

## Book Reviews\*

**Basic Organic Chemistry. Part 5: Industrial Products.** Edited by J. M. TEDDER (University of St. Andrews), A. NECHVATAL (University of Dundee), and A. H. JUBB (I.C.I. Ltd., Runcorn). John Wiley & Sons, New York, N.Y. 1975. xiii + 646 pp. \$35.00, hardbound; \$11.50, paper.

This volume completes the five-part series designed to be a comprehensive treatment of organic chemistry for British undergraduates. It has been written with the help of a large number of chemists from a wide variety of British chemical industries. It begins with a brief history of the chemical industry and a general survey of the sources of raw materials: agriculture, coal, petroleum, and natural gas. Three chapters deal with petrochemicals, and two more are devoted to specific processes and to choices of synthetic routes. The various industrial processes for phenol, acrylonitrile, acetone, and caprolactam are critically compared in an interesting and informative way that gives some insight into industrial considerations.

The remaining chapters cover plastics and elastomers, fibers, dyes and pigments, pharmaceuticals, agricultural chemicals, detergents, fuels, food chemistry, perfumes and flavors, explosives, photographic chemicals, and chlorofluorocarbons. The treatment throughout is concerned with the chemistry, not the engineering, involved, and production figures are used sparingly—just enough to give perspective. There is lots of specific information in the form of equations, conditions, and tables, but it is handled in such a way as to maintain interest as well as to serve the need for a reference source. The information is obviously up to date, much more so than in any general organic text that comes to mind.

This book could be very useful to teachers of organic chemistry who wish to relate the abstract side of the science to the practical realities of our technological society, and it would be salutary reading for both undergraduate and graduate students, so many of whom have a regrettable lack of appreciation for the economic and social aspects of the profession for which they are being trained.

**Benzene and Its Industrial Derivatives.** Edited by E. G. HANCOCK. Halsted/Wiley, New York, N.Y. 1975. xiv + 597 pp.

The editor points out in his preface that until the 1940's, nearly all benzene was produced from the coking of coal, and it was used as a fuel, a solvent, and as raw material for producing certain dyes, drugs, and other fine chemicals. However, since the end of World War II, the use of benzene as a source of plastics, detergents, and synthetic fibers has developed rapidly and extensively, and the resulting demand has far outstripped the supply from coal, necessitating new methods of production from petroleum. The aim of this book is accordingly "to gather together up-to-date methods of production together with all the important end uses of benzene . . ."

This is a book of twelve chapters contributed by an international group of industrial chemists. It is a valuable reference work and includes data on physical properties, analysis, storage, and toxicity of a wide selection of benzene derivatives, as well as the chemistry that is the heart of the work. An introductory chapter that includes the history of benzene as well as an assessment of probable future developments provides overall orientation.

There are some rather strange chemical structures throughout this book, the apparent result of lack of expertise on the part of the printers, and proofreading seems to have been unusually lax (even the name of the publisher, Halste(a)d Press, has suffered). However, this is a very minor matter, and the book should be a very useful source of both perspective and factual details to anyone having to do with industrial chemistry, as teacher, consultant, practitioner, or administrator.

**Geochemistry and the Origin of Life.** Edited by K. A. KVENVOLDEN (Ames Research Center). Dowden, Hutchinson & Ross, Inc.,

Stroudsburg, Pa. (distributed by Halsted/Wiley, New York, N.Y.). 1975. xvii + 422 pp. \$26.00.

This is one of the now well known Benchmark books, in which papers of unusual significance in an area of interest are collected by direct reproduction from the original publication. Although this volume is in the Geology Series, it is obviously of major interest to chemists, for the subject is intimately concerned with prebiotic chemistry and the processes by which organic compounds might have been formed under the conditions supposed to be those of a primitive earth.

Of the forty-three papers included, one is in German, and the rest are in English. The earliest is a 1941 paper by A. M. Macgregor on pre-Cambrian algal limestone. It is a pity that not one of the papers of A. I. Oparin, who is certainly a monumental figure in this area, is included. It is understandable that the editor might have been reluctant to include a paper in Russian, which would be read by only a fraction of the audience, but a translation, as an exception, would have seemed in order.

One might wonder why there has been such an upsurge of activity in the subject largely in the past twenty years. It may be no coincidence that the development of gas chromatography covers the same period, and the power of this tool in detection and analysis of trace organic components of ancient rocks is made evident by the abundant examples of gas chromatograms illustrated in the papers included here.

**Quantum Biology and Quantum Pharmacology.** Edited by PER-OLOV LÖWDIN. Wiley/Interscience, New York, N.Y. 1975. xiv + 316 pp. \$25.00.

This paperback is a supplementary symposium volume to *The International Journal of Quantum Chemistry*. In it are collected the papers that constitute the proceedings of Quantum Biology Symposium No. 1, held at Sanibel Island, Florida, in 1974. The papers are written in conventional journal style as reports of original research essentially concerned with relating biological activity of molecules to their electronic structure. There is no subject index.

**Methods of Enzymatic Analysis. Volumes 1-4.** Edited by HANS ULRICH BERGMAYER. Verlag Chemie (distributed in U.S.A. by Academic Press, Inc., New York). 1974. xxxix + 2302 pp. \$56.00/vol.

The original edition of this book was a very useful collection of practical enzymatic analytic procedures contained in a single volume. Having passed through a second German edition, the work now emerges as a four-volume English translation of the German third edition. From almost every possible viewpoint the new edition is superb. The individual articles are each written by an expert in the field and, in most cases, represent the current state of the art. Most of the credit, however, must go to Bergmeyer himself, for the real value of the work results from what must be regarded as a truly remarkable editorial achievement. He has succeeded not only in producing a very even style of presentation in articles written by over 200 authors from a dozen different countries without sacrificing the level of the treatment, but he has come up with some organizational inventions which make this rather large treatise remarkably easy to use. It might appear rather wasteful, for example, to include the complete index and tables of contents of all four volumes in each volume, but a few test efforts to look up answers to specific analytic problems soon convince the reader that these and a number of similar features are necessary for a work of this size to be of practical use in a laboratory.

Exceptional editorial judgement is also evident in the choice of material included throughout the book, which does manage to introduce important recent chemical and instrumental innovations without detracting from its practical utility. The book begins (after some introductory material) with a section on "Principles of Enzymatic Analysis" including a section on enzyme kinetics. It is re-

\* Unsigned book reviews are by the Book Review Editor.

refreshing to find proof that, while a kinetics discussion in a laboratory manual must necessarily be limited in scope and detail, it does not have to be confined to the concepts, viewpoints, and language of thirty years ago.

Descriptions of experimental techniques, instrumentation (including automated methods) evaluation of experimental results, statistical methods, and methods of cell disintegration follow. Even the most knowledgeable enzyme chemist may find interesting new viewpoints in this particularly authoritative chapter. Since the work deals primarily with the use of enzymes as analytic tools, Volume II is given over to detailed methods for assaying the activity of the various enzymes to be used. Volumes III and IV comprise the main body of the work, the methods for determination of various metabolites. In each case, the principle of the method is first described, followed by specifications of the equipment needed, directions for the preparation of reagents, statements of their stability, the analytic procedure, calculations, precision, and sources of error. In each case a clearly readable pipetting protocol in tabular form is provided.

This edition of "Methods of Enzymatic Analysis" represents an achievement of considerable importance. It should rapidly become a necessary reference for any laboratory whose work involves enzymes in any role.

Harvey F. Fisher

Veterans Administration Hospital, Kansas City, Missouri

**Peptides, Polypeptides, and Proteins (Proceedings of Rehovot Symposium, Israel, 1974).** Edited by E. R. BLOUT (Harvard Medical School), F. A. BOVEY (Bell Laboratories), M. GOODMAN (University of California), and N. LOTAN (Weizmann Institute). Wiley-Interscience, New York, N.Y. 1974. xii + 644 pp. \$24.95.

This volume contains papers presented at a recent conference on the physicochemical and biological properties of poly(amino acids).

The main body of the text is preceded by a very useful survey, by E. Katzir, of the development of this general field over the past 25 years, including comments and suggestions with regard to future research directions. Part I of the collection of research papers is entitled "Conformational Calculations" and deals with the prediction and interpretation of preferred conformations of polypeptides, using potential energy functions and energy minimization routines. Most of the material concerns isolated chains, but considerable progress is being made on intermolecular interactions between chains, and between a single chain and various types of small molecules. The second part, "Polypeptide and Protein Conformation", contains recent experimental results obtained primarily on high molecular weight polypeptides. The techniques and the properties studied include NMR, CD, IR, solution viscosity, chemical exchange reactions, and potentiometric titrations. The next part deals with new theoretical and experimental results on smaller systems, "Cyclic and Linear Oligopeptides".

The fourth part is on "Optical Spectroscopy", and includes CD spectra in the infrared, circular polarization of luminescence, laser Raman spectroscopy, and electron and X-ray diffraction. Part V is concerned with "Intermolecular Interactions" and contains papers on the helix and coil states of collagen and the transition between them, the nature of water in hydrated collagen, the structures of some DNA complexes in solution, higher order coiling in polypeptides, and the effect of structure on the mechanical properties of polypeptides. The final part, "Biological Properties", deals with immunological problems, the use of poly(amino acids) for the detection and purification of enzymes, and the effect of poly(amino acids) on cell membranes, particularly their permeability to other macromolecules. The book ends with the names and addresses of the meeting participants and a Subject Index.

This is an excellent, up-to-date survey of progress being made in the study of poly(amino acids), and it is a pleasure to recommend it to anyone interested in this important class of biopolymers.

J. E. Mark, University of Michigan

**Handbook of Metal Ligand Heats and Related Thermodynamic Quantities. Second Edition.** By J. J. CHRISTENSEN, D. J. EATOUGH, and R. M. IZATT (Brigham Young University). Marcel Dekker, Inc., New York, N.Y. 1975. vii + 495 pp. \$25.00.

As the title implies, this book is a compendium of data collected on the thermodynamic quantities  $\log K$ ,  $\Delta S$ ,  $\Delta H$ , and  $\Delta C_p$  for

metal-ligand interactions. The word "metal" has been interpreted in a liberal sense, and the book includes elements from the right side of the periodic table, i.e., I, Br, Se, etc., but unfortunately does not include  $H^+$ . By design it is intended as a companion to the familiar book by Sillen and Martell, "Stability Constants of Metal-Ligand Complexes", and the format of these books is distinctly similar except that Sillen and Martell do include  $H^+$ .

The primary literature has been carefully and often critically surveyed through 1973, and some 1974 references are included. There are 1083 separate ligand entries. There are four indices which cover Empirical Formulas, Elements, Synonyms, and References. While these are useful, they could have been made much more so by including structural formulas along with empirical formulas in the same index. This is especially true since one is lead from the synonym index by code to the empirical formula index which is arranged in order of the number of carbon atoms contained in the ligand. For example, under "Tritan" in the synonym index one finds "see M10", which after going tediously through the empirical formula index one eventually finds under "C<sub>19</sub>" the listing "C<sub>19</sub>H<sub>16</sub>, M10". Following this trek through the indices, in the main body of the book under "M10" where the ligands are listed in alphabetical order, "M10, Methane, triphenyl, C<sub>19</sub>H<sub>16</sub>, (C<sub>6</sub>H<sub>5</sub>)<sub>3</sub>CH" is found.

Even though this book was printed directly from typescript prepared by the authors, the cost is still high in keeping with the Marcel Dekker tradition. The book does seem to be relatively free of typographical errors, though there is one on the front cover.

These criticisms, notwithstanding, the book should be very useful to all individuals interested in data of this sort and should be possessed by all university libraries. It is an excellent reference work, and the authors should be commended for this undertaking which brings together in a very concise manner a large amount of useful information.

John H. Nelson, University of Nevada—Reno

**Water. Volume 4. Aqueous Solutions of Amphiphiles and Macromolecules.** Edited by FELIX FRANKS. Plenum Press, New York, N.Y. 1975. xxi + 839 pages. \$37.50.

This, the fourth volume of Franks' treatise on water, concerns topics much less clearly understood than those presented in the earlier volumes. Consequently, the overall attitude here is one of discussion of current data and views.

The first of seven chapters is by Franks on an overview of the hydrophobic interaction. The second discusses surfactants (G. C. Kresheck) emphasizing aspects of micelles. Chapter 3 (D. G. Duff and C. H. Giles) is a short chapter on dyestuffs and their aggregation in solution. Chapter 4 (H. Hauser) discusses lipids while the next chapter (D. Eagland) continues with nucleic acids, peptides, and proteins. The biological systems are completed by Chapter 6 (A. Suggett) on polysaccharides. The last chapter (P. Molyneux) discusses, at length, the interaction of water with synthetic polymers. The book has a single bibliography for all the chapters as well as subject, author, and compound indices and a table of contents which is in outline form. The outline does not contain the smaller section divisions of the longer chapters. Inclusion would have made access to specific points easier as well as showing the organization more clearly.

All the chapters focus on the water in the interaction with various macromolecules. Thus if one is interested in proteins, the book would be a complement to reviews concerned primarily with the solutes. There is, of course, significant overlap at the interface.

Because of the vast amounts of information presented, and the relative lack of simple, comprehensive, and accepted models for many of the phenomena discussed, the book is often rather hard reading. It certainly is not the final word on the subjects covered and was not expected to be. It does not contain the complete story of such a complicated and broadly researched topic. However, it does seem to be useful, although daunting in the sheer volume of information.

Kenneth A. Rubinson, University Chemical Laboratory, Cambridge

**Houben-Weyl Methoden der organischen Chemie. Volume 15. Part 1 and Part 2. Synthese von Peptiden.** Edited by E. WÜNSCH (Max-Planck-Institute, München). Georg Thieme Verlag, Stuttgart. Part 1: 1974. xLiii + 1006 pp. DM 540.00. Part 2: 1974. xxxvi + 806 pp. DM 440.00.

The timely appearance of this authoritative treatise, covering every facet of peptide synthesis up to the early part of 1974, will undoubtedly be welcomed by all scientists working in this field. The editor and authors deserve hearty congratulations for accomplishing this truly monumental task.

The two-book volume contains sections on (1) abbreviation, nomenclature, and classification of amino acids, peptides, and their derivatives; (2) general principles of peptide synthesis; (3) protecting groups; (4) formation of the peptide bond; and (5) purification of peptides and the criteria of purity. The books are well written, logically organized, adequately indexed, and extensively referenced.

In section 3, which constitutes the main body of Part 1, the authors have painstakingly compiled practically all of the useful protective groups found in the literature. Over 130 different amino and close to 60 carboxylic acid-protecting groups have been entered and discussed. Equal emphasis was also placed on the art and science of choosing the right combination of protecting groups for the side chains. Numerous retrospective processes of introducing amino or carboxyl group into peptides through conversion of various functionalities have been dutifully incorporated. Small chapters are devoted to preparation of amides and peptide synthesis involving the so-called pseudoamino acids. Detailed experimental procedures for the more important classes of substituted amino acid derivatives are always provided. Pertinent physicochemical data concerning these compounds are collected into nearly 90 tables. A few representative solid-phase schemes have also been presented as illustrative examples. However, the solid-phase method of Merrifield was treated more in the context of polymer-bound carboxylic protecting groups rather than a novel concept that is potentially capable of revolutionizing the entire operation of peptide synthesis.

In section 4, the authors elaborate on more than 150 coupling methods. The most commonly utilized procedures receive more attention. Special techniques such as polymer-bound coupling reagents, reverse solid-phase techniques, four-component condensation as well as processes for preparation of peptoids, poly- or copolyamino acids, were also presented.

The first portion of section 5 is dedicated to the analysis of synthetic peptides including a host of racemization tests. The remaining pages of the section deal with the practical techniques of peptide purification such as chromatography, counter-current distribution, and electrophoresis. Important information required for carrying out these techniques, as well as those peptides that have been purified, is summarized in many well-organized tables throughout the book.

An English edition, priced more reasonably, will be universally welcome.

Su-Sun Wang, *Hoffmann-La Roche, Inc.*

**Physical Chemistry. An Advanced Treatise. Volume XIA. Mathematical Methods.** Edited by D. HENDERSON (IBM Research Laboratories). Academic Press, Inc., New York, N.Y. 1975. xxiv + 564 pp. \$45.00.

This volume of the Advanced Treatise attempts a survey of the mathematical principles and methods useful in physical chemistry. As a survey, it is quite successful. Beginning with six chapters considered by the authors to be material of general interest (Linear Vector Spaces, Generalized Functions, Complex Variable Theory, Boundary Value Problems, Numerical Analysis, and Group Theory), the book concludes with two chapters of more specialized interest (Density Matrices and the Green's Function Method). Each chapter is self-contained and few require more than a knowledge of differential and integral calculus and ordinary differential equations to be understood. In spite of the fact that each chapter is written by a different author, an attempt has been made to regularize both writing style and level of presentation. Each topic is covered in a readable, logical manner making the material accessible to even senior level chemistry students.

The most useful qualities of this volume are its breadth and level of coverage. Most mathematical methods important to physical chemistry are treated. Each technique is derived and explained from an applied point of view, and each chapter contains examples of uses of the methods. Especially useful in this regard are the chapters concerning Density Matrices and Green's Functions. It is not common to find either of these subjects treated in the self-con-

tained manner presented here. Additionally, the list of references provided with each chapter is very useful.

It is a genuine pleasure to find material written about mathematical methods presented from such an applied point of view. The material is clearly explained, reinforced with examples, and totally usable by the reader. This book is a welcome addition to a field cluttered with opaque explanations and generally poor writing.

Michael A. Wartell, *Metropolitan State College*

**Liquid Scintillation Counting.** By K. D. NEAME and C. A. HOMEWOOD (University of Liverpool). Halsted/Wiley, New York, N.Y. 1974. viii + 180 pp. \$13.75.

The preface of this book states that a liquid scintillation counter is now a very common piece of scientific equipment, and that most beginners have to learn about liquid scintillation principles and elementary practice of operation from instruction manuals and more experienced colleagues. This book was written to fill the need for a simple introductory text to liquid scintillation counting.

My background in liquid scintillation counting was obtained in exactly the above-mentioned manner, and I have found this book to be more than just an introductory text: it is, in fact, general enough for most of us who just use liquid scintillation counting as another analytical technique.

The book gives a general introduction to radioactivity and goes on to describe liquid scintillation counters, quench corrections, and all facets of sample preparation, counting, and errors; there is also a chapter on the hazards involved.

I can recommend this book to all beginners in liquid scintillation counting.

Martin J. Williamson, *Rohm and Haas Company*

**Chemical Analysis of Organometallic Compounds. Volumes 1-3.** By T. R. CROMPTON (Cranford, Ashton on Mersey, Sale, Cheshire). Academic Press, New York, N.Y. Vol. 1: 1973. x + 258 pp. £ 5.80. Vol. 2: 1974. ix + 163 pp. £ 5.00. Vol. 3: 1974. ix + 211 pp. £ 6.50.

These three volumes discuss the analysis of compounds of the elements of groups I-III (aluminum and zinc excluded) (Vol. 1), groups IVA and B (silicon only) (Vol. 2), and group IVB (silicon excluded) (Vol. 3). Short discussions of the methods for analysis of the elements themselves are followed by presentations of the various methods for analysis of the organometallics. In addition to the "wet" chemical methods, such as titrimetry, attention is directed toward physical or instrumental methods, e.g., those using spectroscopy (NMR, ir, and uv) and gas chromatography.

Of the organometallics of groups I-II, not unexpectedly, lithium, magnesium, mercury, and boron receive special attention. Particularly germane to the issue of environmental pollution is a section on the detection of mercury in the environment. Analysis of soil and biological matter is discussed, for example, with details for the analysis of mercury and organomercury compounds present in fish.

With the exception of the first four pages, Volume 2 is devoted exclusively to silicon. Emphasis is placed upon analysis and identification of the organic moiety; detailed presentation of spectroscopic (especially infrared) and gas chromatographic data is particularly useful. Methods for the conversion of silicon polymers, analyzable only with difficulty, to the more easily analyzable monomers are included.

Volume 3 continues with discussion of the group IVB elements with a small chapter on germanium (12 pp), and chapters of approximately equal length on tin and lead. The determination of organotin compounds in the environment receives attention owing to their use as stabilizers in a variety of products. Not surprisingly, attention is focused on the analysis of gasoline or petroleum for tetraalkyllead compounds. Little mention is made of analytical methods for determination of lead compounds found as contaminants in the environment.

These three volumes are strikingly detailed; there are, for example, numerous, thorough, experimental procedures for miscellaneous analyses (often accompanied by a list of the necessary equipment), assorted charts, tables and graphs of spectra data, gas chromatographic retention times, polarograms, titration curves, etc., as well as illustrations of appropriate apparatus. With regard to the presentation of the infrared data, it is mildly disconcerting to find wavelength data in one paragraph and wavenumber data in the next, as found in the silicon chapter.

Of outstanding service is the inclusion, throughout the volumes, of tables comparing the various analytical methods for a particular type of compound. The advantages and disadvantages and the degrees of precision of various methods, as well as the necessary techniques for such precision, are often discussed.

In view of the increasing importance of organometallic compounds, these volumes (and presumably, those yet to be published) should continually prove most useful companions to the laboratory chemist. The need for future updating can, of course, be envisioned.

Jeffrey S. McKennis, *Oklahoma State University*

**The Laue Method.** By JOSÉ LUIS AMORÓS (Southern Illinois University), MARTIN J. BUERGER (MIT and University of Connecticut), and MARISA CANUT DE AMORÓS (Southern Illinois University). Academic Press, New York, N.Y. 1975. xi + 375 pp. \$37.00.

This book presents its rather specialized subject with great insight and more thoroughness than is accorded the Laue method anywhere else in the crystallographic literature. Three chapters (77 pp) deal with the stereographic, gnomonic, and stereognomonic projections. An introductory discussion of the Laue method, the symmetry of the diffraction pattern, and application of the method to crystal identification (76 pp) is followed by a discussion (55 pp) of the geometry of the polychromatic component of the diffraction pattern. Additional chapters cover indexing methods, spot shapes and profiles, and the important application of the characteristic component to the study of diffuse x-ray scattering. There are 232 literature references.

The Laue method is by no means a common crystallographic data-collection technique, and the book is more for the specialist than for the novice in crystallography. The viewpoint is sufficiently general, however, to make the book appealing to a wider audience than those actually using the Laue method. Crystallographers with an interest in x-ray diffraction and crystallography per se, and in the relationship of classical to x-ray crystallography, will find this book rewarding.

Finally it might be noted that computers, film scanners, etc., have recently helped to overcome the inconveniences of interpreting the long-forgotten rotation and oscillation patterns. With strong, polychromatic synchrotron x-ray sources becoming available, perhaps the Laue method will soon find new applications. For those inclined to think so, this is a timely book.

C. E. Nordman, *University of Michigan*

**Mechanisms of Virus Disease.** Edited by W. S. ROBINSON (Stanford University) and C. F. FOX (UCLA). W. A. Benjamin, Inc., Menlo Park, Calif. 1974. viii + 544 pp. \$19.95.

This collection of 35 articles was the first conference in a series on topics in molecular and cellular biology (sponsored by ICN Pharmaceuticals and organized by the Molecular Biology Institute of UCLA) in which an attempt was made to focus on the basic biological and molecular processes that occur in virus infection and their relation to the disease state. Thus the program was stated to be constructed to include virologists working at the most fundamental level, those working with models of animal virus diseases, and those who encounter virus-mediated diseases at the clinical level. The authors of the chapters have been well chosen as experts in their fields. The book has been prepared for peers, and it is not for the teacher or nonspecialist. The volume is obviously heterogeneous with respect to subject matter, and unfortunately, as is often the case with published symposia, it also fluctuates with respect to style, depth, scope, and quality.

The book is divided into nine sections, the first of which contains three reviews dealing with *in vitro* and *in vivo* model systems showing that virus infection can alter the capacity of the cell-mediated immune response to distinguish self from nonself antigens. The second section of three papers assesses the influence of host genetic factors on different types of leukemia virus infection in mice. The five articles in the next section are concerned with defective interfering virus (an area receiving an ever increasing amount of attention) and their influence on the outcome of *in vivo* and *in vitro* infection. The fourth section is composed of four papers centered around viruses implicated in chronic central nervous system diseases (multiple sclerosis, SSPE, and others). The three articles in sec-

tion five are concerned with the search for the infectious agent among the various forms of hepatitis B antigen occurring in the serum of infected patients. The next two sections deal with the mechanisms of cell transformation by DNA and RNA tumor viruses, respectively. Four review articles in the eighth section evaluate the control mechanisms for bacteriophage at the level of resistance to successful superinfection, DNA replication, and plasmid formation. The final section contains five papers, two of which are centered around a laboratory animal model for, and the herpes-like virus isolated from, Burkitt's lymphoma (the first human tumor seriously considered to be virus induced). The three remaining papers assess fundamental and clinical properties of other herpes viruses. This book should be a useful addition to research, medical, and university libraries.

Charles J. Pfau, *Rensselaer Polytechnic Institute*

**Electron Spectroscopy. Progress in Research and Applications.** By R. CAUDANO and J. VERBIST (Facultés Universitaires de Namur). Elsevier Scientific Publishing Co., Amsterdam-Oxford-New York. 1974. xxi + 1136 pp. \$57.50.

This volume of the Proceedings of the International Conference on Electron Spectroscopy held in Namur, April 16-19, 1974, contains a wealth of information on experimental studies in molecular photoionization and some information concerning theoretical approaches to the interpretation of the data and to the prediction of the behavior of cross sections as a function of photoelectron energy for different molecules. In the "Forward", the authors state, "Electron Spectroscopy is certainly not a new field of research. However, in the last decade enormous progress has been made . . ." In my view, these proceedings and, to some extent, the entire field of Electron Spectroscopy for Chemical Analysis could be brought into sharper focus with respect to the interpretation of current work and the evolution of future developments if a link could be established with the past, namely, with the study of the photoelectric effect in atomic physics. Of special importance to the education of aspiring theoreticians in ESCA is the work of Sommerfeld and Schur, Stobbe and Sauter, Bethe and other pioneers in the application of quantum mechanics to ionized systems.

Burke Ritchie, *University of Alabama*

**An Introduction to Electrochemical Science.** By J. O'M. BOCKRIS (Flinders University of South Australia), N. BONCIOCAT (Academy of Science, Bucharest), and F. GUTMANN (University of Sydney). Wykeham Publications (London) Ltd., Springer-Verlag, New York, N.Y. 1974. x + 133 pp. \$6.20 (paperback).

"An Introduction to Electrochemical Science" is Volume 29 in the Wykeham Science Series. The stated purpose of the series is "to broaden the outlook of the advanced high school student and introduce the undergraduate to the present state of science as a university study". The book contains ten chapters: an introductory chapter; three chapters devoted primarily to electrochemical principles and concepts (ions in water, electric double layers, and electrode kinetics); five chapters devoted primarily to applications of electrochemical science (in chemistry, materials science, energy conversion and storage, ecology, and biology); and a one-page chapter entitled "The Electrochemical Future".

On the whole the authors have achieved their goal of providing a readable, brief introduction to electrochemistry for undergraduates. Several of the chapters dealing with applications are very good. A notable exception is the chapter dealing with bioelectrochemistry, which is not authoritative. For example, this chapter contains the statement, "In spite of many decades of research, no evidence for the actual existence of such a device [sodium pump] has been found".

The chapters dealing with principles are, for the most part, well done, but the authors have presented several complex equations without sufficient motivation or discussion; the reader is left on his own to discover the significance of the symmetry factor,  $\beta$ , which "is of fundamental importance in charge transfer theory". The book does not contain a bibliography or any problem sets.

The book could serve as a useful supplement to the electrochemistry sections of honors-level, first-year college chemistry texts or introductory physical chemistry texts.

Peter A. Rock, *University of California, Davis*