publication of this textbook was rushed. A little extra time devoted to eliminating the obvious mistakes, the more important of which are pointed out below, would have done the book a great favor.

The exact undergraduate level at which this text is pitched is unclear, because of a severe inconsistency in prerequisites. As an example, Chapter 1, within two pages, includes the use of line structures, invites students to practice the manual ring inversion of a cyclohexane chair model, and yet introduces conformational studies using ^{1}H NMR spectroscopy.

In many aspects, the material is not well presented. The following is a list of some of these. Orbitals are presented without phases, hybridized orbitals do not show back lobes, σ* and π* orbitals are introduced but not depicted (even though this would be useful in some discussions); most figures and schemes lack captions, detail is omitted in figures and schemes to an extent that some become incomprehensible, some axes are not labeled properly; obvious omissions in the choice of references and sources for further reading are irritating; the topic of (chiral) point groups is avoided, and so the discussion of achirality only focuses on symmetry planes and misses the important issue of centers of inversion (a molecule with C_i symmetry is achiral without a symmetry plane); charges in reaction schemes just vanish, and so do some reaction products, reaction arrows are not labeled with their reagents. Also, for a stereochemistry textbook that introduces hybridization and bond angles, some of the drawings of molecules are annoyingly inaccurate.

More serious than the above, especially in an undergraduate textbook that encourages self-study, is the apparent predisposition to generalize ideas that then become wrong: the ideal tetrahedral bond angle is always 109.5° and it cannot vary by a few degrees (if it does, it is no longer ideal); 1,4-disubstituted cyclohexanes without a stereocenter are discussed in a chapter entitled "Molecules with Two or More Stereogenic Centres" without any further explanation; the statement that "four different atoms…must be bonded to an sp^3 hybridized carbon to create a chiral molecule" does not hold true for a *meso* compound (a point that is correctly discussed in detail elsewhere in the book). The text is remarkably free of typographical errors, except unfortunately where it really counts: the maximum number of stereoisomers for n stereocenters is 2^n (as correctly stated in the text) not $2n$ (given as an emphasis in the margin and in the chapter summary); whereas cyclohexene is correctly described in the text as having four coplanar carbon atoms, it has "four planar carbon atoms" in the summary.

Somewhat irritating is the author's tendency to ignore certain (IUPAC) conventions. Even though IUPAC is mentioned in the preface, the usage of its terms in the text is neither systematic nor consistent, which, again, is unfortunate in an undergraduate text. And so conformations that should be termed synperiplanar and antiperiplanar are referred to as *cis* and *anti*, respectively (not even *cis* and *trans*, or *syn* and *anti*). Considering the fact that *E* and *Z* is the approved notation for stereoisomeric alkenes, it is also amusing to read that there is no "objection" to using *E* and *Z* rather than *cis* and *trans* for disubstituted alkenes even where *cis* and *trans* is "adequate".

Obviously a choice had to be made as to the topics covered, but I am unhappy about the omission of certain topics that would not have taken significant extra space. The importance of cyclohexane and its conformations is emphasized repeatedly, but nowhere is it mentioned that the boat conformation is an energy maximum and that chair and twist conformers are energy minima. In fact, the twist conformer is ignored almost entirely. The concept of the conformer is not covered at all. Pseudoasymmetry is not included. Chiroptical methods, and configurational analyses in general, are missing. Robinson's text (see above) covers all of these.

The feeling that publication had been rushed culminated in Chapter 7. This chapter (entitled "Substitution Reactions at Saturated Carbon") consists of just Section 7.1 "Nucleophilic Substitution". The Royal Society of Chemistry website for the book, on the other hand, has a link to an extensive addendum to Chapter 7 (45 pages covering Sections 7.2 to 7.9). From the addendum, it seems that Chapter 7 should be entitled "Stereochemistry in Reactivity". In terms of reactions, it covers everything that is obviously missing from the printed version: rearrangements, reactions of the carbonyl group, radicals and their cyclizations, elimination reactions, and pericyclic reactions (where orbitals are finally shown with their phases). It is clear that this addendum is indeed an afterthought, as the aims stated at the beginning of Chapter 7 do not cover any of the topics of 7.2 to 7.9.

On a positive note, and besides its appealing cover, this book has two features that Robinson's *Organic Stereochemistry* does not have. One is the use of red color in the presentation to emphasize important points. Each chapter begins with the aims and concludes with a summary, both presented in red-shaded boxes. Throughout the text, such boxes also offer additional thoughts and stimulate student participation. This is in line with the independent-learning philosophy that the *Tutorial Chemistry Texts* series advertises, as also is the good choice and number of worked problems, which in my view represent the second advantage.

It seems likely that this book will be reprinted soon to include the missing "half" of Chapter 7. Hopefully at that point the publisher will allow the author to remove the factual mistakes as well. This would lead to a much better text, and then the choice between it and Robinson's book would (almost) be reduced to personal preferences in what should be covered.

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Nanoscale Materials in Chemistry. Edited by *Kenneth J. Klabunde.*. Wiley-Interscience, New York 2001. 292 pp., hardcover $ 99.95.—ISBN 0-471-39395-3

The word nanotechnology raises high expectations. By altering the size-dependent properties of materials in defined ways on one hand, and combining that with a high integration density on the other hand, it should be possible to build complex machines with extremely small dimensions. The exciting possibil-

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ities range from super-fast computers to nano-robots that could swim along our blood vessels to kill harmful viruses.

Of course, we know that things have not yet progressed quite that far. In contrast to those high expectations, the industrial applications of "nano-objects" achieved so far appear rather modest, as is evident, for example, from the fact that in this book of nearly 300 pages the ninth and last chapter ("Applications of Nanocrystals") occupies only six pages. The idea of complex devices that would be assembled by combining different nanoscale building blocks is not yet relevant in the sense of real technological applications. Nevertheless, in the last few years the application of materials science to the many different aspects of nanostructures has developed into a new field of research, in which scientists and engineers from a very broad range of disciplines have begun to work together towards achieving the technological goals.

The book is mainly intended for chemists, and its principal aim is to serve as a foundation on which to base courses in nanochemistry for advanced and postgraduate students. It consists of nine chapters by different authors, mostly chemists. Its claim to be a textbook is only partly justified. As is usual in books that consist of a collection of articles by different authors, the chapters vary greatly in their structure and length, and there are hardly any cross-references. Each chapter ends with a comprehensive bibliography, and the book contains about 500 citations altogether, giving the reader access to original publications and further reading.

In the first chapter K. Klabunde provides a short "Introduction to Nanotechnology", describing the range of potential applications of nanostructures with over 20 illustrative examples. The subject of "nanoscopic dimensions" is also briefly introduced, and some methods for studying nanoscale materials are described.

In Chapter 2, "Metals" (45 pp.), G. Schmidt discusses various aspects of metallic nanocrystals. The author gives a comprehensive overview of metal particles, beginning with their special physical characteristics, such as changes in the electronic density of states which alter the color and electrical conductivity, then moves on to aspects such as the chemistry of their preparation, catalytic properties, and organization. Different aspects are illustrated by well chosen examples, thus completing this chapter which provides an easily understandable introduction to the world of metallic nanocrystals.

Chapter 3, "Semiconductor Nanocrystals" by M. P. Pileni, is concerned solely with a description of the author's own research projects, as can be seen from the fact that over one-third of the publications cited are from that particular group. The first part of the chapter deals with the optical and structural properties of semiconductor particles of Groups II – VI, which is then followed by a discussion of magnetic semiconductors and two-dimensional long-range structures.

In Chapter 4, "Ceramics", A. Khaleel and R. M. Richards are mainly concerned with the preparation of ceramic nanoparticles. They give an excellent description of various gas-phase and liquid-phase preparative methods. This is followed by a useful discussion of bonding in nanostructured oxide compounds, and lastly by details of some selected physical and mechanical properties. Over 160 literature references offer access to a wide choice of material for further reading.

Chapter 5, "Metal Nanoparticles: Double Layers, Optical Properties and Electrochemistry", by P. Mulvaney, is also well written and very informative, but right from the start it is of a fundamentally different kind. Thus, whereas Chapter 4 contains a systematic description of currently used preparative methods with reaction formulas, Chapter 5 derives mathematical formalisms in the style of a physical chemistry textbook for advanced students. For example, there are excellent discussions of the electrochemical double layer in solvated nanocrystals, and of charge-transfer reactions at the surfaces of metal particles. The chapter also includes an excellent treatment of the dielectric properties of nanoparticles, thus providing an important basis for understanding the optical properties of metal particles.

"Magnetism" is the title of Chapter 6, in which C. M. Sorenson discusses the magnetic properties of nanostructures. Much attention is devoted to the fundamentals of magnetism, an aspect which occupies 30 of the chapter's 50 pages. In discussing the magnetic properties of small particles, the main focus of attention is the interesting phenomenon of the disappearance of domain boundaries, followed by the transition to superparamagnetism. This is completed by a discussion of some recent research research results.

Chapter 7 again has a very different structure. Here, under the title "Chemical and Catalytic Aspects of Nanocrystals", K. J. Klabunde and R. S. Mulukutla describe various surface properties of nanocrystals. Within about 40 pages they deal with a variety of materials (metals, oxides, dendrimers, etc.) and with a range of physical and chemical processes. For example, about 30 reaction mechanisms are described, which gives a good impression of the wide scope of this area of research, but also severely tests the reader's concentration.

In Chapter 8, "Specific Heats and Melting Points of Nanocrystalline Materials" (15 pp.), O. Koper and S. Winecki discuss the thermodynamic properties of nanoparticles. Although this chapter is comparatively short, it gives a precise description of the main changes undergone by the temperature-dependent properties. Lastly, in Chapter 9 (already mentioned earlier), J. Parker describes a number of applications that have already become practical realities. The book is completed by a subject index with about 400 entries.

It is difficult in principle to give a general verdict about a book that treats many aspects of nanostructures in widely different styles. Some of the chapters have the character of review articles dealing with a class of materials or with various methods of preparation, while others are individual research reports, or resemble well-written and informative chapters of a physical chemistry textbook. However, on the basis of this variety, I can, with a clear conscience, recommend the book as a reference source or as a collection of introductions to the various topics covered. On the other hand, it is not a compehensive survey nor a well-structured textbook.

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