

Book reviews

***Understanding Organic Reaction Mechanisms*, A. Jacobs, Cambridge University Press, Cambridge, 1997, pp xv + 304, Price £17-95, ISBN 0-521-46776-4**

Organic reaction mechanisms are a fundamental part of organic chemistry, and the ability to understand how they work and appreciate the principles that govern chemical reactivity is extremely important. An understanding of these principles assists individuals in making intelligent predictions about the mechanisms and outcomes of specific chemical reactions.

Molecular orbital theory is used to provide logical explanations of chemical reactivity, and the first chapter introduces the principles of chemical bonding, specifically discussing atomic orbitals, hybridization, resonance structures, curly arrows, frontier orbitals and aromaticity. The next two chapters describe more of the background to understanding reaction mechanisms. Firstly, the nature of ionic species, which are found in the vast majority of chemical reactions, e.g. acids and bases, nucleophiles, electrophiles and leaving groups, and secondly the driving forces behind such reactions, such as thermodynamic and kinetic effects.

The next two chapters take a closer look at the specific molecules that take part in the chemical reactions, the chapter focuses on reactive carbon species, e.g. carbanions, carbocations, carbon radicals, and carbenes, and chapter five deals with the effect of heteroatoms such as oxygen, nitrogen, sulphur, phosphorus, halogens, group I and II metals, and silicon. Most of the principles behind the reasons why chemical reactions take place have been discussed in the first five chapters of the book, so the sixth chapter details some of the types of reactions themselves, such as additions, eliminations, substitutions, rearrangements, and pericyclic reactions.

Chapter seven examines some of the experimental techniques utilised for establishing mechanisms, as not all mechanisms can be theoretically ascertained with certainty. The penultimate chapter is devoted to exploring the thought processes involved in predicting the mechanisms of unfamiliar reactions, and draws together all of the material presented in previous sections of the book. The final section examines the reaction mechanism case histories of four specific reactions with interesting mechanisms.

Overall 'Understanding Organic Reaction Mechanisms' is an extremely well constructed volume that logically flows in sequence from chapter to chapter, with each chapter concluding with a summary of the important points and a

selection of problems to help the reader to apply the knowledge gained from assimilating the data in each section. We are therefore pleased to highly recommend this volume as a main stream undergraduate chemistry textbook, which is also useful as a general mechanistic reference guide for researchers in both academic and industrial organic chemistry.

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***Forest Products Biotechnology*, A Bruce J W Palfreyman (Eds.) pp. ix + 326, ISBN 0-7484-0415-5**

Industries are developing radical, new biotechnological processes to expand and develop their range of products that originate from the world's forests. As a result, biotechnology is helping to reduce any adverse impact on the environment.

Forest Products Biotechnology presents a comprehensive review of specialist research directed towards efficient and environmentally friendly use of the forests. It begins with a brief introduction into wood as a material. It then moves on to examine wood decay. Biopulping is defined as the pretreatment of wood by delignifying fungi. It leads to energy reduction and a lower lignin content after cooking (Chapter 4). Next, two chapters follow which consider environmental alternatives to the two main problems associated with pulp, namely that of bleaching and treatment of effluents.

Bioremediation is the process by which hazardous organic materials are biologically degraded. The bioremediation of contaminated soils and woods is discussed in Chapters 7 and 8, respectively. Next follows a discussion of wood composites. Secondary metabolites in wood processing are defined as those compounds that are not structural polysaccharides or lignin. A review of their chemistry can be found in Chapter 10. There are two main types of wood derived adhesive, which are based on tannin and lignin (Chapter 11).

Chapters 12 and 13 examine products derived from forest waste substances, namely ethanol and mushrooms. In the

US alone, pharmaceutical products originating from plants still make up some 25% of prescription drugs (Chapter 14). The role of biological metal chelators in wood degradation is reviewed in Chapter 15.

Biological control can be generally described as the introduced use of organisms or their products to keep in check the numbers or activities of a particular species (Chapters 16 and 17). Genetic improvement to trees is a long and slow process owing to the long reproductive cycle of these plants. A discussion of transgenic trees is outlined in Chapter 18. The book concludes with a discussion of the use of molecular methods for the detection and identification of wood decay fungi.

This book would be a valuable reference source for students and researchers in the area of forest products, wood science, timber technology, environmental biotechnology and biomaterials.

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***Glycoscience: Synthesis of Oligosaccharides and Glyconjugates*, pp. VIII + 239, Price £129 ISBN 3-540-62033-8**

***Glycoscience: Synthesis of Substrate Analogues and Mimetics*, pp. VIII + 231, Price £129 ISBN 3-540-62032-X**

Topics in Current Chemistry Volumes 186 and 187 H. Driguez, J. Thiem (Eds.)

The formulation of complex saccharide structures by classical organic synthetic means are often restrained by complex protection group chemistry, leading to time consuming multistep synthesis with low overall yields. Where enzymes are readily available for such synthesis, their use can often be hampered by the low regioselectivity of such reactions.

Glycoscience: Synthesis of Oligosaccharides and Glyconjugates, Volume 186 in the Topics in Current chemistry series places special emphasis on the formulation of complex saccharide structures employing various enzymes found in carbohydrate metabolism.

The book begins with a review of glycosidases, and glucosyltransferases. Next, the formation of special ergiot glycosides is described. Protein conjugates have a key role in the passing of chemical signals across the cell membrane and beyond to the cell nucleus. This biological importance has created considerable demand for these complex macromolecules, the synthesis of which is also discussed. The

remainder of the book is concerned with certain classical synthetic strategies for which novel findings have contributed to or have even improved upon, specifically in the synthesis of sialic acids and pyruvated saccharides.

Glycoscience: Synthesis of Oligosaccharides and Glyconjugates, Volume 187 in the topics in Current Chemistry series places particular emphasis on the demanding synthetic approaches to and on the biological implications of carbohydrate derived modulators or inhibitors.

Carbohydrate analogues in which a carbon atom substitutes the glycosidic oxygen are defined as C-glycosides, and the book begins with a review of their synthesis. The book moves on to examine the synthesis of thio-oligosaccharides (oliosaccharides in which at least one intersidic oxygen atom is substituted by a sulphur atom). Carbohydrate lactones have proven to be versatile starting materials which do not require the use of protecting groups (article 4). The book continues with a review of glycosidase and glycan hydrolyses. Heparinoid polysaccharides such as heparan sulphate and heparin are sulfated polysaccharides of the glycosaminoglycan family. Heparinoid mimetics (as discussed in article 5) were prepared to reduce the structural complexity of heparinoids and to obtain selectivities.

Together these books are a useful reference source for researchers in the field of glycoscience especially those which involves in the natural or life sciences.

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***Yeast in Natural and Artificial Habitats*, J.F.T. Spencer and D.M. Spencer (Eds.) Springer, Berlin, 1997 pp. Viii + 381, Price £ 81.50 ISBN 3-540-56820-4**

Yeasts are newcomers to the economic life of man, and among his oldest associates. As newcomers, they are used as vehicles for production of heterologous proteins of many types (e.g. hormones and antigens). As old associates, yeasts have been used in the oldest of the yeast industries, baking, brewing and winemaking, from the earliest days of recorded history. They play a role as spoilage agents, if the "wrong" species of yeast invade food, converting it into undesirable products which are inedible or toxic. They also may invade human tissues with serious or fatal results.

"Yeasts in Natural and Artificial Habitats" is a guide to the world of yeasts. It is impossible for one book to describe adequately everything about every yeast. However, this book brings together a concise assessment of the yeasts in their natural and more artificial habitats, their use by human