

Book Reviews*

Introduction to Metallurgical Thermodynamics. Second Edition. By David R. Gaskell (University of Pennsylvania). Hemisphere Publishing Corporation, Washington, D.C. (also McGraw-Hill Book Company, New York). 1981. xxii + 611 pp. \$29.95.

This book deals logically and clearly with the application of classical thermodynamic methods to metallurgy. Most of the questions I recall being raised by students are treated explicitly. The overall balance is excellent, although I should have preferred more development of the statistical approach to the subject. Nevertheless, the content is nearly ideal for a first course under the guidance of an instructor or for refresher study without an instructor. Particularly valuable are detailed explanations of popular display modes, for example, the Ellingham diagrams for oxide stabilities, the Pourbaix pH-potential diagrams for electrochemical equilibria, and related stability diagrams that are used to supplement conventional ($T-x$) phase diagrams.

There are many additional merits. Careful explanations have few wasted words. Straightforward developments lead to the most useful equations while pointing out constraints explicitly, in a few cases following different paths than I have seen in earlier works. The text is enlivened and deepened by a liberal set of worked examples. The problems at the end of most chapters appear to be adequate except for the brief chapter on the statistical interpretation of entropy. Answers are given just before the index. The tables of data are somewhat limited, but students should be driven to use the standard sources compiled in Appendix B.

Noting a real deficiency, I would find value to students in a more explicit acknowledgement of the sources of data from which figures are constructed, for example for the phase equilibria in Figures 7.12, 7.14, 7.15, and 7.16.

C. Ernest Birchenall, *University of Delaware*

The Infra-Red Spectra of Complex Molecules. Volume 2. Second Edition. By L. J. Bellamy. Chapman, Hall & Methuen Inc., New York. 1980. XI + 299 pp. \$35.00.

It is a pleasure to have this classic work revised, updated, and extended. This monograph deals with a fundamental understanding of infrared group frequencies and their changes as a function of substitution and structural variations. As such, it is much more useful than the usual simple tabulation of functional group absorptions.

Chapter 1 treats alkanes and specifically the stretching and bending modes of CH_3 and CH_2 . Chapter 2 deals with alkenes and the vibrations of $\text{C}=\text{N}$ and $\text{N}=\text{N}$. Chapter 3 covers all types of triple bonds and the $\text{X}=\text{Y}=\text{Z}$ systems such as isothiocyanates, isocyanates, azides, etc. Chapter 4 considers unassociated XH vibrations such as OH, NH, SH, SeH, PH, BH, etc. Chapter 5 discusses carbonyl frequencies in great detail, including aspects such as solvent effects, complexes with Lewis acids, and others. Chapter 6 treats $\text{X}=\text{Y}$ bonds other than carbonyls, namely, $\text{S}=\text{O}$, $\text{P}=\text{O}$, $\text{N}=\text{O}$, $\text{P}=\text{S}$, $\text{C}=\text{S}$, and $\text{C}=\text{Se}$. Chapter 7 covers vibrations of XO_2 systems, specifically RSO_2 , RNO_2 , and RCO_2^- . The final chapter (8) handles associated XH frequencies and a detailed analysis of numerous types of hydrogen bonding.

There are over 1500 references to the original literature with coverage through 1979. Treatment of all topics is uniformly excellent. Considering today's inflated prices on such monographs, this one is a bargain and belongs on the shelves of every scientist dealing with infrared spectroscopy.

Peter J. Stang, *The University of Utah*

Electrodes of Conductive Metallic Oxides. Part B. Edited by Sergio Trasatti (University of Milan). Elsevier Scientific Publishing Co., Amsterdam and New York. 1981. xiv + 336 pp. \$86.00.

This is Part B of a two-part set dealing with metallic oxide electrodes. These are ubiquitous in electrochemical research and of considerable technological importance. The present volume reviews an expanding area of research aimed at understanding electrocatalysis on oxide surfaces.

The book concentrates on noble metal oxides and the technologically important oxides of lead, manganese, and ruthenium with some discussion of the electrochemical properties of nickel, cobalt, iridium, tin and iron oxides, and cobalt-spinel and other spinel-type oxides, with additional mention of still other oxides. Considering the mushrooming interest in oxide anodes, especially as they relate to the chloralkali process, the authors

have done a remarkably thorough job of covering the literature through 1980. There are many useful references to the original literature throughout.

The book appears to have been well edited with good uniformity of style between chapters by the several authors, each of whom is well-known within his respective area of expertise.

The first chapter is contributed by Neil Furlong, David Yates, and Thomas Healy. It reviews current physical knowledge of interfaces in general and how this relates to oxide/solution interfaces. Silica and titania are used as examples of oxide surfaces and various models describing adsorption isotherms and the double layer at oxide/aqueous interfaces are critically reviewed.

The next chapter on reactions of hydrogen and organic substances at oxide films is written by Brian Conway. Reactions at noble metal oxides are reviewed in detail. Included are discussions of the oxidation mechanisms of hydrogen and the simple organics: CO , HCOOH , and $\text{CH}_3\text{-OH}$. The Kolbe and Hofer-Moest reactions are reviewed as is halogen and nitrogen evolution, the latter via N_3^- discharge at platinum oxide. Conway's chapter concludes with an interesting discussion of electrode reactions with rates that oscillate, one example being the oxidation of hydrogen at platinum covered with a submonolayer of oxide.

The third chapter is contributed by the editor along with Gaetano Lodi. It covers oxygen and chlorine evolution at oxide anodes. The arguments in this chapter are so clearly expounded upon and the extensive tabular data so well organized that, for many, the rather high price of the book will be justified by this chapter alone. Basic concepts of electrocatalysis are dealt with first. The use of Tafel plots for evaluation of relative electrocatalytic properties is presented followed by a graphical explanation of oxide effects on anodic reaction rates. Then comes a lucid discussion of the oxygen evolution reaction and a summary table of reported mechanistic pathways in aqueous acid and alkaline media. A similar treatment is afforded the evolution of chlorine on oxides. There are long tables of evolution reactions on many different oxide surfaces. Experimentally oriented readers will find the many plots reproduced from the literature to be especially useful.

The final chapter is by Antonio Nidola, who reviews the technological impact of metallic oxide anodes. The practical aspects of electrode selection for industrial use are presented with a good discussion of the problems encountered in such use, many of which remain unsolved.

The book has much useful information and many references for both electro- and electroanalytical chemists in general and especially for those researching electrode specificity and catalysis.

Newton C. Fawcett, *University of Southern Mississippi*

Gene Expression. Volume II. Eukaryotic Chromosomes. Second Edition. By Benjamin Lewin (M.I.T.). John Wiley & Sons, New York. 1980. xv + 1160 pp. \$45.00.

Gene Expression, Volume II, is a thorough compendium of current facts and factlets concerning chromosomes. It contains a small infinity of information but near zero wisdom. The reader can form no picture of the working of the chromosome. He will find no working models or hard conjecture. It consists of undiluted facts.

James Bonner, *California Institute of Technology*

Photoelectron Spectroscopy and Molecular Orbital Theory. By R. E. Ballard (University of East Anglia). Halsted Press, John Wiley and Sons, New York. 1978. IX + 192 pp. \$49.95.

As a first introduction to the relation between photoelectron spectroscopy and molecular orbital theory many undergraduate or first year graduate students would find the book useful. However, the serious student of photoelectron spectroscopy and/or molecular orbital theory had best look elsewhere for a text. The illustrations in the text are well designed to give concrete examples of the text material and problems are provided at the end of each chapter.

The book is based on lectures given by Professor Ballard. The coverage of topics is very brief but includes such subjects as spin orbital splitting using double groups and the Jahn-Teller effect. The short treatment of these areas would not provide the serious student with enough information to be able to independently treat these topics. However, the discussion in the text is illustrated by numerous gas-phase photoelectron spectra which helps to give some understanding of the numerous topics covered in a relatively short text. The last half of the book is devoted to the assignment of photoelectron spectra using mo-

*Unsigned book reviews are by the Book Review Editor.

lecular orbital theory.

F. A. Grimm, *University of Tennessee*

Lasers and Applications. Edited by W. O. N. Guimaraes (Unicamp), C.-T. Lin (Unicamp), and A. Mooradian (Lincoln Laboratory). Springer-Verlag, Berlin, Heidelberg, and New York. 1981. ix + 335 pp. \$34.00.

The title of this book might lead some prospective readers to conclude that it comprises a survey of lasers and their applications. In fact, this book consists of the proceedings of the 1980 Sergio Porto Memorial Symposium, held in Rio de Janeiro. Appropriate to Porto's broad range of interests, the range of topics covered is extensive. The book includes contributions in the areas of laser devices, laser spectroscopy, laser biology, laser photochemistry, optical communication, and optical bistability, many of them by leading researchers in the optical sciences. Such broad coverage makes it unlikely that any one reader will find all the papers of interest. Nevertheless, since Porto's major contributions were in laser spectroscopy and photochemistry, well over half the papers are devoted to these subjects. Such articles will be of interest to many chemists.

John H. Clark, *University of California*

Cereals for Food and Beverages. Recent Progress in Cereal Chemistry and Technology. Edited by G. E. Inglett (U.S. Department of Agriculture) and L. Munck (Carlsberg Research Center). Academic Press, New York, NY. 1980. xiii + 557 pp. \$39.50.

This book consists of the proceedings of an international conference in Copenhagen in 1979. Aspects of the chemistry and technology of the important cereal grains are included. The book opens with papers on the application of microscopy to cereals, including the location of various constituents in the grain and corn starch structure. The production of sugar from corn starch is treated along with corn proteins, and the utilization of corn in brewing. Wheat proteins are also considered along with their influence on baking quality. The role of lipids and their interaction with proteins in baking is also discussed. Barley protein is treated and the role of barley in brewing. Papers on rice and oats emphasize their nutritional properties, and there is a paper on the dietary effects of wheat bran. One paper each on rye, sorghum, and millet are included. There are also papers on water activity in cereals, soy sauce, and hydrolyzed vegetable protein.

The book gives a good overview of the research being done in important aspects of cereal technology.

Earl G. Hammond, *Iowa State University*

Wood Chemistry. Fundamentals and Applications. By Eero Sjöström. Academic Press, New York. 1981. ix + 223 pp. \$22.00.

The stated aim of this concise textbook is to present an applications-oriented exposition of wood chemistry that will be useful to students, teachers, researchers, and anyone concerned with production and planning in related industries. In aiming his work at such a diverse audience, the author has set a lofty goal for himself. It is perhaps not surprising, therefore, that he has not completely attained it.

The first six chapters deal with the physical structure of wood and the chemical nature of its components. Chapter 1 is a nutshell presentation of long-established aspects of wood anatomy. Chapter 2 is a brief review of the nomenclature, structure, and reactions of carbohydrates, and Chapter 3 is an even briefer treatment of the chemistry of cellulose and hemicellulose. Subsequent chapters on lignin, extractives, and bark complete the group in equally concise fashion. The last four chapters are more applications oriented, in keeping with the book's objective, but they are only slightly lengthier. They deal respectively with chemical pulping, pulp bleaching, cellulose derivatives, and chemicals from wood.

The text is fairly well written, although the frequency of typographical errors and grammatical oddities is great enough to be distracting. A more relevant criticism is that for some of its stated purposes, the treatment is too brief, perhaps even to the point of being superficial. The first six chapters average 17 pages each, of which about half is text. In this respect, it can be contrasted with the earlier, encyclopedic, work by Rydholm. Indeed, the magnitude of the contrast illustrates that the topics covered are sufficiently complex that they cannot be adequately dealt with in the amount of space that the present work allots to them. One example is the extreme brevity of the sections dealing with cellulose, lignin, and such applied topics as pulping kinetics and lignin-preserving bleaching. Another is the sketchiness or complete absence of discussion afforded some of the many excellent illustrations and tables included with the text, e.g., Figure 5-1, which depicts a rather complex biosynthetic pathway to various extractives, and which is only referred to in passing.

A second aspect of the book that the critical reader will notice is the definitive tone of the writing, and the virtual absence of references to the literature, except in the figure captions. The unguided student would

benefit from a greater appreciation of the uncertainty surrounding such matters as the structure of cellulose II, the degree of polymerization of native wood cellulose, and the mechanism by which anthraquinone promotes alkaline delignification.

Whether or not these criticisms are to be considered serious depends on the use the prospective reader has in mind for the book. It is not to be recommended as material for self-study, for the reasons outlined above, nor would it be the best choice as a reference work for researchers in the field. On the other hand, its conciseness would make it an appropriate textbook for a first course in wood chemistry. It would similarly be a good desk reference for those who have taken such a course and have occasional need to recollect the material.

In summary, Dr. Sjöström's book concisely discusses a set of topics appropriate for inclusion in a wood chemistry course of the survey type. It would provide an appropriate framework for such a course, but the treatment would have to be expanded upon by the instructor, who would also have to be prepared to offer alternative points of view on some of the topics discussed and to provide supporting literature references.

Thomas J. McDonough, *Institute of Paper Chemistry*

Intermediate Organic Chemistry. By B. D. Pearson (Central Institute of Technology, Petone, New Zealand). Butterworths, Inc., London. 1970. vii + 310 pp. \$15.95.

The preface states the author's intention to provide for trainee technicians "a reasonable balance between factual information and theory" specifically related to Higher National examinations. A prior knowledge of organic chemistry is assumed.

The first four chapters deal with bonding, stereochemistry, mechanisms, and spectroscopic methods. The next six chapters are devoted to Hydrocarbons, The Carbon-Halogen Bond, The Carbon-Oxygen Bond (two), The Carbon-Nitrogen Bond, and the Carbon-Sulfur Bond. Two chapters discussing compounds having more than one functional group are followed by another on stereochemistry. And the last three chapters cover heterocyclic aromatic compounds, natural organic compounds, and polymers.

Organic reaction mechanisms are emphasized throughout the text. Each type of mechanism is presented in a simple, direct style. For example, under the heading, Esterification of Acids and Hydrolysis of Esters, the writer points out that the reaction can be uni- or bimolecular, that the carbon-oxygen bond of the ester can be made or broken in two ways (acyl oxygen vs. alkyl oxygen), and that the reaction can proceed in basic or acidic solution. Then two of the most commonly encountered mechanisms ($B_{AC}2$ and $A_{AC}2$) are considered.

While maintaining the brevity of presentation, the author allows the reader numerous opportunities to learn by doing. As an example, in the second chapter on stereochemistry three Newman projections representing the three stereoisomers of tartaric acid are drawn. The projection for the meso form has both COOH groups and both OH groups anti. The author proceeds to point out the center of symmetry and describe rotation to a given conformation having a plane of symmetry. Thus meso structures are demonstrated to be optically inactive.

Only a few weaknesses were noted. For example, the suggested references for further reading are outdated, a primary carbonium ion was used in describing the S_N1 mechanism, and R and S sequence rules for chiral configurations were only referenced.

In summary, the essentials of each topic are presented, and the author has touched base with a substantial number of specific topics and types of compounds in organic chemistry. Due to breadth of coverage and economy of expression, this text is recommended for advanced undergraduate and beginning graduate students as an excellent review of basic organic chemistry.

John A. Myers, *North Carolina Central University*

Advances in Clinical Chemistry. Volume 22. Edited by A. L. Latner (University of Newcastle upon Tyne) and M. K. Schwartz (Memorial Sloan-Kettering Cancer Center). Academic Press Inc., New York. 1981. ix + 306 pp. \$38.00.

The volume contains a compilation of well-referenced review articles attempting to provide the reader with an overview of "state of the art" theory and methodology in the following four current areas of interest in Clinical Chemistry:

I. The plasma Cholinesterases: A New Perspective, by S. S. Brown, W. Kalow, W. Pilz, M. Whittaker, and C. L. Woronick. This article reviews human serum cholinesterase and its variants. It also provides a critical assessment of the enzymes' physical and chemical properties as well as many clinical, pharmacologic, and toxicological applications.

II. Biochemical Events Related to Phagocytosing Cells, by M. Markert and J. Frei. The authors consider the biochemistry of normal and abnormal phagocytosis as well as cellular and subcellular isolation techniques. The phagocytosing cells included in this review are the

neutrophils, tissue macrophages, and the eosinophils.

III. The Measurement of Serum Alkaline Phosphatase In Clinical Medicine, by S. Posen and E. Doherty. The authors outline information relative to the clinical significance of serum alkaline phosphatase in normal and pathologic states. They also detail many physiological and analytical parameters affecting activity measurements of this enzyme. Alkaline phosphatase is a very widely employed test in Clinical Chemistry and many workers have cautioned against the overinterpretation of alkaline phosphatase activity determinations.

IV. High-Resolution Analytical Techniques For Proteins and Peptides and their Applications in Clinical Chemistry, by P. M. S. Clark and L. J. Kricka. This review considers the theory and methodologic application of isotachopheresis, high-performance liquid chromatography, and high-resolution two-dimensional electrophoretic techniques all of which are suitable for analyzing complex protein mixtures. Although these techniques are not in widespread use today they most certainly represent the wave of the future when individual protein gene product maps will serve as possible fingerprints of individual relative cellular pathways. Of the thousands of proteins coded for by the human genome only a few hundred are presently characterized. These methods therefore offer great promise of expanding our understanding of both normal and aberrant biological function.

In the opinion of this reviewer, this volume is a very useful source of current, state of the art, information in highly relevant areas of Clinical Chemistry and would be of use to anyone either working in or interested in the areas addressed.

Herbert H. Kohl, *Auburn University*

Advances in Chemical Physics. Volume 51. Edited by I. Prigogine (University of Brussels and University of Texas) and S. A. Rice (University of Chicago). John Wiley and Sons, New York. 1982. ix + 289 pp. \$50.00.

To attempt to review a book in a series which has had 50 previous volumes is indeed a humbling experience, and the present reviewer has had to exploit his friendship with a number of colleagues to attain anything resembling an informed opinion as to the value of this collection of articles to the readers of this Journal. Thus, although the opinions here expressed are solely the responsibility of the undersigned, it would be dishonest for this reviewer to give the impression (by the sin of omission, if nothing else) that he is an expert on each of the fields covered.

The objective facts are simple enough: this volume is a collection of five articles, written by experts in the fields, covering the Statistical Mechanics of Polymer Solutions and Polymer Adsorption, the Theory of Collision Induced Line Shapes-Absorption and Light Scattering at Low Density, Generalizations of the Entropy Concept, Sensitivity Analysis and its Role in Quantum Scattering, and Metallic Glasses. Each of these articles, which vary from 48 to 64 pages in length, carries the usual complement of literature citations and figures, but (not unexpectedly in view of the subject matter) relatively little in the way of tabular data. Hence the focus of the treatments emphasizes in each case the theoretical background rather than the experimental applications.

More subjectively, one may ask to what extent do the individual chapters address themselves to "the desire to remain educated [which] persists in all scientists..." and "...to helping the reader obtain general information about a wide variety of topics in chemical physics..." (quotes from the editors' introduction)?

The chapter by S. G. Whittington (Statistical Mechanics) is unusually clear, concise, and well written and reviews recent progress in the theory of excluded volume effects in dilute polymer solutions. In part II, which is concerned with using the self-avoiding random walk model to study the dependence of the mean square length and the number of allowed conformations of a polymer chain on the degree of polymerization and the solvent concentration, there is an emphasis on asymptotic results obtained by using the techniques from the theory of critical phenomena. Part III is concerned with very recent theoretical results on molecules confined within stated geometrical limits (slits or adsorption planes) and again emphasizes asymptotic results obtained by applying critical phenomena techniques to the self-avoiding-walk model.

The contribution by Birnbaum, Guillot, and Bratos (Light Scattering) is a treatment intended for the specialist and requires familiarity with the background material. Even so, the discussion is sufficiently clear to give the nonspecialist an overview and allows the usefulness of this field for molecular dynamics to be appreciated by the perceptive reader. Of particular usefulness is part I, which places the field of collision induced light absorption and scattering in perspective; part II, which presents an analysis of the spectral density, $g(\omega)$, and its Fourier transform, the time correlation function, $\phi(t)$; and part III, in which these relations are applied to rare gas mixtures. Several theoretical and empirical models are seen to compare well with observed collision induced spectra in the 100-500-cm⁻¹ region.

The treatments by Mead (Entropy) and by Eno and Rabitz (Sensitivity Analysis) will require considerable attention to some of the references cited before the nonspecialist reader will be able to follow the details of the derivations and the nuances of the relationships which are presented. Especially in the discussion by Eno and Rabitz, the authors appear to make a compelling case for the power of their method, made even more dramatic by the fact that fully one-third of the cited references are to papers of Prof. Rabitz and his co-workers.

The volume is completed by S. R. Nagel's review of recent work with metallic glasses, which constitutes the most experimentally oriented contribution to the present book. Not surprisingly (together with Chapter 1) it has the most extensive list of references to guide the reader into the field under discussion.

Considering the current cost of book production, and the large number of review and survey articles being written, this volume will not find its way into every personal library, even if the clientele is restricted to the community of chemical physicists. That it belongs in every institutional research library used by this group of investigators is beyond doubt.

R. H. Herber, *Rutgers University*

Lasers: Theory and Applications. By K. Thyagarajan and A. K. Ghatak (Indian Institute of Technology, New Delhi, India). Plenum Press, New York and London. 1981. xii + 431 pp. \$39.50.

Overall, this is a well-written and useful text for upper-level undergraduates and first-year graduate students, particularly in engineering and physics and for chemists who are seriously involved with lasers as a research tool. The first part of the text is devoted to basic laser theory and operation. This section begins with a questionably useful discussion of quantum mechanics followed by excellent discussions of the Einstein coefficients, the well-known laser rate equations for three- and four-level systems, and a rather detailed analysis of cavity modes and first- and second-order theory of the electric field in a laser cavity. The chapter on optical resonators is one of the most valuable in the text, describing in detail properties such as laser modes, line widths, Q switching, mode locking, etc. The concluding chapters in this part of the text present a discussion of vector spaces and linear operators which is used for the theoretical development of the quantum theory of interaction of radiation with matter. The final chapter in this section on laser properties and types was somewhat disappointing in terms of the very brief discussion of laser types but is highlighted by an excellent presentation of temporal and spatial coherence.

The second part of the text is devoted to rather brief and numerous applications of lasers. It is probably written as best an applications section can be, given how rapidly such updated material changes. However, this section does provide an excellent basis for an instructor to choose and expand upon whatever application most appropriately complements a given emphasis.

The third and final section of the text is a reproduction of the Nobel lectures by C. H. Townes, A. M. Prochorov, N. G. Basov, and D. Gabor which provides an interesting historical perspective.

The first section of this text on basic laser theory is excellent and highly recommended by this reviewer.

William A. Guillory, *University of Utah*

Organic Acids in Man. By R. A. Chalmers and A. M. Lawson (M. R. C. Clinical Research Centre). Chapman & Hall and Methuen, Inc., New York. 1982. xii + 523 pp. \$59.95.

This book describes the biochemistry of approximately 50 human diseases caused by genetic defects in organic acid metabolism, as well as the chemical procedures and analytical information required to diagnose these abnormalities. Amino acid analytical methodology is not within the scope of the monograph. Yet, many aspects of amino acid metabolism are covered because the organic acidurias are due mainly to enzyme defects in the amino acid catabolic pathways. The book has two important strengths. First, it presents a wealth of analytical data concerning urine and plasma concentrations, chromatograms, and mass spectra of the carboxylic acids in a well-organized and easily accessible format. Second, it effectively integrates analytical chemistry with the biochemistry and clinical features of each disease, enhancing the value of the information for both the clinical chemist and biomedical scientist.

The first part of the text describes procedures for characterizing and quantifying the carboxylic acids in biological samples. These include extraction of the acids into organic solvents and the preparation of volatile derivatives for gas-liquid chromatography. Methods are presented clearly and in detail, and they should be easy to follow even by an inexperienced student or technician. There also are chapters describing gas-liquid chromatography and mass spectrometry that should be especially useful for students or clinical investigators not well versed in these techniques. My only objection regarding this section is that there is no information regarding high-performance liquid chromatography, a

technique that is soon likely to come into wide use in this area of investigation. Part two is a compilation of normal clinical values, mostly in urine and blood. A large amount of data are well organized in tabular form, and chromatograms are included for illustration. The final part is a detailed description of the biochemistry and clinical features of the various organic acidurias, including chromatograms and mass spectra of the abnormal metabolites. Throughout the text there are an ample number of diagrams illustrating reaction mechanisms and biochemical pathways. Each segment is followed by a comprehensive list of references, and a large appendix of gas chromatography-mass spectrometry data is contained at the end.

This monograph should become a valuable reference for clinical or analytical chemists who may be called upon to assist in the diagnosis of genetic abnormalities. Biochemists involved in teaching health science students also should find this book useful, either to obtain a more thorough understanding of these genetic defects or as a source of excellent correlations between intermediary metabolism and human disease.

Arthur A. Spector, *University of Iowa*

Amino-acids, Peptides, and Proteins. Volume 12. Specialist Periodical Reports. Senior Reporter: R. C. Sheppard. The Chemical Society, Burlington House, London. 1981. xxi + 634 pp.

Volume 12 is very similar to the recently reviewed Volume 11 and to the previous volumes of this series. It is a series of terse articles on the chemistry of amino acids, peptides, and proteins, which attempt to quote virtually all important papers (some not so important) published in 1979. An exception is the chapter on peptides with structural features not typical of proteins. This covers the literature of both 1978 and 1979. While the writing is quite good and the reviewers knowledgeable, it is not the sort of book to read to gain deep insights or fundamental understanding. As all "Specialist Periodical Reports", it is an annotated list of publications, in this case over 5000. I find it comforting that our library subscribes to this set and I scan each new volume when it comes in.

Michael Laskowski, Jr., *Purdue University*

Organic Reactions. Volume 27. Edited by W. G. Dauben. John Wiley & Sons, New York. 1982. vii + 405 pp. \$45.00.

The march of organic chemistry continues to produce new subjects of significance in synthesis that require the details to be gathered for intensive review. These subjects are often "name" reactions, or those with a potential to be so designated, or are syntheses of a particular class of compound. It is unusual for a chapter of Organic Reactions to be built around an intermediate, as in the case of the larger of the two chapters comprising this volume: Allylic and Benzylic Carbanions, by Biemann and Ducep. The chapter fills seven-eighths of the book, but the great bulk of it is in the Tabular Survey. In it is to be found a comprehensive presentation of metalation (most commonly lithiation) by means of such reagents as butyllithium, lithium diisopropylamide, sodium hydride, potassium *tert*-butoxide, etc., together with useful transformations of the products by reactions with various classes of electrophiles. The subject is one of high current interest. The other chapter is on Palladium-catalyzed Vinylation of Organic Halides, by Heck. This is an underappreciated reaction of broad scope, in which vinylic hydrogen is replaced by an aryl, benzylic, or vinylic group by direct reaction with the appropriate halide. Nearly all of the references to it are from the 1970's. The prompt appearance of this review should lead to more widespread utilization.

Cumulative author and title indexes, and a rather frugal subject index for this volume, are included.

Reactive Intermediates. Volume 2. Edited by R. A. Abramovitch. Plenum Press, New York and London. 1982. xv + 599 pp. \$59.50.

The appearance of this volume provides a good occasion to alert the chemical community to the fact that there are *two* series of books having the title "Reactive Intermediates", both are currently in print, and both have reached Volume 2! The other series is edited by Maitland Jones, Jr., and Robert A. Moss, and is published by Wiley-Interscience. These quite independent works cover the subject in different ways. The Jones-Moss series is devoted to recent developments, for which it provides critical evaluations covering a span of about 3 years. The Abramovitch series presents reviews that cover their subjects in depth for selected topics. The two series thus, to some extent, complement each other, although the unintentional identity of titles must be of some embarrassment to all concerned.

The present volume contains six reviews. In Current Aspects of the Solution Chemistry of Arylnitrenes, E. F. V. Scriven takes up the subject essentially from the time it was reviewed by others in 1970-1971 and discusses the question of nitrenes from azides, nitroso and nitro compounds, anilines, etc., and their reactions and synthetic applications. In Nitrile Ylides and Nitrenes from 2*H*-Azirines, A. Padwa and P. H. J.

Carlsen review the subject apparently for the first time, and pay particular attention to cycloaddition reactions. In Radical Cyclizations by Intramolecular Additions, J.-M. Surzur reviews the behavior of alkenyl radicals and their heteroatom analogues, with attention to the main principles governing the cyclization. In Reactions of Silicon Atoms and Silylenes, Y.-N. Tang reviews their formation as well. In Five-Membered Hetarynes, M. G. Reinecke reviews the formation and reactions of the derivatives of aromatic rings having a formal triple bond, the largest group of which appears to be derived from thiophene. The last chapter, by A. Baretta and B. Waegell, reviews the mechanism of the Favorskii rearrangement of 2-halo ketones, which involves cyclopropanones and carbanions.

The table of contents, which is very detailed, is half as big as the index, which it complements.

Oxidation in Organic Chemistry. Part D. Edited by W. S. Trahanovsky. Academic Press, New York. 1982. xi + 360 pp. \$74.00.

This book is a monograph in the series "Organic Chemistry", under the overall editorship of Harry H. Wasserman, and is the fourth part of an apparently open-ended series on oxidation. It contains four contributed chapters. One is on oxidation by lead tetracetate, by G. M. Rubottom, and is primarily concerned with information published from 1970 to January 1980. It is subdivided into reactions with hydroxyl groups, with nitrogen containing compounds, with hydrocarbons, and with organometallics. A chapter by D. G. Lee extends an earlier chapter on oxidation by permanganate by treating catalysis by phase-transfer techniques, using either quaternary ammonium or phosphonium salts, or crown ethers. This technique greatly extends the utility of the reagent by allowing it to be used with hydrocarbons and many other substances which are too little soluble in water for effective reaction otherwise. A chapter by O. P. Dhingra reviews intramolecular oxidative coupling of aromatic rings, particularly of phenols. Such a process is of importance in biosynthesis of such substances as alkaloids and antibiotics, but it has been difficult to accomplish efficiently in the laboratory. The recently introduced reagents VOF₃, VOCl₃, thallic trifluoroacetate, manganese tris(acetylacetonate), among others, have substantially improved the situation.

The last chapter, by R. Hayatsu, R. G. Scott, and R. E. Wynans, is somewhat out of the ordinary pattern, for it deals with oxidation of a particular material, coal. A wide variety of oxidants have been used, with sometimes greatly differing results. Among them may be mentioned trifluoroperoxyacetic acid, introduced by Deno, Greigger, and Stroud in 1978, which preferentially destroys benzene rings, leaving aliphatic side chains intact as the corresponding fatty acids. Oxidation of coal has great importance in characterizing coal and determining major features of its structure.

This volume is separately indexed and can be used alone.

Theilheimer's Synthetic Method of Organic Chemistry. Volume 36. Edited by A. F. Finch and D. G. Hawkins. S. Karger AG, Basel and New York. 1982. xxiv + 532 pp. \$298.25.

This volume marks the retirement of William Theilheimer, who founded the series and was its editor for 35 years. The new editorial team is part of the Chemical Reactions Documentation Service of Derwent Publications (London), and has already contributed to the two preceding volumes. They plan to continue the format and philosophy unchanged.

This volume begins with the usual 5-page summary, Trends in Synthetic Organic Chemistry, in which developments of particular note are mentioned. It is clear that silicon chemistry continues to be important, and that the electrochemical methods are becoming more widely used. The bulk of the volume remains the highly organized review of synthetic transformations, with prominent equations and minimal text, and is an efficient key to the large mass of literature. The arrangement according to reaction type brings to one's attention developments that might easily have been overlooked. However, one need not use this arrangement to find a particular type of synthesis, for the subject index is very large indeed, and lists products, reactants, catalysts, and types of transformations with many cross-references between simple and complex examples. This book costs a lot of money, but it gives a lot of service.

Perspectives in Peptide Chemistry. Dedicated to Robert Schwyzler. Edited by A. Eberle, R. Geiger, and T. Wieland. S. Karger AG, Basel. 1981. xii + 444 pp. \$87.00.

This book is a collection of 36 papers on many of the aspects of peptide chemistry. The contributors generally are well-known peptide chemists and write with authority; the quality of the papers is excellent.

It is more than just a series of reviews by the contributors on their special area of expertise. In some cases the authors air their frustrations and failures as well as their successes, and speculate on the future of their subject, truly giving perspective to the field. Particularly rewarding in

this respect are the paper by Geoffrey T. Young on problems in synthesis that remain for the chemist; Roger Guillemin's view of the future of biologically active peptides; the account by Ching-I Niu of approaches to the chemical synthesis of large peptides and a summary of the current research at the Shanghai Institute of Biochemistry; Vladimir Pliška's analysis of structure-activity relationships in peptide pharmacology; a discussion of the problems in the selective formation of disulfide bonds by Wolfgang König and Rolf Geiger; and speculation on the mechanism of action of a mast cell-degranulating peptide by Christian Birr and Margot Wengert-Müller.

Synthesis, by both chemical and recombinant DNA techniques, is the subject of nearly half the papers. Merrifield's solid-phase method of synthesis seemed not to be given the attention it deserves, but it has been reviewed thoroughly on several recent occasions. The remaining sections are on purification of peptides (3 papers), conformational studies (8 papers), selected topics in biology of peptides, e.g., neuropeptides, antibiotics, and proteinase inhibitors (7 papers), and peptide receptors (2 papers).

The subject index, listing only about 350-400 items, is curiously silent about a number of topics, and is not a reliable guide to the contents of the book.

The contributions are not interdependent. One can open the book anywhere and find an enjoyable essay on some aspect of peptide chemistry.

Roger W. Roeske, *Indiana University School of Medicine*

Books on Biological or Clinical Subjects Related to Chemistry

The Aminoglycosides/Microbiology, Clinical Use, and Toxicology. Edited by A. Whelton and H. C. Neu. Marcel Dekker, Inc., New York and Basel. 1982. 640 pp.

Contains 26 contributed chapters on chemistry, pharmacology, toxicity, and clinical use.

Human Cancer Markers. Edited by S. Sell and B. Wahren. The Humana Press, Inc., Clifton, NJ. 1982. 450 pp. \$59.50.

Contains 16 contributed chapters on diagnosis of cancer by means of antibody technology and enzyme immunoassay of serum and tissue.

The Canine as a Biomedical Research Model: Immunological, Hematological, and Oncological Aspects. Edited by M. Shifrine and F. D. Wilson. Technical Information Center/U.S. Department of Energy, Oak Ridge, TN. 1980. 435 pp. \$14.50.

A compilation of knowledge for the aid of research in human and veterinary medicine.

Studies of Food Microstructure. Edited by D. N. Holcomb and M. Kalab. Scanning Electron Microscopy, Inc., AMF O'Hare, IL. 1982. 342 pp. \$50.00 (set of two).

A collection of papers, dating from 1979, on scanning electron microscopy of food materials. The illustrations are enough to spoil the appetite of the over imaginative.

Pellagra. Edited by K. J. Carpenter. Hutchinson Ross Publishing Co. 1981. 391 pp. \$48.00.

Contains a series of "Benchmark Papers" in the development of biochemical understanding of pellagra from 1750 to 1977, with critical comments by the editor, delineating the fascinating history of the identification of nicotinic acid as a vitamin.

Survey of Contemporary Toxicology. Volume 2. Edited by T. Tu. John Wiley & Sons, New York. 1982. 248 pp. \$50.00.

The second in a two-part series, this contains six contributed chapters, ranging from pesticide toxicology to marine venoms.

Environmental Science in Perspective. Edited by T. G. Spiro and W. M. Stigliani. State University of New York Press, Albany. 1980. 236 pp. \$6.95 paperback.

The authors state the aim of this book to be "to make sense of the environmental debates by examining the natural cycles that human activities may be upsetting". The book has four sections: energy, atmosphere, hydrosphere, and biosphere.

Ultrastructural Pathology of Human Tumors. Volume 2. Edited by I. Damjanov. Pergamon Press, Inc., Elmsford, NY. 1980. 144 pp. \$24.00.

An annual research review.

Thermodynamic Network Analysis of Biological Systems/Second, Corrected and Updated Edition. Edited by J. Schnakenberg. Springer-

Verlag, Berlin, Heidelberg, and New York. 1981. 145 pp. \$24.80.

"...devoted to the question: What fundamental ideas and concepts can physics contribute to the analysis of complex systems like those in biology and ecology?"

Medical and Biological Applications of Electrochemical Devices. Edited by J. Koryta. John Wiley and Sons, Inc., New York. 1980. 331 pp. \$79.00.

Contains nine contributed chapters centered about polarographic analysis.

Biochemical Tests for Identification of Medical Bacteria. Second Edition. Edited by J. F. MacFaddin. The Williams and Wilkins Co., Baltimore and London. 1980. 527 pp. \$26.50.

A laboratory-oriented work that has been brought up to date and expanded by the addition of five new chapters. There is much chemistry in it and most of it is correct.

Soils and Agriculture. Edited by P. B. Tinker. John Wiley and Sons, Inc., New York. 1981. 151 pp. \$27.95.

Contains four contributed interactions and nitrate, phosphate, and physical methods for studying soil composition.

Fertilization and Embryonic Development *in vitro*. Edited by L. Mastroianni, Jr., and J. D. Biggers. Plenum Press, Inc., New York and London. 1981. 371 pp. \$45.00.

Contains fourteen contributed chapters, clinically oriented.

Books on Applied Subjects of Interest to Chemists

Directory of Publishing Sources: The Researcher's Guide to Journals in Engineering and Technology. By Sarojini Balachandran (Engineering Library, University of Illinois). John Wiley & Sons, New York. 1982. 343 pp. \$27.50.

A list of technical journals, with information on scope and publishing policies. This journal is not among them.

Turbulent Buoyant Jets and Plumes. Edited by Wolfgang Rodi (Universität Karlsruhe). Pergamon Press, Oxford and New York. 1982. viii + 184 pp. \$35.00/£17.50.

An engineering and mathematical treatment of the dispersion of discharges of liquids, gases, and smokes.

Waste Discharge into the Marine Environment: Principles and Guidelines for the Mediterranean Action Plan. Published under the joint sponsorship of the World Health Organization and the United Nations Environment Programme. Pergamon Press, Oxford and New York. 1982. xv + 422 pp. \$80.00/£40.00.

A Guide to industrial waste contaminants, their harmfulness, and availability of waste treatment technology, prepared to improve protection of the Mediterranean Sea.

Oil Shale Processing Technology. Edited by V. Dean Allred. The Center for Professional Advancement, East Brunswick, New Jersey. 1982. ix + 240 pp. \$60.00.

Contains eleven contributed chapters in mining and the various re-torting processes, including those used in Brazil and the Soviet Union.

Engineering Aspects of Thermonuclear Fusion Reactors. Edited by G. Casini (Joint Research Center, Ispra, Italy). Harwood Academic Publishers, Luxembourg, Switzerland, London, and New York. 1981. 639 pp. \$97.00.

Contains lectures from a course held at the Joint Research Center, Ispra, Italy, in 1980.

VLSI Electronics: Microstructure Science. Volume 3. Edited by Norman G. Einspruch (University of Miami). Academic Press, New York. 1982. xiv + 453 pp. \$56.00.

Contains nine contributed chapters on Very Large Scale Integration electronics, at present the most advanced state of semiconductor electronics.

A User's Guide to Vacuum Technology. By John F. O'Hanlon (IBM Thomas J. Watson Research Center). John Wiley & Sons, New York. 1980. xiii + 402. \$24.95.

Contains sections on measurement, materials, production, and systems, with much detail on types and performance of vacuum pumps.

Designing Machines and Dies for Polymer Processing with Computer Programs. FORTRAN and BASIC. By Natti S. Rao. Hanser International, New York and Toronto. 1982. 207 pp. \$29.00.

A book on computer modelling.