

is proportional to the intensity of the absorbed light but is otherwise independent of the acetylene pressure. Using the same light source, the temperature coefficient of the reaction was determined by comparing the rate at 12 and at 39°. The ten degree temperature coefficient, so determined, has a value of 1.25. It is quite possible that this observed value may be largely the temperature coefficient of the light absorption rather than that of the chemical reaction. Experiments performed with light filters indicate that light of wave length 2537 Å. and longer is not efficient in producing the reaction; this is probably due to the comparative transparency of acetylene in this region.

Several determinations of the quantum yield have been made. The light source used in these experiments was a mercury arc combined with a focal isolation apparatus, which excluded all radiation of wave length greater than 2537 Å. A weighted average of  $M/h\nu$ , for three separate determinations, is  $7.4 \pm 2.5$ . The uncertainty of this value is due to the precipitation of cuprene on the walls of the reaction cell, which limited the measurements to the first two millimeters' reduction in pressure. These experiments will be repeated with a more sensitive manometer in order to obtain a more accurate value for the quantum yield. Similar experiments with allene and the homologs of acetylene are now in progress. In all experiments a "hot" mercury arc was used, pressures were measured with a quartz spiral manometer and liquid-air traps and gold foil were used to prevent the access of mercury vapor to the reaction system.

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## NEW BOOKS

**Gmelins Handbuch der anorganischen Chemie.** (Gmelin's Handbook of Inorganic Chemistry.) Edited by R. J. MEYER. Eighth edition. **Beryllium.** System-number 26. Issued by the Deutsche Chemische Gesellschaft, Verlag Chemie G. m. b. H., Corneliusstrasse 3, Berlin W 10, Germany, 1930. xviii + 180 pp. 10 figs. 17 × 25 cm. Price, to subscribers, M. 23.50; singly, M. 30.

This volume covers the history of our knowledge of Beryllium, its occurrence, the preparation and properties of the free element and the preparation and properties of its compounds with elements having system-numbers smaller than 26, namely, the non-metals and the alkali metals. The literature has been covered to May 1, 1930.

The collaborators in the preparation of this volume were Martin Hosenfeld, Hellmut Fischer, Sibylle Cohn-Tolksdorf (atomic and optical properties) and Adrienne Eisner (the complex compounds).

This volume is yet another valuable addition to this useful reference work.

ARTHUR B. LAMB

**Gmelins Handbuch der anorganischen Chemie.** (Gmelin's Handbook of Inorganic Chemistry.) Edited by R. J. MEYER. Eighth edition. Cobalt. Part B. The Cobaltammines. System-number 58. Issued by the Deutsche Chemische Gesellschaft, Verlag Chemie G. m. b. H., Corneliusstrasse 3, Berlin W 10. Germany, 1930. xxv + 376 pp. 2 figs. 17 × 25 cm. Price, to subscribers, M. 45; singly, M. 58.

The great group of the Cobaltammines whose broad outlines were first discerned by our own Wolcott Gibbs and F. A. Genth and which S. M. Jörgensen so greatly enriched, has been of much importance in the development of chemical theory—particularly as a basis for Alfred Werner's revolutionary and far-reaching ideas.

The first and indeed only adequate encyclopedia of our experimental knowledge of this group has been the volume entitled "Kobaltiake" written by Paul Pfeiffer and published as a part of the seventh edition of Gmelins Handbuch. The present volume is a revision and extension of this earlier work. Its original 290 pages have grown to 376 pages in spite of the use of finer type and the exercise of the greatest conciseness. The literature has been covered to the end of 1929.

Dr. Olga Angern (with Professor Pfeiffer's counsel), Dr. Mark von Stackelberg and Dr. Emma Haller collaborated in the writing and preparation of this book. It, like its predecessor, will be invaluable to anyone engaged in a study of this interesting group.

ARTHUR B. LAMB

**Oxidation-Reduction Potentials.** By L. MICHAELIS, Member of the Rockefeller Institute for Medical Research. Translated from the German Manuscript by Louis B. Flexner. J. B. Lippincott Company, East Washington Square, Philadelphia, Pennsylvania, 1930. xii + 199 pp. 16 illustrations. 14 × 21 cm. Price, \$3.00.

During the past few years the author of this monograph has played an active part in the potentiometric study of those oxidation-reduction systems which are of particular interest to the biologist, and he has "thought it timely and useful to venture to weigh the investigations so far made, to collect and to analyze their application to biological problems and to discuss the theoretical principles of oxidation-reduction potentials with the hope that future work by others as well as by himself might be facilitated." An introductory discussion of the energy changes which may occur in living organisms is followed by an exposition of the more important aspects of the physical chemistry of inorganic and organic oxidation-reduction systems. The remainder of the book is devoted to a description of the physiological applications which have been made of these principles, with particular emphasis on the puzzling system formed by cystine and cysteine, to our

knowledge of which Michaelis and his associates have generously contributed.

Those who have felt the need of some assistance in the problem of rapidly instructing the uninitiate in this modern field of research will not find their desires very well fulfilled by the new book, for it is addressed primarily to the expert rather than to the beginner. The treatment throughout is critical, and the author's comments and historical notes, however interesting, do not always add to the clarity of presentation. The coining of the new word "redox" for "oxidation-reduction" and the inclusion in the text of the symbols "Rep," "Ret," "Oxp" and "Oxt" add neither to the beauty of scientific language nor to the simplification of the subject.

Those who are engaged in research on oxidation-reduction potentials will find in Michaelis' monograph an interesting commentary on those phases of the general subject which he has selected for discussion. Few will fail to find both matters which are treated quite to their liking and ideas with which they definitely disagree. Since little agreement among the critics themselves is to be expected, it is clear that Michaelis has hesitated neither to raise plenty of debatable questions nor to indicate his own opinion. Theoretical views, indeed, are often advanced with a considerable degree of enthusiasm. In the treatment of the long-standing question of the mechanism of oxidation-reduction, for example, Michaelis is well aware that equilibrium data, which represent the only facts yet available, furnish no clue to the mechanism, and yet he finds the hypothesis of electron exchange so attractive that he applies it even to the oxidation of basic substances in neutral or acid medium. It is necessary in this case to assume the *acidic* dissociation of a strongly basic group as a primary step in the oxidation. A less ardent supporter of the electron hypothesis would concede that the Wieland mechanism gives a more reasonable interpretation of this particular type of reaction.

While the newer ideas advanced by the author afford stimulating reading, one feels that they are to be regarded as suggestions rather than as well-rounded theories, for they do not always appear to be complete. Thus in developing a theory of the relation between color and oxidation potential the author states that the oxidized forms of the dyestuffs are without exception colored and the reduced forms colorless. He apparently has overlooked the striking relationship between the pale yellow anthraquinones and the intensely colored anthrahydroquinone ions.

In a field of work which is in the course of active development and which still presents numerous important problems, it is of value from time to time to have a comprehensive statement of the views of anyone whose work stamps him as an authority. Michaelis' monograph will be accepted as exactly fulfilling this function.

**Diatomaceous Earth.** By ROBERT CALVERT, Chief Chemist, Van Schaack Bros. Chemical Works, Chicago, Illinois. Book Department, The Chemical Catalog Co., Inc., 419 Fourth Avenue, at 29th Street, New York, U. S. A., 1930. American Chemical Society Monograph Series, No. 52. 251 pp. 15.5 × 23.5 cm.

The author of this American Chemical Society Monograph intends it as "a description of the present day industry of diatomaceous earth, an interpretation of the literature in the light of experience, and an indication of needed discoveries yet to be made in a new and interesting field of research."

He begins by explaining the structure and composition of diatomaceous earth with numerous photomicrographs showing the exquisite and varied forms of the diatoms whose fossilized remains have accumulated in enormous deposits in earlier geologic periods. The available statistics on production and trade throughout the world are assembled, showing that the amount mined in the United States exceeds the total in all the rest of the world by a substantial margin. The more important deposits are briefly described. The mining of the earth and its preparation for the market are discussed in considerable detail. The physical properties are expounded with special emphasis on the high porosity with the resultant low apparent density, great power to absorb liquids and low heat conductivity. Most of the book is devoted to present-day uses of the earth, the chief of these being for the filtration of sugar solutions, and for the manufacture of diatomaceous brick for thermal insulation, and as an addition to concrete. The use of diatomaceous earth in these and in many other industries is discussed thoroughly. There is also a chapter on thermal conductance and loss of heat through furnace walls, which gives the theory and mathematics of conductance and insulation.

The book is well planned and clearly written, and offers a comprehensive review of the diatomaceous earth industry.

GRINNELL JONES  
DOROTHY M. BOLLINGER

**Organisch-chemisches Praktikum.** (Manual of Organic Chemistry.) By Dr. LUDWIG ORTHNER, Lecturer at the Technical High School of Karlsruhe, and Dr. LUDWIG REICHEL, Assistant at the Technical High School of Karlsruhe. Verlag Chemie, G. m. b. H., Corneliussstrasse 3, Berlin W 10, Germany, 1929. xvi + 260 pp. 61 figs. 23.5 × 15.5 cm. Price, unbound, M. 9; bound, M. 10.

This is an interesting, useful and well-written little handbook of organic preparations. The choice and spread of experiments is quite commendable. In keeping with the present trend of organic chemistry, there are a number of experiments dealing with natural products, with the synthesis of biologically important compounds, and with a few catalytic procedures. There are interspersed throughout the book, and particularly at the conclusion of each series of preparations dealing with a given type of com-

pound, brief discussions of the fundamental chemistry of the series. That the authors have an appreciation of the physical chemistry viewpoint is also evident. The conventional chapter on analytical procedures differs uniquely from other texts of this character in that it describes the very useful and practical half-micro methods of H. ter Meulen and Heslinga. Taken as a whole, then, the book creates a decidedly favorable impression.

ARTHUR J. HILL

**The Constitution of Sugars.** By WALTER NORMAN HAWORTH, D.Sc., Ph.D., F.R.S., Professor of Chemistry and Director of the Department of Chemistry in the University of Birmingham. Longmans, Green and Company, 55 Fifth Avenue, New York City, 1929. vii + 100 pp. Illustrated. 15 × 24 cm. Price, \$3.40.

This book gives a review of the more recent developments in the field of carbohydrate chemistry with which Professor Haworth's name is so closely linked.

The important part played by the ring configuration of sugars is being more and more recognized in biological, biochemical, physiological, botanical and industrial problems.

In the field relating to the structure of carbohydrates and polysaccharides, Professor Haworth's brilliant contributions are too well known to require note. Thanks to the masterly technique developed with the aid of his colleague, Dr. Hirst, assisted by a very able group of co-workers, it has been possible to establish the constitution of the majority of the sugars on a firm experimental basis and, while such views have not yet been accepted in their entirety in all quarters, it is, in the reviewer's opinion, merely a matter of a relatively short time before such will be the case.

The volume can be recommended most heartily to all students of carbohydrate and polysaccharide chemistry, as well as to all other students interested in obtaining a clear and accurate present-day picture of the structure of the products in this field.

HAROLD HIBBERT

**Aluminiumchlorid in der organischen Chemie.** (Aluminum Chloride in Organic Chemistry.) By GEORG KRÄNZLEIN, I. G. Farbenindustrie A.-G. Verlag Chemie G. m. b. H., Corneliustrasse 3, Berlin W 10, Germany, 1930. 47 pp. 15.5 × 2.35 cm. Price, M, 3.

The recent developments in the commercial production of aluminum chloride and the publicity given them make this booklet unusually timely. It presents a survey of the organic chemical uses of aluminum chloride in eleven subdivisions: the Friedel-Crafts reaction with its ramifications, the Fries rearrangement, the Scholl reaction, dehydrogenations, addition reactions, condensation reactions with the elimination of water, halogenations, nitrations, polymerization and condensation reactions, splittings and rearrangements, and the cracking of hydrocarbons. The technical

and industrial values of the various reactions are emphasized. The book work is well done and the numerous formulas make for a clearer and more ready understanding of the complicated polynuclear compounds frequently introduced. The brochure is up-to-date, containing, as it does, citations from the literature of 1929. The large number of footnote references, 179 being given, include several to patents. This little volume will be of interest to anyone who is concerned with the scope of the use of a reagent, aluminum chloride, which promises to be of increasing significance in organic chemistry.

G. ALBERT HILL

**Thyroxine.** By EDWARD C. KENDALL, M.S., Ph.D., D.Sc., the Mayo Foundation, Rochester, Minnesota. American Chemical Society Monograph Series. The Chemical Catalog Company, Inc., 419 Fourth Avenue, New York. 1929. 265 pp. 39 figs. 15 × 23.5 cm. Price, \$5.50.

The interested public—and it is a large one—owes much to Dr. Kendall's reserve in the preparation of this admirable monograph on this active agent of the thyroid gland. As the author notes in his preface, the book was one of the first to be announced in the series in which it appears, but actually it is the forty-seventh of the monographs to reach the public. The great interest in all that pertains to the thyroid both from the purely scientific and from the clinical viewpoints has led to a large amount of highly important investigative work during the last few years. By his well considered delay, Dr. Kendall has been able to give us a conspectus of these recent additions to knowledge in the field.

The author's own contributions are of the greatest significance, and the early chapters of the book are devoted to a summary of them, prefaced by a brief historical sketch. As a chemist, the author emphasizes that aspect of the work in these earlier chapters, giving a critical review of the methods adopted for the isolation of thyroxin, the proof of its constitution, and a summary of its physical and chemical properties. This naturally leads to a discussion of the iodine content of the thyroid gland, the only portion of the body known certainly to contain this demonstrably essential element in detectable amounts.

The author next turns to clinical consideration of the thyroid gland and its functional and organic derangements. Certain phases of mineral and nitrogen metabolism, the nervous influence of the secretory activity of the gland, Reid Hunt's acetonitrile test, and the effects of changed function on the respiratory and carbohydrate metabolism are successively considered.

It is well recognized that the thyroid is one of the potent regulators of growth and development, and chapters are allotted both to the results of spontaneous failure on various living forms and also to the stimulating

effects of thyroid substances on the metamorphosis of amphibian larvae. Other chapters dealing with pharmacological studies include the standardization of thyroid preparations and their physiological activity; in addition, certain clinical and pathological material is discussed. With its well-known profound effect upon respiratory metabolism in the living organism, space is devoted to a consideration of possible mechanisms through which the active agent, thyroxin, may influence biological oxidations. The book concludes with a well selected bibliography listing five hundred and forty-one titles and well compiled author and subject indices. The book as a whole is a most excellent piece of work. While the author states that he has approached the task from the standpoint of a chemist, he has presented the clinical aspects in a way to be of interest and information to the practitioner. The selections from the over-abundant literature have been most judicious, and an adherence to factual evidence is maintained throughout, the latter a pleasing and refreshing contrast to some of even the more recent of the literature of the ductless glands. Dr. Kendall is to be congratulated on the production of a most readable and significant treatise on a subject of wide general interest and import.

A. W. ROWE

**Essences naturelles et parfums.** (*Natural Essences and Perfumes.*) By RAYMOND DELANGE, Chief, Services Scientifiques des Fabriques de Laire. Librairie Armand Colin, 103 Boulevard Saint-Michel, Paris, 1930. 222 pp. 11 × 17 cm. Price, unbound, 10.50 fr.; bound, 12 fr.

While this little handbook does not pretend to compete with the larger works on essential oils and perfumes, it should prove very valuable to those who wish to acquire a general knowledge of the chemistry of the subject.

A chapter on odor and its relation to the properties and molecular structure of substances is useful and interesting.

Chapters on analysis of oils and on the chemistry of the constituents of essential oils will be of interest to the worker in the laboratory.

The chapter on definite odoriferous compounds, both natural and synthetic, contains much valuable information.

The information given is accurate and concise.

The author states that by reason of the plan of the work he describes only a few of the more characteristic essential oils. Fifteen such oils are included, besides certain natural resins and some animal products used in perfumery.

The work includes a bibliography with references in the text.

E. K. NELSON