of sunlight opens up. Since the second part of this book deals with related topics, a later placement in this monograph would be ideal. P. Qu and D. J. Meyer report the coating of electrodes with dyes that effect sensitization of the surface. A combination of photo- and electrochemistry is possible and systems which might replace the known photovoltaic devices could be developed. Unfortunately, the current examples show a low efficiency. The following chapter deals with electron transfer in the solid state, repeating some parts from the second Volume (IV/page 446). If layered oxides with Perovskite-related structures or clays are combined with sensitizers, materials are formed having similar properties to the previously mentioned semiconductors. Since these materials are readily accessible they are promising for several applications where electron transfer plays a central role. Instead of inorganic materials, a self-assembled structure can also be used. J. K. Hurst and Khairutdinov discuss the advantages of micelles where the donors and acceptors for the electron transfer are specifically placed on different sides of the membranes. In the third part of the volume, five chapters are devoted to spectroscopic and spectrometric methods giving a deep insight into electron-transfer processes. The examples discussed are well-chosen and demonstrate the power of these methods. This part was edited by Y. Haas and gives a nonspecialist an easy start in this field. However, the quality of some schemes is low (IV/pages 649 and 658).

The last volume starts with a discourse on molecular wires. The second chapter provides an excellent survey on optical switches and antenna molecules. Some schemes are not clearly arranged and the size of the formulas sometimes differs (V/pages 52 and 53). Sections on different electronic molecular-level devices such as rectifiers, logic gates, antennas, and memories succeed. These devices will be crucial in the future for molecular electronics. However, the reader will be surprised how far the development has already gone. The lack of clear definitions between the devices results in a strong overlap of these reviews. The four following chapters deal with imaging and the storage of information. In two impressive essays of 90 pages each, the silver halide photography and photocopy process are reported in detail. A discourse on photorefractive and laser-induced polymerization completes this part of the volume. The third part of the book focuses on the environmental aspects of electron-transfer processes. Beside artificial photosynthesis, which was already discussed in previous chapters, battery systems are presented. The survey on modern systems based on polythiophene and lithium/polymer materials is a highly recommended read. The 80 pages index is rich and carefully made. Looking for specific subjects, even in overlapping chapters, involves very little effort.

In summary, the five volumes provide an excellent overview on the recent developments in electron transfer in chemistry. In the covered topics the books fills in the gaps of previous reviews in the literature. The chapters on the more mature topics, such as imaging, will be a compulsory read for chemists working in these areas. The single volumes are not textbooks but more a collection of excellent reviews providing a good overview of hot topics in the interdisciplinary field of electron transfer. Despite its low quality in some schemes this valuable monograph will have its place in every good library collection.

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The Amide Linkage. Selected Structural Aspects in Chemistry, Biochemistry, and Materials Science. Edited by *Arthur Greenberg, Curt M. Breneman,* and *Joel F. Liebman.* John Wiley & Sons Inc., New York 2000. xii + 653 pp., hardcover £ 126.00.—ISBN 0-471-35893-2

The Amide Linkage provides a unique and fairly comprehensive overview of the vast importance of the amide functional group to chemistry, biochemistry, and materials science. The editors have brought together a broad spectrum of contributors with varied interests and different perspectives on the chemistry of amides. The book starts off with a scholarly discussion of electronic structure provided by one of the editors. Kenneth Wiberg contributes Chapter 2 on the origin of the amide rotation barrier; it should be required reading for students of amide chemistry. Another editor, Arthur Greenberg, presents an interesting contribution (Chapter 3) on distorted and strained amides that provides a nice follow-up to Wiberg's primarily theoretical chapter.

In Chapter 4 Robert Brown presents a retrospective account of his work and that of others on amide hydrolysis. A chapter on the thermochemistry of amides then follows. Chapter 8 is on a related topic, namely sterically hindered and twisted amides. Chapter 6 contains a very interesting discussion of α-lactams, which focuses on synthetic and stereochemical issues in the chemistry of these very reactive, yet relatively unexplored chemical entities. The editors made a wise choice in including this chapter, which gives an individualistic perspective to the book.

Two chapters involve β-lactam chemistry. The first (Chapter 7) provides a historical overview of β-lactam chemistry as well as synthetic routes to β-lactams. The second (Chapter 11) discusses computational aspects of the chemistry of β-lactams as antibacterial agents. My only regret is that relatively little attention was given to new classes and uses of non-natural β-lactams and general inhibitors of serine protease enzymes. It should be stated that this is an important direction in which β-lactam chemistry is headed, countering the widespread belief the β-lactams are only of importance as antibacterials.

Chapters 12 and 13 follow up on computational aspects of amide chemistry, including the design of enzyme inhibitors and ab initio based conformational analysis of protein subunits. The gas-phase chemistry of amides is discussed in Chapter 14, and a very interesting discussion of β-sheet interaction between proteins follows in Chapter 15. Chapter 16 presents a timely discussion of cyclic-peptide libraries, and the last two chapters, 17 and 18, follow up with a discussion of specialized aspects of protein folding.

In summary, this book would provide an excellent addition to the libraries of organic chemists of all subdisciplines. It

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makes extremely interesting reading, and the editors should be commended for assembling an authoritative and distinguished group of contributing authors. I strongly recommend it.

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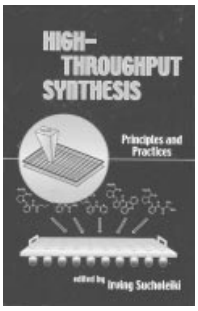
High-Throughput Synthesis. Principles and Practice. Edited by *Irving Sucholeiki*. Marcel Dekker, New York 2001. xxi + 366 pp., hardcover $ 175.00.—ISBN 0-8247-0256-5

Books on combinatorial chemistry and on high-throughput analysis do not have an easy task, as they have to contend with the interdisciplinary nature of these subjects and with the rapid pace of development. It would be very difficult to discuss these new disciplines adequately without including aspects of analytical methods, automation technology, biochemistry, and materials science. Also proper attention must be given to the subject that forms the central core of this field, synthetic chemistry. That is now even more important, because the need to develop synthetic methods is increasingly the main bottleneck hindering the preparation of large numbers of new compounds. It is only when a reliable method for synthesizing a class of compounds has been developed that one can set up a system for high-throughput synthesis.



This new compendium on the subject of high-throughput synthesis aims to meet these requirements by a "cookbook" approach. The actual discussion chapters are very short, and offer only a superficial introduction to one aspect of the subject, rather than serving as an overview of the literature. But they are followed by a collection of case studies which give the work its uniquely useful character. These contributions have been chosen from the great wealth of published work in the field, and are presented in the form of detailed laboratory protocols in the manner of cooking recipes, including lists of the chemicals and apparatus needed. These case studies form the basis of an impressive and wide-ranging treatment of the subject. Automation aspects are discussed in detail, as also are the types of interfaces that have been developed for linking combinatorial synthesis to screening procedures based on biological or materials properties. The reader also learns something about state-of-the art techniques used in synthesis, such as high-throughput purification methods and the use of scavenging reagents.

This form of treatment based on case studies seems very appropriate, especially where it introduces routine procedures in which one can benefit from the advantage of an existing general method. This approach also has clear advantages for establishing synthetic protocols, and could be useful to chemists wishing to establish new techniques in their laboratories. However, the verdict from the standpoint of special syntheses is different. It is true that the book gives detailed descriptions of many syntheses, but the process of adapting a well worked out synthetic protocol for high-throughput use is not where the main difficulties occur in practice. Instead, from a practical viewpoint the difficulties arise mainly in the development and optimization of new synthetic routes, an aspect that is unfortunately hardly touched on in this book. It would have been more useful to place special emphasis on that aspect, for example in discussions of different types of polymer supports and linker systems, thus providing a valuable source of help for the synthetic chemist. What are the advantages and disadvantages of a particular support material? Which linkers are appropriate for which reaction conditions? The available supports and linkers are merely listed, with no attempt to describe their properties in detail. The case studies offer little help in this area. More emphasis should be placed on discussing likely problems and solutions. More information about analytical methods for monitoring reactions, especially the on-bead methods, would have been helpful. Lastly, it would have been desirable to discuss combinatorial approaches to the development and optimization of synthetic protocols.

There remains the question as to which groups of readers the book is suitable for. It cannot be recommended as an introduction to combinatorial chemistry and/or high-throughput synthesis, as the chapters are too superficial. On the other hand, for chemists who already have some basic laboratory experience in combinatorial chemistry it contains useful ideas, hints, and advice, especially about introducing new techniques for synthesis and automation. Chemists whose interest lies in solving problems of synthesis and developing effective synthetic protocols, with the aim of then applying these to high-throughput systems, will find that the book offers little help. For answers to these central questions they must refer to the specialist literature on solid-phase synthesis or combinatorial chemistry.

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NMR Imaging of Materials. By *Bernhard Blümich.* Clarendon Press, Oxford 2000. xxiii + 541 pp., hardcover £ 69.50.—ISBN 0-19-850683-X

This book, in the OUP series of monographs on "Physics and Chemistry of Materials", addresses non-medical applications of magnetic resonance imaging. The book can be roughly divided into three parts: fundamentals of NMR, the basics of MR imaging, and the use of imaging in systems other than medical or animal systems. These parts make up approximately 30, 40, and 30 % of the book, respectively.

The first part (Sections 1–4) covers the general principles of NMR: the spin Hamiltonian, spin dynamics, and the basics of NMR data acquisition and processing. One of its real strengths is the special attention paid to NMR hardware and the ways in which it affects the experiment. While it would have been impossible to give a comprehensive account of the subject in just one or two sections, the book gives a good overview of NMR hardware with excellent refer-

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