

**The Chemistry of Cyclobutanes, Parts 1–2.** Edited by Zvi Rappoport (The Hebrew University, Jerusalem) and Joel F. Liebman (University of Maryland, Baltimore County), from the Patai Series: The Chemistry of Functional Groups. Edited by Zvi Rappoport. John Wiley & Sons Ltd.: Chichester, 2005. xix + 616 pp, xix + 610 pp. \$855.00. ISBN 0-470-86400-1.

Cyclobutanes may be considered the “Cinderellas” of carbocyclic compounds. Found in a variety of forms, including cyclobutadienes, cubanes, prismanes, and photodimers of pyrimidine bases comprising DNA, cyclobutanes are less strained than analogous cyclopropanes, their smaller homologues, less exotic in their chemistry, and harder to make, if one starts from open chains, due to entropy as well as strain. However, these two thick volumes take cyclobutanes to the “Royal Ball” and highlight their diverse and glorious chemistries. The books contain 23 chapters, 1226 pages (including 116 pages of author and subject indexes), and over 3600 references through 2003. They follow the rational organization of the Patai series: theory, structure, chemical properties (e.g., acidity, basicity), spectroscopic properties, synthetic approaches, chemical reactions, special topics, and applications. Bicyclobutanes are, quite appropriately, not treated as cyclobutanes in these books.

In the opening chapter, Wiberg covers a range of topics on physical and theoretical studies from a very balanced experimental and theoretical perspective. He reminds readers that the near-equivalence of strain energies of cyclopropane and cyclobutane is misleading: the higher C–H bond energies in cyclopropane compensate for the weaker (more strained) C–C bonds. Eckert-Maksic and Maksic describe antiaromatic and aromatic properties in cyclobutadiene and an array of related molecules in Chapter 2. They discuss the fascinating benzo[1,2:4,5]dicyclobutadiene system, predicted to exist as two bond-stretch isomers. In the next chapter, the stereochemistry of the flexible cyclobutane system is described by Berg. The cocrystal of *trans*-cyclobutanecarboxylic acid with its disodium salt consists of puckered diacid rings and planar dicarboxylate rings. In Chapter 4, Liebman and Slayden present an encyclopedic discussion of thermochemistry and provide refined estimates for enthalpies of formation of gas-phase species where heats of vaporization or sublimation are not available. They note cases in which new experimental determinations are needed.

Quintanilla et al. discuss solution- and gas-phase acidities in Chapter 5, with cubylium cation, cubyl anion, and cubylamine all exhibiting novel properties. This is followed by a chapter by Seidl and Dias who summarize the dynamic and novel properties of a plethora of cyclobutane derivatives through NMR spectroscopy. In Chapter 7, Kuck describes mass spectrometric studies on cyclobutanes, cyclobutanones, pyrimidine dimers, and species as diverse as “[13]ladderanes”, which require the application of FAB techniques. The next chapter, by Lee-Ruff, is a wonderfully comprehensive and useful treatise on the synthesis of cyclobutanes, which is followed by Fu et al.’s similarly comprehensive chapter on the uses of cyclobutanes

in synthesis. Charton provides an accessible discussion, aided by numerous tables and a glossary, of cyclobutane as a substituent and transmitter of substituent effects in Chapter 10, and Tanko describes rearrangements of cyclobutanes and cyclobutyl-containing reactive intermediates in Chapter 11. In the next two chapters, Siehl describes cyclobutyl and related carbocations, and Bauld discusses cation radicals in syntheses and reactions, respectively. Johnson really “pushes the envelope” in Chapter 14 by describing real, possible, and seemingly impossible  $C_4H_4$ ,  $C_4H_2$ , and even  $C_4$ .

Cyclobutarenes are discussed by Stanger in the next chapter from the standpoint of antiaromaticity, aromaticity, bond localization, and access to diradicals and other intermediates. This is followed by Butenschön’s discussion of organometallic derivatives of cyclobutanes, especially those of cyclobutadienes and related molecules. It was, of course, the stable cyclobutadiene iron tricarbonyl, synthesized by Pettit four decades ago, that made  $C_4H_4$  a “reagent.” The photochemical approaches to cyclobutanes and their photochemistries, which are described by Horspool in Chapter 17, are among the most interesting of stories, as the trapping of photochemical energy in polycyclics and release by transition metals continue to fascinate scientists. Photodimerization is one route to cyclobutanes, and it has been “engineered” in crystal systems, which is discussed in the next chapter by Natarajan and Ramamurthy. This is followed by Bashir-Hashemi and Higuchi’s chapter “Chemistry of Cubane and Other Prismanes”, wherein the “star” is octanitrocubane, whose density and oxygen balance make it an almost perfect explosive, so long as cost is of no concern. Carpenter describes the properties and reactions of bicyclo[2.1.0]pentanes and bicyclo[2.2.0]hexanes in Chapter 20, and Lemal and Chen mine the fascinating and anomalous world of strained fluorinated compounds in the next chapter. In the final two chapters, Friedel et al. discuss UV-induced DNA lesions involving cyclobutane pyrimidine dimers, and Hopf et al. lead the reader along a fascinating “stroll” through a Wonderland of exotic cubanes, fenestranes, ladderanes, prismanes, staffanes, and other alluring molecules.

Although this two-volume work is exceedingly “pricey”, it is absolutely the definitive work on cyclobutanes: it is accessible, has contributions from many “world-class” chemists, and is amply referenced through 2003. It is a must for any serious institutional library.

Arthur Greenberg, *University of New Hampshire*

JA0597855

10.1021/ja0597855

**LC/MS: A Practical User’s Guide.** By Marvin C. McMaster (University of Missouri-St. Louis). John Wiley & Sons, Inc.: Hoboken, NJ. 2005. xii + 166 pp. \$69.95. ISBN 0-471-65531-7.

This aim of the author in writing this book was to “put together a useful tool for introducing the technique and providing

practical information on how to use it." The basic components and operation of LC/MS systems are explained, and methods for using LC/MS techniques efficiently are given. The author describes the latest equipment, such as quadrupole, time-of-flight, and ion trap analyzers, and current processes, like quantifying mass spectral data, and covers current and future applications of LC/MS as well. There are five useful appendices: (A) LC/MS Frequently Asked Questions; (B) Solvents and Volatile Buffers for LC/MS; (C) Guide to Structure Interpretation; (D) Glossary of LC/MS Terms; and (E) LC/MS Selective Reading List. A CD-ROM containing PowerPoint slides about LC/MS also accompanies the book.

JA059829+

10.1021/ja059829+

**Theilheimer's Synthetic Methods of Organic Chemistry, Volume 67, 2005.** Edited by Alan F. Finch (Cambridge). S. Karger AG and the Thomson Corporation: Basel, Switzerland. 2005. xxviii + 398 pp. \$632.00. ISBN 3-8055-7988-8.

This volume, the first of *Theilheimer's* for 2005, contains abstracts of new synthetic methods and supplementary data from papers published in the literature up to August 2004. As with previous volumes, it also features the sections "Trends and Developments in Synthetic Organic Chemistry 2005" and "Reviews", which cover new developments in organic synthetic chemistry through April 2005. A detailed subject index and a list of supplementary references complete the book.

JA0598210

10.1021/ja0598210

**Metallopolymer Nanocomposites.** By Anatoli D. Pomogailo (Russian Academy of Sciences, Moscow Region) and Vladimir N. Kestelman (KVN International, King of Prussia, PA). Springer: Berlin, Heidelberg, New York. 2005. xx + 564 pp. \$199.00. ISBN 0-540-20949-2.

The polymer or inorganic chemist who picks up this book expecting to find a comprehensive review of what most of us consider metallopolymers, i.e., polymers with metals in the backbone or as chemically bound sidegroups, will be disappointed. Indeed, a more accurate title for this book might be metal-polymer nanomaterials, because it covers much more than metallopolymers, making the book a useful single-source for a great deal of information on a broad portion of nanomaterials.

The first half of this monograph is a good overview of metal nanoparticles in polymer matrices. Part I provides basic definitions, structure, and mechanisms of formation and stabilization of composites of polymer-metal nanoparticles, and Part II, the largest section of the book, provides nice coverage of the preparation of these nanocomposites. In Part III, the subject broadens considerably, with a chapter on metal oxide nanomaterials using sol-gel processes that involve some true metallopolymers and polymer intercalation and with another on metal-containing nanocomposites in biological systems. The

focus of the final section of the book is on applications, as described in a chapter on mechanical properties of polymers containing nanoparticles, another on the higher technological electronic and optical applications, and one on catalysis.

Because there are only two rather than a bevy of authors of the book, redundancy is avoided, there is a logical flow to the discussion, and the inclusion of occasional references to a previous section or chapter integrates various topics. Locating information is reasonably straightforward because the book contains a 9-page index and a detailed table of contents with subtopics clearly listed. A long, although not comprehensive, list of abbreviations is also conveniently located at the beginning of the book. This book would be useful for a graduate level course on metal-polymer nanosystems because it contains good introductory information, coverage of synthesis and applications, and a very large number of references, with many of the chapters citing a reasonable number of sources published since 2000. It would not, however, serve as a good example of writing for the students, because the wording is often quite awkward, which occasionally interrupts the flow and inhibits effective comprehension of some sections.

**Patty Wisian-Neilson, Southern Methodist University**

JA0598107

10.1021/ja0598107

**Annual Review of Materials Research, Volume 35, 2005.** Edited by Co-Editors David R. Clarke (University of California, Santa Barbara) and Manfred Rühle (Max-Planck Institute, Stuttgart) and Associate Editor John C. Bravman (Stanford University). Guest Editors include Sir John M. Thomas (The Royal Institute of Great Britain) and Pratibha L. Gai (DuPont and the University of Delaware). Annual Reviews: Palo Alto, CA. 2005. xii + 662 pp. \$208 (print only), \$208 (online only), and \$250 (print and online). ISBN 0-8243-1735-1.

This issue of *Annual Review of Materials Research* contains 18 chapters, which are organized under two sections: (1) Materials Design and Chemistry of Environmentally Acceptable Catalysts and (2) Current Interest. Topics in the latter section range from new techniques for alloy design to new insights about quasicrystals to composites for windpower turbines. A subject index, a cumulative index of contributing authors (Vols. 31-35), and a cumulative index of chapter titles (Vols. 31-35) complete the book.

JA059828H

10.1021/ja059828h

**Perspectives in Flavor and Fragrance Research.** Edited by Philip Kraft (Givaudan Schweiz, AG, Dübendorf, Switzerland) and Karl A. D. Swift (Maybridge Ltd., Cornwall, UK). VHCA: Zürich and Wiley-VCH GmbH & Co. KGaA: Weinheim. 2005. viii + 242 pp. \$170.00. ISBN 3-906390-36-5.

This book presents 18 of the 24 papers given at the Flavor and Fragrance conference held in Manchester, UK in May 2004. The range of topics covered is broad and includes chapters on

natural-product chemistry, the biochemistry of olfaction, foods, and flavors, and the chemistry of fragrances. A subject index completes the book.

JA059807N

10.1021/ja059807n

**Annual Review of Biophysics and Biomolecular Structure, Volume 34, 2005.** Edited by Douglas C. Rees (California Institute of Technology), Michael P. Sheetz (Columbia University), and James R. Williamson (The Scripps Research Institute). Annual Reviews: Palo Alto, CA. 2005. xii + 490 pp. \$86.00 for individuals print and online. ISBN 0-8243-1834-X.

This issue of Annual Reviews comprises 18 chapters on various topics in the area of biophysics and biomolecular structure. A sampling of some of the chapter titles includes "Communication between Noncontacting Macromolecules", "Ligand-Target Interactions: What Can We Learn from NMR?", and "Single-Molecule RNA Science". This issue also includes a list of related articles that appeared in *Annual Review of Biochemistry, Volume 74*, a subject index, a cumulative index

of contributing authors (Vols. 30–34), and a cumulative index of chapter titles (Vols. 30–34).

JA059808F

10.1021/ja059808f

**Handbook of Condensation Thermoplastic Elastomers.** Edited by Stoyko Fakirov (University of Sofia, Bulgaria). Wiley-VCH Verlag GmbH & Co. KGaA: Weinheim. 2005. xxiv + 620 pp. \$330.00. ISBN 3-527-30976-4.

This book covers the "chemical aspects, physical structure and properties, application opportunities, life cycle assessment, recycling possibilities, and the future trends of the three classes of thermoplastic elastomers", to quote from the preface. There are 19 chapters, which are organized into the following sections: Introduction; Polyester-Based Thermoplastic Elastomers; Polyamide-Based Thermoplastic Elastomers; Polyurethane-Based Thermoplastic Elastomers; and Blends, Composites, Applications, and Recycling of Thermoplastic Elastomers. An author and a subject index complete the book.

JA059813J

10.1021/ja059813j