# Book Reviews*

**HPLC of Small Molecules: A Practical Approach.** Edited by C. K. Lim (Medical Research Council, Middlesex, UK). IRL Press: Oxford and Washington. 1986. 350 pp. $31.00. ISBN 0-947946-77-2.

This book deals with the practical HPLC procedures for the analysis of small molecules that are important in life sciences. The book consists of 11 chapters written by a group of international contributors. Chapter 1 is a short (12-page) overview article on different aspects of HPLC such as different modes of HPLC separation, sample preparation techniques, procedures for column testing and column maintenance, etc. Chapters 2–11 are devoted to the HPLC procedures for the analysis of amino acids and small peptides (Chapter 2, 16 pages), biogenic amines (Chapter 3, 18 pages), carbohydrates (Chapter 4, 20 pages), lipids (Chapter 5, 33 pages), bile acids (Chapter 6, 14 pages), steroids (Chapter 7, 40 pages), vitamines (Chapter 8, 61 pages), nucleotides, nucleosides, and bases (Chapter 9, 39 pages), porphyrins (Chapter 10, 44 pages), and bile pigments (Chapter 11, 17 pages).

These chapters provide useful experimental details such as procedures for derivatization, preparation of various types of physiological samples, specific types of stationary phase and mobile phase compositions, detection schemes for the compounds, identification and quantitation, etc. In addition, useful troubleshooting hints, maintenance procedures, as well as useful remarks about the significance of the compounds in the life sciences are covered. All chapters are well organized and documented. There is a disharmony, however, in the length of different chapters which does not necessarily reflect the significance and the research interest in the particular area.

The book is a good experimental handbook for the HPLC analysis of the aforementioned compounds. It will be of great use for researchers in the life sciences who may not be HPLC "experts".

**Morteza G. Khaledi,** *North Carolina State University*

**Solvation Thermodynamics.** By A. Ben-Naim (The Hebrew University of Jerusalem). Plenum Press: New York and London. xi + 246 pp. $49.50. ISBN 0-306-42538-6.

This monograph is a lucid description of the author's approach to solvation thermodynamics. Applications are given to solvation of inert gases in various solvents, molecules in their own pure liquid, such as water in pure water, aqueous alcohol mixtures, and hydrocarbons, simple ions, and proteins in water. Statistical mechanical approaches to solutions are also discussed. The last chapter in this book contains an excellent discussion of mixing thermodynamics in which the concept of entropy change on mixing in ideal systems is clarified in a manner not seen elsewhere by this reviewer. This book can be highly recommended to anyone interested in solvation, solutions, and thermodynamics.

**Sonja Krause,** *Rensselaer Polytechnic Institute*

**Gaseous Ion Chemistry and Mass Spectrometry.** Edited by J. H. Futrell (University of Utah). John Wiley and Sons: New York. 1986. x + 335 pp. $59.95. ISBN 0-471-82803-3.

This book is a collection of papers that developed from a workshop held at the University of Utah in 1983. Each chapter is written by a separate author with expertise in the area of interest. Contributing authors include A. W. Castleman Jr., J. H. Futrell, W. Lindinger, T. D. Märk, J. D. Morrison, R. B. Shirts, D. L. Smith, and A. L. Wahrhaftig. There are four sections to the book: (1) Theoretical Foundations (2 chapters); (2) Ion Formation and Mass Analysis (4 chapters); (3) Techniques for Studying Collision Processes (2 chapters); and (4) Applications to Ion Chemistry and Physics (5 chapters). In general the chapters are written at the level of a first-year graduate student, although they are somewhat uneven in this regard. The emphasis is on teaching concepts rather than mathematical rigor or exhaustive review. The first three sections of the book give a good basic background in the chemical physics of ion formation, reaction, and detection. The last section retains the chemical physics emphasis but broadens the perspective somewhat. The topics include Laser Photodissociation Spectroscopy; State-to-State Reaction Dynamics; Rate Measurements Using Flowtubes; Cluster Ions; and Biomedical Applications of Mass Spectrometry. The last two of these chapters are reviews; the cluster ion chapter is especially thorough. The remaining three application chapters cover topics with emphasis on the authors' own work. I will use the book as required reading for new graduate students in my group. It would also be a useful reference for a course taught on the subject.

**Michael T. Bowers,** *University of California, Santa Barbara*

*Unsigned book reviews are by the Book Review Editor.

**Chromatography: Concepts and Contrasts.** By James M. Miller (Drew University). John Wiley & Sons: New York. 1988. xii + 297 pp. $39.95. ISBN 0471-84821-2.

As stated in the preface, "This monograph attempts a unified approach to chromatography and emphasizes the similarities and differences between the major divisions—GC, LC and TLC." Early chapters cover rate theory, types of interactions in chromatography, achievement of separation, comparison between chromatographic modes, qualitative analysis, and quantitative analysis. This is followed by chapters on gas chromatography, liquid chromatography in columns, liquid chromatography on plane surfaces, "other topics", and selection of a method.

The entire book is pitched at a fairly elementary level, but the essential features of the major types of chromatography are covered. At least some mention is made of almost all of the popular forms of chromatography. The overall quality of the book is adequate but not inspired. Some of the explanations offered are clear while others seem a bit confusing. The discussion of ion-exchange chromatography focuses mostly on older work, and the abbreviation used by the author (IEC) is apt to be confused with the same abbreviation that is often used for ion-exclusion chromatography. On balance, however, this is a reasonably good book for anyone who needs a basic knowledge of chromatography.

**James S. Fritz,** *Iowa State University*

**Advances in Physical Organic Chemistry. Volume 23.** Edited by D. Bethell (University of Liverpool). Academic Press Inc.: Orlando, FL. 1987. vii + 348 pp. $81.00. ISBN 0-12-033523-9.

It was 25 years ago that this acclaimed series first made its appearance. The present volume, the first to be published under the sole editorial supervision of Professor Bethell, continues to provide reviews that are profound, timely, and frequently provocative.

Some of the earlier volumes of this series were typified by recurring themes which seemed to interrelate the individual chapters in those books. This is not to be found in the present volume. The range of topics encountered herein emphasizes the breadth of what might be termed the methodology of physical organic chemistry.

Four reviews are to be found in this volume. S. Henderson and R. A. Henderson have written on the nucleophilicity of metal complexes toward organic molecules. Isotope effects on NMR spectra of equilibrating systems are discussed by H.-U. Siehl. M. I. Page has contributed a chapter on the mechanisms of reaction of β-lactam antibiotics. The final chapter, by G. A. Russell, deals with free-radical chain processes in aliphatic systems involving an electron-transfer process. All are excellent. For a book published in mid-1987, the references are quite up to date. All four articles cite material published in 1985. Three of the articles quote even more recent sources. The material contained in this volume will be of interest to a variety of physical organic chemists.

**Gerald Jay Gleicher,** *Oregon State University*

**Pyrolysis and GC in Polymer Analysis. Chromatographic Science Series. Volume 29.** Edited by S. A. Liebman and E. J. Levy (Chemical Data Systems, Inc.). Marcel Dekker Inc.: New York and Basel. 1985. xii + 557 pp. $89.75. ISBN 0-8247-7187-7.

Volume 29 of this Chromatographic Science Series consists of 9 chapters focusing on the general subject areas of Analysis of Polymers by Pyrolytic Methods (5 chapters), Degradation Mechanisms of Polymers (1 chapter), Chemometrics (1 chapter), and Inverse GC (1 chapter).

Chapter 1 is an introduction to polymer characterization by the two editors, Liebman and Levy. In this introduction they attempt to tie the following 8 chapters together using the theme of Polymer Characterization. Chapters 2, 3, 5, 6, and 7 address the topic of polymer characterization by pyrolytic methods. Chapter 2 by Freed and Liebman and Chapter 3 by Liebman and Wampler give a detailed description of basic and advanced pyrolysis and pyrolysis–gas chromatographic techniques and instrumentation.

Chapter 5 presents the analysis and structural characterization of synthetic polymers by pyrolytic techniques. Ahlstrom first presents a review of the theoretical aspects of the kinetics of analytical pyrolysis as it applies to polymers. The remainder of the chapter is devoted to examples and applications of this technique to various classes of synthetic polymers. This chapter is almost totally devoted to pyrolysis–gas chromatographic techniques but reference is also made to applications of

pyrolysis–mass spectrometry and pyrolysis–FTIR. The topic of applications of pyrolysis–gas chromatography to the characterization of biologically important polymers is treated by Bayer and Morgan in Chapter 6. This chapter is organized by class of materials of biological interest: amino acids, peptides, proteins, etc. They present an excellent critical review, although not exhaustive, of this area including extensive references and specific commentary on the techniques employed. Chapter 7 authored by Richard Saferstein of the New Jersey State Police addresses the forensic aspects of pyrolysis. The chapter presents an excellent review of the state of the art in the applications of pyrolysis–gas chromatography and direct pyrolysis–mass spectrometry to the analysis of polymeric materials in various classes of forensic evidence.

A description of the mechanisms of thermal degradation of organic polymers is presented in Chapter 4 by Flynn and Florin. This chapter is a basic review of the area with very few recent references. The strength in this chapter lies in its excellent bibliography. The topic of Chemometrics is covered in Chapter 8. Harper presents a short but concise overview of chemometrics applied to gas chromatography. The few examples given are all pyrolysis of microorganisms and not of polymers. The last chapter covers the theory and applications of inverse GC. Aspler presents a very well-written and comprehensive treatment of this topic. These last two chapters are not well integrated into the major thrust of this book. The reader that would be interested in either of these areas would be better served to go directly to the texts that deal with these topics.

Overall this book should be of interest to those analytical and polymer chemists presently working in, or interested in, the field of characterization of polymers by pyrolytic methods. For those people I would recommend it as supplementary reading to a previous volume of this same Chromatographic Science Series, specifically Volume 22 by William Irwin entitled *Analytical Pyrolysis, A Comprehensive Guide.*

**Stanley C. Israel,** *University of Lowell*

**Bioseparations: Downstream Processing for Biotechnology** By P. A. Belter, E. L. Cussler, and W. S. Hu (University of Minnesota). John Wiley & Sons: New York. 1988. 364 pp. $39.95. ISBN-0-123-45618-9.

This is a good and a needed book in the field. The coverage is quite extensive. However, certain important topics are missing. Topics such as two-phase aqueous extraction, design and scaleup of separation equipment, protein separations at air–liquid or liquid–liquid interfaces, osmosis/reverse osmosis, stripping and absorption, membrane separations of solvents (acetone/BuOH), and isoelectric focusing are missing. A chapter on combined separation processes based on real separation operations would be quite useful.

The order of coverage also may need to be changed a little. I would cover the product (protein) purification in the following order: precipitation, ultrafiltration, chromatography, electrophoresis/isoelectric focusing, electrodialysis, etc.

In general, this is a good introductory book. It would be a good textbook for a first course on bioseparations. There are quite a few example problems of good quality. Some typographic errors do exist, but I suppose that is not important.

All in all, I think this is a good book and would be better if engineering aspects were emphasized more.

**Fikret Kargi,** *Washington University*

**The Interface Structure and Electrochemical Processes at the Boundary Between Two Immiscible Liquids.** Edited by Vladimir E. Kazarinov (A. N. Frumkin Institute of Electrochemistry, Academy of Sciences of the U.S.S.R.). Springer-Verlag: Berlin and Heidelberg. 1987. XIII + 246 pp. $118.30. ISBN 3-540-17519-9.

This volume consists of a preface and an introduction (both written by the Editor), followed by nine chapters contributed by seventeen prominent electrochemists from the Soviet Union, Czechoslovakia, and Japan. Five of their titles redundantly refer to the interface between two immiscible liquids (or between two electrolyte solutions). Two additional chapter captions mention "oil/water interfaces" which is insiders' jargon for phase boundaries between water and nonaqueous solvents. Substantive contents include the following: electrolysis, quantum theory of charge transfer, hydrodynamics and mass exchange, Galvani and Volta potentials, electrocapillarity, electric double-layer structure, redox and photochemical reactions, counterions and adsorption of ion-exchange extractants, and photochemical charge separation in micellar solutions. Eight hundred literature references are listed in this book, which, per se, make it a "must" for all serious chemistry research libraries worldwide.

By virtue of its focus on a well-defined and significant contemporary topic, this volume clearly qualifies as timely. However, it has presented this reviewer with a paradoxical dilemma. It is undoubtedly an important book but is very difficult to plow through. Its commendable conciseness, which is in principle a virtue, seems to actually aggravate the situation. Most chapters are aimed at a highly specialized audience. This has been carried to such extremes that even imaginative original research contributions by the authors themselves fail to receive the attention they deserve. I remember having been genuinely thrilled by Koryta's superb work on the dropping liquid electrode in the seventies, which pioneered the modern renaissance of interest in the interfacial electrochemistry of immiscible electrolyte solutions. None of that excitement transpires from the lead chapter which the same Koryta has contributed to the present book. Other chapters are similarly handicapped. A notable exception is the chapter on "Redox and Photochemical Reactions" by Boguslavsky and Volkov, which makes good reading.

I hold the contributors to this book in high regard. Their laboratories rank among the leading centers of electrochemical science in the world. I am tempted to speculate that any one of the seventeen authors alone could have written a better comprehensive monograph (encompassing the contents of the entire book) than the present juxtaposition of nine separate chapters. Perhaps this type of book would have benefited from the coherence of the unified approach inherent in single authorship, even though no individual could conceivably have matched the combined expertise of the seventeen.

**Joseph Jordan,** *The Pennsylvania State University*

**Bioreaction Engineering—Reactions Involving Microorganisms and Cells. Volume I. Fundamentals, Thermodynamics, Formal Kinetics, Idealized Reactor Types and Operation Modes.** By Karl Schügerl (Institut für Technische Chemie, Universität Hannover). John Wiley & Sons: New York. 1987. x + 238 pp. $74.95. ISBN 0-471-91309-X.

The text is the first in a series of three volumes on the subject of bioreaction engineering. This first volume presents fundamental concepts. Reactor types and properties are discussed in Volume II. Relationships among cell physiology, reactor state, and reactor control are discussed in Volume III.

After a brief introduction, Volume I is devoted to the presentation of the classical kinetic models that describe cell growth and product formation in idealized bioreactors. This presentation is classical in the sense that it relies on empirical mass balance and kinetic equations with little biochemical structure. This should be very satisfying to the chemical engineer, but not so satisfying to the bioscientist.

The presentation and discussion of kinetic and stoichiometric models for growth and product formation covers a wide range of reactor types and operating conditions. Coverage is as wide and as complete as found anywhere. Discussions of tower and loop reactors are especially good. Basic reactor types are discussed very briefly, and the text quickly moves to the more interesting reactors where axial dispersion, inhibition, recycle, and aeration effects must be considered. The Monod model is used almost exclusively to describe growth rates. This results in nonlinear, second-order differential equations for cell, substrate, and product balances in tower and loop reactors. In several such cases the governing equations are presented but no numerical solutions are presented.

The final 100 pages of the text cover the stoichiometry and thermodynamics of bioreactions and the dynamic behavior of bioreactors. The emphasis is on governing equations and concepts rather than specific examples of microorganisms, substrates, and products. The discussion of the dynamic behavior of bioreactors is especially broad. Phase plane plots illustrating substrate and cell concentration dynamics near stationary states of bioreactors are presented for uncontrolled and closed-loop controlled reactors.

Judging from the text and references, the text was written in 1982–83 and published in 1985 in German, and the English translation was available in 1987. Overall, the English translation is well-done. However, there are some translational errors that confuse the reading of the text.

**Roger A. Korus,** *University of Idaho*

**Mass Spectrometry in Biotechnological Process Analysis and Control.** Edited by Elmar Heinzle and Matthias Reuss (Chemical Engineering Laboratory, Zurich, and Technical University of Berlin). Plenum Press: New York. 1987. xi + 241 pp. $59.50. ISBN 0-306-42777-X.

This book is based on the contributions to the workshop on "Mass Spectrometry in Biotechnological Analysis and Control", which was held in Graz, Austria, from October 23 to 24, 1986. The workshop was sponsored by the International Federation of Automatic Control (IFAC) and the IFAC Committee on Applications, with the intention of promoting interdisciplinary efforts toward further developments in mass spectrometry instrumentation to meet the urgently needed on-line monitoring of biotechnological processes.

With this specific goal, the book begins with the editors' introductory article, which provides an overview on the current status in biotechnological process monitoring and control, including sensor and parame-

ter-estimation developments and potential mass-spectrometry contribution in the subject area. Articles addressing basic requirements and presently available mass spectrometry instrumentation for bioprocess monitoring constitute the first section, which is followed by articles on membrane inlet systems for monitoring gases in liquid media (second section), interfacing approaches for monitoring pyrolysis products and high performance liquid chromatographic (HPLC) eluates (fourth section), and specific applications (third section). Although the primary emphasis is placed on the monitoring of gases and volatile compounds, the attempt to embrace the entire spectrum in utilizing mass spectrometric technology for bioprocess monitoring is evident in the inclusion of HPLC and pyrolysis articles. On-line monitoring of these approaches are obviously more difficult, and more sophisticated data treatment of the complex pyrolysis mass spectra are reserved for more advanced treatises.

The preface provides an excellent summary and preview of the entire book. The nature of individual articles reflects the primitive stages in the utilization of mass spectrometry for on-line monitoring of bioprocesses. However, it provides an excellent status report in the subject area and should facilitate interested biotechnology researchers toward further exploration in various avenues available for a fuller application of mass spectrometry in bioprocess monitoring and control. On the other hand, the information is valuable for instrumentation-oriented mass spectrometrists and manufacturers to formulate another frontier in applied mass spectrometry to conquer. "Biotechnological analysts" and interested mass spectrometrists should be thankful for the success of the workshop and the editors' efforts.

**Ray H. Liu,** *University of Alabama at Birmingham*

**Potentiometry and Ion Selective Electrodes. Analytical Chemistry by Open Learning** By Alun Evans. John Wiley and Sons: New York. 1987. xix + 304 pp. $22.95 ISBN 0471-91393-6.

This book is a section of the Analytical Chemistry by Open Learning series and employs the self-taught method. The preceptor–student method of presentation is employed. Numerous questions and problems are presented strategically; the answers as well as explanations are available in a separate section of the text. This particular anaytical method involves potentiometry and its application to ion selective electrodes. It would be an excellent text for a senior-level or 1st-year graduate-student special problem course involving electrochemistry. Sufficient attention is given to applications and techniques to make it worthwhile for a laboratory technician developing new procedures.

Potentiometry is developed from a consideration of the Daniel's Cell. Special attention is paid to the activity/concentration dilemma and techniques for handling it developed. The importance of selecting the proper reference electrode is considered and the double junction reference electrode system to eleminate foreign-ion interference illustrated. The glass electrode and its several applications are discussed. The sections devoted to solid-state membrane electrodes and ion-exchange electrodes are very informative and would be fertile for original research projects. Enzyme and gas-sensing electrodes are covered at an elementary level. The new technique of ion-selective field-effect transistors is introduced. A sufficient number of analytical applications are considered to be illustrative. A subject index would be a useful addition to this text. The bibliography is adequate but not extensive.

**W. R. Mountcastle, Jr.,** *Auburn University*

**Energy And The Atmosphere, A Physical Chemical Approach. Second Edition.** By I. M. Campbell (University of Leeds). John Wiley & Sons Ltd.: New York. 1986. x + 337 pp. $57.00. ISBN 0-471-90856-8.

*Energy And The Atmosphere* is a serious book written for students in science and engineering disciplines, yet one that can be appreciated by practitioners as well. The book deals primarily with the many important and relevant effects of energy technologies on the composition and chemistry of the atmosphere. It begins with a discussion of the physical structure and physical–chemical/photochemical aspects of the atmosphere. Immediately following is a discussion of the basic science of fossil fuels combustion. These chapters are more general in nature, setting the stage for information to be presented later, including a chapter on various combustion systems. Three additional chapters are devoted to discussions of the global cycles of major elemental constituents, while two final chapters discuss the polluted troposphere and the chemistry of the upper atmosphere. At the end of each chapter is a short section entitled "concluding remarks" which typically contains a brief summary of the material presented.

Throughout, the underlying theme, i.e., that "the use of energy entails inevitable consequences for pollution of the atmosphere," is carried through admirably. The major effects of air pollutants, e.g., greenhouse effect, stratospheric ozone depletion, pollutant reactions leading to degradation of visibility and air quality, and acid rain/acid fog are clearly, and concisely presented. Those looking for extensive derivations of equations of turbulence, thermodynamics, etc., may be disappointed, for Campbell's approach is to present the relevant physics and chemistry, while assuming his readers have a good basic knowledge of the principles, most notably, of thermodynamics, kinetics, and spectroscopy. In short, Campbell presents the relevant material and quickly gets to the bottom line. Each chapter is a concise treatise, full of useful key data and interesting insights. Each may be read independently yet succeeding chapters benefit from those preceding. The result is that few readers should fail to see the forest through the trees. Overall, the integration and distillation of disparate information is excellent. At a time when many new books are simply compendiums of research papers and/or reviews by a multitude of authors, the book comes across with a sense of continuity and understanding that can only be achieved by a single dedicated mind. In this respect, the book is a joy to read.

One could easily criticize Campbell for omissions or lack of depth in some areas. For example, little is said about the role of aerosol particles, especially with regard to the atmospheric heat budget, or perhaps more timely, about the role of condensed nitric acid in stratospheric depletion of antarctic ozone; topics that arguably lie within the scope of the book. There is virtually nothing on aerosol mechanics, i.e., the processes which ultimately govern, in large part, the removal of virtually all reactive tropospheric pollutants. Clearly much new information on antarctic ozone has come to light before publication, and overall, the book is better judged by what it does cover. The author's goal, to provide a "strong framework" upon which additional material may be "hung", is certainly achieved. For the technically sophisticated reader who could read but one book on atmospheric chemistry, *Energy And The Atmosphere* would be a credible choice.

**John M. Ondov,** *University of Maryland*

**Analysis: What Analytical Chemists Do.** By Julian Tyson (Loughborough University of Technology). The Royal Society of Chemistry: London. 1988. xiii + 186 pp. £9.95. ISBN 0-85186-463-5.

A rewarding paperback excursion through the elaborate domain of analytical chemistry awaits the reader of this little book. With 176 comfortably small pages, cleverly constructed to highlight the terrain and vistas of analytical chemistry, the attentive voyager is rewarded with a broad perspective yet concise understanding of what analytical chemists do and how they do it. Although not intended as a textbook, this is definitely a book for chemistry students and teachers, in or out of school. Its seven chapters are quaintly labeled as follows, in order of appearance: What Do Analytical Chemists Do? Making Light Work. Making Electrons Work. Analytical Reaction Chemistry. Tools of the Trade. Problems with Mixtures—Chemistry to the Rescue. Tackling the Problems.

The third in a series of Royal Society of Chemistry paperbacks; this inexpensive text devotes limited but illustrative consideration to a great many analytical principles and techniques. In order to include sufficient detail for certain topics, the author has packaged the material in *Boxes* 1 through 26. Among the box labels, included here to illustrate scope and technical coverage, are the following: Structure Analysis by Infrared Spectrometry; Principles of Mass Spectrometry; Differential Pulse Polarography; Equilibrium Consideration in Titrimetric Analysis; The Standard Additions Method; Quantitative Parameters in Chromatography; ...All things considered, this little book packs it in.

As a seasoned student of analytical chemistry, this reviewer certainly can concur with the statement made on the back cover of the book that it "provides an invaluable insight into what analytical chemists actually do and how they do it." Some may do it differently and some may more actively pursue new methods and tools, but in the final analysis analytical chemists "provide information about the composition of materials". How they do it has been clearly and succinctly reported by Julian Tyson.

**Alfred A. Schilt,** *Northern Illinois University*

**Drugs and the Body.** By R. M. Julien (St. Vincent Hospital and Medical Center, Portland, Oregon). W. H. Freeman and Co.: New York. 1988. xvi + 297 pp. $14.95 (paper); ISBN 0-7167-1842-1. $24.95 (cloth); ISBN 0-7167-1838-3.

The material in this book builds upon Julien's first book, *A Primer of Drug Action.* Together, these books encompass a broad range of pharmacology in a form comprehendable by readers without medical training. The present volume discusses most major classes of nonpsychoactive drugs, whereas the previous volume deals mostly with psychoactive types. Few references to *A Primer of Drug Action* are repeated in *Drugs and the Body.*

Although this book is aimed at those who are without medical or pharmacological backgrounds, some knowledge of human physiology and organic chemistry is recommended in order to follow the tracks of common drugs throughout the human body.

Drugs that primarily act on areas outside the brain, and those that are used clinically to treat non-brain related disorders, are discussed in seven sections. Drugs affecting the autonomic nervous system are discussed first, followed by medications for cardiovascular disorders. Section three contains information concerning how the drug affects the kidneys, lungs, and gastrointestinal tract, and four discusses drugs and the immune system. Drugs used as antibiotics and for cancer chemotherapy are discussed in section five, and hormones and vitamins are included in six. Finally, poisons and antidotes are explored in section seven.

Each chapter begins with a clear and concise description of the body part, its function, and how it works. Afterwards, Julien discusses the general categories of drugs for a particular target area, and then, continues with a discussion of how each specific drug affects the discrete body part, and what disorder is ameliorated. Tables and structures are provided, and some references for further reading are given.

Until now, there has been no book published that concerns prescription drugs and is written in a nonmedical format for the scientifically literate. The text is easy reading and very informative, while providing an introduction to pharmacology. It can be used in households concerned with drugs and general good health and by chemists wanting to be better informed about the uses of the compounds they make.

**Introduction to Hazardous Waste Incineration.** By Louis Theodore and Joseph Reynolds (Manhattan College). John Wiley and Sons: New York. 1987. xxi + 463 pp. $49.95. ISBN 0-471-84976-6.

This book represents an admirable effort to provide a comprehensive introductory text for the subject suggested by the title. The book is divided into four parts:

The first part is an overview of the hazardous waste problem, where it came from, the current situation, and some information on the regulations. This part also outlines the alternate methods of waste disposal (other than incineration).

The second part, consisting of three chapters in just over 150 pages, is called "Incineration Principles". The field covered by these three chapters is indeed considerable and includes perhaps 20% to 25% of the basic background matter usually taught in a typical chemical engineering undergraduate program. Much of it is thus best considered to be review material, since most students would have difficulty absorbing all this background so quickly the first time through. An advanced undergraduate or graduate student in chemical engineering, however, would have no difficulty with the material since it is methodically and thoroughly presented and takes the reader from the very elementary considerations (such as the ideal gas law, the concept of moles, etc.) through phase and reaction equilibria and reactor design.

The third part treats equipment descriptions and includes chapters on incinerators, waste heat boilers (including fundamentals of heat transfer), quenchers, pollution control equipment, and auxiliary equipment such as fans, pumps, piping, ducting, stacks, etc.

The final part of the book treats facility design, including design principles, capital cost estimations, and two comprehensive example designs.

This is a well-executed book; it is easy to read and leaves few if any stones unturned when presenting technical background necessary for the basic understanding of incineration and incinerator design. It does not include extensive derivations; indeed, in view of the ground covered in some areas, to do so would have required many extra pages and would have duplicated much of the typical chemical engineering undergraduate course work. This would be an excellent text for a graduate or advanced undergraduate course on incineration.

**Charles Springer,** *University of Arkansas*

**An Introduction to Chemisorption and Catalysis by Metals.** By R. P. H. Gasser (former University Lecturer in Physical Chemistry and Fellow of Corpus Christi, Oxford). Oxford University Press: New York. xii + 260 pp. 1987. $24.95. ISBN 0-19-855271-8.

Gasser does a good job of covering fundamental concepts in gas–metal interactions and of describing some of the main techniques used in surface studies (low-energy electron diffraction, photoelectron spectroscopies, and Auger electron spectroscopy). In this respect his book is quite interesting and valuable, and it is very similar to the text by Roberts and McKee, *Chemistry of the Gas–Metal Interface* (published in this same series). Gasser makes some new contributions, most notably by drawing analogies between gas–gas and gas–metal interactions. As a result, he places aspects of surface science in a somewhat broader context than that in which they are normally viewed. He also frequently illustrates the use of formulae to calculate "typical" numbers, in a back-of-the-envelope manner that is quite educational.

The main problem with the book lies in the fact that it represents an essentially old-fashioned view of surface science. The author has made a clear attempt to modernize its presentation by pulling in examples from the recent literature. Nonetheless, the book contains statements that are misleading (at best) or simply incorrect (at worst). These statements are often outdated truths. For instance, on page 10 Gasser writes that thermal desorption spectra are "obtained by rapid heating of the sample, usually in the form of a fine wire or ribbon...". This statement would have been correct 20 years ago, but it is *not* correct today, when the majority of such work is done with single crystals rather than with wires or ribbons. On page 177 Gasser writes that infrared spectroscopy is "almost entirely devoted to CO; EELS gives good spectra for catalytically interesting systems" in studies of adsorbates on single crystals. This statement contains a shard of truth, but it would be disputed in many quarters. Someone who is reading the text as an introduction to the field would be misled into thinking that infrared spectroscopy is *not* very useful or versatile in single-crystal work. One needs only glance at the literature tabulated by J. Darville (*J Electron Spectrosc. Relat. Phenomena* **1983**, *30*, 247) to find contrary evidence. Statements containing a similar degree of inaccuracy are made frequently.

In summary, this book makes interesting reading for someone familiar with surface science who seeks to refresh their grasp of the fundamentals, or who wishes to use it as a reference. I would not recommend it to someone who seeks a careful, up-to-date introduction to the field.

**Patricia A. Thiel,** *Iowa State University*

**Introduction to Physical Chemistry.** By M. F. C. Ladd and W. H. Lee (University of Surrey). Cambridge University Press: Cambridge and New York. 1986. xix + 347 pp. $49.50 (hard cover). ISBN 0-521-26448-0. $19.95 (paper). ISBN 0-521-26995-4.

As its title and length imply, this text provides a relatively brief introduction to physical chemistry. Most of the usual topics are covered, but naturally not in the depth that one finds in a more lengthy treatment. A knowledge of calculus is necessary for an understanding of the chapters on thermodynamics and kinetics and would probably be helpful, but not essential, elsewhere.

Perhaps the weakest chapter is that dealing with quantum mechanics, atomic structure, and bonding. A reader with no previous experience in the area would need considerable assistance to understand the quantum mechanics and related calculations somewhat sketchily described here. A number of other topics in this chapter are presented at the same level that one finds in a relatively high level general-chemistry textbook.

The chapter on thermodynamics, on the other hand, leads into the topic with the analysis of several mechanical systems and brings the reader into the area in a very understandable manner. It and the remainder of the eight chapters in the book appear to be quite readable.

An attractive feature of this text is the inclusion of stereoscopic views when dealing with topics where three-dimensional visualization is important. A stereoviewer is not provided, but suppliers are listed and other means of dealing with stereoviews are discussed in an appendix.

There is something of a question as to where a text such as this might fit into the American curriculum. The authors state that it is suitable for the first year college student, but this is probably not true of the average student in this country. It might provide supplemental reading for first-year honors students who have a calculus background. One might also wish to consider it for a one-semester calculus-based physical-chemistry course.

**Basil G. Anex,** *University of New Orleans*