

character of tertiary groups might be expected to make such replacement more, not less difficult than replacement of secondary or primary hydrogen.

2. Replacement by removal of the hydrogen as a negative ion. This mechanism is unlikely because of the absence of rearrangement as in (B).

3. Replacement by removal of the hydrogen as an atom. If direct replacement without inversion occurs, then inactive products would be expected due to the formation of an isolated organic free radical.<sup>8</sup> However a one-step acceptor-donor inversion mechanism, suggested in (C), analogous to that involving ions, need not cause racemization. At present we favor this latter view, in spite of possible objections on thermodynamic grounds. It appears to be consistent with the electron-repelling character of tertiary groups and the ease of replacement of tertiary hydrogen, as well as the absence of rearrangement as in (B). In addition it is in harmony with the results reported by Price and Schwarcz on the chlorination of cyclic dibasic acid esters.<sup>9</sup> Further work on this type of nitration is now in progress.

### Experimental Part

Eleven grams of *levo*-3-methyloctane, b. p. 142–143° (760 mm.),  $\alpha_D^{25}$   $-6.5^\circ$ ,<sup>10</sup>  $n_D^{25}$  1.4045, was prepared as described by Levene and Marker,<sup>11</sup> except that the intermediate bromide was prepared from the corresponding carbinol with dry hydrogen bromide at 120–130°, and the

(8) Compare Brown, Kharasch and Chao, from a paper presented to the Division of Organic Chemistry at Detroit, Michigan, September, 1940. Abstract of papers, pages 57–59.

(9) Price and Schwarcz, Cincinnati Meeting, Abstracts, pp. 18–19.

(10) Homogeneous, 1-dm. tube.

(11) Levene and Marker, *J. Biol. Chem.*, **91**, 77 (1931).

crude hydrocarbon was hydrogenated with Adams platinum catalyst before fractionation. The nitration was carried out in a sealed tube with gentle shaking for twelve hours at 130° using 90 cc. of nitric acid, d. 1.075. The hydrocarbon layer was added to 10 cc. of ether, dried over anhydrous sodium sulfate, the ether evaporated, and the unreacted hydrocarbon (2 cc.) removed by fractionation at 25 mm. through a small bore reflux column of approximately 8 plates, equipped with a gold-plated spiral.

The residue was extracted three times with 15 cc. of a 15% aqueous alcoholic (3–1) potassium hydroxide solution, each extraction lasting 30 minutes with frequent agitation.<sup>12</sup> The yellow-orange alkaline layer was then extracted once with ether, the ether washed with water, and combined with the alkali-insoluble portion, dried over anhydrous sodium sulfate, the ether evaporated, and the tertiary nitro compound fractionated through the above mentioned Podbielniak-type column. To ensure freedom from any secondary or primary nitro compounds, fraction 2 (see below in Table I) was re-extracted thrice in the same way with 15 cc. of a 10% aqueous alcoholic (3:1) potassium hydroxide solution, whereby this time the alkaline solution remained colorless. The product was fractionated as before. The optical activity was virtually unchanged.

TABLE I

| Distillation . . . . .             | First               |                     | Second              |                     |
|------------------------------------|---------------------|---------------------|---------------------|---------------------|
|                                    | Fraction . . . . .  | Residue             | Fraction . . . . .  | Residue             |
| Vol., cc. . . . .                  | 1                   | 2                   | 1                   | 2                   |
| Time, min. . . . .                 | 15                  | 45                  | 40                  | 15                  |
| Reflux ratio . . . . .             | 50/1                | 50/1                | 50/1                | 50/1                |
| Temp., ° C. . . . .                | 100–106.5           | 106.5–107           | 106.5–107           | 106.5–107           |
| Press., mm. . . . .                | 15                  | 15                  | 15                  | 15                  |
| $n_D^{25}$ . . . . .               | 1.4340              | 1.4340              | 1.4340              | 1.4340              |
| $\alpha_D^{25}$ . . . . .          | -0.65 <sup>10</sup> | -0.65 <sup>10</sup> | -0.70 <sup>10</sup> | -0.70 <sup>10</sup> |
| Nitro-<br>gen, % } Found . . . . . | 8.1                 | 8.1                 | 8.1                 | 8.1                 |
|                                    | 8.2 <sup>12</sup>   | 8.2 <sup>12</sup>   | 8.2 <sup>12</sup>   | 8.2 <sup>12</sup>   |

(12) Compare Konawalov, *Chem. Zentr.*, **77**, II, 312 (1906); also Seigle and Haas, ref. 2.

(13) Analysis run on inactive material.

MCGILL UNIVERSITY  
MONTREAL, CANADA

PHILIP G. STEVENS  
ROBERT W. SCHIESSLER

RECEIVED JUNE 3, 1940

## NEW BOOKS

**Electrochemistry and Electrochemical Analysis.** By HENRY J. S. SAND, D.Sc., Ph.D., F.I.C., Lately Head of the Department of Inorganic and Physical Chemistry and Lecturer on Electrolytic Analysis at the Sir John Cass Technical Institute, London. Volume II. Gravimetric Electrolytic Analysis and Electrolytic Marsh Tests. Chemical Publishing Co., Inc., 148 Lafayette St., New York, N. Y., 1940. ix + 149 pp. Illustrated. 12.5 × 19 cm. Price, \$2.00.

Dr. Sand is known particularly for his work in the field of electrolytic analysis. The scope of this book is indicated by the author's statements: "Exhaustiveness has

not been aimed at" . . . "particular attention has been devoted to the methods for separating metals by control of the cathode potential" . . . "simplified by the introduction of what may be described as high resistance voltmeters in place of the potentiometer." Yet no method which would compete with the more usual methods of analysis seems to have been omitted. No theory is included.

The chapter on "Apparatus" seems somewhat elaborate. The author seems to anticipate all of the problems of the novice. In his discussions of "Technique" he shows the work of an experimentalist who is thoroughly familiar with the pitfalls. His methods of detecting small amounts

of metals in the presence of large amounts of others seems more practical than many now preferred. Few seem to realize that electrolytic methods should be combined with others. This is well demonstrated in the chapter "Electrolytic Marsh Tests."

One is impressed by the large fraction of late references, including 1939. Only in case of "Micro-analysis" is a complete bibliography included. The author seems to have included in this text the latest improvements of well-tried methods. It supplements our other latest texts in English.

D. J. BROWN

**Hochpolymere Chemie. Ein Lehr- und Handbuch für Chemiker und Biologen.** By KURT H. MEYER and H. MARK. Band I. Allgemeine Grundlagen der hochpolymere Chemie. (General Principles of High Polymer Chemistry) by H. MARK. Akademische Verlagsgesellschaft m. b. H., Sternwartenstrasse 8, Leipzig C 1, Germany, 1940. x + 345 pp. 126 figs. 16 × 24 cm. Price, RM. 22.20; bound, RM. 24.20.

Ten years have passed since Meyer and Mark's "Der Aufbau der hochpolymeren organischen Naturstoffe" first appeared. During these years interest in polymeric substances has grown rapidly, and important advances have contributed toward establishing the chemistry of polymers as an important branch of chemical science. Developments in this field have been stimulated by the industrial importance of synthetic polymers on the one hand, and by the importance to the Biological Sciences of an understanding of high polymers on the other. With these considerations in mind, Meyer and Mark have seen fit to replace their earlier work with two volumes. As is clearly stated in the preface, it is the purpose of Volume I, written by Professor Mark, to present a critical discussion of the physical and chemical methods available for the study of high polymers. Volume II, written by Professor Meyer, will present a comprehensive treatment of present day knowledge in the field.

Volume I is divided into seven chapters: "The Geometry of the Molecule" in which X-ray and electron diffraction methods, behavior of molecules in electric fields, and certain optical phenomena are discussed; "The Internal Motions of the Molecule"; "Principal and Secondary Valence"; "Crystal Structure, Lattice Forces, and Chemical Structure of the Unit Cell"; "Molecular Order in Liquids and the Investigation of Small Crystallites"; "The Behavior of Mixtures" which covers osmotic behavior, solubility, and viscosities of liquids and solutions; "Kinetic Phenomena in High Polymer Chemistry" in which diffusion, ultracentrifugation, and the mechanism of polymer reactions are discussed.

The criticism might be raised that most of the subject matter in this volume does not relate specifically to polymers, and is adequately treated in various other books. However, as is pointed out on page 217, many investigators have implicitly adopted the viewpoint that the physical and chemical principles applicable to substances composed of small molecules must be replaced by an essentially different set of laws for high polymer phenomena. The author is eager to show that well-established principles

(*e. g.*, those pertaining to valence forces, intermolecular forces, crystal structures, etc.) in other fields of physics and chemistry can be applied to high polymers. To this end the reader is skillfully guided from an understanding of principles established for low molecular weight substances, to their application to polymers. In the opinion of the reviewer, the subject matter is well chosen, and the manner in which it is related to polymer chemistry is an outstanding merit of the book.

The presentation is essentially non-mathematical, although in some cases simple derivations of more important relationships are included. In most instances the important equation is given with an explanation of its basis and limitations; the practical significance of the relationship is then carefully explained and illustrated. The book is extremely well organized and the discussions are very clear.

Although occasions for criticisms of the author's interpretations are rare, attention should be called to the fact that equation (65) for the ideal solubility of a solid in a liquid is based on an incorrect ideal entropy of solution, the entropy of fusion of the solute having been neglected. Also, slight revision of the discussion of polymerization kinetics might be desirable in view of recent work regarding reactivities of large molecules.

PAUL J. FLORY

**Fundamentals of Photography.** By PAUL E. BOUCHER, Ph.D., Professor of Physics, The Colorado College. D. Van Nostrand Co., Inc., 250 Fourth Avenue, New York, N. Y., 1940. ix + 304 + lii pp. Illustrated. 15.5 × 23.5 cm. Price, \$3.00.

The author has reduced to book form his one-semester course for students having an elementary knowledge of physics or chemistry. Theory (except in the discussion of lenses and their aberrations) is first presented in its simplest terms. It is then applied to the practical handling of widely used films, papers and developers. The reader makes the rounds with a real enthusiast, and then enters the dark room with him to observe how results vary with procedure. They emerge with a set of cuts which intimately depict the author's environment and add not a little to the interest of the book. Finally, the reader is invited to perform, with a modest outfit, seventeen quantitative experiments which will serve to expunge such terms as "hard luck" from his photographic vocabulary. Graduates from the course can hope to produce prints of technical excellence and of some artistic merit.

G. S. FORBES

**Elementary Laboratory Experiments in Organic Chemistry.**

By ROGER ADAMS, Professor of Organic Chemistry in the University of Illinois, and JOHN R. JOHNSON, Professor of Organic Chemistry in Cornell University. Third edition. The Macmillan Company, 60 Fifth Avenue, New York, N. Y., 1940. xvi + 420 pp. Illustrated. 14.5 × 22 cm. Price, \$2.00.

The third edition of this well-known manual appears in the familiar "tear-out" style of its predecessors. In general excellence this volume continues the fine tradition

established by the authors some thirteen years ago. Busy instructors will find helpfully selected experiments listed for several types of courses. The amounts of the different chemicals for each experiment are given in an appendix and will simplify the work of a stores department. Students are enabled to plan their work well and to dove-tail experiments by the study of a conveniently arranged timetable. The considered use of this table is heartily commended to those who always feel that they must watch the pot lest it cease to boil. The questions appended to each set of directions are not too simple and are to the point. The modernity of the volume has been assured by the inclusion of new experiments, nicely adapted to student laboratory use, dealing with well-publicized polymers and synthetic drugs. The valuable list of supplementary experiments should be a welcome guide to the fortunate instructor of such ambitious students as may seek extra and more difficult preparative exercises. It is regrettable that an atrocious error in the spelling of aniline should appear on p. v.

Although the reviewer is happy to recommend this manual for elementary semester, and year, courses, such a remark is almost superfluous, for the book is sure to be its own best spokesman and will retain old, and gain new, friends for itself.

G. ALBERT HILL

**A New Dictionary of Chemistry.** By STEPHEN MIALL, Ll.D., B.Sc., with the assistance of many well-known chemists. Longmans, Green and Co., 114 Fifth Avenue, New York, N. Y., 1940. xv + 575 pp. 16 × 23.5 cm. Price, \$15.00.

This book is an ambitious attempt to compress a chemical dictionary into one volume of 575 pages. The typical pages have eight to ten entries. In the case of substances of great importance, the description is expanded beyond the narrow limits of a dictionary treatment. Thus, for example, nearly a page is devoted to glycerine and to nitric acid and more than half a page to silver, followed by a little more than one page to silver compounds. The book also includes brief (about  $\frac{1}{8}$  page) biographies of many chemists, both living and dead. Structural formulas are much used for organic compounds. The entries themselves seem to be as informative and helpful as can be expected within the limits of brevity required to compress the dictionary into a single volume. Many trade-marked names are given but without giving the name of the company which controls the trade-mark.

In order to judge the probability of finding a definition of any desired word the reviewer tried the statistical technique commonly used in giving "examinations" to students. A list of one hundred words was prepared, divided into ten classes of ten words each. Then these words were looked up in their proper alphabetical place. No attempt was made to judge the accuracy or sufficiency of the definition, but if the word was found at all in its normal alphabetical place followed by a definition or by a cross-reference to another place where it was defined it was counted favorably, and if missing unfavorably. The score was 56 words found and 44 missing. Of course, as is usual in such examinations, the words missed were on the

whole more unusual or difficult than those found. The detail score by classes and the words missed are given below in the hope that they may give some indication to prospective buyers as to the probable usefulness of the book.

*Minerals*, 7-3 (7 found and 3 missing) (greenockite, lorandite, patronite); *Inorganic compounds and pigments*, 4-6 (alkahest, cyanogen iodide, phospham, rouge, smalt, thiazyl chloride); *Alloys*, 6-4 (duriron, nichronie, mag-nalium, manganin); *Organic*, 6-4 (dulcin, melamine, per-benzoic acid, tetralin); *Physical*, 5-5 (entropy, fugacity, mesotron, poise, zeta potential); *Apparatus*, 4-6 (eudi-ometer, induction furnace, nephelometer, osmoscope, spec-trophotometer, tensimeter); *Drugs*, 10-0; *Dyes*, 2-8 (Cyananthrol, Eriochrome Black, Indanthrene Red, Rhodamine, Salicine Black, Safranine, Thion Blue, Ursol); *Industrial or Analytical Processes commonly known by the name of the inventor* 8-2 (Carter Process for White Lead, Dubbs Process for Cracking Petroleum); *Trade Names*, 4-6 (Captax, Celanese, Cellophane, Eikonogen, Freon, Kodapak). The reviewer was surprised and disappointed that the score was so low. Perhaps this merely proves that more than one volume is needed to give a 95% chance of success in looking up an unknown word in a chemical dictionary.

GRINNELL JONES

**Statistical Thermodynamics.** By R. H. FOWLER and E. A. GUGGENHEIM. The Macmillan Company, 60 Fifth Avenue, New York, N. Y., 1940. 693 pp. Price, \$9.50.

This companion volume to the well-known "Statistical Mechanics" by R. H. Fowler presents in greater detail but with occasional omission of especially advanced mathematical steps, those applications of statistical mechanics which should be of immediate interest to students of chemistry and physics. It is a comprehensive book and one can hardly think of a branch of physical chemistry which is not mentioned in it, however briefly.

After a short introduction into the general methods of statistical mechanics by the Darwin-Fowler method of "steepest descents," the authors correlate the results with classical thermodynamics and apply them to ideal gases, demonstrating the success of statistical calculations by many comparisons with experimental data. There follows a presentation of the theory of crystals based on an extension of Debye's treatment and then the statistical methods are applied to the problem of homogeneous and heterogeneous equilibria. Grand Partition Functions are introduced in the next chapter, that is, partition functions for the entire assembly of systems whose inter-actions may not be neglected and these are applied in a discussion of the equation of state of slightly imperfect gases and in an analysis of the problem of gas condensation and some other cooperative phenomena. The following chapters deal with liquids and with non-electrolytic solutions, with solutions of electrolytes, surface layers, elementary theory of metals, chemical kinetics (here the classical collision theory as well as the Polanyi-Eyring-Rice statistical treatment are discussed), lattice imperfections and order-disorder in crystals. The last chapter is devoted to a brief consideration of some electric and mag-

netic phenomena, such as the electric and magnetic susceptibilities, ferromagnetism, cooling by means of adiabatic demagnetization, etc.

In a brief review it is difficult to give even an approximate idea of the wealth of information contained in this book which one is tempted to call a standard reference work of the theories of the macroscopic properties of matter. Unfortunately, however, the authors let themselves be carried away by a love for the mathematical formula so that the book is by no means an easy reading one and is hardly suitable for anyone whose mathematical training is somewhat incomplete or rusty. Even after reading this volume, the reviewer has still to be convinced that the Darwin-Fowler method has any advantages, except some mathematical elegance, over the much more instructive Boltzmann procedure and it seems to him that statistical mechanics could be adequately presented with a greater economy of mathematical symbols. Nonetheless any physical chemist with a flair for mathematics cannot do better than to devote a generous portion of his time to a thorough study of at least some portions of this book, to learn better the basic principles of physical chemistry.

As is usual with the books of the Cambridge University Press, the printing and the general make-up of the book are excellent and no serious misprints have been noted by the reviewer.

G. B. KISTIAKOWSKY

**Specific and Special Reactions for Use in Qualitative Analysis with Particular Reference to Spot Test Analysis.** By F. FEIGL, Ph.D., formerly Professor in the University of Vienna, Director of the Research Laboratories Soc. Belge de Recherches et d'Études, Ghent. Translated from the third German edition by RALPH E. OESPER, Ph.D., Professor of Analytical Chemistry at the University of Cincinnati. Nordemann Publishing Company, Inc., 215 Fourth Avenue, New York, N. Y., 1940. ix + 192 pp. 16 × 23.5 cm. Price, \$3.50.

The author states in the Preface that this book is essentially a translation of the third German edition but that some new material intended for the fourth edition which is to be published shortly has been included.

In this volume Feigl discusses chemical reagents and chemical reactions from the point of view of their utility in chemical detection and in chemical analysis in a broad, illuminating, and so far as I am aware, unique fashion. Important chapters deal, for instance, with the masking of reactions, the enhancement of reactivity, the effect of certain atomic groupings on the specific and selective reactivity of compounds, the influence of certain groups and of weighting on solubility and, finally, capillary phenomena and fluorescence analysis in spot reactions.

In these chapters the author cites a wealth of illustrative examples, largely drawn from recent investigations by himself and by many others. It is of particular interest to note from these examples the extraordinary specificity and sensitivity which have been attained, particularly by the methods involving catalyzed and induced reactions.

One cannot refrain from mentioning in this connection the work of Krumholz and Watzek cited by the author where traces of gold salts are used to accelerate catalyti-

cally the reaction between silver salts and ferrous salts. By this means the presence of gold could still be detected in a gold solution diluted  $1:5 \times 10^{12}$  times. This, indeed, appears to hold the record among inorganic reactions, although we might point out that it is perhaps exceeded by *crocin* which Kuhn, Moewus and Jerchel found to show a detectable biological activity at a dilution of  $4 \times 10^{-16}$  parts by weight.

ARTHUR B. LAMB

**Twelfth Report of the Committee on Catalysis—National Research Council.** John Wiley and Sons, Inc., 440 Fourth Avenue, New York, N. Y., 1940. x + 388 pp. Illustrated. 15.5 × 23.5 cm. Price, \$5.00.

It is stated in the preface to this book that "the intention of this report is to present (in twenty chapters) a somewhat critical and proportioned impression of the state of progress of catalysis, with a résumé of some of the important work published since the appearance of the eleventh National Research Council report (in 1935). In the execution of this plan, certain trends have been recognized. Since the pertinent literature on catalysis is now too great to be evaluated by any one man, the various members of the committee agreed to cooperate in the writing of a single report." In the estimation of the reviewer, the original intent of the committee has been splendidly realized and the present work is superior to that of the past in many respects.

The committee has been reorganized since the last report in order "that the most suitable personnel should deal with the succeeding report, the topics of which necessarily change somewhat." An illustration of the expanding activity of the committee is provided by the change in their title from "Committee on *Contact Catalysis*" since the last report. The organization of the committee is explained in the following words which embody quite a vital point of view. "When industrial interest involves some field formerly the domain of academic men, this field is likely to experience a forced growth with which academic men cannot compete experimentally. This has happened, *e. g.*, in some phases of hydrocarbon chemistry. For such reasons, it is doubtful that academic and industrial fields can afford to remain isolated from each other. Accordingly, the committee is composed half of academic men and half of industrial men with no great effort to distinguish that knowledge which is pure from that which is applied." Namely, the committee consists of Messrs. Robert E. Burk, *Chairman*, Dean Burk, P. H. Emmett, Louis S. Kassel, Wilbur A. Lazier, L. F. Marek, F. O. Rice, Hugh S. Taylor, and E. C. Williams, all of whom are authorities in the field and have contributed to the report either individually or in cooperation with an associate. Important contributions have been made by Messrs. George E. Kimball and H. H. Storch also.

Because of the general nature of the title of the book, a repetition here of the chapter headings will probably be helpful in presenting the prospective reader with a little more detailed view of the contents; each chapter is followed by a comprehensive bibliography: I—Recent Developments in the Theory of Chemical Bonds and Reaction Rates; II—Free Radicals and Surface Reactions;

III—Activated Adsorption; IV—Active Centers; V—Physical Adsorption in the Study of the Catalyst Surface; VI—The Role of Ions in Surface Catalysis; VII—Contact Catalysis in the Hydrogenation of Coal, Coal Tar, and Oil; VIII—Catalytic Dehydrogenation of Oxyorganic Compounds; IX—Dehydrogenation of Hydrocarbons; X—Hydrogenation of Hydrocarbons; XI—Hydrogenation of the Oxides of Carbon; XII—Progress in the Catalytic Hydrogenation of Fats and Oils; XIII—The Synthesis of Ammonia; XIV—Catalytic Oxidation; XV—Catalysis in Polymerization; XVI—The Retardation of Chemical Reactions; XVII—The Hydration, Dehydration, and Hydrolysis of Organic Compounds; XVIII—Halogenation and Hydrohalogenation Reactions by Catalytic Processes; XIX—Halide Catalysts; XX—Biochemical Catalysis.

In the presentation of theory (again quoting the preface) "the viewpoint of individual writers on catalysis has been characterized by overemphasis of some particular factor. . . . Actually the phenomena of catalysis are too complex to fit into one mechanism and one advantage of a coöperative undertaking of this kind is to check tendencies to over-develop some aspect of the subject." Even the casual reader of this report will appreciate the accomplishment of this ideal. "This report is reasonably comprehensive on the subjects covered with respect to the literature of the years 1935, 1936, and 1937. It is a progress report." Honorable mention with respect to comprehensive coverage goes to Chapters XIV, XV, and XIX. The patent literature, oft neglected in reviews, is also given careful consideration in many of the chapters. Another feature of the report which might well be copied in other writings of a review or reference nature is the appendage of a series of pertinent book reviews presented "in somewhat greater detail than in the average journal review."

The book is well organized, printed, and bound, practically free of typographical errors. It presents a much more neat appearance than the mimeographed combined tenth and eleventh reports, and also includes a table of contents and complete author and subject indices.

On the whole, this book is probably the finest review of the literature on catalysis ever written. The reviewer recommends it wholeheartedly, particularly as a review and reference volume in its field, and congratulates the committee in their accomplishment.

RICHARD F. ROBEY

**Chambers' Technical Dictionary.** Edited by C. F. TWENEY, editor of "A Technological and Scientific Dictionary," standard books, etc., and L. E. C. HUGHES, A.C.G.I., D.I.C., B.Sc., Ph.D., A.M.I.E.E., A.M.I.R.E., M.A.S.A., lecturer in Electrical Communication, City and Guilds College, Imperial College of Science and Technology, London. The Macmillan Co., 60 Fifth Avenue, New York, N. Y., 1940. viii + 957 pp. 14.5 X 21 cm. Price, \$5.00.

The outstanding feature of this technical dictionary is its wide scope. Its 45,000 entries include not only terms useful in the physical sciences but also many from the natural sciences, branches of engineering, industries (glove making, glass and soap manufacturing, to mention a few), mechanic trades, medicine, printing and psychology. Ac-

cordingly, the definitions, while written by some 29 specialists, are intended, to quote the authors, "for the technically minded man-in-the-street." This does not imply decrease in rigor, but rather wording such that with a previous elementary knowledge the reader can grasp the meaning. An indication of the book's contents can be obtained from the following classification of words on a page picked at random: chemistry, 6; medicine, 6; zoölogy, 5; light, 2; photography, 2; botany, 2; joinery, 2; textiles, 2; geology, 2; and one each from radio, electrical engineering, foundry, masonry, rubber technology, mining, architecture, typography, acoustics and physics.

The book is well printed, entries stand out so that they are easily found, errors are very rare, the binding is good and the volume is of a handy size. It would be of use to any student of science.

R. L. TICHENOR

## BOOKS RECEIVED

August 10, 1940–September 10, 1940

R. G. AUSTIN. "Aids to Inorganic Chemistry." The Williams and Wilkins Co., Mt. Royal and Guilford Aves., Baltimore, Md. 348 pp. \$1.50.

LOUIS DEVRIES. "French-English Science Dictionary." McGraw-Hill Book Co., Inc., 330 West 42nd St., New York, N. Y. 546 pp. \$3.50.

ALEXANDER FINDLAY. "Chemistry in the Service of Man." Fifth Edition, Longmans, Green and Co., 55 Fifth Avenue, New York, N. Y. 398 pp. \$2.50.

J. ALLEN HARRIS and WILLIAM URE. "Experimental Chemistry for Colleges." Second edition. McGraw-Hill Book Co., Inc., 330 West 42nd St., New York, N. Y. 123 pp. \$1.25.

H. MARK and G. STAFFORD WHITBY, Editors. "High Polymers." Volume I. "Collected Papers of Wallace Hume Carothers on High Polymeric Substances." Interscience Publishers, Inc., 215 Fourth Avenue, New York, N. Y. 459 pp. \$8.50.

WILLIAM MCPHERSON, WILLIAM EDWARDS HENDERSON, W. CONARD FERNELIUS and EDWARD MACK, JR. "Chemistry, A Textbook for Colleges." Ginn and Co., 15 Ashburton Place, Boston, Mass. 762 pp. \$3.75.

WILHELM PRODINGER. "Organic Reagents Used in Quantitative Inorganic Analysis." Translated from the second German edition by STEWART HOLMES. Nordeman Publishing Co., Inc., 215 Fourth Avenue, New York, N. Y. 203 pp. \$5.00.

C. F. TWENEY and L. E. C. HUGHES, Editors. "Chambers' Technical Dictionary." The Macmillan Co., 60 Fifth Avenue, New York, N. Y. 957 pp. \$5.00.

E. WERTHEIM. "A Laboratory Guide for Organic Chemistry." Second edition. The Blakiston Co., 1012 Walnut St., Philadelphia, Penna. 560 pp. \$2.00.

ROLAND M. WHITTAKER. "A Laboratory Handbook and Syllabus for a First Year Course in Chemistry." Robley Press Service, Inc., 238 William St., New York, N. Y. 548 pp. \$1.00.