Zimmermann et al. suggest NFkB as a new mediator of sepsis and a new therapeutic concept for Lyell's syndrome, and then investigate the synergism of endothelin/NO/oxalate as a potent regulation system to maintain the homeostasis of septic or polytraumatic patients. Fifthly, Grützmann et al. discuss the coupling of porphyrin with sonochemiluminescence to destroy tumor cells.

The fifth part, "Bioluminescence and applications", consists of three essays. Drokina et al. study the effect of millimeter electromagnetic irradiation in the logarithmic growth phase of cells in different media. Köppen et al. measure the effects of cytotoxic agents on human cells in breast cancer and ovarian cancer. Popova et al. review broad perspectives of employing bioluminescence in global monitoring and biotesting.

The sixth part, "Luminescence-immunoassays and automatisation", consists of five essays. Hubl et al. evaluate a new immunoassay system for thyroid hormone. Liebert et al. determine insulin in pooled human serum by using electrochemiluminescence based on magnetic beads. Scheunert et al. test the behavior of osteocalcin and C-telopeptides at the beginning of the menopause. Wunderlich et al. evaluate thyroid peroxidase levels in human serum as a marker for metastatic differentiated thyroid carcinomas and as a predictor of the effectiveness of iodine-131 therapy. Weiß et al. synthesize several steroid-based fluorescent dyes for possible sensitization of peroxyoxalate CL.

Last but not least, the twelve beautiful and impressive CL color pictures in the book deserve to be mentioned. This fascinating phenomenon of CL inspires many researchers worldwide, including the authors of this book review, and efforts to develop this technique further continue to grow. Overall, these expertly written essays will certainly provide simulating ideas for readers already active in this area, and the literature references will offer a deeper look into topics of special interest. The text definitely has some flaws, but none of them is serious. A minor annoyance is the variations in layout and typography, as expected from photographically reproduced manuscripts. As the editors point out, this book is very useful for student education and teaching and an indispensible tool in modern chemistry, biochemistry, and medicine. Even the expert should find this book to be a very useful addition to his or her collection.

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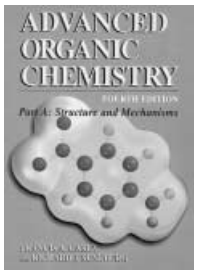
Advanced Organic Chemistry. 4th Ed. Edited by *Francis A. Carey* and *Richard J. Sunberg*. Kluwer Academic/Plenum Publishers, New York 2000/2001.
Part A: Structure and Mechanism, 823 pp., softcover $ 49.50.—ISBN 0-306-46243-5;
Part B: Reaction and Synthesis, 965 pp. softcover $ 49.50.—ISBN 0-306-466245-1

The two volume "Carey – Sundberg" was for a large part of the 1990s THE textbook of organic chemistry for advanced and PhD students. Therefore, a new edition has been eagerly awaited because it should document the important new developments in organic chemistry. So what is new in the last ten years?



In regard to the layout and the division of contents, F. A. Corey and R. J. Sundberg have opted for the tried and tested layout of two volumes for the fourth edition of their textbook. Volume A on the theme of *Structure and Mechanism* already appeared in 2000 and is devoted to the basics of organic reactivity. It is divided into the same 13 chapters as the corresponding volume in the third edition. In their preface, the authors emphasize a new development which makes the essential diferrence between the third and fourth editions: the use of computer chemistry for the investigation of molecular structures and reaction mechanisms. This trend is most evident in the introductory Chapter 1 (*Chemical Bonding and Structure*) where notes on density functional theory and the atoms-in-molecules (AIM) concept can now be found, but it is also responsible for important changes in Chapter 3 (*Conformational, Steric, and Stereoelectronic Effects*), Chapter 4 (*Study and Description of Organic Reaction Mechanisms*), Chapter 5 (*Nucleophilic Substitution*), Chapter 9 (*Aromaticity*), and Chapter 11 (*Concerted Pericyclic Reactions*). It is also made use of in Volume B (*Reactions and Synthesis*) with theoretically calculated results because the consideration of theoretical results can be seen as one of the most important overall guidelines in the up-dating of Carey – Sundberg. The development of the contents is reflected in the change of the cover, as the cover of Volume A displays the electrostatic potential of *para*-nitrobenzyl anions and Volume B the frontier orbitals of ethylene and butadiene. Worthy of improvement in this connection, however, is an effective citation of the theoretical methods, not only are there a large number of typographical errors, but it is also plagued with inconsistencies. In calculations at the Hartree – Fock level, often only the basis set is given, while the same calculations at the B3LYP level are not mentioned at all. In combination with some uncertainties in regard to the citation process (G2 is not a basis set and the 6-311G** basis also does not contain f functions) this generates more confusion than insight. The authors should have taken more care in providing a consistent terminology for the theoretical methods. The following new topics can be found in the chapters of Volume A: enantiomer separation on chiral phases or by kinetic cleavage of racemates by synthetic and natural catalysts (Chapter 2), rate constants for a large number of radical reactions (Chapter 12), conical intersections as important features of potential energy surfaces in photochemical reactions (Chapter 13). No appreciable mention can be found of new reaction media such as supercritical carbon dioxide or ionic liquids, or of the success of short-time spectroscopy in the investigation of reactive intermediates.

The revised version of volume B on the theme *Reactions and Synthesis* appeared only this year and is also subdivided into the same 13 chapters as the previous edition. The last chapter (*Planning and Execution of Multistep Syntheses*) in particular has, however, been

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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

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