

Book Reviews

Organic Synthesis - Theory and Applications. Vol. 2. Edited by T. Hudlicky. Jai Press: Greenwich; 1993, 188 pp., hardback £ 53. ISBN 1-55938-185-X.

This book contains an excellent account of the state of the art of organic synthesis in five chapters. The first chapter written by Hudlicky and Natchus describes the development of synthesis from the Woodward (Robinson?) era to today. Four very different targets are chosen to illustrate how organic synthesis has developed from the 1950s. This introductory chapter details much more than chemistry; the authors demonstrate how many Universities fail to recognise the importance of the intellectual talents of staff but are more interested in immediate financial gain. Another clear fact is that the organic chemical community are far too critical of each other and can inhibit creative thought. As a result we suffer from reduced grant income from the governmental agencies. In the UK the chemical industry is the most profitable industry we have.

In the second chapter entitled 'Toward the ideal synthesis', Wender and Miller set out a most excellent account of synthesis design, planning and execution. The chapter is beautifully illustrated with examples of reactions giving rise to a large increase in molecular complexity in one synthetic operation. The intramolecular arene-alkene cycloaddition reaction is illustrative, providing up to three new rings and six new stereocentres. A discussion of tandem or cascade cyclisation processes is presented again illustrating the dramatic increase in molecular complexity in one synthetic operation.

This discussion includes tandem cation, radical and organometallic induced cyclisation procedures, and is illustrated with examples taken from steroid synthesis, alkaloid synthesis and aromatic ring synthesis. Stereocontrol in polymerisation reactions utilising modified Ziegler-Natta catalysts and even X ray mediated carbon-carbon bond forming reactions with stereocontrol are described. This excellent chapter concludes with a description of the rearrangement disconnection, and the recognition of symmetry in complex systems which can greatly simplify a synthetic strategy. The authors' summary points out that synthesis design can be approached systematically, but is an artistic endeavour. We hence strive towards the perfect synthesis in the hope that society will recognise the importance of future research endeavours in synthetic chemistry.

The applications of graph theory to synthesis planning forms the third area of discussion in this book. Steven H. Bertz and Toby J. Sommer cover the detailed analysis of molecular complexity with an introduction to graph theory that is easy to follow, leading into the identification of topological strategic bonds. The concepts of calculation of molecular complexity and the recognition of reflexivity clearly add to the careful planning of a synthesis and these ideas are well set out here.

In the fourth section of this work, Narasaka and Iwasawa review asymmetric reactions promoted by

titanium reagents. Asymmetric Diels-Alder reactions are discussed in the first few pages, again the theme of increasing molecular complexity is seen with respect to the formation of homochiral molecules. The ene reaction is then presented with a discussion of simple asymmetric induction promoted by chiral titanium catalysts. The chapter concludes with a discussion of asymmetric [2+2], hydrocyanation reactions and kinetic resolution of an α -arylcarboxylic acid. This chapter places a foundation for future studies in this fruitful area.

The final and highly impressive chapter by Brown and Hudlicky describes the detailed chemistry of arene cis-diols derived by microbial transformation of aromatic compounds using *Pseudomonas* sp. This review demonstrates the facile formation of catechols and phenols hitherto difficult to make.

The use of arene diols in the construction of inositols and their analogues is described. An approach to hippastrine is presented which utilises iron carbonyl complexes of arene-1,2-diols. A useful summary of the application of arene-1,2-diols in total synthesis is presented at the end of this chapter together with brief biographical sketches of the authors.

As I have indicated in this review, this book presents an impressive account of the state of organic synthesis; useful and honest comments are also made about refereeing policy, of which the chemical community should be aware. I recommend this excellent book to anyone interested in the challenge of organic synthesis. The book clearly illustrates that the art is very much alive and really still in its infancy; we look forward to intensive research providing future developments. The coverage of clear thinking, planning and the art of strategy is beautifully demonstrated by experts in the field.

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