Book Reviews

Electronic Structure of Organic Molecules. Volume 2/4. Encyclopedia of Physical Chemistry and Chemical Physics. By T. E. PEACOCK (University of Queensland). Pergamon Press Ltd., Oxford, England. 1972. xi + 145 pp. $10.50.

This is the second volume devoted to electronic structure and covers organic molecules. With only 145 pages, the coverage is brief. There are five essentially equal chapters, and throughout the results of theory are compared with measurable quantities such as bond dissociation energy, ionization potential, dipole moment, etc. The first two chapters very briefly cover saturated and simple unsaturated molecules. Chapters 3 and 4 give the development and comparison of Hückel molecular orbital theory and valence bond theory of polyenes and aromatic molecules and Chapter 5 covers improvements in HMO theory of π electrons.

This reviewer feels it is unfortunate that so much space (essentially Chapters 3 and 4) is spent on the historical development of MO and VB theory and too little space devoted to recent advances, particularly the inclusion of σ and π electrons with a limited basis set in the CNDO, INDO, and MINDO approximations.

Alan S. Rodgers, *Texas A&M University*

Benzofurans. By AHMED MUSTAFA (Cairo University). John Wiley & Sons, New York, N. Y. 1974. xvi + 514 pp. $45.00.

This is Volume 29 in the Weissberger-Taylor series of reference monographs on the chemistry of heterocyclic compounds. It may be considered as an extension of Volume 23 (by the same author) dealing with furopyrans and furopyrones which, like benzofurans, constitute an important segment of the plant phenols. The present subject is covered in eight chapters: (1) Benzofurans (including simple substituted derivatives), (2) Acylbenzofurans, (3) Benzofurancarboxylic Acids, (4) Hydrogenated Benzofurans, (5) Benzofuranones, (6) Naturally Occurring Benzofurans (including the aurones), (7) Naturally Occurring Spirobenzofuranones (including the useful griseofulvin), and (8) Less Common and Modified Naturally Occurring Benzofurans (*e.g.*, usnic acid). The literature is reviewed through 1971.

Consistent with the comprehensive coverage characteristic of this series, the information in the written text is highly condensed. Fortunately it is liberally interspersed with structural formulas so that a roving eye can quickly identify any areas of interest to the reference searcher. Unhappily, the great number of closely related, complex structures has led to excessive numbers of errors. In many cases they become obvious on reading the accompanying text, but in others (*e.g.*, structure **272**, p 271), recourse to the original literature may be necessary to avoid confusion. Nevertheless, the volume represents a major addition to this important series of reference works and will provide valuable aid to the specialist in the field.

H. E. Zaugg, *Abbott Laboratories*

Atomic Absorption Spectrometry in Geology. By ERNEST E. ANGINO (University of Kansas) and GALE K. BILLINGS (New Mexico Institute of Mining and Technology). Elsevier Publishing Co., Amsterdam. 1972. x + 191 pp. $13.50.

Just as the title implies, this book is slanted toward an audience of geologists and other scientists who are simply interested in seeing if atomic absorption spectrometry can be applied to solving their particular analytical problems. If a book with a strong theoretical basis is what you are looking for, this one will certainly not be appropriate.

A majority of the book deals with common elemental interferences that can be encountered and specific methods and applications of atomic absorption techniques. Each analytical problem (*e.g.*, brines, silicate rock analysis, ore samples) is presented in terms of how two or more researchers have approached this problem and the techniques they used. Unfortunately, nowhere do Angino and Billings make a value judgment and inform the reader as to which of these techniques is, in all likelihood, the most reliable and accurate. A wealth of references is given in the text; however, one glaring oversight is the lack of any reference to the well-proven methods of L. Shapiro of the U. S. Geological Survey.

Angino and Billings' discussion of silica and alumina determinations in silicate rock samples is very brief and inadequate. They have no references to several techniques now available where Si, Al, Mg, and Na can be measured from separate aliquots of the same dissolved sample, making the need of a separate dissolution procedure simply for Si and Al completely unnecessary. In addition, not nearly enough emphasis is given to the need for analyzing several well-known geochemical standards along with a group of unknown samples. These standards act as internal monitors and give much valuable data concerning the reliability of your measurements.

On the whole, the book does gather together much pertinent information. It will prove to be most useful to the novice, and, presuming that he does have access to a majority of the literature references cited, he ought to be able to select which analytical technique would be of most service to him.

Stanley A. Mertzman, *Franklin and Marshall College*

Biochemistry of the Developing Brain. Volume 2. Edited by WILLAMINA HIMWICH (University of Nebraska) with nine contributors. Marcel Dekker, Inc. New York, N. Y. 1974. vii + 325 pp. $22.50.

Extensive development of the brain and central nervous system continues after birth, when an animal can be greatly influenced by the external environment. Therefore, understanding the biochemical basis of developmental changes in the brain is important in order to maintain an environment for normal brain development and to prevent brain damage and possible associated mental retardation. This book considers the influence of environmental factors (*e.g.*, drugs, hormones, and oxygen deprivation) on brain development. Results are described which affect brain DNA content, intermediary metabolism, growth, and general patterns of behavior; several different animals were studied, including humans. In addition, detailed descriptions of normal metabolic patterns in developing brain constitute a significant portion of the information presented.

Many interesting ideas are suggested throughout the book; one suggestion made by Van den Berg will serve as an example. Energy metabolism in the brain appears to shift during development from the utilization of several different substrates, *e.g.*, amino acids and glucose, to the almost exclusive utilization of glucose. Van den Berg suggests that this observation may account for the sensitivity of developing brain to metabolic errors (induced or genetic) in the utilization of amino acids and other substrates for energy metabolism.

Scientists investigating brain metabolism and function will find this book an important reference, not only because of the ideas presented but also because it contains descriptions and critiques of some analytical techniques and procedures, introductory information on intermediary metabolism, and detailed annotation. Scientists with only peripheral interest in brain metabolism and function can also read the book with profit and with ease.

Elizabeth C. Theil, *North Carolina State University*

Stereochemistry and Bonding in Inorganic Chemistry. By J. E. FERGUSSON (University of Canterbury, Christchurch, New Zealand). Prentice-Hall, Inc., Englewood Cliffs, N. J. 1974. x + 309 pp. $15.95.

This book begins with a short summary of the history of stereochemical knowledge, including a list of ten texts or reviews of inorganic stereochemistry. Chapter 2, "Atomic Orbitals," is a review of the concept of atomic orbitals with emphasis on their symmetry and transformation properties according to group theory. Chapter 3, "Valence Bond Theory," is a summary of the notion of hybrid orbitals and their overlap properties. Chapter 4, "Pauli Exclusion Principle," is a statement of the Pauli principle followed by a discussion of the influence of electron correlation and repulsions on molecular structure. Chapter 5, "Molecular Orbital Theory," is a brief summary of the elementary molecular orbital treatment of simple molecules. Chapter 6, "Equivalent Orbitals," is a five-page summary of Lennard-Jones' formation of equivalent orbitals from linear combinations of molecular orbitals, illustrated by the cases of N_2 and NH_3. Chapter 7, "Transition Metals," is a brief treatment of transition metal complexes by molecular orbital and crystal field theories and a statement of the possibilities for isomerism in four- and six-coordinate complexes. Chapter 8, "Coordination Number and Stereochemistry," describes the effects

on coordination number of radius ratio, central atom oxidation state, electroneutrality principle, ligand electronegativity, orbital energies, bond type, and the nine orbital (effective atomic number) rule. This is done in about three pages of printed text plus figures and tables. Starting Part II of the book, Chapter 9, "First Short Period," focuses on the two-, three-, and four-coordinate structures of the elements in the second period of the periodic table. It also includes a short section on the electron-deficient boron hydrides. Chapters 10 and 11, "The Stereochemistry of the p-Block Elements" and "The Transition Metals," respectively, treat the structures of groups IIIA through VIIA and transition metal complexes. Both chapters are organized on the basis of coordination number. Chapter 11 also deals cursorily with spectral and magnetic methods of determining coordination number and concentrates on the relative stabilities of various structures with different types of ligands. There is a brief treatment of metal π-complexes and a two-page discussion of template reactions. Chapter 12, "The Lanthanides and Actinides," is a short presentation, mostly in tabular form, of the stereochemistry of these complexes.

My personal assessment of the book is that it may be a book without an audience. It is at too high a level for people who have not had an introduction to quantum mechanics or a course in structure and bonding, and it is too brief and superficial for those interested in a thorough knowledge of the subject. One contributor to the latter difficulty is the lack of adequate references. Most references are to texts or review articles rather than to sources where experimental details are available. In reading the book, I frequently was interested in pursuing a controversial point further but there were no leading references to help. This book could serve as a review of elementary quantum mechanics and structural inorganic chemistry.

Charles A. Root, *Bucknell University*

Crystal Growth, An Introduction. Edited by P. HARTMAN (State University of Leiden). American Elsevier, New York, N. Y. 1973. xi + 531 pp. $24.00.

This is the first in an intended series of monographs on crystal growth and consists essentially of the series of lectures delivered at the International Summer School in Crystal Growth which was held at Noordwijkerhout, The Netherlands, in 1971. Thirteen recognized experts present four general aspects of the subject: (1) Nucleation (Homogeneous and Heterogeneous) and Epitaxy; (2) Techniques of Crystal Growth, from vapor to melt and hydrothermal methods as well as industrial mass crystallization; (3) Theory of Crystal Growth; and (4) Properties and Observation of Dislocations.

Chapters range from being relatively short—9 pages each on Chemical Transport Reactions and Equilibrium Forms in a Phase of Small Dimensions to 65 pages on the Kinetics of Growth and 69 pages on Dislocations. In between in size is a well-balanced selection of topics vitally important to both the theorist and experimenter in this rapidly growing field. Each will benefit from reading this book.

While the coverage in this compilation is quite complete, this reviewer would not consider it suitable as a text book for a course in crystal growth but rather as a supplement and reference monograph. The chapters on theory, equilibrium forms, and morphology, in particular, require careful study by the beginner and expert alike while others, such as hydrothermal growth, etc., are more descriptive. All in all, this reviewer considers this book an excellent monograph for the active worker in the field.

Andrew VanHook, *College of the Holy Cross*

The Antigens. Volume 1. Edited by MICHAEL SELA (The Weizmann Institute of Science, Rehovot, Israel). Academic Press Inc., New York, N. Y. 1974. xiii + 573 pp. $35.00.

This first volume in what is to become a series of books designed to provide a central source of information on the biochemistry and molecular biology of the antigens contains seven chapters dealing with nucleic acids and enzymes as antigens, structure of immunoglobulins, immunoglobular allotypes, a general treatment of the evolution of proteins, phylogeny of immunoglobulins, and the chemistry and biology of Immunoglobulin E, a class of immunoglobulins important in allergy. The chapters are authored or coauthored by such authorities as N. Arnheim, R. Arnon, J. A. Gally, H. M. Grey, K. Ishizaka, R. T. Kubo, R. Lieberman, R. Mage, M. Potter, B. D. Stollar, W. D. Terry, and B. Zimmerman.

Each chapter provides a rather complete review of its topic. The topics are dealt with in depth and are written in such a way as to make the subject matter intelligible and valuable not only to the specialist in immunology but also to those scientists who are active in disciplines related to immunology. An extensive list of references is included with each chapter.

This book appears to fulfill very successfully the stated purpose of its editor in that it provides a means by which interested people may keep abreast of all aspects of the chemistry, biology, and immunologic role of antigens.

Eugene S. Wagner, *Ball State University*

Advances in Chemical Physics. Volume 24. Edited by I. PRIGOGINE (University of Brussels, Belgium) and S. A. RICE (University of Chicago). Wiley/Interscience, New York, N. Y. 1973. ix + 358 pp. $22.50.

With this volume the editors of *Advances in Chemical Physics* have undertaken to provide an alternative to conventional review articles by soliciting from an author a "comprehensive article in which he explains his view on a subject freely and without limitation of space." There is the hope that as the style consolidates over the first several volumes there will emerge a series which can stimulate original work and do so in a manner more personal than has been the traditions of review journals.

Such ambitions seem to me both very desirable and very lofty, and it would be inappropriate to judge the effort by its earliest product. Different readers will find different reasons for admiring this volume.

Those who are concerned about laser light scattering, for example, will find the lead article by Fleury and Boon remarkable for its completeness, organization, and sophisticated appreciation of both details and principles, and for enough well-characterized difficulties to stimulate other workers. There are over 500 numbered references (some are multiple), and that fact alone should serve well the reader who is looking for a place to start.

Much more personal is the article of B. D. Coleman on the subject of the thermodynamics of mechanical systems with memory, a field to which he has made numerous substantial contributions. For the most part the presentation is formal and rigorous and for that reason of greatest interest and value to persons already somewhat interested and skilled in these matters.

Variational methods have become an important technique in modern physical chemistry with applications found in subjects of such general importance to chemistry as polymers, solutions, and molecular quantum mechanics. I know of no general introduction to the subject which is more direct, clear, and balanced than that due to Girardeau and Mazo found here. The techniques are of particular value in establishing bounds either on functions or their derivatives and play a major role in problems where behavior as contrasted to details is important. This essay should be especially useful to students and to workers in other areas.

H. T. Davis, on the other hand, has written a modern commentary on the kinetic theory of simple fluids which is at once less tractable to the newcomer and potentially of more interest to the professional since it contains not only an account of earlier results but makes some new contributions as well, especially in the matter of what has been called the "generalized Rice-Allnatt theory." There is here an effort to clarify the situation both at the theoretical and experimental level. It is a long essay and in its course touches on most of the pertinent issues, including those important contributions now generally referred to as "computer experiments."

Every serious student of physical chemistry is expected to take a course in statistical mechanics. Many interesting and useful things are learned there, but the most delicate and interesting question such a course can raise surrounds the problem of the erogodic behavior of mechanical systems and the role ergodicity plays in foundations of the subject. This is the business of Joseph Ford's essay entitled, "The Transition from Analytic Dynamics to Statistical Mechanics."

Although it is admittedly a tough subject for the general reader, Ford has managed to select examples and utilize models which make the points of importance contained in more elaborate accounts of C-systems found elsewhere, and to do so with such a felicitous style that the reading is a delight from beginning to end. It is a short paper, 28 pages, containing a rich assortment of ideas, yet it is neither unbearably dense nor superficial. A reader, inevitably, emerges from a reading of this essay with a much clearer and a much deeper understanding of what is central to the issue, what is known, and what, yet, remains to be done.

If Ford's essay may be taken as illustrative of what this series is aiming for (at least the direction in which I would take aim), then we can hope for that kind of reading which will bring a clarity of issues to specialists, direction to students, and a degree of under-

standing to nonspecialists. That would be a splendid accomplishment.

Andrew G. De Rocco
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Instrumental Methods of Food Analysis. By A. J. MACLEOD (Queen Elizabeth College). Wiley/Halsted, New York, N. Y. 1973. vi + 802 pp. $39.00.

The over-all aims, scope, and organization of this book have been very well thought out and are highlighted by the tremendous quantity of references. The tabular classifications of analyses by components and by foodstuffs as described on pages 9 to 11 seem at first cumbersome but are necessary with the huge bulk of reference analyses cited. This allows the analyst to determine quickly if a particular type of analysis of a certain food item by a required method is mentioned by the author. There is a good cross-checking system between the Index of Food Analysis References (pp 767–780) and the references at the end of each chapter which also aid in finding an analysis for a particular food item by any method.

Most chapters include a very good summary of the type of analysis being discussed in that chapter. The instrumentation and experimental techniques sections of each chapter cover all the basic information, along with the included references, needed by a beginner to perform an analysis. Many excellent points are made, and consequently these sections also make an informative quick review for the experienced analyst.

An inevitable fault with texts of this type is that many of the references, which are this book's strong point, will be outdated in a few years because of the growing number of new innovations and methods in food analysis. Another fault is that if a chemist is trying to improve upon an existing method it is unlikely that the direct information he seeks will be in the analysis or analytical methods sections of a chapter because these sections are so general. However, here again, many references are cited which may help the chemist.

With more than 2500 references mentioned in this book, I question how many have been checked by the author for their quality—those containing the best potentially helpful information to other scientists.

Donald L. Schooley, *Miles Laboratories, Inc.*

The Primary Structure of Transfer RNA. By T. V. VENKSTERN (Institute of Molecular Biology, Academy of Sciences of the USSR). Plenum Publishing Corp., New York, N. Y. 1973. x + 296 pp. $25.00.

Venkstern's monograph is an updated translation from a 1970 Russian edition and is written in a notably clear and direct style.

A factor which is immediately striking is the careful detail which is given to each of the principal areas presented. The book is divided into four chapters, the first of which is a brief introduction to the value of study of tRNA structure. The second chapter contains methods of tRNA purification and primary structure analysis. Chemical and spectrophotometric methods in previous and present use are compared. Particular attention is focused upon the unit method of sequence determination. Chapter Three contains a specific survey of known sequences of tRNA from sources varying from microorganisms to mammalian tissue. All sequences are interpreted according to the cloverleaf model. The concluding chapter has a lucid discussion of minor components and their postulated roles in specific functioning of tRNA molecules.

While the author emphasizes the importance of investigation of the primary structure of tRNA, she takes care to indicate the necessity for determination of three-dimensional structures in order to study functional centers of these molecules. Thus, concerns about primary structure are kept in notable balance with other structural considerations.

The subject area is so well treated that it should prove quite useful as a highly specialized reference text for all workers interested in tRNA structure or function.

Julius H. Jackson, *Meharry Medical College*

Excited States. Volume 1. Edited by E. C. LIM (Wayne State University). Academic Press, New York, N. Y. 1974. xii + 347 pp. $24.50.

Professor Lim is to be commended for editing this authoritative and well-balanced treatise on excited states. Taken separately, each chapter deals with different systems with different techniques. Taken as a whole, this book appears to center on and around the relaxation phenomena. It did not take too long for this reviewer to realize that (with the exception of Chapter 4) the chapters can be conveniently reclassified as: Chapter 1 (Robinson), general theory of electronic relaxations in isolated molecules; Chapter 2 (El-Sayed), relaxations involving spins (intersystem-crossing rates, SLR, triplet–triplet energy transfer); Chapter 3 (Hochstrasser, *et al.*), relaxation of collective excitation (exciton–phonon coupling); Chapter 5 (McGlynn, *et al.*), dipole-dependent relaxation phenomena; Chapter 6 (Goodman, *et al.*), relaxations of excited states of carbonyl compounds.

The consistent emphasis on relaxation may or may not be a result of concerted efforts by the editor and authors. Nevertheless, it certainly reflects the trends of spectroscopic researches, which, in the last few decades, have moved from mere assignments of spectra to a more careful analysis of line-shape functions, quantum yield, and kinetic measurements to understand various relaxation phenomena of various excitations.

The coverage is both extensive and intensive. Experimental techniques reviewed range from more traditional uv spectroscopy (McGlynn, *et al.*; Goodman, *et al.*) to microwave technique for the investigation of triplet sublevels (El-Sayed) to radiofrequency technique for the investigation of Stark sublevels (Liptay). On the theoretical side, the Green's function method is applied to the radiationless transitions (Robinson), and the second quantization formulation is applied to the exciton–phonon couplings (Hochstrasser, *et al.*).

This book is an indispensable reference for research workers directly or indirectly involved in the study of excited states in either gas phase or condensed media. The readers would certainly be looking forward to the publication of forthcoming volumes of this excellent review series.

Hwei-kwan Hong, *State University of New York at Stony Brook*

Allyl Compounds and Their Polymers (Including Polyolefins). By C. E. SCHILDKNECHT (Gettysburg College). John Wiley & Sons, Inc., New York, N. Y. 1973. xiii + 736 pp. $29.95.

This volume constitutes Volume 28 of "High Polymers, A Series of Monographs on the Chemistry, Physics, and Technology of High Polymeric Substances," edited by H. Mark, C. S. Marvel, and H. W. Melville. The book surveys both the scientific and patent literature on allyl compounds and their polymers into 1973. Both monomer synthesis and new developments in polymerization techniques, applied to allyl compounds, are covered without going into much theoretical detail.

The breadth of the book encompasses fundamental concepts of double bond reactivity of monomers and extends itself to the numerous applications to which the allyl compounds and their polymers lend themselves. This includes the electronic, space, medical, optical, perfume, and pharmaceutical fields. Especially detailed are Chapters 10 and 11 covering diallyl carbonates and diallyl phthalates, respectively.

The reader may find parts of this book overwhelming because of the voluminous amount of compounds listed and characterized. In this regard, more structures and reaction schematics would have rendered the reading more enjoyable and easier to digest. This lack of structures is probably due to lack of space caused by the amount of material covered.

This volume with its multitudinous references would make a fine reference book for the industrial chemist as well as supplementary reading for the younger chemist. However, the lack of structures could cause some problems in comprehension.

Lawrence G. Kaufman, *University of Michigan*

Theory of Unimolecular Reactions. By WENDELL FORST (Université Laval). Academic Press, New York, N. Y. 1973. xv + 445 pp. $29.50.

This book is devoted exclusively to the RRKM theory of unimolecular reactions—its basic assumptions, its limitations, and, of greatest importance to the researcher, its use. The author assumes a knowledge of quantum mechanics and firm foundations in statistical mechanics.

The first half of the book (Part I) deals with the theory of unimolecular processes without regard to specific exciting mechanisms which produce reactive molecules. The rate coefficient $k(E)$ is derived following a discussion of intramolecular energy transfer and a brief chapter on potential energy surfaces, particularly as applied to unimolecular reactions. The expression for $k(E)$ and the parameters which are necessary for its calculation are then discussed in detail, followed by the final chapter in Part I on the effects of rotational excitation of the reactive molecules. Part II deals successively with the application of the theory to systems which have

been initially excited by thermal activation, chemical reaction, and more violent means such as electron impact or photoionization. The last chapter in the book discusses the transition state in depth.

The author has thoughtfully included a number of features which made reading and understanding easier. Each chapter is carefully outlined in that chapter's introduction, and numerous informational footnotes are provided which generally do not interrupt the continuity of the text. Mathematical symbols which have occurred previously are frequently redefined, minimizing the necessity to hunt through previous pages for precise definitions; such redefinition makes it considerably easier to open the book to a given section. In general, this is a very readable book which contains an extensive and up-to-date bibliography at the end of each chapter. Workers in any field which involves the study of unimolecular reactions and their interpretation should find it extremely useful.

J. J. Leventhal, *University of Missouri—St. Louis*

Spectroscopy. Second Edition. By D. H. WHIFFEN (University of Newcastle-upon-Tyne). John Wiley and Sons, Inc., New York, N. Y. 1972. viii + 206 pp. $6.50.

The author attempts in this small volume to give an integrated overview of spectroscopy as it applies in particular to physics and chemistry. In the reviewer's opinion this attempt should prove rather successful for the advanced undergraduate with a reasonable mastery of introductory quantum mechanics. However, this book should probably be required reading for graduate students in physics and chemistry. It encompasses a breadth of physical ideas and phenomena not often found in a book so concise. If nothing else the student would learn some of the terminology or "jargon" used in the various areas of spectroscopy.

As stated in the foreword, the book covers the various areas of spectroscopy in order of increasing frequency, starting with nuclear magnetic resonance and ending with atomic and electronic spectroscopy. Two introductory chapters are devoted to a review of the interaction of electromagnetic radiation with matter as that interaction is reflected in spectroscopic measurements. In addition to the theoretical discussion of each area, the author gives a brief introduction to the experimental techniques applicable to that area. The measures taken for brevity's sake may cause some difficulty for the student who tries to understand everything in the book. For example, the author mentions that the observed lineshape for a nuclear magnetic resonance signal can be complicated by "wiggles" if the magnetic field is swept too fast. He states that the wiggles can usually be ignored but gives no physical insight into the origin of the wiggles or into why they can be ignored. It may have been better to limit such a brief discussion to the ideal slow passage case only.

This book should serve as an excellent introduction to the fields discussed, and its usefulness is enhanced by a very good, though not exhaustive, bibliography at the end.

P. B. Pipes, *Dartmouth College*

Metal Ions in Biological Systems. Volumes 2 and 3. Edited by H. SIGEL (University of Basel, Switzerland). Marcel Dekker Inc., New York, N. Y. Volume 2: 1973. xi + 294 pp. $25.25. Volume 3: 1974. xiii + 289 pp. $22.75.

These books are Volumes 2 and 3 of an ambitious series on the chemistry of biologically active metal-ion containing compounds of low and high molecular weight. Volume 1 deals with thermodynamic and kinetic studies of simple complexes of nucleotides, amino acids, and peptide ligands. Volume 2 is a natural extension of such stability and kinetic studies to more complicated mixed ligand complexes with topics such as "Structural Aspects of Mixed-Ligand Complex Formation in Solution," and "Artificial Enzymes" considered. Volume 3 deals specifically with thermodynamic and kinetic studies of high molecular weight systems such as metal ions with nucleic acids, fibrous protein systems such as collagen and the relationship to aging, copper in enzymatic systems relevant to cellular respiration (cytochrome oxidase; hemocyanins), and monovalent alkali metal cations in enzyme-catalyzed reactions important to biological processes, *e.g.*, metabolism. Probably the main criticism that can be leveled at these two volumes is the paucity of discussion of iron-containing compounds, although such systems can constitute an entire set of volumes in themselves and are inherently more difficult to study.

Considering the diversity of authors and variety of topics involved, the editor has done a good job correlating the various articles to make these volumes generally readable. It seems that these volumes will find their greatest use for researchers in the field rather than as an introductory series for the novice. There are sufficient data and bibliographic documentation in each chapter to make them useful as a general reference set to be acquired by libraries.

Volumes 2 and 3 of the series serve as a logical basis for the future volumes which are concerned partly with more detailed studies (susceptibility, magnetic circular dichroism) of the electronic structure of metal ions at biologically active sites. In the preface, the editor has been perhaps over ambitious in expressing the wish that this series "will help to break down the barriers between the historically separate spheres of chemistry, biochemistry, biology, medicine and physics." However, these volumes do serve as a good start toward an interdisciplinary approach to problems involving metal-ion biochemistry in a form that is currently termed *bioinorganic chemistry*.

William Michael Reiff, *Northeastern University*

Electroanalytical Chemistry. Volume 7. Edited by A. J. BARD (University of Texas). Marcel Dekker, Inc., New York, N. Y. 1974. x + 294 pp. $24.50.

For the most part Volume 7 continues to provide the authoritative reviews of theories, techniques, and procedures in modern electroanalytical chemistry as was originally intended for this series. The three reviews in this volume are spectroelectrochemistry at optically transparent electrodes, organometallic electrochemistry, and the faradaic rectification method and its applications in the study of electrode processes.

Kuwona and Winograd's chapter on spectroelectrochemistry includes an excellent review of this area as well as a fine section on experimental considerations. Some very simple, clearly done figures are presented beginning with a block diagram of spectroelectrochemical apparatus and following with different cell types for transmission experiments. This chapter will be of interest to those who may need to utilize spectroscopy at electrodes for mechanism studies. The inorganic and organic chemists are especially recommended to this chapter for their interest in fate of reactive intermediates or unusual species generated electrolytically. The section concerned with applications of spectroelectrochemistry is especially well done and is thorough. The chapter on organometallic electrochemistry by Morris is done well in its fashion and should be useful to many who may just on occasion call on electrochemical principles. The treatment as presented here is one of an element-by-element approach in the manner of the good old descriptive chemistry that we have all come to know so well from our introductory chemistry texts. But the presentation is convenient and the material is pertinent and timely. Lacking in this chapter, however brief they need be, are details on experimental principles and basic instrumentation. The literature has been extensively surveyed. A good number of half-wave potentials are presented in an appendix. The half-wave potentials are included for a judicious selection of each important class of compounds. Agarwol's review of the faradaic rectification method is "first class." This 24-year-old, rapidly progressing technique is very well reviewed. All literature has been covered through 1972. The chapter covers detailed studies of kinetic parameters of fast electrode reactions at redox couple/metal, metal-ion/metal, and metal-ion/amalgam interfaces in the audio- and radiofrequency regions in addition to related methods with applications. The sections of this chapter are presented in clear and logical fashion. This chapter admirably fulfills the purpose stated for the series of authoritative reviews in a chapter useful without repeated reference to the literature. The instrumentation and applications sections are exceptionally complete. The experimental results presented, however, mainly comprise details of the author's own studies. The reason for this exception is that progress has been too rapid to include all developments. Agarwol has written a chapter which can be used as a text for a special topics course on the advanced undergraduate and graduate level.

Gerald I. Spielholtz
Herbert H. Lehman College of The City University of New York