Book Review

Book Review of Bioactive Heterocycles IV. Topics in Heterocyclic Chemistry, 10

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BOOK REVIEWS

Kirk-Othmer Separation Technology, Volumes 1–2, 2nd ed. Edited by the staff at Wiley. John Wiley & Sons, Inc.: Hoboken, NJ. 2008. xii + 1346 pp. $525. ISBN 978-0-470-12741-4.

This two-volume set comprises select articles from the fifth edition of Wiley's *Kirk-Othmer Encyclopedia of Chemical Technology* focusing on "the theoretical and applied aspects of industrially important separation processes" to quote from the Preface. The over 70 articles are written by an international array of experts from industry and academia and cover such areas as "the principles of separation processes, process design, equipment, operation, and applications". An extensive index completes the set.

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Capillary Electrophoresis: Methods and Protocols. Methods in Molecular Biology, 384. Edited by Philippe Schmitt-Kopplin (HelmholtzZentrum München, Neuherberg, Germany). Humana Press: Totowa. 2008. xx + 810 pp. $149.00. ISBN: 978-1-58829-529-2.

This book covers a "selection of current capillary electrophoresis methods used to separate representative types of molecules and particles and in combination with different detection techniques", to quote from the back cover. The contents are divided into two parts: (I) Analyte-Oriented, in which methods and protocols are reviewed based on sample type and size, and (II) Methods-Oriented, which is more methodological and focuses on specific new techniques of capillary electrophoresis, such as zone electrophoresis, electrokinetic chromatography, and affinity-capillary electrophoresis, to name a few. Most of the chapters follow the usual sequence of sections in the series: summary and introduction; materials and equipment; methods; notes; and references. A brief index concludes the book.

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Modern Biooxidation: Enzymes, Reactions and Applications. Edited by Rolf D. Schmid and Vlada B. Urlacher-Kursif(Universität Stuttgart, Germany): Weinheim. 2007. xvii + 300 pp. $190. ISBN 978-3-527-31507-9.

Enzymatic oxidations constitute a valuable class of biotransformations, with relevance in pharmaceutical development, industrial biocatalysis, and basic biochemical understanding. Volumes of literature attest to the importance of oxidoreductases in biochemical research, and past years have seen isolated review articles summing up the status of particular aspects of biooxidations, such as mechanisms, applications, and engineering. However, an updated collection that focuses on and succinctly summarizes current and future biotechnological issues and applications of biooxidations has been notably absent. This volume, compiled by Schmid and Urlacher, provides a unique assortment of reviews, protocols, and research reports highlighting the biotechnological status of biooxidations.

The text provides a nice blend of mechanistic overviews, which are not overly detailed, and catalytic applications, at both industrial and laboratory scales. This includes many descriptions of microbial and protein engineering efforts directed at improving the capabilities of oxidative biocatalysts. Applications range from producing industrial chemicals to studying drug metabolism and drug design. As expected, cytochrome P450 chemistry is the focus of the book. However, it is also nice to see chapters dedicated to other biooxidation reactions and applications, e.g., dehydrogenase, laccase, and Bayer−Villiger monooxygenase. There is also substantial attention paid toward considerations of process design, for example, in relation to cofactor regeneration and supply.

Overall, this book achieves the goal of providing insight into the state-of-the-art in engineering and applying oxidizing enzymes as tools for the pharmaceutical and chemical industries. The layout is sensible, and the chapters are generally well written. It does tend to read like a collection of independent reviews—many of which overlap in introductory content—although several chapters cover results, protocols, or analyses not readily available from the literature. While not likely to serve as a course textbook, I believe this collection will prove quite useful to both experts and novices involved in research and development of systems requiring oxidative biotransformations.

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Bioactive Heterocycles IV. Topics in Heterocyclic Chemistry, 10. Edited by Mahmud Tareq and Hassan Khan (University of Tromsø, Norway). Series edited by R. R. Gupta. Springer: Berlin, Heidelberg, New York. 2007. xvi + 318 pp. $279.00. ISBN 978-3-540-73403-1.

This latest volume in the series *Topics in Heterocyclic Chemistry* is a collection of nine chapters covering a diverse assortment of natural and synthetic nitrogen- and oxygen-containing heterocycles.

The inaugural chapter on tetrahydrocannabinols is an excellent summary of the chemistry, biosynthesis, synthesis, metabolism, biological activity, and medicinal use of this venerable class of natural products. Chapter 2 documents the quantitative structure−activity relationships of heterocyclic topoisomerase I and II inhibitors, which include benzimidazoles, camptothecins, isoaurostatins, naphthyridinones, phenanthridines, terpenes, anthrapyrazoles, benzonaphthofurandiones, desoxypodophyllotoxins, quinolines, and quinolones. Surprisingly, pyridocarbazoles such as the plant alkaloid ellipticine are not covered. Molecular modeling of biologically active alkaloids, such as bis-benzylisoquino-

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lines, lycoctonine, and napelline diterpenoid alkaloids, and synthetic analogues of the quindoline, sildenafil, β-alanine, and arylpiperazine types are discussed in Chapter 3. A weakness here is the lack of uniformity in the structural drawings; e.g., there are at least five distinct drawing preferences, sizes, and fonts. The next chapter deals with the microbial transformation of *Cinchona*, *Veratrum*, benzylisoquinoline, gluco-indole, azacarbazole, and sampagnine alkaloids. Nicotine and morphine are also discussed. Although coverage of this enormous topic is brief, this chapter is a reasonable starting point to guide the reader to the literature.

The synthesis of triazoles and coumarins discussed in Chapter 5, with limited coverage of the biological activity of this peculiar combination, seems out of place. As with Chapter 3, the structural drawings in this chapter are poor and uneven. The next chapter, however, is easily the highlight of this volume. It provides an excellent account of the physiochemical and nucleic acid binding properties of protoberberine alkaloids. Following a concise and clear discussion of nucleic acid polymorphism and the physical techniques for the study of alkaloid−nucleic acid interaction, e.g., spectrophotometry, spectrofluorimetry, Scatchard analysis, etc., the authors present a cogent picture of how protoberberines interact with DNA and RNA. Marine sponge polycyclic diamines are presented in Chapter 7, which is a well-done review of the isolation, biological activity (of which precious little is known), proposed biosyntheses, and syntheses of these interesting alkaloids. Chapter 8 addresses the myriad ubiquitous polyphenolic catechins and proanthocyanidins. Although chemical structures are minimized here, the density of information matches that of a neutron star−chemistry, biosynthesis, synthesis, biological activity, and SAR studies are all succinctly covered in 25 pages. The final chapter deals solely with synthetic compounds, *viz.*, benzofuroxans and furoxans. These neglected heterocycles exhibit a range of fascinating biological activities, such as antifungal, antibacterial, antiparasitic, nitric oxide-releasing, platelet antiaggregatory, gastric antisecretory, and several others. In addition, the chemical reactivity and synthesis of these heterocycles are presented in this excellent culminating chapter.

A Subject Index and an Author Index for Volumes 1−10 are included. All chapters save one cite literature from 2007, and, except for the aforementioned two chapters, the structural drawings are excellent. Although there is much to recommend here, the price tag and eclectic set of topics will probably limit this volume to academic libraries that are collecting volumes from the *Topics in Heterocyclic Chemistry* series.

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Foldamers: Structure, Properties, and Applications. Edited by Stefan Hecht (Humboldt University, Berlin, Germany) and Ivan Huc (Institut Européen de Chimie et Biologie, Pessec Cedex, France). Wiley-VCH Verlag GmbH & Co. KGaA: Weinheim. 2007. xxii + 434 pp. $230.00. ISBN 978-3-527-31563-5.

What is a foldamer? Asking this of colleagues often yields puzzled looks and tortured answers, and even Diederich's elegantly succinct definition, "synthetic oligomers with distinct conformational preferences", in the foreword of *Foldamers: Structure, Properties, and Applications* reveals the great diversity of chemical structures that might qualify. Faced with this definitional challenge, the editors have made the excellent and sensible decision to organize this volume by the molecular properties and design concepts that lead to foldamers rather than by chemical structure. Thus, the opening chapters introduce general principles of foldamer design. After these ideas and the variety of structures that embody foldamers are established, the chapters in the second half of the book cover their specific applications and structural classes.

Each chapter has a clear introduction outlining its organization and defining the topics that are discussed. Importantly, the introductions also detail the authors' intents and biases and state what will *not* be covered. For example, van Gunsteren and Gattin state in their chapter "Simulation of Folding Equilibria" that their intent is solely to illustrate current possibilities for foldamer simulations and that they will draw on examples from their own work rather than survey the field. Although one may quibble with that choice, providing that context for the reader is of great benefit.

The first three chapters are very strong. In turn, they cover foldamers whose global conformations result primarily from local conformational preferences, remote intrastrand interactions (namely hydrogen bonding), and solvophobic effects. Together they are both a useful resource for the specialist and an excellent introduction for the student. The principles and theoretical framework are clearly explained, and the many example structures are represented in an extensive array of figures.

The last seven chapters delve into specific structural and functional classes of foldamers. The former include polyisocyanides and nucleic acids, whereas the latter include biologically active and helix-forming foldamers. The depth of coverage varies, with chapters like "Biological Applications of Foldamers" providing copious practical examples and others like "Protein Design" providing mainly an overview of strategies and methods. The chapter "Nucleic Acid Foldamers" is particularly noteworthy both for its top-notch explication of principles and architectures and because nucleic acid−based molecules are often overlooked when categorizing foldamers. Overall, these chapters are by no means an exhaustive review of all the areas of foldamer-based research, but they do provide a useful representative sample.

The production quality of this book, including not only the strength of the contributions but also its well-edited, readable text and wealth of figures, warrants the $230 list price. At the same time, the cost will make one think twice before requiring this text for a graduate course, unless foldamers are the sole subject. Its educational value is high, and all bioorganic faculty will want a copy available for their students.

Hecht and Huc have made an important contribution to the literature of foldamers. The greatest strength of their volume is that it presents the diversity and open-ended possibilities of foldamer-based research, rather than trying to rigidly categorize the field. Chemists from all subdisciplines will find it an inspiring invitation to join in solving the challenges and exploiting the potential of this fascinating arena of molecular science.

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