

understood and significant deviations from expected secondary shifts can occur (Figure 1C). The characteristic NOE patterns are the true markers defining regions of secondary structure in NMR studies of proteins. However, knowing the range in which  $C\alpha$  and  $C\beta$  carbons are expected to resonate, given that the secondary structure is known, greatly facilitates the spectral assignment process.

Our data base is too small for defining different  $\Delta(\phi, \psi)$  functions for different amino acids, or for taking into account the side-chain conformations. However, we believe that the  $\Delta(\phi, \psi)$  maps presented here facilitate spectral assignment for  $^{13}\text{C}$ -enriched proteins.  $C\alpha$  and  $C\beta$  chemical shifts provide particularly promising structural probes for cases where other parameters such as  $^1\text{H}$ - $^1\text{H}$  NOE or  $J$  couplings cannot be measured, as is frequently the case for partially unfolded structures.

**Acknowledgment.** We thank Dennis Torchia, Donna Baldisseri, and Poul Hansen for making available to us the  $^{13}\text{C}$  chemical shift data of S.Nase and BPTI, prior to publication. We are indebted to Mitsuhiro Ikura, Lewis Kay, Dennis Torchia, Marius Clore, Angela Gronenborn, and Ted Becker for substantial help and many useful and stimulating discussions. This work was supported by the AIDS Targeted Anti-Viral Program of the Office of the Director of the National Institutes of Health.

**Supplementary Material Available:** One figure showing the distribution of  $\phi$  and  $\psi$  angles of the data base used, two figures showing the rms distribution of  $\Delta(\phi, \psi)$  for  $C\alpha$  and  $C\beta$ , one table with all secondary shifts, and two tables with the secondary shifts for  $\beta$ -sheet and  $\alpha$ -helix (15 pages). Ordering information is given on any current masthead page.

## Book Reviews\*

**Historical Atlas of Crystallography.** Edited by J. Lima-de-Faria, with the collaboration of M. J. Buerger, J. P. Glusker, H. D. Megaw, P. B. Moore, M. Senechal, and W. A. Wooster. Kluwer Academic Publishers: Dordrecht, Holland. 1990. x + 158 pp. \$36.00. ISBN 0-7923-0649-X.

This appealing book is the result of a cooperative effort by seven crystallographers, working under the auspices of the Commission of Crystallographic Teaching of the International Union of Crystallography.

The first 42 pages contain "time maps", the first one covering the development of crystallography as a whole over 5 centuries. This is followed by more detailed time maps of subfields: geometrical crystallography (19th and 20th centuries), physical, chemical crystallography, and crystal structure determination, all 20th century only. The time maps are chronologically arranged tables of entries characterizing each scientific advance or discovery. A collection of portraits and an extensive bibliography accompany the time maps.

The remainder of the volume contains articles on the history of each of the subfields, written by experts in each. These articles vary somewhat in technical depth, but for the most part the level of presentation does not require the reader to be an expert crystallographer. Of particular interest to chemists are the two chapters on the history of chemical crystallography, the chapter on inorganic compounds (Moore), and especially that on organic compounds (Glusker).

This book is warmly recommended to anyone with an interest in crystallography or in the history of science. Teachers of chemistry will find easy access to informative and interesting background material through applicable chapters in this book.

Christer E. Nordman, *University of Michigan*

**Charged Particle Beams.** By S. Humphries, Jr. (University of New Mexico). Wiley-Interscience: New York. 1990. xv + 834 pp. \$145.00. ISBN 0-471-60014-8.

This is a book on high-energy beam physics put in 15 chapters. Chapter 1 gives the necessary definitions and reveals the organization of the book. Chapter 2 presents a very lucid introduction to the phase space theory and also treats charged particle dynamics, distribution functions, and numerical trajectory calculations. Chemists will perhaps miss SIMION (not even mentioned), while other trajectory-simulation codes (EGUN, PARAX5, WOLF) are used throughout the book. Beam optics is dealt with in Chapters 3 and 4; the topics covered include transformation methods, beam matching, nonlinear focusing systems, emittance in storage rings, and beam cooling. The next two chapters discuss in detail the space-charge effects (the Child law) and flow limitations derived thereof. The design and performance of high-current electron and ion guns and diodes are dealt with in Chapters 7 and 8. In the next chapter basic equations are derived for paraxial beam transport through cylindrical and quadrupole lenses. Chapter 10 deals with transport of high-current electron beams in solenoidal fields and magnetic cusps, including a discussion of interaction of fast electrons with matter. The techniques of positive ion beam neutralization by electron space charge are discussed in Chapter 11, while Chapter 12 in turn deals with electron beams in plasmas. Beam instabilities are treated in detail in Chapters

13 and 14. Finally, Chapter 15 deals with the generation and amplification of microwave radiation with electron beams in inverse diodes, klystrons, travelling-wave tubes, and magnetrons, including a brief discussion of the free-electron laser.

Although neither of these topics is likely to be discussed daily in an average chemistry laboratory, the book can make interesting reading for synchrotron users and those involved in electron and ion optics in general.

Frantisek Turecek, *University of Washington*

**HPLC of Biological Macromolecules. Methods and Applications.** Edited by K. M. Gooding (SynChrom, Inc.) and F. E. Regnier (Purdue University). Marcel Dekker, Inc.: New York and Basel. 1990. xiii + 680 pp. \$150.00. ISBN 0-8247-7879-0.

Isolating a single active compound from the complex chemical milieu that is living tissue has always demanded the utmost from the chromatographic techniques used as well as in their skillful application. Biochemists as well as separation scientists were quick to adopt high-performance liquid chromatography (HPLC) as a tool. Unfortunately, communication between these two groups has, for the most part, been poor. This text represents a largely successful attempt to bridge the gap between these groups. However, this reviewer must offer one minor complaint before proceeding: although the title proclaims to encompass the HPLC of biological macromolecules, the text primarily focuses on the chromatography of proteins. Only about forty of the nearly seven hundred pages are devoted to nucleic acids; carbohydrates are essentially unmentioned except as glycoproteins.

The text is divided into three parts, the first being on individual chromatographic techniques, as well as on silica and organic supports, sample preparation, and gradient elution. Interestingly, affinity chromatography is absent in this section, as is any discussion of the chromatographic-like purifications being performed with cartridges. The second part describes the use of HPLC in the purification of various classes of polypeptides and proteins. Also included in this part are a chapter on the use of size exclusion chromatography for the measurement of protein-ligand and protein-protein interactions, as well as a chapter on the application of HPLC in the assay of enzymatic activities. The third part, really a single chapter, concerns the application of HPLC to the purification of oligonucleotides and tRNAs.

As with many multiauthored texts, there is a noticeable chapter-to-chapter variation in style. There is likewise a considerable variation in the depth of presentation. Some chapters in the first section (e.g., the chapters on silica, SEC, HIC, and sample preparation) are very nearly complete guides to the technique; others (e.g., the chapters on organic supports and IEC) are only surveys. The variation in the depth of presentation is reflected in the number of references: two chapters had only 8 references, including the chapter on IEC, while several chapters had more than one hundred references each. It is the responsibility of the editors to ensure uniformity of presentation. Further, there is also a significant amount of redundancy: several chapters in the second section each describe the fundamental modes of HPLC, operational considerations of each mode, etc., in spite of these modes being presented in detail in the first section. Again, the editors should have condensed these repetitions.

In spite of these short-comings, this is nonetheless a valuable text. In the preface, the editors state, "This book was written as a practical guide

\*Unsigned book reviews are by the Book Review Editor.

for scientists who must fractionate proteins, peptides, and polynucleotides". In this, the book largely succeeds. The first part in particular will be useful to biochemists and others seeking to utilize HPLC as a tool, providing as it does much useful information on chromatographic techniques. The second and third sections will likewise serve to encourage chromatographers to attempt to develop improved procedures for proteins other than the hydrophilic, globular species typically used. In short, those individuals who match the editors' description above will find this volume a useful addition to their libraries.

John C. Ford, *Indiana University of Pennsylvania*

**Fieser and Fieser's Reagents for Organic Synthesis. Volume 15.** By Mary Fieser (Harvard University). John Wiley & Sons: New York. 1990. 415 pp. \$49.95. ISBN 0-471-52113-2.

The newest member of this series is derived from reports published in 1988 (mostly) and 1989 (early months). It follows the customary format, in which reagents are listed in alphabetical order with a paragraph or two describing their use, accompanied by structural formulas, equations, and references. The presentation is clear and concise and invites browsing as well as searches for specific information. This series has always been a useful tool to sharpen the recent awareness of organic chemists, and it remains so. Both organic and inorganic reagents are included, and the entries range from "acetic anhydride-pyridine" to "zirconium sulfate". An author index and a subject index are included; the latter supplements the self-indexing arrangement of the body of the work, by including reagents that are not the main entries, name reactions, types of products, etc.

**Organic Reactions. Volume 37.** Editor-in-Chief, A. S. Kende. John Wiley & Sons: New York. 1989. xvii + 588 pp. \$79.95. ISBN 0-471-50169-7.

The cumulative index of chapter titles that opens this volume takes up 10 pages and represents a wealth of organic preparative chemistry. As older reactions become so well worked over that reviews are no longer needed, new reactions come to the fore and provide a never-ending supply of subjects for new volumes.

In this volume, one short chapter and one very long one are enough to fill it. Ohno and Otsuka have written an intriguing chapter on Chiral Synthons by Ester Hydrolysis Catalyzed by Pig Liver Esterase, and Fleming, Dunoguès, and Smithers have written about The Electrophilic Substitution of Allylsilane and Vinylsilanes. In the former, enantioselective hydrolysis of prochiral or meso diesters and kinetic resolution are the main topics. The range of published examples is summarized in eleven tables. In the latter, the number of tables, 45, is staggering, and yet there are addenda to them. The topic is substitution of an electrophilic group for the silyl group (with allylic shift in the case of allylsilanes). The vast amount of material described is relatively recent, the first example having been reported in 1948. Part of the reason for the impressive growth of the subject lies in the fact that these silanes react much like the corresponding organometallic reagents but are, in contrast, stable to air, water, and common reaction conditions and are purifiable and storable.

This volume has the customary cumulative indexes of chapter authors and topics, but it does not have a subject index specific to this volume; the highly detailed tables of contents serve that purpose.

**Biological Systems. Papers from Science, 1988-1989.** Edited by Barbara R. Jasny and Daniel E. Koshland, Jr. American Association for the Advancement of Science: Washington, D.C. 1990. xi + 270 pp. \$31.50. ISBN 0-87168-351-2.

This softbound book is a collection of 20 papers that appeared in *Science* in 1988 and 1989. The emphasis is primarily biological, but some are pertinent to the work of chemists who are concerned with medicinal or agricultural chemistry (e.g., Retroviruses, *Drosophila Melanogaster* as an Experimental Organism; The Human as an Experimental System in Molecular Genetics).

**Dienes in the Diels-Alder Reaction.** By F. Fringuelli and A. Taticchi (Università di Perugia). John Wiley & Sons: New York and Chichester. 1990. xx + 348 pp. \$69.95. ISBN 0-471-85549-9.

This book presents yet another account of the Diels-Alder reaction, but from a refreshing point of view. It is divided into chapters based on diene structure following an introductory chapter on basic principles of the Diels-Alder reaction. Thus, Chapters 2-9 discuss Diels-Alder reactions of open-chain, outer-ring, inner-outer-ring, across-rings, and inner-ring dienes. In general, the approach works well for categorization of the vast number of known reactions. The authors have, I feel, successfully targeted this book toward active researchers and toward advanced undergraduate and graduate students.

One of the strong points of the book is inclusion of so many modern

principles: reactivity and regioselectivity based on FMO theory, catalysis, stereoselectivity, high-pressure enhancement, and reactions in aqueous media. Tandem, domino, and diene transmissive Diels-Alder reactions are briefly discussed as separate topics in the first chapter. There is also a short section on the principles of asymmetric Diels-Alder reactions. The literature has been covered through early 1988.

Perhaps the strongest feature for the active researcher is the extensive tabulation of Diels-Alder reactions based on diene type. There are 126 tables covering over 800 different diene structures. Dienophiles are listed in the tables based on an ambitious structural scheme which is carefully explained at the beginning of the book. The alphabetized dienophile categories A1-A14...J1-J2 were chosen depending on multiple bond substitution pattern, rings, and heteroatoms. Items included in the tables are the cycloaddition substrates, yields, references, whether optically active substrates were employed, and whether kinetics were studied. Theoretical studies are differentiated from synthetic studies.

Proofreading for this book was lax resulting in a significant number of typographical errors. The authors have also made a few grammatical mistakes, e.g., "to oligomerize". Some of the book's conventions go counter to prevailing usage, e.g., *dominant* FMO interactions are shown using dashed lines in the diagrams while non-dominant interactions are shown using solid lines. The index is not very extensive, running less than 3 pages. However, these relatively minor criticisms should not deter the intrepid investigator or serious student.

All in all, this book will significantly aid the active researcher wanting to use the Diels-Alder reaction for synthetic purposes. It provides 1500 references to the literature mainly in the period from 1978 to 1987. The book would also be useful as an ancillary reference to a graduate level synthesis course.

Peter A. Wade, *Drexel University*

**A Specialist Periodical Report: Organometallic Chemistry. Volume 19. A Review of the Literature Published during 1989.** Senior Reporters: E. W. Abel (University of Exeter) and F. G. A. Stone (University of Bristol). The Royal Society of Chemistry: Cambridge. 1990. xvi + 468 pp. £137.50 (\$329.00). ISBN 0-85186-671-9.

This volume in the series of Specialist Periodical Reports surveys, in a comprehensive manner, the organometallic chemical literature for the year 1989. The articles, reviews, and books concerning main-group organometallics are classified according to the metal, whereas the transition-metal complexes are described according to the type of complexes (metal carbonyls, complexes containing metal-carbon  $\sigma$ -bonds,  $\pi$ -arene complexes). The chemistry of organoboranes and carboranes has been separated in two distinct chapters. Also a special chapter surveys the homogeneous catalysis performed by using transition-metal complexes. Finally, a very useful chapter describes all the structures of organometallic compounds determined by diffraction methods in 1989. This book covers in a very concise way the 1989 literature in organometallic chemistry. It is regrettable that some primary journal articles are summarized in less than a sentence, making it difficult to judge their content and significance.

Overall, this book represents a very valuable source of information and should be in all scientific libraries.

Paul Knochel, *University of Michigan*

**New Aspects of Organic Chemistry I.** Edited by Z. Yoshida (Kyoto University) and T. Shiba and Y. Ohshiro (Osaka University). Kodansha and VCH: Tokyo. Weinheim: New York, Cambridge, and Basel. 1989. xii + 566 pp. \$110.00. ISBN 0-89573-952-6.

This book presents the proceedings of the Fourth International Kyoto Conference held on November 14-18, 1988 and sponsored by the Kinki Chemical Society. The 25 papers in typescript form are organized under the following three headings: Efficiency in Organic Synthesis (eight papers), Organic Synthesis for Materials Science (eight papers), and Organic Synthesis for Life Science (nine papers). A summary precedes each paper. There is a list of contributors and their affiliations (co-authors as well as the presenters) and a subject index.

**Organic Syntheses. Volume 68.** Edited by James D. White. John Wiley & Sons: New York, Chichester, Brisbane, Toronto, and Singapore. 1990. xvii + 318 pp. \$34.95. ISBN 0-471-53787-6. The paperback version is distributed free of charge by the Organic Division of the ACS to members of the Organic Division of the American and French Chemical Societies, the Perkin Division of the Royal Society of Chemistry, and the Society of Synthetic Organic Chemistry, Japan.

This volume contains 31 experimental procedures checked and edited by members of the Board of Editors. The preparations are broadly compiled into six categories: (a) simple one- and two-carbon synthons, (b) chiral auxiliaries and stereocontrolled processes, (c) functionalizations employing organometallic reagents, (d) useful starting materials for

constructing complex molecules, (e) emerging reactions of potentially broad utility, and (f) cryptands with novel host-guest properties. The hard-bound edition contains the following: an appendix of CA nomenclature, collective index number, and registry number; a list of unchecked procedures that may be obtained by mail; and cumulative author and subject indexes for Volumes 65-68.

**Naturally Occurring Pest Bioregulators.** ACS Symposium Series 449. Edited by Paul A. Hedin (U.S. Department of Agriculture). American Chemical Society: Washington, D.C. 1991. xii + 456 pp. \$89.95. ISBN 0-8412-1897-2.

This book is based on presentations at three ACS symposia. It consists of a preface, an introductory chapter by the Editor, and 31 chapters in typescript form. These are organized into five divisions dealing with the role of insects and other animals, diseases, and weeds. The section headings are the following: Bioregulation of Insect Behavior and Development; Mechanisms of Plant Resistance to Insects; Allelochemicals for Control of Insects and Other Animals; Phytoalexins and Phototoxins in Plant Pest Control; and Allelochemicals as Plant Disease Control Agents. There are indexes of authors, their affiliations, and subjects.

**Experimental Researches in Physics and Chemistry.** By Michael Faraday. Taylor and Francis: London, New York, and Philadelphia. 1991. x + viii + 496 pp + 3 plates. \$55.00. ISBN 0-85066-841-7.

This book is a reprint of the original work written and published by Faraday in 1859, the current volume being published on the bicentennial of Faraday's birth in 1791. A foreword of 6 pages by J. M. Thomas, F.R.S., the present Fullerton Professor of Chemistry and Director of the Royal Institution (Faraday held this post), gives a marvelous insight into this classic work. It is a reprinted compilation of articles published by Faraday between 1821 and 1857 in the *Philosophical Transactions*, the *Journal of the Royal Institution*, the *Philosophical Magazine*, and other publications. It begins with his very first paper written when Faraday was 25 years old and ends with his lecture "On Observations on Mental Education". Although Faraday is renowned mainly for his contributions to electricity and magnetism, he was also one of the founders of chemistry—even elementary textbooks mention his isolation of benzene from the illuminating oil used in the concert halls in London. This is described in detail in this volume.

**Biology of Food Irradiation.** By David R. Murray. John Wiley and Sons Inc.: New York. 1990. xv + 255 pp. \$54.95. ISBN 0-471-92621-3.

This book was written for food scientists and biologists but should be read by everyone who is concerned about the quality of food. The evidence it presents for the potential dangers of irradiated food is alarming and will surely add to the controversy surrounding the subject. Irradiation sufficient to sterilize many foods not only makes them unpalatable but can produce dangerous residues. Many examples are presented of the destruction of essential nutrients and the potential for food poisoning by microorganisms in irradiated foods. References and an index are included.

M. C. W. Smith, *Ann Arbor, University of Michigan*

**Vitamin E. Biochemistry and Health Implications.** *Annals of the New York Academy of Sciences*. Volume 570. Edited by Bill Boland. New York Academy of Sciences: New York. 1989. 555 pp. \$135.00 (cloth). ISBN 0-89766-535X.

This volume is the result of a conference held in New York City on Oct. 31-Nov. 2, 1988. Vitamin E is the major membrane-bound antioxidant. It is essential for humans and plays a role in maintaining the health of the nervous and cardiovascular systems. The immune system may also require vitamin E. Physicians, biochemists, and nutritionists will find much useful information in this book. An index and references are included.

M. C. W. Smith, *Ann Arbor, University of Michigan*

**Alternative Agriculture.** Committee on the Role of Alternative Farming Methods in Modern Production Agriculture. Board on Agriculture. National Research Council. National Academy Press: Washington, DC. 1989. xiv + 448 pp. \$19.95. ISBN 0-309-03985-1 (paperback).

The economic and ecological problems facing the U.S. agricultural industry are enormous. Farmers are finding it difficult to repay debts and competition for world markets is increasing. Increased costs and the use of fertilizers, herbicides, and pesticides have added to their problems. Sediments, salts, fertilizers, pesticides, and manures produce the largest non point source of water pollutants. Twenty two different pesticides have been detected in California as a result of normal agricultural practices. Aquifers are being depleted and marginal lands are eroded. More than 440 insect and mite species and more than 70 species of fungi are resistant to pesticides while their predators have been wiped out.

Federal policies work against crop rotation, some soil conservation practices, reduction in pesticide use, and biological control. Fortunately, there are productive and profitable alternatives to these destructive practices. The committee stated that farmers who adopt alternative farming systems often have productive and profitable operations even though these farms usually function with relatively little help from commodity income and price support programs or extension. Alternative farming practices are not a well-defined set of technological or management techniques. Rather, they are a range of technological and management options used on farms striving to reduce costs, protect health and environmental quality, and enhance beneficial biological interactions and natural processes.

This book is divided into two parts. The first one includes a summary, followed by sections on agriculture and the economy, problems in U.S. Agriculture, research, and science, and an economic evaluation of alternative farming systems. Part two includes eleven case studies. These are concerned with crop and livestock farming, fresh market vegetable production, as well as fruits, nuts, and rice production. One chapter is devoted to integrated pest management in processing tomatoes.

This book is well-written and illustrated. An index and references are included. It will be of interest to farmers and anyone else concerned about our food supply.

M. C. W. Smith, *Ann Arbor, University of Michigan*

**Drinking Water Microbiology. Progress and Recent Developments.** Edited by Gordon A. McFeters (Montana State University). Springer-Verlag: New York and Berlin. 1990. xiv + 502 pp. \$59.00. ISBN 0-387-97162-9.

Engineers, microbiologists, epidemiologists, sanitarians, and health officials will find this book a useful addition to the literature on drinking water supplies. It includes the microbiology of source water and drinking water treatment. The presence of biofilms, invertebrates, and bacteria is discussed in relation to drinking water distribution. Problems involving pathogenic organisms and methods and monitoring in drinking water microbiology complete this volume. An index and references are included.

M. C. W. Smith, *Ann Arbor, University of Michigan*

**Yeast Biotechnology and Biocatalysis. Volume 5. Bioprocess Technology Series.** Edited by Hubert Verachert and René De Mot (Catholic University of Leuven). Marcel Dekker, Inc.: New York. 1990. xv + 522 pp. \$150.00. ISBN 0-8247-8142-2.

Yeasts are utilized in a variety of processes. These include the production, degradation, and utilization of fats, as well as the conversion of inulin. They can utilize xylan and cellulose and are active in biodegradation and biodeterioration processes. They can be used for the production of vaccines and other products for human use.

This book will be useful for biotechnologists, biochemists, and biochemical engineers. An index and references are included.

M. C. W. Smith, *Ann Arbor, University of Michigan*

**Encyclopedia of Engineering Materials. Part A: Polymer Science and Technology. Volume 1: Synthesis and Properties.** Edited by N. P. Cheremisinoff. Marcel Dekker: New York. 1988. 762 pp. \$185.00. ISBN 0-8347-7858-8.

This is the first volume of a 12-volume series concerning all aspects of engineering materials. Part A (the first four volumes) is titled Polymer Science and Technology; parts B and C are titled Composites and Ceramics, and Metallurgical Materials and Technology, respectively.

Synthesis and Properties is the title of this initial volume, the first chapters of which deal with polymer synthesis and polymerization kinetics. The first two chapters are somewhat general, discussing polymerization kinetics and reactor technology. More specific chapters follow: Ziegler-Natta catalysts, block copolymers, aromatic polyesters, nylon polymerization, vinyl ester polymerization, cationic polymerization, PVC polymerization, radiation-induced reactions of polystyrene derivatives, modeling of polymerization reactions, and reactor optimization. Latter chapters come under the heading of "polymer characterization and molecular structure" and are aimed at analytical techniques used in determining polymer structure and properties. After a general discussion of techniques for polymerization characterization, specific chapters deal with microscopy (for characterization as well as to study molecular ordering), viscoelastic and molecular characterization, thermally-stimulated depolarization, structural characterization of styrene-butadiene copolymers by ozonolysis, and gelation of polymer solutions. A 21-page index to this volume is included.

Generally, the individual chapters in this volume are well organized and contain many charts, graphs, and references. The topics covered in this volume are quite detailed; however, only with future volumes will one be able to determine if this *encyclopedia* is a comprehensive treatment

of engineering materials or simply a good collection of reviews in this area. The Encyclopedia of Engineering Materials is an important addition to an applied library.

Charles Z. Hotz, *The Dow Chemical Co.*

**Solubility Data Series. Volume 39: Cumulative Index to Volumes 20–38. Volume 40: Halides, Oxyhalides and Salts of Halogen Complexes of Titanium, Zirconium, Hafnium, Vanadium, Niobium, and Tantalum. Volume 43: Carbon Monoxide.** Volume 39 Edited by C. L. Young, Volume 40 Edited by J. Hála et al., and Volume 43 Edited by R. W. Cargill. Pergamon Press: Oxford and New York. 1989 and 1990. Volume 39: ix + 369 pp. \$85.00. ISBN 008-0372-058. Volume 40: xxxvi + 326 pp. \$85.00. ISBN 008-0362-397. Volume 43: xvi + 307 pp. \$85.00. ISBN 008-0307-337.

These three volumes continue this definitive series. The cumulative index is divided into System Index, Registry Number Index, and Author Index. Volume 40 begins with an appreciation of the late A. S. Kertes, including a list of his publications. The contents of Volumes 40 and 43 follow the style of the series, giving annotated data, with an evaluation if feasible, the experimental procedure, and of course, full references. There are System, Registry Number, and Author Indexes for each volume.

**Nitration: Methods and Mechanisms.** By G. A. Olah, R. Malhotra, and S. C. Narang (University of Southern California). VCH Publishers: New York. 1989. xii + 330 pp. \$70.00. ISBN 0-89573-144-4.

Nitration may result in replacement of hydrogen on carbon, nitrogen, or oxygen and has been one of the basic industrial processes for over a century. The original emphasis on nitration of aromatic hydrocarbons broadened over the decades to embrace a fascinating area of organic reaction mechanisms, with which the names of John Ridd and Sir Christopher Ingold were early associated. However, in spite of the brilliant and extensive work of many investigators, "no clear consensus of (understanding mechanisms) has yet emerged", the authors state in their preface. Nevertheless, substantial advances have been made in the last few decades, and this book is a timely review of them.

Even though the primary thrust of this work concerns mechanism, it is filled with practical detail, and the authors have been careful to avoid the pitfall of overlooking the facts that do not fit neatly into existing theory. The second chapter, Acid-Catalyzed Electrophilic Nitration, for example, is subdivided into 27 sections, according to the nitrating reagent, ranging from nitric acid to metallation-mediated nitration. Whereas this chapter is a descriptive review, Chapter 3, Electrophilic Nitration, gives an historical as well as critical treatment of mechanism. Among the aspects that have arisen since the Ingold-Hughes mechanism was proposed, the Olah proposal of two separate intermediates and the concept of electron transfer as part of the mechanism are thoroughly discussed. This chapter concludes with a summary of present understanding, presented in the form of five questions, and short sections on free radical and nucleophilic nitration.

The last chapter treats Aliphatic Nitration and is organized according to the type of substrate: alkanes, alkenes, alkynes, and compounds presenting heteroatom sites. It concludes with a section on nucleophilic aliphatic nitration, which includes such processes as the reaction of alkyl halides with nitrites. The important nitration (actually nitrolysis) of hexamethylenetetramine to form the explosive RDX is described briefly but is not discussed in detail, especially with respect to mechanism.

The abundant references include papers from the classic era as well as recent ones. A true author index and a 6-page subject index embellish this timely book, which appears to have been finished in early 1989.

**Houben-Weyl Methoden der Organischen Chemie. Band E19, Teile 1 and 2. C-Radikale.** Edited by Manfred Regitz and Bernd Giese. Georg Thieme Verlag: Stuttgart and New York. 1989. xxviii + 1567 pp. DM 1960. ISBN 3-13-218904-9.

This pair of supplemental volumes is an extension and continuation of the Fourth Edition, written by Anne Ghosez, Wolf Mehl, Jürgen O. Metzger, Hendrik Zipse, and Bernd Giese. Preparation of C-radicals makes up the smaller part of Part 1; the remainder of the pair of Parts consists of a systematic, comprehensive survey of transformations undergone by C-radicals. Since the standpoint of the work is preparative, one finds yields prominently cited. There are so many clear equations and structural formulas, as well as tables, that one can put these books to valuable use even without reading the German text. However, many experimental procedures are also described in detail.

References are cited at the foot of each page, and dates as recent as 1988 are to be found. In addition, there is a lengthy bibliography of monographs and reviews at the end of Part 2, which also contains a 54-page author index, and a carefully crafted subject index of 145 pp.

*Houben-Weyl* continues to hold its place as a truly classic work that

is at the same time contemporary; no library for organic chemists should be without it.

**Solubility Data Series. Volume 44: Copper and Silver Halates.** Edited by H. Miyamoto, E. M. Woolley, and M. Salomon. Pergamon Press: Oxford and New York. 1990. xix + 246 pp. \$85.00. ISBN 008-0292-089.

In the format customary in this series, critically evaluated solubility data are given for copper chlorate and iodate, and silver chlorate, bromate, and iodate. Not only water but also other aqueous systems and organic solvent systems are included. Details given include the source of the information, experimental values and methods (including apparatus and procedure), source of materials, and estimated error. Indexes of chemical components (systems), CAS Registry Numbers, and authors are included.

**Aspects of Homogeneous Catalysis. Volume 7.** Edited by Renato Ugo (Università Di Milano, Italy). Kluwer Academic Publishers: Dordrecht and Boston. 1990. vi + 118 pp. \$56.00. ISBN 0-7923-0888-3.

This volume consists of four reviews: Large Transition Metal Clusters—Bridges between Homogeneous and Heterogeneous Catalysis? (G. Schmid); Transition Metal Catalyzed Synthesis of Organometallic Polymers (Richard M. Laine); Homogeneous Catalytic Hydrogenation of Aromatic Hydrocarbons and Heteroaromatic Nitrogen Compounds: Synthetic and Mechanistic Aspects (Richard H. Fish); and Surface Organometallic Chemistry on Oxides, on Zeolites and on Metals (J. M. Basset, J. P. Candy, A. Choplin, M. Leconte, and A. Theolier). They are reproduced from typescripts, some double-spaced and some single-spaced. Each is provided with an abstract and there are many good diagrams and tables. The index of 1 page is not really adequate.

**Handbook on the Physics and Chemistry of Rare Earths. Volume 13.** Edited by K. A. Gschneider, Jr. (Iowa State University), and L. Eyring (Arizona State University). North-Holland: Amsterdam. 1990. xii + 473 pp. \$202.50. ISBN 0-444-88547-1.

This is a collection of five reviews in which information on rare-earth chemistry is presented critically. The longest one is about phase equilibria and crystal chemistry of ternary rare-earth systems. It is complemented by a second review on the same subject on those systems with chalcogenide elements and a third review on metal oxide systems. A review of elemental analysis by atomic emission and mass spectrometry and one on rare-earth elements in biological systems complete this volume.

**Reviews of Environmental Contamination and Toxicology. Volume 118.** Edited by George W. Ware (College of Agriculture, University of Arizona). Springer-Verlag: New York. 1991. ix + 158 pp. \$49.00. ISBN 0-387-97447-4.

This volume of the series contains two reviews: "Toxaphene: Chemistry, Biochemistry, Toxicity and Environmental Fate", by M. A. Saleh, and "Pesticide Residues in Food Crops Analyzed by the California Department of Food and Agriculture in 1989", by D. Okumura et al. The latter review contains a large amount of data in tables. A 6-page subject index is included.

**Comprehensive Medicinal Chemistry. The Rational Design, Mechanistic Study and Therapeutic Application of Chemical Compounds.** Editor-in-chief Corwin Hansch. Six volumes. Pergamon: New York and London. 1990. 5494 pp. \$1995.00. ISBN 0-08-032530-0.

When asked to review such a monumental effort as Corwin Hansch's six-volume treatise on medicinal chemistry, the expected reaction would be to praise it because of the enormity of the task, the wide ranging completeness of the contents, and the mind boggling logistics of orchestrating the efforts of six volume editors, 250 authors, and the publisher required to bring such a vision to reality. All the above is certainly true and laudable. The series is indeed comprehensive and contains a wealth of important information. Nevertheless, the reviewers have also tried to assess how well the aim of the series, "to present the subject, the modern role of which is the understanding of structure-activity relationships and drug design from the mechanistic viewpoint, as a field in its own right, integrating with its central chemistry all the ancillary disciplines", has been attained. We have tried to avoid focusing on details and have attempted instead to deal with the overall flavor, i.e. the pluses and minuses of the volumes which make up the whole. We regret the many times that fragmentary comments are a necessary consequence of the space constraints of such a review.

Inspection of Volume 1 on General Principles identifies several of the flaws of the series. Thus we find within it a very broad range of topics covered, perhaps not unexpectedly, in a very uneven fashion. Some chapters are well done, thorough, and informative. In other cases such

as 2.4, The Concept of Bioselectivity, and 2.6, Selectivity, one wonders why they were separated. Still others are so brief as to be of little use. Occasionally the placement of the chapter in the general context of the volume seems strange, and suggests that the reader who is searching for specific information will undoubtedly find it, but sometimes it will be after considerable difficulty and probably only after substantial browsing.

Volume 2 on Enzymes and Other Molecular Targets begins with some quite nice general summaries that divide enzymes into categories. Unfortunately, these categories appear to be ignored in the layout of the remainder of the volume. This introductory section is followed by a chapter on resistance to antimicrobial drugs. It was difficult to understand the logic of such a juxtaposition, and it seemed uncertain whether someone looking for this information would find it in such a format. Moreover, although the basic premise of the series was that it would not be organized according to specific disease entities, if one is covering drug resistance for antimicrobial agents one would have thought that the important topic of resistance in the treatment of cancer, malaria, and other parasitic diseases should have been included. The unevenness of the work is also evident in that some chapters deal with potential utilities of a target while others ignore them. A chapter on Peptidase Inhibitors is one of the more rationally presented chapters, identifying disease states in which inhibition of these enzymes might be involved and discussing known inhibitors. Ironically, this approach returns to the more traditional organization of current books on medicinal chemistry which the Editor's decries in the Preface.

Volume 3, Membranes and Receptors, seems overall better organized, reasonably thorough, and free of gross errors or scientific omissions. Many of the chapters have appeared elsewhere in similar form but have been revised for this volume and are acceptable up to date. Chapters that are particularly easy to follow or that represent timely summaries are those on the following: Quantitative Analysis of Ligand-Receptor Interactions, Histamine Receptors, Adenosine (P1) and ATP-(P2) Receptors, Platelet Activating Factor Receptors, and Opioid Receptors.

Volume 4, on Quantitative Drug Design, contains 23 Chapters well-organized and lucidly written divided into six sections. The first section begins with a historical overview and a description of some of the basic tools, followed by eight chapters concerned with important types of physicochemical properties affecting drug molecules, and concludes with an exceptional discussion of intermolecular forces, stressing their fundamental importance in biological processes. A quantitative description of biological activity is considered next, along with some of the complexities introduced by the necessity of drug transport and distribution. Chemical and biological parameters are then combined, first in a review of the relatively short history of the use of computer graphics, then in chapters dealing with analysis of molecular structures, and finally in a review of a variety of statistical modelling methods. The extrathermodynamic approach (more commonly referred to as the Hansch approach) is reviewed thoroughly with use of nine drug-design applications. Individual chapters then cover the importance of the design of test series, the Free Wilson method (also termed *de novo* approach or mathematical model) along with its several modifications and extensions and, importantly, its relationship to the extrathermodynamic approach, and finally a variety of techniques which have attained less prominence, but are valuable for certain applications such as substructural analysis, and the distance geometry approach for modeling receptor sites.

Volume 5, Biopharmaceutics, attempts to provide a comprehensive review of the field with 26 chapters divided into 3 sections (Principles of Pharmacokinetics and Metabolism, Analytical Methodology, and Chemistry and Pharmacy in Drug Development). Once again, the order of the chapters within the sections and the assignment of chapters to a particular section are not entirely logical, and, again reflecting the contribution of multiple authors, the volume is uneven with respect to quality, depth, and scope of the chapters. Repetition of information is common. Chapters on Methods in Drug Metabolism, Distribution and Clearance Concepts, and Delivery System Technology are particularly well-written. Others are not as successful partly because the target audience seems to vary substantially. Some chapters present, for example, a very detailed, highly mathematical treatment of a topic of interest only to someone in the field, while others offer only a very basic descriptive introduction. Furthermore, some chapters are limited to recent developments, while

others present a broad historical perspective. Literature coverage also seems to vary substantially. References from 1989 are infrequently found, and in some chapters the most recent citation is from 1986.

The series closes with a volume of nearly 1000 pages, including a 236-page subject index and a compendium of some 750 pages containing information on over 5500 compounds used or studied as medicinal agents in man. Once again this has to have been a labor of love, and certainly it provides a quick way to look up a structure and get a key reference. The volume is certainly necessary to enable readers to locate specific areas of interest, but the usefulness/cost effectiveness of the drug compendium over and above similar guides such as the Merck Index, which is already in the hands of most practitioners, is open to question.

We conclude that this series is certainly a monumental work containing a wealth of information which probably does fulfill its aim. The manner in which it attempts the task, however, may not have been optimized. It is directed at a rather diverse audience, and the attempt to provide something for everyone is a very difficult assignment which may have been responsible, at least in part, for reducing the quality of the presentation as a whole. Thus, it is not clear how easy it will be for the individual researcher to locate specific information or if, once located, it will be adequate. The series competes with a variety of individual, in some cases more detailed, volumes as well as smaller series of similar works. In addition, the cost is substantial, and unless volumes can be purchased individually—without an index—individuals, departments, and even institutions may have difficulty in deciding whether future utilization justifies its purchase.

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**Methods of Biochemical Analysis. Volume 35. Protein Structure Determination.** Edited by C. H. Suelter (Michigan State University). John Wiley and Sons: New York. 1991. ix + 310 pp. \$75.00. ISBN 0-471-51326-1.

This volume in the series consists of four reviews of methods employed in analysis of secondary and tertiary structure in proteins. The first, by Maggiora, Mao, Chou, and Narasimhan, discusses use of theoretical predictions of protein structure. Since these are not highly successful as yet, the section is essentially a progress report. It is well-referenced and up-to-date. The second section is by Arakawa, Kita, and Narhi and describes use of analysis of protein-ligand interactions to study protein surface properties. The interactions in question are relatively weak, nonspecific ones. It is the shortest of the sections, has the fewest references (about 80), and has at least one mistake: the comment that the fluorescence enhancement seen on titrating a protein with ansyl (ANS) is a simple function of the extent of binding is not correct. The fluorescence enhancement provided by a particular site is peculiar to that site. Otherwise, this section was interesting but seemed a bit parochial.

The third section, by Eftink, covers fluorescence analysis of protein structure. The section was relatively poorly proofread and while the reference list contained over 400 citations, at least 20 of these were not mentioned in the text. Still, this reviewer found the article very worthwhile and up-to-date.

The fourth article, by Wilson, describes the uses of limited proteolysis alone or in combination with monoclonal antibody titrations for analysis of protein conformations. This is well-referenced, up-to-date, and the best written of the four articles. The field is described clearly.

Overall, the volume provides a moderately well integrated insight into its topic, although there is considerable emphasis on higher order structure, such as domain structure. This is as it should be, and it is hard to think of an additional technique or approach that could also be included. This being said, this reviewer found it a bit irritating that nearly a third (93 of 310 pages) of the book consists of references, a subject index, a list of authors cited, a cumulative author index, and a cumulative subject index. The first two are indispensable, but the last two seem a bit excessive. *Methods in Enzymology* uses a similar format, but they also provide much more text per volume. Still, the four articles are generally timely, clear, and useful for acquainting the general reader with the latest developments in these areas.

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