
 BOOK REVIEWS

Steroid Reactions, An Outline for Organic Chemists. Edited by CARL DJERASSI, Professor of Chemistry, Stanford University. Holden-Day, Inc., 728 Montgomery Street, San Francisco 11, California. 1963. 657 pp. 7.5 × 10.5 cm. Price, \$9.75.

This is an outstanding book as much for its contents and organization as for its possible seminal influence on other such endeavors. The book is the result of a happy combination of Professor Djerassi's imagination, drive, and phenomenal organizational ability with the efforts of a number of graduate students who did an excellent job of covering the recent literature of steroid chemistry much more thoroughly and rapidly than could be done by only one or two authors. The material is presented in immediately apprehended form, using almost entirely structural equations showing starting materials and products as well as reagents and conditions. Because of this presentation, it is possible to locate very rapidly a transformation which may be immediately applicable in one's laboratory. The method of coverage and of presentation has resulted in extremely up-to-date and thorough coverage of the topics covered in this volume. On the other hand, the restriction of the area to steroid chemistry is not as limiting as it might appear since steroid chemists are always eager to utilize any new synthetic organic reaction, and one can be sure that some steroid examples exist for any worthwhile synthetic method.

To mention some of the topics covered, we find here lists of examples concerning the protection of carbonyl and hydroxyl groups, introduction of fluorine, introduction of double bonds, Birch reduction, metal-ammonia reduction of enones, photolytic reactions, preparation of α -hydroxy and α -acetoxy ketones, etc.

The immediate usefulness of the book can perhaps be judged by reporting that, within a few days of publication, almost every graduate student and postdoctoral fellow on the sixth floor of the Chandler Laboratories had ordered his own copy without any prompting from the reviewer.

DEPARTMENT OF CHEMISTRY
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GILBERT STORK

Handbook of Laboratory Distillation. By ERICH KRELL, Deutsche Akademie der Wissenschaften zu Berlin Institut für Physikalische Stofftrennung, Leipzig. American Elsevier Publishing Company, Inc., 52 Vanderbilt Avenue, New York 17, N. Y. 1963. x + 561 pp. 15 × 23 cm. Price, \$18.00.

This compendium of distillation knowledge has lost little, if anything, in its able translation from the German and presents a sweeping view of distillation from early times to the present-day multiplate separation of isotopes. While the chemical plant is kept in mind, the laboratory claims the author's chief attention. The book will appeal to the American chemist because although American methods and workers are freely cited—Badger, McCabe, Thiele, Othmer are noted in the first chapters—it is British, German, and Dutch techniques that are more often illustrated, thus extending the reader's horizon. Aiding him in the theoretical exposition, which occupies most of the first 200 pages, is an unusually informative glossary of terms and definitions (pp. 522–532) and the usual index.

Chapters 3 and 4 introduce the reader to elementary calculations, principles of simple and countercurrent distillation, equilibrium diagrams, and nonideal systems; a discussion of "activity" leads directly to the simple ebulliometer and thence to detailed diagrams of apparatus. Calculation of vapor-liquid equilibria occupies the early section of the long Chapter 4, passing on to definition and calculation of theoretical plates and experimental means for their determination. The theory and practice of the packed column are illustrated by the separation of multi-component mixtures and proceed to the quantitative evaluation of column stills. The chapter closes with consideration of thermal balance and heat calculations.

Chapter 5 headed "Separation Processes" could equally be titled "Selection"—matching the distilling means to the kind and quantity of mixture. Here in profusion are pictures of stills ranging from match-size horizontal diffusion columns and micro-potstills with multiple receivers to large analytical columns and accessories which occupy a laboratory wall; Podbielniak's many techniques are well represented. The experienced operator will enjoy, indeed revel, in the choices offered. The neophyte will be harder put to distinguish the new and useful from the merely novel; but after all, that is the neophyte's burden. The enrichment of water isotopes described between p. 237 and 249 will be particularly revealing to him. Two sections of Chapter 5, "Temperature" and "Distillation Pressure," cover, rather in-

adequately, examples of high temperature stills and molecular distillation, with a sketchy insertion of the Knudsen-Langmuir rate equation which is, after all, the basic measure of the exchange occurring at all liquid-vapor interfaces.

Azeotropic and extractive distillation engages the attention briefly in Chapter 6, until Chapter 7 invites us to a happy orgy of still construction and auxiliary apparatus. Here the American reader will be able to compare commercial models available abroad with those favored domestically, and in so doing will discover the key to the types of illustrations so profusely reproduced (440 figures!). Some are from German periodicals and textbooks, many others from European catalogs. The excellent diagrams drawn for the book have English captions, often in spidery continental script; others are just plain good in any language. The last chapters, 8 and 9, cover instrumentation, layout of a laboratory, and suggestions for installation.

This book is expensively produced and expensive to buy. In terms of cost per fact, per unit of instruction, it may well be one of the best investments in the art.

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KENNETH HICKMAN

Grundriss der Makromolekularen Chemie. By B. VOLLMERT. Springer-Verlag, Abteilung VI, 1 Berlin 31 (Wilmersdorf), Heidelberger Platz 3, West Berlin, Germany. 1962. xii + 507 pp. 16 × 23.5 cm. Price, DM 48.

The most valuable feature of this book is the perfect balance between organic chemical and physico-chemical approach; the author treats with equal simplicity, clarity, and accuracy the basic contributions of organic chemistry and the fundamentals of kinetics, osmosis, viscosity, and crystal structure.

After a short and glancing introduction on history, definitions, and nomenclature, the text is focused on the synthesis and chemical reactions of macromolecular compounds (Chapter 2, pages 28–202) and presents in great detail our present knowledge on all the many ways in which large molecules can be built up. The treatment of each case is first descriptive and then proceeds to a satisfactory quantitative formula of each particular reaction. The chapter necessarily contains a great number of individual cases but maintains, nevertheless, a respectable degree of uniformity and gives an impressive picture of the almost endless possibilities to prepare polymeric systems.

Chapter 3 (pages 202–339) is devoted to a description of macromolecules in solution and discusses the various concepts, methods, and results which tend to characterize large molecules in their isolated state. All existing methods are presented in adequate detail from the experimental and theoretical point of view.

Chapter 4 (pages 380–483) deals with polymers in the condensed state, starts with the description of dilute solutions, proceeds to concentrated solutions and gels, continues with a description of the rubbery and glassy state, and finally gives a detailed account of our present knowledge of polymer crystallinity. Particularly attractive and instructive in these two chapters are many well chosen tables, curves, and schematic figures which greatly assist the clear understanding of such concepts as a random coil, an immobilized solvent, or a semi-crystalline polymer.

A very well organized list of references to the literature (pages 448–485), abbreviations of journals, and trade names of polymeric materials closes the text of this book which is a very readable and instructive presentation of an important branch of modern chemistry and can be warmly recommended to anybody who wants to introduce himself to polymer science or who is already working in this field.

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BROOKLYN, NEW YORK

H. MARK

Advances in Physical Organic Chemistry. Vol. I. Edited by V. GOLD, Department of Chemistry, King's College, University of London, England. Academic Press, Inc. (London), Ltd., Berkeley Square, London, W.1., England. 1963. 443 pp. 16 × 24 cm. Price, \$13.00.

This first volume of a new serial publication contains six articles. L. L. Schaleger and F. A. Long treat "Entropies of Activation and Mechanisms of Reaction in Solution" by outlining transition state theory, discussing thermodynamic quantities for selected equilibria, and demonstrating the correspondence

between ΔS^* and reaction mechanism for several hydrolytic reactions. L. M. Stock and H. C. Brown give "A Quantitative Treatment of Directive Effects in Aromatic Substitution." The selectivity relationship and its elaborations are presented in a consistent manner; numerous tables and graphs are included to supplement the text. A. I. Shatenshtein reviews "Hydrogen Isotope Exchange Reactions of Organic Compounds in Liquid Ammonia." The lability of various substrates toward isotope exchange in ammonia and other solvents is deduced from qualitative and quantitative studies.

G. Ferguson and J. M. Robertson discuss "Planar and Non-Planar Aromatic Systems." After theoretical analyses, physical, chemical, and spectroscopic data, and X-ray, electron, and neutron diffraction, results bearing on the geometry of aromatic molecules are compared in strength and limitations, the bulk of the article focuses on structural studies using diffraction techniques. "The Identification of Organic Free Radicals by Electron Spin Resonance" by M. C. R. Symons, first relates the basic principles and describes early studies of e.s.r. spectroscopy, then summarizes recent findings about organic radicals in solutions, solid matrices, and glasses. Tables of hyperfine coupling constants for various types of radicals, comment on practical considerations such as sample preparation and analyses of spectra, and exposition of the subject through specific examples aid the presentation. "The Structure of Electronically Excited Organic Molecules" by J. C. D. Brand and D. G. Williamson offers a summary of theory and results of investigations on electronic spectra. The influences on spectra of the symmetry properties, vibrational and rotational structures, and skeletal geometry of ground and excited molecular states are demonstrated.

While some misprints are to be found (*e.g.*, on pages 23, 146, 164, 373) they are seldom troublesome.

These six articles are so uneven in scope and sagacity that matching them all against the editor's professed goal of establishing a "recognized medium for the publication of authoritative reviews" on a variety of aspects of physical organic chemistry would be deceptive. Hopefully, future volumes will be more consistently written at the high standards of accuracy, clarity, and vitality shown by the best of the present contributions.

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BOOKS RECEIVED

November 1, 1963–December 1, 1963

- JERRY K. AIKAWA, M.D. "The Role of Magnesium in Biologic Processes." Charles C. Thomas, 301-327 East Lawrence Ave., Springfield, Ill. 1963. 117 pp. \$6.75.
- GORDON M. BARROW, MALCOLM E. KENNEY, JEAN D. LASSILA, ROBERT L. LITTLE, and WARREN E. THOMPSON. "Programmed Supplements for General Chemistry." Volume II. W. A. Benjamin, Inc., 2465 Broadway, New York 25, N. Y. 1963. 142 pp. \$3.95 (paper).
- DAN H. CAMPBELL, JUSTINE S. GARVEY, NATALIE E. CREMER, and DIETER H. SUSSDORF. "Methods in Immunology. A Laboratory Text for Instruction and Research." W. A. Benjamin, Inc., 2465 Broadway, New York 25, N. Y. 1963. 263 pp. \$8.75.
- MANSEL DAVIES, Editor. "Infra-Red Spectroscopy and Molecular Structure, and Outline of the Principles." American Elsevier Publishing Co., Inc., 52 Vanderbilt Ave., New York 17, N. Y. 1963. 468 pp. \$13.50.
- ROLF HAASE. "Thermodynamik der Irreversiblen Prozesse. Band 8. Fortschritte der Physikalischen Chemie." Dr. Dietrich Steinkopff Verlag, Saalbaustrasse 12, Darmstadt, Germany. 1963. 552 pp. DM 90 (broch), DM 95 (ln.).
- FRANK HERMAN and SHERWOOD SKILLMAN. "Atomic Structure Calculations." Prentice-Hall, Inc., Englewood Cliffs, N. J. 1963. 762 pp. \$13.00.
- A. R. KATRITZKY, Editor. A. J. BOUTLON and J. M. LAGOWSKI, Assistant Editors. "Advances in Heterocyclic Chemistry." Volume II. Academic Press, 111 Fifth Ave., New York 3, N. Y. 1963. 458 pp. \$14.00.
- GEORGE W. MACKEY. "The Mathematical Foundations of Quantum Mechanics. A Lecture-Note Volume." W. A. Benjamin, Inc., 2465 Broadway, New York 25, N. Y. 1963. 137 pp. \$7.00.
- GLENN T. SEABORG. "Foundations of Modern General Chemistry Series. Man-Made Transuranium Elements." Prentice-Hall, Inc., Englewood Cliffs, N. J. 1963. 120 pp. \$1.50 (paper), \$3.95 (cloth).
- RICHARD A. SILVERMAN, Editor. A. A. ABRIKOSOV, L. P. GORKOV, and I. E. DZVALOSHINSKI, Assistant Editors. "Methods of Quantum Field Theory in Statistical Physics." Prentice-Hall, Inc., Englewood Cliffs, N. J. 1963. 352 pp. \$16.00.