

Book Review

Progress in Colloid and Polymer Science, Volume 124: Aqueous Polymer Dispersions Edited by Klaus Tauer (Max Planck Institute of Colloid and Interfaces, Golm, Germany). Springer-Verlag: Berlin, Heidelberg. 2004. viii + 170 pp. \$159.00. ISBN 3-540-00578-1.

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Azeotropic Data, Second, Completely Revised and Extended Edition, Parts I–III. By Jürgen Gmehling (Carl Ossietzky Universität, Oldenburg, Germany), Jochen Menke (DDBST GmbH, Oldenburg), Jörg Krafczyk (DDBST GmbH, Oldenburg), and Kai Fischer (Lab for Thermophysical Properties (LTP GmbH, Oldenburg)). Wiley-VCH Verlag GmbH & Co. KGaA: Weinheim, Germany. 2004. 1992 pp. \$910.00. ISBN 3-527-30833-4.

This reference includes nearly all data currently available for binary and higher systems that are essential for separating azeotropic systems using special rectifying or hybrid processes. The second edition updates the first by including approximately 12 500 more data points. Data for more than 22 000 systems involving approximately 2000 compounds are presented in this three-volume set and are arranged according to molecular formula. The set includes an introduction, a guide to tables, data tables for binary, ternary, and quaternary systems, a list of references, and separate lists of compounds, binary systems, ternary systems, and quaternary systems for the purpose of navigating through the wealth of information.

JA0410035

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Elemental Sulfur and Sulfur-Rich Compounds I. Topics in Current Chemistry, 230. Edited by Ralf Steudel (Technische Universität Berlin). Springer-Verlag: Berlin, Heidelberg, New York. 2003. x + 202 pp. \$189.00. ISBN 3-540-40191-1.

The book is the first of a two-part series on the title topic. It is nicely presented and consists of six chapters, all focused on species with the empirical formula S, except for one chapter that discusses species with the formula Sⁿ⁺. The second volume will cover complementary species, including those containing heteroatoms. In an era where complexity is so celebrated, it is slightly humbling and highly intriguing to realize that a single element can do so much on its own.

The two-part series is not only edited by Steudel, it also contains a number of chapters authored by him, Steudel is the undisputed master scholar of sulfur and is responsible for the demystification of many of its complexities, in particular, sorting out its allotropes. His contributions have been recorded over the past three decades in various reviews, and this particular set encapsulates that work. The contents include not only a lot of factual information but also provide historical context, which will helpfully guide future scholars to the original literature.

The first three chapters deal with the three phases of sulfur: solid, liquid, and gas. Chapter 1 is a status report on the allotropes of elemental sulfur. It presents some details on the procedures for obtaining many of these allotropes, e.g., S₇ vs S₁₄ vs S₁₈. We learn, for example, that the yellow color of “sulfur” is mainly due to the occurrence of a small amount of

S₇. The presentation is meticulous. The succeeding chapter deals with liquid sulfur, an industrially significant material, beginning with the still remarkable fact that its viscosity increases with temperature. Chapter 3 covers gaseous forms of sulfur, including a critical assessment of the electronic description of small S_n species, cyclic and otherwise, and discussion of the ever-intriguing branched species S_n=S.

Chapter 4 focuses on the species S_xⁿ⁺, which, while few in number, played a major role in establishing our understanding of bonding in main group chemistry, e.g. connections to S–N species. In Chapter 5, sulfur sols are discussed, e.g., “sulfur milk” and the like. Such relatively dry information is usually excluded from texts but is essential information for practical applications. The final chapter on biologically produced sulfur describes not only the redox chemistry utilized by microorganisms but also how they cope with a redox cycle that produces a highly insoluble product.

This two-volume set will be a key reference for those interested in the 16th element.

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JA040908F

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Trends in Molecular Electrochemistry. Edited by Armando J. L. Pombeiro (Instituto Superior Técnico, Lisboa, Portugal) and Christian Amatore (Ecole Normale Supérieure, Paris). Marcel Dekker, Inc. and FontisMedia, S. A.: New York and Lausanne, respectively. 2004. xvi + 552 pp. \$185.00. ISBN 0-8247-5352-6.

This book was developed from the symposium “New Trends in Molecular Electrochemistry” held at the Academy of Sciences in Lisbon, Portugal in 2003. It presents the latest research, using an interdisciplinary approach, in the application of electrochemistry to study various molecular systems. Its 15 chapters are organized under the following sections: Redox and Other Molecular Properties; Molecular Electroactivation and Electrocatalysis; Bioelectrochemistry; Supramolecular Electrochemistry; Spectroelectrochemistry; and Unconventional Electrochemistry. A subject index completes the book, which is also available online.

JA040993R

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Highlights in Bioorganic Chemistry: Methods and Applications. Edited by Carsten Schmuck (University of Würzburg) and Helma Wennemers (University of Basel). Wiley-VCH Verlag GmbH & Co. KGaA: Weinheim, Germany. 2004. xxviii + 572pp. \$125.00. ISBN 3-527-30656-0.

Bioorganic chemistry is an exciting and rapidly evolving field, where chemists utilize the tools and principles of organic chemistry to address fundamental questions in biology and to develop new chemistry inspired by Nature. This book is a

compilation of contemporary research by leaders in the field from Germany and neighboring countries, who have attended the "Bioorganic Chemistry Symposium" during the years 1999–2002. It is not intended to be an exhaustive overview of bioorganic chemistry, but rather to highlight some of the latest developments in the field. It covers a wide range of topics, from nucleic acid chemistry to peptides to carbohydrates to small molecules. Each section contains a blend of research and review articles, written in a manner that can be readily understood by nonpractitioners of the field.

The book is divided into six parts. Part 1, "Biomolecules and their Conformations", emphasizes understanding the molecular principles governing RNA and protein folding and applying chemical tools to stabilize and restrict the conformations of flexible biomolecules, such as peptides and lipids. In Part 2, "Non-Covalent Intermolecular Interactions", the design and development of synthetic molecules capable of recognizing nucleic acids, proteins, and carbohydrates are covered. Part 3, "Studies in Drug Developments", deals with both rational and combinatorial approaches in the discovery of therapeutic agents for treating genetic diseases. The detection of nucleic acids and proteins *in vitro*, as well as *in vivo*, is reviewed in Part 4, "Studies in Diagnostic Developments", and various methods used to discover new catalysts are described in Part 5, "Catalysis". Finally, Part 6, "Methodology, Bioengineering and Bioinspired Assemblies", encompasses the development of biologically inspired supramolecules and molecular machines.

Overall, the book is well-written, but the organization is somewhat perplexing. Some of the articles do not seem to belong in their respective sections. Also, although the book covers a broad range of research interests, it does not provide a comprehensive view of the current research in this field, especially from the United States and other parts of the world. Nevertheless, it has sufficient depth and breadth that it can be used as supplementary material for teaching bioorganic chemistry and should be found on the shelves of all chemistry libraries.

Danith H. Ly, *Carnegie Mellon University*

JA040953N

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Progress in Colloid and Polymer Science, Volume 123. Trends in Colloid and Interface Science XVI. Edited by Maria da Graça Miguel and Hugh D. Burrows (Universidade de Coimbra, Portugal). Springer-Verlag: Berlin, Heidelberg. 2004. x + 288 pp. \$189.00. ISBN 3-540-00553-6.

This book contains a selection of peer-reviewed papers presented at the 15th meeting of the European Colloid and Interfaces Society held in Coimbra, Portugal in September 2001. The 60 chapters are organized under the following broad topics: Self-Assembly in Mixed Systems; Surface Modification; Biological and Biomimetic Systems; Theory and Modeling; New Techniques and Developments; Food and Pharmaceuticals; Dynamics at Interfaces; and Mesoscopic and Mesoporous Systems. Author/title and key word indices complete the book, which is also available online.

JA040995B

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Oligonucleotide Synthesis: Methods and Applications. Methods in Molecular Biology, Volume 288. Edited by Piet Herdewijn (Katholieke Universiteit Leuven, Belgium). Humana Press: Totowa, NJ. 2005. xvi + 436 pp. \$125.00. ISBN 1-58829-233-9.

The aim of this book, according to the editor, is "to give the readers an insight into new key developments and to deliver protocols and critical comments for the practical execution of the experiments" in oligonucleotide synthesis. Some of the featured topics include methods for using oligonucleotides for new discoveries in biology, techniques to optimize RNA synthesis for siRNA applications, applications using small interference RNA as an inhibitor of gene expression, and the construction and use of nucleic acid libraries, among others. The same useful and practical format of the series is used here, i.e., each chapter contains an overview of the topic at hand, a list of materials and reagents needed, step-by-step lab instructions, a thorough list of references, and when necessary, a troubleshooting section offering tips and helpful notes. An online version of the book is also available.

JA040997W

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Progress in Colloid and Polymer Science, Volume 124: Aqueous Polymer Dispersions. Edited by Klaus Tauer (Max Planck Institute of Colloid and Interfaces, Golm, Germany). Springer-Verlag: Berlin, Heidelberg. 2004. viii + 170 pp. \$159.00. ISBN 3-540-00578-1.

This book contains 33 chapters that were presented as plenary lectures, oral contributions, or posters at the "Polymer Colloids: Preparation & Properties of Aqueous Polymer Dispersions" symposium held at the Swabian Conference Center in Kloster Irsee, Germany in July 2002. A sampling of the chapter titles includes "Reactive surfactants for commercial polymer dispersions", "Electro-optic properties of giant colloidal crystals", and "Particle-forming precipitation polymerization under unusual conditions". The book concludes with an author/title and a key word index. This series is also available online.

JA040994J

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Organosilanes in Radical Chemistry: Principles, Methods and Applications. By Chryssostomos Chatgililoglu (Consiglio Nazionale delle Ricerche, Bologna, Italy). John Wiley & Sons: Chichester, U.K. 2004. xii + 228 pp. \$265.00. ISBN 0-471-49870-X.

This slim volume covers in a very readable yet rigorous manner aspects of silicon chemistry, material science, organic synthesis, and physical organic chemistry, all nicely linked by the central theme of silicon-centered (silyl) radicals. The diversity of topics presented not only illustrates the importance of silyl radicals in different fields (a topic not previously covered in a single volume) but also parallels the personal experiences of the author, making the book semi-autobiographical. Chatgililoglu spent 1979–1982 in Ottawa with Ingold, using sophisticated methods to form, characterize, and study silyl radicals. On his return to the CNR laboratories in Bologna, Chatgililoglu developed applications of tris(trimethylsilyl)-

silane, $(\text{TMS})_3\text{SiH}$, a reagent discovered by Gilman and co-workers in 1965 but virtually ignored for the next 20 years. The author, who calls $(\text{TMS})_3\text{SiH}$ “another case of Sleeping Beauty in chemistry”, received the 1990 “Reagent of the Year” Fluka prize for this compound. As might be expected, he devotes considerable space to discussing the chemistry and synthetic applications of this reagent, which has proven to be a viable alternative to tin hydrides for use in radical chain reactions. The author notes the lower toxicity of $(\text{TMS})_3\text{SiH}$ and its byproducts relative to tin hydrides, possibilities of using $(\text{TMS})_3\text{SiH}$ in catalytic quantities with sodium borohydride as the consumable reagent, and some differences in selectivity between $(\text{TMS})_3\text{SiH}$ and tin hydrides. However, the high cost as well as storage problems with $(\text{TMS})_3\text{SiH}$, which reacts slowly with oxygen at room temperature, so far limits commercial use of this compound.

The first three chapters deal with fundamental aspects of silyl radicals, e.g., formation, structure, thermodynamics, and chain reactions, with a good mix of gas-phase data and EPR spectra. The middle series of chapters cover the use of silicon hydrides as radical-based reducing agents and key participants in unimolecular as well as consecutive (tandem/cascade) radical reactions. Among the topics discussed are the use of silanes for dehalogenations, reductive removal of chalcogen groups, deoxygenation of alcohols, radical Brook rearrangements and group migrations, addition to multiple bonds, and the formation of inter- and intramolecular carbon–carbon and carbon–heteroatom bonds. These four chapters are especially useful for synthetic chemists because they include practical advice on selecting reagents and controlling experimental conditions based on consideration of kinetic data and the influence of substituents on radical selectivity (e.g., Barton’s concept of “disciplined” radical intermediates). The final chapter deals with silyl radicals in polymers and materials and covers aspects of the chemistry of polysilanes and poly(hydrosilanes), silylated fullerenes, and radical chemistry on silicon surfaces. Virtually all of the references in this last chapter are to work published in the last 10 years.

There are remarkably few errors in this carefully prepared book, which should serve as a rich source of ideas for chemists working in diverse areas who want to learn more about how they may profit from the chemistry of organosilicons in general and silyl radicals in particular. This book, which contains nearly 600 references, mostly from the last 20 years, as well as numerous well-drawn equations, figures, and schemes, and a useful index, is highly recommended, despite its lofty price, which corresponds to \$1.17 per page!

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JA0409513

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Spin Crossover in Transition Metal Compounds I. Topics in Current Chemistry, 233. Edited by Philipp Gütllich (Johannes-Gutenberg-University of Mainz) and Harold A. Goodwin (University of New South Wales). Springer-Verlag: Berlin, Heidelberg, New York. 2004. xiv + 342 pp. \$289.00. ISBN 3-540-40394-9.

Since its discovery in a tris(dithiocarbamate)Fe(III) complex in 1937, spin crossover, the transition of a complex between states with different spin multiplicity in the ground state, has

evolved to become the subject of a mature field of research that is pursued by chemists and physicists and is equally relevant for bioinorganic chemists and earth and materials scientists. Beginning in the 1970s, this field has seen major and accelerated advancement, and topics pertaining to it have been periodically reviewed in journals and books. This first of three volumes dedicated to spin crossover shows that the two editors, whose scientific endeavors in the past decades have extensively and significantly contributed to the development of the field, clearly intend to go beyond presenting a collection of current reviews and aim to give an up-to-date, comprehensive, and critical view of where the field is and where it is going.

The current volume focuses mostly on complexes of Fe(II), which is the main metal ion whose compounds display spin crossover. The presentation of these complexes is generally organized according to their ligands and nuclearity, and thus redundancy is minimal. Whereas some chapters present complexes with ligands that have long been recognized for creating a ligand field appropriate for spin crossover (e.g., diimines or terimines for Fe(II) complexes and Schiff bases for Fe(III) ones), other chapters review complexes with ligands such as pyrazolymethane that have only recently been pursued. The majority of the chapters cover literature up to 2003, and some include references from 2004 and unpublished results.

The researcher just beginning to work in the field of compounds with spin crossover can start by reading the first two chapters of the volume, which give a clear introduction and a broad perspective of the field, and continue with the chapters most relevant to his or her own research. The scientist who already works in this field will find this volume to be an excellent primary source of information. It should also be very useful to those teaching graduate-level courses in inorganic chemistry, for they can choose one out of the many examples presented in the book as an entry point for explaining the fundamental aspects of coordination chemistry and modern applications of coordination complexes.

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JA0409715

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Annual Review of Biophysics and Biomolecular Structure, Volume 33. 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. 2004. xiv + 520 pp. \$84.00 (print and online for individuals). ISBN 0-8243-1833-1.

The Annual Reviews series has become an institution in science since its inception more than seven decades ago. To quote from their “yellow book” Guide to Authors, “Invited Annual Reviews authors contribute, for the benefit of all scientists and students, the highest-quality scientific literature reviews in the world”. This is a lofty goal, but one that the publishers of this series have demonstrably achieved in the more than 30 series presently active. The current *Annual Reviews of Biophysics and Biomolecular Structure* provides an excellent example.

This volume presents in 20 chapters the state-of-the-art in areas ranging from new experimental techniques (electron microscopy at molecular resolution, X-ray microscopy of single

cells, proteomics applications of mass spectrometry, new developments in magnetic resonance spectroscopy) to new theoretical constructs (conformational spread theory of allosteric responses, the use of an engineering Design Matrix to clarify the axiomatic content of complex biological systems), to updates on “classic” problems of biophysics and structural biology (dihydrofolate reductase, topoisomerases, the F_1 -ATPase molecular machine). A cover-to-cover reading, while probably not the typical approach to such a volume, will slice through a cross section of topics of current interest in the field. In the spirit of the series, these contributions all easily pass the “freshness test” of having a majority of their references published within the past few years.

The high quality of these reviews makes them invaluable as an introduction to the current scientific literature, and individual chapters are well-suited for use as supplementary reading in advanced courses. In the best sense, they go beyond a simple review of current literature, providing suggestions of new, emerging research areas that become a preview of science.

James W. Whittaker, *Oregon Health and Sciences University*

JA040969D

10.1021/ja040969d

Protein NMR Techniques, 2nd ed. Methods in Molecular Biology, Volume 278. Edited by A. Kristina Downing (University of Oxford). Humana Press: Totowa, NJ. 2004. xii + 488 pp. \$115.00. ISBN 1-58829-246-0.

Following the step-by-step instructional format of the Methods in Molecular Biology series, this book covers recent advances in NMR methodology for characterizing proteins. Some of the readily reproducible methods presented here include TROSY methods for structural studies, methods for measuring residual dipolar couplings and their application to determining protein structure, and automated methods for structure calculations, to name a few. Each of the 19 chapters presents an introduction and overview of the featured technique, detailed laboratory instructions, including lists of materials needed, references, and in some chapters, helpful notes on troubleshooting and practical hints. A subject index completes the book.

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