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BOOK REVIEWS

Hawley's Condensed Chemical Dictionary, 15th ed. By Richard J. Lewis, Sr. John Wiley & Sons, Inc.: Hoboken, NJ. 2007. x + 1380 pp. $150.00. ISBN 978-0-471-76865-4.

This edition of Hawley's Dictionary contains over 4200 new or updated entries, with many of the new definitions relating to the fields of biochemistry and nanotechnology. As with previous editions, the types of information presented here include "(1) descriptions of chemicals, raw materials, processes, and equipment; (2) expanded definitions of chemical entities, phenomena, and terminology; and (3) descriptions or identifications of a wide range of trademarked products used in the chemical industries" to quote from the Introduction. There are three appendices: (I) "Origins of Some Chemical Terms"; (II) "Highlights in the History of Chemistry"; and (III) "Manufacturers of Trademarked Products".

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March's Advanced Organic Chemistry: Reactions, Mechanisms, and Structure, 6th ed. By Michael B. Smith (University of Connecticut, Storrs, CT) and Jerry March (Adelphi University, Garden City, NY, now deceased). John Wiley & Sons, Inc.: Hoboken, NJ. 2007. xxii + 2358 pp. $99.95. ISBN 0-471-72091-7.

The goal of this book, according to Smith, is "to give equal weight to the three fundamental aspects of the study of organic chemistry: reactions, mechanisms, and structure". The first part of the book is focused on the structure of organic compounds, reaction mechanisms in general, and other topics important to the study of mechanisms, and the second part is devoted to the mechanisms of individual reactions. The sixth edition has been thoroughly updated, and more than 7000 new references have been added. The book concludes with Appendix A "The Literature of Organic Chemistry", Appendix B "Classification of Reactions by Type of Compounds Synthesized", and two very extensive indices.

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Molecular Organic Materials: From Molecules to Crystalline Solids. By Jordi Fraxedas (Institut de Ciència de Materials de Barcelona, CSIC, Spain). Cambridge University Press: Cambridge. 2006. xx + 336 pp. $125.00. ISBN 0-521-83446-5.

Publication of *Molecular Organic Materials* comes at a time when interest in creating new materials is surging, and the subject is attracting the attention of a highly diverse community of researchers representing various areas of chemistry and physics. This book is valuable because it will help draw the community together by presenting key aspects of the science of molecular materials in ways that promote understanding by an interdisciplinary audience.

The book consists of six chapters. One is an introduction to the chemistry and physics of relevant molecular materials, and the remaining five cover the following topics: (1) the synthesis of compounds judged to be of particular interest; (2) the engineering of crystalline molecular materials, in both 2D and 3D; (3) the behavior of molecules at interfaces; (4) the growth of thin molecular films; and (5) the physical properties of selected molecular materials. Unquestionably, all these subjects are active areas of research in materials science, both fundamental and applied. However, the list of subjects reveals a strong emphasis on periodic molecular materials, particularly on their behavior at interfaces and in films. Despite the broad title of the book and its stated goal of integrating the diverse community of scientists studying molecular materials, many important topics have been left out, including gels, liquid crystals, amorphous molecular materials, the optical properties of molecular materials, and the molecular materials of nature. The subtitle of the book, *From Molecules to Crystalline Solids*, provides a hint that the book is more focused than its main title suggests, but in my opinion the author and the publisher should have done more to tell the potential reader that the book is not meant to be a general introduction to molecular materials.

Detailed analysis of the individual chapters of the book reveals significant strengths, as well as a few shortcomings. The introductory chapter, for example, presents topics of central importance in the field of periodic molecular materials, including intermolecular interactions, symmetry, orbitals, electronic configuration, crystal engineering, structure, polymorphism, phase diagrams, conductivity, and magnetism. It thereby assembles a wealth of essential material taken from different areas of specialization. However, key concepts are not always communicated in simple and intuitive ways designed to reach readers unfamiliar with the subject. This should be one of the principal objectives of any book aimed at a diverse community of scientists.

How individual molecular components of materials can be synthesized is addressed in Chapter 2. Specialists in synthesis will find this chapter to be naive and arbitrarily focused on planar aromatic targets of potential use in electronics. The book's narrow perspective on molecular chemistry is reflected in a statement that appears in Chapter 4: "The present chapter tries to highlight the relevance of interfaces for MOMs [molecular organic materials], which is in part due to the nearly planar geometry of most molecules." This remark about planarity will surprise many scientists studying molecules with complex three-dimensional topologies.

In Chapter 3, the author nicely covers a wide range of topics related to engineering crystalline molecular materials, both in bulk and in films. He emphasizes the engineering of ordered

Unsigned book reviews are by the Book Review Editor.

films, particularly those composed of electroactive molecules. However, the issues raised are of broad interest to materials scientists, and the chapter provides a valuable complement to existing reviews that focus on engineering 3D molecular crystals.

A great strength of the book is Chapter 4, in which the author describes the interaction between molecular films and ordered surfaces. The subject is developed systematically, starting with isolated molecules, moving on to denser submonolayer coverages, and finally treating monolayers. Well-selected examples are presented, and basic information about modern techniques for characterizing the resulting structures is gracefully integrated. Of particular interest is the instructive analysis of the electronic structure of heterojunctions between molecular semiconductors and metals, inorganic semiconductors, and insulators. The level of this analysis is sophisticated, however, and a greater effort should have been made to simplify and explain, thereby making the essentials accessible to readers not already familiar with the subject.

In Chapter 5, the author moves logically from the subject of thin films featured in Chapter 4 to a very valuable description of the further growth of films to produce thicker ordered deposits. Among the subjects presented are the mechanisms of crystal growth, nanoscale surface morphology, and polymorphism. By focusing on the behavior of thick molecular films, this chapter nicely complements classic treatises that present the basic principles of crystal growth.

In the final chapter, the author examines the physical properties of selected molecular materials of particular interest. Included are analyses of (i) the electronic structure of the tetrathiafulvalene-tetracyanoquinodimethane salt (TTF-TCNQ), a 1D metal; (ii) 1D magnetism in two representative coordination complexes; (iii) doping and its use in constructing molecular field-effect transistors; (iv) structure−activity relationships, as revealed by the behavior of salts of derivatives of TTF and related compounds; and (v) special molecular materials in which valuable properties of magnetism, conductivity, and superconductivity may coexist. Although the topics reflect the particular interests of the author, they are of general importance in the field of molecular materials.

The book is generally well written and edited, but it repeatedly uses unobvious abbreviations and acronyms that are not already in widespread use, such as MOM for "molecular organic material." This will frustrate many readers, particularly those who open the book to find a particular piece of information and who overlook the lists of abbreviations and symbols in Chapter 1. Similarly, the book makes excessive use of acronyms to name compounds, forcing the reader to have a prodigious memory or to turn constantly to Table 1.1 for enlightenment. On page 161, for example, no less than seven different acronyms—TBPP, CTBPP, BCTBPP, OMBD, PVBA, NN, ML— appear, some of which are used multiple times on the page. Many readers will not recognize any of these abbreviations without consulting the early pages of the book.

The book could also have benefited from revision by an editor who knows how to place commas to help the reader. The book avoids the common problem of using commas too frequently, but it overcompensates by using them too sparingly. Many sentences must be reread before their meaning is clear. For example, the sentence "Chirality is an extremely interesting phenomenon with significant implications in biology and pharmacology and chiral recognition still remains mysterious...." (Chapter 4, page 177) would be much easier to read if it appeared as "Chirality is an extremely interesting phenomenon with significant implications in biology and pharmacology, and chiral recognition still remains mysterious...."

Overall, the strengths of the book far outweigh its weaknesses. It succeeds in presenting a broad range of topics in the field of molecular materials and in making key concepts accessible to a diverse community of scientists. The book is highly authoritative when films and interfaces are described, particularly those involving electroactive molecules. In addition, it is attractively priced. It deserves to find a wide audience of readers.

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