

Book Reviews*

Advances in Inorganic Chemistry and Radiochemistry. Volume 12. Edited by H. J. EMELEUS and A. G. SHARPE, University Chemical Laboratory, Cambridge, England. Academic Press Inc., 111 Fifth Ave., New York, N. Y. 1969. xiv + 471 pp. \$21.00.

The first chapter entitled "Some Recent Preparative Chemistry of Protactinium," by D. Brown, reviews extensively the descriptive chemistry of protactinium. "Vibrational Spectra of Transition Metal Carbonyl Complexes," by Linda M. Haines and M. H. B. Stiddard, includes recent applications of vibrational spectroscopy, methods of normal coordinate analysis, and critical discussions of apparent correlations involving frequencies or force constants. This chapter is a well-written treatment for the nonspecialist. "The Chemistry of Complexes Containing 2,2'-Bipyridyl, 1,10-Phenanthroline, or 2,2',6',2''-Terpyridyl as Ligands" by W. R. McWhinnie and J. D. Miller discusses kinetic, thermodynamic, and spectroscopic results and contains 747 references. "Olefin Complexes of the Transition Metals," by H. W. Quinn and J. H. Tsai, spans 157 pages with the emphasis on isolatable olefin complexes rather than catalytic processes and unstable complexes. J. M. Pratt and R. G. Thorp in "Cis and Trans Effects in Cobalt(III) Complexes" concluded from bond length, spectral, kinetic, and thermodynamic data that the general order of ligands reflecting trans effects differs significantly for cobalt(III) and platinum(II).

This volume is expensive but will be useful to many inorganic chemists.

A. Louis Allred, *Northwestern University*

Advances in Radiation Chemistry. Volume 2. Edited by M. BURTON and J. L. MAGEE, University of Notre Dame. Interscience Publishers (John Wiley & Sons, Inc.), New York, N. Y. 1970. ix + 410 pp. \$19.50.

This volume in the series contains three reviews. The first and longest of the group (176 pp) is on "Electronic Spin Resonance Spectra of Radiation-Produced Radicals" by R. W. Fessenden and R. H. Schuler. Theoretical considerations are discussed in detail, followed by sections on experimental methods, results from esr experiments, and kinetic and mechanistic aspects.

The second article on "Species in Irradiated Oxygenated Water" by B. H. J. Bielski and J. M. Gebicki is subdivided according to the pH of the solution: 0 to 5 and 5 to 14. A total of 228 different reactions are discussed, involving both organic and inorganic compounds, radicals, and ions.

The last article, on "Collisions of Low-Energy Electrons with Molecules: Threshold Excitation and Negative Ion Formation" by R. N. Compton and R. H. Huebner, contains sections on electron impact excitation, negative-ion formation in molecules, dissociative electron attachment, and temporary negative-ion states. A number of particularly useful compilations of literature data are included. Table I is a list of electronic transitions that have been identified, the method used, the incident energy, and the energy region studied. Table II is a nine-page listing of experimentally determined electron affinities of molecules and radicals. Other tables contain literature data for retarding potential-difference negative ion studies, molecular negative-ion resonances below and above the energy of the first excited state, and the thermal energy attachment rates for nondissociative electron attachment and negative-ion lifetimes.

Each of the articles concludes with approximately 300 references.

Adon A. Gordus, *University of Michigan*

Interpretation of X-ray Powder Diffraction Patterns. By H. LIPSON and H. STEEPLE, University of Manchester Institute of Science and Technology. St. Martin's Press, New York, N. Y. 1970. viii + 335 pp. \$15.00.

In their preface to this book, the authors describe it as one of a planned set of three books intended, collectively, to serve as successors to "The Interpretation of X-ray Diffraction Photographs"

by Henry, Lipson, and Wooster. This characterization, and perhaps the title of the book, might falsely suggest that we are dealing with a very narrow treatise on powder patterns.

The book is in fact a very good introduction to X-ray crystallography in general. Topics such as the symmetry of crystal structures, the reciprocal lattice, the structure factor, structure determination, and refinement are dealt with in addition to the many instrumental and interpretive techniques which specifically relate to powder patterns. Many examples from the original literature illustrate the discussion. Twenty-five problems, mostly dealing with powder pattern interpretation, each with a carefully explained solution, are included at the end of the book.

This lucid and highly readable textbook can be recommended to anyone wishing a first introduction to X-ray crystallography as well as to chemists interested in learning to make effective use of the powder X-ray diffraction technique.

Christer E. Nordman, *University of Michigan*

Ultramicro Elemental Analysis. By GÜNTHER TÖLG. Max Planck Institute for Metal Research. Interscience Publishers (John Wiley & Sons, Inc.), New York, N. Y. 1970. xiii + 200 pp. \$10.95.

This monograph is Volume 30 of a continuing series on Analytical Chemistry and Its Applications and is specific for determining the concentration of an element in an organic compound.

The first quarter of the book discusses the procedural development of ultramicroanalysis with some consideration being given to the actual sample sizes involved—that is, samples weighing less than 30 micrograms down to a weight of 1 microgram for the phosphorus determination.

When it is considered that the lower limit of visibility by the unaided eye for solids is approximately 10–20 micrograms, and that dust particles can weigh up to 1 microgram, we begin to have an appreciation of the area of activity.

The book does an excellent task of describing the various procedures for precise weighing and general manipulative techniques requiring great manual dexterity and much practice. It is pointed out that in certain instances absolute standard deviations are valid only for the one who worked out the procedure and are something to be hopefully attained by anyone else. "Personal error" can be a large part of the total error in an ultramicroprocedure and success can be achieved only by establishing exact standards for conditions and then maintaining these as a constant.

There are many ideas and suggestions showing great ingenuity in developing materials, reagents, and equipment peculiar to this field.

The remainder of the book discusses in detail the general decomposition procedures and is followed by an excellent type of laboratory manual for determining the specific elements.

A perusal of the monograph should be of great interest to all analytical chemists, at least, and should be required in the library of all practicing microchemists. No microanalyst could fail to benefit from a review of this work, and he could possibly polish up some techniques which may have become rusty.

Arthur W. Spang, *Spang Microanalytical Laboratory*

Dictionary of Organic Compounds. Fourth Edition. Sixth Supplement. Edited by J. B. THOMSON. Oxford University Press, New York, N. Y. 1970. 280 pp. \$29.00.

The latest edition of the well-known work begun by Heilbron appeared in 1965 and has already been provided with five supplements, the last of which was cumulative over the first four. Each advanced the coverage by the new material published in the preceding year. The appearance of this Sixth Supplement, which covers material published in 1969, indicates that the pattern of annual supplements is now firmly established; presumably a quinquennial cumulative supplement will appear in 1975.

The newest officially adopted changes in nomenclature, both for compounds and for properties, have been incorporated. Cross references are widespread, and there is a formula index. One can therefore find essential information and references on a substance

* Unsigned book reviews are by the Book Review Editor.

in three ways; for example, under "Yomogi alcohol", "2,5,5-trimethylhepta-3,6-dien-2-ol", or " $C_{10}H_{18}O$ ".

The publishers and editors are to be congratulated on the promptness with which this useful volume was made available; the publication date was only eight months after the cut-off date for coverage of the literature.

Chemistry Through the Language Barrier. By E. EMMET REID, Johns Hopkins University. The Johns Hopkins Press, Baltimore, Md. 1970. ix + 138 pp. \$10.00.

This is one of the few books to which the adjective "unique" can be properly applied. Professor Reid has had a longer experience with chemistry than most living chemists, and his name has long been familiar to organic chemists concerned with sulfur compounds, from his research papers and books. Now he has drawn on the ripeness of his experience to give us a short, simple, practical guide to glean the essentials out of chemical articles written in Italian, Spanish, Romanian, French, Dutch, Swedish, Norwegian, German, Hungarian, Finnish, Czech, Polish, Russian, Japanese, and Chinese. He does this by concentrating on the similarities to English and the core of more or less international words, and adds to this just enough of the peculiarities of each language to enable the chemist to understand simple technical discussion. There are many sample translations, followed by a scanning analysis for picking out the words and phrases that carry the heart of the meaning.

Professor Reid's approach is not meant to be a substitute for learning a language, or a method to learn it, but is a kind of abstracting technique. It works best with descriptive text, such as found in experimental sections of articles; it would be difficult indeed to use his technique on sophisticated expositions of theory. This book will be of greatest help to the chemist who wishes to find out how someone carried out a reaction or determined a property. Its positive approach bolsters one's morale against being overly intimidated by Hungarian consonants or Finnish vowels, and its engaging style makes the task easier. The sample texts and general discussion are biased toward the organic, but it should nevertheless be useful to all sorts of chemists who have to cope with the literature in unfamiliar languages. The price of the book is no more than the cost of one professional translation.

John Dalton and the Atomic Theory. The Biography of a Natural Philosopher. By ELIZABETH C. PATTERSON, Albertus Magnus College. Doubleday and Co., Inc., Garden City, N. Y. 1970. xi + 348 pp. \$6.95, hardcover; \$1.95, paperback.

This enjoyable biography brings alive not only the struggles and discoveries of one of the great pioneers of modern chemistry, but affords a picture of the general intellectual and social atmosphere of the industrial revolution. This book is part of the Science Study Series and is intended for the general reader and student, but it can be read with pleasure by one of any level of scientific attainment.

Man's Impact on the Global Environment. Edited by W. N. MATHEWS. The MIT Press, Cambridge, Mass. 1970. xxii + 319 pp. \$2.95, paperback.

This is the report of the Study of Critical Environmental Problems sponsored by the Massachusetts Institute of Technology in July 1970. It comprises a careful assessment of the present state of the environment and man's impact on it, followed by recommendations for further research, monitoring, and action. There is much tabulated information, many references, and a good index. It should be a useful source book, even though not all of the authors who wrote about phosphates knew how to spell "phosphorus".

No Deposit—No Return: Man and His Environment: A View Toward Survival. Edited by HUEY D. JOHNSON. Addison-Wesley Publishing Co., Reading, Mass. 1970. xvi + 351 pp. \$2.95, paperback.

This book is an anthology of 66 papers presented at the 13th National Conference of the U. S. National Commission for UNESCO held in San Francisco in November 1969. It covers the widest possible approach to the subject of man's environment: technical, biological, political, legal, religious. The necessarily short papers are exhortative, with many forceful recommendations for action. They are written for the aware layman and do not include references or detailed factual material.

Strong Water: Nitric Acid, Its Sources, Methods of Manufacture and Uses. By THOMAS H. CHILTON, E. I. du Pont de Nemours and

Co. The MIT Press, Cambridge, Mass. 1970. viii + 170 pp. \$1.95, paperback.

The interplay of science, technology, economics, and politics is described in connection with nitric acid, at a level suitable for the layman who knows a little chemistry and engineering. A few references, mostly of a general sort, and a short index are included.

Chemical Dynamics. Papers in Honor of Henry Eyring. Edited by I. O. HIRSCHFELDER and D. HENDERSON. Interscience Publishers (John Wiley & Sons, Inc.), New York, N. Y. 1971. xxxiii + 816 pp. \$22.50.

This "Festschrift" contains 54 articles written by the students and associates of Professor Eyring. The topics are closely related to Professor Eyring's work and are in many cases elaborations and extensions of concepts that he originated. The remarkable intellectual fertility of the man is illustrated by the wide range of subject matter, which is divided into six major categories: Molecular Quantum Mechanics, Theory of Reaction Rates, Properties of Molecules, Theory of Liquids, Biological Applications, and Engineering Applications.

In addition, this volume includes a short biography, which lists, *inter alia*, the six books of which he is coauthor, and mentions, without listing them individually, that Professor Eyring has published more than 435 papers. Many of the articles are prefaced by short but charming personal notes about the author's experiences with Professor Eyring. There is also an author index, but no subject index. The papers themselves are serious and valuable contributions, with substantial bibliographies and much tabulated information. Most of the papers are original, and many of them present a useful summing up of the present state of theory and its application.

Organic Reaction Mechanisms, 1969. By B. CAPON and C. W. REES, Editors, Universities of Glasgow and Liverpool. Interscience Publishers (John Wiley & Sons, Inc.), New York, N. Y. 1971. xii + 709 pp. \$30.50.

The appearance of another volume in this useful series is most welcome. It covers the literature from December 1968 to November 1969, and, considering the time required for writing, its appearance is unusually prompt. The coverage is, as heretofore, comprehensive, and over 4000 references are cited. The organization is good, and the discursive presentation is surprisingly readable considering the demands of conciseness. The subject index is cumulative over 1965-1969.

This volume is about 25% longer than last year's; it is unnerving to consider the consequences if this should be a continuing trend!

Fluorine Chemistry Reviews. Volume 5. Edited by PAUL TARRANT, University of Florida. Marcel Dekker, Inc., New York, N. Y. 1971. vii + 188 pp. \$19.50.

This volume contains five chapters: Electron-spin Resonance of Irradiated Organic Fluorine Compounds (M. Iwasaki), The Preparation and Chemistry of Fluorinated Diazo Compounds and Diazirines (C. G. Krespan and W. J. Middleton), Fluorine-containing Epoxides (P. Tarrant, C. G. Allison, K. P. Barthold, and E. C. Stump, Jr.), and The Chemistry of Fluoroalkyl Radicals (A. P. Stefani). There is no preface, so we do not know if the editor's direction to the authors was to be encyclopedic or selective. There is also no statement of date at which the literature search was terminated for each chapter, except in the body of the first chapter, where the author mentions September 1969. The bibliographies to the other chapters contain references dated 1969, however. Negligence in giving the cut-off date in works that review or summarize the literature is hard to excuse, for it is so simple to include, and its absence can entail much unnecessary work on the part of the serious user.

The chapters appear to be authoritative and are written from a knowledge of the patent as well as the journal literature. There is an author index and a quite small subject index (2 pp).

Guide to Fluorescence Literature. Volume 2. By R. A. PASSWATER, American Instrument Co. IFI/Plenum Data Corp., New York, N. Y. 1970. iii + 369 pp. \$22.50.

This second volume covers the literature from 1964 through 1968. It consists of lists of the publications on the subject, subdivided into five sections so as to bring similar subject matter together. Titles of articles and *Chemical Abstracts* citation are given in addition to the author and journal reference. An author index and comprehensive subject index make use of this guide flexible and easy. There is, in addition, a sixth section that updates Volume 1 by including references missed before.

Art and Technology. A Symposium on Classical Bronzes. Edited by SUZANNAH DOERING, DAVID GORDON MITTEN, and ARTHUR STEINBERG. The MIT Press, Cambridge, Mass. 1970. xiii + 290 pp.

This beautifully illustrated book treats the relationship of the chemical and metallurgical composition of classical art objects, as determined by modern methods, both destructive and nondestructive, to the origin and conservation of the objects. It is a delightful combination of scientific worth with "coffee table" pictorial quality.

The Chemistry of the Cyano Group. Edited by Z. RAPPOPORT, The Hebrew University of Jerusalem. Interscience Publishers (John Wiley & Sons, Inc.), New York, N. Y. 1970. xv + 1044 pp. \$44.00.

This mammoth addition to the series *The Chemistry of Functional Groups* under the general editorship of Saul Patai consists of sixteen chapters by twenty-five authors of international provenance. In view of the subject, it is not surprising that seven of them are from the E. I. du Pont de Nemours Company. The subject is covered comprehensively, but not encyclopedically, with the intention of emphasizing "mechanistic aspects and the latest advances in the field." It is somewhat unexpected to find chapters on nitrile oxides and on isocyanides included as well. The date at which the literature coverage was cut off for each chapter is unfortunately not given, but 1968 references are abundant, whereas 1969 references do not seem to be present. As usual, an author index and a good subject index are included.

Chemical Applications of Group Theory. Second Edition. By F. A. COTTON (Massachusetts Institute of Technology). Wiley-Interscience (John Wiley & Sons, Inc.), New York, N. Y. 1971. xiv + 386 pp. \$12.95.

This is a textbook, in a field of great current importance to organic and inorganic chemists as well as theoretical chemists. It has exercises and examples that make it suitable for self-teaching as well as use in a course. The level is that of graduate students, and it is so adjusted as to accommodate the chemist whose flare for mathematics is rather feeble, and yet avoids being superficial. Professor Cotton has succeeded in making easy a subject that intimidates many chemists, and his book is a pleasure to read, from the gracefully phrased preface to the several appendices. There are only occasional references in the text, but an annotated reading list is given at the end.

There are many changes over the first edition, among which are additions of a detailed introduction to symmetry-based rules for cycloaddition processes (Woodward-Hoffmann rules) and an outline of *F* and *G* matrix treatment of molecular vibrations.

The Chemistry of Indoles. By RICHARD J. SUNDBERG (University of Virginia). Academic Press, New York, N. Y. 1970. xi + 489 pp. \$24.50.

When new information in an important area begins to accumulate rapidly, it is difficult for the individual to keep abreast of it, and difficult for others to help him with up-to-date reviews or monographs if the earlier literature is also extensive. One way to solve the problem is to build on earlier monographs by writing a supplement, rather than trying to revise the earlier work. It is not only quicker, but cheaper, especially for the chemist who already has an earlier monograph. This book on indoles is a case in point.

Indoles have been given monograph treatment in 1952 in Elderfield's "Heterocyclic Compounds" by Julian, Meyer, and Printy, and in 1954 in Weissberger's "The Chemistry of Heterocyclic Compounds," by Sumpter and Miller. Not only has much descriptive chemistry been published since then, but understanding of reaction mechanism has advanced. In Dr. Sundberg's new book, indole chemistry is reviewed comprehensively over the period 1950 through 1967, with scattered additional references in 1968 and 1969. The

ten chapters are devoted to the several classifications of reactions, to synthesis, to important classes of indoles, and to naturally occurring indoles. The treatment is thoroughly modern, and much attention is given to reaction mechanism as a rational framework for discussion. There is an author index and a substantial subject index.

Chemistry: Reactions, Structure, and Properties. By C. R. DILLARD and D. E. GOLDBERG (Brooklyn College of the City University of New York). The Macmillan Co., New York, N. Y. 1971. xvi + 654 pp. \$10.95.

This is an introductory textbook designed to accommodate both students with a strong high-school preparation in chemistry and those with none. The order of presentation is *Chemical Reactions, Atomic and Molecular Structure, Properties of Matter in Bulk, and Representative Descriptive Chemistry*. Many topics hitherto found usually only in advanced courses, such as crystal field theory and nuclear magnetic resonance, are introduced.

Chemistry and Biochemistry of Amino Acids, Peptides, and Proteins. Volume 1. Edited by B. WEINSTEIN (University of Washington). Marcel Dekker, Inc., New York, N. Y. 1971. \$15.95.

This is the first volume in what is evidently intended as a continuing series of reviews. There are five chapters, each with a substantial bibliography. The cut-off date for the coverage of the literature is nowhere stated, but it appears to have been the end of 1969.

One chapter (by Westley) deals with the assignment of configuration to amino acids and some peptides; another (by Stammer) reviews the chemistry of cycloserine. The use of hydrogen fluoride in peptide and protein chemistry is reviewed (Sakakibara), as are peptide alkaloids (by Pais and Jarrean) and the chemistry and immunochemistry of γ -glutamyl peptides (by Nitecki and Goodman). The approach in general does not assume specialized knowledge on the part of the reader, but leads him into it. There is an author index and a modest subject index.

Physical Chemistry. An Advanced Treatise. Volume IXB. Electrochemistry. Edited by HENRY EYRING (University of Utah). **Volume IV. Molecular Properties.** Edited by DOUGLAS HENDERSON (IBM Research Laboratories). Academic Press Inc., New York, N. Y. 1970. xix + 547 pp. \$25.00 (Vol. IXB); xix + 832 pp. \$39.00 (Vol. IV).

Of these two latest volumes of this important treatise, Volume IXB completes the treatment of electrochemistry in seven chapters: Gas Evolution Reactions (J. Horiuti); The Mechanism of Deposition and Dissolution of Metals (J. O'M. Bockris and A. R. Despić); Fast Ionic Reactions (E. M. Eyring); Electrochemical Energy Conversion (M. Eisenberg); Fused-salt Electrochemistry (G. E. Blomgren); Bioelectrochemistry (J. W. Woodbury, S. H. White, M. C. Mackey, W. L. Hardy, and D. B. Chang); and Kinetics of Reactions with Charge Transport (V. T. Levich). The coverage is concise but authoritative, and substantial, selective bibliographies are included. There is an author and a subject index, which apply to Volume IXB only.

The quality of Volume IV is, of course, similar. In its twelve chapters, the spectrum of spectroscopy, from vibrational to Mössbauer, is spread before us in a form at once didactically assimilable and rigorous. The authors (S. H. Bauer, C. C. Costain, G. W. King, J. R. Hall, D. E. Milligan, M. E. Jacox, T. Shimanouchi, J. T. Hougen, A. D. Buckingham, R. M. Golding, H. G. Hecht, E. Schempp, P. J. Bray, N. N. Greenwood, and C. R. Mueller) have written their chapters for the purpose of introducing the non-specialist to the subject, and, if he is persistent, enabling him to obtain an understanding of the fundamental principles whose application may be found elsewhere (although enough illustrative examples are included to bring the subjects down to earth).