Formation of Alkenes in the Pyrolysis and Photolysis of 1,2-Bis(phenylthio)ethanes [*J. Amer. Chem. Soc.*, **94,** 8447 (1972)]. By PHILIP B. SHEVLIN* and JOSEPH L. GREENE, JR., Department of Chemistry, Auburn University, Auburn, Alabama 36830.

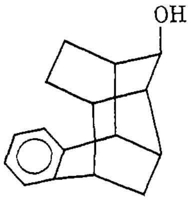
A reference to an earlier report of this type of thermal elimination [A. Schönberg and T. Stolpp, *Justus Liebigs Ann. Chem.*, **483,** 90 (1930)] was inadvertently omitted. Schönberg and Stolpp observed that 9,9′-bisphenylthio-9,9′-bifluorenyl eliminates phenyl disulfide to form 9,9′-bifluorenylidene.

Unimolecular Decomposition of 1,2- and 2,2-Bis(difluoramino)propane [*J. Amer. Chem. Soc.*, **94,** 8776 (1972)]. By DAVID S. ROSS,* THEODORE MILL, and MARION E. HILL, Physical Sciences Division (Chemistry), Stanford Research Institute, Menlo Park, California 94025

In the by-line of the paper the name of the last author listed should read Marion E. Hill.

Chemistry of 9,10-Benzotricyclo[4.2.2.2^{2,5}]dodeca-3,7,9-triene, a Novel Polycyclic Compound [*J. Amer. Chem. Soc.*, **94,** 9228 (1972)]. By N. C. YANG* and JACQUELINE LIBMAN, Department of Chemistry, University of Chicago, Chicago, Illinois 60637.

The correct structure for compound **6** is



6

Mechanism of Metal Ion Promoted Hydrogen Exchange Reactions. Magnesium(II) and Acetonyl Phosphonate [*J. Amer. Chem. Soc.*, **95,** 1071 (1973)]. By RONALD KLUGER* and PHILIP WASSERSTEIN, Department of Chemistry, The University of Chicago, Chicago, Illinois 60637.

Page 1073, column 2, line 50 should read: equimolar (0.2 *M*) concentrations over 75% of both species are. . . .

A Study of the Binding of Two Sulfonamides to Carbonic Anhydrase [*J. Amer. Chem. Soc.*, **95,** 1616 (1973)]. By JITKA OLANDER, SIDNEY F. BOSEN, and E. T. KAISER,* Department of Chemistry, The University of Chicago, Chicago, Illinois 60637.

We have been kindly informed by Professor T. H. Maren and Dr. R. W. King that the $\mathrm{p}K_a$ value we gave in our article for the ionization of pentafluorobenzenesulfonamide was much too low. By the potentiometric titration at 29° of 5.16×10^{-3} *M* pentafluorobenzenesulfonamide in 0.042 *M* Na_2SO_4 ($\mu = 0.13$), Dr. Y. Nakagawa in our laboratory has now found that $\mathrm{p}K_a = 8.05$ for the ionization of the sulfonamide group. Recalculation employing this $\mathrm{p}K_a$ indicates that the largest values of $k_1{}^a$ and $k_1{}^n$ for the binding of this compound to carbonic anhydrase as given in Table I should be $2.1 \times 10^8\ M^{-1}\ \mathrm{sec}^{-1}$ and $1.2 \times 10^7\ M^{-1}\ \mathrm{sec}^{-1}$, respectively. Both of these rate constants are below the theoretical diffusion limit. Therefore, on the basis of our data, contrary to our published statements, we cannot rule out the hypothesis of eq 10, which corresponds to the binding scheme supported by Taylor, *et al.* (ref 24).

Insensitivity to Steric Hindrance of E2 Olefin-Forming Elimination Induced by Mercaptide Ions in Methanol [*J. Amer. Chem. Soc.*, **95,** 1900 (1973)]. By J. F. BUNNETT* and DAVID L. ECK, University of California, Santa Cruz, California 95064.

There are discrepancies between the tabulated kinetic data and statements in the text as to the relative rates of elimination from isopropyl bromide (**3**) and 2-bromo-3,3-dimethylbutane (**4**). The tabulated data are correct, but two paragraphs of the text should be disregarded: that on page 1902, second column, starting "Second, . . ." and that on page 1903, first column, starting "That hindered. . .".

The reactivity of **3** relative to **4**, in the elimination mode, is 13.7 with methoxide ion and less than 4.5 with thioethoxide ion. After statistical correction, these ratios are 6.8 and <2.2, respectively. A modest amount of steric hindrance is evident; it is compatible with attack of the base on β-H, *via* transition states of type **2**. That steric retardation is less with the mercaptide than with the alkoxide base is perhaps due to London dispersion interactions[20] which should be especially favorable in the transition state for attack of thioethoxide ion on **4**.

Book Reviews[*]

Aromaticity, Pseudo-Aromaticity, Anti-Aromaticity. Edited by E. D. BERGMANN (Hebrew University) and B. PULLMAN (Université de Paris). Israel Academy of Sciences, Jerusalem. 1971. 398 pp. $21.50.

This is Volume III of the Jerusalem Symposium on Quantum Chemistry and Biochemistry and contains the proceedings of the symposium held in the spring of 1970. Thirty-four papers by an international selection of chemists (from which representatives of eastern Europe were notably absent) document the efforts to achieve an acceptable definition of the term "aromaticity" from either a theoretical or experimental viewpoint. The problem was not resolved, but at least it was more clearly delineated. The discussions following each paper, reproduced in mildly edited form, are of greater interest than usual. A good index contributes to the reference value of this book.

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[*] Unsigned book reviews are by the Book Review Editor.

The Chemist's Companion. By A. J. GORDON (Pfizer, Inc.) and R. A. FORD (Montgomery College). Wiley-Interscience, New York, N. Y. 1973. ix + 537 pp. $14.95.

The title, and the amusing cartoon on the dust jacket, might lead some to expect a book of jokes and diverting stories for the bedside of the itinerant chemist, but the reality is at least as good. In preparing this book, the authors were motivated by the observation that "there is a continuous and often immediate demand for certain information that seemingly should be, but usually is not, conveniently available." Physicochemical properties are only a part of the need; a major part is composed of questions on "how-to-do-it, what-is-it, what-do-I-use-and-when, and where-do-I-find-it-or-buy-it." Although no chemist's needs are identical with another's, the compilers have done a remarkable job of choosing much-wanted information, a fact that has repeatedly delayed the writing of this review as avaricious colleagues have made off with the book (it has even been hard to get it back at times!).

The content is, as expected, largely tables, but it is well larded with explanatory paragraphs, and, most commendably, with literature references. The organization is in nine divisions: Properties of Molecular Systems, Properties of Atoms and Bond, Kinetics and Energetics, Spectroscopy, Photochemistry, Chromatography, Experimental Techniques, Mathematical and Numerical Information, Miscellaneous. There is also a suppliers index and a subject index.

It is impossible to mention more than token examples of the sort of information included, for it is hard to open to a page that does not have something outstandingly useful. There are subsections on: Drying Agents; Character Tables for Symmetry Groups; Atomic and Molecular Models; Gel Permeation Chromatography; Bond Strengths; Linear Free Energy Relationships; Photochemistry Light Sources and Equipment; Prototropic Tautomerism, etc., etc. On the whole, the content is complementary to the traditional handbooks, and this book does not attempt to compete with them in the field of extensive tables of physical properties. At its reasonable price, "Companion" can be recommended strongly for personal purchase (the library's copy is likely to be out most of the time).

Nobel Lectures: Chemistry. 1963–1970. Elsevier Publishing Co., New York, N. Y. 1972. x + 359 pp. $35.00.

The complete Nobel lectures, in English, of eleven laureates are accompanied by the presentation addresses and biographies. Some, but not all, of the addresses have appeared previously in *Scientific American*. The lectures are complete with illustrations and references. The lectures are by Karl Ziegler, Giulio Natta, Dorothy Hodgkin, Robert Woodward, Robert Mulliken, Manfred Eigen, R. G. W. Norrish, Lars Onsager, Derek Barton, Odd Hassel, and Luis Leloir. They cover a wide range, from organic synthesis to the theory of chemical binding, and any chemist should be able to find something of interest and importance to him.

Proceedings of the Third Lunar Science Conference. Volume 1. Mineralogy and Petrology. Edited by E. A. KING, JR. (University of Houston). **Volume 2. Chemical and Isotope Analyses/Organic Chemistry.** Edited by D. HEYMANN (Rice University). **Volume 3. Physical Properties.** Edited by D. R. CRISWELL (The Lunar Science Institute, Houston). MIT Press, Cambridge, Mass. 1972. Vol. 1, 1132 + xx pp; Vol. 2, 1023 + xiv pp; Vol. 3, 1107 + xv pp. $32.00 per volume; 90.00 per set.

The massive amount of material in these volumes defies specific review; the papers range from about 2 to 15 pages each and are several hundred in number. They are chiefly concerned with the results of the Apollo 14 and 15 expeditions and contain original research results that presumably will not be published elsewhere. Each paper is presented in formal journal style, with illustrations, tables, references, and experimental procedures.

A comprehensive index to all three volumes is included in each volume, so that is is not necessary for those with limited interests to purchase the full set. Volume 3 appears to have the greatest potential interest for chemists.

Proceedings of the Third Tihany Symposium on Radiation Chemistry. Edited by J. DOBÓ and P. HEDVIG. Akadémiai Kiadó, Budapest. 1972. 1458 pp in 2 volumes. $42.00.

The Symposium was held in 1971, the third of its kind, and emphasized radiolysis of aqueous solutions and of organic compounds, including polymers. Most of the 137 papers presented are printed in full, with the ensuing discussions, but a few appear only as abstracts; all are printed in English. The contributors were international in scope, although the Hungarian representation was understandably heavy. A fairly extensive subject index is a happy feature not always found in such collections.

The Evolution of the Atomic Theory. By D. P. MELLOR. American Elsevier Publishing Co., New York, N. Y. 1972. 163 pp. $12.75.

In these days of nuclear fission, fusion, and lasers, it is all too easy for us to take the development of the atomic theory for granted. At the same time, of course, many previous authors have contributed to the topic over the years and, at first, one naturally wonders whether there is anything new to be said.

Professor Mellor is quick to set the stage and unfold his view of this story and then to steer a steady course between a plethora of quotations from early authors and the connective narrative so indispensable to readability—and readability this book possesses.

Professor Mellor proceeds rapidly, but with great clarity, from the Greek speculations through to the more experimental 17th and 18th centuries, thence to the great contributions of Dalton and Avogadro—through the period of flux in the first half of the 19th century in which, even though unrecognized at that time, the fundamental work of Berzelius, Dulong, and Dumas on the determination of atomic weight laid the foundation for the enlightenment which was to occur in the last part of the century, following the critical contribution of Cannizzaro. This is followed by a brief epilogue on the contributions of the 20th century, particularly with respect to modern methods of demonstrating the discrete "particle" concept of atomic theory. All of this is told with both precision and eloquent prose.

For any student of science, particularly in physics and chemistry, this is a book which can be read, at almost a single sitting, with real pleasure and profit. As is usual with books produced by Elsevier, the quality is high, in keeping with the price!

Thomas M. Dunn, *University of Michigan*

Spot Tests in Inorganic Analysis. Sixth Edition. By FRITZ FEIGL (Laboratorio da Producao Mineral, Rio de Janeiro) and VENZENZ ANGER (Research Laboratory Labochemie, Vienna). Translated by R. E. OESPER (University of Cincinnati). Elsevier, New York, N. Y. 1972. xxix + 669 pp. $42.50.

The book is divided into six chapters. Chapter I (28 pp) is a brief review of the historical development, the present state, and future prospects of inorganic spot test analysis. Chapter II (38 pp) discusses the methodology of spot test analysis and gives general information concerning the equipment and chemicals required and specific information concerning techniques such as sampling and methods of separation. Chapter III (20 pp) covers preliminary orientational tests to be made on the sample. This is of great value to the analyst since he is able to obtain much information concerning the nature of the sample by making a few, simple preliminary experiments. Chapter IV (429 pp), "Tests for the Elements, Their Ions and Compounds," represents the major part of the book in which the chemical elements are listed alphabetically and spot tests are given for the free element and also for the various common valence states of its ions. Tests for the element in organic compounds frequently are included. Chapter V (90 pp) is called "Application of Spot Reactions in Tests of Purity, Examination of Technical Materials, Study of Minerals." The title is a good description of the material covered in this chapter. A wealth of practical analytical chemistry is covered here. Topics vary from the detection of lead in platings and enamels to the classification of inks and age of ink writings. Chapter VI (37 pp) entitled "Tabular Summary" gives first a listing of all the tests in Chapter V and their identification limits. This table also serves as an index to all of the spot tests. This is followed by an index to materials tested and finally an index of reagents.

On comparing this edition with the previous fifth edition, published in 1958, one finds many changes. The book is much better organized; for example, spot tests for the elements are listed in alphabetical sequence rather than being grouped according to the old Fresenius qualitative analysis groups. Much new material has been added, including many new spot tests and the chapter on preliminary and orientational tests. Extensive references to the original literature are given.

It is regretable that Professor Feigl did not live to see the completion of this volume. It will serve as a monument to a lifetime devoted to the study of spot tests. Mr. Anger is to be congratulated for his work in revising and organizing the sixth edition. It is a book which should be valuable to all practicing analytical chemists.

Richard B. Hahn, *Wayne State University*

Advances in Carbohydrate Chemistry and Biochemistry. Volume 27. Edited by R. S. Tipson and D. Horton. Academic Press, New York and London. 1972. x + 405 pp. $22.00.

This is the latest in a series of very worthwhile volumes which appear annually. This volume maintains the high standards of previous volumes and should be on the required reading list of anyone interested in carbohydrates.

The first chapter contains a badly needed updating of contributions of nuclear magnetic resonance spectroscopy to carbohydrate chemistry. This article, by B. Coxon, discusses the newer types of instrumentation and introduces the topic of Fourier-transform nmr. A short discussion of the analysis of some selectively chosen spectra follows this. Unfortunately, this article only represents Part I of a two-part presentation, a practice this reviewer finds somewhat annoying. A number of articles in these advances have been broken up in this way in the last few years. Apparently there is a desire to keep each volume at a rather constant size and still allow the publication of as great a variety of topics as possible.

Protein chemists will be delighted to learn that their domain over the catalytic site of enzymes is secure; however, many enzymes have carbohydrate portions which apparently have important biological roles. Such "glycoenzymes," as they are termed by J. H. Pazur and N. N. Aronson, Jr., are discussed in a chapter which places the emphasis of their structure and biosynthesis. Biochemists should also find the chapter by J. E. G. Barnett and D. L. Corina of interest. This section deals with sugars that are labeled with hydrogen isotopes, and there is considerable emphasis placed on mechanistic aspects of reactions run with these compounds.

In recent years, it has become necessary to synthesize carbon–carbon bonds between sugar residues and other noncarbohydrate compounds. Among the most useful reactions for achieving this goal is the Wittig reaction, which is discussed in great detail by Yu. A. Zhdanov and coworkers. This review is especially valuable to English-speaking chemists since many of the primary references are in the Russian language.

A chapter, by T. D. Inch, on the use of carbohydrates in asymmetric synthesis and for the proof of configuration of compounds represents an interesting and somewhat different aspect of carbohydrate chemistry which should be of importance to many organic chemists. Unfortunately, many of the newer breed of organic chemist are unfamiliar with carbohydrate chemistry and its place in the development of chemistry. As a result, they are not familiar with this series of advances, which means that this important article may be missed. This chapter should be widely used since it really represents a way in which carbohydrates can be used as important research tools by organic chemists. The final review article is by C. J. Moye and is concerned with nonaqueous solvents that can be used in carbohydrate research.

Leon M. Lerner, *State University of New York*
Downstate Medical Center

Infrared Spectroscopy. Second Edition. By Robert T. Conley (Wright State University). Allyn and Bacon, Inc., Boston, Mass. 1972. x + 355 pp. $5.95.

This welcome second edition of Conley's excellent book now appears in paperback edition. It contains virtually the identical material in the first eight chapters as the first edition which appeared in 1966; in order, these are: Introduction; Theoretical Calculations; The Infrared Spectrophotometer; Infrared Techniques; Qualitative Analysis; Quantitative Analysis; The Near-Infrared Region; Infrared Spectra of Polymers and Resins; Interpreted Infrared Spectra; Problems in the Interpretation of Infrared Spectra.

A significant change is the presentation of the majority of the spectra along a scale linear in wave numbers, although some spectra are reproduced linear in wavelength in order to expose the student to both systems. Spectra which are linear in wave numbers are usually produced from high-resolution grating infrared spectrophotometers now found in most laboratories.

The new chapter on "Interpreted Infrared Spectra" is added perhaps somewhat too late, since by the authors' own admission "the chemist will undoubtedly collect much more information" and other spectral data will frequently solve the problem more quickly. Nevertheless, it is an excellent chapter to introduce students to basic interpretation of the infrared spectra of some 30 compounds. Equally useful and quite challenging is the expanded (to include 50 examples now) chapter on "Problems."

The type and the pictures in this edition are beautiful, clear, and distinct. The production of this book is superb and the handy paperback format a most useful compendium to beginning students of chemistry. the graduate student, and researcher, alike. No one can afford to be without it!

Ludwig Bauer, *University of Illinois*

Enzyme Inhibitors as Substrates. By W. N. Aldridge (M.R.C. Laboratories) and Elsa Reiner (Institute of Medical Research, Yugoslav Academy of Sciences and Arts). American Elsevier Publishing Co., New York, N. Y. 1972. xvi + 328 pp. $22.50.

This is a well-organized, lucidly written volume which offers much more than might be indicated by its title. The specific chemical subject matter is concerned with organophosphorus compounds (*e.g.*, Parathion), organosulfur compounds (*e.g.*, esters of methylsulfonic acid), and carbamates (*e.g.*, physostigmine) which are acted upon by certain esterases (cholinesterase, acetylcholinesterase, etc.) with the result that a serine hydroxyl in the active site of the enzyme is more or less stably acylated. This reaction is analogous to that taking place with normal substrates and has greatly facilitated studies of otherwise transient kinetic stages. An informative but not extensive overview is provided of structure–activity relationships, and practical applications of the acylating inhibitors in the fields of insecticides, analysis of esterases, and study of the role of esterases in various biological systems.

The greatest achievement of the authors is their presentation of some rather formidable methodology and kinetics in a way which is both interesting and instructive. Most of the basic equations of enzyme and inhibitor kinetics are illustrated in the text, and some more complex cases are taken up in an Appendix section. Throughout the book is much good advice on research strategy, design of experiments, and avoidance of pitfalls.

R. E. Maxwell, *Parke-Davis Research Laboratories*

Vibrational Spectra and Structure. Volume 1. Edited by James R. Durig. Marcel Dekker, New York, N. Y. 1972. viii + 196 pp. $15.50.

This volume introduces a new series of reviews devoted to various aspects of vibrational spectroscopy. The editor is to be congratulated upon this first volume which consists of three related and interesting topics: far-infrared spectra of four-membered ring compounds, pseudorotation of five-membered rings, and determination of torsional barriers from far-infrared spectra as well as a chapter on high-pressure vibrational spectroscopy.

The individual chapters are excellent summaries of the present status of these topics, and each chapter contains an exhaustive list of references.

Despite the cost of nearly 8 cents per page, this volume should find a place on the shelf of every molecular spectroscopist or chemist interested in structural problems.

Thomas M. Dunn, *University of Michigan*

Reaction Mechanisms in Sulphuric Acid. By M. Liler (The University of Newcastle upon Tyne). Academic Press, London. 1971. xi + 350 pp. $17.50.

Although the book is titled "Reaction Mechanisms in Sulphuric Acid," only the last of the five chapters deals specifically with this subject. The first four chapters provide a review of physical properties of aqueous sulfuric acids and oleums, acidity functions, and strengths of weak bases. In the past, these areas have been laced with contoversy and discrepancies. Liler tiptoes through this tangle with admirable agility and ends up with perhaps the best presentation and evaluation yet given.

The section on acidity functions is particularly recommended. The relation to activity coefficient studies is presented well, and the multiplicity of symbols and functions is efficiently reduced. The first chapter on physical properties of H_2O–H_2SO_4–SO_3 is recommended as an especially complete tabulation.

It is inevitable in such a controversial field that work of different authors is not always completely correlated. Examples are: the definitive work on tertiary aliphatic alcohols described on p 244 is presented as independent of less definitive work on p 151; the formation of H_3O^+ and $HS_2O_7^-$ is presented as the single equation 3.13 in Chapter 3, whereas, earlier, three equations (1.6–1.8) were given which infers a mechanism without foundation; again, the definitive work on CH_3COOH–$CH_3COOH_2^+$–CH_3CO^+ equilibria, mentioned on p 157, should have been given in more detail as it supplants some of the work described on acid anhydrides on p 159.

Liler was faced with many value judgements in writing this book. I would take issue with only two of these. Table 4.4 lists visible and ultraviolet λ_{max} for 31 monoaryl carbonium ions. No reliability can be placed on these numbers since no effort was made to demonstrate that monoaryl carbonium ions were under observation. In fact, other work in the literature indicates that a mixture of monomeric, dimeric, and polymeric carbonium ions forms on addition of the monoaryl carbinols to concentrated sulfuric acids, even at the 10^{-6} M concentrations of carbinol employed. In occupying nearly a whole page, Table 4.4 receives an emphasis far beyond its significance.

The other case is the Bunnett plots of log k *vs.* log (activity of water). Liler correctly points out the weaknesses of Bunnett's treatment, but from 0 to 50% H_2SO_4 they have more virtue and utility than indicated.

The book is highly recommended, both for its perceptive treatment of a difficult field and for the large amount of factual material that is concisely presented.

N. C. Deno, *The Pennsylvania State University*

The Physics and Chemistry of DNA and RNA. By J. H. SPENCER (McGill University). W. B. Saunders Co., Philadelphia, London, Toronto. 1972. 143 pp. $12.50.

Professor Spencer has presented in this book an extremely well-organized treatise on DNA and RNA. The opening chapter describes in textbook fashion the structural components of the nucleic acids. Although some errors in carbohydrate structures and nomenclature were found, the chapter serves as a good introduction into the chemisty of the bases and sugars including the less abundant pseudouridine and N^6-(Δ^2-isopentenyl)adenosine.

The occurrence, composition, and primary structures of ribosomal, messenger, transfer, 5S and viral RNAs, as well as animal and plant, bacterial, and viral DNA are adequately described. Of particular interest are the sequence elucidation studies which utilize various enzymes under different experimental conditions. The final polymer structures are then assembled in a manner similar to a jigsaw puzzle. The polymer configurations are deduced primarily by X-ray, spectrophotometry, nmr, electron microscopy, and other physical methods, which are discussed more fully in the final chapter.

The chapter describing synthetic model polynucleotides was most interesting. Deoxy and ribo oligonucleotides prepared by chemical synthesis can be utilized to prepare polynucleotides *via* polymerases which then serve as templates for RNA synthesis. The chapter explains how the synthesis of RNA templates from DNA can yield RNAs of defined sequence and triplet alternatives and ultimately to the synthesis of the entire gene. Finally, helix formation between polymer–polymer, monomer–polymer, etc., can lead to single-, double-, and triple-stranded complexes, the conformations of which are deduced by the physical methodologies described in the final chapter. This book serves as an excellent introduction into the fascinating field of molecular biology and is recommended for those who desire a quick concise insight into this area of biochemistry.

T. H. Haskell, *Parke, Davis and Company*

Analytical Chemistry of Phosphorus Compounds. Edited by M. HALMANN (Weizmann Institute of Science). Wiley-Interscience, New York, N. Y. 1972. x + 850 pp. $39.95.

This excellent book is Volume 37 of Elving and Kolthoff's *Chemical Analysis* series. It is divided into four parts, two method-oriented ("Separation Methods" and "Identification Methods") and two sample-oriented ("Compound Groups" and "Specific Materials"). In addition, a chapter is devoted to methods for determination of total phosphorus. As a result of this organizational arrangement, readers interested in particular analytical methods will find excellent review chapters, while those concerned with specific compounds or materials will also find their interests covered in detail.

The book's 22 chapters are written by 21 different authors or author-pairs, internationally recognized authorities from the United States, Israel, Japan, Germany, Argentina, Australia, Canada, and Scotland. I found the chapters to be of consistently high quality, with little repetition and adequate cross-referencing between chapters. Each chapter begins with a detailed outline of its contents, a feature I liked very much. The coverage is as up-to-date as would be expected. Six chapters contain references to work published in 1971; ten others contain 1970 references. The bibliographies are generally very extensive, one chapter listing 356 references. Several chapters contain extensive compilations of useful data. One table, for example, lists nmr data for more than 650 phosphorus–nitrogen compounds.

The 20-page subject index seems adequate. This book should prove very useful to anyone involved in the analysis of phosphorus or any of its naturally occurring or synthetic compounds.

Emmett F. Kaelble, *Monsanto Company*

Cephalosporins and Penicillins: Chemistry and Biology. Edited by E. H. FLYNN (Eli Lilly and Co.). Academic Press, New York, N. Y. 1972. xv + 752 pp. $25.00.

This book is a compilation of chapters written by various researchers, the great majority of whom are associated with the Lilly research laboratories in Indianapolis. Although the title states "Cephalosporins and Penicillins," the emphasis is clearly on the cephalosporins. The book is about evenly divided between the chemical and biological aspects of the β-lactam antibiotics, and the material is treated with thoroughness. The chapters are extensively referenced and the literature appears to be covered through 1971.

After an introductory chapter on the history of development of cephalosporin C, the chemistry of the β-lactam antibiotics is thoroughly covered with chapters on the preparation of 6-aminopenicillanic acid and 7-aminocephalosporanic acid, modifications of the β-lactam system, alteration of the dihydrothiazine moiety, and the rearrangements of penicillins and cephalosporins which led to the synthesis of a cephalosporin from a penicillin. The chemical portion of the book is concluded with a chapter on the physical-chemical properties of the cephalosporins and penicillins with particular emphasis on the nmr analysis of these compounds.

The biological aspects of these compounds are presented with discussions of the biosynthesis, enzyme deactivation, mode of action, and methodology of biological evaluation. A chapter on structure–activity relationships contains activity profiles of the various cephalosporins which have been prepared. A detailed chapter on the pharmacology and toxicology of the four major cephalosporins in therapeutic use follows.

This book will certainly be valuable to workers in the field of antibiotics, while other organic chemists should find interest in the chemistry of this important group of compounds.

James S. Kaltenbronn, *Parke, Davis and Company*

Introduction to Polymer Viscoelasticity. By JOHN J. AKLONIS (University of Southern California), WILLIAM J. MACKNIGHT (University of Massachusetts), and MITCHEL SHEN (University of California, Berkeley). Wiley-Interscience, New York, N. Y. 1972. xiii + 249 pp. $14.95.

This little book is a much needed addition to the literature of polymer viscoelasticity. It is truly an introduction to the subject at its most basic and descriptive level, a real primer for the uninitiated. By considering a limited subject range and emphasising the more descriptive molecular theories, the complex mathematical approach of continuum mechanics is avoided and a highly readable, clear exposition of the subject is achieved.

The essential character of the book is clearly delineated by the authors themselves: "What we have attempted to do is to provide a detailed grounding in the fundamental concepts. This means, for example, that all derivations have been presented in great detail, that concepts and models have been presented with particular attention to assumptions, simplifications, and limitations, and that problems have been provided at the end of each chapter to illustrate points in the text. The level of mathematical difficulty is such that the average baccalaureate chemist should be able to readily grasp it. Where more advanced mathematical techniques are required, such as transform techniques, the necessary methods are developed in the text." It can only be said that the authors have been eminently successful in achieving their goal.

The book is restricted to the subject of bulk amorphous polymers and as such is not a complete treatment of polymer viscoelasticity. Such topics as crystalline polymers, solution behavior, melt rheology, and ultimate properties are not found in the contents. Instead, the book concentrates on the Phenomenological Treatment of Viscoelasticity, Time-Temperature Correspondence, Transitions and Relaxations in Amorphous Polymer, Statistics of a Polymer Chain, Rubber Elasticity, Viscoelastic Models, and Chemical Stress Relaxation. What the book lacks in scope, however, is more than compensated for by its clarity and depth of the presentation.

Polymer viscoelasticity has been in need of a simple, readable introductory primer that turns students on to the subject. This book is a likely candidate for that primer.

Robert J. Samuels, *Hercules Incorporated*