carbon tetrachloride contained in a flask surrounded by cold water, there was added drop by drop 12 g. (0.37 mole) of absolute methyl alcohol. The reaction mixture was refluxed gently for one to two hours until no more hydrogen chloride was evolved. The solvent was then removed by evaporation under a vacuum and the remaining liquid fractionated at a pressure of 4 mm. Considerable decomposition resulted at higher pressures. There was finally obtained 7 g. (25% yield) of the desired ester boiling at 95–96° (4 mm.). Dimethyl β-chloro-ethyl phosphate is a colorless, mobile liquid having a faint ester odor.

Anal. Calcd. for $C_4H_{10}O_4PCl$: Cl, 18.79. Found: Cl, 18.94, 18.70.

Dimethylphosphato-ethyltrimethylammonium Chloride (Choline Ester of Dimethyl Phosphoric Acid), $(CH_3O)_2OPOCH_2CH_2N(CH_3)_3Cl$.—A toluene solution of 3.0 g. (0.05 mole) of trimethylamine and 9.4 g. (0.05 mole) of dimethyl β-chloro-ethyl phosphate was allowed to stand overnight in a pressure bottle. The product was filtered off and washed with toluene and dry ether. It crystallized from a small volume of chloroform in fine needles, m. p. 136.5–137° (corr.). It is somewhat soluble in chloroform and acetic anhydride, very soluble in water and in ethyl alcohol, nearly insoluble in ether, toluene, petroleum ether and carbon tetrachloride. It is very hygroscopic.

Anal. Calcd. for $C_7H_{19}O_4NClP$: Cl, 14.32. Found: Cl, 14.42, 14.37.

Dr. Reid Hunt has found this compound to have little muscarine action. It does have, however, a powerful stimulating nicotine action.

Conclusion

β-Chloro-ethyl phosphoryl dichloride has been prepared. It condenses with trimethylamine to form a quarternary salt. From it, too, dimethyl β-chloro-ethyl phosphate has been obtained. This forms with trimethylamine the choline ester of dimethylphosphoric acid. Hunt has found that the latter compound has the interesting property of giving a powerful stimulating nicotine action and yet has little muscarine action.

NEW YORK, N. Y.

NEW BOOKS

College Chemistry. By NEIL E. GORDON, Professor of Chemical Education, Johns Hopkins University. World Book Company, Yonkers-on-Hudson, New York, 1928. ix + 516 pp. 88 figs. 14 × 21 cm. Price $2.96.

The book is written especially for students who have had high-school chemistry and therefore omits much of the descriptive material found in ordinary texts. It is divided into two general parts, the non-metals and the metals. Under each head certain units are taken up, since it is the idea of the author that for students who already have a reasonable amount of chemical information, the more advanced viewpoint is best given by the study of topics rather than by a description of the properties of individual elements. Like other Gordon texts, the subject is presented by means of laboratory exercises, on which the discussion is based. While this may make the book less generally useful than if it were cast in the usual form, yet it has advantages for those who wish to follow Dr. Gordon's

methods exactly. In general, standard methods of presentation have been used. The author should be commended for his practice of presenting problems without excessive use of formulas. It is doubtful, however, whether the terms electronization and deëlectronization will ever take the place of the historical reduction and oxidation. The book is carefully written and well arranged and undoubtedly is a real addition to the texts available for the teaching of chemistry.

P. A. BOND

Anleitung zur Chemischen Gesteinsanalyse. (Introduction to Chemical Rock Analysis.) By PROF. DR. J. JAKOB. Gebrüder Borntraeger, W 35 Schöneberger Ufer 12 a, Berlin, Germany, 1928. vii + 81 pp. 3 figs. 16 × 24.5 cm. Price, bound, R. M. 7.

This "Büchlein" attempts to instruct the student in the making of the complicated chemical analysis of rocks, by which igneous rocks are mostly meant, within the compass of 79 pages. There is no general discussion of apparatus, reagents, methods or sources of error, and much of the matter is relegated to the footnotes. The student is assumed to have some knowledge of general quantitative analytical procedure or to work under the supervision of an instructor.

The methods, in general, follow those of Hillebrand and of the reviewer, but there are many complications and variations, and several of these differences in procedure are wide and unexpected, some of them not for the better. The treatment is very unbalanced: some of the descriptions are ultra-detailed, while again an important determination is dealt with much too briefly. Thus, only one page is devoted to the method for FeO, while two pages are given to the unimportant Li_2O. The reviewer differs with the author as to many particulars, such as the use of a porcelain basin ("which should not be much attacked") for treating the sodium carbonate melt; the advocacy of the old and very inaccurate and tedious Cooke method for FeO instead of the rapid and accurate Pratt method; the use of H_2SO_4 instead of HCl in several processes; the inordinate quantities of hydrofluoric acid that are recommended; the non-use of molten pyrosulfate for bringing the ignited Al_2O_3, etc., precipitate into solution; and the details of many other procedures too numerous to be mentioned here. The author advocates the determination of several constituents in aliquot parts of a filtrate. This is usually quite unnecessary, for the amount of rock powder available is, or should be, sufficient to make many of the author's material-saving procedures uncalled for, although they may often be necessary in analyzing a mineral of which there may be only a gram or so. The author lays much stress on accuracy, but the attainment of this is, in many cases, rendered difficult by the elaborate and complicated precautions that are taken especially to ensure it. The book, on the whole, is distinctly disappointing and, as a modern textbook, does not compare favorably with the earlier ones by Dittrich and by Jannasch.

The reviewer takes this opportunity to deplore the very inadequate and unsatisfactory way in which the quantitative analysis of silicates, including rocks and minerals, is treated in the standard manuals of quantitative analysis, such as those of Fresenius and of Treadwell-Hall.

HENRY S. WASHINGTON

Physikalisch-chemische Praktikumsaufgaben. (Experiments in Physical Chemistry.) By DR. ARNOLD EUCKEN, Professor and Director of the Physical-Chemical Institute of the Technical High School of Breslau, and Dr. Rudolf Suhrmann, Lecturer at the Technical High School of Breslau. Akademische Verlagsgesellschaft m. b. H., Markgrafenstrasse 4, Leipzig C 1, Germany, 1928. xii + 240 pp. 103 figs. 16 × 23 cm. Price, unbound, M. 13; bound, M. 14.

This Laboratory manual is undoubtedly the best that has so far been published. The experiments are, in the main, well chosen to illustrate the principles of physical chemistry, and are sufficient in number to allow the instructor considerable latitude in the way of choice of the experiments to be assigned. The directions, while brief, are sufficiently explicit, and an abundance of references are given so that the student who has a real curiosity (and some do exist) can easily learn more concerning the subject. The typography and binding are both excellent.

Part I is an introduction to the various methods of physico-chemical measurement and includes 24 experiments. Part II is devoted to physico-chemical analyses by mechanical, optical, thermal and electrical methods. Fourteen well-chosen experiments illustrate the use of such methods for quantitative analytical work. Doubtless some will consider that much of this should be given in a course entitled, say, "Quantitative Analysis by Instrumental Methods." The important point is that it be given somewhere. Part III is devoted to the determination of physical chemical constants and includes 59 experiments grouped under the general headings: thermal constants (26 experiments), calorimetric measurements (6 experiments), reaction velocity (4 experiments), electrolytic constants (8 experiments), surface phenomena (7 experiments), and the constitution of matter (8 experiments). Among these many experiments are a considerable number which are essentially new, and while the reviewer has not had an opportunity to try them out in the laboratory, he sees no reason why they should not work out satisfactorily. Part IV is an Appendix in which ten additional experiments are suggested. The student is expected to work out his own details of procedure from the literature references and hints given.

A laboratory course based on the performance of all of the experiments given would probably run through a period of two years, which is more time than can usually be devoted to this subject. However, with such an excellent assortment from which to choose, the instructor should be able to plan assignments of 30 to 40 experiments for a year's

course for each student, and at the same time to vary the assignments so as to have most of the experiments going on in the laboratory. Students learn much by association, and the reviewer believes that nothing is more deadly than to have each student in a class perform exactly the same list of experiments. Such a system savors too much of machine production. The greater the variety of the experiments going on in the laboratory, the more interest on the part of the students (and instructor).

J. H. MATHEWS

Das Gesetz der chemischen Massenwirkung. Seine Thermodynamische Begründung und Erweiterung. (The Law of Chemical Mass Action. Its Thermodynamic Basis and Development.) By RICHARD LORENZ, Dr. Phil., Dr. Ing. E.H., Professor and Director of the Physical Chemistry Institute of the University of Frankfort. Leopold Voss, Solomonstrasse 18 B, Leipzig, Germany, 1927. x + 176 pp. 13 figs. 16 × 23.5 cm. Price, unbound, R. M. 12.50; bound, R. M. 14.50.

This monograph presents the results of the experimental work of the author and his collaborators on the equilibrium between molten metals and their salts (chlorides), all being of the type $Pb + CdCl_2 = Cd + PbCl_2$, in which there are two immiscible liquid phases. A thermodynamic development of a mass action law for such condensed systems is given, using van Laar's and the author's equations for the chemical potential of gases in gas mixtures.

The classical mass action law of Guldberg and Waage is discussed at length, giving the van't Hoff derivation and several applications. The chemical potential of a gas in a mixture of ideal gases is next developed and the "ideal mass action" law again derived by use of the general equilibrium relation $\Sigma (\nu_1 \mu_1) = 0$. An equation for the chemical potential of a gas in a mixture of gases obeying van der Waals' equation is then obtained by use of the thermodynamic potential $F_{V,T}$, and applied to condensed (liquid) systems by replacing the volume of the gas by the van der Waals' B constant for the mixture. The "new mass law" deduced in this manner is applied to some nine equilibria between molten metals and their chlorides with fair success. Finally a discussion of the Duhem–Margules relation and the electromotive force of cells composed of molten salts and metals is given.

The logic of the treatment of mixtures of gases obeying van der Waals' equation is not satisfying, although the expression given for the chemical potential can be deduced by use of the more rigorous methods developed by Gillespie and others. The author's derivation is not made with a minimum of assumptions and in fact those assumptions which are used are not clearly stated. Since the treatment of condensed systems requires an integration along the van der Waals' isotherm into the liquid phase, the new mass action law so obtained can hardly be considered as resting on

a firm thermodynamic basis and must stand or fall on its simplicity and reproduction of the experimental data.

The monograph contains a wealth of historical information, especially that derived from German sources. Much material which does not bear on the author's main thesis and which is to be found in textbooks on physical chemistry is included.

JAMES A. BEATTIE

Atomic Structure as Modified by Oxidation and Reduction. By WILLIAM COLEBROOK REYNOLDS, D.Sc. (Lond.), F.I.C., A.R.C.S. Longmans, Green and Company, 55 Fifth Avenue, New York, 1928. viii + 128 pp. 11 figs. 14 × 22.5 cm. Price, $3.00.

This book presents a scheme of electron distribution in atoms which is at variance with those now considered generally useful or probable. The author shows a hearty indifference to spectroscopic or other verifications of his proposed structures, but applies these to the "explanation" of a wide variety of facts of inorganic and organic chemistry. As the rules of the game are not very clearly stated, it is hard to appraise the theory's triumphs in these fields. The sections on the emission and absorption of radiation, the structure of solid conductors and magnets, are entirely qualitative and vague, and appear to offer no advantages over treatments based on quantum theory. No book of this type can be complete without a little something about the ether, and accordingly we learn that "the chemistry of the ether has been neglected" and come to know "the properties of ether particles," and that "on account of these," *e. g.*, it is not m but e which varies at high electronic speeds. Stress and strain, dielectric constants, photoelectricity, gravitation, special and general relativity and many other topics are one by one seized, licked into shape in a few terse sentences and returned to their guardians, the physicists, with a grave word or two of warning or encouragement. It seems a pity that a book of such wide scope should bear a title which might mislead a prospective purchaser into expecting another mere Sommerfeld or Andrade. The reviewer begs to take as his motto a clause from page 123 "At present we must try and appraise aberrations correctly."

NORRIS F. HALL

Lumineszenz-Analyse im filtrierten ultravioletten Licht. (Analysis by Means of Luminescence in Filtered Ultraviolet Light.) By PROFESSOR DR. P. W. DANCKWORTT, Hannover. Akademische Verlagsgesellschaft m. b. H., Leipzig, Germany, 1928. vii + 106 pp. 39 figs. 16 × 23.5 cm. Price, unbound, M. 6.50; bound, M. 7.80.

Inorganic and organic substances in truly great variety fluoresce in that part of the invisible radiation of the quartz mercury vapor lamp which

is transmitted by nickel oxide glass. Differences in color and intensity including, of course, absence of fluorescence, lead to qualitative identifications and even to quantitative data. It is evident that comparisons involving several monochromatic and widely separated spectral bands would be even more highly informative. The book outlines microscopic as well as macroscopic procedures, and does not neglect photographic possibilities. Gems, minerals, fossils, textiles, rubber, dyestuffs, foods, drugs, anatomical preparations and bacteria are examples of the materials discussed. The section on criminal investigation ought to provide plots for a wealth of detective stories involving secret writings, counterfeited or altered money, stamps, checks and other documents, finger prints, physiological secretions and the like. Some two hundred selected references are given in conclusion. The author, enthusiast though he is, stresses the uncertainties of his art, especially in inexperienced hands. The general interest of the book will amply repay the reader, even if it touches upon none of his scientific or personal problems.

G. S. FORBES

Chemical Publications, their Nature and Use. By MELVIN GUY MELLON, **Ph.D.**, Associate Professor of Analytical Chemistry, Purdue University. McGraw-Hill Book Company, Inc., 370 Seventh Ave., New York, 1928. viii + 253 pp. 14.5 × 21 cm. Price, $2.50.

About a year or so ago, Crane and Patterson published their "Guide to the Literature of Chemistry," intended for the student in college as well as for the chemist of wider experience; this, however, is more of a reference book than a textbook. In "Chemical Publications" Mellon has presented a real textbook, based upon his undergraduate course in chemical literature.

The object of the book is stated to be three-fold: first, to sketch briefly the general trend of events giving rise to and accompanying the development of chemical publications; second, to present an outline of the present sources of published chemical information, with a consideration of the general nature of each class and of typical examples in the various classes; and third, to suggest certain exercises indicating possible laboratory work for class use.

The book opens with a discussion of original sources: periodicals, institutional publications (covering mainly Federal documents), patents and their literature, dissertations and manufacturers' bulletins. Then follows a discussion of the so-called secondary sources: abstract journals, review serials, bibliographies, general works of reference and textbooks.

This material, comprising the first eight chapters, covers in an abbreviated form the material previously covered by Crane and Patterson, but it is felt that it is presented in such a way as to be more useful to the

group for which it is intended. The real purpose of the book will be found in the last two chapters, which discuss "Making Searches in Chemical Literature" and "Library Problems." After introducing the student to the methods of classification used by libraries, the card catalog and indexes, directions are given for making a short and an exhaustive search of the literature. Finally, there is presented a series of fourteen problems, sufficient for a semester of sixteen weeks. These are of increasing complexity, starting with data regarding a given journal, institutional publication or patent, then going to data regarding a given chemical, chemical system, apparatus or process and concluding with the preparation of a bibliography and a critical report.

The reviewer has had ample opportunity to observe the need of this kind of training for our chemical students. For example, many of the questions which come to the Research Information Service of the National Research Council could be answered by the inquirer by consulting the standard textbooks or the indexes of *Chemical Abstracts*. Another point which should be emphasized by the instructor in such a course is accuracy in literature citations. When one finds a bibliography with from ten to fifty per cent. of errors, one cannot but wonder at the accuracy of the body of the paper to which the bibliography is appended. While much of this is due to the inexcusable habit of copying citations from published papers without first verifying them, it in no way relieves the author of his responsibility.

Professor Mellon has presented a very helpful book and it is to be hoped that the appearance of this work may stimulate the chemical departments of many universities to introduce a course on "Chemical Literature" as a part of their regular curriculum.

CLARENCE J. WEST

Chemical Patents Index. A Comprehensive and Detailed Index of the Subject Matter of Specification and Claims of United States Patents and Patent Reissues Granted during the Decennial Period 1915–1924 Inclusive, Covering the Entire Field of Chemical Technology. By EDWARD CHAUNCEY WORDEN, FIRST, Ph.C., B.S., M.A., F.C.S., F.L.S. Volume I. The Chemical Catalog Company, Inc., 419 Fourth Avenue, New York, 1927. 904 pp. 17 × 25 cm. Price, $25.00.

This is the first of five volumes which will contain a detailed and comprehensive index of the United States Patents during the decade 1915–1924. During this period 398,377 patents were issued, of which 22,882 dealt with some branch of chemical technology. 14,526 names are recorded as sole or joint inventors in these patents. The chemical patents were examined in detail and an index card prepared for every chemical substance or class or process mentioned. It is stated that in one extreme case 2756 cards were prepared from a single patent. The work will obviously be extremely useful to anyone who has to deal with chemical patents in any

way. Its usefulness is, however, limited by the fact that it covers only a single decade. Therefore the index can supplement, but not replace, the older and more cumbersome method of making a patent search. Fortunately the author announces that he and his staff are now engaged in extending the work to cover the decade 1905–1914 and the period 1925–1926. It is to be hoped that the work will receive sufficient support to make possible its extension backward and forward.

It may be of interest to append the first dozen names of inventors in order of number of chemical patents issued during this decade, together with a few other well-known names: C. Ellis, 237; W. Snelling, 67; W. Lindsay, 47; S. Peacock, 47; A. Backhaus, 46; H. Dreyfus, 41; W. Kempton, 40; L. Barton, 39; R. Benner, 38; S. Carroll, 38; R. Price, 38; T. Edison, 37; L. Baekeland, 28; H. Howard, 27; H. Dow, 24; G. Claude, 20.

GRINNELL JONES

L'État Colloidal et l'Industrie. (The Colloidal State and Industry.) By W. KOPACZEWSKI, M.D., Sc.D., Professor at l'Institut des Hautes Études, Belgium. Vol. II. Librairie Polytechnique. Ch. Béranger, 15 Rue des Saints Pères, Paris, France, 1927. viii + 344 pp. 68 figs. 16 × 25 cm. Price, fr. 70.

Vol. I appeared in 1925, and in response to the criticism it drew that the treatment of many industries was summary, the author in his present preface points out that these books are meant to serve as a *complement* to existing technologies, supplying missing colloidal data.

Vol. II is divided into three parts: (1) applications dealing with the mechanical properties of colloids (including decantation, filtration, centrifugation, ultrafiltration, dialysis, diffusion, adsorption, catalysis and its applications); (2) applications of the electrical properties of colloids (including sorption and its applications and electrophoresis); (3) equilibrium conditions of the colloidal state (including stabilization and labilization of hydrosols, swelling and syneresis of gels). The indexes and tables of contents of both volumes are included, and each chapter is followed by a bibliography, which does not, however, enable the reader to locate the source of each statement directly.

The author has compressed into this book a large amount of useful information and his references indicate that he has not confined his wide reading within national or linguistic lines, so that there is hardly anyone who will not get much good of it. All told, however, one receives the impression that some of the information comes directly from patents, books or journal articles, and expresses points of view rather than commercially and technically accepted procedure. Few will agree to placing the lower colloidal limit or size at 20 mμ; but then, one does not have to agree with everything an author says to profit by his labors.

JEROME ALEXANDER

Pharmaceutical and Medical Chemistry. By SAMUEL P. SADTLER, Ph.D., LL.D., late Professor Emeritus of Chemistry in the Philadelphia College of Pharmacy, Virgil Coblentz, Ph.D., F.C.S., Professor Emeritus of Chemistry and Physics in the Department of Pharmacy of Columbia University, and Jeannot Hostmann, Ph.G., late Associate Professor of Chemistry and Director of the Analytical Laboratory in the Department of Pharmacy of Columbia University. Sixth edition, revised and rewritten by Freeman P. Stroup, Ph.M., Professor of General Chemistry, Philadelphia College of Pharmacy and Science. J. B. Lippincott Company, Philadelphia and London. 15 × 23.5 cm.

As stated in the preface to the present edition, "The appearance of the United States Pharmacopeia X, the National Formulary V, and the 1926 edition of New and Non-official Remedies has made it essential that a new edition of this book be prepared. Besides, many manufacturing chemical processes have undergone change and many new substances have come into more or less general medicinal and pharmaceutical use in recent years." A comparison of past editions with the present one reveals no material change in the general character of the book, although the authors have striven to bring the text up to date and to amplify certain portions obviously needing such attention. Revision of both the inorganic and organic sections has been thoroughly effected. The section on chemical physics is omitted from the present edition owing to the fact that in most college courses in pharmacy today more elaborate courses in physics are available than formerly. This saving in space is taken advantage of by the introduction of entirely new matter of a purely chemical character, as also by materially enlarging the index, thus rendering the present edition more desirable both as a textbook and reference work. Serious errors are few as will be readily apparent to the reader. A typographical error has, however, apparently crept into the periodic system of the elements, p. 208, Period E, Column V, Se should read Sb.

W. O. EMERY

Glycerol and the Glycols. Production, Properties and Analyses. By JAMES W. LAWRIE, Ph.D., Research Chemist, E. I. DuPont de Nemours and Co. American Chemical Society Monograph Series. The Chemical Catalog Company, Inc., 419 Fourth Avenue, New York City, 1928. 447 pp. 81 figs. 15.5 × 23.5 cm. Price $9.50.

This book is an interesting and valuable addition to our knowledge of industrial aliphatic chemistry, containing as it does a very thorough review of the subject and many new and otherwise inaccessible data.

The first four chapters give a review of the sources, methods of production and manufacture of glycerol from soap lyes.

In Chapter V the synthesis of glycerol by fermentation is described at length and in Chapter VI the physical properties and constants of glycerol and its aqueous solution are given. For the latter it is evident that the

author has drawn freely on the valuable data in the DuPont files, which are otherwise inaccessible.

The chemistry and reactions of glycerol, its detection, analysis, specifications and commercial utilization are discussed in a thorough manner, while chapters on the manufacture of glycerol trinitrate, glycol dinitrate and the methods of production of the glycols also contain much valuable information.

While the text is printed in the customary clear type the same cannot be said of the numbering of the footnotes.

The subject matter has been carefully corrected, to judge from the few misspelled words noted, *e. g.*, p. 206, hypochlorus; p. 224, pyrocatechic, isophorn; p. 314, glycerite; p. 348, labil; p. 388, difficient; p. 371, internals.

Formula II on p. 387 is incorrectly given, as is also the formula for ethylene on p. 363. Table 113 on p. 381 is incorrectly given as Table 112. A few other points calling for comment are the following: The statement (p. 44) that propylene chlorohydrin can be hydrolyzed to glycerol is obviously incorrect. The same remark also applies to the statement that glycerol is a triose. The boiling point of di-*iso*-amylin calls for correction, as well as the spelling of the word. It would seem advisable to insert in a footnote to Table 113 the significance of the letters used. The term "artificially" (p. 220) should be replaced by "synthetically."

In Table 98 the melting points of the two forms of the trinitrate are given as 2.2 and 12.2° and in Table 99 as 2.8 and 13.5°. The values obtained by the reviewer and co-worker in a carefully conducted research were 2.0 and 13.2° and so far as is known represent accurate data.

The author (p. 212) gives the number of theoretical oxidation products of glycerol as eleven but overlooks hydroxymalonic acid (tartronic acid).

The latent heat of fusion is given in a clear-cut statement (p. 348) as 23.1 calories per gram, while on p. 391 attention is drawn to the probable incorrectness of the figures by quoting the same author's own attitude. This value was carefully determined by the reviewer and co-worker and there is no doubt as to the inaccuracy of Nauckhoff's figures. As given in the text it would seem that the doubt is on the side of Hibbert and Fuller's results. The description of the apparatus, Fig. 70, p. 359, does not correspond with the text; at least it is difficult to recognize in the sketch a graduated centrifuge tube of the dimensions given.

One point which calls for criticism (and for which the editors of these Monographs must also be held responsible) is the careless use of the terms nitro and nitrate. The author repeatedly speaks of nitro glycerol and nitro glycols when obviously glycerol and glycol nitrates are meant. Thus nearly all of the names used in Table 99, and in much of the text, are scientifically inaccurate and misleading. It is to be hoped that this nomenclature will be carefully revised in any subsequent edition.

The author's views on the future of glycerol and the possibility of its synthesis are of interest. The fermentation process would seem to hold, at present, far greater possibilities than the synthesis from petroleum.

In tabulating the various factors which have led to the recent slump in the price of glycerol the most important is omitted, namely, the commercial development of the manufacture of ethylene glycol at a competitive price.

In the opinion of the reviewer, who has devoted a number of years of his scientific career to the possibility of the synthesis of glycerol and glycols, there are few basic organic raw materials which offer more wonderful possibilities than glycerol.

The makers of this product need not necessarily be at all pessimistic about its future, for if they are willing to spend on scientific and technical research only a fraction of the total sum expended on the commercial development of synthetic glycols, there is reason to believe that they will find other more highly profitable outlets and thus render themselves more independent of its present restricted commercial application.

Dr. Lawrie's book can be strongly recommended as a valuable and authoritative work to all interested in the future development of industrial organic chemistry.

The dedication of it to Professor Julius Stieglitz is an admirable and charming tribute to an investigator who has contributed much to the advancement of organic chemistry.

HAROLD HIBBERT