

Book Review

Green Chemistry and Catalysis By Roger A. Sheldon, Isabel W. C. E. Arends, and Ulf Hanefeld (Delft University of Technology, The Netherlands). Wiley-VCH Verlag GmbH & Co. KGaA: Weinheim. 2007. xiv + 434 pp. \$190. ISBN 978-3-527-30715-9.

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This book, a simply first-rate monograph, focuses on the critical role of catalysis in the emergent field of green chemistry and includes a Foreword aptly written by Martyn Poliakoff. The authors, Sheldon, Arends, and Hanefeld, bring a breadth of expertise in homogeneous and heterogeneous biocatalysis and organic synthesis to their subject. The book is thoughtful in providing perspective, thorough in its topical coverage, and very well written—a real pleasure to read. Throughout, the writing style is clear, concise, and fluid, and I really liked the logical organization of the content.

The first chapter sets the standard and the tone for the remainder of this artfully crafted volume. It opens with a succinct presentation of the 12 principles of green chemistry followed by an introduction to catalysis (homogeneous and heterogeneous), biocatalysis, and organic synthesis, all written within a “green chemistry” framework. Throughout the chapter, the authors illustrate the needs, opportunities, and potential benefits of a “green” approach with excellent examples of chemical processes vital to the chemical industry. Interspersed throughout the introductory chapter are 142 literature references.

Chapter 2 focuses on solid acid/base catalysis. This is followed by a review of homogeneous and heterogeneous catalytic reductions with a rational emphasis on catalytic hydrogenation (Ch 3), catalytic oxidations (Ch 4), catalytic C–C bond formations (Ch 5), and finally enzymatic hydrolysis (Ch 6). In Chapter 7, the authors explore the role of solvents and discuss solvent-free processes as well as the use of nontraditional

solvent systems including bi- and multiphase systems, ionic liquids, and finally supercritical fluids as reaction media. They focus on the use and opportunities for renewable raw materials in chemical processes in Chapter 8 and, in the next chapter, discuss the importance of a green approach not only in the synthetic effort but also in the downstream processing as well. Each chapter ends with a tight, succinct conclusion and outlook section that nicely pulls together the major themes presented and places the potential impact of each process in perspective. The book closes with a perspective on the future of green chemistry, in which the authors do a superb job of making the case that green chemistry is here to stay because it is thoroughly and incontrovertibly interwoven throughout the framework of today’s chemical industry.

At present there are only a handful of books on green chemistry. These include several edited volumes, such as the ACS Symposium Series monograph, “Advancing Sustainability through Green Chemistry and Engineering” edited by Lankey and Anastas (ACS, 2000), and “Green Chemistry: Challenging Perspectives” edited by Tundo and Anastas (Oxford University Press, 2000). The only somewhat comparable book on the market is Ahluwalia and Kidwai’s text, “New Trends in Green Chemistry” published by Kluwer Academic Publishers in 2004. However, there is simply no comparison in terms of either technical content or the quality of the work overall. This book is the clear choice for any chemical professional or graduate student seriously interested in the emerging field of green chemistry.

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