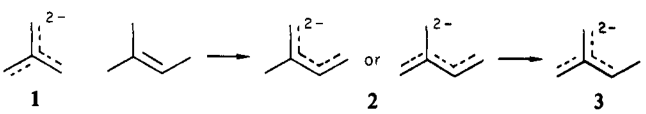
Deactivation of the Fluorescent State of 9-*tert*-Butylanthracene. 9-*tert*-Butyl-9,10-(Dewar anthracene) [*J. Am. Chem. Soc.* **1980**, *102*, 7936]. H. Güsten,* M. Mintas, and L. Klasinc, Kernforschungszentrum Karlsruhe, Institut für Radiochemie, 7500 Karlsruhe, Federal Republic of Germany (H.G. and M.M.); Institut "Rudjer Bošković", Zagreb, Croatia, Yugoslavia (L.K.).

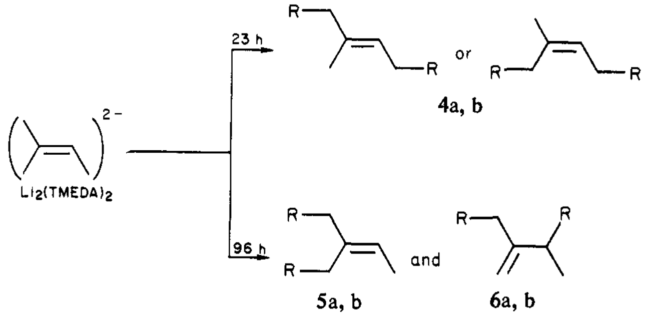
An important reference to previously published work was mistakenly omitted from the published version of this paper. Hart and Ruge reported that decamethylanthracene photorearranges in high yield to the Dewar form (Hart, H.; Ruge, B. *Tetrahedron Lett.* **1977**, 3143).

Dianions of 2-Methyl-2-butene: Evidence for the Stability of a "Y-Aromatic" Species [*J. Am. Chem. Soc.* **1981**, *103*, 1263]. Nancy S. Mills,* James Shapiro, and Mark Hollingsworth, Department of Chemistry, Trinity University, San Antonia, Texas 78284 (N.S.M.); Department of Chemistry, Carleton College, Northfield, Minnesota 50112 (J.S. and M.H.).

Page 1263, first column: The equation should be:



Page 1263, second column: The second equation should be:



a, R = $Si(CH_3)_3$;
b, R = CH_3

Binuclear Copper Complexes: An Open and Shut Case. A Strong Antiferromagnetically Coupled μ-Monohydroxo Bridged Complex [*J. Am. Chem. Soc.* **1981**, *103*, 1273]. Patrick L. Burk, John A. Osborn,* Marie-Thérèse Youinou, Yvette Agnus, Rémy Louis, and Raymond Weiss,* Laboratoire de Chimie Inorganique Moléculaire et de Catalyse (ERA 721), Institut Le Bel, Université Louis Pasteur, 67070 Strasbourg Cedex, France (P.L.B., J.A.O., and M.-T.Y.); Laboratoire de Cristallochimie et de Chimie Structurale (ERA 008), Institut Le Bel, Université Louis Pasteur, 67070 Strasbourg Cedex, France (Y.A., R.L., and R. W.).

Page 1274, column 1, line 7: 447 ($\epsilon_{\mathrm{Cu}} \sim 8000$) should be replaced by 447 ($\epsilon_{\mathrm{Cu}} \sim 3000$).

Carbon–Phosphorus Heterocycles. Synthesis of Phosphorus-Containing Cannabinoid Precursors and a Single-Crystal Analysis of 1,2,3,4-Tetrahydro-10-hydroxy-8-*n*-pentyl-5*H*-phosphorino-[3,4-*c*][1]benzopyran-5-one 3-Oxide [*J. Am. Chem. Soc.* **1981**, *103*, 2032–2036]. Jang B. Rampal, K. Danell Berlin,* Nantelle S. Pantales,* Ann McGuffy, and Dick van der Helm,* Department of Chemistry, Oklahoma State University, Stillwater, Oklahoma 74078 (K.D.B.), University of Tulsa, Tulsa, Oklahoma 74104 (N.S.P.), and University of Oklahoma, Norman, Oklahoma 73109 (D.v.d.H.).

Page 2032, second column, line 5: The line should read—conjugated double bond present in the enol form **5**.

Synthesis and Reactions of a Binuclear Cobalt Bridging Methylene (μ-CH_2) Complex. Conversion to μ-CH_2 Rh/Co and Rh/Rh Complexes and Methylene Transfer to Ethylene Involving Activation by a Second Metal Complex [*J. Am. Chem. Soc.* **1981**, *103*, 2489]. Klaus H. Theopold and Robert G. Bergman,* Department of Chemistry, University of California, Berkeley, California 94720.

Page 2491: The number of the NSF grant supporting the work should be corrected to CHE 79-26291.

*Book Reviews**

Nuclear Magnetic Resonance. Volume 9. Edited by G. A. Webb (University of Surrey). The Royal Socity of Chemistry, London. 1980. xxii + 336 pp.

This Specialist Periodical Report summarizes the literature from June 1978 Theoretical, May 1979, mainly following the same outline which has become characteristic of this valuable publication series. Dr. G. A. Webb (University of Surrey) has taken over Senior Reporter duties for P. J. Abraham whom we all thank for a job well done.

There are twelve reviews in this volume as follows: Theoretical; Physical, and Inorganic Aspects of Chemical Shifts, by C. J. Jameson and J. Mason; Organic Applications of Chemical Shifts, by D. W. Jones; Theoretical Aspects of Spin–Spin Couplings, by K. G. R. Pachler; Applications of Spin–Spin Couplings, by D. F. Ewing; Nuclear Spin Relaxation in Fluids, by H. Weingartner; Solid State NMR, by S. M. Walker; Multiple Resonance, by W. McFarlane and D. S. Rycroft; Natural Macromolecules, by D. B. Davies; Synthetic Macromolecules, by F. Heatley; Conformational Analysis, by F. G. Riddell; Orientated Molecules, by C. L. Khetrapal and A. C. Kunwar; and Heterogeneous Systems, by D. Derbyshire. The later two are biennial reports which alternate with chapters on paramagnetic systems and liquid crystals and micellar solutions. The chapter on spin–spin coupling has also been split for the first time into theoretical and application chapters.

As with prior volumes, the scope of coverage within each subdivision seems comprehensive and thorough. Even though extensive and highly active areas of research are treated in relatively short chapters (Organic Application of Chemical Shifts, 23 pp), the tight, concise style of writing and careful organization of each chapter permit effective presentation of the significant achievements in each area. Because of the extensive number of citations, only brief reference to each article can usually be made. However, by means of the many references listed, the reader can use the review to find details of studies relevant to his own work.

This volume continues the high standards set by this series through the years.

P. E. Garrou, *Dow Chemical Co.*

Polymer Syntheses. Volume 3. By Stanley R. Sandler (Penwalt Corporation). Academic Press, Inc., New York. New York, N.Y. 1980. xi + 368 pp. $42.50.

This is the third (and final?) of a group of volumes describing the preparation of organic polymers. To quote from the Preface,

"In a manner similar to Volumes I and II, detailed laboratory instructions are presented for the preparation of various types of polymers such as olefin–sulfur dioxide copolymers, polythioesters, sulfide polymers, polyisocyanates, polyoxyalkylhydroxy compounds, polyvinyl carbazole, polyvinyl acetate, polyallyl esters, polyvinyl fluoride, and miscellaneous polymer preparations.

The latest journal articles and the patent literature have been reviewed and tabulated in each chapter. In some cases, the major literature

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*Unsigned book reviews are by the Book Review Editor.

sources used were patents. As in our earlier volumes, the procedures were selected both on the basis of safety and as representative of the general polymer preparation in question. Each chapter should be considered a good preparative introduction to the subject but not a final, definitive work. This book should be especially useful to both industrial chemists and students of polymer chemistry by providing a ready source of preparative procedures for various polymer syntheses."

In these three volumes the authors have made a very useful contribution to polymer chemistry. The literature on common monomers has become so voluminous as to be almost useless. Who can contemplate a literature search on vinyl acetate or acrylonitrile with equanimity? Yet the authors seem to have done this, and their books contain a wealth of useful information in readily accessible form.

The review of each topic is not critical, as it could not practicably be. Moreover, it contains a number of errors, p 2—"polyphenylenesulfone has been sold commercially since 1968...". p 7—"propylene", pp 114 and 115—"Shashoua", p 164—"... of 10^2 mole/liter t-butyl peroxide ..." (!). Accordingly, caution is advised.

The detailed format is somewhat disorganized. For example (p 207) under the heading Polymerization of Vinyl Acetate in Ethylene Dichloride is found discussion of polymerization of vinyl acetate in various alcohols.

Safety considerations are justly emphasized.

Comparison should be made to existing treatises. These books are in the vein of Sorensen and Campbell's "Preparative Methods of Polymer Chemistry". They neatly complement "Vinyl and Diene Monomers I–III" (E. C. Leonard, Ed.) and "Condensation Monomers" (J. K. Stille, Ed.), offering less theory and less monomer chemistry, but more polymer synthesis and properties. Finally, they are less critical than "Macromolecular Synthesis" and the procedures have not been checked. However, these books offer a good place to start a polymer synthesis.

This three-volume set offers a wide range of polymer knowledge and deserves a place in organic polymer laboratories.

H. K. Hall, Jr., *University of Arizona*

Structural Principles of Unsaturated Organic Compounds. With Special References To X-Ray Structure Analysis of Coloured Substances. By Siegfried Dähne and Siegfried Kulpe. Akademie-Verlag, Berlin. 1977. 128 pp. DM 24.00.

This little booklet proposes to represent colored organic compounds in terms of three classes: aromatics, polyenes, and polymethines and intermediates between these three classes. Classification is done largely on the basis of X-ray structural data. There are 939 references.

H. H. Jaffe, *University of Cincinnati*

Chemical Microstructure of Polymer Chains. By Jack L. Koenig (Case Western Reserve University). John Wiley and Sons, New York. 1980. xviii + 414 pp. $42.50.

The appearance of "Chemical Microstructure of Polymer Chains" is a welcome addition to the polymer science library. Dr. Koenig has organized a body of current and important information in a form that will be useful to a broad spectrum of workers in the polymer field.

Following a brief introduction, several chapters are devoted to the statistical analysis of chain formation and the resulting chain structures. Characterization techniques are treated with considerable emphasis on vibrational spectroscopy and nuclear magnetic resonance. The book concludes with a complete discussion of the various types of chain isomerism. The exposition is high in quality and the analyses are sound. The book is generally recommended, to the novice and the advanced worker.

The following critical observations should not be taken as serious objections. As a text, this volume may be somewhat difficult, in part because the earlier chapters are highly abstract and very few experimental results are indicated. Exercises and problems would also enhance the usefulness of the book for teaching. The logic diagrams in Chapter I and some of the more exotic results in Chapter III will generate enthusiasm on the part of only a small group of readers.

D. W. McCall, *Bell Telephone Laboratories, Murray Hill, N.J.*

Synthetic Fuels from Coal. By Larry L. Anderson and David A. Tillman (University of Utah and xii of Washington, respectively). John Wiley and Sons, New York. 1979. xii + 158 pp. $16.95.

The stated purpose of this book is to provide "managers and engineers with a method for addressing" the fossil fuel options "as an aid to the development of energy policy in the private sector". This book lies at the technical–political interface, and could easily be reviewed either as a political statement or as a technical work. The political will be ignored here except to say that the writers' politics has not appreciably affected their technological judgment and analysis. Their evaluations seem sound.

The book opens with a brief sketch of the US energy economy and a brief history of the development of synthetic fuels. These are concise and well done. The next three chapters are devoted to coal gasification, and are also done well, achieving the authors' stated aims. Through this point the book is a valuable brief summary, covering all major processes and comparing them incisively and judiciously. The same is not true of their coverage of liquefaction processes. This may be because the gasification technology is relatively mature and they are dealing with developed processes while the coal liquefaction area is replete with developing processes. The book does not contain all of the developing processes and would not provide a useful guide to what is being developed. Perhaps this was not the authors' intent. One must question, however, the wisdom of including the University of Utah process, still operating at bench scale, and omitting any reference to Mobil Oil Company's process based on coal gasification, preparation of methanol from the syngas, and conversion of the methanol to gasoline, one of the front runners for early commercialization. Unfortunately, there is no where to go to find a good summary of the developing liquefaction processes. Norbert Berkowitz' book ("An Introduction to Coal Technology", Academic Press, New York, 1979, xiv, 345 pp,) is probably the best, but it is still very brief.

Production of this book is not satisfactory. Many of the pages had printing readable with ease from both sides of the page.

John W. Larsen, *University of Tennessee*

Progress in Drug Metabolism. Volume 4. Edited by J. W. Bridges (University of Surrey) and L. F. Chasseaud (Huntingdon Research Center). John Wiley & Sons, New York. 1980. ix + 335 pp. $72.00.

This is the fourth volume in the series and is equally divided between drug absorption and drug analysis in biological fluids.

The first chapter, pharmacokinetics as a tool in drug development (S. A. Kaplan and M. L. Jack) delineates the role of the pharmacokineticist in the drug discovery program in an industrial environment. A brief review of factors affecting different aspects of pharmacokinetics and biopharmaceutics is given together with the interrelationship of this field with pharmacology, toxicology, and chemical research. The need for continuing dialogue between the pharmacokineticist and other scientific disciplines for the successful development of a new drug is emphasized.

Chapter 2 (J. B. Houston and S. G. Wood) is a review of factors which affect gastrointestinal absorption of drugs. Methods of assessing absorption of drugs in animals are summarized together with limiations of these methods. Mathematical treatment of the absorption process is kept at a minimum but references are provided for the reader interested in the details.

Factors influencing drug bioavailability and its clinical significance are discussed in Chapter 3 (P. G. Welling). Some of the topics covered are: (1) influence of physiological factors, (2) physicochemical factors related to the dosage form, (3) drug interactions with other drugs and with food, (4) effect of disease states, and (5) generic equivalents of drugs in terms of bioavailability and altered clinical response.

The analysis of drugs in biological fluids by gas chromatography (GC) and high-performance liquid chromatography (HPLC) constitute the last two chapters of the book (Chapter 4, C. M. Kaye, and Chapter 5, P. J. Meffin and J. O. Miners). A brief description of the instrumentation of these methods is outlined. Derivatization procedures for analysis of specific drugs are provided. An exhaustive list (in the form of a table) of GC and HPLC conditions for a wide variety of drugs is given at the end of Chapter 4 and Chapter 5 together with specific references.

This book provides a comprehensive review of drug absorption and analysis. The chapters flow smoothly, though there is some overlap, are easy to read, are well written and well organized, and are presented in a cogent manner. The authors and the editors are to be complimented for a job well done in presenting this important area of the drug discovery program. It should provide an understanding of drug absorption for the novice in the field as well as be a reference text for researchers interested in drug absorption and drug analysis.

Surendra C. Mehta, *Pharmaceutical Research Division, Warner-Lambert Co.*

Ion-Selective Electrode Reviews. Volume I. Edited by J. D. R. Thomas (University of Wales, Institute of Science and Technology). Pergamon Press, Oxford. 1980. v + 279 pp. $43.00.

Continued advances in the field of ion-selective electrodes (ISEs) have prompted the publication of this new journal and it is not at all surprising to find that this series is now being offered in bound form for personal reference collections. This innaugural volume, edited by one of the leading authorities in the field, provides seven reviews covering recent advances in theory, design, and applications of ISEs.

G. J. Moody and J. D. R. Thomas document their pioneering work on the preparation of calcium selective membrane electrodes. Detailed discussions regarding the effects of membrane composition on selectivity, sensitivity, etc. are provided. J. Janata and R. Huber review the theory, preparation, and applications of ion-selective field effect transistors (IS-

FETS). These devices represent a new technology within the ISE area and this article clearly addresses the mechanistic aspects of their operation and performance.

Applications of ISEs in industrial and water analysis are reviewed in separate articles by P. L. Bailey and by A. Hulanicki and M. Trojanowicz. Both papers present thorough discussions on instrumentation design and analytical performance of ISE systems used in "real world" situations. Each article also contains valuable literature surveys of ISE methodologies for individual analyte ions. An additional paper by G. J. Moody and J. D. R. Thomas reviews the applications of the fluoride ISE in dental and mineralized tissue programs.

A comprehensive review of the use of micro-ISEs for intracellular measurements is authored by H. M. Brown and J. D. Owen. Particularly noteworthy here are the extensive tables listing the types of micro-ISE that have been used to date and their specific applications in physiological studies.

This volume also contains the recommendations of the IUPAC for publishing ISE related manuscripts (G. G. Guilbault) as well as a timely compilation of recent titles (1978–1979) relating to ISE research. Overall, this volume is a welcome addition to the ISE literature and should serve as a valuable personal reference for specialists working in this area.

Mark E. Meyerhoff, *The University of Michigan*

Light Scattering in Liquids and Macromolecular Solutions. Edited by V. Degiorgio, M. Corti, and M. Giglio. Plenum Press, New York. 1980. ix + 295 pp. $35.00.

This volume is based on the proceeding of the "Workshop on Quasielastic Light Scattering Studies of Fluids and Macromolecular Solutions", held at Segrate (Milano), Italy, in May 1979. Its (predominantly European) contributors cover a wide range of problems related to this technique. While a year and a half has passed since the conference, the individual articles have aged well, and are not early descriptions of results which have since entered the primary literature. Indeed, at least one author's chapter incorporates relevant material which has appeared since the date of the conference.

The volume is organized about four major topics: diffusion of interacting colloids, surface and biological systems, hydrodynamic and phase transitions, and forced Rayleigh scattering. The quality of the individual chapters is uniformly high. Of particular interest is the paper by Kops-Werkhoven and Fijnaut on diffusion of sterically stabilized silica spheres; with considerable ingenuity they have obtained experimentally the concentration dependence of the diffusion coefficient for a system of hard spheres in which multiple scattering and electrostatic effects are actually negligible. Also of note are Corti and Degiorgio's study of intermicellar interactions—a problem usually avoided in the literature—and Sanders and Cannel's exacting discussion of experimental technique in measurements on biological macromolecules. The forced Rayleigh scattering technique uses the three-dimensional interference pattern between two crossed laser beams to create a pattern of local heating in a fluid. The relaxation of the pattern, as observed by a third probe laser beam, then gives information elsewhise difficult to obtain. Sections by Rondelez, Allain, et al., Scudieri, and Pohl show major applications of this new experimental method.

This volume is well worth its price and belongs in the personal library of anyone working in the field. The level and style are such that the volume may usefully be read by graduate students who are actively using the technique.

George D. J. Phillies, *The University of Michigan*

Introduction to the Magnetic Properties of Solids. By A. S. Chakravarty (Saha Institute of Nuclear Physics, Calcutta). John Wiley and Sons, Inc., New York. 1980. xv + 696 pp. $65.00.

This book is mistitled. It is not an introduction, nor is it concerned so much with magnetic properties as with the calculation of those properties. Furthermore, the emphasis is very definitely on the many-body problem, i.e., ordered magnetic solids. The approach is abstract: angular momenta, group theory, crystal field theory, strong-field coupling, LCAO–SCFMO calculations, molecular field theory, and finally Green Function formalism. Nonnegligible familiarity with quantum mechanics and group theory is assumed. The stated intent is to analyze chronologically the development of different theoretical models from the time of Weiss to the present. The analysis, however, is not critical. The equations are there, and the book surely represents a useful tool for those who need to learn the essentials for complete calculations, but one misses the perceptive insight of Van Vleck's monumental "The Theory of Electric and Magnetic Susceptibilities" or Griffith's admirable "Theory of Transition Metal Ions". In particular, there is insufficient confrontation of theoretical results with experimental evidence. Thus most chemists will generally not find this book especially useful for explaining their magnetic observations or for suggesting what experiment should be tried next. The first half of the book, which deals with the paramagnetic properties of dilute magnetic systems, would be suitable as a text for a graduate level special topics course. However, rare earths, magnetic resonance, and mixed-valence compounds are omitted. The second half, dealing with cooperative phenomena, except for a nice section on spin glasses, is definitely for the specialist.

M. J. Sienko, *Cornell University*

Viscoelastic Properties of Polymers. By J. D. Ferry (University of Wisconsin—Madison). John Wiley and Sons, New York. 1980. xix + 641 pp. $48.00.

In the last decade the field of polymer viscoelasticity has evidenced rapid growth as a result of active research efforts. This book critically reviews the underlying concepts, instrument design, experimental arrangements, and various viscoelastic models for both polymeric liquids and solids. Special emphasis is placed on the effects of many molecular and processing variables influencing the basic viscoelastic properties. Hence, this book continues to be one of the most extensive compilations of the state-of-the-art knowledge of polymer viscoelasticity, a field of vital industrial importance in the processing and utilization of polymers.

Recent advances, notably nonlinear behavior and transient properties, have been incorporated in this edition. It also offers a succinct review of the current status of the development of molecular theories and new experimental results. University researchers as well as scientists and engineers in polymer industry will find "Viscoelastic Properties of Polymers" an essential reference, providing basic information for practical applications and update of active areas of academic research.

David S. Soong, *University of California, Berkeley*

Annual Reports. Volume 76. 1979. Section A: Inorganic Chemistry. Royal Society of Chemistry, London. 1980. xvi + 282 pp. £26.

This is the first volume of "Annual Reports" that contains a separate volume for inorganic chemistry. Previously, recent advances in both physical and inorganic chemistry were covered within a single section. This new format should be welcome to both physical and inorganic chemists, for it permits expanded coverage of major advances in both fields. The reviewers are to be commended for their extremely well-organized and thorough coverage of the significant advances in inoranic chemistry during 1979. There are four main chapters to this review: chemistry of the main group elements; transition metal chemistry (including lanthanides and actinides); organometallic chemistry; and finally, radiochemistry. The first two chapters are subdivided by elemental group, with further subdivisions according to particular areas of interest, i.e., phosphazenes, metal–metal bonds, iron–sulfur proteins. The chapter on transition-metal chemistry contains very little on organometallics, as this important field is covered separately in the following chapter. The recent advances in organometallic chemistry are discussed according to ligand type. Complexes with σ-bonded ligands, such as carbonyls, alkyls, aryls, carbenes, and carbynes, are covered separately from complexes with π-bonded ligands, i.e., alkenes, alkynes, and dienes. Synthetic methods, reaction chemistry, X-ray diffraction, and mechanistic studies are given fairly equal emphasis throughout the book. The final section on radiochemistry is a new addition. The topics covered are chemical techniques for production and/or separation of specific isotopes, and the chemistry associated with nuclear transformations. There is a complete author index for Section A, and the table of contents is included for Section B (Organic) and Section C (Physical) of "Annual Reports", Volume 76.

Harvey S. Trop, *Bell Laboratories*

Advances in Catalysis. Volume 29. Edited by D. D. Eley (University of Nottingham), H. Pines (Northwestern University), and P. B. Weisz (Mobil Research and Development Corp.). Academic Press, New York. 1980. xiv + 367 pp. $45.00.

The present volume constitutes another useful addition to this series. As with previous volumes the material is well presented, consisting of reviews in seven areas of catalysis. This work is directed to those who are active in catalyst research. The reader will find the work well documented with references so that the basics of each area can be readily found.

The chapter on reaction kinetics and mechanisms on metal single crystal surfaces deals with some experimental aspects besides discussing the reactions of carboxylic acids and alcohols. This is followed by a chapter on photoelectron spectroscopy which deals with the application of this technique specifically to surface chemistry through chemisorption. Analyses of reaction rates are well presented in a chapter on site density and entropy criteria in identifying rate-determining steps of solid-catalyzed reactions. The remaining four chapters deal quite adequately with the extension of organic chemistry to catalyst studies. The titles are:

Organic Substituent Effects as Probes for the Mechanism of Surface Catalysis; Enzyme-like Synthetic Catalysts (synzymes); Hydrogenolytic Behavior of Asymmetric Diarylmethanes; and Metal-Catalyzed Cyclization Reactions of Hydrocarbons.

This volume will serve as a good reference to those needing information in the areas which are covered.

G. A. Tsigdinos and B. J. Streusand, *Climax Molybdenum Company, Ann Arbor, Michigan*

Aminocyclitol Antibiotics. Edited by Kenneth L. Rinehart, Jr. (University of Illinois), and Tetsuo Suami (Keio University). American Chemical Society, Washington, D.C. 1980. x + 437 pp. $39.50.

This 22-chapter volume, based on a symposium jointly sponsored by the Divisions of Carbohydrate Chemistry and Medicinal Chemistry at the ACS/CSJ Chemical Congress, Honolulu, 1979, deals with the current status of synthetic, structural, and biochemical studies of aminocyclitol antibiotics, a class which, in spite of toxicity limitations, includes some of the best known or clinically most useful antibacterial agents such as streptomycin, neomycin, and gentamicin. Following the introductory chapter, which classifies the numerous aminocyclitol antibiotics into 12 groups, with figures and recent review articles, the remaining chapters are divided into three main sections: synthetic studies (Chapters 2–14), structural studies (Chapters 15–17), and biochemical studies (Chapters 18–22). These represent contributions from seven universities (6 chapters), two research institutes (2 chapters), and nine pharmaceutical companies (13 chapters). A 14-page, well-organized subject index follows.

The synthetic section deals with total synthesis, as well as modification and analogue synthesis based on existing antibiotics. In the former approach, S. Umezawa (Chapter 2) discusses the total synthesis of aminocyclitols such as neomycin B. D. R. White et al. (Chapter 6) describe the stereospecific synthesis of spectinomycin, an aminocyclitol noteworthy for its lack of oto- and nephrotoxicity. Two groups deal with branched-chain cyclitols: J. Yoshimura et al. (Chapter 4), utilizing the Diels–Alder reaction and nitrosugar cyclization, and D. E. Kiely and J. M. Riordan (Chapter 5), using a new synthesis of epi-configuration deoxyhalogeno- and deoxyaminocyclitols. In the latter (modification and analogue) approach, three groups present studies based on the readily-available pseudodisaccharide neamine: T. Suami (Chapter 3), presenting reactions leading to a variety of structural types, B. J. Magerlein (Chapter 10), providing a novel synthesis of 6-deoxyaminoglycosides, and T. W. Ku et al. (Chapter 12, cf. below). Three groups present studies based on spectinomycin: R. C. Thomas et al. (Chapter 7), on the synthesis of analogues; W. Rosenbrook, Jr., and R. E. Carney (Chapter 8), on modification; and L. Foley and M. Weigele (Chapter 9), on diastereomers of dihydrospectinomycins. Three groups deal with kanamycins: T. W. Ku et al. (Chapter 12), on 3′- and 4′-thiodeoxykanamycin B; J. P. H. Verheyden et al. (Chapter 13), on analogues of kanamycin B; and M. J. Cron et al. (Chapter 14), on the selective N-acylation of kanamycin A, the acyl group being *S*-2-amino-4-hydroxybutyryl, unique in its apparent propensity to confer outstanding activities to various aminocyclitols. J. B. McAlpine et al. (Chapter 11) describe the O-methylation of gentamicins and seldomycins.

In the structural section, T. Naito et al. (Chapter 15) provide and analyze an extensive set of ^{13}C NMR spectra, most useful for identification of aminocyclitol structures. Two groups describe the structures of new fortimicins, aminocyclitols with novel 1,4-diamine substitution patterns: J. B. McAlpine et al. (Chapter 16), on minor components of the fortimicin complex; and K. Shirahata et al. (Chapter 17), on new members having double bonds in their purpurosamine moieties.

In the biochemical section, J. Davies (Chapter 18) discusses enzymes modifying aminocyclitol antibiotics and their roles in resistance determination and biosynthesis, discoveries which already have spurred a significant segment of recent efforts in synthetic modification. K. L. Rinehart (Chapter 19) presents an excellent account of biosynthetic studies and mutasynthesis (the use of mutants in the synthesis of novel antibiotics), an approach which he has pioneered. Examples of the combined use of chemical synthesis and mutasynthesis in the development of novel antibiotics are presented by two groups: the extensive work by P. J. L. Daniels et al. (Chapter 20, which also describes an elegant selective amino protecting procedure using transition-metal cations), on the clinically important gentamicin group; and the studies by J. Cleophax et al. (Chapter 21), on related compounds. Finally, B. D. Davis and P. C. Tai (Chapter 22) discuss the multiple interactions of aminoglycoside antibiotics with ribosomes, revealing insights into the mechanisms of action of this class of antibiotics.

This highly informative and stimulating collection of papers represent an excellent selection, pointing to the rigors and challenges, at the varied frontiers of aminocyclitol antibiotics research: elegant synthetic approaches, novel structures, new insights into mechanisms of action and biosynthesis, together leading to the encouraging emergence of active, less-toxic members. It seems somewhat unfortunate that the book was not published sooner after the symposium. Nevertheless, it should be highly valuable to anyone interested in this field, from the specialist striving for more effective antibiotics, to the layman seeking a sound introductory foundation and insight.

Peter W. K. Woo, *Warner-Lambert/Parke-Davis*

Isoquinolines. Part 1. Edited by G. Grethe. John Wiley & Sons, New York. 1981. xv + 561 pp. $125.00.

This volume in the series of monographs collectively called "The Chemistry of Heterocyclic Compounds" under the overall editorship of Weissberger and Taylor begins a four-part treatment of isoquinoline chemistry. Part 1 contains four chapters and has an introductory aspect. The chapter Properties and Reactions of Isoquinolines and their Hydrogenated Derivatives (by S. F. Dyke and R. G. Kinsman) is a broad treatment that covers physical and spectroscopic properties and major reaction types: substitution, reduction and oxidation, ring fission, rearrangements, etc. The second chapter, Synthetic and Natural Sources of the Isoquinoline Nucleus (by T. J. Kametani and K. Fukumoto) treats the subject in the detail one has come to expect from this series. Biosynthesis of Isoquinolines (by E. McDonald) is much concerned with alkaloids. The last chapter, Quaternary Isoquinolinium Salts (by C. K. Bradsher), is a comprehensive treatment of the subject covering formation, reactions, effects on substituents, uses, etc. Each chapter has a long list of references; this fact combined with the presence of author and subject indexes specific to this volume makes it an important work of reference that will be highly useful for many years.

Glass Technology. Developments Since 1978. Edited by J. I. Duffy. Noyes Data Corp., Park Ridge, N.J. 1981. xii + 322 pp. $48.00.

The United States patent literature has been used as the source of the material in this book, which, like the others in the "Chemical Technology Review" series, extracts and organizes the descriptive matter in patents and presents it in detailed, readable form. The content is divided into the rubrics Glassmaking, Glass Processing, Glass Fibers, Glass-Ceramics, Optical Glass, Electrical Glass, and Technical and Specialty Glass. There are indexes of inventors, companies, and patent numbers; a detailed table of contents serves as a subject index.

Chromans and Tocopherols. Edited by G. P. Ellis and I. M. Lockhart. John Wiley & Sons, New York. 1981. xii + 469 pp. $125.00.

This book is Volume 36 of the series "The Chemistry of Heterocyclic Compounds" under the guiding editorship of Arnold Weissberger and Edward C. Taylor. It is an extension of Volume 31 and now includes the various derivatives of benzopyran that were omitted from that volume, such as chromanols having the hydroxy group on the benzene ring, spirochromans, etc. Flavans and derivatives, and coumarins, are left for future volumes.

The editors have written a large part of this volume, and the remaining chapters have been contributed by R. Livingstone, R. M. Parkhurst, W. A. Skinner, and S. Smolinski. The contents follow the characteristics of previous volumes in the series, with extensive tables of compounds, long bibliographies, and copious use of clear structural formulas. Both author and subject indexes are included, and help to make this a reference work of major importance.

Kirk-Othmer Encyclopedia of Chemical Technology. Third Edition. Volume 13. Edited by M. Grayson and D. Eckroth. John Wiley & Sons, New York. 1981. xxvi + 993 pp. $145.00.

This volume covers subjects from Hydrogen-Ion Activity to Laminated Materials, Glass. In between are some subjects of major importance, including elements (indium, iodine, iron), compounds (hydrogen peroxide, indole, isoprene), classes of compounds (isocyanates, ketones), physical topics (infrared technology, integrated circuits), and commercially important substances (inks, insulation, antimicrobial agents), etc. Readers familiar with earlier volumes know that the entries are reviews of high quality that strike a useful balance between fundamental science and engineering application.

One long and valuable entry is misleadingly titled Imines, Cyclic, whereas it actually deals only with aziridines. One wonders why it was not placed under a more apt title, and also if there will be entries in later volumes under "ketimines and aldimines", "pyrrolidines", and "piperidines" to make up for the gaps left by putting a narrow subject under a sweeping title. In this entry there is, appropriately, a section on Health and Safety Factors, for aziridines are generally very toxic and some can polymerize violiently. However, the fact of carcinogenic danger from aziridine is obfuscated by the curiously oblique statement "...the regulations issued by OSHA to limit exposure of workers to carcinogens include aziridine"; in fact, aziridine (ethylenimine) is listed as a Class

1 carcinogen. In another place, there is an unfortunate use of double arrows, indicating equilibrium, between canomical resonance forms of isocyanates, and the Hofmann, Curtius, and Lossen rearrangements are erroneously portrayed as taking place through nitrene intermediates. These are quite minor criticisms of a first-class work, however.

NATO Advanced Study Institutes Series. Recent Advances in Group Theory and Their Application to Spectroscopy. Edited by J. C. Donini. Plenum Press, New York. 1979. xii + 692 pp. $59.50.

This is a collection of 11 articles based on lectures presented at a NATO Advanced Study Institute at St. Francis Xavier University, Antigonish, Nova Scotia, August 6–20, 1978. Previous knowledge is assumed of the irreducible tensor techniques developed by Racah, Judd, and Wybourne. The lectures cover advanced aspects of group theoretical formulation with applications to ligand field theory, spectroscopy of transition metal and lanthanide systems, magnetic resonance, and magnetic circular dichroism. C. E. Wulfmann gives a very lucid account of dynamical groups in atomic and molecular physics.

S. M. Blinder, *University of Michigan*

The Asbestos Hazard. By Paul Brodeur. New York Academy of Sciences, New York. 1980. 93 pp. $4.00.

Few modern occupational and environmental hazards represent as complex a set of issues as asbestos. These fine silicate mineral fibers are widely used in building materials, insulation, brake linings, textiles, paints, and a host of other essential products. Mining, processing, demolition, and normal wear return many of the fibers to the air and water, which may already contain mineral fibers from natural sources. The diseases caused by asbestos inhalation—asbestosis (lung scarring), lung cancer (often smoking related), gastrointestinal cancer, and mesothelioma—are characterized by long latency periods (around 10 years for asbestosis, 20–50 years for cancer). The virtual impossibility of precisely determining the levels and types of fibers that workers were exposed to some 20–30 years ago can be readily imagined, and the relevance of such epidemiological data to current (often far lower) levels and kinds of exposure continues to be hotly debated. Indeed the electron microscopic techniques required to fully characterize such exposures are only now widely available, although fiber size and shape are believed to substantially affect carcinogenicity.

What then do we know about the current relative risks faced by modern asbestos workers, their families, then man-in-the-street, children in asbestos-containing schools? Some risks there are, no threshold having been demonstrated, but clearly they must differ significantly with the nature of the exposure. Given that the experts disagree in the quantitative interpretation of currently available data, is it any wonder that the public is confused, fatalistic, or frightened? There is, therefore, a desparate need for a dispassionate, well-balanced review of the relevant science for the general public. Unfortunately this book, despite the imprimatur of the New York Academy of Sciences, is not. Rather, it tends to be a partisan, often sensationalist, presentation whose "expose" style occasionally seems calculated more to inflame than inform. I say this even though I am in primary agreement with the overall position of the Mt. Sinai group, whom the book, perhaps overly, follows. A defensible scientific position does not need hype; indeed it may not be able to survive it.

Perhaps a few examples would give the flavor of the text, and explain this pessimistic assessment. There is consistent inequality in the treatment of positive (alarming) and negative (reassuring) results. For example, Chapter 4 discusses positive studies of asbestos insulation workers by Selikoff and Hammond. The subchapters contain "bullets" of hard-hitting facts, and are dramatically titled: Death Among Insulation Workers, The Disaster Continues, The Disaster Spreads, Some Grim Conclusions. Chapter 5 discusses equally large negative studies on asbestos miners and millers. These studies, however, rate neither "bullets" nor more than the blandest titles: Another Study of Chrysotile Asbestos Exposure in Canada, Another Theory Concerning Mesothelioma. There is consistent presentation of only the most alarming estimates, often outliers, without giving responsible lower estimates equal credence. For example, "Dr. Selikoff has projected that asbestos may be causing 10,000 cases of cancer a year... Others [unidentified] have projected much higher levels—as many as 40,000 cases a year." Are there really no responsible estimates below those of Dr. Selikoff? Consistently these unidentified "others" make assertions which do not necessarily (but often seem to) represent mainstream opinions, as in: "Physicians, it is thought, should familiarize themselves with the worker's compensation laws...advise a patient...about legal requirements for notification...direct his patient to an attorney or to a Legal Aid Society...[and] be available to appear in court."

Data are often lacking, or at least not produced, to support the scarey headlines employed. For example, Chapter 13, Unsuspecting Victims, has five "bullets" to emphasize 5 tragic cases of mesothelioma found in Paterson, New Jersey, in families only indirectly exposed to asbestos. However, the only scientific study presented—a large study involving 2447 men living within 0.5 mile of the same Paterson, N.J., factory since 1942, and performed by Drs. Selikoff and Hammond themselves, was firmly negative. "Indeed, their overall death rate from cancer is slightly *lower* [emphasis added] than that of the control group". (Why no bullets here?) Does this result, although explicable, really justify the alarming opening paragraphs? "As we shall see, asbestos disease can damage and destroy the health of people who are neither directly nor indirectly exposed to the mineral as a result of their work. Some [were]...wives, children and relatives of asbestos workers. Some have been residents of neighborhoods in which asbestos factories were located...the disease-producing potential of the magic mineral has been seriously underestimated." The sections on govenment regulation and standards setting are naive at best. There is no scientific discussion of the dependence of carcinogenic potential on fiber size (although it is alluded to); in fact, there is no real discussion of what we have learned from animal or in vitro studies about the likely public health hazards of asbestos. Epidemiology alone is useful, but limited (see above).

In summary, it is difficult to recommend this book to readers without the prior background to place it in proper perspective. On the positive side, its readable format and clarion call for concern should awaken readers (at least those not turned off by its strident tone) from potentially dangerous complacency or apathy. In general, the idea of publishing selected New York Academy conferences in a popular format is a truly excellent one. The Academy should, however, maintain tighter control over the editing to assure greater objectivity, while keeping the legitimate *scientific* excitement intact. They could benefit from the example set by NOVA, which usually manages to be both fascinating, accessible to the public, and even-handed.

Irvin M. Asher, *Rockville, Maryland*

Black Body Theory and the Quantum Discontinuity (1894–1912). By Thomas S. Kuhn (Princeton University). Oxford University Press, New York and Oxford. 1978. x + 356 pp. $24.00.

This text is a historical account of the emergence of anomalies in classical physics. The term "anomalies" is used here to refer to Kuhn's now famous work, "The Structure of Scientific Revolutions". Kuhn, a scientific historian, presents his inquiry into the development of black-body theory by drawing parallels to the stages of science enumerated in "The Structure of Scientific Revolutions".

The author begins by examining certain papers written by Max Planck, which, according to Kuhn's argument, demonstrate that Planck's positions were not as radical as supposed, but rather were embodied in the "normal science" of the classical paradigm. Planck attempted to apply electromagnetic theory to cavity radiation, and found statistical techniques entering his research. Believing that statistics did not belong in his theories, Planck was unsatisfied. Yet further difficulties arose when Planck tried to reconcile the second law of thermodynamics with mechanics. The anomalies, as Kuhn would have it, then began to interfere with Planck's progress. The classical paradigm was showing its incapacity to tackle the new data. The quagmire created by Maxwell's Demon led Planck to announce his support for the continuous matter theory over atomism. The problem of irreversibility was another instance where Planck wished to provide proof without the aid of statistical tools. Only after Planck's (and others) strenuous efforts to design mechanical models did not succeed did recognition come that their aspirations were misdirected. At this point, the equation $\epsilon = h\nu$ was formulated, expressing the ineradicable law that energy is not absorbed and emitted continuously. With the help, most notably, of Einstein, Ehrenfest, and Lorentz, theories were adapted and the transition to statistical thermodynamics became the new emphasis.

The book is a tribute to Kuhn's own interpretation of progress in science. Planck found it hard to relinquish the old paradigm, even in the face of recalcitrant data. What was needed to account for the anomalies was a break with tradition. With a change of focus, the significant contributions by a multitude of scientists could be used to uncover a new sort of physics; a physics which today we regard as the current paradigm.

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