Unlike other scientific data analysis packages, MINSQ is designed to do only one thing, fit nonlinear parametric equations. As a result, it is simple to learn and use and the manual is clear and concise. The menu driven user interface is consistent, only presenting options as they become appropriate.

James K. Hardy, *University of Akron*

MINSQ and RSTRIP, Versions 2.1 and 3.0. MicroMath Scientific Software: 2034 East Fort Union Blvd., Salt Lake City, Utah 84121-3144. List price: $179 each; $329 for both packages.

MINSQ is a fitting package designed for use with an IBM or compatible computer. RSTRIP is a complimentary package of fitting routines designed for pharmacokinetic applications (other packages are due to be available for use with MINSQ). The programs are not copy-protected; however, the software is sold for use on a single computer (site-wide licenses are available). The packages are warrantied for 90 days and no indication is given as to customer support or prices for updates.

Documentation: The manuals provided with both packages are very basic and provide the necessary information to use the package. In addition, a file is provided that includes the current updates. The introductory chapters provide a good summary of the software capabilities and the examples are well chosen for the chemical user. The major fault lies in the lack of detail in the fitting routine methodologies. The user must have some statistical background or consult the references listed to fully appreciate how the fits are performed.

Installation: The current version was installed on a hard disk drive and configured with the reviewer's desired hardware (not the default). This was readily accomplished (~10 min) and should be possible for most common systems. The configuration file is easily modified, and several format files for printers/plotters are included.

The evaluation of the software was made using an IBM, PCAT, CGA monitor, 8087 co-processor, HP7470A plotter. The software takes up two floppy diskettes (about 650K hard disk space) and is compatible with monochrome, CGA, and EGA adapters (the minimum requirements are 512K RAM and 2 floppy drives or a hard disk).

Usage: Both packages are menu driven and include utilities that are available separately (Directory Window, $15.95). This allows one to perform several DOS commands from menus.

The program on the whole is rather simple to use, with all features easily accessed via the menus. This makes it attractive for a novice in the area. It suffers from some major limitations that will restrict its usage in the current version: (1) maximum number of data pairs = 100; (2) limited number of plot options (the reviewer tested the system on an HP7470A plotter), e.g., symbol selection; additionally, no option for residual plots is provided; (3) errors/subtle mistakes return the user to DOS (there are no indications in the documentation as to what the error codes mean).

As a whole the ease of use (at all levels, particularly model/data input), the large number of operations allowed (including itegration and differentiation), and the detailed statistical output make it an attractive package as a teaching tool and/or starting package. However, the drawback and cost (compared to more extensive packages available) limit this versions usefulness to the general scientist.

The reviewer compared the performance of this software package (with data collected in these laboratories and generated exponential decays) with his own (written in BASIC, using a Marquardt based algorithm). For a simulated double exponential decay with 100 points, the MINSQ software found two "false" minima before finding the correct solution (~30 iterations, 2 min). The reviewers' algorithm found the minimum (starting with the same initial guesses) in ~20 iterations, in ~30 s.

The accompanying RSTRIP software (along with other planned application sets) is a "neatly" packaged module and easy to use. Its moderate cost makes it attractive to the industrial community. However, similar results can be obtained from the MINSQ package (with some effort) and limits its use to the chemical community.

Michael Albin, *California Institute of Technology*

Book Reviews

The Handbook of Environmental Chemistry. Volume 4. Part A, Air Pollution. Edited by O. Hutzinger (University of Bayreuth). Springer Verlag: Berlin, Heidelberg and New York. 1986. 222 pp. $76.50. ISBN 0-387-09688-4

Five authors have each contributed one chapter to this first part (A) of the series on Air Pollution (Volume 4). The editor and four of the authors represent three different European countries so the book has somewhat continental flavor, although air pollution science is clearly, at least in the developed world, quite universal. Except for the first chapter, each topic is directed toward a professional audience with an interest in the particular subject. Thus the book is neither a handbook compilation of reference data nor a text on the subject of air pollution.

The first and shortest chapter (22 pages) by A. Wint of the University of Nottingham, England, is an overview called "Air Pollution in Perspective". It is quite nontechnical with only one chemical equation, three tables, and no mathematics. The table of contents for this chapter reveals that air pollution is discussed in global, regional, and local terms. The point is made that an earlier age tacitly assumed that the atmosphere was so huge that it could absorb and dispose of all our gaseous waste. In recent decades the view that only those living very near air pollution sources would be affected has been totally discarded. Later sections of this chapter deal with adverse impacts on health but in a very cursory way in such a short chapter. Vegetation damage is virtually ignored.

The second chapter, by P. Fabian of Max-Planck-Institute für Aeronomie, FRG, is titled "Halogenated Hydrocarbons in the Atmosphere". This chapter, in 29 pages, summarizes current data on twenty of these compounds, many of which are important both technologically and as air pollutants. Data on atmospheric levels as well as trends in emission strengths are given through about 1982. Almost all references are this old or older. With the intense current interest in the role that this family of compounds plays in the ozonosphere, especially in the now famous antarctic ozone hole, it would be difficult to keep up to date on this topic. The chapter does not attempt any review of the vast literature on modelling of the ozonosphere and its depletion.

Hans Güsten of the Institute für Radiochemie, Karlsruhe, FRG. contributed chapter 3 on "Formation, Transport, and Control of Photochemical Smog" (52 pages). This topic is perhaps more mature than the halohydrocarbons since it dates from the pioneering work of A. J. Haagen-Smit in 1950. "Smog" symptoms have now been found in many cities around the developed world and since lifestyles have become so similar the resultant urban smog varies mostly in severity due to population and meterology. This chapter is a good survey of current understanding of smog although each of the three topics promised in the title could by itself take up a good sized book. This means that some very important topics such as automotive emission control receive very short coverage. In fact "formation" including discussion of products gets the largest share of this chapter.

"Atmospheric Distribution of Pollutants and Modelling of Air Pollution Dispersion" by H. van Dop of the Royal Netherlands Meterological Institute, the Netherlands, makes up Chapter 4 (42 pages). The article is written from a meterological perspective and begins with the basics of atmospheric physics and dynamics and proceeds through the modelling of dispersion to culminate in a source/receptor matrix for Europe (Table 6). This gives the calculated sulfur deposition in each European country from every other country.

The last chapter, by J. M. Hales of Battelle Pacific Northwest Laboratories, USA, is titled "The Mathematical Characterization of Precipitation Scavenging and Precipitation Chemistry" (74 pages). Removal of pollutants from the atmosphere by precipitation is good news/bad news. If there were no removal mechanism pollutants would accumulate indefinitely. Yet this process leads to acid rain (precipitation) and fallout with impacts that are far from being understood. As promised in the title, this chapter is quite mathematical although the author says his presentation is highly "visual" so the reader can recognize the relationships between the physical process and their mathematical description. To see how successful the author has been the reader would need to study the mathematics in detail. In one footnote the reader is encouraged to use Laplace transforms to solve a pair of simultaneous partial differential equations. The final section gives advice on model selection, a list of references to special models, and some comparisons with observations.

These five chapters are well-prepared reviews that will be of value to those with matching interests.

Edgar R. Stephens, *University of California, Riverside*

Statistical Thermodynamics of Alloys. By N. A. Gokcen (Bureau of Mines, Albany, Oregon). Plenum Press: New York and London. 1986. xiv + 326 pp. $49.50. ISBN 0-306-42177-1

This book represents a fairly advanced treatment of statistical thermodynamics as it applies to solutions of metals and metalloids. The first chapter deals with classical thermodynamics and contains a review of the fundamental laws and definitions and the mathematical formulations necessary for treating alloys. In chapter two, phase diagrams and their relationships to thermodynamic properties are discussed. Included in this section are discussions of the phase rule, the lever rule, and the construction of thermodynamically valid phase diagrams for unary and binary systems followed by the details of calculating phase diagrams from thermodynamic data.

The remainder of the book is devoted to statistical thermodynamics of alloys beginning with a development of the statistics governing particle distribution, first-law entropies, and a brief summary of quantum mechanics in chapter three. Chapter four covers solution theory. Here the derivation of the first approximation of the regular solutions by permutation of molecules is presented, culminating in the expressions for the thermodynamic excess functions. Order–disorder in binary alloys is discussed in Chapter five. The remaining two chapters include detailed discussions of interstitial solutions including hydrogen storage in metals and alloys and the Fe–C system (Chapter 6) and semiconductors (Chapter 7).

As stated in the preface, readers are assumed to have a good background in thermodynamics. Although most discussions are presented in sufficient detail that they require a minimal amount of additional research, numerous citations are provided to further clarify particular concepts.

While this book provides comprehensive coverage of theoretical approaches to obtaining thermodynamic quantities and phase equilibria, "The calculation of thermodynamic properties from phase diagrams is not emphasized because such a procedure generally gives mediocre results". Unfortunately, this sentiment is shared by numerous theoreticians outside the field of metallurgy, although many so-called "purely theoretical results" are in fact based on a substantial amount of experimental data and even then often produce unrealistic models of phase behavior.

S. Michael Sterner, *Virginia Polytechnic Institute and State University*

Excited States and Reactive Intermediates: Photochemistry, Photophysics, and Electrochemistry. Edited by A. B. P. Lever (York University). American Chemical Society: Washington, D.C. 1986. xii + 276 pp. $56.95 US and Canada, $68.95 export. ISBN 0-8412-0971-5

This book presents a well-rounded picture of several of the approaches currently being taken to examine excited states and reactive intermediates and the insights gained from these studies. Reactions of excited states and/or highly energetic species are important in many areas of chemistry, but these excited state species are often quite different from their ground-state analogues in both structure and reactivity. In order to relate reactivity to what is occurring on a molecular level, detailed knowledge of the structure and properties of the excited state or reactive intermediate is a must. It is exactly this important topic that this collection of papers reviews.

The introduction by A. B. P. Lever, the editor, is especially nicely done. It states briefly the importance of and interest in those questions addressed in the examination of excited states and reactive intermediates. The sixteen papers that make up the text represent several areas of chemistry, illustrating the broad importance of studies concerning excited state structures and reactivities, localization versus delocalization of electrons, long-range electron transfer, and the influence of ligands on excited state lifetimes. This is one of the great strengths of the book—all of the papers address the same general theme while at the same time they illustrate the great scope and variety of the field. Areas such as catalysis, electron transfer, reactions of biologically important complexes, zeolite/metal–guest interactions, kinetics, synthesis, theoretical studies, electrochemistry, and thermodynamics are represented, as are many experimental approaches: ac electrochemistry, SERS/rotating disk voltammetry, flash photolysis, multinuclear NMR, FT–FAR-IR, EPR, Raman spectroscopy, UV–visible spectroscopy, photoelectron spectroscopy, and time-resolved spectroscopy. Some of the topics are clearly controversial (for example, the photochemistry of unsaturated organometallic compounds), and the papers do an excellent job of presenting current views and remaining questions rather than simply cataloguing well-accepted ideas. The paper by Zink et al. presenting the first spectroscopic substantiation of LFT-predicted excited-state distortions is especially readable. A nice overview of the use of low-temperature luminescent studies of excited states and the implications of excited-state distortions is given in the chapter by Güdel. The overview does not get caught up in specific detail but rather is thoroughly referenced, allowing one to obtain more detailed information easily. A most interesting paper by Ozin et al. reports the use of FT–FAR-IR as a probe of metal cations in zeolites, permitting differentiation between internal and external guests. Weaver et al. use SERS in conjunction with electrochemistry to obtain structural information about reactants adsorbed on surfaces and on intermediates present at electrode surfaces. Some intriguing studies of excited complexes are presented in the paper by Vogler et al. who use electrochemistry to generate both ions of a redox couple at the same electrode. Rapid recombination of the transient redox couples leads to the formation of an excited complex. Properties of this excited state can then be compared to those of the analogous photochemically produced complex. The authors apply this technique to the study of electron transfer in transition-metal complexes. The remaining eleven papers are also well presented and contribute unique and complementary information to the overall picture of excited state reactivities.

In summary, the book is a collection of timely, well-written articles with relevance to many areas of chemistry. Most chemists must deal with the importance of excited states and/or reactive intermediates at some time in their research and will no doubt find this a useful volume.

Lucia M. Babcock, *Louisiana State University*

Polycyclic Hydrocarbons and Carcinogenesis. ACS Symposium Series 283. Edited by Ronald G. Harvey (University of Chicago). American Chemical Society: Washington, D.C. 1985. ix + 406 pp. $74.95 U.S. and Canada, $89.95 export. ISBN 0-8412-0924-3

Polycyclic aromatic hydrocarbons are widespread environmental contaminants and many are exceptionally potent carcinogens in experimental animals. Exposure to various substances containing mixtures of hydrocarbons is associated with excess cancer incidence in humans. Although initial research on hydrocarbon carcinogenesis dates back to the early 1920's, the last two decades have seen a remarkable increase in our understanding of the molecular mechanisms of polycyclic aromatic hydrocarbon carcinogenesis. One problem presented by the rapid developments in this field was the lack of a single source to provide a detailed overview of this field. This book, which originated from a symposium sponsored by the Division of Organic Chemistry at the American Chemical Society Meeting in Philadelphia, provides the reference work that was needed. It contains both chapters based upon papers presented at that meeting and additional chapters to provide complete coverage of the field.

The book presents an exceptionally thorough and detailed review of polycyclic aromatic hydrocarbon activation. The first chapter (1) gives an overview of polycyclic aromatic hydrocarbon carcinogenesis and introduces the importance of metabolic activation. The major mechanisms of activation including bay-region diol-epoxides (Chapter 4), one-electron oxidation (Chapter 11), and hydroperoxide-dependent oxygenation (Chapter 12) as well as the stereoselectivity of metabolism (Chapter 2) and effects of methyl and fluoro substituents (Chapter 5) are all covered in chapters that provide detailed reviews of the relevant literature as well as the authors own work. Dr. Harvey's chapter (3) describes the synthetic routes, many of which he developed, for preparation of hydrocarbon diols and diol-epoxides and also serves as an excellent review of which hydrocarbon metabolites are available for biological studies. The interaction of hydrocarbon metabolites with DNA is believed to be one of the initial steps in the induction of cancer by these compounds. These interactions are reviewed in chapters that deal with analysis of DNA adducts by various techniques including immunological, fluorescence and ^{32}P post-labeling (Chapter 8), molecular mechanisms of interaction of hydrocarbon diol-epoxides with DNA (Chapters 6 and 10), intercalation of nonreactive hydrocarbon metabolites into DNA (Chapter 9), and the mutational consequences of hydrocarbon-DNA damage in bacteria (Chapter 13). Chapter 7 provides an excellent review of the structures of hydrocarbons and their metabolites as determined by X-ray crystallography. The data and references given are exceptionally useful for those carrying out computer modeling of hydrocarbon-DNA and hydrocarbon protein interactions. There are also chapters that describe the metabolic activation of two other classes of aromatic carcinogens, the arylamines and arylamides (Chapter 14), and the nitro polycyclic aromatic hydrocarbons (Chapter 15). Both are excellent reviews of the field and the later is especially timely in view of the recent concern about human exposure to nitro polycyclic aromatic hydrocarbons in the environment.

In summary, this book is an excellent review of the present knowledge of polycyclic aromatic hydrocarbon carcinogenesis. The chapters are all very well written and provide detailed coverage of the topics. There are

always additional topics that one would like to have seen included. It would be useful to have a chapter describing tumor induction by various hydrocarbons in different tissues and a chapter on the induction of mutation and transformation by polycyclic aromatic hydrocarbons in mammalian cells of the quality of the chapters in this book. However, no book can cover every potential topic and this is an outstanding source for current information on hydrocarbon carcinogenesis. It is useful to researchers in many disciplines from synthetic organic chemists to biochemists, nucleic acid chemists, and other scientists interested in environmental carcinogens. I use this book to introduce my graduate students and postdoctoral fellows to the current status of research in this field and I find it very useful when searching for detailed reviews of specific topics. This book will prove highly useful for anyone interested in research involving polycyclic aromatic hydrocarbons or other carcinogens and the price allows the purchase of individual copies for frequent use as a reference to this field.

William M. Baird, *Purdue University*

Electrochemistry: Theoretical Foundations. By Jerry Goodisman. (Syracuse University). John Wiley & Sons: New York. 1987. ix + 374 pp. $55.00. ISBN 0-471-82850-5

Electrochemistry has been squeezed out from the physical chemistry offerings of chemistry departments in American universities, largely due to the misunderstanding that the subject concerns principally the classical topics of the physical chemistry of ionic solutions and the thermodynamics of cells at equilibrium. The striking advances that have been made in the huge field of surface electrochemistry in the last few decades have remained out of focus. One obscuring factor is the widespread usefulness of electrochemistry. It is acceptable to have electrochemistry in Chemical Engineering departments, but in Chemistry it is banished to the Analytical division, where the newer quantum-oriented material is foreign turf.

Now an event of great value has occurred. A quantum chemist, J. Goodisman at Syracuse University, has written an account of basic electrochemistry. The electrochemical interfaces he discusses are the seat of several of the great natural processes (photosynthesis, corrosion, energy conversion and storage), and the electrochemical gap in chemistry courses can now be filled by use of Professor Goodisman's book.

There are ten chapters. The first comprises an attempt to say what electrochemistry is (e.g., "Electrochemical Potentials", "Activation Overpotential"). Chapter 2 is titled "Thermodynamics and Electrostatics". The material is appropriately chosen and treats, e.g., the Lippman equation and electrochemical potentials.

Professor Goodisman goes in deep. It is not a matter of definitions, soft descriptive talk and the quotation of a few equations. He develops the basic themes ab initio every time.

Chapter 3 is "Statistical Mechanics" and is a collection, somewhat heterogeneous, of various electrochemistry-relevant topics that have come up to being treated at the statistical mechanical level. A royal treatment is given to the meaning of "electrochemical potential", and an excellent discussion is presented of the many meanings associated with the innocuous term "electrode potential". (I'm glad to say the author has been wise enough to avoid absolute potentials.)

Chapter 4 is "Structure of Surfaces". This chapter contains much to which the author himself has contributed, particularly the sections of metal surfaces. Then comes "Interfaces"—the account of the double layer—and this now includes an excellent and fundamental treatment of surface states. Chapter 6 is "Further Developments" and is a kind of gather-all of the bits which Professor Goodisman wants to discuss. About half of it concerns the hydrated electron. Chapter 7 is "Diffusion". This is perhaps the only section that could have been eliminated; it is readily available elsewhere. The "Electrode Kinetics" chapter is well done, though one might express chagrin that only 9% of the whole book is under this title.

The last two chapters are the most interesting of all. They concern the quantum applications to electrochemistry, which have been particularly controversial because they have been treated by physical chemists of ability and renown (Levich, Marcus), but in a fashion heavier on mathematics than an apperception of molecular happenings.

Goodisman's attitude is to divide the material into two parts, and in the first (Chapter 9) he deals with the subject of electron transfer from a general quantum mechanical point of view—electronic transitions—and not much is to do specifically with electrodes. Then in Chapter 10 he gets down to applying this to electrochemistry and the many problems that exist in attempting to elucidate a subject that has perhaps not properly yet emerged from the smoke of battle.

This book is *absolutely splendid*. A hypercritical reader could object that he is often fobbed of onto a statement of the type, "This field has been reviewed by Trassatti", but it is understandable that the author has had limits in space and has not been able to encompass everything, particularly where light is reduced by depth.

It is satisfying that there has emerged from the United States, a country not generally known for its research groups in physical electrochemistry, a book on this theme that is light years ahead of anything published in Europe or Japan. Unfortunately, the main buyers of the book at first may be readers from abroad where the subjects of discussion are so much more in focus, but it is hoped that soon fundamental physical chemists—and particularly surface chemists—in the United States will wake up to the opportunities awaiting them at the solid–solution interface.

Perhaps, before 2000, electrochemistry might finally reenter the physical chemistry curriculum.

John O'M. Bockris, *Texas A&M University*

Applied Polymer Science. Second Edition. Edited by Roy W. Tess and Gary W. Poehlein. ACS Symposium Series 285. American Chemical Society: Washington, D.C. 1985. 1341 pp. $59.95; export price $71.95. ISBN 0-8412-0891-3

The first edition of this book was published in 1975 under the same title. This edition contains 54 chapters, each by a different contributor, 81 all together. Most of the contributors are active researchers in their respective fields. The editors have divided the text in the following way:

Introductory—two contributions; "Polymerization and polymerization mechanisms" (seven); "Physical phenomena of polymers" (four); "Polymer products and their uses" (ten); "Plasticizers, solutions, and solvents" (three); "Analysis and physical chemistry of coatings and related products" (seven); "Polymer products and their uses in coatings" (sixteen); and "Science and technology of pigment and paint manufacturers" (three). An author and subject index is included. This volume includes twelve topics that are not found in the first edition, bridging the rapid progress in polymer technology that has taken place since 1974. Among the new topics are, for example, "resins for aerospace" and "polymer coating for optical fibers". Several chapters from the original edition have been deleted and quite a few chapters were revised and updated. Cross referencing between chapters cannot be found.

The book contains a vast body of knowledge pertaining to nearly every aspect of polymer science and technology. However, the book is too heterogeneous in the quality of presentation and discussion of scientific and technological issues. As is often to be expected from such a large collection of contributions to a symposium series volume, the extremes between the high and low qualities are too broad and often result in a lack of depth and continuity.

One fundamental aspect that is not addressed well in this book, and which has plagued polymer science since its inception, is the distinction between polymer science and polymer technology. In this regard, the title of this book in relation to its contents lacks coherency and is, in fact, misleading at times. Unfortunately, a well-guided theme, that indeed could have distinguished the book to be what the title claims, is missing. Thus, for example, the reader sails from a thorough but fundamental review on the "recent development in cationic polymerization" to the application of "epoxy resins". Nonetheless, this collection of contributions, many of which are from the industry, may serve as an excellent reference volume to anyone within or outside of the field of polymer science and technology.

One of the major problems that the reader encounters is that the book is not typeset; all of the contributions appear in typewritten camera-ready form with reduced letter size. This may be acceptable for a smaller volume but not for a text of this magnitude and weight that cannot be easily handled.

Israel Cabasso, *State University of New York—ESF*

Topics in Current Chemistry No. 141, Chemometrics and Species Identification. Springer-Verlag: Heidelberg and New York. 1987. 181 pp. $68.00. ISBN 0-387-17308-0

A common problem of books with titles beginning "Topics in..." is the uneven quality of the editing of the text. This book suffers heavily from the problem. While this may be due to constraints of time or other resources, it is none the less distressing. The first four chapters of this book are included as part of a coverage of Chemometrics. The chapter on historical development appears to be a fairly exhaustive coverage but it never seems to distinguish between important concepts and steps and ones that are incidental to the subject. The excessive reference to computer programs by their acronyms may express the author's expertise in the field, but it leaves a non-expert with almost no information with which to evaluate the progress and the intellectual content of the field under discussion. The discussion of optimization is particularly simplistic with an emphasis on the SIMPLEX method (which in these days of inexpensive computing has almost nothing to recommend it). The section on multivariate processing would lead any "man from Mars" to believe

that analytical chemistry is performed by making a matrix of measurements with a multitude of instruments and attempting elemental analysis without reference to chemistry at any time. I submit that it is not so. The chapter on sampling techniques starts well enough with an attempt to define the subject and its nomenclature, but it rapidly becomes a series of references to applications of mathematical models. In a sense this is a set of references to references and will be of limited use to a reader seeking methods of utility. While it is a small point, reference to Shannon's sampling theorem is not cited and I thus cannot know if I should recant my references to the "Nyquist" frequency in my lectures. The chapter on signal and data analysis in chromatography would provide a good first survey for a chemist who is attempting to sort out the meanings of many techniques described in the literature for the analysis of chromatograms. The authors have chosen a topic whose breadth can be handled in the space alloted and they have provided a useful summary. Indeed, part of what we are now calling Chemometrics came from the early attempts to extend this sort of analysis. However, this chapter could have as easily (and probably better) been included in a book on chemical analysis. The chapter on Chemometrics in Food Chemistry was difficult for me to review for two reasons. First I have not worked as a food chemist and the idea of attempting to generate a correlation matrix for further mathematical manipulation from a data matrix which contains elements with such diverse units as "peak maximum in cm^{-1}" to "country of origin" simply remains outside my imagination. Second, the chapter is written in very general terms, yet it treats the subject (which the authors point out is fraught with ambiguities) in a very mathematical form. On the other hand, I think that even with my very imperfect understanding, they have convinced me that food chemistry may be exactly the sort of field where Chemometrics (by the second half of their definition) does indeed have a viable future. For analytical chemists new to food chemistry, I think that this chapter would be a good introduction to the rationale for Chemometrics.

The chapter on Species Identification for Trace Inorganic Elements in Biological Materials confuses me. I do not see why it is included in this book or this series. It is not a review, as far as I can see, of new or specific information of current interest. It is rather a summary of techniques and topics which should be the stock in trade of every analytical chemist working with biological samples. As a first introduction for students it might find use, but it does not belong here.

In summary, this is not a book that I feel I could recommend to any group of people. A few individuals might benefit from one chapter or another, but it seems a classic case of the "Series in ..." gone wild. I cannot believe that the editors edited this book. I cannot believe that anyone edited this book. It was simply, I believe, solicited, typed, collated, and published. I cannot recommend that it be bought.

Eric Enwall, *University of Oklahoma*

An Introduction to Chemisorption and Catalysis by Metals. By R. P. H. Gasser. Clarendon Press: Oxford. 1985. xii + 260 pp. $32.00. ISBN 0-19-855163-0

Quite often we see a typically short book published that is not exactly a text book or a monograph, but rather a sort of "self-help" manual to make it possible for someone to become "up to date" on a topic of current interest. Many of these books are quite inadequate; this one is not. From the general to the specific, from fundamentals of surface reactions and structure, the book builds well to a consideration of recent studies of the oxidation of carbon monoxide on palladium and platinum.

This choice, and that of other topics, seems appropriate. The reference list, bunched at the end of the book, is on the short and selective side, but it provides an adequate entry into the literature.

George D. Halsey, *University of Washington*

Modern Methods in the Analysis and Structural Elucidation of Mycotoxins. Edited by R. J. Cole (National Peanut Research Laboratory). Academic Press: Orlando, FL. 1986. xii + 471 pp. $75.00. ISBN 0-12-179515-2

Mycotoxins are toxic metabolites of fungi. When the producing fungi grow on food and feed commodities, serious health problems for both humans and animals can arise. This book is a compilation of methods currently available for the analysis and structural elucidation of mycotoxins.

The book comprises fifteen chapters. Each chapter follows the general format of a brief description of the theoretical basis for a method followed by specific applications to mycotoxins. Helpful discussions of the advantages and disadvantages of a given method are included. References are liberally supplied so that the reader can easily pursue any area of interest. Some chapters such as the one on gas chromatography contain very detailed analytical descriptions; others are more general.

The first chapter (R. J. Cole, H. G. Cutler, and J. W. Dorner) discusses the use of biological systems for the detection of mycotoxins; examples range from intact animals and plants to tissue culture. The second chapter (J. W. Dickens and T. B. Whitaker) deals with the important question of sampling and sample preparation followed by a chapter on chemical survey methods (O. L. Shotwell) in which screening and quantitative methods and confirmatory tests for the most common mycotoxins are described. There are four chapters on structural elucidation of mycotoxins by UV and IR spectroscopy (C. P. Gorst-Allman), NMR (R. H. Cox), X-ray crystallography (J. P. Springer), and biosynthetic studies (P. S. Steyn and R. Vleggaar). The remaining eight chapters are directed to the analysis of mycotoxins with three of the chapters being devoted to chromatographic methods [TLC (S. Nesheim and M. W. Trucksess), GC (R. W. Beaver), and HPLC (M. J. Shepherd)] and three to mass spectrometry [GC–MS (R. F. Vesonder and W. K. Rohwedder), MS of trichothecenes (C. J. Mirocha, S. V. Pathre, R. J. Pawlosky, and D. W. Hewetson), and MS–MS (R. D. Plattner)]. F. S. Chu has contributed a chapter on the relatively new area of immunoassays for mycotoxins while the final chapter by J. C. Frisvad discusses taxonomic approaches to mycotoxin identification.

For the scientist who is faced with the task of setting up a laboratory for the analysis of mycotoxins, a useful addition to the book would have been a final summary chapter on the relative merits of the various analytical methods in terms of detection limits, reliability, ease and cost of use, etc. as applied to the most common toxins. This information is in the book and can be acquired by the persistent reader, however.

On the whole, this is an excellent book. The material is well-written by acknowledged experts and contains references up through 1986. It should be a valuable addition to the library of those in the mycotoxin field; others seeking brief well-referenced descriptions of a wide variety of analytical procedures suitable for natural products will also find this a useful volume.

Constance M. Harris, *Vanderbilt University*

Problems and Solutions in Quantum Chemistry and Physics. By C. S. Johnson, Jr., and Lee G. Pedersen (University of North Carolina). Dover Publications, Inc.: New York. 1986. xviii + 429 pp. $10.95, paperbound. ISBN 0-486-65236

This book is a reprint of a successful but out-of-print volume originally published by Addison-Wesley in 1974. It consists of twelve chapters, ranging from Waves and Superposition as well as Old Quantum Theory to Postulates and Simple Exactly Soluble Problems, Angular Momentum, Hydrogen-like Atoms, Perturbation and Variational Theory, many electron atoms, Radiation, Molecular Spectroscopy, and even a final chapter on Scattering. The level is that of the usual Senior (or well-prepared Junior), or beginning graduate student, requiring a background of calculus, mechanics, and even some electricity and magnetism to appreciate all of the problems. There are 280 problems with answers, very carefully worked out so that the logic of the solution as well as the principle is covered, and an additional 139 supplementary exercises which could be assigned in a class or used in self study. The subject matter goes very well with a text book such as Levine's "Quantum Chemistry" (Allyn and Bacon, 1974) or other introductory texts, as the topics and level are comparable. This is a most excellent book and the current price makes this paperback affordable as a course supplement. In addition there are ten appendices on units, vectors, special functions, transformations, elementary group theory, and important integrals. While the reference list is dated, the books cited are still excellent reading. The same can be said of this book. It remains an excellent problem book and I would highly recommend using it as a required supplement of students taking their first quantum chemistry course.

Neil R. Kestner, *Louisiana State University*

Mass Spectrometry in Biomedical Research. Edited by S. Gaskell (Baylor College of Medicine). (Baylor College of Medicine). John Wiley & Sons: New York, NY. 1986. xv + 492 pp. $72.95. ISBN 0-471-91045-7

The editor's intent is to focus attention on particular areas of rapid development in mass spectrometry and to provide some insight into problems and potentials. This is achieved. The book is divided into three parts: analyses of labile and polar compounds (eight chapters); analyses at high mass (nine chapters); and trace analyses (nine chapters). Each part begins with an overview by the editor of 8–10 pages. Each chapter in the book has about 20 references.

The overview to Part 1 is about ionization techniques and their associated sample introduction methods. It also covers LC–MS. Numerous reviews are cited in the references of the overview. Several chapters in Part 1 are on the general areas of sample preparation for fast atom bombardment (FAB) and field desorption (FD) MS of polar analytes, direct analysis of biochemical reactions in aqueous solutions, and rapid screening of polar metabolites of drugs with FAB. The rest of Part 1 contains more specific chapters on particular classes of compounds.

These are MS of leukotrienes, free and conjugated bile salts, nucleic acid constituents, and acylcarnitines and acyl–coenzyme A compounds.

Part 2 concerns analyses at high mass. The overview to Part 2 provides background information on tandem mass spectrometers (MS/MS) which enhances the value of the remaining chapters. The chapter by Green and Bordoli on high mass capabilities of sector mass spectrometers is a good introduction to the considerations involved in measurement of mass spectra of high molecular weight material. The capabilities of fourier transform MS for high mass analyses are well described.

Part 3 focuses on trace analyses. The overview addresses selectivity and sensitivity. The chapters are not about how to do trace analysis by MS. Rather, they are on trace analysis of several classes of compounds, including steroids, canabinoids, neurotransmitters (catecholamines and GABA, but not acetylcholine), prostaglandins, neuropeptides, and drugs in urine. There are also chapters on biological applications of triple quadrupole MS/MS and GC electron capture negative chemical ionization MS.

The book provides a good description of what is being done with mass spectrometry in biomedical research through examples of selected classes of compounds. It is not intended to be a thorough introduction to the field or a complete review of the state of biological applications of mass spectrometry. The applications described in the book do provide the reader with an indication of what is currently possible with the recent substantial developments that have occurred in mass spectrometry.

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Developments in Block Copolymers. 2. Edited by I. Goodman (University of Bedford, UK). Elsevier: London. 1985. xii + 299 pp. $66.00. ISBN 0-85334-372-1

This is the second of a series of review volumes on block copolymers, the first of which was published in 1982. This volume contains seven excellent review articles written by an international group of experts in the subjects under discussion. A review on "The Study of Block Copolymer Structures by NMR Spectroscopy", 26 pp, was written by L. W. Jelinski, AT&T Bell Laboratories, who has herself done considerable work on deuterated block copolymers. J. Selb and V. Gallot, Centre de Recherches sur les Macromolécules, Strasbourg, France, wrote on "Ionic Block Copolymers", 79 pp, R. D. Gilbert and V. T. Stannett, North Carolina State University, on "Carbohydrate-based Block Copolymers", 11 pp, T. Hayashi, Kyoto University, on "Block Copolymers as Models of Biophysical Systems", 51 pp, J. M. Widmaier and G. C. Meyer, Université Louis Pasteur, Strasbourg, France, on "Block Copolymers as Adhesives", 42 pp, D. S. Campbell, Malaysian Rubber Producers' Research Association, Hertford, UK, on "Thermoplastic Elastomeric Graft Copolymers", 35 pp, and B. G. Willoughby, Rubber and Plastics Research Association of Great Britain, UK, on "Liquid Rubbers", 54 pp. Liquid rubbers, sometimes called telechelic liquid polymers, are oligomeric precursers of cross-linked rubbers that contain widely spaced functional groups. In many liquid rubbers, one of the blocks is only one monomer unit long.

As shown by their titles, these reviews are on quite different subjects, and will thus be useful to different groups of investigators. Libraries that serve investigators in any field of block copolymers should thus have this volume. Most individual investigators, however, will find only one or two of the articles important for their work since they range from a description of basic research, as in the review on NMR Spectroscopy, to a description of applied research, as in the article on Liquid Rubbers.

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Techniques for the Analysis of Membrane Proteins. Edited by C. I. Ragan (University of Southampton) and R. J. Cherry (University of Essex). Chapman and Hall, Ltd.: London and Methuen, Inc.: New York. 1987. xi + 441 pp. $99.00. ISBN 0-412-24970-7

As pointed out by the editors in their preface to this new book, the explosive progress in membrane molecular biology the last 10–15 years is a result of largely technological developments; this up-to-date volume of experimental techniques for such studies is thus a valuable new addition.

It primary value, however, lies in the approach. There is a popular line of thought that most researchers in modern molecular biology (in its broadest sense) can be classified into two groups: those that specialize in a particular eperimental technique as applied to a biological system(s) and those that focus on a biological function as deduced from a specialized experimental approach(es). Many technique-oriented books are thus written by experts for experts (valuable contributions in their own right). Although composed of contributions from prominent experts in the major experimental techniques responsible for the tremendous advances in the field, this book is written in such a way that researchers investigating a particular biological function (e.g., receptors, transport systems, immunological mechanisms, differentiation) can find out what kinds of information the technique can yield for their system and how easily utilized it is. This is because the chapters focus both on the experimental details of the technique (and its limitations) and on the general kinds of information it has already provided for particular biological systems. Although this necessitates a fair amount of familiarity with fields such as bioenergetics, neurophysiology, and spectroscopy, in general each chapter is written with the nonspecialist in mind.

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Organometallic Chemistry. Volume 15. Edited by E. W. Abel (University of Exeter) and F. G. A. Stone (University of Bristol). The Royal Society of Chemistry: London. 1987. xvi + 516 pp. £110.00.

The Senior Reporters continue their staunch service to organometallic chemistry with the production of Volume 15 of this *Specialist Periodical Reports* series, which surveys the literature for calendar 1985. Continuing pressure on space has entrenched a staccato presentation with emphasis on coverage at the expense of any critical commentary, but adherence to a familiar format ensures optimum usefulness as a reference source.

There are sixteen chapters organized as follows. Group I: The Alkali and Coinage Metals (J. L. Wardell). Group II: The Alkaline Earths and Zinc and its Congeners (J. L. Wardell); Boron with the Exception of the Carbaboranes (J. W. Wilson); Carbaboranes, including their Metal Derivatives (T. R. Spalding). Group III: Aluminum, Gallium, Indium and Thallium (P. G. Harrison). Group IV: The Silicon Group (D. A. Armitage). Group V: Arsenic, Antimony and Bismuth (J. L. Wardell); Metal Carbonyls (B. J. Brisdon); Organometallic Compounds Containing Metal–Metal Bonds (W. E. Lindsell); Ligand Substitution Reactions of Metal and Organometal Carbonyls with Group V and VI Donor Ligands (D. A. Edwards); Complexes Containing Metal–Carbon σ-Bonds of the Groups Scandium to Manganese, Including Carbenes and Carbynes (Mark J. Winter); Complexes Containing Metal–Carbon σ-Bonds of the Groups Iron, Cobalt and Nickel (A. K. Smith); Metal–Hydrocarbon π-Complexes, other than π-Cyclopentadienyl and π-Arene Complexes (James A. Howell); π-Cyclopentadienyl, π-Cyclopentadienyl, π-Arene and Related Complexes (A. H. Wright); Homogeneous Catalysis by Transition Metal Complexes (M. Bochmann); and Structures of Organometallic Compounds determined by Diffraction Methods (D. R. Russell).

The Layout of this book, which establishes a clear relationship with earlier Volumes in the series, lends itself to rapid information retrieval for the working organometallic chemist. The sections devoted to metal–metal bonding and homogeneous catalysis may be of interest to a less specialist readership and Chapter 16 (which lists some 1738 structures in a metal-by-metal Table of molecular formulae) is a particularly useful compilation. The "honey-minty" odor of $PhCH_2SiRR'OMe$ will appeal to some, while the review which mentions "tucked in" structures formed through intramolecular C–H activation at W may offer good bedtime reading.

Transfer of this work to a camera-ready presentation makes the textual density seem more indigestable than ever, but there can be no doubts about the value of such a comprehensive hard copy survey. While every organometallic chemist will want to have access to the book, the cost can be expected to limit its penetration much beyond library collections.

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