(2) C. A. Fyfe, M. Cocivera, and S. W. H. Damji, *Acc. Chem. Res.*, **11**, 277 (1978).
(3) L. T. Muus, P. W. Atkins, K. A. McLauchlan, and J. B. Pedersen, Eds., "Chemically Induced Magnetic Polarization", Reidel, Dordrecht, 1977.
(4) (a) S. Schäublin, A. Wokaun, and R. R. Ernst, *Chem. Phys.*, **14**, 285 (1976); (b) *J. Magn. Reson.*, **27**, 273 (1977).
(5) Under the present operating conditions there is a 25-ms delay between the end of the saturation pulse and the laser flash. This delay arises because the laser charge cycle runs on the 60 Hz mains. Recovery of substrate and/or product signals during this interval is insufficient to exceed the noise level. This delay is in fact exploited by doping the solvent with protiobenzene (10% v/v)—enough signal recovery occurs to provide an internal reference (see Figure 2) allowing normalization of the CIDNP intensities.
(6) H.-G. Heine, W. Hartmann, D. R. Kory, J. G. Magyar, C. E. Hoyle, J. K. McVey, and F. D. Lewis, *J. Org. Chem.*, **39**, 691 (1974).
(7) Appropriate time-resolved CIDEP studies are also applicable to the separation of these processes.[3]

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Book Reviews*

Aspects of Degradation and Stabilization of Polymers. Edited by H. H. G. JELLINEK (Clarkson College of Technology). Elsevier, Amsterdam. 1978. 690 pp. $124.50.

Fourteen contributed chapters deal with the properties of polymers relevant to their stability and with their modes of breakdown. Emphasis is on technical applications. Specific topics include mechanical degradation, effect of degradation on mechanical properties, reaction of polymers with pollutant gases, ignition of polymers and flame propagation, degradation processes in ablation, biodegradation, and degradation kinetics.

The Structure of Non-Crystalline Materials. Edited by P. H. GASKELL. Crane, Russak & Co., New York. 1977. 262 pp. $37.50.

A handsomely printed quanto-size volume containing the Proceedings of the Symposium held in Cambridge, England, 20–23 September, 1976, organized by the Society of Glass Technology. Fifty contributed articles provide a timely panoramic view of the structure and properties of amorphous systems, both experimental and theoretical aspects. A contribution by Nobel laureate N. F. Mott reviews electronic processes in glasses.

High-Power Lasers and Applications (Springer Series in Optical Sciences). Volume 9. Edited by K.-L. KOMPA and H. WALTHER. Springer-Verlag, Berlin. 1978. ix + 228 pp. $24.00.

Proceedings of the Fourth Colloquium on Electronic Transition Lasers at Munich, June 20–22, 1977. The main topics are high-power VUV, UV, and visible and IR lasers, with applications to nonlinear optics, chemical kinetics, isotope separation, and spectroscopy.

The Reward System in British and American Science. By JERRY GASTON (Southern Illinois University). Wiley/Interscience, New York. 1978. xiii + 204 pp. $18.95.

Do scientists receive recognition commensurate with their scientific contributions, free from the influence of extraneous social and political factors? The author's study of 600 British and American University physicists, chemists, and biologists indicates that they are indeed fairly rewarded for their productivity, instances to the contrary being statistically insignificant. The most accessible indicators of productivity—which should surprise none of the readers of this Journal—are number of publications and number of citations. A couple of interesting tidbits: Scientists have mean IQ's well above average but, beyond this threshold, there is practically no correlation between IQ and achievement. Also, the later productivity of scientists appears to be substantially influenced by the recognition accorded their early work as new Ph.D.'s.

Coordination Chemistry. Volume 2 (ACS Monograph, No. 174). Edited by A. E. MARTELL (Texas A & M University). American Chemical Society, Washington, D.C. 1978. x + 636 pp. $90.00.

Volume 2 treats the kinetics and mechanisms of reactions involving coordination compounds whereas Volume 1 (ACS Monograph No. 168, published in 1971) was more concerned with physical and chemical properties. The Monograph contains three chapters: 1. Kinetics and Mechanisms of Complex Formation and Ligand Exchange (Margerum, Cayley, Weatherburn, and Pagenkopf); 2. Ligand Reactions—The Effect of Metal Complexes on Chemical Processes (Hipp and Busch); 3. Oxidation-Reduction Reactions of Coordination Complexes (Pennington). Chapter 1 focuses on the reactions of the more labile metal ions and their complexes in aqueous solution. Chapter 2 views the known metal-affected reactions from a structural and mechanistic standpoint. Chapter 3, a full-scale review of oxidation-reduction chemistry, includes recent innovations in excited state and intramolecular electron transfer.

Atlas of Metal-Ligand Equilibria in Aqueous Solution. By J. KRAGTEN (University of Amsterdam). Wiley/Halsted, New York. 1978. 781 pp. $77.50.

A volume in the Ellis Horwood Series in Analytical Chemistry. This atlas gives computer-generated plots of side-reaction coefficients vs. pH for some 45 metals in the presence of 29 common ligands. The graphs for separate metal-ligand combinations are superposable to provide information on mixed ligands. Accompanying plots of pM′ vs. pH show the regions of predominance of various species and indicate the conditions under which hydroxides will precipitate and polynuclear hydroxo complexes will form.

Ion-Selective Electrodes. Edited by E. PUNGOR and I. BUZAS. Elsevier, Amsterdam. 1978. iv + 613 pp. $75.00.

This volume contains the full text of papers presented at a conference held in Budapest, 5–9 September 1977. Seven plenary lectures covered recent trends in ion-selective electrode research, theoretical problems concerning the mechanism of electrode response, electrode construction and standardization techniques, and high-temperature applications. There follow some 48 discussion papers concentrating mainly on analytical applications of ion-selective electrodes. Topics discussed include transport characteristics and dynamical behavior of glass membrane electrodes, enzyme electrodes, liquid membrane electrodes, ion-exchanger electrodes, and incorporation of ion-selective electrodes into automated systems.

The Quest for Absolute Zero. 2nd Edition. By KURT MENDELSSOHN (Oxford). Wiley/Halsted Press, New York. 1977. 281 pp. $11.50 (paperback).

A charming account of the history of low-temperature research by an important contributor to the field. The book contains lucid semitechnical accounts of cryogenic techniques, thermodynamic and quantum principles near absolute zero, and the phenomena of superconductivity and superfluidity.

Chemistry and Physics of Carbon: A Series of Advances. Volume 13. Edited by P. L. WALKER, JR., and P. A. THROWER. Marcel Dekker, New York. 1977. viii + 295 pp. $32.50.

The volume consists of two chapters: The Optical Properties of Diamond (G. Davies) and Fracture in Polycrystalline Graphite (J. E. Brocklehurst). The effects of nitrogen impurities in diamond are considered in some detail. Author and subject indexes are appended.

Defects in the Alkaline Earth Oxides. By B. HENDERSON (Trinity College, Dublin) and J. E. WERTZ (University of Minnesota). Wiley/Halsted Press, New York. 1977. v + 159 pp. $20.00.

* Unsigned book reviews are by the Book Review Editor.

An update of the authors' 1968 review article in *Advances in Physics*. Two introductory chapters outline the requisite aspects of crystalline defects and of magnetic resonance and optical spectroscopy. Impurity, trapped hole, and electron excess centers are considered in detail. Applications to radiation damage and catalysis are discussed.

Physical Aging in Amorphous Polymers and Other Materials. By L. C. E. STRINK (Delft). Elsevier, Amsterdam. 1978. xiv + 229 pp. $39.95.

Aging plays a central role in the properties of the glassy state. The phenomenon must be taken into account in the synthesis and testing of commercial plastics. Existing testing and prediction methods are shown to be unreliable and new alternatives are suggested.

INTRODUCTORY BOOKS RECEIVED

Chemistry. By J. C. BAILAR, JR. (University of Illinois), T. MOELLER (Arizona State University), J. KLEINBERG (University of Kansas), C. O. GUSS (University of Nevada, Reno), M. E. CASTELLION (Stamford, CT), and C. METZ (Indiana-Purdue, Indianapolis). Academic Press, New York. 1978. xxiv + 908 pp. $16.95.

Chemistry. By J. W. MOORE, W. G. DAVIES, and R. W. COLLINS (Eastern Michigan University). McGraw-Hill, New York. 1978. xii + 804 pp. $17.50.

Chemical Problem Solving Using Dimensional Analysis. By R. NAKON (West Virginia University). Prentice-Hall, Englewood Cliffs, N.J. 1978. xi + 288 pp. $6.98 (softcover).

Concepts in Biochemistry. 2nd Edition. By W. K. STEPHENSON (Earlham College). Wiley, New York. 1978. 152 pp. $7.95 (softcover).

BOOKS RECEIVED

Noble Gas Compounds. A Bibliography: 1962–1976. By D. T. HAWKINS, W. E. FALCONER (Bell Laboratories), and N. BARTLETT (University of California, Berkeley). Plenum Press, New York. 1978. ix + 179 pp. $45.00.

G. C. Applications Library 1959–1975. Varian Associates, Sunnyvale, Calif. 1977. x + 1089 pp. $350.00.

Contains the entire Varian gas chromatography file listing over 50,000 references including articles, papers, and books.

Kirk-Othmer Encyclopedia of Chemical Technology. 3rd Edition. Volume 2 (Alkoxides, Metal *to* Antibiotics, Peptides). Wiley/Interscience, New York. 1978. xxv + 1036 pp. $120.00.

The Modern Inorganic Chemicals Industry. Edited by R. THOMPSON. The Chemical Society, London. 1977. xviii + 466 pp. $16.00 (paperback).

Chemical Engineering. 3rd Edition. Volume 1. By J. M. COULSON (Newcastle-upon-Tyne) and J. F. RICHARDSON (University College, Swansea). Pergamon Press, Oxford. 1977. xiii + 449 pp. $15.00 (paperback).

Revised and updated edition using SI units.

Chemical Engineering. Volume 4. By J. M. COULSON and J. F. RICHARDSON. Pergamon Press, Oxford. 1977. vii + 207 pp. $9.50 (paperback); $15.50 (hardcover).

Solutions to problems in Volume 1.

Organic Electronic Spectral Data. Volume XIII. Edited by J. P. PHILLIPS, D. BATES, H. FEUER, and B. S. THYAGARAJAN. Wiley/Interscience, New York. 1977. xv + 1172 pp. $48.75.

Turbulence. 2nd Edition. Topics in Applied Physics. Volume 12. Edited by P. BRADSHAW (Imperial College of Science and Technology, London). Springer-Verlag, Berlin. 1978. x + 339 pp. $19.80.

Hot Melt Adhesives. 3rd Edition. By D. L. BATEMAN. Noyes Data Corp., Park Ridge, N.J. 1978. xiv + 494 pp. $42.00.

Ash Deposits and Corrosion due to Impurities in Combustion Gases. Edited by R. W. BRYERS. Hemisphere Publishing Corp., Washington, D.C. 1978. xii + 691 pp. $44.50.

Energy Conservation in Heating, Cooling and Ventilating Buildings: Heat and Mass Transfer Techniques and Alternatives. Volumes 1 and 2. Edited by C. J. HOOGENDOORN and N. H. AFGAN. Hemisphere Publishing Corp., Washington, D.C. 1978. xii + 901 pp. $79.50 (two-volume set).

Molecular Structure: Its Study by Crystal Diffraction. The Chemical Society Monographs for Teachers. No. 30. By J. C. SPEAKMAN (University of Glasgow). The Chemical Society, London. 1977. iii + 53 pp. $2.40 (paperback).

Fundamentals of Aerosol Science. Edited by D. T. SHAW (State University of New York, Buffalo). Wiley/Interscience, New York. 1978. ix + 372 pp. $27.50.

Text of six invited papers at the Symposium on Aerosol Science and Technology, Atlantic City, N.J., 30 Aug–1 Sept 1976.

Heraclitean Fire. Sketches from the Life Before Nature. By ERWIN CHARGAFF (Columbia University). Rockefeller University Press, New York. 1978. 260 pp. $13.00.

Autobiography and commentaries on contemporary science and life by the discoverer of base-pairing in DNA.

Anglo-American and German Abbreviations in Science and Technology. Part 1. A–E. By PETER WENNRICH. Bowker, New York. 1976. vii + 607 pp. $?

German-English Science Dictionary. 4th Edition. By L. DE VRIES and L. JACOLEV. McGraw-Hill, New York. 1978. xxxviii + 628 pp. $14.50.

Contains a section offering suggestions to translators on German grammar and syntax.

Thermal Effluent Disposal from Power Generation. Edited by Z. P. ZARIČ. Hemisphere Publishing Corp., Washington, D.C. 1978. viii + 375 pp. $40.00.

Chemical Principles for Life. By LOIS W. FORNEY (Harrisburg Community College). Prentice-Hall, Englewood Cliffs, N.J. 1978. xv + 574 pp. $12.95 (softcover).

Organic and Biological Chemistry. By J. R. HOLUM (Augsburg College). Wiley, New York. 1978. xxii + 494 pp. $14.95.

Heat Transfer and Turbulent Buoyant Convection. Volumes 1 and 2. Edited by D. B. SPALDING and N. AFGAN. Hemisphere Publishing Corp., Washington, D.C. 1977. xiv + 837 pp. $75.00 (two-volume set).

Twenty Lectures on Thermodynamics. By H. A. BUCHDAHL (Australian National University). Pergamon Press, New York. 1975. vii + 106 pp. $12.50 hardcover; $7.50 paperback.

Ion Chromatographic Analysis of Environmental Pollutants. Edited by E. SAWICKI, J. D. MULIK, and E. WITTGENSTEIN. Ann Arbor Science Publishers, Inc., Ann Arbor, Mich. 1978. vi + 210 pp. $28.00.

Thermophysical Properties of Matter. Supplement to Volume 6. Specific Heat, Nonmetallic Liquids and Gases. By Y. S. TOULOUKIAN and T. MAKITA (Purdue University). Plenum, New York. 1976. xii + 157 pp. $29.50.

Compilation of specific heat data for some 307 liquid and gaseous substances.

Parameter Estimation in Engineering and Science. By J. V. BECK and K. J. ARNOLD (Michigan State University). Wiley, New York. 1977. xix + 501 pp. $24.95.

Statistics for Experimenters. By G. E. P. BOX, W. G. HUNTER (University of Wisconsin), and J. S. HUNTER (Princeton University). Wiley, New York. 1978. xviii + 653 pp. $23.95.

An introduction to design, data analysis, and model building.

Chemists by Profession. The Origins and Rise of the Royal Institute of Chemistry. By C. A. RUSSELL, N. G. COLEY, and G. K. ROBERTS (Open University). Humanities Press, Inc., Atlantic Highlands, N.J. 1978. x + 342 pp. $21.50.

Account of the development of the chemical profession in Britain from 1800 to the present.

Farbenlehre und Farbenmessung. 3rd Edition. By WERNER SCHULTZE. Springer-Verlag, Berlin. 1975. 97 pp. $13.20 (paperback).

Introduction to Semimicro Qualitative Analysis. 5th Edition. By C. H. SORUM (University of Wisconsin) and J. J. LAGOWSKI (University of Texas). Prentice-Hall, Englewood Cliffs, N.J. 1977. x + 309 pp. $8.95 (paperback).

Biochemical Principles of the Use of Xylitol in Medicine and Nutrition with Special Consideration of Dental Aspects. Experientia Supplementum 30. By K. K. MÄKINEN (University of Turku, Finland). Birkhäuser Verlag, Basel. 1978. 160 pp. SFr 40.00.

Substitution of sucrose by xylitol in the diet is reported to cause an impressive reduction in the incidence of dental caries in human subjects.

The Self-Splitting Atom. The History of the Rutherford-Soddy Collaboration. By T. J. TRENN (University of Regensburg). Taylor & Francis Ltd., London. 1977. xii + 175 pp. £6.00.

Spectres d'Absorption Ultraviolets de Composés Organique Azotés et Correlations Spectrochimiques. Volume 1. By P. GRAMMATICAKIS (Université Paris VI). Technique et Documentation, Paris. 1977. 107 pp. 120 F.

Contains some 1250 spectra obtained by the author.

Structure Électronique des Elements de Transition. By PAUL CARO (CNRS). Presses Universitaires de France, Paris. 1976. 204 pp. $? (paperback).

Microscope Technique. A Comprehensive Handbook for General and Applied Microscopy. By W. BURRELLS. Wiley/Halsted Press, New York. 1977. xi + 574 pp. $25.00.

Method and Appraisal in the Physical Sciences. Edited by COLIN HOWSON (London School of Economics). Cambridge University Press, New York. 1976. vii + 344 pp. $24.50.

Collection of essays on the critical background to modern science, 1800-1905.

Chemical Equilibrium. A Practical Introduction for the Physical and Life Sciences. By W. B. GUENTHER (University of the South). Plenum, New York. 1975. xiii + 248 pp. $19.80.

Interesting Aspects of Marine Natural Products Chemistry. Tetrahedron Report No. 28. By D. J. FAULKNER (Scripps Institution). Pergamon Press, New York. 1978. 23 pp. $11.00.

Outliers in Statistical Data. By V. BARNETT (University of Sheffield) and T. LEWIS (University of Hull). Wiley, New York. 1978. xi + 365 pp. $39.95.

A survey of statistical methods for handling deviant or exceptional experimental data.

Modern Methods in Partial Differential Equations. By M. SCHECHTER (Belfer Graduate School of Science). McGraw-Hill, New York. 1977. xii + 245 pp. $28.50.

Advances in Biochemical Engineering. Volume 6. New Substrates. Edited by T. K. GHOSE, A. FIECHTER, and N. BLAKEBROUGH. Springer-Verlag, Berlin. 1977. 127 pp. $24.90.

Advances in Polymer Science. Volume 22. Physical Chemistry. Springer-Verlag, Berlin. 1977. 153 pp. $28.20.

Advances in Polymer Science. Volume 25. Polymer Chemistry. Springer-Verlag, Berlin. 1977. 187 pp. $38.70.

Reactivity and Structure Concepts in Organic Chemistry. Volume 3. d-Orbitals in the Chemistry of Silicon, Phosphorus and Sulfur. By H. KWART and K. KING. Springer-Verlag, Berlin. 1977. vii + 220 pp. $39.60.

Reactivity and Structure Concepts in Organic Chemistry. Volume 4. Phase Transfer Catalysis in Organic Synthesis. By W. P. WEBER and G. W. GOKEL. Springer-Verlag, Berlin. 1977. xv + 280 pp. $29.80.

Structure and Bonding. Volume 21. Recent Impact of Physics on Inorganic Chemistry. Edited by J. D. DUNITZ, P. HEMMERICH, R. H. HOLM, J. A. IBERS, C. K. JORGENSEN, J. B. NEILANDS, D. REINER and R. J. P. WILLIAMS. Springer-Verlag, Berlin. 1975. 144 pp. $25.00.

Structure and Bonding. Volume 25. Rare Earths. Springer-Verlag, Berlin. 1976. 154 pp. $30.40.

Structure and Bonding. Volume 27. Bonding Forces. Springer-Verlag, Berlin. 1976. 217 pp. $26.30.

Structure and Bonding. Volume 31. Bonding and Compounds of Less Abundant Metals. Springer-Verlag, Berlin. 1976. 111 pp. $17.30.

Structure and Bonding. Volume 33. New Concepts. Springer-Verlag, Berlin. 1977. 214 pp. $34.10.

Topics in Current Chemistry. Volume 61. Physical and Chemical Applications of Dyestuffs. Springer-Verlag, Berlin. 1976. 187 pp. $27.90.

Topics in Current Chemistry. Volume 65. Theoretical Inorganic Chemistry II. Springer-Verlag, Berlin. 1976. 153 pp. $22.20.

Topics in Current Chemistry. Volume 71. Inorganic Chemistry, Metal Carbonyl Chemistry. Springer-Verlag, Berlin. 1977. 190 pp. $31.80.

Topics in Current Chemistry. Volume 72. Medicinal Chemistry. Springer-Verlag, Berlin. 1977. 157 pp. $29.50.

Determination of Liquid Water Structure. Coordination Numbers for Ions and Solvation for Biological Molecules. Lecture Notes in Chemistry. Volume 2. By ENRICO CLEMENTI (Istituto Guido Donegani, Novara, Italy). Springer-Verlag, Berlin. 1976. vi + 107 pp. $7.40 (paperback).

Topological Approach to the Chemistry of Conjugated Molecules. Lecture Notes in Chemistry. Volume 4. By A. GRAOVAC, I. GUTMAN, and N. TRINAJSTIC (Rugjer Bošković Institute, Zagreb). Springer-Verlag, Berlin. 1977. vii + 123 pp. $8.30 (paperback).

A General SCF Theory. Lecture Notes in Chemistry. Volume 5. By R. CARBO and J. M. RIERA (University of Alberta). Springer-Verlag, Berlin. 1978. xii + 208 pp. $12.50 (paperback).

Robert Boyle and the English Revolution. By J. R. JACOB. Burt Franklin and Co., New York. 1978. 240 pp. $18.95.

"Robert Boyle and the English Revolution", one of the series, "Studies in the History of Science", will be appreciated most by those who already know a lot about Robert Boyle (1627-1691) and 17th-century-English history. There is little if any discussion of Boyle's famous experiments with the air pump and Boyle's law is not mentioned.

The author shows how Boyle's thinking was influenced by the profound changes that occurred in mid-17th-century England. As a result of these changes Boyle and some of his contemporaries became atomists and experimentalists and went on to found the Royal Society. Boyle was, if for no other reason than being the son of the Earl of Cork, a member of an aristocracy which looked on experimental science as something that in their set would scarcely pass. The changes made by the English civil wars allowed Boyle to break with the assumptions of the old aristocracy, thus permitting him to justify using his great intellectual gift to obtain useful knowledge from the study of nature.

David H. Kenny, *Michigan Technological University*

Quantum Pharmacology. By W. G. RICHARDS (Oxford). Butterworths, London. 1977. xiii + 213 pp. $24.95.

The stated aim of this book is to provide an introduction for two sets of experts (medicinal chemist/pharmacologist and theoretical chemist) into the field of the other, or a newcomer into both. The book is divided into four independent parts. Part I on Molecular Pharmacology focuses almost entirely on neuro-transmission and the associated chemical agents. Following a brief overview of the nervous system and pharmacological methods, the remaining chapters in this section are devoted to broad overviews of the pharmacology of acetylcholine, catacholamines, histamine, central nervous system transmitters, and drugs and anesthetics. The treatment in each area is selective and presented with structure-activity relationships (SARs) in mind. Part II of the book consists of the barest of introductions (ca. 50 pp) to

molecular quantum mechanics. Part III presents applications of "theory to experiment" and contains chapters on conformation, solvation, receptor mapping, and activity correlations. The treatment is illustrative and noncritical in each area. Part IV is an annotated bibliography complete through 1976 chronologically arranged by compound. While titles are not included, a brief (three to four words) capsule statement is usually provided regarding the content of the reference. This section may be the most valuable part of the book, providing as it does a convenient route into the literature.

On balance there is probably more in Parts I and II for the theoretical chemist interested in pharmacology than for the pharmacologist interested in applied theoretical chemistry. Parts III and IV, being completely noncritical, are probably best used as a route the primary literature. The research scientist could probably profit by reading the book and then moving on to the more detailed and critical literature in the field. The newcomer, however, may be left with an uneasy feeling as to why so much has been published in the primary literature in the field and yet so little said about it in this book.

Gordon L. Amidon, *University of Wisconsin*

Lead-Acid Batteries. By H. BODE (VARTA). John Wiley & Sons, New York. 1977. xviii + 387 pp. $29.00.

Bode's treatment of lead-acid batteries is at a level which requires at least graduate level education and/or a sound background in battery technology. If a reader had no previous concept of what a lead-acid battery looks like, the reader's conception would hardly be improved at the completion of the book.

The first quarter of the book is a detailed treatment of the physical and chemical properties of lead compounds relevant to lead-acid batteries and the thermodynamic properties of sulfuric acid. There follows a 53-page treatment of thermodynamics and kinetics of electrochemical reactions which is of general value since most of the principles developed can be applied to many electrochemical couples.

The author also treats extensively the physical properties of mixtures of lead dust and water (pastes) and shows how these properties are influenced by material ratios and the physical characteristics of the starting lead dust. Unfortunately, the effect of a third ingredient, sulfuric acid, which is fundamental to paste preparation, is only briefly touched upon.

The last third of the book, which includes discussions of formation and battery performance, is generally excellent. However, the statement that "mixing and curing processes must be carried out so that only tribasic sulfate will form" (p 221) is an oversimplification. This and other statements must be knowledgably analyzed by the reader.

The concluding section on life expectancy is superficial. However, this subject is so complex that it by itself can appropriately be the subject of a book. The bibliography is comprehensive.

R. V. Biagetti, *Bell Telephone Labs*

Comprehensive Chemical Kinetics. Volume 17. Gas Phase Combustion. Edited by C. H. BAMFORD and C. F. H. TIPPER. Elsevier, Amsterdam. 1977. xiii + 519 pp. $111.00

Combustion chemistry is one of the most ancient of our subdisciplines. Anyone coming forth to describe comprehensively even a small part of the chemistry of combustion processes, here gas-phase combustion mechanisms, should then be expected to provide a great deal of long-established knowledge together with his report on discoveries of recent years. So it is with the present volume.

First a short overview of the contents. Half of the book is devoted to a very detailed and up-to-date review of the combustion reactions of H_2 and CO, by G. Dixon-Lewis and D. J. Williams. Hydrocarbon combustion is then described in 100 pages by R. T. Pollard; 60 pages are dedicated to aldehyde combustion chemistry, described by D. J. Dixon and G. Skirrow; and the volume is completed by a 160-page survey of the gas-phase combustion chemistry of virtually everything else by J. A. Barnard.

Second a brief statement about what is not included. Nothing is said about the combustion chemistry of real-world fuel mixtures such as producer gas or gasoline, and one will have to look elsewhere for information about pollutant formation in combustion processes. The influence of transport effects—diffusion, convection, and thermal conductivity—which play very important roles in combustion processes is mentioned only peripherally. Radiation from flames, ionization in flames, and soot formation in flames are not discussed. Finally, emphasis is given (except in the first contribution) to combustion chemistry at relatively low temperatures, where "bulb" experiments provide most of the chemical information, and not in the higher temperature regimes where most practical combustion occurs. A considerable amount of recently acquired insight into the faster processes which occur above say 1000 K is thus omitted.

This volume is nonetheless correctly described as comprehensive in the areas of combustion chemistry which are included. The authors are experts and their reports are fairly complete and completely fair where controversies exist. The great amount of chemical detail that is provided sets this work by itself between the research literature and the sketchy descriptions of combustion chemistry that are provided in traditional or recent treatises covering all of combustion science. Readers who are interested in finding out what is known in the areas covered and in being shown the current research scene are well served by this book.

W. C. Gardiner, Jr., *University of Texas*

Chemistry and Control of Enzyme Reactions. By K. G. SCRIMGEOUR (University of Toronto). Academic Press, New York. 1977. xvi + 633 pp. $47.90.

The readers of this Journal will appreciate this book. Those of us whose research interests are in biochemistry, but who teach only chemistry, often miss some aspects of enzymology. This book is reasonably comprehensive, yet contains detailed examples of selected subjects, and contains many references to the original literature. Thus, it serves as a convenient source for literature on experiments and theories which are known to us, but for which references are not in hand.

While this is not an all-inclusive reference for the experienced enzymologist, it is especially well suited for students beginning in enzymology or for chemists interested in entering the field. I shall recommend it to my students and will undoubtedly refer to it for literature references.

George Glover, *Texas A&M University*

Principles of Pyrometallurgy. By C. B. ALCOCK (University of Toronto). Academic Press, New York. 1976. xiii + 348 pp. $19.25.

The book is divided into three parts: (I) Solid State Processes, (II) Metal Extraction Reactions Producing Liquid or Gaseous Metals, (III) Metal Refining Processes. Part I deals with the principles of reactions involved in ore preparation with particular emphasis on the thermodynamics and kinetics of reactions in roasting, sulfation, chlorination, and sintering. Some basic aspects of rate phenomena and transport properties of gases and solids, including defect structures, are mentioned in a condensed form. Part II gives the basic outline of the thermodynamics and kinetics of gas-slag, slag-metal, and gas-matte reactions, oxidation-reduction reactions, and electrolysis of molten salts. Examples are given to familiarize the reader with basic features of processes for reduction and smelting of iron ores and sulfide concentrates, and halogen treatment of reactive metals. Part III on metal refining gives a brief account of steelmaking, refining of zinc, lead and zirconium, and electrical methods of refining. In discussing these processes, the author describes some aspects of the thermodynamics of metallic solutions, slags, mattes, and molten salts, and the process of diffusion in these systems.

The basic principles of thermodynamics, kinetics, and rate phenomena relevant to pyrometallurgy are presented in different parts of the book as deemed appropriate for different phases of the process metallurgy. The thermodynamics of metallurgical systems and the kinetics of high-temperature reactions are presented with sufficient simplicity that students with basic knowledge of physical chemistry should easily grasp the significance of the role played by the physical sciences in pyrometallurgy. However, certain areas of pyrometallurgy are treated much too lightly as, for example, the reduction of metal oxides, steelmaking, and deoxidation reactions. On the other hand, the author has made a reasonable presentation of the basic aspects of roasting and treatment of sulfide concentrates. This is a good textbook for a course in materials science, engineering, or metallurgy. The fields of process metallurgy and pyrometallurgy are presented in a form that will arouse the interest of the student and guide his research.

E. T. Turkdogan, *U.S. Steel Research Laboratory*