Book Reviews*

Spectral Atlas of Polycyclic Aromatic Compounds. By W. Karcher, R. J. Fordham, J. J. Dubois, P. G. J. M. Glaude, and J. A. M. Ligthart (of the Joint Research Center (Petten Establishment) Commission of the European Communities). D. Reidel Publishing Company; Dordrecht/Boston/Lancaster. 1985. vi + 818 pp. $94.00. ISBN 90-277-1652-8.

This work is a presentation of spectra obtained for 42 polycyclic aromatic hydrocarbons (PAHs) with use of five well-recognized instrumental techniques for molecular characterizations. In addition, 413 references have been used as citations for biological properties of each PAH and occurrence in three media (fossil fuels, food, and the environment) which are further divided into 17 subcategories. The stated objective of the authors was to prepare a convenient reference text for PAHs organized by compounds, rather than by instrumental technique, as is a common practice. That objective has been achieved admirably and attractively; the result is a text suitable for regular and extensive use in research laboratories involved in PAH chemistry and in specialized applications for education. This book was not intended as a primary source for description of PAH chemistry as a cursory inspection will confirm. However, as a practical tool in chemical analysis the book has substantial merits.

The strengths of this compilation of spectra and references, apart from the philosophy of organization, are the clarity, size, and presentation of data for each compound. Moreover, in techniques where methods for preparation of the sample can influence appearances of the final spectrum, alternate methods were used and subsequent spectra were displayed. This is particularly useful in analysis of PAHs using infrared spectrometry (mull, neat, and KBr methods) and mass spectrometry (gas chromatographic vs. direct probe inlet). These features may overshadow the fundamental strength of this work, namely that this collection of original spectra may be one of the first attempts to collect spectra under a set of standard conditions which are clearly documented. This is a major advantage over prior collections (EPA/NIH Mass Spectral Data Base, Sadtler Indices for IR) which were less specialized in objectives.

One weakness, which will certainly disappoint those who work daily with PAHs, is the absence of physicochemical data such as vapor pressures, water–octanol constants, and Henry's law constants. Occasionally, a slight typographical error was found and some peculiar terms (e.g., quadrupolar vs. quadrupole) were used. These minor distractions do not greatly reduce the importance or usefulness of the text.

G. A. Eiceman, *New Mexico State University*

Houben-Weyl Methoden der Organischen Chemie. Volume E5 (Carbonsäure and Carbonsäure-Derivative). Parts 1 and 2. By J. Falbe, W. Bauer, D. Döpp, H. Döpp, T. Eicher, C. Grundmann, B. Trimisch-Pielartzik, H.-G. Korch, G. Krüger, K. Kühlein, R. Mayer, H. Pielartzik, S. Scheithauer, D. Schumann, G. Simchen, and R. Sustmann. Georg Thieme Verlag: Stuttgart and New York. 1985. LIV + VI + 1817 pp. DM 1880.00 (ca. $750.00). ISBN 3-13-217504-8.

These two volumes are supplements to the fourth edition, which appeared in 1952, and cover the literature on preparative methods for the ensuing three decades with critical in-depth reviews. Part 1 is devoted to ortho acids, carboxylic acids, their salts, halides, anhydrides, esters, imidoyl halides, and imidate esters, as well as amino acids, thio acids, their salts and their esters. Part 2 begins with dithio acids and their derivatives and proceeds to amides, amidines, thioamides, nitriles, nitrile oxides, isocyanides, and closely related structures. Although the editor in chief claims coverage for only a 30-year period, references from 1983 are extensively cited, and some from 1984 can be found. Only synthetic methods that have been published since the Fourth Edition are reviewed.

As is characteristic of the main work, the material is treated in a highly organized manner. Preparative methods are described in words and shown in equation, and results are shown in many tables. Properties of the products are often given, and representative experimental procedures are widespread. The references are presented at the foot of the page on which they are first cited. Many readers will find it most agreeable that they are set out in the traditional manner, familiar to readers of this and other American journals before it was meddled with. Initials come before the family name of the authors, and the volume number (in sharp bold-face) comes before the page number, which is followed by the year in parentheses. Structural formulas are drawn with the essential elements of the functional group that results shown in bold-face type.

The text is in German, but that fact should not greatly reduce the usefulness of these volumes to those who have little linguistic facility. The graphics and tabulations give most of the information in language-independent form, and the references are there to provide the fine detail to those who need it.

Such a large compilation of material requires special attention to methods of retrieval. The editors have met the requirement very well, and the several indexes provided are exemplary for their sophisticated design.

This work is, of course, designed for use by reference libraries. Its usefulness far outweighs its high price, and organic chemists are well advised to refute any economic objections that may be raised by their librarians; a serious technical library serving organic chemists cannot afford to be without it.

A Handbook of Computational Chemistry. By Tim Clark (Erlangen–Nurnberg University). John Wiley and Sons Publishers: New York. 1985. x + 332 pp. $35.00. ISBN 0-471-88211-9.

The title of this book is somewhat misleading, in that it is limited to those aspects of computational chemistry which utilize classical force fields or molecular orbital theory to determine chemical structures and energies. While this is unquestionably an important segment of computational chemistry it leaves many areas untouched. It should also be noted that the specific programs included, whose input and output are discussed in exhaustive detail, are in fact among the best documented of all chemistry codes. All of the programs dealt with provide extensive built-in documentation as to input, and the output headings are generally self-explanatory. Some, especially the Gaussian 80 and 82 programs, have what amounts to short monographs, giving numerous detailed examples of input and output, provided with the programs. It is therefore difficult to understand the space spent discussing these features. Even taking into account the limited field of coverage there are numerous important programs which are not mentioned including HONDO and GAMES, while Goddard's GVB method, effective-core potential methods, and post-SCF procedures such as MCSCF, CI, and MP are barely touched upon. While there is clearly still a need for parameterized methods for large molecules, no mention is made of those programs designed to deal with small polypeptides and proteins such as Scheraga's ECEPP, Kollman's AMBER, and Karplus' CHARMM codes, the latter two providing dynamics capability in addition to structural data. In a text of this type, at least in this reviewer's opinion, the author should have concentrated not on already well established and frequently used procedures but on newer, more innovative techniques thus introducing them to a wider audience.

One aspect of this book which the reviewer appreciates, and would in fact have preferred to see as the primary focus of such a text, is the discussion on the limitations of the methods and the types of systems which can be best dealt with by specific programs. This helps alleviate the impression of the book as a "black box" guide. The book is, within its limitations, clearly written and well organized and contains no obvious errors and will undoubtedly prove useful to a somewhat limited audience.

James Tyrrell, *Southern Illinois University*

Annual Review of Materials Science. Volume 15. Edited by R. A. Huggins, J. A. Giordmaine, and J. B. Wachtman, Jr. Annual Reviews, Inc.: Palo Alto, CA. 1985. 590 pp. $64.00. ISBN 0-8243-0715-7.

The volume contains an historical review, by H. Schaefer, of Eduard Zintl's contribution to the study of intermetallic compounds. The twenty other articles are listed in the Table of Contents under five headings. These are (accompanied by the title of one article) the following: Experimental and Theoretical Methods (Thermal-Wave Imaging in a Scanning Electron Microscope by A. Rosencwaig); Preparation, Processing and Structural Changes (Atomic Layer Epitaxy by T. Suntola and J. Hyvärinen); Properties and Phenomena (Interdiffusion in Thin Films by K. N. Tu); Structure (Defects and Order in Perovskite-Related Oxides by D. M. Smith); Special Materials (Recent Results on Hydrogenated Amorphous Silicon by J. Stuke).

The range of materials discussed in the various chapters is very broad, including metals and alloys, semiconductors, ionic solids, biological and nonbiological polymers, and colloids. The physical structures covered include crystalline and amorphous solids, thin films, grain boundaries, and surfaces.

The articles contain a wide mix of theoretical and experimental information. Under the heading Properties and Phenomena, there is, for

*Unsigned book reviews are by the Book Review Editor.

example, a highly theoretical article by T. C. Lowe and J. Lipkin on rate-dependent plasticity in metals and a descriptive article by A. Hiltner, J. J. Cassidy, and E. Baer on the mechanical properties of the tissue of the tendon, aorta, and intestine.

In general, the articles present good, up-to-date reviews of the theories and techniques of each subject covered, including adequate bibliographies. The articles are fairly specialized and would be of most interest to specialists in a particular area wishing to stay current and to new investigators who require a thorough review of a particular field.

Seymour Aronson, *Brooklyn College of the City University of New York*

Alternating Copolymers. Edited by J. M. G. Cowie (University of Sterling). Plenum Press: New York and London. 1985. xii + 281 pp. $47.50. ISBN 0-306-41779-0.

If a book on alternating copolymers had been attempted 10 years ago, it would have been a pamphlet. The amount of knowledge which was available then was relatively meagre compared to what is available now. A number of discoveries and advances have been made, particularly in synthesis, to make a book such as this possible today. The editor has brought together some of the principal British and Japanese investigators to contribute chapters to the book. This book could almost be called "Alternating Copolymerization", because five of its six chapters are involved with the polymerization methods used to bring about the formation of alternating copolymers, leaving the final chapter to consider the characterization methods and physical properties of alternating copolymers per se.

The first chapter, by the editor, gives the theoretical kinetic basis by which the individual methods of alternating copolymerization will be compared. The chapter also defines the scope of the book and previews the topics to be covered in subsequent chapters. The definition of alternation in copolymerization ranges from a strict 1:1 sequence of comonomers in the copolymer produced to any tendency in the copolymerization away from a random sequence toward a 1:1 sequence. In chapter 2, the editor discusses how alternation may be brought about in radical-initiated copolymerization when charge-transfer complexes occur as intermediates. Proofs of the existence of charge-transfer complexes are given for the enlightenment of disbelievers. In Chapter 3, C. H. Bamford summarizes the research which shows that the alternation tendency, to be expected when an electron donor monomer and an electron acceptor monomer are copolymerized, can be considerably enhanced by the presence of appropriate Lewis acids through the formation of ternary complexes. J. Furukawa and I. Maruyama discuss in Chapter 4 the Ziegler–Natta polymerizations of olefins and diolefins which lead to alternating copolymers. The order of reactivity of various olefins and diolefins is included. The enhancement of catalyst activity, sequence regulation, and molecular weight brought about by a third catalyst component is also presented. The formation of alternating copolymers by means of zwitterions is reported by S. Kobayashi and T. Saegusa in Chapter 5. The zwitterions are formed when one monomer is nucleophilic and the other monomer is electrophilic. Initiator or catalyst is usually not necessary. The authors of this chapter also discuss in considerable detail periodic polymerization with monomer sequences of 2:1 and 1:1:1.

In the final chapter, I. J. McEwen and A. F. Johnson successfully "bring together a rather disparate body of knowledge" in order to view the characterization and physical properties of alternating copolymers in a unified manner. They discuss the necessity and methods of determining sequence regularity in alternating copolymers. They show how the extent of alternation can influence the value of the glass transition temperature beyond what would be expected of a random copolymer of the same composition. Other interesting properties of various alternating copolymers such as surfactant behavior, biomedical activity, and antifouling characteristics are mentioned.

This book is a valuable addition to the field of copolymers and copolymerization by reason of collecting a number of studies under a single umbrella and illustrating the recent research advances being made in this area. The authors of each chapter maintain a healthy and useful criticism in their approach by pointing out in passing limitations and areas of uncertainty and speculation. The bibliography of each chapter is quite extensive, averaging over 100 references per chapter. Alternating copolymers are still in the specialty stage of development with industrial applications of relatively low volume at present. By organizing the research in this area and making industrial scientists and engineers aware of recent progress, this book should accelerate the development of larger scale applications of alternating copolymers.

This book is apparently intended to be the flagship of a new "Speciality Polymers Series" to be published by Plenum Press with Professor Cowie as Series Editor. It establishes a high standard of immediacy, thoroughness, and insight so that future books in this series will be awaited with interest.

Charles M. Burns, *University of Waterloo*

Molten Salt Techniques. Volume 2. Edited by R. J. Gale and D. G. Lovering (Louisiana State University). Plenum Press: New York and London. 1984. xviii + 257 pp. $39.50. ISBN 0-306-41549-6.

The topics in this volume are developed, as in the first, from the viewpoints of practical matters of concern in working with groups of salt systems (i.e., "anion-families") or with specific techniques as applied to molten salts measurements. With this volume, the scope is extended to include the following: alkali metal carbonates (Maru); oxides, silicates, phosphates, borates (Somerville and Bell); molten salt spectroscopy (Griffiths); electrochemistry (Lantelme, Inman, and Lovering); and automated admittance spectroscopy of the semiconductor/molten electrolyte interface (Rajeshwar). An introductory chapter develops some considerations in preparing a facility for molten salts research (Gale and Lovering); a brief and informative focus on matters of safety and hazards is included. The topic of alkali metal carbonates is critically developed from the viewpoints of the following: purity levels; preparative techniques; analysis and measurement techniques; containment and related matters to working with carbonates; and some features of safety and hazards (references cited: 31). The subject of the second group of salt systems is developed along similar practical considerations, but with more emphasis on matters thermophysical and thermodynamic (phase diagrams; equilibria between gases and slags; solubilities; basicities; ...); estimation techniques are included (references cited: 38). The topics of molten salt spectroscopy and electrochemistry are approached from comprehensive viewpoints and thus will be found to provide much that will be useful to both experts and nonexperts. The sections dealing with computer-assisted data acquisition and data analyses techniques in each are welcome (references cited: spectroscopy, 115; electrochemistry, 298). The focus on automation is continued in the third techniques topic: admittance spectroscopy at the semiconductor/molten salt interface. In this contribution the concern is at first with the data analysis, equivalent circuits, methodology, and computer simulation of model circuits; this leads naturally to the final sections dealing with experimental matters encountered in undertaking practical measurements (references cited: 30).

This series is providing much that is useful to those concerned with practical measurements, and this volume adds further "touchstones" for reference guidance in this area of materials science and research. The book is a welcome addition.

George J. Janz, *Rensselaer Polytechnic Institute*

The Structure of Volatile Sulphur Compounds. By Istvan Hargittai (Research Laboratory for Inorganic Chemistry, Hungarian Academy of Sciences). D. Reidel Publishing Co., Kluwer Academic Publishers Group: Boston. 1985. viii + 316 pp. $49.00. ISBN 90-277-1395-2.

This useful book organizes and tabulates the structural data on the geometry of small sulfur-containing molecules. Data presented include bond lengths, bond angles, dihedral angles, barrier potentials, nonbonding distances, torsional angles, puckering angles, symmetries and conformational analyses, derived from X-ray and electron diffraction, microwave data, and theoretical methods. The chapters are organized on the basis of the coordination number of the sulfur atom, from 1 (e.g., $R_2C{=}S$), 2 (e.g., sulfides), etc., up to 6-coordinate sulfur (e.g., SF_6). The structural data are tabulated, organized, and discussed in terms of the properties of the compounds and relationships and contrasts are rationalized. Extensive tables and graphs presenting structurally or theoretically interesting interrelationships are presented, and, where useful, related, nonsulfur compounds (e.g., Se_6) are compared.

William A. Pryor, *Louisiana State University, Baton Rouge*

Chemistry in America, 1876–1976. By A. Thackray, J. L. Sturchio, P. T. Carroll, and R. Bud. D. Reidel Publishing Co.: Dordrecht/Boston/Lancaster. 1985. xxiii + 564 pp. $79.50. ISBN 90-277-1720-6.

The century of progress described in this book begins with the founding of the American Chemical Society, with an initial membership of 230. In 1976, there were 112730 members. From the critical analysis of a vast collection of such facts, numerical and otherwise, the authors deduce "Historical Indicators", a term that is the subtitle of the book. The work is a very successful attempt to alleviate the paucity of reliable quantitative knowledge concerning the development of American chemistry.

The first opening of the book provides a surprise; the actual text occupies only a little more than one-third of the total pages. Appendices, some 250 pages of tables, data sources and other bibliography, and an index fill the remaining space. This surprise is dispelled when one reads in the preface "This volume does not offer history. Instead, it provides certain elements—indicators—that may be useful to individuals interested

in the history of American chemistry and chemical industry, and suggestive for policy." Obviously, the fulfillment of such an aim requires the listing of much information, its sources, and the analyses, all in a manner in which details can be readily found.

Chapter headings are Orientations, Chemistry s Occupation and Profession, Chemical Education as Context, Chemical Industry as Context, A Second Look at Employment, and Chemistry as Discipline. The authors have succeeded admirably in the difficult task of making facts and figures tell an intriguing story of what has happened—and may happen—to American chemistry. To this end, numerous graphs and other diagrams are provided. Brief summaries, or "highlights", precede and focus attention on the discussions of the various aspects of chemistry. Thus we learn that the fraction of chemists in the nation's work force has increased by a factor of 7.5 over the century. However, although the conferral of chemistry degrees has grown exponentially, baccalaureates awarded annually in chemistry have dropped to roughly a hundredth of all such degrees. Although they still represent the largest disciplinary group among American industrial scientists, chemists have been a shrinking fraction of all scientists and engineers since 1950. Chemists have been appointed to deanships of American graduate schools more often than members of any other discipline. Yet despite the increase in the number of colleges and universities, the record decade for the appointment of chemists to permanent presidencies was 1910–1919!

This is a book to be read and then to be consulted—very frequently as a prime source by historians of chemistry. Practicing chemists are provided with an excellent means for the assessment of the progress, and possibly the future, of their profession. Most administrators realize that although history does not necessarily repeat itself, a scrutiny of the subject provides much guidance for the making of decisions. Here we have an excellently organized and nicely produced source that can provide such guidance.

John T. Stock, *University of Connecticut*

Polymer Science and Technology. Volume 28. Polymeric Liquid Crystals. Edited by A. Blumstein. Plenum Press: New York. 1985. xx + 457 pp. $75.00. ISBN 0-306-41814-2.

This 28th volume of "Polymer Science and Technology" originated in the Proceedings of the Second Symposium on Polymeric Liquid Crystals held in 1983 by the American Chemical Society, Division of Polymer Chemistry. The book comprises 28 chapters contributed by research workers active in the field. The first seven chapters (152 pages) deal with general consideration of mesophases, such as their optical appearance (texture, disclinations, etc.) and physical properties (order parameter, birefringence, X-ray diffraction, miscibility, rheology, etc.). The discussion includes examples of both monomeric and polymeric liquid crystals, introducing block copolymers with mesogenic elements in the backbone and flexible chains with mesogenic side chains. Taken together, the first seven chapters present a useful overview of many of the current research areas in polymer liquid crystals. With a few exceptions, the remaining chapters have more the character of research papers, covering a diverse variety of subjects. The next eight chapters (122 pages) deal with research on thermotropic main-chain mesogenic polymers, with considerable attention to the relations between molecular structure and physical properties (e.g., phase transition temperature, rheological behavior, morphology, etc.). Flexible chain polymers with mesogenic side groups are discussed in the next seven chapters (94 pages), with emphasis on optical properties of the mesophase domains formed by the side chains and the manipulation of the latter by external fields. Work on mesogenic polymer solutions is discussed in the final six chapters (102 pages), with emphasis on cellulosic chains and polypeptides. A subject index is included.

G. C. Berry, *Carnegie-Mellon University*

Polymers, Liquid Crystals, and Low-Dimensional Solids. Edited by N. March and M. Tosi. Plenum Press: New York. 1984. xx + 628 pp. $89.50. ISBN 0-306-41641-7.

According to the Preface, the origin of this book was in material presented at a course organized by the International Centre for Theoretical Physics, Trieste. The contents reflect this origin, being a somewhat unusual collection of topics, presented at various levels. Fourteen authors have contributed a total of eighteen chapters organized into four broad topics: Polymers, Liquid Crystals, Low Dimensional Solids, and Special Topics. The section on polymers (175 pages) includes introductory concepts on the molecular structure of polymers, the nature of crystallization in polymers and the morphology of the crystalline state (A. Keller), and a brief discussion of rheological properties important in polymer processing (G. Marrucci). The subjects covered represent some of the research interests of these well-known figures. The section on liquid crystals (108 pages) comprises chapters on the nematic, cholesteric, and smectic phases (S. Chandrasekhar) and on optical applications (G. Durand). The former includes well-organized examples from Chandrasekhar's monograph on the subject, along with some new material. The chapter on applications emphasizes optical effects that can be produced with electrical or thermal fields, without entering into technological details. The section on low-dimensional solids is the largest in the book (229 pages), containing five chapters, each by different authors. Subjects include the electronic structure of low-dimensional solids, e.g., linear polyenes and other chains, and layer compounds (N. H. March), an introductory discussion on phase transitions and dimensionality (R. B. Stinchcombe), the effects of electron correlation in the response of a many-electron system to external fields (S. Lundquist), space-charge layers (F. Stern), and some basic ideas on the theory of superconductivity (S. Strassler and P. Wyder). Although on related topics, the chapters of this section are not as interconnected as those in the preceding two sections. The final section, on special topics (100 pages), comprises a chapter on electronic phenomena in biopolymers, with some examples on possible mechanisms involving chemical carcenogens (J. Ladik, S. Suhai, and M. Seel), and a chapter on the relevance of topological defects to disordered systems, touching on several examples (J. Vannimenus). Altogether, the book covers an unusual assortment of topics, but it is a selection with evident scientific and technological interest, and the book should be useful to those intending to initiate research in the subjects covered.

G. C. Berry, *Carnegie-Mellon University*

Methods in Enzymology. Volume 109. Hormone Action. Part I: Peptide Hormones. Edited by Lutz Birnbaumer (Baylor College of Medicine) and Bert W. O'Malley (Baylor College of Medicine). Academic Press: New York. 1985. xxviii + 891 pp. $85.00. ISBN 0-12-182009-2.

This volume is the most recent of several devoted to hormones in the "Methods in Enzymology" series (see also Volumes 36–40, 99, and 102–103). This particular treatise covers the following major subjects: receptor assays, detection, and purification; cell fractionation techniques for internalized receptors; preparation of hormone-sensitive cells; assays for hormone effects (primarily second messenger systems); and the development of antibodies to both hormones and receptors. As the editors note, it is impossible to be comprehensive with such broad topics; however, there are two things I look for in such a techniques text: (1) an ample sampling of methods and (2) methods related to recent and exciting areas. This volume scores well on both counts.

An example of the former is the section on Receptor Assays, which includes a half-dozen different iodination methods, from the staple (chloramine T and lactoperoxidase) to the exotic (electrolytic iodination and iodine monochloride). An example of the latter is the section on Assays of Hormone Effects. Over half of this unit is devoted to techniques related to the polyphosphoinositide/calcium pathway, including assays for many of the metabolic enzymes in this pathway, phospholipid identification techniques, and assays for calcium channels and fluxes. Furthermore, the rationale, advantages, and limitations of most of the techniques are sufficiently well-discussed that the reader should be able to intelligently modify these assays to suit his particular needs.

As such, this volume is an essential addition to any university library and would also be a useful addition to the personal collection of investigators working in the above-mentioned areas.

Franklyn F. Bolander, Jr., *University of South Carolina*

Mechanisms of Inorganic and Organometallic Reactions. Volume 3. Edited by M. V. Twigg (Imperial Chemical Industries P.L.C.). Plenum Press: New York. 1985. xviii + 519 pp. $69.50. ISBN 0-306-4196-2.

The third volume in this admirable series, successor to the Royal Chemical Society's former "Specialist Periodical Reports on Inorganic Reaction Mechanisms", covers the literature period July 1982 through December 1983. In the editor's words its purpose is to provide a "critical review of the literature concerned with mechanistic aspects of inorganic and organometallic reactions in solution." This is accomplished in 15 chapters, for whose authorship Dr. Twigg has rounded up most of the usual suspects and several new ones. The great scope of the undertaking is evident in the size of the volume, its bibliography, and the reference density, which ranges between 2.9 per page (Kane-Maguire, Chapter 12) and 8.8 (Hague, Chapter 9).

The organization is similar to that of previous volumes. Part I treats Electron Transfer Reactions, beginning with an excellent summary by R. D. Cannon of developments related to Marcus formalism, other aspects of theory and related experimental studies, and also appropriately identifying the Nobel award to H. Taube as the "highlight" of 1983 in this field. Chapter 2 concerns redox reactions between metal complexes (A. G. Lappin) and contains 21 pages of tabulated rate constants. In the next chapter, on metal–ligand redox reactions (A. Bakác and J. H. Espenson), nonmetallic substrates of all kinds are included, regardless of coordination status, organized by their "central" elements.

Part 2, entitled Substitution and Related Reactions, begins with a chapter on the nonmetallic elements (N. Winterton), appropriately granted more space here than in previous volumes. The success of this chapter is notable in view of the immense literature covered (416 references). Substitution reactions of inert-metal complexes are covered in 4 chapters: coordination numbers 4 and 5 (R. J. Cross), in which Pd(II) and Pt(II) dominate; coordination numbers 6 and above, chromium (P. Moore); cobalt (R. W. Hay); and "other inert centers" (J. Burgess), principally low spin Fe(II) complexes and complexes of Ru(II), Ru(III), and Rh(III). The section concludes with a brief but action packed treatment of labile metal complexes (D. N. Hague).

Part 3 consists of 5 chapters on the Reactions of Organometallic Compounds, including substitution and insertion reactions (D. A. Sweigert); metal–alkyl bond formation and fission, oxidative addition and reductive elimination (M. Green); reactivity of coordinated hydrocarbons (L. A. P. Kane-Maguire); rearrangements, intramolecular exchanges, and isomerizations (A. J. Deeming); and homogeneous catalysis by complexes of metal ions (C. White).

The final section 4 is a valuable new feature introduced in recognition of the increasing use and importance of activation volume measurements in mechanistic elucidation. R. von Eldik has compiled a comprehensive tabulation of $\Delta V^{\ddagger}$ values for inorganic and organometallic reactions covering the literature period 1980 through 1983. More than 360 entries are included.

The standards of quality and thoroughness are high and uniform throughout the book. The readability factor is somewhat variable, at least partly in relation to reference density. Whether the volume qualifies as a "critical review" may be open to some question, considering the magnitude of coverage. While some authors provide occasional guideposts (e.g., Bakác and Espenson: "... the rate constants tabulated and the data depicted disagree numerically..."), and there are some suggestions that the critical objective has been sought by selection criteria (e.g., Green: "... genuine evidence for a mechanism and measurement of rate constants and activation parameters..."), the principal goal of providing a complete account of the literature for the review period has left the authors little scope for critical commentary. They have succeeded well in achieving comprehensiveness, and that is surely one of the most useful features of the volume. Again, this volume suffers from the inevitable tension between comprehensiveness and timeliness. It has appeared in just under 2 years from the close of the literature period, as fast as could be expected for such a carefully produced and attractive publication. The interval could be shortened only at some sacrifice in publication style, which might be worth considering if the book could also be offered at a less formidable price.

This series definitely represents an important and valuable service both for established workers and for new entrants to the field. The editor and authors are to be congratulated for their dedication in providing it.

Francis T. Bonner, *State University of New York at Stony Brook*

Pyridine–Metal Complexes. Volume 14. Part 6. By P. Tomasik and Z. Ratajewicz. Edited by G. R. Newkome and L. Strekowski. John Wiley & Sons: New York. 1985. xxiii + 2247 pages, in three volumes. $595.00. ISBN 0069-3154.

These three volumes represent Volume 14 (Part 6) in the series "The Chemistry of Heterocyclic Compounds", edited by A. Weissberger and E. C. Taylor. The authors have attempted to collect all known information regarding metal complexes of pyridine and pyridine *N*-oxides and in the process have attempted to produce the primary reference work in this area. From my examination of these volumes, it would appear that this goal has been attained. For each class of compound, the authors summarize all that is known about preparative methods, properties, and applications. Every chapter is extensively annotated with complete bibliographies.

The work is divided into seven chapters, each dealing with a different class of pyridine–metal complexes. These are the following: (1) Essentials of Coordination Chemistry; (2) σ-Pyridine Coordination Compounds with Nontransition Metals; (3) σ-Pyridine Coordination Compounds with Transition Metals; (4) Coordination Compounds of Metals with Pyridine-1-Oxides; (5) π-Coordination Compounds of Pyridines with Metals; (6) Pyridine Intercalation Compounds; and (7) Clathrates. As might be anticipated, the bulk of the information is associated with Chapter 3.

Each chapter largely consists of extensive tabulations of data. These tables are uniformly clear in their organization and extremely informative in their content. Each subject is arranged in a logical progression, and one may quickly extract desired information on a particular compound of choice. As such, the compilation is exceedingly useful as a reference source. The cost of the three volumes probably places these out of the reach of all except the independently wealthy, but they are essential to all libraries. Any investigator contemplating working with metal–pyridine complexes will need to begin his library work with these three volumes.

Harry G. Brittain, *The Squibb Institute for Medical Research*

Intermolecular and Surface Forces: with Applications to Colloidal and Biological Systems. By Jacob N. Israelachvili (Australian National University). Academic Press: London. 1985. xv + 296 pp. $65.00/£59.50. ISBN 0-12-375180-2.

The stated aim of this book is to provide a thorough introduction to the theories and concepts of intermolecular forces in order to increase appreciation of various short-range and long-range forces encountered in the disciplines of physics, chemistry, and biology. A multidisciplinary framework of understanding of intermolecular forces is adopted by the author in the three parts of the text. In part one, the interactions between atoms and molecules is discussed in eight chapters. The level of mathematical rigor is not great and the author provides sufficient examples of the concepts to enable even the relatively uninitiated to grasp the salient points.

In part two, the forces between particles and surfaces is discussed in six chapters and serves to explain the unifying concepts and contrasts between intermolecular, interparticle, and intersurface forces. Those interested in colloid science will find these chapters extremely helpful.

In part three, the intermolecular and surface forces in fluid-like structures namely, micelles, bilayers, and biological membranes are discussed in three chapters. The author provides a clear understanding of the thermodynamics of self association of amphipathic molecules found in biological systems.

The illustrations used in this text are really quite good and serve to amplify the discussion.

This text, aimed at first-year graduate students, demonstrates again how physical chemical concepts help to explain important biological phenomena. In the view of this reviewer, the author has succeeded in achieving the aim of the book.

D. Allan Butterfield, *University of Kentucky*

Heterocyclic Chemistry. Volume 4. Senior Reporters: H. Suschitzky and O. Meth-Cohn. The Royal Society of Chemistry: London. 1985. 466 pp. £95.00; $138.00. ISBN 0-85186-833-9.

This volume of the "Specialist Periodical Reports" series reviews the literature of heterocyclic chemistry, covering the period between July 1981 and June 1982.

The style and organization of the volume are the same as in previous volumes in this series. The chapter headings and subdivisions also remain unchanged.

The coverage of the literature is extensive but sometimes seems to be more devoted to the heterocyclic chemistry of sulfur than other elements (nitrogen for instance). The volume serves as an excellent starting place for the heterocyclic chemist in search of ideas and inspiration, the cited reaction schemes and accompanying references serving as an introduction to the heterocyclic literature. This reviewer found scanning the schemes to be the best way to "read" this volume, as the text does not lend itself to cover-to-cover reading.

As usual, with the "Specialist Periodical Report" series, this volume represents a job well done by the contributing reporters. However, also as usual, the cost of this volume precludes individual ownership, but research libraries should definitely not be without it.

James G. Davidson III, *Warner-Lambert Co.*

Advances in Low-Temperature Plasma Chemistry, Technology, Application. Volume 1. Edited by H. V. Boenig (The Research Institute of Plasma Chemistry and Technology). Technomic Publishing Co. Inc.: Lancaster, PA. 1985. vii + 377 pp. $55.00. ISBN 87762-373-2.

This is an edited book which consists of 17 papers presented at the IUPAC Sixth International Symposium on Plasma Chemistry, Montreal, Canada, July 24–28, 1983, and 9 review papers the editor has collected for this volume. The editor has devoted 177 pages for 3 reviews of his own on subjects of plasma deposition of organic thin films, of inorganic thin films, and of optical wave guides by plasma technology. Other review articles are essentially topical summaries of previous work by the respective authors, with little additional new information and/or interpretation. This book will provide a good coverage of references for scientists and engineers who are interested in this subject and also gives a general overview on what has been going on in this subject area in recent years. The title of "Advance In ...", however, is somewhat misleading. In spite of its volume in 377 pages, 26 articles by a total of 73 listed authors, some readers might find it difficult to locate new information which truely represent the state of the art and/or the advance of science and technology related to the subject.

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