Book Reviews*

Lanthanide Probes in Life, Chemical and Earth Sciences. Theory and Practice. Edited by J.-C. G. Bünzli (Université de Lausanne) and G. R. Choppin (Florida State University). Elsevier: Amsterdam and New York. 1989. XIII + 432 pp. $141.50. ISBN 0-444-88199-9.

This book focuses on the use of the rare earth elements, or lanthanides, as probe ions to study other chemical, biological, geological, and environmental systems. It consists of eleven chapters, each well-written and well-referenced, and provides a comprehensive review of the properties and uses of the lanthanides in general. A variety of spectroscopic and experimental techniques are described by experts in the field from both industry and academia in Europe and North America.

The various authors provide valuable guidance to scientists who intend to apply the advantages of lanthanide probes to their research. In addition, the book highlights the uses and advantages of the lanthanides to scientists who are unaware of their unique properties as probe ions. The wealth of examples reviewed for each technique is especially helpful in illustrating the kind of information obtained with these probes, as well as providing a source of ideas on how to apply lanthanide probe techniques to ongoing research. Various practical considerations and limitations are also discussed. Scientists experienced with the use of the lanthanide probe ions in their research will find this a useful reference text, while beginners to the field will find this book to be a good starting point.

Topics covered are the chemical properties (Chapter 1), laboratory practices (Chapter 2), and elemental analysis (Chapter 3) of the lanthanides, their use as shift reagents in NMR spectroscopy (Chapter 4) and as relaxation agents in NMR imaging (Chapter 5), Gadolinium as an EPR probe (Chapter 6), lanthanide luminescent (Chapter 7) and Chiroptical (Chapter 8) probes, the geochemistry of the rare earth elements (Chapter 9), radioanalytical methods for the lanthanides in geological and biological materials (Chapter 10), and their use in the environmental sciences (Chapter 11).

Phillip M. Hanna, *University of New Hampshire*

Macromolecular Syntheses. Volume 10. Edited by J. K. Stille (deceased). Robert E. Krieger Publishing Co.: Malabar, FL. 1990. 122 pp. $27.50. ISBN 0-89464-303-7.

This volume contains 20 procedures for the preparation of new polymers by a wide variety of procedures, including both chain growth and step growth polymerization reactions. Two additional procedures describe the chemical modification of preformed polymers, and a detailed procedure is also given for the characterization of polymer-supported reagents by ^{13}C NMR. Three of the polymerization procedures are for the preparation of telechelic polyisobutylenes and four procedures are given for the preparation of cross-linked polymers of controlled structure and morphology. The chain growth polymerization reactions described are mostly for vinyl monomers, polymerized by either free radical, anionic, or cationic polymerization reactions, but one coordination polymerization of an epoxy monomer is described. Among the step growth polymerization processes are the preparations of a regular copolyamide and an all-aromatic polyester. For the polymers prepared by these methods, those of particular interest are the block copolymers of polystyrene and poly(tetramethylene oxide), the norbornene–sulfur dioxide copolymer, and the optically active polymer of triphenylmethyl methacrylate obtained from an optically active initiator. As always, all procedures described have been checked by experienced polymer chemists, and all procedure descriptions are appended with important notes, especially safety concerns, related to the synthetic routes and the characterization of the polymers obtained.

Robert W. Lenz, *University of Massachusetts*

Bioorganic Chemistry. Volume 1: Photochemistry and the Nucleic Acids. Edited by H. Morrison (Purdue University). John Wiley & Sons: New York. 1990. ix + 437 pp. $59.95. ISBN 0-471-62987-1.

This is the first volume in a series devoted to photochemical and photophysical studies of biologically important molecules. In view of the current high level of interest in luminescent and photochemical probes of DNA, the topic of this volume is highly appropriate. The series is intended for a broad audience of readers with a combination of biological, organic, and photochemical perspectives.

This volume consists of five chapters written by different authors: a comprehensive review of the photochemistry of nucleic bases, nucleosides, nucleotides, and nucleic acids, followed by four shorter reviews focused on more limited topics. The first chapter begins with an extensive summary of the photophysical properties of nucleic acid singlet and triplet states. There follows a review of several of the more important categories of photochemical reaction, including cycloaddition, hydration, and oxidation. The second chapter deals with photosensitized cleavage and, to a lesser extent, the addition reactions of DNA. Following a brief review of cleavage mechanisms, a catalogue of the several classes of sensitizers is provided. Included are the initial studies of photoactivatable cleaving agents linked to DNA-binding compounds, an area that has rapidly expanded since the chapter was written. The third chapter describes the photochemical addition reactions of nucleic acid bases (and to a limited extent, DNA) with alcohols, thiols, amines, and amino acids. This chapter places a greater emphasis on mechanistic photochemical aspects than do the other chapters. The fourth chapter describes applications of psoralen photochemistry to the study of nucleic acid structure and function. This chapter differs from the others in providing more detailed information about experimental techniques and in its focus on the biological information that can be obtained with use of psoralen photochemistry as a probe. The final chapter deals with the use of 4-thiouridine as an intrinsic photoactivatable probe of nucleic acid structure. The photophysical and photochemical behavior of thiouridine, both in model compounds and incorporated into polynucleotides, is described.

This volume fills a significant void in the existing review literature. The chapters are individually well-written and informative. The absence of duplication of material between chapters is a tribute to an able editor. The appearance of additional volumes in this series can be anticipated with pleasure by the broad audience for which the series is intended.

Frederick D. Lewis, *Northwestern University*

Degradation and Stabilization of Polymers: A Series of Comprehensive Reviews. Volume 2. Edited by H. H. G. Jellinek (Clarkson University) with Associate Editor H. Kachi (Clarkson University). Elsevier Science Publishers: Amsterdam and New York. 1989. ix + 719 pp. $234.25. ISBN 0-444-87402-X.

The first volume of *Degradation and Stabilization of Polymers* appeared in 1983. The second volume was in the editing stage when Professor Jellinek was stricken by illness in 1986. Dr. Hiroshi Kachi completed the volume, which includes a short chapter by Professor Jellinek titled The Cu-catalyzed Oxidation of Isostatic Polypropylene and Low Density (Branched) Polyethylene Including a Brief Discussion of the Basic Autoxidation Scheme (Chapter 4). The eight chapters that comprise the book develop themes established in the first volume. In a sense the book is a final tribute to Professor Jellinek's long and productive career. This is an important companion volume for those who have Volume 1.

Three of eight chapters comprise over two-thirds of the volume, with the final chapter nearly one-third. This last chapter titled Degradation and Stabilization of Poly(vinyl chloride) is a joint contribution by B. Iván and F. Tüdős of the Central Research Institute for Chemistry of the Hungarian Academy of Sciences and T. Kelen of the University of Akron. After a detailed review of the microstructure in PVC and its mechanistic origins, detailed discussions are given of thermal and thermaloxidative degradation and stabilization, and photodegradation and photostabilization. Mechanistic effects and kinetic analyses are given. These range from discussions of the effects of microstructure in dehydrohalogenation to a detailed kinetic analysis of stabilization by metal soaps. Some 846 references are cited up through 1985. This chapter is clearly an important reference, and a book in itself.

The second largest contribution is by N. A. Khalturinsky and A. A. Berlin of the USSR Academy of Sciences titled Polymer Combustion (Chapter 3). This 150-page chapter is a mathematical, physical discussion of combustion with only minimal coverage of the organic nature of such processes. Some 349 references are cited through 1984.

The third largest chapter is titled Energy Transfer and Migration in Degradation Reactions, by Hideyuki Itagaki and Itaru Mita of Shizuoka University and the University of Tokyo, respectively. Some 253 papers through the summer of 1984 are covered. The photophysical aspects of energy transfer and migration and other aspects of photodegradation are reviewed.

The remaining four chapters cover laser photolyses in polymer chemistry (J. C. Scaiano), ozone degradation of elastomers (S. D. Razumovsky and G. E. Zaikov), photodegradation of polymer films on reflecting substrates (J. D. Webb, A. W. Czanderna, and P. Schissel), and bio-

*Unsigned book reviews are by the Book Review Editor.

degradation of polymers (G. E. Zaikov). Of these, the chapter on ozone degradation is perhaps the most uniquely valuable.

The book is of value for those with a comprehensive polymer library and particularly for those with interest in PVC or in ozone degradation.

Gordon L. Nelson, *Florida Institute of Technology*

How To Produce Methanol from Coal. By Emil Supp. Springer-Verlag: New York. 1990. viii + 202 pp. $59.00. ISBN 0-387-51923-8.

This book gives an overview of this currently important subject and attempts to put things in perspective by looking at a variety of aspects, such as how to deal with byproducts and wastes, the types and sources of coals, purification, and requirements for utilities. A moderate amount of representative, specific, quantitative information is given in tables. References are of the more or less general type and are collected at the end of the book. There is no index, an unfortunate omission, but there is an unneeded appendix of conversion factors from SI to US units.

Organic Reaction Mechanisms—1987. An Annual Survey Covering the Literature Dated December 1986 to November 1987. Edited by A. C. Knipe and W. E. Watts (University of Ulster). John Wiley & Sons: New York. 1989. 656 pp. $230.00. ISBN 0471-92078-9.

The literature dated December 1986 to November 1987 is reviewed in this volume. As to be expected, the large quantity of material to be covered necessitates economy in words and avoidance of nonessential duplication among the chapters. The reader has therefore to meet the editors halfway, by putting forth some effort. The usual 15 chapters, on types of reaction or types of reactive intermediate, are retained. A useful feature is a proper author index (i.e., of authors cited), as well as a good subject index.

Toxicological Evaluations. 1. Potential Health Hazards of Existing Chemicals. Produced by BG Chemie. Springer-Verlag: Berlin, Heidelberg, and New York. 1990. 341 pp. $39.00. ISBN 0-387-52577-7.

Data on 19 commercial chemicals, compiled by the Employment Accident Insurance Fund of the Chemical Industry (Germany), are presented in this volume. The material on these and, apparently, many other compounds have been published previously, but in German. The treatment of each compound is extensive. After a "Summary and Assessment", one finds a list of names, a structure, some chemical properties, a statement on uses, much detail on toxicological experiments, and a section on "experience in humans", all supported with references. Both organic and inorganic compounds are included. They are arranged, most curiously, in numerical order according to CAS Registry Numbers, which are normally of no help to the reader. Fortunately, there is an alphabetic index.

Chemical Safety Data Sheets. Volume 3. Corrosives and Irritants. Edited by Rebecca Allen. Royal Society of Chemistry: Cambridge. 1990. xiv + 296 pp. 49.95 pounds. ISBN 0-85186-923-8.

This is a compendium of data on 80 widely used corrosive and irritant substances. The arrangement is alphabetical by name; an index of synonyms and a list of CAS Registry Numbers help with access. For each substance the following are given: alterative identification; threshold limit values for several countries; physical properties; packaging and transportation details; manufacture; uses; biological hazards; first aid; handling and storage; disposal; fire precautions; and references. The purpose is to provide the information necessary for quick assessment of a potential hazard and what to do about it.

Bretherick's Handbook of Reactive Chemical Hazards. Fourth Edition. By L. Bretherick (Sunbury Research Centre, British Petroleum). Butterworth & Co.: London. 1990. xxvi + S23 + 2005 pp. $175.00. ISBN 0-408-04983-9.

The third edition of this standard work was published in 1985 and reprinted twice (1987 and 1989). In addition to changes in lay-out, new information has been incorporated in the fourth edition, which covers material available through March 1989. Some 200 more compounds have been added, making about 4600 entries altogether. CAS Registry Numbers are more widely given, and CA names have been added. Even the appendices have been given attention.

An untitled group of pages, with numbers preceded by S, appears in the forepages and consists of a large number of structural formulas of ring compounds. Many of these have a curious appearance, because substituents are mostly floating in the general vicinity of the rings instead of being connected by explicit bonds. In some examples, bonds are represented most confusingly by single dots.

The entries in the text are arranged in formula-index order, with a structural formula, a reference or two, and one or more sentences describing the type of hazard. Some of the references are very old, dating from the 19th century, but presumably the information remains valid.

Appendices give abbreviations of the titles of reference sources other than the primary literature, a table of fire-related data, and a glossary of technical terms. An alphabetic index of compound names completes the book.

Enzyme Handbook. Volumes 1 and 2. Edited by D. Schomburg and M. Salzmann (Gesellschaft fur Biotechnologische Forschung). Springer-Verlag: Berlin, Heidelberg, and New York. 1990. $150.00 each; spiral bound volume. Volume 1: ISBN 3-540-52579-3. Volume 2: ISBN 3-540-52580-7.

These loose-leaf books are subtitled Class 4: Lyases, Class 5: Isomerases, and Class 6: Ligases. Each part starts with an alphabetic index of enzymes, which are then described individually, approximately four pages per enzyme, with a large amount of unprinted space. One finds alternative names and CAS Registry Numbers, a succinct list of reactivity and specificity, some information on structure, an almost cryptic outline of isolation and preparation, information on stability, cross-references to data-banks, and a short list of references.

Advances in Chemical Physics. Volume LXXV. Edited by I. Prigogine (University of Brussels) and Stuart A. Rice (University of Chicago). John Wiley & Sons: New York. 1989. ix + 588 pp. $100.00. ISBN 0471-62219-2.

The aim of this series is to present analytical reviews of subjects in chemical physics by experts in the field who are encouraged to present their personal views. Eight such contributions make up this volume. The subjects range from femtosecond coherent spectroscopy to quantum cryochemical reactivity of solids. One chapter is a bibliography of collision-induced light scattering. An index of authors cited and an unusually thorough subject index contribute substantially to the usefulness of this book.

Topics in Current Chemistry. Volume 154: Carbohydrate Chemistry. Edited by J. Thiem. Springer-Verlag: New York. 1990. 334 pp. $99.50. ISBN 0-387-51576-3.

The seven contributed reviews in this volume have a noticeable emphasis on oligosaccharides, but also treat glycolipids, pseudo-sugars, carbohydrate photochemistry, and the use of selectively alkylated saccharides in synthesis. There is no index except an author index to Volumes 151–154.

The Chemistry of Functional Groups. Supplement A. The Chemistry of Double-bonded Functional Groups. Volume 2, Parts 1 and 2. Edited by Saul Patai. John Wiley and Sons: New York. 1989. Part 1: xiv + 797 pp. $360.00. ISBN 0-471-91719-2. Part 2: xiv + 893 pp. $430.00. ISBN 0-471-92493-8.

Although these two volumes are priced separately, the pagination is continuous, and the author and subject indexes are found only in Part 2. As with previous supplements to this series, the several chapters serve the purpose either of bringing the subject more nearly up to date, or filling in a gap in the original work, or providing integrative reviews combining several groups. The literature coverage in this Supplement is stated to be through 1987, and in some cases it is well into 1988.

Part 1 consists of 12 contributed chapters, dealing with such subjects as the structure of the double bond, spectroscopic properties, biochemical aspects, radiation chemistry, asymmetric induction, the ene reaction, eliminations, and electrophilic additions. Part 2 contains only six chapters: carbonylation; rearrangements involving allenes; 1,1-diarylalkenes; fulvenes; the thiocarbonyl group; and cycloadditions of enones. The production is of the high standard characteristic of the series, with running heads, plentiful, clear structural formulas, and a few tables. The substantial author index lists all authors cited, and the subject index is composed mostly of names of compounds. This is a work that should have a long life as an important reference work in organic chemistry.

Advanced Methodologies in Coal Characterization. Coal Science and Technology 15. Edited by Henri Charcosset; assisted by Brigitte Nickel-Pepin-Donat (Centre National de la Recherche Scientifique). Elsevier: Amsterdam and New York. 1990. xxiv + 442 pp. $182.00. ISBN 0-444-88695-8.

This is a monograph presenting the state of fundamental research on the characterization of coal in France, resulting from a program of the Centre National de la Recherche Scientifique. An introductory chapter describes the history of coal research in France in the period 1950–1978, and another takes the subject to 1988. A second section presents physical and chemical data on a "minibank" of representative French coals. Part III of the book consists of ten chapters on the properties of raw coals; a large amount of physical and chemical data are included, with much modern spectroscopy. Part IV consists of five chapters on products of heating, oxidation, and extraction. Part V contains two chapters on coal

macerals, the mineralgically homogeneous components of the coal matrix, which can be separated mechanically in principle. The last chapter is a general discussion. The text is reproduced from typescripts as is the index, which is rather modest (4 pages double-spaced, one column per page).

Annual Review of Physical Chemistry. Volume 41, 1990. Edited by Herbert L. Strauss (University of California, Berkeley). Annual Reviews, Inc.: Palo Alto, CA. 1990. viii + 927 pp. $46.00. ISBN 0-8243-1041-1.

As is customary in this series, a medley of topics, ranging in coverage from 15 to 50 pp, is to be found. Each chapter covers the advances in a topic for several years, and no attempt is made to include all major topics in physical chemistry. Some topics are concerned with materials, such as block copolymers and phospholipid monolayers, whereas others are on techniques, processes, or theoretical matters. The opening chapter, however, is an autobiographical reminiscence by Samuel Weissman, of Washington University.

The book is nicely produced in type and is provided with a comprehensive index of authors cited, a subject index, and an index of chapter titles of Volumes 37–41.

Antioxidants in Therapy and Preventive Medicine. Advances in Experimental Medicine and Biology. Volume 264. Edited by Ingrid Emerit (Centre National de la Recherche Scientifique and University of Paris), Lester Packer (University of California, Berkeley), and Christian Auclair (Institut Gustave-Roussy). Plenum Press: New York and London. 1990. xiii + 594 pp. $115.00. ISBN 0-306-43407-5.

The conference from which this book emanates was held in Paris in 1988, to bring together "experts in basic sciences and clinicians" to consider the status of knowledge of superoxide dismutase and the discoveries that have developed since it was first reported 20 years ago. Particular attention was paid to the implications for the aging process, onset of disease, and chemotherapy. The large number of typescript papers in this book are concerned with superoxide dismutase itself, its mimics, the role of copper complexes, antioxidant vitamins, and the biological effects of free radicals. There is a very short index.

The Chemistry of Enols. The Chemistry of Functional Groups. Edited by Z. Rappoport (The Hebrew University). John Wiley & Sons: New York. 1990. xvi + 823 pp. $430.00. ISBN 0-471-91720-6.

The appearance of this volume is timely, in view of the extensive advances in enol chemistry since 1970. Whereas structurally stabilized enols have been well-known for many decades, relatively little attention was paid to simple enols (those derived from simple aldehydes and ketones) until the advent of new techniques for investigation. The table of contents of this book reflects the new status of simple enols. The 13 chapters, the work of 18 authors, cover such subjects as theoretical calculations, gas-phase ionization, generation of unstable enols, photochemical reactions, and spectroscopy.

As is customary in this series, formulas and equations were numerous and well laid out and convey a lot of information. Tables of numerical data abound occasionally augmented with graphs. The chapter on structural chemistry contains many projections as well. All these features in one volume add up to a reference work that will probably remain the definitive source of information on enols for a long time.

Because of the magnitude of the subjects, future volumes will cover the chemistry of enolates and of enol ethers; they are covered in the present volume only insofar as required for adequate discussion of enols themselves.

A valuable feature of this series is retained: a true author index covering all cited works. The subject index is, as usual, extensive.

Theilheimer's Synthetic Methods of Organic Chemistry, 44/1990. Edited by A. F. Finch. S. Karger AG: Basel. 1990. $517.00. ISBN 3-8055-5090-1.

The appearance of an annual volume of *Theilheimer* is an event always eagerly anticipated by organic chemists, because of its comprehensiveness and highly developed organization. It is one of the major entries into the recent literature, and there can be few chemists who do not find a lot of information that they would otherwise have missed.

The content is derived from papers and abstracts published in 1988 and early 1989 and is presented in the form of formulas and equations accompanied by much-compressed text emphasizing experimental methods. There is also, however, the usual essay "Trends in Synthetic Organic Chemistry", amounting to 7 pp. It provides useful insight and is well supplied with references. Other features are a tabulated survey of codified reactions referred to in Volumes 41–44, a glossary of abbreviations, an explanation of the sophisticated method of classification, some hints about conducting high-coverage searches, and subject and formula indexes.

The production of this book is excellent, and it is unusually free of errors, but one amusing one is the "translation" of an author's name from "von Braun" to "von Brown"! Is this not carrying English translation too far?

Rodd's Chemistry of Carbon Compounds. Second Edition. Volume IV: Heterocyclic Compounds. Part IJ. Edited by M. F. Ansell. Elsevier: Amsterdam and New York. 1989. xxii + 552 pp. $315.75. ISBN 0-444-87322-8.

With this volume, the Second Edition of the series, begun in 1962, is completed. It covers six-membered heterocyclic compounds with two heteroatoms from Group V of The Periodic Table: phenoxazines; phenothiazines; phenazines; sulfur dyes; and systems with three or more heteroatoms in the ring. The preface is dated December 1988, and presumably it indicates the limit of the literature coverage. This book is well produced and has numerous clearly drawn structural formulas and many short tables. It provides a comprehensive treatment of the subjects with respect to time (the early literature is well represented), with selectivity as to depth, in order to give the reader a digestible discussion with a substantial but not exhaustive amount of detail. Basic properties of representative compounds are regularly given (e.g., mp, bp, color, solubility, stability). A thorough index is included.