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## NEW BOOKS

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**Volumetric Analysis Including the Analysis of Gases, with a Chapter on Simple Gravimetric Determinations.** By Dr. A. J. Berry, M.A., Fellow of Downing College and University Lecturer in Chemistry, Cambridge. Fifth edition. The University Press, Cambridge: The Macmillan Company, 60 Fifth Avenue, New York, N. Y., 1939. 196 pp. 9 figs. 14 × 22 cm. Price, \$2.50.

The author states in the preface that this book was written in the interests of his own pupils and that his object was to provide a practical book for students having a sufficient background of theoretical principles. He adds that it "would occupy a position intermediate between that of the elementary works of necessarily limited scope and that of standard treatises on volumetric analysis."

A chapter is included on the theory of indicators and a separate chapter has also been added to the present edition devoted to modern developments. Such items as oxidation-reduction indicators, adsorption indicators, the use of ceric sulfate, constant boiling hydrochloric acid, and the use of ammonium persulfate are included in this chapter. It appears unfortunate, however, that these newer developments have not been incorporated at their appropriate point in the body of the book.

Little use is, however, made of the modern theories of ionic reactions, and the inquiring student would find difficulty with the treatment of  $pH$ , since the author merely states that a convenient way of expressing hydrogen-ion concentration is to take the logarithm of the concentration, omitting the negative sign, and write this as  $pH$ .

The printing and binding of the book are good.

CHESTER M. ALTER

**Physik für Studierende an Technischen Hochschulen und Universitäten.** (Physics for Students in Technical Institutes and Universities.) By Ing. Dr. PAUL WESSEL, Lecturer, Wigan and District Mining and Technical College, Wigan. Edited by Dr. V. RIEDERER VON PAAR. Verlag von Ernst Reinhardt, Munich, Germany, 1938. xii + 548 pp. 227 figs. 13 × 21 cm. Price, Mk. 4.90.

This book is intended for university students in their first year and is supposed to be accompanied by a course of lectures and demonstrations in general physics. These students have usually had in school a fairly comprehensive course in physics. The aim of the book is to assist them to a rapid review of all the phenomena in the general field of physics, even including some of the latest discoveries and theories, with applications to modern engineering, chemistry, and medicine.

The arrangement of material follows the conventional order: mechanics, acoustics, heat, optics, magnetism, electricity, electronics, and atomic physics. It is intended to relieve the student of the necessity of taking notes on the lectures so that he can give his undivided attention to the experimental demonstrations. Following the 354

pages of very condensed text, there are 60 pages entitled "A Short Repetitorium" and including a collection of formulas. Then follow 63 pages of questions based on the text, each with a reference to a particular page where the answer may be found. Finally, there are 38 pages of tables and physical constants. The text has many diagrams which are small but very clearly drawn. The style is straightforward.

The American teacher feels the lack of experimental detail in the book and also the absence of historical and biographical references. For example, nowhere does one find a description of Michelson's classical experiment in measuring the speed of light. Anyone who is familiar with American textbooks in college physics will be astonished at the vast amount of material which can be obtained in such an inexpensive volume.

N. HENRY BLACK

**Dictionary of Scientific Terms as Used in the Various Sciences.** By C. M. BEADNELL, C.B., F.Z.S. Chemical Publishing Company of New York, Inc., 148 Lafayette Street, New York, N. Y., 1939. x + 235 pp. 12.5 × 19 cm. Price, \$3.00.

The author in his introduction calls this a book of reference rather than a dictionary. It does indeed give a considerable amount of exact and pertinent information in its definitions and is therefore of corresponding value to the reader who is in doubt as to the meaning of an unfamiliar scientific word. Only some three thousand terms are listed, which seems to be a narrow choice from among the hundreds of thousands in use in the sciences represented. The selection, however, is good, although undoubtedly favoring the biological sciences. Newer words are not neglected.

The volume is all it claims to be, namely, a good book for the desk of the general reader, especially one with scientific training whose reading ventures into other fields than his own.

WILLIS A. BOUGHTON

**Proceedings of the Sixth Summer Conference on Spectroscopy and its Application.** Held at the Massachusetts Institute of Technology, Cambridge, Massachusetts, July 18-20, 1938. Edited by George R. Harrison. The Technology Press: John Wiley and Sons, Inc., 440 Fourth Avenue, New York, N. Y., 1939. vii + 172 pp. Illustrated. 19 × 25.5 cm. Price, \$3.00.

Again, a list of topics of current interest, and of contributors outstanding in their respective fields. Spectroscopic equipment and method, to be sure, are not discussed at such great length as in 1937. Impressive, in this section, is the high-speed absorption spectrophotometer at Massachusetts Institute of Technology which measures and plots within a hundred seconds one thousand transmissions covering the range 10,000 to 2000 Å. Also the

account of the apparatus and methods for obtaining the new tables of 100,000 principal spectrum lines, measured in the same laboratories with accuracy of 0.01 Å. or better. Intensities are given on a scale of one hundred.

Applied photochemistry is well covered, as follows from a partial list of topics: criminal investigation, rare earths in plants, identification of minerals, vitamin determination, enzymes, medical problems, dispersion filters, dyestuffs, analysis of gas mixtures, photochemistry of vision, chemical energy from light, and the problem of the photographic latent image.

These annual demonstrations of the versatility, speed and dependability of optical and photochemical methods cannot fail to exert a beneficial influence upon scientific practice in American and foreign laboratories.

GEORGE S. FORBES

**Les origines françaises de la chimie analytique.** (The French Origins of Analytical Chemistry.) By A. JOUNIAUX. Hermann et Cie., Éditeurs, 6 Rue de la Sorbonne, Paris, France, 1938. 59 pp. 16.5 × 25 cm. Price, fr. 11.

It is always of academic interest to determine the actual sources of our present information. Jouniaux, in this little book, has shown the important part that French chemists have played in the development of analytical chemistry, largely by direct quotations from the original papers. Such information cannot be obtained from the textbooks of analytical chemistry. Even though an analytical procedure may be correctly credited to Gay-Lussac, for example, the original reference will not usually be given if the work dates back about one hundred years. This is partly because it is better to give an approved procedure which takes into consideration all improvements that have been made and partly because most library files are more or less deficient in journals printed at about the beginning of the nineteenth century.

The author's contention is that the French created chemical analysis and originated most of its methods. Since, however, no reference whatever is made to work done outside of France, except for publishing an illustration of an old English buret, the reviewer is left quite unconvinced.

The author's claim that gravimetric analysis began with Lavoisier is surely not correct. This claim is here based upon Lavoisier's inaccurate analyses of carbon dioxide and of water and the fact that he appears to have been the first to determine carbon and hydrogen in organic compounds by combustion in oxygen with measurement of the water and carbon dioxide formed. The Swedish chemist, Torbern Olaf Bergman (1735-1784), made many quantitative analyses of minerals before the work of Lavoisier was published. He used our present methods of fusion with sodium carbonate for decomposing silicates, and he separated calcium and magnesium ions by precipitation with ammonium oxalate. The use of the balance in the assay of ores was common several centuries previous to the work of Lavoisier, who did, to be sure, emphasize the importance of the balance in chemistry and with it he helped overthrow the phlogiston theory.

WILLIAM T. HALL

**Die chromatographische Adsorptionsmethoden. Grundlagen, Methodik, Anwendungen.** (Chromatographic Adsorption Methods: Principles, Methods, Applications.) By DR. L. ZECHMEISTER, Professor, and DR. L. v. CHOLNOKY, Lecturer, Chemical Institute of the University of Pécs (Ungarn). Second, revised edition. Verlag von Julius Springer, Linkstrasse 22-24, Berlin W 9, Germany, 1938. xiii + 354 pp. 74 figs. 14.5 × 21.5 cm. Price, RM. 19.80.

The second edition of this excellent book, somewhat larger than the first, is an invaluable survey of the literature of chromatographic adsorption methods. The authors have themselves contributed a great deal of research work in this field, so that their advice as to the technique and their predictions as to the possibilities in detection and purification of substances by the Tswett column analysis must be given great weight.

Their historical review of the development of the subject since Tswett's original contribution in 1906 is presented in good teaching style. The discussion of the various powders used in columns and the variations in activity due to different methods of preparing the dry powders is most helpful. The solvents and mixtures of solvents, both for adsorption media and for washing purposes, are given full attention. The various aluminas seem to be highly favored by these authors, with reason, but there are two minor points about these aluminas which might be clarified. The authors refer to "Alumina III of Brockmann." As a matter of fact the reviewer first used this phrase to describe a product sold by the Aluminum Company of America and the phrase was copied by other authors. In the same connection it might be noted that the word "Hydralo," once used by this industrial organization to describe its commercial alumina, has been discarded in favor of the phrase "activated alumina."

Biochemists, organic chemists, and analysts may well be interested in this book for it presents to them very useful tools in identification and in separation of substances. Micro chromatographic separations are included, as is a system of qualitative analysis for cations and anions. Although originally Tswett, Willstätter, and others were primarily interested in separating plant pigments by column analysis, Zechmeister and Chohnoky now present extended discussions of separation, even of purification, of dyes, hormones, enzymes, and seven vitamins. Obviously there are many of us who must own this book.

HARRY N. HOLMES

**Systematic Qualitative Organic Analysis.** By H. MIDDLETON, M.Sc. (Manchester), A.I.C. Lecturer in Organic Chemistry, Bradford Technical College. Longmans, Green and Company, 114 Fifth Avenue, New York, N. Y., 1939. 279 pp. Illustrated. 14.5 × 22.5 cm. Price, \$2.50.

This book on qualitative organic analysis appears to have been designed for pharmaceutical students with a quite elementary knowledge of organic chemistry. The general scheme follows Mulliken closely, the first classification being made on the basis of elementary analysis and physical state. But little emphasis is placed on solubility for further subdivision. About 600 pure organic compounds,

including most of those given in the British Pharmacopoeia, are considered. These have been carefully examined by the author, and a systematic procedure which gives decisive results is described. While this should assist the beginning student to gain confidence in his work, the loss in flexibility is serious, and the book fails to provide to the full extent for that exercise in logical deduction from experiment which is the particular beauty of the best courses in qualitative organic analysis. Directions are concise and abbreviated; no descriptive or explanatory matter is included and a rather extended series of lectures on the laboratory work would be necessary to make the book effective. The procedures while generally standard depart in several instances from common practice and the extensive use of color reactions is more in keeping with pharmaceutical work. The newer derivatives for many classes of compounds have been omitted. The manual therefore does not seem well suited for the general course in qualitative organic analysis, but it may well be recommended for those students for whom it primarily was written.

THOMAS L. JACOBS

**Colloidal Phenomena. An Introduction to the Science of Colloids.** By ERNST A. HAUSER, Ph.D., Associate Professor of Chemical Engineering, Massachusetts Institute of Technology. McGraw-Hill Book Co., Inc., 330 West 42d St., New York, N. Y., 1939. xx + 294 pp. 123 figs. 16 × 23.5 cm. Price, \$3.00.

This work by a recognized authority and successful practitioner of the art should find a place in almost every chemical and industrial library. It is a guide to the chief textbooks and monographs and to the more important recent papers and concepts in this field. It is intentionally and unfortunately not "another textbook on colloidal chemistry." It reveals the theoretical apparatus with which an important group of colloid workers operate, largely under the influence of Wo. Ostwald, there being forty-six page citations to him, thirty-nine to von Buzagh, thirty-eight to Freundlich and twenty-eight to the author. The text itself is completely non-mathematical.

The book begins with a preface emphasizing the breaking of some of the barriers of "physicochemistry," and an interesting historical introduction, followed by chapters commenting on the dispersed state, terminology, difform systems, form and shape, production, kinetics, electrical properties, surface phenomena, protection and sensitization, dispersion, coagulation, mechanical and optical properties as influenced by particle shape, aggregates bonded by primary and by secondary forces, and colloidal aggregates. Then comes one of the most valuable features, an Appendix of forty-six pages giving the formulas and equations commonly referred to, with notes on some of the experimental methods.

As presented in this monograph, the subject is clearly not an exact science, but it is one of compelling practical importance where any hint is valuable as a guide to comprehension or to remarkable industrial applications. The text is facile and readable, but if one stops to analyze the meaning, it is not clear. Much that is usually discrimi-

nated is taken as synonymous as, for example, charge and potential, dispersion and peptization; and much of the description is as vague as the undefined expression (page 171) "liquid gel," or (page 169) the statement that "a colloidal sol can be considered a statistical mixed crystal." Many statements are not intended to be taken literally. The expressions evidently serve to recall examples of materials or behavior showing parallelisms which are useful in investigating further systems because they may recur, perhaps in modified or even contrasting form.

The numerous diagrams are beautifully clear, but they are largely schematic and are not referred to actual examples or measurements.

J. W. MCBAIN

**The Plant Alkaloids.** By THOMAS ANDERSON HENRY, D.Sc., Director, Wellcome Chemical Research Laboratories. Third edition. P. Blakiston's Son and Company, Inc., 1012 Walnut Street, Philadelphia, Pa., 1939. viii + 689 pp. 15 × 23 cm. Price, \$12.00.

The reviewer has little but praise for this excellent and scholarly treatise on the alkaloids, which represents an expansion of the second edition by 233 pages. Together with Winterstein-Trier (1931) it is indispensable in any well-equipped scientific library, or to anyone interested in natural products. The literature references are abundant, comprising approximately 6060, and extending through most of 1938. The author and publishers are to be congratulated on this feat, as well as on the comparative freedom from errors. The references have been collected at the end of each section in such compact form as to make it a little difficult to find a desired citation. The frequent designation of bibliographies is a welcome feature.

Criticisms that can be offered are very minor in nature. The structural formulas are reproduced from drawings, but are clear and accurate. An error in the sinomenine formula on page 7 has been carried over from the original publication. The term "deracemization" is somewhat unusual, and "habitués" in the sense used on p. 623 is unacceptable. It is a question, to what extent the physical properties of somewhat remote derivatives should be described in a text of this sort, since it may generally be assumed that one interested in such derivatives will have access to the literature. The occasional citation of specific rotations to the second decimal place without specification of temperature, solvent, or concentration, certainly seems inconsistent.

As in the previous edition, the listing of plant sources is unusually complete, but the illustrations of important alkaloid-bearing plants have been sacrificed. Discussion of physiological action is necessarily limited, but numerous pertinent references are supplied. Much space has been saved by omission of the details of methods of estimation of the alkaloids, which may be found easily in pharmacopoeias and special reports.

Classification of the alkaloids according to nuclear type has been followed much as in the older edition. As would be expected, the sections on the isoquinoline and indole groups have been greatly enlarged. The up-to-date discussion of the Strychnos alkaloids is most welcome

even though it is necessarily condensed. The lupinanes, phenanthridine, pyrrolidine, and quinazoline are new groups; the section on the purine bases has been omitted, as the material is easily accessible elsewhere. The book is durably and attractively bound, and well printed.

LYNDON SMALL

**The Electrochemistry of Gases and Other Dielectrics.** By G. GLOCKLER, Professor of Physical Chemistry, and S. C. LIND, Professor of Physical Chemistry and Dean of the Institute of Technology, University of Minnesota. John Wiley and Sons, Inc., 440 Fourth Avenue, New York, N. Y., 1939. xiii + 469 pp. 82 figs. 15.5 × 23.5 cm. Price, \$6.00.

In contrast to the texts on photochemistry, which continue to multiply, there has hitherto been no monograph on research in the field of chemical reactions produced by the various types of ionizing agencies. In this present volume the need for such has been handsomely met and the authors are to be thanked sincerely for an onerous task well accomplished.

The book is divided into three sections. The first deals with typical reactions in various forms of electrical discharge, the glow discharge, silent electrical, corona, electrodeless and arc discharge, cathode rays and electrons of controlled speeds. The second part attempts to summarize the studies of reactions in the various forms of discharge the data for all forms of activation being collected together for a given substance and its reactions. The final section of the book treats of the theoretical and physical aspects of discharge reactions. As an illustration of the depth of the treatment we may cite the 47 pages on hydrogen and the hydrocarbons or the 40 pages on active nitrogen. The former summarizes the influence of spark, silent discharge and luminous discharge on the properties of hydrogen and gives *inter alia* an extended discussion of the reactions of various hydrocarbons under ozoning conditions. There is a bibliography of 123 titles to this chapter while that on active nitrogen cites 152 titles. This latter chapter illustrates, too, the breadth of the problems covered; spectroscopy, luminescence and phosphorescence, molecular structure and chemical kinetics are all involved.

The final section of the book dealing with the theoretical aspects of the subject is exceedingly interesting. After sections on electron affinities and ion mobilities a chapter is devoted to the results of mass spectroscopy with a convenient summary of the experimental results. The two following chapters on ionization produced by chemical reaction and on cathodic sputtering of metals seem to the reviewer less pertinent to the theme of this section. The final chapter of 13 pages on mechanism is all too brief for the physical chemist since here, if anywhere, is the heart of the subject from his point of view. That the chapter could not have included a discussion of the several interesting papers which have only appeared quite recently notably by Gunther, Mund, Essex and their co-workers, all dealing with reaction mechanism in this field, is to be regretted, but the student can start his inquiries in this field with the Glockler-Lind chapter and turn then to the litera-

ture of 1938-1939 for a very interesting field of fundamental research.

HUGH S. TAYLOR

## BOOKS RECEIVED

May 15, 1939 to June 15, 1939

LOUIS BACHELIER. "Les nouvelles méthodes du calcul des probabilités." Gauthier-Villars, 55 Quai des Grands-Augustins, Paris 6, France. 69 pp. 25 fr.

GEORGE A. BAITSSELL, Editor. "Science in Progress." Yale University Press, New Haven, Conn. 322 pp. \$4.00.

WILHELM BILTZ. "Ausführung qualitativen Analysen." Fifth edition. Akademische Verlagsgesellschaft m. b. H., Sternwartenstrasse 8, Leipzig C 1, Germany. 180 pp. RM. 8.50; bound, RM. 9.60.

ALBERT CHARLES CHIBNALL. "Protein Metabolism in the Plant." Yale University Press, New Haven, Conn. 306 pp. \$4.00.

HAROLD A. FALES AND FREDERIC KENNY. "Inorganic Quantitative Analysis." New edition. D. Appleton-Century Co., Inc., 35 West 32d St., New York, N. Y. 713 pp. \$4.00.

A. FARKAS AND H. W. MELVILLE. "Experimental Methods in Gas Reactions." The Macmillan Co., 60 Fifth Ave., New York, N. Y. 389 pp. \$7.50.

HARRY N. HOLMES. "Introductory College Chemistry." Third edition. The Macmillan Co., 60 Fifth Ave., New York, N. Y. 619 pp.

JOHN R. JOHNSON, Editor-in-Chief. "Organic Syntheses." Vol. XIX. John Wiley and Sons, Inc., 440 Fourth Ave., New York, N. Y. 105 pp. \$1.75.

O. MAASS AND E. W. R. STEACIE. "An Introduction to the Principles of Physical Chemistry." Second edition. John Wiley and Sons, Inc., 440 Fourth Ave., New York, N. Y. 395 pp. \$3.00.

HENRY SEMAT. "Introduction to Modern Physics." Farrar and Rinehart, Inc., 601 West 29th St., New York, N. Y. 360 pp. \$3.50.

F. SHERWOOD TAYLOR. "The March of Mind. A Short History of Science." The Macmillan Co., 60 Fifth Ave., New York, N. Y. 320 pp. \$3.00.

MAURICE DE KAY THOMPSON. "Theoretical and Applied Electrochemistry." Third edition. The Macmillan Co., 60 Fifth Ave., New York, N. Y. 535 pp. \$5.00.

MAX VOLMER. "Kinetik des Phasenbildung." Verlag von Theodor Steinkopff, Residenzstrasse 32, Dresden-Blasewitz, Germany. 220 pp. RM. 14.25; bound, RM. 15.

ROGER J. WILLIAMS AND RAY Q. BREWSTER. "A Laboratory Manual of Organic Chemistry." Third edition. D. Van Nostrand Co., Inc., 250 Fourth Ave., New York, N. Y. 217 pp. \$2.00.