substantially modified, and now contains new subsections on solid-phase synthesis and combinatorial synthesis. Furthermore, vast improvements have been made to Chapter 8 (*Reactions Involving the Transition Metals*), in which a number of catalytic methods especially for stereoselective synthesis are discussed that have been either newly added or that were spread over several chapters in the earlier editions. The particular importance of new catalytic processes is also made clear in other chapters, such as Chapter 4 (*Electrophilic Additions to Carbon–Carbon Multiple Bonds*), Chapter 6 (*Cycloadditions, Unimolecular Rearrangements, and Thermal Eliminations*), and Chapter 12 (*Oxidations*). Other additions concern the stereochemistry of the Aldol reaction (Chapter 2), new reagents in radical chemistry and for the reduction of carbonyl compounds (Chapter 5), the use of organozinc and organoindium compounds (Chapter 7), transition metal catalyzed carbene addition and insertion (Chapter 10), catalytic nucleophilic aromatic substitution (Chapter 11), metal-free oxidation methods (Chapter 12), and synthetic strategies in the total synthesis of taxol (Chapter 13).

Both volumes contain a large number of examples and literature citations which extend to 1998 in Volume A and to 1999 in Volume B. Each chapter is supplemented by exercises, the solution of which can be found in the original literature. A detailed index together with numerous cross-references between the two volumes enables the correct place to be found quickly. One drawback of the revised version is that some areas of organic chemistry, such as supramolecular chemistry and materials chemistry, do not get a mention. Even without covering these topics, this fourth edition covers a breadth that other textbooks on organic chemistry at the moment can not offer. So, there exists little doubt that the new Carey–Sundberg will continue the success of the earlier editions.

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Selective Oxidation by Heterogeneous Catalysis. By *Gabriele Centi, Fabrizio Cavani* and *Ferruccio Trifiro*. Kluwer Academic/Plenum Publishers, New York 2000. xix + 505 pp., hardcover £ 105.00.—ISBN 0-306-46265-6

This book, which is part of a series on fundamental and applied catalysis, surveys recent developments in the field of selective oxidation by heterogeneous catalysis. It is aimed at graduate students and industrial researchers. The two key features of the treatment of the subject are: concept by example and outlook for the future. Rather than striving for comprehensiveness, the authors opt for an in-depth treatment of selected, representative examples in which they clarify the basic concepts required for a better understanding. Attention is focused not only on the catalyst (design) but also on (integration into) process engineering. The second feature is to identify new directions in oxidation catalysis.

In Chapter 1 the reader is introduced to the world of catalytic oxidation and the forces that drive it. The major driving force is the need for cleaner processes that produce less waste, and this is illustrated with three examples: processes for manufacturing propene oxide, cyclohexanone oxime, and methylmethacrylate. The advantages and limitations of heterogeneous compared with homogeneous catalysis are also discussed. In a discussion of the titanium silicalite catalyst (TS-1) the authors state that although such catalysts are often erroneously classified as "redox zeolites", that is incorrect because there is no change in the valence state of the metal during the catalyst cycle. I beg to differ: the term redox refers to the reaction, and redox catalysis means the catalysis of oxidation (or reduction) reactions. The authors' definition is ambiguous when a metal/oxidant combination is involved, as for example in vanadium catalyzed oxidations using hydroperoxide, which can operate through a valence change or a Lewis acid type mechanism.

Chapter 2 deals with challenges and opportunities in catalytic oxidations, for example the trend towards the use of alkanes instead of alkenes as raw materials, and new reactor technologies including monolithic and membrane reactors. The trend towards the use of pure oxygen instead of air is discussed, as is the use of alternative oxidants such as nitrous oxide or ozone, and the in situ generation of hydrogen peroxide.

Chapter 3 continues the discussion of new technological and industrial opportunities with examples of new catalytic processes, e.g., the use of TS-1/H_2O_2 for the epoxidation of propene, the hydroxylation of phenol, and the ammoximation of cyclohexanone (the authors refer to the latter reaction as an ammoxidation). The chapter includes examples of "new" catalytic systems such as metalloporphyrins, polyoxometalates, supported metals, isomorphously substituted molecular sieves, and redox pillared clays. In my opinion the latter name is correct, even though the vanadium example given (epoxidation with RO_2H) does not involve a change in the oxidation state of the metal.

The following two chapters focus on the gas-phase oxidation of alkanes over oxide catalysts, which is a major area of expertise of the authors. Reactions treated in depth include maleic anhydride from n-butane, ammoxidation of propane to acrylonitrile, oxidative dehydrogenation of alkanes, acrolein and acrylic acid from propane, and methacrolein/methacrylic acid from isobutane.

Chapter 6 returns again to the use of framework-substituted molecular sieves and encapsulated, grafted, or tethered complexes as catalysts for liquid-phase oxidations. The use of heteropolyanions, including palladium-heteropoly compounds as heterogeneous catalysts for Wacker oxidations, is also discussed.

Chapter 7 addresses new concepts and new strategies in selective oxidation, and returns to the subjects of in situ generation of H_2O_2 and the use of N_2O as an oxidant in the gas-phase oxidation of benzene to phenol over an Fe-ZSM-5 catalyst. Novel reaction media for oxidations are also touched upon. The final chapter contains an extensive treatment (over 100 pages) of the mechanisms of gas-phase oxidations and ammoxidations on oxide surfaces.

The book contains a comprehensive table of contents which allows the reader to quickly find topics of interest. However, a good book should also have a carefully prepared, comprehensive, and cross-referenced index, and the 4½-page index here is woefully inadequate for a book of 500 pages. I searched in vain in the index for the word "safety" (a not unimportant aspect of oxidations with oxygen or hydrogen peroxide). Safety is briefly mentioned on page 69 in connection with the use of oxygen compared with air, but does not appear in the index.

All in all, the book gives a good overview of heterogeneous selective catalytic oxidations, with a bias towards gas-phase oxidations with O_2 and towards bulk rather than fine chemicals. I can recommend it to academic and industrial researchers interested in the area of selective catalytic oxidation of relatively simple (hydrocarbon) substrates. It will be of less interest to synthetic organic chemists engaged in selective catalytic oxidations of complex organic molecules.

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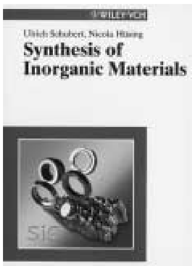
Synthesis of Inorganic Materials. By *Ulrich Schubert* and *Nicola Hüsing*. Wiley-VCH, Weinheim 2000. xvii + 396 pp., softcover € 49.90.—ISBN 3-527-295509-X

Based on a lecture course presented by the authors at the Vienna University of Technology on inorganic materials from molecular precursors, this book is designed to introduce the reader to the chemistry behind materials science. It is not intended to replace standard solid-state chemistry or materials science texts, but to solidify the "weakest link" between preparative inorganic chemistry and technologically important materials.



Given this approach, the text is organized according to preparation processes, with an eye toward those that are actually (or have high potential to be) used in the real world. Several strategies are employed to introduce the novice to the field. A list of some 120 abbreviations reminds one how prone many scientific niches are to creating their own languages. A glossary of 69 terms, from Alloy to Chelate to Green Body to Superconductor to Yield Strength, is included, and each occurrence of these terms is flagged in the text by referring the reader to the glossary. The examples above give an indication of the range of these terms. Clearly the authors erred on the side of caution in compiling this list, and at times the "see glossary" marker seems to overwhelm some pages. However, an undergraduate student might disagree with this assessment. The well-chosen figures, including flow charts, line drawings, chemical structures, and photo(micro)graphs, are nicely done and are a highlight of the book.

Following a very brief introduction, six chapters form the bulk of the text. A chapter on high-temperature ceramic superconductors serves to introduce solid-state reactions, followed by carbothermal reduction reactions such as the Acheson process for SiC. Combustion synthesis and some of the chemical aspects of sintering are discussed. Finally, intercalation chemistry is introduced and applied to lithium ion batteries. This is typical of the chapters with a comfortable blend of chemistry and technology. Suggested further reading is largely confined to the secondary literature. No problems or study questions are provided, but the level of language is quite accessible to a third year undergraduate or beginning graduate student. The text is relatively free of errors.

The formation of solids from the gas phase is dominated by a discussion of chemical vapor deposition, including formation of metal, diamond, metal oxides and nitrides, and semiconductors. Glasses (as opposed to crystalline materials) are first discussed in the context of the formation of solids from solutions and melts. The topic of precipitates leads to a discussion of biomineralization and the challenges of synthetically replicating or replacing biomaterials. Silicon provides the platform for sol–gel chemistry, which is then extended to hybrid organic–inorganic polymers. Inorganic polymers are dominated by the silicones, but phosphazenes, silanes, and even a few transition metal containing systems, are mentioned. The concluding chapters discuss porous and nanostructured materials—both topics of intense current interest.

The authors have succeeded in achieving their stated goal. It is unlikely that the level of the chemistry would intimidate a non-chemical scientist and, as an inorganic chemist, I found the level of treatment of the materials aspects of the science to be very approachable. A student (or instructor) seeking to understand how inorganic synthesis is actually applied in materials science will find this text useful.

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Encyclopedia of Analytical Chemistry. Applications, Theory and Instrumentation. 15-volume set. Edited by *Robert A. Meyers*. John Wiley & Sons, Ltd., New York 2001. 13 970 pp., hardcover $ 6 000.00.—ISBN 0-471-97670-9

Imagine it was your task to present the *complete* discipline of instrumental analytical chemistry in a multivolume book series with an appropriate and state-of-the-art partition between basics and applications of the individual analytical methods. Would this be possible at all considering the enormous effort required? How could one achieve a homogeneous layout and the necessary up-to-date treatment with a large number of individual authors from various subdisciplines? Robert A. Meyers, editor-in-chief of the *Encyclopedia of Analytical Chemistry*, has succeeded in fully achieving these goals by assembling a team of more than 800 authors.

Consisting of 15 volumes and over 13 000 pages, this is a truly unique collection of analytical methods and applications: all parts of the analytical process, from sampling through sample preparation, separation, and detection, to data evaluation and interpretation, have been covered in a logical scheme. Volumes 1–10 contain analytical applications, and Volumes 11–15 deal with the basics of the individual analytical methods. Volume 15 is completed by