

*o*-toluidine-5-sulfonic acid, sodium 6-chloro-5-nitro-*m*-toluenesulfonate, a compound recently shown to be suitable for the separation of the rarer alkali metals. This has resulted in an improvement of the methods and in obtaining a 37% yield of the sodium salt calculated to the *o*-toluidine.

PASADENA, CALIFORNIA

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## NEW BOOKS

**Atlas de Spectres d'Arc: Tableaux d'Analyse pour les Recherches Spectrochimiques.** (Atlas of Arc Spectra: Analytical Tables for Spectrochemical Research.) By DR. JACQUES BARDET. Preface by G. URBAIN, Professor at the Sorbonne. Gaston Doin and Company, 8, Place de l'Odéon, Paris, 1926. 54 pp. 54 figs. 24.5 × 18 cm. Price 240 fr.

After an enthusiastic preface by Professor G. Urbain, extolling the spectroscopic method of analysis, is given a brief description of the necessary apparatus for and methods of making arc spectrograms with carbon electrodes, followed by directions for reading and interpreting the spectrograms by comparison with the iron arc, and a discussion of the peculiarities of individual spectra.

By far the most valuable part of the book is the Atlas itself, a series of accurate drawings of the iron arc prismatic spectrum with a wave-length scale and with the positions indicated of the important arc lines of all the elements which give arc spectra. These reproductions, which cover the range 2500–3500 Å. only, furnish a rapid and accurate means of identifying spectrum lines and should be of great assistance to spectroscopists of either brief or long experience.

G. P. BAXTER

**Tabelle der Hauptlinien der Linienspektren aller Elemente nach Wellenlänge Geordnet.** (Table of the More Intense Lines in the Emission Spectra of All Elements, Arranged According to Wave Length.) By H. KAYSER, Professor of Physics at the University, Bonn. Julius Springer, Linkstr. 23–24, Berlin, W 9, 1926. vii + 198 pp. 19 × 25 cm. Price, bound, Rm. 24.

The table which concludes the sixth volume of the author's *Handbuch der Spectroscopie* has been extended and brought up to date. Among the important changes are included the exclusive use of the International System of wave lengths, an increase in the number of lines from 10,000 to 19,000 so that lines of lower intensity are included, an extension of the region of short wave lengths from 1854 to 124 Å. and an indication of the particular ionization stage (when known) in which the emission originates. Wave lengths are given with one doubtful figure. Besides the method of excitation, the intensities as well as the characters of the lines are indicated. Only the long experience of the author could have provided the critical judgment necessary for correlating the somewhat conflicting evidence in

this field. Chemists and physicists owe Professor Kayser a debt of gratitude for undertaking and completing this exacting and valuable work.

G. P. BAXTER

**The New Heat Theorem. Its Foundations in Theory and Experiment.** By W. NERNST, Professor at the University of Berlin. Translated from the second German edition by GUY BARR, D.Sc. E. P. Dutton and Company, 681 Fifth Avenue, New York City, 1926. xvi + 281 pp. 21 figs. 22.5 × 14.5 cm. Price \$4.00.

This book is a translation of the second edition of Nernst's German book of the same name. It contains a systematic development of the theory which has been dignified by Nernst and others by the name of the Third Law of Thermodynamics and a review of the experimental evidence which Nernst and his pupils have obtained in support of the theory. Many tests of the theory made elsewhere, especially in the University of California, are slighted or ignored. The original is, of course, familiar to all who have made a special study of the subject but the appearance of an English translation will doubtless awaken an interest among a wider circle of English speaking readers. The translator has done his work well.

GRINNELL JONES

**Physical Chemistry for Colleges. A Course of Instruction Based upon the Fundamental Laws of Chemistry.** Second edition. By E. B. MILLARD, Associate Professor of Physical Chemistry, Massachusetts Institute of Technology. International Chemical Series (H. P. TALBOT, Ph.D., Sc.D., Consulting Editor). McGraw-Hill Book Company, Inc., 370 Seventh Avenue, New York, 1926. ix + 458 pp. 81 figs. 21 × 14.5 cm. Price \$3.50.

The first edition of this book was published in 1921 and was reviewed in *THIS JOURNAL* [43, 2477 (1921)]. While it is intended primarily for college use, the new edition has more than enough up-to-date material for a beginners' course in a university and with a little amplification it might well be used as a beginning text for a full year's course in a university. It is to be hoped that amplification will be made in the third edition, as this text contains the most up-to-date presentation of the elementary principles of physical chemistry now available.

In the new edition the chapter on X-Rays and Crystal Structure has been enlarged and rewritten, and the chapter on Conductance and Transference has also been rewritten. The presentation of this material is excellent. Numerous changes in subject matter appear throughout the text and the number of problems has been considerably increased. The chapter on Electrochemistry might well be expanded, and more explanatory material given. Its brevity makes the material too difficult for the student, though the choice of material is excellent. The reviewer believes that more ample description of the optical methods used in physical chemistry might profitably be included.

The chapter on Colloids has much the same faults which appear in the corresponding chapter in other texts on physical chemistry. Continuity and coherence are largely lacking and the terminology and nomenclature are not those in present use, nor are they consistent with any past usage. The classification of "Suspensions and Jellies," and the implication that the terms "sols and gels" are synonymous with "suspensoids and emulsoids" are examples. The paragraph on "Degree of Dispersion" seems very inadequate and that on "The Preparation of Sols" might well be replaced by a reference to Svedberg's "Formation of Colloids." It is not true that Brownian motion prevents particles of  $10^{-5}$  cm. diameter from settling; the equation for the Brownian displacements is incorrect, and it is doubtful whether the stability of emulsions is due merely to a lowered interfacial tension, as stated. The Gibbs adsorption equation, in the simplified form given, is of slight practical importance. Successful use demands a more accurate form in which concentrations are replaced by activities or their equivalents. The list of references contains no mention of Freundlich's monumental treatise, translated by Hatfield. Reference also might well be made to Svedberg's "Colloid Chemistry" (Chemical Catalog Company).

With the exception of this one chapter, however, the book should make a very satisfactory text for a beginning course in the subject and doubtless in the third edition the chapter on Colloids will be entirely rewritten.

J. H. MATHEWS

**Gmelin's Handbuch der anorganischen Chemie.** (**Gmelin's Handbook of Inorganic Chemistry**). Edited by R. J. MEYER. Published by the Deutsche Chemische Gesellschaft, Verlag Chemie, G. m. b. H., Leipzig-Berlin, 1926. 18 × 26 cm. **Fluorine.** Serial No. 5. xvi + 86 pp. 4 figs. Price, No. 5, to subscribers 17 M.; singly, 22 M. **Boron.** Serial No. 13. xix + 142 pp. 11 figs. Price, No. 13, to subscribers 8.50 M.; singly, 11 M.

For reviews of previous instalments, see *THIS JOURNAL*, **48**, 2008 (1926); **47**, 1784 (1925); **47**, 1198 (1925).

The volume on fluorine (Serial No. 5) deals with the element itself and its compounds with those elements of higher serial numbers in the system adopted for this Handbook, namely, the noble gases, hydrogen, oxygen and nitrogen (Nos. 1-4). A particularly useful feature is the tabular list of the complex compounds of fluorine arranged on the basis of the Werner nomenclature. The literature has been covered up to June, 1926. The collaborators with the editor, R. J. Meyer, were Susanne Mugden and Gertrud Willcke.

The volume on boron (Serial No. 13) similarly deals with the free element itself and with its compounds with elements numbered 1-12 in the system. In accordance with this system, the metallic borides, and the salts of boric, polyboric and perboric acids are not described here, but are

found under the corresponding metals, since these are all numbered 20 and higher. However, general surveys of these salts, of their various types, and of their formation and constitution are given in this volume. The literature is covered, with the aid of a supplement, through 1925. The collaborators on this volume were Hellmut Vermehren and Friedrich Struwe.

These volumes appear to be worthy successors of the earlier volumes of this handbook—namely, those on zinc, on cadmium and on the noble gases.

ARTHUR B. LAMB

**A Manual of Radioactivity.** By GEORGE HEVESY, Ph.D. (Copenhagen) and FRITZ PANETH, Ph.D. (Berlin). Translated by ROBERT W. LAWSON, D.Sc. Oxford University Press, American Branch, New York, 1926. xix + 252 pp. 42 figs. 15.5 × 24 cm. Price \$5.00.

The representation of Radioactivity in English texts has for several years been under the disadvantage that the excellent treatise of Sir Ernest Rutherford dates from 1913, while no other full work has appeared in English. For this reason the present English translation of this Manual by two such well-known authorities is a most timely and useful contribution. The reader must agree with the authors' preface that "it is not a literal translation of their original 'Lehrbuch der Radioaktivität' (Barth, Leipzig, 1923) but essentially a new edition," much enlarged and thoroughly revised.

In order to keep the work within the bounds of 250 pages the authors have employed various efficient means. Historical order is not observed and references have been omitted in the text. The history is reviewed in condensed form in the final chapter. All literature references are confined to the period 1916–1925 and are found in an appendix. Description of the earlier, now classical, work is briefly treated so as to leave more space for newer discoveries not described in the older treatises.

One reviewer has objected that the authors have devoted too little space to the description of their own work. If this is true to the extent of being a fault, it is such an unusual one that we must praise their modesty, while the more diligent reader is left to refer to their original publications.

Chapters of especial interest include those on Constitution of the Atom and Radioactive Rays—Isotopy and the Periodic Classification; Alteration of Chemical Character within a Transformation Series; The Displacement Laws; The Chemical Behaviour of Extremely Small Quantities of a Substance; Application of the Radio-elements as Indicators in Physical and Chemical Investigations; those chapters dealing with Isotopy; Disruption of the Chemical Elements; Structure of the Atomic Nucleus; The Preparation of Radioactive Substances, and Effects of the Rays from

Radium. In the latter the authors show an unusual appreciation of the importance of the chemical effects of the radiations and accept the ionic theory regarding them. The chapter on Radioactivity in Geology and in Geophysics is on a subject of wide and increasing interest in which the translator, Dr. Lawson, has made well-known contributions.

In a work written throughout from the most modern viewpoint it appears unfortunate that some of the newer and better terminology was not adopted nor even referred to. The utility of the terms radium emanation, thorium emanation and actinium emanation appears to the reviewer to be largely past. The term *emanation* was always awkward in English since the layman confused it with *radiation*. The double terms do not conform to usual chemical terminology nor lend themselves to the conventional system of symbols. We should, therefore, let neither inertia, sentiment nor prejudice deter us from adopting the better and more scientific terms *radon, thoron and actinon*, which were recommended by the International Committee on Chemical Elements and have been officially adopted in International Critical Tables and by many others.

S. C. LIND