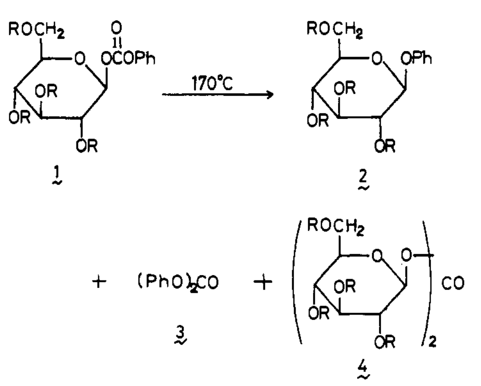

1 2 3 4

in 17% yield,[6] and this fact led us to the idea that the addition of nucleophiles such as phenols, purines, pyrimidines, etc., to the pyrolytic system might afford the corresponding glycosyl compounds accompanied by the formation of phenol and carbon dioxide gas; this may furnish a new procedure for the synthesis of glycosyl compounds.

On the basis of the above assumption, the present authors made an attempt at applying **1** to the reaction with the nucleophiles mentioned above. In this communication, we wish to report on the reaction of **1** with *p*-nitrophenol (**5**), 6-chloropurine (**6**), 2,6-dichloropurine (**7**), theophylline (**8**), 4-methoxy-2(1*H*)pyrimidone (**9**), and 2(1*H*)-pyridone (**10**), respectively, for the synthesis of the corresponding glycosyl compounds.

Fusion of **1** (1.56 g, 3.3 mmol) with **5** (0.48 g, 3.3 mmol) at 140° for 20 min under reduced pressure and removing the coproduced phenol throughout the reaction, which was followed by crystallization and recrystallization from ethanol, afforded *p*-nitrophenyl 2,3,4,6-tetra-*O*-acetyl-β-D-glucopyranoside (**11**) [1.35 g, 77% yield, mp 175–177°, $[\alpha]^{22}\text{D}$ −31° (*c* 1.0, $CHCl_3$)].[7] Similar fusions of **1** with **6**, **7**, and **8** in place of **5** at 130–150° *in vacuo* for 20–150 min followed by chromatography on a silica gel column resulted in the formation of 6-chloro-9-(2,3,4,6-tetra-*O*-acetyl-β-D-glucopyranosyl)purine (**12**) [56% yield, mp 168–169°, $[\alpha]^{22}\text{D}$ −14° (*c* 1.0, $CHCl_3$), λ_{max}^{EtOH} 263 nm (ϵ 7700) with a shoulder at *ca.* 248 nm[8]], 2,6-dichloro-9-(2,3,4,6-tetra-*O*-acetyl-β-D-glucopyranosyl)purine (**13**) [64% yield, mp 134.5–135°, $[\alpha]^{22}\text{D}$ −11° (*c* 1.0, $CHCl_3$), λ_{max}^{EtOH} 250 nm (ϵ 5300) and 272 (ϵ 8500), λ_{max}^{EtOH} 256 nm (ϵ 4700)[9]], and 7-(2,3,4,6-tetra-*O*-acetyl-β-D-glucopyranosyl)theophylline (**14**) [56% yield, mp 165–167°, $[\alpha]^{22}\text{D}$ −23° (*c* 1.0, $CHCl_3$), λ_{max}^{EtOH} 274 nm (ϵ 7600)[10]], respectively.

On the other hand, reactions of **1** with **9** and **10** gave the corresponding *O*-glycosyl compounds, *i.e.*, 4-methoxy-2-(2,3,4,6-tetra-*O*-acetyl-β-D-glucopyranosyloxy)-pyrimidine (**15**) [33% yield, mp 138–140°, $[\alpha]^{22}\text{D}$ 0° (*c* 1.0, $CHCl_3$), λ_{max}^{EtOH} 255 nm (ϵ 4900)] and 2-(2,3,4,6-tetra-*O*-acetyl-β-D-glucopyranosyloxy)pyridine (**16**) [35% yield, mp 92–94°, $[\alpha]^{22}\text{D}$ +10.2° (*c* 1.0, $CHCl_3$), λ_{max}^{EtOH} 268 nm (ϵ 3600], respectively. **15** and **16** were converted to the corresponding *N*-glycosyl compounds, respectively, by treating with an equimolar amount of mercuric bromide in xylene under reflux as usual;[11] 4-methoxy-1-(2,3,4,6-tetra-*O*-acetyl-β-D-glucopyranosyl)-2(1*H*)-pyrimidone (**17**) [mp 213–214°, $[\alpha]^{22}\text{D}$ +27.2° (*c* 1.0, $CHCl_3$), λ_{max}^{EtOH} 276 nm (ϵ 6300)][12] and 1-(2,3,4,6-tetra-*O*-acetyl-β-D-glucopyranosyl)-2(1*H*)-pyridone (**18**) [mp 180–181°, $[\alpha]^{22}\text{D}$ +81° (*c* 1.0, $CHCl_3$), λ_{max}^{EtOH} 222 nm (ϵ 4990) and 298 (ϵ 5300), λ_{max}^{EtOH} 239 nm (ϵ 280)].[13] These results are of great interest in view of the fact that such pyrimidine and pyridine derivatives have never been reported to be condensed with fully acetylated sugars by the fusion method.

Detailed investigations of this novel reaction and the application of other heterocyclic species or 1-*O*-alkyl- and -aryloxycarbonyl sugar derivatives to this reaction are now in progress in our laboratory.

[6] A comparative study on the pyrolysis of typical derivatives is now in progress and will be published elsewhere.

[7] E. M. Montgomery, N. K. Richtmeyer, and C. S. Hudson, *J. Amer. Chem. Soc.*, **64**, 190 (1942), mp 174–175°, $[\alpha]\text{D}$ −41° (*c* 2.0, $CHCl_3$).

[8] G. M. Blackburn and A. W. Johnson, *J. Chem. Soc.*, 4347 (1960), mp 163°.

[9] Y. Ishido, T. Matsuba, A. Hosono, K. Fujii, and T. Sato, *Bull. Chem. Soc. Jap.*, **40**, 1007 (1967): mp 132.5–133°, $[\alpha]^{19.5}\text{D}$ −13.5° (*c* 1.1, $CHCl_3$), λ_{max}^{EtOB} 250.5 nm (ϵ 5850) and 273 (ϵ 8900), λ_{max}^{EtOB} 257 nm (ϵ 4960).

[10] E. Fischer and B. Helferich, *Ber.*, **47**, 210 (1914), mp 168–170°, $[\alpha]^{20}\text{D}$ −12.21°.

[11] G. T. Rogers, R. S. Shadbolt, and T. L. V. Ulbricht, *J. Chem. Soc. C*, 209 (1969).

[12] G. E. Hilbert and T. B. Johnson, *J. Amer. Chem. Soc.*, **52**, 4489 (1930), mp 220–221°.

[13] G. Wagner and H. Pischel, *Arch. Pharm.* (*Weinheim*), **295**, 373 (1962), mp 189–191°, $[\alpha]\text{D}$ +83.5° (*c* 1.3, $CHCl_3$).

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*Book Reviews**

Basic Infrared Spectroscopy. Second Edition. By J. H. VAN DER MAAS (Rijksuniversiteit Utrecht). Heyden and Sons Ltd., New York, N. Y. 1972. 109 pp. $3.75.

The changes in this new edition are limited and consist largely of the addition of a general bibliography and the enlargement of an appendix giving typical band contours. The author's purpose is "an attempt to bring an understanding of the methods one uses in a reasoned approach to the interpretation of the spectra of large molecules to the novice in the field of analytical infrared spectroscopy." The correlation tables are unusually comprehensive. There are no problems, and the chapter entitled "Interpretation of Spectra," where one might expect to find examples worked out in detail, is only three pages long.

Clathrate Compounds. By V. M. BHATNAGAR (Fisk University). Chemical Publishing Co., Inc., New York, N. Y. 1970. 244 pp. $12.50.

The author states his intention "to be comprehensive rather than selective" in gathering in one place all the references on clathrate, or

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* Unsigned book reviews are by the Book Review Editor.

occlusion, compounds. There are thirteen chapters occupying the first half of the book, followed by a "Reference Section" subdivided according to broad structural types (*e.g.*, "Urea and Thiourea Clathrates"), in which references are arranged chronologically. It is useful to find descriptive phrases identifying the specific subject for some references, but it is annoying to find these omitted in many instances. No statement is made as to how far up to date this bibliography carries, but inspection indicates the last year covered to be 1966—distressingly long ago. There is no index.

Hazardous Materials Handbook. By James H. Meidl (South San Francisco Fire Department). Glencoe Press, 8701 Wilshire Blvd., Beverly Hills, Calif. 1972. xviii + 350 pp. $4.00.

This small, softbound book is written for "firefighters," which, even if the author did not anticipate it, must surely include most laboratory chemists. Most of the book consists of a table in which substances are listed in alphabetical order. In succinct form, the Department of Transportation classification (*e.g.*, "Explosive C"; "Flammable liquid"), firefighting procedure, explosive hazard, reactivity toward water or air, mixture hazards, and toxicity hazards are listed. The substances range from specific compounds, such as pentaborane, to complex materials, such as "peanuts [redskin]." It is somewhat unsettling to find the latter listed as a "hazardous material," but one is reassured to find that peanuts are not considered to be either explosive or toxic.

A useful feature is an introductory section that includes illustrations of the various D.O.T. placards used in shipping hazardous substances, with an elucidation of their official meanings. This is a book that could repay its small cost many hundred-fold in a single use.

Lipids, Malnutrition, and the Developing Brain. Edited by K. Elliott and J. Knight (CIBA Foundation). Elsevier, Amsterdam and New York. 1972. xi + 326 pp. $14.50.

A symposium on the title subject, held in London in 1971, provided the seventeen papers composing this volume. All are in English, and include illustrations, references, and the discussions following each (obviously much edited). An index, not always found in books of this sort, is a most helpful feature.

Organic Electronic Spectral Data. Volume 8. Edited by J. P. Phillips, H. Feuer, and B. S. Thyagarajan. Wiley-Interscience, New York, N. Y. 1972. xiii + 782 pp. $34.95.

As in previous volumes of this series, spectra are given in numerical form (λ_{max}, log ϵ) in tables arranged in formula-index order. The data are taken from journals published in 1966. The name for each compound is given after the formula, using *Chemical Abstracts* style. Since such names are designed for indexing, whereas they do not serve such a purpose here, but must instead serve to communicate structure, the result is not always optimum, but the compilers have ameliorated the situation by not adhering overly strictly to C.A. rules. This work continues to be a very valuable reference.

Organic Spectroscopy: Principles and Applications. By Pierre Laszlo (Liege University) and Peter J. Stang (University of Utah). Harper and Row, New York, N. Y. 1971. xi + 275 pp. $13.95.

Organic spectroscopy is treated as a totality in this book, rather than being fragmented into the conventionally separate areas of infrared, microwave, optical, mass spectrometry, etc. The principles are set out more rigorously than is usual in presentations designed for the organic chemist. This is a reflection of the authors' view "that it is intellectually more satisfying to obtain useful results about an organic molecule by deriving them from basic principles." This makes for a more demanding book, and many students in the "beginning graduate or senior undergraduate level," to whom the book is addressed, will find it tough going. If they persevere, however, they should have an excellent command of the subject. The integrated approach is a logical one in view of the fact that most practical applications of spectroscopy use the different kinds jointly. The presentation is divided into three parts: Spectroscopy; Derivations of Molecular Parameters from Spectra; Deduction of Organic Structures from Spectra. Each chapter within these divisions has problems, the answers to which are given at the end of the book. There is a large amount of information given in tables and diagrams, and there are references and suggested readings. This book does not appear to be suitable for use as a supplement to conventional courses in qualitative organic analysis, but would be a valuable text for a course devoted solely to organic spectroscopy, and as a reference work.

The Sadtler Guide to NMR Spectra. By W. W. Simons (Sadtler Research Laboratories) and M. Zanger (Philadelphia College of Pharmacy and Science). Sadtler Research Labs., Inc., Philadelphia, Pa. 1972. ix + 542 pp. $38.50.

The bulk of this book consists of 480 nmr spectra of selected, representative compounds, displayed one per page, and accompanied by integration trace and structural formula in red, a key to assignment of peaks, and an explanatory paragraph. The fore pages consist mostly of definitions of common nmr terms, such as "coupling constants," "deshielding," etc. At the back of the book are various tables: exchangeable protons (shift ranges and list of spectra); chemical shifts of compounds whose spectra consist of but one singlet; methylene additivity constants; coupling constants (with key to spectra shown); spin systems (with key to spectra shown); and alphabetical list of compounds. The list of additivity constants is considerably expanded beyond that originated by Shoolery (whose name is misspelled), and the values have been recalculated so as to avoid the need for adding a fixed constant to the sum of the substituent constants.

The spectra themselves are arranged in groups in ascending order of complexity within each. Since these groupings are according to type of carbon skeleton (*e.g.*, "alicyclics," "acetylenes"), it is not so easy to find spectra of a particular functional group, and the alphabetical index does not bridge this gap, for it contains only names of specific compounds, and not class names. A nitrosamine, dimethylnitrosamine, is shown in spectrum no. 12, but it cannot be found under that name, nor under "nitrosamine, dimethyl"; if one did not think to look under "dimethylamine, N-nitroso," it could be totally missed. This is only a very minor shortcoming, however, and the book is sure to be very useful to students and instructors, and to the many practicing chemists who wish to increase their command of practical nmr spectroscopy by self study. Just browsing in it can be rewarding. The spectra are reproduced with clarity and resolution considerably better than usually found in printed works, a factor that enhances their instructional and reference value.

Advances in Heterocyclic Chemistry. Volume 13. Edited by A. R. Katritzky and J. A. Boulton (University of East Anglia). Academic Press, New York and London. 1971. ix + 439 pp.

Six chapters by contributing authors compose this volume: Heterocyclic Ferrocene (Popp and Moynahan); 1-Azirines (Fowler); Electronic Aspects of Purine Tautomerism (Pullman and Pullman); Thiapentalenes (Lozac'h); Electrophilic Substitutions of Five-Member Rings (Marino); and Recent Developments in Phenanthridine Chemistry (Keene and Tissington). There is an author index and an index of chapter titles cumulative over Volumes 1–13.

Aufschlussmethoden der anorganischen und organischen Chemie. By R. Bock. Verlag Chemie, Weinheim/Bergstr. 1972. 232 pp. DM 64.

This is a practical book concerned with methods for getting inorganic and organic samples into solution for analysis, and is intended as an aid for all varieties of analytical and clinical chemists. Much attention is paid to avoiding inadvertent losses during such procedures. The nearly two thousand references are a valuable feature. The text frequently enlarges on the often meager experimental descriptions given in the original publications. Useful diagrams, tables, and a thorough index make this a well-rounded work that should find good use in the laboratory.

Brief Chemistry of the Elements. By J. L. Hall (Benjamin Writing Center) and D. A. Keyworth (Tenneco Chemicals, Inc.). W. A. Benjamin, Inc., Menlo Park, Calif. 1971. x + 246 pp. $3.95 paperbound.

This book presents classical descriptive inorganic chemistry and qualitative analysis as a supplement to general chemistry texts; it includes a small section on laboratory at the end. The fact that such a book has become necessary is an interesting comment on how far many introductory texts have gone in the direction of theory, with concomitant neglect of the phenomenological basis of the subject.

Chemical Technology: An Encyclopedic Treatment. Volume V. Natural Organic Materials and Related Synthetic Products. Barnes and Noble, New York, N. Y. 1972. xxxii + 898 pp. $42.50 ($37.50 by subscription).

Some encyclopedias are organized according to alphabetical order, which, although logical enough, scatters similar subjects over the entire work. In the present series, related subjects are grouped in the same volume, an arrangement of much convenience. It is difficult to determine whom to thank for this, because the title page lists no editor, a forepage lists a six-man board of editors, and the invoice from the publisher gives T. J. W. Van Thoor as editor although his name appears nowhere in the printed book.

The 22 chapters treat such subjects as Gums, Soap and Synthetic Detergents, Leather, Rubber, Antibiotics, Alkaloids, etc., in a manner suitable to the nonspecialist with limited technical training. Much economic as well as technical information is included; an annotated glossary of technical terms, such as "fellmongering," or "kauri copal," is a useful feature of the chapters. The fundamental chemistry presented varies considerably from chapter to chapter and suffers from the errors of formula and nomenclature that are so common in works dealing with organic chemistry at less than an advanced level. Particularly bad is the confusion of cyclohexane and benzene rings in many places.

This is on the whole an informative and useful work for general orientation, and it provides for those whose needs go deeper by including substantial bibliographies of more specialized works. The authors of the chapters are European, and the technology presented reflects this fact in its emphasis. There are many useful illustrations, but a lot of them are useless and would be more suitable in a child's encyclopedia (*e.g.*, a woman applying eye shadow; the Concorde aircraft taking off). A chapter on inks and dyes would have been appropriate and useful; as it is, inks are mentioned only briefly at the end of the chapter on varnishes and paints. On the other hand, other volumes in the series (to total eight volumes) will deal with food products, oils and fats, wood, paper, and textiles, and petroleum and organic chemicals.

Introduction to Chemistry. By J. C. MUHLER, E. E. CAMPAIGNE (Indiana University), and C. S. ROHRER (East Texas State University). Xerox College Publishing, Lexington, Mass. 1972. xiv + 533 pp. Softbound (price not known).

The principal purpose of this book is stated to be to present "the essentials of general, inorganic, organic and biochemistry that are required as a background for biologically oriented curricula in agriculture, nursing, etc.," and for possible use in a one- or two-semester terminal course in chemistry. Of the 32 chapters, the first twelve cover general and inorganic chemistry, and ten are devoted to organic chemistry, with some merging into the biochemistry that comprises the last ten chapters. It begins at a level that does not require high school chemistry for comprehension, but progresses easily yet efficiently to levels involving a good grasp of chemistry. Theory and phenomenology are properly balanced.

Electrochemistry: Calculations, Simulation, and Instrumentation (Computers in Chemistry and Instrumentation Series. Volume 2). Edited by J. S. MATTSON (University of Miami), H. B. MARK, JR. (University of Cincinnati), and H. C. MACDONALD, JR. (Koppers Co.). Marcel Dekker, New York, N. Y. 1972. xv + 466 pp. $23.50.

Students and practitioners of computerized electroanalytical chemistry will find this book useful as an up-to-date overview of the subject. The text material is directed toward individuals of varying levels of expertise. The 13 chapters range in scope from rather comprehensive reviews of subjects of broad appeal (operational amplifier instrumentation, Laplace plane analyses, and computer interfacing) to areas of more restricted interest (digital simulation of electrogenerated chemiluminescence). While much of the material can be found throughout the electroanalytical literature, the text offers the reader the advantage of concise summaries, circuit and flow diagrams, mathematic analyses, computer programs, and experimental details from expert contributors who have "been there."

Some of the chapters contain information of a general nature, applicable to disciplines and techniques outside electroanalysis. The lead chapter concerning thermodynamic analysis of electrocapillary data actually presents, with examples and computer program listing, a welcome consideration of the "perpetual dilemma of the experimenter—neither to interpret random errors as meaningful nor to obscure significant features of the data by excessive smoothing."

Herman's chapter on organic electrode reaction mechanisms is in reality a chemist's view of numerical analysis as it applies to his world. Emphasis here lies on equation solving and regression analysis with electrochemistry providing the vehicle.

Nicholson (on numerical solution of integral equations) and Pilla (on Laplace plane analysis) slant their discussions toward those with some previous foreknowledge of the associated mathematical treatments. Lengthier introductory material on the need for these mathematical techniques in solving the pertinent partial differential equations would have been desirable for both of these chapters. In addition, step-by-step solution of several simple systems would not have been out of place.

The niceties of digital simulation involving *a priori* generation of voltammetric curves are covered in three chapters. Schroeder presents a somewhat lengthy but nevertheless comprehensive review of operational amplifiers complete to Bode and Nyquist diagrams and cell transfer functions (two-electrode polarography is hereby laid to rest!).

In the final three chapters Osteryoung, Smith, and Perone each provide detailed and specific information on the use of dedicated computers interfaced to electroanalytical experiments (*e.g.*, chronoamperometry, ac polarography, and cyclic voltammetry) both for data reduction and for experimental control.

On the negative side, the editors have failed to provide any kind of continuity between the chapters or to inform the reader how each chapter relates to other material within the book. Emphasis is only on electroanalytical chemistry. Is no one doing any computerized corrosion measurements or molecular orbital calculations of electrochemical significance?

In that electrochemistry embraces its devotees within interfacing lobes of theory, instrumentation, and experimentation, this book has something for everyone.

Howard Siegerman, *Princeton Applied Research Corporation*

Kinetic Systems. Mathematical Description of Chemical Kinetics in Solution. By C. CAPELLOS (Feltman Research Laboratory) and B. H. J. BIELSKI (Brookhaven National Laboratory). Wiley-Interscience, New York, N. Y. 1972. xii + 138 pp. $11.95.

The stated purpose of this book is to provide a practical guidebook whereby students and researchers may become familiar with the mathematical operations encountered in the field of chemical kinetics. In this limited objective, it probably succeeds. Step-by-step solutions are given for the kinetics of various reactions in solution. The treatments are more or less in order of complexity, beginning with zeroth through third order, and then *n*th order irreversible reactions, followed by first and second order reversible, then on to consecutive, autocatalytic, and parallel reactions, etc. There is a feeling of redundancy to each treatment since use is never made of previous results, and the calculations are performed over again from the beginning for each new reaction. For each type of reaction, the limiting cases, such as zero initial concentration of product, or equal initial concentrations of reactants, etc., are worked out before the general case, starting over again each time. It would seem equally useful and less redundant to derive first the general case, and then to simplify the result as limiting cases are considered. Still, there is something to be said for being able to go to a single place for a particular type of reaction and being able to obtain the complete solution without having to look elsewhere for derivations or mathematical manipulations of equations. Several examples are worked by more than one method, and the operator-transform method appears useful.

Virtually no theory of reaction kinetics is given, and thus this book would primarily be of value to students or researchers already familiar with the subject, who either need to be refreshed with the techniques and solutions of the equations encountered, or who just do not want to be burdened with the task of deriving the solutions. Purchase of this book would probably only be worthwhile for people who frequently need to determine the kinetics of reactions of varying complexity and order, and even these people would still do well to purchase a standard kinetics text to supplement this one.

George E. Busch, *University of Colorado*

Interpretation of Electron Diffraction Patterns. Second Edition. By K. W. ANDREWS, D. J. DYSON (United Steel Companies, Ltd.), and S. R. KEOWN (University of Sheffield). Plenum Publishing Corp., New York, N. Y. 1971. xvi + 239 pp. $25.00.

The appearance of this second edition is welcome assurance of the continued availability of this valuable and useful reference book. Although it is physically almost twice as thick as the first edition (because of a change in type of paper), the contents of the second edition are substantially the same as in the first. The book is divided into three parts. Part I presents, in 84 pages, a concise treatment of the principles of electron diffraction. The presentation begins with the basic diffraction equations and develops the concepts of the stereographic projection and the reciprocal lattice. These concepts are then used to explain the origins and characteristics of the different types of electron diffraction patterns commonly encountered in studies of thin metal films. Methods for analyzing these patterns to identify unknown phases, to determine orientation relationships in single and twinned crystals, and to interpret streaking, double diffraction, Kikuchi lines, Laue zones, and related effects are then described and illustrated in detail. There is also a valuable summary of the proper use of the electron microscope in obtaining selected area electron diffraction patterns. Throughout, the emphasis is on the practical use of the concepts covered, rather than on their theoretical development. The principal new material in this part is a three-page description of the origin and interpretation of Laue zones and a seven-page description of methods for calculating diffraction patterns for cubic crystals and for determining point lattices from single crystal patterns.

Part II consists of 82 pages of very useful data, including standard stereographic projections and tables of angles between planes for tetragonal, hexagonal, and cubic crystals; diagrams of patterns for various orientations of cubic and hexagonal crystals; and stereographic projections and patterns for several twin and two-phase combinations, principally in the iron–carbon system. These data have obviously been selected for direct applicability to studies of thin metal films by transmission electron diffraction methods. The table of angles between planes in cubic crystals is exceptionally convenient because it includes the dot product of the reciprocal lattice vectors which enables easy assignment of the correct permutations of indices for each angle listed.

Part III consists of 43 pages of data on interplanar spacings and angles for the carbide, nitride, and intermetallic phases commonly encountered in studies of thin metal films. These include approximately 20 tables of data not given in the first edition. Two short appendices describe plotting tables and measuring devices to facilitate the analysis of diffraction patterns plus eight worked examples illustrating the methods described in Part I.

The methods described in this book will be particularly helpful to persons just beginning to work with electron diffraction techniques. The data it contains could be useful in any laboratory where diffraction methods are used to study metals and alloys.

W. C. Bigelow, *University of Michigan*

Proceeding of the Fourth International Congress on Catalysis. Moscow, U.S.S.R., 23–29, June 1968. Akademiai Kiado Publishers, Budapest, Hungary. 1971. Volume I, 631 pp. Volume II, 519 pp. $41.60.

This two-volume set in English consists of five lectures and 86 technical papers. In the lectures, catalytic activity is related to mobility in pore systems and to electronic factors and internal cybernetics of reactions. Other lectures describe crystal and ligand field models of solid catalysts, structure and stability of hydrocarbon intermediates on catalysts, and catalysis on metals. The technical papers cover a broad spectrum of topics on catalysis and are of good quality. Discussions are presented after each set of three to five papers. An author index is given for each volume.

Volume I emphasizes MO and LCAO calculations of metal surface complexes and charge-transfer reactions and also emphasizes the correlation of catalytic activity of semiconductors, particularly ZnO, to electron-hole pairs, space charges, surface properties, and conductivity. Hydrogenation reactions are very prominent while isomerization and decomposition reactions are reported to a lesser extent. Much attention is devoted to the selection of catalysts for organic oxidation reactions. Catalytic activities are discussed from the viewpoints of the multiplet theory of heterogeneous catalysis, thermodynamics, and kinetics. A significant number of articles illustrate advanced analytical techniques, such as esr and Mössbauer studies, now being applied to catalysis studies.

In Volume II emphasis is placed upon the catalytic properties of molecular sieves and the correlation between catalytic activity and design. Reaction mechanisms and catalytic activities are predicted by using linear free energy relationships. Other articles deal with the adsorption of gases and hydrocarbons on metals and metal films and with the relationship between surface sites and catalytic properties.

The two volumes without any other books on catalysis would not be very useful. As part of any library on catalysis, they would contribute satisfactorily to current trends in some fields of catalysis.

Norman Hackerman, *Rice University*

Guide for Safety in the Chemical Laboratory. By Safety and Fire Protection Committee (Manufacturing Chemists Association). Van Nostrand-Reinhold, New York, N. Y. 1972. vi + 498 pp. $17.50.

The second edition of this book is a valuable updated reference source for safety in the chemical laboratory. It is a well-written, concise guide which provides the essential information for developing and maintaining a safety program. The latest methods, equipment, and precautions are presented.

In addition to its value to the safety officer, the book should serve as an important reference for the administrator. The latest safety specifications and recommendations in laboratory design are presented; these would seem to be of value in the purchase of new equipment, in the design and construction of new laboratories, and in the renovation of old facilities.

The content is comprehensive and each section is well referenced. Sections dealing with teaching laboratories at the high school and college level are included; however, the book seems to be directed more toward the industrial laboratory than the educational institution. The coverage of laboratory inspection and reporting procedures, first aid, fire prevention, and other routine topics is good.

Approximately half of the book, 220 pages, is an appendix, which includes an extensive bibliography, a listing of hazardous reactions, and a reference chart for over 1100 chemical substances. The information is alphabetized or catalogued for rapid access. The reference chart provides information on threshold limits, clean-up and disposal procedures, potentiality of fire or explosion, recycling possibilities, and a variety of useful physical properties. This section is an important reference source.

The reader may be disappointed if he is seeking a short cut or makeshift solution to his safety problem. The authors apparently feel that in the area of laboratory safety, nothing but the best should be recommended.

John M. Haschke, *University of Michigan*

Comprehensive Chemical Kinetics. Volume 7. Reactions of Metallic Salts and Complexes, and Organometallic Compounds. Edited by C. H. Bamford and C. F. H. Tipper (University of Liverpool). Elsevier Publishing Co., Amsterdam. 1972. xv + 615 pp. $62.00.

The purpose of this series is to provide a comprehensive background reference for chemical kinetics. Volume 7, covering the kinetic data available on metal reactions, is true to this purpose. The amount of data reproduced or simply referenced is indeed comprehensive; furthermore, the information is compiled in such a way that most subjects can be reviewed quickly and with ease.

Oxidation–reduction reactions are divided into three categories: reactions between metal ions of the same element (P. J. Proll), between complexes of different metals (D. Benson), and between covalent compounds and metal ions (T. J. Kemp). The number of systems for which data are reproduced is extensive. About thirty metals from the transition, group A, or inner transition series are discussed while the nonmetal reactants vary from organic to noble gas compounds. The data are presented on a metal by metal basis with further subdivisions according to oxidation state of the metal or type of nonmetallic reactant. This allows the chemistry of a particular system to be reviewed without a time-consuming search for separated facts. L. J. Csanyi's chapter on induced oxidation–reduction reactions has the same attributes: system-by-system presentation of a large amount of data.

In contrast, the chapter on substitution reactions of inert complexes (C. H. Langford and M. Parris) is primarily a discussion of the probable general mechanisms operating in the reactions. Three types of complexes are discussed in turn: class A octahedral and square planar (*e.g.*, containing amine ligands) and class B complexes (*e.g.*, containing carbonyl ligands). These discussions are well written and give the reader a good overview of substitution reaction kinetics. Although only a narrow range of data is reproduced, references leading to information on most systems are cited and easily found.

Michael J. Pavelich, *University of Oklahoma*