

## NEW BOOKS

**Mechanisms of Biological Oxidations.** By DAVID E. GREEN, Senior Beit Memorial Fellow, Institute of Biochemistry, University of Cambridge (Cambridge: at The University Press). The Macmillan Co., 60 Fifth Avenue, New York, N. Y., 1940. 14.5 × 22.5 cm. 22 figs. 181 pp. Price, \$2.75.

This volume renders a valuable service for chemists generally, perhaps even more than for the professional biochemist. It covers parts of a very large field in a small space, and the author is to be congratulated on the brevity, clarity and general accuracy of his exposition. Chemists will probably find this account of biological oxidations more immediately useful to them than the other larger, well-known members of the contemporary quadrumvirate in this field, namely, Elvehjem and Wilson's "Respiratory Enzymes," Volume VII of the Cold Spring Harbor Symposia on Quantitative Biology, and Oppenheimer and Stern's "Biological Oxidation," all three of which appeared a year before in 1939. The present volume, although not as didactic or pedagogical as the first-named, nor possessing the extent and variety of subject matter of the second, nor commanding the scholarly background, approach and scope of the third, is, nevertheless, extremely compact and well organized, and has a simplicity, terseness and sustained potency of expression and meaning that is agreeably reminiscent of G. N. Lewis in his "Thermodynamics," or, among biochemical writers, Meyerhof when translated into English, as in his "Chemical Dynamics of Life Phenomena." In short the material presented is readily extractable by experienced readers in biochemistry and adjacent chemical fields, even if for beginning students it is perhaps too brief and too professional to give more than a bird's-eye view that might not repay close class study. As the last of the quadrumvirate to appear, having been completed after the outbreak of the present war, it will probably remain in date for some time to come--well past the "duration"--for unquestionably the war has halted or slowed the great momentum recently achieved in the field of biological oxidation.

With little introduction—two chapters instead of one would have been better—and with scarcely ever pause for reflection, suggestion, or didactics, the book quickly settles down to a very straightforward albeit unimaginative description of the preparation and properties of the various oxidation enzymes, treating them as specific proteins acting in (usually reversible) combination with the following prosthetic groups in order of respective chapters: iron-porphyrins (catalase, peroxidase, cytochromes, cytochrome oxidase); pyridines comprising compounds of nicotinamide, adenine, ribose and phosphoric acid (dehydrogenases); flavins bound to ribose and phosphoric acid and at times adenine (activation of *d*-amino acids, cozymase, aldehydes, probably xanthine); copper (monophenol and polyphenol oxidases, laccase, ascorbic acid oxidase), with parenthetical mention of zinc (carbonic anhydrase); and thiamin (carboxylase, pyruvic

oxidase). Following these are described oxidation enzymes whose activities are seemingly independent of any normal coenzyme (numerous dehydrogenases), and also unclassified oxidation enzymes (amine oxidases, uricase, nitrate reductase, glutamic and aspartic aminophorase, glyoxylase, hydrogenase, etc.). There is a concluding, all too brief, chapter on oxidations in organized living systems. The emphasis is thus placed almost entirely on isolated systems *in vitro* and not on *in vivo* processes; for chemists this is probably preferable. For biochemists, however, the static display of enzyme ware in show cases, excellent and commanding in so many respects, does nevertheless create the pervading atmosphere of a museum that is neat, dustless, and of recent construction, but possessed of few working models. The merits of many of the individual case exhibits have been discussed already by Quastel in *Nature* [148, 5 (1941)] and by Stern in *Science* [93, 475 (1941)]. To this may be added the general comment that the preparative detail presented is perhaps not entirely discriminating and free from pretense, in that it is in fact quite too little for those who might want to use it in the laboratory, and often too much for those who do not; and, perhaps most important, the purposes of the steps in preparations are, as in so many original literature reports, sadly lacking: when will preparative biochemists improve in this respect?

The arresting feature of this short, potent, business-like revue and splendidly organized annotated bibliography of biological oxidations is, however, the puzzling absence of mechanism or mechanism outlook, title notwithstanding. Chemists should not be misled by the introductory statement on p. 1 that "The mechanisms of cellular oxidation are the main concern of this book," since these are almost, if not quite, the last explicit words on the subject in the remaining 180 pages. Kinetics, theoretical chemistry of any sort, and energetics are conspicuously absent, or when appearing in implicit form often befogged with unjustified deduction as on the top of p. 7. Whereas specific reactions written out are not infrequently intermediate with respect to still other reactions, nevertheless the interpretation and approach are essentially descriptive and not analytical, and are mechanistic only by accidental implication, for the most part. From the standpoint of *mechanism*, therefore, this book will be definitely disappointing to both general chemists and biochemists in failing to provide little more than a categorical classification or listing of enzyme oxidations, and in failing to offer that long needed leadership and synthesis in the field of mechanisms of biological oxidations whereby the latter are classified and interpreted according to fundamental chemical types of catalysis, and whereby the available facts are made to illustrate broad common principles operating and are not listed one after the other with relatively little to hold them together. The present book, then—like its fellow quadrumvirers also, to be sure—may thus be regarded as good source book and stepping stone for some future book on mecha-

nism that at present constitutes but a challenge to workers in the field, a gleam in the eye.

DEAN BURK

**Thermochemical Calculations.** By RALPH R. WENNER, Ph.D. McGraw-Hill Book Company, Inc., 330 West 42nd St., New York, N. Y., 1941. xii + 384 pp. Illustrated. 15.5 × 23.5 cm. Price, \$4.00.

To let the author outline the purpose of his book we quote: "The material here presented" deals with "methods for applying thermodynamic principles to a wide variety of practical laboratory and technological problems. The book is not intended to be a comprehensive presentation of the principles of thermodynamics. . . ."

The book is divided into two parts: "Part I, Principles," consists of eight chapters in 195 pages and "Part II, Applications," is divided into nine chapters in 174 pages.

Part I presents most of the thermodynamic and other formulas used in the book. Derivations are not given but references to other sources are often included. Numerous empirical or semi-empirical methods of estimating such quantities as heat capacities, entropies of fusion, entropies of gases, solubility, fugacities, are given. Formulas for calculating thermodynamic quantities from molecular data are included. Examples of applications to heats of solution and reaction, physical and chemical equilibrium, etc., are presented.

Chapter VIII contains an extensive summary of entropies of organic and inorganic substances. Graphical and other methods of estimating entropy values are discussed.

Part II is devoted to such applications as the use of e. m. f. measurements for analysis and control, nitration, hydrogenation, flame temperature, cracking, absorption, air conditioning, metallurgy, liquefaction of gases and fluid flow.

The author has limited the book to a moderate number of examples which are discussed in detail. Many of the examples are of a type requiring the combination of thermodynamic calculations with those dealing with rates of reaction or heat transfer.

The rather considerable discussion of gases based on empirical equations of state would have been improved by inclusion of at least one example of the use of a Mollier or other similar chart since these are available for a great many substances.

Several brief tables of the entropies of aqueous ions, Einstein and Debye functions, empirical equations of heat capacity, and other data useful to the discussions are given at the end of the book.

Sixty problems, some of which require searching the related literature for data, are included.

In preparing the book the author has assumed "that the reader has already been exposed to the formal exposition of the principles of thermodynamics."

We believe the book will serve a very useful purpose for those whose primary object is to get the answer to some problem even though they do not have time to become interested in many of the basic principles involved. At the same time the presentation of the practical applications should prove interesting and useful to all investigators in this field.

W. F. GIAUQUE

**Inorganic Chemical Technology.** By W. L. BADGER, Manager, Consulting Engineering Division, The Dow Chemical Co., and E. M. BAKER, Professor of Chemical Engineering, University of Michigan. Second edition. McGraw-Hill Book Co., Inc., 330 West 42nd St., New York, N. Y., 1941. xi + 237 pp. 58 figs. 16 × 23.5 cm. Price, \$2.50.

A comparison of the second edition with the 1928 edition of this well-known textbook shows that the changes are of such relatively minor character that only a brief review is needed. A large portion of the text is unchanged. The net expansion is only eight pages. There have been some eliminations of descriptive matter dealing with processes which have become obsolete within the past two decades, such as the Shanks Process for recovering niter, and the Arc Process for the fixation of atmospheric nitrogen. Several of the older types of cells for the electrolysis of salt have been displaced by their more modern prototypes. The synthesis of ammonia is described in greater detail and the sections dealing with the potash and bromine industries have been expanded. However, even such an important industrial development as the introduction of catalysts containing vanadium in the sulfuric industry occupies only about one page. Perhaps the most important new matter is an increase in the number and variety of the student problems and the revision of the lists of reading references.

Although the title might be interpreted to imply a comprehensive coverage, there are important inorganic industries which are not discussed, including the manufacture of lime, glass, pottery, Portland cement, chromates, barium chemicals, dry colors and artificial abrasives.

Introductory discussions of some but not all of the unit processes of chemical engineering are dispersed through the book at appropriate places but filter presses, centrifuges and fractionating columns are omitted.

In its revised form this book will serve even better its intended function as an elementary introductory textbook of chemical technology.

GRINNELL JONES

**Four Treatises of Theophrastus von Hohenheim Called "Paracelsus."** Translated from the original German, with Introductory Essays by C. LILLIAN TEMKIN, GEORGE ROSEN, GREGORY ZILBOORG and HENRY E. SIGERIST. Edited by Henry E. Sigerist. The Johns Hopkins Press, Baltimore, Md., 1941. xii + 256 pp. 15 × 23 cm. Price, \$3.00.

These four treatises, translated from the original German, have been selected by Dr. Sigerist from the works of Paracelsus to show the contribution to medicine of this brilliant, forceful and rebellious son of the Renaissance.

The first treatise, "Seven Defensiones," is the most personal. It enunciates the basis of Paracelsus' philosophy and although in the third person, it fiercely denounces the hide-bound and venal medical practitioners of his time, and passionately defends his own acts, character and opinions. The second treatise, "On the Miners' Sickness and Other Miners' Diseases," is the first monograph ever written on the diseases of an occupational group. Paracelsus had lived as a boy at Villach in the mining and metallurgical district of Carinthia and as a young man had worked for

five years in a smelter in the Tyrol. He therefore knew well the chemical and metallurgical background of his subject. However, in spite of this first-hand knowledge and his keenness of observation and independence of mind, his thought was still deeply tinged with the magic, superstition and mysticism of the middle ages. The third treatise, "The Diseases that Deprive Man of His Reason, etc.," not only was the first use of the descriptive method in psychiatry, but also anticipated, at least implicitly, by two or three hundred years the modern concept of personality. The final brief treatise, "A Book on Nymphs, Sylphs, Pygmies, and Salamanders, and on the Other Spirits," was included by the Editor because of its poetical nature, its bearing on the philosophy and theology of Paracelsus and its interest from the point of view of comparative literature and art.

While these particular treatises are not of immediate interest to the chemist, they should be of great value to the student of the history not only of medicine but of science in general. The brief biographical preface and the several introductions to the separate treatises are most helpful and illuminating.

All told, this volume is a fitting commemoration of the four hundredth anniversary of the death of a great and picturesque personality.

ARTHUR B. LAMB

**Dielectrics.** Volume XL, Art. 5, Pages 289-482 of the *Annals of the New York Academy of Sciences*. By WILLIAM O. BAKER, J. D. FERRY, RAYMOND M. FUOSS, PAUL M. GROSS, MARCUS E. HOBBS, JOHN G. KIRKWOOD, S. O. MORGAN, HANS MUELLER, J. L. ONCLEY, HERBERT A. POHL, J. SHACK, CHARLES P. SMYTH, J. H. VAN VLECK. The New York Academy of Sciences, care of the American Museum of Natural History, New York, N. Y., 1940. 15.6 × 23.5 cm. 193 pp. Price, \$2.25. This monograph is one of several, which if purchased as a set may be had at a reduced price.

The papers contained in this volume were presented at the conference on "Dielectrics" held by the New York Academy of Sciences on April 14-15, 1939. In keeping with the auxiliary function of formal papers at these conferences, the papers largely have the character of analytical, preferably suggestive, surveys of recent work in various sections of the field. Since the authors' primary object is the formulation of outstanding problems, the reader should be prepared for bold exercise of personal judgment.

Van Vleck supplies, in very readable form, an evaluation of the modern theories of dipole interaction. Kirkwood's shorter contribution leads up to a new suggestion for im-

provement of the theory. Mueller's clear and complete, yet compact, account of the electrophysics of Rochelle salt seems to the reviewer a perfect introduction to this fascinating subject (36 pp., 29 figs.). Fuoss' investigation of the electrical properties of polyvinyl chloride, which may be indicative of plastics in general, presents interesting riddles. Examples of rotation of molecules in crystals and glasses are dealt with by Baker and Smyth, and by Morgan. Oncley, Ferry and Shack describe the application of dielectric constant and absorption measurements to the study of proteins in solution. Pohl, Hobbs and Gross relate a neat investigation of fatty acids in benzene and hexane solutions.

The reader will find this volume a convenient and effective means to acquaint himself with most of the recent developments in the field of dielectrics. The more general articles have lasting value as an important stage in the organization of available material. With proper allowance for intervening progress, some of which has taken place already, sections of this volume may well be lifted bodily for future textbooks.

The presentation is consistently good, editing and printing likewise.

L. ONSAGER

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## BOOKS RECEIVED

March 10, 1942-April 10, 1942

- KARL T. COMPTON, ROBERT W. TRULLINGER and VANNEVAR BUSH. "Scientists Face the World of 1942." Rutgers University Press, New Brunswick, N. J. 80 pp. \$1.25.
- TE-PANG HOU. "Manufacture of Soda." Second Edition, Thoroughly Revised and Enlarged. A. C. S. Monograph Series. Reinhold Publishing Corporation, 330 West 42nd Street, New York, N. Y. 590 pp. \$9.50.
- KENNETH S. LOW. "Metallurgical and Industrial Radiology." Pitman Publishing Corporation, 2 West 45th Street, New York, N. Y. 88 pp. \$2.50.
- C. L. MANTELL, C. W. KOPF, J. L. CURTIS and E. M. ROGERS. "The Technology of Natural Resins." John Wiley and Sons, Inc., 440 Fourth Avenue, New York, N. Y. 506 pp. \$7.00.
- F. F. NORD and C. H. WERKMAN, Editors. "Advances in Enzymology and Related Subjects." Vol. II. Interscience Publishers, Inc., 215 Fourth Avenue, New York, N. Y. 374 pp. \$5.00.