

on the square root of the azomethane pressure and the three-halves power of the ethylene pressure. The time-pressure curves behave in the ordinary way, and do not exhibit the increasing rate with time found in the thermal polymerization [Storch, *THIS JOURNAL*, **56**, 374 (1934)]. The rate constant is 6.5×10^{-6} at 310° and 3.0×10^{-6} mm.⁻¹ sec.⁻¹ at 290° . No special precautions to remove oxygen from the ethylene were taken.

A chain decomposition is also set up in propionaldehyde and isobutane by azomethane. Al-

though 1% of azomethane completely decomposes acetaldehyde [Allen and Sickman, *ibid.*, **56**, 2031 (1934)], 6.5% azomethane in propionaldehyde leads to only 60-70% decomposition. The suggestion of Semenoff [Semenoff, *Z. physik. Chem.*, **28B**, 62 (1935)], that reactions of this type are "degenerate explosions" and that traces of azomethane should lead to complete decomposition cannot apply to propionaldehyde.

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O. K. RICE
DARRELL V. SICKMAN

RECEIVED JUNE 21, 1935

NEW BOOKS

An Introduction to Inorganic Chemistry for B.Sc. Students of the Indian Universities. By SATYA PRAKASH, D.Sc., Lecturer in Chemistry, University of Allahabad. Kala Press, Allahabad, India, 1934. iv + 478 pp. 16.5 × 24.5 cm. Price, six rupees; or ten shillings.

This is a textbook designed primarily for the advanced student of science in Indian universities. It assumes some knowledge of the principles of elementary chemistry. The treatment is essentially descriptive and any discussion of physical chemistry, except for a brief chapter on colloid chemistry, is purposely omitted.

The book is chiefly of interest to an American because the subject is dealt with so far as possible from the Indian point of view, the occurrence of various substances in India being treated at length and Indian practice in the various branches of chemical manufacture being set forth in considerable detail. This information, according to the author's preface, is not available elsewhere.

The presentation is clear and judging by the few sections examined, particularly the one on heavy water, is up-to-date.

ARTHUR B. LAMB

Annual Survey of American Chemistry, Volume IX, 1934. Edited by CLARENCE J. WEST, Director, Research Information Service, National Research Council. Published for the National Research Council by Reinhold Publishing Corporation, 330 West 42d Street, New York City, 1935. 396 pp. 14 × 22 cm. Price, \$4.50.

The high quality of the earlier volumes of the Survey has been maintained. The general topics selected for consideration have been reviewed by men whose knowledge, contributions to the literature of chemistry, and judgment make them particularly well fitted for the important work. A chapter on biochemistry has not been included, because this field is now covered by another publication. Since the subjects treated vary from year to year, those in the present volume are listed. It is of interest to note

that about one-half of the topics are in the field of applied chemistry. The subjects are as follows: Theories of Solution, The Kinetics of Homogeneous Gas Reactions, Subatomic, Thermodynamics and Thermochemistry, Colloids, Contact Catalysis, American Photochemistry During 1933 and 1934, Radioactivity—Natural and Artificial, X-Ray Examination of Materials, Aliphatic Compounds, Carbocyclic Compounds, Heterocyclic Compounds, Non-Ferrous Metals, Advances in Electrochemical Practice, Food Chemistry 1933 and 1934, Fermentation, Alcoholic Fermentation and Beverages, Trade Waste Treatment, Fertilizers, Coal and Coal By-Products, Petroleum Chemistry and Technology, Textile Chemistry, Dyeing and Finishing, Rubber, Solvents, Chemical Engineering.

The book contains an author index, subject index, and references to all the papers mentioned. The Annual Survey has become a necessity to those who wish to know something of the current contributions of Americans to Chemistry.

JAMES F. NORRIS

Dizionario di Chimica Generale e Industriale. (Dictionary of General and Industrial Chemistry.) By Prof. MICHELE GIUA and Dr. CLARA GIUA-LOLLINI. Unione Tipografico-Editrice Torinese, Corso Raffaello 28, Torino 116, Italy, 1933-1934. 20.5 × 29.5 cm. Vol. I, A-E. iii + 1083 pp. 565 figs. Vol. II, F-Z. iii + 1211 pp. 521 figs. Price, lira 165 and 175.

The authors state in the preface that a modern Dictionary of Chemistry, of limited size, but at the same time dealing with diverse branches of Theoretical and Applied Chemistry, is lacking in Chemical Literature. While the older encyclopedias, such as those of Fehling, Muspratt Würtz, Guareschi, have mainly a theoretical and descriptive character, the more recent ones, *e. g.*, those of Thorpe, and of Ullmann, give greater emphasis to Industrial Chemistry.

The aim of this encyclopedia is to provide the elements for the study of chemistry both in its theory and in its

manifold applications. It does not claim to give more than only rapid information on each separate subject, but at the same time it renders an account of the more recent investigations, and provides references which will permit the reader to orient himself rapidly in the bibliographical sources.

The encyclopedia includes a large number of brief biographical sketches of the major scientists who have contributed to the progress of chemistry. Most of these are accompanied by portraits. This feature will undoubtedly prove most useful to the students of the history of chemistry, particularly in Italy, since the encyclopedia includes biographies of many Italian chemists about whom little information is available outside Italy. It is regrettable, however, that some of the leading figures of modern chemistry, such as Walden, von Weimarn, Abderhalden, Haber, Bergius, Nernst, Sabatier, Baekeland, and Lewis, are not included.

A careful examination of this work leaves a very good general impression. It may be noted, however, that the character of the encyclopedia is preëminently practical, and such topics as Dyes, Fats, Milk, Alloys, Petroleum, etc., receive far greater attention than the more theoretical subjects such as Chemical Affinity, Atomic Theory, Thermodynamics, Colloids, Reaction Statics and Dynamics, etc. Thus twenty-two pages are devoted to War Gases, and fifty-two to Explosives, while only half a page is given to Physical Chemistry, and a page and a half to Solutions.

The bibliographical sources cited are mainly the standard works of reference: Abegg, Gmelin, Friend, and only rarely Mellor; also the encyclopedias of Ullmann, Thorpe, Garelli, Guareschi, Vitali, Mascarelli, Villavecchia, etc. For organic compounds, except dyes, which are accompanied by references to Schultz's "Farbstofftabellen" only, the references are to Beilstein, Meyer-Jacobson, and only rarely to Richter. For minerals the only reference usually given is Doelter's "Mineralogische Chemie." There are also frequent references to numerous texts, mainly Italian, special treatises, and current periodicals.

In addition to very numerous and fine illustrations, there are fifty-one tables in the text. A very complete alphabetical index and a list of errata are appended at the end of the second volume. In spite of the apparent care in detecting unavoidable errors, the following have escaped the attention of the authors: on p. 129, Vol. II, a gas is defined as a non-elastic fluid, and on p. 894, Vol. II, the great treatise of Roscoe and Schorlemmer is referred to as a work on Organic Chemistry.

The books are excellently printed, but the binding leaves much to be desired.

A. W. BOLDYREFF.

Theoretische Grundlagen der organischen Chemie. (Theoretical Principles of Organic Chemistry.) By WALTER HÜCKEL, Professor at the University of Greifswald. Vol. II. Second edition. Akademische Verlagsgesellschaft m. b. H., Markgrafenstrasse 6, Leipzig C 1, Germany, 1935. viii + 338 pp. 35 figs. 16 × 23.5 cm. Price, RM. 14; bound, RM. 15.60.

The second volume of this work comprises Book III on "Constitution and Physical Properties" and Book IV on "Constitution and Reaction Velocity." Both of these be-

ing active fields at the present time, the revised edition contains considerable new material as well as some changes in the presentation of the old. Book III contains chapters on theoretical considerations, the electrical properties of molecules, behavior of substances in an alternating electromagnetic field, relationship between cohesion and constitution, oriented states of matter, and colloidal problems of organic chemistry. Most of the new material is in Book III, and especially in the section on dipole moments. The new nine-page chapter on colloid problems of organic chemistry deals largely with the study of degree of polymerization. The introductory section of Book IV has been shortened by the omission of the basic principles of kinetics which are now discussed in Volume I. Book IV contains chapters on the theory of reaction velocity, reaction velocity constants and constitution, reaction velocity in reversible processes, theory of so-called valence- or affinity-demand. New material considered in the section on reaction velocity includes the work of Ziegler and of Salomon on large rings, of Dimroth on potential and rate of reaction in quinones, of Sebelius on the equilibria and rates of lactone formation, of Lock and Asinger on the hydrolysis of substituted benzal chlorides, and others to which less space is devoted.

The task which Hückel sets himself—that of giving a coordinated account of work having theoretical significance for organic chemistry—is carried out in a stimulating manner in this edition as in the first. The task is a much more difficult one with the diverse and currently developing material of Volume II than with the more "classical" material of Volume I (reviewed in *THIS JOURNAL*, 57, 385 (1935)). There is evidence that the author feels more keenly as time goes on the restrictions which he must observe to keep a work of this kind within bounds. He predicts a bright future for the application of quantum mechanics to organic chemical problems, and at the end of the last chapter he cites important advances which have been made in this field within the past few years. However, the complete impossibility of giving a thorough exposition of the methods underlying such work in a volume of this sort has led him to exclude from detailed discussion all physical formulations except those having a classical basis. An earlier discussion of the quantum theory of dispersion has accordingly been omitted from this edition; and it is stated in the preface that a treatment of the physical basis of optical activity was prepared but omitted since it led too far into purely physical problems.

Hückel's approach to organic reactions is definitely the kinetic one. It is somewhat surprising in a work of this scope to find no use made of thermodynamic methods, even in the cases in which the kinetic treatment is manifestly inadequate. For example, the successive dissociation constants of dibasic acids are dealt with as a rate problem. No less than in the first edition (*THIS JOURNAL*, 53, 4464 (1931)), the total lack of thermodynamic treatment of solutions is conspicuous. Little attention is given to the rapidly accumulating knowledge of organic gas reactions, or to the important role of acids and bases in organic kinetics.

In only one chapter, that dealing with electrical properties of organic molecules, has so much new material entered as to render the first edition obsolete. The bringing up to

date has, however, been done in a careful and thorough manner throughout.

P. D. BARTLETT

Cellulose et Bactéries, Décomposition et Synthèse, (Cellulose and Bacteria. Decomposition and Synthesis.) By Y. ΚΗΟΥΒΙΝΕ. Hermann et Cie., Éditeurs, 6 Rue de la Sorbonne, Paris, France, 1934. 44 pp. 16 × 25 cm. Price, fr. 12.

This 44-page pamphlet presents a brief review of the results of recent studies on cellulose decomposition and on synthesis by bacteria.

The author divides the microorganisms which decompose cellulose into three groups: (1) aerobic, (2) anaerobic and (3) thermophilic. Under each group, a brief discussion is presented on the contributions of various workers; also a description of the organism and the end-products of decomposition. The importance of cellulose decomposition as related to animal nutrition is noted; also the part played by cellulose decomposition in maintaining the supply of carbon dioxide in the atmosphere, as well as the symbiotic relation which exists between denitrifying and cellulose-fermenting organisms.

Approximately one-half of this publication is given over to a discussion of the synthesis of cellulose by *Acetobacter xylinum*, the x-ray studies of the membranes produced by the bacteria, as well as the general characteristics of the organism. The x-ray pattern was found to be identical with that of cotton cellulose, and the acetylated derivatives the same as those of plant cellulose. In the metabolism studies of *Acetobacter xylinum* it was noted that configuration of the alcohols influences the yield of cellulose—the maximum production of cellulose was obtained when mannitol was used as a source of carbon.

E. B. FRED

The Carbohydrates. By E. F. ARMSTRONG, D.Sc., Ph.D., LL.D., F.R.S., and K. F. ARMSTRONG, M.A., B.Sc. Longmans, Green and Company, 114 Fifth Avenue, New York, 1934. vii + 252 pp. 16 × 25 cm. Price, \$6.50.

Chemists interested in the carbohydrate field will indeed be pleased to learn that the Armstrong monograph on the carbohydrates has finally appeared in a new and revised edition. The preceding fourth edition was published in 1924 as "The Simple Carbohydrates and the Glucosides" in the British series of Monographs on Biochemistry. In 1931 the glucoside portion appeared as a separate volume and this has now been followed by the carbohydrate section. In the ten-year period elapsing between the two editions an immense amount of work has appeared in the carbohydrate field. In the task of editing and concentrating this new information, E. F. Armstrong was assisted by his late son K. F. Armstrong. It is to be regretted that chemistry has lost the services of this member of the third generation of such a distinguished chemical family through his unfortunate death in a mountain climbing accident in the Austrian Tyrol during the past winter. The senior Henry Armstrong has long been known for his versatility in the use of written English and this talent appears in his son and grandson in that they are able to state

clearly a great amount of factual material in a very concise and compressed form. In this respect they differ greatly from the German monograph writers.

The present edition of this monograph represents the only English review of the field making any pretensions to completeness. It was necessary to rewrite completely the entire book and even the table of contents bears no relation to the preceding edition. The text is unusually free of minor errors and the proof reading has been thorough. The biochemical aspect has been maintained throughout although of course no attempt has been made to enter the bewildering field of intermediary carbohydrate metabolism. For its size of only two hundred and fifty pages the book is remarkably complete. It is also written from an entirely unbiased although critical standpoint. Emphasis is well placed upon tautomerism in sugar structures. An excellent summary of the chemical evidence for the modern conception of polysaccharide structure is presented. The review of the present status of sugar enzyme chemistry is also especially well done, as would be expected from the important work done by E. F. Armstrong in this subject. The most important point, however, is that this new edition still maintains the inspirational and stimulating viewpoint of the previous editions. It is no mere summation of established facts but succeeds in pointing out the gaps and so indicates the real frontier of a still uncompleted science.

M. L. WOLFROM

Methodik der Vitaminforschung. (Methodology of Vitamin Research.) By Dr. PHIL. CHRISTIAN BOMSKOV, Chemist at the University Children's Clinic of Kiel. Georg Thieme Verlag, Rossplatz 12, Leipzig C 1, Germany, 1935. xvi + 301 pp. 92 figs. 17 × 25 cm. Price, M. 24; bound, M. 26.

This volume, which contains an introduction by Professor E. Rominger, is devoted almost entirely to methods of vitamin assay and to practical and theoretical questions which bear on this important phase of vitamin research. The first 25 pages (general part) are devoted to a discussion of the types of animals used in vitamin assays with a discussion of the care and management of various types of animals used in vitamin research. He also discusses cage equipment, various types of rations used for breeding stock as advocated by representative workers, purified experimental diets, etc., accompanied by a brief discussion of the principles of feeding technique.

A second portion of the book, consisting of 132 pages, is devoted to the fat-soluble vitamins, which, for convenience of discussion, are subdivided into three main divisions, namely, Vitamins A, D and E. Each of these vitamins is discussed from the standpoint of deficiency symptoms (as well as hypervitaminosis), response of different types of animals to vitamin therapy, methods of assay (biological, chemical and physical), feeding and management technique, provitamins (such as carotene and ergosterol), isolation and purification of the fat-soluble vitamins, evidence for their chemical constitution and methods of expressing vitamin potency in units, including a discussion of International units for Vitamins A and D.

The third portion of the book, consisting of 131 pages, is devoted to a detailed discussion of the water-soluble

vitamins and the organization of subject matter and method of treatment are fundamentally the same as that described for the fat-soluble vitamins. All important methods and techniques for the assay of vitamins B (B_1), G (B_2), B_3 , B_4 , B_5 and B_6 are treated briefly but no important details seem to have been omitted. The chemistry of the flavines and their possible relationship to Vitamin G (B_2) are also discussed. All statements and conclusions as well as all methods, experimental diets, etc., are supported by references to the original literature. Vitamin C receives very thorough treatment from practically every angle, including the most recent methods of chemical assay and the chemical synthesis of ascorbic acid. All experimental data and tabular material taken from American and English scientific journals are reproduced in English with citations to the original literature.

The reviewer feels that the book is unique in that it is the only book with which he is familiar which is devoted exclusively to this subject. "Methodik der Vitaminforschung" should prove a valuable addition to the reference shelf of every laboratory in which vitamin research is stressed.

R. ADAMS DUTCHER

Hormone und innere Sekretion. (Hormones and Internal Secretions.) By Dr. FRITZ LAQUER, Professor at the University of Frankfurt. Second edition, revised and enlarged. Verlag von Theodor Steinkopff, Residenzstrasse 32, Dresden-Blasewitz, Germany, 1934. xii + 368 pp. 15.5 × 22.5 cm. Price, RM. 18; bound, RM. 19.

A well documented and critical summary of the present status, chemical, biological and medical, of the hormone problem. The author has managed to present the distillate of the more than one thousand annual research reports in this growing field, including the citation of the most important of these reports, in the space of 368 pages. This brevity is achieved, in part, at the expense of readability. But it is a welcome contrast to the tedious verbosity of many monographs on the hormone problem. The monograph is a significant aid to students and investigators in chemistry, biology and medicine. The author remains critically objective in every chapter, giving little space to the purely speculative, except in the way of protest: "In the last few years the hormone problem has lured some people away from the solid ground of facts" (p. 345). Of special challenge to organic and biological chemists is the summary table (p. 346) which shows that of the eighteen hormones so far identified by the biological tests only two (adrenalin, thyroxine) are chemically identified. There is still some question as to the chemical constitution of insulin, and while the structure of choline is known, the question of the hormone character of choline is still open.

A. J. CARLSON

BOOKS RECEIVED

May 15, 1935-June 15, 1935

- A. BÖMER, A. JUCKENACK and J. TILLMANS, Editors. "Handbuch der Lebensmittelchemie. Zweiter Band. Allgemeine Untersuchungsmethoden. Zweiter Teil. Chemische und biologische Methoden." Verlag von Julius Springer, Linkstrasse 23-24, Berlin W 9, Germany. 1726 pp. RM. 145; bound, RM. 148.60.
- J. H. DE BOER. "Electron Emission and Adsorption Phenomena." Translated from the manuscript by Mrs. H. E. Teves-Acly. The Macmillan Company, 60 Fifth Ave., New York. 398 pp. \$5.50.
- D. A. EPSTEIN. "Chemistry and Technology of Nitrogen Fixation." (In Russian.) General Editorship of Chemical Literature, Press of Eugene Sokolovoy, Leningrad, U. S. S. R. 447 pp. 6 rubles.
- BENJAMIN C. GRUENBERG. "Science and the Public Mind." McGraw-Hill Book Company, Inc., 330 West 42d St., New York City. 196 pp. \$2.00.
- WILLIAM THOMAS HALL. "A Textbook of Quantitative Analysis." Second edition. John Wiley and Sons, Inc., 440 Fourth Ave., New York City. 350 pp. \$3.50.
- JAMES KENDALL. "Smith's College Chemistry." Third revised edition. D. Appleton-Century Co., Inc., 35 West 32d St., New York City. 753 pp. \$3.75.
- R. DE L. KRONIG. "The Optical Basis of Chemical Valence." The Macmillan Company, 60 Fifth Ave., New York. 237 pp.
- C. E. MANGELS, Compiler. "Cereal Laboratory Methods with Reference Tables." Sub-Committee on Revision, Committee on Methods of Analysis, American Association of Cereal Chemists, 833 Grain Exchange, Omaha, Nebraska. 204 pp. \$3.00.
- R. A. MORTON. "The Application of Absorption Spectra to the Study of Vitamins and Hormones." Adam Hilger, Ltd., 98 Kings Road, Camden Road, London N. W. 1, England. 70 pp. 10s./4d.
- J. R. PARTINGTON. "Origins and Development of Applied Chemistry." Longmans, Green and Co., 114 Fifth Ave., New York. 597 pp. \$16.50.
- "Contributions from the Forest-Technical Academy," No. 4 (42). (In Russian.) Library of the Forest-Technical Academy, Leningrad 18, U. S. S. R. 251 pp. 4 rubles, 80 kopecks.
- "Memoirs of the Institute of Chemistry." Vol. I, Nos. 1-4. All-Ukrainian Academy of Sciences, Institute of Chemistry, Korolenko 58A, Kyiw, Ukraine, U. S. R. R.
- "The Scientific Journal of the Royal College of Science." Vol. V. Edward Arnold and Co., 41-43 Maddox St., London W. 1, England. 138 pp. 7s./6d.