

by the plant during its advancement, either of the esters or of the thujyl alcohol.

Conclusions.

In general, it may be asserted with some degree of assurance that the odorous constituents, the esters, of the aforementioned oils do not manifestly seem to be affected during fructification of the plant. However, in all cases there does appear to have been a period during the growth and development of the plants when, with the assistance of certain favorable conditions, the chemical processes in the plant transformed some of the basal constituents into esters and corresponding alcohols.

The steady upbuilding of the ester compounds in the plants as the advancement of the plants proceeded is strikingly apparent. The percentages of free alcohols seemingly bear but slight relationship to their corresponding esters or to the life processes of the plant.

That the odorous constituents formed in plants are simply products of excretion formed during the metabolism of the plant, and are of no further use to the plant, seems probable, since the plants do not obviously utilize these stored-up compounds for any special purpose other than a possible means of protection against insect enemies from which most aromatic plants are notably free.

It has been shown how the processes of metabolism in the plants were influenced under varying conditions of climate (different seasons); also the effect of drying, and lastly the effects of budding, blossoming, and fruiting upon the life processes of the plants, resulting in every instance in changes in the aromatic constituents, but in no instance was a decided consumption of the ester or alcoholic constituents observed.

WASHINGTON, D. C.

NEW BOOKS.

Contribution a l'Histoire de la Chimie a Propos du Livre de M. Ladenburg sur l'Histoire du Developpement de la Chimie depuis Lavoisier. Par A. COLSON, Professeur a l'École Polytechnique. Paris: A Herrman et Fils. 1910. pp. 130. Price, 3 francs.

Professor Colson, after expressing his admiration for the historical work of Ladenburg, mentions certain conditions in France which hinder any foreigner from accurately estimating the science of France. He therefore treats of some points in the history of chemistry which in France are thought of more highly than seems to be the case in Germany. The tone of the little book is excellent; read in connection with Ladenburg, to which references are numerous, it will give a helpful and interesting view of the brilliant contributions to chemistry which have been made by the countrymen of Lavoisier.

EDWARD W. MORLEY.

New Ideas on Inorganic Chemistry. By A. WERNER. Translated from the Second German Edition by EDGAR PERCY HEDLEY. pp. xvii + 268. London and New York: Longmans, Green & Co., Price, \$2.50.

On the deck of a steamer in San Francisco Bay during the last summer meeting of the American Chemical Society three advanced students of a Western university engaged the writer in an eager and earnest colloquy over Werner's extension of the valence hypothesis. Replying to a question—"Yes, his book is in our library, but it is in German, and we haven't had the time to dig through it." A frank reply and one which would apply to most of our advanced students and even to many of us engaged in work of instruction. By all such this English edition should be welcomed.

In his preface the translator expresses the hope "that he is thereby making Prof. Werner's book of greater use to them (English-speaking chemists). The book is a veritable mine of suggestions for research on inorganic chemistry, and should the translator bring home to any one the great possibilities of research in this direction, then the translator has attained his desire."

The book is issued in attractive form by the publishers and the translator has done his work well, although occasional sentences leave no doubt that it is a translation from the German. For example, page 212, line 30—"According to the nature of the element which combines with the oxygen of the water molecule is it possible to sub-divide anhydroacids?" Occasional errors are made in the translation of words, for example, page 58, line 5, "steric hindrance" for steric relations, and page 172, line 11, "granite" for garnet.

The German original is not responsible for the following, page 107, line 24—"which also has *got* a sweet metallic taste;" and page 135, line 10—"for they crystallize differently *to* the other salts."

The reviewer has attempted but failed to find any basis for the several spellings "amin," "amine," "amsuin" and "ammine," as for example on pages 38, 39, 217 and 240.

In view of the general use of "aminonium" for the grouping, NH_4 , and particularly in view of the old ammonium theory for explaining the construction of metal-ammonia compounds, it is unfortunate that the translator uses the word "anunionium" instead of ammonia in such sentences as occur on page 22, line 27; page 27, line 34; page 30, line 8; etc.

One of the most important terms of classification in the original is "Einlagerungsverbindungen" which is translated "substitution compounds." But the author, in explaining the meaning of the German word, states, page 43, line 28-30 (German edition): "Diese Bindungswechsel kann aber nur dadurch erfolgt sein, dass sich das Ammoniakmolekül zwischen die vorher direkt verbundenen Radikale Co und

NO_2 *eingeschoben* hat." Plainly intercalation and not "substitution" is intended.

A number of evident errors are noted other than errors of translation, for example, page 55, line 16, "platinum" for copper; page 77, line 2, "nitrite" for nitride; page 162, line 1, "diaquopentammines" for diaquotetrammines; page 174, line 2, in the formula, NO_2 for O_2 ; page 177, line 10, OH_2 for OH ; page 209, line 14, "hydro-compounds" for hydroxo-compounds; and page 266, line 18, "basic acids" for basic salts.

Among the very large number of rather unusual formulas, it is not surprising that several typographical errors have been overlooked in the proof-reading.

All such errors are of minor importance, however, in comparison with the distinct service Dr. Hedley has performed in presenting Werner's views in English, for whether we subscribe to such views or not, the book deserves the title given by the translator in his preface—"a veritable mine of suggestions for research on inorganic chemistry."

CHAS. H. HERTY.

The Elements of Qualitative Analysis. By W. A. NOYES, Professor of Chemistry in the University of Illinois. Sixth edition, revised, in collaboration with the author, by G. MCP. SMITH, Associate in Chemistry, in the University of Illinois. 8vo, 131 pp. 1911. New York: Henry Holt and Co.

This excellent manual of qualitative analysis has been very largely rewritten for the present edition, in order to bring it up to date, particularly in view of the fundamental researches of A. A. Noyes and his collaborators. The most important improvements in systematic qualitative analysis, resulting from the work of these investigators, have been incorporated in the book. In addition to these changes in analytical detail, more elaborate discussion of the application of the modern theories of solution and of the laws of equilibrium to analytical reactions are included. Thus, the book shows intelligent appreciation of the two directions in which qualitative analysis has shown its most promising development in recent years—a development demanding greater accuracy, a greater proximation towards quantitative conditions in laboratory methods and more extended attention to the physico-chemical principles underlying reactions. Opinions may differ and one's own judgment hesitate, in deciding on the exact extent to which it would be justifiable to carry, in a given course, the advance in either of these directions: the previous preparation of students, the time, the number and training of instructors and assistants and the differences in the aims of laboratories will make it desirable to give various degrees of time and attention to these phases of the instruction in qualitative analysis; but no one who has observed the results of the old and the new methods of instruction can fail to be impressed with the increased interest and the increased

stimulus to accurate manipulation and to accurate thinking, which are attending the progress in these two directions. If some instructors wish to delve more deeply, more critically into the theoretical relations than this book does, they still would elaborate, not change, the spirit of the work it maps out: if others would narrow, somewhat, the scope of the analytical ground covered, with a view to emphasizing the training of the analytical habit of thought rather than the breadth of subject matter studied, this manual would lend itself, without difficulty, to such a course. Its well-balanced plan of instruction and its up-to-date character should recommend it to a wide circle of workers.

JULIUS STIEGLITZ.

Organic Chemistry for the Laboratory. By WILLIAM A. NOYES, Professor of Chemistry in the University of Illinois. Easton, Pa.: The Chemical Publishing Co. 291 pp. Price, \$2.00.

Professor Noyes states in his preface: "The science of organic chemistry rests, for its experimental foundation, on the preparation, usually by synthetical means, of pure compounds. Without a knowledge, based on personal experience in the laboratory, of the relations involved and the methods which may be used in such preparations, no satisfactory knowledge of the science can be acquired. It has been the purpose of the author in writing this book to classify the most important of the laboratory processes which have been used in the development of the science and to illustrate them by concrete examples."

In following this idea of classification, the book is divided into sixteen chapters. In the first, a description of the methods of organic analysis is given. The second chapter considers the "General Operations," such as fractional distillation, determination of boiling points, melting point, and so forth. The next thirteen chapters are devoted to the preparation of one hundred and twenty-six organic compounds, which are grouped under various heads: thus, hydrocarbons; alcohols and phenols; ethers; aldehydes, ketones and their derivatives; acids; derivatives of acids; hydroxy and ketonic acids; carbohydrates; halogen compounds; nitro compounds; amines; diazo, hydrazo, nitroso and other nitrogen compounds; and sulfur compounds. The final chapter deals with the qualitative examination of carbon compounds.

It is not the intention of the author that the order of the experiments in the book be followed, or that a given student should perform all of them, but rather that the instructor select for, and assign to the student, such preparations as seem best suited to his needs.

Each chapter on the "preparations" is prefaced by an excellent general discussion, although no lengthy discourse on the individual experiments follows the "directions," as is the case in the admirable work of Gatterman. The author evidently thinks that such discussion should come after

the performance of the experiment, and should be personally attended to by the instructor, a point of view which is shared by the reviewer.

The descriptive material, relative to the setting up of apparatus and the conducting of the experiments, is clear and concise and entirely free from ambiguous phrases. The proof-reading has been very carefully done, and the volume is remarkably free from typographical errors.

LATHAM CLARKE.

Practical Physiological Chemistry. By PHILIP B. HAWK, M.S., Ph.D. Third edition, revised and enlarged. Philadelphia: P. Blakiston's Son & Co. 1910. Price, \$2.50.

A third edition following so soon after the second is sufficient to show the favor with which this very useful book has been received. The new edition differs from the second, reviewed in *THIS JOURNAL*, 31, 607 (1909), by certain corrections and by the addition of some new quantitative matter. This is a decided improvement, since a quantitative experiment teaches, as a rule, much more than a qualitative one. The many admirable features of the work and its main defects have been mentioned in the former review. The reviewer uses this work in teaching his classes but finds it advisable to require a good deal more quantitative work and also the isolation, in a fairly pure state of several physiologically important substances.

ALBERT P. MATHEWS.

The Nature of Enzyme Action. By W. M. BAYLISS, D.Sc., F.R.S., Assistant Professor of Physiology, University College, London. Second edition. London, New York, Bombay and Calcutta: Longmans, Green & Co. 1911. pp. 137. Price, 3s. 6d.

The first edition, which was reviewed in *THIS JOURNAL*, 31, 606, has enjoyed a deserved popularity. The literature references have been brought up to date by the author; a few verbal changes have been made, and the use of the monograph greatly facilitated by the introduction of effective paragraph headings.

Professor Bayliss is now very cautious regarding unconditional acceptance of the doctrine of the extreme specificity of enzymes. He writes: "It is, at the present time, a matter of custom to postulate the existence of a new enzyme whenever some substrate, previously unknown to be attacked by any enzyme, is found to be so attacked, either by a well-known preparation or by a newly-discovered one. It may be objected that the doctrine of 'lock the key' is unduly neglected, unless the doctrine of specificity is completely acknowledged. It appears, however, that Emil Fischer himself did not intend that his simile should be applied in the extreme way that his successors have applied it. His own experiments were, in fact, not continued for a sufficiently long time to decide whether a particular enzyme might not slowly attack a sub-

strate differing from that on which it is particularly active. Moreover, it must not be forgotten that there are such things as "master-keys" which are capable of opening several different locks" (p. 118).

Reference is made to the probability (according to Rettger) that the coagulation of the blood is not an enzymatic process in its original significance. The arginase system has been introduced into the list of complex systems, but one finds no mention anywhere of the important group of enzymes acting upon purine compounds. LAFAYETTE B. MENDEL.

The Chemistry of Synthetic Drugs. By PERCY MAY, B.Sc. (Lond.). London and New York: Longmans, Green & Co. 1911. Cloth, pp. 229. Price, \$2.25.

That the effect of a medicine on a disease is, in the end, governed by the same laws that govern a test tube experiment will be generally conceded. Also, that fundamentally no reason is seen why the action of quinine on the germ of malaria should not, or at all events could not be formulated with the same precision with which we may express the removal of arsenic from a solution by means of hydrogen sulfide. But, while we may have hope in the future, at the present time our knowledge is hopelessly insufficient. However, a beginning has been made, particularly as regards the relation of the chemical constitution of substances to their pharmacologic action; and this beginning is so interesting, so important, that no chemist can afford to be unfamiliar with the known facts. If the chemist pretends to any knowledge of medicaments, then a thorough acquaintance with the known relation of chemical constitution to pharmacologic effect is of first importance.

The book here under discussion, in the main, is devoted to a consideration of the relation of the chemical constitution of carbon compounds as affected by the introduction of radicles or side chains. In general, it may be considered as an abridged edition to the "Arzneimittelsynthese" of Fränkel and it is to be recommended to all to whom, "Fränkel"—because of its German text—is not available. Those who are familiar with the "Arzneimittelsynthese" will want to read this newcomer in the hope that it may contain information of the things on which the other book was silent—and in this they will not be disappointed.

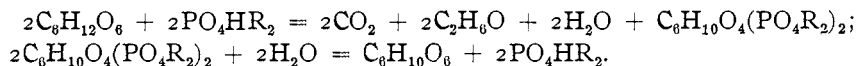
W. A. PUCKNER.

Alcoholic Fermentation. ARTHUR HARDEN, PH.D., D.Sc., F.R.S., head of the Biochemical Department, Lister Institute, Chelsea. Monographs on Biochemistry, edited by R. H. ADERS PLIMMER and F. G. HOPKINS. London, New York, Bombay, and Calcutta: Longmans, Green & Co. 1911. pp. 128. Price, \$1.25.

Since the epoch-making discovery of zymase by Buchner, our knowledge of the nature of alcoholic fermentation has made such rapid strides that one can scarcely find a published review of this subject which is in any way adequate or up-to-date. Dr. Harden's lectures are commend-

able because they present much of the newer work in a form that is not only readable but also stimulating in its suggestions. This effect is in good measure attributable to the author's intimate experimental acquaintance with the chemistry of fermentation. This is seen in the chapters on the two factors now recognized to have a remarkable influence upon the fermentation of sugars, namely, the presence of phosphates and likewise of the indispensable co-ferment or co-enzyme in the liquid.

The monograph reviews the experiments of Harden and Young leading to the conclusion that the addition of a soluble phosphate to a fermenting mixture of hexoses with yeast juice or zymine causes the production of an equivalent amount of carbon dioxide and alcohol. The evidence for the formation of a phospho-organic compound and its nature are discussed, an equation of alcoholic fermentation in which hexose phosphate is formed, being constructed as follows:



The role of zymase, hexose phosphate, and the problem of the co-enzyme discovered in boiled yeast juice are discussed. A brief chapter takes up inhibitory and accelerating substances.

The most interesting part, perhaps, is that dealing with those heretofore little understood so-called by-products of alcoholic fermentation. The masterly researches of Felix Ehrlich and others, showing conclusively that the alcohols and aldehydes of fusel oil are in reality derived from amino acids formed by the hydrolysis of proteins present in fermenting mixtures, are described in some detail. Harden points out that this so-called fermentation of amino acids is brought about only by the living yeast in the presence of fermentable carbohydrates. Here we learn how the cell is able to supply itself with indispensable nitrogen.

Other chapters take up the chemical changes in fermentation, especially the lactic acid theory, with the various possibilities of other intermediary products (methylglyoxal, glyceraldehyde, dihydroxyacetone), the mechanism of fermentation, etc., all preceded by an historical introduction telling the story of zymase.

This modern, though incomplete, story of alcoholic fermentation deserves to be read by the biologist as well as the technological chemist, because of the value of the fundamental newer contributions to an appreciation of the mode in which chemical changes are accomplished by living organisms.

LAFAYETTE B. MENDEL.

RECENT PUBLICATIONS.

BASKERVILLE, C.: *Municipal Chemistry*. New York: McGraw-Hill. 8°, 526 pp., \$5.00.