

a good introduction to modern concepts of graphical data analysis. The program comes with a second disk containing an extensive collection of real data sets taken from different fields. Important concepts underlying novel features of the program are illustrated in the manual by reference to these data sets.

When the Macintosh Clipboard is used, data may be exchanged between MacSpin and other programs, including Excel, Multiplan, Statview, Statworks, Cricket Graph, and the Data Desk. In this way, large data sets can be imported into the program without retyping. Graphical plots generated by the MacSpin itself may be copied and transferred via the Clipboard to MacPaint or MacDraw. The program works with the LaserWriter to create crisp hard-copy graphs.

One draw-back of the program is the difficulty of transforming variables except for simple formulas. The program lacks a parsing-capability

that would allow the user to enter an arbitrary formula defining a new variable in terms of existing ones.

This program should be useful to any chemist working with multivariate data. For example, it should be very useful to geochemists or atmospheric chemists studying the variation of chemical concentration with height, depth, or distance. The program could also be useful to pharmacologists and biological chemists correlating structure-function relations in a series of drugs.

The program's copy-protection scheme requires that the Master-disk be inserted every ten uses or every seven days. The program is available from D<sup>2</sup> Software. To our knowledge no equivalent public domain or commercial software exists on any microcomputer.

Neocles B. Leontis and Deanne L. Snively, *Bowling Green State University*

## Book Reviews

**Thermodynamic Data for Biochemistry and Biotechnology.** Edited by H. J. Hinz (Universität Regensburg). Springer Verlag: Heidelberg and New York. 1986. XVI + 456 pp. \$142.00. ISBN 0-387-16368-9.

The title of this treatise may imply that it is only a compilation of thermodynamic data. This is perhaps unfortunate. This book contains much more than tables of data. Each chapter is written by a recognized active worker in the field and is refereed by another outstanding contributor in the area covered by the chapter. Each chapter reviews the field concisely but adequately, providing appropriate introduction, theory and methodology, and tables of data with references. In most cases some interpretation of the data is included, with indications of important gaps in our current knowledge and areas that require further study.

The book is divided into six sections. Section I is an introduction by J. T. Edsall, including a brief and interesting history of the application of thermodynamics to biochemical processes followed by a discussion of the contributions of each of the chapters in the book.

Section II is entitled Nonreacting Systems and includes chapters by H. Høiland on Partial Molar Compressibilities, G. M. Mrevlishvili on Heat Capacities, and A. Cesaro on the Thermodynamics of Carbohydrate Monomers and Polymers.

Section III, on Interactions in Solution, includes chapters by H. Wiesinger and H. J. Hinz (Thermodynamics of Protein-Ligand Interaction), by P. D. Ross (Protein-Protein Association), and by B. G. Barisas (Hemoglobin).

Section IV is devoted to Solution Processes and includes Chapters by S. Cabani and P. Gianni on Gas-Liquid and Solid-Liquid Equilibria in Binary Aqueous Systems of Nonelectrolytes and by M. Luscher-Mattli on Biopolymer-Water Systems.

Section V deals with Phase Changes, including chapters on The Formation of Micelles by H. Hoffmann and W. Ulbricht, on Unfolding of Proteins by W. Pfeil, on Conformation Transitions in Polynucleotides by V. V. Filimonov, and on Oligonucleotide Transitions by K. J. Breslau.

Section VI consists of a single chapter on Enzyme Catalyzed Processes by M. V. Rekharsky, G. L. Galchenko, A. M. Egorov, and I. V. Berenzin. This book provides an invaluable summary of available data and methodology in the fields covered by the chapters. The only negative comment deals with the, perhaps unavoidable, lead time required to produce a volume of this quality. The most recent references are at least 3 years old. Nevertheless, these chapters will provide a useful summary of available data, methods, and interpretation to the time of writing.

Siegfried Lindenbaum, *University of Kansas*

**Advances in Organometallic Chemistry. Volume 25.** Edited by F. G. A. Stone (University of Bristol) and R. West (University of Wisconsin, Madison). Academic Press: New York. 1986. vii + 399 pp. \$79.50. ISBN 0-12-031125-9.

This volume contains eight fairly specialized reviews written by leaders in each field. The first chapter, "Silenes" by A. G. Brook and Kim M. Baines (44 pages, 209 references), outlines the preparation, physical properties, reactions, and molecular rearrangements of this interesting class of molecules. This tersely written review is quite comprehensive.

The second chapter, "Metalla-Derivatives of  $\beta$ -Diketones" by Charles M. Lukehart (36 pages, 57 references), covers developments in this field since an earlier 1981 review by the same author. The use of these complexes in metalla- $\beta$ -ketoimine chemistry and in interligand carbon-

carbon coupling reactions is emphasized.

"Organometallic Sonochemistry" by Kenneth S. Suslick (44 page 261 references) begins with a discussion of the physics of acoustic cavitation followed by a section on the devices used by chemists for ultrasonic irradiation. The limited amount of known sonochemistry of organometallic complexes, both in homogeneous and heterogeneous systems, is described.

Chapter four is an informative review by Mark A. Gallop and Warren R. Roper on "Carbene and Carbyne Complexes of Ruthenium, Osmium and Iridium" (77 pages, 138 references). The first section outlines reasons why Fischer and Schrock type carbenes should not be viewed as separate classes of molecules. A detailed section on the bonding properties of carbyne ligands is also given. This is followed by an extensive survey of the synthesis and reaction chemistry of carbene and carbyne complexes of these three metals. Particularly useful is the section on halocarbene complexes.

A comprehensive review entitled "Borabenzene Metal Complexes" by Gerhard E. Herberich and Holger Ohst (37 pages, 104 references) outlines the bonding characteristics of these ligands followed by the syntheses and reactions of their metal complexes. Similarities and differences of analogous cyclopentadienyl complexes are discussed.

The sixth chapter by Glen B. Deacon, Suellen J. Faulks, and Geoffrey N. Pain is entitled "The Synthesis of Organometallics by Decarboxylative Reactions" (39 pages, 169 references). The bulk of this article outlines in detail the preparation of both main group and transition-metal organometallic compounds by a variety of thermal decarboxylation reactions. Many detailed examples are given.

Chapter seven is an informative introduction to "Detection of Transient Organometallic Species by Fast Time-Resolved IR Spectroscopy" by Martyn Poliakoff and Eric Weitz (39 pages, 112 references). It is divided into three parts. The first section outlines general methods that have been used to detect short-lived organometallic species. The second section discusses the hardware, basically four different instruments, being used to collect time-resolved IR data. Finally, the known experimental data are presented. This review is very recent, much of it coming from the authors' laboratories, including many 1985 publications and unpublished results.

Finally, a comprehensive review, "Carbonyl Derivatives of Titanium, Zirconium and Hafnium" by David J. Sikora, David W. Macomber, and Marvin D. Rausch (62 pages, 117 references), discusses the preparative properties, and reactivity (to form other complexes containing a carbonyl group) of this important class of compounds. The authors pay close attention to detail, especially in the preparation section, frequently comparing and contrasting different preparative methods.

The topics in this volume are of interest to the organometallic community and it should be in every research library. Most of the topics are a little specialized to justify purchase for private collections.

Daniel L. Reger, *University of South Carolina*

**Ab Initio Molecular Orbital Theory.** By Warren Hehre (University of California, Irvine), Leo Radom (Australian National University), Paul v. R. Schleyer (Universität Erlangen-Nürnberg), and John A. Pople (Carnegie-Mellon University). John Wiley and Sons: New York. 1986. xviii + 548 pp. \$79.95. ISBN 0-471-81241-2.

This book is not an introductory text in ab initio molecular orbital theory, though the first four short chapters do outline this theory an

could be used with the references to provide such an introduction. Rather, the purpose of the book is to give a clear understanding of the kind and accuracy of data that can now be gotten in a fairly routine way from *ab initio* molecular orbital programs. Although the main conclusions apply to all such programs, discussions are concerned specifically with the GAUSSIAN series. This is entirely appropriate, since Professor Pople has been primarily responsible for the development of the GAUSSIAN programs, and all the authors have had extensive experience with them. Further, these programs have been distributed widely through the generosity of Professor Pople's group so that the nonspecialist user is likely to have them available.

Chapter 5 of the book gives a readable introduction to the use of the GAUSSIAN programs, but it does not replace the more detailed users' manuals for them.

The long Chapter 6 of some 200 pages with 90 tables and 37 figures is the heart of the book. It shows in a detailed way the accuracy to be expected and the current practical limit of molecular size for the various *ab initio* levels of computation of structural and thermodynamic quantities. These time-saving compilations are very welcome and will be used frequently. The experimentalist need not rely on the claims of his theoretical colleague; he can easily scan these data himself to decide whether theory can provide a sufficiently accurate result for his purpose.

The final chapter also presents the results of many theoretical calculations. Here the emphasis is on chemical features of particular systems rather than on the comparison of theoretical methods. These systems, more elaborate and more chemically interesting than those in Chapter 6, are typical of those that can now be treated by *ab initio* methods.

L. J. Schaad, *Vanderbilt University*

**The Chemical Analysis of Water: General Principles and Techniques.** By D. T. E. Hunt and A. L. Wilson (Water Research Centre, Medmenham Laboratory). The Royal Society of Chemistry: London. 1986. xxi + 683 pp. \$99.00. ISBN 0-85186-747-9.

The Royal Society of Chemistry should be commended for inviting Hunt and Wilson to revise their first edition of "The Chemical Analysis of Water". Research scientists, graduate students, environmentalists, and water quality control agencies will profit greatly from these revisions. A debt of gratitude is certainly due the authors for such an extensive review of the literature in the development of the second edition. Since the publication of the first edition, many instrumental methods and techniques have been developed and improved. New instrumentation has increased accuracy, decreased time and cost, and improved detection limits. The demands in water quality control programs have promoted the development of a large number of techniques and procedures for the determination of very small elemental concentrations. The introduction of advanced technology and rapid increases in the industrialization of greater portions of our world in recent years coupled with population increases have created more sources of environmental pollution including water pollution.

In the second edition the attempt to integrate various aspects of water quality measurements has produced a complete experimental reference on principles, methods, techniques, and procedures for the chemical analysis of water. The new volume is a response to the demands and is both orderly and timely.

The comprehensive nature of the book is supported by an excellent and extensive list of references which follow each chapter. Equations, figures, tables, and illustrations are very selective, clear, and well explained. The data contained in the tables and the figures appear to be based on original work with the reference cited when necessary.

The authors approach enabled them to treat all the important aspects of water analysis. Chapter one is a brief introduction which discusses the importance of water analysis, the aims of this edition, and the arrangement of the text. Chapters two and three deal with information requirements of measurement programs (planning and management) and sampling techniques, respectively. Various aspects of the nature and treatment of analytical results are discussed in Chapters 4 through 8. Chapters 9 through 12 give a very detailed discussion on various analytical methods and techniques, including automatic and on-line analysis and laboratory precautions. The final chapter entitled "Computer in Water Analysis" is an excellent review of laboratory computer systems use and implementation in water analysis.

In the foreword to the second edition, the authors stated that the aim of the book was "to provide a comprehensive discussion of all types of errors so that the book may be used by analysts as an aid to ensuring the appropriate accuracy of analytical results. In addition, in response to the many developments in analytical techniques and procedures, we have up-dated and expanded many parts of the first edition that dealt with these topics, and new sections have been added where necessary." It is the feeling of the reviewer that the authors have fulfilled their goals and achieved their purpose in the development of this text. The reviewer feels

sure that this book will serve as a standard and guide for all analysts in the chemical analysis of water.

I would recommend this volume as a reference book for all college and university libraries. This book should prove very beneficial to all persons and invaluable to persons involved in water analysis and control.

Bobby L. Wilson, *Texas Southern University*

**Chemistry and Function of Pectins.** Edited by Marshall L. Fishman and Joseph J. Jen. American Chemical Society: Washington, DC. 1986. IX + 274 pp. \$54.95. ISBN 0-8412-0974-X.

This book constitutes Volume 310 of the American Chemical Society Symposium Series. This volume is a collection of 20 chapters in camera-ready form from a Symposium sponsored by the Division of Agricultural and Food Chemistry at the 189th meeting of ACS held in Miami Beach in April 1985.

The subject area is wide, but appropriate to the title of the book, and covers physical properties, biochemistry of pectin, and application in food technology. The chapters are divided into three sections. The first section, entitled "Chemical Composition, Structure and Physical Properties", contains ten chapters, but only the first deals seriously with structure and chemical composition of pectins. The second section, entitled "Plant Biochemistry", consists of only four chapters by a total of nine authors. This section provides the reader with an abundance of biochemical synthesis, analysis, and enzymatic studies on pectins. One chapter provides the reader with a new technique of characterization of the sequential-cooperative ion binding mechanism of pectins by using electron spin resonance, spin-spin coupling experiments.

The last section, entitled "Food Technology and Nutrition", covers six chapters. The first four chapters are on physical effects of pectins and their characteristics. Two others treat effects of pectin on human metabolism and the role of pectin in binding of bile acids to carrot fiber.

In view of increasing interest in the physical, biochemical, and functional properties of pectin during the past years this book (the first in 10 years) is highly valuable. The reference list in every chapter is extensive (over 700 total references) and almost fully up to date. An author index (only contributors) and subject index are also provided.

Overall, this volume is of interest primarily to such specialists as food technologists concerned with the pectins and their chemical and physical properties, but less so to most carbohydrate chemists and biochemists.

Zbigniew J. Wiczak, *Purdue University*

**Inorganic Reactions and Methods. Volume 1. The Formation of Bonds to Hydrogen (Part 1).** Edited by J. J. Zuckerman (University of Oklahoma). VCH Publishers, Inc.: Deerfield Beach, FL. 1986. xxv + 326 pp. \$92.00. ISBN 0-89573-251-3.

This is the first volume of a remarkable 18-volume set of books "that describes all of inorganic reaction chemistry". This series will occupy a unique position in the review literature and should be a valuable reference to chemists in a variety of contexts.

The first 14 volumes of this work "describe methods by which bonds between the elements can be formed". Volume 1 treats reactions which form bonds between hydrogen and itself and other elements. The various ways in which H<sub>2</sub> (i.e., the H-H bond) is formed are discussed first. The formation of HD and D<sub>2</sub> is also described. Then reactions which generate bonds between hydrogen and the halogens and between hydrogen and the elements of the group headed by oxygen are presented. Subsequent volumes on hydrogen describe the formation of bonds between hydrogen and the elements in the groups headed by nitrogen, carbon, boron, beryllium, and lithium as well as hydrogen bonds to the transition metals, the f elements, and the noble gases. This scheme is repeated in subsequent volumes on bond formation involving the other elements, i.e., homoatomic bond formation and then heteroatomic bond formation following the order cited above for hydrogen. This covers all possible combinations. These 14 volumes plus 4 additional special-topic volumes cover all inorganic reaction chemistry.

By design, the editor and editorial board have focused their description of inorganic chemical reactions on "synthetic utility, yield, economy, availability of starting materials, purity of product, specificity, side reactions, etc." Extensive editing has led to a uniform style which gives a high density of information. For example, "because the series focuses on the chemistry rather than the chemical literature, the need to tell who reported what, how, and when could be considered of secondary importance". Hence, proper names are not included in the text and the present tense is used throughout.

Considerable thought has gone into the organization and presentation of this work and the chemical community will find this series extremely usable as a result. For example, the words corresponding to the necessary section headings of the type 1.4.5.1 are repeated at the top of every page and are organized to make a coherent phrase when read in order. The top of page 175 has the following chapter, division, and section headings:

1.4 The Formation of Bonds between Hydrogen and O, S, Se, Te, Po; 1.4.4 by Reactions of Protonic Acids; 1.4.5.2 with Sulfides. The subsection on that page completes the phrase: 1.4.5.2.3. in Preparations of Anhydrous Acids of Sulfur. A detailed Table of Contents is given at the beginning of the book, and the author, compound, and subject indices are extensive: Volume 1 Part 1 has 89 pages of indices for the 236 pages of text. References are conveniently located at the end of each subsection. Judging by Part 1 of Volume 1, this format provides the desired comprehensive account of bond formation information in an efficient, readable, and skimmable form. Part 1 gives not only all the ways to make the various element-hydrogen bonds but also special attention to features such as preferred industrial methods and inherently dangerous reactions. The editors have handled the problem of how to designate groups in the periodic table by defining one common method (transition metals in Groups IIA-VIIIA) for the purpose of the series and by putting a periodic table with these labels in the back of every volume. The bond formation approach used to construct this series, the comprehensive scope of the work, and the attention to detail and organization will make this a singularly important reference of enduring value for many years.

William J. Evans, *University of California, Irvine*

**Endocrine and Metabolic Effects of Lithium.** By J. H. Lazarus (University of Wales). Plenum Publishing Corporation: New York, 1986. xi + 208 pp. \$35.00. ISBN 0306-42057-0.

The author succeeds in condensing in just over 200 pages information on the effects of lithium on the physiology and biochemistry of different organs and systems. He summarizes scattered information obtained in different areas of research which has been published predominantly in medical journals.

He undertakes this formidable task in a readable and concise manner. Two brief introductory chapters treat the history, pharmacology, and indications for lithium therapy. The author then discusses the effects of lithium on cellular, brain (written by K. J. Collard), mineral, and carbohydrate metabolisms and also the effects of this drug on the kidney and thyroid, pituitary, gonadal, adrenal, and pineal glands. Brief notes on the effect of lithium on the immune and blood systems and on the remission of herpes simplex virus are also included. Each chapter ends with an extensive list of references (through 1984), a convenient guide to the original literature on these topics.

The author details the endocrine and metabolic effects of lithium. Although he acknowledges that this drug does not act through these areas alone, he fails to propose or test possible mechanisms of action of lithium. His discussion of the underlying chemistry of lithium is scant, most noticeably in the chapters on the effects of lithium on cellular and mineral metabolisms. This comment, not a criticism per se, reflects more the lack of chemical and biochemical research on this important problem. I recommend this book for medical and science libraries and for those investigators interested in the problem of the biological action of lithium. If Dr. Lazarus' book stimulates research in the inorganic biochemistry of lithium, it has accomplished a very important feat.

Duarte Mota de Freitas, *Loyola University of Chicago*

**Amino Acids, Peptides and Proteins. Volume 16.** Edited by John H. Jones (University of Oxford). The Royal Society of Chemistry: London, 1985. xxi + 410 pp. \$144.00. ISBN 0-85186-144-X. (Available from the American Chemical Society.)

This book is the latest volume in the series of "Specialist Periodical Reports", in which researchers in various subfields provide critical accounts of progress on studying amino acids, peptides, and proteins. Chapter 1, written by G. C. Barrett, covers 469 references on amino acids, including newly discovered ones, synthetic methods, resolutions, various physical and stereochemical studies, chemical studies, and analytical methods. Chapter 2, written by R. Cassells and numerous other authors, covers structural investigations of peptides and proteins. It includes useful tables on (a) proteins purified by affinity chromatography, (b) proteins purified by dye-affinity chromatography, (c) proteins purified by hydrophobic-interaction chromatography, (d) proteins purified by immunoaffinity chromatography, (e) purification of membrane proteins, (f) purification of plasma proteins, (g) chemical modification of proteins (this one is 61 pages long in small print!), and (h) preliminary reports of protein crystallizations. Also reviewed in this Chapter are numerous reports on physical methods and their use in studying peptides and proteins. Chapter 3, by I. J. Galpin, covers 623 references on peptide synthesis. In addition, three rather extensive appendices, compiled by C. M. Galpin, catalogue many specific examples of peptide syntheses and some of their physical properties and purification methods. Chapter 4, by P. M. Hardy, deals with peptides with structural features not typical of proteins. This includes much chemistry of natural products. It contains a liberal use of chemical structures for browsers. Finally, in an Appendix to the book, reprinted in its entirety, is the IUPAC-IUB Joint Commission on Biochemical Nomenclature's recommendations for 1983 on Nomenclature and Symbolism for Amino Acids and Peptides.

This book, which almost exclusively covers references for the year 1983, should be a valuable help to those working in these research areas. It is clear that an enormous amount of work has gone into this volume, which should be a great time-saver to those who need to keep abreast of these rapidly developing research fields.

George L. Kenyon, *University of California, San Francisco*

**Solution Equilibria.** By F. R. Hartley (Royal Military College of Science), C. Burgess (Gloxco Operations UK Ltd.), and R. M. Alcock (Severn-Trent Water Authority). Ellis Horwood Limited: Chichester, UK, 1980. 361 pp. \$29.95. ISBN 0-470-20280-7.

This soft-cover book is exactly the same as the hard-cover version reviewed in *J. Am. Chem. Soc.* **1982**, *104*, 1787. The many strengths and few weaknesses of the text therefore remain. The price of the text, \$29.95 (as opposed to the previous \$79.95), is now so reasonable that the book could be used alone or with another text for a course dealing with metal-complex formation or inorganic solution chemistry. The volume clearly discusses the methods and common errors that occur in the study of metal-ligand complex equilibrium. The computer programs in the Appendix are quite useful.

Robert Nakon, *West Virginia University*