NEW BOOKS

British Chemicals and Their Manufacturers. The Official Directory of the Association of British Chemical Manufacturers. Published by and available only from the Association, 166 Piccadilly, London W 1, England, 1937. 466 pp. *Gratis* to genuine purchasers of chemicals.

This book, the Official Directory of the Association of British Chemical Manufacturers, gives information as to the products manufactured by the members. It contains a list of the products, with the grades and the manufacturer of each product.

It also contains lists of Proprietary Trade Names and Trade-marks and complete indices.

All different sections are printed in English, French, Spanish, Italian, Portuguese and German.

Genuine purchasers of chemicals can obtain this book *gratis* from the office of the Association. For educational institutions, as well as industry, this book will be found a handy reference to the many chemicals manufactured by the association.

CLIFTON P. ADAMS

Organic Chemistry. The Chemistry of the Compounds of Carbon. By LUCIUS JUNIUS DESHA, Professor of Chemistry, Washington and Lee University. McGraw-Hill Book Company, 330 West 42d Street, New York, N. Y., 1936. xv + 750 pp. Illustrated. 14.5 × 22 cm. Price, $3.75.

"This textbook has been written for college students and primarily for those whose formal instruction in organic chemistry ends with a one-year course .... The guiding policy has been to consider compounds if, where, and as they serve usefully to illustrate and explain the general principles of organic chemistry." The book is conspicuously different from other present-day texts not in this, but in following W. A. Noyes's practice of treating aliphatic and aromatic compounds side by side. The first 128 pages are devoted to hydrocarbons, under the chapter headings: Saturation and Unsaturation—Isomerism—Homology—Natural Gas and Petroleum—Ring Formation; Alicyclic Hydrocarbons—The Aromatic Nucleus; Benzene and its Homologues—Polynuclear Hydrocarbons; By-products of Coking. In the following nine chapters, simple derivatives of the hydrocarbons, aliphatic and aromatic together, are considered in order. Eight chapters follow on polysubstituted and mixed compounds, and five chapters on "Special Results of Certain Structures." The chapter headings in this section are: Variable Strength of Linkages—Tautomerism—Rearrangements—Color and Constitution; Dyes and Dyeing—Stereoisomerism. The final four chapters deal with some important plant and animal products (carbohydrates, fats, lipides, proteins, terpenes, etc.). An appendix includes generalizations on the identification of organic compounds.

There is a restrained but consistent emphasis upon theory throughout the book, which leads to the inclusion of such topics as the theory of affinity-capacity and the mechanisms of molecular rearrangements, frequently reserved for later courses in organic chemistry. This willingness to tackle fundamental problems will be appreciated by the better students, but these are the very students whose instruction in organic chemistry ought *not* to end with a one-year course. In contrast to these inclusions, the experimental facts about conjugated systems are touched only very lightly, and the diene synthesis of Diels and Alder is not mentioned. The benzene problem is discussed at a point where simple conjugated systems are not available for comparison, although cyclooctatetraene is mentioned in a note. Many experimental tests are described throughout the book, but nothing is said about how the molecular formula of a compound is established.

The book is not entirely free from inaccuracies. In alkylating acetoacetic ester it is not usual, as stated on page 517, to add sodium wire to the anhydrous ester. By established usage, the Wurtz reaction (page 24) becomes the Wurtz-Fittig reaction only when carried out between an aliphatic and an aromatic halide. The "chair" form of the cyclohexane ring (page 79), according to models, does not shift into the other form without some slight bond distortion. In the main, however, the statements in the book are well considered. The illustrations are good and the style clear.

One of the greatest aids to a student in studying this necessarily descriptive subject is the consideration, more or less together, of a group of genetically related compounds. The shuttling back and forth between aliphatic and aromatic compounds throughout the book limits the possibility of this. Thus it seems to the reviewer that the distinguishing feature of this text, its order of presentation, is its one serious drawback.

P. D. BARTLETT

Thermodynamic Theory of Affinity. A Book of Principles. By TH. DE DONDER, Professor of Mathematical Physics, University of Brussels, and PIERRE VAN RYSSELBERGHE, Assistant Professor of Chemistry at Stanford University. Stanford University Press, Stanford University, California, 1936. xx + 142 pp. 4 figs. 16 × 24.5 cm. Price, $3.00.

This book presents in a readable form a fairly complete résumé of the theory of affinity developed by De Donder. The use of the international set of thermodynamic symbols makes the reading much easier in this than in the French editions for those not familiar with De Donder's earlier notation. The method of presentation is didactical. The first three chapters are devoted to the two laws of thermodynamics; the next five, to the properties of the affinity and the last eight, to the applications of the affinity function to a discussion of equilibrium, the phase rule, ideal and non-ideal gases, Le Chatelier's principle,

heterogeneous and homogeneous equilibria and galvanic cells.

The representation of the status of a chemical reaction in a closed system by the "degree of advancement of the reaction" introduces a very desirable symmetry into such discussions.

The thermodynamic treatment is involved because of the introduction of the uncompensated heat of Clausius. This leads to relations as on pages 16 to 18 which have many unfamiliar added terms all of which are shown to be zero. On page 18 it is implied that the relations containing these zero terms are more general than those heretofore used. The method of Gibbs in which changes in state properties are treated by reversible processes whether or not the actual change under consideration is reversible is more direct and satisfying. An appreciable part of the book is devoted to warning the reader against a mistake which only the most naïve beginner would make, as on pages 34 to 36 where a straw man is thoroughly demolished. On page 54 some new equations of interest are given; a statement in words of the significance of these relations would be a valuable help to the reader.

Throughout the book the affinity function is used and the properties and uses of this function are developed at length. For a chemical change in state in a closed system the affinity A is given by the relation $A = -\Sigma\nu_i\mu_i$ (ν_i = stoichiometric coefficient and μ_i = chemical potential of the i-th constituent). The treatment throughout is almost entirely mathematical; the physical interpretation of some of the results, especially the connection between the affinity and the yield of a chemical reaction under different conditions, would add to the interest in this function.

J. A. BEATTIE

The Mechanism of Contact Catalysis. By R. H. GRIFFITH, D.Phil., Senior Research Chemist, The Gas Light and Coke Co. Oxford University Press, 114 Fifth Avenue, New York, N. Y., 1936. xi + 208 pp. 90 figs. 14 × 22.5 cm. Price, $5.00.

The avowed purpose of this book is to summarize developments in the theory of catalytic mechanism in the decade since the publication of such works as Rideal and Taylor's "Catalysis in Theory and Practice." Studies reported as late as 1936 are included, as well as a number of interesting, unpublished investigations by the author. Chapter heads are: experimental methods, adsorption, promoters and carriers, poisoning and retardation, examination of the catalyst surface, geometry of the catalyst surface, mechanism of catalysis, development of catalysts. The focus of attention is the catalyst and its behavior with reactants and products, rather than the reactions themselves. The author treads the middle road between the extremes of theory and practice, emphasizing laboratory researches to the exclusion of quantum mechanics on the one hand and data from technical operations on the other. His critical comments on recent work should be of interest, particularly to specialists in the field even though their own views may sometimes differ. The treatment is selective rather than exhaustive, but at least a majority of the principal contributions receive attention.

In the exposition of a subject as various and elusive as catalytic mechanism, a certain looseness of organization of material is probably unavoidable. The resulting diffuseness and repetition the author strives to minimize by frequent cross references, an author index and an elaborate subject index. But not all the traditional "mystery" of catalysis is removed. Apparently it must largely remain until more precise concepts are developed and generally understood, so that more precise statements can be used. For example (p. 36): "The significance of these facts [rates of diffusion of hydrogen and deuterium through copper] in connexion with catalytic changes occurring at a surface is probably much greater with regard to determining the character of the surface itself than with respect to any influence on the catalyzed reaction, once the surface has been formed."

The physical make-up of the book is irreproachable.

ARTHUR F. BENTON

Prelude to Chemistry. An Outline of Alchemy, its Literature and Relationships. By JOHN READ, Ph.D., M.A., Sc.D., F.R.S., Professor of Chemistry in the United College of St. Salvator and St. Leonard in the University of St. Andrews, Scotland. The Macmillan Company, 60 Fifth Avenue, New York, N. Y., 1937. xxiv + 327 pp. Illustrated. 16 × 24 cm. Price, $5.00.

Professor Read's book is devoted primarily to an account of the affiliations of early chemistry, and, for that reason perhaps, succeeds in supplying a correct understanding of the theories of early chemistry and alchemy, of their probable origins and of their nature and development. It does this better than any other single book with which we are acquainted. It contains very little of the actual chemical knowledge of the ancients, but by its thorough examination of the speculative background of that knowledge it throws a clearer light than would otherwise be possible upon the central and dominant doctrine. It shows how the doctrine operated in the laboratory, but also how it operated in the minds of the laboratory workers in their imaginative and metaphorical language, their curious diagrams and symbolic pictures. Professor Read follows the elaborations of alchemical doctrine in considerable detail in a number of special cases, the hieroglyphic pictures of Nicholas Flamel, the *Splendor Solis*, the "Hermetic Museum," the works of Thomas Norton, John Cremer and Basil Valentine, the alchemical pictures of Stolcius, Mylius and Michael Maier (whose interconnections he straightens out), and the alchemical music of the last-named in *Atalanta Fugiens*. The reader cannot fail to see that the alchemists, for all their intellectual and artistic excesses, were men of much sense: he will understand the ideas which were guiding them.

The book is scholarly, interesting and attractive. It is written in a fine literary style, pervaded by the author's gentle sense of humor and sympathetic insight. An Appendix contains an essay on "The Music in *Atalanta Fugiens*" by F. H. Sawyer, together with several of the fugues arranged in the modern manner for choral singing—also a Glossary and Bibliography and Notes. The work is profusely illustrated with a colored frontispiece, 63 other plates, 17 figures and additional small pictures.

"The Garden has been arrayed to lure *Bees* and *Butterflies* alike; but it may be added that a flowery Border, metamorphosed after the manner of alchemy into a bibliography, garnishes the out-going Arbour. Moreover, divers faire Rose-trees, transmuted into cross-references, have been planted in the middest of the Garden. The *Butterflies*, an they list, may hover over these blossoms without settling thereon; but peradventure the *Bees* will find them as full of Honey as of Fragrance."

TENNEY L. DAVIS

Introduction to Theoretical Chemistry. By WILLIAM BUELL MELDRUM, Professor of Chemistry, Haverford College, and FRANK THOMSON GUCKER, JR., Associate Professor of Chemistry, Northwestern University. American Book Company, 88 Lexington Ave., New York, N. Y. 1936. xiv + 614 pp. 155 figs. 15 × 22.5 cm. Price, $3.50.

This text is well worthy of its name. It carries the student through each of the main subdivisions of modern chemistry from the earliest developments to the most recent, without, however, becoming too specialized for the average undergraduate. It has, of course, the disadvantages of the historical presentation—the student must follow each mistake and false premise of the early workers before arriving at the currently accepted point of view on each subject. For this reason it will probably be found unsuited to the needs of beginning students, who are usually confused by a multiplicity of theories. On the other hand, this very treatment could make this book extremely valuable in teaching students who have already completed the elementary course in chemistry. They would be led to examine the theoretical and experimental bases of each of the statements which they had, perhaps, taken for granted in their first course.

In addition to the usual subjects discussed in elementary textbooks on physical chemistry there are interesting chapters entitled: "Modern Theories of Electrolytes," "Radiations and Spectra," "The Nucleus," "Arrangement of External Electrons," and "The Electronic Theory of Valence." Each chapter is provided with a set of problems and exercises as well as a bibliography for outside study.

There can be little doubt that this book will fill the need for a text sufficiently advanced to interest students who have already acquired an elementary knowledge of chemistry, yet it is not too specialized and intricate to discourage them.

D. HARKER

Gmelins Handbuch der anorganischen Chemie. (Gmelin's Handbook of Inorganic Chemistry.) Edited by R. J. MEYER. Eighth Edition. System-Number 36, **Gallium**. Issued by the Deutsche Chemische Gesellschaft. Verlag Chemie G. m. b. H., Corneliusstrasse 3, Berlin W 35, Germany, 1936. 100 pp. 17 × 25 cm. Price, RM. 13.87.

This relatively slender volume, entitled "Gallium," discusses the free element itself and its compounds with the elements of smaller "System-Number"; *i. e.*, with the nonmetals, with the metals in the preceding group of the periodic table and with aluminum. The literature of the subject has been covered up to October 1, 1936, so that the important recent work of Goldschmidt and Peters and of I. and W. Noddack on the occurrence and that of Kraus and his collaborators on the preparation, of gallium are included. Indeed a surprisingly large fraction of all the data given in this book is of recent date, presumably because of late gallium and gallium compounds have become more easily available.

ARTHUR B. LAMB

Laboratory Methods of Organic Chemistry. By L. GATTERMANN. Completely revised by Heinrich Wieland. Translated from the Twenty-fourth German Edition by W. McCartney, Ph.D., A. I. C. The Macmillan Company, 60 Fifth Avenue, New York, 1937. xvi + 435 pp. 59 figs. 15.5 × 22.5 cm. Price, $4.50.

Gattermann-Wieland's Laboratory Manual is too well known to require a detailed description.

This edition has been revised in several very important parts. Perhaps the most significant change is the abandonment of all macro methods of analysis, and their replacement by semi-micro ("meso-analytical") procedures which require the use of only 20–30 mg. of sample.

There have also been some changes made in the list of experiments, with the omission of some and the addition of others which are of greater current interest. The new experiments include the preparation of a platinum oxide catalyst for reductions, the ozonization of cyclohexene to give adipic aldehyde and the separation of chlorophyll-*a* and chlorophyll-*b* by the method of chromatographic adsorption. Improved directions for the preparation of diazomethane and octaacetylcellobiose are given.

Space has been given to a short discussion of the Wolff-Kishner reduction and selenium oxide oxidations, and the sections on carbohydrates, porphyrins and chlorophyll, and sterols have been revised to cover recent developments. The pyrones, anthocyanins and oxonium salts are treated in this edition for the first time.

The improvement in indexing should be especially commended. This change has greatly increased the usefulness of this well-known laboratory manual. The new Gattermann-Wieland can be highly recommended to all organic chemists.

C. S. MARVEL

The Scientific Principles of Plant Protection, with Special Reference to Chemical Control. By HUBERT MARTIN, D.Sc., A.R.C.S., F.I.C. Longmans, Green and Company, 114 Fifth Avenue, New York, N. Y., 1936. xii + 379 pp. 14.5 × 22 cm. Price, $8.00.

Since the appearance of the first edition of this book, entomologists, plant pathologists and chemists have been so active in this field that in preparing the second edition, Dr. Martin has found it necessary to rewrite and reset all but the introductory chapter. The present edition gives

an excellent up-to-date summary of the scientific literature on the control of insects and plant diseases, with many citations of the literature enabling the reader to go more deeply into any subject in which he is interested. It offers biological information to the chemist and chemical facts to the applied biologist.

Phases of control other than chemical are discussed. Among these are plant resistance, effects of fertilizers, biological control, traps, and the elimination of infection centers or vectors. A chapter is devoted to spreaders, stickers, protective colloids, and dispersing and emulsifying agents. This book should prove of value in clearing up confusing points in recent developments such as a difference between sulfated and sulfonated spreaders. A chapter on the measurement of toxicity and the relationship of chemical constitution to toxic action is of particular interest.

The work is not intended to give definite formulas, but to indicate broadly the field of usefulness of different methods of control and give the principles underlying these methods.

Various commercial products are mentioned and, where possible, the active ingredients are given. The author errs in stating that the calcium cyanide in Cyanogas is manufactured from liquid hydrocyanic acid and calcium carbide. The calcium cyanide in Cyanogas is made from calcium cyanamide, and the calcium cyanide resulting from the reaction of liquid hydrocyanic acid and calcium carbide is sold under the trade name of Calcid. The patent literature which represents much of the research work of commercial firms and which may suggest ideas to all workers in this field has not been covered. It is hoped that in a future edition the author may be able to cover the patent literature dealing with pest control as well as he has the scientific literature in the present edition.

This book should prove of great value to the mycologist, entomologist and chemist working in the field of pest control.

WILLIAM MOORE

Die Fermente und ihre Wirkungen. (Enzymes and their Action.) Supplement. Lieferung 5 (Bd. I Specieller Teil: Haupt-teil XII). By Prof. CARL OPPENHEIMER with the collaboration of Dr. W. ROMAN. W. Junk Verlag, Scheveningsche Weg 74, The Hague, Holland, 1936. 140 pp. 5 figures. 20.5 × 28 cm. Price, Fl. 10.

Lieferung (Installment) 5 is the fifth number in a series of separate supplements, the purpose of which, as stated in the reviews of the previous numbers [THIS JOURNAL, **58**, 538, 2344 (1936)] is to bring up to date the vast amount of information that has been accumulating in the field of enzyme chemistry during the past ten years since the publication of the original main treatise.

The present installment is devoted to the chemistry of the proteinases and various types of peptidases. Not only is the more recent information found in the chemical literature discussed, but considerable space has been devoted to recent studies on the constitution of proteins. About half of the number is given over to the chemistry of the peptidases, their methods of preparation and differentiation, and to a discussion of their properties such as stability, optimum *p*H, specificity, behavior on adsorption, sensitivity toward foreign substances, etc.

J. M. NELSON

The Nature of Water—Heavy Water. (In russian.) By E. KH. FRITSMAN. ONTI—Khimteoret, Leningrad, U. S. S. R., 1935. 314 pp. 15 × 22 cm. Price, bound cloth, rubles 7.00.

This monograph is one of the first attempts toward a broad discussion on the nature of water from the inorganic point of view. The first 106 pages are devoted to a discussion of the earlier literature on the properties and structure of water and of ice. Two pages are given to the ortho and para modifications of water, and the remainder of the 155 pages of the discussion of fundamental investigation is devoted to heavy water. In the section outlining special investigations, pages 162–206 relate to X-rays, Raman, and ultra-red analysis of water; pages 207–209 to ortho and para hydrogen. The remainder of the book is a review of important investigations relating to deuterium and deuterium oxide. Two pages are devoted to tritium and two to the heavy isotopes of oxygen. The author gives 699 references, about 260 of them relating to work done on heavy water. The reviewer has in his files approximately 1200 titles relating to heavy isotopes of hydrogen and oxygen through 1934. This work is a well written and valuable contribution in a field of wide present interest.

MERLE RANDALL

Thermodynamics of Chemical Reactions and Their Application to Inorganic Technology. By A. F. KAPUSTINSKII, Professor of Physical Chemistry, All-Union Scientific Research Institute of Economic Mineralogy, ONTI, Moscow, U. S. S. R., 1935, 2d edition in Russian. 303 pp. 15 × 22 cm. Price, bound cloth, rubles 5.00.

This book presents a short course in general physical chemistry with emphasis on thermodynamics for students and engineers. Chapters 1 and 2 give a brief elementary outline of the gas laws; Chapter 3, heat capacity including quantum theory; Chapters 4 and 5, first law of thermodynamics and thermochemistry; Chapter 6, liquefied gases; Chapter 7, second law and entropy; Chapter 8, vaporization; Chapter 9, theory of solutions; Chapter 10, phase rule; Chapter 11, chemical equilibrium; Chapter 12, free energy; Chapter 13, third law; Chapter 14, technical reversible reactions. There follows 35 pages of tables of thermodynamic functions and 198 selected equations are brought together in a final table. The American reader will find some difficulty in following the author owing to inconsistencies in terminology. The author recognizing the necessity of a uniform and consistent system of symbols has added his own system in a table summarizing several current systems. At the same time he does not invariably follow his chosen system. This is unfortunate, for otherwise the book appears to be well thought out and well written.

MERLE RANDALL

The Biochemistry of the Lipids. By HENRY B. BULL, Ph.D., Assistant Professor of Physiological Chemistry, Northwestern University Medical School. John Wiley & Sons, Inc., 440 Fourth Avenue, New York, N. Y., 1937. ix + 169 pp. 63 figs. 15.5 × 23.5 cm. Price, $2.75.

This work was first published as a mimeographed book by the Burgess Publishing Company in 1935.[1] Through a happy thought of the author, the subject matter has been rearranged, rewritten and in some cases notably increased, with the result that he has succeeded in the production of a readable up-to-date textbook. As stated in the preface, its object is to give the graduate student in biochemistry an insight into the chemistry and physiology of the lipids. The book contains nine chapters, the titles of which are "The Fatty Acids," "The Soaps," "Alcohols, Waxes, and Hydrocarbons," "The Sterols and Related Compounds," "Fats and Oils," "The Phospholipids," "Cerebrosides," "Carbohydrate Esters of the Higher Fatty Acids" and "Emulsions." Although the treatment of the subject matter for the most part, as would be expected from the size of the volume, is much condensed, it will, with few exceptions, be found satisfactory. In all cases, however, adequate references are given. Also, the author has called attention several times to useful reviews covering a given subject which will prove helpful.

(1) See Jamieson, THIS JOURNAL, **58**, 184 (1936).

G. S. JAMIESON

BOOKS RECEIVED

February 15, 1937–March 15, 1937

EMIL ABDERHALDEN, Editor. "Handbuch der biologischen Arbeitsmethoden. Abt. I, Teil 11, Heft 7." "Methoden zur Erforschung der Konstitution von Kohlenhydraten," by Percy Brigl and Hans Grüner. "Pektin," by Felix Ehrlich. Verlag Urban und Schwarzenberg, Friedrichstrasse 105 B, Berlin NW 7, Germany. 298 pp. RM. 16.50.

HERMAN T. BRISCOE. "An Introduction to College Chemistry." Houghton, Mifflin Company, 2 Park St., Boston, Mass. 653 pp. $3.00.

HENRY B. BULL. "The Biochemistry of the Lipids." John Wiley and Sons, Inc., 440 Fourth Ave., New York, N. Y. 170 pp. $2.75.

L. F. FIESER, Editor. "Organic Syntheses. Vol. XVII." John Wiley and Sons, Inc., 440 Fourth Ave., New York, N. Y. 112 pp. $1.75.

LEICESTER F. HAMILTON AND STEPHEN G. SIMPSON. "Talbot's Quantitative Chemical Analysis." Eighth edition. The Macmillan Company, 60 Fifth Ave., New York, N. Y. 297 pp. $2.50.

HANS HOHN. "Chemische Analysen mit dem Polarographen." Verlag von Julius Springer, Linkstrasse 23–24, Berlin W 9, Germany. 102 pp. RM. 7.50.

E. RABALD, Editor. "Dechema Werkstoffblätter. Kurzreferate über Werkstofffragen in der chemischen Technik aus dem Schrifttum des in- und Auslandes." Verlag Chemie G. m. b. H., Corneliusstrasse 3, Berlin W 35, Germany. 104 pp. RM. 10.

J. SIVADJIAN. "Les Vitamines et les Hormones." Gauthier-Villars, Éditeur, 55 Quai des Grands-Augustins, Paris, France. 80 pp.

"Index to A. S. T. M. Standards and Tentative Standards." American Society for Testing Materials, 260 South Broad St., Philadelphia, Pa. 120 pp.