

scribes the properties of the individual reactions. While several questions and hypotheses are presented, the accomplishments of the last three years, especially those of the authors, Bloch, Lynen and their associates in describing the reactions of mevalonic acid, the isoprenyl pyrophosphates and squalene, justify the optimism of the authors in predicting rapid progress in revealing the obscure portions of the picture.

Koshland's discussion of the active site of enzymes is necessarily preliminary and speculative. The justification for reviewing this subject is contained in the summary, which metaphorically proclaims the availability of methods for elucidating enzyme structure and function. The compilation of suggestive information about numerous enzymes is organized to show systematically the sorts of information that can be obtained by a large variety of techniques. Since no single enzyme has been analyzed sufficiently to permit a description of its catalytic properties in terms of its structure, it is to be hoped that future work will combine and extend the approaches outlined and that subsequent reviews may describe how specific enzymes do work.

Coenzyme binding, an essential component of studies on reactive sites for a prominent group of enzymes, is described in comprehensive detail by Shifrin and Kaplan, but no generalizations are drawn and little attempt is made to evaluate critically various findings. This article reports the properties of many individual enzymes, primarily those that use pyridine nucleotides, but also those that use flavines, pyridoxal phosphate and thiamine pyrophosphate.

The synthesis of nucleotide coenzymes defines the principles involved in forming phosphate derivatives. Essentially all of the naturally occurring small nucleotides have been synthesized, along with many analogs. The properties of acid anhydrides, carbodiimides and phosphoramidates are discussed, and numerous examples of their uses are described. Column chromatography of enzymes is discussed in an article that makes a gallant attempt to produce a theory without mathematics. Unfortunately, our dependence on incompletely understood resins and completely undefined proteins would seem to offer little hope at this time for a useful theory even with mathematics. A large number of examples of chromatograms of various enzymes is included, but the prospect seems unfortunately clear that the separation of individual enzymes from other proteins will remain empirical.

There are many functions to be served by review articles. All of those included in this volume will be valuable to those seeking a compilation of literature on the topics included. Of the articles on enzymatic subjects three are especially noteworthy in that they do more for the reader. The review on cholesterol biosynthesis presents a coherent picture that orients those outside the field and clearly indicates the problems of current interest. The two articles on genetics and enzyme induction similarly make the questions being investigated today not only comprehensible, but exciting to the general reader as well as the expert. These articles and the optimistic approach to the question of active sites are certain to provoke experiments, which alone would justify the publication of this interesting volume.

LABORATORY OF BIOCHEMISTRY
NATIONAL INSTITUTE OF DENTAL RESEARCH
NATIONAL INSTITUTES OF HEALTH ALAN H. MEHLER
BETHESDA, MARYLAND

Annual Review of Physical Chemistry. Volume 11. H. EYRING, Editor, University of Utah, C. J. CHRISTENSEN, Associate Editor, University of Utah, and H. S. JOHNSON, Associate Editor, University of California. Annual Reviews, Inc., Palo Alto, California. 1960. vii + 588 pp. 16 × 22.5 cm. Price, \$7.00 (U.S.A.); \$7.50 (elsewhere).

Volume 11 of this valuable series includes 21 chapters contributed by 31 authors. Almost uniformly the authors have reviewed articles available to them through some time in December, 1959. The *Annual Review of Physical Chemistry* is truly annual. Sixteen of the chapters deal with topics or some phase of topics which have been reviewed annually in this series for four to ten years. Of 4201 references only some 830 were published prior to 1958, and over 60% of these occur in the remaining 5 chapters. Two of these cover subjects never before reviewed in this series,

namely, dielectric polarization and fused salts. The topics of the other three chapters, the statistical theory of transport, combustion and flames, and photosynthesis, have not been covered for a number of years. The chapters on fused salts and combustion and flames reflect the current lively interest in high temperature chemistry. The chapter on aspects of the statistical theory of transport, dedicated to the late John G. Kirkwood, is a short monograph.

It is no reflection on the importance of the subject, or the competence of the survey of such subjects as are reviewed annually, to say that one finds the chapters dealing with initial treatments and less frequent treatment of subjects more rewarding. While the rather strictly "annual" reviews of fields in which the number of contributions is large may serve the specialist already at home in the field largely as a check against careless oversight, they are valuable to the many others who have only secondary interests in these fields, and to the young research worker beginning his special interest.

The authors are generally very helpful in pointing out other reviews and monographs, as well as limitations on coverage under which their chapters have been written.

A special feature of the current volume is the cumulative index by author and by chapter title of the first eleven volumes of the series. The 237 articles are listed by chapter titles under 42 subjects. Though there are significant variations in the areas covered by articles under the same subject, it may be noted that 20 of the subjects have been reviewed 6 to 11 times. This index is extremely valuable, for with it one may make much more efficient use of the set as a whole. The editors, the late Gerhard K. Rollefson and Henry Eyring, and their editorial boards deserve our thanks and praise for the skill and devotion with which they have nurtured this well-planned and useful project.

The price is reasonable and should encourage those who have an interest in physical chemistry to become regular purchasers.

DEPARTMENT OF CHEMISTRY
UNIVERSITY OF VIRGINIA HUGH M. SPENCER
CHARLESTON, VA.

Inorganic Syntheses. Volume VI. Editor-in-Chief, EUGENE G. ROCHOW, Harvard University. McGraw-Hill Book Co., Inc., 330 West 42nd Street, New York 36, N. Y. 1960. xi + 272 pp. 16 × 23.5 cm. Price, \$7.75.

Volume VI of "Inorganic Syntheses" follows the same general pattern as previous volumes. Each synthesis is an individual entity including a brief historical introduction, the procedure, a general description of the properties of the compound and a bibliography. All procedures have been independently checked in a laboratory other than the one from which submitted.

There are several novel features in this volume which are worthy of mention. There is an increase in the number of contributors from abroad indicating increased international prestige for this series. All foreign articles have been translated into English. Articles on the synthesis of sulfur-nitrogen compounds by Professor Goehring, and dibenzenechromium by Professor E. O. Fischer are included. In addition, there are contributors from India, Poland, Austria, England, Australia, etc.

A most welcomed innovation are the procedures submitted by F. P. Dwyer, *et al.*, on the resolution of several optically active complexes. A partial asymmetric synthesis also is included.

The syntheses of deuterio compounds have been included for the first time and it is hoped that more isotopic syntheses will be forthcoming in view of the many research applications of these materials.

A general discussion on the syntheses of halomethyl derivatives of silicon, germanium and tin by using diazomethane is very well written and quite informative. Several procedures for synthesizing compounds which are currently popular are also included, *e.g.*, S_2N_4 , $Ni(PCl_2)_4$, $[PNCl_2]_2$, $[PNCl_2]_4$, $TiCl_3$, dibenzenechromium and magnesium cyclopentadiene.

As in past volumes, there also appear in Volume VI several procedures in the area of metal ion complexes that are obvious. What is needed in this area is a set of general procedures applicable to the synthesis of most complexes.

Where these general procedures do not work, detailed syntheses can be described.

Volume VI contains a total of 69 syntheses and a complete subject and formula index for all the 389 syntheses now published in this series. Inorganic chemists are indebted to Professor Rochow and to the contributors of syntheses for a well written, valuable reference source that should be in the library of every inorganic chemist.

Contributions for Volume VII in this series are invited and manuscripts should be submitted in triplicate to the editor: Professor Jacob Kleinberg, Department of Chemistry, University of Kansas, Lawrence, Kansas. Offers to check syntheses are also welcomed.

CHEMISTRY DEPARTMENT
UNIVERSITY OF ILLINOIS
URBANA, ILLINOIS

RUSSELL S. DRAGO

Progress in Inorganic Chemistry. Volume II. Edited by F. ALBERT COTTON, Department of Chemistry, Massachusetts Institute of Technology, Cambridge, Massachusetts. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1960. 399 pp. 16 × 23.5 cm. Price, \$10.50.

The review articles in this volume are of the same high quality as those which appeared in Volume I of the series. They will be very helpful to persons engaged in research in the various fields which are covered, and they will be studied with much interest by many students in inorganic chemistry. Only the budding inorganic chemist, who has invested his own money in the book, is likely to read it from cover to cover. There are many more readers, however, who will profit greatly from reading selected topics.

While reviews such as these result from the rather recently awakened interest in inorganic chemistry, it is probable that their existence will be a growth-factor for the movement. "Progress in Inorganic Chemistry" is a fine addition to the chemical literature.

The number of series dealing with reviews of inorganic chemistry is now large enough to justify some sort of traffic control to avoid duplication of effort. Articles about fluorine chemistry have recently appeared in four different series and some duplication has occurred. By exchanging information before the reviews are written, the editors of the different series should be able to handle this problem.

The volume now being discussed contains the following articles: 1. "Radioactivation Analysis in Inorganic Geochemistry," by John W. Winchester of the Massachusetts Institute of Technology; 2. "Halides and Oxyhalides of the Elements of Groups Vb and Vlb," by John W. George of the University of Colorado; 3. "Extraction of Inorganic Compounds into Organic Solvents," by R. M. Diamond (University of California) and D. G. Tuck (University of Nottingham, England); 4. "Some Fluorine Compounds of the Transition Metals," by R. D. Peacock of the University of Birmingham, England; 5. "Intensities of Spectral Bands in Transition Metal Complexes," by C. J. Ballhausen of the University of Copenhagen, Denmark; 6. "Unusual Oxidation States of Some Actinide and Lanthanide Elements," by L. B. Asprey (Los Alamos Scientific Laboratory) and B. B. Cunningham (University of California); 7. "Metal Alkoxides," by D. C. Bradley of the University of Western Ontario, Canada.

DEPARTMENT OF CHEMISTRY
UNIVERSITY OF WASHINGTON
SEATTLE 5, WASHINGTON

GEORGE H. CADY

Molecular Distillation. By G. BURROWS, Research Department, Associated Electrical Industries (Manchester), Ltd. Oxford University Press, 417 Fifth Avenue, New York 16, N. Y. 1960. viii + 214 pp. 14.5 × 22 cm. Price, \$5.60.

The author of "Molecular Distillation" has brought together in an excellent presentation the various phases of the subject under a single cover. In some 200 pages, he thoroughly discusses the subject under the following headings: Basic Theory, Theory of Operation, Representation of Results, Vacuum Techniques, Mechanical Design, Physical Design, Examples of Apparatus, Operation and Control, and Utilization of the Process. An appendix of

values useful to the art and a comprehensive bibliography are included.

The theory is presented from every possible aspect of classical kinetic theory and basic distillation equations. An interesting graphical method for representing results is included which may find great favor among the users of this technique.

Examples of equipment for typical laboratory and commercial scale operations are presented in the discussion of applications and performance. The requirements to produce, maintain and measure vacuum are discussed. The engineering aspects of high vacuum equipment as well as the flow characteristics of gases at low pressures are clearly presented and will be of special interest to the design engineer. The discussion on equipment and still performance favors the achievements of the British workers in which the stationary evaporator is employed. However, the adequate bibliography covers the accomplishments of the American group who made significant contributions to the field both through the use of the centrifugal evaporator and general technique.

Every phase of importance to the successful application of molecular distillation is presented so that the uninitiated will find but little difficulty in getting started in the field. The expert will benefit from those experiences of the author which appear here in print for the first time.

RESEARCH LABORATORIES
EASTMAN KODAK CO.
ROCHESTER 4, NEW YORK

EDMOND S. PERRY

Photochemistry in the Liquid and Solid States. Based on Some of the Papers Presented at a Symposium Held at Endicott House in Dedham, Massachusetts, September 3-7, 1957. Edited by LAWRENCE J. HEIDT, Massachusetts Institute of Technology, ROBERT S. LIVINGSTON, University of Minnesota, EUGENE RABINOWITZ, University of Illinois, and FARRINGTON DANIELS, University of Wisconsin. John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1960. vi + 174 pp. 22 × 28.5 cm. Price, \$6.00.

The symposium from which this book was assembled probably had a historic value. It brought together specialists from a variety of fields, each investigating some aspect of photochemical storage of radiant energy. Assembled, these specialists can relate the various facets of the problem of utilization of solar energy. However, the major gains were undoubtedly made in the minds of the contributors who gained a larger view of the impact and direction of their own work. It is difficult to capture these gains in a book.

Nevertheless, this collection of papers has significant value—much of it stemming from the introductory chapter, from the terse but meaty résumés preceding each of the Chapters 2 to 8, and from the final chapter collecting the conclusions.

The chapter titles are: Chapter 1. Introduction to the Symposium Photochemistry in the Liquid and Solid States; Chapter 2. Photochemical Reactions (4 papers); Chapter 3. Photosensitized Reactions (4 papers); Chapter 4. Fluorescence (2 papers); Chapter 5. Kinetic Considerations (1 paper); Chapter 6. Role of the Triplet State (1 paper); Chapter 7. Photochemical Reactions Involving Chlorophyll (7 papers); Chapter 8. Photoreactions in Solids (5 papers); Chapter 9. Conclusions.

There are two notably penetrating and general articles, "Mechanism of Photosensitization in Solution" (G. Porter) and "Kinetic Complications Associated with Photochemical Storage of Energy" (R. M. Noyes). The article "Photoprocesses in Elemental Semiconductors" (G. L. Pearson) gives an excellent résumé of optical processes in semiconductors, understandable to the novice, but without emphasis on energy storage. Twelve of the remaining twenty-one articles (and the one by Noyes) are collected elsewhere, in the January, 1959, issue of *The Journal of Physical Chemistry*.

The content of this book is stated succinctly in the introduction to Chapter 1. "The availability of sunlight, the various ways it might be used photochemically, the limitations, and the ground rules for scientists and inventors are suggested." The book is concluded with the apt remarks "It is clear . . . there is no easy solution . . . by which to