Book Review

Radioanalytical Methods in Interdisciplinary Research: Fundamentals in Cutting-Edge Applications Edited by Carola A. Laue (Lawrence Livermore National Lab) and Kenneth L. Nash (Argonne National Laboratory). American Chemical Society (distributed by Oxford University Press): Washington, DC. 2004. xii + 364 pp. $165.00. ISBN 0-8412-3837-5.

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BOOK REVIEWS

Challenges in Taste Chemistry and Biology. Edited by Thomas Hofmann (Universität Münster), Chi-Tang Ho (Rutgers, The State University of New Jersey), and Wilhelm Pickenhagen (Dragoco Gerberding and Company). American Chemical Society (distributed by Oxford University Press): Washington, DC. 2004. xiv + 290 pp. $135.00. ISBN 0-8412-3852-9.

This book was developed from the symposium "Taste Research: Chemical and Physiological Aspects" held in Boston, MA in August 2002. The symposium attracted scientists from academia and industry to discuss the "biochemistry, genetics, and physiology of human taste transduction-perception", to quote from the Preface. The 18 chapters are organized under the following headings: Molecular Physiology and Taste Coding; Analytical Characterization and Structure−Activity Relationships; Taste-Active Peptides and Amino Acid Derivatives; and Flavor Interactions. An author and a subject index complete the book.

JA033680P

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Electron Spin Resonance Spectroscopy of Organic Radicals. By Fabian Gerson (University of Basel) and Walter Huber (Hoffmann-La Roche & Cie AG, Basel). Wiley-VCH Verlag GmbH & Co. KGaA: Weinheim. 2003. xvi + 464 pp. $115. ISBN 3-527-30275-1.

This beautiful and useful book serves both as a summary of work on magnetic spectra of organic open shell species and as a review of the extensive work of Gerson's group in this area. It updates his important book that appeared in 1967, but its coverage has been expanded to include both π and σ radicals of all charge states as well as biradicals and triplets. In addition, there is a brief discussion of multiresonance methods (especially ENDOR) as well as modern quantum-mechanical methods for the calculation of spin densities. It does not cover paramagnetic species in physics or biology, or paramagnetic transition metal coordination complexes, nor does it give extensive discussion of the chemistry of radicals and radical ions chemistry.

The book starts with a 165-page "General Part" that is a review of the principles and practice of continuous-wave ESR and multiresonance techniques. The types of information that can be obtained and how assignments are made are discussed, including many examples (over 136 numbered structures), mostly from the authors' work. The larger section of the book is the "Special Part" that is a survey of work published on a great range of organic radicals and radical ions. It also includes a 19-page summary of studies on biradicals and triplets, a 2-page appendix on spin labeling and trapping, and 7 pages including 3 tables showing alkali metal splitting constants for radical anions. Thousands of hyperfine splitting constants are helpfully arranged in dozens of short tables that compare closely related compounds and are conveniently associated with their structures. There are also pictures of over 929 numbered structures, making this book remarkably comprehensive. The number of references decreases significantly after 1999, but there are a few as late as 2002. The "Special Part" is logically organized, and there is an 18-page subject index. Unfortunately, for a book with 1251 references, there is no author index.

This book should serve as a comprehensive, one-volume source for finding what is known about the splitting constants and *g* factors of virtually all types of organic radicals. It features the careful attention to details of preparation and presentation as well as over 40 of the beautiful displays of spectra, structures, and the information derived from them that have been so characteristic of Gerson's papers.

Stephen F. Nelsen, *University of Wisconsin*

JA0336675

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Chiral Separations: Methods and Protocols. Methods in Molecular Biology, Volume 243. Edited by Gerald Gübitz and Martin G. Schmid (Karl-Franzens University, Graz, Austria). Humana Press: Totowa. 2004. xiv + 432 pp. $99.50. ISBN 1-58829-150-2.

This books features 25 chapters, written by 43 authors from around the world, on "chromatographic and electroseparation techniques for chiral separation on an analytical scale." The first chapter provides an introduction to the field, and the following three give an overview of some special techniques and practical advice on their use. The remaining chapters give descriptions in step-by-step detail of "typical procedures for enantiomer separation by chromatographic and electromigration techniques applying different chiral separation principles." In keeping with the Methods in Molecular Biology series, these chapters also contain helpful notes on troubleshooting and practical hints. A subject index is included.

JA033682+

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Radioanalytical Methods in Interdisciplinary Research: Fundamentals in Cutting-Edge Applications. Edited by Carola A. Laue (Lawrence Livermore National Lab) and Kenneth L. Nash (Argonne National Laboratory). American Chemical Society (distributed by Oxford University Press): Washington, DC. 2004. xii + 364 pp. $165.00. ISBN 0-8412-3837-5.

This book is based on the symposium "Radioanalytical Methods at the Frontier of Interdisciplinary Science:, held in Orlando, FL in April 2002. The participants were a diverse group who rely on radioanalytical chemistry in their research,

Unsigned book reviews are by the Book Review Editor.

and they have provided in this book discussions of the methods they employ. In addition, the book contains an introduction to the history and principles of radiochemistry as well as "a siren's call for advancing radioanalytical and radiochemical education to meet the future (and present) needs of the scientific community for trained radiochemists" to quote from the Preface. There are 21 chapters, which are organized into the following sections: Introduction to the Field; Developments in Radioanalytical Methods: Radiation Detection Methods; Developments in Radioanalytical Methods: Separation Techniques; and Interdisciplinary Applications. An author and a subject index complete the book.

JA033681H

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Silicon Chemistry: From the Atom to Extended Systems. Edited by Peter Jutzi (University of Bielefeld) and Ulrich Schubert (Vienna University of Technology). Wiley-VCH Verlag GmbH & Co. KGaA: Weinheim. 2003. xii + 494 pp. $165.00. ISBN 3-527-30647-1.

This book gives an overview of the results of two research programs focused on silicon chemistry: (1) "Specific Phenomena in Silicon Chemistry: New Experimental and Theoretical Approaches for the Controlled Formation and Better Understanding of Multidimensional Systems" sponsored by Deutsche Forschungsgemeinschaft in 1995 and (2) "Novel Approaches to the Formation and Reactivity of Silicon Compounds" sponsored by the Austrian Fonds zur Förderung der wissenschaftlichen Forschung in 1996. The chapters are organized into three sections: (1) Reactive Intermediates in Silicon Chemistry—Synthesis, Characterization, and Kinetic Stabilization; (2) Si−Si− Systems: From Molecular Building Blocks to Extended Networks; and (3) Si−O Systems: From Molecular Building Blocks to Extended Networks. A subject index completes the book.

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Chemicals in the Atmosphere − Solubility, Sources and Reactivity. Edited by P. Fogg (University of North London, Retired) and J. Sangster (Sangster Research Labs, Montreal). John Wiley & Sons, Ltd.: Chichester. 2003. xiv + 454 pp. $180.00. ISBN 0-471-98651-8.

The interactions of molecules with liquid water are of extreme importance to a host of atmospheric phenomena. In particular, soluble gaseous pollutants are scavenged by the action of precipitation, dissolved or surfactant gases in aerosol particles facilitate the formation of cloud droplets, and chemical reactions can proceed in the condensed phase that do not progress at appreciable rates in the gas phase. A significant example of the importance of solution phase chemistry is the atmospheric oxidation of sulfur dioxide to form sulfuric acid, which is thought to occur via dissolution of SO_2 in the water of cloud droplets followed by reaction with oxidants such as dissolved O_3 and H_2O_2.

Chemicals in the Atmosphere − Solubility, Sources and Reactivity is a compilation of chapters that each address specific aspects of the interactions of gases with atmospheric particulate substrates. A variety of authors, many of whom are leaders in their fields, have contributed to the book, and one of its strengths is that it presents a very good balance between theoretical descriptions of the chemistry, experimental techniques, and compilations of data. In this regard, I consider the book unique in attempting to cover all these subjects within one volume. To illustrate, topics range from highly practical subjects, such as "Henry's Law Constants for Dissolution in Seawater" (Chapter 12), "Solubility of Gases in Strong Electrolyte Solutions" (Chapter 7), and "The Experimental Measurement of Henry's Law Constants" (Chapter 4), to more theoretical descriptions, such as "Thermodynamic Aspects of Henry's Law" (Chapter 3) and "Calculation of Henry's Law Constants and Infinite Dilution Activity Coefficients" (Chapter 5). The book is also valuable for its discussions of issues related to mass transfer from the gas to the aqueous phase (Chapters 2 and 8) and for providing a compilation of Henry's Law data (Chapter 11). In this regard, this book stands alongside the very detailed database provided by Rolf Sander at the Max Planck Institute for Air Chemistry in Mainz, Germany (http://www.mpch-mainz.mpg.de/~sander/res/henry.html).

My only criticism of the book is that the title does not accurately reflect the contents, as it suggests a broader coverage of subjects than is provided. The focus of the contents is on the interactions of gases with aqueous solutions, with a lesser emphasis on the role of solid particulates and heterogeneous reactions. Thus, the title implies that it contains a full survey of the sources of chemicals to the atmosphere and of all the interactions they undergo, whereas, in fact, detailed discussions of gas-phase radical chemistry, photochemistry, and biogeochemical/anthropogenic chemical sources are not included.

This does not diminish the usefulness of this book to atmospheric chemists studying subjects such as marine boundary-layer chemistry, heterogeneous chemistry of the ozone hole, which at times can proceed in highly concentrated aqueous solutions of nitric and sulfuric acid, and the chemistry of clouds.

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JA033670O

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Energetic Materials, Part 2. Detonation, Combustion. Edited by Peter A. Politzer and Jane S. Murray (University of New Orleans). From the Series: Theoretical and Computational Chemistry, 13. Elsevier: Amsterdam and New York. 2003. xx + 454 pp. $210.00. ISBN 0-444-51519-4.

The field of energetic materials is highly interdisciplinary in terms of the types of materials and range of chemical and physical phenomena. Organic and inorganic compounds containing highly oxidized and reduced elements, compounds with more positive heats of formation, and metal mixtures in which exothermic redox reactions exist are among the noteworthy examples. The combustion and detonation of these materials cuts across the boundaries of chemistry, physics, and mechanics.

This volume is a multi-author presentation of selected topics of current importance. The compounds discussed are primarily familiar organic and inorganic explosives and oxidizers. The

specific topics of the 11 chapters would be agreed by many to be frontier subjects. Four deal with energy transfer, four with combustion modeling and mechanisms, two primarily with sensitivity, and one with the equation of state. All of the chapters are written by experts.

Veterans of research in energetic materials will be familiar with a majority of the technical details and the authors' styles. Indeed, some of the chapters are essentially research papers. This fact tends to give the volume a somewhat uneven flow and format, which is its only drawback. Of greatest value to the reader is the fact that several authors have made a sincere effort to provide their analysis and opinion of particularly thorny issues in their topical area. Newcomers to energetic materials will find these chapters particularly useful, but the entire book is worth careful examination.

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Organosilicon Chemistry V: From Molecules to Materials. Edited by Norbert Auner (University of Frankfurt) and Johann Weis (Consortium of Electrochemical Industry GmbH). Wiley-VCH Verlag GmbH & Co. KgaA: Weinheim. 2003. xviii + 838 pp. $160.00. ISBN 3-527-30670-6.

This fifth volume of the *Organosilicon Chemistry* series presents all of the scientific contributions that were given at the *1st European Silicon Days* conference held in Munich in 2001. A sampling of some of the 126 chapters includes the following: Reactions of Silicon Atoms − An Access to Unusual Molecules; Synthesis of a Highly Enantiomerically Enriched Silyllithium Compound; Organosilicon Chemistry and Nanoscience; and Catalytic Hydrosilylation of Fatty Compounds. An author and a subject index complete the book.

JA033665K

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Host-Guest-Systems Based on Nanoporous Crystals. Edited by Franco Laeri (Technical University Darmstadt, Germany), Ferdi Schüth (Max-Planck-Institute of Coal Research, Mülheim an der Ruhr, Germany), Ulrich Simon (RWTH, Aachen, Germany), and Michael Wark (Hannover University, Germany). Wiley-VCH Verlag GmbH & Co. KGaA: Weinheim. 2003. xxiv + 662 pp. $220.00. ISBN 3-527-30501-7.

This book contains 32 chapters written by more than 60 contributors, most of whom are German. Each begins with an introduction and contains some review material of work published in the last 10 years. The chapters are loosely organized into four parts: 1. Synthesis Routes for Functional Composites Based on Nanoporous Materials, 2. Structure and Dynamics of Guest−Host Composites Based on Nanoporous Crystals, 3. Electrical Properties and Electronic Structure, and 4. Optical Properties of Molecular Sieve Compounds. The articles, for the most part, concern materials that are silicon- or aluminum oxide-based, wherein the authors focus on compounds that are housed in these porous oxides and describe how the oxide cavities influence the properties of these compounds. The references are fairly recent, with many from 2000 to 2002.

As a compilation of many articles, this book will be beneficial to those who have specific areas of interest. It is not a general review that has tightly correlated parts, however.

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JA0336731

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Dendrimers V: Functional and Hyperbranched Building Blocks, Photophysical Properties, Applications in Materials and Life Sciences. Edited by Christoph A. Schalley and Fritz Vögtle (University of Bonn). Springer-Verlag: Berlin, Heidelberg, New York. 2003. xii + 274 pp. $239.00. ISBN 3-540-00669-9.

This book is the fifth installment of a series dedicated to the chemistry of dendrimeric and hyperbranched polymers. The series has become an indispensable resource for information about current research in the field and nicely complements earlier and more comprehensive treatises on the subject. Research on dendrimers has grown exponentially over the past decade, leading not only to the creation of many novel structures but, increasingly, to the emergence of an understanding of the structure−function relationship. In contrast to the first four volumes of the series, each of which focused on four to six topics, this rather large volume presents 11 chapters ranging in content from the synthesis of novel dendrimeric scaffolds to biological and photophysical applications. The topics covered fall into three general areas in the chemistry of dendrimers: novel dendrimer/hyperbranched structures (five chapters), the development of functional applications of dendrimer scaffolds (four chapters), and the use of dendrimers in biochemical applications (two chapters). In general, the chapters contain the results of recent research by the authors within the context of a broader view of related work in other laboratories. The book provides current references in each chapter and should be an excellent resource for chemists and nonchemists interested in learning more about the synthesis and utility of dendrimers.

Dendrimers constructed from unique building blocks based upon organometallic, porphyrin, fullerene, and rotaxane subunits are the focus of the first five chapters. The first one is a detailed summary of the synthesis and properties of hyperbranched methacrylates in solution, melt, and on surfaces and is the only chapter in the book devoted entirely to hyperbranched polymers. Chapters 2−5 cover dendrimers constructed from subunits having special electronic or photophysical properties and which hold great promise for the development of functional materials. Specifically, the properties of porphyrin oligomers for molecular recognition, the photophysical features of metallodendrimers, and the phenomenon of energy transfer within fullerodendrimers are presented along with associated synthetic strategies. The photophysical properties of these and several other dendrimers are treated explicitly in Chapters 7 and 8, which focus on the luminescence of dendrimers and the exceptional ability of dendrimers to concentrate photon energy via an "antennae effect". Light harvesting, signal amplification, and other properties associated with the ability of dendrimer structures to serve as "energy funnels" are described clearly within these two

chapters. Chapter 9 is a description of how these unique photophysical properties are being utilized in laser emission and nonlinear optics applications.

The highly branched structure and approximate globular morphology of dendrimers ideally suits them as scaffolds for facilitating processes such as inorganic crystallization and gene transfer into eukaryotic cells. In natural systems, organic−inorganic hybrid materials, such as bone and teeth, are produced by mineralization of inorganic materials on scaffolds of folded peptides. This book contains an excellent review that nicely delineates how the well-defined structures of dendrimers and hyperbranched polymers control crystal nucleation and growth of calcium carbonate. Another chapter describes how PAMAM dendrimers, which maintain a positively charged surface in water, bind to DNA and facilitate its transfer into cells by protecting the DNA from endosomal nucleases and inducing endosomal release at low pH. The concluding chapter is dedicated to the synthesis and properties of antibody dendrimers for molecular recognition. Such supramolecular assemblies of antibodies form the basis for applications as highly selective biosensors. Overall, this book should be an excellent resource for scientists interested in the current status of dendrimer research, especially in conjunction with the previous four books in the series.

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