Book Reviews*

Mathematical Modeling of Fluidized Bed Combustors. By Jan Olofsson. IBA Coal Research, London. 1980. 100 pp. £10.00.

This publication represents an attempt to describe work undertaken by the Department of Energy Conversion, Chalmers University of Technology, Sweden, and funded by the National Swedish Board of Energy Source Development for the Coal Working Party of the International Energy Agency. Considering the complexity and scope of the subject, the efforts of the author and collaborators have been remarkably successful.

The first section is a brief introduction. The second section discusses general definitions of mathematical models and the philosophy involved. In the third section basic assumptions concerning the fluid dynamics and combustion are formulated. The two phase theory of fluidization is proposed to describe the fluid dynamics.

Basic equations of a model, that is, mass and energy balances, are discussed in the fourth section. The mass balances consist of equations for the flow materials such as char, limestone, and gaseous species. The two phase theory of fluidization requires balances for the gaseous species in both particulate and bubble phases.

The mass and energy relationships developed in the fourth section lead to more unknowns than relationships. In the fifth section additional relationships are presented by modeling the bed fluid dynamics, combustion kinetics, flue gas emissions, and heat transfer. The author suggests Vreedenberg's correlation for modeling the heat transfer. In the next generation of models a correlation based on high-temperature operation and large particles (>1 mm) is highly recommended by this reviewer.

The sixth section reviews existing mathematical models of fluidized bed combustors. The following models were reviewed: M. M. Avedisian and J. F. Davidson, Combustion of Carbon Particles in a Fluidized Bed; B. M. Gibbs, A Mechanistic Model for Predicting the Performance of a Fluidized coal Combustor; A. L. Gordon and N. R. Amundson, Modelling of Fluidized Bed Reactors IV, Combustion of Carbon Particles; Jean F. Louis and Shaeo El Tung, Modelling of Fluidized Combustion of Coal; D. A. Berkowitz, A. Ray, and V. H. Sumaria, Modelling and Simulation of Multicell Fluidized Bed Steam Generator.

In this section the author compares the models listed above. The intended range of application of each model is discussed. All the models have their advantages in their intended range; therefore, the models were not ranked in an order of usefulness.

Conclusions and recommendations are discussed in the seventh section. Models developed to date are able to describe the qualitative performance of a FBC. The development of mathematical models for accurate quantitative analysis will require a more comprehensive knowledge of processes and phenomena occurring in the bed and free board.

It is not an introductory work; however, it would be extremely valuable to those experienced in fluidization, chemical kinetics, and applied mathematics.

W. E. Genetti, *University of Mississippi*

The Heterocyclic Chemistry of Phosphorus. Systems Based on the Phosphorus–Carbon Bond. By L. D. Quin (Duke University). John Wiley and Sons, New York. 1981. XIII + 434 pp.

Within the limitations reasonably set by the author, this monograph contains a wealth of information organized in the following chapters: 1. Introduction to Phosphorus-Containing Ring Systems and Some General Characteristics (24 ref). 2. Principles of Forming 5-Membered Ring Compounds in Phosphorus Chemistry (197 ref). 3. Synthetic Methods for 6-Membered Rings (123 ref). 4. Small and Large Rings Containing Phosphorus (94 ref). 5. ^{31}P NMR Spectroscopy of Cyclic Compounds (209 ref). 6. ^{13}C NMR Spectra of Heterocyclic Phosphorus Compounds (81 ref). 7. Proton NMR Spectroscopy of Cyclic Phosphorus Compounds (111 ref). 8. Special Properties of Phosphorus Heterocycles: Conformation and Cyclic Electron Delocalization (223 ref).

This is an excellent book, which manages to achieve the status of a research monograph and of an introduction to one important phase of organophosphorus chemistry. It can be strongly recommended to the specialist and to students of mainstream organic chemistry. The tables are superb: clear, concise, and informative. The text is more than a compendium of facts; it is crisp, critical and, most of the time, well balanced between fact and attractive speculation. In a few instances, I was mildly disappointed. For example, on p 168 one reads: "Pseudorotation seen from DNMR to pass through ring-diequatorial". Pseudorotation is one of two reasonable hypotheses to explain the *phenomenon* of permutational isomerization of compounds with pentacovalent phosphorus. Dynamic nuclear magnetic resonance is concerned with phenomena, and does not "see" speculations. Barring such minor lapses, attributable to a commendable penchant for conciseness (and perhaps influenced by current fashion), the book maintains a high level of accuracy and objectivity in describing and interpreting a great deal of interesting contemporary organic chemistry.

Fausto Ramirez, *State University of New York at Stony Brook*

Principles of Applied Clinical Chemistry. Volume 3. Plasma Proteins in Nutrition and Transport. By Samuel Natelson (University of Tennessee) and Ethan A. Natelson (University of Texas). Plenum Press, New York. 1980. xvi + 554 pp. $42.50.

This volume provides a valuable collection of information on selected topics, some of it difficult to obtain from a single source. The authors discuss a number of proteins and protein groups of importance under the title categories, such as albumin, transferrin, ceruloplasmin, the circulating lipoproteins, and various hormone-binding proteins. The selection, however, is somewhat arbitrary in spots; for example, the longest chapter is about glycoproteins and proteoglycans, topics not centrally concerned with the usual definitions of either nutrition or transport.

Nonetheless, the topics selected are approached with an admirable conciseness, the result of generally avoiding extraneous detail. This approach happily does not sacrifice depth of discussion, and interest tends to be sustained by the continual introduction of significant factual statements. Thus, the work should appeal to the clinical chemist and pathologist, presumably the intended audience.

However, a somewhat uncritical view of certain topics is occasionally encountered. The apparently complete acceptance of the clinical value of carcinoembryonic antigen determination, the assertion that weight reduction programs are responsible for the recent significant decrease in cardiovascular mortality in the U.S., and the emphasis on the Frederickson–Levy lipoprotein phenotyping may strike many as a one-sided rendering of some controversial subjects.

There are also rather minor defects in other categories. Some errors and inconsistencies in nomenclature are evident; the use of "glycerine" and "glycerol", and "palmityl" and "oleyl" rather the highly preferable "palmitoyl" and "oleoyl" are examples. A bit disconcerting as well is the frequent use of gratuitous commas, which tend at times to inhibit comprehension, at least momentarily.

These deficits are small, however, compared to the abundance of valuable information provided. The plasma protein survey chapter is particularly good, containing a number of excellent figures from diverse sources which would be quite difficult to match elsewhere. There is an emphasis on genetic diseases which is a valuable compendium in its own right. The individual chapters on specific binding proteins also contain much information which is also otherwise not readily available from one text. These merits make the book a successful enterprise which is highly recommended as a working reference.

Arthur F. Rosenthal, *Long Island Jewish-Hillside Medical Center*

Cell Surface Glycolipids. Edited by Charles S. Sweeley. American Chemical Society, Washington, DC. 1980. 504 pp. $44.50.

"Cell Surface Glycolipids" edited by Charles S. Sweeley and published as 128 in the ACS Symposium Series is a collection of 27 papers presented in October, 1977 at a meeting in Honolulu, Hawaii. These papers deal with many aspects of glycolipids including cellular composition, metabolism, and immunology. Four papers deal with new methodology including HPLC, field desorption mass spectrometry, and proton NMR; however, these methods were not used to any appreciable extent in the subsequent papers. In general, most of the papers were in the nature of review papers, and little methodology was given. The primary research papers, in most cases, could be consulted for the specific methods used in a particular study.

Approximately 9 papers dealt with the glycolipid composition of a variety of tissues including: plants, small intestine, epithelial cells, testes, spermatozoa, nervous tissue, neutrophils, skeletal, muscle, glandular epithelial tissue, thymus, and human colonic cells.

Glycolipid metabolism, and the regulation thereof, was the subject of about 6 papers. Metabolism was studied in B and T lymphocytes, neuroblastoma cells, and in normal versus transformed cells. Reports were made concerning regulation by substances such as enkephalins, opiates,

* Unsigned book reviews are by the Book Review Editor.

and prostaglandins or regulation during myelination or in familial hypercholesterolemia.

There were 3 interesting papers concerning glycolipids as receptors, as effectors of membrane properties and as model compounds to study nerve ending functions. There were 4 papers dealing with the role of glycolipids and glycoproteins in the immunology of some tissues, and finally there was 1 paper dealing with the carbohydrate moieties of gangliosides and their relationship to interferon action.

The following statements reflect an overview of glycolipids which one perceives after reading this book: Glycolipids differ quite markedly from one cell type to another; therefore, they may be very important in terms of their role in cell differentiation. There is no question as to the importance of the sialic acid moiety(s), and their location within the carbohydrate component of the ganglioside. The synthesis of the gangliosides depends, to a great extent, upon the sialyltransferases. These enzymes vary in activity depending upon location in the cell and upon whether or not the cell secretes materials. They seem to ultimately play one of the most important roles in controlling ganglioside biosynthesis. Some gangliosides provide specific receptor binding sites, and the cell surface glycolipids play important roles in immunology.

Basically, this book touches on most of the aspects of cell surface glycolipids, and it is fairly well organized into the different groups cited above. It is a good book for both the novice and the experienced glycolipid researcher. For the novice, it will bring reasonably up to date information without too much experimental detail, and it ultimately will give the novice a broad overview of the area of cell surface glycolipids; however, a more frequent use of abstracts would have been helpful. For the experienced researcher, this book may leave something to be desired. Because the information is 3–4 years old, those who have kept up with the literature in this field will surely be ahead of the data presented. Thus, the purpose of the ACS Symposium Series probably has not been accomplished in that it has taken about 3 years to get the information presented at the symposium into print.

Ronald C. Reitz, *University of Nevada*

Polymer Materials. An Introduction for Technologists and Scientists. By Christopher Hall (University of Manchester Institute of Science and Technology). John Wiley and Sons, Inc. (Halstead Press), New York. 1981. vii + 198 pp. $29.95.

This book is targeted as an entry-level text for undergraduates and those desiring a broad overview of the field of polymer technology.

Written at a relatively nontechnical level, the book covers fundamental chemistry, molecular structure, morphology, polymer structure/property relationships (mechanical, thermal, electrical, optical, chemical), and processing and end-use technology. In general, the topics are well covered (although the material seems to be but superficially covered at times, even for a text of limited scope); discussions of polymerization methods, crystallization and spherulite formation, and processing technologies (those which were covered) were particularly well handled. The usage of illustrations, tables, and real-life examples of polymers demonstrating concepts is another strong point.

On the other hand, some discussions were ambiguous (particularly the discussion of $\bar{M}_w$ vs. $\bar{M}_n$); in addition, several terms were either vaguely, or not at all, defined. The book was also imbalanced, in that mechanical properties were covered *ad nauseam*, at the expense of additional practical discussion of formulating and processing technologies (particularly for thermosets) and of polymer testing and analysis procedures. (The absence of a discussion on GPC was most surprising.)

Other than providing a fresh viewpoint into polymer technology, it is difficult to recommend this book over other general polymer science texts, considering the steep price vs. the limited information presented.

Walter J. Wawro, Sr., *Ferro Corporation*

Developments in Polymer Characterization. Volume 2. Edited by J. V. Dawkins (Loughborough University of Technology). Applied Science Publishers Ltd., London. 1980. X + 244 pp. $55.00.

This book is a successful continuation of Volume 1 on polymer characterization where a small number of topics are considered in detail. The editor has selected contributions from authorities in six topical areas of considerable importance in the characterization of polymers.

The first three chapters in the book deal with ^{13}C NMR, neutron scattering, and laser Raman analysis of copolymers, semicrystalline polymers, and synthetic polymers, respectively. The first chapter is primarily concerned with the determination of monomer sequence distributions and tacticity in copolymers and several excellent examples have been chosen to demonstrate the utility of the technique. In the second chapter on neutron scattering a good introduction to the technique is given along with various representative examples of applications to semicrystalline polymers. Chapter three on laser Raman spectroscopy is particularly well done and in the space of about 70 pp the authors have managed to include a section on theory, the experimental techniques (noticeably well done) and a good review of applications. The chapter is written with the nonexpert in mind and is a good reference for those unfamiliar with the topic.

The fourth chapter on the application of ESCA to polymer surface analysis was an excellent selection for the book by the editor. Surface characterization of polymers is playing an increasingly important role in both the academic and technological communities and this review is not only timely for the series but quite comprehensive. For the uninitiated to the field of ESCA applied to polymers this chapter will serve as an excellent focal point for the work done in this area up to 1980.

The remaining two chapters explore in detail the segmental and conformation mobility in polymer solutions and melts by acoustic and optical effects. The chapters discuss the experimental techniques and briefly the theoretical backgrounds and give examples of the applications. It is worthwhile pointing out that the chapters are very well referenced, with over 150 references from both, and will serve as a good starting point for those interested in the techniques.

In summary, it is fair to say that the book is well done and timely and should find its way into many libraries and personal collections.

H. Ronald Thomas, *Xerox Webster Research Center*

Polycrystalline and Amorphous Thin Films and Devices. Edited by Lawrence L. Kazmerski (Solar Energy Research Institute). Academic Press, New York. 1980. xv + 304 pp. $37.50.

This book is a timely one that reviews recent work on properties and applications of thin films, which is at present a field of rapidly increasing technological importance. The book consists of 9 chapters by 12 authors that deal with both the experimental and theoretical aspects of thin film science. Emphasis is on the experimental work and this includes both measurements of electrical and optical properties as well as details of the performance of practical devices such as thin film transistors and solar cells. Information is presented on a number of materials such as hydrogenated amorphous silicon and large grained polycrystalline silicon as well as materials such as cadmium sulfide, cadmium selenide, gallium arsenide, and others. Most of the work is on active devices but one chapter deals with passive applications of thin films such as encapsulants, protective coatings, and membranes. The book includes extensive bibliographies for each chapter and gives a good review up to the date of publication. As in any rapidly developing field such as this one, some important results have since been published but anyone seeking a rapid education in this field can benefit from this book.

Harold F. Webster, *General Electric Corporate Research and Development*

The Inorganic Heterocyclic Chemistry of Sulfur, Nitrogen and Phosphorus. By H. G. Heal (Queen's University of Belfast). Academic Press, London. 1980. xvi + 272 pp. $82.50.

This book is intended to be a "compact, comprehensive and up-to-date survey" of the chemistry of sulfur–nitrogen, phosphorus–sulfur, and phosphorus–nitrogen ring systems. This particular grouping is a logical one in that there is a certain commonality of concepts and models employed in the study of these systems and often a researcher investigating one of these classes of compounds is also interested in the other species covered in this book. The author is active in the area of sulfur–nitrogen ring systems and hence has a good grasp of the significant advances and problems in this area of chemistry. The list of topics covered contains both familiar and less familiar entries. After introductory materials, there are chapters on the following subjects: cyclic sulfur imides with two-coordinate sulfur, and their derivatives; imides and amides of sulfur(IV) as source materials for inorganic heterocycles; imides and amides of sulfur(VI) as source materials for inorganic heterocycles: sulfanuric halides and related compounds; formally unsaturated sulfur nitrides and sulfur nitride ions; unsaturated cyclic sulfur nitride S-halides and their S-derivatives; unsaturated cyclic sulfur nitride S-oxides and S-oxide ions; bonding and electron counting in S–N heterocycles; phosphorus–sulfur rings and cages; saturated phosphorus–nitrogen heterocycles; the phosphazenes; and polymeric phosphorus nitrides and related compounds.

The compactness of this book clearly establishes that it is not a massive compendium of data. Indeed, one of the virtues of the monograph is that it is readable and digestable as a whole. Literature citations are often to recent review articles thus giving the reader the ability to track down additional details. The coverage of ring systems in addition to the familiar sulfur nitrides and phosphazenes is of value since much of this material is not conveniently available elsewhere. There appears to be a marked imbalance in the coverage strongly favoring sulfur nitrogen rings at the expense of phosphorus nitrogen systems. The author indicates that "many chemists would regard the phosphazenes as the most important group of inorganic heterocycles" yet the coverage of these materials is rather brief (36 pp).

In summary, this book has several attractive features which will make it of value to researchers and those wishing to learn about the area. However, anyone with a desire to learn about phosphazene chemistry may wish to supplement their reading with information from other sources.

Christopher W. Allen, *The University of Vermont*

Electronic Interpretation of Organic Chemistry. By F. M. Menger and L. Mandell (Emory University). Plenum Press, New York. 1980. vii + 216 pp. $27.50 ($12.50 paperback).

This book was written to supplement the standard treatment of the principles governing organic reactions. It begins with a brief description of some of the basic principles, and then presents a chapter of 40 worked-out problems in organic reaction mechanisms ranging from the protonation of methoxide ion to the complex rearrangement of thebaine when treated with phenylmagnesium bromide. The third chapter is a set of reactions followed by likely reaction mechanisms using what the authors call the "electron-pushing" method. In the last chapter there is a qualitative presentation of MO theory which is then used to explain frontside vs. backside displacement and the reactions covered by the Woodward–Hoffman rules. Overall, the book seems to be free of mistakes and the writing is clear and straightforward.

Since most of the concepts presented in this book are included in a standard text such as that by Morrison and Boyd, the use of this book by students would seem to be of limited value. The advantage of bringing together principles of reaction mechanisms is lost on students who are working their way through their first year of organic chemistry and is far outweighed by the benefits of the more complete discussions which are generally available. This reviewer agrees with the authors that their approach "is a gross oversimplification", but cannot accept their view that "this is of little concern to us because we get the right answer...". The authors rightly believe that learning organic chemistry should not be simply the memorization of dozens of organic reactions, but an equally spare listing of rules for writing reaction mechanisms does not offer an appropriate palliative.

Gerald R. Bakker, *Earlham College*

Principles of Polymerization. Second Edition. By George Odian (The College of Staten Island, The City University of New York). John Wiley and Sons, New York. 1981. xxvi + 731 pp. $37.50.

This book is a revision and updating of the first edition published in 1970. It is "concerned with the physical and organic chemistry of the reactions by which polymer molecules are synthesized". It is not concerned to any great extent with polymer physics, fabrication technology, polymer characterization or analysis, polymer solutions, rheology, or structure. It is designed to be a "self-educating introductory text" as well as a classroom textbook for the first half of a 1 year course in polymer chemistry.

The book consists of nine sections including an introduction which serves to distinguish polymers from their lower molecular weight homologues by briefly discussing types of polymers and polymerizations, nomenclature, molecular weight, physical state, structure, applications, and mechanical properties. Detailed presentations follow in chapters on step, radical chain, emulsion, ionic chain, and ring-opening polymerizations, chain copolymerization, stereochemistry of polymerization, and reactions of polymers. Polymerization reactions are characterized via descriptive organic chemistry, their scope and utility for preparing various polymer structures, reaction parameters, kinetic and thermodynamic considerations, and, to a lesser extent, process conditions. Study questions and problems are presented at the end of each chapter. Each chapter is well documented by numerous and valuable literature references. The literature is covered through August 1980; patent literature is not included. The subject index is adequately detailed.

"Principles of Polymerization" is a systematic, comprehensive, easily readable, and well-balanced presentation of one of the major areas of polymer science. It should prove valuable to students of polymer chemistry as well as practicing synthetic polymer chemists.

H. N. Beck, *Dow Chemical, Walnut Creek, CA*

Burger's Medicinal Chemistry. 4th Edition. Part III. Edited by Manfred E. Wolff (University of California, San Francisco). John Wiley and Sons, Inc., New York. 1981. xiv + 1354 pp. $100.00.

This new edition of Burger's Medicinal Chemistry collects into three volumes the salient features of our science. Part I (1979, Chapters 1–12, which has been recently reviewed: *J. Am. Chem. Soc.* **1980**, *102*, 7620) treats the general principles of drug action and drug design. Part II (1979, Chapters 13–35) and Part III (1981, Chapters 36–63) provide a concise, yet meticulous coverage of the individual drug classes. Part III details primarily the drugs acting on the central and autonomic nervous system, the cardiovascular system, and the renal system. Specific chapter contents (Chapters 36–63) are: Anti-aging Drugs, Radioprotective Drugs, Cardiac Drugs, Thyromimetic and Antithyroid Drugs, Diuretic and Uricosuric Agents, Adrenergics: Catecholamines and Related Agents, Antihypertensive Agents, Cholinergics, Anticholinergics: Antispasmodic and Antiulcer Drugs, Antiparkinsonism Drugs, Neuromuscular Blocking Agents, Skeletal Muscle Relaxants, Histamine H_2-Receptor Agonists and Antagonists, Inhibitors of the Allergic Response, General Anesthetics, Local Anesthetics, Analgetics, Antitussives, Sedative-Hypnotics, Anticonvulsants, Antipsychotic Agents, Antianxiety Agents, Antidepressant Agents, Anorexigenics, Hallucinogens, Radiopaques, Nonsteroidal Anti-inflammatory Agents, Anti-inflammatory Steroids. Each chapter details the current understanding of the area and includes the recent advances in biochemistry, molecular biology, chemistry, metabolism, and sufficient pharmacology and physiology to aid the comprehension. Pertinent background is provided to aid the novice in understanding the growth of a particular area; the contents clearly delineate the current status of the area complete with triumphs and some failures and through individual perception provide the information base for future studies and development. Each chapter is apparently well referenced, ranging from 57 references for Antianxiety Agents to 941 references for Antipsychotic Agents with the norm being 150–300 references, and should provide sufficient basis for the interested student, fun perusal for the intrigued instructor, and the required information for both the new and committed researcher.

Importantly, this series continues to grow with the field. The series collecively gathers the information together into chapters, many of them new, of contemporary interest and significance. These changes reflect the advances of the field and an understanding of the current direction of future endeavors. The individual chapters, and the collective three-part series, remain the authoritative comment of the field.

All interested students, faculty, and researchers must have ready access to this series and every serious practitioner will want their own personal copy.

Dale L. Boger, *The University of Kansas*

Disturbances of Amino Acid Metabolism: Clinical Chemistry and Diagnosis. By H. J. Bremer and H. Pozyembel (University Children's Hospital C, University of Düsseldorf), M. Duran and S. K. Wadman (The Wilhelmina Children's Hospital, University of Utrecht), and J. P. Kamerling (University of Utrecht). Urban & Schwartzenberg, Baltimore and Munich. 1981. xi + 525 pp. $54.00.

This title should best be read as a whole, by no means treating the last four words as a mere subtitle. The book does not treat disturbances of amino acid metabolism in any biologically connected way. The authors immediately contrast the attitude of their book in this respect with those of Nyhan's "Heritable Disorders of Amino Acid Metabolism", Scriver and Rosenberg's "Amino Acid Metabolism and its Disorders", and the pertinent chapters of Stanbury, Wyngaarden, and Frederickson, "The Metabolic Basis of Inherited Disease". Instead, the present book concerns itself with providing the clinician and clinical chemist with the comprehensive information about getting the chemical data needed for a diagnosis.

I can best show how this goal is pursued by listing the five parts of the book:

Part A lists in an alphabetic array in 177 pages 100 ninhydrin-positive compounds, mainly amino acids and amino acid derivatives, which have clinical chemical importance. Their chemical structure, occurrence in normal and pathological states, analytical properties, methods of estimation in body fluids, and synthesis are presented briefly, somewhat in the style of a Merck's Index. This is a valuable compilation. Ninhydrin-negative amino acid derivatives, incidentally, are not included. The book may almost be called a Clinical Chemistry with Ninhydrin. Even though the compounds of interest are selected on this apparently arbitrary basis, together they represent a large and important group of genetic diseases.

Part B tabulates in 21 pages normal values in a wide range of body fluids and tissues under various conditions for many of the amino acids of Part A. The data come from numerous sources, one set of analyses of amniotic fluid being unpublished values by two of the authors from the Düsseldorf laboratory.

Part C treats in 157 pages in alphabetical order the clinical chemistry of some 74 inherited diseases of amino acid metabolism. Each listing includes the enzyme or transport defect, where known, the chemical abnormalities to be expected, a short summary of the clinical symptoms, and considerations of differential diagnosis. Sections A and C are heavily cross-referenced. Note that attacks of a disease called *propionic acidemia* can be characterized by high plasma levels and high urinary excretion rates of glycine, a random example showing the merit of the separate approaches of Sections A and C.

Part D discusses in 29 pages 20 categories of disease in which secondary disturbances of amino acid concentrations occur.

Part E treats analytical procedures in 82 pages. These procedures depend on the remarkable development of chromatographic techniques, which are rationally applied here according to whether or not the patient population is somewhat preselected to neglect extremely rare or as yet undescribed disorders. Quantitative analyses are described for the cases where these should follow screening by one- or two-dimensional chromatographic tests. Procedures for sample collection and storage, for derivatization, and for some special group analyses follow. Finally, possible artifacts in amino acid occurrence arising from medication or diet are considered briefly.

The reviewer readily visualizes a population of users, namely clinical chemists, clinical pathologists, and the clinicians with whom they communicate their findings, for whom E may prove the most useful section. As a biochemist I am pleased myself to have access to Section A, but then I should want to turn also to Section C to learn more about the diseases in which a given amino compound is involved. I find the book on the whole an interesting, well-prepared, and original combination of approaches to its subject. It produces for me a picture of good working relationship among clinicians, analytical chemists, and teachers and researchers in the special area of genetic diseases involving amino acids and related compounds. Indeed the list of authors, from a University children's hospital in Düsseldorf and one in Utrecht, and from chemical sections of the latter university, appear to represent approximately such a combination. Beyond those who will have recognized a need for this book from the above list of its contents, I suggest that any educational unit interested in developing a program of training in clinical-analytical biochemistry should have a copy, also those interested in guiding biochemistry majors at any level to possible career choices.

A separate list of references follows many of the subsections, the references extending occasionally into 1979. A common index provides section and subsection numbers for each entry, rather than page numbers, so that one easily identifies the kind of information likely to be found in the text.

H. N. Christensen, *The University of Michigan*

Handbook of Protein Sequence Analysis. By L. R. Croft (University of Salford). John Wiley & Sons, New York, 1980. XIV + 628 pp. $105.00. The first part of this book is available in a paperback form entitled "Introduction to Protein Sequence Analysis" by L. R. Croft (University of Salford). John Wiley & Sons, New York. 1980. XI + 157 pp. $14.00.

The methodology section of this book (which constitutes the entire paperback edition) is in general an excellent introduction for someone with little or no experience in protein sequencing. The experienced investigator will find little that he/she does not know, but occasionally a slightly different approach or technique will be suggested that may prove helpful. Most laboratories should find at least one copy of this book useful as a reference source and as a general guide to methodology in training new personnel, etc.

A short introduction on the historical development of protein sequencing and the future prospects for this area (especially in light of the recent advances in gene cloning and sequencing) is a welcome addition to the otherwise methods-oriented format. Generally, the methods included are those that are widely used at the present time (including improvements and modifications), but promising newer methods are also included (e.g., a whole chapter on mass spectrometry in sequencing). An attempt has been made to give the reader a feeling for some of the nuances and difficulties that may be encountered in protein sequence work.

Although no book on this subject can possibly include everything of importance, it was disappointing that the use of high perrformance liquid chromatography in peptide purification is not mentioned (the use of this technique to separate the phenylthiohydantoin derivatives of amino acids is included). It would also have seemed worthwhile to include at least one reference to such important techniques as maleylation to block ϵ-NH_2 groups of lysine residues (the citraconylation method of doing this is described). One should also warn users about following the procedures in cookbook fashion (for example, we much prefer to use volatile buffers for the hydrolysis of peptides by aminopeptidase M rather than the nonvolatile buffer suggested on p 113).

The listing of the complete protein (and peptide) sequences reported through the end of 1978 in the second section of the book (not in the paperback edition) appears to be comprehensive and should prove to be very useful in many ways to a variety of investigators. This listing is based on the first edition of this book (which did not include a methodology section) together with subsequent supplements (A and B) and new additions. In order to prevent perpetuation of errors (e.g., the calf thymus histone 4 sequence was corrected in the reference given for the pea seedling histone 4, but the correction does not appear in the listing), it would seem advisable to verify the sequences in original sources before including them in new publications. There are over 800 sequences given (all in three-letter symbols) plus a useful 30-page Appendix on the human hemoglobins.

Robert J. DeLange, *University of California at Los Angeles*

Catalysis by Zeolites. Edited by B. Imelik, C. Naccache, Y. Ben Taarit, J. C. Vendrine, and G. Coudurier. Elsevier Scientific Publishing Company, Amsterdam and New York. 1980. xii + 351 pp. $65.75.

The invited papers presented in this publication were taken from the proceedings of an international symposium sponsored in 1980 by the Centre National de la Recherche Scientifique, Ecully (Lyon). This text is the fifth volume published under the topic; Studies of Surface Science and Catalysis.

In most cases the articles include a brief but adequate experimental and review section. The subject matter overviews the more recent developments in catalysis by zeolites. The main topics discussed are synthesis gas and methanol conversion into hydrocarbons, alkylations, and hydrocarbon transformations. Zeolite modifications through the techniques of ion exchange and specific site poisoning are also included.

Those with a basic working knowledge of zeolite chemistry would find this book valuable as an introductory source complete with current references in the area of zeolite catalysis. Experts in the field of zeolites would find this volume a useful current addition to their library.

Jere D. Fellmann, *Dow Chemical, Wayland, MA*

Growth of Crystals. Volume 11. Edited by A. A. Chernov (Institute for Crystallography, Academy of Science, U.S.S.R., Moscow), translated by J. E. S. Bradley (University of London). Consultants Bureau, New York. 1979. ix + 386 pp. $42.50.

Volume 11 of this series reports the proceedings of the Fourth All-Union Conference on Crystal Growth which was held September 17th to 22nd in Tsakhkadzor. Its format is similar to the earlier volumes in this series. Four sessions are covered in this volume and the remainder will appear in Volume 12. Approximately one-third of the papers are by authors from outside the Soviet Union. About a third of the articles are short reviews of rather specific areas of crystal growth.

The first section covers nucleation and initial growth stages. The subjects range from nucleation in liquid metals to autoepitaxial nucleation in ionic crystals. Of the 17 papers presented slightly less than half discuss epilaxial processes.

This is followed by a section of 16 papers on growth kinetics and surface morphology. Most work reported was experimental. Several papers on the surface effects of impurities on crystal growth are included. K. A. Jackson's brief review on computer modeling applied to crystal growth is the only completely theoretical paper of this section.

Growth shape stability and transport processes are discussed in the 11 papers of the third section. More emphasis was placed on theoretical than experimental work. The stability of the growth front in the presence of various perturbing influences was given most attention.

The last section covered impurity trapping during growth. As with the other sections of this meeting, a wide range of materials and processes were discussed. Some exceptional autoradiographs of impurity trapping during melt growth were given in Barthel's article.

In the 7 years since this meeting, much progress has been made in our understanding of the processes discussed at the Fourth All-Union Conference. However, most of the problems are still incompletely understood and Volume 11 of this series on crystal growth provides a very convenient reference.

W. J. Fredericks, *Oregon State University, and Visiting Fellow, Centre for Chemical Physics, The University of Western Ontario*

Methods in Carbohydrate Chemistry. Volume VIII. General Methods. Edited by Roy L. Whistler and James N. BeMiller. Academic Press, New York and London. 1980. xxi + 349 pp. $38.50.

This volume might be more aptly subtitled General and Miscellaneous Methods, inasmuch as many of the methods are highly specialized. It seems to me that an article on methods should include a statement of the basic principles, emphasizing any aspects that may be relatively unfamiliar; an experimental description or protocol in which the method is applied to one or more specific situations; a discussion of precautions, pitfalls, reliability or reproducibility, and alternative procedures; some mention as to how the method is better than previously used methods; and suggestions as to how the method might be applied to a wider range of situations. If this is a valid objective, it is unevenly met in this volume. On the other hand, the reader will find a wide range of current methods, some of which have a research flavor, some being mainly informative rather than procedural, and some having essentially a "cookbook" type of approach. The 50 articles are divided into sections and subsections

as follows: Section I. General Methods of Separation and Analysis: Chromatography (6 articles); Analysis of Polysaccharides by Chemical, Physical, and Enzymic Methods (10 articles); Other Chemical, Physical, and Enzymic Methods (5 articles). Section II. Preparation of Mono-, Oligo-, and Polysaccharides and Their Derivatives: Monosaccharides and Their Derivatives (7 articles); Polysaccharides (1 article); Unsaturated Sugars (1 article); Deoxyhalo Sugars (1 article); Glycosides and Glycosylamines (7 articles); Esters and Amides (8 articles); Ethers (1 article); Cyclic Acetals (2 articles); Oxidized Products (1 article).

I was impressed by the number of references and cross-references, particularly to previous volumes of this series. In one article there were six references to the preparation of dry pyridine, but no indication as to the consequences of a trace of moisture in the process.

As I read through this book, I was continually confronted with new ideas and new procedures, and I kept thinking how these might be applied to my own area of research. Presumably the average carbohydrate scientist will react in much the same way, and, if so, this will be a welcome and valuable addition to the reference shelf.

Dexter French, *Iowa State University*

Soviet Scientific Reviews, Section B. Chemistry Reviews. Volume II. Edited by M. E. Vol'pin (Institute of Organo-Element Compounds). Harward Academic Publishers, Amsterdam. 1980. vii + 469 pp. $90.00.

This book is part of a new series of Soviet Scientific Reviews, published in the English language under the auspices of the Academy of Sciences of the USSR. The articles are written by a Soviet expert in the field and appear in print for the first time in these volumes. This volume contains the following reviews: The Catalytic Properties of Zeolite Systems in the Presence of CO_2 by Kh. M. Minachev and Ya. I. Isakov, Gel-Immobilized Metal-Complex Catalyst by V. A. Kabanov and V. I. Smetanyuk, Biphotonic Photochemistry by Kh. S. Bagdasarʹyan, Organometallic Catalysis in Stereospecific Polymerization Processes and Nature of the Active Centers by B. A. Dolgoplosk, Boraheterocycles from Allylboranes by B. M. Mikhailov, and Long-Range Electron Tunneling in Chemical Reactions in Condensed Media by K. I. Zamaraev and R. K. Khairutdinov.

The main thrust in all of these reviews is to pull together work that has appeared, by the authors mostly, in the Soviet literature and therefore has been somewhat more obscure to Western readers. For the most part, such work is blended well with Western literature to give readable, informative articles. Although longer in length, these could be viewed as modified "Accounts of Chemical Research" articles, and as such, are of value to the scientific community.

The basic utility of such a series is to keep the reader updated, in specific areas, about work which one would normally find difficult or impossible to obtain in his local chemistry library.

P. E. Garrou, *Dow Chemical—New England Laboratory*

Mixed-Valence Compounds. Edited by David B. Brown (University of Vermont). D. Reidel Publishing Co., Boston. 1980. viii + 519. $60.50.

This book presents 17 review articles covering a broad spectrum of topics related to mixed-valence compounds. This is a much needed and thorough review of an important subject. There has been no comprehensive treatment of mixed-valence compounds since 1967, yet the strides made in the theory and syntheses of these compounds in the interim have been substantial. This is not to imply that the final word has been written regarding the understanding of the mixed-valence state. One of the strong points of this book is that several different perspectives are presented, and it is made clear to the reader where the various theories differ. The book, however, does not dwell only on theory. Several chapters discussing the many different types of mixed-valence compounds and some of the modern spectroscopic techniques such as Resonance-Raman, Mössbauer, and photoelectron spectroscopy are presented.

The subject has been divided into four sections. In the first, An Overview of Mixed-Valency, there is an Introduction to Mixed-Valence Chemistry (P. Day), discussion of the Descriptive Chemistry of Mixed-Valence Compounds (A. Ludi), and a chapter on Synthetic Approaches to Mixed-Valence Chemistry (D. B. Brown and J. T. Wrobleski). Much of the theory is presented in the second section. The topics include Electron Transfer in Mixed-Valence Compounds (T. J. Meyer), A Vibronic Coupling Model for Mixed-Valence Compounds and Its Application to Real Systems (P. N. Schatz), and Electron Delocalization, Structure and Dynamics in Mixed-Valence Systems (N. S. Hush). The third section covers Magnetism of Mixed-Valence Compounds (W. E. Hatfield), Applications of the Mössbauer Effect to the Study of Mixed-Valence Compounds (D. B. Brown and J. T. Wrobleski), and Electronic, Raman, and Resonance-Raman Spectroscopic Studies of Mixed-Valence Complexes (R. J. H. Clark). A wide range of mixed-valence materials is discussed in the last section. A chapter on Mixed-Valence Minerals of Iron and Titanium (R. G. Burns, D. A. Nolet, K. M. Parkin, C. A. McCammon, and K. B. Schwartz) is followed by Mixed-Valency in Discrete and Condensed Transition Metal Cluster Species with Classical Ligands (R. E. McCarley). Chapters on Heteropoly Blues (M. T. Pope), Linear Chain Mixed-Valence Systems with Direct Metal-Metal Interactions (H. J. Keller), and The Verwey Transition Revisited (J. B. Goodenough) are followed by Polymetallic Centers in Biology (S. J. Lippard), Mixed-Valence in the Organic Solid State (J. J. Mayerle), and finally Photoelectron Spectroscopy of Mixed-Valence Compounds (P. A. Cos, R. G. Egdell, and A. F. Orchard).

Wayne L. Gladfelter, *University of Minnesota*

Gas Phase Reactions, Kinetics and Mechanisms. By V. N. Kondratiev and E. E. Nikitin. Springer Verlag, Berlin, Heidelberg, and New York. 1981. xiv + 241 pp. $63.80.

This is a short book that summarizes the theoretical and experimental aspects of a big subject. Thus the text is compact and often omits the extra words or explanations that would be helpful to someone studying the subject for the first time. The result is more like a long review article than a book usually is. Many topics are introduced with the help of simple models that provide useful insight but may be only rough approximations to reality. The reader must then turn to the references to learn how one can proceed further.

The book has attractive features. It gives an overall view of the field by two acknowledged experts whose work has led the way for many others. It offers nice comparisons of the results from theory and experiment and suggests useful directions for future research.

Unfortunately, a reader should be able to expect more care in the production of a book for which the publisher is charging 25 cents a page. A careful reading of the manuscript by a knowledgeable editor surely could have reduced substantially the large number of misprints and awkward expressions.

E. F. Greene, *Brown University*

Size Exclusion Chromatography (GPC). ACS Symposium Series No. 138. Edited by Theodore Provder (Glidden Coatings and Resins). American Chemical Society, Washington, D.C. 1980. vii + 312 pp. $30.75.

This volume contains papers delivered at a symposium sponsored by the Division of Analytical Chemistry at the 178th National American Chemical Society Meeting held in Washington, D.C., on September 10–14, 1979. The monograph consists of 17 articles, most of which concern the GPC of polymeric materials. Subjects discussed include the use of gel exclusion chromatography for particle size analysis, polymer viscosity determinations, and the characterization of branched chain polymeric, copolymeric, and oligomeric substances. Particularly interesting is the article which deals with the study of inverted micellar systems via use of GPC. Additionally, work on polymerization kinetic modeling and the utilization of Spherogel-TSK or Sephadex gels for aqueous GPC are presented.

The articles are all technically well written and, with one exception, up-to-date. In a few instances, as have been pointed out by another reviewer [Janovsky, M. *J. Chromatogr.* **1981**, *210*, 192], the misuse of symbols and nomenclature leads to ambiguities. Each article is well referenced and appears in its original typescript, which is generally of very good quality. The monograph contains numerous illustrations and has an overall extensive subject index. Most of the papers are clear and concise; but as would be expected, the subject matter is highly specific. For this reason, this book is unlikely to appeal to those having only a general interest in GPC. On the other hand, the volume will be most useful to industrial scientists who are actively engaged in size exclusion chromatography of synthetic polymeric materials and are concerned with the latest views and developments.

Willie L. Hinze, *Wake Forest University*

Metal Carcinogenesis Testing: Principles and In Vitro Methods. By M. Costa (University of Texas Medical School at Houston). The Humana Press, Inc., Clifton, N.J. 1980. xiii + 164 pp. $29.50.

Chemical carcinogens can be broadly classified as organic or inorganic in nature. While many publications have dealt with principles and methods applicable to organic carcinogenesis, few have considered these topics in relation to metal carcinogenesis. This book deals solely with various aspects of metal carcinogenesis. Part I reviews the epidemiological studies and animal tests which have been performed on metal compounds. The author focuses on arsenic, cadmium, chromium, and nickel but also mentions studies related to other metals. These chapters provide a useful source for the types of cancer produced by the metal carcinogens and their organ specificity in humans and animals. Sources and levels of nonoccupational exposure to metal carcinogens are summarized in a series of tables. There is little information presented con-

cerning exposure levels or doses required to induce tumors, therefore, the reader is left without a good feel for the potency of the various metal carcinogens.

Based on results of animal studies and in vitro assays possible mechanisms by which metal compounds exert their carcinogenicity are presented in Part II. Important aspects of metal carcinogenesis such as uptake of the carcinogen and its interaction with nucleic acids and proteins are emphasized in this section.

The in vitro systems applicable to testing metal carcinogens are reviewed in Part III. The rationale for using short term assays in screening for inorganic carcinogens is presented. The basic principles of biochemical fidelity of DNA synthesis assays, bacterial and cell culture mutagenicity assays, and cell culture transformation assays are described. Detailed procedures are given for the testing of metal carcinogens with use of the Syrian hamster embryo cell transformation assay. Methods for handling the metal compounds as well as methods for handling the cell cultures are thoroughly described. The author devotes one chapter of the book to the application of in vitro metal carcinogenesis assays in the industrial setting.

This book should be a useful reference for those entering the field of metal carcinogenesis since it not only provides a review of the field but also details established procedures which can be used to address the problems associated with metal carcinogenesis.

Karen Wetterhahn Jennette, *Dartmouth College*

Chemical Kinetics and Reaction Mechanisms. By James H. Espenson (Iowa State University). McGraw-Hill Book Company, New York. 1981. 211 pp.

The title of this book is somewhat misleading since its principal subject is the experimental study of reaction kinetics. The connection between experimental methods, which are treated in a reasonably good fashion, and mechanistic interpretations of the results is very weak. No energy–reaction coordinate profiles are present except as an emblem on the book's cover. The definition of elementary reactions as distinct from those involving one or more intermediates is thus not clearly made. Similarly, the distinction between transition states and intermediates is stated in terms which would be clear in conjunction with the missing energy–reaction coordinate diagram but will not be clear to a student reading the text alone. The book appears to be derived, as the author acknowledges, from a course and would be useful in conjunction with lecture notes which provided the missing pieces.

A preoccupation with experimental aspects of kinetic studies is evident in the organization which this reviewer found arduous. The choice of examples also seemed to be dictated by their ability to demonstrate an experimental technique. The advantage gained in including examples from both organic and inorganic chemistry is negated by the dearth of good connections to the structure and meaning of the results.

The book is short and provides mathematical solutions to a variety of kinetic problems. It should be useful as a text for courses treating the special area of experimental kinetic methods applicable to reactions in solution and to beginning graduate students who will be heavily involved in such kinetic studies in their research.

T. Koenig, *University of Oregon*

Vibrational Spectra and Structure. Volume 8. Infrared Interferometric Spectrometers. By A. E. Martin. Elsevier, Amsterdam, Oxford, and New York. 1980. ix + 292 pp. $73.25.

The impact of Fourier transform interferometers on the field of infrared spectroscopy is rapidly spreading as lower priced commercial instruments appear on the market. For those just entering the field, this book, which gives a relatively simple yet complete explanation of the theory of interferometry, could be valuable. The basic principles of interferometry are outlined in the first five chapters, which discuss the theoretical and optical considerations, the interferometer details (sampling, dynamic range, noise, etc.), and the mathematics of the Fourier transform. These chapters which occupy slightly more than half of the book are well written. The only weakness in this section is a bias toward the slow-scanning far-infrared instruments which were the early leaders in interferometry. The brief descriptions of the major advances in instrumentation which have allowed rapid-scanning interferometers to dominate the field of commercial spectrometers appear to have been appended to the discussion of the earlier work.

The rest of the book covers rather diverse topics with varying degrees of success. Chapter VI which describes seven commercial interferometers has the potential to be both interesting and valuable. Unfortunately, this potential is not realized. Some of the instruments described are no longer manufactured, and some of the more recently developed instruments (such as the innovative high-resolution Bomem spectrometers) are not even mentioned. The last three chapters describe methods of measuring refractive indices, modifications of the basic Michelson optical system, and other interferometers and allied instruments. The latter two will be interesting to those who are prepared to design or substantially modify their own instruments. The book also has 13 brief but useful appendices, which for the most part give mathematical details of certain aspects of Fourier transform spectroscopy.

As is usual for books in this series, this volume is technically well produced. It is carefully cross-referenced and is quite free of typographical errors. Good use is made of the diagrams. While this book is not particularly appropriate for those interested in recent developments (most references are pre–1973), it can be recommended to those who require an understanding of the fundamental principles of infrared interferometry.

R. A. Kydd, *The University of Calgary*

Atmospheric Pollution, 1980. Edited by Michel M. Bernarie (Institut National de Recherche Chimique Appliquée, and the IUPAC Commission on Atmospheric Environment). Elsevier Scientific Publishing Co., Amsterdam and New York. 1980. xv + 440 pp. $73.25.

This volume, which is number 8 in the Elsevier Studies in Environmental Science series, contains 62 papers, with abstracts, selected by panel from the 81 presented at the 14th International Colloquium on Atmospheric Pollution held May 5–8, 1980, in Paris. The Colloquium is held every second year.

A volume consisting of papers kept purposefully short in an unstructured colloquium is probably most valuable for the indication it gives of the topics of greatest current concern in the area of atmospheric pollution. The division of topics by the editor and the number of papers under each heading is as follows: modeling, 9; Gaussian plume, 2; airflow and dispersion, 6; analog modeling, 4; pollution formation, transformation, and transport, 6; computations and statistical representations, 4; air chemistry and formation of particulate matter, 6; aerosol physics and measurements concerning the suspended particulate matter, 12; monitoring networks and survey results, 9; and effects on man and on vegetation, 4.

A review of the titles shows that 12 papers concern modeling, 21 deal with particulates and aerosols, and 10 mention specific pollutant gases. This reflects the greater emphasis on and attention given to particulates and aerosols at the present time, in contrast to the greater concern about gaseous pollutants in the past.

A reader interested in the area of atmospheric pollution should consult the titles listed under Contents for papers of special value to him or her. Due to the nature of the publication and the pressure to publish the results of the Colloquium, an author index is provided but no subject index is available for the reader to consult for specific items of interest.

Jack L. Lambert, *Kansas State University*

Neurochemistry of the Retina. Volume 1. Numbers 1–4. Edited by N. Bazan (Universidad Nacional del Sur) and R. Lolley (VA Hospital, Sepulveda, CA). Published as a special issue of the journal Neurochemistry International. 572 pp.

This volume is the proceedings of an International Symposium on the Neurochemistry of the Retina held in Athens, Greece August 28–September 1, 1979, cosponsored by the International Union of Biochemistry and the Fundación Oftalmológica Argentina Jorge Malbran. The organizers and editors—Drs. Bazan and Lolley—are to be commended for an ambitious and generally successful undertaking, which brings into focus the great appeal of the vertebrate retina as an organ for the study of neurochemical transmission and transduction in their many dimensions. The reviewer can find only one noticeable weakness in the selection of invited papers—the conspicuous absence of any devoted to the calcium hypothesis for conversion of light absorbed by the visual pigment to blocking of dark current sodium channels. It is still far too early to lay this hypothesis to rest, or to embrace the cyclic nucleotide hypothesis as the long-awaited explanatory Messiah.

Certain of the papers deserve special mention either because they are experimentally strong, or because they present new or exceptionally well-argued ideas. Among these are "Synthesis and turnover of lipid and protein components of frog retinal rod outer segments", by Robert Anderson et al., and a paper by Joe Hollyfield et al. examining time and order of appearance of biosynthesis, release or uptake of specific neurotransmitters in different cells of developing Xenopus retina.

Richard Young contributes a nice overview of retinal nucleic acid metabolism in which he reminds us that, while neither DNA replication nor regular turnover occurs in the adult retina, DNA repair certainly does. Young anticipates the complexities to be unraveled before we understand gene expression in each of the different cell types of the retina.

Three papers, by M. J. Voaden et al., D. M. K. Lam et al., and B. Ehinger and I. Florén underline the variability and in some instances lack of identity of the transmitters operating in different types of retinal cells.

In these three particular papers lies a message for those of us who feel constrained to line up prematurely on either side of the Ca^{2+} vs. cGMP controversy in photoreceptor transduction.

Paul Hargrave et al. present a fine overview of work on the primary structure of rhodopsin. C. D. B. Bridges and S.-L. Fong present a short but elegant description of the use of lectins as probes of membrane carbohydrates in rods and cones. R. Paulsen and P. Rudolphi provide an excellent description of the use of light microscopic autoradiography to follow the time-course and distribution of light-induced rhodopsin phosphorylation in frog rod outer segments. J. A. Ferrendelli et al. offer a good persepctive on possible functions of multiple cyclic nucleotide systems in the retina.

Adelbert Ames III and colleagues, long involved in developing a rigorous technique for keeping intact retinas alive in vitro, describe use of such retinas in impressive work on synthesis and degradation of different retinal proteins. Relative to Richard Young's question about control of gene expression, Ames' group reports that on-line modification of these proteins to accommodate environmental or functional demands is post-translational.

D. Armstrong et al. impressively characterize canine ceroid-lipofuscinosis, a degenerative canine and human disorder involving genetically depressed retinal peroxidase levels. Richard Lolley, Gerald Chader, and colleagues implicate cGMP in retinal degeneration of rats, mice, and dogs, and H. W. Reading offers a useful review of the biochemistry of retinal degeneration in rats and mice.

In the final section, Bernard Agranoff et al. provide an eloquent exposition of the usefulness of the retina as a biochemical model of CNS regeneration. In a paper by Richard Masland on localization and characterization of cholinergic cells occurs an unexpected dividend—an extraordinary statement of the discrepancy which typically prevails between organization of scientific data and understanding of their meaning. K. J. Watling et al. make a case that all dopamine receptors in the carp retina activate adenylate cyclase. In the final selection, Franz Daemen and W. J. de Grip discuss the ROS disc, proposing some nuggets: (1) Opsin spontaneously returns to its original dark conformation, into which 11-*cis*-retinal then fits as a key into a lock. (2) The narrow internal disc space must be hydrophilic but quite atypical because of high oligosaccharide and charge densities. In particular, the case for trans-disc ionic transport is not very strong. (3) The coupling between rhodopsin photolysis and visual excitation remains unanswered.

Despite the predominantly positive observations foregoing, a handful of difficulties exist, including many typographical errors and awkward or incomprehensible sentence construction by authors whose native language is not English. The pharmacological studies reported by M. Schorderet and P. G. Magistretti and by J. S. Wassenaar and H. Roelse suffer from the above, in addition to loosely designed experiments and often uninterpretable results. A paper by F. Piccoli et al. on effects of exogenous gangliosides on respiratory enzymes in experimental diabetic retinopathy is a fishing expedition further weakened by incomplete translation from the Italian and by ignorance of rudimentary retinal physiology: e.g., "a movement of ions occurs through the receptor membrane upon the light-excitation, just as it occurs in the nerve."

David G. McConnell, *Michigan State University*

Surface Crystallography by LEED. By M. A. Van Hove (University of California, Berkeley) and S. Y. Tong (University of Wisconsin, Milwaukee). Springer-Verlag, Berlin. 1979. ix + 286 pp. $32.50.

The last 10 years or so have witnessed remarkable developments in knowledge and understanding of atomistic properties at well-characterized surfaces of single crystals under conditions of ultrahigh vacuum. Among the various techniques that have contributed to these advances is low-energy electron diffraction (LEED), which gives surface structural information. This information can be of two types. The first concerns the diperiodic translational symmetries of ordered surface regions for which extensive qualitative information has been obtained from direct observations of diffraction patterns. The second aspect is quantitative and involves the analysis of measured diffracted beam intensities to yield atomic positions and hence surface bond lengths.

The purpose of this book is very specific: it is to provide information on how to do the rather heavy multiple-scattering calculations of LEED intensities that are required en route to determining surface structures. The book treats some particular examples in detail, but full discussions are given for extending to other types of systems as well as for reducing computing times and storage by utilizing symmetry. Just over half the pages are taken up with computer program listings. These are well-documented, both by comment statements in the listings and by background discussions in the main text. The authors have both made significant contributions to the development of LEED crystallography, and they are to be congratulated on producing a most practical book for those who want to calculate LEED intensities. A summary is included of surface structural data available to 1978.

K. A. R. Mitchell, *University of British Columbia*

Introduction to Industrial Drying Operations. By R. B. Keey (University of Canterbury, New Zealand). Pergamon Press, New York. 1978. xx + 376 pp.

This is an engineer's monograph covering a wide variety of drying situations.

A 14-page introductory chapter covering the need for drying, types of driers, and drier design is followed by 44 pages of thermodynamics of moisture in gases and solids. Heat and mass balances take 45 pages; humidification, 45 pages; processes, 41 pages; performance, 68 pages; continuous drying, 63 pages; and batch drying, 37 pages. All of the capters are quantitative and rigorous. An appendix contains tables on hygrothermal and transport properties and moisture sorption properties. Charts are included that relate enthalpy to humidity.

Attesting to the rigor of the treatment, 70 worked examples are sprinkled throughout the book to illustrate application of the various principles. This book deserves a place near or on the desks of any who design drying plants. It can be relegated to libraries of firms already engaged in drying.

Raymond R. Myers, *Kent State University*

Surfactants and Interfacial Phenomena. By Milton J. Rosen (Brooklyn College of the City University of New York). Wiley-Interscience, New York. 1978. XIV + 304 pp. $22.50.

Surface-active substances and the physics and chemistry of interfacial phenomena are of basic importance to many industries. This book is an excellent effort to bridge the gap between the pure and applied areas. The effort succeeds for the most part. Those working in the applied or industrial areas will find this well-organized volume a most welcome addition to the literature. Those engaged in basic research in related areas will also find much material of interest.

The first chapter contains a great deal of useful information in the form of condensed discussions of the uses and advantages and disadvantages of many surfactants. Other topics covered in some detail in subsequent chapters include: adsorption, micelle formation, solubilization, surface and interfacial tension, wetting, foaming, emulsification, dispersion and aggregation of solids, and detergency. Most of these discussions are oriented rather strongly toward practical applications.

Certainly a major contribution is the inclusion of a number of well-organized and lengthy tables of documented data that should be most useful to those working with the many applications of surfactants. For example, one of the tables on adsorption at liquid-liquid and liquid-gas interfaces covers 8 pages. Another example is a 6-page table of critical micelle concentrations for aqueous systems. Many smaller tables are equally well done and thoroughly documented. Essentially all of the tables give the formulas for the compounds listed. Moreover, the data tabulated are taken from the relatively recent literature.

The author places considerable emphasis throughout on the effect of molecular structure on surfactant behavior. One of the most reliable and versatile techniques for relating molecular structure and surface behavior is the Langmuir–Adam–Harkins method for pressure–area measurements on monolayers. The literature is extensive in this field (e.g., G. L. Gaines, Jr., "Insoluble Monolayers at Liquid-Gas Interfaces", Wiley-Interscience, New York, 1966). However, references to the broad area of monolayers, or monomolecular films, are almost completely omitted. Moreover, for those studying the more basic aspects of interfacial phenomena, the omission of references to the work of W. D. Harkins (and Gaines) is quite conspicuous in that fundamental contributions to almost every area of the field were made by Harkins in his many papers and his book (W. D. Harkins, "The Physical Chemistry of Surface Films", Reinhold, New York, 1952).

Nevertheless, this book will be a valuable addition to the personal library of everyone working with surfactants and to every science library. Minor suggestions for a subsequent edition would include a more detailed index and a few pages for definitions of the most frequently used terms.

Herman E. Ries, Jr., *The University of Chicago*

Coordination Compounds of Porphyrins and Phthalocyanines. By B. D. Berezin (Ivanovo Chemical Technology Institute, Moscow). Translated by V. G. Vopian. John Wiley and Sons, New York. 1981. xiii + 286 pp. $53.95.

This book is a translation of the Russian edition published in 1978. The quality of the translation is uneven; there are a number of constructions which require unraveling by the reader. The root "ether-" is used throughout where "ester-" is meant. There appears to have been no attempt to update the references of the original edition; the references are generally pre-1975. Thus the citations to the original literature are not any more current than those in the K. M. Smith volume (1975) or

the Dolphin series (1978–1979) on porphyrins.

The volume is a highly personal rendering of topics of interest to the author. Almost half (148 of 308) of the Russian literature citations are by the author; a total of 532 references are cited with a number of duplications (uncounted). Topics treated include a brief description on synthesis (Chapter 2) and a (unsatisfactory) description of bonding concepts (Chapter 3). Chapter 4 treats ionization (acid–base) phenomena of free-base porphyrins and phthalocyanines and the corresponding metalated species, and kinetics of metal ion insertion. The dissociation of metal ions from the complexes, including solvent effects, is given in Chapter 5, the most interesting one in the volume. The thermodynamic stability of metal complexes is attempted in Chapter 6, with a very brief discussion of the thermodynamics of axial ligation. Chapter 7 deals with correlation of visible spectra with other physical properties. There is no discussion of modern spectroscopies, i.e., NMR, MCD, etc. Most of the material treated in this volume is available in either the Smith or Dolphin monographs; this volume would appear to be of interest to a very limited group.

W. Robert Scheidt, *University of Notre Dame*

Photoeffects at Semiconductor–Electrolyte Interfaces. Edited by Arthur J. Nozik (Solar Energy Research Institute). American Chemical Society, Washington, D.C. 1981. x + 416 pp. $39.00.

This book, No. 146 in the ACS Symposium Series, is based on a symposium held during the 179th meeting of the American Chemical Society at Houston, Texas, March 1980. A collection of 25 papers that encompass many of the most active areas of research on photoelectrochemical cells, it focusses on basic aspects of photoeffects at semiconductor–electrolyte interfaces.

The first 12 chapters are concerned primarily with surface effects on photoelectrochemical behavior. The influence of surface structure and morphology, chemical passivation of recombination centers, kinetics of charge transfer at chemically-modified electrode surfaces, charge-transfer processes including those involving surface states, kinetics of competing photoelectrochemical reactions, and photocorrosion are among the subjects covered.

The remaining chapters present aspects of the search for new materials and chemical systems as well as studies of interesting phenomena associated with photoelectrochemistry. Applications of several new oxide semiconductors, composite electrodes with protective surface layers, and chlorophyll layer structures are included. Fundamentals of the semiconductor–electrolyte interface are explored in studies of inversion layers and potential distributions. Luminescence studies, the behavior of molten salt electrolytes, and carbanion photoelectrochemical oxidation are also discussed. Concluding chapters relate to cadmium chalcogenide-based photogalvanic cells and photoelectrochemical cells employing solid electrolytes.

This volume is a valuable addition to the literature on photoelectrochemical cells. The articles are generally well written and cover many of the areas of active interest in this field so as to highlight the state-of-the-art in the burgeoning field of research on photoelectrochemical cells.

Lynn F. Schneemeyer, *Bell Laboratories*

Variational Methods in Electron-Atom Scattering Theory. By Robert K. Nesbet (IBM Research Laboratory). Plenum Press, New York. 1980. vii + 228 pp. $32.50.

The application of variational methods to problems involving the bound states of many-electron systems is well known to most chemists. Variational principles for scattering states are less well known but play a very important role in the quantitative treatment of molecular collision processes.

Dr. Nesbet has done an excellent job in describing the theory and application of the Hulthen–Kohn variational method to electron-atom collisions. The treatment is self-contained and is readable to a person familiar with quantum mechanics and potential scattering theory. The author gives an excellent presentation of the Schwinger variational principle, which until quite recently has not been much used by scattering theorists. In addition to the discussion of variational principles per se, there is a chapter on resonances and threshold phenomena which is a good introduction to the analytic behavior of the scattering matrix and the stabilization method for resonances. Dr. Nesbet also discusses the computational techniques needed to calculate Hamiltonian matrix elements in scattering calculations and presents a variety of numerical examples which show the quantitative success of the full multichannel theory in real-world problems.

The only fault I find with the book, and this is a matter of personal taste, is the author's bias to his own view of the subject. Most of the material in the book has been taken from the author's papers on this and related subjects (i.e., electron-correlation). Although significant contributions to the subject of electron-atom collisions made by other researchers are mentioned, the amount of space given to them is not proportional to their merit.

All in all this is a good book and can be recommended as a valuable source for the researcher desiring a look at the state-of-the-art of electron-atom collision theory.

Barry I. Schneider, *Los Alamos National Laboratory*

Organic Photochemistry. Volume 5. Edited by Albert Padwa. Marcel Dekker, Inc., New York. 1981. x + 502 pp. $65.00.

The current volume of this well-known series is primarily concerned with synthetic applications of organic photochemistry. There are five chapters by researchers currently active in this area. These are: Synthetic Applications of the Paterno-Büchi Reaction by Guilford Jones, II, Synthetic Aspects of 2+2 Cycloadditions of α,β-Unsaturated Carbonyl Compounds by Steven W. Baldwin, Photoextrusion of Small Molecules by Richard S. Givens, The Norrish Type I Reaction in Cycloalkanone Photochemistry by David S. Weiss, and The Photochemistry of Imides by Paul H. Mazzocchi.

Each of the chapters combines a discussion of the theoretical and photophysical aspects of the topic reaction with a critical review of the known and potential synthetic applications of the transformation. The literature reviewed appears to be complete to about mid-1980.

This collection of reviews will be of value to a wide range of practicing organic chemists. For novitiate photo-synthetic chemists these reviews will provide the necessary background information on scope, limitation, and experimental technique for the covered reactions. For journeyman photochemists this volume provides a central location for data on these well-known reactions. Unfortunately, the typically sparse index does not provide easy access to specific information, but the chapters are sufficiently well organized that this is not a major drawback.

Gary B. Schuster, *University of Illinois*

Advances in Biochemical Engineering. Volume 16. Plant Cell Cultures I. Edited by A. Fiechter (Eidgenoessische Technisches Hochschule, Hönggerberg, Zürich). Springer-Verlag, New York. 1980. viii + 148 pp. $42.60.

The contents of this book will be of special interest to biochemists, biochemical engineers, and pharmaceutical chemists. With the development of continuous culture of plant cells, many new biochemical transformations and syntheses are now possible. Five main topics are covered in this volume. In the section dealing with continuous culture of plant cells, the growth of cells in batch culture and the chemostat are compared. The chemostat simplifies the culture system and makes kinetic studies possible. Biomass production using large-scale continuous culture method is discussed. This is followed by a chapter on embryogenesis in citrus tissue culture. The section on biotransformation by plant cell cultures includes aromatic compounds, coumarins, alkaloids, terpenoids, and steroids. The metabolism of steroids in plant tissue cultures is the topic discussed in Chapter 4. The inclusion of culture techniques and recipes for culture media makes this a particularly useful section. Information on oxidations, reductions, isomerization of double bonds, glycosylation, esterification, and side-chain cleavage is also included. The final chapter is devoted to composition, metabolism, and degradation of lipids in plant cell cultures.

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

Materials for Advanced Batteries. NATO Conference Series. Series VI: Materials Science. Edited by D. W. Murphy and J. Broadhead (Bell Laboratories) and B. C. H. Steele (Imperial College). Plenum Press, New York and London. 1980. ix + 373 pp. $39.50.

This book consists of the proceedings of a NATO symposium. It comprises eight plenary review papers, sixteen short communications, five study group reports, and a list of participants. Each of the review papers presents a thorough background to a particular battery system, contains important data and, in most cases, is well illustrated with, for example, discharge curves, cyclic voltammograms, phase diagrams, and morphological scans. The first review paper sets the stage by describing the requirements of battery systems in terms of such parameters as efficiency and cycle life. Subsequent reviews focus on particular battery systems including the lithium–aluminum/iron sulfide battery, molten salt batteries, and lithium organic electrolyte batteries and on phenomena such as solid electrolytes, intercalation electrodes, and interfacial studies. Each review contains a sizable and up-to-date bibliography which will be useful for those concerned with advanced battery development. The authors of each review have examined the battery system critically and discuss outstanding problem areas.

The short communications cover recent findings in a variety of both aqueous and nonaqueous battery systems including lead–acid, lithium–$SOCl_2$, molten chloroaluminate systems, and organic electrolyte batteries

and a range of topics such as passivation, intercalation, micro reference electrodes, and kinetic and morphological effects. Again, the short communications are well illustrated with data, contain sufficient theoretical background, and discuss prospects for future battery development.

The study group reports are divided into state-of-the-art and new-system development, high-temperature systems, solid electrolytes, electrode materials, and interface problems. This book will be valuable for all those involved in battery research and development.

Reginald P. T. Tomkins, *New Jersey Institute of Technology*

Calculator Programs for the Hydrocarbon Processing Industries, Volume I. By S. Jagannath (Weyerhaeuser Company). Gulf Publishing Company, Book Division, Houston, Texas. 1980. xi + 224 pp. $19.95.

As the title indicates, this book identifies and defines problems in the hydrocarbon processing industries which can be solved on a programmable hand calculator. Although this limits the size of the problems, a large number of important process problems can be handled. The first four chapters (36 pages) present a concise and clear overview of numbers, errors, algebraic and reverse Polish operations systems, simple flow charts, functions on hand calculators, and simple programming.

The remaining chapters—Chapters 5 through 8—present a series of problems with illustrative examples. These problems contain the basic derivations (the equations to be solved); memory data documentation; user instructions; program print out including results; and in some cases the computer flow chart. Examples are worked on either the TI or HP programmable hand calculator. Problems are arranged in an order of levels I, Ii, and III which represent increasing difficulties and problem complexities. All examples are clearly presented. An inexperienced user can easily follow the steps.

Concerning the programs and problems chosen—there are approximately 45 examples. These seem to be fundamental in process design and analysis. They further appear to represent the present state of the art.

Leroy F. Stutzman, *University of Connecticut*

Polycrystalline and Amorphous Thin Films and Devices. Edited by Lawrence L. Kazmerski (Solar Energy Research Institute). Academic Press, New York. 1980. xv + 304 pp. $37.50.

This book is a timely one that reviews recent work on properties and applications of thin films, which is at present a field of rapidly increasing technological importance. The book consists of nine chapters by twelve authors that deal with both the experimental and theoretical aspects of thin film science. Emphasis is on the experimental work and this includes both measurements of electrical and optical properties as well as details of the performance of practical devices such as thin film transistors and solar cells. Information is presented on a number of materials such as hydrogenated amorphous silicon and large grained polycrystalline silicon as well as materials such as cadmium sulfide, cadmium selenide, gallium arsenide, and others. Most of the work is on active devices but one chapter deals with passive applications of thin films such as encapsulants, protective coatings, and membranes. The book includes extensive bibliographies for each chapter and gives a good review up to the date of publication. As in any rapidly developing field such as this one, some important results have since been published but anyone seeking a rapid education in this field can benefit from this book.

Harold F. Webster, *General Electric Corporate Research & Development*

Techniques of Electrochemistry. Volume 3. Edited by Ernest Yeager (Case Western Reserve University) and Alvin J. Salkind (CMDNJ—Rutgers Medical School). John Wiley and Sons, New York. 1978. ix + 495 pp. $34.95.

The stated purpose of this series is to explain and document electrochemical techniques at a level that the nonspecialist can understand. This particular volume, which deals with industrial and applied electrochemical techniques, achieves that goal.

The volume is composed of seven chapters, each introduced by an outline of its contents. The first chapter on Industrial Electrolysis, by T. R. Beck, should be required reading for any electrochemist or electrochemical engineer beginning a career in industrial cell design and processes. Economic considerations are developed as one of the factors influencing design and helpful examples of optimizing complex relationships are presented. J. P. Hoare and M. A. LaBoda nicely develop and integrate theory and practice in the second chapter on Electrochemical Machinery; they pay particular attention to the use of sodium chlorate electrolyte. The third chapter on Electrochemical Techniques Applied to Semiconductors, by D. R. Turner and J. I. Pankove, concentrates mainly on germanium, plus some silicon, devices. The fourth chapter on Primary Batteries, by R. J. Brodd and A. Kozawa, is a well written, easy to follow description of the practical methods and techniques used to test both components and batteries; some material on fuel cells is also included. G. Halpert presents a good summary of rechargeable batteries, including lead–acid and alkaline cells, and some less familiar metal/gas and molten salt systems, in the fifth chapter, A Review of Secondary Batteries and Evaluation Techniques. The sixth chapter on Electrodeposition, by D. S. Carr, covers the practical aspects of industrial electroplating; general observations are supported by specific examples and instructions. The seventh and last chapter on Electrodialysis of Aqueous Solutions, by I. F. Miller, is quite theoretical and less practical than the other chapters in this volume.

The strength of this book is the practical knowledge of the contributors, gained from years of experience, which is willingly shared with the reader in a straightforward, rational manner. Several chapters are excellent introductions to the nitty-gritty of particular types of industrial electrochemistry. Another admirable quality of this text is its fair amount of cross-referencing to other chapters or volumes in the series; such coordination reflects well on the editors and authors. The weakness of this volume is the age of some material, particularly the last chapter on electrodialysis. The latter begins with a footnote stating that the chapter was completed in September 1970 and that the reader should refer to the current literature for later work.

Larry M. Wier, *Hobart & William Smith Colleges*

Chromosome Techniques: Theory and Practice. 3rd Edition. By A. K. Sharma and A. Sharma (University of Calcutta). Butterworths Publishers, Woburn, Massachusetts. 1980. xii + 711 pp. $135.00.

This volume represents a compendium of chromosome technology from the beginning of this science through the late 1970's. The procedures for both plant and animal systems are complete; the theory is integrated nicely with the practical; and the entire work is well-documented and referenced. It is an excellent source book for all of the older, classical procedures and seemingly none have been omitted. Most of the material presented in the second edition has been kept verbatum in the third edition; however, in some sections, most notably on microscopy, there has been a reordering of the material to improve the continuity. Integration of the plates and illustrations into the text has also made the volume more readable.

Significant additions of modern techniques have been added in the areas of Chromosome Banding Patterns, Ultrastructure and Electron Microscopy, Somatic Cell Fusion, Chromosome Isolation, Biochemical Characterization of Chromosomes and Chromatin, and in situ Hybridization. These appropriately integrated additions account for most of the 125-page increase from the second edition, and are discussed with detail and clarity equal to the more classical procedures.

The greatly detailed classical procedures account for the book's major strong point; however, this can also be counted as its primary weakness, depending on one's point of view. With the technology available today, is it valuable to have these methods available except for historical or developmental interest? The answer to this question is "yes", but the rapid increase in knowledge of molecular and chromosome biology and the techniques related to it will preclude this luxury in future editions of this work.

Wayne Wray, *Baylor College of Medicine*

Protective Groups in Organic Synthesis. By Theodora W. Greene (Harvard University). John Wiley & Sons, New York. 1981. xiii + 349 pp. $37.50.

This book is composed in the modern trend of presentation of information largely in the form of equations for the sake of quick comprehension. By this means a very large amount of information is provided, and the reader can find a particular part of it very efficiently. The subject of protecting groups to suppress the reactivity of one functional group temporarily has grown from the occasional use of acetylation to moderate the reactivity of anilines to a veritable arsenal of special reagents. It was comprehensively reviewed in 1973, but so much has been added to it since then that the present book is well justified.

The book takes up five functional groups to be protected (–OH, –NH, –SH, $-CO_2H$, >C=O), each to its own chapter, and then gives the protecting reagents with examples and the means to remove the protecting group, when its job is done, with references. There is only a small amount of discursive text, and therefore little critical comparison, but there is an introductory chapter on selection of a protecting group, and an elaborate table or chart, in which is set out the sensitivity of the principal protecting groups to 108 selected reagents. Some of the entries derive from reasonable deduction, and some from experimental verification; the two are distinguished. These tables, which occupy 42 pages, are an important feature of the book. They are easily adaptable for use in computer-assisted synthetic analysis.

Although many readers might have preferred more detailed discussion of each protecting group, that would have made the book slower to use,

and much larger and more expensive. As it is, its evident usefulness should lead to widespread purchase by individuals as well as libraries.

Benzimidazoles and Congeneric Tricyclic Compounds. Part 1. Edited by P. N. Preston, with contributions by D. M. Smith and G. Tennant. John Wiley & Sons, New York. 1981. x + 687 pp. $175.00.

This is a volume in the Weissberger–Taylor series on The Chemistry of Heterocyclic Compounds. It contains chapters on benzimidazoles, their N-oxides, dihydrobenzimidazoles and related compounds, and condensed benzimidazoles of types 5-6-5 and 6-6-5. The subject will be completed in Part 2. However, author and subject indexes are included in Part 1, making it useful independently. The content represents a successor edition of Imidazole and Its Derivatives by Klaus Hofmann, published in 1953, but this book is a totally new work. A companion volume on imidazoles is being prepared.

The editor notes in the preface that benzimidazole chemistry has grown greatly since 1953, in part because of determination of the partial structures of nucleic acids, and the attractiveness of benzimidazoles as potential inhibitors of biosynthesis of nucleic acids. The volume he gives us conforms to the characteristics and standards of the series to which it belongs, and contains a thoroughly detailed treatment of the subjects, clearly presented with abundant equations, monumental tables, and awesome bibliographies. The only significant criticism is that not every chapter includes the date up to which the literature was surveyed.

The Condensed Chemical Dictionary. Tenth Edition. By Gessner G. Hawley. Van Nostrand Reinhold Co., New York. 1981. xi + 1135 pp.

This is a dictionary of technical and chemical terms, compounds, trademarks, and acronyms. The entries for compounds give physical properties and information on hazards and uses, as well as condensed formulas. Most of it is well done, and the definitions of trademark names are especially useful, but the book is flawed by a number of parochial or incompetent definitions and the omission of many important chemical terms. For example, the term "imide" is defined as "a nitrogen-containing acid having two double bonds", and "hydrazone" is defined as "an exotic fuel formed by the action of hydrazine...". A mysterious entry is "synton", defined as "any of several isomers of prostaglandins...". If the author meant to use "synthon", the definition is still misconceived. Omitted terms include antarafacial, phase-transfer, amidine, sultam, etc. "Diastereoisomer" is defined, but the more usual form "diastereomer" is not mentioned. the term "aminimide" is defined in terms only of the products of reaction of dimethylhydrazine with epoxides, and the entry includes the statement "This family of compounds was announced in 1973...". The writer of this definition should look at the primary literature as well as patents.

A dictionary in its tenth edition should be better than this.

Coal Structure. Edited by M. L. Gorbaty and K. Ouchi. American Chemical Society, Washington, D.C. 1981. viii + 376 pp. $36.00.

This volume of the "Advances in Chemistry" series consists of expanded versions of 22 papers presented at a symposium held in Honolulu in April 1979. Unlike most volumes of symposium proceedings, this one includes experimental descriptions as well as discussion. Most of the papers are, in fact, reports of original research presented in much the same way as in primary journals, but less restricted by space limitations. Illustrations in the form of graphs, spectra, and photographs are abundant, and the text is set in type.

The papers embrace the physical as well as the chemical structure of coal, but are mostly concerned with the response of various coals to specific chemical treatment and the structural information that can be deduced from the responses. Taken as a group, they give a good picture of the special problems of structure determination of coal, which is both heterogeneous and polymeric, and the degradation of which produces very complex mixtures. The material is brought together by an introductory paper by R. C. Neavel, Coal Structure and Coal Science: Overview and Recommendations.

Research in coal chemistry is moving ahead very rapidly and it is therefore regrettable that this volume appears over 2 years after the event. Proceedings of symposia are generally of ephemeral rather than long-term reference value, and it would be most useful if the ACS "Advances" program could find a way to publish them more promptly.

There is a substantial subject index, a feature too often missing from volumes of proceedings.

Carbon-13 NMR Spectral Problems. By R. B. Bates (University of Arizona) and W. A. Beavers (Texas Eastman Co.). The Humans Press, Clifton, N.J. 1981. xxi + 259 pp. $29.00 hardbound, $12.95 softbound.

This is a book of spectra shown graphically for 125 widely representative compounds ranging from hydrocarbons to peptides. For each compound, both the completely and the partially decoupled ^{13}C NMR spectra are given, together with the integrated ^{1}H NMR spectrum; in addition, the molecular formula and major features or the mass and infrared spectra are given numerically. The user must then use his wits and experience to work out the structure. There is an answer key, in the form of references to Chemical Abstracts and other formula indexes, but it is just sufficiently troublesome to use so as to provide good motivation for a determined try at getting the answer from the spectra.

Most of the fore pages are devoted to a succinct discussion of ^{13}C NMR spectroscopy and how to go about interpreting it; one worked example is included. A small but important part of the book is three pages of charts correlating ^{13}C NMR shifts with structure. Much information is packed into them, and their usefulness for reference will last for years after the problems themselves have been conquered. There are two minor drawbacks to them, however: The lack of a heading title, and an unfortunate choice of typeface, in which the lower-case t looks very like f, and the lower case Greek letters are most peculiar. A good feature is the inclusion of some information on heterocyclic structures.

This is the sort of book that can be recommended to students and to chemists whose education was pre-^{13}C NMR and feel the need for self-education.