Book Reviews

Coenzymes and Cofactors: Volume II. Part A: Pyridine Nucleotides Coenzymes. By D. Dolphin and O. Avramovic (University of British Columbia) and R. Paulson (University of Victoria). John Wiley & Sons: New York. 1987. XVI + 776 pp. $99.95. ISBN 0-471-01125-8 (Part A)

This book is Volume II of a planned series of books dealing with coenzymes and cofactors. This particular volume (IIA) discusses the chemical and biochemical aspects of pyridine nucleotide enzymes.

Volume IIA contains 15 chapters: (1) History of the Pyridine Nucleotide by N. A. Kaplan; (2) Nomenclature by W. E. Cohn; (3) Evolution of Pyridine Nucleotide: Relationship Between Biosynthesis and Evolution by G. A. M. King; (4) Crystal Structure, Coenzyme Conformations, and Protein Interactions by H. Eklund and C-I. Branden; (5) Optical Spectroscopy of Pyridine Nucleotides by V. Rizzo, A. Pande, and P. L. Luisi; (6) Excited States of Pyridine Nucleotide Coenzymes; Fluoroescence and Phosphorescence by A. J. W. G. Visser; (7) Nuclear Magnetic Resonance Spectroscopy of Pyridine Nucleotides by N. J. Oppenheimer; (8) Mass Spectrometry of Pyridine Nucleotides by H-R. Schulten and H. M. Schiebel; (9) Mechanism of Action of the Pyridine Nucleotides by F. H. Westheimer; (10) Chemical Stability and Reactivity of Pyridine Nucleotide Coenzymes by N. J. Oppenheimer; (11) Stereochemistry of Fatty Acid Biosynthesis and Metabolism by A. Kawaguchi and Y. Seyama; (12) Kinetics of Pyridine Nucleotide-Utilizing Enzymes by P. F. Cook and B. L. Bertagnolli; (13) Preparation and Properties of NAP and NADP Analogs by C. Woenckhaus and R. Jeck; (14) Model Studies and Biological Activity of Analogs by B. M. Anderson and N. O. Kaplan; (15) Spin-Labeled Pyridine Nucleotide Derivatives by W. E. Trommer.

In summary, Part A contains chapters on history, nomenclature, evolution, stereochemistry, and crystal structure. Other physical aspects such as kinetic and thermodynamic behavior, electronic and photochemical properties, along with spectroscopic techniques, including absorption, luminescence, mass, NMR, and ESR spectroscopy are covered. The preparation, properties, biological activity, and mechanisms of action of NAD and NADP and their analogues, as well as model studies, complete the 15 chapters of Part A.

The volumes on pyridine coenzymes are dedicated to the late N. O Kaplan, who was a giant in the field of pyridine nucleotides, and also includes several chapters authored by him. The book is very good because authorities have been selected to write on topics familiar to them.

Kerry T. Yasunobu, *University of Hawaii*

Coenzymes and Cofactors: Volume II. Part B: Pyridine Nucleotides Coenzymes. By D. Dolphin and O. Avramovic (University of British Columbia) and R. Paulson (University of Victoria). John Wiley & Sons: New York. 1987. XVI + 776 pp. $99.95. ISBN 0-471-01126-6 (Part B)

This book is part of a planned series of books entitled coenzymes and cofactors. This particular volume (IIB) discusses the chemical, biochemical, and medical aspects of pyridine nucleotide coenzymes.

Volume IIB contains 17 chapters: (1) Biosynthesis and Salvage Pathways of Pyridine Nucleotides by A. G. Moat and J. W. Foster; (2) Intercellular Pyridine Nucleotide Degradation and Turnover by A. M. Ferro and B. M. Olivera; (3) Pyridine Nucleotides and Control of Metabolic Processes by R. L. Veech; (4) Nature and Biochemical Significance of Compounds Derived from Pyridine Nucleotides by C. Bernofsky; (5) Determination of Pyridine Nucleotides by Fluorescence and Other Optical Techniques by R. Roskoski, Jr.; (6) Radioimmunoassays of Oxidized and Reduced Pyridine Nucleotides by R. Bredehorst and H. Hilz; (7) Amperometric Assay of Pyridine Nucleotides by M. Aizawa and Y. Ikariyama; (8) Immunobilized Pyridine Nucleotide Coenzymes by M. O. Mansson and K. Mosback; (9) Redox Reactions of Pyridine Nucleotides by A. Ohno and K. Ushio; (10) Pyridine Nucleotide-Linked Sulfur Metabolism by R. H. Schirmer and G. E. Schulz; (11) Fatty Acid Synthesis and the Role of Pyridine Nucleotides by Y. Seyama and A. Kawaguchi; (12) Transhydrogenases Linked to Pyridine Nucleotides by J. Rydstrom, B. Perrsson, and E. Carlenor; (13) Complex Pyridine Nucleotide-Dependent Transformations by P. A. Frey; (14) Pyridine Nucleotide-Linked Glycohydrolases by S. R. Price and P. H. Pekala; (15) Non-redox Reactions of Pyridine Nucleotides by K. Ueda; (16) Nutritional Aspects of Pyridine Nucleotides by H. E. Sauberlich; (17) Medical Aspects and Applications of Pyridine Nucleotides by A. Fessler.

In summary, Volume IIB contains 17 chapters that emphasize the biochemical, nutritional, and medical aspects of the pyridine nucleotides. Chapters on biosynthesis, degradation, turnover, and salvage pathways are included as well as methods of assay and the utilization of immunobilized coenzymes. Both the redox and nonredox properties of the coenzymes are considered as well as their roles in sulfur and fatty acid metabolism. A number of chapters are also devoted to the medical and nutritional aspects of niacin.

The goal of the editors to provide a comprehensive and up-to-date treatise on coenzymes of the quality of "The Enzymes" has largely been met. In summary the 37 chapters in these two volumes covers just about all the major aspects known about NAD^+ and $NADP^+$ and analogues. The two volumes on pyridine nucleotide coenzymes are highly recommended.

Kerry T. Yasunobu, *University of Hawaii*

Scientific Controversies: Case Studies in the Resolution and Closure of Disputes in Science and Technology. Edited by H. Tristram Engelhardt, Jr. (Texas Medical Center), and Arthur L. Caplan (The Hastings Center). Cambridge University Press: New York. 1987. x + 639 pp. $59.50 cloth; ISBN 0-521-25565-1. $19.95 paper; ISBN 0-521-27560-1.

The title of this book is misleading: about the intention of the editors, which was to focus on closure of *public* controversies involving science or technology; about the result, which is not really focussed at all; and in suggesting that the controversies are specifically "scientific".

There are 28 chapters: half of them are purportedly about some general aspect of the closure of controversies, the others being concerned with four particular cases—laetrile, psychiatric categorization of homosexuality, nuclear power, and safety in the workplace. The lengthy introduction reveals that the volume arose from a grant to study how controversies are settled, in particular public controversies over scientific or technological issues. As part of this "Closure Project", a number of conferences were held between 1978 and 1982. The essays in this book are by some—but not all—of those who participated in those meetings; the authors are predominantly philosophers and social scientists.

Since the volume is a grab-bag of many topics, every reader is likely to find some of the essays interesting but others best ignored; thus only philosophers will want to bother with the first two chapters, which are entitled "Ethical Theory and the Problem of Closure" and "Scientific Controversy and its Termination" but offer nothing to the general as opposed to the specialist reader. As a chemist whose research now concerns the public understanding of science, particularly public controversies about science and its applications, I appreciated most the following: Ronald Giere on "Controversies Involving Science and Technology: A Theoretical Perspective"; Robert Rich on "Politics, Public Policy-Making, and the Process of Reaching Closure"; Loren Graham on "How History and Politics Affect Closure in Biomedical Discussions: The Example of the Soviet Union"; Allan Mazur, "Scientific Disputes over Policy"; Rae Goodell, "The Role of the Mass Media in Scientific Controversy". That I found these useful, however, does not imply that I learned from them about scientific controversies; thus Graham's chapter might more accurately have been titled "Science in Russia". Other readers might be more interested in the summary of the debate over continental drift—unlike the other disputes mentioned in the book, one that is purely internal to science itself; or the Marxist analysis of the eugenics movement; or the essay on nuclear fear.

In view of the misleading title, perhaps the most regrettable thing about this volume is that readers are not even guided clearly toward important writing about public controversies purporting to concern science. The classic piece by Alvin Weinberg, "Science and Trans-science", *Minerva* **1972**, *10*, 209, is mentioned only in Giere's essay, and neither "Trans-Science" nor "Weinberg" can be found in the index (even though the latter covers more than 7 pages); Mazur's book, "The Dynamics of Technical Controversy" (1981), central to the purported focus of this collection, is summarized in Mazur's own essay but ignored by most of the other contributors. Also regrettable are defects in publishing craftsmanship: more typographical errors than one expects from this Press, and occasionally quite irritating ones ("international" had to be wrong, but should it have been "internal", or "intentional", or what?); a whole line (or several) missing on page 71; and pages 53–84 bound between pages 20 and 21.

Who ought to or needs to read this book? Certainly not scientists who seek a discussion or overview of controversies concerning science, technology, or public aspects or impacts of those.

Henry H. Bauer, *Virginia Polytechnic Institute and State University*

Hypercarbon Chemistry. By G. A. Olah, G. K. S. Prakash, and R. E. Williams (University of Southern California), L. D. Field (University of Sidney), and K. Wade (University of Durham). John Wiley & Sons, Inc.: New York. 1987. xi + 311 pp. $49.95. ISBN 0471-06473-4

As any undergraduate organic chemistry student knows, saturated carbon is normally tetravalent and tetracoordinate. This reviewer has been inclined to greet suggestions to the contrary with a degree of skepticism. However, after reading this book, I have been persuaded of the importance, if not the omnipresence, of hypercarbon atoms in the chemical world. A hypercarbon (the term is short for "hypercoordinated carbon") atom is one surrounded by five or more nearest neighbors. The bonding at carbon is generally characterized by electron-deficient three-center two-electron bonds. Hypercarbon atoms are found in a myriad of chemical species ranging from the simple cation CH_5^+ to the structurally complex carboranes. There is also evidence of their involvement as intermediates in a host of otherwise unrelated reactions.

The objective of this book is to survey the many types of compounds containing hypercarbon from the perspectives of structure, bonding, and reactivity. It succeeds admirably. The book opens with a broad overview of hypercarbon chemistry. The remaining six chapters, which are organized according to structure, elaborate on the subject in considerable detail. Each of the chapters is filled with factual information, thoroughly documented. Topics include bridged metal alkyls; carboranes and metallocarboranes; mixed metal carbon clusters and metal carbides; hypercoordinate carbocations; carbocation, borane, and polyborane analogues; and hypercarbon reaction intermediates. Each chapter is subdivided in outline format which creates the impression of tight and logical organization. In this regard the Table of Contents is most useful for searching out specific subjects. There is also an extensive index.

Since the literary styles vary from chapter to chapter, I conclude that the several authors made varying contributions to each chapter. The result, which is to be expected in a book written by committee, is a certain unevenness. The quality of the writing ranges from lively to rather dry. I found those chapters dealing with the novel structures of hypercarbon compounds to be more interesting than those describing esoteric reactivity. Another result of the committee format is the intrusion of some redundancy, as for example the multiple citations of label scrambling in $(CH_3)_2Zn$ via a hypercarbon intermediate.

There is actually very little to criticize here, but a few deficiencies should be noted. Although there were relatively few typographical errors, the repeated use of "cannonical" (*sic*) and the various renditions of "acetylenes" [e.g. "actylenes", p 266; and "acteylenes", p 271] were amusing. A strong feature of the book is its abundant use of illustrations; clear and definitive drawings are essential for depicting the complex structures of the substances. Unfortunately, conventional typesetting failed to do justice to the unusual three-dimensional features of some of the molecules. A larger proportion of the artwork should have been assigned to a draftsman. Finally, I felt that the presentation of the norbornyl cation story was disappointingly one-sided. The case for the nonclassical nature of this species is argued entirely on the grounds of sophisticated spectroscopic evidence, mostly from the authors' laboratories. There is only a passing reference to the solvolytic studies which were at the center of the original controversy. This omission is forgiveable given the subject matter, but it would certainly mislead the neophyte.

Overall, however, this is a superb book which should be on the shelves of every chemistry library. The authors' protestations notwithstanding the coverage of hypercarbon chemistry is virtually encyclopedic and spans a number of chemical subdisciplines. A recurring theme is the inherent unity of chemistry which derives from structure and bonding. There will be something of interest here for everyone, from the physical organic chemist, to the organometallic chemist, to the theoretician.

The book also includes a charming implicit tribute to the Fiesers. Inside the front cover is a photograph of the Olahs' cocker spaniel which "enlightens this otherwise wasted page". Bravo!

Mark R. DeCamp, *University of Michigan—Dearborn*

Nuclear Magnetic Resonance Imaging in Medicine and Biology. By Peter G. Morris (University of Cambridge). Clarendon Press: Oxford. 1986. xii + 388 pp. $59.00. ISBN 0-19-855155-X

Nuclear magnetic resonance (NMR) imaging has developed by now into a viable clinical tool for diagnosis and research since its advent in 1973. This book is a useful text for the uninitiated. Both the complete novice in anything NMR and the one familiar with basic principles of NMR spectroscopy, but lacking knowledge of NMR imaging, may benefit from this monograph. The scope of the text is quite comprehensive, ranging from basic NMR theory through imaging techniques and instrumentation to imaging applications. The reader, novice included, will not need any outside text for full understanding; those averse to mathematical formalism, however, may find it difficult, at times, to follow the derivations. Background in the physical sciences may help, and it seems that this book may be most valuable for those familiar with NMR spectroscopy but who wish to expand their knowledge to NMR imaging. It is also possible to restrict reading to the chapter on applications (Chapter 6) with need for little or no reference to the rest of the book. Chapter 1 is a general introduction, and it outlines the development of NMR, the development of NMR imaging, its current commercial spread, and a section with advice to the reader. Chapter 2 gives a thorough description of basic NMR theory including the concepts of relaxation times, chemical shift, and scalar coupling. A useful section at the end of the chapter deals with NMR spectroscopic studies of living systems. Chapter 3 walks the reader through the various point- and line-imaging methods using clear illustrations and providing pertinent equations. Also included is a short section of volume-selective methods for spectroscopy. Chapter 4 takes us into the world of two- and three-dimensional imaging methods giving detailed expressions for the spin density in the various methods. The application of the theory to imaging is explained. Chapter 5 describes the different elements of NMR instrumentation: magnet, gradient coils, radiofrequency transmitter, receiver, pulse controller and processor, and image display. Practical design as well as theory pertinent to each component are presented. Chapter 6 is the longest of all, surveying throughout its 118 pages application of NMR to biological systems. First the NMR properties of tissue water are described, and the basis for discriminating between types of tissue is explained. Subsequently, the various pulse sequences are detailed, including the expressions showing in each case the dependence of signal intensity on relaxation times and delay parameters. This practical, introductory part of the chapter closes with sections on choice of imaging plane, resolution, imaging time, contrast agents, and flow imaging. The rest of the chapter is dedicated to examples from the literature of head and whole-body scans, the latter subdivided into thoracic, abdominal, and musculoskeletal studies. The chapter closes with a section on imaging with non-proton nuclei and chemical shift imaging.

The book is well-organized and clearly written. It contains a large number of useful illustrations and images. Each chapter has its own reference section which may not be the best method of listing references. The subject index is comprehensive enough. An author index would be useful. All in all, this book would serve well readers with chemical background.

Gabriel A. Elgavish, *University of Alabama at Birmingham*

Basic Inorganic Chemistry. 2nd edition. By F. Albert Cotton (Texas A and M University), Geoffrey Wilkinson (Imperial College, London), and Paul L. Gaus (The College of Wooster). John Wiley & Sons: New York. 1987. x + 708 pp. $38.00. ISBN 0-471-02969-6

This is a text designed for an inorganic chemistry course that would follow the freshman college-level general chemistry courses but not have physical chemistry as a prerequisite. In general, the authors have succeeded in presenting the material at the appropriate level. Some notable exceptions are the discussions of the reactivity of coordination compounds (Chapter 6) and the electronic absorption spectra of transition-metal complexes (Chapter 23), in which Tanabe-Sugano diagrams are given. The discussion is insufficient for even a basic understanding unless the instructor supplements the text material extensively or the student has had prior instruction in these areas. This, however, is not to be considered a major problem with the text, since it seems unlikely that all of the material in the text would be covered in a one-term course. An instructor will find it necessary to omit some parts and several can easily be omitted without loss of continuity.

The text is divided into four major parts. The first part is entitled First Principles and contains the basic material necessary for understanding the other parts. The major portion is a very good review of fundamentals, some of which are normally presented in two-semester general chemistry courses. Part Two, The Main Group Elements, briefly surveys the sources, preparations, properties, and some of the commonly encountered compounds of the elements by group. The European system of group designations is used and the proposed IUPAC group designations are also given. This may lead to some confusion initially since few general chemistry texts use these. Part Three, The Transition Elements, contains several chapters on the chemistry, bonding, and structures of the compounds of the transition metals. The emphasis is on those of the first transition series; however, some material is presented on the metals of the second and third transition series as well as those of the actinides and lanthanides. As with the main group elements, the sources and properties of many of the transition metals are included. Part Four is entitled Some Special Topics and contains material of an advanced nature. Included

are chapters on metal carbonyls, organometallic compounds, and bioinorganic chemistry. Students who read these, especially the chapter on bioinorganic chemistry, should get an appreciation for some of the important areas of research work in inorganic chemistry. They could provide a stimulus to delve further into the field.

Good questions are present at the end of each chapter. Most chapters contain three levels of questions. The first set is a series of review questions directly pertaining to the material of the chapter. This is followed by additional exercises that require more thought and application of the principles presented in the chapter. The third set poses questions from cited literature references. This appears to be an attempt to get students familiar with the literature of inorganic chemistry, something that is very desirable. Each chapter also contains references for supplemental reading. The presence of a glossary at the end of the text will be most helpful to students when encountering new terms.

Instructors who teach an intermediate-level inorganic chemistry course should seriously consider this text for adoption. The authors have provided a good survey of principles, elements, compounds, and reactions. Some instructors will find one or more of their favorite topics missing, but they can easily supplement the text at the appropriate places.

Joseph M. Kanamueller, *Western Michigan University*

High Performance Liquid Chromatography in Plant Science. Edited by H. F. Linskens and J. F. Jackson. Springer-Verlag: New York. 1987. xx + 248 pp. $79.00. ISBN 3-540-17243-2 and 0-387-17243-2

This book is Volume 5 of the New Series *Modern Methods of Plant Analysis.* The volume addresses a very important analytical technique for the separation and analysis of the various components of plants. This is an edited book utilizing 22 experts in the field of plant analysis as the contributing authors. The various topics that are addressed are the following: the gibberellins, cytokinins and related compounds, abscisic acid and its catabolites, indole-3-acetic acid and some of its decarboxylated catabolites, phenolic compounds, thiophenes, ascorbic acid, phytoalexins, lipids, proteins and peptides, polyamines, and alkaloids.

There is no Plenary Chapter regarding the fundamental theory of HPLC nor a section on the components of a chromatographic system. Thus, the volume is aimed at people familiar with the liquid chromatographic technique. This omission does not detract from the usefulness of the volume. Those readers who wish to read about the theory and/or instrumentation of the liquid chromatrographic technique are referred to texts specifically written about these topics.

The individual chapters are well written and present enough information to permit one to pursue the analysis of a particular type sample or to analyze for a specific plant component. The cited literature is up-to-date; many chapters have 1986 and 1987 journal references. This is a compliment to the editors who kept a very rigid schedule and the publisher who did not delay in the publishing of the volume.

The volume is adequately filled with representative data, conditions, and example chromatograms to furnish the reader with sufficient visual material to know what to expect from a particular analysis.

Overall the volume is well-written and a fine addition to the New Series. The reviewer recomends this volume (and the previous four volumes) to those working in and contemplating working in the area of plant analysis.

Robert L. Grob, *Villanova University*

Chemical Pattern Recognition (Chemometrics Series: I1). By O. Strouf (Czechoslovak Academy of Sciences). Research Studies Press Ltd.: Letchworth, Herts., UK. John Wiley & Sons Inc.: New York. 1986. xvi + 202 pp. $49.95. ISBN 0-86380-044-0 (UK); ISBN 0-471-91252-2 (US)

This is the eleventh book in the *Chemometrics Series* edited by Dr. D. Bawden. Unlike many of the other selections that focus on particular methods or applications of chemometrics, this book examines perhaps the largest activity, pattern recognition covering several methods and applications. In this regard, the book is far from a textbook. It is really more of an historical introduction to the literature of chemometrics and as such it is quite accurate.

As the author states, the book summarizes recent results emphasizing the period from 1979 to 1985. Since quite a lot of work is covered, the book reads like a review with over 300 references. However, the interested reader should bear in mind that this is not a critical review.

Following a short and well-written introduction chapter, the two chapters comprising most of the book cover first the pattern recognition methods used or developed by chemists trying to get useful information from chemical data and then the primary areas of application. For the latter, the author categorizes the work on the basis of the type of data involved (e.g., spectral) rather than the goal or focus of the study (e.g., environmental science). This may serve to force specialists to read more of the book.

The author clearly has a good grasp of the field and has produced a book that is easy to read and should serve to introduce chemists to chemical pattern recognition. Besides the occasional typographical error often associated with camera-ready manuscripts and the absence of critical comments that would help guide the new chemometrician through a growing literature, I found only one serious shortcoming (my opinion). The topic of principal-component analysis, also known by several other names, is central to chemical pattern recognition and deserves more coverage than that afforded to it by this book. Perhaps this could be an opening for a second monograph by Dr. Strouf.

Bruce R. Kowalski, *University of Washington*

Theory of Reflection. By John Lekner (Victoria University of Wellington). Martinus Nijhoff Publishers: Dordrecht, Boston, and Lancaster. 1987. xii + 279 pp. $78.50. ISBN 9-024-73418-5

This work is a treatise on reflection phenomena. While primarily a detailed mathematical physics reference, it is extremely well written and thought out. The author has successfully unified the various models and applications of virtually all wave and matter reflection phenomena; he clearly demonstrates the ease in relating such apparently diverse subjects as reflection from the ionosphere and generation of surface plasmons, or reflection/absorption from evaporated thin films on silicon and from homogeneous media, whether partially absorbing or specular. (Many of these topics are of interest to those working in spectroelectrochemistry.) In addition, Lekner provides a quantum mechanical treatment of particle reflection from potential barriers, which is of direct value to some areas of molecular beam research, laser optica, semiconductor physics, and superconductivity.

The basic theories of electromagnetic reflection as applied to waves, particles, acoustics, and many-body interferences are developed in the first chapter. The chapter continues with a detailed section on how these principles will tie into the detailed applications presented in the rest of the book; this is a carefully considered section and a real asset to the work. The detailed applications include, to mention only a few, grazing reflection from various surfaces, total and frustrated internal reflection, absorption at many interfaces, an elegant treatment of the Fresnel relations, excellent comparisons of the interactions of radiation with dielectrics and conductors, thin film interactions with electromagnetic waves, nonuniform films, diffuse reflectance, and finite beam phenomena. The detailed reference lists are subdivided into references quoted in the text, general references for additional reading, and topical references. Helpful annotations are provided, in addition.

Admittedly, the book first appears too heavy on the math to allow a comfortable assimilation of physical insight into the subject. The author has, however, recognized this first and rapidly develops a very nice treatment without sacrificing rigor. The volume is well worth having to those interested in the interaction of radiation with matter.

Stanley Pons, *University of Utah*

Equations of State: Theories and Applications. ACS Symposium Series 300. Edited by K. C. Chao (Purdue University) and R. L. Robinson, Jr. (Oklahoma State University). American Chemical Society: Washington, DC. 1986. ix + 597 pp. $94.95. ISBN 0-8412-0958-8

This volume of proceedings is based on the 1985 equation-of-state symposia. The twenty-eight papers included present and evaluate numerous mathematical formulations describing volumetric behavior and phase equilibria in a variety of nonpolar and polar, single- and multicomponent fluid systems. Equation design, mixing parameters, and theoretical modeling are emphasized.

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