

Cinchona Alkaloids in Synthesis & Catalysis: Ligands, Immobilization and Organocatalysis. Edited by Choong Eui Song (Sungkyunkwan University, Suwon, Republik Korea). WILEY-VCH Verlag GmbH & Co. KGaA: Weinheim. 2009. 526 pp. \$129.95. ISBN 978-3-527-32416-3.

Cinchona alkaloids and their derivatives have had a tremendous impact on chemistry and medicine. This book provides a very timely and much needed overview of many aspects of cinchona alkaloid chemistry. Despite the large volume of published work, the editor successfully compiled a very readable and well-organized text that captures the essence of this topic. The coverage includes much of the work published up to and in 2008, and some chapters reference work published in early 2009.

The book is divided into four parts with a total of 13 chapters. Chapter 1 provides an introduction to the history of cinchona alkaloids and also covers the conformational properties that determine much of their reactivity. Chapters 2–4, which constitute Part 1 of the book, offer descriptions of the use of cinchona alkaloids and derivatives in metal-catalyzed reactions, be it as ligands or cocatalysts. Homogeneous and heterogeneous metal-catalyzed reductions are discussed in Chapter 2. Unique to this chapter is an analysis of the described transformations in the context of their industrial applicability. Arguably, the most significant impact cinchona alkaloids have had on modern synthesis is in their use as ligands for asymmetric dihydroxylation and aminohydroxylation reactions, the subject of Chapter 3. Although this chapter provides a nice summary of these important reactions, some of the schemes would have been improved by including more detailed information, such as yields and selectivities.

The largest portion of the book, Part 2, Chapters 4–11, is dedicated to organocatalysis, an area in which cinchona alkaloids have had a major impact and one that has seen explosive growth over the past decade. These chapters are organized by type of reaction rather than mode of activation, which makes for a very clear presentation of the material. Discussed are oxidation and reduction reactions (Chapter 5), nucleophilic α -substitutions of carbonyl derivatives (Chapter 6), enantioselective protonations (Chapter 7), nucleophilic additions to C=O and C=N double bonds (Chapter 8), and conjugate additions to electron deficient

C=C double bonds (Chapter 9). Chapter 10 is dedicated to cycloadditions, but in the loosest sense of the term. Included are stepwise processes and annulation reactions such as Michael–Michael cascades. As a consequence, there is some redundancy with Chapter 9. Part 2 of the book concludes with Chapter 11 on the use of cinchona alkaloids as organocatalysts for desymmetrizations and kinetic resolutions.

Part 3 (Chapter 12) is an excellent summary of the fascinating and often unexpected organic chemistry of cinchona alkaloids, detailing methods that lead to functionalization or degradation. Taken in context, it is surprising that some of these methods were discovered only very recently. In Part 4 (Chapter 13), the use of cinchona alkaloids and their derivatives as resolving agents are outlined. Discussed are classical and current industrial applications as well as efforts to use these versatile reagents to generate chiral stationary supports for various chromatographic applications. The book concludes with an appendix that summarizes in tabular form all of the reactions that are described in detail in Chapters 2–11. This useful summary allows the reader to obtain a quick overview of the subject matter.

Although most schemes and figures in this book are presented clearly, a number of them could have used some touchup to eliminate odd bond angles and overlapping labels. Also, a more unified depiction of cinchona alkaloid structures throughout the book would have been desirable. As with almost any book of this type, there are some errors and confusing drawings, e.g., in Schemes 6.32 and 9.10, but overall their occurrence is minimal. A chapter summarizing approaches to the total synthesis of cinchona alkaloids would be a nice addition for a future edition.

Overall, this book can be highly recommended to anybody interested in the chemistry of these versatile natural products. Novices as well as experts in the area of asymmetric catalysis will find this book to be a very valuable resource. The relatively affordable price puts it in the reach of a wide audience. It certainly should be added to any good chemistry library.

Daniel Seidel, *Rutgers, The State University of New Jersey*

JA103586V

10.1021/ja103586v