$	2	586641	
$3d^1 D_2$	$2s^1 2p^1(^1P^\circ)3d$	$3d^1 D^\circ$	2	492864		$4d^1 D_2$	$2s^1 2p^1(^1P^\circ)4d$	$4d^1 D^\circ$	2	587130	
$3d^1 D_1$	$2s^1 2p^1(^1P^\circ)3d$	$3d^1 D^\circ$	1	497481.4	94.2	$3d^1 F_2$	$2s^1 2p^1(^1P)3d$	$3d^1 F$	2	588021	202
$^1D_2$			2	497575.6	153.5	$^1F_3$			3	588223	255
$^1D_3$			3	497729.1		$^1F_4$			4	588478	
$3d^1 P_2$	$2s^1 2p^1(^1P^\circ)3d$	$3d^1 P^\circ$	2	500390.1	-212.0	$4d^1 D_1$	$2s^1 2p^1(^1P^\circ)4d$	$4d^1 D^\circ$	1	589109	79
$^1P_1$			1	500602.1	-114.4	$^1D_2$			2	589188	218
$^1P_0$			0	500716.5		$^1D_3$			3	589406	
$3s^1 P_1$	$2s^1 2p^1(^1P)3s$	$3s^1 P$	1	502723.0+x	241.4	$4d^1 P_2$	$2s^1 2p^1(^1P^\circ)4d$	$4d^1 P^\circ$	2	590024	-177
$^1P_2$			2	502964.4+x	318.0	$^1P_1$			1	590201	-61
$^1P_3$			3	503282.4+x		$^1P_0$			0	590262	
$3d^1 F_3$	$2s^1 2p^1(^1P^\circ)3d$	$3d^1 F^\circ$	3	505421.4		$4d^1 F_3$	$2s^1 2p^1(^1P^\circ)4d$	$4d^1 F^\circ$	3	592240	
$3d^1 P_1$	$2s^1 2p^1(^1P^\circ)3d$	$3d^1 P^\circ$	1	506514		$4d^1 P_1$	$2s^1 2p^1(^1P^\circ)4d$	$4d^1 P^\circ$	1	592674	
$3s^1 P_0$	$2s^1 2p^1(^1P)3s$	$3s^1 P$	0	519341	198	$3d^1 D_1$	$2s^1 2p^1(^1P)3d$	$3d^1 D$	1	595331	72
$^1P_1$			1	519539	351	$^1D_2$			2	595403	78
$^1P_2$			2	519890		$^1D_3$			3	595481	
$3p^1 S_1$	$2s^1 2p^1(^1P)3p$	$3p^1 S^\circ$	1	534686		$3p^1 F_1$	$2s^1 2p^1(^1D)3p$	$3p^1 F^\circ$	3	609811	
$3p^1 D_0$	$2s^1 2p^1(^1P)3p$	$3p^1 D^\circ$	0	[538507] +x	[66]	$3p^1 D_1$	$2s^1 2p^1(^1D)3p$	$3p^1 D^\circ$	2	612830	
$^1D_1$			1	538573.3+x	135.9	$3p^1 P_1$	$2s^1 2p^1(^1D)3p$	$3p^1 P^\circ$	1	618889	
$^1D_2$			2	538709.2+x	200.6	$5d^1 F_1$	$2s^1 2p^1(^1P^\circ)5d$	$5d^1 F^\circ$	2	629547	
$^1D_3$			3	538909.8+x	256.3				3		
$^1D_4$			4	539166.1+x					4		

F IV—Continued

F IV—Continued

Edlén	Config.	Desig.	<i>J</i>	Level	Interval	Edlén	Config.	Desig.	<i>J</i>	Level	Interval
5d ¹ D ₂	2s ² 2p(³ P°)5d	5d ¹ D°	2	650019	[-120]	3d' ¹ F ₃	2s 2p ² (³ D)3d	3d' ¹ F	3	657546	-199
	2s ² 2p(³ P°)5d	5d ³ D°	1			3d' ¹ D ₃	2s 2p ² (³ D)3d	3d' ¹ D	2	657800	
5d ³ D ₃			2	651126		3d' ¹ P ₁	2s 2p ² (³ D)3d	3d' ¹ P	1	658629	
5d ³ P ₁	2s ² 2p(³ P°)5d	5d ³ P°	2	[651426]			2s 2p ² (³ P)4p	4p ³ D°	1		
5d ³ P ₀₁			1, 0	651546		4p' ³ D ₃			2	662843	
5d ¹ F ₃	2s ² 2p(³ P°)5d	5d ¹ F°	3	652790			2s 2p ² (³ P)4p	4p ³ P°	0		
5d ¹ P ₁	2s ² 2p(³ P°)5d	5d ¹ P°	1	652740		4p' ³ P ₁			1	665409	
3d' ³ F ₂₃₄	2s 2p ² (³ D)3d	3d' ³ F	2, 3, 4	644224		4d' ³ P ₂	2s 2p ² (³ P)4d	4d ³ P	3	675110	
	2s 2p ² (³ P)4s	4s ³ P	1	645504		4d' ³ P ₁₃			2, 1	675309	
4s' ³ P ₂			2	645827		4d' ³ F ₂	2s 2p ² (³ P)4d	4d ³ F	2	677467	
4s' ³ P ₁			3			4d' ³ F ₃			3	677667	
	2s 2p ² (³ D)3d	3d' ³ P	0			4d' ³ F ₄			4	677906	
3d' ³ P ₂			1	648827	146	4d' ³ D ₃	2s 2p ² (³ P)4d	4d ³ D	1, 2	679798	196
3d' ³ D ₁₂	2s 2p ² (³ D)3d	3d' ³ D	1, 2	650196					3	679994	
3d' ³ D ₁			3	650342			F v (³ P ₂ °)	Limit	-----	703766.4	
	2s ² 2p(³ P°)6d	6d ³ D°	1				2s 2p ² (³ P)5p	5p ³ D°	1		
6d ³ D ₃			2	653606	-61	5p' ³ D ₃			2	710760	-202
6d ³ P ₂	2s ² 2p(³ P°)6d	6d ³ P°	2	653772					3	716878	
6d ³ P ₀₁			1, 0	653833		5d' ³ P ₃	2s 2p ² (³ P)5d	5d ³ P	2, 1	717080	
6d ¹ F ₃	2s ² 2p(³ P°)6d	6d ¹ F°	3	654469		5d' ³ P ₁₂					
3d' ³ S ₁	2s 2p ² (³ D)3d	3d' ³ S	1	654739		4d' ³ F ₂₃₄	2s 2p ² (³ D)4d	4d' ³ F	2, 3, 4	738996	

December 1947.

F IV OBSERVED TERMS*

Config. 1s ² +	Observed Terms		
2s ² 2p ²	{ 2p ² ¹ S 2p ² ³ P 2p ² ¹ D		
2s 2p ³	{ 2p ³ ⁴ S° 2p ³ ³ P° 2p ³ ³ D° 2p ³ ² S° 2p ³ ¹ P° 2p ³ ¹ D°		
2p ⁴	2p ⁴ ³ P		
	ns (n ≥ 3)	np (n ≥ 3)	nd (n ≥ 3)
2s ² 2p(³ P°)nx	{ 3, 4s ³ P° 3, 4s ¹ P°	3p ³ S 3p ³ P 3p ³ D 3p ¹ D	3-6d ³ P° 3-6d ³ D° 3-5d ³ F° 3-5d ¹ P° 3-5d ¹ D° 3-6d ¹ F°
2s 2p ² (³ P)nx	{ 3, 4s ³ P 3s ³ P	3p ³ S° 3p ³ P° 3p ³ D° 3-4p ³ P° 3-5p ³ D°	3-5d ³ P 3d ³ D 3d ³ F 3d ³ P 3, 4d ³ D 3, 4d ³ F
2s 2p ² (³ D)nx'	{ 3s' ³ D 3s' ¹ D	3p' ³ P° 3p' ³ D° 3p' ³ F°	3d' ³ S 3d' ³ P 3d' ³ D 3, 4d' ³ F 3d' ³ P 3d' ³ D 3d' ³ F

*For predicted terms in the spectra of the C I isoelectronic sequence, see Introduction.

F v—Continued

F v—Continued

Edlén	Config.	Desig.	<i>J</i>	Level	Interval	Eglén	Config.	Desig.	<i>J</i>	Level	Interval
$3d' \ ^1F_3$ $\ ^1F_4$	$2s \ 2p(^1P^o)3d$	$3d \ ^1F^o$	$2\frac{1}{2}$ $3\frac{1}{2}$	712840 713306	466		$2s \ 2p(^1P^o)4d$	$4d \ ^1D^o$	$1\frac{1}{2}$ $2\frac{1}{2}$	841598 841695	97
$4s \ ^1S_1$	$2s^2(^1S)4s$	$4s \ ^1S$	$\frac{1}{2}$	712936		$4d' \ ^1P_3$	$2s \ 2p(^1P^o)4d$	$4d \ ^1P^o$	$2\frac{1}{2}$ $1\frac{1}{2}$ $\frac{1}{2}$	$842452+x$	
$3d' \ ^1P_3$ $\ ^1P_1$	$2s \ 2p(^1P^o)3d$	$3d \ ^1P^o$	$1\frac{1}{2}$ $\frac{1}{2}$	718472 718691	-219		$2s^2(^1S)6d$	$6d \ ^1D$	$1\frac{1}{2}$ $2\frac{1}{2}$	843497	
$4d \ ^1D_2$ $\ ^1D_3$	$2s^2(^1S)4d$	$4d \ ^1D$	$1\frac{1}{2}$ $2\frac{1}{2}$	744010 744036	26		$2p^2(^1D)3p$	$3p''' \ ^1F^o$	$2\frac{1}{2}$ $3\frac{1}{2}$	844112 844266	154
$\overline{3p'} \ ^1D_2$ $\ ^1D_3$	$2s \ 2p(^1P^o)3p$	$3p' \ ^1D$	$1\frac{1}{2}$ $2\frac{1}{2}$	751406 751452	46	$\overline{3p''} \ ^1F_3$ $\ ^1F_4$	$2p^2(^1D)3p$	$3p''' \ ^1F^o$	$2\frac{1}{2}$ $3\frac{1}{2}$	847506 847817	311
$\overline{3p'} \ ^1P_1$ $\ ^1P_3$	$2s \ 2p(^1P^o)3p$	$3p' \ ^1P$	$\frac{1}{2}$ $1\frac{1}{2}$	752529 753656	127	$4d' \ ^1F_3$ $\ ^1F_4$	$2s \ 2p(^1P^o)4d$	$4d \ ^1F^o$	$2\frac{1}{2}$ $3\frac{1}{2}$	853035 853442	-407
$\overline{3p'} \ ^1S_1$	$2s \ 2p(^1P^o)3p$	$3p' \ ^1S$	$\frac{1}{2}$	760342			$2p^2(^1D)3p$	$3p''' \ ^1D^o$	$1\frac{1}{2}$ $2\frac{1}{2}$	854971	
$\overline{3d'} \ ^1F_{34}$	$2s \ 2p(^1P^o)3d$	$3d' \ ^1F^o$	$\left\{ \begin{array}{l} 2\frac{1}{2} \\ 3\frac{1}{2} \end{array} \right\}$	783650			$2p^2(^1P)3d$	$3d'' \ ^1P$	$2\frac{1}{2}$ $1\frac{1}{2}$ $\frac{1}{2}$	860421+x 860619+x 860725+x	-198 -106
$3s'' \ ^1P_1$ $\ ^1P_3$ $\ ^1P_3$	$2p^2(^1P)3s$	$3s'' \ ^1P$	$\frac{1}{2}$ $1\frac{1}{2}$ $2\frac{1}{2}$	784343+x 784604+x 785014+x	261 410	$\overline{3d''} \ ^1D$	$2p^2(^1D)3d$	$3d''' \ ^1D$	$\left\{ \begin{array}{l} 1\frac{1}{2} \\ 2\frac{1}{2} \end{array} \right\}$	873904	
$\overline{3d'} \ ^1D_2$ $\ ^1D_3$	$2s \ 2p(^1P^o)3d$	$3d' \ ^1D^o$	$1\frac{1}{2}$ $2\frac{1}{2}$	787725 787764	39	$\overline{3d''} \ ^1F_{34}$	$2p^2(^1D)3d$	$3d''' \ ^1F$	$\left\{ \begin{array}{l} 2\frac{1}{2} \\ 3\frac{1}{2} \end{array} \right\}$	880312	
$\overline{3d'} \ ^1P_{13}$	$2s \ 2p(^1P^o)3d$	$3d' \ ^1P^o$	$\left\{ \begin{array}{l} \frac{1}{2} \\ 1\frac{1}{2} \end{array} \right\}$	793308		$\overline{3d''} \ ^1P_1$ $\ ^1P_3$	$2p^2(^1D)3d$	$3d''' \ ^1P$	$\frac{1}{2}$ $1\frac{1}{2}$	882930 883083	153
$3s'' \ ^1P_1$ $\ ^1P_3$	$2p^2(^1P)3s$	$3s'' \ ^1P$	$\frac{1}{2}$ $1\frac{1}{2}$	797059 797519	460		$2s \ 2p(^1P^o)5s$	$5s \ ^1P^o$	$\frac{1}{2}$ $1\frac{1}{2}$ $2\frac{1}{2}$	$892180+x$	
$5d \ ^1D_3$	$2s^2(^1S)5d$	$5d \ ^1D$	$1\frac{1}{2}$ $2\frac{1}{2}$	808663 808677	14		$2s \ 2p(^1P^o)5p$	$5p \ ^1D$	$1\frac{1}{2}$ $2\frac{1}{2}$	901487 902012	525
$4s' \ ^1P_3$	$2s \ 2p(^1P^o)4s$	$4s \ ^1P^o$	$\frac{1}{2}$ $1\frac{1}{2}$ $2\frac{1}{2}$	$810298+x$			$2s \ 2p(^1P^o)5d$	$5d \ ^1D^o$	$\frac{1}{2}$ $1\frac{1}{2}$ $2\frac{1}{2}$ $3\frac{1}{2}$	$906074+x$	
$\overline{3s''} \ ^1D$	$2p^2(^1D)3s$	$3s''' \ ^1D$	$\left\{ \begin{array}{l} 1\frac{1}{2} \\ 2\frac{1}{2} \end{array} \right\}$	811075		$5d' \ ^1D$	$2s \ 2p(^1P^o)5d$	$5d \ ^1P^o$	$2\frac{1}{2}$ $1\frac{1}{2}$ $\frac{1}{2}$	906565+x	
	$2p^2(^1P)3p$	$3p'' \ ^1D^o$	$\frac{1}{2}$ $1\frac{1}{2}$ $2\frac{1}{2}$ $3\frac{1}{2}$	816518+x 816759+x 817101+x	241 342		$2s \ 2p(^1P^o)5d$	$5d \ ^1P^o$	$2\frac{1}{2}$ $1\frac{1}{2}$ $\frac{1}{2}$	921450	
$3p'' \ ^1D_4$	$2p^2(^1P)3p$	$3p'' \ ^1P^o$	$\frac{1}{2}$ $1\frac{1}{2}$ $2\frac{1}{2}$	823375+x 823625+x	250		FvI ($^1S_0$)	Limit	-----		
$3p'' \ ^1P_3$	$2s \ 2p(^1P^o)4p$	$4p \ ^1P$	$\frac{1}{2}$ $1\frac{1}{2}$	829436 829707	271		$2s \ 2p(^1P^o)6d$	$6d \ ^1D^o$	$\frac{1}{2}$ $1\frac{1}{2}$ $2\frac{1}{2}$ $3\frac{1}{2}$	$940921+x$	
$4p' \ ^1D_2$ $\ ^1D_3$	$2s \ 2p(^1P^o)4p$	$4p \ ^1D$	$1\frac{1}{2}$ $2\frac{1}{2}$	833501 833920	419		$2s \ 2p(^1P^o)6d$	$6d \ ^1P^o$	$2\frac{1}{2}$ $1\frac{1}{2}$ $\frac{1}{2}$	$941286+x$	
$3p'' \ ^1S_2$	$2p^2(^1P)3p$	$3p'' \ ^1S^o$	$1\frac{1}{2}$	$834790+x$			$2p^2(^1P)4d$	$4d'' \ ^1P$	$2\frac{1}{2}$ $1\frac{1}{2}$ $\frac{1}{2}$	$998189+x$	
	$2s \ 2p(^1P^o)4p$	$4p \ ^1S$	$\frac{1}{2}$	838036							
	$2s \ 2p(^1P^o)4d$	$4d \ ^1D^o$	$\left\{ \begin{array}{l} \frac{1}{2} \\ 1\frac{1}{2} \\ 2\frac{1}{2} \\ 3\frac{1}{2} \end{array} \right\}$	$841037+x$ $841095+x$ $841305+x$	58 210						
$4d' \ ^1D_4$											

December 1947.

F V OBSERVED TERMS*

Config. $1s^2 +$	Observed Terms		
$2s^2(^1S)2p$	$2p\ ^1P^o$		
$2s\ 2p^3$	$\left\{ \begin{array}{lll} 2p^3\ ^1S & 2p^3\ ^1P & 2p^3\ ^1D \\ 2p^3\ ^1S^o & 2p^3\ ^1P^o & 2p^3\ ^1D^o \end{array} \right.$		
$2p^3$			
	$ns\ (n \geq 3)$	$np\ (n \geq 3)$	$nd\ (n \geq 3)$
$2s^2(^1S)nx$	$3, 4s\ ^1S$	$3p\ ^1P^o$	$3-6d\ ^1D$
$2s\ 2p(^3P^o)nx$	$\left\{ \begin{array}{l} 3-5s\ ^1P^o \\ 3s\ ^1P^o \end{array} \right.$	$\begin{array}{lll} 3p\ ^1S & 3p\ ^1D \\ 3, 4p\ ^1S & 3, 4p\ ^1P & 3-5p\ ^1D \end{array}$	$\begin{array}{lll} 3-6d\ ^1P^o & 3-6d\ ^1D^o & 3, 4d\ ^1F^o \\ 3d\ ^1P^o & 3, 4d\ ^1D^o & \end{array}$
$2s\ 2p(^1P^o)nx'$	$3s'\ ^1P^o$	$\begin{array}{lll} 3p'\ ^1S & 3p'\ ^1P & 3p'\ ^1D \end{array}$	$\begin{array}{lll} 3d'\ ^1P^o & 3d'\ ^1D^o & 3d'\ ^1F^o \end{array}$
$2p^2(^3P)nx''$	$\left\{ \begin{array}{l} 3s''\ ^1P \\ 3s''\ ^1P \end{array} \right.$	$\begin{array}{lll} 3p''\ ^1S^o & 3p''\ ^1P^o & 3p''\ ^1D^o \end{array}$	$\begin{array}{l} 3, 4d''\ ^1P \\ 3d''\ ^1P \end{array}$
$2p^2(^1D)nx'''$	$3s'''\ ^1D$	$\begin{array}{lll} 3p'''\ ^1D^o & 3p'''\ ^1F^o \end{array}$	$\begin{array}{lll} 3d'''\ ^1P & 3d'''\ ^1D & 3d'''\ ^1F \end{array}$

*For predicted terms in the spectra of the B I isoelectronic sequence, see Introduction.

F VI

(Be I sequence; 4 electrons)

$Z=9$

Ground state $1s^2 2s^2\ ^1S_0$

$2s^2\ ^1S_0\ 1267581\ \text{cm}^{-1}$

I. P. 157.117 volts

Edlén has revised and extended his published analysis and has generously furnished a manuscript copy of his complete term list in advance of publication, for inclusion here.

In the published papers he has used the same notation to designate the terms from the $^1P^o$ limit in F VII.

Intersystem combinations connecting the singlet and triplet systems of terms, have been observed.

REFERENCES

- B. Edlén, Zeit. Phys. **89**, 179 (1934). (I P) (T) (C L)
 B. Edlén, Zeit. Phys. **94**, 56 (1935). (T) (C L)
 B. Edlén, unpublished material (Dec. 1947). (I P) (T)

F VI

F VI

Config.	Desig.	<i>J</i>	Level	Interval	Config.	Desig.	<i>J</i>	Level	Interval
2s ²	2s ² 1S	0	0		2p(2P°)3d	3d 1P°	2	938524	
2s(2S)2p	2p 1P°	0	96601	260			1	938811	-287
		1	96861	576			0	938958	-147
		2	97437		2p(2P°)3d	3d 1F°	3	947305	
2s(2S)2p	2p 1P°	1	186841		2p(2P°)3d	3d 1P°	1	953402	
2p ²	2p ² 1P	0	251341	294	2s(2S)4s	4s 1S	1	989928	
		1	251635	510	2s(2S)4s	4s 1S	0	997693	
		2	252145		2s(2S)4p	4p 1P°	1	1007852	
2p ²	2p ² 1D	2	274597		2s(2S)4d	4d 1D	1		
2p ²	2p ² 1S	0	340424				2		
2s(2S)3s	3s 1S	1	747298				3	1014439	
2s(2S)3s	3s 1S	0	764392		2s(2S)4d	4d 1D	2	1019363	
2s(2S)3p	3p 1P°	1	787833		2s(2S)5s	5s 1S	1	1093463	
2s(2S)3p	3p 1P°	0			2s(2S)5p	5p 1P°	1	1099409	
		1	790326	148	2s(2S)5d	5d 1D	1		
		2	790474				2		
2s(2S)3d	3d 1D	1, 2	812169	39			3	1106417	
		3	812208		2s(2S)5d	5d 1D	2	1108712	
2s(2S)3d	3d 1D	2	826853		2p(2P°)4s	4s 1P°	1	1112328	
2p(2P°)3s	3s 1P°	0	871160	281	2p(2P°)4p	4p 1P	1	1115967	
		1	871441	637	2p(2P°)4p	4p 1D	1	1117498	243
		2	872078				2	1117741	532
2p(2P°)3s	3s 1P°	1	884290				3	1118273	
2p(2P°)3p	3p 1P	1	895287		2p(2P°)4p	4p 1S	1	1121377	
2p(2P°)3p	3p 1D	1	900442	343	2p(2P°)4p	4p 1P	0		
		2	900785	612			1	1122468	194
		3	901397				2	1122662	
2p(2P°)3p	3p 1S	1	909316		2p(2P°)4p	4p 1D	2	1126152	
2p(2P°)3p	3p 1P	0	915196	224	2p(2P°)4d	4d 1D°	2	1126168	
		1	915420	350	2p(2P°)4d	4d 1D°	1		
		2	915770				2		
2p(2P°)3d	3d 1D°	2	921821				3	1130339	
2p(2P°)3p	3p 1D	2	925393		2p(2P°)4d	4d 1P°	2	1131653	-204
2p(2P°)3d	3d 1D°	1	933586	131			1	1131857	
		2	933717	203			0		
		3	933920		2p(2P°)4d	4d 1F°	3	1135953	
2p(2P°)3p	3p 1S	0	934633		2p(2P°)4d	4d 1P°	1	1137535	

F VI—Continued

F VI—Continued

Config.	Desig.	<i>J</i>	Level	Interval	Config.	Desig.	<i>J</i>	Level	Interval
2s(2S)6p	6p ¹ P°	1	1154428		2p(³ P°)5d	5d ³ D°	1 2 3	1220840	
2s(2S)6d	6d ³ D	1 2 3	1156097		2p(³ P°)5d	5d ³ P°	2 1 0	1221541	
2s(2S)6d	6d ¹ D	2	1157385		2p(³ P°)5d	5d ¹ F°	3	1223598	
2s(2S)7p	7p ¹ P°	1	1184469		2p(³ P°)5d	5d ¹ P°	1	1224285	
2s(2S)7d	7d ³ D	1 2 3	1185884		2p(³ P°)6p	6p ³ D	1 2 3	1266672	
3s(2S)7d	7d ¹ D	2	1186611		F VII (2S _{1/2})	Limit	-----	1267581	
2s(2S)8d	8d ³ D	1 2 3	1205139		2p(³ P°)6p	6p ³ P	0 1 2	1267616	
2p(³ P°)5p	5p ³ D	1 2 3	1215055		2p(³ P°)6p	6p ¹ D	2	1268554	
2p(³ P°)5p	5p ³ P	0 1 2	1216995		2p(³ P°)6d	6d ³ D°	1 2 3	1269888	
2p(³ P°)5p	5p ¹ D	2	1218588		2p(³ P°)6d	6d ¹ F°	3	1271437	
2p(³ P°)5d	5d ¹ D°	2	1218786		2p(³ P°)7d	7d ³ D°	1 2 3	1299418	

December 1947.

F VI OBSERVED TERMS*

Config. 1s ² +	Observed Terms		
2s ²	2s ² ¹ S		
2s(2S)2p	{ 2p ³ P° 2p ¹ P°		
2p ³	{ 2p ³ ¹ S 2p ³ ³ P 2p ³ ¹ D		
	ns (n ≥ 3)	np (n ≥ 3)	nd (n ≥ 3)
2s(2S)nx	{ 3-5s ³ S 3, 4s ¹ S	3p ³ P° 3-7p ¹ P°	3-8d ³ D 3-7d ¹ D
2p(³ P°)nx	{ 3s ³ P° 3, 4s ¹ P°	3, 4p ³ S 3-6p ³ P 3-6p ³ D 3p ¹ S 3, 4p ¹ P 3-6p ¹ D	3-5d ³ P° 3-7d ³ D° 3-5d ¹ P° 3-5d ¹ D° 3-6d ¹ F°

*For predicted terms in the spectra of the Be I isoelectronic sequence, see Introduction.

F VII

(Li I sequence; 3 electrons)

Z=9

Ground state $1s^2 2s^2 {}^4S_3$ $2s^2 {}^4S_3$ 1493656 cm^{-1}

I. P. 185.139 volts

The analysis is by Edlén, who, in 1934, published a list of nine classified lines in the range between 86 Å and 134 Å. He has recently extended the analysis and has generously furnished his unpublished term list for use in the present compilation. All terms in the table have been taken from the later list, although the entries in column one are from the earlier paper.

Edlén remarks that the $np {}^2P^\circ$ and $nd {}^2D$ series have been observed in the vacuum spark further than indicated in the table, but beyond $n=6$ the term values calculated from a Ritz formula are probably to be preferred.

REFERENCES

B. Edlén, Zeit. Phys. 89, 179 (1934). (T) (C L)

B. Edlén, unpublished material (Sept. 1947). (I P) (T)

F VII

F VII

Edlén	Config.	Desig.	J	Level	Interval	Edlén	Config.	Desig.	J	Level	Interval
$2s^2 {}^4S$	2s	$2s^2 {}^4S$	$\frac{1}{2}$	0			6s	$6s^2 {}^4S$	$\frac{1}{2}$	1339216	
$2p^2 {}^4P_1$ ${}^4P_2$	2p	$2p^2 {}^4P^\circ$	$\frac{1}{2}$ $1\frac{1}{2}$	112258 113235	977		6p	$6p^2 {}^4P^\circ$	$\left\{ \frac{1}{2} \right.$ $\left. 1\frac{1}{2} \right\}$	1342877	
$3s^2 {}^4S$	3s	$3s^2 {}^4S$	$\frac{1}{2}$	854625			6d	$6d^2 {}^4D$	$\left\{ \frac{1}{2} \right.$ $\left. 2\frac{1}{2} \right\}$	1344141	
$3p^2 {}^4P_1$ ${}^4P_2$	3p	$3p^2 {}^4P^\circ$	$\frac{1}{2}$ $1\frac{1}{2}$	885136 885418	282		7s	$7s^2 {}^4S$	$\frac{1}{2}$	1380775	
$3d^2 {}^4D_2$ ${}^4D_3$	3d	$3d^2 {}^4D$	$\frac{1}{2}$ $2\frac{1}{2}$	895632 895722	90		7p	$7p^2 {}^4P^\circ$	$\left\{ \frac{1}{2} \right.$ $\left. 1\frac{1}{2} \right\}$	1382858	
$4s^2 {}^4S$	4s	$4s^2 {}^4S$	$\frac{1}{2}$	1140416			7d	$7d^2 {}^4D$	$\left\{ \frac{1}{2} \right.$ $\left. 2\frac{1}{2} \right\}$	1383841	
$4p^2 {}^4P_1$	4p	$4p^2 {}^4P^\circ$	$\left\{ \frac{1}{2} \right.$ $\left. 1\frac{1}{2} \right\}$	1152977			8p	$8p^2 {}^4P^\circ$	$\left\{ \frac{1}{2} \right.$ $\left. 1\frac{1}{2} \right\}$	1408848	
$4d^2 {}^4D_2$	4d	$4d^2 {}^4D$	$\frac{1}{2}$ $2\frac{1}{2}$	1157223 1157255	32		8d	$8d^2 {}^4D$	$\left\{ \frac{1}{2} \right.$ $\left. 2\frac{1}{2} \right\}$	1409538	
	5s	$5s^2 {}^4S$	$\frac{1}{2}$	1269826							
	5p	$5p^2 {}^4P^\circ$	$\left\{ \frac{1}{2} \right.$ $\left. 1\frac{1}{2} \right\}$	1276194			F VIII (${}^4S_0$)	Limit		1493656	
$5d^2 {}^4D_2$	5d	$5d^2 {}^4D$	$\left\{ \frac{1}{2} \right.$ $\left. 2\frac{1}{2} \right\}$	1278404							

September 1947.

F VIII

(He I sequence; 2 electrons)

Z=9

Ground state $1s^2 1S_0$ $1s^2 1S_0$ 7693400 $\pm$ 800 cm^{-1} I. P. 953.60 $\pm$ 0.10 volts

Flemberg has classified three lines between 13 Å and 16 Å as the first three members of the singlet series. Tyrén has also observed the first two members of this series and classified a line at 16.951 Å as the intersystem combination $1s^2 1S_0 - 2p^3 P_1^0$. Tyrén's value of the limit is quoted here. The unit, 10^3 cm^{-1} , has here been changed to cm^{-1} .

Edlén has extended the analysis and has generously furnished his unpublished manuscript containing absolute values of the triplet terms extrapolated along the He I isoelectronic sequence. The relative positions of the singlet and triplet terms thus determined confirm the intersystem combination reported by Tyrén. The $2s^2 S - 2p^3 P^0$ combination has apparently not been observed, but Edlén regards the extrapolation from the irregular doublet law as very reliable. Brackets are used in the table to denote extrapolated values not yet confirmed by observation.

REFERENCES

- F. Tyrén, Nova Acta Reg. Soc. Sci. Uppsala [IV] 12, No. 1, 25 (1940). (I P) (T) (C L)
 H. Flemberg, Ark. Mat. Astr. Fys. (Stockholm) 28A, No. 18 p. 34 (1942). (T) (C L)
 B. Edlén, unpublished material (Sept. 1947). (T)

F VIII

F VIII

Config.	Desig.	J	Level	Interval	Config.	Desig.	J	Level	Interval
$1s^3$	$1s^2 1S$	0	0		$1s 3d$	$3d^3 D$	3, 2, 1	[6912360]	
$1s 2s$	$2s^3 S$	1	[5829920]		$1s 3p$	$3p^3 P^0$	1	6916590	
$1s 2p$	$2p^3 P^0$	0	[5899150]	[160] [950]	$1s 4p$	$4p^3 P^0$	1	7256880	
		1	5899310						
		2	[5900260]						
$1s 2p$	$2p^3 P^0$	1	5949900		Fix ($3S_{1/2}$)	Limit	-----	7693400	

September 1947.

○