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## NEW BOOKS

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**Lumineszenz-Analyse im filtrierten ultravioletten Licht.**

Ein Hilfsbuch beim Arbeiten mit den Analysen-Lampen. (Analysis by Means of Luminescence in Filtered Ultra-violet Light. A Manual for Work with the Analysis Lamp.) By Professor Dr. P. W. DANCKWORTT, Hannover, and Dr. J. EISENBRAND. Third, revised edition. Akademische Verlagsgesellschaft m. b. H., Markgrafenstrasse 6, Leipzig C 1, Germany, 1934. viii + 190 pp. 62 figs. 16 × 23.5 cm. Price, RM. 8.50.

As contributions to the subject, since the second edition appeared in 1929, proved too extended to be discussed in detail, indispensable additions and revisions, only, could be considered. The magnitude of the expansion involved is largely concealed by the use of smaller type. In particular, the past four years have witnessed an intensive development of quantitative methods for luminescence analysis, so Dr. J. Eisenbrand, active in this type of work, prepared a new thirty-page section upon them. Nearly six hundred new references, from the most varied sources, were added during preparation of the manuscript, and a hundred more just before publication. Luminescence, whether regarded as a tool, or studied for its own sake, assumes new importance and interest through the appearance of this book.

G. S. FORBES

**Faraday.** By THOMAS MARTIN. Great Lives Series. Gerald Duckworth and Company, Ltd., 3 Henrietta Street, Covent Garden, London, W. C. 2, England. 144 pp. 11.5 × 19 cm. Price, 2s.

Most scientific men know that Michael Faraday started as a bookbinder's apprentice, became assistant to Sir Humphry Davy at the Royal Institution, and developed into one of the great scientific men of all time. It is always profitable to run over periodically the work of such a man as Faraday.

Faraday's scientific papers fall pretty sharply into two groups: the work he did for others and the work he did for himself. In the first group we have the work on special steels, the liquefaction of chlorine, the isolation of benzene, the work on optical glass, his work as one of the Elder Brethren of Trinity House. This was good work, all of it; but of no especial theoretical significance. Faraday's real work was in electrochemistry and electromagnetism. In 1821 he produced the continuous rotation round a magnet of a wire carrying a current, and of the magnet round the wire. In 1831 he showed that an electric current in one wire can induce a current in a second circuit. In 1845 he showed the electromagnetic rotation of the plane of polarized light, and also the existence of diamagnetism. In 1833-34 he worked out his theory of the voltaic cell and what the chemists call Faraday's Laws.

The striking thing about this work was that Faraday was always looking for effects which he believed to exist and which did exist. He did not discover the Zeeman effect because he did not have a sufficiently good equip-

ment; but his last experiment, in 1862, was an attempt to do just this. His concept of the fields of force led Clerk Maxwell nearly twenty years later to the electromagnetic theory of light. Maxwell said in 1864 that "the conception of the propagation of transverse magnetic disturbances to the exclusion of normal ones is set forth distinctly by Professor Faraday in his 'Thoughts on Ray Vibration.' The electromagnetic theory of light, as proposed by him, is the same in substance as that which I have begun to develop in this paper, except that in 1846 there were no data to calculate the velocity of propagation."

The author gives an interesting explanation, p. 74, why Faraday did not found a school. "Faraday's experimental work was to him a personal thing, and he could never delegate any part of it to others. He must handle the apparatus himself, and see with his own eyes every stage in the progress to a result. He could never make use of an observation by another until he had repeated the experiment and made it his own. So it was that his helper must be an assistant, not a collaborator; and, great originator though he was, he trained no successor, as Davy had done, and founded no school."

WILDER D. BANCROFT

**Raumchemie der festen Stoffe. (Space Chemistry of Solid Substances.)** By Prof. Dr. WILHELM BILTZ, Hannover und Göttingen. Verlag von Leopold Voss, Salomonstrasse 18 B, Leipzig, Germany, 1934. x + 338 pp. 54 figs. Price, RM. 22.50; bound, RM. 24.

The thesis to which this volume is devoted is stated by the author as follows: "The space requirements of a solid substance can be represented approximately as the sum of single 'increments' which are related in a rational fashion to the condition of the single particles of which the substance is composed." These increments are deduced statistically from the observed volumes of the substances.

In the older "space chemistry" the attempt was made to represent the molecular volumes as the sum of the atomic volumes. In Professor Biltz' space chemistry no such attempt is made, although in limiting cases the atomic volumes and the increments do largely coincide. Moreover, no account is taken of any geometrical arrangement of the particles so that the treatment is not restricted at all to crystals but includes also partially disordered solid substances such, for instance, as the glasses. In this generality it makes contact with Kopp's volume chemistry of liquids. The increments, while indeed independent of the geometrical position of the particles, are nevertheless dependent on the other conditions or states of the particles.

The book is divided into three parts. The first part (128 pages) contains extensive tables listing the molecular volumes of some 1800 substances at the temperatures of the measurements and at the absolute zero. The second part (168 pages) sets forth the derivation of the "increments," interchangeable volumes, the theories of "preferred volumes" and the validity of approximation formu-

las relative to the additivity of atomic volumes and of atomic radii. The third part (42 pages) discusses the space chemistry of organic substances, of some complex compounds and of certain aberrant low-boiling substances. It also discusses the packing effect in certain oxygen compounds.

The book is a continuation and not a review of the long series of papers by Professor Biltz and his co-workers in the *Zeitschrift für anorganische und allgemeine Chemie*, entitled "Concerning Molecular and Atomic Volumes." It will be invaluable to all concerned with this fundamental and promising field of research.

The publisher states that these researches were published in this form to relieve the *Zeitschrift* and also to make them available to a wider circle of readers. It may well be that with the constantly increasing cost of our journals, investigators will be forced more and more to publish their results in book form. This may entail a loss in speed, but it should make for a more finished and well considered product.

ARTHUR B. LAMB

**Large-Scale Phase Equilibrium Diagrams.** By ROBERT B. SOSMAN and OLAF ANDERSEN. Research Laboratory, United States Steel Corporation, Kearny, New Jersey. 4 diagrams. Price, \$2.00.

These four ternary diagrams of the refractory oxides, CaO, MgO, Al<sub>2</sub>O<sub>3</sub> and SiO<sub>2</sub>, have been prepared by a skilled cartographer under the direction of Sosman and Andersen, chiefly from the excellent data of the Geophysical Laboratory of the Carnegie Institution of Washington. The original data have been revised to include the most recent determinations. The diagrams are on a scale large enough so that points can be picked accurately to 0.1% in composition. Individual data are not indicated. By means of various colored inks and other devices the following information is depicted: projected boundary curves, isotherms, boundaries of ternary crystallization fields, solid solutions, compounds and the primary phases. These diagrams, while excellent for individual use, do not adapt themselves readily to large group demonstrations. The publication of these charts is a further example of the excellent work which is being done in many of our commercial laboratories and which is made available for chemists at large.

WARREN W. EWING

**Einführung in die organisch-chemische Laboratoriumstechnik.** (Introduction to the Laboratory Technique of Organic Chemistry.) By Dr. KONRAD BERNHAUER, Lecturer in the German University of Prague. Verlag von Julius Springer, Linkstrasse 23-24, Berlin W 9, Germany, 1934. x + 129 pp. 50 figs. 13.5 × 21 cm. Price, RM. 4.80.

This small volume is intended to bridge the gap between the elementary laboratory manuals and the comprehensive treatises on the methods of organic chemistry by Houben-Weyl, by Lassar-Cohn and by H. Meyer. It contains none of the usual experiments and preparative details, but presents rather a discussion of the ways and means of carrying out various standard operations. Many useful

hints and suggestions are to be found here with regard to crystallization, distillation, vacuum technique, extraction, sublimation, agitation and clarification. Lists are given of the various available heating baths, freezing mixtures, lubricants, solvents and drying agents. There are suggestions regarding the preparation and boring of corks, the cleaning of glassware, glass-blowing, note-taking, and even regarding the preparation of a manuscript for publication. This will indicate the general character of the contents. It may be added that there is no discussion of elementary analysis.

That the book is quite up-to-date will be evident from the fact that particular attention is given to micro and semi-micro methods (*e. g.*, distillations with 0.1-0.5 cc. of liquid), and there is a rather extensive discussion of the method of chromatographic adsorption.

The treatment throughout is quite broad and the author has endeavored to point out several alternate ways of carrying out a given operation. The manner of presentation suffers somewhat from being so brief and so abstract that the procedures outlined will in some cases be difficult for the inexperienced worker to follow. Since many of the tricks of the trade have to be self-taught, this perhaps is no great disadvantage, and Dr. Bernhauer's manual can be recommended to research students as a source of suggestion and inspiration in the development of a good laboratory technique.

LOUIS F. FIESER

**Tautomerism.** By JOHN WILLIAM BAKER, D.Sc., Ph.D. (Lond.), A.R.C.S., F.I.C., Lecturer in Organic Chemistry in the University of Leeds. George Routledge and Sons, Ltd., Broadway House, 68-74 Carter Lane, E. C. London, 1934. viii + 332 pp. 14 × 22 cm. Price, 25/-net.

The intent, scope and spirit of this monograph are admirably expressed in the opening paragraph of the Preface where the author states that: "The recent development of electronic theory in its application to the reactions of organic chemistry has permitted the correlation of such reactions on a much more fundamental basis than was hitherto possible. The present monograph is an attempt briefly to trace the historical development of such ideas in their relation to the phenomenon of tautomeric change, and to present a broad survey of this field in the light of modern theoretical conceptions. Although there is a fair measure of agreement amongst chemists with regard to the fundamentals of electronic theory, there is naturally some divergence of opinion in relation to detail. Hence, in attempting to deal with theories which are in such a fluid state of development, it has been considered desirable to adopt a single-minded viewpoint in order to maintain a continuity of argument throughout this monograph."

The "viewpoint" is that of C. K. Ingold and the group of active collaborators and followers whom he has interested in the field. The "modern theoretical conceptions" include the octet theory, inductive and electromeric effects, polarization and polarizability, activation and its converse, and even—though mainly in the appendix—perturbation and degeneracy. With all this theoretical machinery at his disposal, the author can undertake the

correlation of many phenomena that ordinarily are not considered in connection with tautomerism, like addition to ethylenic and conjugated systems, intramolecular rearrangements, and orientation in aromatic compounds.

All organic chemists who are interested at all in the applications of electronic theories will welcome this broad survey by one who has been an active worker in the field. Widely scattered material is here collected and skilfully organized. Earlier views that have not stood the test of experiment or of incidental discoveries are criticized and improved. And divergent views, although not usually discussed, receive generous recognition.

E. P. KOHLER

**Chemie der organischen Farbstoffe.** Erster Band. Künstliche organische Farbstoffe. (**Chemistry of Organic Dyestuffs.** Vol. I. Synthetic Organic Dyestuffs.) By Professor Dr. FRITZ MAYER. Third, revised edition. Verlag von Julius Springer, Linkstrasse 23-24, Berlin W 9, Germany, 1934. iv + 255 pp. 5 figs. 16 × 24 cm. Price, RM. 23.60; bound, RM. 24.80.

This excellent survey of a fascinating chapter of organic chemistry has been extensively revised in the third edition and the literature has been reviewed up to January 1, 1934. The brief account of the naturally occurring dyes given in the earlier editions has been omitted from the present volume and will appear in an extended form in a second volume promised for next year. The accounts given of the azo dyes, the cyanine dyes, the sulfur dyes, the anthraquinone and indigo dyes have been so expanded that the chapter on coal tar and the dye intermediates has been sacrificed.

As the title of the book indicates the entire emphasis is placed upon the chemistry, constitution, preparation and application of dyes. There are good, if brief, discussions of the theory of color, the relationship between color and constitution and the absorption of dyes by the fiber, as well as of such problems of general interest as the mechanism of the coupling reaction, the structure of colored ions and the nature of the organic free radicals. The whole subject is so broad that the discussions are necessarily limited, but the author supplies abundant citations to the literature and, without taking a too definite stand in debatable matters, he shows good judgment in the material selected for presentation and for reference. Dr. Mayer also has made good use of his connections with the industry in keeping abreast of the rapid advances from the technical side and in making available some of the information of general interest accumulated in the industry.

LOUIS F. FIESER

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## BOOKS RECEIVED

August 15, 1934–September 15, 1934

W. BRITZ. "Raumchemie der festen Stoffe." Verlag Johann Ambrosius Barth, Salomonstrasse 18B, Leipzig C 1, Germany. 348 pp. RM. 22.50; bound, RM. 24.

HUBERT T. S. BRITTON. "Conductometric Analysis: Principles, Technique, Applications." D. Van Nostrand Company, Inc., 250 Fourth Ave., New York. 178 pp. \$5.00.

J. A. V. BUTLER. "The Fundamentals of Chemical Thermodynamics. Part II. Thermodynamical Functions and their Applications." The Macmillan Co., 60 Fifth Ave., New York. 271 pp. \$3.00.

C. H. DOUGLAS CLARK. "The Electronic Structure and Properties of Matter. An Introductory Study of Certain Properties of Matter in the Light of Atomic Numbers. Being Volume I of a Comprehensive Treatise of Atomic and Molecular Structure." John Wiley and Sons, Inc., 440 Fourth Ave., New York. 374 pp. \$5.50.

WHEELER P. DAVEY. "A Study of Crystal Structure and its Applications." McGraw-Hill Book Co., Inc., 330 West 42d St., New York. 695 pp. \$7.50.

CECIL H. DESCH. "The Chemistry of Solids." The George Fisher Baker Non-Resident Lectureship in Chemistry. Cornell University Press., 124 Roberts Place, Ithaca, N. Y. 213 pp. \$2.50.

W. GEILMANN. "Bilder zur qualitativen Mikroanalyse anorganischen Stoffe." Verlag von Leopold Voss, Salomonstrasse 18B, Leipzig C 1, Germany. RM. 8; bound, RM. 9.

ALEXANDER McADIE. "Fog." The Macmillan Co., 60 Fifth Ave., New York. 23 pp. 52 plates. \$2.50.

J. F. McCLENDON. "A Manual of Biochemistry." John Wiley and Sons, Inc., 440 Fourth Ave., New York. 381 pp. \$5.00.

J. T. RANDALL. "The Diffraction of x-Rays and Electrons by Amorphous Solids, Liquids and Gases." John Wiley and Sons, Inc., 440 Fourth Ave., New York. 290 pp. \$5.75.

PATRICK D. RITCHIE. "Asymmetric Synthesis and Asymmetric Induction." Humphrey Milford, Oxford University Press, Oxford, England. 155 pp.

CATHERINE CASSELS STEELE. "An Introduction to Plant Biochemistry." G. Bell & Sons, Ltd., Publishers, York House, Portugal St., London W 2, England. 356 pp. 15s./- net.

ARTHUR W. THOMAS. "Colloid Chemistry." McGraw-Hill Book Co., Inc., 330 West 42d St., New York. 512 pp. \$4.00.

HARRY WILLSTAEDT. "Carotinoide Bakterien- und Pilzfarbstoffe." Heft 22, Ahrens Sammlung chemischer und chemisch-technischer Vorträge. Verlag Von Ferdinand Enke, Hasenbergsteige 3, Stuttgart, Germany. 119 pp. RM. 9.80.

"Mineral Resources of the United States, 1931." Part I, Metals. U. S. Department of Commerce, Bureau of Mines. Superintendent of Documents, Government Printing Office, Washington, D. C. 710 pp. \$1.50.