Metal-catalysis in Industrial Organic Processes, edited by G. P. Chiusoli and P. M. Maitlis; RSC Publishing: Cambridge, **2006**, hardcover, 328 pp, £99.95, ISBN 0-85404-862-6

This book presents, in 290 pages, introductory and general information on industrial-scale metal-catalyzed processes for the production of organic chemicals from economical, technical, and scientific points of view. It is a textbook that presents its material in concise form together with general analyses of tendencies and principles.

As the title implies, the scope of processes covered spans a wide range, from petrochemical refining or Fischer–Tropsch technology via specific small-scale applications of asymmetric catalysis to the hydrogenation of oils for margarine production. The contributing authors are experts from industry and academia.

Chapter 1 is a general introduction on the use of catalysis in the chemical industry and analyzes the interplay of economy of scale, R&D costs, feedstock, thermodynamics, kinetics, and other aspects of catalysis. Chapter 2 covers carbon–oxygen bond-forming processes, mainly oxidations of unsaturated hydrocarbons. The chemistry behind the processes is well described throughout the book. Organic chemists will already be familiar with many of the mechanisms, but may still find the discussion of mechanisms of surface reactions quite interesting. With caprolactam, adipic acid, methacrylic acid, and phenol as examples, it is shown that older production processes have been replaced by new and more efficient ones, and that current processes are likely to be replaced in the near future. Chapter 3 deals with hydrogenation and metal hydride chemistry. The 'usual suspects' among asymmetric catalytic processes (DOPA, metolachlor, menthol) are presented. Ironically, the structural formula drawings in this section on stereochemical aspects lack a basic sense of symmetry and geometry. Chapter 4 analyzes some remarkable syntheses with carbon monoxide, based on syngas as feedstock. The production of acetic acid by carbonylation of methanol is discussed, and catalyst systems are compared. Chapter 5 on carbon–carbon bond formation covers Friedel–Crafts alkylations, cracking, cross-coupling reactions, butadiene chemistry, and other reactions. Two shorter chapters on metathesis of olefins and aliphatic polyolefin synthesis follow. The book ends with two short appendices on the basic organometallic chemistry related to catalysis and basic aspects of heterogeneously catalyzed reactions; they can be considered extended glossaries.

Throughout the book, 'discussion points' are included in the form of questions. They are sometimes quite general with no simple and correct answer. All chapters contain references to the original or secondary literature. The rich information contained in this book is not just in the main text, but also comes in the form of text boxes and appendices. The overall information presentation is therefore a bit fragmented; for example, Box 2 on petroleum cracking is placed in Chapter 3, and the concepts of TON and TOF are only defined on page 270. This fragmentation is probably a consequence of the broad range of topics, the 'edited-book-character', and the desire to keep the book open to readers with various backgrounds. Quantitative aspects and details of physical chemistry are not treated in depth; instead the editors have created a big picture based on general principles, connections, and trends. I enjoyed reading this book to learn about metal-catalyzed organic syntheses that are not typically included in general lectures on organic chemistry. I can recommend the book as an interesting introduction into the field of metal-catalyzed industrial processes for readers with a basic background in organic chemistry. The book will also be helpful for the preparation of lectures on industrial chemistry and as a source of application examples for lectures on organometallic, synthetic, and catalytic chemistry.

Lukas Hintermann, Rheinisch-Westfälischen Technischen Hochschule (RWTH) Aachen, Germany

SYNTHESIS 2007, No. 13, pp 2064–2064
Advanced online publication: 26.06.2007
Art ID: B21307SS