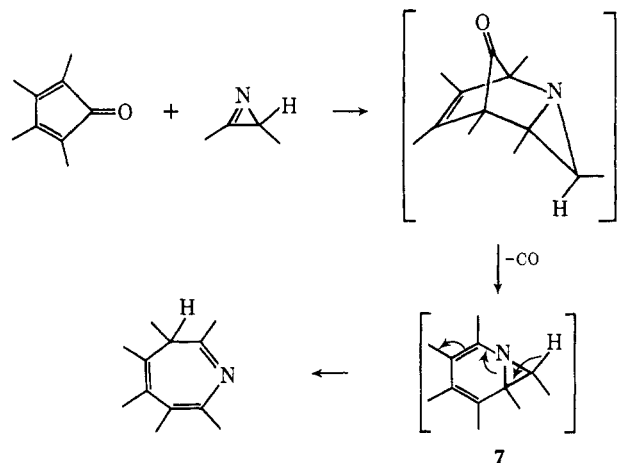


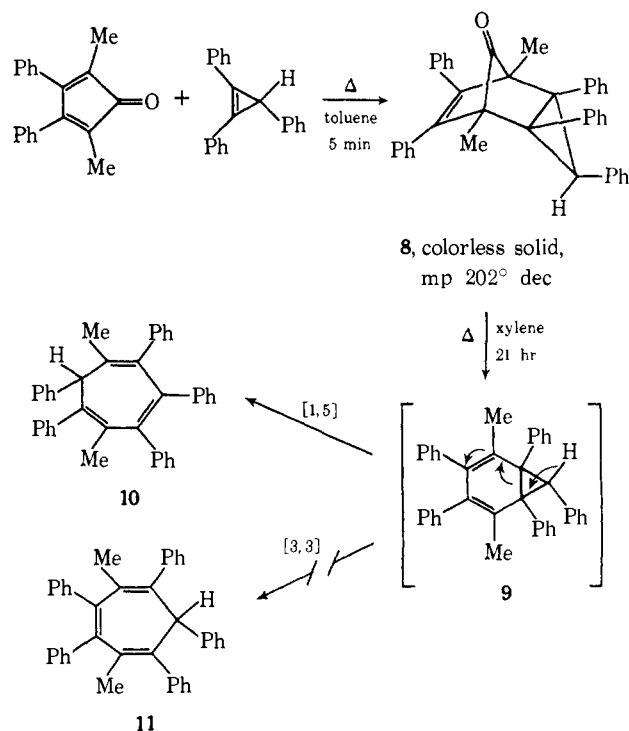
Scheme I



heptatriene is readily distinguished from the symmetrical isomer **11** (expected from a [3,3] shift of the intermediate norcaradiene **9**) by the nonequivalence of the two methyl groups at τ (CDCl_3) 8.80 and 8.15 in the nmr spectrum. Only one product from the thermolysis of **8** could be detected by tlc and nmr techniques even when the reaction was conducted under milder conditions. For example, the decarbonylation was only 60% complete in refluxing toluene after 6 days. These observations suggest that the symmetry-allowed [1,5]-hydrogen shift mechanism is operative in both the multisubstituted carbocyclic and heterocyclic systems. A similar observation of the norcaradiene-cycloheptatriene rearrangement has also been tentatively suggested.¹⁰

In a typical experiment, tetracyclone (1.4 g, 3.65 mmol) and 3-methyl-2-phenyl-1-azirine (0.65 g, 5.0

(10) T. Mukai, H. Kubota, and T. Toda, *Tetrahedron Lett.*, 3581 (1967).



mmol) were heated under reflux in toluene (50 ml) in an atmosphere of nitrogen for 6 days. After this time the solvent was removed and the residue was recrystallized from ethanol to afford 7-methyl-2,3,4,5,6-pentaphenyl-3*H*-azepine (**5b**) (1.15 g, 65% based on tetracyclone) as yellow hexagonal plates, mp 212°.

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Book Reviews*

Cement and Concrete Research. Edited by DELLA M. ROY (Pennsylvania State University). Pergamon Press, New York, N. Y. 1971 (bimonthly). \$30.00 per year.

This is a new journal, devoted to the chemistry and physics of cement and related materials, and publishing articles on fundamental research and reviews.

The Basis of Organic Chemistry. By R. J. FESSENDEN and J. S. FESSENDEN (University of Montana). Allyn and Bacon, Inc., Boston, Mass. 1971. x + 420 pp. \$12.95.

This is a textbook for introductory organic chemistry for students of various backgrounds. The approach is a departure from the traditional one and begins with types of bonds and their reactions, proceeds rapidly through the traditional descriptive material, and dwells for the last third of the book on subjects of biochemical interest (sample chapter headings: "Addition Reactions and Reduction of Compounds Containing Pi Bonds"; "Nucleic Acids and the Chemistry of Heredity").

Structure and Bonding. Volume 8. Edited by P. HEMMERICH, *et al.* Springer-Verlag, New York-Heidelberg-Berlin. 1970. 198 pp. \$11.60.

This publication stands between a periodical and a softbound book. It "appears at irregular intervals, according to the material received," the publisher states, but the criteria for selection of manuscripts are not disclosed. Volume 8 is essentially biochemical and contains four chapters: "Iron Electronic Configurations in Proteins: Studies by Mössbauer Spectroscopy," by Bearden and Dunham; "Structural Studies of Hemes and Hemoproteins by NMR Spectroscopy," by Wuthrich; "The Chemical Nature and Reactivity of Cytochrome P-450," by Hill, Roder, and Williams; and "Cobalt(II) in Metalloenzymes," by Lindskog. These are review papers that apparently include some original work of the authors, but there are no explicit experimental sections. There is a cumulative table of contents for Volumes 1 to 8, but no index.

Tables for Group Theory. By P. W. ATKINS, M. S. CHILD, and C. S. G. PHILLIPS (University of Oxford). Oxford University Press, New York, N. Y. 1970. 32 pp. \$1.00.

This little pamphlet contains essential tables for using group theoretical methods: character tables, direct products, descent in symmetry and subgroups. There are notes and illustrations, but no discursive text.

Microtechniques. A Laboratory Guide. By R. L. WILLEY (University of Illinois at Chicago Circle). The Macmillan Co., New York, N. Y. 1971. viii + 99 pp. \$3.95.

* Unsigned book reviews are by the Book Review Editor.

This is designed for a short course in histological microscopy and contains useful pragmatic information on fixing and staining animal and plant tissues.

Beet Sugar Technology. Second Edition. Edited by R. A. MCGINNIS. Beet Sugar Development Foundation, Fort Collins, Colo. 1971. xxx + 835 pp. \$20.00.

This new edition is said to be 80% rewritten since the first edition (1951). It surely contains everything you ever wanted to know about beet sugar, from chemistry to control of environmental pollution, and is a basic reference work. The editor dedicates his book to his wife, who, he claims, carries the distinction of being the only woman to have met the manager of every beet sugar factory in the United States.

Biochemical Evolution and the Origin of Life. Edited by E. SCHOFFENIELS (University of Liege). North Holland/American Elsevier Publishing Co., Amsterdam-London-New York. 1971. xiv + 398 pp. \$23.00.

This volume contains the twenty-two papers presented at the International Conference on Biochemical Evolution, held at Liege in 1970, to honor Professor Marcel Florin on his seventieth birthday. There are in addition a welcoming allocution by Professor Welsch, Dean of the Faculty of Medicine, in which he greets "a galaxy of talented biochemists who have notoriously illustrated their respective fields of investigation," and a twelve-page index. A large proportion of the contributors is from the United States or Britain, and all the papers are in English. The editor and authors are to be congratulated on the high quality of preparation of the papers, which are polished presentations with excellent illustrations and good bibliographies. The editor is also to be thanked for kindly having spared us the verbatim reports of the ensuing discussions, which are so often a feature of such conference proceedings.

Steroids. Volume II. Part E. Chemistry of Carbon Compounds. Second Edition. Edited by S. COFFEY. American Elsevier Publishing Co., Inc., New York, N. Y. 1971. xv + 289 pp. \$20.00.

This subvolume completes Volume II of the Second Edition, and together with Part D covers the entire field of steroid chemistry. There are only two chapters: "Steroid Saponins and Sapogenins," by J. Elks, and the "Biogenesis of Terpenes and Steroids," by T. W. Goodwin. The second chapter did not appear in the First Edition and is entirely new. It is somewhat more didactic than most in this work, and provides a lucid introduction to the "isoprene rule" and its modification, justification, and elaboration; it is an important and timely contribution. The date to which the literature is covered is not clearly stated, but the preface is dated September 1970, and a number of 1969 references are present in the text.

A major portion of this book (151 pp) consists of a cumulative index for Volume II (Parts A-E).

A History of Chemistry. Volume I. Part I. By J. R. PARTINGTON. St. Martin's Press, New York, N. Y. 1971. \$35.00.

This is the last volume to appear in the late Professor Partington's four-volume treatise. Part II is yet to appear; Part I deals with the "Theoretical Background" of Chemistry up to 1500 AD. There are twenty chapters, starting with "Early Greek Philosophy" and ending with "The Qabbalah". Each chapter is heavily footnoted; although this practice supplies invaluable scholarly documentation, it is a distraction, and the price is paid in readability. Accounts of chemistry in this prescientific period are necessarily involved in anthropology, philosophy, theology, etc., and it is not easy to set borders to the subject. It takes a wide-ranging scholar to handle such breadth of material, which also makes demands on the reader.

This work is meant for reference rather than for entertaining reading, and it is so highly successful that it seems unlikely that a competing work will be attempted. The reasonable criticism that this work is organized about movements and schools of thought, rather than chemical concepts, can be countered by pointing to the detailed index, in which such entries as "atomic theory", "colours", etc., guide the reader to the many places where such concepts are dealt with. There is also an Index of Names, which can be very useful, although one must be alert to the fact that the latinized names of Arab, Greek, and other personalities are discarded in favor of the originals (e.g., Herakleitos instead of Heraclitus, al-Battani instead of Albategnus, Alain of Lille instead of Alanus ab Insulis), without much cross-indexing.

Altogether it is a fascinating volume to browse in, and the wealth of information it contains makes it an outstanding work of reference.

Dimethyl Sulfoxide. Volume 1. Edited by S. W. JACOB, E. E. ROSENBAUM, and D. C. WOOD (University of Oregon Medical School). Marcel Dekker, Inc., New York, N. Y. 1971. xv + 479 pp. \$27.50.

This volume consists of fourteen contributed chapters, of which one (90 pp) is entitled "Chemistry of DMSO", one is a comprehensive bibliography (including the titles of the papers listed), and the others all deal with biological and clinical aspects of DMSO. This book covers the periods of initial enthusiasm, subsequent disillusionment, and later acceptance with respect to the unusual physiological properties of this interesting and versatile substance. The literature is said to be essentially complete as of May 1969. There is an extensive author index, but only an inadequate subject index (3 pp).

The Pyrimidines. Supplement I. By D. J. BROWN (Australian National University), R. F. EVANS (University of Queensland), and T. J. BATTERHAM (Australian National University). Wiley-Interscience, New York, N. Y. 1970. xxiii + 897 pp. \$39.50.

This volume in the Weissberger-Taylor series "The Chemistry of Heterocyclic Compounds" covers the decade 1957-1967, and updates the original Volume 16, published in 1962. The quality of research published in that time is impressive, and its compilation, covering 4328 references, must have been an enormous effort! This Supplement is designed to be used with the original volume, to which it is keyed by a carefully worked-out system paralleling that used in the Beilstein Supplements. The actual text occupies 398 pages. An appendix of systematic tables, listing all simple pyrimidines indexed in *Chemical Abstracts* through June 1967, gives melting points and references in the next 372 pages, and the highly detailed index occupies the final 127 pages. There are, of course, many small tables in the text, which includes all the subject headings of the original volume, plus a number of new ones to cover new synthetic methods, nmr spectroscopy, etc.

Analytical Determinations and Separations: A Textbook of Quantitative Analysis. By C. T. KENNER (Southern Methodist University) and R. E. O'BRIEN (El Centro Junior College). The Macmillan Co., New York, N. Y. 1971. xx + 395 pp. \$9.95.

This book is intended for use in a one-semester course for both majors and nonmajors in chemistry. It includes some instrumental methods and a chapter on chromatography and ion exchange.

Developments in Water Quality Research. Edited by H. I. SHUVAL (Hebrew University of Jerusalem). Ann Arbor-Humphrey Science Publishers, Ann Arbor and London. 1970. xiv + 312 pp. \$17.50.

This contains the proceedings of the Jerusalem International Conference on Water Quality and Pollution Research, June 1969. It contains twenty papers, with illustrations and references; their emphasis is on practical applications. There is a short index.

5th International Symposium on Separation Methods: Column Chromatography. Edited by E. sz. Kováts (Swiss Federal Institute of Technology, Lausanne). Swiss Chemists' Association, Sauerländer AG, Aarau, Switzerland. 1970. 285 pp. sFr 56 (\$13.00).

This book, a supplement of "Chimia 1970," presents the proceedings of a symposium dealing with various current aspects of column chromatography. The first eight chapters, titled after the subject of each of the plenary lectures, include: liquid column chromatography, electrophoresis, gel permeation, and a thorough discussion of retention data, as well as briefer topics, for example, chromatography of supercritical fluids, labile and corrosive substances, engineering treatment of chromatography, and reaction chromatography. Several short related presentations are compiled after each of the major topics. Chapter nine is comprised of a potpourri of diverse subjects which are not directly associated with the more formalized chapters.

The Editor has also incorporated some of the relevant discussions, explanations, and conclusions of the participants to the presentations, which tend to contribute much to the depth of the subject matter. Although many experimental details have been largely omitted to conserve space, the pertinent references and addresses of all the cited speakers have been included. The papers, which are written in English, French, or German, carry recent bibliographies, but there is unfortunately no subject index.

George R. Newkome, Louisiana State University

Problems in Structural Inorganic Chemistry. By WILLIAM E. HATFIELD (University of North Carolina) and RICHARD A. PALMER (Duke University). W. A. Benjamin, Inc., New York, N. Y. 1971. xi + 328 pp. \$4.95.

This book provides a source of problems that can be used in course work covering primarily the more theoretical aspects of inorganic chemistry. Apart from the first two topics (nomenclature, and elementary structure and stereochemistry), the rest of the topics covered rely on a sound background in physical chemistry (atomic structure and chemical bonding, molecular symmetry and group theory, vibrational and electronic spectroscopy, magnetic susceptibility and magnetic resonance, and basic crystallography). It is stated that the book might be used for self-study by seniors and first year graduate students; source material for reading is cited, and there are given detailed solutions to about one-third of the problems and partial solutions to about one-third more. Such self-study of several of the topics would require considerable effort. Most undergraduates and many first year graduates would find reading some of the source material rather difficult.

Milton Tamres, *The University of Michigan*

Basic Laser Raman Spectroscopy. By JACK LOADER (University of Southampton). Heyden and Son Ltd., London. 1970. x + 105 pp. £ 1.18.0

This little book, although extremely brief in coverage of the topics selected, could be of considerable aid to the novice in laser Raman spectroscopy. After a short introduction to the Raman effect in Chapter 1, Chapter 2 treats sample handling and the various types of cells available. Chapter 3 gives a useful account of calibration procedures using either a neon lamp or the Raman spectrum of indene. Comprehensive tables for calibration are given. Chapter 4 treats of the standard resolution checks using CCl_4 or BCl_3 . Included is a most useful table of possible spurious lines from the argon ion laser.

Chapter 5 is especially useful. Here the author considers those factors affecting the intensity of a Raman spectrum and how those factors depend on wavelength. In addition to the Raman effect with the well-known inverse fourth-power dependence on wavelength, the author also demonstrates the grating response and photomultiplier response with appropriate figures. Mention should have been made of the polarization dependence of the spectral response of gratings as well. The concluding chapter deals with the advantages of laser Raman spectroscopy for qualitative analysis (fingerprinting compounds) and for quantitative analysis. Two appendices, one listing commercially available laser Raman spectrometer systems, the second listing available laser sources, are quite useful. The book concludes with the Raman spectra of 25 typical solvents.

J. F. Verdick, *United Aircraft Research Laboratories*

Essential Fiber Chemistry. Fiber Science Series, By MARY E. CARTER (American Viscose Division, FMC Corporation). Marcel Dekker, Inc., New York, N. Y. 1971. vii + 216 pp. \$19.75.

This book is a useful introduction to the chemistry and technology relating to the formation and use of textile fibers. Each of the ten short chapters deals with a separate class of fibers with sections on chemical structure, polymerization, fiber formation, physical properties, and chemical reactions. Also included are the major aspects of dyeing and finishing, flame proofing, light stabilization, and fiber modification. Although the presentation lacks the detail necessary for anyone requiring more than a basic knowledge, there are adequate references at the end of each chapter which deal mainly with the more recent work on these fibers. Unfortunately, in many cases the more important primary references are omitted because they are older. There are separate chapters on cotton, rayon, cellulose acetate, wool, polyamide, acrylic fibers, polyethylene terephthalate, polyolefins, Spandex, and glass. The book is easy to read and up-to-date, and would be useful as a handy reference for student, chemist, or engineer.

Donald R. Baer, *Jackson Laboratory
E. I. du Pont de Nemours & Co.*

Inorganic Vibrational Spectroscopy. Volume 1. By L. H. JONES (Los Alamos Scientific Laboratory). Marcel Dekker, Inc., New York, N. Y. 1971. x + 218 pp. \$22.50.

This book is a review of normal coordinate analyses (force constant calculations) on inorganic and coordination compounds. It consists of a short introduction on theories of normal vibrations and potential constants (force constants and compliance constants)

(Chapter 1) followed by discussions on individual molecules such as diatomic and triatomic molecules (Chapter 2), halide complexes (Chapter 3), cyanide complexes (Chapter 4), and metal carbonyls (Chapter 5). Nine appendices concerning normal coordinate analyses of simple molecules and related subjects are also included. Throughout the book, the author discusses the significance of the general quadratic valence force constants in relation to electronic structure and bonding theories while giving critical comments on the results obtained by using other potential fields. According to the author, the significance of most of the previous calculations reported in the literature is "highly" questionable since they involve "rather gross approximations." However, this view is debatable, as was demonstrated by the "Jones-Cotton controversy" (see *Inorg. Chem.*, 7, 1681-1683 (1968)).

This book is highly recommended to those who are already familiar with the principles of normal coordinate analysis and wish to learn more about determining the potential constants and evaluating their significance. However, it is not an introductory textbook on normal coordinate analysis.

Kazuo Nakamoto, *Marquette University*

The Analysis of Elemental Boron. (5th book of the AEC Critical Review Series). By MORRIS W. LERNER (New Brunswick Laboratory, U. S. Atomic Energy Commission). National Technical Information Service, U. S. Department of Commerce, Springfield, Va. 1970. 125 pp. \$3.00.

Reliable methods for the analysis of elemental boron are an absolute necessity when one takes into consideration the monetary value of the enriched material. There has been a need for a book summarizing the total field, particularly for use by bench chemists so that they will have a single source of information to aid them in applying the many newly developed analytical techniques and procedures. This book will fill that need.

The author has concisely summarized a plurality of data resulting from a several-year cooperative program between certain AEC contractors and the AEC New Brunswick Laboratory. The above information was derived primarily through an exchange sample program involving analysis for total boron and impurities. Samples were also distributed for isotopic and particle-size determinations to a few participating laboratories. Statements concerning the reliability of each method are often included.

The usefulness of the book is certainly increased with the inclusion of many methods and techniques relative to the impurities in elemental boron. Heretofore there has been no such single source of information regarding impurity analysis available. The many literature references should prove extremely valuable to the practicing chemist.

Joe M. Walker, *Kansas State College of Pittsburg*

Quantitative Analysis of Gaseous Pollutants. By WALTER E. RUCH. Ann Arbor-Humphrey Science Publishers, Ann Arbor, Mich. 1970. 241 pp. \$18.75.

Federal and local regulations are bearing down increasingly on gaseous pollutants. Frequently the standards require a continuous selective monitor. For these measurements, the analytical chemist must invent and calibrate instruments to be used by others. In addition, he must himself perform more difficult analyses in such numbers that rapid instrumental analysis is mandatory. He has little use for a book in which gas chromatography and spectroscopy (mass or optical) are not mentioned.

There are, nevertheless, analyses of a nonroutine nature where traditional wet-chemical techniques are required. For these, the book gives a very thorough annotated bibliography, particularly of colorimetric methods.

One hundred and sixty-nine compounds are covered alphabetically from acetaldehyde to 2,4-xylydine. The majority are non-hydrocarbon organics, although important inorganic gaseous pollutants are covered. Under each compound, the references are followed by an outline of the method, sampling procedures, and a statement regarding concentration range and interferences. The material is accurately presented and well organized. The book's greatest virtue is that it provides rapid access to the literature on wet-chemical techniques up to about August 1968. For this purpose, a copy of this book should be available, because it brings together the diverse references in a handy form. Unfortunately, by its neglect of instrumental methods, the book does not live up to the full promise of its title.

D. H. Stedman, *Ford Motor Company*