

pentenes. The ready availability of (+)- and (-)-ephedrine translates this strategy into a practical asymmetric synthesis of either enantiomeric cyclopentyl series.^{14,15}

Acknowledgment. We thank the National Institutes of Health for their generous support of our programs. Mass spectra were gratefully provided by the Mass Spectrometry Facility, University

of California-San Francisco, supported by the NIH Division of Research Resources.

(14) For use of chiral sulfoxides, see: Chaigne, F.; Gotteland, J. P.; Malacria, M. *Tetrahedron Lett.* **1989**, 30, 1803.

(15) All new compounds reported herein have been fully characterized spectrally and elemental composition established by high resolution mass spectroscopy and/or combustion analysis.

Additions and Corrections

Current Contents on Diskette [*J. Am. Chem. Soc.* **1989**, 111, 2747]. JAMES K. WHITESELL

The introductory paragraph now reads "List Price \$600.00; ...;" it should read "J600 publication series for IBM and Macintosh \$380.00; ...".

Book Reviews*

Advances in Cycloaddition. Volume 1. Edited by Dennis P. Curran (University of Pittsburgh). JAI: Greenwich. 1988. xii + 189 pp. \$34.25. ISBN 0-89232-861-4.

This volume contains five articles in which various aspects of 1,3-dipolar cycloadditions are reviewed. The first, "Steric Course and Mechanism of 1,3-Dipolar Cycloadditions" (31 pp) by R. Huisgen, takes the reader from the early to the latest stereochemical and kinetic probes and includes examples of stepwise cycloadditions. In the second, E. Vedejs reviews the preparation and cycloadditions of "Nonstabilized Azomethine Ylides" (19 pp). The third, by A. G. Schultz, is a review of "Molecular Rearrangements Occurring from Products of Intramolecular 1,3-Dipolar Cycloaddition:—", including azide, nitrene, and diazoalkane dipoles (33 pp). P. DeShong, S. W. Lander, Jr., J. M. Leginus, and C. M. Dicken coauthored the fourth review, "Dipolar Cycloadditions of Nitrones with Vinyl Ethers and Silane Derivatives" (42 pp). The last and longest review (61 pp), "The Cycloadditive Approach to β -Hydroxy Carbonyls:—", is by D. P. Curran and provides an overview of an alternative to the aldol condensation strategy.

This volume is highly recommended to all those who want to stay abreast of developments in the mechanisms and synthetic applications of 1,3-dipolar cycloaddition reactions. The writers have realized a good balance between the summary of achievements and the reporting of gaps in understanding or remaining synthetic challenges. The articles are well written, they are amply illustrated with equations or schemes, and they cover the literature into or through 1986.

J. Warkentin, *McMaster University*

Advances in Chemistry Series 218: Electronic and Photonic Applications of Polymers. Edited by M. J. Bowden (Bell Communications Research) and S. R. Turner (Eastman Kodak Company). American Chemical Society: Washington, D.C. 1988. XIV + 372 pp. \$94.95. ISBN 0-8412-1400-X.

This highly recommended book was developed from a symposium similarly titled, sponsored by the Division of Polymeric Materials: Science and Engineering (PMSE), held at the 192nd Meeting of the American Chemical Society in Anaheim, California, September 7–12, 1986. As mentioned in the Preface, the plenary lectures from that Symposium provided the basis for this book. The contributed papers

from the plenary sessions were published in a companion book as ACS Symposium Series No. 346, *Polymers for High Technology: Electronics and Photonics*.

Let me not delay in acclaiming this book as an intelligent, well organized, superbly written, and timely resource. The contents are divided into seven chapters, each one of which provides an in-depth yet highly readable account of a pertinent subject area authored by experts in that field. The entire book is profusely illustrated with creative plots, figures, photos, sketches, molecular structures, and tables which promote understanding. This volume also boasts 613 references to the literature, thus serving as an invaluable review and resource book for any current or prospective worker in this field. However, maybe the most appealing feature of this book is its pedagogical and unassuming approach in introducing and developing each subject. While it is clearly targeted at an informed or expert audience, this book is easily digestible by the beginner, thanks to the paced introductions and illuminating illustrations that fill each chapter.

Chapter 1, *Polymers for Electronics and Photonic Applications* (M. J. Bowden), provides an informative overview of each subject covered in the remaining six chapters. The Chapter highlights the role of polymers in relevant high-technology areas, including microlithography, packaging, conducting polymers, molecular electronics, optical fiber coatings, integrated optics, nonlinear optics, and optical recording. The clear, concise writing style and captivating illustrations in Chapter 1 are highly compelling and encourage one to read further. This reviewer also appreciated the section Abbreviations and Symbols at the end of this (and several later) chapters.

Chapter 2, *Organic Resist Materials* (C. G. Willson and M. T. Bowden), reviews recent developments in applications of polymers as resists in microlithography designed to extend into the submicrometer regime and to maintain dominance in commercial manufacture of integrated circuits. Chapter 3, *Materials and Processes for Deep-UV Lithography* (T. Iwayanagi, T. Ueno, S. Nonogaki, H. Ito, and C. G. Willson), reviews in great detail resist materials and processes designed to support high-resolution deep-UV (DUV) lithography. Chapter 3 is easily the longest (116 pp) and most highly annotated (225 references) chapter in the book. Chapter 4, *Molecular Electronics Using Langmuir-Blodgett Films* (G. C. Roberts), provides a clear introduction to the preparation of LB films and describes their potential applications in the field of electronics, particularly those relying on the highly nonlinear properties of supermolecular assemblies. Chapter 5, *Progress Toward Processable, Envi-*

*Unsigned book reviews are by the Book Review Editor.

ronmentally Stable Conducting Polymers (G. L. Baker), reviews progress in developing polymeric materials that conduct electricity yet endure the gauntlet of engineering and chemical prerequisites. Recent work on substituted polythiophenes, polypyrroles, and poly(arylene vinylenes) is discussed, as is the synthesis of blends and graft and block copolymers designed to enhance processability. Chapter 6, Polymers in Nonlinear Optics (D. Williams), reviews the current state of understanding of second-order nonlinear optical properties in organic materials, thin films including Langmuir-Blodgett films, and polymers. Electric field poling as a method for removing the orientational averaging of polymer films and the use of poled films in waveguide formats are also discussed. Brief mention is made of third-order nonlinear optical effects in polymer films. Chapter 7, Polymers in Optical Recording (J. M. Pearson), reviews the current status of polymeric materials as substrates, protective layers, and active recording media in laser recording.

It is worth mentioning that the book is also blessed with a detailed 16-page Subject Index, quite uncommon for a book covering a symposium.

William J. Welsh, *University of Missouri—St. Louis*

Crystals in Gels and Liesegang Rings. By H. K. Henisch (Pennsylvania State University). Cambridge University: Cambridge and New York. 1988. xiii + 197 pp. \$54.50. ISBN 0-521-34503-0.

Crystals may be seen by some as objects of beauty, by others as manifestations of molecular order in a chaotic world, and by still others as items of value in commerce. For anyone with an interest in growing crystals, whether for art, for scientific research, or for profit, the attractive little book by Henisch is highly recommended reading. The first half of the book discusses potential advantages of growing crystals in a gel medium, reviews the history of the subject, describes results for a wide variety of systems, and outlines nucleation theory as it pertains to the precipitation of crystals from solution. The last half of the book relates the history of, the art of formation of, and the theory of Liesegang rings. Such rings are approximately periodic bands of crystals or microcrystals that can be formed by the diffusion of reagents into a gel. Liesegang himself, a restless nonconformist of widely varied activities, discovered the rings which bear his name in research on photographic emulsions.

Unifying the two halves of the presentation is the idea of carrying out nucleation and growth in a gelatinous system, which can be organic or inorganic. The gel's role is supposed to be to suppress nucleation in a comparatively cool environment free from convection. Among the advantages cited are the relatively large and perfect crystals which can be formed under appropriate conditions. Despite the importance of producing crystals of high quality and the intriguing aspects of periodic precipitation, the procedures described remain laboratory curiosities more than technologically significant techniques. Perhaps the present book will change the situation.

Even though the book does not claim to be encyclopedic, it covers and carefully documents an enormous range of systems and approaches. Fortunately, the author has such a lively and imaginative style that the compendium of results is not only extremely useful, it is also a delight to read. Least successful is the section on nucleation theory, treated too vaguely to be likely to enlighten. This minor flaw is of no practical consequence, however, because nucleation theory has yet to contribute much to the advancement of the book's main subject. It is to be hoped that the book will attract the attention that it deserves. At the very least it should be added to the libraries of all who are seriously involved with crystal growth or the preparation of samples for research on the solid state.

Lawrence S. Bartell, *University of Michigan*

Archaeological Chemistry IV. Advances in Chemistry Series 220. Edited by Ralph O. Allen (University of Virginia). American Chemical Society: Washington, DC. 1989. xiii + 508 pp. \$89.98. ISBN 0-8412-1449-2.

The 27 papers in this volume were developed from a symposium held at the 193rd Meeting of the American Chemical Society in Denver in 1987. This volume's purpose is to acquaint archaeologists through case studies with chemical techniques that may be useful in archaeological research.

Although the volume is not a comprehensive review of chemical analysis in archaeology, it is nevertheless broad in scope. Discussed techniques range from fairly conventional neutron activation analyses to potentially promising electron spin resonance studies and ^{41}Ca dating. Archaeological subjects range from Roman coins to paleolithic Chinese faunal remains. New approaches to fibers and textiles, one involving pseudomorphs (mineralized fabric) are described in two chapters, while four other contributions discuss conservation.

Sourcing studies using trace element analysis or NMR are best represented. Eight of the papers deal with this subject in various contexts,

including Mesolithic Iberian lithics and prehistoric amber. Olin and Blackman's neutron activation analysis of Mexican Majolica ceramics (Chapter 5) is a clearly reasoned and well-presented example. Consideration of excavation contexts, good sample size, statistical tests of significance, and careful use of modern comparative material make this study exemplary.

Many chemical approaches to sourcing or differentiating archaeological materials are complicated by the difficulties in identifying cultural additions, the effects of weathering, etc. In light of this, several of the articles are important as "cautionary tales". Bishop and Neff (Chapter 4) show that chemical composition of Guatemalan ceramics may reflect production methods rather than clay sources, Mitchell and Hunt (Chapter 5) discuss how pottery chemical composition may change after burial depending on firing temperatures, and El-Kammar et al. (Chapter 18) outline how human bones can be contaminated in the soil.

This volume is valuable as a collection of both chemical techniques with promising applications and examples of proven approaches. The index is very good and references are up-to-date. As a final note on content, the inclusion of more than one paper concerned with the Shroud of Turin (not an object of archaeological interest) does not seem appropriate for this type of volume.

Marc Bermann, *University of Michigan*

Organic High Pressure Chemistry (Studies in Organic Chemistry 37). Edited by W. J. Le Noble (State University of New York at Stony Brook). Elsevier: Amsterdam and New York. 1988. xii + 489 pp. \$168.50. ISBN 0-444-43023-7.

This volume, edited by one of the prominent research workers in the study of organic reactions under pressure, is intended to introduce the practicing organic chemist to this expanding (no pun intended) field. The book contains an introductory chapter by the editor and 13 chapters by several international contributors, dealing with the results of applications of high-pressure studies to specific classes of organic reactions. No discussion of the required apparatus or experimental details are included, which is unfortunate in a volume intended to introduce the newcomer to high-pressure research, but the reader is referred to the abundant primary references in each chapter.

The introductory chapter is very well written and underlines the significance of the quantities that can be determined from pressure studies of equilibria (reaction volume, i.e., changes in volume between reactants and products) and of rate constants (activation volume). This chapter also points out, with a touch of humor, the cautions which must be used in interpreting pressure data.

Thus, arguments about proposed reaction mechanisms and the nature of the transition state can be elucidated by pressure studies. Since such arguments depend on reliable estimates of molar volumes of chemical species, a chapter by O. Exner is devoted to this subject. The chapter by S. D. Hamann treats in some quantitative detail the aspects of the thermodynamics of reactions in solution which are needed to interpret pressure effects. Succeeding chapters describe, e.g., studies of stereoisomerization (by T. Asano), pericyclic reactions (G. Jenner), free radical reactions (V. M. Zhulin), and organometallic chemistry (A. Rahm). A chapter near the end of the volume describes the application of high pressure to enhance synthetic yields (J. Jurczak). Selected applications of high pressure to the elucidation of fluorescence quenching processes and photochemistry are critically reviewed in the chapter by R. Schmidt and H. D. Brauer, and a chapter by K. Heremans surveys studies of the influence of pressure on protein compressibility, ligand binding, and conformational changes.

The contributions are well-written for the most part, with perhaps just a few more typos than one would like to see in a volume of this price, and vary in nature from presentation and discussion of large numbers of results to critical evaluation of selected points. The chapters are set out in a logical sequence, progressing from general principles to specific applications in organic chemistry, and finally, to photophysical and bioorganic applications. However, after reading the introductory chapter, the reader may easily jump to chapters dealing with his specific interests. The chapter by S. D. Hamann is the most quantitative in nature and might require a not terribly onerous review of elementary physical chemistry. However, the book on the whole is readily accessible to a general organic chemistry audience and will also be quite useful to specialists already working in this field.

Henry C. Brenner, *New York University*

Foundations of Colloid Science. Volume 1. By Robert J. Hunter (University of Sydney). Oxford University: Oxford and New York. 1987. xi + 673 pp. \$115.00. ISBN 0-19-855188-6.

This is the first of two planned volumes on colloid science. The present volume is complete in itself and suitable as a text for a one-year graduate course; the second volume will treat applications and more specialized

topics. The author contributed four of the ten chapters himself, and wrote or rewrote the other six chapters from text provided initially by colleagues at the Universities of Sydney, Melbourne, New South Wales, Adelaide, the Australian National University, and CSIRO. The level of difficulty varies considerably, from largely descriptive chapters on colloidal dispersions, particle size and shape, polymer stability, and association colloids to more theoretically based treatments of van der Waals forces, and thermodynamics of surfaces, and electrical and transport properties of colloids.

Probably the strongest sections of the book are the discussions of dispersion force theory and experiment, electrified interfaces, and the electrical double layer. This material relies heavily on the work of the active group of Australian colloid scientists, including the author. Students who complete a one-year course based on the textbook should attain a good background in modern colloid science, although many graduate students may require supplemental material in hydrodynamics, statistical thermodynamics, and mathematical methods to tackle some of the theoretical developments. Taken as a whole, the scope and balance of topics are excellent, and colloid scientists in many disciplines (including chemistry, engineering, and biology) should be able to profit from a thorough study of *Foundations of Colloid Science*. The major weakness of the book, which it has in common with almost all textbooks in colloid science, is that the diversity of material and interests of colloid scientists are so broad that no single monograph can do justice to the entire field. But the book's orientation toward the molecular and physical causes of colloid phenomena is consistent and satisfying.

Sherril D. Christian, *The University of Oklahoma*

Books on Applied Subjects

Toxicology of Coal Conversion Processing. Edited by Robert H. Gray et al. John Wiley & Sons: New York and Chichester. 1988. xxv + 603 pp. \$80.00. ISBN 0471-80264-6.

This book presents a comprehensive overview of the toxicology of compounds that are prepared and used in coal-conversion processes. These processes include coal gasification and liquefaction, as well as conversion of coal into synthetic fuels.

Descriptions of coal-conversion processes and the chemistry of them are given in one of the larger chapters. The last chapter gives an assessment of the health risk workers may face from working in plants where these processes are carried on. Some chapter titles include: Coal Conversion Processes and Database Description; Toxicological Effects of Coal-Based Synfuels; Engineering Analysis of the Toxicological Database for Coal-Conversion Materials. Several chapters discuss a database on toxicology of compounds used in these processes.

This book presents a good introduction to the field of toxicology in coal conversion processes. Each chapter is written in an outline form, making the table of contents more informative. Several pages at the beginning of the text are devoted to a glossary of abbreviations. Finally, a well-organized index is included.

Water-Soluble Polymers for Petroleum Recovery. By G. A. Stahl and D. N. Schulz (Exxon Corporation). Plenum: New York and London. 1988. ix + 355 pp. \$69.50. ISBN 0-306-42915-2.

This 24-chapter volume is based on papers presented at a symposium held by the American Chemical Society, Division of Polymeric Materials: Science and Engineering, in Anaheim, CA, in August 1986.

The first five chapters review the applications of polymers in enhanced oil recovery and their synthesis, characterization, and properties. The second section consists of seven chapters about preparative polymer chemistry. Copolymer preparations, physical properties, and oil recovery applications are discussed in this section. The next eight chapters deal with polymer characterization methods such as size-exclusion chromatography, band sedimentation, light scattering, and electron microscopy. Supplements to viscosity testing and methods for analyzing thermally promoted hydrolysis of polyacrylamide are also examined. The last four chapters report studies of cross-linked polymers and their applications.

The text is well-organized, and the graphics are clear. The index, however, is not adequate.

Introduction to Industrial Gas Cleaning. By F. A. Dullien (University of Waterloo). Academic: San Diego and New York. 1988. xii + 285 pp. \$55.00. ISBN 0-12-223652-1.

The contents of this book include an in-depth description of gas-cleaning devices such as scrubbers, electrostatic precipitators, filters, and particle separators as well as the properties of particulates and gaseous pollutants themselves. Much effort has gone in to explaining the physics and chemistry of industrial gas cleaning; the mathematical development of these concepts is highly detailed. Numerous tables, graphs, and diagrams are used in the explanations, and many examples are given to supplement understanding. Sets of problems are given at the end of each chapter. This book concludes with a short chapter on the measurement of factors needed to be controlled according to federal law. Finally, this book contains an appendix of conversion factors and physical constants along with a thorough index of terms. Along with its contents, the easy readability of this book makes it a valuable source for those beginning to pursue this specialized area.

Surfactants in Chemical/Process Engineering. Surfactant Science Series Volume 28. Edited by D. T. Wasan (Illinois Institute of Technology) et al. Marcel Dekker: New York and Basel. 1988. x + 555 pp. \$99.75. ISBN 0-8247-7830-8.

This volume, consisting of 10 contributed topics, focuses on some of the recent developments in the industrial applications of surfactants. Chapter One, Dilatational Properties of Adsorbed Surfactant Interfaces and Their Applications, by Edwards and Wasan, introduces the reader to surface rheological properties and their applications to practical dynamic surface problems. The other chapters are as follows: The Effect of Surface-Active Agents in Distillation Processes; Surfactant-Based Treatment of Aqueous Process Streams; Liquid Surfactant Membranes for Metal Extractions; Surfactants in Aqueous Emulsification Separation of Oleic and Stearic Acids; Surfactants in Flotation; Surfactants in Herbicide Dispersions; The Role of Surfactants in Emulsion Polymerization; Microemulsions: Formation, Structure, Properties, and Novel Applications; and Importance of Surfactants and Surface Phenomena on Separating Dilute Oil-Water Emulsions and Dispersions.

The index of this book is well-organized, and the chapters are thoroughly referenced and outlined. These features allow the reader to scan the volume easily for particular topics or discussions. The introduction to each chapter is also written in a way that even a novice in surfactant technology can understand.

Solvents in Common Use. Health Risks to Workers. Health, Safety, and Environment Committee of the Royal Society of Chemistry. Royal Society of Chemistry: London. 1988. 308 pp. \$120.00. ISBN 0-85186-088-5.

The 10 chapters of this book outline essential data concerning hazards to workers of 10 common industrial solvents: acetone; carbon disulfide; diethyl ether; 1,4-dioxane; ethyl acetate; methanol; nitrobenzene; pyridine; toluene; and xylene. The data for each solvent are outlined in 20 categories, which include toxicity; exposure limits; physicochemical properties; hazardous reactions; and storage, handling, and use precautions. In addition to the Chemical Abstracts name and Registry Number, common synonyms as well as references for spectroscopic data for each solvent are given. The book is extremely well referenced. The references are up-to-date and include reviews, primary journals, governmental reports, and documents from international agencies. The text uses professional language, and a considerable measure of scientific knowledge is therefore needed if the book is to be fully appreciated. It would seem that this book would be ideally suited for safety officers or laboratory managers. The absence of an index does not detract from the usefulness of the book due to its straightforward, consistent organization in chapters on each specific solvent.

Large Scale Cell Culture Technology. Edited by Bjorn K. Lydersen (Hybritch Ind). Hanser: Munich and New York. 1988. x + 244 pp. \$69.00. ISBN 0-19-520765-3.

This book is intended to present students and practitioners of cell-culture technology with a broad view of methods for manufacture of biotechnology products. The contents can be divided into five methods using mammalian and plant cultures, fermentation, encapsulation, bioreactors, and plant-cell culture. Each chapter is contributed by separate authors and contains its own table of contents, introduction, summary, and references. The book also includes a chapter titled Safety Considerations for Cell-Culture Derived Biologicals, which discusses past safety problems and future strategies to insure the safety of biologicals.