

A careful review of the literature shows, therefore, that with the exception of Kondakow's leather-like, alcohol-soluble product and his higher molecular, insoluble polymeride obtained from 2,3-dimethylbutadiene, none of the earlier investigators described a rubber-like polymeride, or even anything approaching rubber-like, as resulting by the polymerization of an isomer or homologue of isoprene.

By some stretch of the imagination, we might possibly regard some of the solubilities of certain of these polymerides as resembling the solubilities of rubber, yet in all other important respects they were totally unlike rubber, *and by no means could they be termed isomeric or homologous rubbers.*

Prof. Perkin, Jr., sums up the position of synthetic rubber at the beginning of the year 1909 with these words:

"It was generally recognized that most compounds containing the conjugated double linking showed a tendency to polymerise, in some cases very readily, but in others with difficulty. The polymerides varied from sticky, indefinite substances, through well defined rubbers, to hard resins; their properties also varied somewhat with the method of polymerisation and with the molecular weight of the hydrocarbon polymerised. The methods of polymerisation included spontaneous polymerisation and polymerisation due to heat, sunlight, or the action of various chemical reagents, such as acids and alkalies. But, in most of these cases the methods in use were uncertain, wasteful or slow."

With one very important modification, I think we can all agree with this statement of Prof. Perkin, Jr. The part of his summary which I feel is *very* misleading, is his statement that "the polymerides varied from sticky, indefinite substances, *through well defined rubbers*, to hard resins." For, *with the exception of the work of Bouchardat, Tilden, Weber, and Wallach, on isoprene, and that of Kondakow on dimethylbutadiene*, there is, to the best of my knowledge, no reference in the literature by any investigator where "*a well defined rubber*" was ever formed as a polymeride from any conjugated double linkage compound, prior to the work of Prof. Harries and of Bayer & Co. in the year 1909.

HOBOKEN, N. J.

NEW BOOKS.

Les Progrès de la Chimie en 1912. Traduction Française autorisée des "Annual Reports on the Progress of Chemistry for 1912, Vol. IX," issued by the Chemical Society, London, Traducteurs, D. FLORENTIN, E. GELIN, P. HUCHET, M. DRECO, J. SAPHORES, P. POURQUERY. Paris: Librairie Scientifique A. Hermann et Fils. 1913. Price, 7,50 francs.

These well-known "Annual Reports" for 1912 contain the following divisions: General and physical chemistry, by G. Senter; inorganic chemistry, by E. C. C. Baly; organic chemistry, I, aliphatic series, by H. R. LeSueur, II, homocyclic series, by K. J. P. Orton, III, heterocyclic series and stereochemistry, by A. W. Stewart; analytical chemistry, by G. Cecil Jones; physiological chemistry, by W. D. Halliburton; agricultural chemistry and vegetable physiology, by A. D. Hall; mineralogical chemistry, by Arthur Hutchinson, and radioactivity, by Frederick Soddy.

It is gratifying to see the excellence and importance of these reports recognized by the publication of this translation. W. A. N.

Logarithmic Reduction Tables. For Students in Analytical Chemistry. By CHARLES J. MOORE, Austin Teaching Fellow in Advanced Analytical Chemistry in Harvard University. Ginn and Co., Boston. 1913. 78 pp. Price, \$1.00.

This little volume comprises 28 tables of data of especial interest to students of analytical chemistry, but of considerable interest to all chemical workers as well. The data have been collected from the most reliable sources, the authority being cited in all practicable cases. The selection of material is very good, including just about what the average worker will need in any ordinary calculation. Parallel with each value is its logarithm in six places, and those values which are often multiplied, as the atomic weights and the analytical factors, have logarithms of the multiples most used. Table 29 is a well-arranged table of six-place logarithms for general use. Following this come 14 pages devoted to very common sense explanations of the use of the tables and of logarithms. If this little book, with its attractive appearance and convenient arrangement, can stimulate students to a more habitual use of logarithms in chemical calculations, it will serve a very useful purpose in our colleges.

W. E. HENDERSON.

A Foundation Course in Chemistry. For Students of Agriculture and Technology. By J. W. DODSON, B. Sc. (Lond.), Lecturer in Chemistry at University College, Reading, and J. ALAN MURRAY, B.Sc. (Edin.), Lecturer in Agricultural Chemistry at University College, Reading. Longmans, Green and Co., New York. 1913. x + 254 pp. Price, \$1.10.

This book presents a brief, pointed *description* of "those fundamental facts and general principles of chemistry upon which the superstructure of agricultural chemistry or other technical application must necessarily rest." Its scope and contents is shown by the following chapter headings: (1) Matter and energy; (2) air; (3) the chief gases of the atmosphere; (4) water; (5) hydrogen; (6) general principles; (7) oxides, acids, bases, and salts; (8) limestone; (9) common salt; (10) sulfur; (11) ashes; (12) sand, clay, etc.; (13) organic matter; (14) paraffins and their derivatives; (15) coal tar; (16) some common metals.

The materials mentioned in most of the headings are merely the starting points for the presentation of the chief elements contained in them, and for the common compounds made from them. Hence the chapter on *limestone* includes what in other texts is commonly included under the *oxides of carbon*; that on ashes, what is commonly included under *phosphorus*; etc. Seventy-five pages are devoted to organic chemistry, which appears to the reviewer to be a wise "innovation" in elementary text-books.

In the main, the selection of the topics shows discrimination and good

judgment, and the presentation is brief, pointed, and clear. However, no attempt is made to point out the general relations or conditions which determine whether or no chemical changes will take place—not even the solubilities of acids, bases and salts are given or referred to in this connection. This is a serious defect. Otherwise the book is quite commendable, and should serve its purpose well. E. P. SCHOCH.

Cours Élémentaire de Chimie et de Minéralogie. Par DR. C. I. ISTRATI, Professeur de Chimie organique à l'Université de Bucarest, et DR. G. G. LONGINESCU, Professeur de Chimie inorganique à l'Université de Bucarest. Avec une Préface de CHARLES FRIEDEL, Membre de l'Institut. Deuxième édition française. Publiée d'après la quatrième édition roumaine par A. ADAM, Professeur agrégé au Lycée de Charlesville. Gauthier-Villars, Paris. 1913. xii + 397 pp. Price, 14.50 francs.

This volume is designed by the authors primarily for use in secondary schools, and aims to present the subject inductively for beginners. Much stress is laid in the prefatory notes and introduction upon the fact that constant use is made of the atomic theory and the valence concept, which seems to be regarded as something of an innovation in works of this character. The opening chapter deals with water, as a familiar substance, and after a discussion of the general operations of solution, crystallization, distillation and filtration, the distinctions between physical and chemical changes are emphasized along customary lines. Chapters dealing with hydrogen, oxygen, the halogens, sulfur, and their compounds, follow in the order named, and at this point the atomic theory is introduced, and symbols, formulas and equations are first employed. The remaining chapters devoted to inorganic chemistry include the more common non-metals and metals, closing with a brief presentation of the periodic law, the whole occupying two hundred and sixty pages. Of the remaining pages, one hundred and twenty are devoted to organic chemistry. The characteristic methods of preparation of the various types of organic compounds, and their behavior, including that of certain important representatives of each type, are given in considerable detail. The system of nomenclature used is that adopted by the International Commission at Geneva. The last few pages of the book are devoted to brief biographical notes regarding some of the more important workers in the chemical field. The entire text is freely interspersed with directions for experiments, which the pupil is expected to perform.

The book is notable for one feature, which the authors regard as most important, namely, extensive instruction in mineralogy, especially from its crystallographic side.

The course as presented in this book is not one which would be adaptable to our own secondary schools, nor would it probably meet the requirements of our college courses in its present form. The material

is, however, thoughtfully presented, and, especially in the variety of experiments described, is of interest to teachers. H. P. TALBOT.

Elementary Chemical Theory. By J. M. WADMORE. D. Van Nostrand Co., New York. 1912. xi + 275 pp. Price, \$1.50.

In his preface the author says: "there is a growing tendency, and one much to be commended, to include more or less Chemical Theory in textbooks of Inorganic Chemistry; Ostwald's 'Principles' is the prototype." "For school use the objection is that, though each point receives consideration as it crops up, and is well illustrated by concrete instances, the connection between different theoretical questions is obscured, and the elementary student, who is making his first acquaintance with the subject, fails to grasp it as a whole." The author also says he has been unable to find a suitable elementary book on Theoretical Chemistry; those now published "are too advanced, and too costly for school use." And again, his "book is not for those who, in a chemical sense, have grown their wisdom teeth, and with beginners, the obvious is just that which usually presents the most difficulty." With the last statement most teachers of chemistry will heartily agree.

There follow twenty-one short chapters with familiar titles such as: "Atomic Hypothesis;" "Vapor Densities;" "Periodic Law;" "Radioactivity;" "Constitution and Configuration of Compounds;" "Gas Laws and the Kinetic Hypothesis;" "Liquefaction of Gases;" "Solutions;" "Freezing and Boiling Points;" "Diffusion-Osmotic Pressure;" "Electrolysis-Ionization;" "Equilibrium of Electrolytes." Numerous interesting facts and comments, not often found in a work of this size, are included, so that but few could read the book through without learning something. Many of the topics are treated in a clear, concise way, wholly admirable. The chapter on the periodic law is particularly good.

The frequent use of historic allusions and apt quotations is an agreeable feature. The simplicity of language and expression in some chapters is almost excessive, but occasionally the author forgets the limitations of those for whom he is writing. For instance, the introduction of Baeyer's "strain hypothesis" and the giving, in degrees and minutes, the distortion of angles between the "carbon valencies" would seem to presume the existence of well grown "wisdom teeth." But these flights are few and short; a few pages further on may be found a painstaking explanation of the meaning of "inverse proportion."

In this country we are undoubtedly much under the dominion of German thought and methods—too much so some may think—and it is refreshing to read a book so frankly British. But a whole chapter (and one of the longer ones), dealing with osmotic pressure from the historic standpoint, in which van't Hoff's name is not even mentioned, is a curiosity.

The theory of electrolytic dissociation is approached with an infinitude

of precautions, and is handled, metaphorically speaking, with tongs, like a hot crucible. On page 243 the student is solemnly admonished "that in its present form it is not accepted with quite universal consent." One cannot object to this warning, but it becomes rather amusing when compared with the direct and dogmatic way in which Callendar's osmotic hypothesis is presented in the previous chapter. This unevenness in selecting topics and in appraising theories is regrettable.

In the opinion of the reviewer, about two-thirds of the text is well adapted to the beginners for whom it is written, and the other third is interesting and suggestive reading for those much further advanced. So there is something for everybody in this book. S. LAWRENCE BIGELOW.

Theoretical and Physical Chemistry. By S. LAWRENCE BIGELOW, Ph.D., Professor of General and Physical Chemistry in the University of Michigan. xiii + 544 pp. The Century Company, New York. 1912. Price, \$3.00.

This book was written for use in a course that should follow "the first courses in general chemistry and qualitative analysis"—as a text-book for sophomore or junior students. It aims to give the *advanced general* student in chemistry a large number of carefully selected and well discussed facts upon which the fundamental principles of the science are based. Such a book is greatly needed. The reviewer has examined this book repeatedly during a rather long period of time in which it has been before him, and he has recently also tried it as a text-book with just the class of students for which it is intended. It appears to him that the book fulfills its mission exactly, and that in its scope and general treatment of its subject matter it is excellent.

The scope of the subject matter is far greater than that of its famous prototype—Ostwald's *Grundriss der Allgemeinen Chemie*. We find among the headings not only all the familiar topics, but also the following: "Spectroscopic Evidences and the Theory of Inorganic Evolution;" "Luminiferous Ether and Vortex Rings;" "Radioactivity and the Electron Theory;" "Colloidal Solutions." Under many of the familiar topics are found new subheadings; thus, under "Osmotic Pressure" are found: "Attempts to Explain Osmosis, the Kinetic Hypothesis, the Attraction Hypothesis, the Surface Tension Hypothesis—the Function of the Membrane-Capillary Structure-Membranes as Solvents, etc." Under "The Periodic System" we find mention of Loew and Erdman's *Archimedes Spiral Arrangement*, and of Crooke's *Genesis of the Elements*. These topics serve to increase the student's interest in the subject and widen his view of natural phenomena.

The book is very readable: the style is simple, direct, and very sympathetic to elementary students, hence they read the comparatively large number of pages readily and note the important points without effort.

Naturally, a book as large as this, and which deals with so many differ-

ent topics is not without flaws and objectionable parts. However, they do not affect the book seriously as a whole, and since the first edition of the book is practically exhausted and the author is at work on a revised edition in which most of these slips and shortcomings will probably be corrected, none of them need be pointed out here.

The publishers have done their work well: the book is printed in clear type, on good paper, and is well bound. E. P. SCHOCH.

Experiments Arranged for Students in General Chemistry. (Shorter course.) By EDGAR F. SMITH, Blanchard Professor of Chemistry in the University of Pennsylvania, and HARRY F. KELLER, Professor of Chemistry in the Central High School of Philadelphia. P. Blakiston's Son and Co., Philadelphia. 1913. vii + 56 pp. 12.5 × 18.5 cm. Price, \$0.60, net.

This little volume contains, in condensed form, a well selected list of experiments taken from the larger volume by the same authors. It is primarily for high school use but may equally be adapted to short college courses. Though much too brief upon such important subjects as the oxygen compounds of sulphur and nitrogen, with their corresponding acids, it is to be remembered that these experiments have been selected mainly for the purpose of covering the entire field in as short a time as possible; to this end the authors have succeeded in presenting a selection clearly illustrative of the principles of general chemistry.

WILLIAM J. HALE.

Traité de Chimie Minérale. Par H. ERDMANN. Tome second. 8vo., 331 pp. A Hermann et Fils, Paris. 1914. Prix, 10 fr.

The first volume of this translation by Professor A. Corvisy of the fifth edition of the German work was noticed in the July, 1913, number of THIS JOURNAL.

The present volume deals with the metals exclusively. Extensive and interesting information is given in regard to their mineralogical origin, uses, compounds, statistics, history, etc. Like the preceding volume, it is a useful book for French-reading lecturers and students. It is hardly extensive enough to be used as a book of reference to compounds, except the more common ones. Some peculiarities of treatment have been noticed, which are doubtless due to the author's varying interest in the different metals. For instance, five and one-half pages are devoted to rubidium, while the more interesting, because extreme, metal caesium receives but little more than half a page of comment. The comparative rarity of caesium is hardly a good excuse for this brevity of treatment, for its compounds have been studied more thoroughly, probably, than those of rubidium.

H. L. WELLS.

Traité de Metallographie. Par FÉLIX ROBIN. Préface de M. F. OSMOND. Libraire Scientifique A. Hermann et Fils, Paris. 1912. 464 pp. Price, 30.00 fr.

The book is an attempt to condense in one volume much of the more

recent work on metallography. The author first discusses the general principles of metallography, the preparation of specimens, etching methods, etc., and follows with a description of the ideal alloy diagrams. This part of the subject is not adequately treated. He next deals with microchemical analysis and its application to the study of pure metals and alloys. The nature and microscopical appearance of the pure metals and the chief constituents of the common alloys are then considered. Special attention is given to the micrographic constituents of iron and steel and the descriptions are detailed and accurate. This is followed by outline descriptions of a large number of binary alloys with accompanying diagrams and photographs. Some of the equilibrium diagrams are taken from the earlier French alloy literature and are quite out of date. Most of the diagrams are satisfactory, however, and the microphotographs are excellent. In later chapters the author deals with the practical problems of steel metallography, such as the effects of mechanical treatment on structure, the effects of slag inclosures, etc. The final chapter deals with the microstructure of slags and similar metallurgical products.

The book contains a large amount of material not readily available, and, though some of the material does not seem to be very closely connected with metallography, much of it is distinctly useful. Special emphasis is laid on the microstructure and properties of steel, so that the book should be chiefly useful to the steel metallographist. It is profusely illustrated with 250 diagrams and 500 microphotographs, most of which are excellent and well reproduced.

ROBERT S. WILLIAMS.

Treatise on General and Industrial Organic Chemistry. By DR. ETTORE MOLINARI, Professor of Industrial Chemistry to the Society for the Encouragement of Arts and Manufactures and Merceology at the Luigi Bocconi Commercial University, Milan. Translated from the second enlarged and revised Italian Edition by THOMAS H. POPE, B.Sc., A.C.G.I., F.I.C., School of Malting and Brewing, University of Birmingham. P. Blakiston's Son & Co., Philadelphia. xix + 770 pp. 10 × 6⁷/₈. Price, \$6.00.

The fact that a new edition of this book has been called for in only two years after the appearance of the first, and also that it is translated into both English and German, is evidence that it meets a real need. It presents a combination of theoretical with applied chemistry, though it has evidently not been the intention of the author to prepare a complete treatise on technological chemistry. Details are given only in the cases of some of the principal industries and especially in those well adapted to give a general idea of the different applications of chemical processes. For example, the industries of illuminating gas, sugar, beer, alcohol, acetic acid, dyeing, textile fibers, fats and soaps, explosives, etc., are dealt with, in more or less detail. Statistics of production, exportation and importation have been brought up to the year 1910 and in some instances up to

1911. Mr. Pope has made a number of alterations and additions, principally in amplifications of the statistics referring to Great Britain and the United States.

M. V. DOVER.

Aus dem Kaiser Wilhelm-Institut für Chemie. Untersuchungen über Chlorophyll. Methoden und Ergebnisse. Von RICHARD WILLSTÄTTER UND ARTHUR STOLL. Mit 16 Textfiguren und 11 Tafeln. Verlag von Julius Springer, Berlin. 1913. $9\frac{1}{2} \times 6\frac{1}{2}$. Paper. iv + 424 pp. Price, 18 marks.

In the preface, Professor Willstätter states that this book contains the unpublished investigations which he has carried on together with Mr. Arthur Stoll during recent years. These comprise the isolation of chlorophyll, the separation and quantitative estimation of all components of the coloring matter of the leaf, and the hydrolysis of chlorophyll.

In these investigations new methods for the preparation of chlorophyll and its decomposition products have been worked out. With the new experience thus gained and the more easily accessible materials, the earlier experiments on the transformations of chlorophyll have been repeated and most of the older processes improved.

In order to make this work a more complete representation of our knowledge of chlorophyll, it is supplemented with the results of the investigations which Professor Willstätter and his co-workers have published in *Liebig's Annalen der Chemie* during the last seven years. To these have been added some unpublished investigations on the pigments of the brown algae made by Professor Willstätter and Mr. H. J. Page and also those on the relation between chlorophyll and haemin, carried on with Mr. M. Fischer. Chlorophyll and haemin have been broken down to a common mother-substance with the aid of reactions, which throw some light on the essential differences in the constitution of chlorophyll and haemin.

Some idea of the book may be obtained from the following condensed table of contents: I. Theoretical Introduction; II. Description of the Coloring Matter of the Leaf; III. The Extraction of the Coloring Matters; IV. Quantitative Analysis of the Four Coloring Matters of the Chloroplasts; V. Isolation of Chlorophyll; VI. Isolation of the Two Components of Chlorophyll; VII. The Action of Chlorophyllase; VIII. Use of the Enzyme for the Partial Synthesis of Chlorophyll; IX. The Chlorophyllides; X. Isolation of the Components, *a* and *b*, of the Chlorophyllides; XI. Description of the Chlorophyllides; XII. The Yellow Pigments of the Chloroplasts; XIII. Phaeophytin; XIV. Method of Separating and Estimating Chlorophyll Derivatives; XV. The Phaeophorbides *a* and *b*; XVI. Phytochlorins and Phytorhodins; XVII. Phytol; XVIII. The Chlorophyllin Salts; XIX. Introduction of Magnesium into Derivatives of Chlorophyll; XX. Decomposition of Chlorophyll by Alkalies: Phyllins and Porphyrins; XXI. Oxidation of the Chlorophyll De-

rivatives; XXII. Reduction of the Chlorophyll Derivatives; XXIII. Etiophyllin and Etioporphyrin; XXIV. Decomposition Products of Haemin; XXV. Graphical Representation of the Absorption Spectra.

The book also contains eleven plates of photographs of spectra and crystals.

It is hardly necessary to state that the book is a most excellent one and one of the most important contributions to our knowledge of chlorophyll that has appeared. As Professor Willstätter states in the preface, it makes chlorophyll and its derivatives easily accessible and will much facilitate investigation in this field by both chemists and physiologists.

W. R. ORNDORFF.

The Synthetic Dyestuffs and Intermediate Products. (Second Edition.) By JOHN CANNELL CAIN AND JOCELYN FIELD THORP. 8vo., 423 pp. C. Griffin and Co., Ltd., London. 1913. Price, 16 shillings, net.

The first edition of this book, which appeared in 1905, was well received by all laboratory workers in color chemistry, and especially by teachers of the chemistry of the coal tar dyes, as it filled a place in their libraries, which until then had been vacant.

In the second edition of this book the text has been revised where the authors considered it advisable, and owing to the advances which have been made in the synthesis and development of the so-called "vat colors," they have renamed two chapters of the book. The chapter formerly called "Oxyketone Dyestuffs" has been changed to "Anthracene Dyestuffs" so as to include indanthrene and related colors, and the chapter formerly entitled "Indigo" has been changed to "Indigoid Coloring Matters" and includes the many indigo derivatives which have been introduced during recent years. The authors have also thought it advisable to replace the tables of reactions on the fiber, published in the first edition, by the excellent tables recently elaborated by Green and his co-workers. The main features of the book are as follows:

Part I gives the theoretical description of the dyestuffs and their intermediate products, especial attention being paid to the orientation of the various groups as they enter the intermediate products, and their structural position in the dyestuff molecule. The discussion of the dyestuffs is arranged in accordance with a very complete structural classification and the comprehensive character of numerous complex structural formulas as well as their excellent typography, is worthy of special note.

Part II is devoted to the practical side of the subject and gives the working detail for the laboratory preparation of one or more typical members of each group of intermediate products and dyestuffs.

Part III is analytical in character and describes the processes actually in use in chemical and color works for the identification and analysis of intermediate products and dyestuffs. It includes tables for the identi-

fication of dyes on both animal and vegetable fibers, and an appendix of useful specific gravities tables.

This revised edition will be received with interest by all teachers of the organic chemistry of the dyestuffs, to whom the first edition has proved almost indispensable, and its use may well be extended to every laboratory worker and student of the subject.

L. A. OLNEY.

Elements of Water Bacteriology. By S. C. PRESCOTT AND C. E. A. WINSLOW. Third edition. John Wiley & Sons, New York, 1913. Price, \$1.75.

This excellent book, which first appeared in 1904, has now reached its third edition. Much new material has been inserted throughout the book and a new chapter has been added upon the "Bacteriological Examination of Shellfish." The recent recommendations of the Committee on Standard Methods are fully discussed, but the authors do not agree with the recommendation of the Committee that the 37° count should replace the 20° count. Their position is in fact that held by most practical workers in the field of water bacteriology. The authors also express their full sympathy with the view that the whole group of lactose-fermenting bacilli is significant in sanitary water analysis and that too narrow an interpretation of identification tests for *B. coli* is unwarranted. On this point, again, the opinion of Prescott and Winslow is probably shared by most American workers.

Little criticism can be made of details. It is possibly not quite fair (page 52) to discuss Miquel's numerical standards in comparison with others without reference to the special methods employed by that worker. On page 59, "warnings of danger" as to the character of a water supply based on "daily bacteriological analyses" are referred to with approval. The authors apparently overlook the fact that in surface waters of fluctuating character like some of those referred to, the "warnings" may not be given until long after the danger has passed, and conversely, that an assurance of safety may be made at a time when the water, perhaps in only a few hours, has changed for the worse.

The book as a whole is wonderfully well up with the times and is written with much spirit and discrimination. The material presented is for the most part thoroughly digested, and represents the best discussion of the sanitary bacterial examination of water to be found anywhere.

EDWIN O. JORDAN.