

that of a chemical control mechanism rather than an outright deletion, is proposed by Chance. From studies on ascites tumor cells, he sets up a computer representation of glucose and oxygen metabolism which suggests that the metabolic control mechanism may result from the law of mass action and a "compartmentation" of ATP and reduced diphosphopyridine nucleotide between the cytoplasmic and mitochondrial spaces.

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X-Ray Powder Photography in Inorganic Chemistry.

Sponsored by the United Kingdom Atomic Energy Authority, Harwell. By R. W. M. D'EYE, M.Sc., Ph.D., A.R.I.C., and E. WAIT, M.A., D.Phil., Atomic Energy Research Establishment, Harwell. Academic Press Inc., 111 Fifth Avenue, New York 3, N. Y. 1960. viii + 222 pp. 14.5 × 22.5 cm. Price, 8.50.

This book is one of many devoted to the techniques of X-ray powder photography. Its merits are that it is brief, accurate and quite readable. A large number of ideas are introduced, but the authors limit their discussions only insofar as they apply to routine powder analysis. A number of literature references are included, for the reader who feels that presentation a bit narrow. The book can be recommended as quite useful to the chemist without experience in crystallography who wishes a rapid introduction to the subject.

The most important material is presented in Chapters 3, 4 and 5, and accounts for about 40% of the book. The various cameras in use in powder photography are examined and many of the common experimental problems related to crystal mounting and sample alignment are discussed. A quite detailed account is given on the methods of indexing patterns of unknown material. Actual examples are worked out in detail for crystals of cubic, tetragonal and orthorhombic symmetries. A complete chapter is devoted to the measurement of accurate cell dimensions. The techniques discussed pertain to photographic methods exclusively, no mention being made of counter methods of collecting data.

Two chapters on theory follow those on experimental procedures. The first introduces crystal symmetry and describes the effects of various translational symmetries on the diffraction pattern. The second discusses the intensities of X-ray reflections as a function of atomic parameters. The book is rounded out by an introductory chapter on the generation of X-rays and a final chapter on the application of X-ray diffraction to chemical analysis and to problems of thermal analysis such as the determination of expansion coefficients, transition temperatures and phase diagrams.

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Crystal Structures. Supplement V. By RALPH W. G. WYCKOFF, University of Arizona, Tucson, Arizona; formerly Laboratory of Physical Biology, National Institute of Arthritis and Metabolic Diseases, Bethesda, Maryland. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1960. 676 pp. 19.5 x 24.5 cm. Price, \$26.50.

In 1948, the first section of a compilation of crystal structures by R. W. G. Wyckoff was published. To make it possible to keep information up to date, the material has been issued in loose leaf form. The entire work now consists of fifteen chapters, published in four sections and four previous supplements; five binders, labeled Volumes I-V, are needed to hold the material. The first twelve chapters pertain to inorganic substances and constitute Volumes I-III. Chapter XIII, Aliphatic Compounds, makes up Volume IV and Chapters XIV (Derivatives of Benzene) and XV (Alicyclic and Heterocyclic Compounds) Volume V. The present review concerns the fifth supplement which now completes the work.

This final supplement contains material to be integrated into all volumes. It consists largely of bibliographic sections covering the years 1914-1934, based on Wyckoff's "The Structure of Crystals" (2nd Ed., Reinhold, Publ. Corp.,

New York, N.Y., 1931) and its supplement (Reinhold Publ. Corp., New York, N. Y., 1934), both of which are now out-of-print. While only bibliographic material is included for Chapters II, III, IV, V, VI, VII, VIII, XIV and XV, new structure illustrations (approximate number indicated in parentheses) are also included for Chapters IX, Inorganic Compounds, R₂(MX_m)_n, (25); X, Hydrates and Ammoniates (49); XI, Misc. Inorg. Compounds (46), XII; Silicates (42); and XIII, Aliphatics (49). A number of these refer to work completed in the 1950's.

Most welcome is the inclusion of a complete index for the five volumes. The Inorganic formula index constitutes about 56 pages with ca. 4000 formulas listed; a mineralogical name index also is provided. These are intended to be placed at the end of Volume III. The organic index comprises about 40 pages and lists the names of ca. 2000 compounds.

The 5th supplement provides a check list of pages which should be in all volumes after the various sections and supplements have been integrated properly. The pagination has become somewhat complex in places but follows a logical order which is carefully described.

All interested in the structure of crystals will benefit immensely from this compendium and I am certain would wish to join this reviewer in an expression of thanks to Dr. Wyckoff for his contribution.

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Kolloidchemie. By JOACHIM STAUFF, Dr. Phil., Apl. Professor für Physikalische Chemie an der Universität Frankfurt a.M. Springer-Verlag, Heidelberger Platz 3, Berlin-Wilmersdorf, Germany. 1960. viii + 744 pp. 16.5 × 23.5 cm. Price, DM. 69.—.

The book is divided into ten large chapters. It begins with a General Introduction (42 pp.) containing highlights of the history of colloid chemistry, definitions of major terms and classification. The two following chapters represent the center of gravity of the work (pp. 43-289) treating the physical properties of colloids: diffusion, sedimentation, osmotic pressure, viscosity, optical properties, etc. In the fourth chapter (80 pp.) are treated the surface phenomena, the fifth chapter (47 pp.) is concerned with the electrical properties of colloids, whereas in the sixth chapter the author attempts to apply statistical thermodynamics to some disperse systems. The last four chapters treat the dispersion colloids (lyophobic dispersions, emulsions, aerosols, foams), the association colloids (soaps, detergents), the macromolecules (proteins, nucleic acids, etc.), and the gels. Moreover, an appendix contains explanatory treatments of some fundamentals in thermodynamics and optics.

The "Colloid Chemistry" of Stauff is an advanced treatment with a strong emphasis on theory. This is illustrated by the fact that in chapter 2 one finds a section on statistics and two sections on statistical thermodynamics of mixtures. As a consequence, the factual side of the presentation is somewhat sketchy. For example, one finds little on the methods of preparation of dispersion colloids, whereas the theory of flocculation is treated more extensively. Emulsions and foams are described on 20 pages, and aerosols on only 6 pages. Soaps and other detergents are treated more thoroughly (53 pp.), and quite attractively. Although the choice of examples of the factual material in general is satisfactory, some important items of practical value have been omitted, e.g., the author has not mentioned the Northrop-Anson method for diffusion measurement and the precipitation titration (Fällungstiteration) of G. V. Schulz. Also the Flory-Scheraga-Mandelkern equations correlating molecular weight with sedimentation constant and viscosity should be given more attention in this size book. Most regrettable, however, is the cursory indexing. The book has no authors' index, and the subject index is inadequate. For example, one finds in the index such items as amino acids, horse methemoglobin, Volta potential, but fails to find gold sols, silver sols, sulfur colloids, albumin, nitrocellulose and molecular weight. It may be doubted if one would ever look in the index for such items as "Kombinatorik" or "Polyform," but it is likely that one interested in colloids will be looking for ferric hydroxide colloids or glob-

ulins which are omitted from this subject index. These defects limit the use of this volume as a source for reference.

In spite of this criticism the book of Stauff is a commendable attempt to present the field of colloid science in a modern way. With a few exceptions, all the most important modern theoretical and experimental approaches are presented in this volume. It does not read easily in most of the sections, but it will be appreciated by those advanced postgraduate students and research workers who enjoy theoretical thinking and want to go to the very bottom of the matter. One of the most charming aspects in the new colloid science is the unsettled state of affairs, the many unsolved problems so challenging to the investigator. Professor Stauff has succeeded in showing some new possibilities in solving these problems, although he also had to admit that at this moment there are wide gaps between theories treating idealized systems and reality.

The production of the book is fine, the illustrations are instructive, and the abundant references are conveniently placed at the bottom of the pages where they belong. Only a few misprints were noticed, e.g., in formulas on p. 585 and 589, and in Tables 67.I (p. 469) and 84.III (p. 624).

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Chromatographie en Chimie Organique et Biologique. Volume II. Applications en Chimie Biologique. By E. LEDERER, Professor à la Faculté des Sciences de Paris. Masson et Cie., 120, Boulevard Saint-Germain, Paris 6, France. 1960. xiv + 876 pp. 18 × 25.5 cm. Price, broche, 130,00 NF; cartonné toile, 140,00 NF.

The first volume of this work, which is being edited by E. Lederer, dealt mainly with certain applications of chromatography to organic chemistry. The second volume is now concerned in its 16 chapters with different classes of biologically important substances. Under the editor's supervision, 15 authors have contributed to the compilation of this work, which has both author and subject index and a table of contents. The interest of the first volume is thus sustained in the second, which will be a useful reference work for those who use chromatographic methods in biological research.

Each chapter deals with a special group of compounds, viz., sugars; phosphoric acid esters; amino alcohols; amino acids; peptides; amino acid derivatives; proteins, purines, pyrimidines and their derivatives; pigments; fat- and water-soluble vitamins; hormones; antibiotics, etc. For each class of compound much information is given concerning the different techniques which are available, and there are copious tables of R_f data based on the compounds named and their derivatives and that also relate to many solvents. For example, the presentation shows how the separation of sugars as acetylated sugars or of amino acids as their phenylthiohydantoins can be contemplated. Each chapter gives much necessary technical detail for the systematic separation of the compounds with which it deals, but an adequate idea of the content can hardly be presented in this short review. Where it is known that the absorbent used in column techniques of separation affects the nature of the substances being separated this is wisely stressed. The tables may assist in tentative identification of the structure of compounds being chromatographed both on the basis of R_f values and of reactions which are more or less specific for the class of compounds in question. Again, it is wisely suggested that such identifications be supported by the elution of the compound in question, the preparing of derivatives or the use of specific reactions or confirmatory measurements based on such techniques as spectrophotometric measurements. All this cautions against too facile identifications based only on a one-solvent system. The bibliography at the end of each chapter, sometimes as much as 400 to 500 titles, will prove to be a useful feature, and these bibliographies have been kept up to date by the inclusion of additional material when the proofs were corrected.

If there are criticisms, it may be that the reader receives a mass of information about techniques applicable to each class of compounds, whereas careful and detailed guidance on which of these it is best to adopt might have been more profitable. Some repetition occurs. For example, chroma-

tography of co-enzyme A appears in three different chapters. The chapter on chromatography of water-soluble growth factors is strangely lacking in reference to those which have been discovered in plants. Also, the chapter on chromatography of organic acids is not as full as their importance in plants merited. Nevertheless, this book will be welcomed by those who need a compendium of the accumulated information in this now large and diverse field.

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The Chemistry of Heterocyclic Compounds. Volume 14. Pyridine and its Derivatives. Part One. Edited by ERWIN KLINGSBERG, American Cyanamid Co., Bound Brook, New Jersey. ARNOLD WEISSBERGER, Consulting Editor. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1960. x + 613 pp. 16 × 23.5 cm. Price, \$49.00; Subscription price, \$42.00.

The volume of recorded literature in organic chemistry is a source of both pride and despair: pride in the tremendous accomplishment which generations of organic chemists have achieved and despair in the hopelessness of maintaining an adequate picture of the present status of almost any area of organic chemistry. The book under review not only brings this situation into focus but also points a way out of the dilemma. As the title indicates, this book is the first of four parts dealing with pyridine and its derivatives. It is proposed to treat this topic in sixteen chapters and part one consists of two chapters. Chapter I, prepared by R. A. Barnes, is devoted to a discussion of the Properties and Reactions of Pyridine and its Hydrogenated Derivatives. This chapter provides a unifying account of their chemical properties and supplies a sound basis for the understanding and appreciation of the more detailed treatment which is to follow in subsequent chapters. A careful study of this chapter will be most rewarding.

Chapter II deals with Synthetic and Natural Sources of the Pyridine Ring and is written by Frederick Brody and Philip R. Ruby. The classification of synthetic methods with which they are confronted is a difficult matter and has been accomplished in an admirable fashion. Relatively short treatments of each class of synthetic procedures followed by tables indicating the specific transformations which have been carried out makes this chapter particularly valuable. An impression of the magnitude of this task may be gained from the fact that there are one hundred and thirty-two tables, which bring the literature coverage up to the middle of 1956. Eighteen hundred and fifty one references (a number of which refer to patents) are cited. Certainly, this material has been rendered more accessible by these authors and organic chemists must become increasingly more dependent upon treatises of this kind. The authors and publishers have performed a valuable service.

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Methods in Geochemistry. Edited by A. A. SMALES, Atomic Energy Research Establishment, Harwell, and I. R. WAGER, F.R.S., Department of Geology and Mineralogy, University Museum, Oxford. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1960. vii + 464 pp. 16.5 × 23.5 cm. Price, \$13.50.

This book has been written as a survey of newer methods of geochemical analysis but it should be read by and has a value for a much wider audience.

Our knowledge of the composition of the earth's crust, given from early in the century by the monumental works of Clarke and of Washington, was based on standard chemical methods of analysis and was accordingly subject to their inherent limitations. A generation ago geochemistry made a great stride forward with the help of optical spectrography. It is now making what will prove to be a still more impressive step ahead using new methods of analysis that are largely products of the growth of nuclear physics.

The Editors and authors of this book are drawn from a group of investigators associated with Harwell and nearby