

Book Reviews

Techniques of Electrochemistry, Volume 3. Edited by ERNEST YEAGER (Case Western Reserve University) and ALVIN J. SALKIND (CMDNJ—Rutgers Medical School). John Wiley & Sons, Inc., New York. 1978. x + 495 pp. \$28.00.

This third volume in the series continues the stated goal of describing experimental techniques that are currently in use in modern electrochemistry. However, this particular volume leans very heavily toward industrial electrochemistry with contributions from many of the well-known names in electrochemical engineering: Theodore R. Beck (Industrial Electrolysis), James Hoare and Mitchell La Boda (Electrochemical Machining), Dennis Turner and Jacques Pankove (Semiconduction Applications), Ralph Brodd and A. Kozawa (Primary Batteries), Gerald Halpert, James Doe, and Alvin J. Salkind (Secondary Batteries), Dodd Carr (Electrodeposition), and Irving Miller (Desalination of Water). Accordingly, workers in the fundamental areas of electrochemistry will find this volume of only limited value, whereas those who are concerned with the application of electrochemistry to industrial processes should welcome this issue as a valuable source of information on electrochemical techniques.

This book, like many others, has its high and low points. On the high side are the economic aspects of electrochemical machining discussed by Beck in Chapter I and the reasonably lucid discussion of electro-dialysis by Miller in Chapter VII. The definition for pH stated on p 402, $\text{pH} = 1/\log [\text{H}^+]$, is a good example of a low point, although the reviewer assumes that this indiscretion arises from insufficient proof-reading by the author. Furthermore, examination of the references included at the end of each chapter reveals that, except for the chapter by Halpert et al., the literature reviewed is no later than 1974 (Chapter IV contains one reference to 1976). This is unfortunate, since in the reviewer's opinion the lack of more up-to-date information detracts from the overall value of the volume.

Digby D. Macdonald, *SRI International*

Function and Biosynthesis of Lipids, Advances in Experimental Medicine and Biology, Volume 83. Edited by N. G. BAZÁN, R. R. BRENNER, and N. M. GIUSTO. Plenum Press, New York. 1977. xii + 646 pp. \$59.50.

This volume contains the proceedings of the International Symposium on Function and Biosynthesis of Lipids held November 1976, at Sierra de la Ventana, Argentina. The conference was organized by the Argentine Biochemical Society and cosponsored by the International Union of Biochemistry and the Pan American Association of Biochemical Societies.

The proceedings are divided into four parts. The first part, entitled "Lipid Involvement in the Biogenesis of Membranes", is divided into a section on the Biosynthesis of Fatty Acids and a section on Biogenesis and Organization of Cellular Membranes. The eleven papers in the first section present reports on the biosynthesis of saturated and unsaturated fatty acids in brain and tumoral cells. Several papers discuss regulation, particularly regulation of desaturation. The nine papers in section two discuss the composition and assembly of membrane components and lipid interactions with proteins and enzymes. Specific examples include the influence of the lipid environment on the properties of rhodopsin in photoreceptor membranes, role of phospholipids in sodium potassium ATPase activity, and lipid composition and calcium transport function of the sarcoplasmic reticulum during development in vivo and in vitro. Lipid metabolism during development in insects and the composition and metabolism of phospholipid during early stages of vertebrate embryonic development are discussed also.

Part Two consists of six papers on glycosphingolipids—gangliosides. It contains new information as well as reviews of current concepts on the structural specificity, biosynthesis, and function of glycosphingolipids. Biosynthesis of gangliosides and sialoglycoproteins in the bovine retina, the possible presence of psychosine in the brain, and the effects of brain gangliosides on reinnervation of fast-twitch rat skeletal muscle illustrate the breadth of Part Two.

Eighteen papers appear in Part Three which is entitled Lipids In

Neurotissue. These papers are divided into a section on the biosynthesis and turnover of lipids in neurotissue and a section on the function of lipids in neurotissue. This part examines the various aspects of biosynthesis, turnover, and function of lipids in the central nervous system and in the retina. Transformations of the polyunsaturated fatty acids in the brain, significance of base exchange reactions, and biosynthesis of complex lipids such as prostaglandins and thromboxans by nervous tissue are discussed. Also examined is the latest progress achieved in the study of phosphatidylinositol biochemistry. In addition, the significance of lipids in transmitter release and in receptors is analyzed.

Nine papers dealing with enzymology and the role of fatty acids in human nutrition, diet, brain, developing retina, and testis complete the book.

The types of papers presented in this book range from survey-type papers to those papers presenting recent data on lipid metabolism and function in a variety of tissues and organisms. The most recent references are selected from 1977. The book should be of interest to a variety of scientists. It should be quite informative to those scientists who have looked on lipid biochemistry as being somewhat less important than the biochemistry of proteins, carbohydrates, and nucleic acids. The chapter on the asymmetric composition of plasma membranes is just one illustration of the highly complex nature of plasma membranes and the importance of lipids in membrane structure and function.

The conference provided a forum for several researchers to summarize their work of many years. These papers are interesting and valuable. It also provided the opportunity for other exciting results to be presented such as S. L. Bonting et al.'s report on the influence of the lipid environment on the properties of rhodopsin in photoreceptor membrane, B. W. Agranoff's report on approaches to the biochemistry of regeneration in the central nervous system, H. Weigand's report on structural specificity of gangliosides, M. Hokin-Neaverson's report on metabolism and role of phosphatidylinositol in acetyl-stimulated membrane function, and L. S. Wolfe et al.'s report on the biosynthesis of prostaglandins and thromboxanes by nervous tissue.

Richard L. McCarl, *The Pennsylvania State University*

Rare Gas Solids, Volume 2. Edited by M. D. KLEIN (National Research Council, Canada) and J. A. VENABLES (University of Sussex, England). Academic Press, New York. 1977. xiii + 643 pp. \$50.75.

This second part of the book on noble gases is a logical continuation of the first volume. Whereas the first volume was essentially theoretical, the second volume contains certain experimental procedures and data.

The first chapter, appropriately numbered Chapter 11, deals with crystal growth and crystal defects. Because of the importance of crystal properties of noble gases in understanding crystal theory, in general, and crystal structure theory, in particular, the usefulness of this chapter is beyond noble gases.

The chapters on melting, vaporization, and sublimation; thermal and elastic properties at low pressure; high pressure and thermodynamics; and thermal conductivity are reasonably comprehensive and up to date and describe various models and experimental techniques.

The chapter on neutron scattering is a rather brief review of the subject. The Doppler-shifted scattering of monochromatic light as a result of interaction with thermal waxes (Brillouin spectroscopy) is discussed in Chapter 16 and in the Appendix. The reader will appreciate Appendix B for a clear description of Brillouin zones and band structure notation.

The last three chapters deal with dielectric and optical properties, electronic transport properties, and point defects and diffusion.

The interest of the authors and editors in the theoretical aspect of the subject is clearly evident in both volumes of the book. Noticeably absent from both volumes is any reference to radon. Because of its radioactive nature, experiments with condensed radon are difficult,

if not impossible. Because these two volumes are largely theoretical, one would have liked at least a short discussion on radon.

The two volumes have been prepared with a great deal of care. Clearly the authors and editors are leaders in this field.

This reviewer was amused by the dedication of the book "to the wives, lovers and other sources of inspiration . . ." Are there many other scientific books dedicated to the lovers of the authors?

A. Alan Moghissi, U.S. Environmental Protection Agency

The Chemistry of Nonaqueous Solvents. Volume V.B. Acidic and Aprotic Solvents. Edited by J. J. LAGOWSKI (University of Texas). Academic Press, New York. 1978. xvi + 360 pp. \$36.50.

This is the last volume of the ambitious undertaking, started in 1965, covering the chemistry of nonaqueous solvents. As pointed out in the foreword, because of difficulties in obtaining manuscripts in chronological order, the logical sequence of the topics to be presented in these volumes could not always be followed. However, such an outline is given in the preface.

The present volume contains chapters on trifluoroacetic acid, halosulfuric acids, the inter-halogens, inorganic halides, and oxyhalides as solvents, as well as molten salts as nonaqueous solvents. The coverage and quality of the chapters differ widely. For example, the chapter on halosulfuric acid discusses in detail superacids derived from fluorosulfuric acid and their chemistry. In contrast, in the chapter on inorganic halides and oxyhalides as solvents, only antimony trihalides are discussed, and widely used antimony pentafluoride, as well as antimony pentachloride, is not even mentioned. The same is true about the up-to-dateness of the covered literature. Whereas, in most chapters, a thorough job was done, the mentioned chapter on "inorganic halides and oxyhalides as solvents" contains practically no references after 1970, and by any standards must be considered exceedingly outdated. Despite inevitable shortcomings of differing approaches and thoroughness in coverage in different chapters, the book is of great value. The editor must be congratulated on having completed a project of this proportion, providing what obviously will be for a long while to come a definitive treatise of wide use to everybody interested in nonaqueous solvents. It is only regrettable that the inevitably exorbitant prices of chemical monographs will limit the availability of this series mostly to libraries and not to the desk of the practicing chemist.

George A. Olah, Hydrocarbon Research Institute
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Ganglioside Function: Biochemical and Pharmacological Implications. Edited by GIUSEPPE PORCELLATI (University of Perugia, Perugia, Italy), BRUNO CECCARELLI, and GUIDO TITAMANTI (University of Milan, Milan, Italy). Plenum Press, New York-London. 1976. ix + 306 pp. \$29.50.

This volume (Volume 71 in the Advances in Experimental Medicine and Biology series) is the proceedings of the International Satellite Meeting on Biochemical and Pharmacological Implications of Ganglioside Function held in Italy, 1975. It is a comprehensive review of recent advances in the field of gangliosides. It consists of seventeen contributed papers, most of which appear to be reports of original research, which are divided in four sections: Chemistry and Biochemistry, Functional Biochemistry, Toxins, and Experimental Pathology and Pharmacology. In addition to providing detailed information of separation, biosynthesis, degradation and functions of these very complex biological molecules throughout the volume, a chapter is devoted to the finger-printing of gangliosides using mass spectrometry. The major strength of this volume rests in its organization of multidisciplinary approach to this subject. Although this volume offers only limited interest to chemists, it would provide excellent review of gangliosides for graduate students and researchers interested in biochemistry and functions of these complex molecules.

Mulchand S. Patel, Case Western Reserve University

Inorganic and Nutritional Aspects of Cancer. Advances in Experimental Medicine and Biology. Volume 91. Edited by G. N. SCHRAUZER (La Jolla). Plenum Press, New York. 1978. xi + 351 pp. \$32.50.

The book is divided into four parts: Carcinogenesis by Inorganic Compounds and Minerals; Metal Compounds in Chemotherapy and Related Topics; Nutrition and Trace Elements in Cancer; and Trace Elements and Nutrition in Cancer Prevention. A major asset of this book is that it brings together under one cover the thinking of many

current cancer researchers with a wide diversity of backgrounds. Likewise there was considerable diversity in the scope of chapter coverage, some of the chapters being truly broad in scope with others being very narrowly confined. For one seriously interested in the subject matter, the book should prove to be a valuable beginning due to the well-documented historical treatments in many of the chapters. The editor has even given a summary report of the book's content (*Bioinorganic Chemistry*, 7, 359 (1977).) A reading of the latter report combined with the current review should enable the potential reader to decide on the merits of the book for her/his purposes.

This reader was disappointed that there was not more chemistry, *per se*, in most of the papers. While this deficiency may be due to the primitive state of the art, it is nevertheless a deterrent to the book's appeal to chemists. Notable exceptions of this general observation are to be found in the chapters devoted to beryllium, asbestos, and infidelity in DNA synthesis in Part I, and to noble metal complexes in cancer chemotherapy, potential carcinostatic activity of metal complexes, antitumor virus activity of Cu-binding drugs, and reactions of copper complexes with ehrlich cells in Part II. These chapters, along with the one on arsenic, are likely to be of most interest to chemists.

Overall the book has accomplished a major objective in focusing national attention on one very important arena of cancer research heretofore neglected, namely, the role of trace elements in both causation and prevention of cancer.

David Pennington, Baylor University

Scattering of Light by Crystals. By WILLIAM HAYES and RODNEY LOUDON. Wiley-Interscience, New York. 1978. x + 360 pp. \$27.50.

This attractively prepared volume presents a theoretical treatment (supported by careful descriptions of many experimental results) of most of the major effects observed in the inelastic scattering of light by crystals. Each topic is begun at an elementary level, accessible to a student who has already had some slight introduction to light scattering and solid-state physics. By referring the reader to other sources for detailed derivations and extensive literature reviews on specialized topics, this relatively slim work is still able to discuss more subtle refinements, such as the corrections to the fluctuation-dissipation theorem due to Bose-Einstein statistics. Macroscopic (continuum) and microscopic (quantum mechanical) descriptions are used interchangeably, depending on the particular problem being considered.

While the title of the work refers only to light scattering, each of the appropriate chapters actually develops the relevant parts of solid-state theory before treating scattering effects; consequently, the book may usefully be read by those without an advanced knowledge of solid-state physics. Indeed, much of the volume is really a treatment of the physics of crystals, with problems being selected to the extent that light scattering has proven a useful experimental tool for their study. References are primarily to publications from 1976 and before, though a few footnotes with 1977 and 1978(!) dates speak highly for the speed of publication. The book has appreciable historical depth, with direct references to classical experiments and to long-settled disputes, such as the Born-Raman controversy over the nature of second-order scattering in nonpolar crystals.

Chapter 1 discusses the theory of light scattering. Arranging the usual scattering calculation around the wavevector of the induced polarization density rather than around the scattering vector (the wavevector of the fluctuation doing the scattering) gives some novel insight into the theory. Chapter 2 presents a brief description of lasers, spectrometers, and detectors, including some general experimental considerations. Chapters 3 and 4 discuss nonpolar and polar vibrational scattering, including first- and second-order nonpolar scattering and polar scattering in crystals of different symmetry. Chapter 5 considers scattering near structural phase changes, using as exemplary systems quartz, BaTiO₃, and KH₂PO₄. Chapter 6 treats scattering from para-, ferro-, and antiferromagnetic crystals, as well as magnetic defect scattering. Chapter 7, on Raman scattering by electrons, considers local states, such as those due to impurities, and also conduction electrons, both in the plasma and single-particle regimes. Chapter 8, Rayleigh and Brillouin scattering, includes a short discussion of scattering from liquids and gasses as well as the use of light scattering to measure elastic constants.

The volume is written in international system (SI) units with scattering formulas usually being grouped so as to permit ready conversion to cgs units. Comments on the desirability of converting

entirely to SI units would not here be appropriate. However, in a field in which line shifts are universally (including this volume) reported in cm^{-1} , the use of m^{-1} as the units for reciprocal crystal lattice spacings seems perhaps not entirely fortunate. The scope of coverage, the extensive references to other reviews, and the comparatively modest price should make this well-written book a useful addition to private as well as public libraries.

George D. J. Phillies, *University of Michigan, Ann Arbor*

Non-Isothermal Reaction Analysis. By E. KOCH (Institut für Strahlenchemie im Max-Planck-Institut für Kohlenforschung). Academic Press, London-New York-San Francisco. 1977. 607 pp. \$62.50.

This is a specialized monograph for those wishing to use the techniques of thermal analysis to characterize reactions. The several advantages and limitations of this technique for the evaluation of chemistry are detailed. The book is couched in elegant and elevating terms which may be appreciated only by the expert and yet may not mask the appreciation of the methods and evaluation by the interested reader. Much of the early portions of the book corresponds to a review of established information such as the rationales for the method provided through the first three chapters. Beyond the Introduction, Chapter 2 covers the temperature dependence of chemical reactions, and Chapter 3 covers nonisothermal reaction kinetics, with more complex processes covered in Chapter 4. Subsequently, "differential thermal analysis as a universal method for reaction analysis" is covered along with the application of the technique to studies in solution. The book concludes with a useful chapter on "Summary and Outlook".

This text will be important for the specialist in thermal studies of chemical processes.

Roger S. Porter, *University of Massachusetts*

Base-Catalyzed Reactions of Hydrocarbons and Related Compounds. By HERMAN PINES (Northwestern University) and WAYNE M. STALICK (George Mason University). Academic Press, New York. 1977. xi + 587 pp. \$57.00.

A massive amount of detailed data from nearly 1000 cited references is presented in the text and in numerous tables and equations of this work. The information is largely of a practical nature with minor attention to mechanism, principles, or broad generalizations. The organization of the material into 14 chapters is on the basis of reactant structure (olefins, aromatics, pyridines, etc.) or reaction type (hydrogenation, dehydrogenation, oxidation, etc.). The chapters vary greatly in length, from 92 pages on the Isomerization of Olefins to 6 pages on Dehydration of Alcohols. Coverage of the literature is through 1976.

Calvin D. Ritchie, *State University of New York at Buffalo*

Transient Techniques in Electrochemistry. By D. B. MACDONALD (SRI International). Plenum Publishing, New York. 1977. viii + 323 pp. \$37.50.

It was the author's intention, as expressed in the fly-leaf description, to present a discussion of transient techniques in electrochemistry suited to graduate-level courses with enough new material to interest the professional electrochemist. With a topic as specialized as this one is, these intentions should be within the scope of a single text. Unfortunately, the accomplishment falls well short of the intention. As a textbook, it might provide companion and supporting material for a

course in electroanalytical chemistry, although the price may deter most graduate students from purchasing it. The specialist engaged in research in electroanalytical chemistry will not find this book to be a necessary addition to his library. It could at best be regarded as a supplement to Vetter's classic "Electrochemical Kinetics", in that coupled chemical/electrochemical reactions and a.c. impedance techniques are given expanded treatment in Macdonald's text. However, the professional electrochemist will find this book lacking in the rigor and precision one expects in the presentation of well-known material. There is some discussion of experimental methods and apparatus for transient techniques, but in essence the book is an encyclopedic presentation of solutions to Fick's law of diffusion for various time-dependent boundary conditions, the boundary condition corresponding to the experimental control applied, e.g., potentiostatic, galvanostatic. The presentation is made in an uncritical manner, such that all methods appear to be equally applicable to any number of electrochemical reactions, which, of course, they are not. Relatively few, if any, proven applications of these methods to real examples are discussed in detail, although some references to detailed studies are given. In places, extended derivation is given for a trivial problem, e.g., the Cottrell equation for potentiostatic decay, while conceptually important material is only quoted from the literature, e.g., the explanation for faradaic rectification. In general, the belabored and often redundant mathematics and the inadequate discourse severely handicap the use of this book by anyone unfamiliar with this specialty.

Philip N. Ross, Jr., *Lawrence Berkeley Laboratory*

Colorimetric Determination of Nonmetals. Second Edition. Edited by D. F. BOLTZ, (deceased) and J. A. HOWELL (Western Michigan University). John Wiley & Sons, New York. 1978. xvii + 543 pp. \$33.95.

This book, Volume 8 in the series "Chemical Analysis", is a collection of colorimetric methods for the determination of traces of nonmetals, consisting of 12 chapters written by specialists in the field. All the common nonmetals are covered except arsenic. Each chapter has an introduction discussing recent developments in the determination of that element, and most chapters have sections dealing with separations, methods, and applications, respectively. The experimental sections provide the reader with detailed procedures of analysis. In addition to determination of the element, its determination in many of its most common compounds (NH_3 , NO_3^- , NO_2^- , NO_2 for nitrogen, e.g.) is discussed in the application section.

The authors have collected an extremely large group of colorimetric assays, and references to the literature are extensive. There are, however, few references more recent than 1975; most have been taken from papers published during the period from 1950 to 1965.

The omission of methods for arsenic is perhaps the most serious criticism of the book, in view of its importance and toxicity, and the wide use of colorimetric methods in its determinations.

In summary, this is a good laboratory reference. It is well written with few typographical errors. The sections dealing with specific applications, particularly with reference to current environmental problems, should be especially useful. This volume represents a large amount of work by the authors and editors and it provides the reader with a comprehensive outlook of colorimetric analysis of the nonmetals.

Jack T. Spence, Wayne B. Robbins, *Utah State University*