

tems. Chapter 4 deals with "The Axiomatic Foundation of Thermodynamics," a subject which usually does not concern or interest the physical chemist. The only references given at the end of this chapter are to a 1921 paper of M. Born and to the 1909 and 1925 papers of Carathéodory whose presentation a very recent paper by Landsberg (*Rev. Modern Phys.*, 28, 363 (1956)) claims to have improved. With Chapter 5 "the logical order of development is broken in order to derive the fundamental formulae of statistical mechanics." This "inelegance," as the author designates this procedure, is handled in 46 concentrated pages which assume that the reader is familiar with quantum mechanics. Chapter 6, in 51 equally concentrated pages, presents "Some Applications of Statistical Mechanics" (Specific Heat of Gases—Crystalline Solids—Systems Obeying Fermi-Dirac and Einstein-Bose Statistics—Radiation). Chapter 7 offers a treatment of the Third Law based largely on the work and the ideas of F. Simon. Chapter 8 gives in 50 pages a thorough treatment of imperfect gases. Chapter 9 handles "The Heterogeneous Equilibrium of a Single Substance" and includes an interesting and detailed study of the properties of helium. The very substantial Chapter 10 on "Electric and Magnetic Phenomena" (75 pages) would alone constitute a useful reference work on topics which texts of chemical thermodynamics usually do not touch: force and energy relations in an electrostatic field, statistical mechanics of polar substances, ferroelectricity, statistical mechanics of paramagnetic bodies; ferromagnetism, antiferromagnetism, superconductivity. Chapter 11 on "Gas Mixtures and Chemical Reactions" is a condensed treatment of what would constitute the major portion of a book on chemical thermodynamics. Section 11.411 entitled "The affinity as defined by De Donder" denotes incomplete comprehension of the method and contains statements indicating similar incomplete comprehension of other procedures (compare this section with the preceding one, 11.41). Interestingly enough De Donder's method is used in section 11.423 to calculate the conditions required for the maximum extent of a reaction. Chapter 12 on "Solutions" may be sufficient to initiate theoretical physicists to the subject, but is far too incomplete to be regarded as useful to physical chemists. The same remark applies to Chapter 13 on "Solutions of Electrolytes and Electrochemical Systems." Chapter 14 is entitled "Further Topics in Solids" and offers interesting treatments of rubber, superlattices in alloys, and some exact solutions of the one-dimensional order-disorder problem.

As a whole it may be concluded that a book of this type rightfully belongs in a Chemistry Department library, but there seems to be no strong reason to urge its addition to the private libraries of physical chemists, although, with the extremely moderate price of \$9.50 for such a large, beautiful and after all very competently written book, the investment is not at all unattractive.

DEPARTMENT OF CHEMISTRY
AND CHEMICAL ENGINEERING
STANFORD UNIVERSITY PIERRE VAN RYSSELBERGHE
STANFORD, CALIFORNIA

Organic Synthesis. Volume 1. Open-Chain Saturated Compounds. Volume 2. Open-Chain Unsaturated Compounds. Alicyclic Compounds. Aromatic Compounds. By VARTKES MIGRICHIAN, Senior Research Chemist, Central Laboratory, American Cyanamid Company, Stamford, Connecticut. Reinhold Publishing Corporation, 430 Park Avenue, New York 22, N. Y. 1957. Volume 1, xxviii + 833 pp. Volume 2, xiii + pp. 834-1822. 15.5 × 24 cm. Price, \$35.00.

These volumes comprise an extensive documented treatise of classical organic chemistry excluding heterocyclic compounds. Written in textbook style, the work emphasizes the synthetic approach to organic compounds. Many sections are devoted to characteristics and chemical behavior of compounds as well as to analytical techniques. A nine-page discussion of ozonization includes the preparation of ozonides, determination of ozone, properties of ozonides and methods for their decomposition. Organic structural theory, reaction mechanisms and methods of resolution are not discussed.

Approximately 30% of the space is devoted to aromatic

chemistry and most of the remainder to aliphatic compounds. Organic compounds of metalloids and non-metals other than nitrogen and sulfur are treated separately. Although certain of these sections are too brief and out-of-date to be of interest to the specialist (*e.g.*, silicon chemistry, 3 pages; boron chemistry, 2 pages), the section has value in bringing together for comparison some of the chemistry of these elements. A chapter on organometallic compounds of similar size and scope and a separate chapter on the "Grignard reaction" are included. The chapter on alicyclic compounds deals chiefly with methods of ring closure, expansion and modification. It is particularly recommended for its sections on azulenes, tropolones and sterols. Twelve pages are devoted to methods for the modification of sterol structures without change in ring skeleton.

The tremendous task of reducing a large part of Beilstein's Handbook to two volumes and attempting to include important recent developments is not an easy one. The author acknowledges his indebtedness to a host of treatises, monographs and general reviews which made this work possible. Even so, the integration and organization of thousands of facts and references is not without major problems. A few reactions of great breadth such as Friedel-Crafts, Grignard and Diene Syntheses are discussed mainly in separate chapters. That the entire work could not have been so organized seems unfortunate. Much duplication and fragmentation has resulted from the classical subdivision into aliphatic, alicyclic and aromatic compounds coupled with the treatment of most series from the standpoint of chemical behavior as well as synthesis. Frequently, a reaction is discussed in several places. Thus, on page 945 under chemical behavior of unsaturated aldehydes, it is stated that "oxidizing agents even of the mildest type convert only a small portion of unsaturated aldehydes into the corresponding unsaturated acids." An illustration, the conversion of "methylacrolein" to "methylacrylic acid," is given with no reference. However, on p. 957, a general method for the preparation of olefinic acids by oxidation of the corresponding aldehydes is presented along with five references from the period 1862-1899, and finally a detailed procedure for this oxidation is given on p. 258. The more recent work of Goldberg and Linstead in which α -methyl- β -ethylacrolein is oxidized in 60% yield to the corresponding acid is omitted.

The literature before 1925 has been covered more adequately than that of recent years. A reference to *Bull. soc. chim.* (1905) rather than *Organic Syntheses* (1943) for the preparation of β , β -dimethylacrylic acid by the haloform reaction is one of many examples. Only 9% of the 770 papers cited in the chapter on Aromatic Halogen Compounds appeared in the last three decades, and of these, less than a dozen were in American journals. Although the same ratios do not apply to all chapters, the inclusion of questionable work and the omission of recent findings are frequent. Thus, the dihydrohalogenation and decarboxylation of dihalo acids, p. 942, does not include the comprehensive studies of Farrell and Bachman, *THIS JOURNAL*, 57, 1281 (1935), and the formation of olefinic bromides from the corresponding alcohols does not include the modifications necessary to prevent isomerization [Young and Lane, *THIS JOURNAL*, 59, 2051 (1937); Goering, Cristol and Dittner, *ibid.*, 70, 3314 (1948)]. Even the conversion of simple alcohols to halides (pp. 17-21) is considerably out-of-date from the standpoint of molecular rearrangement and its prevention. The emphasis on the older literature leads to errors of fact, as on p. 116, where it is stated that yields of aldehydes by the Bodroux-Tschitschibabin Synthesis do not exceed 25%. The many excellent preparations of all classes of aldehydes in 25-82% yields in the period 1923-1941 and the comparative studies of L. I. Smith, *et al.*, *J. Org. Chem.*, 6, 437, 489 (1941) do not bear this out.

The index includes entries to specific compounds, general classes of compounds and named reactions. Some type reactions, such as decarboxylation, are indexed; others such as dehydration and dehydrohalogenation are not. The indexing of prefixes is almost as general as the indexing of root names. For example, one reference to dimethylnaphthalene is indexed under dimethyl, whereas another is found under naphthalene, dimethyl. Entries to carboxylic acids are divided under four headings: acids, carboxylic acids, aliphatic acids and aromatic acids. There is little duplication or cross indexing. Important items are sometimes omitted. A reader in search of methods for the synthesis

of acids and esters would not find the Arndt-Eistert Synthesis, for this reaction is discussed under "Acid Halides" and not indexed under esters nor the four categories for carboxylic acids.

Although this reviewer has considerable reservation concerning the publishers' use of the descriptive adjectives, most systematic, fully integrated, complete, up-to-date and precise, there is no question that these books are a valuable addition to the literature of organic chemistry. The treatment of the chemistry of large molecules and the coverage of very old literature and patent literature make them a worthwhile place to search before planning any organic reaction.

DEPARTMENT OF CHEMISTRY
THE PENNSYLVANIA STATE UNIVERSITY HARRY D. ZOOK
UNIVERSITY PARK, PENNSYLVANIA

BOOKS RECEIVED

July 10, 1957–August 10, 1957

- ROGER ADAMS, Editor-in-Chief. "Organic Reactions." Volume IX. John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1957. 468 pp. \$12.00.
- WILLIAM G. COCHRAN AND GERTRUDE M. COX. "Experimental Designs." Second Edition. John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1957. 617 pp. \$10.25.
- G. L. DE HASS-LORENTZ, edited by. "H. A. Lorentz. Impressions of His Life and Work." Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1957. 172 pp. \$3.00.
- W. E. GARNER, edited by. "Chemisorption." Proceedings of a Symposium held at The University College of North Staffordshire, Keele, Staffordshire, by The Chemical Society, 16–19 July, 1956. Academic Press, Inc., 111 Fifth Avenue, New York 3, N. Y. 1957. 277 pp. \$9.00.
- R. G. W. HOLLINGSHEAD. "Oxine and its Derivatives." Volume I. Part 1. Butterworths Scientific Publications, 88 Kingsway, London, W. C. 2, England. 1954. 322 pp. \$8.80.
- R. G. W. HOLLINGSHEAD. "Oxine and its Derivatives." Volume II. Part 2. Butterworths Scientific Publications, 88 Kingsway, London, W. C. 2, England. 1954. pp. 323–616. \$8.80.
- INTERNATIONAL UNION OF PURE AND APPLIED CHEMISTRY. "XIVth International Congress of Pure and Applied Chemistry, Zürich, 20–27. VII, 1955." *Experientia Supplementum II*. Birkhäuser Verlag, Elisabethenstrasse 15, Basel, Switzerland. 1955. 284 pp. Fr. 32.—.
- W. JOST. "Fortschritte der Physikalischen Chemie." Band 1. "Diffusion. Methoden der Messung und Auswertung." Verlag Dr. Dietrich Steinkopff, Holzhofallee 35, Darmstadt, Germany. 1957. 177 pp. DM 25.—.
- MARTIN D. KAMEN. "Isotopic Tracers in Biology. An Introduction to Tracer Methodology." Third Edition, Revised, Enlarged and Reset. Organic and Biological Chemistry. A Series of Monographs. Edited by Louis F. Fieser and Mary Fieser. Academic Press, Inc., 111 Fifth Avenue, New York 3, N. Y. 1957. 474 pp. \$9.50.
- H. A. KAMERS. "The Foundations of Quantum Theory." Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1957. 228 pp. \$6.50.
- HENRY LEE AND KRIS NEVILLE. "Epoxy Resins. Their Applications and Technology." McGraw-Hill Book Company, Inc., 330 West 42nd Street, New York, 36 N. Y. 1957. 305 pp. \$8.00.
- J. MURRAY LUCK, Editor, FRANK W. ALLEN, AND GORDON MACKINNEY, Associate Editors. "Annual Review of Biochemistry." Volume 26. Annual Reviews, Inc., Grant Avenue, Palo Alto, California. 1957. 768 pp. \$7.00 (U. S. A.), \$7.50 (elsewhere).
- ALTON MEISTER. "Biochemistry of the Amino Acids." Academic Press, Inc., 111 Fifth Avenue, New York 3, N. Y. 1957. 485 pp. \$10.00.
- WILLIAM J. PANGONIS, WILFRIED HELLER AND ARVID JACOBSON. "Tables of Light Scattering Functions for Spherical Particles." Wayne State University Press, Detroit 2, Michigan. 1957. 116 pp. \$5.50.
- H. K. PORTER, Editor. "Symposia of the Society for Experimental Biology." Number XI. "The Biological Action of Growth Substances." Academic Press, Inc., 111 Fifth Avenue, New York 3, N. Y. 1957. 344 pp. \$9.50.
- I. PRIGOGINE with the collaboration of A. BELLEMANS AND V. MATHOT. "The Molecular Theory of Solutions." Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1957. 448 pp. \$13.25.
- C. REID. "Excited States in Chemistry and Biology." Academic Press, Inc., 111 Fifth Avenue, New York 3, N. Y. 1957. 215 pp. \$7.50.
- BERNARD CHARLES SAUNDERS. "Some Aspects of the Chemistry and Toxic Action of Organic Compounds Containing Phosphorus and Fluorine." Cambridge University Press, 32 East 57th Street, New York 22, N. Y. 1957. 231 pp. \$6.00.
- H. ZEISE. "Thermodynamik auf den Grundlagen der Quantentheorie, Quantenstatistik und Spektroskopie." Dritter Band. Ergebnisse in tabellarischer und graphischer Form. 1. Hälfte: "Tabellen." S. Hirzel Verlag, Schuhmachergässchen 1–3, Leipzig, Germany. 1954. 311 pp. DM 20.—.
- H. ZEISE. "Thermodynamik auf den Grundlagen der Quantentheorie, Quantenstatistik und Spektroskopie." Dritter Band. Ergebnisse in tabellarischer und graphischer Form. 2. Hälfte: "Graphische Darstellungen und Literatur." S. Hirzel Verlag, Schuhmachergässchen 1–3, Leipzig, Germany. 1957. 299 pp. DM 22.20.