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BOOK REVIEWS

Lewis Acids in Organic Synthesis. Volumes 1 and 2. Edited by Hisashi Yamamoto (Nagoya University). Wiley-VCH: Weinheim. 2000. xviii + 995 pp. $375.00. ISBN 3-527-29579-8.

This two-volume work is one of a series of titles from Wiley-VCH on organic synthesis. There are 21 chapters authored by experts in their respective areas. The book is well-edited, and even though many of the authors are not native English speakers, the writing style is consistent throughout and easy to follow. Of the 21 chapters, 19 cover a particular metal or groups of metals (e.g., Li, Na, and K; Mg and Zn; B; Al; Si; Sn; Sb; Cu; Ag; transition metals; Ti; Hf; Zr; Sc; lanthanides). Of the remaining two, one covers polymer-supported Lewis acids and the other discusses additions of allylic and allenic tin and indium reagents. Some metals (boron, aluminum, and titanium) are covered in two chapters under the broader topics of achiral Lewis acids and chiral Lewis acids. Each chapter covers the literature up to 1998.

The strengths of this work are that it provides broad, up-to-date coverage of the subject; it is rich in information; and the material is well-presented and well-indexed. The organization of topics by metal, rather than by reaction, has its advantages and disadvantages. Scientists who are interested in developing new classes of Lewis acids might appreciate this organization, since it better presents the state-of-the-art in a particular area. However, those interested in using this book as a reference for deciding the best method to conduct a reaction will have a harder time sifting through the information, since many reactions are promoted by different metals. This problem is largely alleviated by the index, but a reaction-based approach with a comparison of the advantages of each method would have been more convenient for such scientists. There is also some duplication of material. For example, for studies in which a comparison of metals is made, the data sometimes appear twice in the book. On another note, many of the chapters highlight the advantages of the methods that are discussed but do not discuss the limitations or disadvantages as prominently.

Overall, this is an important and timely work and should certainly be in every major research library. Unfortunately, at $375 for the two volumes, the cost renders it beyond the reach of many who might otherwise purchase and benefit from it.

Tarek Sammakia, *University of Colorado*

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Reactions and Synthesis in Surfactant Systems. Surfactant Science Series. Volume 100. Edited by John Texter (Strider Research Corporation, Rochester, NY). Marcel Dekker: New York, Basel. 2001. xii + 909 pp. $250.00. ISBN: 0-8247-0255-7

As may be appropriate for the 100th volume in a series, *Reactions and Synthesis in Surfactant Systems* is a massive piece of work. With 909 pages, it is a much bigger book than those usually found in the surfactant science series. Although the title gives a reasonable description of the contents, it should be noted that coverage goes well beyond reactions and synthesis and also deals extensively with structure, application, and production.

The volume comprises 40 chapters, divided into 5 parts (indicated on the contents page only) according to the overall theme. There are a total of 96 authors, drawn from all across the world, of which a majority are affiliated with academic institutions, national laboratories, or research corporations. Only three chapters are written entirely by contributors that hail from industry. Part One, entitled "Surfactant Synthesis and Transformation", is anchored by a comprehensive chapter on industrial surfactant synthesis. The remaining six chapters in this section deal with other syntheses (including oligomerization), electrochemical matters, surfactant vesicles, biological activity, super- and near-critical fluids, and drug delivery. Part Two, "Chemistry in Isotropic Phases and Mesophases", covers reactions and reactivities in organized systems, including electrocatalysis/synthesis, multiphase systems, and modeling aspects. The treatment of reactivity control by self-assembling systems is especially extensive. The eight chapters in Part Three, named "Polymerization Chemistry", deal with the various roles of surfactants in this arena, ranging from (micro)emulsion polymerization, in which they provide a reaction environment, to polymerization of the surfactants themselves. Parts Four and Five, comprising about one-third of the book, deal with larger assemblies, including organic and inorganic nanostructures. Part Four is entitled "Particle Precipitation" and addresses precipitation and condensation processes in the formation of (nano)particles and their compartmentalization in homogeneous solution, interfaces, and films. An excellent treatment of particle geometry is included. Part Five, "Supramolecular Synthesis", continues the particle/template theme with emphasis on inorganic mesoporous solids.

Each chapter in this volume is essentially a stand-alone treatise, leading the reader through fundamental introductory material before reaching the subject area. The slight degree of repetition inherent in this approach is a small price to pay for its usability as a reference as a whole. The bibliographies included in all of the chapters are extensive, in many cases impressive, mostly including material through 1999. Surfactant chemistry lends itself well to visual representation, and this volume is no exception. Illustrations are generally of good quality and liberally distributed. Good use is made of electron micrographs of both surfactant structures and inorganic nanoparticles. As is often the case, however, the index is rather mediocre.

Overall, this is a beautifully turned-out volume with extensive up-to-date coverage of a very broad area of surfactant science and engineering. Despite the rather hefty price, it should

Unsigned book reviews are by the Book Review Editor.

probably be considered a "must-have" for serious surface scientists.

Ray von Wandruszka, *University of Idaho*

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Chemical Properties of Material Surfaces. By Marek Kosmulski (Technical University of Lublin, Lublin, Poland). Surfactant Science Series. Volume 102. Edited by Arthur T. Hubbard (Santa Barbara Science Project, Santa Barbara, CA). Marcel Dekker, Inc.: New York, Basel. 2001. viii + 754 pp. $225.00. ISBN: 0-8247-0560-2.

The adsorption of inorganics from aqueous solution onto inorganic adsorbents is the topic of this reference book, with emphasis on the relationship between adsorption and surface charging. It also compiles values of the points of zero charge of various materials obtained by different methods and examines the correlation of these zero points with other physical quantities. Other topics, presented as chapter headings, that are explored include Physical Properties of Adsorbents, Surface Charging in the Absence of Strongly Adsorbing Species, Strongly Adsorbing Species, Adsorption Modeling, and Sorption Properties of Selected Organic Materials. Appendices of abbreviations, trade names and trademarks, and points of zero charge are included, as are references through the 1990s.

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The Law of Mass Action. By Andrei B. Koudriavtsev (D. Mendeleev University of Chemical Technology of Russia), Reginald F. Jameson (University of Dundee), and Wolfgang Linert (Technical University Vienna). Springer-Verlag: Berlin, Heidelberg, and New York. 2001. xiv + 328 pp. $74.95. ISBN 3-540-41078-3.

What can one say about a wonderful book with a tiny market? *The Law of Mass Action* represents the culminating relationship of standard chemical thermodynamics, a sort of crown jewel of abstract reasoning putting the Gibbs' free energy at the service of chemical equilibrium. For American students, who usually learn the mechanics of chemical equilibrium as college freshman and who derive (in physical chemistry class) the equation $\Delta G^\circ = -RT \ln K_p$ (in the author's marvelous phrase, ab ovo), this is their last exposure to the theory of chemical equilibrium, even if they later in their physical chemistry studies learn some statistical thermodynamics.

The interested student may ask, "Where do I go from here? How do I handle nonideal gases and the most nonideal of gases, liquids and solids?" For this tiny subset of students, this book is perfect. It reviews (succinctly) what needs to be reviewed and deals with the harder topics of chemical equilibrium in states that are less convenient than the ideal gas state. It never directly addresses the question of why $\mu = \mu^\circ + RT \ln f$ is the historically appropriate rendition for further discussion, but not the appropriate statistical mechanical one. The fugacity does not appear in the index. For advanced, mathematically competent students, this is the perfect text. How many such students exist, however, is the question.

A minor caveat concerns the dimensional analysis polemic concerning natural logarithms of quantities bearing units on page 84, but students learning from this text can easily puzzle out what the authors intended and adopt that attitude or not as they see fit.

Carl David, *University of Connecticut*

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Calixarenes 2001. Edited by Zouhair Asfari (ECPM-ULP-CNRS, Strasbourg, France), Volker Böhmer (Johannes Gutenberg-Universität, Mainz, Germany), Jack Harrowfield (UNA-ECPM, Perth, Australia), and Jacques Vicens (ECPM-ULP-CNRS, Strasbourg, France). Kluwer Academic Publishers: Dordrecht. 2001. x + 684 pp. $182.00. ISBN: 0-7923-6960-2.

This book is clearly the definitive volume on calixarene chemistry as it stands at the beginning of the 21st century. As the editors state in the preface, we "...hope that what is to be found in *Calixarenes 2001* gives a good sense of the impact and vibrancy of calixarene chemistry." It does much more. It presents a reasonably comprehensive report on the entire field of calixarene chemistry. The 36 chapters are written by leading authorities in their particular specialties. Most of the chapters are amply illustrated with clear structural formulas/diagrams (critical to an understanding of this field) and are well referenced with the most current references dated 2000 and a few even 2001. Every important aspect of calixarene chemistry is covered. The book is loosely organized in the following manner: synthesis, physical/theoretical aspects, complexation, and applications, although many chapters address several or all of these aspects.

The first seven chapters discuss various synthetic aspects, with separate chapters devoted to calix[4]-, calix[5]-, calix[6]-arenes, sulfur-containing calixarenes, and multicalixarenes. The sulfur-containing chapter is particularly timely as a result of the recent emergence of thiacalix[4]arene (calix[4]arene with sulfur, instead of methylene, bridges) as a new and readily available platform. The next three chapters deal with organizing calixarenes by self-assembly or into specific cavitands and carcerands. These are followed by three chapters on homocalixarenes (nonmethylene-bridged structures) and heterocalixarenes (nonphenolic structures). A chapter on oxidation and reduction of the aromatic rings follows. The next five chapters are focused on theoretical/dynamic/thermodynamic aspects: conformations, host−guest complexes, and cation and anion interactions. Three chapters follow on specific metal−ion complexation, including phase-transfer extraction of heavy metals. Specific chapters are devoted to anion receptors, water-soluble calixarenes, neutral molecule recognition, fullerene complexes, bioorganic/biomimetic aspects, coordination chemistry/catalysis, metal reactivity on oxo surfaces, and *f*-element complexes. The final six chapters are the most applications-oriented, covering luminescent probes, chromo-/fluoroionophores, mono- and multilayers, sensors, nuclear waste treatment, and stationary phases.

This book will be useful to both experts in the field (as a convenient and recent reference volume) and to those who might find that calixarenes have potential applications to their own fields. No library should be without this book, because there is no other such comprehensive and up-to-date source. Several excellent books have been published on calixarene chemistry; however, if you are to decide on only one, this should be it.

Michael Lattman, *Southern Methodist University*

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Basic Organic Stereochemistry. By Ernest L. Eliel (University of North Carolina at Chapel Hill), Samuel H. Wilen (Formerly of City College of the City University of New York), Michael P. Doyle (University of Arizona). Wiley-Interscience: New York. 2001. xvi + 688 pp. $79.95. 0-471-37499-7.

The 1994 Eliel/Wilen book entitled *Stereochemistry of Organic Compounds* was properly recommended by important reviewers to be on the bookshelf of every practicing organic chemist. (Heathcock, C. H. *Science* **1995**, *267*, 117. Whitesell, J. K. *J. Am. Chem. Soc.* **1995**, *117*, 1183.) It was a more than worthy successor to the original classic, *The Stereochemistry of Carbon Compounds*, written by Eliel in 1962. The breadth and depth of the 1994 version placed it as the most scholarly treatise in the area. More than 4000 references provided not only a historical context, but also a treasure of data analyzed by a world-class expert with expert help. The cost of the 1994 version, roughly $75 for 1250 pages, made it accessible to all, but its size made it a daunting book, particularly for use in first-year graduate courses. Enter Mike Doyle, who with his expertise in the area and indefatigable enthusiasm, helped produce this more manageable text, which is roughly two-thirds the size of the 1994 edition. This was accomplished without, in my view, sacrificing the core of the subject. Gone is a large glossary of stereochemical terms as well as Mander's excellent but now out-of-date chapter on asymmetric syntheses. The logic with respect to the latter excision is the recognition that a large series of books would be necessary to treat that subject with anywhere near the rigor of the rest of the book. In addition, a large number of parenthetical comments and some interesting but exotic examples were cut from the 1994 version to provide the dramatic reduction in size. The cost is the same as the 1994 version, which, considering inflation, is a value comparable to that version.

So what has been added? Perusal of the references reveals about two dozen new citations since 1994, some to more recent reviews of subjects, which were included in previously cited reviews. There are also three references to J. Fraser Stoddart's molecular devices, two to Vögtle's pretzelanes, one to Peter Rabideau's review of fullerenes, and one to the contribution of Amos Smith and Peter Wipf on the additivity of molecular rotations due to independent chiral centers. Although this may not provide sufficient incentive for those who own the 1994 version to purchase *Basic Organic Stereochemistry*, there is no excuse not to make this book a required book for graduate courses in organic chemistry.

Joseph J. Gajewski, *Indiana University*

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Encyclopedia of Physical Science and Technology. 3rd edition. Edited by Robert A. Meyers (Ramtech Limited, Tarzana, CA). Academic Press: San Diego. 2001. 17 volume set plus a separate index volume. $2900 introductory price through January 31, 2002. $3750 list price thereafter. ISBN: 0-12-227410-5.

The third edition of this definitive source of information in the physical sciences includes nearly 800 articles that provide overviews of 16 general subject areas. Some of the new topics relevant to chemistry that have been added to this edition are cell death (apoptosis), the greenhouse effect, and fullerenes and carbon nanotubes. All of the articles contain an outline of their contents, a glossary of terms, and references. In addition to the usual subject index, this edition has both a Relational Index and a Thematic Index. The latter lists articles according to the general discipline to which they relate, whereas the former lists other titles in the encyclopedia that relate to the original article of interest. Because of the breadth and cost of this publication, it would be difficult to justify its purchase for a specialized collection.

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