

## Book Reviews\*

**Polymer Materials: An Introduction for Technologists and Scientists. Second Edition.** By Christopher Hall (Schlumberger Cambridge Research). John Wiley & Sons: New York. 1989. x + 243 pp. \$39.95. ISBN 0470-21092-3.

This book surprisingly is very good. While most books of this ilk (technology introductions), in their effort to give cursory treatment to many topics, do not have sufficient depth in any topic to be useful, this one provides excellent coverage for chemists or other scientists or technologists not specifically schooled in testing and characterization of polymers.

Topics include molecular structure and chemistry, morphology, technology (compounding, processing, adhesives, fibers, etc.), and mechanical, thermal, electrical, optical, and chemical properties. Test methods are described (including ASTM references) with drawings of instruments and graphs of data, the latter accompanied by discussions of interpretation. There is sufficient mathematical treatment of each appropriate topic to provide a good basis for understanding, but not so much as to overwhelm. Bibliographies, at the end of each chapter, are extensive and are divided by subtopics from the chapter, a helpful touch. The book ends with thorough author and subject indices, a glossary, and an appendix of names and abbreviations.

This book has wide appeal, yet depth sufficient to be quite useful. It should be on the shelves of chemists, engineers, or technologists who are involved in any way with polymer technology or testing.

Patrick E. Cassidy, *Southwest Texas State University*

**Using a Chemical Library, an Introduction to the World of Chemical Literature.** By Pascual Segura (University of Barcelona). Patent Documentation Training Centre, University of Barcelona. 1988. 60 min. English, Spanish, and Catalan versions. 19000 Pesetas.

This videotape is designed to introduce students of chemistry to the vast world of chemical literature. Produced by the Patent Documentation Training Centre at the University of Barcelona, it is used in conjunction with a chemical literature course taught for their chemistry students.

The videotape discusses basic types of chemical literature (journals, handbooks, patents, indexing sources) and covers specific titles in greater depth: *Beilstein*, *Gmelin*, *Chemical Abstracts*, and publications of the Institute of Scientific Information.

To present an introduction to accessing chemical literature on videotape is an excellent idea. Currently there are no other programs of this kind in this format. There are slide/tape guides for specific chemical titles, e.g., *Chemical Abstracts* and *Beilstein*, but there is no general overview of the literature and how to access it.

A videotape of this kind presents several challenges. It must be up-to-date and accurate and should be attractive and appealing to relative newcomers to the discipline. The chemical literature discussed should be organized logically, and transition between types of literature should be smooth. *Using a Chemical Library* progresses slowly and somewhat awkwardly through the primary and secondary literature. The information presented is accurate and up-to-date, including mention of new software available to access *Beilstein*. The style, however, is somewhat plodding. *Using a Chemical Library* is a good first attempt, but presentation of the information needs some refinement in order to make it appealing to students beginning work in the chemical literature.

Christine Johnston, *The University of Texas at Austin*

**Carbocycle Construction in Terpene Synthesis.** By Tse-Lok Ho (The NutraSweet Co.) VCH: New York and Weinheim. 1988. 768 pp. \$125.00. ISBN 0-89573-279-3.

This book is well planned and represents a comprehensive, yet succinct, review of more than 750 naturally occurring terpene syntheses through mid-1988. The work is divided into Robinson Annulations; Aldol Condensations; Cyclizations of Michael-Aldol, Claisen and Dieckman Reactions; Intramolecular Alkylations; Cationic Cyclizations; Diels-Alder Reactions; Other Thermal Processes; Radical Cyclizations; Synthesis of Small-Ring Compounds; Ring Expansion and Contractions; and Transitory Annulations. Although the writing is terse, the reading is easy. Moreover, the text is richly illustrated with flowcharts which emphasize the key carbocyclization reactions and the general synthetic strategy employed. In addition, it is thoroughly documented (>1400 references

are provided) and well indexed. A general knowledge of most fundamental synthetic methods and their reaction mechanisms is assumed.

As a whole this book has much to offer and seems a worthwhile, albeit dear, acquisition for anyone involved in the field of terpene synthesis.

G. Majetich, *University of Georgia*

**Methods for the Oxidation of Organic Compounds: Alcohols, Alcohol Derivatives, Alkyl Halides, Nitroalkanes, Alkyl Azides, Carbonyl Compounds, Hydroxyarenes and Aminoarenes.** By Alan R. Haines (University of East Anglia). Academic: San Diego and New York. 1988. xx + 467 pp. \$139.00. ISBN 0-12-315502-9.

This is the sixth volume in a series *Best Synthetic Methods*, edited by Katritzky, Meth-Cohn, and Rees. The series is intended to emphasize the practical side of the subjects, and accordingly, the books include many examples of preparative procedures.

The organization of most books that deal with oxidation is according to reagent; in contrast, this book is organized according to transformation. Its aim is to help the chemist select the best method or reagent to convert an alcohol to an aldehyde, for example. The chapters begin with a short, comparative review of the methods available and take up each in more detail, with experimental descriptions. Literature citations are extensive and include important reviews as well as articles in primary journals, but if references to the patent literature appear, they are not obvious. *Houben-Weyl* is cited throughout, but curiously, the equally useful *Methodicum Chemicum* appears to have been overlooked.

The term "oxidation" is given a special interpretation in this book; it is applied only to the carbon atom at the site of reaction and includes transformations that do not involve an external oxidant. Thus, photolysis of azides to generate imines, and from them aldehydes or ketones by hydrolysis, is the only "oxidation" of alkyl azides that is discussed. Similarly, the Beckmann rearrangement and the Nef reaction are classified as oxidations. Since the emphasis is on the transformation of carbon, this may be regarded as an acceptable formalism.

The examples in the text are augmented by 122 pages of tables, in which conditions are included. The index is extensive.

**Supplements to the Second Edition of Rodd's Chemistry of Carbon Compounds. Volume III. Aromatic Compounds. Part H: Polycarbocyclic Compounds with More Than Thirteen Atoms in the Fused-Ring System.** Edited by M. F. Ansell (University of London). Elsevier: Amsterdam. 1988. xvi + 139 pp. \$76.25. ISBN 0-444-42989-1.

Supplementation of the second edition of this encyclopedic work continues with three chapters, starting with anthracene and phenanthrene and proceeding to compounds with four or more six-membered rings fused (e.g., benzopyrenes, benzanthrene, triptycene). No dates are stated for the termination of literature coverage, but the preface is dated March 1988. The chapters are reproduced from presumed camera-ready copy, but the structural formulas are not in uniform style, and some have an inappropriate, hand-lettered appearance. The material covered includes not only the hydrocarbons but all types of functional derivatives. The typeset subject index is good.

**Compendium of Organic Synthetic Methods. Volume VI.** By Michael B. Smith (University of Connecticut). John Wiley & Sons: New York and Chichester. 1988. xix + 534 pp. \$39.95. ISBN 0-471-84896-4.

Volume VI of this valuable series includes information published in 1983-1986. The new editor has maintained the former classification system, but has added a new chapter, Preparation of Oxides, in which are found preparations of oxygenated functional groups of nitrogen, sulfur, and selenium (e.g., amine oxides, nitro and nitroso compounds, sulfones, sulfoxides). Bifunctional compounds are grouped in the largest of the chapters (212 pages). As customary, most of the information is presented in the form of equations, showing reagents and yields, accompanied by references but no discussion. The arrangement is easy to follow, and the book is self-indexing; a full author index is included.

**Activation and Functionalization of Alkanes.** Edited by Craig L. Hill (Emory University). John Wiley & Sons: New York and Chichester. 1989. xi + 372 pp. \$49.95. ISBN 0-471-60016-4.

Twelve contributed chapters (one by the editor) make up this volume, reproduced from print-quality laser-writer copy. The editor states two goals for it: "to provide discussions of most of the principal approaches to transforming alkanes" and "to bring together ... most of the principal

\*Unsigned book reviews are by the Book Review Editor.

methods for activating or functionalizing alkanes that are currently of interest to preparative chemists ...". The book begins with a review of the history of homogeneous activation of alkanes (A. E. Shilov) and continues with contributions by Olah, Farooq, and Prakash; Crabtree; Jones; Rothwell; Mansuy and Battioni; Suslick; Hill; Barton and Ozbalik; and Tolman, Druliner, Nappa, and Herron. Electrophilic chemistry, shape-selective oxidation, oxo-transfer catalysts, the "Gif" and "Gif-Orsay" systems, and oxidation studies in Du Pont's Central Research Department are included. Phosphine catalysts, photosensitization, noble-metal complexes, activation by lanthanide and actinide metal systems, and cytochromes are described. An index of uncommon thoroughness enhances the value of the book.

**Ethylene (Ethene). International Thermodynamic Tables of the Fluid State - 10.** Edited by K. M. de Reuck (Imperial College) et al. Blackwell Scientific: Oxford and Boston. 1988. xxviii + 299 pp. \$65.00. ISBN 0-632-01709-0.

This volume was produced as part of the Thermodynamic Tables Project of the Division of Physical Chemistry of IUPAC. It replaces the version of 1972, in order to include important new measurements. A shorter discursive section consists of chapters on experimental results, equations of state, auxiliary equations, and the construction of the tables. The latter two-thirds of the book consists of the tables themselves, of which there are nine. In them are to be found numerical data on ideal gas properties, zero-pressure properties, properties on the saturation curve, single-phase properties, properties on the melting curve, properties in the critical region, and properties of triple points.

**Organic Reaction Mechanisms. 1986.** Edited by A. C. Knipe and W. E. Watts (University of Ulster). John Wiley & Sons: Chichester and New York. 1988. ix + 604 pp. \$231.00. ISBN 0-471-91729-X.

As the march of progress in knowledge of the mechanisms of organic reactions continues, so does this series, with a few changes in contributors, but the same organization and concise thoroughness. Each of the 15 chapters is devoted to a subject defined by a class of compounds (e.g., aldehydes and ketones), a class of reaction (e.g., elimination reactions), or a structural type of intermediate (e.g., carbocations). Lots of well-drawn structures help one to follow the densely presented information. The author and subject indexes are of substantial size.

**Organic Syntheses. Volume 66.** Edited by Clayton H. Heathcock. John Wiley & Sons: New York and Chichester. 1988. xix + 265 pp. \$29.95. ISBN 0-471-61972-8.

The latest volume of *Organic Syntheses* contains 28 preparative procedures in the usual carefully described manner, and they are, as always, independently checked for reproducibility. The rise in importance of silicon and various metals in reagents or catalysts in organic synthesis is quite evident; procedures involving iron, tin, zinc, palladium, and copper are included, as well as hypervalent iodine. Whereas earlier volumes of this series gave little information on the scope and applications of a reaction used in a particular synthesis, discussion of these aspects has become an important and valuable feature of the preparative presentations.

Most compounds are named rationally, a fact of importance when the preparations are listed in alphabetic order, but the odd nomenclatural gaffe can be found, such as the use of "arylidene" (a structural impossibility) when benzylidene (or, more generally, arylmethylene) is meant. In other cases, curiously lengthened names are used, apparently out of an attempt to deal with CAS index names, such as "cyclopropanecarboxylic acid chloride" instead of "cyclopropanecarbonyl chloride" (the latter name is not even in the index).

A list of submitted procedures that have not yet been checked is also included.

**Statistical Mechanics of Chain Molecules.** By Paul J. Flory. Oxford University: New York and Oxford. 1989. xxv + 432 pp. \$49.95. ISBN 0-19-520756-4.

The original edition (1969) of this landmark book has been reprinted, with corrections made by the late author. His autobiographical sketch composed for Les Prix Nobel in 1974 has been added. Eight appendixes, an extensive glossary of symbols, and author and subject indexes help to maintain the usefulness of the work.

**Modern Synthetic Methods. Volume 5. 1989.** Edited by R. Scheffold (Universität Bern). Springer-Verlag: New York and Berlin. 1989. 304 pp. \$39.50. ISBN 0-387-51060-5.

The fifth of the triennial Interlaken Seminars on Modern Synthetic Methods, held in 1989, had four sets of lectures: Biotransformations in Organic Synthesis (David H. G. Crout and M. Christen); Enantioselective Catalysis with Chiral Co and Cu Complexes (Andreas Pfaltz); Enantioselective Catalysis with Metal Complexes (R. Noyori and M. Kitamura); and Clays, Zeolites and Other Microporous Solids (John M. Thomas and Charis R. Theocharis). The full texts and illustrations, with

extensive bibliographies, are presented in this soft-bound volume, the main purpose of which is stated to be "to serve as an updated guide for chemists interested in catalysis applied to organic synthesis". Although there is no index, the thorough reviews have extensive tables of contents. Some experimental procedures are included.

**Ion and Cluster Ion Spectroscopy and Structure.** Edited by J. P. Maier (Universität Basel). Elsevier: Amsterdam and New York. 1989. xiii + 483 pp. \$161.00. ISBN 0-444-87283-3.

*Ion and Cluster Ion Spectroscopy and Structure* is an excellent collection of essays on some of the most exciting topics in the field of the physical chemistry of ions. Dr. Maier has persuaded an outstanding group of authors to contribute articles, and it would be difficult to imagine any better choices. It seems that the editor must have instructed the authors to make their subjects accessible to the nonspecialist because, as an organic chemist with an interest in ion chemistry, I was able to get a lot from each of the chapters. On the other hand, there is quite a bit of detail also present so that specialists will surely find much of interest. The book has been produced rapidly, with 1988 references in nearly every chapter.

The volume opens with a clear review by Vager, Naaman, and Kanter on the Coulomb explosion technique for the determination of the structure of ions, followed by a chapter by R. C. Woods on the microwave spectroscopy of molecular ions. As with the other chapters which describe experimental results, these begin with short but vivid accounts of the experimental method used and then describe recent experimental results. The articles are not complete reviews of the field but mostly are updates from the latest previous review.

Two chapters follow which describe the application of theory to the field of ion structure. Botschwina's chapter deals mainly with calculations performed in his laboratory over the last 8 years on the infrared spectra of ions. This chapter is more technical than most and contains a large number of results. The following chapter by H. F. Schaefer is an amusing and informative one describing the highly interactive collaboration between the Schaefer and Saykally groups during the latter's work (described in the next chapter) on the infrared laser spectroscopy of molecular ions. These are followed by a chapter by Neumark on high-resolution photodetachment studies of molecular negative ions and one by Maier on the electronic spectroscopy of open-shell cations.

The remaining chapters deal, in one way or another, with "cluster" ions. Unfortunately in the field of gas-phase ion chemistry the term "cluster" is being used to describe two rather different types of ions. In the first of these it refers to an ion "clustered" to a neutral by what are essentially solvation forces—i.e., an ion-dipole complex. On the other hand polyatomic ions like  $C_{60}^+$ , in which the bonding is undoubtedly covalent, are also called "clusters". Of course there are intermediate cases in which the bonding is unknown or a mixture of covalent and noncovalent. Kennedy, Kung, and Miller describe laser-induced fluorescence and mass spectrometric detection and characterization of ionic clusters of, for example,  $(NO)_x^+$ , and Bowers summarizes his work on the photodissociation dynamics of, e.g.,  $(SO_2)_3^+$ . In a relatively long chapter Keese and Castleman discuss the structure of solvated cluster ions, by which they mean ions like  $CO_2 \cdot (H_2O)_x$  and protonated ammonia and methanol clusters. Heinrich and Schwarz generate ion-dipole complexes from another direction, namely by the decomposition of metastable organic radical cations, and show how the application of ab initio MO calculations provides useful information on the nature of such complexes. Cheshnovsky, Pettiette, and Smalley discuss the ultraviolet photoelectron spectroscopy of metal and semiconductor clusters, e.g.,  $Cu_x^-$ ,  $C_x^-$ , and  $Si_x^-$ . In the final chapter Arnold, Eaton, Patel-Misra, Sarkas, and Bowen give a lucid account of their work on the photoelectron spectroscopy of cluster anions of various types, for example  $H^-(NH_3)_n$ ,  $NH_2^-(NH_3)_n$ , and  $NO^-(N_2O)_x$ . The volume ends with a short index which consists mainly of empirical formulas of ionic species. However, it was easy to find species in the chapters on pages not listed in the index, so one should not depend upon the index for an adequate coverage of the contents.

Ordinarily I would conclude this review with the comment that this book belongs in every library and perhaps on the shelf of many chemists. However, in view of its price one cannot make such a general statement. The book consists of 483 pages of mostly double-spaced word-processed manuscripts directly reproduced. I would estimate that if the book were set in type it would consist of no more than 250 pages, especially if most of the figures were reduced in size. So whether it would be worth purchasing even for a library will depend upon an evaluation of the need in the individual situation. For example, if one is mainly interested in a general appreciation of the different experimental methods and what can be done with them, similar reviews, often by the same author or authors, will already be available in the library in *Science*, *Accounts of Chemical Research*, and other journals. However if one wants this whole area surveyed in a single volume, this one can be highly recommended.

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