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BOOK REVIEWS

Carbohydrates: Synthesis, Mechanisms, and Stereoelectronic Effects. By Momcilo Miljkovic (Pennsylvania State University, Hershey, PA, USA). Springer Science+Business Media: New York. 2010. xvi + 544 pp. $199. ISBN 978-0-387-92264-5.

This book represents a compendium of methods and principles used in the field of synthetic carbohydrate chemistry. Useful information concerning basic aspects of the subject, such as nomenclature, conformational analysis, and anomeric effects, is easily available to the reader and is well presented (Chapters 1−4). A number of chapters are dedicated to reactions of nonanomeric functional groups (Chapters 5−11 and 15). These discussions are centered on well-established methods and provide a very thorough literature review of early methods. However, discussions of recent advances that have emerged during the past quarter of the century are scarce and are presented for selected topics only. For instance, the section dealing with regioselective protection of carbohydrates (Chapter 5) gives a nice overview of the early literature but lists no references beyond 1985, which may give the impression that no advances have been made since. Only one reference beyond 1984—to a book chapter—is given for the section on cyclic acetals (Chapter 6), which virtually means that all new advances made in regioselective acetal openings are unmentioned, and presentations of dispiroketal methods for protection of vicinal cis-diols are completely absent.

Less than 10% of the book (part of Chapter 12) is dedicated to methods for glycosylation, the most significant reaction in the field. Practically no modern strategies for oligosaccharide synthesis are discussed beyond the armed−disarmed approach. Sections dealing with mechanistic aspects of carbohydrate chemistry are very dedicated and thorough; however, on some occasions, the arrows symbolizing electron flow are very imprecise. This, along with some copy/paste errors and inconsistencies in graphical representation, will undoubtedly confuse some readers. Sections on total synthesis dealing with the preparation of natural products and aminoglycoside antibiotics (Chapters 13 and 14) include no work beyond 1986.

Overall, if this book were published around 1985−1990, it would easily become one of the best textbooks dedicated to carbohydrate chemistry. In light of recent breakthroughs that have emerged in the rapidly evolving field of synthetic chemistry, one would wish to see seminal studies dedicated to synthesis, mechanisms, and stereoelectronic effects (as the title suggests) beyond the 25-year-old state of the art that is presented. The book can still serve as a good source of literature references from the early days of carbohydrate chemistry, but it does not introduce the reader to what has evolved in the field during the past two decades. The readers of this book are advised to continue learning the subject by referring to recent review articles for updated information and citations.

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Reactive Intermediates: MS Investigations in Solution. Edited by Leonardo S. Santos (Talca University, Chile). WILEY-VCH Verlag GMbH & Co. KGaA: Weinheim. 2010. xxiv + 318 pp. $170.00. ISBN 978-2-527-32351-7.

This book presents a comprehensive compilation of organic and organometallic reactions whose mechanisms and reactive intermediates can be studied by mass spectrometry (MS), a technique that has been used for decades to study chemical reactions in the gas phase and solution. Recent developments in MS-based techniques, including ionization sources and coupling to reaction chambers, have allowed scientists to use MS for monitoring the progress of reactions in a more efficient way. This book is a good source for organic chemists who would like to learn how to benefit from using MS in their studies of organic and organometallic reactive species.

The book opens with an overview of mechanisms involved in electrospray MS. It is followed by a chapter that gives a historic perspective of using MS to study reaction mechanisms. This chapter provides convenient lists of major discoveries in this field going back almost 20 years, and several scientists (Eberlin, O'Hair, and Guo) credited with significant contributions to the field are authors of some of the subsequent chapters as well. The chapter also touches on the subject of relating the gas-phase data to results in the condensed phase, which is often a hotly debated topic in MS-based studies.

The bulk of the book (Chapters 3−7) deals with specific examples of MS-based investigations of reactive intermediates, grouped mostly by their chemistry, from classic organic reactions, like S_N2, to metal catalysis, e.g., Suzuki coupling. Unmasking the pathways and intermediates in palladium-catalyzed reactions is a prominent theme of these chapters. Among them, Chapter 5, written by Santos, starts with a very valuable discussion of current experimental MS-based techniques for studying reaction mechanisms, information that is not easy to find in a single source. However, I felt that more than just 10 pages could have been devoted to this important topic. Nonetheless, overall, the main core of the book gives a very expansive and current view on the subject.

The book is not without its quirks, though. For instance, there is an excellent Foreword written by Enke. It is an amazingly well-written perspective by an analytical chemist on the past, present, and future of mass spectrometry. Unfortunately, the Foreword is not in any way related to the subject of this book. As noted earlier, the opening chapter is dedicated to the mechanism of electrospray ionization (ESI). Because the bulk of the data in the book is generated using this particular ionization technique, it would seem to be a good idea to discuss the details of ESI. Again, however, this particular chapter does

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not relate to the rest of the book—it could have been made more relevant by discussing ESI of metal ions, organometallic complexes, and other pertinent species—and thus strikes me as disconnected from the topic at hand. It is also a little too technical for the target audience of this book. Chapter 8, which closes the book, mostly deals with binding studies in biomolecular noncovalent complexes and also seems totally out of place here. What could have been included instead is a chapter on the investigation of biochemical reactive species in solutions by mass spectrometry—a subject that was not addressed at all.

In summary, this is a good source for researchers looking to utilize mass spectrometry for detecting reactive species in organic and organometallic reactions or for studying their mechanisms. It would be a worthwhile acquisition for libraries and individual scientists alike.

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