cover the use of n.m.r. and c.d. spectroscopy and mass spectrometry in structure elucidation. The book in its present form is, however, quite useful. It is informative, easy to read, and up to date. It fills a gap in the carbohydrate literature, and will therefore be a welcome addition. It constitutes a worthy achievement for which the authors are to be congratulated.

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Modern Carbohydrate Chemistry, by ROGER W. BINKLEY, Marcel Dekker, New York, 1988, xi + 322 pages + Subject Index, $90.00 (North America), $108.00 (elsewhere), $49.75 (orders of five or more copies for classroom use only).

This very readable and enjoyable book seems to be correctly targeted towards undergraduate and graduate students who wish to expand their knowledge of carbohydrate chemistry beyond what is given in typical organic chemistry texts, and to those organic chemists and even carbohydrate chemists who need to review particular synthetic procedures or reaction mechanisms in this field. However, this is carbohydrate chemistry in the narrow sense of structure and organic chemical reactions; the reader should not expect to find much discussion, if any, of analytical, biochemical, or spectroscopic aspects. The general approach is definitely modern, and extensive use is made of conformational and mechanistic interpretations, especially for many of the more-recently developed reactions of carbohydrates.

Chapter 1, "Introduction", provides brief descriptions of the role of carbohydrates as natural products, and of carbohydrate chemistry, past, present, and future. Chapter 2, "Definitions", categorizes the monosaccharides, oligosaccharides, polysaccharides, and certain carbohydrate derivatives. Chapter 3, "Structural Representation", describes the use of wedge–slash formulas for cyclic and acyclic systems, and Fischer and Haworth projections, and also introduces the concept of α and β anomers. Chapter 4, "Stereochemical Designation: The D,L System" includes reasons for retaining this older system of nomenclature, and mentions a specific example where the *R, S* convention is less useful than the D,L system. Chapter 5, "Naming of Carbohydrates", leads the reader through some of the intricacies of carbohydrate nomenclature by means of a series of examples of structures and names of monosaccharide and oligosaccharide derivatives.

Chapter 6, "Conformational Analysis", gives major attention to the conformations of saturated pyranoid-ring systems. The factors that determine conformational energy are well described, including nonbonded interactions, the anomeric effect, the reverse anomeric effect, hydrogen bonding and solvent effects, and the calculation of favored conformations by empirical and semi-empirical methods. Briefer discussions are then given of the conformations of unsaturated pyranoid rings in relation to the allylic effect, and of furanoid-ring systems, acyclic compounds, and oligosaccharides, including the subject of torsion angles and the exo-anomeric effect.

The remainder of the volume consists of discussions of synthetic carbohydrate chemistry. Chapter 7, "Unprotected Sugars", outlines the equilibria of reducing sugars in solution, including the effects of complexation. A variety of reactions at the anomeric and non-anomeric carbon atoms is also discussed, including glycoside formation, oxidation, and acid- and base-catalyzed degradations and rearrangements. Chapter 8, "Protecting Groups", provides fairly extensive coverage of the major classes of protecting groups, including acetals, amides, anhydro compounds, carbamates, esters, and ethers. Regioselective protection and deprotection methods are also disussed, and general comments on the protection of carbohydrates are offered. Chapter 9, "Nucleophilic Substitution Reactions", is the longest chapter in the book, a fact that seems to reflect the author's strong interest in this area. The general factors that influence nucleophilic substitution are discussed, together with leaving groups and carbon-, halide-, hydride-, nitrogen-, oxygen-, phosphorus-, and sulfur-containing nucleophiles. Chapter 10, "Oxidation Reactions", focuses on hydroxyl-to-carbonyl oxidation in partially protected carbohydrates. Chapter 11, "Hydrogenation and Hydrogenolysis", mainly discusses catalytic, free-radical, and photochemical mechanisms of reduction of carbohydrates. Chapter 12, "Addition Reactions", is a quite extensive treatment of 1,2- and 1,4-addition reactions of carbon-, nitrogen-, and oxygen-containing nucleophiles, hydride reagents, cycloaddition reactions, and such electrophilic addition reactions as epoxidation, halogenation, and mercury-catalyzed ring-opening. Chapter 13, "Elimination Reactions", details the importance of base-catalyzed over acid-catalyzed eliminations, various implementations of E2 elimination reactions, and other more-specialized reactions for the elimination of adjacent groups. Chapter 14, "Oligosaccharide Synthesis", discusses the general factors that relate to reactant and catalyst reactivity in the Koenigs–Knorr and Helferich procedures, the reactivity of groups leaving the anomeric carbon atom, the influence of protecting groups, and various fundamental approaches to the stereoselective synthesis of oligosaccharides, including neighboring-group participation, reactions with and without glycosyl halide anomerization, and the use of cyclic intermediates.

This text contains a limited number of errors. Among the more serious ones are the representation, on page 11, of raffinose as having two D-glucose units and one D-fructose unit and, on pages 263 and 264, respectively, the interchange of the

contents (not the captions) for Figures 8 and 9. The formulas are clearly reproduced, with bold lettering. However, whereas Haworth projections and the conformations of acyclic compounds have been drawn with thickened or wedge-shaped bonds, the many conformations of ring derivatives in the book have been printed without this useful visual aid. Chapters 6–14 are well referenced, and the book provides a comprehensive, 20-page Subject Index, but no Author Index.

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