

dues and water, but with the magnesium sulfate solutions showed marked accelerations, especially toward triacetin. In no case, however, was the sum of the actions of the filtrates plus residues and water or magnesium sulfate equal to the action of unfiltered lipase preparation and magnesium sulfate solution.

The same results were found with the two manganous sulfate solutions. It appears probable, therefore, that the mechanical act of filtration produced a change in the lipase preparation which made it more difficult for the salts to produce acceleration. It was found, however, that the acceleration produced by the action of the salts, whatever may be the cause, was due to their action on the residues and not on the filtrates. This last observation appears certain from the experiments, but the results obtained do not throw further light on the changes involved.

Conclusions.

The result of extraction experiments in which the lipolytic activities of the filtrates and residues of a castor bean preparation after treatment with water, 0.1 molar sodium fluoride, molar sodium chloride, and molar methyl alcohol solutions, were tested toward ethyl butyrate and triacetin, confirmed the conclusion given in the fifth and sixth papers that the inhibiting actions of these solutions on the lipase were due to precipitating or coagulating actions.

Two lipases were shown to be present in the preparation. One of these was soluble in water, the other insoluble. The former exerted a comparatively greater action toward ethyl butyrate than toward triacetin, the latter a greater toward triacetin than toward ethyl butyrate.

Extraction experiments with solutions of magnesium and manganous sulfates which showed acceleration with unfiltered preparations indicated that the accelerations were due mainly to the action of the salts on the residues. Filtration also appeared to decrease the accelerating actions of these salts.

NEW BOOKS.

“Einführung in die Thermodynamik.” By R. BLONDIOT. Translated into German by Carl Schorr and Friedrich Platschek. Leipzig: Verlag von Theodor Steinkopff, 1913. 102 pages, paper. Price, 4.00 Marks.

The chief merit of this little book, first published in 1888 and now appearing in its second edition translated into German, lies in a really clear and logical presentation of the first and second laws of thermodynamics and the immediate consequences to be drawn therefrom. The earlier experimental determinations of the mechanical equivalent of heat by Joule and Hirn, are interestingly described, and the ideas of Carnot and others which have led to the second law of thermodynamics are well presented. As the book was designed merely as an introduction to the

subject, but few applications of thermodynamics are presented either in the field of engineering or chemistry.

For readers familiar with the modern nomenclature of either German or English writers on thermodynamics, the use of \mathfrak{R} or T for work, E for mechanical equivalent of heat, and t for absolute temperature seems particularly unfortunate. Furthermore, the writer has apparently inherited from an older day the unpragmatic practice of measuring heat and work in different units, so that all equations have to be complicated by the introduction of the mechanical equivalent of heat. This must serve not only to increase the difficulties of the beginner, but also to obscure the fundamental likenesses of energy in all its different forms. It is also noteworthy that the writer apparently pays no attention to any determinations of the mechanical equivalent of heat made during the last twenty years.

On page 45 the reader is confronted by an extraordinary statement which can only be a slip: "In Wahrheit kann—ausgenommen den Fall der adiabatischen Aenderung—eine Zustandsänderung niemals vollkommen reversibel sein." The reasons for excepting adiabatic changes from the general law of nature that all processes (macroscopically considered) are irreversible are not evident to a casual thermodynamist.

RICHARD C. TOLMAN.

A History of Chemistry. By JAMES CAMPBELL BROWN, late professor in the University of Liverpool. P. Blakiston's Son & Co., Philadelphia, 1913. pp. xxxi + 543. Price, \$3.50 net.

This work published after the death of Dr. Brown, is based upon the manuscript of his lectures on the subject. It contains a portrait, biographical sketch and list of the publications of the author.

The book devotes much space to the work of the early chemists, the first half of the volume bringing the history down to 1775. These chapters deal in a scholarly and critical, yet sympathetic manner with the writings of the ancients, the alchemists, the iatrochemists, the phlogistonists, and other schools of chemists. While the general ideas are lucidly presented, there is also a wealth of specific information in regard to the writers, their works, and their discoveries and speculations. The history of the founding of modern chemistry, during the latter part of the eighteenth and the first half of the nineteenth centuries, is admirably described. Thereafter, several chapters deal with the special history of organic chemistry, and one each with physiological and agricultural chemistry. Four chapters are devoted to valency, isomerism, affinity, and ionogens, respectively. The last chapters contain a brief history of each element. The whole book is eminently readable, and is, at the same time, a valuable contribution to the literature of the subject.

Considering that the author did not himself prepare the manuscript

with a view to publication, there are surprisingly few statements which require revision, and these are chemical, rather than historical, in bearing. The omission of Couper's name and of his important paper on the valence of carbon, does indeed surprise one in the writings of a Scot who gives due credit to his other countrymen, and even mentions Cullen who published nothing on chemistry. In a future edition, the statements on pp. 465 (par. 1), 466 (last par.), and 479 (definition of chemical kinetics) might be improved, and pages 475-477 might be changed, where necessary, to harmonize with the present views on physical and chemical isomerism.

The book is excellently printed, and is illustrated with a large number of portraits and of cuts of ancient chemical apparatus.

ALEXANDER SMITH.

La Pression Osmotique et le Mecanisme de L'Osmose. By PIERRE GIRARD. 18 pp.
A. Hermann et Fils, Paris. Price, 1 franc.

This is an interesting discussion of the phenomena of osmosis. The first half gives a review of the history and includes the usually accepted view of the dependence of osmotic pressure on molecular concentration and degree of dissociation in case of electrolytes.

The author then considers the actual motion of the water through the pores of the membranes, and seeks an explanation. He is not satisfied with the conception of Van't Hoff, that in the solution within an osmometer the concentration of the water, its vapor pressure, etc., are lower than in pure water and, therefore, the pure water passes through the membrane into the solution. He does not accept the view of others that the osmotic process may be looked at as due to the attraction between dissolved substances and water or to the same force which determines the solubility. He then takes up the results of biologists and others who have found unexpected irregularities in osmotic pressure where natural and living membranes were used. Here the endosmose frequently defied the laws of osmotic pressure. It seemed necessary to accept specific attractions and powers in the living cells of the membrane which determined the direction of the osmose. That the action was due to a "vitality" in the cell, he says, "has the disadvantage that it does not explain anything." The author then proposes his explanation, which is that the capillaries of the membrane are electrically charged by the H or OH ions preponderating in the solution used. This leaves the solution with the Helmholtz double layer at the capillary surface. A potential difference between the water and the solution would determine the direction of flow of the charged water of the capillary. This is inherent in the two liquids, but the motion can then also be accounted for by the fact that the two sides of the membrane or the ends of the capillaries are oppositely charged, due to the preponderating ion in the solution and the adsorption by the membrane material. In other words, this potential difference

is the same as that which might be measured between the two liquids used as a cell. In accord with this reasoning he would expect much greater endosmotic effects in cases where the solutions used were acid or basic, than where neutral, and that the results would run parallel to the potential differences of the solutions. This he found true. While the osmotic pressure of a solution may well have something to do with the osmose, the latter is really largely determined by the electrostatic effects. The author points out that much is still left undone in applying this idea to osmosis in living tissues. The idea seems to fit in well with the known electrosmotic effects and the old experiments of Wiedemann, where the migration of the water or solution through membranes or porous walls was brought about by potential differences applied to electrodes in the two liquids.

W. R. WHITNEY.

Introduction to the Study of Igneous Rocks. GEORGE IRVING FINLAY. New York, 1913. Pp. vii + 228, 16mo. Price, \$2.00.

This well made little book is intended for beginners in the study of petrography. After a few pages on the qualitative classification of igneous rocks and on those determinations which can be effected on hand specimens, there are some eighty pages on optical principles and their use in the microscopic determination of minerals in thin sections. In some fifty pages the types and varieties of igneous rocks are described and so tabulated as to facilitate the reference of a specimen to its proper place. A few pages assist in writing description of rocks, a longer and important chapter describes briefly the quantitative classification devised for igneous rocks by Cross, Iddings, Pirsson and Washington, with a good number of well chosen examples of the calculation of *norms* from analytical data. These calculations are facilitated by nearly fifty numerical tables which follow.

The chapter on calculation adequately and clearly explains a simple and well defined subject. The rest of the book can, obviously, only select from a great body of details that fraction most needed by the beginner, for whom the book seems well adapted, and to whom it is cordially commended.

The paper and press work are excellent, and the book is well bound in flexible leather.

EDWARD W. MORLEY.

Notes on Qualitative Analysis. By HORACE G. BYERS AND HENRY G. KNIGHT. New York: D. Van Nostrand Co., 1912. pp. xi + 181. Price, \$1.50.

The authors state that these notes were prepared "for home consumption." The book is something more than "notes," and less than a complete text-book. It is apparently a growth from outline notes given to classes, which has not yet reached sufficient maturity to make it an especially valuable book for general use.

Part I contains a brief statement of theories, followed by illustrations of their application to reactions of qualitative analysis. The statements of theory are too brief to be of great use except as a summary of an extended course. The illustrations, which are well chosen and clearly treated, will be likely to prove the most useful part of the book to teachers other than the authors. The average student should not be expected to follow the explanations without a study of the theories more extended than that provided for in this book. Their isolated position in the book, before the analytical reactions and procedure, is bad. They are of such a character as to be hardly appreciated by the student who is not already familiar with the outline of the processes of separation. It would be an advantage to insert them in the description of the procedure, at the appropriate places, in the form of notes, or at least the student should be directed to them at the proper points in his reading of the procedure. Such matters should not be class-room ornaments, but a part of the thinking in the laboratory.

Part II, Metal Analysis. A brief statement of the analytical reactions of the metals in each group, followed by the routine procedure within the group, not always stated with sufficient fulness to insure successful separation. No reasons are given for the various steps. Part III, Acid Analysis. Part IV, Systematic Analysis. Preliminary tests, preparing solutions, and tabular plans. Part V, Reactions of the rare metals. The appendix contains a list of reagents with concentrations expressed, unfortunately, not in terms of normality.

CHARLES W. MOULTON.

Gas Analysis. By L. M. DENNIS. The Macmillan Co., New York. xvi + 434 pp. Price, \$2.00 net.

In the preface the author says that the book was begun with the original intention of having it serve as a new edition of *Hempel's Methods of Gas Analysis*. It will be easier, therefore, to review it by comparison with that work, which is familiar to every one interested in gas analysis.

Although much material of the older work has been excised, all that is essential has been retained, in some cases in more concise form, and much new material has been added. Among the newer forms of apparatus (some of them already well known and in general use) the following additions may be noted: A section on mercury pumps; descriptions of new forms of sample containers, stopcocks, gas washing bottles and absorption apparatus, which have been well tested in the Cornell laboratory; the rotatometer and the baroscope; and some account of automatic flue gas apparatus, carbon dioxide recorders, autolysator, and gas refractometer. Several new modifications of the Orsat apparatus, one of them devised by the author, are treated and comparative tests on their speeds of absorption are quoted. A good deal of space is still devoted to Hempel's apparatus for "exact analysis over mercury without rubber connections or stopcocks"—a method of very little application indeed.

Among many newer methods for the determination of the various gases which have been added are: Franzen's oxygen absorption with sodium hyposulfite; the absorption of hydrogen by a colloidal palladium solution; the fractional combustion of hydrogen with copper oxide; and Haldane's colorimetric method for carbon monoxide. 'The Referees' method for sulfur and a method for naphthalene have also been added.

A welcome addition is the chapter that treats of the possibilities and the limitations of the calculation of constituents from the results of combustions, and especially timely is the section upon the simultaneous determination of two or three hydrocarbons. These points are generally very puzzling to students and often to chemists of even greater experience.

The chapter on the determination of fuel values has been brought more nearly to date and an account of the Junker's calorimeter has been added. The chapter on the analysis of acetylene has been considerably extended. In the last chapters more emphasis has been laid on the Lunge apparatus than was the case in the older work.

Several years' use of the Hempel work in the class room have convinced the reviewer of the justice of two criticisms. The first is, the material is too scattered, there is much repetition, and the minute and verbose descriptions defeat their own purpose by confusing, rather than helping, the student. In this respect this book by Professor Dennis shows some improvement. That the author realized this danger is shown by this statement in the preface: "In gas analysis the accuracy is probably dependent to a greater degree on manipulatory skill—than in any other branch of chemical analysis. It is for this reason that the manipulation of each of the more generally used types of apparatus is described at length." The second criticism is that in Hempel's book there is no place where an account is given of the analysis of a typical gas (as illuminating gas) such that the student can use it as a laboratory guide. Instead, he has had to pick his way step by step by reference to matter scattered in half a dozen or more places. It would seem possible to include in one chapter a straightforward narrative of the process, sufficiently detailed to guide the student, and to leave to subsequent chapters alternative methods and apparatus and the minutiae of the determinations. Professor Dennis has remedied this defect in large measure but not so perfectly as it might have been done.

These criticisms are pedagogic in character and they lose much of their force as soon as we cease to regard the work as a *text-book*. Regarded as a *hand-book* of gas analysis, the present volume seems, to the reviewer, the best that has yet appeared.

R. H. JESSE, JR.

An Introduction to the Chemistry of Plant Products. By PAUL HAAS AND T. G. HILL. One vol., pp. xii, 401, with diagrams. Longmans, Green & Co., London, 1913. \$2.25 net.

The first of the two authors is Lecturer on Chemistry at the Royal

Gardens at Kew, the second is Reader in Vegetable Physiology in University College, London. Hence, though a chemist, the first, like his botanical associate, has had abundant opportunity to learn at first hand as a teacher the importance of phyto-chemical knowledge in the study of botany. Not only is a working knowledge of elementary or so-called general chemistry requisite, but often an acquaintance with those plant products is indispensable that "do not necessarily fit into the scheme of instruction of the chemist." Hence the authors desire "to provide such students, who are assumed to have some acquaintance with chemistry with an introductory account of the chemistry and biological significance of some of the more important substances occurring in plants."

It will be noted that the authors do not pretend to have written an introduction to plant chemistry but to "the chemistry of plant products," since a knowledge of these is essential to an understanding of the broader aspects of the biochemical study of plants. Every good contribution on this subject, no matter what its restrictions, will be welcomed, more particularly by those who, as teachers, have themselves taken an interest in this aspect of chemistry, an aspect that has been sadly neglected since the days of synthetic organic chemistry.

As to the selection of the material and the manner of treatment, there may well be differences of opinion. Just why the authors should have made the selection which the table of contents readily reveals, or more correctly why they should have omitted certain classes of compounds does not become altogether apparent. The manner of treatment is possibly best explained by the assumption that the book is written for students of botany with "a working knowledge of chemistry" rather than for students of plant chemistry with a working knowledge of general and systematic botany and possibly an inkling of plant physiology.

We are accustomed to see such subjects as the chemistry of the alkaloids treated in a rather unsatisfactory manner because apparently we cannot break with traditions. Of all the chapters of plant chemistry possibly none suffers more in this respect than the one on pigments. As might be expected, this is possibly the least satisfactory one of the book.

In making these remarks, the reviewer desires not to be misunderstood. As stated before, we have reason to welcome every good book on the subject of plant chemistry and we certainly shall want to give a hearty welcome to this, the latest contribution to the book literature of this subject. For the blending of plant chemistry and plant physiology we should be exceedingly grateful. Even for such small favors as the recording of numerous references we ought not to be unmindful.

E. KREMERS.

Literatur-Register der organischen Chemie, geordnet nach M. M. RICHTER'S Formelsystem. Published by the *Deutsche chemische Gesellschaft*; edited by ROBERT STELZNER. Volume I, comprising the literature of the years 1910 and 1911, supplementing the third edition of Richter's "Lexikon der Kohlenstoff-Verbindungen," Berlin, 1913. L, 8vo ($10\frac{5}{8} \times 7\frac{3}{4}$ in.). 1286 pages. Price to members of the *Deutsche chemische Gesellschaft*, \$15.25. Price to non-members, \$21.00 (Marks 86), bound in cloth, from F. Vieweg & Sohn, Braunschweig.

This valuable bibliography will eventually bring Richter's Lexikon practically up to date and should be in the library of every one who owns a copy of the 3rd edition of the Lexikon.

An excellent feature of the work is that the arrangement is the standard one according to the chemical formulas of the compounds, and that the references give not only the original article, but also the abstracts of the same from the *Chemisches Zentralblatt*. Any one who is accustomed to using Richter's Lexikon will therefore have no trouble in using this volume.

There is an excellent index of 38 pages which not only contains the names of the majority of the compounds given, but also structural formulas of compounds whose exact composition is unknown.

It is the expectation of the Society to publish further volumes about every two years, so as to keep the material as nearly up to date as possible. It is to be hoped that this expectation may be realized.

The typography, paper, and proof-reading are of the proverbial German excellence. The binding is in the usual German style which looks well but does not wear well. Intending purchasers are advised to procure the volume in the unbound form (price, 50 cents less) and have it bound in this country.

D. D. BEROLZHEIMER.