

- (6) G. Porter and P. Suppan, *Trans. Faraday Soc.*, **62**, 3375 (1966).
 (7) (a) K. Mizuno, C. Pac, and H. Sakurai, *J. Chem. Soc., Chem. Commun.*, 553 (1975); (b) J. A. J. Vlnk, P. L. Verheijdt, J. Cornelisse, and E. Havinga, *Tetrahedron*, **228**, 5081 (1972).
 (8) (a) W. C. Peterson and R. L. Letsinger, *Tetrahedron Lett.*, 2197 (1971); (b) R. L. Letsinger and R. R. Hautala, *ibid.*, 4205 (1969); (c) R. L. Letsinger and J. H. McCain, *J. Am. Chem. Soc.*, **91**, 6425 (1969); (d) E. Havinga and M. E. Kronenberg, *Pure Appl. Chem.*, **16**, 137 (1968); (e) G. G. Wubbles and R. L. Letsinger, *J. Am. Chem. Soc.*, **96**, 6698 (1974).
 (9) (a) J. Cornelisse, *Pure Appl. Chem.*, **41**, 433 (1975); (b) J. Cornelisse and E. Havinga, *Chem. Rev.*, **75**, 353 (1975).
 (10) S. Nilsson, *Acta. Chem. Scand.*, **27**, 329 (1973).
 (11) G. Porter and P. Suppan, *Proc. Chem. Soc. London*, 191 (1964); G. Porter and P. Suppan, *Pure Appl. Chem.*, **9**, 499 (1964); M. Kasha, *Discuss. Faraday Soc.*, **9**, 14 (1958).
 (12) (a) A. J. Parker, *J. Chem. Soc.*, 1328 (1961); (b) J. A. Leary and M. Kahn, *J. Am. Chem. Soc.*, **81**, 4175 (1959).
 (13) (a) M. K. Chantooni and I. M. Kolthoff, *J. Am. Chem. Soc.*, **97**, 1582 (1962); (b) I. M. Kolthoff and M. K. Chantooni, *ibid.*, **89**, 2521 (1967).
 (14) I. D. Kuntz, Jr., and C. J. Cheng, *J. Am. Chem. Soc.*, **97**, 4852 (1975).
 (15) R. Alexander, A. J. Parker, J. H. Sharp, and W. E. Waghorne, *J. Am. Chem. Soc.*, **94**, 1148 (1972).
 (16) R. L. Benoit and C. Bulsson, *Inorg. Chem. Acta*, **7**, 256 (1973).
 (17) Correspondence should be addressed to the Department of Chemistry, Bloomsburg State College, Bloomsburg, Pa., 17815.

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Received May 1, 1978

Book Reviews*

Catalysis in Coal Conversion. By J. A. CUSUMANO, R. A. DELLA BETTA, and R. B. LEVY (Catalytica Associates, Inc.). Academic Press, New York. 1978. xiii + 272 pp. \$21.00.

The conversion of coal to synthetic fuels, generally by liquefaction, has become a subject of major importance in the last decade, as the fact that petroleum is nearing its end as a cheap source of energy becomes recognized. The present book is a survey of methods for such conversion, and is based on a report prepared for ERDA (U.S. Energy Research and Development Administration). It is divided into three sections: Survey of Advances in Catalysis; Advances in Supporting Disciplines; and Specific Coal Conversion Processes.

A large amount of information is presented concisely, although rather often it is given in general terms, with references to sources of further details. A great value of the book lies in these references, which are abundant, and are drawn from a wide range of sources, including industrial and government contract reports. Each chapter ends in a "Summary and Conclusions" section, in which needs and recommendations for future research are given; this feature, susceptible to rapid obsolescence, is clearly an inheritance from government report status.

The level of presentation is to the initiated, and newcomers to the field may have to work to achieve full comprehension of the material, but the authors have made a helpful concession by including in the index the many acronyms that have become a part of the jargon of the subject (example: HDN for hydrodenitrogenation). Both chemists and engineers should find this book useful if they are in any way concerned with coal chemistry.

Rodd's Chemistry of Carbon Compounds. Second Edition. Volume IV. Part H: Heterocyclic Compounds. Edited by S. COFFEY. Elsevier Scientific Publishing Co., Amsterdam and New York. 1978. xx + 576 pp. \$106.95.

Six-membered rings of various sorts dominate this volume, which continues from the previous part with Chapter 36 (Isoquinoline Alkaloids). The remaining five chapters cover rings with a nitrogen atom common to two or more fused rings or with one heteroatom in each of two fused rings (such as furoquinolines), and those six-membered rings that contain two heteroatoms from groups VIB, or VB and VIB, of the periodic table, plus a chapter on lupinane and quinolizidine alkaloids.

Some of these are large subjects indeed, and the contributors have had to compress a formidable amount of literature into their concise chapters. Nevertheless, this has not prevented them from making the text readable, nor from detailing the development of a subject through the correction of errors, such as seen in the revision of the structure of gigantine in 1970 from a phenolic to an alcoholic system. Attention is also given to such important facts as the extraordinary toxicity of certain polychlorodibenzodioxins which may occur as contaminants of polychlorophenols.

The index is of the usual elaborate form, and is preceded by a helpful two-page guide. This is an excellent work and it is a pity that

no indication is given as to the termination date of the coverage of the literature.

Advances in Heterocyclic Chemistry. Volume 22. Edited by A. R. KATRITZKY and A. J. BOULTON (University of East Anglia). Academic Press, New York. 1978. ix + 437 pp. \$39.50/£25.65.

The practice of bringing older reviews up to date is continued in this volume. It was 15 years and 20 volumes ago that the original chapter in this series on quinoxalines appeared; developments in 1963-1975 are now covered. Quaternization of heteroaromatic compounds is a subject whose original review is only one year younger; the new supplementary review reflects the increased role of kinetics in understanding this class of reaction.

Chapters on phenanthrolines and on isatogens and indolones supplement earlier reviews written in the 1950s. There was still room for two previously unreviewed subjects: aromatic azapentalenes and cyclazines (including related N-bridged annulenes).

The problem of nomenclature and ring numbering is dealt with felicitously by the contributors, who have recognized that names used in *Chemical Abstracts* indexes, which are designed for handling by computers rather than warm-blooded chemists, are often far from satisfactory for quick comprehension. Thus, it is, for example, that Boekelheide's cyclazine nomenclature is used instead of the ring-fusion names of CA. The basic word cyclazine is used to denote a conjugated, unsaturated ring of carbon atoms that is held planar by three bonds to a central nitrogen atom. Whatever one's preference, however, an abundance of clearly drawn and numbered structures makes the text easy to follow.

As in earlier volumes, a highly detailed table of contents substitutes for an index, but there is a cumulative index of chapter titles for the complete run of 22 volumes at the end.

Saturated Heterocyclic Chemistry. Volumes 4 and 5. Edited by M. F. ANSELL and G. PATTENDEN (Vol. 4) and by M. F. ANSELL (Vol. 5). The Chemical Society, London. Vol. 4: 1977. x + 362 pp. \$60.00. Vol. 5: 1978. ix + 314 pp. \$52.00.

Volume 5 is the swan song of this section of the Specialist Periodical Reports. The Editors foreword explains that it "has ceased to remain viable economically". However, some of the material will be included in the Report on "General and Synthetic Methods". Presumably, rising costs have priced these books out of the personal purchase market, and library purchases alone are not enough to sustain the series.

The volumes follow the established pattern and consist of five tightly written contributions: Three-membered Rings; Four-membered Rings; Five- and Six-membered Rings and Related Fused Systems; Medium-sized Rings, and Bridged Heterocyclics. Volume 4 reviews the literature published in 1974 (1973 as well for medium-sized rings), and Volume 5 covers 1975.

These volumes will remain useful for many years, because of the well-organized way in which widely scattered material is presented, although their primary purpose has been to promote "recent awareness". There is an author index, which is valuable in such works, and

* Unsigned book reviews are by the Book Review Editor.

a very detailed table of contents substitutes for an index.

This series will be missed.

Advances in Laser Chemistry. Edited by A. ZEWAIL. Springer-Verlag, New York. 1978. x + 463 pp. \$34.50.

This book is a collection of papers presented at a conference held in March 1978. The 46 papers are reproduced from the authors' own typescripts and include many figures and references, but in general lack detailed description of experimental method.

The commendable aspect of this book is the promptness with which it has appeared; this reflects the diligence of an effective editor. This promptness is particularly important, for by its nature, the book will rapidly become obsolete. If, as is reasonable to expect, the content of the papers will be published in primary journals, if indeed it has not already been so published, the book will have become redundant. The publishers evidently recognize this situation, for they have provided no index, and not even an alphabetized list of contributors, of which there are many (most of the papers have three or more authors). Although the price is reasonable for a book of this size, one wonders how many libraries will wish to consider such a luxury in these times when library budgets are often insufficient to meet the needs for long-term reference books.

Synthetic Methods of Organic Chemistry. Volume 32. Edited by W. THEILHEIMER. S. Karger A. G., Basel and New York. 1978. xvi + 593 pp. \$267.00.

This perennial work continues to confront the ever-increasing onslaught of new discoveries imperturbably, and with little change except in size and price. Reactions of actual or potential preparative value published "between 1975 and 1977" have been collated into the familiar highly systematized format and presented in a manner suited to quick visual comprehension. The system must be learned, of course, but for the chemist who has not done this in spite of the 31 opportunities offered by previous volumes, there is a really thorough index. The system can be learned in ten minutes, but it would be considerably easier to use if the table of contents, presently of little value, were expanded to include the major subject headings, such as "Formation of Carbon-Nitrogen Bonds", etc. This function is already performed by a two-page "Systematic Survey", but it is tucked away in between the index and the supplementary references and is easily overlooked. The customary short section (4 $\frac{1}{4}$ pages) entitled "Trends in Synthetic Organic Chemistry" is a useful feature, in which selected new methods are identified in starkly unembellished prose.

Chemistry of 1,2,3-Triazines and 1,2,4-Triazines, Tetrazines and Pentazines. By H. NEUNHOEFFER (Technische Hochschule, Darmstadt) and P. F. WILEY (The Upjohn Co.). Wiley/Interscience, New York. 1978. xxv + 1335 pp. \$92.50.

All of the compounds containing six-membered rings having more than two nitrogen atoms, other than 1,3,5-triazines, are covered in this volume, which replaces the original edition of 1956. That work dealt with the literature through 1950; the present volume incorporates the literature through 1974 with the original work.

The overwhelmingly largest part of this volume is devoted to the 1,2,4-triazine system, and includes an incredible 2,316 citations to the literature. This subject has burgeoned because of pharmaceutical interest in compounds that are aza analogs of pyrimidines, and the consequent development of improved synthetic methods for them, as well as the interest in their herbicidal potential. In contrast, the chemistry of pentazines is covered in only two pages with 14 references, in which it is pointed out that the only substance claimed to be a pentazine has long since been demonstrated to be an amino tetrazole.

The index of only 35 pages is perhaps small for a book of this size, but in view of the detailed nature of the table of contents, its size may not be a matter of moment. References are at the very end of chapters, which in some cases means separation by over 800 pages from the page of citation, a noticeable obstacle to use. Tables, small and large, abound, formulas and equations are liberally provided, and sub-headings are frequent and clear. This is altogether a well-conceived and well-produced book and a worthy addition to the series "The Chemistry of Heterocyclic Compounds".

How to Name an Inorganic Substance. Edited by W. C. FERNELIUS (Chairman, IUPAC Commission on the Nomenclature of Inorganic Chemistry). Pergamon Press, New York. 1978. 36 pp. \$5.50.

This surprisingly expensive soft-bound booklet is a guide to the use of the larger work, *Nomenclature of Inorganic Chemistry: Definitive Rules 1970*. It briefly defines thirteen different types of names (binary, substitutive, additive, etc.) with samples, and then outlines procedure in two pages of questions (example: "Is the substance a radical? See §3.3, Table II.") with answers that lead one to the right part of the parent work. The bulk of the booklet is a table of names for ions and radicals, in formula-index order. There are some surprises to be found, such as "aminylene" for HN, more familiar under the names "nitrene" or "imidogen".

Annual Reports in Organic Synthesis—1977. Edited by R. B. MILLER and L. G. WADE, JR. Academic Press, New York. 1978. xiv + 457 pp. \$17.50.

This series is now firmly established, and the appearance of a new volume is a welcome event to organic chemists concerned in any way with synthesis. Comparison with Theilheimer's "Synthetic Methods in Organic Chemistry" is inevitable. Some of the differences are, for "Annual Reports": one-fifteenth the cost, soft cover; narrower coverage; more equations; almost total absence of commentary; many tabulations of examples with yields; lack of an index, but presence of a detailed table of contents; less elaborate classification system; reproduction from typescript rather than typesetting. Some of these are positive, and some are negative, and one must make one's own personal balance. Although the number of pages in each is comparable, "Theilheimer" has a more compact format and smaller type and appears to contain about twice the amount of information. One can summarize by saying that both are good works; "Annual Reports" is personally affordable, but less comprehensive, whereas "Theilheimer" is clearly the choice for libraries, if they cannot afford both.

The Chemistry of the Carbon-Carbon Triple Bond. Edited by S. PATAI. Wiley/Interscience, New York. 1978. xiv + xiv + 1065 pp. \$162.00.

It scarcely seems possible that the subject of acetylenes has grown so large as to require 20 chapters contributed by 31 authors filling two volumes. Even so, three intended chapters are missing. The subjects cover the wide range customary in this series (The Chemistry of Functional Groups), from theoretical to descriptive, but stop short of industrial applications. They are, as usual, treated critically, but with much factual detail and many references, although tables are used sparingly.

With this volume, the series as originally conceived would have required only the volume on oxidized sulfur compounds for completion, but such has been the success of the series, and the industry of the editor, that the plan has been extended, not only to new subjects (e.g., organometallic compounds), but to supplements, in which it is hoped that some of the chapters missing from earlier volumes may appear. The series has acquired a reputation for authoritativeness and utility, and it is obviously one of the essentials of a chemical reference library.

The Chemistry of Diazonium and Diazo Groups. Edited by S. PATAI. Wiley/Interscience, New York. 1978. xiv + xiv + 1069 pp. \$150.00.

This volume in the series "The Chemistry of Functional Groups" is in two separately bound parts, with a 25-page subject index and a 68-page author index at the end of the second. There are 18 contributed chapters, encompassing theoretical, structural, and physical aspects, detection, preparation, reactions with their mechanism and applications, etc. Only an intended chapter on biological and pharmaceutical effects failed to materialize.

The subject is so large as to be difficult to manage, a fact that may be in part attributed to the at times awkward marriage of diazonium with diazo groups. The massiveness of the text has led to some repetition; the chapter on kinetics and mechanism concerns itself with preparative methods for diazoalkanes, and the chapter on preparative methods devotes much attention to mechanism, for example. Proof reading appears to have been less rigorous than in previous volumes, and some misleading errors occur, such as "*p*-toluene sulphamide" for *p*-toluenesulphonamide, and "terephthalamide" for terephthalamide. Nomenclature is not always uniform, and one chapter uses "2,3-diazabuta-1,3-dienes", which falls short on quick reader recognition, whereas another uses the more familiar "azines" for the same structures.

The foregoing criticisms are very minor in comparison to the vast effort that has so evidently been spent on this work, which will be a basic reference for many years. The 19 contributors, among whom are included some of the most important researchers in the field, have performed a service deserving the gratitude of organic chemists, who should be sure that their libraries order copies.

Transition Metal Hydrides. Edited by ROBERT BAU. American Chemical Society, Washington, D.C. 1978. ix + 429 pp. \$42.00.

This volume constitutes the Proceedings of a symposium sponsored by the ACS Division of Inorganic Chemistry in Montreal in 1977. There are 26 contributions, most of which appear to be reports, or at least summaries, of original research, including abbreviated experimental sections. Presumably these will see publication in ACS journals eventually.

The editor's statement that "the volume summarizes recent results of some of the leading investigators" seems to be a fair description. It is evident from even a casual perusal that crystallographic methods continue to be of major importance. Tables and figures are plentiful. The book is typeset, and the indexes, both author and subject, cover the content of the papers rather than just the titles; these features provide a refreshing distinction from most volumes of proceedings.

N-Ylid Chemistry. By I. ZUGRĂVESCU and M. PETROVANU (A. I. Cuza University, Iasi). Translated by C. STOICESCU. McGraw-Hill International Book Co., New York. 1976. vii + 396 pp. \$39.50.

This book, received rather late from the publishers, is a "revised and up-dated" translation of 1974 original edition in Romanian. It treats the formation and reactions of compounds containing the structure $\text{>N}=\text{C}$. It is unfortunate that the translator has used the German term "ylid" instead of the English form "ylide". There are other peculiarities of the translation, including non-idiomatic sentence structure and tenses, and the astonishing term "internal carbonates" for ylides.

The book begins with an interesting historical survey, from which it appears that the first encounter with a recognizable ylide was by Ingold and Jessop in 1929, who had trimethylammonium fluorenylide in solution. The remaining seven chapters cover various classes of ylides, most of which are derivatives of nitrogen heterocycles. One chapter is devoted to nitrile ylides, of much importance in the chemistry of 1,3-dipolar cycloadditions, and one chapter, rather curiously, is about diazoalkanes, which for the purposes at hand are considered as "diazonium-ylides". It is necessarily quite brief.

There is an author index, but most strangely there is no subject index, a fault that must be considered serious in a reference book. The book is also badly out of date, and the fact that a chapter picked for representative checking contained no reference later than 1970 casts doubt on the claim that the manuscript has been "updated" with any thoroughness (although one reference from 1974 was noticed in another chapter).

Electron Spin Resonance. Volume 4. Edited by P. B. AYSCOUGH (University of Leeds). The Chemical Society, London. 1977. x + 302 pp. £24.00.

This is the latest volume of the Specialist Periodical Reports on Electron Spin Resonance (ESR). It reviews ESR literature published between June 1975 and November 1976. The scope of the review is indicated by the following list of ten chapters and their authors: Relaxation, Lineshapes, and Polarization (P. W. Atkins); ENDOR and ELDOR (K. Möbius); Triplets and Biradicals (A. Hudson); Transition-metal Ions (A. L. Porte); Inorganic and Organometallic Radicals (M. C. R. Symons); Organic Radicals: Structure (B. C. Gilbert); Organic Radicals: Kinetics and Mechanisms of Their Reactions (R. C. Sealy); Organic Radicals in Solids (T. J. Kemp); Radical Ions, Ion Pairs, and Dynamic Processes (R. F. Adams); Biological Systems (P. F. Knowles and B. Peake). As compared with previous reviews, this topical selection reflects an increase in the number and type of ESR applications, particularly in the biological sphere, and a decreased effort in ESR-related theory.

In general, the authors have done a very satisfactory job of covering their areas, and accurately and concisely summarizing a considerable amount of work. Access to a copy of this book should be helpful to all workers in ESR, both in surveying the literature and refreshing their memories of specific areas of ESR research.

Frank J. Adrian, *APL, The Johns Hopkins University*

Encyclopedia of Electrochemistry of the Elements. Volume 7. Edited by ALLEN J. BARD (University of Texas). Marcel Dekker, Inc., New York. 1976. xiv + 483 pp. \$75.00.

This volume critically, carefully, and exhaustively reviews the electrochemistry of carbon and vanadium. Each chapter follows the standard series organization and format. The chapter on carbon and its compounds, by Jean-Paul Randin, covers 291 pages, and cites 1558 references, covering the period up to 1974 with some 1975 references. The presentation is excellent and thorough. Considerable discussion is devoted to the surface and double-layer properties of carbon and graphite. The material is up to date as of its writing. Only several references are made to surface analysis techniques such as X-ray photoelectron spectroscopy (XPS), although such methods have yielded a number of interesting advances in surface analysis of graphite and carbon electrodes during the past few years. The presentation, however, provides an excellent starting place for building an updated bibliography.

The electrochemistry of vanadium and its compounds is reviewed by Yechezkel Israel and Louis Meites in 173 pages, with 498 references cited, through 1972. Coverage is extensive and apparently thorough.

Although the chief focus of this volume is on electrochemistry, a wealth of chemical information is afforded on reactions accompanying electron transfer. Thus this volume may prove instructive to non-electrochemists interested in carbon, vanadium, and their compounds. The volume succeeds admirably in its goal of an encyclopedic treatment of the electrochemistry of carbon, vanadium, and their compounds. It would be a logical place to start a literature search. Although the price is rather high for individual acquisition, it is a very worthwhile addition to institutional libraries. Typographical errors are minimal, and the volume is well indexed.

James Anderson, *North Dakota State University*

Advances in Cereal Science and Technology. Volume II. Edited by Y. POMERANZ (U. S. Department of Agriculture). American Association of Cereal Chemists, St. Paul, Minn. 1978. 463 pp. \$30.00.

Volume II follows the pattern of Volume I in covering randomly chosen subjects that are of interest to chemists and technologists in the field of food science, particularly in cereals. The subjects are well covered and the reviews supply the reader with a concentration of information and literature citations. Technical information is given along with practical applications and interpretations. Several of the chapters end with suggestions for needed future research. Authors for the seven chapters are from the United States, Scotland, The Netherlands, and West Germany.

Chapter 1, Cereal Grain Drying, assumes the reader knows the basics of the field, but gives references for those who want them. Main topics of the chapter are theory of grain drying, effects on quality, and techniques of drying. Chapter 2 discusses insects and microorganisms in stored grain and the current status of methods for their control. Chapter 3, Corn and Sorghum Grain Proteins, contains detailed information on the extraction and classification of proteins, content and quality of protein, high lysine grains, nutritional value, and the effects of handling procedures on protein. Chapter 4 on cereal lipids reviews the literature from 1969 to 1976. The review covers structure, extraction, and quantification of lipids, distribution and composition of lipids in cereals and grains at various stages of development and handling, enzymes, and lipids in processed products. Chapter 5 covers composite flours, the products made from composite flours and the results achieved. Chapter 6 is an overview of wheat production and use in the Peoples Republic of China. Chapter 7 covers regulation and production of bread in West Germany and includes recipes for many of their specialty breads.

This is a valuable book for researchers in cereal foods. The series should continue with Volume III.

Doris Baker, *USDA, Science and Education Administration Nutrition Institute*

The Chemical Equilibrium of Gaseous Systems. By ROBERT HOLUB and PETR VONKA (Czechoslovak Academy of Sciences). D. Reidel Publishing Co., Dordrecht—Holland/Boston. 1976. 279 pp. \$35.00.

This book describes methods for the calculation of equilibria in gaseous systems. The purpose of the book is practical. In many chemical processes of industrial importance, particularly in the pe-

troleum industry, it is necessary to use mixtures of gaseous reactants. As it becomes possible to deal with the thermodynamics of such systems, the advantages gained both for new applications and improvements of old are almost unlimited. As the authors point out, a yield increment in a chemical process of less than 1% may be of great economic importance. The approach in this book to the understanding of these systems is fundamental. As such it could form a useful course for chemical engineers at the third- or fourth-year level. The first chapters describe basic principles of equilibria in simple systems in the ideal gas state. Emphasis is placed on the calculation of the degree of conversion and of the equilibrium composition. Examples are clearly described and exercises are included.

The authors then proceed to describe modern computational methods for the calculation of chemical equilibria in ideal systems. The availability of rapid computers has, of course, transformed this endeavour and essentially removed limitations to the complexity of the system analyzed. Several procedures are described in detail. The problems associated with non-ideal gases are also discussed and several general approaches are considered. The authors have rightly devoted considerable space to an evaluation of thermochemical data and the methods for obtaining and presenting it. In many applications the accuracy of the data is the limiting factor in the interpretation of a given system of chemical equilibria. A detailed analysis of an important industrial process, the partial oxidation of methane, is included as an example.

The emphasis in this book is entirely on thermodynamics. Kinetic aspects are not considered. From the point of view of undergraduate instruction, a course based on this book should be complemented by one of the kinetics of such systems. In fact, analysis of industrial processes at any level must consider the kinetics of the reactions involved. Nevertheless, within its specialization this book provides a concise yet comprehensive treatment and will be valuable both to industry and to university.

As a minor point of criticism it might be mentioned that the authors are careless about including the units to values for the equilibrium constant (in cases where units apply). Although the writing is clear there are some minor errors of translation.

Margaret Back, *University of Ottawa*

Analytical Calorimetry, Volume 4. Edited by R. S. PORTER and J. F. JOHNSON. Plenum Press, New York, 1977. 251 pp. \$27.50.

This fourth volume in the series "Analytical Calorimetry" appeared in March 1977, less than eight months after the ACS Symposium on Analytical Calorimetry upon which the volume is based. Although far slimmer than Volume III of this series (251 pp vs. 818), the range of topics has not been restricted. The timeliness of the publication is no doubt due to the editor's requirement of a complete manuscript at the time of meeting and Plenum's use of the photo-offset printing plates taken directly from author-supplied masters. The total effect created is a very neat, legible volume produced on excellent paper in a time frame suitable to this fast-moving research tool. Although the majority of the papers employ dynamic scanning or differential thermal measurements, the areas of thermomechanical analysis and sophisticated classical calorimetry have not been neglected.

The fourth volume of "Analytical Calorimetry" should be of great use to the polymer and materials analyst as well as workers in such diverse areas as medicine, pollution control, and pyrotechnics. It properly belongs on the lab book shelf as well as the library.

E. M. Barrall, *IBM Corporation*

Environment and Man, Volume 6 (The Chemical Environment). By J. LENIHAN and W. W. FLETCHER (University of Glasgow). Academic Press, New York, 1978. xii + 163 pp. \$14.50.

This slight volume is a powerhouse of well-integrated information on the chemical, biological and meteorological processes affecting the development of global equilibria and the consequences to human health of their disturbance. In the opening chapter, the "natural" cycles for sulfur, nitrogen, phosphorus, fluorine, and some heavy metals are discussed. The perturbations caused by industrial and domestic activity are analyzed in rather general terms. Succeeding chapters are devoted to a more detailed examination of some particular problems. It is unusual, in one volume, to find an examination of the pollution of both the industrial and the larger environment. Individual chapters focus on mercury, lead, arsenic, aflatoxins, and asbestos with a wealth of data on environmental factors and discussions of health

effects, often centering on occupational health problems. Since several of the authors are British, it is not surprising to find that most of the environmental data derive from British studies. The occupational data presented have a more cosmopolitan character.

Several things disappoint. With the current knowledge that halo-genated hydrocarbons engender a very heavy toll in teratogenicity, systemic toxicity, and cancer, it is disappointing to find that this volume does not treat them at all. It is to be hoped that the editors are already at work in this area. Some of the authors are at such pains to be balanced in their presentation that the unsophisticated reader is sometimes left with inadequate means to draw a conclusion. The section on mercury is a case in point. The author states that, except for instances of "gross chemical contamination of water, as at Minamata . . ." mercury poisoning is no longer a worrisome problem. Such an optimistic view is far from justified. Although the hazards of acute poisoning are not as great as they were in Minamata, Quebec, Iraq, and Texas, we are now becoming aware that airborne mercury, principally generated (directly and indirectly) by industrial usage, may represent a chronic toxicity problem, the magnitude and importance of which are as yet undefined. Although the author deprecates this view, many others (whose views are not presented) think otherwise.

Judith S. Bellin, *Polytechnic Institute of New York*

Methods in Molecular Biology, Volume 8. Edited by JEROLD A. LAST (Harvard University). Marcel Dekker, Inc., New York, 1976. x + 460 pp. \$32.50.

This volume is a collection of methodologies for the purification and characterization of eucaryotic mRNA molecules. Six chapters are included which outline the present state-of-the-art techniques employed in the subcellular study of each of these systems: the chorion of insects, mRNA transcription in a slime mold, avian erythroid development, mammalian collagen and lung growth, avian myosin heavy chain mRNA, and avian ovalbumin mRNA. A seventh chapter details the principles for analyzing DNA-DNA and DNA-RNA hybridization data.

The subject material of each chapter is independent of the others and consists, in order, of a content outline, the text including tables, extensive references, and supplementary figures (if any). The volume includes an Author Index cross-referencing all literature cited in the volume, and a brief Subject Index. In general, this format and the contributors have made this volume concise, up to date, and easy to read with the notable exception of the location of the figures which necessitates some searching for diagrams and illustrations.

The contributions in this volume detail technical achievements which should be of considerable interest to molecular biologists. These include the purification of proteins and/or specific mRNA fractions from whole organisms or tissue culture cells and the subsequent assay of mRNA molecules in *in vitro* cell-free translation systems. There is a refreshing compensatory emphasis on methods, materials, and the principles of analysis not otherwise found in scientific periodicals. This should enchant the novice while providing the expert with an excellent review of current methodologies and techniques

Hessel Bouma III, *Calvin College*

Analysis of Foods and Beverages, Headspace Techniques. Edited by G. CHARALAMBOUS (Anheuser-Busch, Inc.). Academic Press, New York, 1978. xiv + 394 pp. \$21.00.

This work collects 14 symposium papers presented at the ACS National Meeting in August-September, 1977. Discussed are: the methodology of sampling and analysis of headspace vapors; applications to various foodstuffs (vegetables, hydrolyzed vegetable protein, vanilla beans, coffee, tea, cocoa, citrus fruit, alcoholic beverages); the study of mouth odor; the action of lipoxxygenase on peanuts and soybeans. The coverage is current and well referenced, and a subject index is included. This work is probably of greatest interest to flavor and fragrance chemists, although the techniques described should be applicable to analyses for many types of trace volatiles.

Keith T. Buck, *Fries & Fries, Inc.*

Designing Organic Syntheses. A Programmed Introduction to the Synthron Approach. By STUART WARREN (Cambridge University). John Wiley & Sons, New York, 1978. 285 pp. \$9.95.

This book is intended to introduce students with a knowledge of the

basics of organic chemistry to the analytical approach to synthesis enunciated by Professor E. J. Corey. The presentation proceeds in graded order of difficulty, using a question-answer format, through some 400 syntheses, many of which involve several steps. The material is cross-referenced and the style is concise and informal.

Considering the generally excellent organization of the book, this reviewer was annoyed to find some distracting typographical mistakes in the text and references. There are also two particularly disturbing errors of fact: the preparation of eugenol (p 209), although correctly illustrating the Claisen rearrangement, affords not eugenol, but an isomer; a synthesis on p 224 advocates the Reformatsky reaction on a β -bromo ester, a procedure which fails.

The author concentrates on well-known carbon-carbon bond forming reactions of wide versatility (e.g., Grignard, Wittig, aldol, Friedel-Crafts). It is my feeling that the degree of sophistication necessary to appreciate this book also requires a broader knowledge of synthetic reactions, as well as an ability to use the literature, so it is difficult to see what audience this work is suited for. My guess is that it would fit best into a first year graduate course, in conjunction with a standard work, such as that of House, to supply necessary background. The lack of an index detracts somewhat from the use of this book as a student reference, although the abundant structural formulas make it relatively easy to locate specific reactions by riffling the pages.

Keith T. Buck, *Fries & Fries, Inc.*

Fundamental Research in Homogeneous Catalysis. Edited by MINORU TSUTSUI and RENATO UGO. Plenum Press, New York/London. 1977. x + 242 pp. \$27.50.

This book summarizes the proceedings of the First International Workshop on Fundamental Research in Homogeneous Catalysis held at Santa Flavia, Italy, December 1976. At this conference, several timely topics in homogeneous catalysis were addressed. These included activation of molecular oxygen, olefin functionalization, anchored organometallic complexes, molecular metal clusters, phase-transfer catalysis, activation of dinitrogen, asymmetric synthesis, and photo-redox catalysis. This volume presents a summary of the technical discussions as well as the conclusions and recommendations of the attendees who were divided into five working groups at the conference.

The first two-thirds of this book presents a well-documented survey for each of the topics addressed. The discussion is comprehensive and well referenced, and the analysis is generally of a critical nature. For example, the section on homogeneous catalytic activation of oxygen for selective oxidations has 292 references. The difficulties of obtaining selective oxidations via coordination catalysis and the implications of the radical mechanisms which are thought to occur are well documented. It is suggested that the metal generally functions during oxidation by catalyzing transformations of hydroperoxides formed in situ. A similar critical approach is used in discussing the other topics.

The last third of the book is devoted to discussions concerning a number of unsolved problems of possible commercial interest. Recommendations are given for future work in such areas as: paraffin functionalization; the selective oxidation of olefins; carbon monoxide reactions, and the interface between homogeneous and heterogeneous catalysis.

This book does not provide an abundance of scientific or technological details, but rather serves to interface the science of homogeneous catalysis with some perceived technological needs. It provides a useful perspective for scientists interested in the current state of several key areas of homogeneous catalysis, particularly with respect to the possible impact of these areas on emerging problems in the chemicals and energy sectors.

James A. Cusumano, *Catalytica Associates, Inc.*

Aspects of Homogeneous Catalysis. A Series of Advances. Volume 3. Edited by RENATO UGO. D. Reidel Publishing Co., Dordrecht, Holland/Boston. 1977. vii + 240 pp. \$39.50.

This book is the third volume in a continuing series devoted to advances in the field of homogeneous catalysis. It contains reviews on three areas of homogeneous catalysis: metal-catalyzed homogeneous oxidation; the relations between molecular metal clusters and small metal crystallites; and asymmetric hydrosilylation.

Chapter One deals with transition metal complexes as catalysts for the addition of oxygen to reactive organic substrates. The length of

this chapter (136 pp) and an impressive list of 524 references are indicative of the intensity of recent work in this field. The work covered in this chapter was carried out over the last 10 years, with most of the references covering 1970 to 1975. The catalysts discussed are limited to complexes of the first-row transition metals and the second- and third-row metals of groups VI, VII, and VIII. After a brief introduction to structure, bonding, and other properties of dioxygen complexes, a number of classes of oxidation reactions are explored in some detail. These include the oxidation of phosphines, arsines, sulfides, nitrogen compounds, carbon monoxide, aldehydes, ketones, alcohols, and a detailed section on olefins.

Chapter Two is a timely essay on the structural and electronic relations between molecular clusters and small metal particles. The authors do an admirable job of comparing and contrasting molecular clusters with dispersed metal systems. The comparison of dispersed metals with molecular clusters includes an analysis and discussion of size range, physical methods of characterization, geometric relationships, electronic structure, and metal-metal bonding. The chapter serves a very useful function as it not only reviews metal clusters and dispersed metals, but also raises a number of questions and points worthy of further study. Very little catalytic data are discussed. However, this is probably due to the limited number of published data on molecular clusters. Recent increased interest in this area (e.g., Rh clusters for polyhydric alcohol synthesis) should change this over the next few years.

Chapter Three covers recent advances in catalytic asymmetric hydrosilylation. Asymmetric synthesis, in general, has received increased attention, particularly following the commercialization of L-Dopa synthesis using a chiral rhodium complex. This section deals with the asymmetric hydrosilylation of olefins as well as carbonyl and imino compounds, catalyzed by transition metal complexes of chiral phosphine ligands. Significant emphasis is placed on the asymmetric reduction of prochiral carbonyl compounds, an area which has been studied extensively over the last five years. The treatment is reasonably comprehensive considering the available data. The 72 references cover the period of 1958 to 1975, with most of the work between 1970 and 1975.

This volume provides a useful compendium of timely topics in homogeneous catalysis. It should be of use to scientists interested in both homogeneous and heterogeneous catalysis.

James A. Cusumano, *Catalytica Associates, Inc.*

The DNA Molecule: Structure and Properties. By D. FREIFELDER (Brandeis University). W. H. Freeman and Co., San Francisco, Calif. 1977. x + 499 pp. Cloth, \$20; paper, \$12.

Indeed as the author of this book states, the reading of original papers can give an undergraduate science student insight into experimental research, which cannot be obtained from the standard textbooks and lectures. This book is a collection of 44 published articles on DNA structure with short introductions to its ten sections, questions for the student, and appendices for the uninitiated molecular biologist. The assembled material is intended as a supplement to a course in molecular biology, molecular genetics, or nucleic acids.

With discretion in the choice of papers to be used from the collection, appropriate explanation of ill-defined experimental details, and application mainly in advanced undergraduate and beginning graduate courses, an instructor could make valuable use of this book. The papers begin with the now classic Hershey-Chase experiment of 1952 showing that the DNA rather than the protein of T2 bacteriophage is the genetic material and end with Worcel and Burgi's study in 1972 of the highly folded conformation of the *Escherichia coli* chromosome. Most articles in this collection deal with the secondary or tertiary structure of DNA, its length, or its semiconservative replication. Some of the included papers such as No. 18 by Doty and co-workers provide excellent illustrations of logical thought coupled with elegant experimentation elucidating very important biochemical phenomena. Other articles in this book would require lengthy explanations before they could be understood by most students and deal either with less universal phenomena or, although they are good science, are not suitable for pedagogical purposes. Some aspects of DNA structure are described in a multiplicity of articles while other basic attributes of DNA like the repetitiveness of eukaryotic DNA, the nearest neighbor or pyrimidine isostich analysis of DNA, or the methylation of DNA are not covered at all. The recent, very important breakthroughs in sequencing DNA are not included.

It seems inappropriate to assume that most of the papers in this book

could be understood by undergraduates who have so little previous exposure to molecular biology that they would need Appendix A, "Structural Formulas of the Components of DNA and RNA" and the overly simplified Appendix B, "Life Cycle of *E. coli* Phages T2 and T4". However, for the more advanced student many of the full length papers in this book and many of the questions formulated by the author, would greatly enhance the students understanding of several aspects of DNA structure and DNA research. Furthermore, this compilation of articles provides a good historical perspective for molecular biologists who obtained their training after many of these papers had been published. Some of these articles clarify for the younger scientists why certain attributes of DNA, which in retrospect seem noncontroversial, were so heavily emphasized.

Melanie Ehrlich, *Tulane Medical School*

Aliphatic Chemistry (A Specialist Periodical Report), Volume 5. A Review of the Literature Published during 1975. Senior Reporter: A. MCKILLIP (University of East Anglia). The Chemical Society, London, 1977. xi + 337 pp. \$47.00 (£23.00).

This volume contains five chapters written by six reporters (F. D. Gunstone, K. B. Mallion, G. Pattenden, J. C. Saunders, E. F. V. Scriven, and B. P. Swann). The first chapter discusses recent work in the chemistry of acetylenes, alkenes, allenes, and olefins (B. P. Swann and J. C. Saunders). The second chapter (E. F. V. Scriven) covers the chemistry of other groups of compounds such as carboxylic acids and anhydrides, lactones, esters, α -amino acids, amides, nitriles, aldehydes and ketones, alcohols, amines, alkyl halides, ethers, and sulfur. Naturally occurring polyolefinic and polyacetylenic compounds are dealt with in the third chapter (G. Pattenden), while the chemistry of prostaglandins has been surveyed in Chapter 4 (K. B. Mallion). The last chapter deals with a review of fatty acids and related compounds covering the years 1974 and 1975 (F. W. Gunstone).

Each chapter contains valuable chemical information, mechanistic illustrations, and references. The authors have done an excellent job of compiling and presenting the recent literature of various aspects of aliphatic chemistry. This volume will be of variable addition to a science library, for it will be of interest to anyone working in the chemistry of aliphatic compounds.

Mustafa I. El-Sheikh, *University of Wisconsin—Milwaukee*

Annual Reports on the Progress of Chemistry, Volume 73, 1976, Section B, Organic Chemistry. Senior Reporters: P. G. SAMMES and J. H. P. UTLEY. The Chemical Society, London, 1977. xv + 456 pp.

The present volume covers the literature of organic chemistry for the year 1976 in 14 chapters. Twenty-eight senior reporters have contributed to this volume. The first chapter deals with physical methods and new techniques including gas chromatography, while Chapter 14 deals with certain aspects of biological chemistry, for example, peptides, proteins, enzyme mechanisms, and nucleic acids.

The other 12 chapters present work in areas such as theoretical chemistry, reaction mechanisms, arynes, carbenes, nitrenes, organometallic chemistry, aliphatic chemistry, aromatic chemistry, heterocyclic chemistry, alicyclic chemistry, and synthetic chemistry.

The volume is well illustrated with useful diagrams and the author index is quite good. This volume is another addition to the fine series begun by the Chemical Society and will be of great help to organic chemists.

Mustafa I. El-Sheikh, *University of Wisconsin—Milwaukee*

Recent Developments in the Chemistry of Natural Carbon Compounds, Volume VIII, Synthesis of Prostaglandins. By Cs. SZÁNTAY and L. NOVAK (Technical University of Budapest, Hungary). Akadémiai Kiadó, Budapest, Hungary, 1978. 267 pp. \$16.00.

This book, I believe, is the most complete and useful of the recent prostaglandin reviews to practitioners of the fast-moving field of "prostaglandin chemistry". It also has much value for chemists involved in other branches of synthetic chemistry since it has a great deal to say about the general problems of devising stereospecific, regio-specific, and asymmetric syntheses. The seven chapters consist of (1) a general introduction (2, 3) stereocontrolled syntheses of prostaglandins, (4) asymmetric syntheses of prostaglandins, (5) synthetic routes to prostaglandin analogs, (6) biosynthesis and isolation from natural sources, and (7) a brief summary of the analytical chemistry

of prostaglandins. The meat of the book is contained in Chapters 2-5, offering much critical detail on Corey's syntheses and on a variety of other approaches. Also described are a number of valuable technical improvements in syntheses of PG's and analogs made by workers at the Pharmaceutical Works Chinoin, Budapest, information not otherwise readily available. A considerable amount of time, and rightly so, is spent on the theory and practice of asymmetric syntheses. Unfortunately, the presently very active field of prostacyclin chemistry is only briefly mentioned, but this will be soon rectified by other authors.

The literature coverage through 1976 is quite complete, and an addendum gives additional references for each chapter through 1977. Relatively few typographical errors and mistaken interpretations of the literature were noted. Tables of various physical and spectral properties of many of the natural prostaglandins undoubtedly will be useful to workers in this and related fields. On the whole, this will be a valuable addition to the literature of natural product chemistry.

William P. Schneider, *The Upjohn Company*

Structure of Biological Membranes. Edited by S. ABRAHAMSSON and I. PASCHER (University of Göteborg). Nobel Foundation Symposium 34. Plenum Press, New York, 1977. xi + 580 pp. \$49.50.

This volume contains the papers presented at the Thirty-fourth Nobel Symposium on the Structure of Biological Membranes held in Skövde, Sweden, June 7-11, 1976, and in this context serves as a record of the current thinking of leading researchers in the field of plasma membranes. As such, the papers contain the results of recent experiments which add to, but do not complete, the information base required to really understand the structure and functional properties of lipid membranes.

A wide variety of direct and indirect techniques and approaches are being applied to this problem in the hope of obtaining more specific information about the structure of the membrane itself. Some of the current approaches discussed in this volume include X-ray diffraction, spin-label and fluorescent probes, surface pressure isotherms, calorimetry, specific hydrolytic enzymes, freeze fracture electron microscopy, conductivity, inelastic light scattering, X-ray scattering, immunochemistry, NMR, and circular dichroism.

Abrahamsson reviews information on crystal structure of lipids and possible implications for structure of bilayer membranes and packing of various lipid constituents. He postulates a liquid and structural role for the hydrocarbon part and a structural and surface functional role for the polar part.

Photochemical effects in chromatophore membranes are discussed by Avron et al. and Baltscheffsky.

Cadenhead provides evidence that monolayers formed at the air-water interface are valid models for evaluating the behavior of lipid bilayers. Consistent results were obtained using either spin label or fluorescent probes.

Chapman and Cornell speculate on changes in membrane fluidity caused by incorporation of proteins which span the membrane. They studied phase transitions calorimetrically and suggest that if the transmembrane protein does not allow hexagonal packing of the lipid chains, the system will be unstable in the region of phase transitions.

Van Deenen et al. discuss the use of purified phospholipids in the erythrocyte membrane. They found an asymmetry in the distribution of phospholipids, with the inside predominantly phosphatidylethanolamine and phosphatidylserine, the outside sphingomyelin and phosphatidylcholine about equally distributed. Some information on surface pressures could be obtained by comparing the kinetics of specific lipases on the erythrocyte membrane with their activity against lipids in monomolecular films under known surface pressures.

Spin-label interpretation for amphiphilic molecular probes is outlined by Ehrenberg et al. Ernster et al. find evidence that conformational changes of ATPase may play an important role in energy transport across mitochondrial membranes.

Eylar shows some correlations between myelin membrane proteins and multiple sclerosis and Guillain-Barre syndrome.

Hackenbrock studied the fluidity of mitochondrial membranes by both differential scanning calorimetry and freeze etch techniques. He concludes that these membranes contain a high concentration of transmembrane proteins in a very fluid phospholipid environment. The proteins such as cytochrome oxidase can translate laterally, rotate, and move in conjunction with other proteins, providing a diffusional

component in electron transport.

Lucy uses the hen erythrocyte for studying membrane fusion. It appears that an increase in the permeability to Ca^{2+} is an initiating factor in fusion. A redistribution of phospholipid is hypothesized to follow the onset of fusion.

The latter part of the book contains a number of excellent short reviews on current aspects and models for membranes. Ovchinnikov reviews the properties of peptide ionophores as probes for membrane structure; Scanu shows that specific phospholipases can be used as structural and functional probes of circulating lipoproteins; Singer reviews his fluid mosaic model of membrane structure; Tanford describes the suitability of detergents for providing an appropriate environment to isolate membrane proteins, and Traube outlined the use of the theory of electrostatics as applied to membrane phenomena.

The symposium organizers and contributors have provided an excellent "state-of-the-art" compilation of membrane research which should be of great value to those working in this or related subject areas.

Jerome S. Schultz, *University of Michigan*

Membrane Electrodes. By N. LAKSHMINARAYANAIH (University of Pennsylvania School of Medicine). Academic Press, New York, 1976. x + 368 pp. \$34.50.

The classification of an electrode as belonging to the membrane category has broadened in recent years from ion-selective membrane types to nearly any electrode configuration that includes a change in phase at its boundaries. In presenting this subject, the author first provides the reader with a review of electrochemistry and then discusses the various modalities of constructing membrane electrodes along with typical performance data. The theory of electrochemistry of aqueous solutions more or less follows the approach given in standard texts of physical chemistry. Membrane electrode potentials are related to single electrode potentials and membrane potentials. Various models are discussed for estimation of membrane potentials depending on the boundary conditions chosen for the "membrane phase" which separates the two aqueous solutions.

The various approaches for determining the potential across liquid junctions, i.e., Henderson, Planck, are mentioned but not in sufficient detail to really appreciate the assumptions involved in these classical derivations. The other classical theories for membrane potentials given by Teorell, Meyer and Sievers, Staverman, Goldman, and Hodgkin and Katz are outlined and compared in a very brief manner. The very important theoretical analysis of Eisenman and colleagues for estimating potentials across liquid membranes with mobile carriers is presented and serves as a basis for the understanding and design of carrier-type, ion-selective liquid membranes.

The next four chapters of the book are devoted to the literature concerning solid membrane electrodes. The most common device of this nature is the familiar glass electrode which is sensitive to hydrogen ion activity. In the past 16 years a multitude of substances have been found to exhibit selectivity to ionic transport and thus could serve as the basis of ion-selective electrodes. These devices are formed by placing at the active end of the electrode probe either a thin crystal wafer such as AgBr, a heterogenous powder of an inorganic salt in a polymer matrix, or an ion-exchange membrane.

In operation, these electrodes are used in the same manner as conventional glass pH electrodes; that is, both the ion-selective electrode and a reference electrode are placed in the test solution and connected to a high impedance millivoltmeter. The measured potential is then related to concentration of the species of interest.

Characteristics of interest to the user of these electrodes are selectivity, sensitivity, and stability. For the electrodes fabricated with inorganic membranes, selectivity arises from the fact that only anions and cations of the same type as the crystal lattice have appreciable mobility in the lattice. Potentials develop across the electrode in response to change in the concentration of these ions. However, an exact understanding of all factors that influence ion mobility in solids is not available at this time, and much of ion-selective membrane development is of a semiempirical nature. Therefore, the theoretical concepts presented in the first few chapters are not very helpful in the author's

organization of the enormous amount of published information available for these systems.

The author has elected to present the material along the lines of specific ions, so that one can easily find electrode systems that are available for individual ions. Unfortunately, this approach is not very instructive in developing a comprehensive framework for the understanding of these systems by a reader who is not already very familiar with membrane electrodes. Where the information is available, tables of selectivity are given for the many electrodes discussed. Somewhat less data on electrode sensitivity is given and hardly any information on stability appears, presumably reflecting the interest priorities of researchers in this field.

The chapter on liquid ion-selective membranes is very complete and didactically satisfying, perhaps because of a closer correspondence between theory and experiment. In these electrodes, the selective membrane is formed by placing an ion-binding organic carrier in an immobilized organic phase. For example, the cyclic peptide, valinomycin, selectively binds K^+ , and, when placed in an organic solvent such as diphenyl ether, will selectively facilitate the transport of K^+ across this phase by a factor of 10,000 when compared to Na^+ transport. A comprehensive survey of these systems is clearly and concisely given.

After a chapter on conventional glass electrodes, the author briefly introduces other approaches for the construction of membrane electrodes that are sensitive to non-ionic species and are under active development. Examples include the Clark oxygen electrode which is basically a miniature polarographic cell placed behind an oxygen permeable membrane, and various electrodes based on the selectivity of enzyme reactions. In the latter types, an enzyme is immobilized between a dialysis membrane and an electrode sensitive to a component of the enzyme-catalyzed reaction scheme. For example, a gel containing glucose oxidase is placed over the end of a Clark O_2 electrode and covered with a dialysis membrane. Then, when the electrode is placed in a solution containing glucose, glucose penetrates the membrane and the oxygen consumed according to the reaction: $\text{glucose} + \text{O}_2 = \text{gluconic acid} + \text{H}_2\text{O}_2$. A change in O_2 concentration is an indirect measure of glucose concentration.

In summary, this book comprehensively documents most of the literature on ion-selective electrodes up to the date of publication. One is quickly guided to the original literature to obtain complete details for specific ionic systems. On the other hand, while the principles of other membrane electrode systems are fully illustrated, the depth of coverage is somewhat superficial compared to the earlier sections of the book.

An author index would have added to this book's value as a reference text.

Jerome S. Schultz, *University of Michigan*

The Selectivity of Drugs. By ADRIEN ALBERT (Australian National University, Canberra). Chapman and Hall, London, 1975. 64 pp. \$3.25.

For the chemist beginning an inquiry into the selective biological activity of drug molecules, Professor Albert's book provides a useful introduction. As promised in the Editor's foreword, this is a guidebook, not a textbook. As such, it provides enough information to acquaint the reader with the major approaches to correlating structure with biological activity and selectivity, while leaving the textbook detail to references.

The author defines selectivity and describes the concept of "receptors", the most important working model for relating molecular structure to activity. He then explores three determinants of activity: distribution, biochemistry, comparative cytology. As long as the reader remembers that these areas are often intricately interrelated, their separation into three distinct categories serves a useful teaching function. Interesting examples from the literature illustrate each area.

This brief book should give the neophyte a quick glimpse at how one approaches the area of drug selectivity. Should further information be desired, the "suggestions for further reading" at the end of each chapter is an excellent source of texts and reviews.

William L. Scott, *Eli Lilly and Company*