

*supra*] and suggests that the latter reactions proceed by ionic mechanisms. At room temperature there is slow reaction between gaseous hydrogen iodide and cyclopropane in Pyrex vessels. The negative temperature coefficient (*vide* results at

300°) suggests that it is almost certainly heterogeneous.

DEPARTMENT OF CHEMISTRY  
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R. A. OGG, JR.  
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RECEIVED NOVEMBER 24, 1937

## NEW BOOKS

**Outlines of Theoretical Chemistry.** By FREDERICK H. GETMAN, Ph.D. Sixth Edition by FARRINGTON DANIELS, Professor of Chemistry in the University of Wisconsin. John Wiley and Sons, Inc., 440 Fourth Avenue, New York, N. Y., 1937. ix + 662 pp. 170 figs. 15.5 × 23.5 cm. Price, \$3.75.

A measure of scientific progress is the frequency with which new editions of standard text-books are published. In physical chemistry, progress seems to have been most rapid in the sub-atomic field. It is in the clear and concise presentation of these recent findings that Dr. Daniels has made a major contribution to the sixth edition of the always popular "Outlines of Theoretical Chemistry."

In format, the new edition is similar to the earlier issues. All the chapters have been revised, most have apparently been completely rewritten. Important changes are found in the chapters on Thermo-chemistry and Electromotive Force. The chapter on Colloids has a more quantitative aspect and has been amplified by discussions of sedimentation, adsorption, and the ultracentrifuge. Rich in the new chemistry are Chapters XX-XXV which cover the Quantum Theory, Photo-chemistry, Nuclear Structure, Atomic Structure, and Molecular Structure. Here are discussed the neutron, positron, deuterium, atomic transmutation, artificial radioactivity, isotopes and deuterium. By condensing tables and omitting some less important discussions, space has been made for this mass of new material without largely increasing the number of printed pages.

Many problems have been added to the book, some of which are to illustrate the practical use of a specific formula or equation, others to test the student's ability to correlate his information. In order to avoid confusing the reader with an undue amount of mathematical detail, the author has placed in an appendix the derivations of the more difficult physical chemical equations. A welcome addition is the list of standard chemical and physical symbols and abbreviations.

From attractive bookplate inside the front cover to the convenient four-place logarithm table inside the back cover, the Sixth Edition of "Outlines of Theoretical Chemistry" is well organized and well executed.

EDWARD P. BARTLETT

**Inorganic Chemistry. A Survey of Modern Developments.** By SIR GILBERT T. MORGAN and FRANCIS HERWARD BURSTALL, The Chemical Research Laboratory, Teddington, Middlesex. Chemical Publishing Company of New York, Inc., 148 Lafayette Street, New York, N. Y., 1937. ix + 462 pp. 14.5 × 22.5 cm. Price, \$6.00.

It is seldom that the title is so exactly descriptive of the contents as is the title of this book. The book truly gives a survey, very complete and informative, to one already adept in chemistry, of the developments in chemical thought and knowledge since the advent of Werner's coordination theory. Indeed the dominant note of this book is coordination. One chapter alone is free of coordination, namely, that on the transmutation of the elements.

An introduction deals with the chemical elements, the structure of the atom and valency, the argument being developed in the main around the law of uniform atomic plan as set forth by Main-Smith. A separate chapter is devoted to hydrogen and deuterium and nine chapters are devoted to a systematic recapitulation of the elements from Group 0 to Group VIII of the periodic arrangement. Mention is made of many interesting developments in the production and utilization of these elements, but by far the greater part of each chapter is devoted to the most varied types of coordination compounds of these elements. To one not already completely acquainted with developments in this field, the vast number of such coordination types comes as a great surprise. Even coordination compounds of the inert gases are convincingly described.

Chapter XII on the transmutation of the elements, natural and artificial, is an exceedingly clear and complete summary of the subject down to the date of publication, and it illustrates the remarkable breadth and accuracy of the authors' information and understanding outside of their own special field of coordination chemistry.

Following are chapters XIII on coordination compounds in nature and in the arts and industries; XIV on corrosion of metals; XV on intermetallic compounds; XVI on the carbides; XVII on metallic carbonyls; XVIII on nitrosyl compounds; XIX on organic derivatives of metals and metalloids. One again receives almost a shock to find the extent to which the coordination conception serves in correlating the varied phenomena of these fields. One hardly

expects it to apply to the composition of minerals, to corrosion of metals, to intermetallic compounds or to the carbides.

Copious references are given throughout the book to original investigations, but only with the name of the investigator and the year. One might well question whether the convenience of a bibliography—it would take many pages—at the end of the book, giving specific titles and journal references, would not repay the additional effort.

The skeptical reader may well feel that the treatment of coördination sometimes approaches the dogmatic, that the significance of volatility and of molecular weight determination in solution is not sufficiently considered, that solvent molecules are placed arbitrarily inside or outside the coördinate sphere, that the electrochemical theory of corrosion of metals is entirely ignored.

Nevertheless, one finishes reading this book with the conviction that it is one of the most valuable reference books to keep constantly at hand, and with the overwhelming conviction that coördination forces play a far more controlling part throughout the range of chemical phenomena, than he had ever before suspected.

ARTHUR A. BLANCHARD

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**Practical Organic Chemistry.** By FREDERICK GEORGE MANN, Sc.D., D.Sc., F.I.C., Trinity College, Cambridge, and BERNARD CHARLES SAUNDERS, M.A., Ph.D., B.Sc., Magdalene College, Cambridge. Foreword by SIR WILLIAM J. POPE. Longmans, Green and Co., 114 Fifth Avenue, New York, N. Y., 1936. xiii + 403 pp. 14.5 × 22.5 cm. Price, \$3.60.

Of the 400 pages of this volume, 37 are devoted to methods and manipulation, 164 to preparations, 79 to organic qualitative, 77 to quantitative analysis. Simple enzyme reactions are given in 20 pages. The remainder of the book deals with the preparation of reagents, first-aid, log and anti-log tables, and a satisfactory index. The book is admirable save in one feature: the authors insist on endeavoring to wash back the waves of the sea of analytical chemistry with a broom by presenting at length the now essentially out-moded macro methods. The diagrams in the main are more than adequate and misprints are remarkably few. Unfortunately many concentrations are expressed on the thoroughly ambiguous percentage basis. The statement appearing on page 175 to the effect that in quinones the carbon of the carbonyl group is part of the benzene ring is obviously incorrect. The laboratory directions cover a wide variety of substances and are splendidly written. "The experimental work throughout the book has been carefully and repeatedly checked to ensure accuracy of detail, and to effect the utmost economy, not only in the student's time, but also in the cost of apparatus and chemicals." Explanations are freely given for particular parts of the directions in many instances. This offers much of interest in itself and makes the student appreciative of the niceties which are included in properly performed laboratory work. Save for the feature above mentioned this is a strictly excellent manual.

G. ALBERT HILL

**A Comprehensive Treatise on Inorganic and Theoretical Chemistry.** Volume XVI. Platinum and General Index. By J. W. MELLOR, D.Sc., F.R.S. Longmans, Green and Company, 114 Fifth Avenue, New York, N. Y., 1937. x + 811 pp. 94 figs. 15.5 × 25 cm. Price, \$20.00.

With the publication of this sixteenth volume devoted to the chemistry of platinum and containing a general Index, "The Comprehensive Treatise on Inorganic Chemistry," whose first volume appeared in 1922, is now completed. Its sixteen million words of lucid, succinct summaries of scientific facts, its innumerable data, tables and literature references, *all written by one man*, constitute a stupendous, indeed an almost incredible, achievement. The publishers tell that the author once remarked to them: "I admire your courage, and I admire my own, but I cannot say that I admire my sanity." The event has demonstrated that his momentary qualms were unjustified.

At this time it is unnecessary to point out in detail the merits of this Treatise; the present reviewer and many others have done so repeatedly in connection with the earlier volumes. It is sufficient to say that this Treatise, reflecting on every page the meticulous care and the independent and penetrating intellect of the author, has rendered obsolete all similar reference books of inorganic chemistry in our language and represents a monumental contribution to the chemical literature of the English speaking world.

Many new discoveries have, of course, been made since the earlier volumes appeared; moreover, there is a sort of No Man's Land between organic and inorganic chemistry, particularly in connection with some of the carbon compounds of hydrogen and nitrogen, which up to now has not been adequately described. Dr. Mellor with undiminished zest announces three Supplementary Volumes to meet these needs.

ARTHUR B. LAMB

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**Stiasny Festschrift.** (Stiasny Jubilee Volume). By K. H. GUSTAVSON, Editor, Valdemarsvik, and Collaborators. Eduard Roether Verlag, Darmstadt, Germany, 1937. 432 pp. Illustrated. 18.5 × 27.5 cm.

This very attractive volume has been prepared by an International Committee under the leadership of K. H. Gustavson of Valdemarsvik in celebration of the sixty-fifth birthday of E. Stiasny of Hälsingborg. It contains thirty-nine original contributions by eminent investigators from all over the world in the fields of colloid chemistry and the chemistry of tanning. Sixteen of the articles are in English, two in French and twenty-one in German.

Most of the articles deal with matters chiefly of interest to chemists and biochemists concerned with tanning, but a number of them are of decided interest to a wider circle. An article by Jahr, "Concerning the Course of Complicated Processes of Hydrolysis," and another by Perkins and Thomas, "Olation of Basic Chromium, Aluminum and Ferric Chloride Solutions," present the very interesting results which these authors have secured as to the polymerization which takes place particularly in concentrated solutions of basic chromic, aluminum and ferric salts. There is an article by W. R. Atkin and one by W.

Grassmann and others on the chemistry of collagen; one by K. Freudenberg on the more recent developments in the chemistry of catechin, and one by Pauli, "On the Purest Colloids and the Relation between Electrochemical-Constitutive and Colloidal Behavior." Finally, there is an interesting article by A. Gansser-Burckhardt, "Regarding the Prehistoric Treatment of Hides and an Interpretation of Primitive Tools Used Therein," dealing with an important item of the culture of neolithic man in Switzerland.

These articles show in a pointed way how the study of a special field of applied chemistry can yield results of decided value to the science in general.

ARTHUR B. LAMB

**Atomic Structure of Minerals.** By W. L. BRAGG, Langworthy Professor of Physics in The Victoria University of Manchester. The George Fisher Baker Non-Resident Lectureship in Chemistry at Cornell University, No. 15. Cornell University Press, 124 Roberts Place, Ithaca, New York, 1937. xiii + 292 pp. 144 figs. 16 × 24 cm. Price, \$3.75.

In this volume Professor Bragg presents a valuable survey of the results of the X-ray studies of the crystal structure of minerals which have been obtained since his pioneering investigations were carried out with the cooperation of his father twenty-five years ago. The book contains an introduction of 40 pages on the symmetry of crystals, methods of crystal analysis, and general structural principles, followed by 240 pages of descriptions of the structures of individual minerals. These descriptions are clearly written and are illustrated with excellent drawings. Emphasis is laid on the nature and physical significance of the structures, with mention of interatomic distances, coordination types, distribution of bonds, and relation of structure to cleavage, hardness, and other properties. A reader should obtain a good idea of a mineral structure by reading its description in this book. The author has wisely decided not to include extensive tables of atomic coordinates and parameter values, but to report instead values of derived quantities of more direct structural significance.

The volume is intended to include descriptions of the mineral structures determined before 1933 and the more important ones reported between 1933 and 1936. This plan has in general been carried out; a few structures of interest (including stannite, enargite, and zunyite) have, however, remained unmentioned.

LINUS PAULING

**The Chemistry and Technology of Rubber.** By CARROLL C. DAVIS, Editor, and JOHN T. BLAKE, Associate Editor. Published under the Auspices of the Rubber Division of the American Chemical Society. American Chemical Society Monograph No. 74. Reinhold Publishing Corp., 330 W. 42nd St., New York, N. Y., 1937. ii + 941 pp. Illustrated. 16 × 23.5 cm. Price, \$15.00.

This monograph surveys and correlates the field of rubber chemistry, appropriately excepting the science of producing rubber. It is comprehensive and readable. Rubber chemists desiring information along lines with which

they are not intimately acquainted will find the book invaluable. Younger technicians may well use the volume as the basic textbook for their education. The monograph must certainly be considered a major contribution to the literature of rubber chemistry.

The small amount of repetition in the monograph is a tribute to careful editing. There seems no excuse, however, for the lack of uniformity in the arrangement of the bibliographies. No attempt was made to standardize on precise terminology. The editors state that "the terminology was chosen with due consideration of American Chemical Society usage, and at the same time with due regard for the wishes of the authors." Unfortunately, to give but one example, the American chemist is forced to cope with such terms as antioxygen, antideteriorant, or anti-collotrope when precisely what is meant is age resister.

French, English, and American rubber chemists are represented. These authors for the most part represent an industrial viewpoint and are all well recognized authorities.

The scope of the book may be determined by considering the subject matter of its twenty-six chapters.

The first five chapters deal with crude rubber. The chapter on composition by A. Van Rossem and the chapter on physical properties by G. Stafford Whitby present very readable summaries of these subjects. Harry L. Fisher and Roscoe H. Gerke write on the chemistry and structure of the rubber hydrocarbon. Warren F. Busse contributes a chapter on the structure and behavior of rubber in solvents. These authors critically review existing theories, bringing to light many inconsistencies. The unsolved problems are presented with the authors' views on the subjects. The existing data on the mastication of rubber and its plasticity characteristics are submitted by Wilfred Gallay.

There follows a discussion of the vulcanization of rubber and the properties thus obtained. Ira Williams contributes an interesting chapter on the theories of vulcanization with his personal views on the subject. That by-path in rubber chemistry of vulcanizing without sulfur is written, as it should be, by Ivan I. Ostromislensky. A chapter on the history and use of accelerators by Sidney M. Cadwell and J. W. Temple briefly presents the properties of accelerators in a manner valuable to the rubber compounder. This is also true of the contribution by Winfield Scott and L. B. Sebrell on the theories of acceleration. A penetrating analysis of the applications of physics to the understanding of rubber behavior is given by W. W. Vogt.

Perhaps next in importance to vulcanization and acceleration to industrial rubber chemists is the subject of fillers and reinforcing agents. Norman A. Shepard, John N. Street, and Charles R. Park present a critical discussion of these materials and their effects on the physical properties of rubber.

The international character of the monograph is well shown by the chapters on the deterioration of rubber. W. L. Semon, an American, contributes a valuable practical as well as a theoretical discussion of the history and use of age resisters. A table of chemical and trade names of commercial age resisters is included. Charles Dufraisse, a Frenchman, discusses the autoxidation of rubber with a verbosity which detracts somewhat from its excellence.

F. Harriss Cotton, an Englishman, considers the deterioration of rubber by heat, light, and ozone and discusses the proper compounding technique for minimizing these effects.

A chapter on the electrical behavior of rubber, gutta-percha and balata by Archibald T. McPherson and a chapter on hard rubber by A. R. Kemp and F. S. Malm summarize the existing knowledge in these fields.

The rapidly growing field of latex technique is briefly covered by two chapters: one on the properties of latex, by W. A. Gibbons and P. D. Brass; the other on the industrial uses of latex, by D. F. Trwiss, E. A. Murphy, E. W. Madge, and G. W. Trobridge.

Rubber derivatives of commercial utility are handled by T. R. Dawson and P. Schidrowitz. These authors treat thoroughly the chlorination of rubber but neglect with a short literature survey other commercially important rubber derivatives. An all too brief review of synthetic and substitute rubbers is contributed by Thomas Midgley, Jr. The chapter on gutta-percha and balata by J. W. Dean neglects the golf ball industry. A short description of the basic points in reclaiming rubber is written by George W. Miller.

An introduction to the art of practical rubber compounding is submitted by W. F. Russell. Arthur W. Carpenter contributes a comprehensive survey of the physical testing of rubber compounds. These two chapters, as well as a chapter on the chemical analysis of rubber and rubber products by R. P. Dinsmore, R. H. Leeds and H. E. Rutledge, add greatly to the practical value of the monograph.

The volume concludes with a chapter on the literature by one of the editors, C. C. Davis.

FRANK K. SCHÖNFELD

**Methods of Quantitative Chemical Analysis. An Introduction to Their Theory and Technic.** By M. G. MEL-  
LON, Ph.D., Professor of Analytical Chemistry, Purdue  
University. The Macmillan Co., 60 Fifth Avenue, New  
York, N. Y., 1937. ix + 456 pp. 76 figs. 15 × 22 cm.  
Price, \$3.00.

The plan of this book is quite novel. Following an excellent introductory discussion of matters affecting laboratory work, the author takes up the theory and practice of the various operations of quantitative analysis in the order in which these operations are generally met with in an analysis. Thus, Part I (47 pages) is devoted to The Sample; Part II deals with The Desired Constituent and is divided into two sections: The Methods of Separation (73 pages) and The Methods of Measurement (254 pages).

Of the four chapters in Part I the first and last describe in general terms the selection and preparation of the sample, and its preliminary treatment; the other two chapters are given over to the theory and use of the balance and volumetric apparatus. In the section on methods of separation there are four chapters covering volatilization, precipitation, electrochemical, and extraction methods. For each method there is first a discussion of the general theory followed by a description of the special equipment and technique. The last section on methods of measuring the desired constituent takes up practically all the

common methods, classifying them into two groups, the specific property methods (8) and the systemic property methods (4). Here again there is first an introductory section dealing with the theory of the method and this is followed by directions for laboratory determinations employing the method. These directions are always given systematically under the headings: Apparatus; The Sample—Selection and Preparation, Measurement, Treatment; The Desired Constituent—Separation, Measurement.

There can be no quarrel with the fundamental logic of the author. Indeed, it is a pleasant surprise to discover a system of classification which embraces so successfully the diverse methods and operations of quantitative analysis. As the basis for an elementary textbook this logical plan has both decided advantages and disadvantages. On the one hand, it makes possible unusually clear and concise laboratory directions because all theoretical and practical factors have been considered previously. On the other hand it limits seriously the degree of coordination between the theory discussed in the early chapters and the laboratory work described in the last part of the book. For instance, the first gravimetric procedure (chloride) is described on page 311; yet the whole theory of precipitation, the preparation of the Gooch crucible, the general technique of filtering, and the conditions for drying are treated under methods of separation, pages 100–140. The only connection between this particular experiment and the methods of measurement is that the desired constituent is determined by weighing the precipitate. The laboratory directions, it should be noted, are complete in themselves. For many teachers of elementary students and probably for all students who have some knowledge of quantitative analysis the merit of the logical structure of the book will outweigh disadvantages of the kind just pointed out.

The reviewer must confess that he was disturbed by the systematic terminology developed by the author. For example, since different types of titrimetric methods are named according to the kind of reaction or standard solution used, we find such polysyllables as thiosulfatimetry, ferrousometry, ferrocyanometry; and to characterize other types of measurement we meet with opticometry, colligimetry, volumetry.

The material in this book is well chosen and is very much up-to-date. The list of determinations for which directions are given is much greater than that found in the usual textbook and in addition the appendix contains a valuable collection of references where other suitable laboratory exercises may be found. For use in calculations a graphic logarithm table is provided.

ARTHUR F. SCOTT

**Analytical Chemistry. Volume I. Qualitative Analysis.**

Based on the German text of F. P. TREADWELL. Translated and revised by WILLIAM T. HALL, S.B., Associate Professor of Analytical Chemistry, Massachusetts Institute of Technology. Ninth English edition. John Wiley and Sons, Inc., 440 Fourth Avenue, New York, N. Y., 1937. x + 630 pp. 15 × 24 cm. Price, \$4.50.

This outstanding text and reference book of qualitative analysis remains the same in its scope and essential com-

position, although portions have been rewritten, considerable new material added and certain sections have been omitted; the number of pages remains approximately the same.

The introductory section, dealing with the principles of analytical chemistry, has been "rewritten to make it correspond more closely to modern chemical theory"; however, there may be some who will not agree with the author's vigorous rejection of the use of the newer definitions of acids and bases.

The descriptive material has been amplified, mainly by including "drop" and microchemical reactions, and a section of about ten pages is devoted to an outline of a semi-microchemical system for the detection of the commoner cations and anions. The system of Noyes and Bray for the rare element analysis, and the syllabus of a course of instruction has been omitted from this edition.

E. H. SWIFT

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## BOOKS RECEIVED

November 15, 1937-December 15, 1937

- RUDOLF BUCHER. "Die Diffusionsanalyse am Blutplasmagel. Ein neuer weg der Blutforschung." Benno Schwabe und Co., Verlag, Klosterberg 27, Basel 10, Switzerland. 123 pp. 30 Swiss francs.
- R. P. BYERS. "The Chemical Elements Interpreted." Superuniversity Publications, 324 Newbury St., Boston, Mass. 26 pp. \$1.00.
- HENRY LE CHATELIER, Editor. "Traité Élémentaire de Chimie de Lavoisier." Reprint from the Original. Gauthier-Villars, Éditeur, 55 Quai des Grands-Augustins, Paris 6<sup>e</sup>, France. 191 pp. Fr. 21.
- ED. F. DEGERING, R. E. NELSON, and J. R. HARROD, Editors. "An Outline of Organic Chemistry." Revised edition. Barnes and Noble, Inc., 105 Fifth Ave., New York. 317 pp. \$2.25.
- MARCEL DELÉPINE, Editor. "La Synthèse Totale en Chimie Organique. Mémoires de MM. Wöhler, Gerhardt, Berthelot, Lebel, Van't Hoff, Jungfleisch, Ladenburg, Pasteur." Gauthier-Villars, Éditeur, 55 Quai des Grands-Augustins, Paris 6<sup>e</sup>, France. 145 pp. Fr. 21.
- W. D. JONES. "Principles of Powder Metallurgy, with an Account of Industrial Practice." Longmans, Green and Co., 114 Fifth Ave., New York, N. Y. 199 pp. \$5.00.
- J. W. MELLOR. "A Comprehensive Treatise on Inorganic and Theoretical Chemistry. Vol. XVI. Platinum. General Index." Longmans, Green and Co., 114 Fifth Ave., New York, N. Y. 811 pp. \$20.00.
- R. S. MORRELL, T. HEDLEY BARRY, R. P. L. BRITTON, and H. M. LANGTON. "Synthetic Resins and Allied Plastics." Oxford University Press, 114 Fifth Ave., New York, N. Y. 417 pp. \$11.00.
- JOSEPH NEEDHAM and DAVID E. GREEN, Editors. "Perspectives in Biochemistry." Cambridge University Press: The Macmillan Company, 60 Fifth Ave., New York, N. Y. 361 pp. \$4.75.
- IRVINE H. PAGE. "Chemistry of the Brain." Charles C. Thomas, 220 East Monroe St., Springfield, Ill. 444 pp.
- J. R. PARTINGTON. "A Short History of Chemistry." The Macmillan Company, 60 Fifth Ave., New York, N. Y. 386 pp. \$2.50.
- I. H. B. and A. G. H. SPIERS. "The Physical Treatises of Pascal: 'The Equilibria of Liquids' and 'The Weight of the Mass of the Air'." Columbia University Press, Columbia University, New York, N. Y. 181 pp. \$3.75.
- E. STENGER and H. STAUDE. "Fortschritte der Photographie." Akademische Verlagsgesellschaft m. b. H., Sternwartenstrasse 8, Leipzig C 1, Germany. 415 pp. RM. 33; bound, RM. 35.
- GEORGES URBAIN, Editor. "Leçons de Philosophie Chimique, par J.-B. Dumas." Gauthier-Villars, Éditeur, 55 Quai des Grands-Augustins, Paris 6<sup>e</sup>, France. 270 pp. Fr. 21.
- C. WALTHER. "Motortreibmittel." Verlag von Theodor Steinkopff, Residenzstrasse 32, Dresden-Blasewitz, Germany. 108 pp. RM. 6; bound, RM. 7.
- "A. S. T. M. Standards on Rubber Products. Methods of Testing. Specifications." Prepared by Committee D-11 on Rubber Products. Published by the American Society for Testing Materials, 260 South Broad St., Philadelphia, Pa. 238 pp. \$1.00.