

glycerol with hydrogen peroxide in the presence of ferrous iron, contains *dl*-glyceric aldehyde:

(1) By converting the aldehyde into glyceric aldehyde diethyl acetal, which was separated by extraction with ether and subsequent distillation and was identified by its color, taste, boiling point, and,

(2) By liberating and crystallizing pure glyceric aldehyde from the syrup obtained on hydrolyzing the above acetal in 0.1 *N* sulfuric acid.

The presence or absence of glycolaldehyde and dihydroxyacetone was not established by these experiments.

This is the first time that either *dl*-glyceric aldehyde or its acetal have been isolated from an oxidation syrup or in fact from any source, except by the synthetic method devised by Wohl. It is likewise the first time that a sugar has been isolated from a reaction mixture by converting it into the acetal.

CHICAGO, ILL.

NEW BOOKS.

Introduction to Modern Inorganic Chemistry. By J. W. MELLOR, D.Sc. 1914. pp. xvi + 657. 8vo. Longmans, Green & Co., London, New York. Price, \$1.30.

The earlier and similar work by the same author, "Modern Inorganic Chemistry," 1912, has been reviewed in *THIS JOURNAL*, 35, 494. In the preface to the present book the author says: "I have prepared a smaller introductory volume to suit students who want to start with a rather simpler book, and I have been persuaded to introduce some pages dealing with a few of the more important compounds which the inorganic chemist borrows from the organic chemist. My larger book can now be regarded as a kind of sequel to the present work."

We all believe that good teaching requires us to arouse and hold the attention of the student, but those of us who have to perform this task for freshmen may well be discouraged over our feeble efforts on reading such an exciting book as this. Our attempts to keep the students awake by such crude means as strange smells and explosions are here supplanted by poetry and drama. Who ever suspected that chemistry afforded such opportunities for literary effect as we find on page one? "Wind is air in motion, and wind has sufficient energy to propel our sailing ships, to drive the machinery of our windmills, and, when stirred by cyclonic blast, to uproot trees, sweep away buildings, and lash the surface of the ocean into wild monster waves." Again, how the student will be aroused by the paragraph commencing "Let us assume the function of a judge in a law court and sum up the evidence for the jury," etc. How many of us have ever thought of reciting stanzas from Shelley's poem "The Cloud" to enliven our lecture on water? We find a paragraph headed, "Nature Abhors

a Vacuum," and the next, "Death of the Hypothesis: Nature Abhors a Vacuum." There lacks only an illustration of Nature shrinking in terror from a Vacuum, and another of the Dying Hypothesis.

But if the above suggested illustrations are lacking there is no dearth of others. We are shown countless hands holding test tubes, mice languishing in miniature black holes of Calcutta, a man watching a big pile of wood turning to charcoal, bacteria growing on the root of a bean plant, literally dozens of generating flasks with delivery tubes and pneumatic troughs, eyes looking, mouths blowing, and many other unique chemical phenomena. The visual memory is surely not neglected. (One of these illustrations, molecules of hydrogen and chlorine, on page 150, is not arranged according to the labels.)

The author is much interested in words. He distinguishes carefully between the Latin and Greek numeral prefixes, although he allows "trivalent" to slip in, p. 523, instead of his chosen "tervalent." We wonder if beginners in England are usually required to understand such terms as "Fremy's salt," "atmolysis," "eremacausis," "temoin tube," etc.?

A suggestive feature of the book is the unconventional order of presentation. No attempt is made near the beginning to treat completely the compounds of any element. The effort seems to have been rather to select only such descriptive material as will aid in presenting the fundamental principles. There are places, however, where one hunts in vain for any sequence. Thus, in Chapter XXIX, we find several paragraphs on air followed by one on "Maximum, Active, and Sleeping Valences." On p. 282 we find a paragraph on "Dialysis" (being a treatment of colloids) out of any apparent connection with the rest of the chapter. (Dialysis is again defined on p. 594.)

There are very full historical references. The student is usually given the historical explanations of phenomena—as, for example, in the full discussion of the phlogiston conflict—before being introduced to the modern viewpoint.

In reading a textbook which is "modern" by title, one is surprised to find no use made of the ionic theory. It is presented in Chapter XXIII, but in terms that indicate that the author is rather afraid of anything so hypothetical. Thus, "The ionic hypothesis is to be regarded as a 'daring stroke of scientific speculation' which is very fashionable;" and later, "In this way the ions have been invested with such imaginary properties as may be needed to keep the ionic hypothesis in accord with the facts. Quite an elaborate system, fairly consistent with itself, has been founded on the above postulates. Neither the ionic nor the chain (Grotthus) hypothesis has proved an adequate explanation of the facts, and although the majority of chemists favor the ionic hypothesis, yet it is recognized

that it has many defects which will render a change necessary when chemists can think of a better." This fear of overbold hypotheses does not prevent the author from confidently writing structural formulas for a large number of inorganic compounds; and explaining that the failure of ammonia to precipitate the hydroxides of magnesium and manganese in the presence of ammonium salts as due to the formation of double salts. It is always interesting to find what theories are accepted without qualm by those who look upon ions with suspicion.

On p. 414 we find the possibility of arranging the elements in a series "representing the strength of the current (in volts)," etc. A sentence on page 458, referring to passive iron, says what the author evidently does not mean.

As in the larger book, numerous questions are subjoined to each chapter. These are exceedingly interesting, and would alone repay the teacher for the purchase of the book.

JOEL H. HILDEBRAND.

Die Theorie der Strahlung und der Quanten. VERHANDLUNGEN AUF EINER VON E. SOLVAY EINBERUFENEN ZUSAMMENKUNFT (30 Oktober bis 3 November 1911). Mit einem Anhang über Die Entwicklung der Quanten theorie vom Herbst 1911 bis zum Sommer 1913. In Deutscher Sprache herausgegeben von A. Eucken, Halle. Druck und Verlag von Wilhelm Knapp, pp. i-xii und 1-405. Price, 15 M 60 pf.

This volume bears witness not only to the extraordinary activity and success of the German physicists in the development of the Quantum theory, but also to their industry and zeal in getting the latest phases of this subject both from the experimental and the theoretical side into the most convenient possible form for the use of the German scientist. The book before us represents, in the first place, the translation into German of the addresses and discussions on the Theory of Quanta which were held in Brussels in November, 1911, and were published in French in 1913. These addresses represent practically the only source to which one can as yet go for authoritative information as to what is involved in the theory of Quanta and what experimental success that theory has had. If, however, these addresses were the entire content of the volume, one might question whether their translation into German, when they were already available in French, would be worth while, even from the point of view of the German reader. For papers on a subject which is in its early infancy, the aspect of which is changing almost every month, must, of necessity, have much about them which is ephemeral. But Dr. Eucken has done much more than render these notable addresses into good German. He has added a thirty-five page paper of his own which is just as notable as any paper which was presented at the Solvay Congress. In it, Dr. Eucken, though a very young man himself, has sketched, with the hand of a master,

the developments of the Quantum theory from the fall of 1911 to the summer of 1913. There are few men who possess either the ability or the knowledge to present so comprehensive, and at the same time, so judicial and so discriminating a view of all the work which appeared within these two years upon this subject. This review gives to the German edition of the "Theory of Radiation and of Quanta" a value greatly in excess of that possessed by the French edition.

To present a review of the content of the addresses themselves is wholly beyond the possibilities of a book review such as this. There is a limit beyond which *concentration* cannot be carried and this limit was about reached in some of the original addresses. Suffice it to say that anyone who would familiarize himself with the theory of Quanta, can do no better than to get the book in hand and read the papers of Einstein, of Nernst, of Planck, of Lorenz, of Sommerfeld, of Langevin and of Eucken. The paper of Perrin is very long and has no immediate bearing upon the theory of Quanta. Also, the papers of Knudsen and of Jeans may be omitted for the purpose at hand; the first, because it does not bear on the subject of Quanta, and the second, because the viewpoints taken in it have now been abandoned even by the author. All the rest of the volume is a storehouse of information for the student of the theory of Quanta.

R. A. MILLIKAN.

Die Lichtbrechung in Gasen als physikalisches und chemisches Problem. DR. STANISLAW LORIA. Braunschweig. Vieweg & Sohn. 1914. pp. vi + 92. Price, 3 Marks.

The "Sammlung Vieweg" is to be devoted to scientific or technical matters which are in active development. By means of brief monographs it hopes to make their present state more widely known and to suggest the directions of possible progress.

Dr. Loria's little book is the fourth of the series. The literature concerned with refraction in gases is extensive. Much of it, though still of interest to the historian or bibliographer or student of methodology, is not utilized in this monograph, whose object is to revise all of our experimental knowledge of the refraction and dispersion of light by gases, in the hope of obtaining, in the future, information as to the structure of the atom. Since this subject will interest, not only physicists, but also chemists, the book begins with a chapter for the benefit of the latter, entitled "Elektromagnetische Dispersionstheorien."

The working model of the optical action of even the simplest molecule or atom is not yet devised. This little book well sets forth the facts and theoretic relations from which such a model may sometime be derived. It is commended to the attention of those who are interested in physical chemistry.

EDWARD W. MORLEY.

Crystallography. An Outline of the Geometrical Properties of Crystals. By T. L. WALKER, M.A., PH.D. pp. xiv + 204. Illustrated. Cloth, 6 × 9. New York: McGraw-Hill Book Co. 1914. Price, \$2.00.

This is the first comprehensive treatment in English of the fundamental concepts of crystallography based on the methods of Victor Goldschmidt. The treatment is practical rather than theoretical. The author lays especial stress in the projection of crystal forms and the derivation of their symbols from the projections.

The book consists of 17 chapters, of which 8 are very short. These are devoted to such subjects as the chemical and physical properties of crystals, their formation, symmetry, the irregularities of crystal surfaces, crystal drawing, etc. Of the remaining 9 chapters, 6 deal with the discussion of the six crystal systems, one treats of crystal aggregates (mainly twinned crystals), one of the mathematical characteristics of crystals, including their measurement and projection and in one—the last—the author illustrates the methods of procedure in crystallographic investigations by reprinting in full the article by Goldschmidt and Nicol on "New Forms of Sperrylite," and that by Eakle on "Colemanite from Southern California." This last chapter serves as a summary of all that precedes it.

The volume is satisfactory in every respect. It is clearly written and well printed; its discussions are logical and the subject matter is fundamental. The book is an excellent one for mature students and for those who are familiar with the elements of crystallography. It is unquestionably the best book in English for those who desire to make a serious study of crystals. Its author and publisher are to be congratulated upon its publication.

W. S. BAYLEY.

Quantitative Analysis. By EDWARD G. MAHIN, PH.D., Associate Professor of Chemistry in Purdue University. First edition. New York: McGraw-Hill Book Company, Inc. 1914. pp. ix + 511; 119 ills. 14 × 20 cm. Price, \$3.00 net.

This is another member of the International Chemical Series, of which Prof. H. P. Talbot is consulting editor, and is uniform in external form with the other members of the series.

To quote from the preface, "The author has felt a desire that has probably been felt by every teacher of quantitative analysis, to produce a book that would cover the ground that he wishes to cover in the college courses, providing a reasonable degree of latitude in the selection of exercises for other possible users of the book, and at the same time to present a theoretical and practical discussion of the subject, sufficiently simple to be comprehended by the average student but not so elementary as to destroy his self-respect. . . . The general discussions have been given a large share of attention although elaborate or involved theoretical discussions have been, as far as possible avoided." The first half of the book is devoted to principles and standard methods of analysis, as may be gleaned

from the titles of Chapters 1 to 10: general principles, gravimetric analysis, experimental gravimetric analysis, electroanalysis, volumetric analysis, color change of indicators, standardization, experimental volumetric analysis, oxidation and reduction, titrations involving the formation of precipitates. Silver chloride, by the way, must fuse far above 151° (p. 70), for it will be recalled that Richards latterly dries it at 250° without fusion. The second half of the book is entirely occupied by Chapter 11, analysis of industrial products and raw materials, with the following sub-heads: carbonate minerals (6 pp.), silicate minerals (7 pp.), coal and coke (total 24 pp.), gas mixtures (18 pp.), burning oils (6 pp.), lubricating oils (5 pp.), edible fats and oils (26 pp.), water for industrial uses (13 pp.), water for sanitary uses (26 pp.), iron and steel (33 pp.), fertilizers (18 pp.), dairy products (23 pp.), assaying gold and silver ores (22 pp.), from which titles one can obtain an indication of how far the author has endeavored to cover some of the fields of applied analysis.

Even in the second part of the book, the manual training solidity of the subject is leavened somewhat by an infusion of reason and reasonableness, and the unavoidable high concentration of facts and directions somewhat diluted by recollections of theory. "References to original papers have been carefully selected with a view to actual reading by the student..." The book is modern and well-done, and will doubtless prove acceptable to many who wish to use a book of a content such as this one offers.

ALAN W. C. MENZIES.

Quantitative Analysis by Electrolysis. By ALEXANDER CLASSEN with the coöperation of H. CLOEREN. Translated from the "Thoroughly Revised Fifth German Edition" by William T. Hall, Assistant Professor, Massachusetts Institute of Technology. New York: John Wiley & Sons, Inc., London: Chapman & Hall, Limited. 1913. 8vo. x + 308 pp. 52 figures. Cloth, \$2.50 net (10/6 net).

This book was issued sometime ago, with the excellent print and binding characteristic of the publications of J. Wiley and Sons. As stated in the review of the German edition (*THIS JOURNAL*, 31, 513) this *fifth* edition differs particularly in its introduction from the previous editions, and is altogether one of the best books on the subject. As before, the book consists of four parts—Part I, Introduction, 100 pages; Part II, Electro-analytical Determinations, 88 pages; Part III, Separation of Metals, 63 pages, and Part IV, Special Analyses, 60 pages. The introduction has been rewritten entirely, and presents the fundamental facts of electro-chemistry according to our present-day manner of viewing them. This presentation is fairly accurate, but the absence of divisional headings and experiments or demonstrations makes it difficult for study by a beginner.

The other parts of the book retain the form and much of the matter of the former editions, but the results of recent investigations on the subject have been carefully added, and obsolete matter has been omitted. The

information given is reliable in the main. It is to be regretted that the author has omitted as important a method as the ammoniacal electrolyte for the determination of silver, and that he credits the cyanide electrolyte for silver as being absolutely accurate; also, that he fails to mention that all methods for determining zinc give too high results. But these errors and omissions are exceptional.

The presentation of the separate topics is excellent, but as a whole the book lacks plan: it does not give the student such a perspective view of the subject as a modern presentation should give. The metals are not presented in their electrochemical relation. Thus in Part II the metals are taken up in this order: copper, lead, cadmium, bismuth, silver, etc., which may be a very good order for a series of exercises to be given to students, but which has absolutely no theoretical basis, and hence is not a desirable order for either a textbook or for a reference book in which facts are to be correlated as much as possible. This lack of correlation shows itself to particular disadvantage in Part III—Separation of Metals—in which, with proper plan and correlation, much needless and really bewildering duplication could have been avoided.

Part IV—Special Analyses—is particularly valuable. It reflects the author's wide experience and great ability in selecting and combining the methods for different metals into plans for the rapid and accurate analysis of special compounds such as the commercial alloys and the important metalliferous minerals.

The book may truly be designated as one of the standards of analytical chemistry, and should be found in every chemical library.

E. P. SCHOCH.

Qualitative Chemical Analysis. A Laboratory Text Treating of the Common Elements and their Compounds. By ANTON VORISEK, Professor of Analytical Chemistry, College of Pharmacy, Columbia University, in the City of New York. P. Blakistons' Son and Co., Philadelphia. pp. x + 226, with a plate of spectra, tables and text figures. Price, \$2.00.

The appearance of still another textbook on Qualitative Analysis can hardly fail to cause some curiosity on the part of teachers regarding the originality of the material contained in the book, and of the method of presentation. The author of this book states in the preface: "The object of the volume is to present a concise but thorough course of qualitative analysis of the commonly occurring compounds and their chemical constituents." Many other texts have had the same purpose, and have in a large number of cases fulfilled it with distinct success. It therefore becomes necessary to seek the qualities of this book which mark it as distinct from those we already possess.

The thorough description of all the compounds the student is likely to meet in an elementary course, or even in a more advanced one, is a feature of this

book wanting in nearly all the smaller texts. These descriptions precede the presentation of the systematic separations and are of such a nature that the student who has mastered them is in a position to prepare for himself schemes of analysis. This is true not only of the basic analysis; for the same method is adopted in the presentation of the analysis for acidic constituents. The concise form in which the chemical facts are thus presented should make the book of value as a laboratory reference book.

It is to be regretted that these excellent features are marred by the absence, in all discussions and reactions which accompany the descriptions, of any regard to the theories of ionic dissociation or to the reversibility of reactions developed in other parts of the book. Even though the author accepts the prevailing views of chemistry in aqueous solutions he writes reactions, such as the formation of barium sulfate and silver chloride as, $\text{BaCl}_2 + \text{H}_2\text{SO}_4 = \text{BaSO}_4 + 2\text{HCl}$, and $\text{AgNO}_3 + \text{HCl} = \text{AgCl} + \text{HNO}_3$, and cites these as *typical examples of irreversible reactions*. (See p. 3 and again p. 185.) Moreover, the theoretical portion itself is weak and inaccurate, and its utility in the correlation of the facts and methods presented is exceedingly slight.

Some of the inaccuracies are of rather a serious nature. The algebraic statement of the mass in equation *b* on page 180, and its application on page 181 and in other parts of the book, is, to say the least, unintelligible. Again, on page 180, the formula for hydrogen fluoride in aqueous solution is given as HF, whereas it is generally recognized that nearly all the substance present in such a solution has the formula H_2F_2 . Similar examples of inaccuracy and vagueness are not infrequent in other parts of the book.

Altogether, the usefulness of the book, from either the scientific or the pedagogical aspect, is by no means apparent. LUDWIG ROSENSTEIN.

Nucleic Acids. Their Chemical Properties and Physiological Conduct. By WALTER JONES, Ph.D., Professor of Physiological Chemistry in the Johns Hopkins Medical School. Longmans, Green and Company, London, 1914. viii + 118 pp., Royal Octavo. Price, \$1.10.

This small volume, after considering historically the discovery of nucleic acid and its clear separation from the nucleins and nucleoproteins, takes up a detailed discussion of its chemistry. The identity of all animal and of all vegetable nucleic acids is emphasized, after which thymus nucleic acid and yeast nucleic acid are taken up at length as representative members of these groups. The second half of the volume deals with the physiological behavior of nucleic acid.

The book, as a whole, states fairly our present knowledge of the subject. Due consideration is given the several score of workers who have made this field, and their several hundred articles. But it is more than the so common review, in which all findings and all views are given the same space, and are made to appear as of equal value. Jones' view is critical and since

his contributions to the biochemistry of nucleic acid and its derived purines, and to the ferments acting upon these, are to be counted among the really substantial ones of American physiology, his judgment means something.

An appendix to the volume gives in excellent form an outline for preparing thymus nucleic acid, for isolating and identifying its various derivatives and for proving the presence or absence of the various purine ferments.

One does not add this new volume to the Plimmer and Hopkins series of monographs on biochemistry without renewed commendation of the editorial spirit which has brought them into being, and of the courage of the publishers in bringing them out. We could, to the benefit of scientific development in the United States, advantageously exchange many of our textbooks for monographs of this type. Nor does one note carelessly that, in adding Jones' name to the list, we become indebted to another non-medical investigator and writer for light in a field which from many angles has been considered peculiarly medical. Medical men have literally filled shelves with books and articles on "uric acid" and its allies and said nothing. Will the day not come soon when our ranks will again show the effects of that same mental discipline demanded in other branches of science?

MARTIN H. FISCHER.