

either of two dissimilarity measures: Elucidian distance or correlation between data points. Alternatively a pre-calculated dissimilarity matrix can be keyed in directly or loaded from a file. The cluster analysis is performed with either screen or printer and screen display. Options exist in both programs to store new data files for each step along the way. Clue-C displays and/or prints previously stored cluster results and may be selected directly from the start-up menu.

Clue comes boxed with a vinyl, 3-hole notebook manual typical of commercial software but with oversized pages. The four-part manual includes an introduction (9 pages), user guide (79 pages), scientific background (25 pages), and program listing (39 pages). The brief introduction provides a descriptive overview and two applications. The well-written and organized user guide first describes each of the programs and menu options and then explains the simple installation procedure. Finally, operations with a tutorial data set are demonstrated, so that the user can be running Clue after only a few hours of reading. The scientific background section consists of one- or two-page explanations of each major mathematical term and procedure.

Clue can be implemented either on diskette or hard disk drive; the procedures for both are explained. A batch file (AUTOEXEC.BAT) is provided to initiate Clue-A, in which the installation program is maintained. BASICA must be available on the diskette, in the subdirectory, or through a PATH command.

The Clue programs are supplied as both BASICA interpreted (.BAS) or compiled (.EXE) files, and the start-up menu offers selection of either. As might be expected the performance of the compiled version executable file is significantly faster than the interpreted version. This becomes obvious when calculations are performed in each stage by following the displayed number of objects left to be computed. With a fast CPU (e.g.,

IBM PS/2 Model 80, 16 MHz), these indicators never appeared for the compiled version.

Data files are sequential with file information, including the number of objects and variables as well as missing data identifier, preceding the data. Normally, 50 objects by 50 variables can be manipulated, although changes to the source code are described to increase the number of objects (maximum recommended 65) with less variables (e.g., 25). Data entry, review, and editing are provided in Clue-A, although for large data sets, editing or configuring data files with a spreadsheet or data base management program would probably be faster and more efficient.

In no more than an afternoon a new user can be applying Clue constructively. Clue does its job well, but some additional user-oriented features would have been nice to have been included. For example, objects and variables are identified only by the order in which they appear in the data file, and the final cluster result or graphic representation (dendrogram) contains only the object numbers. If object identifiers or short labels were added to the data file and printed with the results, then the user would not have to re-identify each one during the final interpretation. Secondly, the menu selection is effective although primitive, and returning to Clue-A from Clue-B or -C requires restarting the entire program. No escape or abort is provided once some of the selections begin their operations, which makes recovering from a mistake in typing sometimes cumbersome. On the wish list of future items, it would be nice to see Clue adapted so that it could run as a command language program within a spreadsheet or data base program.

Overall, Clue is a valuable and useful software package, which is easy to learn and apply. It is supported by a good user guide and reflects the long experience of the expert chemists who wrote the software.

Ramon M. Barnes, *University of Massachusetts*

Book Reviews*

Acid-Base Chemistry. By C. W. Hand and H. L. Blewit (University of Alabama). McMillan Publishing Co.: New York. 1985. X + 273 pp. \$19.35. ISBN 0-02-349910-9.

The book is not a research compendium and there are no references to the literature. It is a teaching text covering the entire range of undergraduate subject matter dealing with acid-base chemistry (some of it remotely) as taught in inorganic, analytical, and organic chemistry courses. The excellent chapters VII through IX deal in detail with the quantitative aspects of aqueous acid-base equilibria (salt hydrolysis and buffers, titrations, polyprotic and amphoteric substances). Examples of thorough solutions of numerical problems are included. Lists of problems suitable for homework or exams are given at the end of all chapters of the book.

The parts of the book dealing with what could be taught in organic chemistry contain the sort of misconceptions and pedagogically misleading aspects found in many text books—such as ground-state reasoning, careless use or misuse of the resonance concept, and failure to clearly delineate ionic compounds. The authors stretch the definition of acid-base reactions perhaps too far for useful categorization, including as examples S_N2 , nucleophilic addition to $C=O$, and aromatic substitution. One example of a glaring error: "For diprotic strong acids $[H_3O^+]$ is equal to twice the original molarity."

W. M. Schubert, *University of Washington*

Comprehensive Carbanion Chemistry. Part C. Ground and Excited State Reactivity. Edited by E. Buncl (Queen's University) and T. Durst (University of Ottawa). Elsevier Science Publishing Company Inc.: Amsterdam and New York. 1987. ix + 372 pp. \$122.00. ISBN 0-444-42869-0.

This third volume in this series covers five diverse areas in six chapters. To my taste, the review of molecular orbital theory of carbanions by Radom and co-workers is the best, being comprehensive (at the ab initio level), insightful, and critical. The review is complete and up to date to early 1986 (392 references). Chapters 5 and 6 offer an interesting contrast in approaches to fluorinated carbanions. Koch has treated a limited number of carbanions generated by addition to alkenes and their proton transfer kinetics in alcoholic solvents. The careful analysis of isotope effects and consequent mechanistic conclusions is a model of clarity and logical thought. Chambers and Bryce have covered a wide

variety of fluorocarbanions from theory through photosynthetic applications. The contributions of the DuPont group have been given scant treatment, but most references are there. Chambers makes reference to his own publications in 38 out of 128 references. The role of solvent and cation is almost ignored in this general overview. The ability of an experienced organic chemist to rationalize any trend is illustrated here.

The second chapter, by Fox, is another general treatment. It gives a broad-ranging qualitative overview of electrochemistry from the point of view of an organic chemist. The review will be of limited interest to practitioners of the art. The proof-reading of this section does not match the high standards in the rest of the volume.

Grovenstein has provided a survey and analysis of the structure of organodialkali compounds. The results of X-ray determinations and theoretical calculations are covered in detail. The importance of electrostatics and cation coordination in establishing the equilibrium structures is emphasized. Tolbert's review of the excited state chemistry of carbanions provides a sound introduction. It reveals the diversity of the area and Tolbert highlights many topics that are ripe for additional development.

This is a book for the specialist, but there are scattered nuggets here for the casual organic prospector.

John Grutzner, *Purdue University*

Vibrational Spectroscopy of Phase Transitions. By Z. Iqbal (Allied Corporation) and F. J. Owens (AMCCOM). Academic Press: Orlando, FL. 1984. x + 316 pp. \$61.50. ISBN 0-12-373780-X.

This multi-author volume reviews the application of infrared, light scattering, and neutron scattering spectroscopies to the study of phase transitions. Aside from a chapter on phase and conformational transitions in biological systems, the focus is on structural phase transitions in solids and the behavior of soft modes that couple to the relevant order parameters. There are, of course, numerous other books that cover similar material, for example, *Light Scattering Near Phase Transitions*, edited by H. Cummins and A. Levanyuk (North-Holland: Amsterdam, 1983). However, the inclusion of several, different vibrational spectroscopic techniques makes this volume rather unique, and it nicely complements the other existing reviews in this field.

The first chapter, by Z. Iqbal, reviews the basic concepts of structural phase transitions and soft modes, briefly discusses and compares the different spectroscopic techniques, and describes some selected, new developments. This chapter would be an excellent resource for researchers needing an introduction to the theory, or a succinct pointer to the primary literature. Infrared spectroscopy is discussed by J. Petzelt and V. Dvořák

*Unsigned book reviews are by the Book Review Editor.

in the second chapter, Raman and Brillouin scattering by C. H. Wang in the third chapter, and neutron scattering by W. Bührer and Z. Iqbal in the fifth chapter. Each of these chapters summarizes experimental results for several different structural phase transition types and materials, including order-disorder, displacive, incommensurate, ferroelectric, and ferroelastic transitions, and charge-density wave substances, superionic conductors, low-dimensional metals, plastic crystals, and liquid crystals. The fourth chapter on Raman and infrared studies of biological systems is quite different in that the emphasis is not on solid-state, structural-phase transitions but on conformational changes and transitions. Consequently the focus is on internal modes of biomolecules, although some discussion is devoted to the recent suggestion that soft modes may be involved in the A → B transition in DNA.

I would recommend this book both to those looking for a general introduction to this area as well as to those looking for specific leads to the literature (references up to 1984 are included). It would be equally at home in either a chemistry or physics library.

Richard A. MacPhail, *Duke University*

Proceedings of the Sixth Tihany Symposium on Radiation Chemistry. Volumes I and II. Edited by Péter Hedvig, Lajos Nyikos, and Róbert Schiller. Akadémiai Kiadó: Budapest. 1987. XIX + 890 pp. \$78.00. ISBN 963-05-4643-4.

Once every 4 years the Hungarian Chemical Society in cooperation with the International Atomic Energy Agency of Vienna organizes a week-long Symposium on Radiation Chemistry held in 1986 at Balatonszékplak in Hungary. This two-volume work, all in English, contains the typescripts of the 125 papers delivered there. The authors came from 27 different countries: 33 from the Soviet Union, 19 from Poland, 16 from Hungary, 10 from the German Democratic Republic, etc., but only 9 from the United States. By studying these papers one can obtain excellent information of the radiation chemical studies in the Eastern block of nations. The papers are listed in six sections: General Problems (18), Aqueous and Inorganic Systems (20), Organic Materials (21), Polymers (37), Dosimetry and Industrial Processes (15), and Biological Problems (14). Much excellent work is described. New techniques such as pulse radiolysis, the latter especially in the Aqueous and Inorganic Systems section, the electron swarm method for the investigation of electron attachment, the study of thermally stimulated current fluctuations, Fourier transform dielectric spectroscopy, and optically detected ESR add considerable interest.

Among many papers of practical interest the following can be mentioned: the description of the electrocurtain technical center in Geneva, a method for the homogeneous cross-linking of polyethylene articles by γ -radiation, a study of ten special-purpose heat-resistant rubbers when exposed to γ irradiation at elevated temperatures and treated with decontaminating agents, how to produce radiation cross-linked low-density polyethylene containing antioxidants that could undergo problem-free operation for 25 000 h at 125 °C, radiation-induced oxidation of pollutants in power plant combustion gases, etc. In the biological problem section a paper on increase of aerobic and hypoxic radiosensitivity after extensive glutathione depletion can be mentioned.

In the polymer section, eight papers are devoted to the study of radiation effects in polyethylene. There are also several papers related to the effect of additives; for example, in one paper it is concluded that the introduction of additives such as propyl alcohol in poly(methylmethacrylate), which can cause vibrational cross-relaxation, is an effective method for the improvement of the stability of polymers against γ - and UV-irradiation.

In conclusion we can say that these two volumes demonstrate again the scientific importance of the Tihany Symposia on Radiation Chemistry.

Malcolm Dole, *Los Gatos Meadows, California*

Gas-Phase Chemiluminescence and Chemi-Ionization. Edited by A. Fontijn (Rensselaer Polytechnic Institute). North-Holland-Elsevier Science Publishers: Amsterdam and New York. 1985. xii + 372 pp. \$40.75. ISBN 0-444-86950-6

This book is based on the lectures presented at an ACS symposium of the same title held in 1984, although several additional chapters have been added and the contributions were individually refereed. The stated purpose is, for the first time in a single volume, to bring together a discussion of the title phenomena. The editor's projected audience is both the worker already in the field and the beginning graduate student. The initial response of any reviewer asked to report on a volume of current research papers already 3 years old is skepticism. Indeed, the references are, for the most part, only complete to late 1983. However, in searching for the most recent previous review of this type of material, one must go back to 1971 and Volume 6 of *Progress in Reaction Kinetics*. Clearly, the need for this compendium existed in 1984 and the book will still prove

useful, especially as a resource to workers in the field, in 1988.

The book opens with an excellent introduction and overview by the editor. This is followed by 18 additional "chapters" of 10–25 pages written by active researchers in various subdisciplines of chemiluminescence and chemi-ionization. The topics covered extend from basic inquiries into the theory and chemical dynamics of atom (ion)-molecule reactions to applied work in flames, surface catalysis, atmospheric chemistry, and environmental problems. The editor appears to have enforced upon the individual authors his vision of a mixed target audience. For the most part, each chapter begins with a brief introduction aimed at one not expert in that particular area. While certainly not the equivalent of a text, the beginning graduate student will have no difficulty becoming familiar with some basics and will pick up sufficient background to confidently approach the voluminous literature in this branch of physical chemistry.

The only deficiency in this volume is that the format tends to discourage extensive bibliographies. It is not a review in the usual sense of complete literature coverage, but the reference lists will certainly direct the reader to appropriate starting points for such information. The book has definitely met the intent of the editor and will supplant the series noted above as both the introductory material for new graduate students and general resource material for established researchers. I recommend it to those involved in this type of research.

Joseph J. BelBruno, *Dartmouth College*

Anti-anxiety Agents. Edited by Joel G. Berger. John Wiley & Sons: New York. 1986. \$65.00. xii + 164 pp. ISBN 0-471-80705-2.

This book is a short multi-authored guide to the field of minor tranquilizers, aimed at a chemical audience. It focuses on the benzodiazepine family of drugs, of which Librium and Valium are well known examples. The book describes the in vitro and in vivo test methods, as well as the synthetic chemistry of the benzodiazepines and other newer molecules which have shown anti-anxiety activity. The authors of the four chapters are well recognized investigators in their fields and have done a thorough job reviewing their areas.

The chapter by Phil Skolnick and Steven M. Paul on receptor binding describes the techniques for screening new molecules by the displacement of radio-labeled ligand from rodent brain preparations. Many chemists may be unaware of the power of receptor binding studies as a method for rapidly screening large numbers of new compounds; only tiny amounts of each sample are required. The authors also explain some of what is understood about the function of the benzodiazepine receptor in a living system. A limitation of this discussion is that the field of receptor studies changes rapidly and a book chapter such as this is soon out of date.

The chapter on animal testing by Allen Barnett describes the behavioral and drug-induced models of anxiety in mice and rats with some discussion of monkeys. There is also a discussion of tests for side effects and for dependence. Anyone seeking a cogent introduction to the field of behavioral pharmacology would be very well served by this chapter.

The longest chapter in the book is by Jackson B. Hester, Jr.; it describes various methods of synthesis of the benzodiazepines as well as a description of pharmacologically useful modifications of the basic system. This chapter nicely complements the recent two-part series in *The Chemistry of Heterocyclic Compounds*, Volume 43, which omitted benzodiazepines. I suspect that even the most knowledgeable CNS chemist would glean something from Hesters' review.

The final chapter, by Joel G. Berger, describes the synthesis of other molecular types which have shown anti-anxiety activity in the laboratory. There are compounds which bind to the benzodiazepine receptor but which do not closely resemble the benzodiazepines and a diverse array of molecules which do not interact with the receptor but which do show anti-anxiety activity in other models.

All in all anyone about to embark in a new program of synthesis of anti-anxiety agents is urged to buy this book.

T. C. McKenzie, *The University of Alabama*

Liquid Chromatography Detectors. 2nd Edition. Journal of Chromatography Library. Volume 33. By R. P. W. Scott (Perkin-Elmer Corporation). Elsevier Science Publishers: New York and Amsterdam. 1986. xvi + 271 pp. \$64.75. ISBN 0-444-42610-8.

Since the first edition of this popular book was published in 1977, there have been many important advances in liquid chromatographic detection. The revised version, which retains the form and substance of the first edition but includes a significant amount of new material and references, is a valuable and timely addition to the literature.

In the first two chapters, the history and classification of liquid chromatographic detectors are described, and appropriate performance criteria are defined. Chapter 3 summarizes the principles and applications of bulk-property detectors, such as the refractive index, electrical conductivity, dielectric constant, and other less common detectors. In

Chapter 4, selective property detectors such as UV absorbance, fluorescence, electrochemical, radioactivity, and other detectors are described. The combination of liquid chromatography with ancillary spectroscopic techniques such as NMR, MS, and IR spectroscopy is described in Chapter 6. In Chapters 5 and 7, special detector techniques and computer data acquisition are described. Finally, practical information concerning the selection and optimal use of these detectors is contained in Chapter 8.

Although the text is comprehensive and well-written, it contains some conceptual errors. For example, the thermal lens detector provides an indirect means of measuring solute absorbance and, hence, should be classified with other absorbance detectors rather than with bulk-property refractive index detectors. Similarly, the interferometric detector should be discussed and compared with other refractive index methods, rather than as a separate detector class. The electrical conductivity detector is described and characterized as a bulk-property detector, although its primary use is for selective detection of ionic solutes. In addition to these classification errors, there are several significant omissions from the text. Light-scattering detectors, which have been commercially available in several designs, are not presented. While fluorescence detection is briefly discussed, there is no mention of other luminescence techniques such as phosphorescence or chemiluminescence. Likewise, atomic absorption spectroscopy is discussed as a means of metal-specific detection, but not the more common technique of atomic emission spectroscopy in flames or plasmas. There is no discussion of the recent developments in laser-based detection methods for refractive index, absorbance, fluorescence, optical activity, and photothermal and photoacoustic measurements. Finally, although the bibliography has been expanded in the revised edition, more than two-thirds of the references are dated prior to 1980 and no references are given to the many fine review articles in this field. These errors and omissions, while notable, detract only slightly from the practical utility of this book. The revised edition is highly recommended for libraries as well as for those individuals who wish to learn the basic principles of detector design and operation and who wish to obtain optimal performance from their commercial chromatographic detectors.

Victoria L. McGuffin, *Michigan State University*

Annual Review of Biophysics and Biophysical Chemistry. Volume 15. Edited by Donald M. Engelman, Charles R. Cantor, and Thomas D. Pollard. Annual Reviews Inc.: Palo Alto, CA. 1986. ix + 498 pp. \$47.00. ISBN 0-8243-1815-3.

This volume contains an excellent group of articles which review the current state of areas such as ion channels, active transport, analysis of nucleic acid and amino acid sequences, muscular contraction, electrostatic interactions in membranes and proteins, halorhodopsin, polar fish glycoproteins, recombinant lipoproteins, the nuclear matrix and DNA, and applications of NMR and electron spectroscopy to specific biological systems. The articles provide an excellent cross-section of research being carried out in biophysics and biophysical chemistry and encompass new techniques and applications, detailed measurements and analyses, and theory. The reviews provide detailed and up-to-date summaries which should be useful for experts in the respective fields. In general, the articles also provide clear overviews which will be helpful for nonexperts. This is an excellent volume for those interested in the areas covered, as well as for individuals with a general interest in biophysics and biophysical chemistry.

Dewey Holten, *Washington University*

Biochemical Techniques: Theory and Practice. By J. F. Robyt and B. J. White (Iowa State University). Brooks/Cole Publishing Company: Monterey, CA. 1987. xvi + 407 pp. ISBN 0-534-07944-X.

This text is intended to be used in conjunction with laboratory experiments already developed by individual instructors. It is intended to present fundamental theory and practice used in biochemical laboratory courses and in biochemical research. In certain respects it will be a useful reference text. It contains and emphasizes many frequently used equations, calculations, and methods. There is an extensive bibliography and a few appendices that might be useful.

The text starts with a very important chapter—Analyzing and Reporting Experimental Data. However, as is the case with most of the chapters, the chapter seems to be designed for students who have not had a previous course in statistics. Since this may be the case with statistics and many biochemistry students, this chapter is very appropriate. However, there is one omission in the chapter, especially as scientists are recognizing the value of their knowledge and findings. There is no mention of the laboratory notebook.

Subsequent chapters address the preparation and properties of solutions, spectroscopic methods, chromatography techniques, electrophoretic techniques, theory, measurement, and use of radioisotopes, qualitative and quantitative methods for determining biological molecules, biological

preparations, enzymology, and structural analysis of biological molecules. The text has a historical flavor that is quite interesting but unfortunately may be distracting. Many of the described techniques are very important and useful but very dated and certain modern techniques are missing. For example, the chapter on spectroscopic methods does not include sections on ESR, Mössbauer, etc. The chapter on chromatography contains an excellent reference (table on p 91) that gives water regain, exclusion limits, maximum hydrostatic pressure, and maximum flow rates for a number of common gels used in gel-permeation chromatography. However, HPLC, perhaps currently the most widely used technique, is allotted very little coverage. Other, more modern, methods are not mentioned. There are several other examples of things that seriously date this text. The chapter on electrophoresis stresses high voltage paper electrophoresis. The chapter on radioisotopes includes plachets for Geiger-Müller counting. The section on qualitative and quantitative methods covers a Rudolph polarimeter but not the bicinchoninic acid method of protein analysis nor the ELIZA method, for example. In many cases the authors were limited by space and therefore chose only to give examples of methods. For example, under biological preparations (Chapter 8) only liver mitochondria and nuclei, spinach chloroplasts, and *E. coli* ribosomes are listed, and the methods presented are somewhat dated. They may be very appropriate for many teaching laboratories but probably not for modern research laboratories.

In summary, this may be a useful reference text for very basic biochemistry. Students in biochemistry may want to have the text for a quick reference but it may not be all that useful for well-trained students in a modern research setting. The text may be quite useful as a supplement to a biochemistry laboratory manual for undergraduate biochemistry majors, especially if laboratory equipment is limited. It may have less utility in a modern research laboratory but it may still be a very good text to have on the laboratory shelf.

Steven D. Aust, *Utah State University*

Problems and Solutions in Organometallic Chemistry. By S. E. Kegley (Middlebury College) and A. R. Pinhas (University of Cincinnati). University Science Books: Mill Valley, CA. 1986. xii + 323 pp. \$18.00. ISBN 0-9357-2-23-7.

Although an independent publication, *Problems and Solutions in Organometallic Chemistry*, is intended to match the subject material covered in *Principles and Applications of Organotransition Metal Chemistry*. Chapter 1 on *methods for the identification* is a very useful supplement, although it does not contain any problems and solutions. The remainder of the book provides a large number of problems and solutions with many references. The number of problems on applications to organic synthesis is, however, disproportionately small. Despite this weakness, it is a unique book without competition. At another bargain price of \$18.00, it may be strongly recommended as supplementary material for a course on organotransition-metal chemistry.

Ei-ichi Negishi, *Purdue University*

Principles and Applications of Organotransition Metal Chemistry. By J. P. Collman (Stanford University), L. S. Hegeudus (Colorado State University), J. R. Norton (Colorado State University), and R. G. Finke (University of Oregon). University Science Books: Mill Valley, CA. 1987. xii + 989 pp. \$48.00. ISBN 0-935702-51-2.

This is a "second edition" of a book with the same title written by J. P. Collman and L. S. Hegeudus and published in 1980. It has been extensively rewritten and expanded from 15 chapters and 715 pages to 20 chapters and 989 pages. It consists of three parts: Part I, Basic Principles; Part II, Catalytic Processes; and Part III, Applications to Organic Synthesis.

Part I contains 8 chapters and about 500 pages. Following a brief discussion of *structure and bonding* (Chapter 2), an extensive *survey of organotransition-metal complexes according to ligands* is presented in a 178-page chapter with over 600 references. The rest of Part I except Chapter 9 on *metallacycles* presents an excellent discussion of fundamental processes for organotransition-metal complexes. This part of the book has been substantially revamped and improved. In the original version, only *oxidative addition*, *reductive elimination*, and *insertion reactions* were discussed. In addition to these topics, *ligand substitution* (Chapter 4), *nucleophilic attack* (Chapter 7), and *electrophilic attack* (Chapter 8) are now included. Thus, most of the known processes are covered, although some fundamentally important processes, such as carbonyl addition, are not explicitly discussed. Chapter 9 on *metallacycles* appears to be out of sequence. Logically, it should follow Chapter 3. It is also somewhat odd to find a separate chapter on metallacycles, while all the other types of organotransition-metal complexes, such as σ -organyl derivatives, metal-carbene and metal-carbyne complexes, i.e., "two-membered" metallacycles, and various π -complexes, are discussed in Chapter 3. Although excellent in general, some potentially confusing

features are also present in Part I. In Chapter 2, for example, some alkylidene groups and imides are considered as neutral 2-electron donors, whereas the other alkylidene groups are considered as -2 , 4-electron donors. Likewise, NO and diazenides ($-\text{N}=\text{NR}$) are viewed as either $+1$, 2-electron donors or -1 , 2-electron donors. All confusions and dilemmas associated with the electron counting formalisms stem from the coexistence of a few different and arbitrary ways to divide and assign the valence electrons to the metal and ligands. This point could have been made more explicit so as to minimize confusions and misunderstanding about this matter.

Three groups of industrially important catalytic processes, i.e., *hydrogenation* and related reactions, *polymerization of olefins and acetylenes*, and *carbonylation*, are presented in Part II. Presentation of various polymerization reactions of olefins and acetylenes in one chapter (Chapter 11) represents an improvement over the original version.

Part III (Chapters 13–20) corresponds to Chapters 7 and 9–15 of the original version. *Applications of metal-carbene complexes* are discussed much more extensively than in the original version, reflecting the rapid developments in this area over the past decade. Part III is mostly arranged according to the types of carbon ligands. In some chapters, general schemes showing various synthetically useful transformations are shown in the beginning, and their specific examples are then presented. This is a useful and pedagogically attractive format. This format, however, is not followed in Chapter 18 on *transition-metal alkyne complexes* and Chapter 19 on η^3 -*allyl transition-metal complexes*.

The weakest aspect of the book is the drawing work. It is almost uniformly poor and contains many obvious errors, such as 37 (p 68), 8.37 (p 452), 9.19 (p 470), 10.53 (p 560), 11.44 (p 614), 14.63 (p 717), 17.40 (p 841), and 17.62 (p 853).

Despite some shortcomings, such as those mentioned above, this book continues to be about the only one which at least adequately covers the structural, mechanistic, and synthetic aspects of organotransition-metal chemistry all in one volume, while providing over 2000 references. At \$48.00, it is also a bargain by today's standard. Indeed, it is the book this reviewer has used and plans to use as the textbook for a graduate-level special topics course on the subject.

Ei-ichi Negishi, *Purdue University*

Introduction to Modern Statistical Mechanics. By David Chandler (University of California, Berkeley). Oxford University Press: Oxford and New York. 1987. xiii + 274 pp. \$42.00. ISBN 0-19-504276-X. Paperback ISBN 0-19-504277-8.

This book is for people who want short, sophisticated treatments of a number of modern topics in statistical mechanics and who already have an excellent background in physics and a good understanding of classical statistical mechanics, thermodynamics, and quantum mechanics. This is not a book from which to learn the basics, though the first 118 pages are devoted to them. It is a book from which to get new ideas, new ways of looking at or approaching these topics: phase transitions (the Ising model), the Monte Carlo method, classical fluids (distribution functions, especially the radial distribution function, including solvation and chemical equilibrium in liquids, even molecular liquids), non-equilibrium systems (including time correlation functions, fluctuation dissipation, chemical kinetics, absorption of light, and the Langevin equation).

Attractive features of the book are three Monte Carlo computer programs (in Basic) with which readers may experiment: one for the two-dimensional Ising model, one for a two-level system coupled to a fluctuating field, and one for a classical hard disk fluid. The book covers a lot of tough topics quickly. It seems to be written more to physicists than chemists, though chemists certainly have many reasons to understand these topics. Readers attracted to the book by the word "Introduction" in its title might feel like the whole thing was going over their head. Readers who already understand the topics will be able to appreciate and benefit from Chandler's elegant presentations.

Frank C. Andrews, *University of California, Santa Cruz*

Micro-Algal Biotechnology. Edited by Michael A. Borowitzka (Murdoch University, Australia) and Lesley J. Borowitzka (Western Biotechnology Ltd., Perth, Australia). Cambridge University Press: Cambridge and New York. 1988. x + 477 pp. \$79.50. ISBN 0-521-32349-5

The micro-algae have been of economic interest for some time. In the 1940's, diatoms were studied as sources of liquid fuels and since the 1950's micro-algae have been a source of single-cell protein. This book provides a comprehensive introduction to algal biotechnology with references through 1985. It will be of interest to biotechnologists, biochemists, bioengineers, and civil engineers.

This book is divided into three sections. The first, the algae, includes discussions of the morphology, growth requirements, and physiology of *Chlorella*, *Dunaliella*, *Scenedesmus*, *Spirulina*, *Porphyridium*, and other micro-algae. Products and uses of micro-algae comprise section two.

Dunaliella is the first micro-alga to be used commercially to produce fine chemicals and is the best natural source of β -carotene. Many algae produce vitamins, pigments, bile proteins, phytol, amino acids, polysaccharides, biofloculants, polyols, and other carbohydrates as well as pharmaceuticals and biologically active compounds. Algae play an important role in aquaculture as a food source for molluscs, shrimp, and some fish. They are also used for human and animal food. *Spirulina* has become a popular health food. Extensive toxicological studies indicate that it is safe for human consumption. Significant amounts of fats, oils, and hydrocarbons are also produced by micro-algae. These include lipids, fatty acids, wax esters, sterols, and starting materials for liquid fuels. Micro-algae also play an important role in agriculture and waste water treatment. The last section is devoted to the technology of micro-algal mass culture. This includes growth limits, large scale culture systems, harvesting, and genetic engineering.

An appendix contains directions for media preparation and sources of algal cultures, as well as species and subject indices. Extensive references are included.

This book is typeset and has fine drawings and photographs. It has been put together with care and attention to detail.

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

Carbon: Electrochemical and Physicochemical Properties. By Kim Kinoshita (Lawrence Berkeley Laboratory). John Wiley & Sons: New York. 1988. viii + 533 pp. \$75.00. ISBN 0471-84802-6.

This book provides a reference source for the application and study of carbon materials in electrochemistry. The first four chapters deal with the physical properties and chemical reactivity of carbon in its many forms. The remaining chapters focus on the role of carbon materials in electrode and electrochemistry applications. The book concludes with a complete listing of recently assigned patents pertaining to carbon-based electrodes and electrode substrates.

The first chapter is devoted primarily to the production of carbon. Chapter 2 is concerned with the physical properties of carbon and contains an excellent account of the microstructure of carbon materials. Many of the important properties are presented in clear, readily understood tables and figures. Reactivity and surface properties of carbon are reviewed and well referenced in Chapters 3 and 4. These chapters also provide a survey of the spectroscopic analysis of carbons, graphites, and chemically treated carbons.

Chapter 5 discusses the various types of carbon electrodes, grouping them into porous, nonporous, and intercalated structures. This section contains a good discussion of chemically modified electrodes and contains tables of chemical modification reactions involving covalent bonding, irreversible adsorption processes, and polymer films coating. The two subsequent chapters deal with the electrochemical behavior and the application of carbon in electrochemistry. These chapters are very thorough and contain over 600 references. The final chapter suggests areas of research that the author feels are most important to carbon electrochemistry.

Overall the book is well-written and is organized in such a way as to be an excellent reference source. For those subject areas in which greater detail is not possible, for example, the discussion of the electrical properties of carbons, other review works are cited. The reviewer recommends this volume both to electrochemists and to materials scientists with an interest in carbon.

Tom Apple, *University of Nebraska*

Dense Gases for Extraction and Refining. By E. Stahl, K.-W. Quirin, and D. Gerard (University of the Saar). Translation from the German Edition by M. R. F. Ashworth. Springer-Verlag: Berlin, Heidelberg, and New York. 1988. xii + 237 pp. \$89.50. ISBN 0-387-18158-X.

This volume is a compilation devoted entirely to the present state of extraction and fractionation with dense gases. It is fitting that this work is a translation from German, for historically and scientifically this is an area long pursued by Europeans in general and Germans in particular. Not surprisingly, many of the important references from the original literature are in German. The book is very well referenced, including a complete list (at the front of the book) of all abbreviations. This volume may be of importance in that it makes the techniques and literature of this important, but, at least in the U.S., rather proprietary area open to all. There are numerous schematic drawings of pilot-plant set-ups, methods of sealing autoclaves, and many other important technical details. I must say that the inclusion of the "how to" aspects of this book was most refreshing. Basic physicochemical principles such as phase diagrams and equilibria are included only for a better understanding and not as a primer on the scientific background. There is, however, a chapter entitled "Basic Principles of Extraction with Dense Gases". This is not a chapter for the uninitiated, as one proceeds quickly from a simple $P(T)$ state diagram of a pure substance, through extraction circuits to $P(T)$

projections of selected $P(X)$ isotherms; rapidly through phase equilibria ending in a P,X diagram of Henry's Law Plot of CO_2 and n -hexane.

Many sections of the book read like technical reports in that the substance to be extracted, conditions, solvation procedure (complete with apparatus and some operational details), and graphs charting the results are clearly given. However, the authors' style eliminates a need on the reader's part to fall asleep during such discussions.

I did find the index somewhat disappointing in that it is only a subject index (as stated), yet more abstract subjects such as dew point and dielectric constant were to be found, whereas there were no cross references to such topics as applications of, e.g., the Peng-Robinson equation (used in the book) were listed.

A very useful feature of this book is to be found in chapter three, Table 7, i.e., a literature survey through 1984 of substance separation using dense gases.

As a side note, it becomes clear in even cursory reading of this volume how far the U.S. is behind Europe in supercritical extraction, and as an example, the ROSE process is briefly discussed. It has essentially died because of this country's incredible short sightedness with regard to petroleum reserves specifically and a lack of basic research support more generally.

For those interested in particular in dense-gas extraction applications, or even dense-gas theory, this book makes very interesting reading. It is thorough, clear, and up to date by comparison to other available compenda of supercritical applications.

F. G. Baglin, *University of Nevada (Reno)*

Impedance Spectroscopy Emphasizing Solid Materials and Systems. By J. Ross Macdonald (University of North Carolina). John Wiley & Sons, Inc.: New York. 1987. xvi + 246 pp. \$44.95. ISBN 0471-83122-0.

This is a well organized book written in four chapters. The organization and clarity of presentation are rather surprising in light of the fact that there are actually ten contributing authors. However, the book is not a series of articles written by the individual contributors, but rather it is written in a fashion that one has come to expect of a textbook with a sole author. This book addresses the theories and techniques used in impedance spectroscopy. There is little mention of the physical-chemical interpretation of the results.

The first, rather short introductory chapter describes and defines impedance spectroscopy. There is a brief mention of the history of the technique and its application in materials characterization science. Much is said about the models used to interpret the data. All experiments and materials, collectively called the system, are modelled as complex networks of resistors and capacitors. The data are the complex impedance of the system which are, in turn, analyzed in terms of the first-order processes giving rise to the phenomenological response of the system.

The second chapter addresses the theory of impedance spectroscopy. The chapter is subdivided into two main sections addressing the electrical analogues of physical and chemical processes, and the physical and electrochemical models. The electrical analogues are RC networks, although here, more emphasis is placed on the foundation theories, i.e., the Debye theory of dielectric properties. Using the electronic network model allows for a simplified interpretation of the data in terms of well-known and understood electronic components. This reviewer found no problem with this analogue model approach to the interpretation of the physical theories. The development is clear and concise. However, there may be a tendency for some to lose track of the physics in this approach since there is much said on choosing the proper model, in terms of electronic components, and less said about how to model the physical theories with electronic analogues. But bearing this in mind, the interested reader will find a wealth of information that will allow practical application of these models, even to systems not specifically covered in this text. Besides the foundation models derived from the Debye theory, the main physical theory discussed is that described by the Nernst-Planck equation for electrochemical systems. Subsequent sections of this chapter are devoted to modifications of the theoretical model to more realistically represent the data obtained in impedance spectroscopy. Several particularly virtuous sections discuss the ambiguity among models. The arguments found in these sections are rather unique and hopefully will serve as models for future books describing the experimental nature of measurement science.

The topic of the third chapter is precisely described by the chapter title: Measuring Techniques and Data Analysis. Again, the chapter is divided into two main sections. The first describes the many means by which one can obtain impedance spectra. This section is a straightforward discussion of the instrumentation and the different methods used to obtain the data. Of particular value here are the concise discussion of the virtues and limitations of each of the many techniques presented. Since the data can be obtained as either time dependent impulse-response or as frequency domain complex impedance, transform techniques are

necessarily introduced. The second section of this chapter addresses the data analysis. It is not particularly comprehensive but it does reflect the current state of the art in the practice in model identification. Only a few examples are given here and the data smoothing and modelling procedures are only referred to, not stated in a form that would allow coding. One suspects that this is due to the fact that the author has a commercial software package available for such purposes.

The last chapter addresses the use of impedance spectroscopy for characterization of solid-state materials. This chapter is actually divided into three main sections. The first section addresses the interpretation of data in terms of the characterization of solid-state materials. There is much emphasis placed on the complementary data obtained when used in conjunction with electron microscopy for surface characterization. After this, two uses of impedance spectroscopy for characterization of solid-state materials are discussed. The first is for solid-state device characterization and the second is for the determination of corrosion parameters. Both topics include plenty of practical information, both in terms of the experimental details and in terms of typical results and their interpretation. In general, this chapter brings together the theoretical and experimental details given in prior chapters by demonstrating some of the applications of experiment to physical model interpretation.

In summary, this book is apparently complete in the discussion of models and theories used in impedance spectroscopy. It is a reference book and contains no problems that would allow it to be used in a graduate level course. It will probably serve well as a reference to those interested in the theory and practice of this particular method of materials analysis. It reads well and important points are discussed in a very clear fashion. The one problem that this reviewer has is that there is no mention of electrochemical applications in the final chapter. However, the theories and models for electrochemical applications are developed well in the theory chapter. And there is adequate reference to the electrochemical literature to allow one to start into this rather new method of analysis.

Stephen E. Bialkowski, *Utah State University*

Control of Animal Cell Proliferation. Edited by A. L. Boynton (Cancer Center of Hawaii, University of Hawaii) and H. L. Leffert (Division of Pharmacology University of California, San Diego). Academic Press: Orlando. 1987. xviii + 510 pp. \$85.00. ISBN 0-12-123062-7.

Control of proliferation in animal cells is one of the most complex and intriguing problems facing modern biology. Because of this, individual researchers cannot investigate the entire scope of the problem themselves. The "big picture" can only be presented at multidisciplinary meetings and in treatises such as the present book. In their preface to Volume 2, Boynton and Leffert state that they hope that their book "will present the reader with a coherent picture of cell proliferation...". Unfortunately, it does not. Like the blind men and the elephant, the chapters in this book present a concise and accurate alternate view of cell proliferation. There is no omniscient narrative which ties the individual chapters together. This book is the second in a series, and it is organized with the same format as the first, with sections on "Trends and Issues", "Growth Factors", "Receptors", "Transduction Mechanisms", and "Regulation". With editorial commentary, this organization would be adequate to provide a coherent picture of cellular proliferation.

Despite the organizational flaws, the individual chapters are excellent and can be applied in vacuo as comprehensive and didactic reference material. In the first chapter, Michael Ededin has authored a comprehensive and trenchant review on modern membrane biochemistry. However, it is unclear to the casual observer how the information in this chapter relates to cellular proliferation. Similar problems are encountered in other chapters. For instance, much of Goldwasser's chapter on erythropoietin deals with discriminating between stochastic and deterministic models of differentiation pathways, while most of Fenton's chapter on thrombin deals with the role of thrombin in blood coagulation. A similar complaint can be lodged against Bates' and Hedley's articles on transferrin. Of all of the chapters in the book, however, Vizard et al.'s article on repeated DNA sequences fits the least. Even the most broad-minded of readers will have difficulty applying the information in this chapter to problems in control of cell proliferation. All of the above-mentioned chapters were well written and interesting in their own right, yet compared to the theme of the book, they were non sequitur.

In contrast to those above, most of the other chapters were well focused upon problems dealing with the regulation of cell proliferation. These are exemplified by the excellent and comprehensive articles by Adamson on teratocarcinomas and by Rosnfeld et al. on the regulation of gene transcription by epidermal growth factor. Moses et al. have contributed a balanced article on transforming growth factors, which discusses the various factors from both cellular and molecular biological perspectives.

There are also a number of excellent chapters dealing with control of

blood-cell proliferation, such as those by Metcalf on Granulocyte-macrophage colony stimulating factors, by Dutton and Swain on B and T cell growth factors, and by Hedrick on the antigen receptor of T cells. These latter two articles were very complementary.

Finlay and Cristofalo have written an excellent and focused article on glucocorticoids, which includes extremely well-organized and comprehensive tables. This is followed by an equally didactic article by Thompson and Gametchu on glucocorticoid receptors. The complementarity between these two chapters on glucocorticoids was excellent, giving more information than is contained in the articles by themselves.

A similar synergy exists in the chapters by Epel and Dubé on intracellular pH and by Hesketh, Smith, and Metcalfe on intracellular Ca^{2+} . These articles both discuss pH and Ca^{2+} and the interactions between these two ion systems. Epel and Dubé have extensive experience in sea urchin egg activation and rely upon this experience in their article. There are a number of differences between urchin eggs and animal cells, and these are duly noted. They rightly comment on the importance of bicarbonate in animal systems and address, with balance, the possibility that mitogenic activation of Na^+/H^+ exchange does not result in a pH change. The only flaw with Epel and Dubé's article is that they spend a considerable amount of space questioning whether or not a pH change takes place, then they speculate on how a pH change might participate in a mitogenic response. Hesketh's chapter, on the other hand, focuses on the increase in cytosolic Ca^{2+} . They explore this comprehensively with discussions on the regulation of cytosolic Ca^{2+} , mechanisms which alter this regulation, interactions of Ca^{2+} with other systems, and molecular targets for the action of Ca^{2+} . Although much of their discussion centers on their work on the activation of thymocytes, there is some treatment of this phenomenon with regard to other systems.

In conclusion, there is little wrong with the individual chapters of this book. However, in many cases, it is unclear how the chapters in both this and the previous volume are meant to fit together to give a "coherent picture of proliferation". This problem could have been mitigated if the editors had interjected a running narrative explaining their rationale and, hopefully, simplifying a very complex subject.

Robert J. Gillies, Colorado State University

Protein Purification: Principles and Practice. 2nd Edition. By Robert K. Scopes (La Trobe University). Springer-Verlag: New York and Berlin. 1987. xv + 329 pp. \$37.00. ISBN 0-387-96555-6.

This book is intended to be a working introduction to protein purification suitable for a student or beginning researcher. As the author states, it is not intended to be an extensive treatise but instead is intended to give a brief account of the main procedures available, with a simple theoretical explanation. With this in mind, the identification of what are "main" procedures becomes somewhat arbitrary and a matter of taste.

Techniques and procedures given throughout the book are in general very good. However, I would like to see a more complete Chapter 8, Maintenance of Active Enzymes. Specifically much more information on the large variety of enzyme stabilization procedures would appear desirable. This is a very important final step in enzyme purification and could benefit from a more complete description.

On page 278, in the description of methods for measuring protein concentration, it would be good to also give a summary of the major interferences for each method, i.e., SDS, Tris, EDTA, sulfhydryl compounds, etc. While this is briefly mentioned, it can be a major pitfall in protein purification and the beginner needs to be acutely aware of interference from various buffer components.

In general, the book is excellent in theory but somewhat light on practical applications. While FPLC is briefly mentioned in Chapter 4, I would like to see a more complete description of this highly useful method for protein purification. The affinity chromatography sections of the book, however, are truly outstanding. In addition to a fine introduction to affinity chromatography, the book serves as a first-class reference to this highly useful method.

Overall, I highly recommend this book to the beginning laboratory worker embarking on a protein purification project and recommend it is an extremely useful work for anyone, beginning or advanced, doing affinity chromatography.

Arnold Hampel and James Sachay, Northern Illinois University

Books in Applied Subjects

Carbon-14 in the Environment. The National Council on Radiation Protection and Measurements: Bethesda, Maryland. 1985. vi + 108 pp. \$12.00. ISBN 0-913392-73-1.

The subject of this softbound book is the importance of ^{14}C as a "potential source of local and worldwide radiation exposure." The book

includes chapters on properties, sources, distribution, analysis, biological behavior, protection, and waste management.

Synthetic Detergents. By A. S. Davidsohn and B. Milwidsky. John Wiley & Sons: New York. 1987. xiii + 315 pp. \$59.95. ISBN 0-470-20722-1.

The original intent of this work was that it be a reference book for the industry, but this latest edition includes more material on basic synthetic processes, to meet the needs of those who wish to use it as a training manual or textbook.

Casey's Reports on Paper and the Paper Industry. By James P. Casey. Marcel Dekker, Inc.: New York and Basel. 1984. vi + 130 pp. \$79.50. ISBN 0-8247-7101-X.

This book is written for the technologist beginning a career in the paper industry. Half of it treats chemical pulping, and the other treats mechanical pulping. The content seems to be largely empirical and descriptive, and chemical structures are absent. Indexed.

What Every Engineer Should Know about Corrosion. By Philip A. Schweitzer. Marcel Dekker, Inc.: New York and Basel. 1987. ix + 124 pp. \$35.50. ISBN 0-8247-7755-7.

This book is written for engineers, designers, and architects, to enable them to reach optimal designs for prevention or control of corrosion. It is intended to be a practical book. In the 12 chapters, materials, coatings, inhibitors, and testings are strongly represented.

European Food Composition Tables in Translation. By L. Arab, M. Wittler, and G. Schettler. Springer-Verlag: New York and Berlin. 1987. viii + 155 pp. \$49.70. ISBN 0-387-17393-5.

This is a compilation of material on composition of food, taken from 19 tables from 14 European countries. The tables are accompanied by much descriptive text. Everything has been translated into English except table headings. There are, unfortunately, some horrors of translation, the result of insufficient chemical knowledge on the part of the translator, e.g., systematic names of fatty acids are all wrong ("hexane acid" instead of hexanoic acid, for example).

Pesticides on Plant Surfaces. Edited by H. J. Cottrell. John Wiley & Sons: Chichester and New York. 1987. xiii + 86 pp. \$41.95. ISBN 0-471-91478-9.

Two contributed chapters make up this book: Uptake and movement of herbicides from plant surfaces and the effects of formulation and environment upon them; and Behaviour of insecticide deposits and their transfer from plant to insect surfaces. The first chapter focuses attention on the properties of the outer layers of leaves, and the second chapter treats the questions arising out of the introduction of insects into the leaf-pesticide picture. A useful glossary and a good subject index augment the presentation.

Basic Toxicology. Fundamentals, Target Organs, and Risk Assessment. By Frank C. Lu. Hemisphere Publishing Corporation: Washington and New York. 1985. xvi + 276 pp. \$49.95. ISBN 0-89116-468-1.

The author's lecture notes prepared for a training course conducted in China in 1982 provided the basis for this book. In 18 chapters, grouped into General Principles of Toxicology, Testing Procedures, and Target Organs, it covers the subject systematically. Each chapter includes a list of references, and the subject index is substantial.

Handbook of Fiber Science and Technology. Volume LV. Fiber Chemistry. Edited by Menachem Lewin and Eli M. Pearce. Marcel Dekker, Inc.: New York and Basel. 1985. xxiii + 1090 pp. \$195.00. ISBN 0-8247-7335-7.

This book consists of twelve contributed chapters, each about a specific class of fiber: wood, jute, acrylics, polyamides, etc. Structure, properties, manufacture, analysis, uses, markets, etc., are treated in detail. Tables and graphs are abundant, and the lists of references are extensive.

Handbook of Separation Process Technology. Edited by Ronald W. Rousseau. John Wiley & Sons: New York & Chichester. 1987. xiv + 1010 pp. \$69.95. ISBN 0-471-89558-X.

The stated objective is "to cover in a single volume the operations that constitute most of the industrially important separation processes." Thirty-five contributors have been enlisted for the task. Four chapters are devoted to general principles: Phase Equilibria; Mass Transfer Principles; Phase Segregation; and General Processing Considerations. The remaining 18 chapters take up individual types of separation: distillation, extraction, adsorption, chromatography, osmosis, etc. The standpoint is that of industrial processes, and therefore separation processes that are largely analytical, such as gas chromatography and thin-layer chromatography, are not covered.

Health Hazard Control in the Chemical Process Industry. By Sydney Lipton and Jeremiah Lynch. John Wiley & Sons: New York and Chichester. 1987. vii + 358 pp. \$65.00. ISBN 0-471-84478-0.

This book is intended to be a comprehensive summary of current technology for control of toxic hazards in chemical plants, brought together from government agencies and private industry. The nine chapters range from Occupational Health Hazards to Drains, Sewers, and Wastewater Emissions (is the last term perhaps a euphemism for leaks?). The references at the end of each chapter include many government reports and publications that would otherwise be difficult to identify.

Reactions and Reaction Engineering. Edited by R. A. Mashelkar and R. Kumar. Indian Academy of Sciences: Bangalore. 1987. xxi + 331 pp. \$40.00.

This softbound volume is a *Festschrift* in honor of Dr. L. K. Doraiswamy on the occasion of his 60th birthday; it contains a tribute to him and a list of his publications. The text consists of 18 contributed papers, beginning with one on "A global study of Kondepudi's pitchfork" (Song and Aris), and ending with one on "Supercritical fluid extraction of Chinese Maoming oil shale with water and toluene" (Funazukuri and Wakao).

Process Development in Antibiotic Fermentations. By C. T. Calam. Cambridge University Press: Cambridge and New York. 1987. 217 pp. \$54.50. ISBN 0-521-30490-3.

The author's intent is to present a single account of the subject with a few examples. He has arranged his material in three parts: Background (six chapters); Process Development in the Laboratory (four chapters); and Industrial Fermentation Plants and Pilot Plants (three chapters).

Advances in Chemical Engineering. Volume 13. Edited by James Wei. Academic Press, Inc.: Orlando. 1987. viii + 274 pp. \$70.00. ISBN 0-12-008513-5.

The four contributions in this volume are the following: Future Opportunities in Chemical Engineering (E. G. Jefferson); Analysis of Transport Phenomena Using Scaling and Physical Models (E. Ruckenstein); Mathematical Modeling of Packed-Bed Reactors: Numerical Solutions and Control Model Development (R. Khanna and J. H. Seinfeld); and Mobil's Kinetic Reforming Model: A Review of Mobil's Industrial Process Modeling Philosophy (M. P. Ramage, K. R. Graziani, P. H. Schipper, F. J. Krambeck, and B. C. Choi).

Needle Felts in Gas and Dust Filtration: The Design of Mechanically-Bonded Filters. By G. J. I. Igwe. John Wiley & Sons: New York and Chichester. 1987. 132 pp. \$53.95. ISBN 0-470-20998-4.

This book deals with the production of bags and blankets for filtering gases, and in particular, with the use of "needling" (punching of fabrics) to achieve bonding of the materials.

Separation Processes in Hydrometallurgy. Edited by G. A. Davies. John Wiley & Sons: Chichester and New York. 1987. ix + 502 pp. \$154.00. ISBN 0-470-20883-X.

This constitutes the proceedings of a conference held in 1986 and contains 45 contributions arranged in six parts: Leaching; Solvent Extraction; Solvent Purification and Treatment; Membrane Separations; Ion Exchange; and Case Studies.

Manufacturing and Chemical Industries. Edited by D. Barnes, C. F. Foster, and S. E. Hruday. John Wiley & Sons: New York. 1987. xiii + 220 pp. \$87.95. ISBN 0-470-20808-2.

This volume is concerned with the control and treatment of the wastes from inorganic industries. It approaches the subject from the standpoint of the increased awareness of the potentials for environmental damage.

Handbook of Industrial Drying. Edited by Arun S. Mujumdar. Marcel Dekker, Inc.: New York and Basel. 1987. xii + 948 pp. \$150.00. ISBN 0-8247-7606-2.

This book of 29 contributed chapters is intended to be a reference work for all aspects of drying of solids, from minerals to foods. It is divided into four parts: Fundamental Aspects; Description of Various Dryer Types; Drying in Various Industrial Sectors; and Miscellaneous Topics in Industrial Drying. The only subject that appears to be missing is mummification.

Batch Process Automation. Theory and Practice. By Howard P. Rosenoff and Asish Ghosh. Van Nostrand Reinhold Company Inc.: New York. 1987. xiii + 336 pp. \$44.95. ISBN 0-442-27708-3.

Production of chemicals by batch processes rather than by continuous flow is very much alive, and is particularly important in those activities

that are carried out on too small a scale for efficient use of continuous flow (e.g., the pharmaceutical industry). Control of conditions is especially important, since it is the basis for reproducibility and good quality control. This book deals with the application of automated control, and is written for the industrial chemist or chemical engineer.

Guidelines for Laboratory Design: Health and Safety Considerations. By L. J. Diberardinis, G. T. Gatwood, J. S. Baum, E. F. Groden, M. W. First, and A. K. Seth. John Wiley & Sons: New York and Chichester. 1987. x + 285 pp. \$34.95. ISBN 0-471-89134-7.

This book is addressed to "laboratory owners, managers and occupants, architects, engineers, health and safety personnel, and risk managers." The authors represent industry, universities, health professionals, and consultants. The scope is represented by the four parts: Common Elements of Laboratory Design; Design Guidelines for a Number of Commonly Used Laboratories (these range from General Chemistry to pilot plant to radiation and biosafety); Administrative Procedures; and an extensive set of appendices.

Recent Developments in Chemical Process and Plant Design. Edited by Y. A. Liu, H. A. McGee, Jr., and W. R. Epperly. John Wiley & Sons: New York and Chichester. 1987. xviii + 509 pp. \$75.00. ISBN 0-471-84780-1.

This book is claimed to provide "both an introduction to the subject as well as a fairly comprehensive status report". It consists of twelve contributed chapters, and a substantial index.

Vadose Zone of Modeling of Organic Pollutants. Edited by Stephen C. Hern and Susan M. Melancon. Lewis Publishers, Inc.: Chelsea, Michigan. 1986. xi + 295 pp. \$49.95. ISBN 0-87371-042-8.

This book is meant for those who are concerned with soils and transport in them. The vadose zone (the region between the surface of the soil and the groundwater table) is the abode of most plant life, and is of dominant importance in the technology of sustained agriculture. In this book, the chemical fate of substances purposely added (e.g., fertilizers) or inadvertently added (e.g., waste spills) to the soil is taken up, as well as the movement of such substances in the soil. The text is from camera-ready typescript, and includes many references plus some tables and diagrams.

Acidification of Freshwaters. By Malcolm Cresser and Anthony Edwards. Cambridge University Press: Cambridge and New York. 1987. viii + 136 pp. \$34.50. ISBN 0-521-32270-7.

The authors' purpose is "to provide an insight into the interactions between precipitation, acidifying pollution, plants, soils and waters" that regulate water acidity. The five chapters are the following: The importance of freshwater acidification; Natural acidification processes; Anthropogenic influences on acidification processes; Experimental methods in acidification research; and Possible priorities in freshwater acidification research. Each chapter has an extensive list of references, and there is a subject index.

Safety Evaluation of Drugs and Chemicals. Edited by W. Eugene Lloyd. Hemisphere Publishing Corporation: New York and Washington. 1986. xviii + 487 pp. \$59.95. ISBN 0-89116352-2.

This is a book about toxicology, and it is intended to be "a relatively complete compilation" of basic considerations, testing procedures, and interpretation of tests. It contains 30 contributed chapters, ranging from "Introductory Toxicokinetics" to "International Harmonization of Toxicity Testing". Some chapters have references, others do not. The subject index is usefully substantial.

Introduction to Nondestructive Testing: A Training Guide. By Paul E. Mix. John Wiley & Sons: New York and Chichester. 1987. xiv + 406 pp. \$54.95. ISBN 0-471-83126-3.

This is a "self-learning" manual with lots of "how to do it" information. It includes 7 pages of bibliography, an appendix of manufacturers and suppliers (with addresses), and another appendix consisting of questions matched to chapters, followed by a list of answers to the questions. There is a substantial subject index.

Dictionary of Water Chemistry. By Friedrich von Ammon. VCH Publishers, Inc.: Weinheim. 1985. xi + 203 pp. \$58.00. ISBN 0-89573-434-6.

This is a trilingual dictionary of technical terms, arranged in three parts, so that one can locate a term in alphabetic order in English, French, or German, and find the equivalent term in both the other languages. It is addressed to those engaged in water technology, especially in analytical aspects of it.