

- (7) We thank Professor R. D. Macfarlane, Department of Chemistry, Texas A&M University for a trial with the plasma desorption MS employing  $^{252}\text{Cf}$ ; cf. R. D. Macfarlane and D. F. Torgerson, *Science*, **191**, 920 (1976).
- (8) A JEOL micro  $^{13}\text{C}$  NMR probe was used on a PS-100 instrument. Although **2** and **3** were separated by acetic acid containing solvent on TLC (see text), acetate was not the counterion ( $^{13}\text{C}$  NMR). The counterions are presumably chloride which could have been picked up during earlier stages of isolation.
- (9) G. C. Levy and G. L. Nelson, "Carbon-13 Nuclear Magnetic Resonance for Organic Chemists", Wiley-Interscience, New York, N.Y., 1972, p 47; J. B. Strothers, "Carbon-13 NMR spectroscopy", Chapter 5, Academic Press New York, N.Y., 1972.
- (10) JEOL PS-100, in  $\text{D}_2\text{O}$ ; the HDO peak was removed by making it appear as an inverted sharp signal by partial relaxed Fourier transform, and completely moved upfield from overlapping positive signals around 4.70 ppm by warming the probe to 55 °C.
- (11) Measured with a Finnigan 3300 instrument, multiple ion detection technique. We are grateful to Ms. Vinka Parmakovich for measurements.
- (12) J. L. Wong, M. S. Brown, K. Matsumoto, R. Oesterlin, and H. Rapoport, *J. Am. Chem. Soc.*, **93**, 4633 (1971).
- (13) The open acid form has so far not been isolated from STX by Rapoport and co-workers, presumably due to different workup procedures; their product is the lactam. However, the uv of the noncyclized monoanion has been reported: H. A. Bates and H. Rapoport, *J. Agric. Food. Chem.*, **23**, 237 (1975); our uv datum at pH 10 is identical.
- (14) J. L. Wong, R. Oesterlin, and H. Rapoport, *J. Am. Chem. Soc.*, **93**, 7344 (1971).
- (15) The 11-ene-11,12-diol, the intermediate in the GTX-II and -III equilibrium, could also tautomerize to the 11-ket-12-ol form. If this were GTX-III, the  $^1\text{H}$  NMR should show a sharp singlet lower than 5 ppm (12-H). This was not the case.
- (16) Relative mobility of gonyautoxin II to saxitoxin on cellulose acetate strip in pH 8.7 Tris buffer at 200 V was 0.56 (unpublished data).

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## Book Reviews\*

**Bibliography of Electrophoresis 1968-1972 and Survey of Applications.** Edited by Z. DEYL, J. KOPECKÝ, J. DAVIDEK, M. JURICOVÁ, and R. HELM. Elsevier Scientific Publishing Co., Amsterdam. 1975. 861 pp. \$83.50.

This soft-bound volume is published as Supplement No. 4 to the *Journal of Chromatography*, and is complementary to previously published bibliographies that covered column, paper, and thin-layer chromatography. The organization is similar to them and consists of a General Part and a Special Part. The former includes books and reviews, treatments of theory and principle, and all aspects of technique. The references, which number no less than 8236, are given with their full titles. The table of contents is detailed, and there is an author index and an extensive subject index entitled "List of Compounds Electrophoresed". The Czechoslovak team that compiled this work has made a most valuable contribution to separation chemistry.

**Biophysical Chemistry. Readings from "Scientific American".** Selected and introduced by V. A. BLOOMFIELD and R. E. HARRINGTON. W. H. Freeman & Co., San Francisco, Calif. 1975. viii + 231 pp. \$12.00 cloth; \$6.95 paper.

This is another in the useful series of collections of the excellently produced articles in "Scientific American". The articles date from 1951 to 1973, and include many great names among the authors. They are grouped in sections: Basic Biomolecular Structure; Macromolecular Aggregates and Organized Structures; Enzymes: Macromolecular Catalysts; and Methods to Characterize Macromolecules. Each section is begun by a unifying introduction. Four pages of bibliographies, a name index, and a subject index complete the work.

**Chemical Tables.** By BÉLA A. NÉMETH. Wiley/Halsted, New York, N.Y. 1976. 477 pp. \$27.00.

The very general title misleadingly represents the restricted scope of this work, which the author states is intended for "graduate and non-graduate laboratory and plant workers and technicians of the chemical industry". It seems to be designed only for those engaged in classical analytical control chemistry, and it ignores instrumental methods and spectrometry, except for a table of spectral lines of the elements. One-third of the book is devoted to tables of densities of inorganic solution, and nearly one-quarter to a table of the simplest properties of inorganic compounds. It will be of no use in a research laboratory, but might be of use in restricted types of relatively unsophisticated control laboratories.

\* Unsigned book reviews are by the Book Review Editor.

**Chemistry Decoded.** By LEONARD W. FINE (Housatonic Community College). Oxford University Press, New York, N.Y. 1976. xvi + 446 pp. \$11.50 (an Instructor's Manual, 131 pp, is available).

This book is fun, and will probably be so even for those who are not scientists at all. Indeed, that is the author's aim, to produce a book to introduce the student who has no technical background to chemistry in such a way as to leave him with a good feeling. This book is reviewed here because it is rather different from other general chemistry textbooks. Its approach is not simply the currently fashionable one of interlarding ecology into chemistry, but it follows the broader canon that "the student needs to be shown how chemistry fits into the whole framework of human knowledge". That is a big order, but it seems to have been fulfilled remarkably well. The numerous illustrations, their extraordinary variety (from medieval paintings to modern cartoons), and the ingenuity of their selection are an outstanding feature. They make the book enjoyable for anyone to browse in. A rich spicing of history is an integral part of the writing throughout, in contrast to the footnote treatment usually found. The author brings out what is so often disguised, that man is as much a part of chemistry as are molecules.

**Dissolution Technology.** Edited by L. J. LEESON and J. T. CARSTENSEN. Academy of Pharmaceutical Sciences, Washington, D.C. 1974. 197 pp. \$8.50.

This is a most peculiar book. It has no preface and no index. The editors are not identified as such, and one would infer that they were the authors, unless one examined the six main papers, five of which are contributed by others. The book is the proceedings of a conference, held in 1973, but that fact is nowhere stated in the book. The clue is the inclusion of a ten-page appendix, "Abstracts from an Evening Session".

The subject of the conference was dissolution of medicinal agents and the relation of formulation thereto. Chemical engineers attracted by the misleadingly general title are likely to be much disappointed, although two of the papers do deal with the fundamental theories of dissolution of particles. One of them has a group of "Selected Problems", followed by their answers, appended to the bibliography. It is not explained what role these are intended to play (or whether they were perhaps set as a homework task for the conferees?).

**Environmental Quality and Safety. Volume 4.** Edited by F. COULSTON and F. KORTE. Academic Press, New York, N.Y. 1975. viii + 276 pp. \$19.50.

This is a serial publication, devoted to reports of original research.

as well as monographs and reviews. Its frequency of publication is not clearly stated, but it appears to be an annual. It differs from conventional journals in this respect and in its physical form (hardbound book). There are thirty papers in this volume, most of which are chemically or biochemically oriented, and all of which are concerned with toxicology (with the exception of one, entitled "Farewell", that is the text of remarks made on the occasion of a retirement party). The title of the series is thus misleadingly general; the subtitle more accurately describes the publication: *Global Aspects of Chemistry, Toxicology, and Technology as Applied to the Environment*. There is a very good subject index.

**Gas and Liquid Chromatography Abstracts. Cumulative Indexes 1969-1973.** By C. E. H. KNAPMAN. Applied Science Publishers, Ltd., Barking, Essex, 1976. 381 pp. £16.00.

The last cumulative index to this publication covered the years 1964-1968. The present index completes the span of annual bound volumes; from 1973, the publication has appeared as a quarterly journal. The book is divided into a mammoth section on gas chromatography and a dainty 24-page section on liquid chromatography. Each section consists of author and subject indexes. The latter are conveniently subdivided into useful headings, such as Reviews, Apparatus and Technique, Sample Type, etc. A cumulative index such as this is always a welcome arrival and greatly increases the utility of the publication covered.

**IP Standards for Petroleum and Its Products. Part I: Methods for Analysis and Testing. 34th Edition.** By The Institute of Petroleum (Great Britain). Applied Science Publishers, Ltd., Barking, Essex, U.K. 1975. ~700 pp. £12.50.

Those in the petroleum industry will know that this work consists of standards and methods of testing approved by the Institute of Petroleum. The properties covered include numerous practical ones, such as flash point, oxidation stability of gasoline, demulsification number of lubricating oil, Ramsbottom carbon residue, heat of combustion of liquid fuels, etc. There are also standards and analytical methods for components such as sulfur, lead, barium, etc. The work is soft-bound in two sections, in the second of which is a subject index, the need for which is particularly great in view of the skimpiness of the table of contents.

**Organic Syntheses. Volume 55.** Edited by S. MASAMUNE. John Wiley & Sons, Inc., New York, N.Y. 1976. xiv + 150 + 18 pp. \$11.95.

The interests of the editor and of chemists in general in the uses of metallic compounds are reflected in seven of the thirty preparations, which involve thallium, copper, and lithium reagents. The recently introduced technique of phase-transfer catalysis is represented by three preparations. One of these is an improvement on that venerable classic, the Hofmann isocyanide reaction, used to prepare *tert*-butyl isocyanide in 66-73% yield. The reaction was hitherto useful only as a qualitative test reaction, owing to the low yields. Another antidiluvian reaction that has been subjected to improvements is the Hofmann elimination; although use of anion-exchange resins instead of silver oxide to prepare quaternary ammonium hydroxides is a quarter of a century old, it is useful to have fully detailed directions.

The matter of nomenclature is specifically noted in a foreword, wherein it is explained that "common" names are accompanied by *Chemical Abstracts* indexing names. It is a pity that IUPAC names are not explicitly considered, for they are designed for communication, whereas CA names are designed for the sole purpose of indexing compatible with computers.

The value of this series remains high, in large part owing to the diligence of the editors in keeping it abreast of current developments and interests. Many of the preparations are of more value as examples of techniques rather than for the specific products.

A memorial biography of Cliff S. Hamilton (by Wayland Noland) is an appropriate addition to this work, for he was a former Editor-in-Chief and member of the Advisory Board.

**Organic Syntheses Cumulative Indices.** By R. L. SHRINER and R. H. SHRINER. John Wiley & Sons, Inc., New York, N.Y. 1976. xi + 432 pp. \$22.50.

For the first time, the entire contents of Collective Volumes I through V are included in a single index (actually, a collection of indexes). As the number of Collective Volumes has increased, so have the time and nuisance of looking up an item in them. This cumulative

index should cut the work to one-fifth. Considering the frequency with which most organic chemists consult "Organic Syntheses", acquisition of this retrieval aid is almost an economic necessity.

This book is more than a simple integration of the indices of the five component volumes, although that in itself would be of sufficient value to justify the book. There are nine types of index: Title Names; CA Index Names; Reaction Type; Compound Type; Formula Index; Solvents and Reagents; Apparatus; Author, and General. The first two do not occur in the Collective Volumes and are newly compiled for this work.

The compilers have been concerned with the considerable changes in nomenclature practices over the 55-year history of organic syntheses, which have the effect that there is no uniform system of nomenclature for the complete span. This problem has been considerably alleviated by the new Index of Chemical Abstracts' names, which have been provided for all the early volumes for which they were previously lacking, along with the CA Registry Numbers. As a result, those whose way of thinking is so odd that the name "2,5-cyclohexadiene-1-one, 2,4,6-triphenyl-4-(5'-phenyl[1,1':3,1''-terphenyl]-2'-yloxy)-" speaks to their souls whereas "2,4,6-triphenylphenoxy" does not, will be able to find what they want. Some of us might have found a Wiswesser Line Notation alphanumeric index more useful, but it would be ungracious to complain.

Two Appendices, a Title Name index to Annual Volumes 50 to 54, and a History of Organic Syntheses complete this gift to organic chemists by the Shriner's. Their accomplishment deserves our gratitude.

**Molecular Association. Volume 1.** Edited by R. FOSTER (University of Dundee). Academic Press, Inc., London. 1975. xiv + 366 pp. \$31.25.

This volume is the first of an intended series of critical reviews dealing with interactions of chemical species (molecules, atoms, and ion) ranging from clusters of molecules without definite geometry and stoichiometry to complexes such as electron-donor-acceptor and hydrogen-bonded types. Four review articles are included in the volume, with literature surveyed through 1973 and early 1974.

Chapter 1, by Z. G. Soos and D. J. Klein, is entitled "Charge Transfer in Solid State Complexes". To cope with the infinite molecular stacks of  $\pi$ -molecular crystals, the authors develop a phenomenological molecular-exciton theory, and discuss a variety of experimental and theoretical aspects of solid-state charge-transfer complexes in terms of this theory; 340 references are cited. Chapter 2, "Dielectric Properties of Molecular Complexes" by N. Kulevsky, discusses the use of dipole moments and polarization relaxation times to elucidate molecular complexes in solution. Stable complexes, solute-solvent complexes, and solute-solute complexes in ternary solution are considered; there are 103 references. Chapter 3, "Solvent Effects on Charge-Transfer Complexes" by K. M. C. Davis, provides a detailed discussion of solvent effects on charge-transfer absorption and fluorescence bands, charge-transfer-to-solvent spectra, vibrational spectra, nuclear magnetic resonance spectra, and such thermodynamic properties as association constants, transfer energies, and transfer free energies of complexes. The theory of solvent effects is developed, and experimental results interpreted; 304 references are cited. Chapter 4, "Photochemical Reactions Involving Charge-Transfer Complexes" by R. S. Davidson, is the last and longest of the volume, having more than 450 reference citations. The chapter considers excited charge-transfer complexes that are intermediates in photochemical reactions; a large number of photochemical reactions involving intermediate complex formation are discussed.

The chapters in this volume are well written and well organized; each provides a critical, in-depth, review of the literature in the area of discussion.

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**Analytical Chemistry of the Elements. Platinum Metals.** By S. I. GINZBURG, N. A. EZERSKAYA, I. V. PROKOF'eva, N. V. FEDORENKO, V. I. SHLENSKAYA, and N. K. BEL'SKII (Vernadskii Institute of Geochemistry and Analytical Chemistry, USSR Academy of Sciences). Halsted Press John Wiley & Sons, New York, N.Y. 1975. xii + 673 pp. \$60.00.

This book is a monograph on the Analytical Chemistry of the Platinum Metals. It is part of a series of monographs entitled, "Analytical Chemistry of the Elements". When completed by the Vernadskii Institute of Geochemistry and Analytical Chemistry of the

USSR Academy of Sciences, the series will include about 50 volumes on the analytical chemistry of individual elements.

This particular monograph presents an excellent survey of applied analytical methods dealing with ruthenium, rhodium, palladium, osmium, iridium, and platinum. The monograph contains an exhaustive and up-to-date bibliography. The subject matter will be of interest to research institutes, industrial and commercial laboratories, as well as teachers and students of chemistry in academic institutions.

This book is divided into seven chapters. Chapter I covers general information on the platinum metals. For example, their position in the periodic system of the elements and their stable and radioactive isotopes are discussed as well as the natural occurrence of the elements and the types of minerals of the platinum metals.

Chapter II describes the chemico-analytical characterizations of the elements and their compounds. Physical and chemical properties are described in detail. The behavior of the platinum metals in acids, bases, halogens, and other reagents are also described.

Chapter III deals with the qualitative analysis of the platinum metals. Detailed procedures with element sensitivities are given.

Chapter IV is a presentation on the determination of the elements. Gravimetric, titrimetric, spectrophotometric, fluorimetric, electrochemical radioactivation, and kinetic and spectrochemical methods compose about one-third of the book. The interferences, the analytical errors, and limits of detection are given for many methods.

Chapter V features separation methods for the platinum metals. Methods based on distillation, precipitation, and extraction are presented. Chapter VI is devoted to the concentration of the platinum metals and their separation from associated elements. Assay enrichment and chemical methods using cation and anion exchangers are utilized. The analysis of natural and industrial objects containing the platinum metals is presented in Chapter VII. Methods for determining micro and submicro quantities of the elements in copper-nickel sulfide ores, meteorites, minerals, and other "lean" natural and industrial objects are given. Part of the chapter describes macro methods for the determination of platinum metals "rich" in concentration such as platinum concentrates and alluvial platinum.

This book should prove to be very useful to the scientist concerned with the chemistry of the six platinum metals.

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**Rubber Technology, Second Edition.** Edited by MAURICE MORTON (The University of Akron). Van Nostrand-Reinhold, New York, N.Y. 1973. 594 pp + index. \$18.50.

"Rubber Technology", Second Edition, edited by Maurice Morton, is an updated version of "Introduction to Rubber Technology" (1959). This newer book (1973) contains information related to the stereoregular rubbers developed in the intervening years. This book provides information about rubber technology to readers at all levels of scientific understanding and serves as a reference source to rubber technologists.

Concepts of polymer chemistry are introduced early and in a masterful fashion by the Editor. Within a single chapter, the reader is given an appreciation of the major distinguishing feature of polymers, their large molecular weight, and the molecular basis for rubber elasticity. An introductory chapter devoted to polymer characterization and discussion of such methods as intrinsic viscosity, gel permeation chromatography, and molecular weight averages would have been desirable for better appreciation of the discussion in the chapters devoted to specific rubbers. Similarly, it may have been more useful to have Chapter 3 on "Fillers: Carbon Black and Nonblack", after Chapter 4 on "Processing and Vulcanization Tests" and Chapter 5 on "Physical Testing of Vulcanizates".

As might be expected of a book with separate chapters written by different authors, certain topics are covered in an exceptionally complete manner, whereas others are deficient. Chapter 3 on "Fillers: Carbon Black and Nonblack" is an example of a well-written chapter. In it, an introduction to the types of fillers is given, along with the general property characteristics resulting from their presence and a theory of filler reinforcement. The Mullins effect or stress-softening behavior is described, and a complete and useful set of references is provided for the reader for further study. Chapter 10 on "Butyl and Chlorobutyl Rubber" is another example of a well-organized chapter which includes a useful description of the chemistry, structure, and properties of vulcanizates. A comprehensive description of silicone

rubber synthesis and its cure mechanisms is given in Chapter 15 on "Silicone Rubber". A table in which the various silicone rubbers are described, on page 390, is a useful and effective means of presenting this type of information. This chapter includes a discussion of the compounding, processing, and fabrication of silicone rubber articles.

In various chapters, reference is made to tack of rubbers, although a precise definition and the nature of this important property is not given.

As might be expected, an inconsistency exists in the units used by the various contributors. Future revisions should incorporate the SI system throughout the text. Similarly, we would like to see some typographical errors and poorly communicated ideas corrected in the future editions of this book. As an example of the latter problem, we refer to: "Synthetic trans-1,4 polyisoprene is polymerized . . .", on page 300, variants of this appearing on page 290, "Alkyl lithium catalyzed isoprene rubber . . .", and on page 315, "Polyacrylic polymers are either emulsion-polymerized."

In spite of its few shortcomings, which for the most part consist of an unevenness in format, and certain chapters which fall short of the book's comprehensive scope, we highly recommend this book to the rubber technologist of today. We believe that it is an important contribution to the literature of rubber technology.

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**Biochemical Reactors.** By B. ATKINSON (Manchester Institute of Science, U.K.). Pion Ltd., London. 1974. 267 pp. \$13.

Although Professor Atkinson pleads for some patience in following the nomenclature used in this book, it is difficult not to irritate the reader familiar with the biochemical engineering literature, and perhaps more so for those biochemists wishing to become acquainted with reactor design.

Following a brief review of industrial fermentation processes, various reactor configurations are discussed, and the reader is introduced to the concept of microbial flocs and films. Indeed, a great part of the book is devoted to Professor Atkinson's considerable research on microbial films, such as are commonly found in biological waste water treatment facilities, but less common in most other industrial fermentations. In this respect, sanitary engineers may find more value in the reactor design equations presented than the biochemical engineer.

In considering overall rate equations, the commonly used Monod model for microbial growth is coupled with the rate of diffusion through the microbial film or floc, and various limiting cases and geometries are examined. Little mention is made of the kinetics related to the production of antibiotics, organic acids and alcohols, etc., where the microbial floc is essentially a single organism and the kinetics differ considerably from the Monod type. This is perhaps the greatest weakness of the book, together with the lack of experimental kinetic data as examples of various microbial and enzyme reactions. No mention is made of the mechanism for providing sufficient oxygen for microbial growth, a major problem in the design of biochemical reactors. The two chapters on enzyme systems provide an introduction to the enzyme technology area, but are also restricted in the kinetics considered to simple Michaelis-Menten types. This overall lack of scope makes the book perhaps unsuitable for a text, although it serves well as a reference, especially for those involved in biological wastewater treatment.

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**Entropy and Energy Levels.** By R. P. H. GASSER and W. G. RICHARDS (Oxford University). Oxford Chemistry Series, No. 19. Oxford University Press, New York, N.Y. 1974. 134 pp. \$10.00.

The Oxford Chemistry Series, currently some twenty-odd volumes, is a series of short textbooks covering topics in pure and applied chemistry on an advanced undergraduate level. Gasser and Richards' monograph provides an adequate and competent but fairly standard treatment of the statistical thermodynamics of molecular systems. Essentially equivalent coverage is to be found in a great many standard texts. A few more advanced topics are touched on briefly but quite lucidly—these include low-temperature phenomena, lasers, lambda transitions, and information theory. The volume is exploited as an advertising vehicle by numerous references to other OCS volumes.

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