

Book Reviews*

Topics in Phosphorus Chemistry. Volume 7. Edited by EDWARD J. GRIFFITH (Monsanto Company) and MARTIN GRAYSON (American Cyanamid Company). Interscience Publishers, a division of John Wiley & Sons, New York, N. Y. 1972. viii + 444 pp. \$35.00.

The present volume consists of six topics: addition reactions of tertiary compounds with electrophilic olefins and acetylenes, oligophosphonates, nonenzymatic hydrolysis at phosphate tetrahedra, cyclophosphates, compilation of physical data of phosphazo trihalides, and peroxyphosphates. The specialized nature of the book makes it a valuable addition to any phosphorus chemist's library, but it is of considerably less value to the general scientific reader without adequate background knowledge of phosphorus chemistry. The authors' treatment of subject matter, including reaction mechanisms, reflects the assumption that the reader is reasonably well acquainted with organophosphorus and inorganic phosphorus chemistry. The tabulation of known ^{31}P nmr, ir, and other data of compounds properly referenced should prove to be of great help to the research worker studying compounds of the type discussed in the book.

U. Albert Lehtikoinen, *Ethyl Corporation*

A Textbook of Physical Chemistry. By ARTHUR W. ADAMSON (University of Southern California). Academic Press, New York and London. 1973. xxi + 1079 pp. \$16.95.

This well-written book is intended for students who have used a modern elementary text with a strong emphasis on molecular behavior. While the order of topic presentation is the standard way of macroscopic phenomena and thermodynamics first and wave mechanics second, the necessary molecular topics are presented early so that both macroscopic thermodynamics and statistical approaches are presented together. The usual thermodynamic applications such as equilibrium, phases, solutions, and cells are presented in the traditional manner. The presentation on kinetics is divided into two chapters: the first on gas-phase reactions and the various rate theories, and the second chapter on reactions in solution. The treatment of diffusion-controlled reactions, collision encounter theory, and other special problems of kinetics in solution is unusually well done and not found in other texts. The chapter on wave mechanics does a good job on the hydrogen atom. The treatment of group theory is unusually successful. With a minimum of mathematical derivation, it is possible for the student to determine the correct choice of symmetry orbitals for bonding, and the same approach is applied later in the treatment of molecular spectra. The subject of excited electronic states is treated very well and is extended into a useful treatment of photochemistry. The book ends with chapters on solids, colloids, and surface chemistry, and nuclear and radiation chemistry.

The organization of the chapters clearly demonstrates care and selectivity. The basic material necessary to understand the topic is presented first followed by a "Commentary and Notes" section in which the author consolidates the efforts of the first part and presents some examples beyond the range of the introductory treatment. A "Special Topics" section offers choice of extra topics such as partial molal quantities, theory of diffusion, etc. A set of exercises with answers given is followed by a set of more involved problems without answers.

In answer to the question "How does the student learn from this book?" I would say that the major learning device is the very clearly worded explanation. While the necessary mathematical derivations are well done, the book does not depend on mathematical manipulations as much as in clarity of explanation. Experimental techniques are not emphasized in the chapters, but the problems bring up a number of novel approaches. The book does not have as many photographs and illustrations as some.

George L. Hardgrove, Jr., *St. Olaf College*

The Chemical Structure and Thermal Characteristics of Polymers (a translation of *Khimicheskoe Stroenie i Temperaturnye Kharakteristiki Polimerov*). By V. V. KORSHAK (Institute of Hetero-Organic Compounds, Academy of Sciences of the USSR). Trans-

lated by J. SCHMORAK. Israel Program for Scientific Translations, Jerusalem. 1971. Halsted Press, John Wiley & Sons, Inc., New York, N. Y. 1972. vii + 460 pp. \$37.50.

Originally published in Russian in 1970, this is a companion monograph to "Heat-Resistant Polymers" by the same author. Comments in the review of the latter book [*J. Amer. Chem. Soc.*, **94**, 5142 (1972)] regarding usefulness, level of presentation, format, and literature coverage apply to the present one. At first glance the two books appear to be quite similar in content. The earlier volume, however, represents a survey of polymers, both organic and inorganic, of interest as heat-resistant materials, whereas the current volume focuses specifically on the relationship between structure and thermal properties.

Heat resistance (threshold temperature at which the polymer loses its mechanical strength under externally applied load of a specific magnitude) and thermal resistance (threshold temperature at which polymer undergoes chemical change with a corresponding change in properties) are systematically examined as a function of repeating unit, presence of side groups and branching, crosslinks, stereoregularity, molecular weight, and chain flexibility. The relationship between heat resistance and thermal resistance, methods of determination of thermal resistance, and the mechanisms, kinetics, and chemical changes involved in thermal decompositions (both in air and inert media) are reviewed. The non-Russian literature is reviewed to about 1969 and the Russian literature to 1970.

Those who find the earlier volume a useful reference work should obtain this one. Either one is less useful without the other.

Daniel T. Longone, *University of Michigan*

Vibrational Spectroscopy of Solids. By P. M. A. SHERWOOD (University of Newcastle upon Tyne). Cambridge University Press, New York, N. Y. 1972. xii + 254 pp. \$19.50.

This book is intended for use by undergraduate students and research workers who are unfamiliar with the field of solid-state spectroscopy. It opens by differentiating between vapor-phase and solid-phase spectra. A short discussion of lattice vibrations follows, with the most detail presented for the one-dimensional chain and with brief, qualitative coverage for a series of more complex cases that extend to point defects. Numerous literature citations are given for detailed theoretical and experimental studies of the vibrational problem. A chapter considers the applications of group theory to the crystal lattice. Definitions are given for the various relevant groups, and a detailed unit cell analysis is presented for calcite (listing all the normal modes as equations and as figures). Character tables are collected in an appendix. A list of more than 50 literature citations are given for crystals analyzed with the help of infrared and Raman techniques.

Two particularly interesting chapters consider the interaction of radiation with the crystal and second-order spectral effects. These topics are broadly surveyed and many interesting points uncovered. The microscopic and macroscopic models for the crystal dielectric properties are presented, and absorption, reflection, and scattering by the crystal are discussed. Multiphonon effects are included, and a strong emphasis is given to research work on the effects of crystal size and shape on the observed properties.

The book impresses one as an excellent source of definitions and of quick, qualitative, discussions of a great many solid-state phenomena (with infrared and Raman studies predominant). The book provides a ready access to the literature of the many topics covered with 778 references dating through 1971. The book is too cursory on most topics to serve as a strong text, but it does provide the desired qualitative though wide-ranging introduction to solid-state spectroscopy; it excites the curiosity and provides a pleasant step to the more advanced discussions of the field.

R. L. Redington, *Texas Tech University*

Chemical Technicians' Ready Reference Handbook. G. J. SHUGAR, R. A. SHUGAR, and L. BAUMAN. McGraw-Hill Book Co., New York, N. Y. 1973. xi + 453 pp. \$19.50.

This handbook will be a welcome addition to general as well as private libraries. It should be particularly useful to the occasional chemist who either has forgotten basic techniques or who must, for lack of formal instruction, work out procedures on his own.

* Unsigned book reviews are by the Book Review Editor.

Teachers should find it an aid in organizing laboratories and courses, as necessary equipment and procedures are illustrated and equipment sources are suggested.

This book is divided into three main sections. One is techniques and procedures, first describing what a chemical technician is and does, then discussing laboratory techniques and procedures, heating, sublimation, evaporation, and centrifuging, interjoint glassware, mechanical agitation, determination of physical properties, basic chemistry, grades of purity of chemicals, basic concepts in organic chemistry, the balance, the technician and his sample, volumetric analysis, pH measurement, the electromotive series, an introduction to mass spectrometry, determination of elements in organic compounds, electricity, and a collection of useful tables. A section on equipment follows. Section three is devoted to practical reference information including a glossary of important terms, the metric system, signs and symbols commonly used, prefixes and abbreviations commonly used, arithmetic, the slide rule, and a table of hazardous chemicals.

Sections are well illustrated and procedures are clearly described with adequate warnings for the novice. It is hoped that future editions will have a more extensive bibliography which would be useful when the book is used in areas where large libraries are not available for browsing.

M. C. W. Smith, *University of Michigan*

Advances in Inorganic Chemistry and Radiochemistry. Volume 15. Edited by J. H. EMELÉUS and A. G. SHARPE (Cambridge University). Academic Press, New York, N. Y. 1973. vii + 351 pp. \$24.00.

This volume consists of five contributed review chapters: Secondary Bonding to Nonmetallic Elements (N. W. Alcock); Mössbauer Spectra of Inorganic Compounds (G. M. Bancroft and R. H. Platt); Metal Alkoxides and Dialkylamides (D. C. Bradley); Fluoroalicyclic Derivatives of Metals and Metalloids (W. R. Cullen); and The Sulfur Nitrides (H. G. Heal). The lack of a preface is noticeable, particularly in view of the fact that the authors do not indicate in their chapters the termination date of their coverage of the literature. There is an author index, a subject index, and a list of contents of previous volumes.

Descriptive Medical Electronics and Instrumentation. By T. C. KARSELIS (SUNY Buffalo). Charles B. Slack, Inc., Thorofare, N. J. 1973. xv + 373 pp. \$14.95.

This book is intended for medical technologists and allied personnel, and the author states that "a potential reader need be familiar with only a few basic principles of algebra, chemistry, and physics." The approach is pragmatic. There is a bibliography of books that carries the reader deeper into the subject, a 54-page glossary of terms, and a subject index. Clinical chemists might find this book useful, although therapeutic and bioengineering aspects make up perhaps a third of it.

Nitrogen NMR. Edited by M. WITANOWSKI (Polish Academy of Sciences) and G. A. WEBB (University of Surrey). Plenum Press, New York, N. Y. 1973. ix + 403 pp. \$28.00.

Six contributed chapters make up this book: Theoretical Background of Nitrogen NMR (by the editors); Experimental Aspects (E. W. Randall); Nitrogen-14 Nuclear Quadrupole Effects (J. M. Lehn and J. P. Kintzinger); Nitrogen Chemical Shifts in Organic Compounds (M. Witanowski, L. Stefaniak, and H. Januszewski); Correlations of Nitrogen Coupling Constants with Molecular Structure (T. Axenrod), and Applications of ^{14}N NMR Data in the Study of Inorganic Molecules (N. Logan). The subject is one that has grown up almost entirely in the last decade, and, although there have been review articles and chapters on the subject, this is the first book devoted to it. Emphasis is given to the potential value of studying the effects of the nuclear quadrupole moment of ^{14}N , which are so commonly regarded as an annoyance owing to broadening of the nmr lines. Nmr of ^{15}N is dealt with with respect both to natural abundance (<0.5%) and ^{15}N enriched compounds. Many tables of data and long lists of references (to early 1972) make this book a useful work of reference.

3rd International Congress of Atomic Absorption and Atomic Fluorescence Spectrometry. Volumes 1 and 2. Edited by M. PINTA. Wiley/Halsted, New York, N. Y. 1973. xvii + 398 and xvii + 924 pp. \$35.00.

In these two volumes are to be found 69 papers presented at the Congress held in Paris in 1971. They are multilingual and are reproduced from the authors' typescripts. The papers are reports of original research; it is not clear whether the material has already

been published elsewhere, in which case this book is redundant, or if the authors expect to seek journal publication of material already in print. The categories of the papers are quite varied: Theory and Methodology; Apparatus; Atomic Fluorescence; Rocks, Soils and Minerals; Water, Agriculture and Related Subjects; Biology; Metals; and Miscellaneous. Two pages at the end of Volume 2 are headed "Index", but they in fact contain only a list of contributors of papers.

Non-Polluting Coatings and Coating Processes. Edited by J. L. GARDON (M & T Chemicals Inc.) and J. W. PRANE. Plenum Press, New York, N. Y. 1973. vii + 272 pp. \$17.50.

An ACS Symposium held in August, 1972, gave rise to the nineteen papers in this book, which are reproduced from typescript. The subject has become of concern because of recent air-pollution regulations, which have a major effect on users of coatings that emit solvents into the atmosphere during application. Many of the papers deal with use of electron beams, ultraviolet curing of solvent-free resins, and electrodeposition. There is a short subject index.

Water-Soluble Polymers (Volume 2 of Polymer Science and Technology). Edited by N. M. BIKALES (Rutgers University). Plenum Press, New York, N. Y. 1973. xvi + 424 pp. \$20.00.

A symposium held by the Division of Organic Coatings and Plastics Chemistry of the American Chemical Society in August, 1972, provided the papers that compose this volume. However, they have been somewhat enlarged to include more detail and larger bibliographies. Water-soluble polymers have become of greater importance recently because of their ability to flocculate suspended solids, which has engendered much interest on the part of chemists concerned with treatment of waste waters. The papers are not all concerned with this aspect, however; petroleum recovery, modification of fluid flow, water-based finishes, and biological properties are given attention. There are also groups of papers on synthesis and on characterization.

The papers are reproduced from typescript. There is a good subject index.

Aromaticity. By P. J. GARRATT. McGraw-Hill, London. 1971. 184 pp. \$3.40.

This paperback, part of the European Chemistry Series, is intended for students in their final year of the Chemistry Honours B.Sc., and for postgraduate students. It deals with all major aspects of aromaticity as seen from the titles of its ten chapters: The Aromaticity Problem; Cyclobutadiene, Benzene, and Cyclooctatetraene; The Annulenes; Monocyclic Aromatic Ions; Monocyclic Antiaromatic Ions; Annulenes, Fulvenes, and Related Systems; Heterocyclic Systems; Polycyclic Systems; Homoaromatic and Bicycloaromatic Systems; Aromatic Transition States and Criteria for Aromaticity. It is well-documented, including literature data until 1971, and easy to read. It does not shun controversial or open topics, and when the author exposes his own ideas he frankly states his bias (*e.g.*, p 106). The illustrations and formulas are ample and excellent. A subject index facilitates the search of topics, but a few items are absent from the index, *e.g.*, calicene, though they are discussed in the book. Each chapter has a few selected literature references (mostly reviews) for further reading.

Typographic errors are few: on p 128 and in the bibliography Märkle (correct Märkl); same page, formula 44, H^+ should be H^2 ; same page, 1.75° (correct 1.75 Å); on p 134, 1,6-diazo[10]-annulene (correct diaza); p 135, oxazolanes (correct oxazolones); p 138, K-electron (correct π -electron); 86, Fig. 4.13, a bond is missing in two eight-membered rings; p 169, line 9, appears (correct appear); $\text{C}_6\text{H}_5\text{N}$ in Fig. 4.7, p 76 (correct $\text{C}_6\text{H}_5\text{N}$).

A few mistakes can be noted: on p 109, the NMe_2 group of 34 is electron-donor, not -withdrawing; pyrylium pseudobases (*cf.* 35) open their ring to 1,5-enediones. Two different values for the pK_a of triphenylcyclopropene (40 on p 96, 51 on p 97) are included without a critical comment. There are actually three, not two, types of monocyclic aromatic heterocyclic systems with one heteroatom (*cf.* p 118), the third type being exemplified by borepin which is not mentioned, and correspondingly there are more types of systems with two heteroatoms (p 130).

The reviewer would have welcomed a comment on the biochemical importance of hydroxypyrimidines (67, 68, pp 133-134) or porphine (70). Additional suggestions are the aromaticity of pyrylium cations evidenced by their uv, ir, and nmr spectra and the fact that tricyclo[10.6.0.0^{8,10}]octadecanonaene, an isomer of ben-

zoctalene 69 (p 157), should be a triplet, evidencing the influence of the topology of condensation.

Despite these minor drawbacks, compared with other recent books on aromaticity, Dr. Garratt's textbook is one of the best available for students and postgraduates.

Its modest price makes it a book worth owning for most organic chemists.

A. T. Balaban, *Institute of Atomic Physics, Bucharest, Roumania*

Free Radicals (Volume 1. Dynamics of Elementary Processes). Edited by J. K. Kochi. Wiley-Interscience, New York, N. Y. 1973. 712 pp. \$37.50.

In the series "Reactive Intermediates of Organic Chemistry" edited by G. A. Olah, a four-volume monograph concerning free radicals is edited by Professor J. K. Kochi.

The first volume contains eleven chapters: Rate Processes in the Gas Phase (J. A. Kerr); Rate Constants for Free Radical Reactions in Solution (K. U. Ingold); The Decompositions of Peroxides and Azoalkanes (T. Koenig); "Cage" Effects (T. Koenig and H. Fischer); Diradicals: A Case Study of Trimethylene (R. G. Bergman); Chemically Induced Dynamic Nuclear Polarization (H. R. Ward); Reactivity, Selectivity, and Polar Effects in Hydrogen Atom Transfer Reactions (G. A. Russell); Free Radical Rearrangements (J. W. Wilt); Electron Transfer Reactions of Organic Anions (J. F. Garst); Biomolecular Homolytic Substitution at Metal Centers (A. G. Davies and B. P. Roberts); and Oxidation-Reduction Reactions of Free Radicals and Metal Complexes (J. K. Kochi).

A subject index is appended. More detailed (author and subject) indexes will presumably conclude the last volume of the monograph.

By a careful selection of topics and authors, the first volume gives a wide coverage of topics with up-to-date literature data (including 1972). Printing conditions are excellent with very few printing errors (one concerns the photolysis of aryllithiums, p 534; 2-naphthyl and 2,2'-binaphthyl derivatives should be mentioned in the text and formula (77) instead of 1-naphthyl derivatives).

Though the style differs from one author to another, most chapters are very readable.

This monograph constitutes a valuable source of information which should recommend it for all chemical libraries and for those interested in free radicals.

A. T. Balaban, *Institute of Atomic Physics, Bucharest, Roumania*

The Rheology of Lubricants. By T. C. DAVENPORT (British Petroleum Co., Ltd.). Halsted Press, a Division of John Wiley & Sons, Inc., New York, N. Y. 1973. x + 148 pp. \$13.75.

Eleven papers on rheology with discussion summaries have been compiled into the book, "The Rheology of Lubricants."

The contributing authors, from industrial research laboratories and universities, have covered a broad range of rheological problem areas. The coverage will be beneficial to the reader in identifying those areas in which rheological investigations are being conducted.

The authors have indicated the effect of pressure on viscosity, the effect of rapid pressure changes, and the effects of temperature extremes as examples of some of the areas where the knowledge of rheological properties of lubricants is likely to be important.

Authoritative reviews of all of the papers have been made and appear in the back section of the book as a Discussion Summary.

The "Rheology of Lubricants" will be a valuable reference both for the theoretician and the experimenter in rheology.

John B. Christian, *Air Force Materials Laboratory
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Ring-Forming Polymerizations. Parts B,1 and B,2. Heterocyclic Rings. By R. J. COTTER and M. MATZNER (Union Carbide Corp.). Academic Press, New York, N. Y. 1972. Part B,1: xxi + 422 pp. \$37.95. Part B,2: xxi + 568 pp. \$39.50.

These two volumes and Part A (1969: "Carbocyclic and Metallorganic Rings") constitute Volume 13 of "Organic Chemistry. A Series of Monographs." Over the past ten years this series, under the editorship of A. T. Blomquist and now with coeditor H. Wasserman, has produced two dozen volumes which are as valuable as they are diverse in subject matter. Volume 13, the first devoted to polymer chemistry, is a most useful addition to the series.

The two parts discussed here are a comprehensive review of those polymerizations which proceed with the formation of a heterocyclic ring. This approach brings together interrelated work from diverse areas of synthetic polymer chemistry. Written primarily for chemists who are currently involved in polymer

synthesis, it is an excellent reference work for those about to enter the field as well as instructive to chemists who see a gulf wider than exists between organic monomer synthesis and organic polymer synthesis.

Starting with polymerizations which generate carbon-nitrogen, nitrogen-nitrogen, and nitrogen-phosphorus double bonds ("two-membered rings"), the material is organized according to the number of carbon atoms in the ring being generated. The coverage is exhaustive and the presentation a model of clarity and conciseness. The text outlines synthetic methods, properties, and applications. The bulk of the information, however, appears in the tables which occupy the greater portion of the volumes. The tables contain structural formulas (polymer repeat units), methods of preparation, relevant physical data, and literature references. The format allows the reader to find in a few minutes, for example, much about polyimides based on pyromellitic anhydride (84 structural entries) from among the 400 entries containing the imide linkage.

Both volumes contain author and subject indexes; the latter include monomers. Other useful features are: chapter references arranged in alphabetical order by author; patent listings with inventors, assignees, and *Chemical Abstracts* citations; and supplementary references at the end of each book which extend the literature coverage into 1971. In addition, Part B,2 contains a supplementary reference list (into 1971) for Part A.

Part B,1: Multiple Bond-Forming Polymerizations; Rings Containing Two Carbon Atoms; Rings Containing Three Carbon Atoms.

Part B,2: Rings Containing Four Carbon Atoms; Intra-Intermolecular Polymerizations Leading to Heterocyclic Rings; α,β -Unsaturated Aldehyde Polymerizations; Miscellaneous Ring-Forming Polymerizations.

Daniel T. Longone, *University of Michigan*

Annual Reports on NMR Spectroscopy. Volume 5A. Edited by E. F. MOONEY (Anacon Instruments, Ltd.). Academic Press, London. 1972. xii + 696 pp. £13.00.

Workers specializing in or making extensive use of nmr techniques are only too aware of the burgeoning literature and, therefore, the need for frequent, comprehensive reviews. During the past decade, several annual series have been established that tend, from year to year, to deal with a rather unpredictable range of subject matter and degree of specialization.

The present volume is the most recent of a series that has displayed a remarkable degree of continuity over the years with respect to subject matter and organization. While there have been exceptions, the general philosophy of this series has been to avoid the "hyper-microspecialized" areas of nmr and to consistently treat more general classifications (an increasingly difficult task) such as proton and fluorine nmr, conformational analysis, etc. Continuation along these lines has required this latest volume to exceed, by twice, the length of its 1968 predecessor and to relegate to a separate volume (5B, not reviewed here) aspects of phosphorus nmr.

The separate topics covered in Volume 5A are proton magnetic resonance, fluorine magnetic resonance, nmr of carbohydrates and related compounds, heteronuclear magnetic double resonance, nitrogen nmr, nmr of liquids containing Al and Ga compounds, and Fourier-transform high-resolution nmr.

The last chapter, on Fourier-transform nmr techniques, is particularly timely in view of the current, rather enormous influence of pulse methods in high-resolution work (in fact, the presence of this chapter seems to emphasize the absence of one on carbon-13 nmr). The, as yet modest, literature on Fourier-transform nmr has resulted in a fairly up-to-date coverage, whereas the companion chapters review work only through 1970.

Those specialists who desire generally to keep abreast of progress in nmr should find this volume of considerable usefulness. The nonspecialist will find many of the subjects treated with almost textbook thoroughness and with generous use of illustrations and tables.

Philip I. Rose, *Research Laboratories, Eastman Kodak Company*

Conformation of Biological Molecules and Polymers. Volume V of the Jerusalem Symposia on Quantum Chemistry and Biochemistry. Edited by E. D. BERGMANN and B. PULLMAN. Israel Academy of Sciences and Humanities, Jerusalem. Distributed by Academic Press, Inc., New York, N. Y. 1973. 831 pp. (price not known).

This symposium was held in April, 1972, and consists of 57 papers that on the whole appear to be reports of original research, both experimental and theoretical. The important subject of conformation in proteins and polynucleotides dominates the contributions.

The growth of this subject has raised new problems of nomenclature, to deal with which an informal committee was formed; its unofficial recommendations, which are to be submitted to IUPAC, are printed as an appendix. Although the proposals may be sound and desirable, there is the danger in formalizing them in print at this stage of preempting the work of the IUPAC committees and thus of promoting unapproved practices that may differ materially from those ultimately adopted.

The discussions following many of the papers are included, but only where both questions and answers were subsequently supplied to the editorial committee in writing. This appears to be a salutary procedure.

Annual Reports in Organic Synthesis—1972. Edited by JOHN McMURRY and R. BRYAN MILLER (University of California). Academic Press, New York, N. Y. 1973. xii + 273 pp. \$7.50.

It is gratifying to see that the "poor man's Theilheimer" is continuing. As in the two previous volumes, reactions of synthetic value are presented succinctly by equation with adjacent reference, and are organized in seven chapters covering broad categories, such as "Protecting Groups," "Reductions," etc., plus a two-page list of reviews of synthetic processes. It is intended largely as a bridge between current-awareness publications and works of permanent reference, and this fact plus the internal organization makes an index (which is not included) unnecessary. This book can be recommended for personal purchase.

Environmental Chemistry—Air and Water Pollution. By H. STEPHEN STOKER and SPENCER L. STAEGER (Weber State College). Scott, Foresman, and Co., Glenview, Ill., and London. 1972. iv + 168 pp.

Our Chemical Environment. Edited by J. CALVIN GIDDINGS and MANUS B. MONROE (University of Utah). Canfield Press, San Francisco, Calif. 1972. xiii + 367 pp. \$4.95.

On the current wave of ecological awareness much has been written about environmental pollution and much of it with intense emotion. The debate has become polarized; one side accuses the other of irresponsibility, of devastating our planet, and of undermining all hope for a future of dignity and joy on this earth. Whether these accusations be accurate or not, the heat of the debate will be wasted if it does not lead the profound concern into responsible action. To that end, a sober assessment of the unembellished reality of environmental problems is of prime importance.

In their book "Environmental Chemistry," Stoker and Saeger have compiled and discussed much of the factual information available to date on the extent and sources of air and water pollution. Their analyses include sources and distribution of pollutants, their

impact on plant and animal life, and their effects on humans. The prospects for pollution abatement and control are presented and evaluated in terms of technology, currently available or under development. The style is remarkably low-keyed; interpretations are strictly based on extensive data compiled from authoritative sources, mainly U. S. Government agencies. A great deal of these data is reproduced in the book. The result is a rather ascetic restriction to the necessity of factual evaluation that must precede meaningful involvement, without the spark to incite to action or the call of the trumpet to unite in the urgent and great cause. Certainly, the authors have realized their intent to provide "... information that will aid the reader in deciding what his feeling and actions will be concerning environmental pollution problems."

The trumpet does sound, again and again, in the articles collected in "Our Chemical Environment." An especially compelling and forceful call to mobilize all our intelligence and to combine all efforts at solving the environmental crisis is the contribution by John Platt: "What we must do." The crisis is real. Just as chemical pollutants are only one aspect of the problem, complemented by overpopulation, threat of nuclear disaster, economic imbalance, and the energy crisis, chemical technology alone cannot provide an effective solution. The crisis can be effectively met only through cooperation of all disciplines. In view of this it is fortunate that Giddings and Monroe have included in one volume contributions from authorities in many different fields. Articles have been reprinted from sources as dissimilar as *Playboy* and *Environmental Science*, with an appropriate diversity on tone. Most of the contributions are outstanding; they include factual presentations of pollution and its abatement, many of these by the staff of *Chemical and Engineering News* or of the Environmental Protection Agency. Others give interpretative projections, as the one by Glen T. Seaborg on nuclear power. Some are emphatic calls for action.

The largest segment is devoted to chemicals; one section deals with food additives, others address themselves to the problems of heavy metal contaminations, air and water pollution, pesticides, detergents, and plastics. The social contributors to the environmental crisis are scrutinized in the section on population and environmental impact, by such men as Paul Ehrlich and Garrett Hardin. The energy crisis, of course, commands its own section, followed by one on nuclear power, its beneficial as well as destructive potential.

Both books contain some elementary chemistry, but are readily understandable to readers without chemical background. Both are valuable additions to the libraries of those interested in a sincere evaluation of the many aspects of environmental pollution and its abatement.

Edith M. Bruckmann, *Stanford University*