

BOOK REVIEWS

Crystal Structures. Supplement III. R. W. G. WYCKOFF. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1958. 556 pp. 20 × 24.5 cm. Price, \$20.00.

All who have a serious interest in the structure of crystals are undoubtedly familiar with the monumental task undertaken by Dr. Wyckoff in his publication of "Crystal Structures." Supplement III continues in the style established in sections published in 1948, 1951, 1953 and 1957. It provides in loose leaf form additions which will complete Chapters I-VIII of Sections I and II on Inorganic Compounds. New structural information for the elements and for compounds of the general types RX , RX_2 , R_mX_n , $R(MX_2)_n$, $R_n(MX_3)_p$ and $R_n(MX_4)_p$ is summarized. Some tables have been revised to include more recent data and are designated as replacements for those in the earlier publication. The majority of the material is supplementary, however, covering references over the period 1948-1954, with limited references to papers in 1955.

The present supplement is certainly essential for any library maintaining reference works on structural information. It is intended to fit into the previously published volumes and would lose much of its utility if purchased independently. Chemists concerned with the structure of inorganic substances will be particularly pleased to learn of the availability of this latest contribution.

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Contact Catalysis. By R. H. GRIFFITH, D. Phil., Director, London Research Station, The Gas Council, and J. D. F. MARSH, M. A., B. Sc., Research Department, The North Thames Gas Board. Third Edition of "The Mechanism of Contact Catalysis." Oxford University Press, 114 Fifth Avenue, New York 11, N. Y. 1957. x + 299 pp. 15 × 22 cm. Price, \$8.00.

The above book is the third expanded edition of "The Mechanism of Contact Catalysis." Ten years have elapsed since the second edition appeared and a very large amount of research in the field of both catalysis and catalytic chemistry has taken place. The new edition brings the theoretical and experimental results up-to-date and includes a wealth of new material.

The book is divided into the following ten chapters: (1) The Preparation and Evaluation of Catalysts; (2) Examination of the Catalyst Surface; (3) Adsorption; (4) The Electronic Factor in Catalysis; (5) Geometry of the Catalyst Surface; (6) Promoters and Carriers; (7) Poisoning, Retardation, Fouling, and Sintering; (8) The Reactions of Hydrocarbons; (9) The Mechanism of Catalysis and (10) The Development of Catalysts.

The material has been well chosen by the authors. This reviewer enjoyed particularly the pages regarding the effects of diffusion (p. 31), the electrical properties of catalysts (p. 48) and surface area measurements (p. 58), because of their clarity of presentation. For those who are interested in a concise, up-to-date book summarizing the results of physical-chemical research on contact catalysis, this book is highly recommended.

The authors state (p. 269): "With a full understanding of the underlying principles of catalysis, it should be possible to select suitable catalysts for hitherto unknown chemical reactions and to be certain that the best catalysts were already available for existing processes." In spite of the many elegant and precise methods introduced in past years by physical chemistry, this reviewer is left with a feeling of uneasiness and even doubt regarding the eventual success of reaching the above goal by present physico-chemical direction of catalytic research. Catalytic chemistry in our century has been advanced by such outstanding chemists as P. Sabatier, V. Ipatieff, F. Fisher and H. Tropsch, and in recent decades by W. Reppe. None of the above scientists (except Sabatier) are mentioned in the book. Their

approach in selecting "suitable catalysts for hitherto unknown chemical reactions," in the estimation of this reviewer, is *essentially different* from the approach taken by the authors of the above book. It should be understood that this is not a criticism of the authors, but more generally of the efforts of many outstanding physical chemists to reach the above goal.

This reviewer introduced the concept of *catalytic chemistry* about fifteen years ago¹ and has defined and described it as a natural development of classical organic and inorganic chemistry. Just as the advances of physical chemistry in our century, and they have been outstanding, have been independent of either inorganic or organic chemistry, so this reviewer feels that the advance of catalytic chemistry does not by necessity have to rely only on physical chemistry. He firmly believes that future catalytic chemists will reach the goal defined by the authors of the book, following the footsteps of Sabatier and Ipatieff.

(1) *Ind. Eng. Chem.*, **35**, 762 (1943).

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Cahiers de Synthèses Organique. Méthodes et Tableaux D'Application. Volume III. Collection Publiée sous la Direction de LÉON VELLUZ, JEAN MATHIEU ET ANDRÉ ALLAIS, Ingénieurs-Docteurs. Masson et Cie., 120, Boulevard Saint-Germain, Paris VI, France. 1957. 266 pp. 15.5 × 22.5 cm. Price, Broché: 4.200 frs.: Cartonné toile: 4.600 frs.

This is the third volume of a projected ten to twelve volume series, edited by Léon Velluz and written by J. Mathieu and A. Allais with the assistance of J. Walls and P. Poirier.

This volume consists of three chapters which are as follows:

6. This chapter deals with condensation reactions leading to the formation of compounds containing a carbon-carbon double or triple bond. The Azlactone, Knoevenagel, Perkin and Stobbe condensations, to mention only a few, are grouped together in this chapter.

7. This chapter is concerned with hydroxyalkylation and aminoalkylation in the aliphatic series. The reactions discussed here are those which result in the introduction of an alkyl group with an α -hydroxyl or amino group in an aliphatic compound. The reactions of active methylene and acetylenic compounds with carbonyl or imino compounds are grouped in this chapter together with the Grignard, Mannich and Reformatsky reactions. The Stevens rearrangement of ammonium or sulfonium compounds and the Wittig rearrangement of allylic or benzylic ethers seem to be misplaced in this section since they are concerned with an intramolecular type of reaction.

8. The last chapter of the book contains a discussion of hydroxyalkylation and aminoalkylation in the aromatic series. The reactions of aromatic Grignard reagents with carbonyl or imino compounds are described in this chapter together with some typical reactions restricted to the aromatic series, such as the Hammett reaction, and the condensation of phenols or aromatic amines with chloral, mesoxalic esters or alloxan.

Each chapter begins with a table of symbols which the reader will find very useful in locating, almost at a glance, any reaction discussed in the chapter. After a brief introduction concerning the principles of the reactions covered in the chapter, a section on the mechanisms of these reactions follows. However, the usefulness of this section on mechanisms is doubtful since only a very shallow treatment is given. The next section is concerned with applications, *i.e.*, the uses of the compounds obtained as intermediates for further reactions. The reaction types are then discussed in turn and the material included is arranged in a semi-tabular fashion. Each chapter closes with a tabular survey of a number of examples taken from the literature. The

tables list the starting materials, reaction products, reaction conditions, yields and references to the literature.

At the end of the book there is an index prepared in a tabular fashion which covers not only the material contained in volume three, but the contents of the two previous volumes as well.

The concise arrangement of material, the very extensive use of attractively printed formulas throughout the text and the wealth of literature references given both in the text and in the tables should contribute to make this series a source of valuable information in a readily accessible form.

The editor and authors should be thanked for this major undertaking which should prove to be of great value to those needing information concerning synthetic methods.

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Encyclopedia of Chemical Technology. First Supplement Volume. Edited by the late RAYMOND E. KIRK, Head, Department of Chemistry, Polytechnic Institute of Brooklyn, and DONALD F. OTHMER, Head, Department of Chemical Engineering, Polytechnic Institute of Brooklyn. Assistant Editor, ANTHONY STANDEN. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1957. xviii + 974 pp. 19.5 × 26.5 cm. Price, \$25.00.

Long before the last volume of the 15-volume "Encyclopedia of Chemical Technology" appeared in print, the editors must have debated the problem of how to keep it up to date. Instead of issuing an annual yearbook or revising the articles volume by volume to the extent that they might need it, the editors chose to prepare a supplement volume, presumably the first of a series, which contains articles on those areas of chemical technology that have undergone major developments during the past decade or so. Consequently, this supplement will be of much greater current interest and value than if it were a revision of "A to Anthrimides."

Some 51 articles are included, ranging in length from nearly one hundred pages devoted to Nuclear Reactors to articles of from four to six pages each on such subjects as Isoleucic Acid, Patents, and Kojic Acid. Approximately half of the articles are on subjects treated in the original Encyclopedia and serve to bring them up to date; the others are on new topics such as Computers, Fluidization and Water Demineralization or on a particular aspect of an earlier subject in which developments have been very rapid, as on Antibiotics—Non-medical Uses, or Boron Hydrides. The method of presentation is similar to that used in the original Encyclopedia. As in the Encyclopedia itself, the articles here range over processes, classes of substances, specific chemicals, unit operations and extend into areas such as Solid State where advances in a science will increasingly affect future technology. Each person will probably have a different preference as to the topics he would like to have seen chosen and the relative space to have given to each, but in general the choice of subjects seems judicious to this reviewer, and the presentations are well balanced and up to date. Judging from the many recent references throughout the book the editors must have had extraordinary success in getting their authors to submit their manuscripts on time.

The contributions come almost exclusively from Americans of whom about three-quarters are in industry. In essentially every case the contributor or the organization with which he is associated is in the forefront of activity in the subject discussed. As might be expected, the styles vary substantially, in a few cases being little more than an annotated bibliography, but usually being a unified and critical presentation. The treatments here will be of particular value to the chemist or chemical engineer who wishes to obtain a perspective on a field outside of his own specialty, but who may then wish to go to one or more review articles for more complete guidance to the literature. As is appropriate in any encyclopedia, the references are selective rather than exhaustive in many cases.

This volume contains its own comprehensive index and the articles have many cross references to the Encyclopedia. Nevertheless, in this method of keeping the Encyclopedia up to date, the problem of retrieval of information will become rapidly more complicated as additional supplement

volumes are published. For the person who wants to know quickly if a subject of interest to him is included in a particular supplement volume, an alphabetical listing of the articles in a prominent place in the front of the volume would be of help; at present, they are distinguished only by bold face type in the index and in conjunction with a listing of authors.

All-in-all, this supplement volume provides a fine means whereby one may acquire an authoritative and up-to-date survey of many topics in chemical technology of current and increasing interest.

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Physico-Chemical Effects of Pressure. S. D. HAMANN, M.Sc., Ph.D. Academic Press Inc., 111 Fifth Avenue, New York 3, N. Y. 1957. ix + 246 pp. 15 × 22 cm. Price, \$8.50.

This book is a discussion of the changes in the properties of matter which are induced by the application of pressure. The book is concerned largely with changes which are brought about by pressures above and about one hundred atmospheres. A good deal of emphasis is placed on the experimental techniques used to obtain high pressures and in measuring the various properties. In some cases a molecular interpretation of the results is discussed.

Two chapters are devoted to the experimental determination of the equation of state and the phase behavior of various pure substances and mixtures at extremely high pressures. Some of the results are interpreted in terms of the principle of corresponding states and in terms of the Lennard-Jones Devonshire equation of state.

Measurements of the effect of pressure on the transport coefficients are also discussed. A brief summary is given of the theories of transport phenomena in dense gases and liquids. Subsequent chapters are devoted to the effect of pressure on the dielectric and optical properties, on electrolytic conduction, and on the rates of chemical reactions.

The book will be of interest to many readers who are unfamiliar with the variety of new effects which appear at high pressures. Others will find the review of recent developments and the extensive bibliography of considerable value.

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Inorganic Syntheses. Volume V. Editor-in-Chief, THERALD MOELLER, University of Illinois. McGraw-Hill Book Company, Inc., 330 West 42nd Street, New York 36, N. Y. 1957. xiv + 265 pp. 16 + 23.5 cm. Price, \$6.00.

Inorganic chemistry has undergone a rapidly accelerated growth during the past 25 years. The Manhattan Project provided a tremendous stimulus in awaking interest in this long neglected field, but the real explanation of the renewed interest is the success of the modern physical theories in interpreting the structure of atoms and the mechanisms of chemical bonding. At last inorganic chemistry has begun to make sense, and it is possible to correlate the physical, mechanical and chemical behavior of materials in terms of fundamental parameters, not merely to catalog these properties. In the United States a nucleus of devoted and competent inorganic chemists provided the energy and drive, and their efforts have at last culminated in the establishment of a Division of Inorganic Chemistry in the American Chemical Society. This is about the same group of chemists who established in 1939 the "Inorganic Syntheses" series, which has now reached Volume V. The present list of editor-in-chief, associate editors, and members of the advisory board, still carries names of several of these pioneers. Volume V is dedicated to the memory of Raymond E. Kirk and Arthur A. Blanchard, who have died since the publication of Volume IV in 1953. The continuance of the same chemists on the editorial board has ensured a continuity of policy, and while Volume V differs from its predecessors in content, it follows the same plan. The syntheses are considered as separate contributions, as in a