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BOOK REVIEWS

Handbook of Chemical Glycosylation: Advances in Stereoselectivity and Therapeutic Relevance. Edited by Alexei V. Demchenko (University of Missouri, St. Louis). Wiley-VCH Verlag GmbH & Co. KGaA: Weinheim. 2008. xxii + 502 pp. $230.00. ISBN 978-3-527-31780-6.

The current renaissance of preparative glycochemistry in organic synthesis is largely due to our ever-increasing understanding of biological systems and the ways in which these systems can be manipulated by natural and non-natural products. Carbohydrates are essential in this regard owing to their natural function in modulating molecular recognition. Driven by the development of chemical biology, synthetic chemists must continually improve and expand upon their existing arsenal of glycosylation methods in order to construct larger, more complex glycostructures in a reliable, stereocontrolled manner. The *Handbook of Chemical Glycosylation* addresses this issue in a clear, succinct manner, resulting in an excellent text that will be of interest to students and teachers alike. Each method of glycosylation is introduced concisely and illustrated with numerous pertinent examples. This text showcases the diverse, and in some cases ingenious, methods that have been devised to tackle the stereocontrolled construction of this important class of biomolecules. The contributing authors provide expert overviews of such methods set among a plethora of figures and synthetic schemes. The result is a fascinating reference that is far removed from the tedious protection/deprotection regimes that are the hallmark of classical syntheses of carbohydrates.

The introductory chapter provides a general overview of the formation of glycosidic bonds and takes the reader on a logical journey through the variables that may be altered to tune anomeric reactivity. Chapter 2 presents the development of glycosyl fluoride, chloride, and bromide donors and covers the relative merits of each method. Chapters 3 and 4 authoritatively survey oxygen-based and sulfur/selenium-based glycosyl donors, respectively. Beginning with the synthesis of glycosides from 1-*O*-substituted donors, the authors of this subsection of the text traverse the Periodic Table's *p*-block in their discussion of electrophiles that effect hemiacetal activation. The classical Schmidt trichloroacetimidates feature prominently as do the more recent variants of this method. Anomeric transglycosylation and *O*-*P* derivatives are also covered in this portion of the book. In Chapter 4 the authors assess the development and success of 1-sulfur/selenium-substituted glycosyl donors, building upon their skillfully written preliminary section on thioglycosides. This section of the book concludes with authoritative reviews of sulfoxides, sulfimides, sulfones, xanthates, thioimidates, and selenoglycosides in carbohydrate synthesis. Finally, Chapter 5 provides a fine overview of less common methods of glycosylation and is perhaps the most synthetically impressive component of this book.

In addition to being thoroughly referenced, each chapter of this work contains a section entitled "General experimental remarks" in which the authors provide representative protocols for the methods that have been showcased. There are a few minor aesthetic irritations that detract from the excellent overall layout of this text, however. The use of more than one ChemDraw setting combined with the inconsistent system for numbering compounds is particularly noticeable. Nonetheless, these superficial details should not deter researchers from purchasing this book. Every carbohydrate chemist would be well advised to secure a copy!

Ryan Gilmour and Peter H. Seeberger, *Swiss Federal Institute of Technology (ETH) Zurich*

JA805038E

10.1021/ja805038e

Advances in Chemical Physics, Volume 138. Edited by Stuart A. Rice (The University of Chicago). John Wiley & Sons, Inc.: Hoboken, NJ. 2008. x +460 pp. $175. ISBN 978-0-471-68234-9.

This book consists of seven timely reviews that cover a broad range of topics in modern chemical physics and physical chemistry. It continues the series' tradition of excellence and presents comprehensive expert analyses that are written at a level that is both accessible to beginners in the field and useful to practitioners. This volume focuses on current issues in chemical dynamics from theoretical and experimental perspectives. Topics include the effect of geometric phase on chemical reactions (Althorpe, Juanes-Marcos, and Wrede), control of chemical reactions by tailored laser pulses (Balint-Kurti, Zou, and Brown) and nonadiabatic effects in chemistry (Nakamura). There are also contributions covering the mechanisms of multiple-path chemical reactions (Osborn), the photoionization dynamics of chiral molecules (Powis), the activation of C−H and C−O bonds by metals (Metz), and the excited-state dynamics of weakly bound complexes (Boucher and Loomis).

The first half of the book is dedicated to quantum phenomena in chemical reactions and provides an excellent introduction to modern treatments of nonadiabatic effects, quantum control, tunneling, and electron transfer. These topics are particularly relevant in light of the widespread existence of conical intersections and the central role these intersections play in the chemical and biochemical reaction pathways of photoexcited molecules. Powis' presentation of circular dichroism in photoelectron ejection from chiral molecules will be of broad interest because of potential applications in biomolecular spectroscopy. Osborn's chapter on multipath reactions challenges the concept of a single "reaction coordinate" along the minimum energy path for chemical reactions by highlighting the breadth of molecular motions that effectively lead to product formation. Metz's contribution on the reactivity of hydrocarbon−metal complexes highlights the intricate underlying details of this important class of chemistry. The comprehensive discussion by Boucher and Loomis of the spectroscopy of rare gas−dihalogen complexes underscores the fact that diverse structural and dynamical properties exist even in the simplest of chemical systems.

The experimental studies discussed in this volume provide important benchmark comparisons for theoretical calculations

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of intermolecular potential energy surfaces. This volume of *Advances in Chemical Physics* will be an important resource for students and advanced researchers in the areas discussed.

Amy S. Mullin, *University of Maryland*

JA805061G

10.1021/ja805061g

Materials Handbook: A Concise Desktop Reference, 2nd ed. By François Cardarelli (Materials and Electrochemical Research (MER) Corp., Tucson, AZ). Springer-Verlag: London Limited. 2008. xxxviii + 1340 pp. $229.00. ISBN 978-1-84628-668-1.

This book provides the latest data on the physical and chemical properties of all classes of materials, particularly common industrial ones. After an introductory chapter on the general properties of materials, the chapters are organized according to classes of materials: ferrous metals and their alloys; nonferrous metals; semiconductors and superconductors; magnetic materials; insulators and dielectrics; miscellaneous electrical materials; ceramics, refractories, and glasses; polymers and elastomers; minerals, ores, and gemstones; rocks and meteorites; soils and fertilizers; cements, concrete, building stones, and construction materials; timbers and woods; fuels, propellants, and explosives; composite materials; gases; and liquids. Several detailed appendices are also included, providing such additional information as data on the chemical elements, thermochemical data, crystallographic calculations, etc. An extensive bibliography and subject index complete the book.

JA805138A

10.1021/ja805138a

Pharmaceutical Applications of Raman Spectroscopy. Edited by Slobodan Sasic (Pfizer, Ltd., Sandwich, U.K.). John Wiley & Sons, Inc.: Hoboken, NJ. 2008. xiv + 264 pp. $95.00. ISBN 978-0-813-81013-3.

There are eight chapters in this multiauthor book. The first is an introduction to Raman spectroscopy, and the remaining seven cover the different areas where this technique can used in the pharmaceutical industry, from quantitative applications, to chemical imaging of solid dosage formulations, to identifying polymorphs, to name a few. It is purported to be the first single source to consolidate all the current pharmaceutical applications of Raman spectroscopy and features contributions from experts around the world. A brief subject index completes the book.

JA805341D

10.1021/ja805341d