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Book Reviews

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BOOK REVIEWS

Rodd's Chemistry of Carbon Compounds, Volume IV, Heterocyclic Compounds, IVB. Edited By Malcolm Sainsbury, Elsevier, ISBN 0-444-827587. 1997, 794 pp. \$ 324.24.

This book reviews several classes of heterocyclic compounds in nine chapters, 7-15. Each chapter is reviewed by a different expert in that area. Chapter 7 discusses pyrrolidines and pyrrolidones. Chapter 8 discusses pyrrolizidine alkaloids. Chapter 9 discusses indole alkaloids, Chapter 10 *Amaryllidaceae* alkaloids, and Chapter 11 tropane alkaloids. Chapters 12 and 13 discuss pyrrole pigments. Chapter 14 discusses indigo derivatives and Chapter 15 cyanine dyes.

Chapter 7 presents one- or two-line descriptions of several synthetic routes to pyrrolidines or pyrrolidones. There are many references to supplement the brief descriptions and representative structural transformations. In addition, there is a description of 34 new pyrrolidines, and 12 new pyrrolidones. There are also references to 11 new *N*-acylpyrrolidines and 5 new *N*-acylpyrrolidinones.

Chapter 8 begins with a pertinent review of pyrrolizidine alkaloids, and references to other review material. This chapter describes several new necine bases and the syntheses of several alkaloids. There is a brief description of the work, pertinent references, and representative transformations. This chapter also shows the structure of over 116 new pyrrolizidine alkaloids.

Chapter 9 is entirely devoted to a description of the isolation and structure of new indole alkaloids. These include simple indoles, alkaloids that do or do not contain a tryptamine unit, alkaloids containing a terpene-derived moiety, and bisindole alkaloids. Chapter 10 begins with a description of *Amaryllidaceae* alkaloids. There is a discussion of the biogenesis of these compounds and their biological activity. Many new alkaloids in the class are presented, along with comments on their structures. There are selected syntheses of lycorine and lycorenan alkaloids, crinine alkaloids, galanthamine alkaloids and pancracine alkaloids. Phenanthridine alkaloids and several miscellaneous analogs that can be categorized in this class are also discussed.

Chapter 11 begins with an introduction that includes nomenclature and structural variations of tropane alkaloids. There are some syntheses, with a brief description, reference, and pertinent structures. In addition, the structures of several new tropane and cocaine alkaloids are presented.

Chapter 12 begins with nomenclature for pyrrole pigments. There is a section on synthesis with a brief description, references, representative structures, and strategy. The synthetic targets include porphyrins, chlorins, phlorins, corroles, porphycenes, corrins, and biliverdins. Chapter 13 was not supplemented since the pertinent material is presented in chapters 12 and 15.

Chapter 14 discusses the reaction of indigo and its derivatives. The syntheses of many new indigo analogs are discussed in some detail, with pertinent reactions and references. Chapter 15 begins with a description and a review of cyanine dyes. There is a section on the theory, color, and constitution of these compounds. There is a section on the synthesis of cyanine dyes, and another on their properties. The application of cyanine dyes to high technology fields is discussed: light absorption and emission, light induced polarization, photoelectric activity, and photochemical activity.

This volume presents a reasonably concise and up-to-date review of new compounds and syntheses of many alkaloids and important heterocycles. It will be essential to those planning a synthesis, or developing new products containing the heterocyclic structures found in chapters 7-15.

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Glycopeptides and Related Compounds. Synthesis, Analysis, and Applications.
Edited By D. G. Large and C. D. Warren, Marcel Dekker, Inc. New York, ISBN 0-8247-9540-7. 1997, 794 pp. \$ 195.00.

Among the myriad compilations of new developments in the growing field of the synthetic chemistry of glycopeptides and glycoproteins, D.G. Large and C.D. Warren have drawn together the most recent applications of glycopeptides in an easily readable layout. Consisting of fifteen chapters, the volume sets out to be a comprehensive reference dealing exclusively with glycopeptides.

The editors compiled the first chapter, which introduces readers to the chemistry of glycopeptides. The chapter outlines glycopeptide history, present research on glycopeptides, and poses possible future research questions and areas of focus and study.

Chapter 2, by Kunz and Schultz, entitled "Recent Advances in the Synthesis of Glycopeptides," describes new aspects of modern synthetic technologies in the field. Among the various detailed examples that the authors chose are protecting groups, selective deblocking and linkage regions between glycans and the peptide backbone.

Enzymatic synthesis of oligosaccharides and glycopeptides is the subject of Chapter 3 written by Ichikawa. The chapter specifically focuses on the chemical and enzymatic production of the selected oligosaccharides. Also covered is the application of glycosidases and glycosyltransferases to oligosaccharide synthesis.

Chapter 4, entitled "Chemical Synthesis of Glycoprotein Glycans" by Flitsch and Watt, offers a long overview of the fundamental chemistry of these oligosaccharides. Flitsch and Watt give special emphasis on selected approaches to "difficult" linkages such as 2-acetamido-2-deoxy- α -D-glycopyranosyl and β -D-mannosyl.

Perhaps one of the most important contributions to the volume is Chapter 5, contributed by Danishefsky and Roberge, which deals with "Syntheses of Oligosaccharides and Glycopeptides on Insoluble and Soluble Supports." The authors present the most important aspects of the nature of supports (solid or soluble), linkages to the support, and activation, coupling, deprotection, capping and cleavage procedures. The chapter also emphasizes the application of the glycal assembly method.

The first set of chapters culminate with chapter 6 by Large and Bradshaw, who present methodologies and strategies used in the synthetic approaches to the peptide portions of glycopeptides.

The next two chapters (Chapters 7 & 8) illustrate the chemistry of GPI and related glycolipids. Chapter 7 by Gigg and Gigg entitled "Synthesis of Glycosylphosphatidylinositol Anchors," is an extensive review of the chemistry and the mechanistic and physical aspects of all known GPI anchors. Chapter 8, by McConville and Ralton, deals with "Analysis of GPI Protein Anchors and Related Glycolipids" and reviews the most important aspects of various techniques of classical analysis of glycolipids.

The synthesis of dolichol intermediates are discussed in Chapter 9 written by Shibaev and Danilov. Entitled "Synthesis of Intermediates in the Dolichol Pathway of Protein Glycosylation," the chapter also deals with the status of current glycosyl polyprenylphosphates and glycosyl phosphates as intermediates in the studies of glycoprotein biosynthesis.

Williams in Chapter 10, entitled "Synthesis of Inhibitors of the Glycosidases and Glycosyltransferases Involved in the Biosynthesis and Degradation of Glycoproteins," reviews almost all the classes of glycosidase inhibitors. A short section offers the current status of development and the design of donor and acceptor analogs as glycosyltransferase inhibitors.

The next four chapters (Chapters 11-14) deal with analytical and physicochemical aspects of glycoconjugate analysis.

Leverly presents new developments in the "Use of Permethylation with GC-MS for Linkage and Sequence Analysis of Oligosaccharides: Historical Perspectives and Recent Developments" in Chapter 11. Particular focus is on the problem of intramolecular esterification in glycoconjugates containing sialic acid.

The "Structural Determination of Protein-Bound Oligosaccharides and Glycopeptides by NMR" written by Harvey is described in Chapter 12. Electrospray applications and matrix-assisted laser desorption ionization (MALDI), and the determination of composition and structure of oligosaccharides are the subjects of this chapter.

Chapters 13 and 14 deal with reviews of NMR methods. Chapter 13, written by Hounsell and Bailey and entitled "Approaches to the Structural Determination of Oligosaccharides and Glycopeptides by NMR," outlines the utility of these methods to the studies of O-glycans, glycosphingolipids, lipopolysaccharides, and glycosaminoglycans.

Chapter 14, "Conformational Studies of Glycoprotein Glycans Using NMR and Molecular Dynamics," authored by Rutherford, describes various NMR techniques such as COSY, NOESY and their variants.

The final chapter (Chapter 15) contributed by Koganty, Reddish and Longenrecker is entitled "Glycopeptides in the Immunotherapy of Cancer". The authors spend considerable space on the design of synthetic glycopeptides that express cancer-associated antigens. According to the authors, these antigens can be used to direct the action of the immune system against the parent glycoprotein.

Readers concerned only with specific derivatives or applications can breathe easily, as the extensive twenty-four page subject index makes even the most obscure terms easy to find. The volume is meticulously edited so that the error-free prose is a pleasure to read.

Seldom does a volume present its material in such a clear and concise manner, which recommends it as a core reference text of glycobiology. It is an essential addition to institutional libraries as a handy reference for organic and medicinal chemists, and biochemists actively engaged in research on glycoconjugates.

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Modern Catalytic Methods for Organic Synthesis with Diazo Compounds. Michael P. Doyle, M. Anthony McKervey, and TaoYe, Wiley, ISBN 0-471-13556-9. 1998, 652 pp. \$69.95.

The stated purpose of this book is to bring together those features of the chemistry of diazocarbonyl compounds that emphasize their versatility as intermediates for organic synthesis. The focus is on applications in synthesis, particularly through the use of modern catalytic procedures.

The book is written in twelve chapters. 1. The synthesis of α -diazocarbonyl compounds; 2. Catalysts for metal carbene transformations; 3. Insertion reactions; 4. Intermolecular cyclopropanation and related addition reactions; 5. Intramolecular cyclopropanation and addition reactions; 6. Cycloaddition and substitution reactions with aromatic and heteroaromatic compounds; 7. Generation and reaction of ylids from diazocarbonyl compounds; 8. X-H insertion reactions of diazocarbonyl compounds, where X=N, O, S, Se, P, halogen; 9. The Wolff rearrangement and related reactions; 10. Reactions of α -diazocarbonyl compounds with aldehydes and ketones; 11. Acid-promoted cyclization of unsaturated and aromatic diazo ketones; and, finally, 12. Miscellaneous diazocarbonyl reactions that include oxidation, β -hydride elimination, X-Y insertion reactions, dimerization, and [3+2]-cycloaddition reactions where diazocarbonyl compounds are 1,3-dipoles.

A particular attractive feature of this book is the inclusion of selected experimental procedures. These offer a useful and refreshing addition to the usual discussion, reactions and line drawings. Each chapter is fully referenced. The synthetic examples range from esoteric molecules that are difficult or impossible to make by other methods, to alkaloids, peptides, terpenes, etc. where this methodology offers significant improvements to "classical" approaches. There are also many examples of new "synthetic methodology" that will be appealing to those working in a variety of areas. In addition to the syntheses the book presents individual reactions that will allow researchers and students to put together new "disconnections" for specific transformations.

This book is well written and brings together many modern techniques that would be difficult to find in one place elsewhere in the literature. For those planning a synthesis, it will be one of those books that should be on the bookshelf, since it will be referred to many times during the planning and execution of the work. It is highly recommended to the synthetic community.

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