Book Reviews*

Methods of Surface Characterization. Volume 1: Vibrational Spectroscopy of Molecules on Surfaces. Edited by J. T. Yates, Jr. (University of Pittsburgh), and T. E. Madey (National Bureau of Standards). Plenum Press: New York and London. 1987. xvi + 468 pp. $75.00. ISBN 0-306-42505-X.

This excellent book contains an extremely helpful collection of history, literature citations, current theory, and current and predicted practice about this important subject. The series, currently planned for four volumes, is intended "to assist newcomers to the field" with the hope "that the series will also be of value to more experienced workers." This first volume is intended "to bring together in one place a discussion of the major methods used to measure vibrational spectra of surfaces species" with emphasis "on basic concepts and experimental methods rather than a current survey of the extensive literature in this field." The editors and authors have largely achieved these commendable goals and, as an additional benefit to the newcomer, have generated a useful entry into the extensive literature in the field.

Chapter 1 (Normal Modes at Surfaces by N. V. Richardson and N. Sheppard, 73 references) deals with vibrational degrees of freedom for surfaces, introduces symmetry properties to generate surface selection rules, and presents a number of interesting and enlightening examples of applications of symmetry arguments to known faces of single crystals.

Chapter 2 (Excitation Mechanisms in Vibrational Spectroscopy of Molecules on Surfaces by J. W. Gadzuk, 116 references) introduces five experimental methods (IR, SERS, EELS, IETS, INS) to be treated in detail in subsequent chapters, presents excitation mechanism for vibrations using both photons and particles (electrons and neutrons), and discusses the information content of experimental line shapes.

Chapter 3 (Infrared Spectroscopy of High-Area Catalytic Surfaces by A. T. Bell, 39 references) emphasizes experimental techniques for the three primary methods (transmission, diffuse-reflectance, photoacoustic) and includes sample preparation, cell designs, and spectrometers with a comparison of Fourier-transform and dispersive spectrometers.

Chapter 4 (Inelastic Electron Tunneling Spectroscopy by P. K. Hansma, 106 references) introduces the principles of the method via an informative analogy to water flow from holes at different heights in a storage tank, describes typical apparatus and calibration, presents warnings about artifacts and other problems, discusses the theory for data interpretation, and concludes with nice examples of the method's use (model catalysts, corrosion) and a comparison with other techniques (IR, Raman, EELS).

Chapter 5 (Incoherent Inelastic Neutron Scattering: Vibrational Spectroscopy of Adsorbed Molecules on Surfaces by R. R. Cavanagh, J. J. Rush, and R. D. Kelley, 68 references) presents the case for neutron scattering and the fundamental physics of neutrons scattering, introduces the experimental methods (spectrometers, sample preparation and cells, data acquisition) and the analysis of data, and gives illustrative examples of the dynamics of hydrogeneous species (hydrogen, hydrocarbons) chemisorbed on high surface-area catalysts.

Chapter 6 (Electron Energy Loss Spectroscopy by N. R. Avery, 31 references) describes the EEL spectrometer (selectors, monochromator, analyzer), construction materials and methods, and power supplies, presents important procedures for operating an EEL spectrometer and handling samples, and discusses the application of time-resolved EELS to surface reaction intermediates and kinetics.

Chapter 7 (Reflection Absorption Infrared Spectroscopy by B. E. Hayden, 137 references) begins with the general principles of the reflection absorption phenomenon for metals, considers the details of the reflection absorption experiment (optical configuration, sources, monochromators and interferometers, modulation, detection), gives interesting examples of important applications (selection rules and adsorbate geometry, fingerprinting, coverage-dependent frequency shifts, line shapes, intensities), and concludes by looking ahead for improvements to extend the available frequency range to further utilize the two great advantages of RAIRS (high-resolution and pressure insensitivity).

Chapter 8 (Raman Spectroscopy by A. Campion, 92 references) introduces SERS and multichannel surface Raman spectroscopy without enhancement and classical and quantum mechanical theory for the Raman process, presents experimental considerations based on the nature of electromagnetic fields at surfaces as relevant to the interaction with visible photons, describes instrumentation (lasers, sample configuration, conventional detection, multichannel detection), gives examples of multichannel surface Raman spectra without enhancement (single crystals, high surface area materials), describes mechanisms for surface-enhanced Raman scattering and presents applications of SERS, and concludes with predictions about advances in techniques and new experiments.

Chapter 9 (Infrared Spectroscopy of Adsorbates on Metals: Direct Absorption and Emission by P. L. Richards and R. G. Tobin, 75 references) raises the question of measuring small signals superimposed on large backgrounds, reviews some aspects of infrared technology (sources, photon noise, detectors, spectrometers), describes direct absorption infrared spectroscopy at low temperatures (2 K) where the sample itself is used as a bolometric infrared detector and gives results from the instrument developed and their interpretation, presents a description of the results obtain from a dispersive spectrometer maintained at low temperatures (~5 K) to study emission from samples at temperatures up to 310 K, and suggests additional improvements and experiments.

The first two chapters provide a sound basis for the remaining ones. The authors and editors have done a fine job in coordinating the material so the individual chapters tend to reinforce one another. Thus, the reader gains an appreciation of how the different experimental methods are related and what the relative strengths and weaknesses are. The importance of combining the spectroscopic methods with other methods of surface characterization is properly emphasized. A person who has grasped the ideas presented should be prepared to make intelligent choices of the method or combination of methods appropriate for a particular investigation.

The inevitable minor typographical errors are present (G. Herzberg's name is misspelled in reference 73 on page 342) but do not detract from the value of the book. It is awfully nice to have all this information collected in one place. Newcomers to the field and more experienced workers alike will enjoy reading this book and may want to add it to their personal libraries.

Robert M. Hammaker, *Kansas State University*

Advances in Molten Salt Chemistry. Volume 6. Edited by G. Mamantov, C. B. Mamantov, and J. Braunstein. Elsevier Science Publishers: Amsterdam and New York. 1987. xii + 350 pp. $118.00. ISBN 0-444-42822-4

This is the most recent volume in the successful, longstanding *Advances in Molten Salt Chemistry* series. This series has a reputation for providing high quality, carefully edited, comprehensive reviews of established topics in the field of molten salt chemistry. Volume 6 of this series continues this reputation. This book is divided into four chapters covering diverse and important topics such as ionic mobilities in molten salts, industrial processes for the production of aluminum and magnesium from molten salts, and organic and organometallic reactions in molten media. Contributors to this volume include A. Klemm of the Max-Planck-Institute for Chemistry, J. Thonstadt of the Norwegian Institute of Technology, G. J. Kipouros and D. R. Sadoway of the Massachusetts Institute of Technology, and R. M. Pagni of the University of Tennessee.

The chapter on ionic mobilities by Klemm overlaps with a previous article that he contributed to *Molten Salt Chemistry*, edited by M. Blander, which was published in 1963. However, the majority of the literature citations in the present contribution postdate this earlier chapter. Like the previous article, the bulk of this new chapter consists of detailed discussions about the various aspects of internal and external mobilities of single salts and mixtures of salts. In addition, Klemm discusses experimental techniques for measuring external mobility ratios and provides numerous references to experimental results. A brief discussion about self-diffusion coefficients appears at the end of the chapter.

Thonstadt provides a comprehensive review of the Hall–Heroult process for the electrolytic production of aluminum. Topics that are covered include the general properties of the sodium fluoride–aluminum fluoride based molten salt system that serves as the electrolyte for the Hall–Heroult process, the solubilities of aluminum and aluminum carbide in this electrolyte, and the physical and transport properties of various $NaF-AlF_3$ molten mixtures containing different additives, especially Al_2O_3. The anode and cathode reactions and the current and energy efficiency associated with Hall–Heroult cells are covered in additional sections of Thonstadt's chapter. A brief discussion about the electrolytic

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*Unsigned book reviews are by the Book Review Editor.

refining of aluminum from aluminum chloride based molten salts (Alcoa Smelting Process) also is provided.

Kipouros and Sadoway give a detailed review of the electrolytic and thermochemical reduction methods used for the industrial production of magnesium. The section covering electrolytic methods includes subsections describing cell feed preparation for the hydrous (Dow Chemical) and anhydrous (I. G. Farben–Norsk Hydro–VAMI) methods, the physicochemical properties of the electrolyte, the characteristics of industrial electrolysis cells, and the mechanism of magnesium electrodeposition. Carbothermic, metallothermic, and other non-electrolytic reduction methods for producing magnesium from magnesium oxide as well as a brief discourse on flux chemistry are covered in another section.

Pagni's extensive chapter, which is concerned mainly with organic reactions, is organized into sections that are based on different classes of molten salts and nonionic melts. The systems that are covered include molten aluminum chloride based solvents, pyridine hydrohalide molten salts, ammonium and phosphonium salt melts, nitrate and nitrite melts, alkali and alkaline earth salts, antimony trichloride melts, and solvents based on molten zinc, copper, iron, or tin chlorides. A small section at the end of the chapter is devoted to organometallic reactions.

In keeping with the preceding volumes of the *Advances in Molten Salt Chemistry* series, the chapters that appear in this volume are written primarily for scientists and engineers with experience in the field of molten salts. However, for the most part, these contributions are not couched in specialized language that would seriously deter a determined reader with a technical background. Copious literature references accompany each chapter.

Charles L. Hussey, *University of Mississippi*

Carbohydrate Chemistry. Volume 18, Part I. Mono-, Di-, and Trisaccharides and Their Derivatives. Edited by N. R. Williams (Birkbeck College, University of London), Senior Reporter. A Specialist Periodical Report. Royal Society of Chemistry: London, 1986. x + 284 pp. $94.00. ISBN 0-85186-202-0.

Volume 18 of the Specialist Periodical Reports on Carbohydrate Chemistry (Part I) provides a comprehensive review of the literature published during 1984 on all aspects of the chemistry of monosaccharides and lower oligosaccharides. As in the previous volumes of this series, the material is extremely well organized and constitutes an invaluable bibliographic source in carbohydrate chemistry. Of the 24 chapters of the book, three deal with free sugars, glycosides, and oligosaccharides, fourteen with derivatives (acetals, esters, etc.) and modified sugars (e.g., amino-sugars, deoxy-sugars, branched-chain sugars, alditols), two with carbohydrate-containing natural products and related materials (antibiotics, nucleosides), and three with structural and analytical methods in carbohydrate chemistry (e.g., NMR, chromatography). The final chapter is of particular interest to synthetic organic chemists since it covers the applications of carbohydrates as chiral precursors for the synthesis of enantiomerically pure non-carbohydrate compounds.

As the previous ones since Volume 15, this issue has been prepared from camera-ready originals, with neatly handwritten structures and a uniform format throughout the book. Remarkably few mistakes were detected: a missing or a misplaced group in structures has been noted occasionally. Thus, without lessening the quality and the appearance of the material, the delay of publication of the series has been considerably reduced and the price of each issue is now in a reasonable range. A high standard of clarity and thoroughness of reporting is maintained throughout the issue, in an order that should constitute a model for the organization of the carbohydrate literature. It is regrettable that the future of this series is threatened by low sales and it is strongly hoped that all of the chemists interested in some aspects of carbohydrate chemistry will continue to recognize the indispensable nature of the "Carbohydrate Reports" and support their publication.

Olivier R. Martin, *SUNY-University Center at Binghamton*

Advances in Chemical Physics. Volume 68. Edited by I. Prigogine (University of Brussels and University of Texas) and S. A. Rice (University of Chicago). John Wiley and Sons: New York. 1987. ix + 386 pp. $89.95. ISBN 0-471-84901-4.

This 68th volume of the series maintains the superb quality of review article that chemical physicists and physical chemists throughout the world have come to associate with it. In this volume the photophysics of internally twisted molecules, the kinetics of ionized gases, and charged-particle interactions in radiation tracks are developed in three well-organized chapters. A common feature of all three is the articulation of formalisms which enable the detailed treatment of dynamics of excited-state evolution and energy dissipation. The inadequacy of conventional concepts, such as the Born–Oppenheimer approximation which uncouples nuclear and electronic motions, and the Boltzmann equation based on molecular chaos, is particularly evident when applied to the systems considered in these articles.

The first article, making up about 45% of the total volume, is based on 234 references and considers the effect of vibrational relaxation during fluorescence. The decay of photoexcited dimethylaminobenzonitrile (DMABN), planar in its ground state and twisted 90° in the most stable singlet excited state, appears to typify the competitive electronic and vibrational relaxation pathways accessible to internally rotating (twisting) excited molecules. E. Lippert, W. Rettig, and V. Bonačic̄-Kouteckȳ, of the Free and Technical Universities in Berlin, are joined by their colleagues F. Heisel and J. A. Miehē, in Strasbourg, in presenting both the experimental and theoretical aspects of these adiabatic photoreactions, known as TICT (twisted intramolecular charge-transfer) mechanisms.

This article reviews the effects of solvent and rotational barrier height on the fluorescence decay kinetics from the initially prepared (Franck–Condon) excited state and the vibrationally relaxed (twisted) one, leading to the unusual "dual" fluorescence phenomena characterized mainly by the work of Grabowski. A theoretical framework based upon a stochastic description of the chemical events leading from the excited state is developed, which incorporates both Markov chains and Kramers approach to non-Markov processes. The temperature and time dependence of experimental rate constants can thus be rationalized.

The second article, on reactions in ionized plasmas, is by Y. L. Klimontovich (Moscow State University), D. Kremp (Rostock, DDR), and W. D. Kraeft (Greifswald, DDR). It includes 37 references, makes up about 20% of the volume, and is basically a theoretical framework for describing the quantum-statistical properties of a many particle system whose interactions deviate strongly from ideality. That is, the classical Boltzmann picture replying on molecular chaos is inadequate when the particles react (i.e., join a "bound state") and interact with long-range Coulombic forces.

The early kinetic theory of Leontovich, which uses a "composite particle" approach, is the starting point for these three authors. Here, the initial correlations between a group of elementary particles make up the composite, and the kinetic theory of fluctuations is used to model chemical reactions far from equilibrium. Binary density matrices and operators are the detailed formalisms used to develop the kinetic theory of "non-ideal" gases and "bound states".

Perhaps the greatest difficulty faced by practicing kineticists will be the identification of the individual terms in the density fluctuations and collision integrals with the empirical rate expressions for inelastic scattering, recombination, and ionization. Such gaps must clearly be closed before the full potential of the theory can be realized.

The third and final article, by I. G. Kaplan and A. M. Markov (Karpov Institute of Physical Chemistry, Moscow), deals with radiation-track reactions both in a generalized sense and in various media, but most frequently condensed ones. It has a reference base of 375 citations, making it quite comprehensive by nearly any standard. In some respects the interaction of charged particles with real molecules could be formally described by methods outlined in the previous review, but in practice, radiolysis has evolved along a different pathway.

Perhaps the greatest difference between radiation chemistry and partially ionized gases is the energy and time scale of the initiating act in radiolysis. Here it is pointed out that high energy deposition, producing secondary charged particles which in turn cause further ionization, is a first phase. The later physical and chemical stages are effectively relaxations of the medium as the track evolves.

This review summarizes the current state of thinking about these phases of the radiation process, including initial excitation (scattering cross-sections, oscillator strengths, stopping power) and Monte Carlo simulation of track structure in the sub picosecond time domain, which is presently experimentally inaccessible. Despite the inadequacy of knowledge of the elementary event cross sections in condensed phases, this simulation (and a comparison of its predictions with measurables on longer time scales) appears to be the currently accepted method of understanding the early events.

This excellent volume will serve workers in the fields of photochemistry, radiation chemistry, and plasma physics extremely well.

Howard D. Mettee, *Youngstown State University*

Handbook of Organic Chemistry. Edited by John A. Dean (Emeritus, University of Tennessee at Knoxville). McGraw-Hill Book Company: New York. 1987. xiv + 957 pp. $64.50. ISBN 0-07-016193-3.

This handbook should be a valuable reference for any practicing organic chemist. In my opinion, there is no question that it lives up to the description given in the preface as "...a one-volume source of factual information designed specifically for organic chemists." The wealth of data and general information that it contains is available from other sources, but the format in this book makes the information much easier to find than in most of the other "old standard" laboratory reference books. The Table of Physical Constants of Organic Compounds (312 pp) is organized such that I found it much easier to locate compounds than is possible in other similar reference tables. The tables of properties of inorganic elements and compounds are more extensive than I would have expected for a handbook of organic chemistry.

The useful summary of organic nomenclature includes some recent changes in IUPAC rules which have not made their way into many standard organic texts. The Periodic Table inside the front cover may bother some of the folks who want to see the 1 to 18 group numbering system adopted for everything, since this table uses one of the older systems.

There are chapters on thermodynamic properties of compounds; properties of atoms, radicals, and bonds; and physicochemical relationships. The chapter on spectroscopy includes sections on photoluminescence, electron-spin resonance, and ionization potentials. The sections on reference electrodes and electrode potentials were not expected, but they can be useful. A chapter on laboratory manipulations includes tables of cooling mixtures; humidification and drying; separation methods and McReynold's constants. The chapter on polymers, rubbers, fats, oils, and waxes contains much more information in the 74 pages than I had expected. The sections in this chapter on polymers and rubbers are very clear and concise summaries of the properties of a wide variety of these materials. The final chapter contains miscellaneous tables, including a table of conversion factors. I cannot remember when I last needed to convert "apostib" to "candela per square meter", but I now know where to find the conversion factor.

Overall, my impression of this handbook is very favorable. I am sure that it will be very handy in the lab because of the information it contains and, also, because it is a much more convenient size than some of the "old standards".

Roy D. Pointer, *Bloomsburg University*

Nuclear Magnetic Resonance Spectroscopy: A Physicochemical View. By Robin K. Harris (University of Durham). Longman Scientific & Technical: Essex, England. 1986. xx + 260 pp. $29.95 paper. ISBN 0-582-44653-8.

With the diversity of current applications for NMR spectroscopy, and the recent concomitant increase in the number of NMR text books, finding a book that can serve as a comprehensive text for an introductory course is exceptionally important. This book serves that purpose well and is to be highly recommended for that use, as well as to the individual reader seeking an introduction to the physical basis of NMR phenomena.

It begins with chapters that describe single-particle behavior, both classical and wave-mechanical (Chapters 1 and 2). This includes sections on angular momentum operators, which clearly describe nuclear (and electron) spin transitions. These chapters are supplemented by two appendices (3, 4) whose topics are time-dependent perturbation theory and tensor properties. The reader can emerge from these sections with a strong sense for the foundation of the basic solution-state NMR experiment. Chapter 3 further describes characteristics of solution NMR: relaxation phenomena, the Bloch equations, pulse NMR, measurement of T_1 and T_2, spin locking and $T_{1\rho}$. Chapters 4 and 5 describe dipolar interactions, chemical exchange, and quadrupolar effects. Chapters 3–6 are quite nicely done, with ample illustration. All of these chapters provide pertinent literature references for more inquiring minds.

Chapter 6 provides an introduction to solid-state NMR. The topics discussed include magic-angle spinning, second moments, and how motion affects relaxation times, shielding anisotropy, cross-polarization, and multiple pulse methods. This chapter is a welcome inclusion, and one that is not usually covered in introductory texts. Nevertheless, with the increasing number of publications involving solid-state NMR, it is very important to develop a basic understanding of these methods in the general population of chemists. These topics are supplemented by an appendix (5) that explains the effects of rapid sample spinning.

The final two chapters involve special pulse sequences (Chapter 7) and a detailed discussion of the origin of chemical shifts and coupling constants (Chapter 8). Chapter 8 seems somewhat out of order and would more properly fit earlier in the book. Chapter 7 provides a well-illustrated introduction to spin-echoes and the dynamics of coupled spins immediately after $\pi/2$ pulses. The APT and INEPT are described and accompanied by spectral examples. An introduction to 2-dimensional NMR follows, with examples of 2D-J resolved methods and the COSY experiment. If there is one unsatisfying aspect of the book, it is the relatively brief treatment of 2D NMR. For example, the emerging importance of NOESY experiments to solution structures is not mentioned at all, despite the fact that the elementary spin dynamics required to understand the phenomenlogical basis for the nuclear Overhauser effect were adequately provided in Chapter 4.

Overall, this is an excellent book for a one-semester introduction to NMR spectroscopy. It is complete and well written, with ample illustrations and example spectra. It provides a good guide for lectures on basic phenomena and is a sound basis from which the lecturer can depart to more detailed descriptions of myriad topics. All of the required jargon is included and explained, as are pulse timing diagrams and (where applicable) illustrations of spin behavior in the rotating frame of reference. Readers of this book will find themselves competent to understand articles published in the *Journal of Magnetic Resonance.*

James D. Satterlee, *University of New Mexico*

Electron Transfer Reactions in Organic Chemistry. Reactivity and Structure Concepts in Organic Chemistry. Volume 25. By L. Eberson (University of Lund, Sweden). Springer-Verlag: Berlin, Heidelberg, New York. 1987. xiii + 234 pp. $77.50. ISBN 3-540-17599-7.

This is a book that all organic chemists should have, whether or not they themselves are directly concerned with electron-transfer reactions. For some years, now, Lennart Eberson has been trying to educate us, in review articles and in his own research work, about the role that electron transfer has in organic chemistry. Coupled with this chemical evangelism is Eberson's belief that organic chemists have neglected the use and importance of Marcus theory in properly understanding electron-transfer reactions. Again, in this regard, he has tried to provide teaching in his reviews [*Adv. Phys. Org. Chem.* **1982**, *18*, 79–185. *Adv. Free Radical Biol. Med.* **1985**, *1*, 19–90]. Now, he has enlarged the scope of his treatment of Marcus theory and electron transfer in organic reactions in this timely and much needed book.

The book consists of 12 chapters and an epilogue. It is worth listing the chapters by title to give the reader of this review some idea of the book's content: 1. Electron Transfer, a Neglected Concept in Organic Chemistry. 2. Concepts and Definitions. 3. Theories of Electron Transfer in Organic Chemistry. 4. How to Use Marcus Theory. 5. Experimental Diagnosis. 6. Reactions Between Organic and Inorganic Non-Metallic Species. 7. Reaction Between Organic and Metal-Ion Species. 8. Electron Transfer Between Organic Species. 9. Electricity and Light-Promoted ET. 10. Electron-Transfer Catalyzed Reactions. 11. ET and Polar Mechanisms; How Are They Connected. 12. Applications of Outer-Sphere Electron Transfer.

Chapters 3 and 4 bear on what is written above. Apart from a very brief introduction of the single-electron-shift concept (Pross and Shaik), these chapters are designed to teach us about Marcus theory: what it is and how to use it. Eberson's treatment is very readable and should be extremely useful for inclusion, for example, in courses in physical organic chemistry. The "How to" chapter is particularly helpful, with examples of application from the literature, such as in Kochi's innovative work with organometals. Here, the reader learns, for example, about reorganization energy, its connection with structural changes in the process of electron transfer, and its bearing on the likelihood that electron transfer can occur.

The book is not a long one. Consequently, no chapter is very long and insofar as the remaining chapters are concerned, this means that treatment of subject matter is rather brief. Some readers may be disappointed in the brevity. Lengthy expositions of particular types of electron-transfer reactions or reactions over which controversy on electron transfer exists, with numerous examples, are not to be found. Instead, brief descriptions are given of notable types of reaction in which electron transfer has been proposed and/or validated, and these Eberson often evaluates in terms of Marcus theory. A notable example is carbanions as ET reductants (3.5 pages) followed by alkyllithiums and Grignard reagents as ET reagents (4 pages). In the chapter on electron-transfer catalysis, one finds brief descriptions of the $S_{RN}1$, $S_{RE}2$, $S_{OE}1$, and $S_{ON}2$ mechanisms, and in each case the reader will have to go to the more extensive literature if a fuller appreciation of those reactions is to be had. ET-catalyzed cycloaddition receives fuller treatment, while ET-catalyzed additions of dioxygen, cycloreversions, rotations around bonds, and reactions of organometallics are short and enough only to whet one's appetite. Chapter 11 is pleasing in its analysis of the question of electron transfer in aromatic substitution and S_N2 reactions. Again, the treatment is brief, but succinct.

Such is the growth of research in electron-transfer reactions, that nearly all of the chapters have a note or notes of latest relevant works added in proof.

In the epilogue Eberson sobers us up in case we have become tipsy with the idea that outer-sphere electron transfer is going to be the "be all and end all" of organic reactions. He says: "as the work proceeded, it gradually dawned upon me that outer-sphere processes involving organic species presumably are better characterized as steps taking place when no other mechanistic pathways are available, than as automatically occurring when standard free-energy change and reorganization energy are favourably disposed toward outer-sphere ET." "Thus, outer-sphere ET is actually the energetically least favoured pathway in any encounter between two species D and A, and it often takes some extra features to lead a reaction into this direction." The book is an enjoyable account of these extra features and the role of electron transfer in organic reactions.

A reviewer is not necessarily supposed to comment on price, but this reviewer regrets that the price of this book probably puts it out of the hands of all but libraries and research-grant holders. Especially regrettable is the fact that few students are likely to be able to afford it.

Henry J. Shine, *Texas Tech University*

Römpps Chemie Lexikon. Eighth revised and enlarged edition. Volumes 3, 4, and 5. Edited by O. A. Neumüller. Franckh'sche Verlagshandlung: Stuttgart. 1983 (Vol. 3), 1985 (Vol. 4), 1987 (Vol. 5). Volume 3: 854 pp. DM 195. ISBN 3-440-04513-7. Volume 4: 800 pp. DM 195. ISBN 3-440-045-14-5. Volume 5: 853 pp. DM 195. ISBN 3-440-04515-3

The previous two volumes of this remarkably useful work were reviewed in 1982 (*J. Am. Chem. Soc.* **1982**, *104*, 3784). The new volumes cover entries H–L, M–Pk, and Pl–S, respectively, and the set should therefore be complete in about 1989.

The entries are somewhat longer than those in a general dictionary, but shorter than those in an encyclopedia, and they vary in length from one line to 2 or 3 pages. The terms that have been selected include classes of compounds (e.g., Polyamides), names of chemists (e.g., several Hoffmann's), firms (e.g., Hoffmann-La Roche), processes (e.g., Hofmann-Eliminierung), rules (e.g., Hofmann rule), reactions (e.g., Hofmann-Löffler-Freytag-Reaktion), trivial names (e.g., Hofmann's Violett), prefixes (e.g., holo-), trade names (e.g., Holopon), and many other types. Leading references are given in most cases. These are themselves almost enough reason to consult the work, even for those who know no German. The clarity and simplicity of the entries make them understandable without much knowledge of the language (the majority of chemical terms are immediately recognizable from one language to another). The material is commendably up to date for a work of this kind—references as recent as 1985 are to be found in Volume 5.

The praise given the series in the previous review continues to be deserved.

Explosives. Third Edition. By Rudolf Meyer. VCH Publishers, Inc.: New York and Weinheim. 1987. 452 pp. $75.00. ISBN 0-89573-600-4

This book is something between a glossary and an encyclopedia, for it consists of about 500 alphabetic entries, from Abel Test to X-Ray Flash. Many technical terms are included as well as procedures, and large numbers of specific explosives are listed. For them, the corresponding German and French terms, structural formula, basic physical and chemical properties, preparation, and explosive features are given. A substantial index serves in lieu of cross-references; it includes German and French names as well. The weakest point of the work appears to be the nomenclature, which is irregular, although it may be characteristic of the field (for example, such names as "ethylphenyl urethane", "glycerol chloride dimitrate"). As a result, success in looking up a compound under its IUPAC or CAS index name is problematic. The index, which is extensive, and includes French and German terms, does not help in this matter, and there is no formula index. Nevertheless, this is an informative and useful work.

Journal of Chromatography Library. Volume 37: Chromatography of Lipids in Biomedical Research and Clinical Diagnosis. Edited by A. Kuksis (University of Toronto). Elsevier Science Publishers: Amsterdam and New York. 1987. xxii + 459 pp. US $97.75/Dfl. 220.00. ISBN 0-444-42762-7

As outlined in the thirteen chapters of this volume, a considerable amount of progress has been achieved in isolating and characterizing lipid materials through the use of chromatographic techniques. As with all collected works, some of the chapters are more informative to a general readership than others, and that is why such a book also must contain a solidifying chapter. Chapter 1 (General Strategies..., by the Editor A. Kuksis and J. Myher, 176 references, 47 pages) is an interesting description of how HPLC may be employed to analyze lipid material, in conjunction with other procedures, including thin-layer chromatography, gas chromatography, and mass spectroscopy. I appreciated the information on how to handle and store samples, and I found the figures and tables to be useful.

The most informative chapters for me were those devoted to the use of high-performance (pressure) liquid chromatography (HPLC) in lipid research. Chapter 3 (HPLC of Arachidonic Acid Metabolites..., by W. Powell, 56 references, 30 pages) describes the separation of a series of metabolites with both normal-phase and reverse-phase chromatography and with a new technique (to me), silver ion-exchange HPLC. Chapter 6 (HPLC of Arachidonyl Species of Glycerophospholipids..., by Y. Nakagawa and K. Waku, 76 references, 27 pages) defined reverse-phase procedures for separating a group of structurally similar lipids from alveolar macrophages. Chapter 7 (HPLC of Diacylglycerol and Phospholipase C Sensitive Glycerolipids..., by B. Rustow, H. Rabe, and D. Kunze, 98 references, 33 pages) is a description of the separation of glycerol-containing compounds from the microsomal fractions of several tissue sources. This chapter did not provide a complete set of abbreviations of terms and included some typographical errors. Chapter 10 (HPLC of Molecular Species of Glycerophospholipids..., by G. Patton and S. Robins, 63 references, 36 pages) is an interesting and useful description of the separation of several classes of phospholipids. (These authors provided the abbreviations I needed to read Chapter 7.) The authors of Chapter 10 have included some practical considerations for the use of silica- and reverse-phase HPLC in lipid analyses, along with predictions of future research. My students and I found this chapter to be quite informative. Chapter 11 (HPLC of Glycosphingolipids..., by F. Jungalwala, M. Ullman, and R. McCluer, 87 references, 29 pages) describes the separation of some brain metabolites, through the use of reverse-phase HPLC and other techniques.

Several chapters were devoted to descriptions of the use of GLC (Chapters 2 and 5), TLC (Chapter 9), and MS in lipid separations and analyses. Chapters 4, 12, and 13 provide descriptions of innovative uses of mass spectroscopy as a detection device for compounds first separated by gas or liquid chromatography. Chapter 13 (LC/MS of Natural Glycerolipids, Sterols and Steryl Esters, by A. Kuksis, L. Marai, J. Myher, and S. Pind, 67 references, 37 pages) is a very technique-oriented narrative of how mass spectroscopy and liquid chromatography may be employed to separate and quantify a series of naturally occurring lipids. (The figures in this chapter were especially informative.) These authors also have attempted a summation of the compilation of diverse chapters in this volume.

A complete (18 pages) and very useful subject index has been provided.

Donald L. Sloan, *The City College of CUNY*

Books on Biological and Clinical Subjects

Practical Teratology. By Pamela Taylor. Academic Press: London and Orlando. 1986. xi +171 pp. $29.50. ISBN 0-12-683860-7

The author, an experienced pathology technician, describes experimental techniques to detect fetal abnormalities induced by drugs or other toxins. Thirty-three teratogenic drugs are also presented, with their structural formulas and thier teratogenic effects in man and animals.

Interaction of the Chemical Senses with Nutrition. Edited by Morley R. Kare and Joseph G. Brand. Academic Press: Orlando. 1986. xxiv + 477 pp. $59.95. ISBN 0-12-397855-6

The 20 typeset chapters in this volume come from the Third International Conference on the title subject, held at the Monell Chemical Senses Center in 1984. They are arranged in four groups: Effects of Nutritive State on Chemical Senses; Effects of the Cephalic Phase on Digestion and Absorption; Consequences of Food Palatability to Nutrition; Interplay of Chemical Senses with Nutrient Metabolism. Among the many interesting facts and concepts to be gleaned from this book is that the gut–brain axis is somehow not the same as the brain–gut axis, but, curiously, only the former appears in the subject index.