Book Reviews*

Inductively Coupled Plasma Emission Spectroscopy. Part II: Applications and Fundamentals. Volume 2. By P. W. J. M. Boumans (Philips Research Laboratories). John Wiley & Sons: New York. 1987. xii + 486 pp. $70.00. ISBN 0-471-85378-X

This is the second part of the two-volume treatise by this well-known and respected author. This volume reviews applications of inductively coupled plasma atomic emission spectroscopy (ICP-AES), summarizes fundamental studies, and compares ICP-AES methods with other methods of analysis. The first six chapters are devoted to specific fields of application, including the following: metals and other industrial materials, geology, the environment, agriculture and food, biology and clinical analysis, and organic materials. The chapter on the analysis of organic materials also covers the special instrumental considerations required when organic solvents are introduced into an inductively coupled plasma. A chapter on the direct analysis of solids completes the first part of this volume.

Each of the applications chapters begins with a summary of the types of samples that are encountered in that field, and the kinds of problems that an elemental analysis can help to solve. This is followed by a tutorial approach covering applicability, advantages, and limitations of the methods. The coverage is thorough, including sample handling, storage, and preparation, acid, and fusion dissolution, avoiding contamination, methods of preconcentration, the types of interferences that can be expected and ways to reduce them, and the types of ICP plasmas that are used. Although the emphasis is on ICP-AES, the authors have had considerable experience with practical analytical problems and they include comparative comments about other atomic spectroscopic methods that are commonly used in their fields. Many examples are discussed, and readers who need cookbook details for the methods will find them in the cited references. Each chapter is clear and concise, and easily read in a short time when looking for an idea to help solve a particular problem.

The second half of the volume covers fundamental studies of ICP-AES: basic processes of aerosol generation, plasma modeling and computer simulation, spectroscopic diagnostics, excitation mechanisms, and discharge characteristics. This section introduces the experimental and modeling methods that have been used to obtain fundamental information about ICPs. Each chapter is written by an expert in the field. On the one hand, these chapters provide a concise introduction and review of the methods involved for the person doing research on ICPs, or other types of plasmas and atom cells as well. On the other hand, knowledge of the fundamental processes occurring during an analysis can often help to solve a special problem or help to obtain optimum analytical results. Therefore to the analyst involved in development or applications, the most important benefits of having access to these chapters are the valuable conclusions that are presented.

The book ends with an appropriate and excellent comparison of ICP-AES methods with other established, as well as newly developing, methods of trace element determinations. This is consistent with the approach in the first half of the volume and helps the reader put ICP-AES into proper perspective. The final chapter is particularly valuable to the manager of a laboratory involved in trace element determinations.

I highly recommend this volume as a valuable resource to analytical chemists and spectroscopists involved in research, development, or applications in the field of ICP-AES and in related fields of atomic emission spectroscopy. Every laboratory that has an ICP should have a copy of this important treatise.

Edward H. Piepmeier, *Oregon State University*

Topics in Current Chemistry 140: Molecular Inclusion and Molecular Recognition. Clathrates I. Edited by E. Weber. Springer-Verlag: New York. 1987. XI + 171 pp. $69.00. ISBN 3-540-17307-2/ISBN 0-387-17307-2

This is another volume in a series of books that deals with increasingly specialized topics, and the subtitle (Clathrates I) implies that even more on this subject will be forthcoming. The current volume continues the tradition of chapters written by leading-edge specialists in the field. The first two chapters deal with enantiomeric separations by clathrates and by inclusion crystallization. The third deals with triorthothymotide clathrates, and the fourth chapter is a more general overview of structural features in inclusion complexation. The last chapter is concerned with tetraphenylene compounds. Increased interest in resolutions as well as asymmetric reactions in the solid phase make the first two chapters of this volume unusually timely.

The introduction attempts to streamline some of the unnecessary verbiage in this area. While its success is questionable it does give an excellent perspective of structural types for which clathration might be expected. The chapter by Toda suggests that inclusion phenomena can lead to high enantiomeric excesses for a number of reactions in the solid state; it is possible that these systems will soon compete with solution processes. The chapter on triorthothymotide clathrates lacks the depth of similar chapters in the Atwood, Davies, and McNichol *Inclusion Compounds* series. Likewise, the final chapter on tetraphenylene dwells overmuch on the synthesis of these materials; this probably reflects the relatively short history of these structures for inclusion purposes. In brief, specialists in the solid state will find this a very useful volume. Those involved in molecular recognition will also appreciate the first half of the book; they will find it a good source of ideas.

Julius Rebek, Jr., *University of Pittsburgh*

Schwingungsfrequenzen II: Nebengruppenelemente. By Johann Weidlen, Ulrich Müller, and Kurt Dehnicke. Georg Thieme Verlag: Stuttgart and New York. 1986. xvi + 206 pp. 220.00 DM. ISBN 3-13-686701-7.

This is a compilation of reference values for the stretching frequencies of compounds in which a transition element is involved. It is thus mostly concerned with inorganic substances, but by no means entirely. Every value is provided with a reference (there are 1443 references). The only text material consists of a bilingual foreward and four pages of instruction for use, in German and English.

Methods in Enzymology. Volume 139. Part A. Calcium- and Calmodulin-Binding Proteins. Edited by A. R. Means and P. M. Conn. Academic Press: Orlando. 1987. xxxi + 917 pp. $85.00. ISBN 0-12-182039-4

This recent addition to a famous series consists of four sections, each of which deals with a different aspect of proteins which act as calcium receptors and the peptides and proteins which interact with them. As is appropriate for this series, the viewpoint is uniformly practical and experimental.

Section I is concerned with the isolation and characterization of calcium-binding proteins. The section begins with a useful chapter on the purification of calmodulin by melittin-sepharose chromatography. Subsequent chapters deal with the isolation of less-well-known calcium-binding proteins, whose roster is growing rapidly. A chapter by R. E. Klevitt on the study of calmodulin–peptide complexes by NMR spectroscopy stands somewhat apart from the balance of the section.

Section II discusses the molecular cloning of calcium-binding proteins. The initial chapter describes the isolation and characteristics of the gene for chicken calmodulin. The first seven chapters deal with calmodulin genes from various species, while the remaining chapters are concerned with the cloning of various other calcium-binding proteins, including parvalbumin, troponin C, vitamin D induced intestinal calcium-binding protein, calcium-dependent proteases, as well as calcium-binding proteins from sea urchins and *Myxococcus xanthus*.

Section III describes a series of selected techniques for the study of calcium-binding proteins. These include a wide range of immunological, chemical modification, gel, and other methods. In this section the chapters by Newton et al. on phenothiazine–calmodulin conjugates and that by Erickson–Viitanen and DeGrado upon calmodulin binding sequences may be singled out for particular mention.

The final section is concerned primarily with the interaction of calmodulin with regulated proteins, including methyltransferases, protein and tyrosine kinases, adenylate cyclase, phosphofructokinase, microtubules, and actin. In addition, three chapters deal with the crystallographic structures of troponin C, calmodulin, and vitamin D dependent intestinal calcium-binding protein, while other chapters discuss the interaction of calmodulin with cyclosporin, the calcium regulation of sperm motility, the calcium pump of plasma membranes, and techniques for the in vivo study of calcium and calmodulin.

This volume will be of enormous value and will indeed be virtually indispensable for any investigation planning to embark on the study of Ca^{2+}-binding proteins. A wealth of experimental detail, covering every aspect of the subject, has been collected, including substantial unpublished material. Because of the stress on methodology it complements nicely the "Calcium and Cell Function" series edited by W. Y. Cheung. Many fine points of technique are included, as well as potential stumbling

*Unsigned book reviews are by the Book Review Editor

blocks, which tend to be left out of journal articles and for which the investigator must otherwise often fall back on experience.

However, the value of the volume is by no means confined to the practical side. Many of the chapters are also excellent mini-reviews of their topics. The chapter by G. W. Mayr on the interaction of calmodulin with phosphofructokinase, that of Herzberg, Moult, and James on the 3-dimensional structure of troponin C, and that of Mani and Kay upon S-100 protein are excellent examples.

In general this volume does not depart from the high standards of its predecessors. It can be recommended without reservations to anyone seriously interested in this field.

Robert F. Steiner, *University of Maryland*

Stereochemical and Stereophysical Behavior of Macrocycles. Edited by I. Bernal (University of Houston). Elsevier Science Publishers: Amsterdam and New York. 1987. X + 246 pp. $95.00. ISBN 0-444-42815-1

This book is the second volume of a series on the stereochemistry of organometallic and inorganic compounds. It consists of three chapters, all dealing with macrocycles. The first chapter, stereochemistry of metallic macrocycles (Boeyens and Dobson), lists 184 metal complexes of macrocyclic ligands in the range between nine-membered rings and sixteen-membered rings. Descriptions in Chapter one include nomenclature, coordination geometry, and macrocyclic conformation. Important parameters for characterization, such as torsion angles, puckering, and corners of rings, are also mentioned briefly. This chapter is well-written. Chapter two, thermodynamics and stereochemical aspects of the macrocyclic and cryptate (Bushmann), combines description of macrocyclic ligands (crown ethers) and macrobicyclic ligands (cryptands). The author reviews the factors that are responsible for the stability of these compounds to form complexes mainly with alkali and alkaline-earth metal elements. Thermodynamic data for complex formation are given in several tables. They are helpful for understanding the interactions between the donor atoms and metal ions. Crown ethers and cryptands have been in the news recently since three chemists shared the 1987 Nobel prize in chemistry. The review of these subjects is timely. Chapter three, stereochemical aspects of macrocyclic complexes of transition metal ions (Mathes and Parker), is closely related to Chapter one. In Chapter one, complex compounds are restricted to transition-metal elements; here, they are further limited to the second and third row transition elements in the periodic table, with copper, nickel, manganese, and chromium as exceptions. In order to avoid overlap, metals involved are arranged in pairs, e.g., copper and nickel, silver and gold, palladium and platinum. The systems chosen for discussion are those in which at least three donors of macrocyclic ligands bind the metal ion. The material covered is well organized.

Throughout the book numerous drawings are given to show the structure of macrocyclic complexes. Even at a casual glance one gets an idea as to what kind of molecules (complexes) the book is describing. If the discovery by Werner of the metal complexes and their later development along this line is considered the first step, then the discovery and development of macrocycles as described in this book can be considered the second step in the advancement of coordination chemistry. In the first step, coordination compounds are recognized as consisting of a metal ion with a well-defined oxidation number located in the center and surrounded by ligands. Complexing occurs through chelation. In the second step, coordination compounds are extended to macrocyclic ligands of N, P, O, or S atoms. Complexing is due to encapsulation of a metal ion by the ligand donors.

The book is of good quality in content and readability. While it is useful to researchers of coordination chemistry, it is also worthy to be listed among the reading assignments for a graduate student or an undergraduate senior who is studying coordination compounds.

S. F. Sun, *St. John's University*

Drug Discovery and Development. Edited by Michael Williams (Ciba-Geigy Corp.) and Jeffrey B. Malick (Stuart Pharmaceuticals). Humana Press: Clifton, NJ. 1987. XVIII + 447 pp. $79.50. ISBN 0-89603-108-X

This work consists of a series of fifteen contributed monographs generated by some twenty-seven authors/coauthors. The book is divided into an Overview (by Williams and Malick) and three broad subject areas: Compound Discovery, Toxicological Evaluation and Clinical Aspects, and Therapeutic Entities—From Discovery to Human Use. Each individual monograph is generously footnoted and contains its own bibliography.

The Overview monograph covers the entire process of drug discovery and development, highlighting the strategic approaches currently in use by the pharmaceutical industry. From a qualitative standpoint, this article is very well written and could stand alone as a contributed article to any number of descriptive technical magazines.

The Compound Discovery section describes all of the commonly practiced approaches to drug discovery. These include qualitative structure activity relationships, serendipity, computer-based approaches, intact-tissue preparation-based approaches, biochemical approaches to drug-receptor interactions, enzyme level based approaches, and immunopharmacological approaches. Also included are articles on neuropsychopharmacology, and some analytical tools for evaluating opiates and other psychoactive agents.

The Toxicological Evaluation and Clinical Aspects section offers a very complete glimpse into the title areas. Another very informative article is included on drug delivery systems.

The section on Therapeutic Entities gives some case studies on specific compounds and compound classes. Those described are Cimetidine (and other histamine H_2–receptor antagonists), the psychotropic agents Trazodone and Buspirone, and the calcium channel blockers.

In summary, this work gives a very clear and detailed look at the process of drug discovery and development from the perspective of the medicinal chemist. To complete the picture, perhaps a section could have been included which describes the process of chemical development leading to the ultimate goal of commercial manufacture. This could describe what a drug substance must go through from the synthetic point of view to become a viable, safe, marketable drug.

James A. Thomas, *Parke-Davis Pharmaceutical Research, Warner-Lambert Co.*

Radionuclide Tracers: Their Detection and Measurement. By M. F. L'Annunziata (International Atomic Energy Agency). Academic Press: Orlando. 1987. xviii + 505 pp. $96.00. ISBN 0-12-43252-4

This book was written to serve both as a teaching text and as a reference for radionuclide users. The book covers four broad areas.

The first two chapters discuss the basic properties of radiation and radioactivity. Chapters 3 through 7 describe the theory, construction, and operation of the various types of ionizing radiation detectors and their associated electronics. Chapter 8 describes radionuclide imaging including a detailed review of autoradiography techniques. Chapter 3 also discusses radionuclide imaging with the less frequently used detectors, such as multiwire and gas scintillation proportional counters.

Lastly, a series of appendices, including 44 pages of radionuclide-decay data, statistical considerations, and procedures for the safe handling of radionuclides, completes the volume.

Although few people will need to read the book in its entirety, it still is organized in a fashion to permit its use as text for students with little or no knowledge of radiation detectors. The book's timely chapter references and complete index simultaneously make the book useful to experienced radionuclide users. The lack of a description of ionization-chamber detectors, which are useful in the quantitation of radioactivity (dose calibrators) and radiation (cutie pie instrument), is unfortunate in a book that has so thoroughly described most other radiation detectors. Ionization-chamber detectors warrant as much consideration as proportional or Geiger-Mueller counters since a large number of radionuclide users employ γ or high-energy β-emitting radionuclides in activities sufficient for use of these detectors.

In summary, all users of radionuclides could benefit from reading the first two chapters and the additional chapters which describe their detection devices. An afternoon's reading of this book will eliminate the need for investigators to view their detectors as unknown black boxes. An understanding of the advantages and particularly the limitations of each detector type, with a knowledge of the sources of error in measurements, should be of great practical significance to researchers. I recommend L'Annunziata's volume to all users of radionuclides.

Craig C. Williams, *University of Cincinnati*

Cellulose Hydrolysis. Biotechnology Monographs. Volume 3. By L. T. Fan, M. M. Gharpuray, and Y. H. Lee. Springer-Verlag: Berlin, Heidelberg, and New York. 1987. XIII + 198 pp. $101.50. ISBN 3-540-17671-3

This book is a collection of four chapters. The first chapter, entitled "Nature of Cellulosic Materials", furnishes a compendium of the compositions and the structures of cellulosic materials. The second chapter, entitled "Enzymatic Hydrolysis", provides the reader with an abundance of kinetics and mechanisms of enzymatic hydrolysis of cellulose. The chapter contains 334 references, which fact clearly demonstrates the actual interest in the field. The third chapter, entitled "Acid Hydrolysis of Cellulose", gives a readable survey of kinetics and examples of possible hydrolysis mechanisms. The last chapter, on "Design and Economic Evaluation of Cellulose Hydrolysis Processes", is highly valuable in view of the increasing interest in the economic trends for renewable energy resources.

Each chapter is well-written, clearly organized, easily comprehensible, direct and to the point, with no overlaps of subject area with the other

chapters, and it is concluded by an up-to-date bibliography covering the most relevant literature references (over 640 total references). An author index and subject index are also provided. The quality of the graphic presentations (65 figures) and mathematical equations is excellent and the authors are to be congratulated in achieving their stated objectives and making a significant contribution to the literature.

The relatively high price must be taken into account and regrettably the cost is beyond the real limit for personal purchase. However, it will be a nice companion volume for an institutional library on cellulose chemistry.

Overall, this volume is of interest to such specialists as biotechnologists concerned with cellulose and its chemical and physical properties but less so to most carbohydrate chemists and biochemists.

Zbigniew J. Witczak, *A. E. Staley Manufacturing Co.*

The Physics and Chemistry of Aqueous Ionic Solutions. NATO ASI Series C: Mathematical and Physical Sciences. Volume 205. Edited by M.-C. Bellissent-Funel (Centre d'Etudes Nucleaires de Saclay) and G. W. Neilson (University of Bristol). D. Reidel Publishing Company: Dordrecht, Boston, Lancaster, Tokyo. 1987. xvi + 475 pp. $99.00. ISBN 90-277-2534-9

Physical chemistry of aqueous ionic solutions is one of the traditional and classical subjects in chemistry, but not a closed chapter; it is still fully research-active and a very important branch in modern chemistry, as this publication under review demonstrates. This book is a collection of twenty lectures and seminars and twenty five posters, only the titles of which are listed, presented at a NATO Advanced Science Institute held at Gargese, Corsica in June 1986.

There are four lectures on basic theories of liquids, ionic solutions at equilibrium and nonequilibrium, and polyelectrolytes presented by the following well-known researchers: J. P. Hansen, H. L. Friedman, J. B. Hubbard, and J.-M. Victor. Studies of ionic solutions by X-ray diffraction, neutron, and NMR spectroscopy and light-scattering methods are discussed by J. E. Enderby, A. J. Dianoux, P. A. Madden, and G. Jannink.

Papers dealing with the electrolyte/electrode and the ionic solution/air interfaces are given by M. P. Tosi et al., R. Parsons, and D. Andelman et al. Seminars on structural, thermodynamic, and transport properties of ionic solutions in terms of molecular dynamics computer simulation methods are presented by three speakers: P. Bopp, D. Levesque, and P. Turq. The rest, six papers, deal with aqueous ionic glasses and crystallization (P. Chieux and J. Dupuy et al.), ionic solutions in natural environment (G. Michard, C. Monin, and J. Schott), ionic solutions under extreme conditions (E. U. Franck), and solid aqueous solutions (J. Klinger).

As the list of topics indicators, this is a very broad lecture series on physical-chemical studies on ionic solutions, but everyone is concerned with the common objectives, namely, structural, thermodynamic, and dynamic phenomena of solutions. The reviewer considers this a well-rounded presentation of current studies in aqueous solutions and that it is a good review for anyone who wishes to begin research in the field. However, no chemical reaction kinetics has been discussed except for the electrode processes. In general, lecture series publications of this kind lack either a subject index or a compound index, but this book has both, making it very easy to find a specific item.

Both the editors and Postscript and Summary state that papers dealing with ions in biochemical systems are presented, but the reviewer could not find such. The book price is stiff for an individual, but I definitely recommend our department library to purchase it.

K. S. Yun, *University of Mississippi*

Encyclopedia of Polymer Science and Engineering. Second Edition. Volume 9. Edited by H. F. Mark (Polytechnic Institute of New York), N. M. Bikales (National Science Foundation), C. G. Overberger (University of Michigan), G. Menges (Institut for Kunststoffverarbeitung of the RWTH Aachen), and J. I. Kroschwitz. John Wiley and Sons, Inc.: New York. 1987. xxiv + 840 pp. $200.00. ISBN 0-471-80941-1

Volume 9 represents a highly useful addition to the second edition series of the *Encyclopedia of Polymer Science and Engineering.* This volume covers 29 topics from Liquid Crystalline Polymers to Mining Applications, including lithographic resists, mass spectrometry, mechanical properties, membranes, methacrylonitrile polymers, and microencapsulation. All aspects of polymer science are treated, from basic principles (e.g., metathesis polymerization) to applied topics (e.g., machining) and economics (e.g., market evaluation).

The chapter on Membranes was carefully read as it is a topic whose literature I have closely followed over a number of years. The chapter is written by Prof. Israel Cabasso, who has made many notable contributions of his own to this area. The treatment is remarkably complete given that it covers no less than 70 pages and 233 references. Key concepts whose understanding is critical to providing an overview of the area are lucidly presented. After an introductory section on morphology, the principles of permeation are discussed via Fick's Law, followed by a section on materials used in membrane preparation and the corresponding processing techniques used such as extrusion. Separations through facilitated and coupled transport are detailed and the more specialized biomimetic and ion exchange membranes introduced. Applications in liquid and gas separations then round out the chapter. It thus forms an excellent introduction to a topic which continues to see a great deal of research emphasis.

The Mass Spectrometry chapter was also carefully read and assessed for its pedagogical value as it is an area with which I have only a passing familiarity. This chapter is written by Prof. Kelsey D. Cook and it covers 192 references in 37 pages. It is a remarkably clear exposition in that it explains mass spectrometry through the four-step procedure inherent to its utilization. Each of the four steps are applied to the analysis of polymers. The explanation of mass spectrometry thus evolves from the first step, sampling via techniques such as pyrolysis which permit monomer and oligomer identification, to ionization via, for example, desorption ionization, then to separation for the time-of-flight determination in order to calculate the mass-to-charge ratio, and finally, the last step, detection with the Faraday cage. Applications which are detailed include the analysis of polymer surfaces, the degradative analysis of bulk polymers, and the determination of molecular weight distributions. The chapter therefore provides an excellent overview to a topic which is receiving increased emphasis in polymer science.

A rather unusual chapter which deserves special mention is that by Julia T. Lee on the Literature of Polymers (35 pages). As the title implies, this chapter presents an overview of the resources available in polymer science information. A section on patents thus notes that one can access the well-known Derwent Publications and Chemical Abstracts as well as the lesser known but equally valuable International Patent Documentation Center. The relevant journals are listed—from *Acta Polymerica* and *Adhesion* to *Reactive Polymers* and *En Bi To Porima.* Lastly, 20 categories of books are listed with each category chronologically listing many of the available books. For example, the General Polymer Science Category lists 36 books such as Flory's Principles of Polymer Chemistry, the Polymer Structure category lists 41 books such as Sharples' Introduction to Polymer Crystallization, the Analysis category lists 72 books such as Kampf's Characterization of Plastics Using Physical Methods, and the Polymer Synthesis category lists 66 books such as Hodge and Sherrington's Polymer-Supported Reactions in Organic Synthesis. Each category seems reasonably thorough, though my own favorite, Lenz's Organic Chemistry of Synthetic High Polymers, is missing from the Synthesis category. Such a breakdown of the literature will be useful to everyone, but a special effort should be made to alert graduate students of its existence.

In general, then, the chapters provide an important summary of their subjects, given especially that they are prepared by noted researchers in their fields. Effective use of tables, figures, and graphs are consistently made and great editorial care taken to ensure clarity and the elimination of typographical errors. Obviously, no reference library should be without it.

Spiro D. Alexandratos, *University of Tennessee, Knoxville*

Microprocessor Applications. By Donald Stevenson (Paisley College, UK) and Keith Miller (Wolverhampton Polytechnic, UK). John Wiley & Sons: New York. 1987. 590 pp. $36.95. ISBN 0-471-91403-7 (paperback).

This textbook is one of 29 in the Analytical Chemistry by Open Learning series. There are six major topics covered by the book: Microprocessors and Computing Concepts, Introduction to Programming (BASIC), Microcomputer Interfacing, Automated Ion Selective Electrode Measurements, Simple Programs for Curves and Peaks, and Case Study: On-Line Measurements in Atomic Absorption Spectroscopy. The book is intended for self-study by chemical technicians and students who wish to understand the specific functions performed by microcomputers in modern analytical chemistry; the absence of an index limits its usefulness as a reference. Each topic is followed by a pertinent question along with space for student response; thorough answers to each of these 105 questions occupy the final quarter of the book.

This book definitely fulfills its aim of bringing a technician with no previous knowledge of computers to a level of confidence sufficient to "discuss problems or developments with computer specialists and electronic engineers". The sections covering hardware are concise but specific. The 6522 Versatile Interface Adapter and 8255 Programmable Peripheral Interface and generic analog-to-digital and digital-to-analog converters are employed to illustrate the major interfacing concepts. The case studies are particularly relevant. The quarter of the book on BASIC

programming may be superfluous due to the high BASIC fluency rate among technical personnel and the availability of many excellent books on this subject (some of which are cited). The BASIC section could have been profitably replaced by discussion of simple troubleshooting techniques and modern data acquisition software.

Tom Lyons Fisher, *Juniata College*

Similarity and Clustering in Chemical Information Systems. By P. Willett (University of Sheffield). Research Studies Press: Letchworth, England. 1987. xii + 254 pp. $54.95. ISBN 0471-91463-0

A number of computerized chemical information systems, in which even hundreds of thousands of substances are represented as structural fragments in machine-readable files, have been developed during the past two decades. This monograph summarizes computational methods for determining (a) similarities among different substances and (b) clusterings (groupings) among substances using such files.

The six-chapter book is well organized. Chaper 1 deals with chemical information systems, stressing methods for representing chemical structures in files and for searching these files. Chapter 2 presents techniques for calculating the similarity between pairs of substances and for assigning substances to clusters. Chapter 3 details (a) comparative studies of 16 data files using various approaches for measuring similarity and (b) procedures for finding the best matche(s) to a query structure. Chapter 4, the longest chapter, presents comparative studies of several clustering methods. Chapter 5 discusses the computer-science aspects of searching and clustering, using brief algorithms in PASCAL-like notation. The last chapter gives some conclusions. Applicability of the techniques discussed to drug design is pointed out throughout the book.

This monograph is essential reading for anyone involved with large-scale chemical information systems. The first two chapters are of interest to researchers concerned with chemometrics. The latter four chapters, presenting methodological research primarily by the author's group, are for the specialist. Some background in computer science is needed to comprehend the latter material since the emphasis is on the efficiency and effectiveness of searching and clustering algorithms. Referencing is extensive, with several 1986 citations being given. The body of insights presented have not previously been assembled for chemists. Since information systems are assuming ever greater importance in chemistry, the strategies set forth for handling very large data files are of particular value. Omission of headings for the columns in many tables is the only major oversight in a generally well done monograph.

Darryl G. Howery, *City University of New York, Brooklyn College*

High Performance Liquid Chromatography. By Sandy Lindsay (East Ham College, UK). Edited by D. Kealey. John Wiley & Sons: New York. 1987. xx + 244 pp. $21.95. ISBN 0471-91373-1

This volume is one of a series of practical textbooks on basic instrumentation and techniques of analytical chemistry. The series is produced by the "Analytical Chemistry by Open Learning" project and is designed for technicians and students who need to update their skills in a particular area but do not have access to conventional university courses, i.e., the so-called "distance learners". The "Open Learning" concept provides a structure that is simple to follow and furnishes feedback in the form of self-assessment questions, SAQs, and indicated segments of the text where the reader is to answer a question, do a calculation, or create a graph or drawing. The initial portion of the textbook contains a Study Guide, four suggested and three additional practical experiments, and a very limited bibliography.

The material is divided into four principal chapters with 3 to 4 sections in each chapter. Each section covers a different sub-topic and concludes with concise Summary and Objectives statements. The chapters are titled "Instrumentation", "Column Packing and Modes of HPLC", "Some Applications of HPLC", and "Some Practical Aspects of HPLC".

The Instrumentation chapter is lengthy and covers constant-pressure and constant-flow pumps, injection systems, columns and dispersion mechanisms, detectors (UV, fluorescence, electrochemical, and RI), and derivatization techniques. The discussion of each topic is necessarily brief; however, most of the important topics of instrumentation are at least mentioned.

Column Packing and Modes of HPLC is a chapter covering the different types of phases and techniques used for HPLC. The topics include column packing, normal/reversed-phase chromatography, bonded phases, chiral stationary phases, ion-exchange chromatography, ion-suppression and ion-pairing methods, as well as adsorption and exclusion chromatography.

The final two chapters on applications and practical aspects give several examples of significant HPLC separations, gradient-elution techniques, and methods for quantitative analysis.

The primary problems with the text are imposed by the limited size of the volume. The authors have chosen to cover a wide range of topics with necessarily limited discussion of each topic, rather than a more detailed discussion of fewer topics. However, the book is clearly written and illustrated, and it will be useful for the practicing technician.

Jon F. Parcher, *University of Mississippi*

Organic Synthesis. Volume 65. Edited by E. Vedejs. John Wiley & Sons: New York. 1987. xv + 278 pp. $29.95. ISBN 0-471-63637-1

This volume continues the practice of presenting detailed and tested procedures for preparing specific compounds, an endeavor that began just after the Second World War, to meet a need arising from the cessation of imports from Europe. The recent innovation of using camera-ready copy is also continued. The content of this volume is prefaced by a memorial to the late Harold Blatt, who was Secretary to the Board of Editors from 1938 to 1943 and coeditor of Collective Volume I.

The preparations include methods for 5-membered rings using carbonyl condensations, for some olefins and acetylenes, for several organosilicon compounds, and for a variety of heterocyclic compounds. The most evident feature of this volume is the use of chiral auxiliary reagents in asymmetric synthesis, a subject that is growing very rapidly. When one compares this volume with those of earlier decades, a characteristic that is especially obvious is the greater length of the preparations. This is due to several factors, of which an important one is the inclusion of more information on the scope of the reactions represented. In a number of instances there are tables listing other examples of the reaction, with conditions and yields. As is customary, a list of preparations that have been submitted but not yet checked is included.

Handbook of Coordination Catalysis in Organic Chemistry. By Penny A. Chaloner (University of Sussex). Butterworth & Co. Ltd.: London and Boston. 1986. 1002 pp. $110.00. ISBN 0-408-100776-6

The author has taken on the formidable task of marshalling a vast number of references in a field that is expanding rapidly. Coverage of the literature reaches into 1984. Critical evaluation of material naturally suffers when such a large amount of literature has to be dealt with against a deadline, but generalizing principles can nevertheless be found. However, the book is apparently intended to be an organized compendium rather than an explanation of fundamentals; its purpose is stated to be "to show the increasing importance of homogeneous catalysis by metal complexes to organic chemists."

The organization at the first level, chapters, is according to reaction: hydrogenation, oxidation, isomerization, reactions of the carbonyl group, formation of carbon–carbon bonds, reactions of carbon monoxide, and alkene metathesis. The book would have been more useful if this organization had been maintained within each chapter, so that, for example, hydrogenation of a given type of structure by various catalysts would be found together. Instead, however, each type of catalyst is treated separately, and treatment of a given type of transformation is therefore scattered; although there are brief comparisons in some places, much use of the index is required. This is not an easy book to use for reference purposes, but for those willing to work, there is a great quantity of information to be found in it.

The book has been produced from camera-ready typescript which does not lend itself to efficient use of space (especially when it is double-spaced), but the structural formulas are abundant and clearly drawn. There are a few tables, all short, but the large number of equatons augments them. It is helpful to find that most of the equations are accompanied by references; many also have yields, but more would have been very welcome.

A most helpful feature is an extensive glossary of terms and abbreviations, which includes the many arcane designations commonly used for the catalysts (e.g., BPPM = 2*S*,4*S*-*N*-*t*-butoxycarbonyl-4-diphenylphosphino-2-diphenylphosphinomethyl-pyrrolidine). The subject index is substantial.

Advances in Polymer Science. Volume 83. Biopolymers. With contributions by K. Kamide and M. Saito (Fundamental Research Laboratory of Fibers and Fiber-forming Polymers, Osaka) and A. H. Clark and S. B. Ross-Murphy (Unilever Research, Bedford). Springer-Verlag: New York, Heidelberg, Berlin. 1987. 192 pp. $77.50. ISBN 0-387-17779-5

This volume directs much deserved attention to industrially important polymers of biological origin: cellulose and its derivatives, and the gel forming polysaccharides and proteins. Both articles focus on physical chemistry techniques and their applications to molecular characterization. Biophysical chemists, as well as industrial chemists, will find the volume useful because the physicochemical properties discussed ultimately form the basis of biological function.

The volume title, *Biopolymers*, is therefore appropriate both with respect to the commercial importance of polymers from biological sources and also in its reference to that subgroup of biophysics dealing with

macromolecules.

"Cellulose and Cellulose Derivatives: Recent Advances in Physical Chemistry" by Kamide and Saito (56 pp) is largely a survey of the authors' own substantial contributions. A third of the 133 references are to their work from 1975 to 1985; the remaining citations are mainly pre-1978. The article summarizes results of thermodynamic, hydrodynamic, and spectroscopic methods. The only omission is reference to the application of semiempirical energy calculations. It would have been interesting to have related to that area the authors' conclusion, based on a double extrapolation of unperturbed chain dimension to a totally deacetylated chain in a hypothetical nonpolar solvent (p 46), that cellulose itself is "intrinsically very flexible". In general, the article illustrates well what can be accomplished with a multitechnique approach.

"Structural and Mechanical Properties of Biopolymer Gels" by Clark and Ross-Murphy (136 pp) is an ambitious, and successful, survey of the title topic using a format designed "to pursue the link (both from theory and from experiment) between the structural methods and mechanical measurements" for some rather complex systems. Two sections describe techniques of structural and mechanical characterization of biopolymer gels. Specific systems are then presented in order of increasing complexity, starting with gels formed from disordered polymers, such as gelatin, carrageenans, pectins, starch, and (very briefly) microbial and animal polysaccharides. A final section describes networks formed from globular and rod-like biopolymers, including actin, tubulin, fibrin, caseins, myosin, and others.

Both articles have a satisfying mix of experiment and theory and in a useful fashion give a good indication of both the practical importance of biopolymers and some fundamental questions still quite unresolved.

Eugene S. Stevens, *State University of New York at Binghamton*

Polymer Photophysics and Photochemistry: An Introduction to the Study of Photoprocesses in Macromolecules. By James Guillet (University of Toronto). Cambridge University Press: New York. 1987. xiii + 391 pp. $24.95. ISBN 0-521-34783-1

This volume contains 14 well-written chapters on the photophysics and photochemistry of synthetic macromolecules. Professor Guillet begins with first principles and rapidly proceeds to current research topics. Some of the subjects treated are fluorescence, excimers, exciplexes, phosphorescence, energy transfer and migration in polymers, photopolymerization, mechanophotochemistry, and radiation chemistry of polymers.

The text contains numbered paragraphs with titles, which readers will find helpful in locating specific topics. References are grouped by chapter at the end of the text.

While it is a difficult task to write a treatise on an expanding field such as the photophysics of polymers, Guillet has produced a text that will be a standard reference. Certain chapters that have been the subject of numerous papers by the author are outstanding for their clarity and development, in particular "Excimers and Exciplexes" and "Energy Transfer and Migration in Polymers". In Chapter 9, the author presents his concept of the "antenna effect" in polymers that contain chromophores and traps. Such systems may prove essential in the development of solar energy conversion units.

This work is highly recommended for theoreticians of polymer photophysics and for polymer scientists wishing to utilize photoprocesses in such applications as photoresists, xerography, photomechanical reproduction, photocuring, photodegradation, and stabilization of polymers.

W. R. Cabaness, *The University of Texas at El Paso*

Electroanalysis: Theory and Applications in Aqueous and Non-Aqueous Media and in Automated Chemical Control. By E. A. M. F. Dahmen (Twente University of Technology). Elsevier Science Publishers: Amsterdam and New York. 1986. xv + 384 pp. $139.00. ISBN 0-444-42534-9

The goal of this book is to *build a welcome bridge between electroanalytical chemistry as a science and electrochemical analysis as an art*, and, in many ways, it succeeds. Dahmen's clear and concise writing style allows a multitude of information to be addressed in a short reading time. The material is introduced in a logical and organized sequence reminiscent of a well-taught graduate-level electrochemistry course.

Dahmen divides the text into three major sections: electroanalysis, electroanalysis in nonaqueous media, and electroanalysis in automatic chemical control. Almost 60% of the text focuses on electroanalysis in aqueous media. In this section the basics of electrochemistry are introduced and expanded. The strong foundation established in the beginning of this book helps greatly in the understanding of following sections. Dahmen mixes historical background with the introduction and discussion of each new topic. Figures and practical examples are strategically used to clarify and illuminate difficult points.

The electroanalysis section serves to introduce the reader to electrodes, electrochemical cells, and solution electrodics. Non-faradaic methods of conductometry and potentiometry are covered in comprehensive detail including the latest advances in ion-selective field effect transistors (ISFETS). Faradaic methods include an introduction to electrode kinetics, polarography, voltammetry at stationary and hydrodynamic electrodes, electrogravimetry, and coulometry. Most of the faradaic methods are treated with the same depth, vigor, and clarity as the non-faradaic methods. In contrast, hydrodynamic systems and coulometry are given only a cursory treatment with a total of 20 pages. This aspect is unfortunate, since hydrodynamic techniques have become so popular over the past 10 to 20 years, and may be greatly responsible for the routine use of an electrochemical method in many research and industrial laboratories. Coulometry can only be classified as an essential and necessary electroanalytical tool, and it deserves better coverage.

Nonaqueous electroanalysis is a welcome addition to a general review book. This topic is rarely encountered in many electrochemistry courses. Dahmen handles this material with the uninitiated reader in mind. Most of this section is devoted to an in-depth review of the basic theory of electrochemistry in nonaqueous systems. This extensive review allows one to easily understand the discussion of non-faradaic and faradaic electroanalysis techniques in nonaqueous media.

Being well-within the age of micro-processors and computers, a section on automated chemical control of electroanalysis techniques is well justified. This section serves to enlighten the reader to the advantages and limitations of automated control. Most of all it emphasizes the impact of automated control on electroanalysis. Automated chemical control has stimulated many new developments and allowed electrochemical techniques to be generally employed.

This book does have a few difficulties. Dahmen attempts to write a self-contained book with the assumption that the reader has a basic physical chemistry background. I would venture to say that a previous course in electrochemistry or some practical experience would greatly add to the impact of this book. In addition, the text and equations are written with words and symbols typical of European books, which may give discomfort to students and non-electrochemists. Some topics are covered with much less depth although they are of equal importance, i.e., hydrodynamic systems and coulometry. Other electroanalysis advances are not even mentioned or are given only trivial treatment, such as, on-line voltammetry, pulsed amperometric detection, and micro-electrodes and arrays.

In spite of the drawbacks, the combination of historical, theoretical, and practical treatment of each subject along with many fine examples and illustrative figures makes a powerful combination, which serves to help the reader attain an intelligent grasp of the basic principles of electroanalysis.

This book is readable and enjoyable. It would be a welcome addition to any collegiate library, for it contains something for every level. For the student, it delivers a systematic approach to the basic principles of electroanalysis with easy to follow derivations and many references. The non-electrochemist can use this book to attain an understanding of electroanalytical theory which can be quickly translated and applied to experimental techniques and procedures. The electrochemist will appreciate the general overview of the field written with a historical perspective, the in-depth introduction to nonaqueous electroanalysis, and the insight on how microprocessor-control and computers are helping electroanalytical techniques to be employed for routine analysis.

William R. LaCourse and Dennis C. Johnson, *Iowa State University*

Advances in Inorganic Biochemistry. Volume 7: Heme Proteins. By G. L. Eichhorn (NIH Gerontology Research Center) and L. G. Marzilli (Emory University). Elsevier Science Publishing Company: New York, NY. 1987. xiv + 271 pp. $75.00. ISBN 0-444-00826-8

This seventh installment in the fine series on inorganic biochemistry is devoted to the various aspects of the structure and function of heme proteins. This edition contains five well-written and timely chapters with helpful figures and extensive reference lists. Because of the distinctly biochemical nature of this volume, the chapters are couched predominantly in terms of the protein. Despite this biochemical flavor, the material is true to its inorganic roots. All discussions of amino acid sequence, catalytic function, or protein structure and dynamics are related to the metal center and its character. This volume illustrates the importance of considering the whole protein, not just the active site or the iron porphyrin center. This point is becoming increasingly apparent in studies by inorganic chemists on metalloproteins.

Chapter One, by T. L. Poulos on "Heme Enzyme Crystal Structures", chronicles the considerable recent progress in the determination of heme protein architecture and active-site structure. The author concentrates on cytochrome *c* peroxidase, catalase, and cytochrome P450. Each section provides background information and specifics on the protein structure. The chapter further provides comparisons between the three

related heme proteins, illustrating the important differences in active-site structures and, hence, protein functions. The discussion on the regio- and stereoselective hydroxylation of camphor by cytochrome P450, complete with substrate-free and substrate-bound structures, provides an equisite example of this concept.

Chapter Two, by M. A. Cusanovich, T. E. Meyer, and G. Tollin on "*c*-Type Cytochromes: Oxidation–Reduction Properties", assembles the considerable amount of data on the electron-transfer reactions and kinetics of this well studied family of heme proteins. The consideration given to the classifications and structures of the three types of *c*-type cytochromes highlights the importance of knowing the active site and protein structure when comparing the properties of this diverse family of cytochromes. Particularly interesting is the discussion of the unique nature of horse cytochrome *c*, the "prototypical" cytochrome *c*. A succinct and quite readable section on electron-transfer theory provides the necessary background for the ensuing discussions of the effects of driving force, electrostatics, distance, orientation, and protein dynamics on the electron-transfer kinetics of various cytochrome *c* proteins.

Chapter Three, by M. Brunori, G. Antonini, F. Malatesta, P. Sarti, M. T. Wilson on "Structure and Function of Cytochrome Oxidase: A Second Look" provides a detailed view of this particular heme protein. The authors point out that they cannot avoid dealing with the protein and the membrane in addition to the active site, so the first portion of this chapter is distinctly biochemical. The authors are then able to discuss the metal center in its proper perspective. This discussion benefits from organized presentation, useful figures, and several good summaries.

Chapter Four, by J. M. Rifkind on "Hemoglobin", organizes and summarizes the extensive data on the well-known hemoglobin protein. This monumental task (571 references are cited!) has been performed very well. The chapter considers experimental methods, ligation, and allosteric interactions. The summary of the methods is cohesive and provides a number of useful "rules-of-thumb" for such studies. Discussions of ligation of hemoglobin and allosteric interactions address physical methods, model compounds, and protein structure to provide a thorough and readable assessment of the understanding of hemoglobin.

Chapter Five, by D. A. Webster on "Structure and Function of Bacterial Hemoglobin and Related Proteins", provides interesting comparisons of the bacterial heme proteins with the more extensively studied vertebrate hemoglobins. The more limited data on these systems results in a slightly shorter, but still informative chapter. A historical perspective sets up the discussion of present investigations and findings of the bacterial hemoglobin and leghemoglobin.

This volume is well written, illustrated, and documented. The print quality is high and the frequency of typographical errors is very low. These considerations prevail over the hefty price to make this text highly recommended to inorganic chemists and biochemists alike.

Charles R. Leidner, *Purdue University*

Photochemistry. Volume 18. Edited by D. Bryce-Smith (University of Reading). The Royal Society of Chemistry: London. (Available from the American Chemical Society.) 1987. xii + 592 pp. £98.00. ISBN 0-85186-165-2

The latest volume in this series of *Specialist Periodical Reports* contains reviews of the literature published between July 1985 and June 1986. It differs from earlier recent volumes in relinquishing coverage of gas-phase photoprocesses to a new series commissioned by the Royal Society of Chemistry entitled "Molecular Dissociation Processes". The annual *Review* of the Year is also regrettably missing. Part I, Physical Aspects of Photochemistry, now concentrates on Photophysical Processes in Condensed Phases and includes an extensive discussion of processes in biological systems. The other main headings in this volume are the following: Part II, Photochemistry of Inorganic and Organometallic Compounds; Part III, Organic Aspects of Photochemistry; Part IV, Polymer Photochemistry; and Part V, Photochemical Aspects of Solar Energy. An author index completes the book.

Seyhan N. Ege, *University of Michigan*

Nuclear Magnetic Resonance Spectroscopy, Analytical Chemistry by Open Learning. By David A. R. Williams (Manchester Polytechnic). John Wiley & Sons: New York. 1986. xix + 272 pp. ISBN 0-471-91177-1

This elementary text on NMR spectroscopy is designed for self-study, primarily by those studying to be chemical technicians. The style is informal and direct. The basic elements of chemical shifts, spin–spin coupling, integrated intensities, and relaxation times are discussed briefly, with examples, but the emphasis is much more on "this is the way it is" than on providing a satisfying rationale. Quick introductions to sample preparation, NMR instrumentation, and signal enhancement techniques are included, but these are very sketchy. Only four pages are devoted to the Fourier Transform technique, hardly enough to give anyone a resonable basis for understanding the technique and its power. About a third of the main part of the text is devoted to practical applications of ^1H and ^{13}C NMR spectroscopy, including structural assignments of peaks in the spectra of simple molecules and quantitative measurements of simple mixtures.

The author provides a variety of questions and problems throughout the book, some of the simple memory-retention type but some more thought-provoking. The last 90 pages of the book are devoted to answering the questions and problems posed in the five chapters.

The book's primary utility is likely to be in training technicians working in an analytical laboratory with access to an NMR spectrometer and being tutored by an experienced NMR spectroscopist. Just reading about the elements of NMR and about a few simple applications will not turn one into a useful practititoner anymore than just reading a book about playing the piano will turn one into a pianist.

Gerald Ray Miller, *University of Maryland*

Organic Photochemistry. Second Edition. By James M. Coxon (University of Canterbury) and Brian Halton (Victoria University of Wellington). Cambridge University Press: Cambridge. 1987. viii + 243 pp. $69.50. ISBN 0-521-32067-4

The second edition of this introduction to organic photochemistry follows closely the format of the first edition (reviewed in *J. Am. Chem. Soc.* **1975**, *97*, 7493). The material is organized in five chapters with emphasis on the Woodward–Hoffmann Rules and on other mechanistic ideas to unite otherwise different-seeming reactions. Many of the examples are now from the more recent literature with references up to 1984. The book remains a good first introduction to the basic principles and the most important reactions of organic photochemistry.

Seyhan N. Ege, *University of Michigan*

Specialty Polymers. Edited by R. W. Dyson (London School of Polymer Technology, Polytechnic of North London). Chapman and Hall: Glasgow and London. 1987. xii + 186 pp. $59.95. ISBN 0-412-01551-X.

The book consists of seven chapters and two helpful lists, one of common abbreviations and one of trade names. The chapters include polymer structures and general properties, polymerization, high-temperature and fire-resistant polymers, hydrophilic polymers, polymers with electrical and electronic properties, ionic polymers, and polyurethanes.

The topics are presented in a clear and concise manner in a simplified and uncomplicated version. They are not for experienced chemists or engineers working in the area of interest, but they are quite suitable and would be very helpful for the technician or early professional who is seeking background information on topics of interest in which he has little or no particular expertise. There is a respectable amount of helpful information for applied technology and a clear, brief background of the chemistry of each class of material.

As with most books that are prepared by several authors (six in this case), this one suffers, albeit in small measure, by a lack of parallel structure and some overlap among chapters. For example, chapters have a very few, many, or no references, some have a bibliography for further reading, and one chapter has neither references nor bibliography.

This book will serve well the industrial technologist as background reading or students seeking information in specialized polymer topics.

Patrick E. Cassidy, *Southwest Texas State University*

Mechanisms of Inorganic Reactions. By D. Katakis (University of Athens) and G. Gordon (Miami University). John Wiley & Sons: New York, NY. 1987. xxiii + 384 pp. $39.95. ISBN 0-471-84258-3

This book is intended to serve as a text for a one-semester course in the mechanisms of common types of inorganic reactions. The level is stated to be appropriate for advanced undergraduate and beginning graduate students. Each chapter contains a problem set and a brief list of general references. The book is concerned primarily with reactions in solution. There are very few typographical errors and the overall format is visually appealing.

The first five chapters comprise about one-half of the book and present the principles of kinetics. The remaining chapters deal with specific reaction types: Chapter 6, substitution, insertion, topological, proton transfer reactions; Chapter 7, electron-transfer reactions (including oxidative addition and reductive elimination); Chapter 8, homogeneous catalysis; Chapter 9, photochemistry.

There is a need for a text that provides a good grounding in mechanistic inorganic chemistry; necessarily such a text would need to include a discussion of the general principles of kinetics in sufficient depth to make possible genuine insight into chemical processes. The authors have attempted to write such a book. Their stated goal is to provide the student with an understanding of (1) mechanistic concepts and how to correlate and classify them, (2) the experimental and theoretical methods

(with limitations) used to study mechanisms, (3) how to solve theoretical and practical problems and conceive new ones, etc. Clearly, this is a difficult task, particularly in a one-semester course. Unfortunately, for the reasons listed below I do not believe that the book being reviewed here will meet the requirements of most teachers planning a course in mechanistic inorganic chemistry.

The major weakness of the book is its comprehensive nature, with the result that many (important) topics are dealt with at a superficial level. By reading the book, the student can learn many new terms but will acquire relatively little insight into mechanistic inorganic chemistry. The text reads like a catalogue of reaction types and kinetic terms, with insufficient depth. Topics of marginal importance on a first exposure are included at the expense of a good treatment of important topics. For example, the discussion of transition-state theory, linear free-energy relationships, and microscopic reversibility is inadequate, yet these subjects are very useful for an understanding of inorganic (and other) reactions. Similarly, the treatment of nucleophilic attack on coordinated olefins and organometallic insertion reactions is weak. The very brief treatment of electrochemical methods should either be expanded or eliminated. A discussion of the Hellmann–Feynman Theorem (p 144) is not necessary in a text at this level.

If a topic is to be included in a book, it makes sense to present it in sufficient depth so it can be utilized by the student. With this in mind, the authors could develop a very nice second edition, without lengthening the book, by consolidating the subjects treated and reducing their number.

D. A. Sweigart, *Brown University*

Mechanisms of Ionic Polymerization: Current Problems. By B. L. Erusalimskii (Leningrad Macromolecular Institute). Consultants Bureau: New York and London. 1986. ix + 306 pp. $89.50. ISBN 0-306-10991-3

In the face of the vast literature on the subject of ionic polymerization mechanisms, including books and monographs, this new work attempts to bring to light and appraise critically the many new facts and concepts that have enriched the field in recent years. In the Foreword the author states that he has addressed himself "... to the reader who is already quite well acquainted with the general literature." He has dispensed with detailed introductions and has instead limited himself to brief comments on the fundamentals of the subject. The author therefore concentrates mainly on the problems of reactivity and stereospecificity of ionic active sites. The discussion of these topics forms the bulk of the monograph (Chapters 4 and 5, 188 pages). These chapters are preceded by a brief description of the processes of ionic polymerization (Chapter 1), a brief analysis of some physicochemical studies on ionic initiators and growing chains (Chapter 2), and a general analysis of multicenteredness, i.e., the origin and coexistence of different active sites (Chapter 3).

Chapter 1 is a general and rather abstract discussion of the characteristics of ionic polymerization processes. Because of its generalizations without specific examples, it will probably be of little use to the uninitiated reader. The active practitioner will find it unnecessary. Chapter 2 is a different matter. Here the author deals with the methods used in the study of non-free-radical active sites. The methods are mainly spectroscopic (UV, IR, NMR), electrochemical, and quantum-chemical. In this chapter he treats Ziegler-Natta as well as cationic and anionic processes. This is a highly technical and critical analysis of the recent findings on these research methods and of their use in the analysis of active sites. Chapter 3 examines the following general questions: (1) how the effects of different active sites may result from very different causes, (2) whether mutual transitions between individual species take place, and (3) the relative activity of each of the sites that is functioning in a given system. Here again, the analysis is detailed and critical.

In the main chapters (4 and 5) Erusalimskii deals with the meat of the subject that he has carved out. He does so in Chapter 4 by analyzing the progress that has been made in studying the reactivity of initiators of growing chains, and in particular of monomers. He deals with organolithium and organomagnesium active sites, with cationic active sites and the effect of counterion on the latter, with Ziegler-Natta systems, medium effects, and monomer structure. In Chapter 5 he discusses in critical and exhaustive detail the problem of stereospecificity and the high degree of structural regularity that has become so important in the practice of synthetic polymer chemistry.

Erusalimskii ends his monograph with a brief chapter in which he examines several important questions regarding polymerization mechanisms that remain unclear. Among these unanswered questions are systems in which radical anions play a role.

As the author points out, he has had to limit the scope of processes examined. This limitation in scope is combined with considerable detail in those discussions that are included. Except for Chapter 1, each chapter carries an exhaustive bibliography.

Jack E. Fernandez, *University of South Florida*

Quantitative Analysis using Chromatographic Techniques. Edited by Elena Katz (Perkin Elmer Corporation). John Wiley & Sons: New York. 1987. xviii + 427 pp. $69.95. ISBN 0-471-91406-1.

This book is one of those multiauthored volumes that have so often in the past disappointed this reader. Unfortunately, the present example is not an exception. The stated objective for the book is "to encompass all of the important aspects of quantitative chromatography (*sic*) analyses".

The book is divided into nine contributed chapters. Chapter 1 is an elementary introduction to the concepts of the chromatographic process. Chapter 2 is a brief discussion of the detectors used in liquid chromatography; many similar and more comprehensive reviews exist. Quantitative measurements in liquid chromatography are discussed in Chapter 3 with examples taken from the author's work. The most popular detectors used in gas chromatography are reviewed in Chapter 4, which is followed by a treatment of quantitative analysis with gas chromatography (Chapter 5). A good portion of Chapter 6 dealing with quantitative thin-layer chromatography is taken from an earlier book by one of the authors, but the discussion of errors is new and more complete than those in Chapters 3 and 5. Chapter 7 deals with the application of quantitative chromatographic methods to the analysis of pharmaceuticals. The desiderata of automated analytical methods are discussed in Chapter 8; it concludes with a discussion of the use of robots for the preparation of samples and the loading of them into otherwise fully automated chromatographic systems. In Chapter 9 an introduction is given to the complex matter of extracting information from the shapes of peaks generated by liquid chromatography. The measurement of diffusion coefficients and distribution isotherms is discussed, but the influence on peak shapes of systems undergoing chemical transformation is excluded. While this brief account is only indirectly related to the subject of quantitative analysis, it is one of the more valuable contributions to this book.

Taken individually, the chapters constitute informative reviews of the subjects of the chapter headings. However, the reading of the book from cover to cover is a frustration because of the amount of repeated material and the diverse styles and notations. Some examples are the redundant presentations of the meaning of a linear response curve in Chapters 1, 2, 3, 4, and 7, and the two explanations (Chapters 3 and 5) of the internal-standard method of calibration for gas and liquid chromatography with different notations. One might expect in a book on quantitative methods some discussion of statistical methods of data reduction. However, only in the Thin-Layer chapter are regression techniques mentioned. Mercifully, the editor has seen that references to the characteristics of commerical instruments do not appear and has tried to achieve cohesiveness by providing a list of symbols. But the book stands as a collection of individual reviews of varying quality, and should be purchased as such, and not as a general, coherent account of quantitative methods. It falls short of its objective.

T. W. Gilbert, *University of Cincinnati*