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## NEW BOOKS

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**Anorganische Chemie. Ein Lehrbuch zum Weiterstudium und zum Handgebrauch. (Inorganic Chemistry. A Textbook for Advanced Study and Reference.)** By DR. FRITZ EFRAIM, Professor at the University of Berne. Fifth revised and enlarged edition. Verlag von Theodor Steinkopff, Residenzstrasse 32, Dresden-Blasewitz, Germany, 1934. xii + 841 pp. 88 figs. 16.5 × 25 cm. Price, RM. 18.

A comparison, page by page, with the fourth edition, reveals the consummate skill with which significant developments of inorganic chemistry over a period of five years have been woven into the fabric of this standard work without noticeably increasing its bulk.

The wealth of references previously given is augmented by many recent citations and even by personal communications added in proof. While the Americans are not completely neglected, it is hard to see, for instance, how four references can do justice to the total output of such outstanding inorganic laboratories as those at Brown and Cornell.

The author, while obviously impressed by recent interpretations of inorganic chemistry in terms of physics and physical chemistry, wisely guards his book from becoming a half-way treatise on the latter subjects. Possibly he is still overconservative in this respect. None the less, in this edition he frequently invokes crystal lattices, atomic and ionic radii, deformation and magnetic data to explain, semi-empirically, configurations, relative stabilities and properties. The borides, carbides and silicates are examples of compounds which have profited greatly by such treatment. The section on intermetallic compounds is found unchanged except for three sentences stating the lattice types most commonly encountered.

Striking indeed is the number of new binary compounds, especially of halogens, recently isolated thanks to more highly developed technique and more consistent application of physicochemical principles. The reader constantly encounters topics, new or newly expanded, of great interest, such as surface chemistry, inert gas compounds, the carbonyls, hydroxo salts and the long desired clarification of the polyacids.

More than ever this book maintains its unique position in chemical literature. It correlates the essential facts of inorganic chemistry in an unrivalled fashion. Better still, it imparts an attitude and a spirit conducive to further progress.

G. S. FORBES

**Physico-Chemical Practical Exercises.** By WILLIAM NORMAN RAE, V.D., M.A. (Cantab.), F.I.C., and JOSEPH REILLY, M.A. (Cantab.), D.Sc. (N.V.I.), Sc.D. (Dub.), D.ès-Sc. (Geneva), F.Inst.P., F.R.C.Sc.I., F.I.C. Methuen and Company, Ltd., 36 Essex Street, W. C. 2, London, England, 1934. xiv + 276 pp. 74 figs. 13 × 19.5 cm. Price, 7s./6d., net.

The most striking feature of this laboratory manual is the large number of experiments included, seventy-three

in all. In spite of the fact that many alternative methods are given in some cases (there being nine experiments on the determination of molecular weights in solution), a very large variety of experiments is included. Most of the classical experiments to be found in laboratory manuals of physical chemistry are included and in addition many of the recently developed procedures such as the determination of the activity of hydrochloric acid by the e. m. f. method, the quinhydrone electrode, the use of thermionic tubes for high resistance cells, and the glass electrode. In spite of the comprehensiveness of the subject matter the volume is of a very convenient size.

Seven brief chapters at the beginning take up experimental errors, graphical methods (nomograms) and the standardization of laboratory apparatus. Each succeeding chapter contains a brief theoretical discussion of the principles underlying the experiments of the chapter. The discussion of the apparatus is particularly good. Many experiments indicate commercial applications.

Perhaps the most serious objection which will be raised to the use of the book as a laboratory manual of physical chemistry will be that the emphasis is placed upon the physical measurements rather than upon the study of phenomena or principles of physical chemistry. This is a criticism not of the experiments given, which well illustrate the theory, but describes the type of experiment which is omitted. Experiments such as the study of oil films, the behavior of colloids, and buffer solutions are not to be found.

This book will be found not only a very useful laboratory manual well suited to many courses in physical chemistry, but will also be a very convenient handbook on physical measurements for those engaged in research.

HENRY E. BENT

**Distortion of Metal Crystals.** By C. F. ELAM (Mrs. G. H. Tipper). Oxford University Press, 114 Fifth Avenue, New York, 1935. xiii + 182 pp. 94 figs. 16 × 24 cm. Price, \$5.00.

This book, the sixth of the Oxford Engineering Science Series, is a very welcome and much needed summary of a large part of the enormous and rather chaotic literature of the permanent distortion of metal crystals. Most of the literature has grown up within the last ten or fifteen years, and has been made possible by the development of technical methods of producing large single crystals. It is a subject which the author is well qualified to handle because of her own important experimental contributions. The emphasis of the book is almost entirely on plastic behavior below the breaking point, including temperature effects, and as such is primarily concerned with work associated with the names of Taylor and Carpenter in England and the Berlin group in Germany. One could wish that it had been possible to include in the scope of the book more than an incidental discussion of phenomena of rupture, which still afford such a lively topic of disagreement.

The mere fact that the book is published in an Engineering Series is itself an interesting commentary on the frequently expressed attitude of many engineers ten years ago that practical engineering had nothing to learn from a study of the mechanical properties of single crystals, the idea apparently being that in the microscopic aggregates which constitute the metals as used industrially it was hopeless to attempt to analyze out the contributions of the single crystal grains. Although the existence of the book is evidence of a change from this attitude, it could not be claimed, I think, that the practical engineer can yet derive much for his purpose from a study of single crystals which he could not better get from a more direct examination of his actual polycrystalline material. In fact one of the great merits of the book is that the exposition of the author succeeds in vividly emphasizing the present lack of any general coördinating point of view. One very striking thing in all theoretical explanations yet attempted is that no distinction is made between the metal crystal and other sorts of crystal. I do not know of a single attempt in which the electron constitution characteristic of the metal plays a role, or in which use is made of the wave mechanics picture of a metal as composed of atomic nuclei embedded in a more or less all-pervading electron atmosphere. Perhaps such an application of wave mechanics will constitute one of its triumphs of the next few years, but at present the difficulties look pretty formidable. At any rate there is no denying the importance of the field open to attack.

P. W. BRIDGMAN

**Materiewellen und Quantenmechanik.** Eine Einführung auf Grund der Theorien von de Broglie, Schrödinger, Heisenberg und Dirac. (**Material Waves and Quantum Mechanics.** An Introduction Based on the Theories of de Broglie, Schrödinger, Heisenberg and Dirac.) By ARTHUR HAAS, Dr.Phil., Professor of Physics in the University of Vienna. Fourth and Fifth Revised and Enlarged Edition. Akademische Verlagsgesellschaft m. b. H., Markgrafenstrasse 6, Leipzig C 1, Germany, 1934. viii + 299 pp. 7 figs. 12.5 × 19.5 cm. Price, RM. 7; bound, RM. 7.80.

In his preface to this book, the author states that his purpose is to present a brief but comprehensive view of quantum mechanics. In pursuit of this end he devotes approximately one hundred pages to a presentation of the elementary aspects of the theory, and then launches into a rather sketchy account of a variety of applications and related topics, among which are the Pauli principle, the new statistics, the Heitler-London theory of valence, ortho- and para-hydrogen, Dirac's theory of the electron and positron and various aspects of the theory of metals. Different parts of the book are not closely related to each other, and one notes a certain lack of unity; for example, the author first treats Schrödinger's wave equation and then begins over again on Heisenberg's quantum mechanics, later indicating the relation between them, instead of treating them as two aspects of the same theory. Nevertheless, the various chapters are quite clear and readable, and the book may be recommended for the reader who desires a brief survey of the whole field, either prior to

a more thorough study or in case such a study is impossible on account of lack of time.

O. K. RICE

**The Aliphatic Free Radicals.** By F. O. RICE AND K. K. RICE, The Johns Hopkins University. The Johns Hopkins Press, Baltimore, Maryland, 1935. 204 pp. 15.5 × 23.5 cm. Price, \$4.50.

The authors, in concluding, say: "In this book we have put together, to the best of our ability, the present knowledge of the properties of the aliphatic free radicals, primarily actually of the methyl, ethyl and methylene groups. In addition we have presented a certain amount of purely theoretical material concerning the role of free radicals in organic decompositions; in the course of a comparatively short time these hypotheses will be either confirmed or disproved."

The first half of the book is devoted to a brief historical review of the idea of free radicals in organic chemistry, to the discovery of the methyl radical by Paneth and to the extensive researches of one of the authors with his collaborators on the formation and properties of free radicals. Many details of the methods of preparation and identification are also given. In the second half of the book a large number of organic reactions, primarily thermal decompositions, but also some reactions in solutions, are treated from the point of view of the free radicals and of the reaction chains which they create. The authors' opinion is that very few, if any, decompositions at elevated temperatures proceed without the formation of radical chains.

It is indeed true that in many instances, where the experimental material is available, the chain theory does give an excellent account of the facts observed. It is rather unfortunate, however, that the authors almost completely neglect to consider the rival theories of thermal decompositions and thus the reader, unless thoroughly familiar with the field, cannot form an opinion as to the relative merits of these interpretations. While the reviewer cannot agree with many of the opinions of the authors, nevertheless the book is stimulating and may be recommended to all interested in pyrolysis and oxidations of organic compounds, and indeed to an even wider circle of readers.

G. B. KISTIAKOWSKY

**An Introduction to Plant Biochemistry.** By CATHERINE CASSELS STEELE, M.A., B.Sc., Ph.D. G. Bell and Sons, Ltd., York House, Portugal Street, London W. 2, England, 1934. viii + 356 pp. 14.5 × 22.5 cm. Price, 15 s./-, net.

In this volume directed primarily to students of botany Dr. Steele has provided a very interesting introductory account of the chemical nature and relationships of the substances elaborated by plants. A sufficient development of the principles of organic chemistry has been woven into the text to make the book useful to students who have had no training in the subject, and another feature is the inclusion of experiments to provide a parallel course of practical instruction. The survey of the chemical constituents of plants is quite comprehensive and the exposition is lucid and stimulating. Although it was not her

intention to delve very deeply into problems of chemical constitution, Dr. Steele can write on such subjects with the authority of an experienced investigator in the field.

The book may be recommended to students of chemistry who become interested in the fascinating subject of plant biochemistry and who seek a source of ready information on points not covered adequately by the usual textbooks of organic chemistry, as, for example, the problems of plant metabolism. Of particular value in this connection are the concise statements of the current views regarding the physiological function of the fats, waxes, lipins, polysaccharides, glucosides, nucleic acids, alkaloids, essential oils, the various plant pigments and other plant products. This material provides most interesting reading and although no references are included in the text a suggestive bibliography is given at the end of the book.

LOUIS F. FIESER

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### BOOKS RECEIVED

February 15, 1935-March 15, 1935

- RENÉ AUDUBERT. "Propriétés Electrochimiques des Proteines." Hermann et Cie., Éditeurs, 6 Rue de la Sorbonne, Paris, France. 52 pp. Fr. 12.
- E. BRENECKE, K. FAJANS, N. H. FURMAN AND R. LANG. "Neuere massanalytische Methoden." Verlag Ferdinand Enke, Hasenbergsteige 3, Stuttgart, Germany. 211 pp. RM. 18; bound, RM. 19.80.
- WELTON JOSEPH CROOK. "Metallurgical Spectrum Analysis." Stanford University Press, Stanford University, Calif. 82 pp. + 24 plates. \$12.50.
- ADALBERT FARKAS. "Orthohydrogen, Parahydrogen and Heavy Hydrogen." The Macmillan Company, 60 Fifth Ave., New York. 215 pp. \$3.50.
- GEORG HAHN. "Die Homöopolare Bindung. Eine allgemein Anwendbare Elektronentheorie der Valenz." Druck und Verlag, Wilhelm Isensee, Frankfurt a. M., Germany. 96 pp.
- ARTHUR JOHN HOPKINS. "Alchemy: Child of Greek Philosophy." Columbia University Press, 2960 Broadway, New York City. 262 pp. \$3.50.
- P. JAQUET. "Procédés Electrochimiques de Protection des Métaux contre la Corrosion." Hermann et Cie., Éditeurs, 6 Rue de la Sorbonne, Paris, France. 42 pp. Fr. 12.
- ERNEST KAHANE. "L'Action de l'Acide Perchlorique sur les Matières Organiques et ses Applications a la Chimie Analytique. I. Généralités. II. Applications." Hermann et Cie., Éditeurs, 6 Rue de la Sorbonne, Paris, France. I, 48 pp., fr. 12. II, 76 pp., fr. 16.
- ERNEST KAHANE. "Rémarques sur l'Analyse Indirecte." Hermann et Cie., Éditeurs, 6 Rue de la Sorbonne, Paris, France. 46 pp. Fr. 12.
- FERNAND KAYSER. "Créatine et Créatinine." Hermann et Cie., Éditeurs, 6 Rue de la Sorbonne, Paris, France. 90 pp. Fr. 15.
- FERNAND KAYSER. "Métabolisme des Corps Créatinique." Hermann et Cie., Éditeurs, 6 Rue de la Sorbonne, Paris, France. 84 pp. Fr. 15.
- Y. KHOUVINE. "Cellulose et Bactéries. Décomposition et Synthèse." Hermann et Cie., Éditeurs, 6 Rue de la Sorbonne, Paris, France. 44 pp. Fr. 12.
- G. MALFITANO AND M. CATOIRE. "Les Grandeurs des Unités Micellaires et leurs Variations en Raison Géométriques." Hermann et Cie., Éditeurs, 6 Rue de la Sorbonne, Paris, France. 60 pp. Fr. 15.
- Wo. OSTWALD, Editor. "Röntgenoskopie und Elektronoskopie von dispersen Systemen, Fäden, Filmen und Grenzschichten." Sonderheft der *Kolloid-Zeitschrift*, Band 69, Heft 3. Haupt-Vorträge Gehalten auf der 10 Hauptversammlung der Kolloid-Gesellschaft in Hannover vom 17-20 September, 1934. Verlag von Theodor Steinkopff, Residenzstrasse 32, Dresden-Blasewitz, Germany. 138 pp. RM. 9.
- FRANZ SEDLACEK. "Auer von Welsbach." Verlag Julius Springer, Schottengasse 4, Wien I, Austria. 85 pp. RM. 3.60.
- N. THON. "L'Électrolyse et la Polarisation Electrolytique." Hermann et Cie., Éditeurs, 6 Rue de la Sorbonne, Paris, France. 33 pp. Fr. 9.
- JAN ZERNDT. "Les Mégaspores du Bassin Houiller Polonais." Part I. Académie Polonaise des Sciences et des Lettres, Kraków, Poland. 56 pp. + plates.
- "Communications of the Institute for the Study of Platinum and Other Precious Metals" (in Russian). Vol. XII. Edited by N. C. Kurnakov and O. E. Zwiagincev. Academy of Sciences of U. S. S. R., Leningrad, U. S. S. R. 192 pp.
- "Gmelins Handbuch der anorganischen Chemie." 8 Auflage. System-Nummer 4: Stickstoff. Lieferung 1. Verlag Chemie, G. m. b. H., Corneliusstrasse 3, Berlin, Germany. 282 pp. RM. 43; to subscribers, RM. 38.
- "Gmelins Handbuch der anorganischen Chemie." 8 Auflage. System-Nummer 35: Aluminium, Teil B, Lieferung 2. Verlag Chemie, G. m. b. H., Corneliusstrasse 3, Berlin, Germany. 305 pp. RM. 49.
- "Starunia." Edited by M. J. Stach. Numbers 1-5. Académie Polonaise des Sciences et des Lettres, Kraków, Poland.
- "Transactions of the Butlerov Institute for Chemical Technology of Kazan." (In Russian.) G. B. Bohautdinov, Editor. Kazan, Tatar S. S. R. Vols. I, II and III. 192 + 150 + 174 pp.