

## Book Reviews

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## BOOK REVIEWS

*New Aspects of Organic Chemistry I.* Z. YOSHIDA, T. SHIBA, and Y. OHSHIRO. VCH Publishers, Suite 909, 220 East 23rd Street, New York, NY 10010-4606. 1989. xii + 565 pp. 18 × 26 cm. \$125.00. ISBN 0-89573-952-6.

This volume is a collection of the twenty-five invited and plenary lectures presented by an international group of academic and industrial organic chemists at the Fourth International Kyoto Conference on New Aspects of Organic Chemistry in November, 1988. The papers address various aspects of organic synthesis and are organized into three main categories, Efficiency in Organic Synthesis, Organic Synthesis for Materials Science, and Organic Synthesis for Life Science. The papers are all written in English, and most contain useful literature references to the material discussed.

The first section, on Efficiency in Organic Synthesis, contains eight papers devoted primarily to synthetic methods. These include reviews of the use of samarium iodide, photolytic reactions of chromium carbene complexes, and asymmetric synthesis with transition metals, among other topics. In general, this section is not a repetition of the traditional synthetic methodology topics. The second section, on Organic Synthesis for Material Science, contains eight papers focused primarily on conducting or semi-conducting materials. The main paper discusses systematic trends and design of organic conductors, bringing together a good overview of this important area. The inclusion of this area in a symposium devoted to synthesis emphasizes the close relationship of materials science to traditional organic chemistry and is unusual in a collection of otherwise more traditional papers. The third section, on Organic Synthesis for Life Science, includes nine papers covering topics from the use of sugars as enantiomerically pure building blocks in synthesis to the design of chemotherapeutic drugs to the use of enzymes in synthesis.

As might be expected from a conference of this nature, the papers all follow the general theme of new aspects of organic chemistry but do not compose an in-depth study of any particular area. The papers and references therein reflect, for the most part, the work of the principal authors. The book was published promptly following the conference, and this made the papers quite current at that time. While these reviews and papers will be of interest to other researchers and students in the individual areas who have not had the chance to hear these presentations, much of the work has been or will be reported in the chemical literature. This latter fact and the high price of the book will undoubtedly restrict it to a library purchase.

ALBERT T. SNEDEN, *Virginia Commonwealth University*

*A Dictionary of Concepts in NMR.* S.W. HOMANS. Oxford University Press, 200 Madison Avenue, New York, NY 10157. 1989. vi + 343 pp. 15.5 × 23 cm. \$80.00. ISBN 0-19-855274-2.

This book addresses a problem which one encounters when studying unfamiliar nmr methods. Authors may use terms which the reader does not quite understand. For instance, exactly what do they mean by "coherence transfer?" Thumbing through standard treatises with this question can be quite frustrating, for they are addressed to readers who know perfectly well what coherence transfer is. In this book the subject is treated in a paragraph, followed by six pages on related subjects.

The book would be better described as an encyclopedia than a dictionary, for subjects are treated at some length, often a dozen pages. Appropriately, there is neither index nor table of contents, but the articles are generously provided with cross references. Since the topic is concepts, there are no chemical data, even the characteristic frequencies of various nuclei. To connect chemical shifts and couplings to structures, one must refer to the indispensable Jackman and Sternhell, or to such  $^{13}\text{C}$  works as that of Kalinowsky, Berger, and Braun.

Within this limitation, the scope of the work is broad, from preamplifiers to magnetic imaging. Of course, in a book of modest size, some topics one might expect to be treated are missing, such as the popular BIRD sequence, three-dimensional methods, or the dependence of signal on field. The format does make it a little difficult to be sure you haven't missed the relevant article. In any event, producing a work on nmr which is both current and comprehensive is as impossible as keeping an atlas of Africa up to date.

Books on nmr tend to be either mathematical or qualitative. This one is very much of the mathematical persuasion. Most subjects receive mathematical treatments, from simple ("Phase") to arcane ("Average Hamiltonian Theory"). Happily, the results are often described qualitatively when the math is done. This treatment contrasts markedly with that of Freeman's *Handbook of Nuclear Magnetic Resonance*, a work in a similar format. Freeman treats similar subjects more by qualitative descriptions and geometrical expositions. The two works are therefore nicely complementary.

Here, then, one finds concise and instructive articles on a wide variety of nmr topics. The treatment is lucid and authoritative. There are few typographical errors and the price is moderate by current standards. The book will certainly find its way to the bookshelves of many laboratories.

R. J. HIGHT, *National Institutes of Health*

*The Chemistry of Heterocyclic Compounds, Volume 49. Isoxazoles, Part 1.* P. GRUNANGER and P. VITA-FINZI. John Wiley and Sons, 605 Third Avenue, New York, NY 10158. 1991. xxi + 877 pp. 15.5 × 23.5 cm. \$225.00. ISBN 0471-02233-0.

This is a great book! It is packed with information and written by authors expert in the field who have tackled the monumental task of assembling all available information on monocyclic oxazoles in a most careful manner, indeed with loving dedication. The result is a great memorial to Professor Quilico. The information is assembled in a very logical order and with the minimum of verbiage. The book abounds with tables and every page is packed with facts. The information is critically discussed by the authors, and very few typographical or other types of errors could be detected. It has obviously been very well proofread.

In addition to the isoxazoles themselves, the dihydro and tetrahydro derivatives (i.e., the isoxazolines and isoxazolidines) are covered in detail. Thus, it does indeed cover all the monocyclic isoxazole derivatives. This book will be of inestimable benefit to anybody working in the field of isoxazole chemistry or using its many advantages in general synthesis.

The reviewer does have one large caveat to make, however. Unfortunately, the book is already six years out of date! The last year for which there is an appreciable number of references given is 1984; a few 1985 references are included. This is a great pity and a disservice to readers and authors alike. It is not understandable that a book like this should take six years to produce and no hint of any reason for this is given to readers in the introduction or preface.

Despite this, the book will be of very great use for very many years and should be in every library.

ALAN R. KATRITZKY, *University of Florida*

*Reagents for Organic Synthesis, Volume 15.* MARY FIESER. Wiley-Interscience, John Wiley and Sons, 605 Third Avenue, New York, NY 10158. 1990. 415 pp. 15 × 22.5 cm. \$49.95. ISBN 0471-52113-2.

Reviewing Fieser and Fieser's *Reagents for Organic Synthesis* is almost an unnecessary task, since the series has established itself as an essential part of the library of all synthetic organic chemists. The current volume is no exception, and it contains the usual selection of short articles on synthetic uses of chemical reagents, covering work published for the most part during 1988 and the early months of 1989. Most of the reagents are described in about half a page, but in some cases (ceric ammonium nitrate, cyanotrimethylsilane, organocopper reagents, etc.) the discussion involves two or more pages. The volume was compiled by Dr. Mary Fieser with the assistance of some 22 "advisors," and the editorial team is to be congratulated on their continuing work on this invaluable series. The only recommendation that this reviewer would make is the publication of a second edition that would combine the entries from the fifteen extant volumes into one comprehensive reference work.

This volume is highly recommended to all researchers with an interest in organic synthesis.

DAVID G.I. KINGSTON, *Virginia Polytechnic Institute and State University*

*Topics in Stereochemistry, Volume XX.* Edited by ERNEST L. ELIEL and SAMUEL H. WILEN. Wiley-Interscience, John Wiley and Sons, 605 Third Avenue, New York, NY 10158. 1991. ix + 344 pp. 16 × 23 cm. \$110.00. ISBN 0471-50801-2.

This is Volume XX in the series *Topics in Stereochemistry*, edited by Ernest Eliel and Samuel Wilen. The editors point out it is impossible for any one individual to be aware of all of the current developments with regard to stereochemistry; consequently this series is designed to provide an in-depth discussion of topics of recent stereochemical interest. This volume continues in the tradition of the previous members of the series. It is intended for the advanced student, teacher, and active researcher.

Contained in Volume XX are four chapters which deal with four very different topics with regard to stereochemistry. In chapter 1, Ripka and Blaney (E.I. duPont de Nemours & Co.) describe the current methods and trends in molecular modeling. This section, which is titled "Molecular Modeling in the Analysis of Synthetic Targets," details the major software packages employed in computer graphics as well as modeling techniques with respect to the fit of small molecules into the binding regions of biopolymers. This includes protein-ligand interactions as well as DNA-ligand binding interactions, and it is very well written. This section is important for it not only describes the language and methods employed in molecular modeling but also details many of the pitfalls. Emphasis is placed on the use of the actual structure of proteins and the design of ligands to fit an active site of known topology. The design of active site-directed agents via modeling techniques when the geometry of the binding site is unknown does not receive enough attention. The discussion of 3D QSAR (CoMFA) methods to predict binding  $IC_{50}$  values also does not receive enough attention in this reviewer's opinion. Ripka and Blaney, however, present an excellent overview of methods employed in molecular modeling and computer graphics. This section is highly recommended for anyone who plans to begin research of this nature in drug design.

The second chapter, authored by David Oare and Clayton Heathcock, deals with the stereochemical outcome of Lewis-acid-catalyzed reactions of enol ethers with  $\alpha,\beta$ -unsaturated carbonyl compounds. The stereochemical consequences of these reactions, as well as those of enamines with Michael acceptors, are fully detailed. This chapter contains an excellent review of these Michael reactions, as well as an analysis of the origin of the stereocontrol. The authors describe a full range of reactions beginning with enamines of simple ketones and finishing with the total synthesis of indole alkaloids of complex structure. This section is designed for advanced students of organic chemistry, as well as those who are pursuing the total synthesis of natural products.

In chapter three, Zefirov and Palyulin detail the conformational behavior of bicyclo[3.3.1]nonanes and their heteroanalogues. To describe the preferred conformation of these [3.3.1]nonane systems, the authors employ modern methods of computational chemistry, X-ray crystallography, and spectroscopy, as well as an in-depth description of the chemistry. Although the stereochemistry of the azabicyclo[3.3.1]nonanes is of importance in indole alkaloid chemistry (for example, macroline alkaloids from *Alstonia* species), this section is also important for it reviews the structure and chemistry of [3.3.1]nonanes that contain oxygen, sulfur, nitrogen, or phosphorous in their molecular structure. The preferred conformations of 3-oxa, 7-aza, diaza, and 1,3,7-triazabicyclo[3.3.1]nonanes are described, to mention only a few of the many examples. The authors conclude that despite occasional unusual conformational behavior, the preferred conformation of the bicyclo[3.3.1]nonanes can be predicted from the analysis of intramolecular interactions and a comparison with the conformational behavior of molecules described in this chapter. In many cases, molecular mechanics methods have been employed to predict the conformation, and this is well documented. This section will be important for anyone working on the chemistry or spectroscopy of bicyclo or heterobicyclo[3.3.1]nonanes.

The final chapter in this volume deals with the chemistry of strained (bent and nonplanar) alkenes. It is authored by Reinhart Keese and Wolfgang Luef, who describe strained (bent) olefins from a number of perspectives. They first provide a spectroscopic view of simple olefins detailing the results of X-ray crystallography, electron diffraction, and microwave spectroscopy. They go on to compare the stability of these simple alkenes with that of strained olefins from a force field approach and then from a quantum-chemical based analysis of structure. The discussion follows a logical pattern and is quite effective. Keese and Luef then describe the synthesis of molecules that contain strained olefinic systems. In this section the discussion goes from simple trans cycloalkenes to the strained bridgehead systems of Wiseman and later Shea. Discussion of the stability of [a,b]betweenanes is also of interest, as well as the short section on transition metal-stabilized strained olefins.

The spectroscopic properties of strained olefins are compared to the simple systems by nmr, ir, uv, and Raman spectroscopy. Photoelectron spectroscopy and sudden polarization are also employed to characterize these olefins. This section is especially important for investigators who have just begun work in the area. Finally, an analysis of strain energy and olefin strain in regard to the stability of these systems is presented. This chapter represents an excellent overview of research in this area.

In addition to the standard subject index, Volume XX also contains a cumulative author and title index for Volumes I-XX. As indicated by the editors, these cumulative indices should be useful in locating reviews by leading researchers in the field who have contributed to this series. The prices of all monographs are too high, in this reviewer's opinion, and the cost (\$110.00) of this volume is no exception. Despite this, Volume XX serves as an excellent addition to the series. It is timely and is recommended reading for all those who practice the art of organic chemistry.