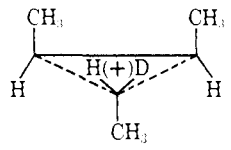
by the finding of a 68–32% mixture of inversion and retention. We believe our data are best accounted for if opening occurs by way of an unsymmetrical corner-protonated cyclopropane (**6**) in which the attacking D^+ is in the plane of the ring. In such an intermediate the ring-carbon would resemble a trigonal bipyramid (**7**) making the two ring-bonds slightly different and leading naturally to a non 50–50% mixture of threo and erythro deuterium products. We reject an edge-protonated structure (**8**) as the intermediate giving rise directly to products[6] since its structure as usually written does not reveal why inversion and retention reactions have nearly the same activation energy. Of course **6** and **8** differ only slightly in the position of the proton and **8** may be a transition state on the way to **6** or an intermediate which leads to **6**. We hope that further experiments now underway will shed further light on these possibilities.



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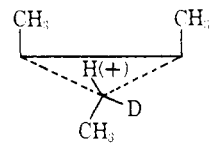

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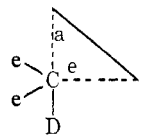

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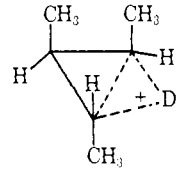

8

Acknowledgment. The authors wish to thank the National Science Foundation for support of this research by Grant GP 13783X.

(6) It could be argued that opening occurs both from corner- and edge-protonated species, with perhaps the 5% erythro acetate found in the opening of **1** (the product of nucleophilic retention) arising from the latter intermediate *via* an open carbonium ion. We think it unlikely that if opening were occurring competitively from both **6** and **8**, the stereochemical results would remain constant over such a wide range of solvents and reaction conditions.

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*Book Reviews**

Aromatic and Heteroaromatic Chemistry. Volume I. Edited by C. W. Bird and G. W. H. Cheeseman (University of London). The Chemical Society, London. 1973. xvi + 445 pp. £11.00.

This volume represents still further expansion of the Specialist Periodical Reports. It covers the literature between July, 1971, and June, 1972. Future volumes are planned yearly. There are fifteen contributed chapters that cover such subjects as synthesis by intramolecular cyclizations, condensation reactions, and cycloaddition reactions; ring interconversions; substitution of various types; ring cleavages; reactions of substituents, and various important naturally occurring systems, such as porphyrins.

Electronic Structure and Magnetism of Inorganic Compounds. Volume 2. Edited by P. Day (University of Oxford). The Chemical Society, London. 1973. ix + 372 pp. £8.00.

This volume of the Specialist Periodical Reports reviews the literature of 1971 and early 1972. The contributed chapters are: Photoelectron Spectroscopy, Electronic Spectra, Optical Activity, Magnetic Susceptibility Measurements, and Molecular Calculations.

Electron Spin Resonance. Volume I. Edited by R. O. C. Norman (University of York). The Chemical Society, London. 1973. x + 273 pp. £7.00.

This is a volume in the Specialist Periodical Reports, successors to the former Annual Reports. It is a group of ten contributed chapters in which the literature published between January, 1971, and May, 1972, is reviewed comprehensively. Future volumes are planned to cover 18-month intervals. The subject is treated from various standpoints, including the theory and phenomenon of esr, endor and eldor, free radicals in the solid state and in solution, and inorganic and organometallic radicals; biochemical applications will be treated in a future volume.

Molecular Spectroscopy. Volume 1. Edited by R. F. Barrow, D. A. Long, and D. J. Millen. The Chemical Society, London. 1973. xv + 622 pp. £12.00.

This part of the expanded Specialist Periodical Reports series covers the "recent" literature up to December, 1971, and in some chapters "additionally into 1972". Future volumes are planned at yearly intervals. The emphasis is on the principles and practice of spectroscopy, as applied to microwave, electronic, infrared (near and far), and Raman spectra. Special chapters are devoted to macromolecules and to matrix isolation.

Statistical Mechanics. Volume I. Edited by K. Singer (University of London). The Chemical Society, London. 1973. viii + 256 pp. £6.50.

The expansion of the series of Specialist Periodical Reports now embraces statistical mechanics. This volume reviews "the recent literature published up to July, 1972"; future volumes are planned to appear every other year. The four chapters cover Integral Equation Approximations in the Theory of Fluids, Equilibrium Theory of Liquid Mixtures, Perturbation Theory in Classical Statistical Mechanics of Fluids, and Thermal Transport of Coefficients for Dense Fluids. As in other volumes of the series, there is an author index (very useful in such reviews), but a subject index has been dispensed with.

Dielectric and Related Molecular Processes. Volume 1. Edited by M. Davies (The University College of Wales, Aberystwyth). The Chemical Society, London. 1972. xv + 394 pp. £8.00.

This is the first volume in what is intended to be a biennial series; it covers the literature in the period 1966–1971. The chapters are intended not to presume "too much previous knowledge of their subjects." There are seven of them, of which the last, entitled "General Molecular Theory and Electric Field Effects in Isotropic Dielectrics," constitutes half the book. There is no subject index, but the table of contents is very detailed.

Advances in Free-Radical Chemistry. Edited by G. H. Williams (Bedford College, London). Academic Press, New York, N. Y. 1972. ix + 307 pp. $19.50.

There are four reviews in this volume, each covering the material published up to mid-1970: Homolytic Substitution Reactions of Heteroaromatic Compounds in Solution (K. C. Bass and P. Nababsing); Absolute Rate Constants for Reactions of Oxyl Radicals (J. A. Howard); Allylic Halogenation (A. Nechtaval); Free-Radical Reactions in the Presence of Metal Ions (G. Sosnovsky and D. J. Rawlinson). The last chapter is subtitled "Reactions of Nitrogen Compounds" and covers both uncharged radicals and cation-

* Unsigned book reviews are by the Book Review Editor.

radicals. The extensive author and subject indexes contribute to the usefulness of this authoritative series.

Atlas of Thermoanalytical Curves. Volume 2. Edited by G. LIPTAY. Heyden and Son, Ltd., London. 1973. 161 pp. $31.65 (in ring binder).

This is a collection of DTA, DTG, and TG curves of inorganic (largely) and organic substances. Each substance has a separate page, on which are reproduced the experimental curves, the conditions under which the measurements were made, a key to transitions or changes occurring, and references. Accessibility is achieved through an alphabetical index of substance names.

Chemical Sterilization. Edited by PAUL M. BORICK (Ethicon, Inc.). Dowden, Hutchinson & Ross, Inc., Stroudsburg, Pa. 1973. xiii + 352 pp. $18.00.

This is a volume in a series entitled "Benchmark Papers in Microbiology," and reproduces in original form papers from primary journals selected for their pathfinding significance. Comments by the editor precede the various groups of papers. The subject concerns disinfection broadly defined to include control of spores, bacteria, and viruses. The emphasis is, of course, on the application of chemical agents to the task, but some papers deal with mechanism of action. The papers included date from 1961 to 1972.

Lehrbuch der Organischen Chemie. 17th Edition. By HANS BEYER. Edited by WOLFGANG WALTER (University of Hamburg). S. Hirzel Verlag, Stuttgart. 1973. xx + 878 pp. DM 48.

This new edition of the late Professor Beyer's highly successful textbook has been kept up to date by attention in many places. The new material includes a chapter on physical methods of structure determination. Although this book is recommended as a textbook for use in courses or for self-study, it has a secondary function as a general reference work, for it gives far more leading references than do most textbooks, and the amount of descriptive detail is unusually great. Almost every page has references in a footnote; they are mostly to books and reviews, but a substantial number are to primary journals. This fact justifies the eight-page author index, which supplements the excellent subject index.

Nuclear Moments and Nuclear Structure: Proceedings of the International Conference, 1972. Edited by H. HORIE and K. SUGIMOTO. Physical Society of Japan, Tokyo. 1973. x + 637 pp. Price not stated.

This volume includes all the invited and contributed papers, summaries of the discussions, and tables of nuclear moments, of the conference held in September, 1972. The large number of papers, most of which appear to be reports of original research, are all in English. They are set in type and contain many figures and tables. The Tables of Nuclear Moments, included as an appendix, occupy 27 pages.

Organicum. Practical Handbook of Organic Chemistry. English translation by B. J. HAZZARD. Edited by P. A. ONGLEY. Addison-Wesley, Reading, Mass. 1973. xx + 747 pp. $23.50.

The German "Organikum," written in 1960–1962 by a group in Dresden, has gone through eleven editions, and now appears in English for the first time. It is meant to integrate practical and theoretical organic chemistry, and provides experimental directions for a large number of representative preparations as well as concise descriptions of mechanism, scope, and the dependence of reactivity on structure.

The first section is an Introduction to Laboratory Technique, which presents innumerable bits of useful information not normally brought together, in a form adapted more to reference use than is to be found in introductory manuals. A short section on literature and report writing is followed by a section called "Some General Principles," which takes up classification or organic reactions, concepts of acids and bases, kinetics and mechanism, and electronic effects.

The largest bulk of the book is found in the "Organic Preparative Section," which takes up reactions by type (*e.g.*, nucleophilic substitution, eliminations, etc.). There is also a substantial section on identification of organic substances, and there are three short appendices: "Properties, Purification, and Preparations of Important Reagents, Solvents, and Auxiliaries"; "The Toxicity of Important Chemicals"; and a "Method Index".

The shortcomings of this work are essentially those of omission; it is preoccupied with classical methods with consequent neglect of newer methods that are eclipsing them. Such terms as "hydroboration" and "cycloaddition", for example, cannot be found in the index, and these important subjects appear to have been completely overlooked. The section on identification is completely devoted to wet chemical methods, and the ascendance of spectroscopic methods of identification is effectively ignored (although spectroscopic methods are treated in the section on techniques). Some of the preparative methods are also outdated, or the choice presented is misleadingly restricted; for example, the only preparation mentioned for diazomethane is from *N*-nitroso-*N*-methylurea.

Some of the omission and condensation is obviously justified by the aim of presenting under one cover as much of the working heart of organic chemistry as possible, and of keeping the bulk, and thus the cost, down to a level that encourages individual ownership. It certainly provides a quick reference and well-organized review for both the student and the practicing chemist, and, notwithstanding its considerable shortcomings, it appears to have no serious competitor. ("A Textbook of Practical Organic Chemistry," by Arthur Vogel, is similar in aim and scope, but its organization is along traditional functional-group lines, and the latest edition is that of 1956.) "Organicum" can be recommended for personal purchase, and it is to be hoped that it will achieve sufficient success to warrant a thorough revision in the near future to bring it abreast of the state of chemistry today.

Organometallic Compounds. Volume II. Compounds of Germanium, Tin and Lead. Second Edition. First Supplement. By R. W. WEISS (Fachhochschule Lippe). Edited by M. DUB. Springer-Verlag, New York, N. Y. 1973. xxiv + 1116 pp. $41.80.

This volume covers the period 1965 to 1968 and presents encyclopedic noncritical information in concise, abbreviated form on organic derivatives of germanium, tin, and lead. The material is arranged according to structural type and is essentially self-indexing with the aid of the table of contents. Much information is given in tables, and everything is supported by literature references (including patents), which number 3005, in addition to a fifteen-page list of reviews and monographs.

Peptides 1971. Edited by H. NESVADBA. **Peptides 1972.** Edited by H. HANSON and H. D. JAKUBKE. American Elsevier Publishing Co., New York, N. Y. 1973. xxii + 428 pp. $28.50. xxviii + 470 pp. $32.50.

The proceedings of the Eleventh and Twelfth European Peptide Symposia (April, 1971 and September, 1972) are presented here, reproduced from the contributors' varying typescripts, with illustrations. Most of the papers are in English or German. They all appear to be accounts of original research, but in abbreviated form and without full experimental details. There are indexes of contributors but no subject index. It is obviously of some convenience to have this material gathered together for current consulting, but such books are likely to have only transitory value. In the meantime, they add to congestion in the stream of scientific communication by the redundancy with journal publication that is bound to occur. The prospective purchaser must weigh carefully whether this is an efficient use of library funds (and publishing effort).

Phonons. Edited by M. A. NUSIMOVICI. Flammarion Sciences, Paris. 1971. Distributed in U.S.A. by International Scholarly Book Services Inc., P.O. Box 4347, Portland, Ore. 502 pp. $20.00.

This volume contains the proceedings of the international conference held at Rennes, France, in 1971. The numerous papers are reports of original research; they are printed in either English or French. There is an index of contributors, but no subject index.

Catalysis and Enzyme Action. By MYRON L. BENDER (Northwestern University) and LEWIS J. BRUBACHER (University of Waterloo). McGraw-Hill Book Co., New York, N. Y. 1973. xii + 203 pp. $3.95.

This small paperback is a survey of modes of catalysis. It might be inferred from the title that catalysis is considered only as applied to enzymes, but the discussions of acid–base catalysis and metal ion catalysis also cover nonenzymic aspects. In fact, the discussions of Ziegler–Natta catalysts, cracking catalysts, etc., seem to depart from the biological spirit of the rest of the book.

The authors reach the heart of problems in remarkably short space and this conciseness is the great virtue of the book. The book serves to introduce freshmen chemists and biologists to catalysis and enzyme action and can be recommended for this purpose.

The first chapter introduces transition state theory. Although

$\Delta G^{\ddagger}$ is mentioned on four pages beyond Chapter 1, it is interesting that in each case the discussion could perhaps have been phrased as well in collision theory terms. Chapter 1 also introduces reaction coordinate diagrams, and these are used once again on p 103. Such diagrams have been severely criticized (see Harold S. Johnston, "Gas Phase Reaction Rate Theory," Chapter 16). In fact, their problems appear in the use of $\Delta G^{\ddagger}$ as concentration dependent on p 62 whereas elsewhere it is implied to be a constant for a reaction. However, this short book can hardly be expected to settle controversies of this sort.

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

Laboratory Techniques in Biochemistry and Molecular Biology. Volume 3. Part I. Determination of Sequences in RNA. By G. G. BROWNLEE (Laboratory of Molecular Biology, Cambridge, England). **Part II. Techniques of Lipidology.** By MORRIS KATES (University of Ottawa). American Elsevier Publishing Co., New York, N. Y. 1972. viii + 601 pp. $32.50. Parts I and II available separately in paperback form: $9.95 and $10.50.

This is Volume 3 in a series entitled "Laboratory Techniques in Biochemistry and Molecular Biology." The first part, "Determination of Sequences in RNA," is a masterful exposition of techniques in this field. Procedures are explained in great detail even to including recommendations on laboratory flooring and recommended laboratory notices to post in connection with certain instrumentation. There were 62 figures which indicates the plentiful diagrams and illustrations. Names of suppliers are given for both chemicals and equipment used in its various procedures. This book is not only indispensable for workers in the field, but it is equally a good introduction for the complete beginner. Reading the first part makes one appreciate a tangible and highly experimental approach as an introduction to any field.

The second part, "Techniques of Lipidology," has most of the virtues of the first part. The first 50 pages are devoted to names and structures of lipids isolated from natural sources. This was helpful in grasping the scope of the field. Much emphasis is placed on the isolation and separation of lipids, particularly by chromatography.

The author chose to largely refer the reader to other works in the area of mass spectrometry, and this choice tends to obscure some new methods developing in this area such as analysis of mixtures of unsaturated acids by conversion to trimethylsilyl ethers of diols and analysis of mixtures of hydroxy acids *via* their trimethylsilyl derivatives.

The subject of insect pheromones appears to have been omitted. Although this field is new and rapidly developing, the compounds are largely lipid in nature and the combined gc–chemical–mass spectroscopy represent elegant techniques in lipidology.

The printing itself is of excellent quality with large type on high quality glossy paper. It was a pleasure to see such a quality production effort.

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

Pesticides in the Environment. Volume 1. Part 1. Edited by R. WHITE-STEVENS (Rutgers University). Marcel Dekker, Inc., New York, N. Y. 1971. xx + 270 pp. $23.50.

This volume is the first part of a series on pesticides which deals "with the more theoretical aspects of pesticidal chemicals," while Volume 2 is intended to treat "the practical business of handling pesticides in the environment." The editor is well qualified by education and experience to undertake such a task.

The preface, in addition to explaining the scope and purpose of the series, consists of a stinging denunciation of persons and groups which asserts that the environment of Earth has been degraded by chemical insults hurled upon it. He defends the careful use of pesticides and asserts that most fatalities attributed to pesticides in the U. S. are attributed to mishandling or to the older metal organic and arsenical compounds. He defends the newer pesticides on the grounds that there is no proof that they cause illness or death among humans or valuable animals when used as directed. He makes a plea for the scrupulous application of scientific objectivity in evaluating the good and bad effects of pesticides.

Chapter 1, "The Chemistry and Biology of Pesticides," written by R. L. Metcalf, is an extensive compendium of various types of pesticides, and the names, structures, properties, dosages, and toxicities of a great many compounds are given. It is likely to prove quite useful as a reference for workers in the field.

Chapter 2 is entitled "Metabolism of Insecticides and Fungicides" and was written by T. R. Fukuto and J. J. Sims. It covers in some detail the metabolic studies on a rather small number of pesticides, which underscores the difficulty in performing such studies and the lag between the use of a pesticide and the determination of its fate in the milieu in which it is used.

Chapter 2, "Metabolism of Herbicides," by J. E. Loeffler and J. van Overbeek, is a very general discussion of the general approach to a study of the problem of herbicide metabolism. The specific information of interest to the specialist is mainly confined to the last 40% of the chapter.

The book has some 655 references of which only 7 are dated 1967 or later. There is no author or subject index in Part I, but there is a fairly extensive table of contents at the beginning of each chapter.

David W. Emerson, *The University of Michigan—Dearborn*

Defects in Crystalline Solids. By B. HENDERSON (Keele University). Crane, Russak & Co., Inc., New York, N. Y. 1973. ix + 203 pp. $19.50.

It is unusual to initiate a series of texts on solid state physics with a book on "Defects in Crystalline Solids." For those who have long been accustomed to the idea of defect being a perturbation on the periodic lattice, the supposition of studying the perturbation without some knowledge of the unperturbed system is disturbing. Dr. Henderson, however, discusses defects as a localized phenomenon with only weak coupling to the rest of the many-body system.

Such an approach is fruitful for the novice beginners in solid state physics, especially for the more technology-oriented student of metallurgy and material science. The book, being an undergraduate text, has only limited relevance to research workers who are excited about general disordered systems such as liquids, amorphous semiconductors, surfaces, and alloys. The elementary level at which this text is written is witnessed by a lengthy, although clear and precise, exposition of the basic concepts of epr, endor, and the Franck–Condon principle.

The emphasis is on point defect, although a discussion of dislocation is included. The most readable chapters (from this reviewer's viewpoint) are those on color centers in ionic crystals and defects in semiconductors. However, even in these areas the coverage does not appear to be sufficiently extensive to satisfy the more inquisitive students. For example, U-centers and localized phonons are not discussed at all, let alone the more sophisticated propagator method which has become an indispensable tool in dealing with defect states.

The illustrations are, in general, helpful. However, in a spot check, this reviewer found some minor inconsistencies between the discussion in the text and illustrations (*e.g.*, Figures 1.4, 2.2, and 2.3) which might be troublesome to a less experienced student. The bibliography is hardly adequate since students would have difficulty in going beyond the text into current literature. Basic articles and more detailed books such as "Localized Excitations" by Wallis, "Impurity Spectra" by Rebane, and reviews by Mott and Twose on impurity conduction should, at least, have been included.

As an introductory text on defects in crystalline solids, this book is easy to read and technically well done. More serious students would have to consult more advanced treatises as well.

Hwei-Kwan Hong, *State University of New York at Stony Brook*

The Determination of Hydroxyl Groups. By STIG VEIBEL (Technical Unversity of Denmark). Academic Press, London. 1972. xvii + 159 pp. $10.50.

Neither the writing nor the author's conception of the subject can be recommended. The book is not a review as the title suggests, but an annotated bibliography. The writing is sketchy and becomes nearly an outline at times. There is no significant attempt to evaluate methods, recommend methods, or help a reader in choosing methods.

The book is composed on the premise that chemical reagents exist which can be used for the titrimetric, gravimetric, colorimetric, etc., determination of alcohols, and a reasonable collection of such recipes are abstracted. However, the premise is doubtful, and, perhaps as a result of this premise, the book barely touches on the elegant instrumental and chromatographic methods which are the methods actually used today for sterols, terpene alcohols, carbohydrates, hydroxy fatty acids, and alcohols of the insect pheromone type.

This book is signaled as the first in a series on "The Analysis of Organic Molecules." The editors would do well to take a more realistic look at how organic molecules really are analyzed.

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