
NEW BOOKS

Therapeutic Agents of the Quinoline Group. Cinchophen, Plasmoquine, Nupercaine, Quinine and Acridine Dyes. The Relation between their Chemical Constitution and Pharmacologic Action. By W. F. VON OETTINGEN, M.D., Ph.D., Assistant Professor of Pharmacology, School of Medicine, Western Reserve University. American Chemical Society Monograph Series. The Chemical Catalog Co., Inc., 330 West 42nd St., New York, 1933. 301 pp. Illustrated. 15.5 × 23.5 cm. Price, \$6.00.

There has deservedly been an increased interest of late in the synthesis of physiologically active quinoline derivatives. Unquestionably this nucleus has untouched therapeutic possibilities, and it is for this reason, as apart from the purely chemical phase, that this monograph is timely in its appearance. The author has endeavored to collect the pharmacologic literature as completely as possible, thus correlating chemical constitution and physiological action. The chemical data are admittedly less complete, but such extended discussion is beyond the intended scope of the book.

In the first part the pharmacology of quinoline and certain of its simple derivatives (aminated, hydroxylated, carboxylated, alkylated, arylated and hydrogenated) is presented. This is followed by an excellent discussion of the more complex derivatives, including the quinine group, hydrocupreines, acridines, quinoline dyes and the phosphines. With its fund of useful information it is unquestionably a valuable treatise, which clearly points the way to new research, both in pharmacology, and in synthetic organic chemistry.

ARTHUR J. HILL

A Textbook of Organic Chemistry. By JOSEPH SCUDDER CHAMBERLAIN, Ph.D., Professor of Organic Chemistry, Massachusetts State College. Third edition, revised. P. Blakiston's Son and Company, Inc., 1012 Walnut Street, Philadelphia, Pennsylvania, 1934. xxv + 873 pp. 15 × 22 cm. Price, \$4.00.

In this, the revised third edition of Chamberlain's successful text, the major change has been a segregation in a new section (Part III) of certain of the topics previously presented in Parts I and II of the older edition. This was done with a view to restricting the material for conventional classroom usage to smaller scope. In this third part appear such topics as Uric Acid, Alkaloids, Dyes, Terpenes, Coal Tar, Proteins and Industrial Sugar.

The book is an excellent one. It has many good features, among them, the thoroughness with which each topic is presented, the scholarly value of the list of books of reference, the useful preparational references in the appendix. If any criticisms were to be directed at the book, they would be concerned chiefly with its being too voluminous. For example, such topics as Chlorophyll, Hemin, etc., would appear to be beyond the scope of the usual undergraduate courses. In extenuation of this, it

must be admitted that there is increasing need for supplementary reading, by reason of the rather general adoption by colleges of honors courses. This additional material may well serve in some degree the needs of such groups. Arrangement of subject matter can always be made the subject of criticism, for no two critics are wholly in agreement on this matter. The reviewer, for example, fails to see the logic of relegating so much pertinent material on diazo compounds to the supplementary Part III, but again this is a matter of personal opinion.

As a whole the book merits considerable commendation both as to content, and to clarity of presentation.

ARTHUR J. HILL

Auer von Welsbach. By Ing. Dr. FRANZ SEDLACEK. Verlag von Julius Springer, Schottengasse 4, Wien I, Austria, 1934. viii + 85 pp. 30 figs. 17.5 × 25 cm. Price, RM. 3.60.

Carl Auer von Welsbach died in 1929. This short biography, well printed and illustrated, is part of a commemorative program whose aim it is to keep his name and achievements fresh. Its style is simple and direct, and the subject matter compact and concise. It follows his scientific and industrial accomplishments in a manner to arouse an increasing attention. Auer was essentially the experimenter in chemistry, his laboratory bench the most important element of his home, primarily the scientist but interested alike in pure science and in the technical utilization of his observations.

His invention of the gas mantle in 1885 was made in the same year as his discovery of the new elements neodymium and praseodymium and was suggested to him by the surprising result obtained on impregnating cotton with salts of the rare earths in the aim of intensifying the flame spectra for the study of these elements. Its importance lay in increasing the yield of light from illuminating gas by almost ten fold. His scientific study was so thorough and intense that all major improvements had been completed within a year.

In 1902 came a second major invention, particularly startling because it took Auer from the gas to the electrical industry. This was the osmium lamp, with a light efficiency more than double that of the carbon filament. Handicapped by the scarceness of this pure metal, the lamp nevertheless found a market and, more important still, drew attention to the possibilities of metal filament lamps, and thereby became the John the Baptist for the tungsten filament.

The narration continues with the invention of the pyrophoric alloys of iron and cerium and with further studies of the rare earths, culminating in the separation of a new element from ytterbium.

The book deals but briefly with the personal life and characteristics of Auer. This is as Auer would wish. His activities and his intercourse with others were confined to social welfare and scientific study. When presented with

vases glazed with the rare earths of his discovery, he interrupted the formalities of the ceremony by pulling out his pocket spectroscope to examine their purity.

GORTON R. FONDA

An Introduction to Biochemistry. By WILLIAM ROBERT FEARON, M.A., Sc.D., M.B., F.I.C., Fellow of Trinity College, Dublin. William Heinemann, 99 Great Russell Street, London, W. C. 1, England, 1934. x + 313 pp. 14.5 × 22.5 cm. Price, 10s/6d. net.

The book is intended for an elementary survey course, with special claim for its emphasis upon the inorganic relationships of biochemistry. "The author has taken various short cuts, chiefly by omitting much in the way of organic chemistry, and has also avoided some regions of tissue chemistry, especially blood, muscle and nerve. . . . The time thus saved has been devoted to the practical description of illustrative tests, . . ." In a survey text it seems scarcely justifiable to devote so much space to detailed directions for making qualitative tests, especially when such an arrangement involves a sacrifice of clarity regarding organic structures, and nearly complete omission of such important topics as blood, muscle, and respiration. With emphasis claimed for inorganic aspects of biochemistry, one is surprised to find: (1) such erroneous statements as that the minimum daily requirement of iodine per person is 0.65 mg.; (2) only a very brief discussion of H-ion relationships; (3) practically nothing concerning the general behavior of solutions or colloids; (4) no résumé of the physico-chemical properties of proteins; (5) incomplete presentation of present knowledge of the requirements and functions of copper, nickel and manganese; (6) such vague statements as "The significance of rubidium is unknown; its presence in animal tissues is suggestive of a marine ancestry, since the metal occurs in sea water." Incorrect spelling is found fairly frequently, for example on pages 222, 223 and 227, one finds "tyrosene," "argenine" and "6-aminipurine." At the end of each chapter there is a selected group of good references, mostly of the review or book type.

C. G. KING

The Chemistry of the Hormones. By BENJAMIN HARROW, Ph.D., Associate Professor of Chemistry, College of the City of New York, and CARL P. SHERWIN, D.Sc., M.D., Dr.P.H., St. Vincent's Hospital and French Hospital, New York. The Williams and Wilkins Company, Mt. Royal and Guilford Avenues, Baltimore, Maryland, 1934. vii + 227 pp. 15.5 × 23.5 cm. Price, \$2.50.

The authors state that an attempt has been made "to put together a practical book" for the laboratory worker "who wishes to prepare active hormone fractions or to isolate a chemically pure hormone." The material on the thyroid, parathyroid, on insulin, the pituitary, suprarenal, on male and female hormones, secretin and plant hormones is presented in the main from this point of view. In some cases the instructions are given in sufficient detail to warrant the assumption that the reader will meet with success in following the instructions, but in others it is very doubtful whether a novice will do so. This is particularly true for the synthetic methods for thyroxin and adrenalin.

It is rather unfortunate that the difficulties experienced in evolving the structural formulas of thyroxin and adrenalin are not given in more detail. In some chapters the biological assay of the material is referred to, but in others it is omitted almost completely. The assays should have been emphasized to a greater extent in some cases because so much depends upon the mode of assay in hormone studies and these assays usually lead to further fractionations. It may furthermore be of considerable importance to consider the activity of a group like thyroxin, whether in the free or in the combined form, from a quantitative point of view. The statement that Abel, by saponification and precipitation with ammonia, isolated the adrenal principle, is misleading. One wonders why intarvin is included in a publication of this type.

F. C. KOCH

Origins and Development of Applied Chemistry. By J. R. PARTINGTON, M.B.E., D.Sc., Professor of Chemistry in the University of London, Queen Mary College. Longmans, Green and Company, 114 Fifth Avenue, New York City, 1935. xii + 597 pp. 16 × 26 cm. Price, \$16.50.

In these days when the progeny of the printing press has become well-nigh innumerable it is rare indeed that a new book can be characterized as *novel*. This present work does, however, merit this designation; it is, so far as I am aware, the first of its kind.

It presents a concise, systematic and critical account of the early sources, production and uses of the important materials on which the daily life and civilization of mankind depend; the common metals, earthenware, glass, salts, heavy chemicals, organic substances and drugs. These materials are discussed seriatim for each of the great ancient civilizations, namely, those of Egypt, Babylonia and Assyria, the Aegean, Troy and Cyprus, Asia Minor, Persia, Phoenicia and Palestine. The civilizations of China and India were omitted after much material about them had been collected because, the author states, "these regions in some ways lie apart from the rest of the world in their technical processes, but more particularly because the information at present available seemed insufficient as compared with that for the other regions." The period covered is from the very earliest times to the end of the Bronze Age.

One point of especial interest emerges from this careful study; namely, the realization that the knowledge of the production and use of materials which was available in the Classical Period, usually taken as the starting point of the historian, is in fact almost wholly derived from much older cultures. "It represents, in many cases, not an original and vigorous development of national genius, but a decadent form of craftsmanship which had existed for a period often as long as that which now separates us from the best days of Greece and Rome. Just as the modern industrial period has ruined the traditions of craftsmanship, so the irruption of the people of the Iron Age broke the continuity in a traditional use of materials which had developed almost without a break from the period of the Stone Age. The essential methods nevertheless continued with little alteration, as in some cases, such as the art of the potter, they do to the present day. In the study of the

development of man no part is more significant, even if more neglected, than that concerned with the use of materials."

The chapters on each individual civilization are made much more useful, especially to the layman, and certainly much more interesting than would otherwise be the case, by introductory accounts of the general history and archaeology of the regions involved. These are particularly advantageous in view of the extraordinarily rapid extension of our knowledge of these matters which recent excavations and investigations have afforded.

Chemists often teach and cultivate their science with too little appreciation of its relation to other branches of human thought and with too little regard for the role which their science has played and does play in the life of mankind. Historians, on the other hand, usually are too exclusively concerned with wars and with the exploits of kings rather than with the intrinsically more important daily life of the people, a large part of which is occupied with the production, utilization and enjoyment of materials. This volume should therefore be of the greatest value both to chemists and historians.

The reviewer would register but a single complaint. The title is certainly misleading. While the book does indeed deal with the origins and early history of applied chemistry, it covers only a minute fraction of the development of this science as a whole. Applied chemistry today is a science of immense extent and complexity. Relatively speaking, almost none of it was extant in the Bronze Age, the latest period covered by this book. Indeed the bulk of this science did not exist even two hundred years ago. The title should read "Origins and *Early* Development of Applied Chemistry."

ARTHUR B. LAMB

Electron Emission and Adsorption Phenomena. By J. H. DE BOER. Translated from the manuscript by Mrs. H. E. TEVES-ACLY. The Macmillan Company, 60 Fifth Avenue, New York, 1935. vi + 384 pp. 150 figs. 14.5 × 22 cm. Price \$5.50.

In the preface, de Boer states that it is his intention that the book should give "not merely a description of phenomena, but especially that it should present a satisfactory interpretation of them from the molecular point of view." Thus the theoretical rather than the experimental side is emphasized. Throughout the book phenomena are interpreted according to potential energy curves in which the energy of a particle (atom or ion) is given as a function of the distance from the surface. Undoubtedly if data were available by which such curves could be constructed their use would be very great, but most of de Boer's potential curves seem to be diagrammatic and hypothetical. The author says that in 1933 he was mainly familiar with the photoelectric and thermionic properties of dielectric surfaces upon which alkali metal atoms were adsorbed but had not had similar experience with the properties of adsorbed films on metals. In the book, however, the order is reversed and the films on dielectrics are considered only in the latter half of the book.

The first two chapters deal with the electron emission from pure metals and the nature of the forces involved in adsorption; that is, the forces exerted by ions, atoms, and

dipoles, the polarization of atoms, and van der Waals forces. The third chapter treats the adsorption of cesium on tungsten, and in the next chapter the adsorptions of other metals, such as thorium and barium, are considered. There is then a chapter on photoelectric emission by adsorbed films on metals. There follows a discussion of the absorption of light by films on metals and the photoelectric effect. The conduction and photoelectric effects produced by alkali atoms within alkali halide lattices are treated in considerable detail. Two chapters are devoted to the theory of photoelectric emission and thermionic emission from oxide-coated cathodes, and there is finally a chapter on dry rectifiers and photoelectric cells with blocking layers.

The interpretations of most of the phenomena described are those that have been developed by de Boer himself. His attitude is critical; he definitely either accepts or rejects the theories that have been proposed by others. In general, his interpretations are based upon the hypothesis that the atoms of adsorbed metals exist definitely either as neutral atoms or as ions. In this way by assuming variations in the proportions of atoms and ions, the changes in properties are explained when the amount of adsorbed material increases. Nowhere is there a reason given why atoms and ions of cesium should exist on a surface in such discrete states. He apparently conceives of atoms and ions as they are defined as isolated particles in space. He seems to be unaware that such definitions would require modification (in terms of Bridgman's operational definition of concepts) for particles which are adsorbed on a metal surface.

It is remarkable that in the whole book no use is made of thermodynamic relationships. A failure to think in terms of thermodynamics has led the author to advance some impossible hypotheses. A paper of de Boer's to which reference is made on p. 79 states, "In calculating the mutual repulsive forces (of adsorbed cesium atoms on tungsten) Langmuir takes into account only the forces parallel to the surface; these components, however, do not influence the heat of evaporation." It is evident that Gibbs' thermodynamic adsorption equation gives directly the relationship between the horizontal forces acting between atoms on the surface and the change in the rate of evaporation which must involve vertical forces.

The theories which have been proposed by Taylor and Langmuir in their studies of cesium on tungsten are in a large part rejected by de Boer for reasons which, I believe, are based on misunderstandings. He objects to the idea that the virtual dipoles formed by the adsorbed cesium atoms on metal surfaces have their moments decreased by the effect of neighboring dipoles. Apparently de Boer believes completely in a classical image theory, in which a cesium ion is a rigid sphere in contact with an infinitely hard solid surface of an ideally conducting metal (infinite conductivity!). He does not seem to recognize the fact that the image force must result from the displacement of an electron atmosphere which extends in decreasing concentration to an appreciable distance above the last layer of metal atoms.

These differences in opinion as to the nature of adsorbed films on cesium will need to be considered in more detail in a future publication by us in which we shall also discuss new experimental evidence.

The fact that the reviewer disagrees with many of de Boer's interpretations does not interfere with his recommendation of the book as a valuable contribution to the field of thermionic and photoelectric emission. The modern viewpoint, the frank criticism, and the stimulating differences of opinion that are thus brought into existence make the book one that will be read widely and profitably.

IRVING LANGMUIR

The Optical Basis of the Theory of Valency. By R. DE L. KRONIG. Cambridge Physical Chemistry Series. The Macmillan Company, 60 Fifth Avenue, New York City, 1935. 237 pp. + index. 67 figs. 14.5×21.5 cm. Price, \$4.50.

This little book is clearly and attractively written and arranged. It should serve well the function of introducing the reader to the main theoretical principles and the main empirical results, up to 1935, in the subjects it covers. Relatively little space is devoted to problems of valence as such. The scope of the book can be seen from a summary of the chapters. These are as follows.

I. Introduction. II. Investigation of Atomic and Molecular Structure by X-Rays and Cathode Rays: theory and experimental determination of atomic form factors and of internuclear distances by x-ray scattering and by electron diffraction, with surveys of results so far obtained; determination of molecular properties from fine structure of x-ray absorption bands, a new method. III. Atomic Spectra and the Periodic System: with tables of ionization potentials, ionic radii, and electron configurations of normal states. IV. Band Spectra and Chemical Binding in Diatomic Molecules, including tables of constants for normal states as found from band spectra, discussion of electronic structures and dissociation correlations, and theory of Raman effect. V. Band Spectra and Chemical Binding in Polyatomic Molecules, including tables for important molecules showing modes of vibration and giving constants obtained from band spectra and from the Raman effect; comprehensive summaries of present status of research on spectra of important types of molecules; and a critical review and comparison of three main forms of the quantum theory of valence. VI. Optical and Thermal Dissociation, including discussions of dissociation spectra, polarization molecules, predissociation, dissociation by rotation, and determination of dissociation energies and degree of dissociation from spectroscopic data. Chapters IV and V occupy more than half the book. The chapters are accompanied by extensive lists of references, especially to recent papers.

The book contains some misprints, minor errors, and doubtful statements, but hardly anything of serious consequence for the reader not interested in accuracy of all details. [Examples: top p. 110, intersystem transitions (change of S) are not, as there indicated, always very weak,—*cf.* the visible halogen absorption bands; p. 133, definition of bonding and anti-bonding electrons? p. 162, tenth line from bottom, "even" and "odd" should be interchanged; p. 163, labelling of mixed states according to v_1, v_2 is rather misleading; p. 186, BCl_3 pyramidal?] The nomenclature used for diatomic molecules departs in several respects from that which is now generally accepted. For instance, band lines are here numbered by the rotational

quantum number of the upper energy level instead of that of the lower energy level, which may tend to confuse readers referring to other sources. In a few cases words are used with a meaning which is not usual in English. In connection with the classification of polyatomic vibrational and electronic levels, attention might well have been called more explicitly to the group theory treatment. On the whole, the book forms an excellent introduction to the subjects treated.

ROBERT S. MULLIKEN

Dielektrische Polarisation. (Dielectric Polarization.)

By O. FUCHS and K. L. WOLF, Kiel. Eucken-Wolf "Hand- und Jahrbuch der chemischen Physik," Band 6, "Elektrizität und Materie," Abschnitt I B, Hengstenberg-Wolf, "Elektronenstrahlen und ihre Wechselwirkung mit Materie." Akademische Verlagsgesellschaft m. b. H., Markgrafenstrasse 6, Leipzig C 1, Germany, 1935. x + 222 pp. + indexes + appendix 36 pp. Illustrated. 17.5×22.5 cm. Price, RM. 27.

Our knowledge and use of the dipole moment has come into being mainly during the past ten years. So extensive has been the development in this field that the dielectric constant or the dipole moment calculated from it may now be classed with the infra-red spectrum and the x-ray and electron beam as the most important tools for the investigation of molecular structure. Indeed, these and other methods must be regarded as complementary since they yield more or less different information, all of which may be necessary for a satisfactory solution of the problems that arise. The use of the dielectric constant measurement is not confined to the examination of the structure of molecules, as it may tell much about molecular association and intermolecular action in liquids and even something about molecular behavior in solids. As many largely empirical papers are being published and as the newer theoretical material also can profitably be scrutinized as part of the whole, it is highly desirable that a general summary of the field be published from time to time.

This section of one of the important new German handbooks constitutes the fullest and most up-to-date account of dipole moments and their relation to the structure of matter. The first of the four main divisions of the section gives the fundamental ideas and definitions involved in the dielectric constant, induced polarization and molecular refraction, examining the physical picture represented by the equations, considering the complicating effects of the internal field, and collecting experimental data to test the validity of the expressions derived. The division ends with an account of experimental methods which might be criticized for too great brevity were it not for the fullness of the references to the literature. The second and largest division devoted to the molecular polarization of free molecules gives an account of the molecular beam method, the classical Debye theory of molecular polarization and its application to the determination of dipole moment, the quantum theory of polarization, and anomalous dispersion and related phenomena. To the average chemist, the remainder of the division is probably of the greatest interest, as it deals with the relation of dipole moment to molecular structure. Quite rightly, it does not attempt to consider all the moments that have been determined but it

assembles values which illustrate and illuminate the fundamental principles involved and so refers to other methods of attack upon the problems as to give a good picture of the whole. Bond and group moments, distribution of charge, vector resolution of moments, intramolecular induction, valence angle and rotation of groups in the molecule are among the principal topics treated. The brief third division on the polarization of liquids describes the relation of internal field, intermolecular forces and molecular association to polarization. The even shorter final division on the polarization of solids treats rigid and so-called non-rigid bodies with particular reference to the characteristic vibrational frequencies in the former and the possible molecular rotations in the latter. A separately bound 36 page appendix gives a table of the weighted mean values of all hitherto determined dipole moments, which should prove very useful.

Since the authors of this book have worked for years in the field which they describe and have made valuable contributions, they speak with the voice of authority. As may be expected, however, in a work of this sort, there are minor statements of fact which are open to criticism and matters of interpretation on which there is certainly room for disagreement. The reader may properly wonder at the inclusion of an account of the theory of Heisenberg and Hund of molecule formation through polarization, never satisfactory and now rendered obsolete by the wave-mechanical theory of valence. It is a little unfortunate that so much material is presented in the form of footnotes, which tend to destroy the continuity of the reading. The reviewer does not wish, however, by piling up minor criticisms to obscure the fact that the book is a full and critical survey of an important field, which should be useful in conveying information to the chemist ignorant of the field, in filling gaps in the knowledge of the worker in the field and in aiding the latter to orient and possibly correct his ideas.

CHARLES P. SMYTH

Acta Physicochimica U. R. S. S., Vol. I, 1934-35. 990 pp. The State Scientific and Technical Press, Onti, U. S. S. R. Price, \$4.00.

The first volume of this new Russian physico-chemical journal now justifies the editorial claim made in the first issue of this journal that "Physical chemistry is making rapid progress in the U. R. S. S. Prior to the revolution but little work was done in this field, but conditions have radically changed." The one thousand pages of this first volume give an admirable cross section of the diverse interests in physical chemistry which are being studied in the various research institutions that have been set up in Russia devoted to the furtherance of theoretical and applied science. The purpose of the journal is to acquaint foreign scientists with the work of Soviet physical chemists. A perusal of the contents of the journal indicates that these achievements must necessarily be studied carefully by such foreign scientists if they wish to be in touch with striking developments in their science.

A selection from the contents of the first volume by any reviewer must necessarily be colored by the reader's own personal interests. With this caveat it can be pointed out that the journal contains a striking array of papers

dealing with (a) catalysis and adsorption, (b) photochemistry, (c) reaction kinetics and also finally a group devoted to the specialized problems of colloid chemistry. The papers on catalysis and adsorption bulk largely in the first volume because of the physical chemistry conference conducted in December, 1933, in Moscow. As a consequence, there are a number of papers which were communicated at this conference incorporated in the third issue of the journal. This issue simulates the issues of the Faraday Society devoted to the reports of their general discussions, although the Russian issue does not contain any record of the discussions which succeeded the papers presented. It is obvious from the individual papers that the Russian scientists are abreast of the most recent developments in the field and are making fundamental contributions in this field that so successfully meets the double condition of industrial and theoretical interest. It is evident that theories of activated adsorption, of the atomic spacing of contact catalysts, of promoter action and of the quantum mechanics of catalytic processes are all receiving serious consideration in Russia. The work on photochemistry is inspired by all the recent developments in this field to which Russian scientists have made notable contributions in the last ten years. Photosensitization, fluorescence and photodissociation of organo-metallic compounds are among some of the subjects treated in this volume, as well as an interesting paper by Terenin on the photochemistry of absorbed iodine. Naturally, too, there are to be found papers in reaction kinetics dealing with the concepts of chain reactions for which we are so largely indebted to Professor Semenov of Leningrad. It is very evident to the reviewer that if the high standard that has been set in this initial volume be maintained in future volumes it will be necessary for the modern physical chemists to add *Acta Physicochimica U. R. S. S.* to the list of those foreign journals with which it is necessary to be fully and quickly familiar.

HUGH S. TAYLOR

X-Rays in Theory and Experiment. By ARTHUR H. COMPTON, Ph.D., Sc.D., LL.D., Professor of Physics, University of Chicago, and SAMUEL K. ALLISON, Ph.D., University of Chicago. Second edition of "X-Rays and Electrons," by Arthur H. Compton. D. Van Nostrand Company, Inc., 250 Fourth Avenue, New York, 1935. xiv + 828 pp. Illustrated. 15.5 × 24 cm. Price, \$7.50.

Although a few portions of the book might be called a second edition of "X-Rays and Electrons," the greater part is completely rewritten and expanded to accommodate the wealth of new material. The book is essentially a presentation of the experimental facts in the physics of x-rays, and the interpretation of these facts in the light of present-day wave mechanics and atomic theory. Experimental methods are described briefly, but no attempt is made to give a detailed exposition of experimental technique.

The first few chapters discuss the properties and the production of x-rays, x-ray scattering including the scattering from gases, liquids and solids, and the dispersion of x-rays. A chapter on the study of crystal structure by means of x-rays presents a brief account of the

methods used, but is not intended to be an adequate presentation for those intending to work in this field. The next chapter, on the intensity of reflection of x-rays from crystals, discusses in detail the diffraction by perfect and imperfect crystals, and the atomic structure factor. The remaining chapters deal with the ejection of photo-electrons, x-ray spectra, and a number of miscellaneous topics such as the measurement of the electronic charge by use of the ruled grating. Excellent tables of atomic scattering factors, absorption edges, absorption coefficients, and x-ray wave lengths are provided.

The book is certain to become the leading reference work for the general field of the physics of x-rays. The position of the two authors in this field makes it almost unnecessary to add that the book can be most highly recommended.

B. E. WARREN

The Structure of Crystals. Supplement for 1930-1934 to the Second Edition. By RALPH W. G. WYCKOFF. American Chemical Society Monograph. Reinhold Publishing Corporation, 330 West 42d Street, New York City, 1935. 240 pp. 341 figs. 16 × 23.5 cm. Price, \$6.00.

"The Structure of Crystals" second edition comprised a discussion of the methods of crystal structure analysis, and a summary of all important crystal structure results up to and including 1930. The present supplement contains no further discussion of methods, but brings the summary of crystal structure results complete through 1934. The presentation of the results of the past four years follows strictly the form used in "The Structure of Crystals," and includes all studies that lead at least to cell dimensions. In addition to the structure summary, the equally valuable bibliography is brought up-to-date.

The importance of maintaining an up-to-date structure summary can hardly be overemphasized. The author deserves the thanks of every person interested in this field for the excellent job which has been done. It is to be hoped that the good work will be carried on and that structure supplements such as this will appear at regular intervals. It is the method of presentation which has made Wyckoff's structure summaries so unique and valuable. Instead of being a collection of abstracts, each result is critically presented, with the highly probable and the uncertain features clearly pointed out.

Excellent diagrams are given for the more important structures. The printing is very good, and the subject matter well arranged. The supplement can be highly recommended as forming the second part of the best and most up-to-date crystal structure reference which exists.

B. E. WARREN

BOOKS RECEIVED

July 15, 1935-August 15, 1935

HERMAN T. BRISCOE. "General Chemistry for Colleges." Houghton Mifflin Co., 2 Park St., Boston, Mass. 872 pp. \$3.75.

MALCOLM DOLE. "The Principles of Experimental and Theoretical Electrochemistry." McGraw-Hill Book Co., Inc., 330 West 42d St., New York City. 549 pp. \$5.00.

PIERRE DUBOIS. "Thèses. I. Contribution à l'Étude des Oxydes du Manganèse. II. Structure des Cristaux Mixtes." Les Presses Modernes, 96 Galeries Beaujolais, Paris, France. 72 pp.

WILLIAM EDWARDS HENDERSON and W. CONARD FERNELIUS. "A Course in Inorganic Preparations." McGraw-Hill Book Co., Inc., 330 West 42d St., New York City. 188 pp. \$2.50.

WOLFGANG LANGENBECK. "Die organischen Katalysatoren und ihre Beziehungen zu den Fermenten." Verlag von Julius Springer, Linkstrasse 23-24, Berlin W 9, Germany. 112 pp. RM. 7.50.

J. W. MELLOR. "A Comprehensive Treatise on Inorganic and Theoretical Chemistry." Vol. XIV, Fe (Part III), Co. Longmans, Green and Co., 114 Fifth Ave., New York City. 892 pp. \$20.00.

L. ROSENTHALER. "Toxikologische Mikroanalyse. Qualitative Mikrochemie der Gifte u. a. gerichtlich-chemisch wichtiger Stoffe." Verlag von Gebrüder Borntraeger, Schöneberger Ufer 12a, Berlin W 35, Germany. 368 pp. RM. 25.50; bound, RM. 28.

H. SPONER. "Molekülspektren und ihre Anwendung auf chemische Probleme." I. Tabellen. Verlag von Julius Springer, Linkstrasse 23-24, Berlin W 9, Germany. 154 pp. RM. 16; bound, RM. 17.60.

H. W. STONE and M. S. DUNN. "Experiments in General Chemistry." McGraw-Hill Book Co., Inc., 330 West 42d St., New York City. 285 pp. \$1.60.

ANDREW L. WINTON and KATE BARBER WINTON. "The Structure and Composition of Foods. Vol. II. Vegetables, Legumes, Fruits." John Wiley and Sons, Inc., 440 Fourth Ave., New York City. 904 pp. \$15.00.

"Internationale Tabellen zur Bestimmung von Kristallstrukturen. Erster Band, Gruppentheoretische Tafeln. Zweiter Band, Mathematische und physikalische Tafeln." Verlag von Gebrüder Borntraeger, Schöneberger Ufer 12a, Berlin W 35, Germany. 692 pp. RM. 33; bound, RM. 40.