

phenone were oxidized. Benzophenone and benzil were not.

5. All simple fatty and aromatic acids including formic, gave negative results. This was true also of glycolic, lactic, tartaric, citric, mucic, mandelic and benzilic acids. All the amino acids of protein origin tested (16 samples) remain unoxidized except cystine, tyrosine and tryptophan. Unsaturated acids, maleic and crotonic, also gave negative results.

6. All aldohexoses tested, glucose, mannose, galactose and their derivatives,  $\alpha$ -methylglucoside, pentaacetylglucose, glucosamine, maltose, and lactose failed to be oxidized detectably. Cellobiose and trehalose consumed less than 2 milliequivalents per millimole. This was attributed to impurity.

7. The ketose, fructose and sorbose were *oxi-*

*dized*, also sucrose (presumably due to fructose formation). Benzoin was untouched.

8. The pentoses, *d*-arabinose and *l*-xylose (and rhamnose, a methyl pentose more slowly) were oxidized, presumably due to furfural formation.

9. Every phenolic compound tested (13 substances) as well as the phenol ethers anisole and phenetole were oxidized.

10. All aniline derivatives tested (7 compounds) were oxidized.

This study is being continued along the lines suggested by the results. We do not, however, expect to go into the specialized field dealing with the structures of sugars where we believe the reagent may be useful.

DEPARTMENT OF CHEMISTRY  
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ROGER J. WILLIAMS  
M. ALLAN WOODS

RECEIVED JUNE 7, 1937

## NEW BOOKS

**The Organic Chemistry of Nitrogen.** By N. V. SIDGWICK, F.R.S. New edition, revised and rewritten by T. W. J. TAYLOR, M.A., Oxford, and WILSON BAKER, M.A., D.Sc., Oxford. Oxford University Press, 114 Fifth Avenue, New York, N. Y., 1937. xix + 590 pp. 17 × 25.5 cm. Price, \$8.50.

Since the appearance of the original edition of this book in 1910 theoretical chemistry has advanced at a whirlwind pace. The past quarter of a century has seen the introduction of the atomic theories of Bohr and Lewis and finally of the wave mechanics as an integral part of theoretical chemistry. In the description of chemical phenomena in these terms the chemist has been aided by dipole moment measurements, absorption spectra, Raman spectra and electron diffraction measurements. The revision of Professor Sidgwick's famous book has been carried out ably in terms of these new concepts and the related experimental evidence.

The chapter headings are: I. Esters of Hyponitrous, Nitrous, and Nitric Acids; II. Aliphatic Amines; III. Aromatic Amines; IV. Amino Acids; V. Amides; VI. Hydroxylamine Derivatives; VII. Nitroso Compounds; VIII. Nitro Compounds; IX. Carbonic Acid Derivatives; X. Derivatives of Cyanogen; XI. Aliphatic Diazo Compounds and Derivatives of Hydrozoic Acid; XII. Hydrazine Derivatives; XIII. Aromatic Diazo Compounds; XIV. Azoxy and Azo Compounds and Other Compounds Containing Two Linked Nitrogen

Atoms; XV. Compounds Containing a Chain of Three or More Nitrogen Atoms; XVI. Cyclic Polymethylene-Imines (Excluding Pyrrolidine and Piperidine); XVII. Five-Membered Rings; XVIII. Six-Membered Rings.

In the chapter on amines the structure of the quaternary ammonium salts is given as involving four covalences and an electrovalence. The weak basicity of the primary, secondary and tertiary amines is explained in terms of the hydrogen bond.

Under the heading of aromatic amines is the first application of the idea of resonance-hybrids. There are three possible structures of the positive ion of the triphenylmethane dyes differing only as to which of the rings has quinoid structure. The actual state of the ion is a hybrid between all three and to this fact are related the properties of the substance as a dye. This concept has been logically applied to all the classes of dyes discussed throughout.

The fourth chapter gives a full discussion of the amphoteric properties of the amino acids from a modern physicochemical point of view. The various equilibria involving the zwitterion are fully discussed and the data on the acidic and basic dissociation constants correlated from this point of view.

Along with the hydroxylamine derivatives the interesting free radicals  $R_2N \rightarrow O$  are discussed and attention drawn to the magnetic properties produced by the unpaired electron. There is a very full discussion of the evidence concerning the configuration of oximes and the effect of

configuration on the Beckmann rearrangement. The modern point of view concerning free rotation is discussed in connection with the change of  $\alpha$ - to  $\beta$ -oximes.

The idea of a resonance-hybrid is applied to the structure of urea, aliphatic diazo compounds, the azide groups, and pyrrole. Thereby many difficulties of the more definite older structures disappear.

The peculiar properties of the ortho-nitrophenols and of the ortho-hydroxyazo compounds, in which the properties of the hydroxyl groups are almost lost, are explained on the basis of formation of a chelate ring by hydrogen bond formation.

The application of electric moment in the elucidation of structure is well exemplified by the following: the structure of the nitro group, the configuration of the geometrical isomers of the azoxy compounds, the demonstration of a *trans* structure for azobenzene.

The results of electron diffraction measurements are used to show the straight chain structure of the aliphatic diazo compounds and of methyl azide.

Along with the compounds containing a chain of three or more nitrogen atoms are discussed the relatively new classes—the tetrazanes and the tetrazenes.

As the authors point out, the omission of the purine derivatives has made space for a fuller description of the fundamental chemical properties of the simpler heterocyclic compounds.

This volume besides containing all the most important information on organic nitrogen compounds is a definite contribution to theoretical organic chemistry. It is a nice book to read.

J. G. ASTON

**Handbuch der präparativen Chemie. Ein Hilfsbuch für das Arbeiten im chemischen Laboratorium.** (Handbook of Preparative Chemistry. A Manual for Work in the Chemical Laboratory.) Edited by Professor Dr. LUDWIG VANINO. Third edition. Vol. II. Organic Section. Verlag von Ferdinand Enke, Hasenbergsteige 3, Stuttgart-W, Germany, 1937. iii + 887 pp. 27 figs. 16.5 × 25.5 cm. Price, RM. 45; bound, RM. 48.

Comparison of this edition with the earlier ones is made difficult by the fact that the table of contents has been abolished. However, in the entire volume there are but twenty references to the literature of the last ten years, four of these to "Organic Syntheses." A number of preparations given in earlier editions have been omitted, and others added, although not all of the latter are of recent origin. Though the author states in the Preface that the material has been thoroughly revised, this edition is not to be trusted for a selection of the most advantageous methods of preparation. It is doubtful whether any organic chemist at the present time would set out to prepare dibenzoylmethane by an ester condensation, or use five kilos of sodium amalgam to get thirty-five grams of dihydroresorcinol.

The author has increased his selection of interesting and unusual types of compounds. For example, the newest one is the ketene acetal of Beverstedt and McElvain. Organic chemists will probably use the book for stimulating

window-shopping rather than as a reliable guide to the best preparative methods.

The book is poorly bound, the reviewer's copy having begun to disintegrate during the cutting of the leaves.

PAUL D. BARTLETT

**Organic Syntheses.** An Annual Publication of Satisfactory Methods for the Preparation of Organic Chemicals. Vol. XVII. By L. F. FIESER, Editor-in-Chief, W. H. CAROTHERS, R. C. FUSON, W. W. HARTMAN, JOHN R. JOHNSON, CARL R. NOLLER and C. F. H. ALLEN, Secretary. John Wiley and Sons, Inc., 440 Fourth Ave., New York, N. Y., 1937. v + 112 pp. 15.5 × 24 cm. Price, \$1.75.

This volume contains carefully checked directions for the preparation of thirty compounds, nearly all of which are frequently used as intermediates in organic and biochemical laboratories. It also contains new methods or changes in procedure for the preparation of compounds presented in earlier volumes and a description of several new forms of apparatus.

The list of new preparations is as follows: aconitic acid,  $\gamma$ -aminobutyric acid,  $\epsilon$ -aminocaproic acid, 1,2-aminonaphthol hydrochloride and 1,4-aminonaphthol hydrochloride, benzoylene urea, bromal, *p*-bromobenzaldehyde, 4-bromoresorcinol, 1,3-butadiene, 2-carbethoxycyclopentanone, cellobiose,  $\alpha$ -cellobiose octaacetate, chelidonic acid, cholestanone, dihydrocholesterol, 2,4-dimethyl-5-carbethoxypyrrole,  $\beta,\beta$ -diphenylpropiophenone, ethyl ethoxalylpropionate, ethyl methylmalonate, *unsym.*-heptachloropropane, 2-ketohexamethylenimine, 6-methyluracil,  $\beta$ -naphthoic acid,  $\beta$ -naphthoquinone and  $\alpha$ -naphthoquinone, pentaerythrityl bromide and iodide,  $\alpha$ -phenylethylamine, *d*- and *l*- $\alpha$ -phenylethylamine, tetramethylene chlorohydrin, tricarbethoxymethane, triphenylethylene.

E. P. KOHLER

**Quantitative Analysis. A Theoretical Approach.** By WILLIAM RIEMAN, III, Ph.D., Associate Professor of Chemistry, Rutgers University, and JACOB D. NEUSS, Ph.D. McGraw-Hill Book Company, Inc., 330 West 42nd Street, New York, N. Y., 1937. ix + 425 pp. 44 figs. 14.5 × 21 cm. Price, \$3.25.

In this text a remarkably close co-ordination between physio-chemical theory and the practical art of analysis is attained. The first five chapters give a brief but sufficient account of the fundamental ideas of analysis and the use of analytical apparatus, both gravimetric and volumetric. In chapter six the procedure for the determination of chloride ion by Mohr's method is described and a thorough treatment of the solubility product principle and its application to this analytical problem is given. The activity concept is introduced and equations are given for computing activity coefficients from the Debye-Hückel theory. The beginner no doubt will heave a sigh of relief on turning page 68 and finding he is to be excused from using these equations because of mathematical difficulties.

Chapters seven and eight, upon potentiometric measurements and the ionization of salts, acids, and bases, are pure

physical chemistry free from all taint of practical analysis. With this basis the student returns to the technique of acidimetry and oxidimetry. Gravimetric analysis which follows volumetric analysis begins with the determination of aluminum. Here the close juxtaposition of theory and practice is maintained. A very thorough treatment of coprecipitation is given. The book ends with a chapter on the determination of  $pH$ .

This is a difficult text. Students who master it will gain an excellent understanding of the theoretical basis of quantitative analysis. There is grave danger, however, that students of less ability may become lost in a maze of physio-chemical theory and fail to learn even the essential details of analytical technique. This is the more likely in that the close co-ordination of theory with practice has necessitated a wide separation of the general details of quantitative manipulation from the specific problems to which they must be applied.

Numerous problems are furnished at the ends of the chapters and solutions are given in the appendix. The authors are to be complimented upon the excellent tables of solubility products, ionization constants, and electrode potentials which they have collected in the appendix. These are thoroughly up to date and include references to the original work upon which the data are based. They are far superior to the usual time worn values which are quoted in the average analytical text book.

CHARLES H. GREENE

**Chemische Analysen mit dem Polarographen.** (Polarographic Chemical Analysis.) By DR. HANS HOHN, Research Department, Duisburger Copper Works. Verlag von Julius Springer, Linkstrasse 23-24, Berlin W 9, Germany, 1937. vii + 102 pp. 42 figs. and tables. 13.5 × 21 cm. Price, RM. 7.50.

This little monograph not only gives a review of the various uses of the polarograph in the chemical laboratory but also contains new material of primary importance to analytical chemists. Although full credit is given to Heyrovský and his co-operators (a valuable bibliography is added at the end of the book) the book is in many respects quite original and reflects the rich experience which the author must have acquired with the polarograph.

Considering the practical purpose of the book, the theoretical discussion is kept very short and incomplete. This is somewhat deplorable, because a thorough study of the various factors affecting the diffusion current and the slope of the current-voltage curve is highly desirable in the invention of procedures of general applicability. Moreover, various inexact statements occur. For example, on p. 36 the author introduces the activity concept and assumes that the diffusion current is a linear function of the activity instead of the concentration of the electro-reducible ion. On p. 45 the work of Heyrovský and Ilkovic is quoted regarding the constancy of the "half wave potential." It is generally overlooked that this value is a constant only in the electro-reduction of simple cations to the metallic state, but cannot longer be constant when the metal ions are present in the form of a complex or slightly dissociated compound, and when the electro-reduced component is not soluble in mercury.

From the practical viewpoint the monograph is almost indispensable to those making practical application of polarographic methods. In the first few chapters a detailed discussion of the principles and manipulation of the Leybolds polarograph is given. This is followed by an excellent discussion of the technique of polarographic determinations. From the analytical viewpoint it is particularly valuable that the author stresses the significance of calibration curves obtained using solutions of about the same composition as the unknown. The medium is kept approximately constant by the use of "Grundlösungen" (adjusting solution) which are different for various ions and may vary with the type of separations which have to be made. A novelty from the analytical viewpoint is the introduction of stabilizing colloids (methylcellulose, gelatin), to avoid adsorption currents and irregularities caused by a stirring effect. A set of 28 experiments is carefully selected which will aid as an introduction to the technique, but also will make the experimenter acquainted with the multitude of factors which affect the shape of a polarogram. At the end of the book a table is added giving the reduction potentials (on the dropping electrode) of inorganic and organic electro-reducible substances.

This little monograph should prove to be an excellent stimulus for the recognition of the usefulness of the polarograph in industrial and research laboratories.

I. M. KOLTHOFF

**Handbuch der anorganischen Chemie.** (Handbook of Inorganic Chemistry.) Edited by Dr. R. ABEGG, Dr. Fr. AUERBACH and Dr. I. KOPPEL. Fourth volume, third division, second part B, section 4, first installment. **Nickel and its Compounds.** Verlag von S. Hirzel, Königstrasse 3, Leipzig C 1, Germany, 1937. viii + 827 pp. Illustrated. 18 × 25.5 cm. Price, RM. 78.

None other of the traditional metals has experienced so rapid an increase in the extent and variety of its applications as has nickel. Its annual world production grew from 5000 tons in 1895 to 70,000 tons in 1934. This enhanced importance of nickel in everyday life and in industry makes the appearance of this volume most opportune.

In the present first installment are discussed the characteristics of the nickel atom, the properties of metallic nickel, the most important compounds of nickel and the colloidal chemistry of nickel. Evidently influenced by the economic importance of nickel, the authors discuss the occurrence of its ores, the production of the metal and its mechanical, electrical and catalytic behavior in considerable detail; indeed in much greater detail than has been the case with previous elements treated in this Handbook.

In the second installment which is to appear somewhat later, the compounds of nickel with the non-metallic elements of the first six groups of the Periodic Table are to be covered.

This volume follows the excellent traditions and maintains the high standards of its predecessors in the series. As before, the editorial board has striven for a "a clear, easily understood and lively depiction of the present status of our knowledge of the subject," and this goal has indeed been substantially realized.

ARTHUR B. LAMB

**Kolloidik. Eine Einführung in die Probleme der modernen Kolloidwissenschaft.** By Dr. A. von BUZÁGH, Chemical Institute of Königl and University of Budapest. Verlag von Theodor Steinkopff, Residenzstrasse 32, Dresden-Blasewitz, Germany, 1936. 323 pp. 68 figs. + 18 tables. 16.5 × 24.5 cm. Price, RM. 15; bound, RM. 16.50.

The reviewer finds this a difficult book to read and to review, although he is schooled in and a profound admirer of German scholarship, yielding to Fajans by a month or so the honor of having been the last pupil of Wilhelm Ostwald. The first third of the book is very largely devoted to ideology and systematic classification of geometrical forms of colloidal dimensions with relatively little reference to experiment. When finally a factual résumé of the dependence of the optical and mechanical properties of colloid material upon the form of their particles is included (pages 82-90), this is put in fine print. It is almost as though the author were trying to avoid repeating the material that was assembled in the "Kolloidchemisches Taschenbuch" of the previous year.

However, this book is an important account of the subject of colloids, for it may be taken as an authoritative representation of the current views of the author and of the present Leipzig school. The latter portions of the book contain a great deal of valuable information, together with its interpretation.

The main chapter headings are: introduction, disperse and difform systems, the importance of colloids in the study of matter, the distinctive characteristics of colloidal dimensions, the morphology of disperse and difform systems, primary aggregates, secondary aggregates, adsorption, electrical properties of disperse systems, the formation of colloid solutions, the destruction of colloid systems, internal changes in colloids.

JAMES W. MCBAIN

**Handbuch der biologischen Arbeitsmethoden.** (Handbook of Biological Procedures.) Edited by PROF. DR. EML ABDERHALDEN. Abt. I, Chemische Methoden, Teil II, Heft 7, Lieferung 458. **Methoden zur Erforschung der Konstitution von Kohlenhydraten.** (Methods for the Investigation of the Constitution of the Carbohydrates.) By PERCY BRIGL, Berlin, and HANS GRÜNER, Hohenheim. **Pektin.** (Pectin.) By FELIX EHRLICH, Breslau. Urban and Schwarzenberg, Friedrichstrasse 105 B, Berlin NW 7, Germany, 1936. 298 pp. 2 figs. 18 × 25.5 cm. Price, RM. 16.50.

The Brigl-Grüner section on methods in the sugar group covers 77 pages. It presents the more commonly used procedures for sugar esterification, ether formation, condensations with aldehydes and ketones, glycoside formation, and the synthesis and transformations of the halogen derivatives. There is a brief division on the various types of sugar acids, which includes an account on the structure and synthesis of vitamin C. Methods for the quantitative estimation and differentiation of aldoses in the presence of ketoses and the Criegee lead tetraacetate oxidation are given. The methylated aldonic acids and their lactones

(Haworth and Hirst's work) that played a significant role in the development of our present concepts of ring structure are considered separately from the general section on the sugar acids. The spontaneous migration of radicals and groups concludes the section on the simple sugars. The section on the oligosaccharides is restricted primarily to the proof of the structure of maltose *via* the methylation route (Haworth's work), the application of Zemplén's oxime degradation to the structure of cellobiose and several representative syntheses (Freudenberg-Helferich). Under the heading of polysaccharides the methods employed in the study of cellulose, starch, inulin and chitin are considered. The Brigl and Grüner section suffers severely from over-condensation and omissions. The organization could also have been improved.

Ehrlich's long and detailed account on pectin (185 pages) is primarily a reiteration of his extensive researches which have already been republished several times in various journals and handbooks. The historical development, the preparative, analytical, and descriptive aspects of pectin and *D*-galacturonic acid are all presented in great detail from a highly personal point of view. Ehrlich is particularly chary on the contributions of other workers. They are usually dismissed in caustic footnotes.

Libraries that have committed themselves to the costly venture of shelving Abderhalden's giant octopus on biological methods will have to make room for *Lieferung* 458. The individual research worker and the departmental library not flushed with funds will do well to skip it and rely on the 4th edition of Tollens-Elsner, "Kurzes Handbuch der Kohlenhydrate," which appeared in 1935. This excellent *Handbuch* covers the same field in a more practical, thorough and scientific manner.

KARL PAUL LINK

**An Introduction to Comparative Biochemistry.** By ERNEST BALDWIN, B.A., Ph.D., University Demonstrator in Biochemistry, and Fellow of St. John's College, Cambridge. Foreword by Professor Sir FREDERICK GOWLAND HOPKINS. Cambridge University Press: The Macmillan Company, 60 Fifth Avenue, New York, N. Y., 1937. xviii + 112 pp. 12.5 × 19.5 cm. Price, \$1.50.

Chemical data are as important to the biologist in developing views of evolution and adaptation as are morphological facts. Where the biological problem is essentially chemical in nature they are indispensable. This book presents in simple fashion current views on a number of problems of this nature such as the regulation of electrolytes in the blood, the metabolism of nitrogen, and the chemistry of respiration, all considered in relation to the evolution of animals and their adaptation to marine, fresh-water and terrestrial environments. The treatment is elementary and there is a well selected bibliography of general articles and reviews. The book will be of value to teachers of biology who wish their students to grasp the contribution which chemistry can make to general biological theory and may be read with pleasure by chemists interested in the broader applications of their subject.

ALFRED C. REDFIELD

**Elementary Physical Chemistry**, By HUGH S. TAYLOR, D.Sc., F.R.S., David B. Jones Professor of Physical Chemistry, Princeton University, and H. AUSTIN TAYLOR, Ph.D., Professor of Physical Chemistry, New York University, Second Edition. D. Van Nostrand Company, Inc., 250 Fourth Avenue, New York, N. Y., 1937. xiii + 664 pp. 14.5 × 22.5 cm. Price, \$3.75.

In the preface to this second edition the authors say "physical chemists should incorporate, into their courses, an elementary presentation of those aspects of the subject which will enable the student to sense some of the present vivid progress in the science." In accordance with this idea they have presented a text in which unusual stress is put on recent developments in atomic theory, quantum theory, and chemical kinetics. The first chapter entitled "The Atomic Concept of Matter" presents the usual type of material first and then proceeds with a discussion of isotopes and of nuclear reactions. The second chapter on "Energy in Chemical Systems" presents the first law of thermodynamics (called the first law of energetics by the authors) and its application to thermochemical problems. The authors then start the discussion of the gaseous state presenting the more classical aspects of kinetic theory. This is followed by a chapter on "The Atomic Concept of Energy. Energy Quanta" in which we find a statement of the elementary ideas of the quantum theory including such topics as energy levels in atoms and molecules. With the aid of these ideas the discussion of the gaseous state is continued with such topics as the rotational and vibrational heat capacities and ortho and para hydrogen. The next two chapters deal with the liquid and crystalline states. The latter contains more details concerning the structure of crystals than is usually found in books of this type. These chapters conclude the portion of the book devoted to the structure of matter.

Next the authors present a chapter on gaseous reactions which is much the best the reviewer has ever seen in a book of this character. The quantum mechanics picture of the meaning of activation energy is presented in considerable detail. Other topics treated rather fully are the apparent unimolecular reactions and surface reactions involving gases. This chapter is strongly recommended to all students beginning the study of chemical kinetics. The subject of kinetics in solution is treated briefly in the later chapters on ionic equilibria.

The remainder of the book is devoted to a discussion of equilibrium and two chapters introducing the subjects of photochemistry and colloids. The reviewer has a number of objections to the treatment of equilibrium. One of the most important applies not only to this text but to most other texts, that is the stress put on a multiplicity of equilibrium constants ( $K_a$ ,  $K_p$ ,  $K_c$ ,  $K_x$  in this book). It would be much simpler for the student if he were taught that the  $K$  in terms of activities is the real constant and that the corresponding functions using pressures, concentrations, mole fractions, *et alia* are constants only insofar as  $p$ ,  $c$ ,  $x$ , etc., are proportional to the activities.

Although the ionic theory is discussed extensively including such topics as the Debye-Hückel theory we find in the discussion of hydrolysis, p. 491, " $K_a$  is defined in a way independent of ionic theory." The reviewer believes that the ionic theory is so well established that it should be

used in all discussions involving solutions of electrolytes.

In the chapter on solutions on p. 328 we find Henry's law stated as equivalent to Raoult's law instead of giving it in the general form  $p = kp_0$  where  $k$  must be determined experimentally and which reduces to Raoult's law if  $k$  is equal to the mole fraction. Although ideal solutions are not defined in terms of Raoult's law in this text, the behavior of non-ideal solutions is discussed in terms of deviations from this law.

On the whole this text can be recommended to the teacher who wishes to give a modern course in physical chemistry. It is not a book for a lazy teacher as there are many points which may have to be amplified or revised to meet the requirements of a particular class. The order of presentation, especially as it concerns kinetics and equilibrium, can be altered with little effort but the reviewer believes that very satisfactory results can be obtained with the arrangement given.

G. K. ROLLEFSON

**Talbot's Quantitative Chemical Analysis**. Eighth Edition, revised and rewritten by LEICESTER F. HAMILTON, Professor of Analytical Chemistry, and STEPHEN G. SIMPSON, Assistant Professor of Analytical Chemistry, Massachusetts Institute of Technology. The Macmillan Company, 60 Fifth Avenue, New York, N. Y., 1937. xiv + 297 pp. 12 figs. 14.5 × 22.5 cm. Price, \$2.50.

**Praktikum der quantitativen chemischen Analyse**. Teil I. **Gewichtsanalyse, Elektroanalyse, Gasanalyse**. (Manual of Quantitative Analysis. Part I. Gravimetric, Electro and Gas Analysis.) By DR. R. STREBINGER, Lecturer at the Vienna Technical Institute. Verlag Franz Deuticke, Wien, Austria, 1936. vii + 100 pp. 33 figs. 14 × 21 cm. Price, M. 2.80.

The previous edition of Talbot's well-known textbook lacked certain things (*e. g.*, discussion of mass action principle—theory of co-precipitation—directions for weight calibrations) which teachers have come to expect in textbooks of analytical chemistry. In this new edition, these gaps have been filled. A number of other changes have also been made, all of which contribute to bring this textbook quite up-to-date.

The plan of the second of these books is somewhat unusual. There is a brief (9 pages) introductory section dealing with general topics such as "Balance and Weighing," "Calculation of Analyses," etc. This is followed by a section (16 pages) giving procedures for fourteen simple gravimetric determinations. The procedures are those frequently met with in analytical work and are arranged in the order of increasing complexity. A third section (4 pages) outlines the method of electroanalysis and describes the procedure for the determination of copper, nickel, cadmium, silver, lead and brass. The next and longest section (35 pages) is devoted to the description of twenty-one typical and common separations. Among those described are the separation of iron and manganese, the separation of chlorine, bromine and iodine, the analysis of brass, of German silver, of dolomite, of pyrites. For many separations, alternative procedures are given. Thus, in the case of the calcium-magnesium separation, the author describes

both the oxalate-phosphate method and also the reverse oxine-oxalate procedure. The last section (22 pages) of the book is given over to gas analysis and includes, in addition to procedures for the more common determinations, procedures for some complex determinations such as the gas-gravimetric determination of carbon monoxide.

This book is not intended to be a textbook of analytical chemistry. It assumes a knowledge of theoretical principles and aims, as is stated in the foreword, to provide the chemical student with a series of laboratory exercises which will acquaint him with the fundamental tools of the analytical chemist. To make sure that the basic ideas will not be obscured and to avoid the danger of mechanical "cook-book" laboratory work, the author omits detailed directions as to the exact quantity of reagents to be used but gives full explanations of the factors involved. Despite the condensed form of the procedures, they are surprisingly complete.

This volume is to be followed by one dealing with volumetric analysis and colorimetry.

ARTHUR F. SCOTT

**Lichtzerstreuung.** (Scattering of Light.) By H. A. STUART, Königsberg, and H.-G. TRIESCHMANN, Würzburg. Eucken-Wolf "Hand- und Jahrbuch der chemischen Physik," Band 8, Abschnitt II. Akademische Verlagsgesellschaft m. b. H., Sternwartenstrasse 8, Leipzig C 1, Germany, 1936. ix + 191 pp. 113 figs. 17.5 × 25.5 cm. Price, M. 24.

In the first of the two articles comprising the handbook section under review, Stuart discusses critically the classical theory of the scattering of visible light in relation to the structure of the scattering units. Subjects treated are the scattering by small particles; Rayleigh scattering by molecules, with the interpretation of depolarization measurements; Raman scattering; and the scattering due to fluctuations in density and anisotropy. Passing mention is made of experimental methods, and tables of measured degrees of depolarization, etc., are included.

The second article, 87 pages long, by Trieschmann, is concerned with the coherent scattering of X-rays by atoms and molecules. After a description of factors affecting the scattering by a single atom comes a summary of the theory of X-ray scattering by gases and liquids, accompanied by a satisfactory description of the more important researches on fluids. Scattering by solid bodies is dismissed with four perfunctory pages on crystal diffraction. A summary of structural constants obtained mainly from the X-ray scattering by gases has only historical value.

The articles of both Stuart and Trieschmann are narrowly restricted in subject matter, and contain no exhaustive analyses. The latter defect may not be serious, for the methods dealt with are at present neglected by chemists in favor of more positive means for the analysis of molecular structures. The book will serve those who desire a guide over, rather than into, the field of light scattering.

J. H. STURDIVANT

## BOOKS RECEIVED

May 15, 1937-June 15, 1937

- W. L. BRAGG. "Atomic Structure of Minerals." Cornell University Press, 124 Roberts Place, Ithaca, N. Y. 292 pp. \$3.75.
- J. DUCLAUX. "Introduction a l'Étude des Protéins." Hermann et Cie., Éditeurs, 6 Rue de la Sorbonne, Paris, France. 29 pp. Fr. 10.
- T. R. HOGNESS and WARREN C. JOHNSON. "Qualitative Analysis and Chemical Equilibrium." Henry Holt and Co., 257 Fourth Ave., New York, N. Y. 417 pp. \$2.75.
- J. WALLACE JOYCE. "Manual on Geophysical Prospecting with the Magnetometer." U. S. Bureau of Mines. Printed by the American Askania Corporation, Houston, Texas. 129 pp. \$1.50.
- JAMES KENDALL. "Smith's Inorganic Chemistry." Second revised edition. D. Appleton-Century Co., 35 West 32d St., New York, N. Y. 954 pp. \$4.00.
- A. LALANDE. "Introduction a la Cinétique des Réactions Chimiques en Phase Gazeuse." Hermann et Cie., Éditeurs, 6 Rue de la Sorbonne, Paris, France. 44 pp. Fr. 12.
- J. LAVOLLAY. "I. Applications de la 8-Hydroxyquinoleine a l'Analyse Biologique et Agricole. II. Recherches sur le Magnésium en Biochimie Animale. III. Le Magnésium dans les Terres Arables." Hermann et Cie., Éditeurs, 6 Rue de la Sorbonne, Paris, France. 44 + 81 + 101 pp. Fr. 10 + 15 + 18.
- GILBERT T. MORGAN and FRANCIS HERWARD BURSTALL. "Inorganic Chemistry. A Survey of Modern Developments." Chemical Publishing Company of N. Y., Inc., 148 Lafayette St., New York, N. Y. 462 pp. \$6.00.
- WILLIS CONWAY PIERCE and EDWARD LAUTH HAENISCH. "Quantitative Analysis." John Wiley and Sons, Inc., 440 Fourth Ave., New York, N. Y. 412 pp. \$3.00.
- LUDWIG PINCUSSEN. "Mikromethodik. Quantitative Bestimmung der Harn-, Blut- und Organbestandteile in kleinen Mengen für klinische und experimentelle Zwecke." Franz Deuticke Verlag, Helferstorferstrasse 4, Wien, Austria. 193 pp. M. 5.
- MARCEL PRETTRE. "Réactions en Chaînes." Hermann et Cie., Éditeurs, 6 Rue de la Sorbonne, Paris, France. 88 pp. Fr. 18.
- G. ROSS ROBERTSON. "Laboratory Practice of Organic Chemistry." The Macmillan Company, 60 Fifth Ave., New York, N. Y. 326 pp. \$2.25.
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