

Book Reviews

Catalytic Asymmetric Synthesis. Edited by I. Ojima. VCH: Weinheim; 1993, XIV + 476 pp., hardback DM 186, £ 76. ISBN 3-527-89532-9.

With explosive growth in the realisation of catalytic asymmetric syntheses over the last several years, it was inevitable that there would be attempts to assemble a set of articles which endeavoured to assess the state of progress. This has already happened in a modest way through, for example, published symposia from the ACS, a dedicated issue of Chemical Reviews, and elsewhere. It is therefore fortunate that the first genuine attempt to provide a comprehensive treatment of Catalytic Asymmetric Synthesis in book form is a resounding success, providing credit both to editor and contributors. In most of the areas covered, Ojima has persuaded a leading expert to contribute an overview of his topic which is critically assessed, readable and remarkably up-to-date. In a book of this kind, the visual presentation is critical; thus it is a pleasure to find that the quality of illustration is uniformly high, and augmented by an Appendix which displays and cross-references all the catalysts employed. The book is logically organised by topic, with the sequence of nine Chapters being Hydrogenation (Takaya, Ohta, Noyori); Isomerisation (Akutagawa, Tani); Cyclopropanation (Doyle); Oxidation – in four parts, namely Allylic Alcohol Epoxidation (Johnson, Sharpless), Alkene Epoxidation (Jacobsen) Sulfide Oxidation (Kagan) and Dihydroxylation (Johnson, Sharpless); Carbonylation (Consiglio); Hydrosilylation (Brunner, Nishiyama and Itoh); C-C Bond Formation – in two parts, firstly Substitution and Cross-Coupling (Hayashi) and then Aldol Reactions (Sawamura, Ito); Phase-transfer (O'Donnell) and finally Chiral Lewis Acids (Maruoka, Yamamoto). The speed of production has not led to loss of veracity although there are minor errors – for example, the running mast on pages 89-99 properly belongs to the previous chapter, and Pauson-Khand is consistently misspelt.

Given such a wealth of new chemistry, so well organised and presented, criticisms may appear to be mere quibbles. This reviewer might have preferred a somewhat different balance, however. The excellent overview of asymmetric hydrogenation necessarily includes only a fraction of the literature in its 38 pages whilst Chapters covering topics of lesser scope command comparable space. Oxidation is generously treated and hence Chapter 4 provides 40% of the total page count; having said that, the review on epoxidation of simple alkenes and that on dihydroxylation provide *the* definitive current summaries of their respective subjects, and purchase of the book is well justified on that count alone – although the bulk of the allylic alcohol subsection had already appeared in *Comprehensive Organic Synthesis*. The organisation is generally a successful one and avoids overlap, but is least

comfortable in the division of Lewis acid catalysis. More seriously, there are gaps in the coverage, some crevasse-sized. The spectacularly successful Corey-Itsuno oxazaborolidine-catalysed carbonyl reductions fail to get a mention, as also does the asymmetric catalysis of dialkyl zinc additions (other than in the Epilogue). Similarly, the recent breakthroughs in asymmetric Heck reactions lie neglected, and perhaps also a mention of asymmetric catalytic hydroboration would have been appropriate. If the structure of the book had been irrevocably set before these advances, then there should have been a concluding Chapter which engineered the missing information into place.

The reader might gain an impression from the apparent completeness of many of the presentations that this is a mature field, close to fulfilment of its mission. Fortunately, that is far from the truth. Where direct comparison can be made, the calibrant for catalytic asymmetric synthesis is biological chemistry. In many cases the scope, specificity and reactivity of the chemical catalyst equals or exceeds that of the enzymic counterpart. But in many other cases they do not, sustaining the impetus and the challenge.

John M. Brown, University of Oxford, England