

peculiar activity; but a red heat expelled an additional quantity of water rendering the reagent inert. When the reagent is exhausted with hydrochloric acid, the residual earth is still effective. The activity of the reagent is not impaired by concentrated nitric acid or by *aqua regia*. After the alkaloid has been removed from its combination with the reagent, the residual material retains the full effect. This process results in a jelly difficult to filter and slow to settle; it is precipitated readily by addition of an acid, or an alkaloidal salt. In drying, the jelly shrinks to a very small bulk; conversely, the solid expands remarkably in contact with water. The jelly precipitates inorganic salts also, *e. g.*, barium chloride, lead acetate, zinc sulfate, etc.

It will be observed that the phenomenon is one of colloidal chemistry. The thought suggested itself that water-deposited clay might show the same action; indeed it was found by the writer last summer that the fine blue clay so abundant in the hills of Cincinnati, after treatment with hydrochloric acid, had the same effect upon alkaloidal salts, rather faintly as may be expected, yet very distinctly.

In the course of this investigation, other colloidal materials were also examined, and it was found among others that colloidal silicic acid, or colloidal arsenious sulfide plainly precipitated quinine sulfate.

SIGMUND WALDBOTT.

OHIO MECHANICS INSTITUTE, CINCINNATI, O.

NEW BOOKS.

Treatise on General and Industrial Inorganic Chemistry. By DR. ETTORE MOLINARI, Professor of Industrial Chemistry to the Society for the Encouragement of Arts and Manufactures and of Merceology at the Commercial University Luigi Bocconi at Milan. Third revised and amplified Italian Edition translated by Dr. Ernest Feilmann, B.Sc., Ph.D., F.I.C. With 280 illustrations in the text, one chromolithographic plate and two phototype plates. Philadelphia, P. Blakiston's Son & Co. 10 × 6¹/₄. pp. xvi + 704. Price, \$6.00 net.

The object of this book, as explained by the author, is to initiate the young chemist in those exercises which link theory and practice together.

The work is divided into three parts. Part I is devoted to a short historical sketch of the progress of chemistry, followed by a theoretical section which explains the principal, fundamental laws. The treatment of these laws is more suitable for the needs of the student who has an elementary knowledge of the science than to one who is entirely ignorant of it.

Part II deals with the non metals and their more important compounds with special reference to their commercial production.

Part III opens with a section upon the fundamental laws of electrochemistry and the electrolytic theory of solutions, followed by a descrip-

tion of the metals, methods of extraction from their ores, and the manufacture of their important chemical products.

The work closes with a short summary of the periodic system of the elements.

The sections upon cement, superphosphates and the utilization of atmospheric nitrogen, white lead, steel and water have been considerably amplified in this edition, on account of their ever-increasing practical and theoretical importance.

The application of theory to practice is emphasized throughout the book.

The description of ordinary laboratory apparatus has been omitted. Various analytical methods of testing the more important chemical products have been included and numerous patents cited.

Brief emphasis has been given to those industrial processes which deal with the production of the more common compounds and the varied applications of each. The present and past importance of these compounds has been summarized by means of statistics, which are brought up to date.

M. V. DOVER.

Chemical Theory and Calculations, an Elementary Text-Book. By FORSYTH JAMES WILSON AND ISIDOR M. HEILBRON, Lecturers in chemistry at the Royal Technical College, Glasgow. D. Van Nostrand Co., N. Y., 1912. 126 pp. Price, \$1.00.

This book is designed to assist college students about to undertake the systematic study of chemistry and consists of some 200 problems systematically classified into groups. Each group is accompanied by a presentation and discussion of the theory and principles which the problems are intended to illustrate. Practically all of the principles usually presented in a course in general chemistry are treated in this manner. In the preface the authors disclaim any originality except with reference to the arrangement of the subject matter. With this statement the reviewer is inclined to agree for the book is very evidently a compilation made without any attempt at critical selection and is characterized by numerous errors in the theoretical explanations which accompany the groups of problems. On page 105, for example, the solubility-product law is stated and as an illustration, the precipitation of sodium chloride from a concentrated solution by saturation with hydrochloric acid gas is cited. On the next page, in speaking of the reactions of analytical chemistry, the student is advised to "endeavor in all cases to work out for himself the explanations of such reactions from this standpoint." If the student has no better success than the authors seem to have had he will not profit much by this advice.

E. W. WASHBURN.

Monographs on Inorganic and Physical Chemistry. Osmotic Pressure. By ALEXANDER FINDLAY. Longmans, Green and Co., New York and London, 1913. 76 pp. Price, \$1.00.

In this little monograph Dr. Findlay, the editor of the series, has estab-

lished a standard of general excellence which it is to be hoped will be upheld by his collaborators. So much of the literature on osmotic pressure and the part which it plays in the theory of solutions has been written by men whose ideas on the subject were in a hopelessly muddled condition, that the critical exposition by Dr. Findlay in this little treatise deserves a warm welcome and should be read by everyone who wishes to know what osmotic pressure really is and what it is good for. The subject is treated under the following headings: 1. Semipermeable membranes and osmotic pressure. 2. Van't Hoff's theory of dilute solutions. 3. Direct determination of the osmotic pressure of concentrated solutions. 4. Discussion of the recent determinations of osmotic pressure and of the van't Hoff theory. 5. The general theory of ideal solutions. 6. Discussion of the osmotic pressure of aqueous solutions of cane sugar in the light of the theory of ideal solutions. 7. Indirect determination of osmotic pressure. 8. Views regarding the cause of osmosis and the action of the semi-permeable membranes.

The last chapter might perhaps more appropriately have been entitled, "Views Regarding the Cause of Osmosis and the Mechanisms of the Action of Semipermeable Membranes," for the mechanism is certainly different with different membranes. At the close of the last chapter it might also have been well to emphasize once more, as in the summary of Chapter VI, that while a knowledge of the mechanism of osmosis is doubtless of considerable importance—to the physiologist for example—it has nothing to do with the theory of solutions, for almost the only role which osmotic pressure and semipermeable membranes play in solution theory is that of a very convenient (but by no means indispensable) mechanism by means of which the change in free energy, or the maximum work, associated with a change in the composition of a solution may be visualized. If it is ever to have any other use, it will only come when the accuracy and ease of direct osmotic pressure measurements have been brought to such a state of perfection that they can be *conveniently* and generally employed in studying solutions in the laboratory. If this is ever attained, and the chances seem to be very small, osmotic pressure will then take its place beside vapor pressure, freezing point, boiling point, electromotive force, etc., as a useful property to measure when endeavoring to discover what goes on in a given solution.

The only subject in Dr. Findlay's treatise which seems to the reviewer to call for adverse criticism is the rather loose manner in which the term, "thermodynamic" is employed in a number of places. On page 32 in the expression, "The thermodynamic equation connecting the osmotic pressure and the vapor pressure of solutions has been worked out by several mathematicians," the term is properly used as indicating that the relation is one which can be deduced from the laws of thermodynamics

alone. On page 31, however, in the statement "the theory of 'ideal' solutions has here been stated merely as a thermodynamic deduction, of which it is desirable to obtain experimental confirmation," it would, in the opinion of the reviewer, have been better to omit the term, "thermodynamic," for the theory of "ideal" solutions, or any other theory of solutions for that matter, is, of course, not deducible by means of thermodynamics alone. In order to construct a quantitative theory of solutions, it is necessary to have an equation of state as a starting point. This can not be obtained from thermodynamics, but once given, many of the other laws of the solution are thermodynamically deducible from it.

E. W. WASHBURN.

Der Kolloide Zustand der Materie. By DR. LEONARDO CASSUTO. Translated into German by Johann Matula. Dresden and Leipzig, Theodor Steinkopff, 1913. 252 pp. Price, M. 7.50 unbound; M. 8.50 bound.

The natural question: Why is this work translated into German when the best published work on the subject is of German publication? is apparently answered by the completeness and compactness of this new volume. There is a marked clearness in the treatment of the subject which may, in part, be attributed to the division into sixteen chapters, each of which is confined to a clear discussion of a particular topic. The subject is rapidly becoming complex enough to demand such treatment. For example, the important Brownian motion is treated in a separate chapter, as are also coagulation, swelling, and gelatinizing, etc. The literature references are quite complete and frequent. It seems as though the author had attained his object, which was to put into a small book the principal facts bearing directly on the subject, without emphasizing too greatly the views of the pure physicist or chemist. He has also not emphasized, as some other writers have done, illustrations of the possibilities of new nomenclature, nor some particular method of producing or examining the colloidal state. The book will well fit a definite want felt by many general physicists and chemists.

W. R. WHITNEY.

An Introduction to the Physics and Chemistry of Colloids. By EMIL HATSCHKE. Philadelphia, P. Blakiston's Son & Co. 94 pp. Price, \$1.00.

This little volume covers the subject as given by the author in ten lectures delivered to students of the Sir John Cass Technical Institute. It covers the subject in a very readable and interesting manner, and shows that the author frequently writes from personal experience. The separate chapters are not divided into paragraphs and interruptions of definitions, laws and exceptions which an author frequently thinks necessary for apparent completeness, and the "readableness" is exceptionally enhanced thereby. The reader cannot help being impressed with the fact that the author has produced an exceptionally complete, instructive and inter-

esting book which gives a very comprehensive idea of colloids. It is the most readable short treatise of the subject which the reviewer has seen. The author very commonly refers to practically all the recent investigations by the principal workers in the field, but omits literature references. The book includes a subject and an author's index.

W. R. WHITNEY.

The Principles of Organic Chemistry. International Chemical Series. By JAMES F. NORRIS, Ph.D., Professor of Chemistry, Simmons College, New York. McGraw-Hill, 1912. 15 × 21 cm. pp. xv + 579. Price, \$2.50.

This volume, by Professor Norris, the first in the International Chemical Series, presents an attractive appearance both in type and binding and is a welcome contribution to chemical literature. The usual quantitative methods for the determination of formulas and molecular weights, amply sufficient for any text-book on organic chemistry, are discussed in the first chapter. The next three chapters deal briefly with the three series of the hydrocarbons, the two following with the saturated and unsaturated alcohols, and the next two, in order, with the acids. Under the study of the amyl alcohols (page 83) we first meet with stereoisomerism, thereby affording the student an early and better insight into the chemistry of crotonic, oleic and maleic acids, which follow in close order. The treatment, however, which the fumaric and maleic isomerism receives is far too meager; lack of mention of the highly instructive reactions of the halogens and haloid acids upon these acids leaves much to be desired. In this same chapter on the alcohols we note the early introduction of the Geneva system of nomenclature. Though the system finds but occasional use throughout the text, it serves well for instructive purposes—especially to be observed in the study of unsaturated acids. In Chapter IX the relation between ethers, anhydrides and esters would be more clearly shown in the equations if the haloid derivatives were written in transposed form. This chapter also contains a good description of the more common fats and waxes. Chapter X, on aldehydes and ketones, is excellent. In Chapter XI close analogies are frequently drawn between the substituted amines and ammonia to illustrate the course of these reactions. Chapter XIV on mixed compounds is possibly the best in the entire volume; the clearness with which the acetoacetic ester tautomerism and synthesis is discussed deserves especial praise. Not till this chapter do we find anything like a general tabulation and systematic grouping of the methods for the preparation of any class of compounds (in this case lactic acid). The next chapter on the carbohydrates takes up in detail almost all varieties of polysaccharides but distinguishes in no way between the simpler hydrolytic products: arabinose and xylose, glucose and galactose, etc. From the importance which the author justly accords to the organo-magnesium compounds it is surprising that no reference

is made to the role of ether in the Grignard reaction. The simpler methods for the identification of unknown organic compounds are presented in concise form in Chapter XVII. Though of pedagogical value, it is doubtful if an elementary student will be able to accomplish much in this direction. Chapters XIX to XXVII deal briefly with the aromatic compounds, in the last chapter of which are presented interesting tables to show the relative influence of substituents in an acid upon the corresponding ionization constants. The general methods for the preparation of the aromatic hydrocarbons (p. 368) and those for reactions of diazonium salts (p. 432) are well systematized. Chapter XXVIII on dyes and Chapter XXXI (the final chapter) on proteins should be highly commended for clearness and completeness of presentation. Chapter XXIX on terpenes and Chapter XXX on heterocyclic compounds are exceedingly brief even for an elementary text. The index, though good, should be improved by further additions and cross-references (especially on such general subjects as oximes, steric hindrance, etc.).

The text is comparatively free from misprints. It should be noted, pp. 202 and 403, that Hinsberg's reaction is not applicable to all I and II amines as has clearly been shown by Solonina. The use of tables throughout the chapters summarizing such data as formulas and physical constants is highly instructive. It is somewhat surprising, however, to find no mention of the approximate composition of the well-known low-boiling fractions of petroleum in the table of hydrocarbons. The problems at the end of each chapter afford an excellent drill for the student and should help him materially in his generalisations. It is to be regretted that the hybrid "pentavalent" meets with preference over the more correct "quivalent" of pure Latin origin. The volume is replete with brief descriptions of a very large number of commonly occurring organic substances, both in nature and in the arts and trades. This text of Dr. Norris is to be distinguished from others of its scope by the interesting manner in which the several classes of compounds are discussed. These discussions, from the standpoint of positive and negative radicals, are exceedingly helpful to the beginner, assisting him in the correlation of many seemingly complex reactions. For example the explanation (pp. 207-8) of the difference in behavior of amides and amines toward water admirably brings out this point. The explanation of the influence of radicals in the benzene ring upon the position of substituents (p. 395) may also be cited.

The incorporation of so much detailed information on the every day and practical subjects undoubtedly forced an abbreviation in other directions. Thus we find only rarely anything like a systematic presentation of the general methods for the preparation of a class of compounds (the 3 instances already cited). The student, therefore, is left to his own

systematizing and with this text alone would undoubtedly find the task somewhat arduous. This volume aims rather to present the subject matter only from the lecturer's standpoint and toward this end the material is clearly and logically woven into a composit whole, highly interesting and instructive. But, on the other hand, the absence of so many general methods illustrating the possible reactions through which even the simpler substances may be formed, renders the book unsuitable for giving the student a broad foundation in the science. It is the reviewer's opinion that no student can be expected to understand the properties of any type of compounds without the study of a large and varied set of reactions characteristic of this type; and later, only by constant references and cross-references in the text, can he be expected to acquire anything like a real foundation in the elements of organic chemistry.

This volume by Dr. Norris will admirably meet the needs of many instructors who aim to give a brief outline of the principles of organic chemistry, but for those who desire to establish a more thorough ground work it will be necessary to accompany this well written text with one more complete in both reactions and syntheses. WILLIAM J. HALE.

Recent Advances in Organic Chemistry. By A. W. STEWART, D.Sc. Published by Longmans, Green & Co., London, 1911. xii + 320 pages. Second edition. Price, \$2.50 net.

The appearance of the second edition of Stewart's "Recent Advances" within two years after the first one indicates that there is a demand for books which treat the subject of organic chemistry from the broad and general point of view rather than from the detailed one for the benefit of the specialist.

"In the present volume," says the author in the preface, "the author has aimed at giving a general idea of the researches which have been carried out in organic chemistry within the last ten years, but there has been no rigid adherence to this period when it appeared desirable to include earlier investigations. A considerable portion of the material has not previously been collected in volume form; and as far as possible the most recent work in each branch of the subject has been described."

The book under consideration covers a variety of topics of timely interest, and is characterized by a critical manner of presentation. Throughout the whole treatment the author emphasizes naturally the more modern "dynamic" viewpoint of considering chemical reactions in contradistinction to the older "static" view.

The chapters are entitled: Main Currents in Organic Chemistry during the Last Half Century; The Polymethylenes; The Monocyclic Terpenes; The Dicyclic Terpenes; The Olefinic Terpenes; The Alkaloids; The Poly-peptides; The Polyketides and their Derivatives; The Quinoles; The Triphenylmethyl Question; Asymmetric Syntheses and New Methods of

Producing Optically Active Compounds; Some Theories of Addition Reactions; Unsaturation; Conclusion.

The reviewer is in hearty sympathy with the author as regards the method of presentation: "In dealing with organic chemistry two courses are open; for we may consider the matter either historically or from the synthetic point of view. In the present volume the second method has been adhered to as far as possible; and when the synthesis of a substance is known, its constitution has been deduced from the method of formation rather than from its decomposition products. The latter, when important, are reserved for consideration after the constitution has been demonstrated."

From his experience in the class-room the writer of this review is convinced that the subject of organic chemistry has become sufficiently crystallized to permit the writing of an *elementary* text-book on similar lines, *i. e.*, wherein the whole matter should be treated consistently largely from the synthetic rather than from the analytic point of view.

Professor J. N. Collie has written the introduction to Stewart's book, and he justly says, "The present volume should be of great use to students of organic chemistry. The subject-matter is put in an eminently lucid form that enables the reader easily to follow all the arguments, while at the same time his critical faculty is stimulated. The book, moreover, is unlike so many modern text-books in that it is not a mere compilation of facts; several novel theories on organic chemistry are dealt with, theories that up to the present can hardly be said to have assumed definite shape, but which rather point to the paths along which the pioneers of the science are likely to go in the immediate future." M. GOMBERG.

The Plant Alkaloids. By THOMAS ANDERSON HENRY. pp. vi + 466. P. Blakiston's Son and Company, Philadelphia, 1913. Price, \$5.00 net.

The chemically interesting and medicinally important group of compounds known as alkaloids has received little attention from English and American authors and publishers. Of the several treatises on alkaloidal chemistry published in foreign languages only that of Pictet has been translated into English, while such excellent works as Brühl's "Die Pflanzenalkaloide" and Winterstein and Trier's "Die Alkaloide" are still accessible only to those who read German. Henry's book is the first original and comprehensive treatise in English on this subject, and the author has done his work so well that the book deserves a cordial welcome from every chemist who is looking for information on this rather complicated branch of organic chemistry. By leaving out details of manufacture and descriptions of relatively unimportant salts the author has managed to condense much information into a comparatively small bulk, and by consulting original sources has made the information thoroughly reliable and strictly up to date.

The *introduction* is devoted to the *definition, classification, physical properties, chemical properties, alkaloidal precipitants, biological significance and physiological action*. The alkaloids are defined as relatively complex basic substances, occurring naturally and possessing some physiological action. While this definition is not quite satisfactory, it is not inferior to any other so far proposed. The alkaloids are classified into nine groups: pyrrole, pyridine, diheterocyclic with a common nitrogen atom, quinoline, isoquinoline, glyoxaline, purine, cyclic derivatives of aliphatic amines, and alkaloids of unknown constitution. This arrangement is, however, frequently modified, alkaloids from the same source being dealt with together, even when belonging to different groups. The alkaloids of unknown constitution are treated in the alphabetical order of the botanical names of the plants yielding them. The various hypotheses which have been proposed by Pictet, Winterstein and Trier and others for the mode of formation and function of the alkaloids in plants are adequately, though briefly, discussed. The relation between chemical constitution and physiological action is pointed out whenever important observations in this respect have been made.

The book is supplied with a very good index, and the numerous references will enable the reader to consult the original literature. From the viewpoint of book-making the work is well done, the paper and print being good, and typographical errors very rare. H. M. GORDIN.

Malaria. Cause and Control. By WILLIAM B. HERMS, M.A. The Macmillan Co., New York. 1913. xi + 163 pp. Price, \$1.50.

The subject matter of this little volume is based on nearly four years of practical study of malaria in California, and presents a strong plea for the adequate control of the disease in that state.

The author says: "The subject of malaria control deserves the most careful attention of the best scientifically equipped men of this time, and to enter into this work no one, not even the most dignified scientist, needs to suffer abasement. There are still some few scientists who, under the shadow of scholasticism, disdain to give to mankind the facts in their hands to relieve suffering, but who in their laboratories concern themselves with the microscopical structure of disease-bearing and disease-causing organisms and scorn the man who has the courage to step out of his laboratory and apply these facts for the welfare of humanity. All honor to the man who searches in his laboratory for the unknown mysteries of living things, but twice honor to the scientist who does this for the purpose of serving his fellow men!"

The book is well illustrated and artistically printed. P. B. HAWK.