Book Review

Modern Rhodium-Catalyzed Organic Reactions Edited by P. Andrew Evans (Indiana University). Wiley-VCH Verlag GmbH & Co. KGaA: Weinheim. 2005. xxiv + 474 pp. $185.00. ISBN 3-527-30683-8.

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BOOK REVIEWS

Immobilized Catalysts: Solid Phases, Immobilization and Applications. Topics in Current Chemistry, 242. Edited by A. Kirschning (Universität Hannover). Springer: Berlin, Heidelberg, New York. 2004. x + 336 pp. $299.00. ISBN 3-540-20915-8.

This volume contains eight chapters, written by leading experts in their fields, that cover a variety of different aspects of immobilized catalysts. Although it would be impossible for this book to be fully comprehensive, the authors have done an excellent job of covering the most recent key developments in the field. Topics covered include polymeric supports, noncovalently bound catalysts, immobilized palladium catalysts for organic synthesis, applications of catalysts on soluble supports, microwave-assisted synthesis, continuous flow processes, industrial applications, and immobilized biocatalysts in industrial research and production. This will prove to be a valuable reference work for those already involved in the field and also for those contemplating entering it. It should be on the shelves of every good chemistry library.

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Macromolecules Containing Metal and Metal-like Elements, Volume 4: Group IVA Polymers. Edited by Alaa S. Abd-El-Aziz (University of Winnipeg), Charles E. Carraher, Jr. (Florida Atlantic University), Charles U. Pittman, Jr. (Mississippi State University) and Martel Zeldin (Hobart and William Smith Colleges). John Wiley & Sons, Inc.: Hoboken, NJ. 2005. xviii + 348 pp. $125.00. ISBN 0-471-68238-1.

This monograph is part of a series in which the subject of Group IVA-containing polymers will appear over several volumes. Volume 1 was a review of silicon-, germanium-, tin-, and lead-containing polymers, and the editors note that a future volume will focus on silicon-containing macromolecules. Volume 4, under consideration in this review, is devoted to all elements of the group except carbon. In this monograph, there are individual chapters on germanium, tin, and lead polymer chemistry. These reviews encompass mostly older literature with some recent updates, although each chapter contains fewer than 20 references since 1999, which might be expected due to the slower pace of development in these areas compared to silicon. The lion's share of the text is devoted to different aspects of silicon chemistry, including siloles, siloxane elastomers, silsesquioxanes, silica/silsesquioxane-organic polymer hybrids, silica polyamine nanocomposites, and bioinspired silica.

In a monograph of this type, I look for authoritative reviews that capture the essence of a body of work, including a description of the scientific fundamentals, and provide insights into new directions in the field. The most successful chapters in the book in this regard give solid background information and provide an excellent level of detail on current trends. They include a chapter on polyhedral oligomeric silsequioxanes (POSS) and a chapter on bioinspired silica. For the expert and novice alike, these two chapters alone make the book worthwhile. POSS chemistry has been reviewed several times, but the authors, Li and Pittman, Jr., have nicely divided the discussion into syntheses of POSS materials per se and their incorporation into resins. With regard to the latter chapter, new perspectives into silica chemistry have arisen through a better understanding of silica biomineralization in both animals and plants. The review on bioinspired silica by Patwardhan and Clarson captures the essence of these new results, while articulating in a clear way the current understanding of the processing of bio-derived silica and their own efforts to exploit biological principles to prepare silica with well-defined properties.

The normal standards for a monograph, with respect to both consistency and production qualities, are not completely met in this book. The subject of one review, silica polyamine composites, was interesting in its own right, but its main focus on metal complexation by amines is only peripherally involved with Group IVA chemistry. In addition, the various authors of the book were apparently not provided with clear editorial guidelines: Chapters 2, 3, and 7 appear to be normal scientific papers that include experimental sections; indeed, there are three different experimental sections in Chapter 7. These inconsistencies reduce the overall impact of the text for the reader. With respect to quality control, my favorite typographical errors include US Patient Appl. for US Patent Appl. and discarnate for diisocyanate, but there are many others. Thus, taken in its entirety, this book is not completely satisfactory. It is interesting to "dip into" from time to time and will make a useful addition to an institutional collection. It should also be a useful addition to the collections of those interested in more highly condensed silicon-based materials.

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Modern Rhodium-Catalyzed Organic Reactions. Edited by P. Andrew Evans (Indiana University). Wiley-VCH Verlag GmbH & Co. KGaA: Weinheim. 2005. xxiv + 474 pp. $185.00. ISBN 3-527-30683-8.

Rhodium-catalyzed organic reactions have played an important historical role in the field of organic synthesis, and in recent years that role has expanded at a breathtaking pace. Thus, there has been a real need for a work such as this in which the most major recent advances in the field are brought together in a systematic and highly useful manner. Evans succeeded in assembling a group of internationally recognized scholars to author 19 chapters on rhodium-catalyzed transformations, with each chapter focusing on a specific reaction class, listed as

follows: asymmetric hydrogenation (Chi, Tang, and Zhang); hydroborations and related reactions (Brown); asymmetric additions of organometallic reagents to alkenes (Yoshida and Hayashi); asymmetric olefin isomerizations and hydroacylations (Fu); stereoselective hydroformylation and silylformylations (Leighton); carbon−carbon bond formations involving Rh−H and Rh−Si species (Matsuda); cycloisomerization and cyclotrimerization reactions (Fujiwara and Ojima); the Alder-Ene reaction (Brummond and McCabe); nucleophilic ring cleaving reactions of allylic ethers and amines (Fagnou); allylic substitutions (Leahy and Evans); [2+2+1] and [4+1] carbocyclizations (Jeong); [4+2] and [4+2+2] carbocyclizations (Robinson); [5+2], [6+2], and [5+2+1] cycloadditions (Wender, Gamber, and Williams); rhodium-stabilized carbenoids containing both donor and acceptor substituents (Davies and Walji); chiral dirhodium carboxamidates for asymmetric cyclopropanation and carbon−hydrogen insertions (Doyle); cyclopentane constructions via intramolecular C−H insertions (Taber and Joshi); oxidative aminations (Espino and Du Bois); rearrangement processes of oxonium and ammonium ylides formed by rhodium-catalyzed carbene transfers (West); and 1,3-dipolar cycloaddition reactions (Savizky and Austin).

Each chapter has a brief review of the history of the topic reaction(s), and useful details concerning the scope, selectivity, and mechanism of that particular reaction type are provided. Some chapters, such as those covering reactions with well-established mechanisms, appropriately focus more on issues of scope and selectivity than on the mechanism. However, all chapters have key references to relevant mechanistic work. The authors of many of the chapters do an excellent job of highlighting the complementary nature of rhodium catalysts relative to other metals and describing remaining challenges and future research directions. In most cases, the literature is covered through the year 2002, with some chapters highlighting developments from 2003 and even 2004.

In summary, this timely book is a concisely written and highly valuable reference that will find widespread use by scientists in the fields of catalysis, organometallics, and organic synthesis in the years ahead.

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