The Mechanism of Reaction between Thionylaniline and Organomagnesium Halides, by Henry Gilman and Harry L. Morris.

P. 2402. The first part of the last sentence of Ref. 15 should read: "Benzene sulfonanilide melts at 112°, but..."

Optical Rotation and Atomic Dimension. VI, by D. H. Brauns.

P. 2786. In line 30, instead of "pseudo-cellobiose," (a name used by the author before its full identification), read "4-glucosido-mannose."

The Alkylation of Hydroxynaphthoquinone. I. Ortho-Ethers, by Louis F. Fieser.

P. 2922. In the title, in place of "ortho-ethers," read "oxygen ethers."

P. 2927. In the first line following the formulas, instead of "new," read "now."

NEW BOOKS

Quantum Principles and Line Spectra. By J. H. VAN VLECK, Assistant Professor of Physics, University of Minnesota. Bulletin of the National Research Council, Vol. 10, Part 4, 1926. 316 pp. 13 figs. 25 × 17 cm. Price $3.00.

This bulletin presents the theoretical and mathematical aspects of the quantum theory of atomic spectra, the experimental data being referred to only as they support or disagree with the theoretical conclusions. Chapter 1 gives a brief review of classical theory. Chapters 2–8, inclusive, present the fundamental postulates of the quantum theory and the statement of the quantum conditions, with special emphasis on the correspondence principle form of these conditions. The author gives the successful application of these conditions to hydrogen and ionized helium atoms and their Stark and Zeeman effects, and discusses the attempts to apply them to atoms of more than one electron. Chapters 9 and 10 deal with the intensities of spectral lines and the polarization and dispersion of light from the standpoint of the quantum theory. The more mathematical part of the theory is collected in Chapter 13 under the title of the mathematical technique of the quantum theory. The remaining two chapters are devoted to the anomalous Zeeman effect and the recent work on the Compton effect and light quanta.

This bulletin gives a very complete and well written review of what we shall probably call "classical" quantum theory. It brings the theory up to the time of the introduction of a true quantum mechanics. The references are complete and in addition to its desirability for the clear presentation of the entire subject, it is well worth its cost for the references to the literature which it contains.

H. C. UREY

Colloid and Capillary Chemistry. By HERBERT FREUNDLICH, Ph.D., Professor at the Kaiser Wilhelm Institute for Physical Chemistry, Berlin. Translated from the third German edition by H. STAFFORD HATFIELD, B.Sc., Ph.D. E. P. Dutton and Company, 681 Fifth Avenue, New York City, 1926. xvi + 883 pp. 157 figs. 15.5 × 26 cm. Price $14.00.

This translation of Freundlich's "Kapillarchemie" merits a hearty welcome. It makes available to the English and American reader the most

complete and comprehensive treatise extant on the theoretical aspects of colloid chemistry.

The translator has been eminently successful in turning the German into clear and idiomatic English. The publishers have produced a book which in typography and composition surpasses even the excellent original.

ARTHUR B. LAMB

Kolloidchemie: Ein Lehrbuch. (Colloid Chemistry: A Textbook.) By Dr. RICHARD ZSIGMONDY, Professor at the University of Göttingen. Fifth, enlarged and thoroughly revised edition. Otto Spamer, Leipzig, 1925. xii + 246 pp. Illustrated. 25 × 18 cm. Price 3.60 Mk.

The great advance in our knowledge of colloids which has taken place in the past few years has required a complete revision and a marked enlargement of this new edition of Zsigmondy's monograph. The outstanding feature of this advance has been the increase in our knowledge of the structure, size and nature of the colloid particles themselves that has resulted from the use of the ultrafilter, the ultramicroscope, the polariscope and x-ray analysis. Other important developments have concerned particularly the structure of the lyotropic colloids and colloidal aggregates, and the electrical properties of the colloidal micelle. All of these subjects are here discussed in an illuminating way by one who has himself made important contributions to them.

The presentation is clear and non-mathematical. The book is not so encyclopedic as the corresponding treatise on capillary chemistry by Freundlich. It does, however, cover the field in a careful and systematic fashion and should be of real value to every student of colloidal chemistry, and indeed to anyone interested in the newer developments of this fascinating subject.

ARTHUR B. LAMB

Die Grundlagen der Dispersoidchemie. (The Fundamentals of Dispersoid Chemistry.) By Professor Dr. ANDOR FODOR, Director of the Institute for Biochemistry and Colloid Chemistry of the Hebrew University, Jerusalem. Theodor Steinkopff, Dresden and Leipzig, 1925. viii + 280 pp. 34 figs. 23.5 × 16 cm. Price, unbound, Gldmk. 11; bound, G. M. 13.50.

The contents of this book represents the subject matter of a series of lectures given by the author at the Hebrew University of Jerusalem. It is an attempt to present a relatively brief account of colloid chemistry from a single viewpoint. The titles of the chief subdivisions of the book will serve to indicate the method of treatment; they are as follows: The Nature of Disperse Systems; Adsorption on Coarsely and on Colloidally Disperse Matter; The Formation of Disperse Systems; The Fundamental Laws of Dispersoid Chemistry; The Processes of Dispergation and Condensation; finally, there are special chapters on Clay, Proteins, and Fermentation—subjects of which the author himself has been an active and productive investigator.

The subject is presented in a briefer and more elementary fashion than in the corresponding book by Zsigmondy, reviewed above. Moreover, the author fixes his attention on the system as a whole, rather than on the colloidal particles themselves as does Zsigmondy. The book affords a useful review of the subjects treated, particularly in the case of the chapters devoted to the author's special interests.

ARTHUR B. LAMB

An Introduction to Surface Chemistry. By ERIC KEIGHTLEY RIDEAL, Humphrey Owen Jones Lecturer in Physical Chemistry, Cambridge University. At the University Press, Cambridge, England, 1926. viii + 336 pp. Illustrated. 22 × 14.5 cm. Price 18 sh.

The literature of colloid chemistry has of late been enriched by the collections of Alexander and of Bogue. These compilations, valuable as they are, do not however take the place of a systematic treatment of the subject from a single viewpoint. This function is fulfilled by the present volume in a brilliant fashion.

The author defines his subject matter as the physics and chemistry of interfacial phases. While he utilizes thermodynamic considerations fully, his point of view is essentially the molecular-kinetic one which has yielded such splendid results in the investigations of Hardy and of Langmuir. The book is not only very valuable in setting forth the work of these investigators but also in covering the more recent achievements in this field to which the author himself has made notable contributions.

The title of the book is far too modest. While it is perhaps not as encyclopedic as the comparable work of Freundlich, it is nevertheless surprisingly complete, particularly in its discussions of the more recent investigations. The various subject matters are presented clearly, are critically examined, and well-considered conclusions even if merely tentative are drawn. The book is replete with suggestions for promising further research. It is instructive, interesting and stimulating. I cannot do better than to quote and to second the concluding sentence of Professor Donnan's Preface to this book: "Every student and investigator of surface and colloid phenomena owes Dr. Rideal a warm debt of gratitude for his admirable survey and presentation of a great and rapidly advancing field of physico-chemical science."

ARTHUR B. LAMB

A Comprehensive Treatise on Inorganic and Theoretical Chemistry. Vol. VI. Carbon (Part II), Silicon, Silicates. By J. W. MELLOR, D.Sc. Longmans, Green and Company, 55 Fifth Avenue, New York, 1925. x + 1024 pp. 221 figs. 25 × 16 cm. Price $20.00; 63 sh. net.

This volume completes the chapters on carbon by discussing carbon dioxide and carbon disulfide. It omits the cyanides, the complex cyanides and those hydrocarbons that are commonly but quite arbitrarily classified

as inorganic. The author states that they may be discussed later in a supplementary volume.

The larger part (nearly 900 pages) of this large volume is devoted to the chemistry of silicon, and in particular to that of the silicates. In this connection the author remarks in the Preface, "In the original design of this work—many years backwards—it was not intended to devote so much space to the minerals, but no sound reason could be found for excluding the purer minerals from inorganic chemistry. It is merely an *accidental* circumstance that the majority of the silicates has been made in Nature's laboratory where she is continually carrying on an endless variety of chemical operations, the results of which, like those which obtain in our own laboratories, belong to the domain of chemistry. No one doubts that the minerals have been formed by the operations of the very same laws as those which are recognized in general chemistry. On its chemical side, therefore, mineralogy is a subordinate branch of inorganic chemistry."

The result is extremely satisfactory. The literatures, both of chemistry and mineralogy, have been covered and the resulting data marshaled with a degree of skill which only the rare combination of qualifications possessed by the author would make possible. It is a uniquely complete, succinct and yet readable account of this important field.

As ever, the author aims above all to present the *facts*. In his philosophy a formula or a theory should be a means toward an end, and must be constantly revised as our knowledge increases. In accordance with this, he presents the various theories having to do with silicon, for instance those concerned with the constitution of ultramarine, the zeolites and the silicates, adequately but in an impartial and non-committal manner. As to the various formulas proposed for the silicates, he says: "These formulae stand virtually on the same ground in illustrating our extreme ignorance of the mol. constitution of the silicates. Hypotheses are often multiplied with reckless abandon when the evidence is feeble and the facts are few. This has been the case with the formulae of minerals. The hypotheses may serve a useful purpose if they stimulate interest and work, but an inutile purpose if they hinder the exploration of other useful channels by a bigoted and intolerant attitude toward rival hypotheses."

The printing and composition of this volume maintain the high standards of the previous volumes. It will be of great value to all concerned with the chemistry of silicon and the silicious minerals.

ARTHUR B. LAMB

Über die Synthese der Feldspatvertreter. (Concerning the Synthesis of the Feldspathoids.) By W. EITEL. Preisschriften von der Fürstlich Jablonowskischen Gesellschaft, LII (52nd Prize Essay of the Jablonowski Society). Akademische Verlagsgesellschaft, m. b. H., Leipzig, 1925. viii + 258 pp. 50 figs. 4 plates. 29 × 20.5 cm.

The feldspathoids are a group of alkali and calcium aluminosilicates related to the feldspars both in composition and in petrogenesis. It includes the alkali aluminosilicates, nephelite, kaliophyllite and leucite, the calcium and magnesium compounds included under the melilites, and in addition the interesting double-salt type of compounds of the cancrinite [$3(Na_2O.Al_2O_3.2SiO_2).2CaCO_3.2Na_2CO_3$]-sodalite [$3(Na_2O.Al_2O_3.2SiO_2).2NaCl$] group, minerals which contain the less common rock components, carbon dioxide, chloride, sulfide and sulfite. A thorough discussion of the feldspathoids thus necessitates consideration of the greater part of our knowledge of mineral chemistry, both of the non-volatile systems and of systems in which volatile components add greatly to the experimental difficulties. Such a discussion has been given, and the author's experience in both petrology and physical chemistry has enabled him to give a well balanced analysis of the literature, which consists of two portions of widely differing character. The first portion comprises the work of the older school, whose mineral syntheses were oftentimes carried out by most ingenious methods, but by methods which bore no possible relation to the natural mineral paragenesis. The second portion includes the precise physicochemical researches of the past two decades, which have yielded much information concerning various binary and ternary systems containing the above common rock-forming oxides. The discussion of this material is particularly full. The third portion of the book consists, largely, of work in which the author has been active, the introduction of volatile components, particularly carbon dioxide, into mineral systems, work which has served to show the physicochemical relationship of the complex mineral cancrinite and the more usual compounds calcite, sodium carbonate and nephelite. This book is to be recommended to all interested in the problems of mineral chemistry and their study from the standpoint of physical chemistry. The indexing has been well done.

GEORGE W. MOREY

Experiments in College Chemistry. By LYMAN C. NEWELL, Professor of Chemistry, Boston University, Boston, Massachusetts. D. C. Heath and Company, Boston, 1925. vi + 320 pp. 111 figs. 20.5 × 14 cm. Price $1.60 postpaid.

"This book is based on experiments performed by students in the author's classes during many years. It includes experiments for students who have studied chemistry before as well as for those who begin chemistry in college."

It is evident that the author has attempted to give to other teachers the benefit of his own successful experience as a teacher of laboratory science. He has included many experiments which unmistakably reveal his close attention to the limitations of beginning students and to the necessity of

teaching the fundamental facts and principles of chemistry. Simple forms of apparatus are used and the directions are given with such detail as to preclude many of the common errors of the beginner.

There are several features which will appeal strongly to the busy teacher. A satisfactory set-up of apparatus is assured by clear line drawings, which are freely used in the early part of the book, making it easy for the student to learn his apparatus and its use with a minimum amount of supervision. The commonly used laboratory processes are carefully described and illustrated. The experiments cover a wide variety of topics and they are sufficiently abundant to permit a choice of subjects and considerable variation from year to year. References to the author's "College Chemistry" are frequent, making it easy to link together the laboratory and the class room.

There are several distinctive features which are easily observed. Theoretical principles are illustrated by an unusual number of experiments, most of which are simple and of proven value. Quantitative experiments are abundant and frequently accompanied by a form for tabulating results. Many times questions are absent from the body of the experiment but exercises to insure an understanding of its lessons are certain to follow. Supplementary experiments are numerous and these the author has found indispensable for review and for "additional laboratory work for those who are thoughtful, rapid, ingenious or specifically interested."

The experiments include some interesting material on the common metals and their salts, as well as some of their more important tests. There is also an ingenious list of experiments on fuels, illuminants, plants, plant products and food.

The appendix contains tables of logarithms, of gas volumes, of vapor pressure and of atomic weights. In addition there are given lists of equipment and supplies and of experiments which the author recommends for various purposes.

The book is eminently fitted for its purpose. The style is clear, the directions are complete and the choice of material is unusually happy. The mechanical features have been skilfully handled. The book as a whole is a valuable companion of the author's well-known series of publications.

B. S. HOPKINS

Qualitative Analyse und ihre Wissenschaftliche Begründung. (Qualitative Analysis and its Scientific Foundation.) By Dr. WILHELM BÖTTGER, Professor of Analytical Chemistry and Director of the Chemical Division of the Physico-Chemical Institute of the University of Leipzig. Fourth to seventh edition, revised and enlarged. Wilhelm Engelmann, Leipzig, 1925. xvi + 644 pp. 32 figs. 1 spectrum chart in color. Tables (34 pp.) for use in the laboratory. 23 × 16 cm. Price M. 22.

The second and third editions were reviewed in THIS JOURNAL, **30,** 1796 (1908) and **35,** 1312 (1913); the title then being "Qualitative Analyse vom Standpunkte der Ionenlehre."

In accord with the change in title, the first Part, General Principles, is increased to 166 pages from 120 in the third edition, and contains excellent discussions of compounds of higher order (including the Werner theory), and the Bohr-Kossel theories of atomic structure and valence. The discussions of the ionic theory, of the law of mass action, and of oxidation and reduction (including auto-oxidation and catalysts) are not curtailed, and that of the colloidal state is extended. A feature of this Part and of Part II, Practical Suggestions, consists in the experiments to be performed by the student; the number is now 49 as compared with 36 in the third edition.

Part III, Characteristic Reactions, and Part IV, Analysis, have been carefully revised, and some new reactions have been included, the usefulness of which has been demonstrated experimentally. An effort has been made to determine the exact conditions necessary in each operation, and the necessity of careful manipulation is stressed. In these Parts the same type is now used as in the rest of the book instead of a larger type; but in spite of this change there is a small increase in the number of pages. Comparatively few changes have been made in the 47 pages of Part V, Rare Elements. The separate 34-page pamphlet, which fits into a pocket in the cover of the book, contains analytical tables, essential directions, and section and page references.

Throughout the book references to important articles are given. It is hoped, thereby, to stimulate even beginning students to devote proper attention to the study of original literature.

From the foregoing it is evident that Dr. Böttger has developed a course in general and inorganic chemistry, which, when supplemented (as in Leipzig) by a lecture course and by later laboratory work in quantitative analysis and physical chemistry (or physics), will rapidly advance a student to the stage at which he can undertake original investigation. The student works as an individual, not in the lock-step formation of a large class, and can devote nearly all of his time to one subject. This course, the result of over 25 years of continued endeavor, deserves the careful attention of all who are interested in the problem of teaching chemistry.

It is scarcely necessary to add that this is one of the best reference books in qualitative analysis.

WILLIAM C. BRAY

Praktikum der Qualitative Analyse für Chemiker, Pharmazeuten und Mediziner. (The Practice of Qualitative Analysis for Chemists, Pharmacists and Physicians.) By Dr. RUDOLF OCHS, Chemical Institute of the University, Berlin. Julius

Springer, Berlin, 1926. VII + 126 pp. 10 figs. 21 × 14 cm. Price, unbound, Reichsmark, 4.80.

The purpose of this publication is to provide a manual for students where reliable and tested methods are given for the identification of the commonly occurring cations and anions. As the manual is meant for practice in the analytical laboratory, it leaves to private reading or lectures all questions of theory and all discussions of the merits of various methods of analysis. There are no new methods given but, in regular order and very clearly, tried procedures are presented in very good type. The material of the book is excellent, but the avowed desire of economy in its production has led the author to avoid all Group Tables as well as a change in type to show precipitates or the evolution of gases—both of which would have helped to clearness and usefulness. It would seem that the use of Group Tables instead of a series of separate tests would systematize the analysis and render it less of a fishing expedition with the consequent uncertainty of the quality of the catch. Scattered through the text are frequent notes which stress the causes of analytical failure, or give helpful details for manipulation to the beginner. These notes are the best justification for the title and the book.

GEO. L. COYLE, S. J.

Organic Chemistry. By WILLIAM ALBERT NOYES, Director of the Chemical Laboratory of the University of Illinois. Henry Holt and Company, 19 West 44th Street, New York, 1926. xix + 677 pp. 22 figs. 22.5 × 14 cm. Price $3.50.

The text that appeared some years ago has been entirely rewritten, though its distinctive features have been retained. The arrangement and treatment differ widely from those found in other texts, the most important difference being that the division between aliphatic and aromatic compounds is wiped out, phenols and alcohols being treated together as are methylamine and phenylamine. This is by no means the only novelty.

The book is much more deductive than is usually the case. From the quadrivalence of carbon, the tetrahedral arrangement of the groups about it, structural formulas, substitution, stereo-isomerism, stability of rings and geometrical isomerism are deduced in the introduction. The next section of the book, pp. 43–104, is a preview of organic chemistry covering all of the common classes of organic compounds, their preparation, their reactions and particularly their relations one to another. The succeeding chapters take up classes of compounds for fuller discussion. A chapter usually ends in an extensive table of compounds giving names, structural formulas, melting and boiling points and densities of members of the series, with full literature references.

The book is written for the well prepared and thoughtful student. It abounds in problems and questions and demands much of the student.

There are many references to chemical literature. Liberal use is made of modern conceptions of atomic structure. Whether or not the new arrangement is better than the conventional one may be debated, but it is refreshing to have the facts presented from an entirely different point of view. The student does well to use several textbooks and will find this one helpful.

E. EMMET REID

Die Fermente und ihre Wirkungen. (The Ferments and Their Actions.) By Professor CARL OPPENHEIMER, Dr. phil. et med., Berlin, with a chapter by Dr. RICHARD KUHN, Munich. Parts IV–XII. Fifth, completely revised edition. Georg Thieme, Leipzig, Germany, 1925–1926. 481–1871 pp. Illustrated. 26.5 × 19.5 cm.

In my review of the first three instalments of this treatise [THIS JOURNAL, **47**, 296 (1925)], I stated that the author regretted that in much of the recent foreign literature he had been obliged to depend largely on the abstracts rather than on the original articles. Dr. Oppenheimer has kindly informed me that this is not correct, and that the references were in every case based on the original articles. His statement was merely that in his *assembly* of the literature, he was obliged to rely on the abstracts and hence was not absolutely certain that all the pertinent articles that appeared during the war period had actually been included.

With the present instalments (IV–XII) this encyclopedic treatise is completed except for a final instalment containing the index, bibliography, etc., and substantially within the period promised by the author and publisher at the outset. The first three parts or instalments covered the general chemistry and biology of the ferments; the present instalments contain long chapters that are in fact monographs on the various individual ferments, esterase, carbohydrase, nuclease, amidase, protease, zymase, oxidase, reductase, catalase, etc., and the general theories of fermentative oxidations.

These chapters furnish a veritable mine of information and will be invaluable to the student of the ferments and enzymes. The last-mentioned chapter on the theories of fermentative oxidations is extremely interesting, and will appeal not only to the biochemist but to chemists in general.

All told, a perusal of this treatise leaves one with the impression that here we are just entering the domain of a chemistry of the next higher order of complexity beyond the conventional chemistry of today—but that its labyrinthine turnings will not indefinitely baffle the resolute and relentless efforts of the human intellect.

ARTHUR B. LAMB