

is a well-referenced starting point for others in the field and should spark the interest in electrochemist and material scientist alike.

The second chapter, concerning "Analysis in Highly Concentrated Solutions: Potentiometric, Conductance, Evanescent, Densometric and Spectroscopic Methodologies", by Licht, describes analytical methods to characterize solutions where the solutes are of similar concentration to the solvent. In these solutions, activity coefficients are far from unity, and the behavior of these systems is unlike the better characterized dilute solution limit. This chapter deals almost exclusively with aqueous solutions of OH^- , SH^- , and S^{2-} . These solutions are extremely important to battery and solar cell research. However, the techniques and analysis described belong to a different era of chemistry. None of the techniques are particularly new, with many having been treated in earlier volumes, but the solutions described here have been previously mischaracterized. Nonetheless, many of the references are dated, and the switching between molal concentrations and molar concentrations is distracting to the reader.

The third chapter is entitled "Surface Plasmon Resonance Measurements of Ultrathin Organic Films at Electrode Surfaces", by Hanken, Jordan, Frey, and Corn. Surface plasmon resonance spectroscopy can determine the combined thickness—refractive index of a dielectric film at a metal interface. This technique gives essentially the same information as ellipsometry but in a quite different manner. The first section details some of the background theory and the variety of materials and surface structures explored. Many examples from both biochemical and surface materials science are included in this chapter. A second section deals with imaging of surfaces using this technique. The primary examples focus on self-assembled monolayers and binding of polypeptides and oligonucleotides to engineered surfaces. The last section details recent studies in electrochemically modulated surface plasmon resonance measurements. This form of the technique promises to elucidate the electric fields at the metal/dielectric interface. Given the importance of the double layer to electrochemistry and the importance of internal fields in nonlinear optical and ferroelectric materials, this well-explained and detailed section should pique many scientists' interest. Overall, this chapter is a very understandable and well-referenced guide to surface plasmon resonance methods.

The last chapter, on "Electrochemistry in Neuronal Microenvironments", by Clark, Zerby, and Ewing, provides a nice background on the use of microelectrodes inside cells. This chapter describes various microelectrode techniques (although it focuses on voltammetry) to determine the concentration and time dependence of neurotransmitters in and near nerve cells. An introductory section describes the use of microelectrodes and their surface modification to provide electrodes with good electrochemical kinetics. The second section details electrochemistry within cells. The last and longest section gives examples of electrochemistry outside of cells and signal transduction in particular. This is a good review of recent literature, including sufficient background work to put these studies in perspective. With lots of references and examples, this primer guides the reader through a complex, interdisciplinary field.

This volume describes very diverse topics in the field of electroanalytical chemistry and is worth reading for both the novice and expert electrochemist, alike.

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Chemistry of Hypervalent Compounds. Edited by Kin-ya Akiba (Hiroshima University). Wiley-VCH: New York. 1998. xvi + 414 pp. \$135.00. ISBN 0-471-24019-2.

This book is an excellent, long-needed, first comprehensive treatise of the chemistry of hypervalent main group elements. In the foreword to the book, the late D. H. R. Barton states that "the book describes recent and up-to-date aspects of the chemistry of hypervalent compounds" and he has found "the quality of each chapter to be excellent and well written by outstanding experts in the field".

The term "hypervalency" was established by J. I. Musher in 1969, and since then it has been accepted and used worldwide. According to the revised definition adapted in the book, hypervalent species are ions or molecules of the elements of Groups 1, 2, 13–18 that contain a number N of more than an octet of formally assignable electrons in a valence shell of the central atom X in directly bonding a number L of

ligands (the so-called N - X - L designation of hypervalent molecules). General and theoretical aspects of structure and reactivity of hypervalent molecules are overviewed by K.-y. Akiba in the first two chapters of the book. This is an excellent, systematic review of the concept of hypervalency in its historical development. In the first chapter, a systematic classification of the essential structural types of hypervalent molecules based on the N - X - L formalism is provided, and the molecular orbital description of hypervalent bonding is overviewed. In Chapter 2, general aspects of the structure and reactivity of hypervalent organic compounds are reviewed according to coordination number L . Chapters 1 and 2 overview literature through 1998, although the bulk of the cited papers were published in the 1980s and early 1990s.

Chapters 3–13 of the book describe chemistry of the specific hypervalent elements. In Chapter 3, the static and dynamic structures of hypervalent Sb(III), Sn(II), and Ge(II) are reviewed with emphasis on phase transitions of halogenoantimonates and halogenogermanates and the metallic and semiconducting properties of Sn(II) halides. Structure and reactivity of stable hypercoordinate silicon species are discussed in Chapter 4, while synthetically useful transformations of hypercoordinate silicon intermediates are presented in Chapter 5. In particular, C–C bond formation using pentacoordinate allylsilicon and silyl enolate intermediates, catalytic cross-coupling reactions with pentacoordinate silicon species, and reduction of carbonyl compounds using pentacoordinate hydridosilicon species are summarized in Chapter 5. In the following chapters, the structure and chemistry of phosphorus compounds (Chapter 6), sulfuranes (Chapter 7), hypervalent chalcogen compounds (Se and Te: Chapter 8), organic compounds bearing the $-\text{XF}_5$ group ($X = \text{S}, \text{Se}, \text{Te}$: Chapter 10), polycoordinate iodine compounds (Chapter 11), and xenon compounds (Chapter 13) are reviewed. Synthetic applications of hypervalent organoiodanes (mainly, chemistry of alkenyl- and alkynylodanes) are summarized in Chapter 12, and the ligand-coupling reactions of Group 15 and 16 elements are overviewed in Chapter 9. All chapters are concisely written by the internationally renowned experts in the field; I found just occasional overlapping and cross-referencing in several chapters. The reviews cover literature up to 1996–1997.

In summary, this is an excellent book presenting the new and rapidly developing field of hypervalent compounds. It is highly recommended to organic and inorganic chemists who wish to update their knowledge and to find new ideas for future research.

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Comprehensive Natural Products Chemistry. Edited by D. H. R. Barton, K. Nakanishi, and O. Meth-Cohn. Elsevier Science: Oxford, UK. 1999. Nine volumes, \$6515.00. ISBN 0-08-042709-X (complete set). Vol. 1, Polyketides and Other Secondary Metabolites Including Fatty Acids and Their Derivatives: ISBN 0-08-043153-4, pp xl + 1007. Vol. 2, Isoprenoids Including Carotenoids and Steroids: ISBN 0-08-043154-2, pp xxxviii + 446. Vol. 3, Carbohydrates and Their Derivatives Including Tannins, Cellulose, and Related Lignins: ISBN 0-08-043155-0, pp xl + 939. Vol. 4, Amino Acids, Peptides, Porphyrins, and Alkaloids: ISBN 0-08-043156-9, pp xl + 429. Vol. 5, Enzymes, Enzyme Mechanisms, Proteins, and Aspects of NO Chemistry: ISBN 0-08-043157-7, pp xxxviii + 495. Vol. 6, Prebiotic Chemistry, Molecular Fossils, Nucleosides, and RNA: ISBN 0-08-043158-5, pp xxxviii + 299. Vol. 7, DNA and Aspects of Molecular Biology: ISBN 0-08-043159-3, pp xxxviii + 733. Vol. 8, Miscellaneous Natural Products Including Marine Natural Products, Pheromones, Plant Hormones, and Aspects of Ecology: ISBN 0-08-043160-7, pp xxxviii + 749. Vol. 9, Cumulative Indexes: ISBN 0-08-043161-5, pp xxxviii + 351.

The first chapter of the first volume starts with an historical perspective of natural product chemistry masterfully written by one of the truly great experts, Koji Nakanishi. Having set the "tone", the quality is uniformly maintained at the highest level with excellent writing, clear structures and diagrams, and very few typographical errors. The full range of modern natural products chemistry is reviewed from molecular biology and its impact on biosynthesis to the diverse structures of marine natural products. Each volume has the same introductory chapter and a great deal of redundant information that is already in volume 1.

Presumably, this duplication is deemed necessary because each volume can be purchased separately and therefore must be a complete entity in its own right. Unfortunately, for those who purchase the complete set, they will buy nine copies of the same chapter 1, nine copies of an obituary notice (in this writer's opinion, out of place), and in volume 9 a second set of the indexes. Quite a lot of excess paper, and combined with the very high price of this series, will cause most libraries and individuals not to purchase these volumes. This is unfortunate since it is a marvelous and monumental piece of work, but a more realistic approach to pricing and dividing the series is needed.

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Carbohydrate Mimics: Concepts and Methods. Edited by Yves Chapleur. Wiley-VCH Publishers: Weinheim. 1998. 579 pp. \$190.00. ISBN 3-527-29526-7.

Carbohydrate Mimics: Concepts and Methods is an elegant, select compilation of works from laboratories around the world. The audience should include natural product and medicinal chemists, pharmaceutical laboratories, as well as both the budding and the expert carbohydrate chemist. Carbohydrates, which play roles in many biological phenomena in Nature, are challenging targets for the chemist with goals such as proving a structure, elucidating critical chemical functionalities, and increasing pharmacological efficacy. All chapters, save one on modeling of oligosaccharide conformations, describe chemical syntheses that pursue these goals.

The creation of various analogues of carbohydrates, including azasugars, C-linked sugars, carbasugars, aminocyclopentitols, and carbocycles, is described. The mimics possess close similarity to natural molecules yet display altered shapes, functionalities, or hydrophobicity, or possess refractory linkages that transform their biological activity or pharmacology. Some of the other syntheses capitalize on using naturally occurring sugars as chiral starting materials for more complex molecules. In the last half of the book, dynamic biomedical arenas, including inflammation, diabetes, cancer, and signal transduction, are dissected using carbohydrate mimics or analogues. Figures depicting the assays for biological activity and the data are often presented; many of these mimics possess promising attributes. Some of the current topics include work with architectonic (e.g., dendritic) molecules, combinatorial libraries, and rational design of enzyme inhibitors. Several chapters describe nucleic acid or nucleotide-based molecules that utilize carbohydrates to alter the physicochemical nature of the natural molecules.

Every chapter starts with a concise and often very interesting introduction. The logic or rationale in designing experiments is explicitly stated in most cases. Throughout the book, the structure figures are systematically portrayed and labeled in a clear fashion; very rarely is a typesetting error found. The references appear as timely as the arduous pace of carbohydrate chemistry allows.

In summary, this book is a well-rounded and detailed encyclopedia of current and standard carbohydrate chemistry focused on the construction of mimics. It should save much time in the library, assist in designing syntheses, and spur on more chemists into the world of carbohydrates.

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Named Organic Reactions. By Thomas Laue and Andreas Plagens. J. Wiley & Sons: New York. 1998. 283 pp. \$69.95. ISBN 471-97142-1.

The practice of naming organic reactions has long been used by synthetic chemists to convey complex information in a concise manner.

This book contains a collection of 134 carefully chosen named reactions, detailing each with clearly drawn mechanisms, up-to-date references from the primary literature, and well-written accounts covering not only the mechanistic aspects of the reactions but also details of side reactions and substrate limitations. The reactions which are covered are the mainstay of undergraduate and graduate synthetic organic chemistry courses, and as such this book will make an excellent resource for chemistry students and academic libraries.

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Chirality in Industry II: Developments in the Manufacture & Applications of Optically Active Compounds. Edited by A. N. Collins, G. N. Sheldrake, and J. Crosby. J. Wiley & Sons: New York. 1998. 389 pp. ISBN 0-471-98284-9.

Although the number of single enantiomer pharmaceuticals and agrochemicals on the market is small, this situation is changing rapidly. This book, taken along with its predecessor, covers a wide range of technologies for the production of single enantiomer products on an industrial scale. The book is divided into three sections, covering Physical Methods and Classical Resolution, Biological Methods and Chiral Pool Syntheses, and Asymmetric Synthesis by Chemical Methods. Each section contains several case histories, all of which are superbly written accounts in their own right. Coverage ranges from the rational design of resolution methods, crystal science techniques, membrane separations, biotransformations, the synthesis of enantiopure liquid crystals, and enantioselective protonation as well as the more familiar enantioselective ketone reduction, epoxidation, chiral pool, and chiral auxiliary methodologies. There is also a chapter on regulatory aspects of enantiopure drug production. The outstanding case histories in this book make it an invaluable read for anyone following a career in organic process research.

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Encyclopedia of Bioprocess Technology. Edited by Michael Flickinger and Stephen Drew. John Wiley: New York. 1999. Five-volume set. \$1750. ISBN 0-471-13822-3.

This five-volume set is one of four titles in the Wiley Biotechnology Encyclopedias series. (Other sets cover cell technology, molecular biology, and ethics and policy issues.) In the absence of any preface or introductory background, the subtitle "Fermentation, biocatalysis, and bioseparation" must suffice to explain this set's scope. About 400 contributors from industry and academia have authored brief articles that the publisher claims will provide "both depth and breadth of coverage" and focus on hands-on industrial practice.

Articles are arranged alphabetically by topic and are cross-referenced to each other. This browsing capability is important, because the index in Volume 5 is somewhat brief, and there is no table of contents. Each article includes a bibliography, but a number of those examined cite few papers later than the early 1990s. In a field as rapidly developing as biotechnology, this might cause a reader to question whether the "state of the art" is really represented here. Further suspicion arises from the realization that the very first article, on activated carbon, is reprinted verbatim from the 1992 edition of the *Kirk-Othmer Encyclopedia of Chemical Technology*.

These concerns aside, this encyclopedia may prove useful to students and nonspecialists needing background information on bioprocessing techniques.

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