Book Reviews*

Biology of Carbohydrates. Volume 2. Edited By Victor Ginsburg (National Institutes of Health) and Phillips W. Robins (Massachusetts Institute of Technology). John Wiley and Sons: New York. 1984. ix + 342 pp. $80.00. ISBN 0471-03906-3.

The title of this book may not cause as many as should to obtain it. Those that do will find five interesting and worthwhile reviews on the carbohydrate portions of glycoproteins.

Almost everything we know about the structures, conformations, biosynthesis, and functions of the saccharides of glycoproteins has been discovered in the past two decades. It is these exciting developments that are presented clearly and concisely. Each chapter, by reviewing progress in an organized way, gives a flavor not only of where we are but also of where we are going. And although this is a multiauthored volume, the topics have been chosen and the volume has been edited in a way to make the book both unified and coherent.

A review of lectins (by Lis and Sharon) does not try to cover all aspects of their isolation, properties, and applications, as indeed would be impossible in 85 pages, but it emphasizes the use of lectins in research and medicine, particularly applications to the study of complex carbohydrates (glycoconjugates) in solution and on cell surfaces.

Structures of O- and N-linked oligosaccharides are reviewed by Kobata. Included in this chapter are discussions of structural methods and variations in oligosaccharide structures.

Biosynthesis is covered in two chapters. Snider reviews the current state of knowledge of the formation of N-linked oligosaccharides, including both assembly and processing. Sadler reviews the structure, function, and biosynthesis, including localization and regulation, of O-linked oligosaccharides.

Carver and Brisson review the determination of three-dimensional structures of N-linked oligosaccharides. New high-field NMR instrumentation, new NMR techniques, and molecular computer graphics programs have made this newest subdiscipline possible. The chapter emphasizes the authors' own work.

We come away from the book with the idea that what we can anticipate is some very interesting correlations of biological activities with primary and three-dimensional structures and developmental changes in them.

The chapters are written by recognized experts, are well organized, fit together nicely to give a rather complete picture of the state of the science, and cover the literature through about half of 1983. The book is a must for anyone interested in the biology of carbohydrates, whether as a researcher or as someone who simply wants to be informed.

James N. BeMiller, *Southern Illinois University at Carbondale*

The Chemistry of Ruthenium. By Elaine A. Seddon and Kenneth R. Seddon (University of Sussex). Elsevier Science Publishers: Amsterdam and New York. 1984. xi + 1374 pp. $250.00. ISBN 0-444-42375-3.

This is a monumental work that provides essentially comprehensive coverage of ruthenium chemistry from its origins in the early 19th century up until 1978. Some references from 1979 are included and, although by my count it did fall somewhat short of the claimed 4000 references, it remains an impressive and immensely useful compilation, especially when considered in conjunction with two up-date articles which have appeared in Coordination Chemistry Reviews. The authors emphasize that the book is concerned with the *chemistry* of ruthenium, including coordination, organometallic, structural, electro-, and photochemistry, spectroscopy, and kinetics. The areas of metallurgy, alloys, analysis, and binary compounds (other than halides and chalcogenides) have been consciously excluded. Even with these exclusions, a formidable quantity of work remains in an area which as not been reviewed in English since 1967, at which time there were only about 400 references. The general rapid development of platinum-metal chemistry and the special impetus given to ruthenium chemistry by research in solar energy conversion and photocatalytic decomposition of water make this book a timely and important contribution.

Organization of the text is basically according to formal oxidation state with chapters on Ru(VIII) through Ru(0) and additional chapters on low oxidation states, carbonyl clusters, nitrosyls, and photophysics and photochemistry of Ru(II). Within chapters, coverage is arranged according to the periodic group of the donor atom of the principal ligand. However, the authors are keenly aware of possible deficiencies of an oxidation state classification, pointing out, for example, that all formal Ru(I) complexes have chemistry which is "absolutely characteristic of Ru(II", and a notable feature of the book is a preliminary chapter introducing the "MLX system". This is an extremely interesting new system for the classification of covalent molecules and ions which has been developed by Drs M. L. H. and J. C. Green at Oxford University and will be fully described in a forthcoming book by these authors. It utilizes a dual classification according to "electron number" and "valency number" to replace the classical definition of formal oxidation state. This provides a better rationalization of compounds containing purely covalent (especially homonuclear) bonds, avoiding such quirks as the different formal oxidation states of CH_4, CCl_4, and C_2H_6, and inorganic complexes such as $PtCl_2(PPh_3)_2$ and $Pt_2Cl_2(\mu\text{-dppm})_2$.

The text is well written with occasional touches of humour and provides both reassessment of early work in the light of modern developments and discussion and commentary on the most recent advances. It is very liberally and clearly illustrated with line structures, crystallographic diagrams, electronic spectra, etc., and there is a wealth of tabular material. This extends even to the presentation of line structures for simple well-known ligands such as pyrazole and phenanthroline and for many simple octahedral complexes, thus making the book accessible even to the nonspecialist reader. This virtue does have a negative side since the book has been printed by direct reproduction of camera-ready typescript. Because of this, one occasionally feels that tables, reaction schemes, and simple structural formulae occupy far too much space and presumably add to the cost of an already very expensive book. Surely it should be possible for the publishers to give more attention to layout and use of photographic reduction?

In summary, the authors are to be congratulated for their effort in producing a work which will undoubtedly become essential reference material for any chemist concerned with the platinum metals and probably for all transition-metal chemists. An essential acquisition for any well-stocked chemical library but unfortunately perhaps too expensive for individual purchase!

Keith R. Dixon, *University of Victoria*

The Laboratory Microcomputer. By James W. Cooper. John Wiley & Sons: New York. 1984. 328 pp. $29.00.

This book covers the writing of Pascal and assembly language programs for the IBM System 9000 (or CS/9000) laboratory microcomputer. Other microcomputer systems are not discussed and no comparisons are made. Chapters 1 and 2 (32 pages) give an introduction to the CS/9000. Chapters 3–10 (105 pages) cover Pascal programming and are fairly independent, although Chapter 6 on input, output, and file handling is specific to IBM equipment. Chapter 11 (24 pages), Calling CS/9000 Library Functions, and Chapter 12 (15 pages), The Display Screen: Displaying Characters and Graphics, are quite machine-specific.

The second part of the book is titled Programming the MC68000 Processor. Chapters 14–19 (63 pages) are an introduction to assembly language programming that is quite machine-independent. Chapters 20–22 (38 pages) cover the CS9000 assembler program, error traps, and graphics display.

The author states that all of the example programs have been compiled and run on the CS/9000 and should run without errors. The Pascal examples include an alphabetic sort, a matrix inversion and solution, a key definition routine, a Lorentzian peak program, and a window generation program. The assembly examples deal mostly with mathematical operations and driving the CS9000 display.

William M. Butler, *University of Michigan*

Modern High Temperature Science. Edited by John L. Margrave (Rice University). Humana Press: Clifton, New Jersey. 1984. xv + 462 pp. $95.00.

This book, constituting Volume 17 of the journal *High Temperature Science*, is a collection of 26 original research papers from scientists, post-doctoral associates, and colleagues of Professor Leo Brewer in celebration of his 65th birthday. In addition, there is a report by Brewer which extends to the actinides his work on the thermodynamic properties of gaseous atoms. Appropriately, three of the papers relate directly to Brewer's work on intermetallic compounds and two others to his interest in gaseous monoxides.

Perhaps the most succinct way to summarize the contents is to say they are representative of both the enormous range of interests of high-temperature scientists and the vast array of methods these scientists

*Unsigned book reviews are by the Book Review Editors.

employ in their research.

Thomas C. Ehlert, *Marquette University*

Comprehensive Treatise of Electrochemistry. Volume 8. Edited by R. E. White, J. O'M. Bockris, B. E. Conway, and E. Yeager. Plenum Press: New York. 1984. ix + 620 pp. $89.50. ISBN 0-306-41448-1.

This recent volume of this excellent series is a particularly useful addition to the series. As the authors correctly state in the preface, electrochemistry has grown considerably since the 1950's. It is no longer Weston cells and slide wire potentiometers, although unfortunately it is still viewed as such by many chemists. Someone who has that view and is willing to take the time to peruse this volume will discover a new world of chemistry.

The authors correctly note that one of the reasons for the renaissance in this field is due to advances in electronics and instrumentation. They thus start off with an excellent chapter in electronic instrumentation that overlaps very nicely with the second chapter on computerization. The latter area has had a major impact on electrochemistry either by interfacing or through the use of microprocessors.

The remainder of the book is nicely balanced between those techniques that are clearly electroanalytical and those that are less analytical and more physical in nature. Thus there are extensive chapters on ion selective electrodes and polarography, including its variations, followed by chapters on ellipsometry, Raman, ESR, electron spectroscopy, and electron microscopy. It is the inclusion of these latter subjects that makes the book especially valuable. These topics are now scattered throughout the literature which makes it difficult for the interested reader to obtain a grasp of the methods. This problem has now been solved.

The chapter on ion-selective electrodes is very thorough and should be read by the non-electrochemist who frequently learns his or her electrochemistry from manufactuer's literature.

The electroanalytical chemist might, at first glance, conclude that the text is lacking in that there are no chapters devoted to his or her favorite techniques such as cyclic voltammetry, linear sweep voltammetry, stripping methods, etc. The editors apparently decided that selectivity was required and that the newer interdisciplinary methods deserved higher priority than did the well-established techniques. The latter are covered somewhat in the chapter on polarography, but there is an excellent bibliographic chapter that covers all the "older" methods. The chapter is arranged by technique and then further divided into theory, instrumentation, and applications for each technique. This chapter alone will make the volume a very useful reference source.

This new volume will be a very useful addition to any reference collection.

George W. Harrington, *Temple University*

Carcinogenesis and Mutagenesis Testing. Edited by J. F. Douglas (Scientific Services, Inc). The Humana Press, Inc.: Clifton, NJ. 1984. xvii + 335 pp. $49.50 US/$59.50 elsewhere. ISBN 0-89603-042-3.

Genetic toxicology is a relatively new branch of biology that has matured to a point where it is now arousing interest among chemists. In addition, the area of genetic toxicology has become highly important in the decision-making processes that function in governmental regulation, as well as in product R & D efforts within industry itself. It is simply inadvisable to market a potent mutagen with potential carcinogenic activity; it is equally unwise to invest R & D monies on assured drop-outs.

"Carcinogenesis and Mutagenesis Testing" presents introductions to some of the biological background underlying currently used tests for chemicals active in mutagenesis and in carcinogenesis. The trend is strictly toward short-term and relatively inexpensive tests for detection of compounds with activities affecting the structure of the genetic material or its partitioning to daughter cells (genotoxic chemicals). This need for speed and economy arises because some 30 000 to 50 000 agents are now considered as available in the commercial world of synthetic chemicals, with some 300 to 1000 synthetics estimated as being introduced to the market annually. Detection of adverse biological effects early in product development is important. The book emphasizes that genetic toxicity scoring is done at the cellular and organismal levels rather than being based purely on chemical reactivity. In part, this is because of the need to extrapolate directly from test result predictions as to possible impacts on man, a difficult enough situation as it is. In part, complex biological systems are used because our knowledge of the chemistry of molecularly complex aqueous systems is primative, the field of "chemical genetic toxicology" awaiting expertise and new technologies. Extrapolation from other systems to the human is necessary because present methods in monitoring humans and in cancer epidemiology are currently grossly inadequate for the task of ascertaining any but exceptional instances of carcinogenicity... even if the human were considered a suitable model system for random experimentation of genotoxins.

Direct measurements of the interaction of chemicals with the hereditary material, cellular DNA, are reviewed by Dr. James Koropatnick and Jules J. Berman. Several chapters by David J. Brusick and Steve R. Haworth concisely introduce assays for genetic effects of chemicals using bacteria, yeasts, mammalian tissue culture cells, and fruit flies (Drosophila). John O. Rundell has written short introductions on in vitro tests in which tissue culture cells are "transformed" in growth properties and, after growth, are able to form tumors when implanted into experimental animals. Up the scale of complexity is a rapid, whole animal bioassay for carcinogenic activity, described by H. Witschi. Jerrold Ward, Cipriano Cueto, Jr., and J. Fielding Douglas present the logic behind the more classic whole animal carcinogen bioassays, general requirements for valid performance, and guidelines to be used in interpreting the results. Definitive protocols are not included in the text, but are to be found in the literature cited, effectively pinpointed through about mid-1982. The book serves as an adequate companion to Dr. Brusick's own pioneering text, "Principles of Genetic Toxicology", published in 1980 by Plenum Press.

There is every indication that genotoxic chemicals will receive closer scrutiny as time passes—human health impacts very probably extend far beyond carcinogenesis to generation of life-threating atherosclerotic plaques and to many other physiological processes associated with "aging". Through effects on the germ line, genotoxic chemicals may also affect the health and well-being of future generations. "Carcinogenesis and Mutagenesis Testing" efficiently introduces the state of the art today. As desired by the editor, the book should "stimulate thinking and research in those areas that will provide effective means for reducing exposure to specific (genotoxic) chemicals". The book gives enough background so that it should initiate understanding of the meaning of the test systems to those not already acquainted. To some, the book may also allow individual interpretation of current literature in the field, a major component of such journals as *Mutation Research*, *Environmental Mutagenesis*, and *Cancer Research* (to mention the three journals most cited in the computerized information retrieval system of EMIC, the Environmental Mutagen Information center at Oak Ridge).

Philip E. Hartman, *The Johns Hopkins University*

Applications of Infrared, Raman and Resonance Spectroscopy in Biochemistry. By Frank S. Parker (New York Medical College). Plenum Press: New York. 1983. xiv + 550 pp. $65.00. ISBN 0-306-41206-3.

As the use of vibrational spectroscopic techniques in biochemical research becomes more widespread, the need for compilations of the myriad of efforts has been met by recent publications such as this book. Other works of a similar nature have focused solely on the scattering techniques, whereas the present author has illustrated the utility of both infrared and Raman techniques in biochemistry. Despite the advantages of employing Raman scattering from samples in aqueous media, Parker has provided clear evidence that FTIR techniques should not be dismissed when investigating biochemical systems.

The author has placed considerable emphasis on the presentation of spectra and has compiled numerous tables to augment his lucid descriptions of the original research reports. All major areas of endeavor have been addressed although protein studies comprise the vast majority of pages. Special chapters have been devoted to the eye and the purple membrane; copper proteins; viruses and nucleoproteins; carotenoids; steroids; and gases of biological significance. As in all works of this type the newest accomplishments are lacking; however, this in no way detracts from Parker's superb compilation of an extensive bibliography.

This text will be of value to both established and novice researchers dedicated to the study of biological molecules using vibrational spectroscopic methods. In addition, the biophysical chemist or molecular biologist who might consider such techniques as a potential source of molecular structure information will find the chapters on theory and sample methods especially useful. Scientists in a variety of disciplines will benefit by the addition of this text to their libraries.

Paul W. Jagodzinski, *West Virginia University*

Physical Properties of Polymers. By J. E. Mark (University of Cincinnati), A. Eisenberg (McGill University), W. W. Graessley (Exxon Research and Engineering Company), L. Mandelkern (Florida State University), and J. L. Koenig (Case Western Reserve University). American Chemical Society: Washington, D.C. 1984. ix + 246 pp. $44.95. ISBN 0-8412-0851-4.

The book is divided into five sections with each author contributing one section. The book is remarkably effective at bringing the reader up to date in the five areas of the rubber state, the glass state, viscoelasticity, the crystalline state, and spectroscopy. The main ideas of recent development in the fields are presented with a minimum of mathematics and detail. The book is a good aid to the polymer chemist trying to keep up with advances in areas adjacent to one's own speciality. The book also nicely complements standard polymer texts. Graduate students com-

pleting the typical polymer course would find new insights by reading this book. The sections on the glass state, viscoelasticity, and the crystalline state seemed the most useful while the section on molecular spectroscopy seemed least useful.

Alan Anthony Jones, *Clark University*

The Determination of Ionization Constants—A Laboratory Manual. 3rd Edition. By Adrien Albert (SUNY at Stony Brook) and E. P. Serjeant (University of New South Wales). Chapman and Hall: New York. 1984. xi + 218 pp. $33.00. ISBN 0-412-24290-7.

The 1st edition of this popular book appeared in 1962. Like its predecessor, this book gives detailed instructions for the determination of the ionization constants of acids and bases. Potentiometric methods utilizing the glass electrode and spectrophotometric methods are dealt with most thoroughly. Fortran programs are included for handling the determination of overlapping pK_a values. Chapters on conductimetric methods, solubility relationships, and zwitterions are retained. A short new chapter introduces the techniques of Raman spectroscopy, nuclear magnetic resonance spectroscopy, and thermometric methods. A chapter on stability constants of metal complexes, missing in the 2nd edition, has been reinstated and updated in this edition. Of great value to the novice in the area are actual data with sample calculations that give a feel for sample sizes, standard solutions, conditions of the titration, calculations, and precision. Sources of error, anticipated difficulties, and good laboratory practices are all covered. The chapter dealing with ionization constants of typical acids and bases has been extensively updated, and a new table of 370 biologically active substances has been added. These additions will make this standard reference even more useful.

Darl H. McDaniel, *University of Cincinnati*

Nucleic Acid Biochemistry and Molecular Biology. By W. I. P. Mainwaring, J. H. Parish, and J. D. Pickering (University of Leeds) and N. H. Mann (University of Warwick). Blackwell Scientific Publications: Oxford, London; Boston, MA. 1982. xi + 557 pp. $33.95 paperback.

The authors state, "This book is intended primarily for university students of biochemistry and for other courses with a major component of molecular biology". They also suggest that the book may be of use to research scientists involved with nuclei acids. "The book draws on our experience in teaching the methodology, biochemistry and molecular biology of nucleic acids to undergraduates in two universities". I might add the teaching experience covers both biochemistry and biology departments.

The authors' aim is to present a balanced, working knowledge of both the DNA and RNA areas that are important in current research. The sections on prokaryotic and eukaryotic RNA and protein synthesis are quite thorough. The chapter on the recombinant DNA technology is very good. I believe that the authors have been quite successful in the achievement of their objectives. I would welcome a new graduate student in my laboratory who had covered this material. Any reservations I have about the book are traceable to the rapidity of change in this field that can hardly be put to the authors' account. The references are excellent and represent coverage through 1981.

Perhaps the most productive point of view for this review is to direct it to the general research reader of this Journal who does not work in the area of nuclei acid chemistry. A number of readers may have had an exposure to biochemistry but not to molecular biology. This book appears to me to be very useful for covering the gap between the organic chemistry and biochemistry areas and the molecular and developmental biology areas. A course in biochemistry would not be necessary.

The book includes an introduction to nuclei acid chemistry, the transfer of genetic information, viruses, and bacterial genetics. The introduction is followed by chapters on Nucleotide Metabolism, Nucleic Acid Chemistry, Prokaryotic DNA Replication, Repair and Recombination, Prokaryotic Biosynthesis of RNA, and Bacterial Protein Synthesis. There are similar chapters on eukaryotic DNA, RNA, and protein biosynthesis and structure. The last two chapters cover Organelles (primarily mitochondria and chloroplasts) and Recombinant DNA.

The principal problem for the outsider is one of the nomenclature and unfamiliar terminology. For this purpose, a glossary is indispensable and this book includes one. It covers primarily genetic terminology. It could be longer but it is adequate in conjunction with the index. The general reader may need to refer to a bacterial genetics text and to a cellular biology text to refresh his memory. There are no diagrams of cells.

This textbook can provide a good background for reading the current literature of biochemistry and molecular and cellular biology. It is a very exciting time in these areas, and Arthur Kornberg has pointed out, the universal language is the language of chemistry. This period in biological, structural, and mechanistic work can perhaps best be compared to the period just after the advent of quantum mechanics and the rapid developments in structural and mechanistic chemistry. The recombinant DNA methods provide synthetic sources of specific DNA's, RNA's, and proteins for the study of biological structure and mechanism.

I can recommend the book both for its intended uses and as in introduction to research workers in other fields.

Brown L. Murr, *Johns Hopkins University*

Water Analysis. Volume 2. Inorganic Species. Part 2. Edited by Roger A. Minear (University of Tennessee) and Lawrence H. Keith (Radian Corporation). Academic Press, Inc.: Orlando, FL. 1984. xii + 405 pp. $65.00. ISBN 0-12-498301-2.

This volume is comprised of eight chapters, on Molecular Absorption Spectrophotometry (1), Atomic Absorption Spectrophotometry (2), Atomic Emission Methods (3), Molecular Luminescence Methods (4), Mass Spectrometry (5), Electrochemical Methods: Ion-Selective Electrodes (6), Electrochemical Methods: Amperometric Analysis (7), and Electrochemical Methods: Anodic Stripping (8).

The first chapter, by B. E. Jones, D. E. Erdmann, and M. W. Skougstad, is devoted to the basic principles of molecular absorption; the theory and function of spectrophotometer components and systems; quantitative spectrophotometric relationships; and a section on chemical systems and methods of analysis for thirteen nonmetals and two metals.

The second chapter, by T. C. Rains, addresses the theory of absorption and instrumentation only briefly and is primarily devoted to an extensive treatment of the various applied quantitative aspects of atomic absorption, including such topics as limits of detection, interferences, preconcentration and separation techniques, evaluation of data, and numerous specific elemental determinations.

In Chapter 3, by R. K. Winge and V. A. Fassel, the authors discuss classical atomic emission spectrometric techniques, plasma excitation sources (including plasma arc, microwave and high-frequency plasmas, and inductively coupled plasma systems), and X-ray techniques, with a short section devoted to analyte-enrichment procedures. The topics are treated from a "review of literature" perspective with extensive specific literature citations in the text. Comprehensive tables of elements vs. detection limits, wavelength, etc., are included.

Chapter 4, by E. L. Wehry, includes discussions of the basic theory of luminescence processes; the quantitative basis of molecular luminescence anaysis; instrumentation and experimental procedures; and both general considerations and specific applications to the determination of inorganic species. A periodic table representation showing metals forming complexes which exhibit fluorescence or phosphorescence and referenced tables of metals and anions vs. reagents for fluorometric or chemiluminescence determinations could be quite helpful to those involved in water analysis by molecular luminescence methods.

In the fifth chapter, the authors J. Wallace and R. Brown deal with spark-source mass spectroscopy and isotope-ratio spectroscopy. Relatively brief discussions of historical development and the role of computers are included with the following main topics: the instrument; the spectrum; methodology; and the measurement of isotope ratios. A few examples serve to illustrate applications but "...in no sense cover the entire range of applications."

Chapter 6, by R. P. Buck, is divided into three main sections: (I) Definitions and Principles; (II) Types of Ion-Selective Electrodes; and (III) Response Equations for the Steady State, Response Parameters, and Examples. The discussion contained in these sections is largely devoted to a rather thorough treatment of the definitions, theory, materials, electrode types, electrode characteristics, and operations considerations (such as junction potentials, ionic strength effects, response time, etc.). Applications are primarily addressed by way of referenced tables showing various information such as the response range of specific electrodes.

In Chapter 7, the author J. D. Johnson discusses the two basic types of amperometric methods, end-point detection and direct measurement, that are used primarily for the measurement of chlorine, ozone, and oxygen in water analysis applications. Following a review of applications and theory, the chapter includes sections on end-point methods of amperometric titrations; continuous amperometric recorders and bare-electrode measuring cells; amperometric membrane electrodes; and other amperometric cells.

Chapter 8, by M. S. Shuman and M. Martin-Goldberg, includes three main sections covering general background and theory; practice; and practical applications of anodic stripping to water analysis. Topics such as preconcentration, stripping, limitations, interferences, speciation, and analytical applications are included. The analytical applications are well summarized in an extensive table showing the constituents determined vs. solution compositions, observations, applicability, and references.

This book represents a significant effort on the part of the editors and several contributing authors toward the stated goal "...to present both the theoretical and practical aspects of understanding and determining the trace-level components that are found in all natural, pristine, and polluted waters." While both theoretical and practical aspects are well presented

in some chapters, other chapters only partially meet the stated objectives with regard to theory and/or practice. I believe that the value of any future volumes or editions would be greatly enhanced by *more uniformity* in the following: format; depth of theory treatment; specificity and extent of applications; and the approach used in discussion and referencing. Finally, I believe that inclusion of the theory and applications of the "ion chromatograph" alluded to in Volume I would have improved this volume.

Robert E. Neas, *Western Illinois University*

Carbon-Black Polymer Composite. Edited by Enid Keil Sichel (GTE Laboratories). Marcel Dekker, Inc.: New York. 1982. X + 212 pp. $37.50.

This book is of interest to material scientists and emphasizes the electrical properties of carbon-black–polymer composites. Chapter headings are indicative of the contents: [the] nature of carbon-black and its morphology in composites, tunneling conducting in..., DC conduction in..., conduction in carbon-black-doped polymers, AC electrical properties of ..., rheology of..., and triboelectrification of carbon–polymer composites.

Eli M. Pearce, *Polytechnic Institute of New York*

Chemistry and Technology of Explosives. Volume 4. By Tadeusz Urbański (Technical University, Warsaw). Pergamon Press: Oxford and New York. 1984. xxiii + 678 pp. $120.00 ISBN 0-08-026206-6.

The chemistry of explosives suffers from a poor public image that arises from the misconception that explosives are primarily of significance for war. In fact, as Professor Urbański points out, "more explosives have been used in peace than in war", and he has dedicated this book to peaceful applications. The uses of explosives range from construction and excavation for roads and railways, mining, control of floods, fires, and avalanches and production of rain to precision punching of holes in metal for manufacture of machinery, and the clearing of land for agriculture. The technological society we know would not be possible without them.

This book is devoted solely to the chemistry involved in the synthesis and reactions of compounds with explosive properties and the closely associated chemical technology. Four of its 25 chapters deal with nitro compounds and nitrating agents, three deal with nitrates, and one each with nitramines and difluoroamino compounds. The remaining chapters are concerned with explosive polymers, initiators (largely inorganic), explosive powders, liquid explosives, propellants, and safety and toxicity.

This volume is essentially a supplement to the three previous volumes, which were written in the period 1964–1967, and it deals with the literature from 1960 to, apparently, 1981, although many earlier references are included for convenience. The treatment is comprehensive without including every published detail, and the material is presented in an integrated, critical manner. The references are particularly valuable because of the inclusion of many less well known sources, such as symposium papers, patents, books from the East Bloc that are difficult to access, and journals not commonly read by chemists, such as the *Journal of Spacecraft*.

This book is of much potential value to chemists who have no concern with explosives as such but are interested in the chemistry of organic nitrogen compounds. A thorough subject index makes access easy. Finally, the contents of three previous volumes are set out in detail in 30 pp.

Dictionary of Organometallic Compounds. Executive Editor J. Buckingham. Chapman and Hall/Methuen, Inc.: New York. 1984. In three volumes: xviii + 2468 + 764 pp. $990.00. ISBN 0-412-24710-0.

The Preface makes the justifiable claim that "organometallic chemistry has now come of age as a scientific discipline", and it is not only fitting but necessary that the accumulated information on the astonishing variety of compounds that have been reported be brought together in a form for ready reference. This set follows much the same pattern as its senior sister work, "Dictionary of Organic Compounds", originated by Sir Ian Heilbronn.

Questions of nomenclature and logical order have led the editors wisely to adopt a formula-index arrangement for the entries. This policy puts the derivatives of a given metal together, starting with silver and ending with zirconium. Although the term "organometallic" is not defined in this work, the Introduction tells us that "Compounds of all important structure types (typically the parent member of each series, where known, together with a selection of its homologues)" are included. In addition, "any compound with an established use, such as in catalysis, as a synthetic starting material" is included, and "other compounds of particular chemical, structural, biological, or historical interest, especially those thought to exhibit unusual bonding characteristics" are also entered. Under "organometallic" are subsumed organic derivatives of all the elements but the halogens, the chalcogenides, hydrogen, carbon, the noble gases, and unstable radioactive elements. Compounds are included irrespective of the site of bonding to the organic moiety, and such salts as silver acetate, which has no carbon–metal bond, are listed (sodium and potassium acetates, however, are not). At least one legitmate organometallic compound, copper acetylide, Cu_2C_2, has been omitted, however, although silver acetylide and ethynylcopper, CuC_2H, appear.

Although the listing is by formula, names are not neglected. The name given in the original report (even some that are questionable), names used by Chemical Abstracts (identified by the particular cumulative index), and IUPAC names where they are different are to be found (thus, "dichloropropylaluminum, 9CI; dichloropropylalane; propylaluminum dichloride"). CAS Registry Numbers are given after the names, then the formula (fully drawn where appropriate), and then the molecular weight to three decimal places. Some may wonder about the utility of the latter, for they are based on natural isotope abundances, and are thus of no use in mass spectroscopy. Next comes hazard information, stereochemical description, physical properties, and information on derivatives. Uses, if appropriate, are also mentioned. Finally, a short selection of references, keyed to the kind of information contained (use, synthesis, structure, spectroscopy), gives the reader access to the primary literature. In many cases, not all of this information is available, and indeed, some important organometallic compounds are known only in solution (e.g., alkylmagnesium halides). Such compounds are nevertheless reported in this Dictionary, with indications about their instability.

For each element, there is a page of introductory information about the free element. The entries for that element are also preceded by a few pages on which the structures of all the compounds entered are laid out for easy visual recognition, with a Dictionary Number for each to allow quick location. Supplementing this feature and the formula index order is the Index Volume, which consists of a Name Index (with much cross-indexing), a Molecular Formula Index, and a Chemical Abstracts Service Registry Number Index. With all these means, there should be no difficulty in locating a compound.

Provision is made for periodic supplements and indexes to them. The publishers clearly believe that this dictionary is here to stay, and they are probably quite right. The work is well done and fulfills a need; it should see immediate, heavy, and continued use.

Organic Syntheses. Volume 62. Edited by M. F. Semmelhack. John Wiley and Sons: New York. 1984. xvi + 269 pp. $26.50. ISBN 0471-81786-4.

This edition of the work every organic chemist must surely know well brings some innovations with it. It is now reproduced from typescript (mercifully uniform!). The procedures accepted for checking but not yet published are now listed at the end in a more condensed form, and the pages carrying the list are numbered. The biggest change, however, is that instituted with the previous volume: the availability of a soft-bound, cheaper edition that does not contain the index. Still another change is presaged: beginning with Collective Volume Seven, the span of the collective volumes will be reduced from ten to five years.

This volume begins with a tribute to the late John R. Johnson. The bulk of the book is, as usual, the carefully described and independently checked preparative procedures, of which there are 28. These procedures have been selected as representative examples of modern synthetic methods. Seven of them illustrate uses of metal-promoted reactions. A number of important intermediates useful in more elaborate syntheses are described. Organosilicon chemistry crops up in several places. New, improved procedures for older compounds and reactions are always a valuable part of *Organic Syntheses*, and among those in this volume is a new route to acyloins involving condensation of aliphatic aldehydes by means of a thiazolium catalyst. This is a satisfying, informative, and useful addition to the venerable series.

Advances in Heterocyclic Chemistry. Volume 36. Edited by A. R. Katritzky. Academic Press: Orlando, FL. 1984. ix + 416 pp. $95.00. ISBN 0-12-020636-6.

Of the four chapters in this volume, only one is devoted to a specific class of heterocycle (pyrazolopyridines, by C. R. Hardy). One of the chapters treats Conformational Equilibrium in Nitrogen-containing Saturated Six-membered Rings (T. A. Crabb and A. R. Katritzky). This is concerned with the effects of the facile inversion of amines, and the steric effect, or "size", of unshared electron pairs. The major questions now having been largely resolved, a chapter such as this that reviews methods and the results for individual rings is timely.

Applications of Phase Transfer Catalysis in Heterocyclic Chemistry is the title of a chapter by R. J. Gallo, M. Makosza, H. J.-M. Dorn, and P. Hassanaly. It deals with cyclizations, reactions of substituents, ring transformations, and the use of heterocyclic compounds as phase transfer catalysts. The second part of the review of Electrolysis of N-Heterocyclic Compounds, by J. Lund and I. Tabakovič, is the longest in the book. It

brings up to date the original chapter, published in 1970. The chapter on pyrazolopyridines provides the first comprehensive review of the subject, which comprises five isomeric ring systems of biological and pharmaceutical interest. It is confined to the chemistry. The respective reviews cover the literature up to mid-1982 or mid-1983. A cumulative index of chapter titles concludes this volume.

Topics In Bioelectrochemistry and Bioenergetics. Volume 5. Edited by G. Milazzo. John Wiley and Sons: New York. 1983. xiv + 304 pp. $96.00. ISBN 0471-10531-7.

This volume of the series of review monographs begins with a Foreword by the late Philip Elving. There are four reviews: Modern Polarographic (Voltammetric) Techniques in Biochemistry and Molecular Biology (in two parts, one for low molecular weight substances and one for macromolecules), by J. Krita and E. Palecek; Electrochemistry of Bilayer Lipid Membranes, by F. A Siddaqi and J. Ti Tien; Bioelectrocatalysis Enzymes as Catalysts of Electrochemical Reactions, by M. R. Tarasevich and V. A. Bogdanovskaya; and Phenomenological and Molecular Aspects of Bioelectrogenesis, by E. Schoffeniels and D.-G. Margineanu. There is no index, but each chapter has a table of contents in some detail.

Densities of Aqueous Solutions of Inorganic Substances. By O. Söhnel and P. Novotny (Research Institute of Inorganic Chemistry, Ústi and Labem, Czechoslovakia), Physical Sciences Data 22. Elsevier Science Publishers: Amsterdam and New York. 1985. 336 pp. $67.25. ISBN 0-444-99596-X.

In this volume are presented density and to a lesser extent solubility data for aqeous solutions of some 293 substances, the majority of which are inorganic. Actual experimental data are not included; rather, the results of a statistical regression of pubished data are tabulated as a function of temperature and composition and are presented together with the equation and an indication of the closeness of fit of the equation to the original data set. Ideally, the density of a given solution is reported over a range of 0 to 100 °C (in 5-degree intervals) for concentrations up to and including saturation. For those systems where published data are incomplete, density data are presented as a function of composition at one or two temperatures—typically in the 15–30 °C range. Although no mention is made of pressure, presumably all measurements were performed at ambient or saturated water-vapor pressure.

The book is logically arranged into an introduction, containing an explanation of tables and a semirigorous thermodynamic justification for the form of the regression equation used, a body of tables, arranged alphabetically by compound name, and an index, arranged likewise according to compound formula and containing the references from which the original data were taken.

Frequently, in compilations of this nature, inevitable disparities occur between individual sets of published data. Though it would not be appropriate for the purpose of this book to include all such data, some mention of the criterion used in evaluating the various data sets would have been useful. Also, the density data for pure water are not presented in tabular form and although they are easily obtainable from the regression equation and not an "aqueous solution" in a strict sense, their omission seems unfortunate. The book is a useful compilation presented in an easily accessible and consistent format and should be considered as at least a starting point whenever solution density data are required.

S. Michael Sterner, *Syn Flinc Co.*

Salt, Evaporites, and Brines: An Annotated Bibliography. By V. S. Hall and M. R. Spencer (University of Kentucky). Oryx Press: Phoenix, Az. 1984. viii + 216 pp. $87.50. ISBN 0-89774-042-4.

This volume is a compilation of references to works dealing with the geological, geochemical, geophysical, and economic aspects of evaporite deposits. It also contains many sources pertaining to underground waste storage. Citations, through 1980 with a few from 1981, include not only English sources but numerous works from the European and Russian literature and encompass geologic localities worldwide. Informative, concise annotations are provided for most English entries but are often absent in references to works published in other languages; in some cases English translations of titles are not provided.

In addition to the bibliography, the authors have provided a detailed geographic index which can be cross-referenced to the bibliography via author and publication date. A very general subject index is also provided which unfortunately contains only eight categories. The citations included in this volume are mostly geologic or geochemical in nature and as such should be of interest to petroleum geologists, geochemists, and those having an academic interest in salt deposits. However, some of the references pertaining to underground waste storage should be of interest to virtually everyone acquainted with modern technology.

A final point bears mention—one not directly related to the quality of the text. According to the preface, most of the annotations have been written by four graduate students in geology (a considerable contribution to a work of this type) and yet none are acknowledged by name.

S. Michael Sterner, *Syn Flinc Co.*

Transition Metal Carbene Complexes. By K. H. Dötz, H. Fischer, P. Hoffmann, F. Kreissl, U. Schubert, and K. Weiss. Verlag Chemie: Deerfield Beach, FL. 1983. xiii + 264 pp. $60.00. ISBN 0-89573-073-1.

This book was written in tribute to Professor E. O. Fischer on the occasion of his 65th birthday by six of his former students. It is fitting that the first monograph in this area be dedicated to the man who not only opened the area but has made the most contributions to an area that has been rapidly growing since its inception 20 years ago.

A comprehensive coverage of the field was not intended by the authors, but rather a collection of "state of the art" articles aimed at demonstrating the principles. The principles are outlined in eight chapters that vary in length from 2 to 64 pages. Three of the more substantial chapters have appeared in related forms in other publications. The opening chapter (Fischer) is the longest and surveys the various synthetic approaches to the preparation of carbene complexes and is a slightly updated version of that which appeared in "The Chemistry of the Metal-Carbon bond", F. R. Hartley and S. Patai, Eds., John Wiley: New York, 1982, pp 181–231. The solid-state structures of carbene complexes are reviewed by U. Schubert and organized according to the coordination number of the metal. The author has published (*Coord Chem. Rev.* **1984**, *55*, 261–286) another review of the same material that is organized according to the various structural features of carbene complexes (metal–carbene carbon bond lengths, etc.). Although this review has a discussion section that is more in depth, the chapter presented in this book must be commended for its complete tabular survey of the known structures. The chapter on carbene complexes in organic synthesis (Dötz), more than the other chapters, is limited to the group VI heteroatom-stabilized (Fischer) carbene complexes, and recent synthetic applications of other types of complexes (Tebbe's Reagent, iron complexes) are not included. The newer version of this review that recently appeared (*Angew. Chem., Int. Ed. Engl.* **1984**, *23*, 587) is far superior in terms of depth and breadth. Other chapters of interest are Electronic Structures of Transition Metal Carbene Complexes (Hofmann); Metal Complexes from Carbene Complexes; Selected Reactions (Kreissl); and Carbene Complexes as Intermediates in Catalytic Reactions (Weiss).

The authors's preface states that the terms "carbene" and "alkenylidene" occur as synonyms throughout the book. This statement is illustrative of the confusion in the naming of transition-metal carbene complexes. These names are not descriptive of the chemical differences between the two major classes of transition-metal carbene complexes. Furthermore, both of these names are misleading to the uninitiated, since the intermediacy of a free carbene from the reaction of a carbene complex has never been established, and the chemistry of these complexes resembles that of carbenes in only the most superficial way. An alternate and systematic naming system would be beneficial.

This book as a whole is well written and is surprisingly free of errors except for the normal level of frustrating typographical errors in the references that is to be expected. In the last 14 years there have been a number of reviews on various aspects of transition-metal carbene complexes and most are now seriously out of date. The collection of articles presented in this book does not present a comprehensive coverage of the literature, but it does nicely provide the reader with an up-to-date overview that is naturally biased toward the Fischer type of complexes rather than the "alkenylidene" complexes. This book will assuredly influence chemists outside the area of organometallic chemistry, particularly organic chemists with interests in synthetic applications of the stoichiometric and catalytic reactions of these complexes.

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