Book Review

Separations and Reactions in Organic Supramolecular Chemistry. Perspectives in Supramolecular Chemistry, Volume 8 Edited by Fumio Toda (Okayama University of Science) and Roger Bishop (University of New South Wales). John Wiley & Sons, Ltd.: Chichester. 2004. xiv + 240 pp. $210.00. ISBN 0-470-85448-0.

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J. Am. Chem. Soc., **2005**, 127 (16), 6135-6136• DOI: 10.1021/ja0409614 • Publication Date (Web): 26 March 2005

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BOOK REVIEWS

Ion Exchange and Solvent Extraction, Volume 16. Edited by Arup K. SenGupta (Lehigh University) and Yizhak Marcus (The Hebrew University of Jerusalem). Marcel Dekker, Inc.: New York, Basel. 2004. xviii + 378 pp. $225.00. ISBN 0-8247-5489-1.

The six chapters in this book cover adsorption and ion-exchange properties of carbonaceous materials, ion-exchange behavior of hydrophobic organic ions, ion-exchange supersaturation concepts, metal separations by pH-driven paramagnetic pumping, removal of perchlorate by ion-exchange processes, and ion-exchange kinetics for ultrapure water. The book is concerned exclusively with processes carried out on a large scale using commercially available sorbents. A thermodynamic approach is often emphasized. Numerous figures are included on the effect of variables, such as chemical and physical composition of the sorbent materials, temperature, equilibrium isotherms, and methods of regeneration. The number of figures often seemed excessive: 69 in Chapter 5 alone! A sharper focus on principles and concepts would have been preferred.

The overall quality of the book is very good and the topics covered are timely and interesting. However, the book did not live up to the claim on the back cover that "Vol. 16 summarizes revolutionary advancements..." For example, a reading of Chapter 1 leads one to conclude that some important aspects of activated carbon sorbents vis-à-vis polymeric sorbents have not changed greatly for some years. Carbon has a greater capacity for herbicides and complex aromatic solutes but regeneration/stripping is much easier with a polymeric sorbent. The precise mechanism of adsorption of aromatic molecules on carbon is still not well understood.

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JA041021M

10.1021/ja041021m

Handbook of Sol-Gel Science and Technology: Processing, Characterization and Applications, Volumes I−III. Set edited by Sumio Sakka (Professor Emeritus of Kyoto University). Kluwer Academic Publishers: Boston, Dordrecht, London. 2005. lx + 1980 pp. $1500.00. ISBN 1-4020-7969-9.

This set comprises three volumes: (1) Sol-Gel Processing, (2) Characterization and Properties of Sol-Gel Materials and Products, and (3) Applications of Sol-Gel Technology. Volume 1, edited by Hiromitsu Kozuka, covers general aspects of sol-gel processing, divided into the following eight areas: Sol-Gel Precursors; Processing of Powders and Bulk Materials; Processing of Non-Oxide Materials; Processing of Thin Films; Processing of Fibers and Monodisperse Particles; Encapsulation of Organic Materials; Processing of Catalysts, Porous Materials, and Aerogels; and Special Techniques Used in Sol-Gel Processing. Volume 2, edited by Rui M. Almeida, deals with "structural and microstructural characterizations, plus the characterization of thermal, mechanical, optical and electrical properties of sol-gel derived materials", to quote from the preface. Its 23 chapters are organized under the following six headings: Structural Characterization at the Atomic Scale; Microstructure Characterization at the Nano- and Micro-Scales; Thermal and Rheological Characterization; Mechanical Properties; Optical Properties; and Electrical and Magnetic Properties. The final volume, edited by Sumio Sakka, consists of 35 chapters on materials produced by applying sol-gel technology. These are grouped into six sections: Dense and Porous Materials; Particles and Fibers; Lasers and Related Materials; Environments and Energy; Applications to Organic and Bio-Materials; and Functional Coatings. Each volume concludes with a subject index.

JA041056M

10.1021/ja041056m

Separations and Reactions in Organic Supramolecular Chemistry. Perspectives in Supramolecular Chemistry, Volume 8. Edited by Fumio Toda (Okayama University of Science) and Roger Bishop (University of New South Wales). John Wiley & Sons, Ltd.: Chichester. 2004. xiv + 240 pp. $210.00. ISBN 0-470-85448-0.

Over the years, supramolecular chemistry has rapidly developed in different directions. Volume 7 of the Perspectives in Supramolecular Chemistry series focused mainly on crystal design and engineering. This volume, on the other hand, turns its attention to separation and reactions in the solid state.

The first part of the book (Chapters 1−5) is a description of recent methodologies for the effective resolution of racemates and mixtures of isomers, making use of the technique of inclusion complexation. The contents of the chapters clearly show how this methodology, using subtle supramolecular interactions, is very useful for (enantio)separations that are otherwise very difficult or even impossible. For these separations, 1,4-diols, simple dipeptides, and bile acid derivatives that give unique arrangements in their crystalline state are used, for example. The separation of isomers using supramolecular systems is approached from a physical organic viewpoint in Chapter 5, which emphasizes physicochemical studies.

Chapter 6 can be considered the caesura in the theme of the book; it is more or less an outsider. This excellent chapter demonstrates how the retro-cyclopropanation reaction has become a powerful tool for the separation of enantiomers and constitutional isomers of fullerenes. However, it has nothing to do with the solid state.

The second part of the book (Chapters 7−9) is a nice description of selective thermal and photochemical reactions in inclusion crystals. Here it is seen that the solid state provides a medium to organize reactants using linear templates wherein the templates operate by way of hydrogen bonds. The format of the final chapter, on the development of a new biocide, is

different from the previous; it reads like a regular research paper, complete with an experimental section.

In conclusion, this book gives a good overview of this particular research area and can be used by both undergraduate students and specialists in the field. Unfortunately, not all of the chapters really relate to the general topic of the book. Another disadvantage is that the authors of several chapters focus mainly on their own work, rather than providing a more general overview of the topic. Also, the quality of the book could have been improved by using some color figures, although that would have resulted in an even higher cost. As it is, its high cost may prevent many individuals from buying the book. However, it should be a useful addition to the reference collections of libraries.

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JA0409614

10.1021/ja0409614