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Book reviews

Stereoselective Synthesis; by M. Nógrádi, VCH Publishers, 1987, xiv + 356 pages, £69.00, ISBN 3-527-26467-1.

The stated aim of this book is to review practical methods of stereoselective synthesis with particular emphasis on recent advances. This is a vast area and the author has prudently limited the scope of his discussion. Enzyme mediated reactions are not considered, nor are syntheses utilising the "chiral pool" of naturally occurring optically active starting materials. More stress is laid on formally enantioselective rather than diastereoselective reactions. Despite these limitations, the areas which are discussed are done well, and the book conveys the excitement which has been felt in this field in recent years.

The first Chapter deals with the general concepts of stereoselective synthesis, with careful definition of the formal stereochemical terms to be used in later sections. This is indeed useful, but may be a little daunting to the uninitiated. Chapter 2 considers stereoselective catalytic reductions: although the enantioselective reduction of prochiral dehydroamino acid derivatives, in the presence of chiral rhodium phosphine complexes, occupies pride of place, as might be expected, other metals and reduction of carbon to heteroatom multiple bonds are not neglected. However, the diastereoselective reductions of double bonds bearing nearby polar functional groups, as recently reported by Brown, Crabtree, and Evans, are somewhat under-emphasised. Stereoselective non-catalytic reductions, discussed in Chapter 3, are mainly represented by reductions of carbonyl compounds to alcohols. Chirally modified hydride reagents, chiral metal alkyls, and chiral hydride transfer agents are considered and diastereoselective reductions are also detailed.

Chapter 4 deals with stereoselective oxidations, considering both enantioselective and diastereoselective reactions. This is a weak section, particularly in its discussion of the predictability of the results of the Sharpless oxidation. In Chapter 5 carbon–carbon bond formation by addition of nucleophiles to carbonyl compounds is discussed, including both reactions catalysed by chiral additives and diastereoselective reactions of chiral substrates. The sections on allylmetal nucleophiles and diastereoselective aldol reactions are especially well described. Other (and somewhat miscellaneous) carbon–carbon bond forming processes are detailed in Chapter 6; the reactions considered include Michael additions, allylic alkylation, hydroformylation, enolate alkylation, and related processes, and cross coupling reactions of organometallics. Pericyclic reactions, both catalysed and otherwise, are discussed in Chapter 7, whilst Chapter 8 is a collection of reactions involving the formation of carbon–heteroatom bonds.

The volume is well-produced, as readers have come to expect from this publisher. The diagrams are clear and consistent, with few typographic errors, and there is a useful glossary of terms. The literature is reviewed up to the end of 1984; unfor-

tunately this is a fast-moving field and a good deal has happened since that date. The index seems useful and complete.

This book is not a complete overview of the subject of stereoselective synthesis, but the topics which are considered are well reviewed. The stress throughout is on chemical utility, reflecting the now well established importance of this topic in commercial as well as academic circles. The style is both readable and informative. For a relatively slim volume, the price is probably too high for individual purchase, but this is an interesting and stimulating book, which deserves a wide readership.

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Catalyst Design; Progress and Perspectives, edited by L.S. Hegedus. Wiley-Interscience, 1987, xi + 288 pages, £43.60, ISBN 0-471-85138-8

This book has its origins in two symposia on catalyst design at Annual Meetings of the American Institute of Chemical Engineers. Some of the participants subsequently met to prepare this volume. They are clearly an optimistic group in that they believe that method and reason may be brought to bear in a field which has, in the past, been largely characterised by luck and empiricism. A wide range of topics are addressed within the field of catalysis, reflecting the authors' varied backgrounds and interests.

The introductory chapter, written by the editor, points out the importance of catalysts and their design both in technological and economic terms. Chapter 2 by G.A. Somorjai discusses the building of catalysts from the point of view of a molecular surface science approach, considering mainly the structures of and reactions at metal surfaces. The third chapter, by B.E. Gates, will be of more interest to organometallic chemists, since it considers the molecular processes involved in reactions catalysed by supported metal complexes. Chapter 4 also details supported species, but these are mainly supported metals, more readily studied by the methods of physical chemistry rather than by investigation of molecular mechanism. In Chapter 5 by M. Boudart, the rôle of kinetic studies in catalyst design is reviewed, whilst Chapter 6, by W.O. Haag and N.Y. Chen, considers catalyst design involving zeolites. Mathematical models in catalyst design are considered by R. Aris in Chapter 7. The final section by J. Wei details an approach towards the design of hydrodemetallation catalysts for crude oil.

This is an attractively produced volume with few errors, good diagrams, and a reasonable index. The bibliography is useful and up to date (including 1986 references) but is presented in an irritating manner, being referenced only by author's name without numbers. As a chemist interested in catalysis by organometallics, I approached this book with interest and optimism and I must confess to some disappointment. It is a good book, reflecting many important areas of catalyst design, but it will be of much more interest to surface scientists and chemical technologists than to chemists interested in molecular process.

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