

Book Reviews ^{*}

Bioceramics, Volume 8. Edited by June Wilson and Larry L. Hench (University of Florida) and David Greenspan (U.S. Biomaterials Corp., Florida). Elsevier: Oxford. 1995. xvi + 512 pp. \$200.00. ISBN 0-08-0426778.

This book is the edited proceedings of the 8th International Symposium on Ceramics in Medicine, held in Florida in November 1995. This work contains the latest research on the increasingly important and wide-ranging role of bioceramics in medicine. This volume will be a vital reference document for academic and industrial researchers in the field, and it will also be of great value to students and lecturers in materials science, medical engineering, and clinical implantology. There are 85 papers divided into the following sections: Bone Biology, Spinal Reconstruction, Orthopaedic Applications, ENT and Maxillofacial, Dental Applications, Calcium Phosphate Coatings, New Directions, Composites, and Bioactive Glasses. There are an author index and a subject index.

JA965604A

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Concepts in Chemistry: A Contemporary Challenge. Edited by Dennis H. Rouvray (University of Georgia). Wiley: New York. 1997. xvi + 420 pp. \$79.95. ISBN 0-471-96555-3.

This volume of twelve essay reviews is largely based on lectures originally presented as part of the conference *Are the Concepts of Chemistry all Fuzzy?*, held in Pitlochry, Scotland, in July of 1995, and organized by Dennis Rouvray and Edward Kirby under the sponsorship of the International Society for Mathematical Chemistry. The range of topics includes the fuzziness of chemical concepts; the role of mathematics in chemistry; the concepts of periodicity and hyperperiodicity; the concept of chemical structure; electron-counting rules and topology in carbon allotropes, inorganic clusters, and superconductors (three essays); the concept of ring currents; the concepts of symmetry and chirality (two essays); the concept of complexity; and the concept of epitopes and paratopes in immunological reactions.

In keeping with both the title of the original conference and the editor's comments in the preface, one might expect each essay to focus on an analysis of the "fuzziness" of a key chemical concept using the paradigm of fuzzy logic theory. However, as is usually the case with volumes based on symposia, the various authors often wander far from the organizers' original intention. Indeed, a measure of just how much wandering has occurred can be gaged from the fact that the term "fuzzy" and its various derivatives (fuzzified, fuzziness, etc.) appear only 13 times in the index, and that nine of these references are to the editor's own paper.

In any analysis of the precision or fuzziness of a concept, one would reasonably expect the author to trace the history of the concept, documenting both its origins and historical permutations; to document the extent of its current fuzziness by citing examples of variable usage in the modern literature; to cite specific examples in which application of the concept leads to ambiguity; and, lastly, to suggest ways of making its meaning more precise. All of this assumes, of course, that the author has selected an important general chemical concept for analysis in the first place. Very few of the essays in this volume meet all five of these criteria. Though many of the essays do focus on key chemical concepts, such as structure, chirality, or periodicity, in other cases the authors use the term "concept" as a synonym for whatever current theoretical model they happen to be working on. Only a few of the essays attempt a historical survey. Unfortunately, this is usually quite general and does not specifically focus on the ways in which the concept in question has changed its meaning over time. Likewise, none of the essays appear to document the current range of variation for the concept under discussion.

However, where all of these essays do excel is in their attempts to make current usages more precise (or, if one will excuse the paradox, in the attempt to more precisely define their lack of precision) and, to a lesser degree, in their analysis of ambiguous applications. This, in turn, is a reflection of a common interest in mathematical chemistry

on the part of all of the authors. After all, the common thread which underlies most work in this area is the attempt to use current trends in mathematics and logic—such as topology theory, permutation theory, group theory, graph theory, fuzzy logic, catastrophe theory, chaos theory, etc.—to reformulate in a more precise and quantitative manner chemical concepts which have traditionally been largely verbal or pictorial in nature. Response to these reformulations varies from chemist to chemist. The more conservative tend to view them as relabeling exercises which use overly formal mathematical jargon to unnecessarily obfuscate simple concepts. At the opposite end of the spectrum are those who feel that such reformulations not only provide greater precision but also bring out novel ways of looking at traditional topics and, at their very best, even lead to new predictions. The ultimate test is the extent to which these reformulations stimulate the experimentalist and lead to new discoveries in the laboratory.

While most of the essays do not completely conform to the reviewer's idealized vision of how one would go about analyzing the key concepts of chemistry, there is no doubt that Dr. Rouvray has made an important start in this direction and that all of the essays in this volume are of great interest in their own right. Though some of the topics have been covered in much greater detail elsewhere and have even been the subject of separate monographs, this volume will provide an excellent and stimulating starting point for chemists, mathematicians, historians, and philosophers interested in mathematical chemistry and the nature of chemical concepts.

William B. Jensen, *University of Cincinnati*

JA9755471

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Microbial Physiology. By Albert G. Moat (Marshall University School of Medicine, West Virginia) and John W. Foster (University of Alabama School of Medicine). Wiley: New York. 1995. xv + 580 pp. \$59.95. ISBN 0-471-01452-4.

The book *Microbial Physiology* is by all appearance a very worthwhile addition to the biochemical literature. In spite of its modest size, the table of contents shows that this book is very broad in scope, covering all aspects of microbial physiology including current concepts of microbial genetics and molecular biology along the more traditional aspects of cell structure, intermediary metabolism, and growth.

The goal stated in the book "to help set the foundation for further inquiry into microbial physiology and genetics" is well achieved. The text can be used by advanced students with some biochemical and microbiological background or can be of benefit to any researcher establishing an interest in any field of microbial physiology, as it brings together in a single volume a large number of revised and updated topics. The text is well-written and clear, although the discussion of each topic is necessarily brief and mostly limited to the paradigm of *Escherichia coli*. It will not be satisfying to every reader, but it is impossible to convey in one book all that is known about thousands of different microorganisms. More reading is suggested for the in depth inquiry by many references provided, most of them very recent at the time of the book print.

Overall, authors have written an informative book of much fundamental potential use and provide an excellent reference source for further studies.

Elzbieta Prusak-Sochaczewski, *Laurentian University*

JA955297T

S0002-7863(95)05297-8

Radical Chemistry. By M. J. Perkins (Brunel University, London). Ellis-Horwood: New York. 1994. x + 182 pp. \$25.95. ISBN 0-13-320920-2.

This is a short and very readable overview of various diverse aspects of radical chemistry. It provides a sampling of the types of reactions and applications of free radicals in organic chemistry. The first half

^{*}Unsigned book reviews are by the Book Review Editor.

of the book presents the basic physical chemical fundamentals which control radical reactions and properties. The second half focuses on applications.

Chapter 1 provides a historical overview of the early developments in radical chemistry. Chapter 2 covers types of radical processes, and Chapter 3 discusses the generation of free radicals. Chapter 4 contains an excellent discussion of the factors that influence radical reactivity and selectivity, including polar and steric effects, intramolecularity, and orbital overlap. Chapter 5 covers spectroscopic detection methods: ESR, ENDOR, and CIDNP. Synthetic aspects are addressed in Chapter 6, including radical chain processes for alkane functionalization, functional group interconversions, carbon-carbon bond formation, and tandem reactions, as well as stoichiometric radical reactions. Chapter 7 discusses stereochemical topics: diastereoselectivity, chiral auxiliaries, and kinetic resolution. Radical ions and single electron transfer reactions are treated in Chapter 8. Chapter 9 is an ensemble of various topics, including Frontier Molecular Orbitals, kinetic and thermodynamic measurements, captodative stabilization, lipid autoxidation, the persistent radical effect, ketone triplets, and the role of transition metals in radical reactions. Chapter 10 ends the book with a very nice discussion of the variety of biological roles played by radicals, including enzymatic processes.

This is an excellent resource for the organic chemist with little prior knowledge of radicals; however, even specialists in the field will find it informative. The book is peppered throughout with explanations grounded in physical chemical insights. The book is written in a pedagogic tone, and includes a collection of problems at the end. A great improvement would result from more extensive references to the primary literature, in place of the sparse selected additional readings listed in the back. While this book is certainly not intended to be an inclusive coverage (carbenes, diradicals, and photochemistry are scarcely mentioned), it provides an introduction to the fundamentals as well as to the diversity of recent developments and applications in organic radical chemistry.

Rebecca Braslau, *University of California, Santa Cruz*

JA975525E

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Guidebook to the Calcium-Binding Proteins. Edited by Marco R. Celio (University of Fribourg, Switzerland). Oxford University Press: New York. 1996. xvi + 238 pp. \$34.95. ISBN 0-19-859950-1.

In the *Guidebook to the Calcium-Binding Proteins* published by Oxford University Press, Marco R. Celio has edited a very useful and comprehensive handbook for all calcium-binding proteins known as of 1995. The *Guidebook* presents synopses from more than 100 scientists in 84 chapters with a fairly well defined layout (Identification, Alternative Names, Gene and Sequence, Protein, Anatomical Localization, Biological Activities and Regulation, and References). Almost 60 "EF-hand" proteins, 9 "Annexin" proteins, and 8 "other" calcium-binding proteins are described in "chapters" that range in length from one to seven pages with the average length being two to three pages. The graphics are primitive, and figures are limited. The fact that such a guidebook can be written with close to 80 different calcium-binding proteins is evidence for the need for such a book for anyone working in the field to keep informed about newly discovered proteins as well as newly discovered information about well-established systems. References for most chapters were limited to 21 and contained the most seminal references for each protein as well as more current references. The fact that the field is undergoing rapid expansion is taken into account by the inclusion of a website address in the introduction (<http://www.oup.co.uk/guidebook>) which promises updates and new information. Unfortunately, though the construction of the site was promised for September 1996, as of May 1997 the website was still under construction.

One would expect that the information content of each chapter would be concise and cut to the bare bones of essential information. There is some unevenness in the chapters on this point. It was surprising to note that two entire pages in the chapter on calmodulin were devoted to complete amino acid sequence information for 41 different calmodulins while almost no reference was made to the different conformations adopted by calmodulin upon binding to different targets. Still, the information contained in this chapter is useful for directing someone

unfamiliar with a particular protein further or for comparative purposes, comparing say the calcium affinities of calmodulin and troponin C. The list of antibodies available for these compounds, the companies' names and addresses which market them, and an entire introductory chapter on methods to measure calcium and magnesium binding to calcium-binding proteins also gives this book a decidedly "applied" feel to it. Though the *Guidebook* is definitely not a lab manual, the organization of the information in the book is directed toward easy access and applicability. Those looking for a theoretically grounded text best look elsewhere though there are individual examples of particularly clear and insightful chapters, such as the chapter by J. A. Cox on invertebrate, plant, and lower organisms' calcium-binding proteins.

In summary, the *Guidebook* provides easy access to information on the entire family of calcium-binding proteins and will be useful to both experienced workers in the field for comparative purposes and newcomers wishing a handy snapshot of the field.

Patricia B. O'Hara, *Amherst College*

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Protein Sequencing Protocols. Series: Methods in Molecular Biology, Vol. 64. Edited by Bryan John Smith Celltech Therapeutics, U.K.). Humana Press: Totowa, NJ. 1997. xiv + 375 pp. \$69.50. ISBN 0-89603-353-8.

The goal of this text, as stated by the editor, is to provide a handy reference of currently used techniques, as well as a description of newer, less used methods appropriate for the elucidation of the sequence structure of proteins. The editor has achieved this goal, and the text is well organized and accessible such that one can quickly locate a method, identify potential problems, and then be directed to the literature for solutions or suggestions to minimize its affect on the sequence analysis.

The text is composed of 30 chapters written by a variety of authors with expertise in the given technique. The mix of topics contains information about both standard, accepted techniques (e.g., Edman degradation) and new, state-of-the-art methodologies (e.g., MALDI-TOF) for sequence analysis. Thus, the text will be of use to those researchers interested in a specific technique to accomplish a given task, as well as those interested in an overview of available techniques. The book contains a variety of practical information important to protein sequencing but frequently overlooked. This discussion includes techniques for handling microgram, or less, quantities of protein, potential interferences in sequence determinations, and the need for appropriate blanks and controls, and discussion is offered concerning the merits of the three commercially available automated Sequenators. This chapter, as well as the one concerning Sequenator maintenance may not be useful as the discussion is fairly specific and design and/or technology changes may quickly make the information obsolete. However, these chapters comprise only a small portion of the text, and the methods chapters will provide more use to the reader over time.

Because the text was written to be a handy reference for the laboratory, the background discussion for each technique is limited and the history and underlying theory are only treated in a cursory manner. The bulk of the text discussion, as appropriate given the goals of the book, are devoted to specific protocols for sequence analysis. The editor has also included a number of practical chapters involving methods appropriate for the determination of the site and nature of protein modification including phosphorylation, glycosylation, etc. In addition to the 30 chapters, the editor has compiled much useful information in several appendices. Particularly useful is a detailed compilation of amino acid modifications found in proteins and peptides. This table contains both a structural representation of the modification for easy reference and a description of the site of the modification.

Overall, *Protein Sequencing Protocols* has been prepared as a methods manual, and this may be a strength of the text for those working in the field and needing specific information in order to implement a given technique. Those researchers more interested in learning about a range of methods for protein manipulation, modification, and sequencing at the picomole level will find enough information to understand the various techniques and up to date references to consult

to more thoroughly delve into the principles and specifics of the various methodologies.

Donald R. Bobbitt, *University of Arkansas*

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Advances in Silicon Chemistry, Vol. 3. Edited by Gerald L. Larson (Huls America, Inc., New Jersey). JAI Press: Greenwich, CT, 1996. ix + 279 pp. \$109.50. ISBN 1-55938-831-5.

The third volume in this series focuses on the chemistry and properties of organosilanes in three areas: (1) Oxidative cleavage of the silicon-carbon bond (author K. Tamao); (2) organosilyl peroxides as a stable source of oxygen in synthetic reactions (authors A. Ricci, G. C. Seconi, R. Curi, and G. L. Larson); (3) α -silyl carbonyl compounds (author G. L. Larson). Each chapter is well-organized and offers a structured review with reasonably current references (primarily through 1995 with a few in 1996).

The first chapter covers oxidative cleavage of the silicon-carbon bond and primarily concerns itself with reactions occurring through a mechanistic route in which the oxidizing agent coordinates to the silicon center rather than to the organic group. In these reactions at least one heteroatom must be bonded to silicon, and the cleavage process usually leads to the formation of alcohols. Conditions required for oxidative cleavage and possible mechanisms for a variety of organosilane reactions are discussed. The last major section of the chapter summarizes synthetic applications in a large table covering several pages.

Silyl peroxides form a class of peroxides that will be of interest to those who seek alternatives to organic peroxides. The second, relatively short, chapter reviews the synthesis and chemistry of a variety of these compounds. A key feature of many organosilyl peroxides is their stability as an oxygen source in synthesis. Also, an introduction to the chemical kinetics and mechanisms of several classes of organosilyl peroxides is provided.

The largest chapter consumes more than half of Volume 3 and is written by the editor. The chemistry of α -silyl carbonyl compounds has been reviewed several times, and a recent one was written in 1990 by the editor. This chapter covers some of the same material in previous reviews and also brings the subject more current. The carbonyl groups discussed include aldehydes, ketones, enones, carboxylic acids, esters, and amides. The syntheses and reactions of these types are reviewed in detail.

Volume 3 of the subject book is a useful resource for students, educators, and researchers interested in an overview of the three topics and provides an excellent lead-in to the primary literature. References provide a good cross-section of the literature.

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Basic Principles of Membrane Technology. By Marcel Mulder (University of Twente, The Netherlands). Kluwer Academic: Dordrecht, 1996. 564 pp. \$255.00. ISBN 0-7823-4247-X.

This title is a second edition to one published in 1991. Marcel Mulder is an accomplished researcher in the field of membrane science and technology from one of the leading university centers. The second edition adds over 200 pages, but much of this may be attributed to formatting changes. Some of the new material that is added to the second edition includes brief discussions of membrane contactors (where the membrane acts as an interphase in gas-liquid and liquid-liquid separations) in Chapter IV and membrane reactors in Chapter VI. Other than the inclusion of these new topics within existing chapters, overall coverage is in the same order as the earlier edition which includes chapters on membrane preparation, characterization, transport, membrane processes, polarization phenomena and fouling, and module and process design. The first two chapters are introductory in nature including coverage of general principles of materials and material properties in Chapter 2. From my own perspective, this material could have been eliminated as it would be reasonable to assume that the reader

would have had some undergraduate training in the nature and properties of materials and a basic training in thermodynamics.

A major difference between the two editions is the inclusion of problems at the end of each chapter. This is an important component since the book was originally designed to be a text to facilitate the teaching of membrane science and technology at both undergraduate and graduate levels. Our own department has offered such a dual-level course for over 10 years and would benefit from a structured text. Although the substantial price of the hardbound edition may relegate it only to library acquisition, it is important to note that the second edition is also available in paperback version (ISSN 0-7923-4248-8) at a much reduced price of \$65 which is reasonable for course adoption.

Inclusion of problems is a welcomed addition to the second edition. Solutions to some of the problems (termed "solved problems") are included at the end of the book while the majority of problems are "unsolved." There is no indication if there is a solutions manual to the unsolved problems which would help the instructor in the selection of suitable homework problems or test material. In general, the problems are representative of the chapter content and are useful exercises.

The science and technology of synthetic membranes is an important field and is one that should be promoted as an elective course especially for students in chemical and environmental engineering and in materials science and engineering. In this regard, *Basic Principles of Membrane Technology* is a welcomed contribution and can serve as an excellent, authoritative text for such courses. I would also highly recommend it as a useful primer for practicing engineers and chemists who find themselves involved in membrane operations in their professional activities. It is also a hope that more coverage of basic principles of membrane science be incorporated in fundamental undergraduate courses in science and engineering including those in unit operations, thermodynamics, and materials science.

Joel R. Fried, *University of Cincinnati*

JA975504K

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Mössbauer Spectroscopy Applied to Magnetism and Materials Science, Vol. 2. Series: Modern Inorganic Chemistry. Edited by Gary J. Long (University of Missouri-Rolla) and Fernande Grandjean (University of Liege). Plenum: New York, 1996. xv + 361 pp. \$89.50. ISBN 0-306-45398-3.

This is the second book of review chapters edited by Long and Grandjean dealing with application of Mössbauer spectroscopy to magnetism and materials science. The two subjects are closely intertwined, as quite often the major contribution of the technique is to elucidate the magnetic structure of materials. The editors state that they tried to make the book more attractive to materials scientists who are not experts in Mössbauer spectroscopy by including complementary techniques such as neutron and surface scattering. This inclusion has been done in several chapters, but the book does seem oriented toward scientists who are moderately familiar with the technique, if not experts. The book was prepared in camera-ready format and is remarkably free of typographical errors. There are very good subject and author indexes, and most chapters have extensive reference lists emphasizing modern papers through 1995.

The chapters vary in length from 14 to 48 pages and also vary considerably in topic. Chapters of broad general interest include the ones on surface analysis by W. Meisel, metal layer interfaces by Ch. Sauer, and high pressure applications by M. P. Pasternak and R. D. Taylor. Meisel's chapter has brief discussions of the major surface analysis techniques such as X-ray photoelectron spectroscopy, Auger spectroscopy, and scanning electron microprobe. Scattering Mössbauer spectroscopy, as opposed to the standard transmission geometry, has become of special interest in surface studies and is discussed in some detail, emphasizing the various depths which can be probed depending on whether the γ -rays or conversion electrons are detected. Example applications are given. Sauer's chapter also places Mössbauer spectroscopy in a broad context of techniques used to study interfaces. Emphasis is given to examples illustrating the varied kinds of information about the interface which can be obtained through the Mössbauer technique, especially magnetic properties. The internal conversion scattering method is the one most used. Pasternak and

Taylor review recent experimental studies using the diamond anvil cell to obtain ultrahigh pressures. They wisely provide a clear discussion of the experimental technique and its peculiarities. A number of applications are also discussed, illustrating the variety of problems which can be addressed.

In other chapters a wide range of materials are covered, including industrial glasses, metglas and other amorphous ribbons and wires, quasicrystals, and galvanneal steel coatings. A long chapter by S. J. Campbell and W. A. Kaczmarek discusses materials prepared by mechanochemical methods such as ball milling. Several chapters dealing with theory and spectral analysis seem somewhat out-of-place.

This book belongs on the shelf of any scientist working with the materials discussed. At least portions of the book should be of interest to all Mössbauer spectroscopists.

Lawrence H. Bowen, North Carolina State University

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Chromatographic Analysis of Pharmaceuticals, 2nd ed. Revised & Expanded Chromatographic Science Series, Vol. 74. Edited by John A. Adamovics (Cytogen Corp., New Jersey). Marcel Dekker, Inc.: New York. 1997. x + 527 pp. \$165. ISBN 0-8247-9776-0.

This book consists of eight chapters written by seven authors and is less voluminous than its predecessor (Volume 49 of the series, 661 pages). As in the previous edition, this book focuses on the analysis of bulk and formulated drugs. The chapters on robotics and head space analysis found in the first edition were consolidated with sample pretreatment and gas chromatography chapters. Two new chapters on capillary electrophoresis and supercritical fluid chromatography were added.

Chapter 1, by John A. Adamovics, provides an overview of regulatory considerations of impurities, stability testing, method validation, system suitability testing, and product testing. Chapter 2, also by John A. Adamovics, deals with sample pretreatment, which includes topics on sampling, sample preparations, and various extraction methods. In Chapter 3, under the title of planar chromatography, John A. Adamovics and James C. Eschbach discuss the techniques and applications of paper and thin-layer chromatography. Chapter 4, also by John A. Adamovics and James C. Eschbach, is a review of gas chromatography based on capillary and megabore column technology. Chapter 5, entitled high-performance liquid chromatography by John A. Adamovics and David L. Farb, gives a practical overview of the HPLC sorbents, instrumentation, and various method development approaches. The readers will find the examples of HPLC assays on biomolecules, chiral drugs, and other drug types informative.

Capillary electrophoresis (CE), a relatively new comer in pharmaceutical industry, is introduced in Chapter 6 by Shelley R. Rabel and John F. Stobaugh. Method development, instrumentation, and various forms of CE including micellar electrokinetic capillary chromatography, chiral and sieving separations, and isoelectric focusing are surveyed. Supercritical fluid chromatography of bulk and formulated pharmaceuticals is examined in Chapter 7 by James T. Stewart and Nirdosh K. Jagota. Discussion on instrumentation is brief, but application examples are numerous and extensive.

Approximately half of the book is devoted to applications, which are included in the last chapter by John A. Adamovics. Methods for over 1300 pharmaceuticals, and their excipients and impurities are surveyed. The chromatographic methods cited include those from the *Chinese Pharmacopoeia* and updates from the pharmacopoeias of Britain, Europe, Japan, and the U.S. This chapter is thoroughly referenced (1167 cited articles).

Overall, this book provides the latest information on the state of pharmaceutical analysis by various chromatographic techniques. The references are up-to-date. The contents should benefit chemists in both

academia and industry who have an interest in the areas of pharmaceutical method development and quality assurance.

Chia-yu Li, East Carolina University

JA9658022

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Carotenoids, Volume 2: Synthesis. Edited by George Britton (University of Liverpool), Synnove Liaaen-Jensen (Norwegian University of Science & Technology), and Hanspeter Pfander (University of Bern). Birkhauser: Neward. 1996. xix + 359 pp. \$139.50. ISBN 3-7643-5297-3.

This is another masterpiece produced by the brilliant and expert editorship/authorship of Britton, Liaaen-Jensen, and Pfander; it is simply an indispensable reference source for all scientists involved in carotenoids, retinoids, and related polyene chemistry research, especially synthesis. This follows the 1995 publication of *Carotenoids Vol. 1A, Isolation and Analysis*, 328 pp, and *Vol. 1B, Spectroscopy*, 360 pp, edited by the same group. The three volumes are coupled to *Key to Carotenoids*, Second Edition, edited by H. Pfander, 296 pp, with 563 carotenoid structures and 2558 references. The four volumes comprise an update of the classic *Carotenoids* edited by Otto Isler, 1971, 932 pp.

The present volume is the first to be devoted entirely to the chemical synthesis of carotenoids and retinoids, a class of widely occurring natural products of ever increasing interest. Each chapter is written by specialists who have been in this field for many years and who have first-hand experience in their assigned areas. The majority of authors from the Swiss schools started by P. Karrer and continued by O. Isler and the Hoffmann-La Roche team are joined by authors from BASF AG, Berne, Kobe, Leiden, Liverpool, Natal, Okayama, and Trondheim. Chapter 1: I. Synthesis in Perspective; II. Strategies of Building the Carbon Skeleton; Characterization of Products. Chapter 2: I. Enol Ether and Aldol Condensations; II. Organometallic Reactions; III. Wittig Olefination; IV. Sulphone Coupling. Chapter 3: I. Polyene Synthons; II. Acyclic Carotenoids; III. Synthesis of Cyclic Carotenoids; IV. Synthesis of Acetylenic, Allenic and In-chain Substituted Carotenoids; V. Total Synthesis of (Z)-Isomers; VI. Labeled Carotenoids; VII. Technical Synthesis; VIII. Partial Synthesis of Glycosides and Glycosyl Esters; IV. Partial Synthesis of Sulphates. Worked Examples: Enol Ether Condensations/Organometallic Reactions/Wittig and Horner-Emmons Reactions/Sulphone Coupling/Asymmetric Synthesis/Synthesis ex Chiral Pool/Optical Resolution of Racemic α -ionone/ β,β -Carotene. Appendix I: List of Synthons. Appendix II: List of Naturally Occurring Carotenoids Prepared by Total Synthesis. As seen here, the fact that the synthetic chapters are described on the basis of reaction types greatly facilitates the reading.

The 250 page chapter on total synthesis written by H. Mayer and O. Isler in the 1971 Isler *Carotenoids* monograph delineated the conceptual format for describing the synthetic routes of carotenoid preparation by defining the various synthons and their coupling reactions; this format was followed in subsequent proceedings of the IUPAC International Symposia on Carotenoids series. The present volume is an extension and updated compilation of all major synthetic methods in the carotenoid/retinoid field, with emphasis in outlining the practical methodology and providing an easy source of information. Each chapter, which follows the rigidly systematic and concise format tested for over 25 years since 1971, provides an excellent source for reviewing the synthetic approaches available for the synthesis of a specific target, as well as giving a quick summary of the various synthetic strategies used in the syntheses of the numerous carotenoids in academe and in industry. As seen in the content outline, large scale practical preparations and isotopically labeled compounds for biophysical, biochemical, and biological studies are also described. As in Vol. 1A these chapters are followed by eight Worked Examples, corresponding to Experimental in full papers, which give readers a general feeling for the syntheses of these polyunsaturated and highly colored compounds.

The carotenoids in the present monograph which are listed in *Key to Carotenoids* (1987) are given in bold print, whereas those not listed are numbered separately in italics. However, in some cases bold print numbers are given without structures; since not all readers have the *Key*, all compounds mentioned should be accompanied by structures. For example, p 24 mentions a tetrol **204** named pirardixanthin without

a structure; I found the compound on p 342 in the list of newly synthesized carotenoids. It would facilitate the reading if all compounds mentioned in this *Synthesis* volume follow a single italicized number, and if listed in the *Key*, this could be followed by the *Key* number in bold in parentheses. However, this is but a minor point to be considered in the future. *Carotenoids Volume 2: Synthesis* is an outstanding book which should be useful for all chemists involved in syntheses. For chemists involved in carotenoid investigations, it is an indispensable monograph.

Koji Nakanishi, *Columbia University*

JA9657519

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Chemical Aspects of Drug Delivery Systems. Edited by D. R. Karsa (Akcros Chemicals) and R. A. Stephenson. The Royal Society of Chemistry: Cambridge. 1996. viii + 161 pp. \$89.00. ISBN 0-85404-706-9.

This book consists of 15 chapters based on lectures presented at a symposium jointly organized by the Waterborne Polymers Group of BACS and the MACRO Group UK and covers some of the advances in chemical aspects of drug delivery systems. New material for drug delivery and targeting is presented as well as a range of excipients in delivery systems considered in depth. Particular attention is given to poly(ethylene oxides) and carbohydrate derivatives including starch, lactose, and microcrystalline cellulose as well as selected water-soluble polymers and hydrogels.

The book begins with a chapter on new materials and systems for drug delivery and targeting and continues with chapters on bioadhesive polymers, transdermal delivery, and controlled release systems based on poly(ethylene glycols) and then proceeds to structural investigations of monolayers and nonionic surfactant systems, nonionic surfactant vesicles, and monofunctional poly(ethylene glycols). The book then proceeds into some of the more traditional pharmaceutical excipients with chapters on lactose and regulatory aspects of lactose products including modified lactose, the use of lactose in direct compression, high-density grades of microcrystalline cellulose, and starch-based drug delivery systems and then finishes with chapters on trehalose in drug stabilization and delivery, aqueous shellac solutions for controlled release coatings, finally information requirements for drug delivery systems.

Overall this is a relatively broad and somewhat unusual book on chemical aspects of drug delivery. While the book does review some of the current new polymer systems being used for bioadhesive transdermal and controlled drug delivery systems, one of the more interesting aspects is the rather extensive coverage of some of the more traditional excipient materials used in pharmaceutical processing, such as lactose, modified lactose, cellulose, starch, trehalose, and shellac. Consequently the monograph will be of interest to pharmaceutical scientists who are interested in both new polymer delivery systems and modifications and new uses of relatively well known pharmaceutical excipients.

Gordon L. Amidon, *The University of Michigan*

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Protein Phosphorylation. Edited by Friedrich Marks (Heidelberg). VCH: Weinheim. 1996. xxiii + 381 pp. DM198.00. ISBN 3-527-29241-1.

As the prominence and pervasiveness of protein phosphorylation—dephosphorylation as a means of exerting biological control has become more and more apparent, a growing and increasingly diverse segment of the scientific research community is confronted with the need to acquaint themselves with this important phenomenon. In *Protein Phosphorylation*, Friedrich Marks and colleagues have produced a much needed primer that is eminently suited for persons seeking their first introduction to this powerful and versatile regulatory mechanism as well as signal transduction experts seeking to familiarize themselves with aspects lying outside of their particular area of concentration. The book is concise, lucid, and extensively referenced and features a nice balance between text and illustrations. In its first chapter, entitled *The*

Brain of the Cell, Marks paints a concrete and compelling picture of how nature configures individual protein phosphorylation events to form an integrated network capable of processing past and present cellular inputs so as to produce an appropriate, and comprehensive, cellular response. The next twelve chapters cover a wide variety of individual topics with a strong focus on areas of contemporary interest and recent scientific progress. These range from the three-dimensional structure of protein kinases to the role of protein phosphorylation in neuronal function and the cell division cycle, from the molecular mechanisms underlying hierarchical phosphorylation events to the modulation of gene expression via the phosphorylation of transcription factors, and from the domain structure of the src protein tyrosine kinase and CaM kinase II to the possible molecular defects in protein phosphorylation processes underlying diseases such as cancer. In general, the emphasis here is on protein kinase structure—function relationships and signal transduction from the membrane to the nucleus, with little space devoted to more classic topics such as control of intermediary metabolism or muscle contraction. While the individual chapters were almost all informative and well written, it was disappointing that only a few of the authors made an effort to expand upon the exciting central theme outlined in the first chapter. It was particularly disappointing that only a single chapter was devoted to the protein phosphatases, since it is their ability to enzymatically “reverse” this covalent modification event that imbues protein phosphorylation with much of its regulatory power. Compromises are, however, inevitable in attempting to cover such a vast topic. This book is highly recommended for any and all seeking an overview of this area that emphasizes broad concepts rather than specialist-level detail, and does so in a package that is appealing in format and digestible in size. Its style and breadth of coverage should render *Protein Phosphorylation* particularly well suited to serve as a reference text for a course on the role of protein phosphorylation in biological signal transduction.

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The Theory of Intermolecular Forces, Volume 32 of International Series of Monographs on Chemistry. By A. J. Stone (University of Cambridge). Oxford University Press: New York. 1996. xi + 264 pp. \$90.00. ISBN 0-19-855884-8.

The study of intermolecular forces is crucial to the study of all materials and their reactions; fortunately we are seeing more books on the topic. This is one of the better ones. Most books emphasize various aspects of intermolecular forces, and this is no different. Professor Stone has chosen to emphasize perturbative techniques and theory in general. To find out more about experimental determinations and typical literature potentials in general, one needs to go to another book for details; only sketches of these topics are presented.

After beginning with an excellent compact presentation of electrostatic interactions between molecules as well as between molecules and electric fields using spherical tensors and symmetry, the book then develops perturbation theory of small molecule interactions in some detail. While most of the attention is devoted to the long-range interactions including issues of damping and how to make estimates, he does discuss determining the repulsive part of the potential as well. One excellent chapter is devoted to practical model potentials, with a detailed discussion of water—water interactions. The last third of the book develops the ideas of distributed moments and polarizabilities for application to the interactions of larger molecules, a topic in which Professor Stone has been personally involved. While *ab initio* and density functional theory are not discussed in detail, they are discussed sufficiently, so some of the problems with their use can be demonstrated. Finally, there are several excellent appendices on tensors, perturbation theory, and conversion factors, as well as sixteen pages of references to relevant and recent journal articles.

In short it is a good book if you want to understand and evaluate intermolecular potentials.

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