

In all the compounds studied here, the convergence of the program and the definition of the populations are good. The derived values of the free-energy differences between equatorial and axial conformers are given in Table I, along with errors at the 50% confidence limit<sup>11</sup> and literature values. The value of 1.3 kcal mol<sup>-1</sup> for the 2-methyl compound obtained by Servis and Bowler<sup>4</sup> appears to be somewhat low. Interestingly, their treatment assumes that "the location of the lanthanide in the 2- and 4-alkylcyclohexanone complexes is the same"; in support of this they quote an earlier analysis of the LIS's of 4-*tert*-butylcyclohexanone which gave identical locations for the europium atom in the two cases on the basis of a one-site model.<sup>5</sup> Our analysis clearly demonstrates the considerable differences in the lanthanide populations between the 2-methyl- and 4-methylcyclohexanones (and 4-*tert*-butylcyclohexanones) and emphasizes once again the errors which can arise from the use of the inadequate one-site

binding model. Particularly pleasing is the value for 2-chlorocyclohexanone. The conformational equilibrium in this molecule is solvent dependent: a recent study gave  $\Delta G^\circ$  varying from +1.0 (*n*-pentane) to -0.6 kcal mol<sup>-1</sup> (Me<sub>2</sub>SO).<sup>12</sup> The literature value quoted in Table I is for the same solvent (CDCl<sub>3</sub>) as was used in this LIS study and is in precise, though perhaps fortuitous, agreement with the value obtained here.

**Acknowledgments.** L. G. acknowledges an S.R.C. studentship, F.S. a British Council Fellowship (1977-1978), and R.J.A. a Senior CIBA-GEIGY fellowship (July-December 1979). A British Council Academic Link (R.J.A., D.J.C., and F.S.) is also acknowledged.

Raymond J. Abraham,\* Derek J. Chadwick, Lee Griffiths  
The Robert Robinson Laboratories  
The University of Liverpool, Liverpool L69 3BX, England

Fernando Sancassan  
Institute of Organic Chemistry  
University of Genoa, Genoa, Italy  
Received January 14, 1980

(10) R. J. Abraham, D. J. Chadwick, L. Griffiths, and F. Sancassan, *Tetrahedron Lett.*, 4691 (1979).

(11) W. C. Hamilton, *Acta Crystallogr.*, **18**, 502 (1965). The errors at the 90% confidence limit are ca. three times the values in Table I.

(12) R. J. Abraham and L. Griffiths, *Tetrahedron*, in press.

## Book Reviews\*

**Encyclopedia of Electrochemistry of the Elements. Volume XII.** Edited by A. J. Bard (University of Texas) and H. Lund (University of Aarhus). Marcel Dekker, Inc., New York. 1978. xii + 512 pp. \$88 (\$75 by subscription).

This volume of the Encyclopedia is the second of five devoted to organic chemistry. Three have been published, and a fourth is in press. The three chapters in this book are devoted to Carbonyl Compounds (by D. H. Evans), Carboxylic Acids, Esters, and Anhydrides (by L. Ebersson and K. Nyberg), and Organic Sulfur Compounds (by J. Q. Chambers). Each chapter is subdivided into sections on electrode potentials and voltammetric properties, electrochemical (or mechanistic) studies and electrochemical synthesis, or applied electrochemistry.

The Series clearly represents an encyclopedia of the reactions which have been investigated electrochemically. No discussion of methods or apparatus is included. Much of the information is given in an extensive series of tables, although there is a concisely written discussion of general mechanistic details and specific points of interest. The editors have successfully managed to strike a good balance between analytical electrochemistry and preparative organic electrochemistry with a nice bridging through mechanistic studies. The precise balance, of course, does depend upon the orientation of the authors and does vary in these three chapters. The authors are all experts, both as chemists in their particular areas and as scientific writers.

The major problem in any encyclopedia is the selection of data to present within a reasonable number of pages. Most of the literature covered has appeared between the years of 1950 and 1974 with a few references before and after. However, references are given to earlier reviews and to books which summarize the older literature. The material chosen for discussion appears to be pertinent and meaningful, and the extensive tables make it possible to present a large number of results briefly. Thus, the selection seems to be exceptionally well made.

The Series was designed to provide a "natural starting point for new electrochemical investigations". This purpose is admirably served by this volume. The Series should be in all scientific libraries.

James M. Bobbitt, *University of Connecticut*

**Asbestos: Properties, Applications and Hazards. Volume I.** Edited by L. Michaels and S. S. Chissick (University of London). John Wiley & Sons, New York. 1979. xi + 553 pp. \$62.50.

Although the use of flame-resistant asbestos cloth in classical antiquity and medieval China are attested to by Pliny the Elder and Marco Polo, respectively, it was the spread of the steam engine during the Industrial Revolution that transformed asbestos from a curiosity to an important insulating material. Subsequently produced in bulk—often under ap-

alling conditions—asbestos production has increased from 50 tons in 1877 to over 3 000 000 tons in 1977. Over 90% of this material is chrysotile asbestos, a fibrous serpentine hydrated magnesium silicate. Increasing reports of asbestos-related pulmonary fibrosis (asbestosis) during the 1930-40s, and neoplasia during the 1950-60s, have resulted in considerable public concern and increased governmental regulation.

The present book would bring together a wide variety of material "of value to all concerned with the asbestos industry ... and the general public", primarily from a British point of view; indeed, all but two of the 16 articles are by British authors. The Introduction provides a useful glossary, a brief history of British regulation, and a 27-page annotated list of commercially available products and services in Britain. The chapters on mineralogy, chemistry, and physics of asbestos are on the whole attractive and useful introductions, although the problem of non-fibrous asbestos analogues is not sufficiently dealt with.

The clinical and histopathological aspects of asbestos-related disease are well illustrated and dealt with at length, although there is comparatively little discussion of possible mechanisms. The 57-page chapter on "Attitudes to Asbestos" is an over-detailed, rather unexciting comparison of government and industry positions; it includes many pages of verbatim quotes from the "Medical Examination" policy of a producer, the 1975 OSHA proposed regulations, proposed revisions by Johns-Manville, and a chart of claims and counterclaims on health effects. This and the chapters on industrial asbestos fiber usage, work practices, control, and replacement may be useful to concerned industrialists but may be of less interest to the "general public".

Unfortunately, these enthusiasms are balanced by a slighting of other topics of importance, especially, those representing new technical trends. For example, there are only four pages on electron microscopic identification—the topic of two major published symposia by U.S. regulatory agencies (FDA, 1976; NBS, 1977) and the technical key to future monitoring requirements—and only one page is devoted to *in vitro* effects, which may eventually provide a useful correlation with (and thus screening method for) adverse health effects. Similarly, despite 140 pages on health effects, mostly devoted to human studies (where accurate characterization of materials, exposures, and controls is difficult), there is virtually no mention of the important work of Stanton, Wright, and other U.S. investigators on the apparently crucial relationship between fiber morphology and carcinogenicity. Such material was available in 1978, although, in all fairness, it may be part of the planned, second volume.

Despite claims of a wider potential readership, this volume appears primarily an attractive, somewhat dated, text that seeks to provide practical, down-to-earth background material and where-to-find-it advice for industrially oriented readers. Although its British emphasis may limit its usefulness for some American readers, it does provide an interesting

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

introduction to an important subject from a different point of view.

Irvin M. Asher, *U. S. Food and Drug Administration*

**Advances in Photochemistry.** Volume 11. Edited by J. N. Pitts, G. S. Hammond, and K. Gollnick. J. Wiley & Sons, New York. 1979. 538 pp. \$35.95.

The latest volume in the series "Advances in Photochemistry" should have a broadly based appeal. Both industrial and academic photochemists will find something of interest to them. For example, the industrially important topics of photochemical imaging systems and photoluminescence in polymer systems are reviewed. The reactions of hydroxyl radicals with organic compounds, important in the formation of smog, are also thoroughly reviewed. Contributions covering the topics of singlet oxygen quenching, vitamin D photochemistry, and new progress in the photophysics of excimers will be of interest to academic researchers.

The first contribution, entitled "Organic Photochemical Imaging Systems", by G. A. Delzenne, provides a readable account of these systems. This is understandable even to those who have not been initiated into this important area. A particularly enjoyable aspect of this work is that the author attempts to explain the methods and appropriate applications for the methods covered.

The review of photoluminescence methods in polymer science by S. W. Beaman, J. S. Hargreaves, and D. Phillips describes some of the important uses of emission spectroscopy in delineating the structure of polymeric materials. The article begins with an account of some fundamentals of energy transfer that could have been abridged considering the audience. However, the second part of the article which describes some specific examples where fluorescent probes have yielded valuable information on the structure of polymers is particularly enlightening.

The review of vitamin D photochemistry by H. H. C. Jacobs and E. Havinga emphasizes work done in the last several years on the isolation and identification of "overirradiated" photoproducts. Many of these products are those one would expect by considering the photochemistry of simple hexatrienes. The authors have clearly pointed out the similarities and, in some cases, the irregularities in the vitamin D series. In short, this is an enjoyable account of some very elegant photochemical work.

The short article on excimers reviews theoretical approaches to excimer properties in the crystalline state. Experimental results are compared with the theoretical predictions. The article is short and does not seem to do justice to the material covered.

The physical quenching of singlet oxygen has been reviewed by D. Bellus. The article is actually an update of a previous review by Bellus (in "Singlet Molecular Oxygen", B. Ranby and J. F. Rabek, Ed., Wiley-Interscience, New York, 1978), but the added material makes a perusal worthwhile.

Finally, the kinetics and mechanism of hydroxyl radical reaction with organic compounds are reviewed by R. Atkinson, J. R. Darnall, A. M. Winer, A. C. Lloyd, and J. N. Pitts. This is a thorough review of the material although it is noted that the reported rate constants have been selected as the "best" values by the authors. Besides reporting the rates and mechanism of these reactions, their importance in photochemical smog formation is discussed. Hence, the reader is left with some idea of how and why the hydroxyl radical is important in smog formation as well as the enormous difficulties involved in studying atmospheric pollution.

In summary, the current volume is a potpourri of photochemistry and should be of interest to both industrial and academic researchers.

William R. Cherry, *West Virginia University*

**Membranes and their Cellular Functions.** Second Edition. By J. B. Finean, R. Coleman, and R. H. Mitchell (University of Birmingham). John Wiley & Sons, New York. 1978. 157 pp. \$10.95.

The second edition of this text has been reorganized, largely rewritten, and expanded to bring to the reader the important advances of the previous four years. In this process it has not lost its easily read style, one which is conducive to efficient transfer of information.

The book appears primarily intended as a text for graduate or advanced undergraduate courses in membrane biochemistry. In either case a good understanding of general biochemistry is presumed. I would also recommend it to the practicing biochemist who would like to become familiar with membranes since some general review is necessary prior to an excursion into the primary literature.

The format enhances its utility as a teaching device. There are no references to interrupt the text; rather, a reading list is provided at the end of each chapter. The wide margins leave space for extensive notes. Rather than fragment the text, most of the ancillary material is confined to these margins, including tables, lists, drawings, etc. Frequent use of illustrative material keeps the text light and, by preventing eye fatigue, helps maintain interest. The illustrations themselves contain no dis-

tractions unnecessary to their role in introductory teaching.

The cartoons by T. A. Bramley (TAB) are a highly effective teaching device. It is surprising how succinctly he can summarize the important elements of a 20-page chapter in a small cartoon. His drawings, occasionally irreverent, ease the task of retaining the technical material. They can also serve to stimulate additional inquiry by both the student and practicing biochemist since the cartoons frequently draw analogies between cellular systems and systems we see in the everyday world. The subcellular world, as seen by TAB, is a series of Rube Goldberg devices. Is it no wonder membrane study is difficult to understand?

"Membranes and their Cellular Functions" is an excellent introductory text. The writing, format, and illustrations each contribute equally to this conclusion.

Patrick L. Coleman, *University of Michigan*

**In Memory of H. L. Meerwein (Topics in Current Chemistry. Volume 80).** Edited by F. L. Boschke. Springer-Verlag, Berlin-Heidelberg-New York. 1979. 320 pp. \$69.80.

It is 80 years ago this year that Wagner published his discovery of the isomerization of camphene hydrochloride to isobornyl chloride. In the following decade, Baeyer, Gomberg, and Hantzsch unequivocally proved the occurrence of ionization in triphenylmethyl chloride, and in 1922 Meerwein and van Emster followed with their famous paper showing that the same solvents and Friedel-Crafts type of catalysts that promoted the formation of the trityl cation also enhanced Wagner's isomerization. This reaction therefore did not take place in the neutral halide, but in the cation following ionization. Thus, the Wagner-Meerwein rearrangement was one of the first organic reactions in which the role of a transient and not directly observed intermediate was unambiguously demonstrated. When Whitmore subsequently pointed out the similarity of this reaction to a host of other so-called 1,2-shifts, it was clear that assignments of structure in organic chemistry could henceforth not be based on the principle that the molecular carbon framework was essentially inviolate. This was followed by Wilson's casual and parenthetical remark to the effect that Meerwein's equilibrating cations could be a single mesomeric species, a thought later supported by Ingold on the grounds of unusually rapid rates, and by Winstein by virtue of both kinetic and stereochemical arguments. This question became the core of a lively controversy, when especially Brown objected to the implicit possibility of pentacoordinated carbon atoms. With the further advents of stable solutions of carbocations, of the insights that the Wagner-Meerwein rearrangement is the simplest possible example of a Woodward-Hoffmann (symmetry-allowed) sigmatropic shift and that the so-called nonclassical ions possess a homoaromatic nature, it is clear by now that carbocation chemistry has been one of the mainstays of 20th century organic chemistry.

The present volume was published to commemorate the 100th birthday of the man whose contribution in these developments was of such pivotal importance — Professor H. L. Meerwein. It consists of four chapters: H. C. Brown (10 pp, 47 refs), G. A. Olah (70 pp, 229 refs), H. Hogeveen and E. M. G. A. van Kruchten (31 pp, 63 refs), and W. Kirmse (186 pp and 621 refs), respectively.

Brown's contribution is essentially a brief restatement of his well-known position in the 2-norbornyl ion controversy. This chapter is probably of limited interest because not much new work has been done in this area since the author published his book (with comments by P. von R. Schleyer): *The non-classical ion problem*.

Hogeveen's chapter is of a very different sort; it is a progress report of his studies of two valence-isomeric (CR)<sub>3</sub><sup>+</sup> species: the bicyclo[2.2.1]- and -[3.2.0]heptadienyl cations. Much of this work has not yet been published in the journals. The problems discussed here are concerned with the question as to which of these ions predominates under conditions of long life at equilibrium (it depends on the substitution pattern), and with the mechanism of interconversion. Extensive D-labeling studies reveal that these reactions usually involve circumambulation of the nonclassically bound ethylene bridge via Wagner-Meerwein shifts, but bridge flipping intercedes in some cases also; both pathways had first been observed by Winstein in the parent and in some of the 7-substituted ions.

The chapter by Olah is a review concerned with the spectral properties of carbocations in superacid media. The emphasis is on <sup>1</sup>H and <sup>13</sup>C NMR, but ESCA and Raman spectra are also included. This chapter is thorough and up to date, and provides an excellent background not only in the author's own extensive contributions in this area but those of his competitors as well. The writing is lucid, well organized, and easy to follow; this reviewer can think of no better source on this subject for anyone interested in getting acquainted with it. It goes without saying that the question of bridged vs. classical, rapidly equilibrating structures provides the basic organizing principle for the chapter, but this is not done in a patently partisan way.

Kirmse's chapter, also a review, has the misleadingly modest title "Rearrangements of Carbocations". It deals with just about every known

aspect of carbocation chemistry: gas-phase ions, superacid media (the only item in the volume suffering slightly from overlap), ion pairs, carbocation sources, micellar effects, conformational effects, assistance, and bridging are all included in this authoritative and very thorough discussion. Again, no better source is known to this reviewer for the student desiring to study this field: it is well organized and written, and it does not present a "point of view". The book as a whole is furthermore quite free from printing and drawing errors. It is indeed, as the editors and authors intended, a fitting tribute to a great man, and it is warmly recommended to all who can afford it.

W. J. le Noble, *State University of New York at Stony Brook*

**Hydrogen Sulfide.** By Committee of Medical and Biologic Effects of Environmental Pollutants. University Park Press, Baltimore, Md. 1979. xi + 183 pp. \$16.50.

This volume is part of the ongoing series of reference texts on the Medical and Biologic Effects of Environmental Pollutants. Because of the increasing incidence of H<sub>2</sub>S in conventional and unconventional sources of both raw materials and energy, the broad scope of this volume is called for and generally accomplished. Topics from properties and occurrence of H<sub>2</sub>S, biogeochemical aspects of the sulfur cycle, absorption, metabolism, and effects of H<sub>2</sub>S on animals, vegetation, and human, to the subject of air-quality standards are covered. An informative chapter is included on the "Psychological and Aesthetic Aspects of Odor", an often confounding issue in the case of H<sub>2</sub>S emissions and its perception by individuals. Besides a concise section of conclusions and recommendations on hydrogen sulfide, this text's usefulness is enhanced by two appendixes: (I) a detailed survey of H<sub>2</sub>S sampling and analysis techniques, and (II) the 1924 Public Health report's review of 150 years of previous scientific observations of H<sub>2</sub>S. In total, this volume is a detailed resource for information and references on key aspects of H<sub>2</sub>S and its effects.

Charles A. Lieder, *Shell Development Company*

**Transfer Processes. Second Edition.** By D. K. Edwards, V. E. Denny, and A. F. Mills. Hemisphere Publishing Corp., Washington, D.C. 1979. xv + 421 pp. \$21.50.

This text is designed for a first course in heat and mass transfer to provide an introduction to the field so that later more specialized courses can start at a somewhat higher level. It also provides a broader background for those students who do not specialize in the field than would a first course in conduction. In line with the foregoing aims, the authors have chosen to treat heat conduction, mass transfer, fluid flow, convection transfer, and radiation first from a macroscopic point of view, generalizing concepts the student has already met in basic science courses. The book then goes on to present the underlying concepts from a microscopic point of view. The idea of microscopic carriers of energy, mass, and momentum traveling in straight lines between collisions or other interactions is used to develop the concepts of transport properties. The last two and one-half chapters return to problems of the macroscopic world on a systems scale. An attractive feature throughout the volume is the presentation of worked-out applications to relevant and interesting problems as soon as sufficient formalism is developed.

The treatment in the text is limited to one-dimensional processes, and generally to steady-state conditions. There is only a brief introduction to transient phenomena requiring partial differential equations for their description. The authors have succeeded in their efforts to keep the physical nature of the phenomena from being obscured by mathematical complexity. I feel that the volume would make a successful text for a course with similar goals. I would also suggest that physics and chemistry libraries not associated with engineering departments have a copy available. It is a readable and accessible source for guiding nonexperts in heat-exchange problems that do not require sophisticated design.

James N. Lloyd, *Colgate University*

**Chromatography of Synthetic and Biological Polymers. Volume 1.** Edited by R. Epton. John Wiley and Sons, Inc., Somerset, N.J. 1978. ix + 368 pp. \$42.50.

This is the first of two volumes which include papers presented at a well-conceived and thorough symposium sponsored by the Macromolecular Group of the Chemical Society (London). Volume 1 is subtitled "Column Packings, GPC, GF and Gradient Elution", and Volume 2, "Hydrophobic, Ion Exchange and Affinity Methods". This volume consists of detailed and comprehensive reviews followed by state-of-the-art papers. The latter are now of reduced value: while the meeting was held in July, 1976, the book was not published until May, 1978. The topical coverage of the important aspects of gel permeation and polymer separations is excellent. The historical and conceptual introduction by the editor is most helpful. The papers consist of a balanced blend of the practical and specialized, including theoretical as well as industrial de-

velopments. Both analytical and preparative scale discussions include low- and high-pressure techniques along with one paper on thin-layer gel chromatography. Unfortunately, geographical representation of authors is far from adequate, with the majority from the United Kingdom. No speakers from Japan were included, and only 4 of the 28 were from the United States.

Part 1 of this volume (General Developments) includes several papers on modified polysaccharide supports and begins with an excellent review by Porath, one of the fathers of GPC. A later paper describes the development of cellulose packings obtained in bead form for improved handling and performance. Two papers on composite packings deal with agarose on a polyacrylamide support and "soft" polystyrene on a rigid polystyrene support. The combination of structural stability with enhanced swellability and substrate interaction makes these composites ideal for high-pressure applications. Two exciting developments in "universal" packings are based on poly(acryloylmorpholine) and poly-(hydroxyethyl methacrylate). These may be used with both aqueous and organic solvents, the latter including chloroform, tetrahydrofuran, *N*-methylpyrrolidone, aromatics, alkyl alcohols, and ketones.

Parts 2 and 3 deal with Preparative and Industrial Chromatography and Specialized Applications, Theory and Technique, respectively. The latter includes, for example, GPC of milk proteins, cheesemaking coagulants, protected peptides, antibody conjugates, nonionic micelles, and chain-extended and low-density polyethylene. Other topics are universal calibration, service problems in GPC, and several aspects of porous silica packings.

The subject coverage along with the combination of reviews and current (1976) areas of research make this a necessary library addition and a valuable reference for the scientist doing polymer purification and fractionation.

Lon J. Mathias, *Auburn University*

**The Politics of Contraception.** By Carl Djerassi (Stanford University). W. W. Norton, New York. 1979. 265 pp. \$10.95.

This book was reviewed as the two-volume publication by the Stanford Alumni Association which was distributed to subscribers. Dr. Djerassi explains his choice of title in two separate statements: "I use 'software' to cover all the complicated social, cultural, political, religious, and legal issues that must be dealt with before any 'hardware' (the actual means of birth control) research can be implemented" and "Contraceptive 'software' issues have become inextricably intertwined with politics, hence the title of this book."

After an introductory chapter in which the author presents the background of experience, writing, and lecturing incorporated into this book, the current contraceptive hardware is discussed concisely. "The Pill" (steroid oral contraceptive) receives special consideration with emphasis on its software aspects (Chapter 3).

The Fear of Cancer (Chapter 4) is a defense of the (relative) safety of "the Pill" and a protest against the costs and consequences of over-riding concern for safety.

The Road from Laboratory to Consumer (Chapter 5) follows the 1970 predictions by the same author regarding the effect of regulatory requirements on the cost and the time needed for the development of a new contraceptive (whether for male or for female users).

The Public's Right to Know (Chapter 6) is critical of anti-Pill news releases and of uncritical media reporting of such releases and of developments in contraceptive hardware.

In Future Prospects in Male Contraception (Chapter 7) and Future Prospects in Female Contraception (Chapter 8), Dr. Djerassi finds nothing to indicate that the women of today can expect they (or their male partners) are likely to use a replacement for "the Pill". In Birth Control à la 1984 (Chapter 9), the prospects of successful development of government-imposed birth control agents seem even less attractive. However, Birth Control in China, the Contraceptive Supermarket (Chapter 10), recounting the author's experiences in The People's Republic in 1973, suggests that significant progress in the development of methods for population control is possible under a set of circumstances unique to that country.

Those of us who have watched (and participated in) the gradual disappearance of fertility-control research from the programs of the pharmaceutical industry have long recognized the thesis offered in 1970 and again in this book by Dr. Djerassi. There has been no better spokesman on this subject, and it is saddening to find in Strategies for the Future (Chapter 11) that Dr. Djerassi sees little hope for the acceptance of any of the proposals which would give encouragement to contraceptive research and development.

On the lighter side are the illustrations, photographs of pre-Columbian pottery figures from the author's collection, appropriately selected and placed in relation to the text.

Much of this book is an updating of prior separate contributions. On the subjects of "the Pill", contraception, and population Carl Djerassi deserves attention from the wider audience this book may reach. His writings on the above subjects are marked by practicality and by penetrating thought. It is depressing that much of the world so often prefers a politics which can be credited with neither.

G. W. Moersch, *Ann Arbor, Michigan*

**Advances in Polymer Science. Volume 26. Conformation and Morphology.** Edited by H. J. Cantow, G. Dall'Asta, K. Dusek, J. D. Ferry, H. Fujita, M. Gordon, W. Kern, G. Natta, S. Okamura, C. G. Overberger, T. Saegusa, G. V. Schulz, W. P. Slichter, and J. K. Stille. Springer-Verlag, New York and Berlin. 1978. 183 pp. \$38.00.

Each volume of this series is traditionally a loosely connected collection of in-depth reviews of relatively narrow areas of polymer science. The title "Conformation and Morphology" is not, like that of a monograph, indicative of the specific field of coverage. It is rather that general aspect of polymers which happens to contain the four areas reviewed. This book is not a general introduction to physical polymers and is not for novitiates. The reviews presuppose a well-established interest and understanding of the specific areas covered. Their true value, then, is that they are tightly restricted, thorough discussions incorporating the recent developments presented in three-to-five score original publications. The four titles are presented below with brief descriptions of content.

"Molecular Mobility, Deformation and Relaxation Processes" by W. Holzmüller develops "a simple model of quasicubic elements of flow" to describe these properties and processes. The review is highly mathematical; e.g., three of ten subtopics contain "Differential Equations for..."

"The Iso-Free-Volume State and Glass Transitions in Amorphous Polymers: New Developments of the Theory" by Y. S. Lipatov concludes that the "free volume concept...cannot be used for the quantitative description of many properties of polymer systems." Much experimental data are included with the theoretical discussions.

The third paper continues the physical chemistry theme to "Model Networks" by P. Rempp, J. E. Herz, and W. Borchard. Extensive evaluation of the synthesis and properties of these three-dimensional models supports the application of existing theories of rubber elasticity to the understanding of cross-linked polymers.

Finally, "NMR Approach to the Phase Structure of Linear Polyethylene" by R. Kitamaru and F. Horii presents recent experimental results using broad-band  $^1\text{H}$  NMR on solid state samples. These include fibers and both bulk and solution-grown crystalline materials. This technique is especially applicable to the noncrystalline regions which vary greatly depending on sample preparation.

If you are not intimately involved in one of these areas, this book is probably not for you. If you are, you should examine it carefully before adding it to your personal library.

Lon J. Mathias, *Auburn, University*

**Carbon-13 NMR Spectral Data: A "Living" COM-Microfiche Collection of Reference Material.** By W. Bremser, L. Ernst, and B. Franke. Verlag-Chemie International, Inc., New York. 1978. \$346.00.

This compilation of  $^{13}\text{C}$  NMR spectral data contains chemical shifts, coupling constants, and, where available, spin-lattice relaxation times for 7572 compounds. Literature references, but not original spectra, are included in the collection, which at present comprises 10 000 spectra (including in some cases, multiple spectra for a given compound under different conditions of pH, temperature, solvent, etc.) and occupies approximately 11 000 pages of computer printout. Computer-stored and -arranged information is available on microfiche as "computer output in microform" (COM-microfiche). Spectral data are accompanied by molecular and structural formulas, the latter stored in a computer-interpretable topological representation that differs slightly from the conventions of the Chemical Abstracts Service. A set of nine indexes arranged according to chemical names, molecular formulas, molecular weights, CAS registry numbers, literature references, structure vs. coupling constants, coupling constants vs. structure, chemical shifts, and substructural codes are included with the collection.

The authors believe that their master compilation includes one-third to one-half of all published  $^{13}\text{C}$  NMR spectra. Their references originate from four sources: (1) papers from 16 journals that were completely abstracted from 1973 to early 1977; (2) selected papers from other journals; (3) spectral catalogues; and (4) their own unpublished data. The compilation of data is intended to be comprehensive, thus replacing previous spectral catalogues. Data from the Sadtler and JEOL catalogs, from the Bruker Carbon-13 Data Bank, and from the spectral atlases of Johnson and Jankowski and of Breitmeyer, Haas, and Voelter have been incorporated. According to the publisher, updated and corrected microfiche will periodically be available. If the planned revisions occur with

regularity, this catalog will certainly become a major reference resource of every chemical library.

R. R. Sharp, *The University of Michigan*

**Topics in Current Chemistry: Organic Compounds, Syntheses/Stereochemistry/Reactivity.** Edited by F. L. Baschke. Springer-Verlag, Berlin-Heidelberg-New York. 1978. iv + 133 pp. \$28.00.

This volume presents four quite diverse, very brief review articles. The first, by F. Vögtle and G. Hohner, is entitled "Stereochemistry of Multibridged, Multilayered, and Multisteped Aromatic Compounds. Transannular Steric and Electronic Effects". This article reviews the present state of knowledge and outlines further synthetic approaches and mechanistic information that can be gained from studying these kinds of compounds.

The second chapter by E. S. Lewis is entitled "Isotope Effects in Hydrogen Atom Transfer Reactions". This chapter covers some of the same ground as Lewis's chapters in "Isotopes in Organic Chemistry" (E. Buncl and C. C. Lee, Eds.) and "Proton Transfer Reactions" (F. F. Calder and V. Gould, Eds.) but treats only free-radical reactions and is an up-to-date review that offers a wide perspective. This is an interesting field in which newer points of view have been presented recently by Lewis and by others, and the chapter is authoritative and well done.

The third chapter, entitled "N-Methylacetamide as a Solvent", is by R. J. Lemire and P. G. Sears. N-Methylacetamide is a high dielectric constant solvent that has been used increasingly. This review stresses the physical properties of the solvent, but also briefly mentions some of the reactions that have been studied in it.

The final chapter is entitled "EROS; A Computer Program for Generating Sequences of Reactions", by J. Gasteiger and C. Jochum. This chapter presents and illustrates one of the programs that can provide computer-generated synthesis of organic molecules.

William A. Pryor, *Louisiana State University*

**NMR and the Periodic Table.** Edited by ROBIN K. HARRIS (University of East Anglia) and BRIAN E. MANN (University of Sheffield). Academic Press, New York. 1979. xxv + 459 pp. \$62.00.

Multinuclear NMR instruments are now commercially available. Therefore, there certainly will be an explosion of work on NMR nuclides which largely have been overlooked until now. This book makes a timely contribution which should be appreciated by scientists interested in multinuclear NMR. It probably will be used as a primary source of information for many years to come.

The book is concerned mainly with the liquid or solution state. It contains 14 chapters written by 18 contributors. The first 84 pages of the text are concerned with general background such as experimental methods, definition of terms, nuclear screening, spin-spin coupling, and nuclear spin relaxation. The more popular nuclei, viz.,  $^1\text{H}$ ,  $^{10,11}\text{B}$ ,  $^{13}\text{C}$ ,  $^{14,15}\text{N}$ ,  $^{19}\text{F}$ , and  $^{31}\text{P}$ , are discussed only briefly (25 pages). The remainder of the book deals with the remainder of the periodic table. The discussion includes: deuterium and tritium (17 pp); the alkali metals (48 pp); the alkaline earth metals (10 pp); the transition metals (84 pp); aluminum, gallium, indium, and thallium (24 pp); silicon, germanium, tin, and lead (62 pp); arsenic, antimony, and bismuth (4 pp); oxygen, sulfur, selenium, and tellurium (35 pp); chlorine, bromine, and iodine (18 pp); xenon and krypton (15 pp). In each section, attention is paid to special considerations regarding the observation of the nuclide at hand. There is extensive use of tabular data which is nicely complemented with figures in many cases. The SI system of units is employed almost exclusively.

Ralph W. Rudolph, *The University of Michigan*

**Microbial Technology, Microbial Processes. Volume 1.** Edited by H. J. Peppel (Universal Foods Corp., Milwaukee, Wis.) and D. Perlman (School of Pharmacy University of Wisconsin, Madison, Wis.). Academic Press, New York-San Francisco-London. 1979. xvi + 552 pp. \$47.50.

Of the many books in print concerned with biotechnology, this volume and Volume 2 which make up the second edition of Microbial Technology are my first choice. They are almost encyclopedic in their coverage, yet they are well written and well illustrated. Historical material and extensive references are included. In fact, I found them such interesting reading I had a hard time putting them down. It was a pleasure to review them.

Volume 1 contains 17 chapters and a subject index. Subjects covered are: bioinsecticides, Rhizobium species, lactic starter culture concentrates, production of single-cell protein for use in food or feed, production of yeasts and yeast products, plant cell suspension cultures and their biosynthetic potential, microbial production of butanol-acetone, amino acids, antibiotics, enzymes, nucleosides and nucleotides, organic acids, and polysaccharides. The final chapters are concerned with microbial transformation of steroids and sterols, and microbial processes for the

production of vitamin B<sub>12</sub>, riboflavin, and carotenoids.

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

**Microbial Technology Fermentation Technology. Volume 2.** Edited by H. J. Pepler (Universal Foods Corp., Milwaukee, Wis.) and D. Perlman (School of Pharmacy University of Wisconsin, Madison, Wis.). Academic Press, New York-San Francisco-London. 1979. xviii + 536 pp. \$44.00.

Workers in the food industry will find the chapters on beer brewing, cheese production, distilled beverages, mold modified foods, wine vinegar, ketogenic fermentation processes, and mushroom fermentation particularly interesting. Other chapter titles include microorganisms for waste treatment, elementary principles of microbial reaction engineering, microbial culture selection, methods for laboratory fermentation, instrumentation of fermentation systems, computer applications in fermentation technology, general procedures for isolation of fermentation products, use of immobilized cell systems to prepare fine chemicals, economics of fermentation processes, and fermentation processes and products: problems in patenting. It is obvious from the range of subjects treated in these two volumes that, not only are they excellent reference books, but they could form the basis for a comprehensive course in biotechnology.

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

**Applied Biochemistry and Bioengineering. Volume 2. Enzyme Technology.** Edited by Lemuel B. Wingard, Jr., Ephriam Katchalski-Katzir, and Leon Goldstein (University of Pittsburgh, Pittsburgh, Pa.), The Weizmann Institute of Science, Rehovot, Israel, and Tel Aviv University, Tel Aviv, Israel). Academic Press, New York-San Francisco-London. 1979. xiii + 306 pp. \$32.50.

This book is directed toward the biologist, biochemist, chemical engineer, microbiologist, and analytical chemist involved in pharmaceutical manufacturing, analytical and diagnostic chemical and medical devices, food processing, food science, petroleum processing, immunology, polymers, separation and purification, fermentation, and medical research. The first three chapters are devoted to production of intracellular and extracellular enzymes. Next glucose isomerase production of high fructose syrups is discussed. This is followed by five chapters devoted to immobilized and fiber-entrapped enzymes. Transformation of steroids by immobilized living microorganisms is discussed in the final section. References are included.

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

**Advances in Biochemical Engineering. Volume 12.** Edited by T. K. Ghose, A. Fiechter, and N. Blakebrough (Indian Institute of Technology, New Delhi, India; Eidgen. Techn. Hochschule, Zurich; National College of Food Technology, Weybridge Surrey, England). Springer-Verlag, Berlin-Heidelberg-New York. 1979. 253 pp. \$53.90.

Biochemists and biochemical engineers will welcome this latest volume in a series devoted to biotechnology. The first article deals with enzyme production during transient growth. This is followed by sections devoted to stabilized soluble enzymes, the use of coenzymes in biochemical reactors, process development and economic aspects in enzyme engineering, acylase L-methionine system, and the rational design of affinity chromatography separation processes. References are included.

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

**Advances in Biochemical Engineering. Volume 13.** Edited by T. K. Ghose (Indian Institute of Technology, New Delhi), A. Fiechter (Eidgen. Techn. Hochschule, Honggerberg, Zurich), and N. Blakebrough (National College of Food Technology, Weybridge Surrey, England). Springer-Verlag, Berlin-Heidelberg-New York. 1979. 214 pp. \$48.40.

The material in this volume will be of interest mainly to biochemical engineers and applied microbiologists as it is quite technical. Topics covered are: application of microcomputers in the study of microbial processes, dissolved oxygen electrodes, and power consumption in aerated and stirred tank reactor systems. A final section on loop reactors is included.

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

**Topics in Enzyme and Fermentation Biotechnology. 3.** Edited by Alan Wiseman (Department of Biochemistry, University of Surrey, Guildford, England). Ellis Horwood Limited, Chichester. 1979. 294 pp. \$54.95.

This book contains a variety of topics and should find a wide audience among bioengineers, microbiologists, biochemists, and workers in the food and drug industries. Following an introduction, uses of oxyanions in enzyme equilibrium displacement are discussed. The effects of oxyanions have not been appreciated and one would hope that the increased product yields reported in this chapter would stimulate more research in this area. Chapter Three is devoted to a discussion of developments in microbial

extracellular enzymes. Workers in the dairy industry will find the extensive treatment of rennets and cheese highly informative. In addition to a description of milk and its components and traditional methods of cheese making, new coagulants are included as well as immobilized enzymes for cheese production. Scale-up of fermentation processes makes up Chapter 5. New and modified invertases and their applications are discussed in the final chapter. References and an index are included.

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

**Perspectives on Lake Ecosystem Modeling.** Edited by Donald Scavia and Andrew Robertson (Great Lakes Environmental Research Laboratory, Ann Arbor, Mich.). Ann Arbor Science Publishers Inc., Ann Arbor, Mich. 1979. xiv + 326 pp. \$27.00.

This book will appeal to specialists in environmental studies.

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

**International Review of Biochemistry. Volume 21. Microbial Biochemistry.** Edited by J. R. Quayle (Department of Microbiology, University of Sheffield, Sheffield, England). University Park Press, Baltimore, Md. 1979. x + 381 pp. \$29.50.

Energy metabolism provides the main theme for this volume. It begins with the search for correlation between theoretical and experimental growth yields. Next, energy metabolism in aerobes and anaerobes is discussed. Chapter 4 is devoted to the interrelation between modes of carbon assimilation and energy production in phototrophic purple and green bacteria. This is followed by a discussion of continuous culture applications to microbial biochemistry. Utilization of inorganic nitrogen by microbial cells and microbial biochemistry of methane are reviewed in the two final chapters. References are included.

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

**Best Management Practices for Agriculture and Silviculture.** Edited by Raymond C. Loehr and others (College of Agriculture and Life Sciences, Cornell University, Ithaca, New York). Ann Arbor Science Publishers Inc., Ann Arbor, Mich. 1979. xvi + 740 pp. \$35.00.

This book is concerned with water quality problems associated with agriculture and silviculture.

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

**Wastewater Treatment.** By Donald W. Sundstrom and Herbert E. Klei (Department of Chemical Engineering, The University of Connecticut). Prentice-Hall Inc., Englewood Cliffs, N.J. 1979. xvi + 444 pp. \$23.00.

Five sections make up this latest contribution to the growing literature on wastewater treatment. Section one is titled Wastewater Characteristics and Treatment Processes. This is followed by sections on biological, physical, and chemical processes. Section five is concerned with solids treatment and systems analysis. References are included as well as several appendixes.

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

**Progress in Industrial Microbiology. Volume 15.** Edited by M. J. Bull (Gist-Brocades N.V., Research Department, Delft, The Netherlands). Elsevier Scientific Publishing Co., Amsterdam-Oxford-New York. 1979. 283 pp.

A wide range of subjects is offered in this collection of review articles. These are microbial  $\beta$ -glucanases, starch-degrading enzymes of microbial origin, immobilized microbial cells, yeast genetics in industry, and the microbiology of interfaces in the marine environment. This last section will be of particular interest to anyone concerned with fouling and corrosion by marine organisms. References are included.

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

**Physicochemical Measurement by Gas Chromatography.** By John R. Conder (University of Wales, Swansea) and Colin L. Young (University of Melbourne, Victoria). John Wiley & Sons, New York, Chichester. 1979. xix + 632 pp. \$75.00.

This book is intended as both a text and a reference monograph for users of gas chromatography. Emphasis is placed on physicochemical measurements based on the dynamics of chromatographic processes rather than routine analytical uses. No previous knowledge of chromatography is assumed.

The text is divided into thirteen chapters, three appendixes, and the usual author and subject indexes. The first three chapters, along with Chapter 11, deal with the foundations as well as the scope of gas chromatographic theory and practice. Chapters 4 and 5 cover "physical properties of single substances" and "solution thermodynamics", respectively. Chapters 6 and 7 deal with "complexes" and "phase transitions" respectively, while Chapter 8 covers "mixed second virial coefficients and refined theory". Chapters 9 and 10 treat "finite concentration" and "gas-solid adsorption and surface areas". The last

two chapters (12 and 13) cover "diffusion and rate processes" and "on-column reactions", respectively. Appendix 1 describes a "teaching experiment" on the determination of activity coefficients in solution at infinite dilution by GC. Appendixes 2 and 3 describe the practical aspects of "preparation of glc columns with diatomaceous supports" and the "preparation of glc columns with teflon support", respectively.

In general the text has an excellent blend of the theoretical and practical aspects of gas-liquid chromatography. It is readable, with a good depth of coverage of most topics. There are over 1400 references to the original literature. It can be highly recommended to practitioners of gas chromatography.

Peter J. Stang, *The University of Utah*

**Physical Chemistry: With Applications to the Life Sciences.** By David Eisenberg (UCLA) and Donald Crothers (Yale). The Benjamin/Cummings Publishing Co., Menlo Park, Calif. 1979. xxvi + 868 pp. \$21.95.

In spite of the impression its title may convey to some, this is a rigorous textbook, intended to introduce biologists to physical chemistry by way of illustrations of the application of this discipline to questions of biological importance. The price of such an approach is the omission of extensive coverage of the physical chemistry of gases and changes of state. Equally important topics such as quantum and statistical mechanics, thermodynamics, and spectroscopy are given thorough coverage, and the level of mathematical sophistication required of a student using this text is not much different from that required for a standard course in physical chemistry. The book is divided into five major sections (thermodynamics and kinetics, solutions and electrochemistry, quantum mechanics and spectroscopy, statistical mechanics and transport processes, and symmetry and molecular structure); in all cases the theoretical material is interwoven with examples relevant to physical chemistry and to biological systems. Each chapter has an extensive set of problems, identified according to their application to topics in physical chemistry or biophysics. A notable omission is coverage of chemiosmotic energy coupling, a topic made to order for a text such as this; an unusual and entertaining addition is brief biographical sketches of notable physical scientists such as Gibbs, Einstein, Helmholtz, and others (I have some fears for the morale of a typical undergraduate, who, wrestling for the first time with the concepts of entropy and the second law, stumbles across the sketch of Baron Kelvin and learns that he entered university at age 10, published his first papers at 17 and occupied the chair of physics at Glasgow at age 22).

This textbook can be safely recommended for courses where physical chemistry is taught separately to biologists. Chemists teaching such a course ought to feel comfortable with the book, and an astute student will receive a thorough grounding in the principles of physical chemistry and their applications to biology. For standard courses in physical chemistry whose clientele includes biochemists and biologists, the book could very usefully serve both as a source for adjunct reading and as a ready rejoinder to the question, too often heard, about the relevance of physical chemistry to the life sciences.

Charles F. Yocum, *The University of Michigan*

**Heat Exchange Fluids and Techniques.** By M. W. Ramney. Noyes Data Corp., Park Ridge, N.J. 1979. xi + 392 pp. \$42.00.

This is a review in detail of the descriptive information in United States patents issued "since January 1975". Indexes include ones on Company, Inventor, and Patent Number, but a detailed table of contents substitutes for a subject index.

**Industrial Starch Technology: Recent Developments.** By J. C. Johnson. Noyes Data Corp., Park Ridge, N.J. 1979. xi + 372 pp. \$45.00.

The United States Patent literature "since July 1976" is descriptively reviewed in this book. The content is understandably highly applied, but should be of interest to chemists concerned with polymers, paper adhesives, coatings, pharmaceuticals, as well as many consumer products. There is an inventor and a patent number index, but no subject index (but the table of contents is detailed enough to be an acceptable substitute).

**Kirk-Othmer Encyclopedia of Chemical Technology. Third Edition. Volume 7.** Edited by M. Grayson. John Wiley & Sons, New York. 1979. xxvi + 891 pp. \$120.00.

"Copper Alloys to Distillation" is the subtitle of this volume, which includes such important topics as corrosion, cosmetics, crystallization, dental materials, digital displays, and disinfectants, as well as a variety of entries on specific compounds of industrial importance, such as crotonaldehyde, or classes of compounds, such as cyanohydrins. The entries average about 30 pages each, and are mostly contributed by chemists in industry chosen for their expertise in the subject. The material is very well laid out, with accurate structural formulas, clear tables, selected figures, and extensive bibliographies that emphasize the patent literature

but do not overlook the fundamental sources. The content is comprised of basic chemistry and properties, industrial applications and sources including syntheses, uses, and health and safety factors. The editing appears to have been very carefully done, although one can find strange curiosities, such as "lacrimatory" (used in connection with crotonaldehyde, in place of "lacrimatory"), which do not detract from the overall high quality.

**Organic-Chemical Drugs and Their Synonyms. Fifth Edition.** By Martin Negwer. Verlag Chemie, New York and Weinheim. 1978. xvi + 1863 pp. (in three volumes). \$125.00/set.

This is a much enlarged as well as revised edition compared to the 4th edition published in 1971. It embraces all drugs "that had come to the author's attention by the end of 1974", with a supplementary section reaching to the middle of 1977. Two of the three volumes list drugs (6664 of them) in formula-index order, giving for each the structural formula, systematic name, *Chemical Abstracts* index name and registry number, notes on the form in which it is used (e.g., sodium salt), synonyms, and therapeutic use. Access to this vast list is provided by indexes in the third volume, one of which is an alphabetical index that includes all known synonyms. There is also a CAS Registry Number Index, and an innovative "group index", designed to bring together drugs having a common feature, such as "benzoic acids", "antibiotics", "quaternary ammonium compounds", etc.

Although this book is formally in German, it is essentially international, and can be used by readers with no knowledge of German at all, since the only textual material, the Foreword and Introduction, is in both English and German. For example, the entry under  $C_4H_4O_4$  reads "Fumarsäure = *trans*-Ethylen-1,2-dicarbon-säure = (*E*)-2-Butendisäure; Calciumsalz; Fulaxan; Laxativum (the therapeutic uses are always given in latin). This is obviously an important reference book for medical chemistry libraries.

**Condensed Pyrazines.** By G. W. H. Cheeseman and R. F. Cookson. John Wiley & Sons, New York. 1979. xii + 835 pp. \$115.00.

This volume, number 35 in the Weissberger/Taylor series "Chemistry of Heterocyclic Compounds", differs from many of the others in being a case of joint authorship rather than an edited volume of contributed chapters. It comprises no less than forty chapters, beginning with a general introduction to quinoxaline chemistry, which is the subject of the first twenty chapters. The next seventeen chapters are concerned with ring systems consisting of a pyrazine ring fused to another heterocyclic ring (e.g., imidazopyrazines), and the last three chapters cover benzoquinoxalines and pyridoquinoxalines. Thorough author and subject indexes finish off the volume. Pteridines are not included, because they are planned to be the subject of a future volume, and phenazines are omitted because they have been reviewed already.

There is a large amount of information included in tables, and the bibliographies are extensive; one cannot but admire the diligence of the two authors. They have covered the literature through 1975, with some additional material from 1976 and 1977, in the middle of which year they completed their manuscript.

**Introduction to Modern Liquid Chromatography. Second Edition.** By L. R. Snyder (Technicon Instruments Corp.) and J. J. Kirkland (E.I. du Pont de Nemours & Co.). John Wiley & Sons, New York. 1979. xix + 863 pp. \$29.50.

It is testimony to the rapid growth of the field that a new edition of this book has appeared only five years after the original. In that time, there have been great improvements in detection methods, enabling almost any class of compound to be detected now. Microprocessing has been introduced, and small-particle reverse-phase liquid chromatography has been exploited. This and many lesser developments have led to the complete rewriting of the book, which is now larger, and contains many examples with actual chromatograms. The book remains a highly practical handbook for those to whom the subject is familiar or not. The publishers must have good reason to expect large sales to have priced the book so reasonably.

**Aromatic and Heteroaromatic Chemistry. Volume 7.** Edited by H. Suschitzky and O. Meth-Cohn. The Chemical Society, London. 1979. xiii + 368 pp. \$90.75.

This volume of Specialist Periodical Reports is based on material appearing in Volumes 87 and 88 of *Chemical Abstracts*, and thus covers the literature abstracted between July 1977 and June 1978. The arrangement of subject matter is that used in Volume 6, except that two chapters on natural products have been omitted. The term "aromatic" is interpreted broadly enough to allow the review to begin with unsaturated three- and four-membered rings, but the largest part of the book is, of course, devoted to five- and six-membered systems, with two

chapters covering rings of seven and more members. Three separate chapters deal with electrophilic, nucleophilic, and free-radical substitution. The book concludes with a chapter on porphyrins and related compounds. Nine contributors collaborated with the editors to produce this addition to the series of aids to the harassed chemist trying to keep abreast of information that rivals economic inflation in its rate of growth. For those who wish the quickest alert to the most outstanding advances in the year covered, a selection is presented in under two pages in the Introduction.

**Advances in Inorganic Chemistry and Radiochemistry. Volume 22.** Edited by H. J. Emeleus and A. G. Sharpe. Academic Press, New York. 1979. ix + 457 pp. \$48.00.

This volume contains seven reviews from the pens of ten contributors: Lattice Energies and Thermochemistry of Hexahalometallate(IV) Complexes,  $A_2MX_6$ , Which Possess the Antifluorite Structure (by Jenkins and Pratt); Reaction Mechanisms of Inorganic Nitrogen Compounds (Stedman); Thio-, Seleno-, and Tellurohalides of the Transition Metals (Atherton and Holloway); Correlations in Nuclear Magnetic Shielding, Part II (Mason); Cyclic Sulfur-Nitrogen Compounds (Roesky); 1,2-Dithiolene Complexes of Transition Metals (Burns and McAuliffe), and Some Aspects of Bioorganic Chemistry of Zinc (Prince). Where a termination date for literature survey is given, it is 1977, and the reviews are devoted either to recent developments in fields of long standing, or to entire subjects of relatively recent development. The bibliographies are substantial, averaging over 200 per review. A subject index of eleven pages is adequate; it is supplemented by a list of the contents of previous volumes in chronological order.

**The Biosaline Concept.** Edited by A. Hollaender. Plenum Press, New York. 1979. viii + 391 pp. \$39.50.

This book, subtitled "An Approach to the Utilization of Underexploited Resources", is the proceedings of an "International Workshop on Biosaline Research", augmented with contributed material on additional but related topics. It is concerned with the problems of agricultural production of food and fuels using sea water or other saline waters for irrigation on land, or open-ocean farming. There is a thin but significant stream of chemistry discernible in most of the chapters.

**Structure and Bonding. 36. Inorganic Chemistry and Spectroscopy.** Edited by J. D. Dunitz et al. Springer-Verlag, New York. 1979. 178 pp. \$42.90.

This volume of this quasi-periodical series consists of three unrelated reviews: The Resonance Raman Effect, by R. J. H. Clark and B. Stewart; Structure and Bonding with Alkali Metal Suboxides, by A. Simon; and The Electronic Structure of Cobalt(II) Complexes with Schiff Bases and Related Ligands, by C. Daul, C. W. Schlapper, and A. Von Zelewsky.

**Use of Indicator Enzymes for Measurements of Endogenous or Enzyme-liberated Ammonia.** By D. M. Goldberg. Clinton Laboratories, 1805 Colorado Ave., Santa Monica, Calif. 90404. 1978. 32 pp. \$5.00.

**Interconversion of Enzyme Units.** By S. M. Sax. Clinton Laboratories. 1972. 24 pp. \$4.00.

**SI Units in the Clinical Laboratory.** By S. M. Sax. Clinton Laboratories. 1979. 50 pp. \$6.00.

These three softbound booklets contain much practical information of use to the clinical chemist. There are procedures, explanations, tabulations, and lists of references. The content appears to be authoritative, but it is curious to see in a table headed "Symbols whose use should be avoided" the symbol L for liter, a recommendation contrary to the practice of this Journal.

**The Chemistry of Functional Groups. Supplement B. The Chemistry of Acid Derivatives.** Edited by S. Patai. John Wiley & Sons, New York. 1979. In two parts: xiv + 753 pp, and xiv + 718 pp. \$151.25 each.

The title of this pair of books may mislead some readers, owing to the omission of the word "carboxylic"; no other kinds of "acid derivatives" are dealt with. This is the second of a group of six categories of supplements planned for keeping the essentially completed original set abreast of new developments, for filling in gaps in the original coverage, and for presenting chapters that give a unifying or comparative review of subjects embracing related functional groups. Although the two parts of this work are priced separately, purchasers are advised to acquire both volumes, for the index is only in Part 2, and closely related subjects overlap both parts (e.g., "The Chemistry of Lactones and Lactams" is

in Part 1, but "The Synthesis of Lactones and Lactams" is in Part 2).

There are altogether 19 chapters, contributed by an international group of writers of recognized expertise in their respective subjects. Several chapters deal with theoretical and physical aspects: thermochemistry, chiroptical properties, mass spectra, hydrogen bonding, photochemistry, radiation chemistry, and electrochemistry are each given chapters. Orthoamides and thio acids are reviewed, as are such special subjects as decarbonylation, transcarboxylation, pyrolysis, and micellar effects on deacylation reactions. A chapter on detection and determination is a useful feature.

The quality maintains the high standard of the series, but it is especially unfortunate that in a work such as this, the termination dates of the surveys of the primary literature are not given for most chapters. One pair of authors (Wolfe and Ogliaruso) nobly state this information (their survey reached to mid-1976), but it is surely the editor's job to see that all contributors include this simple but important datum.

**Environmental Indices. Theory as Practice.** By Wayne R. Ott (U.S. E.P.A.). Ann Arbor Science Publishers, Ann Arbor, Mich. 1978. xi + 371 pp. \$28.00.

This book reviews the methods of measuring and describing the quality of the environment. Its primary purpose is to serve as a basic reference for those who must analyze environmental data; such an audience embraces a wide range, from research scientists to the general public.

**Water Resources Assessment—Methodology & Technology Sourcebook.** By L. W. Canter (University of Oklahoma). Ann Arbor Science Publishers, Ann Arbor, Mich. xxii + 529 pp. \$29.50.

The U.S. Army Engineers Waterways Experiment Station contracted with the author to prepare "a comprehensive review and evaluation of methodologies and technologies that are used directly or that have potential application to environmental impact assessment". This book is the result; it covers the literature from 1960 to 1978. The material is organized by time period rather than subject. The content is only very marginally chemical, but the book may nevertheless be useful to chemists who must consider the broad implications of water pollution and environmental impact.

**Organometallics of the f-Elements.** Edited by T. J. Marks and R. D. Fischer. D. Reidel Publishing Co., Boston-London-Dordrecht. 1979. xv + 517 pp. \$110.00.

The NATO Advanced Study Institute, held in Italy in September 1978, provided the content of this volume of proceedings. There are 15 papers, devoted to various aspects of organometallic chemistry of the lanthanides and actinides, an area of relatively little activity until recent years. The papers include accounts of original research, but with abbreviated experimental details. It is good to find a substantial (17 pp) index, which increases the usefulness of this volume.

**Guide to Gas Chromatography Literature. Volume 4.** By A. V. Signeur (Canisius College). Plenum Press, New York. 1979. vii + 1321 pp. \$145.00.

The main body of this work is a list of no less than 16357 references, including the full titles in English of each, arranged in alphabetical order of the first authors. Both the original and *Chemical Abstracts* citations are given. Access to specific information is provided by an author index (142 pp) and a subject index (159 pp). The entries are papers or reviews concerned with instrumentation, methodology, and applications, including interfacing of chromatographic techniques with instrumental methods, such as mass spectrometry. The method by which the papers were selected is not stated, but it is evident that more than the bare titles was considered, for many of them do not specify chromatography as part of the content. This volume covers the literature "from late 1971"; it is unfortunate that the termination date is not also given.

**Quantitative Structure-Activity Analysis.** Edited by R. Franke and P. Oehme. Akademie-Verlag, Berlin. 1978. 452 pp. 72 Marks (soft-bound).

This is the Proceedings of the Second Symposium on Chemical Structure-Biological Activity Relationships: Quantitative Approaches, held in 1976. It consists of a large number of papers of about six pages in length, including transcripts of the ensuing discussions. The papers are about equally divided in language between English and German. Unfortunately, there is neither an index nor a list of participants, and the papers are presented in the table of contents without apparent logical order, so it is very difficult to find a desired piece of information, or even a subject of interest.