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 NEW BOOKS
 

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**The Glass Electrode, Methods, Applications, and Theory.**

By MALCOLM DOLE, Associate Professor of Chemistry, Northwestern University. John Wiley and Sons, Inc., 440 Fourth Avenue, New York, N. Y., 1941. London: Chapman and Hall, Limited. 332 pp. 112 figs. 15.5 × 23.5 cm. Price, \$4.50.

Dr. Dole has performed a valuable service in writing this book. It contains an excellent history of the glass electrode, an extensive exposition of its construction and uses and a voluminous bibliography. Indeed it is hard to think of a paper on the subject which is not mentioned, and the more important articles are fully and critically reviewed. The book does not limit itself to the glass electrode but gives a detailed account of the hydrogen, quinhydrone, silver chloride, and calomel electrodes. There is also a short section on indicators. The chapter on e. m. f. measuring circuits is most useful and contains a timely warning on the unthinking use of commercial "pH machines." There are interesting sections on unbuffered solutions, potentiometric titrations and micro-methods. There are very few typographical errors; the figures are excellent.

In reading about the shortcomings of the glass electrode, the reader may wonder why such emphasis should be placed upon its errors in the alkaline range above pH 9, when Dr. Dole's own experiments have shown that there is a glass which gives only a small error at pH 14.

This reviewer must take issue with the book on its treatment of the theory of the pH scale as put forth in Chapter II. The exposition is often uneven and the transition from equation to equation too abrupt. Thus, on page 7, the unexplained leap from the concept of chemical potential to that of e. m. f. will leave the less erudite readers badly frustrated. And is it not a distinct disservice to commence with Sørensen's definition of pH as the negative logarithm of the hydrogen ion concentration? This is a case where to begin with history may be to end in confusion. It is true that the hydrogen electrode, due to the dilemma of individual ion activities and liquid junction potentials, does not measure hydrogen ion activity, but all recent attempts to standardize the pH scale have been approached from the activity standpoint. It is now realized that pH should be given the operational definition

$$\frac{E - E_0}{2.303(RT/F)}, \quad E_0 \text{ being determined by quasithermodynamic methods.}$$

Dr. Dole points this out in his last chapter but it would be better to resolve the reader's natural confusion much earlier in the book.

Dr. Julius Sendroy, Jr., has contributed a monograph on the measurement of blood pH upon which the reviewer would like to comment briefly from his own experience. The "first acid change" in blood pH is said to be an artifact due to a temperature difference between the electrode and the blood sample. The reviewer, however, has always found a rapid drop of pH in freshly drawn blood even although the whole operation was carried out in a constant temperature room at 38°. Might not this drift be due to a

contamination of the glass surface by proteins, as is the case when the pH of human seminal fluid is measured? The latter material invariably affects the glass electrode in such a way that it gives low pH values for standard buffers, unless vigorous washing is employed after a few determinations have been made.

DONALD BELCHER

**Experimental Physical Chemistry.** By FARRINGTON DANIELS, J. HOWARD MATHEWS and JOHN WARREN WILLIAMS, Professors of Chemistry, University of Wisconsin. Third Edition. McGraw-Hill Book Company, Inc., 330 West 42nd Street, New York, N. Y., 1941. xvii + 459 pp. 121 figs. 16 × 23.5 cm. Price, \$3.50.

This third edition of a well-known laboratory text, though greatly revised in detail, retains the major features of organization and treatment of material which distinguished the earlier editions (reviewed in *THIS JOURNAL*, 52, 2585 (1930); 57, 384 (1935)). As before, some thinking and judgment on the part of the student as well as the instructor is assumed. The general trend is toward greater complexity of apparatus when justified by increased accuracy or convenience. All users will appreciate the larger format—the book will now lie open at any page; many will be glad that "cc." has become "ml." throughout.

"Laboratory Experiments" (Part I) has been considerably expanded. Of the 72 experiments 15 are new. Most of these require rather elaborate apparatus, *e. g.*, gas density balance, photoelectric colorimeter, spectrophotometer, spectrograph, fractionation column, liquid film balance, radioactive bromine. About ten old experiments call for marked changes in apparatus or technique. Several others of less fundamental or more elementary character have been dropped and some techniques have been regrouped in new experiments, with general improvement in order of presentation. Each experiment now begins with a brief statement of purpose or utility. New figures have been added and nearly all have been redrawn to suggest perspective.

Part II on "Apparatus" is cut nearly in half, by elimination or transfer to Part I of descriptions of much elementary or familiar apparatus, and by omission of variations or alternatives of method. "Miscellaneous Operations" (Part III) and the appended tables are not greatly changed.

The book can be recommended even more strongly than before to teachers of serious courses in physical chemistry.

ARTHUR F. BENTON

**Chemical Arithmetic.** By SAUL B. ARENSON, Professor of Inorganic Chemistry, University of Cincinnati. Second Edition. John Wiley and Sons, Inc., 440 Fourth Avenue, New York, N. Y., 1941. ix + 130 pp. 9 figs. 14 × 22 cm. Price, \$1.50.

The author remarks in the Preface that "changes consist in a few new types of exercises, . . . approximately a

fifty per cent. increase in the number of problems, . . . and a simpler approach in many cases . . . (as) the result of re-writing a large part of the original edition (1931). The chapter headings are: Introduction, Units and their Conversion Factors, Atomic and Molecular Weights, Gas Laws, Weight and Volume Relationships, Normal Solutions, Balancing Equations, Graphical Representation; each chapter contains appropriate subdivisions for the various phases of the subject and types of problem involved. The usual method in each section is first a discussion, then an illustrative example or two, followed by a group of problems (in all 99 examples and 437 problems). Each problem is accompanied by its answer given as the first three significant figures only, leaving the student to decide how many digits to report and find his own decimal point. The book should be of considerable help in making students "problem-conscious," provided time is available for such an intensive attack.

ALLEN D. BLISS

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**The Analytical Chemistry of Industrial Poisons, Hazards and Solvents.** By MORRIS B. JACOBS, Ph.D., Food, Drug and Insecticide Administration, U. S. Dept. of Agr., 1927, Chemist, Department of Health, City of New York, 1928. Volume 1 of Chemical Analysis, a series of Monographs on Analytical Chemistry and its Applications. Interscience Publishers, Inc., 215 Fourth Ave., New York, N. Y., 1941. xviii + 661 pp. 110 illustrations. 16.5 × 23.5 cm. Price, \$7.00.

This book is mainly a collection of methods available for the determination in the air of gases, vapors or dusts which might cause ill health in industrial workers. Considerable toxicological information is also included.

A brief introduction is followed by chapters on sampling, measurement of air flow, and absorbing devices. Dust sampling and counting methods and apparatus, and the chemical and microscopic estimation of silica are described. This section (159 pages) summarizes very well the various techniques which have been developed by industrial hygienists for investigating atmospheric contamination.

The main part of the book is devoted to sections on individual toxic metals (82 pages), other inorganic substances (115 pages), and organic compounds (117 pages). A short discussion of the physical, chemical and toxicological properties of each substance is followed by one or more analytical procedures for the determination of minute amounts, such as may be found in the air of industrial establishments.

The choice of analytical methods is excellent and evidently results from a thorough and careful search of the literature. The more important procedures, and some others, are given in detail, but many are described rather briefly. There is a tendency to quote directly the exact procedure, including reagents and apparatus, of the original authors, although simpler and better methods for some of the steps, especially sampling, may be recorded elsewhere in the book. In some cases the methods given are suitable for high concentrations, but require modification when applied to the quantities likely to be present in industrial atmospheres. These changes are not always indicated.

A few of the methods given are open to criticism. The

*s*-diphenylcarbazine procedure for lead (p. 168) is considered by many to be unreliable. The recommendation of water for the absorption of vapors of compounds such as amyl alcohol, methyl acetate, acrolein and nitrobenzene, none of which is completely soluble in that medium, is open to question.

The toxicological part reflects to some degree the confusion which seems to be the outstanding characteristic of industrial hygiene literature. There are a few statements, such as that "aniline tumors" are caused by arsine (p. 7) and that toluene is as toxic as benzene (p. 416), which are in direct disagreement with most recent experience, but in most major respects the information presented is in accord with the opinions of modern authorities.

The final chapter is a timely discussion of chemical warfare agents. An appendix containing tables of toxicological material is included.

While one could wish for more critical treatment of some of the material, it could hardly be expected in a volume which covers so much ground and its lack is more than compensated for by the wealth of useful information which is presented.

H. B. ELKINS

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**Physical Chemistry for Students of Biology and Medicine.**

By DAVID INGERSOLL HITCHCOCK, Associate Professor of Physiology in the Yale University School of Medicine. Third edition (with Laboratory Experiments). Charles C. Thomas, 220 East Monroe Street, Springfield, Illinois, 1940. xiv + 264 pp. 22 figs. 14.5 × 24 cm. Price, \$3.50.

The third edition of this book has been extensively revised, and several new sections have been added. There is a new chapter on electrolytic conductance and transference, and the fundamentals of electrochemistry are expounded in more detail than before. Eight new experiments, involving electrochemical measurements, have been added to the laboratory section of the book. The discussion of the activity concept, and its relation to ionic strength, is somewhat fuller than in the two earlier editions [reviewed in *THIS JOURNAL*, 55, 1746 (1933), and 57, 966 (1935)]. The section on oxidation-reduction potentials contains much new material. The sections on acids and bases (protolysis), the glass electrode, diffusion and particle size, the ultracentrifuge, bio-electric phenomena, and the reciprocal influence of oxygen and carbon dioxide in blood, are new or have been completely rewritten.

I believe that these changes have added much to the value of the book. Some of the new discussions on electrochemistry deal with more difficult topics than are treated in the rest of the book; but their importance justifies their inclusion. I have noted no erroneous statements, except that on p. 142 it is said that pure liquids and gases, free of colloids or suspended particles, do not scatter light. This statement is still encountered in many authoritative books; but if it were true, the sky would be black, and Raman spectra (among other things) would be non-existent.

The emphasis in the treatment remains on the physical chemistry of dilute aqueous solutions. The high standard of clarity and accuracy, set by the previous editions, is

maintained; and the book may be warmly recommended to students of biology and medicine.

JOHN T. EDSALL

**Heat and Thermodynamics.** By J. K. ROBERTS, Ph.D. (Cantab.), Assistant Director of Research in Colloid Science, University of Cambridge. Third edition. Blackie and Son, Limited, 50 Old Bailey, London, England. In the U. S. A.: Interscience Publishers, Inc., 215 Fourth Avenue, New York, N. Y. xvi + 488 pp. 15 × 22.5 cm. Price, \$5.50.

This book, which has been written as a text of college physics, is an excellent piece of work. The author has illustrated the numerous topics with details of actual experiments, and very many references to original papers are included.

The author states that the whole book has been brought up to date as of 1938 or later; however, in a few cases rapidly developing subjects have few or no recent references, *e. g.*, the last reference to the separation of isotopes is 1929 although the most important work of this subject has been done since that time. The third law of thermodynamics ("Nernst Heat Theorem") is almost entirely and rather inadequately illustrated by data which have, in nearly every case, been superseded by more accurate measurements.

On page 189 the author explains the deviations of NO, NH<sub>3</sub>, C<sub>2</sub>H<sub>5</sub>OH and H<sub>2</sub>O from Trouton's rule by association of the vapors instead of emphasizing the association effects in the liquid state, which actually give the observed positive deviations.

The chemist will wish that the subject of solutions had not been eliminated but this is not an oversight of the author, who had to draw the line somewhere. As it is, an astonishing number of subjects related to thermodynamics, kinetics, statistics and radiation has been compressed into 488 pages. The author's approach from the experimental point of view has made most of the subject matter clear and stimulating and we are glad to recommend the book as one of the best in its field.

W. F. GIAUQUE

**The Separation of Gases.** By M. RUHEMANN. Oxford University Press, 114 Fifth Avenue, New York, N. Y., 1940. xiii + 283 pp. 148 figs. 16.5 × 24 cm. Price, \$5.75.

The separation and purification of gases is one of the oldest of the chemist's endeavors, and innumerable scientific advances are related to this activity. Both chemical and physical methods have been employed, but the large-scale production of liquid air nearly fifty years ago marked the beginning of important commercial operation. The present volume is a very acceptable, if brief, presentation of the present status of gas separation methods centering on the three standard commercial processes for separating the constituents of the atmosphere.

The author was prompted to prepare the volume because of the rapidly growing industrial significance of low temperature refrigeration and the scarcity of a book in English which brings together the large though scattered material bearing on low temperature refrigeration processes. He

is quite wrong, however, in stating that students of the subject "do not and cannot" exist because, "before there can be students there must be teachers." The real students will always be composed of "those having the simplicity to wonder, the ability to question, the power to generalize and the capacity to apply." Indeed the truth is that there must be students before there can be teachers, as all records show.

The arrangement of the material leaves something to be desired. Thus some twenty pages on heat, work and entropy follow three chapters on equilibrium in binary and ternary mixtures, rectification, heat interchangers, evaporation, condensation, etc.

Under the following chapter "Refrigeration" additional thermodynamical considerations are introduced in expounding the operation of the three oxygen separating processes; the Linde, Claude, and Heylandt systems.

The succeeding four chapters are really four parts of the same subject, the separation of oxygen from air regarded as a binary mixture. The single and double columns in use are discussed and considerable of the design details of the commercial plants representative of the three standard systems are presented. The third and fourth parts deal with elementary column theory (air is a very good example of the simplest case; a mixture to which Raoult's law may be applied) and the more complex problem of dealing with the separation of the rare gases accompanying air.

The remainder of the volume, some fifty pages, sketches the problems involved in separating the constituents of coke oven gas and the preparation of pure hydrogen for hydrogenation processes. The preparation of pure methane, helium and nitrogen for the ammonia synthesis is a principal subject. The final chapter of thirteen pages deals with the separation of olefins from cracker gas.

The book undertakes to cover a range of subjects. It is an introduction as the author intended and, considering the very scattered condition of the information, a difficult task was undertaken. The author apparently has not given sustained attention to developments and applications of low temperature refrigeration in the United States and Canada. It is here that the great developments of the future will be made in this field.

The boiling point of normal air given is the old value, -193° instead of -194.4°C. One is a little startled to learn (p. 10) that it is possible to store liquid methane in tanks in the U. S. S. R. The critical temperature is -81°C. Also (p. 19) "We have refrained from introducing (*v, x*) diagrams as they might disconcert the reader." No universal agreement would probably be found that (p. 79) "... a light and simple exchanger is inefficient and an efficient exchanger is cumbersome, complicated, and expensive." The equation (2), p. 108, for the Gibbs heat function, *H-TS*, appears in an unfamiliar form, believed incorrect. W. Koch based a very good compilation of steam properties practically entirely on measurements of measured specific heats which the author states has not so far been done. Also, the American work of developing the means of accurately measuring ( $\partial H/\partial p$ )<sub>T</sub> has not come to the author's notice. The use of the gallon as a unit of measure is not usual and an American reader must find out for himself that the English gallon of 4546 cc. is meant.

These items are, however, but minor details in a good book which has entailed much work to produce. It should appeal to the large number of students of low-temperature processes in this hemisphere, and suggest numerous applications in a field which is really only just beginning to open.

FREDERICK G. KEYES

**The Design of High Pressure Plant and the Properties of Fluids at High Pressures.** By DUDLEY M. NEWITT, M.C., D.Sc., Ph.D., Assistant Professor of Chemical Technology, Imperial College of Science and Technology, Oxford, At the Clarendon Press; Oxford University Press, 114 Fifth Avenue, New York, N. Y., 1940. viii + 491 pp. 17 × 25 cm. Price, \$10.00.

The literature pertaining to the methods of measurement of the physical properties of fluids and solids is now very extensive. By far the larger fraction, however, has accumulated during the present century and at a rate which has outrun critical correlation. It is singular, having in mind the very great practical value of the results, that a more determined or consistent effort has not been made to bring the existing material into book form. The author of the present volume has produced a book which will be valued by scientists and engineers alike.

The contents of the 491 pages of the volume are arranged under two parts; the first of which deals with the design of high-pressure plant and the methods of measurement of high pressures. The second part, some 350 pages covering thirteen chapters, deals with the properties of fluids at high pressures. An attempt to "survey briefly the specific effects of pressure upon physical processes taking place in liquids and gases" is the task the author set himself. The problem of the selection of material and emphasis are matters of difficult judgment which the author exercised with discrimination. One chapter on the liquefaction of gases has been contributed by Dr. M. Ruhemann. A bibliography follows each chapter.

Part I sketches properties of steel and modern steel alloys as pressure retaining materials suited to special conditions of pressure and temperature. Chemical interaction under pressure is now developing rapidly and the reviewer regrets that a more extensive survey of alloy properties, particularly at higher temperatures, was not made. The latest reference out of a total of twelve is 1937. There follow four chapters, one on storage and transport cylinders, the second an excellent sketch on the stress-strain relations in cylinders subjected to pressure within and without, the third on pressure plant design and the fourth on pressure measurement.

Part II is introduced with a ten-page sketch of the kinetic theory and is then followed by a presentation of the pressure-volume-temperature properties of pure gases; the actual form of the isotherms and isochores. This is accompanied by numerous references and illustrations relating to the particular means by which data have been secured. The succeeding chapter on the equation of state problems and the results achieved to date is presented in a very compact and practical way. The chapter on gaseous mixtures is much too brief, a defect for which the author may be absolved; since more measurements are urgently

needed in order to secure a necessary foundation in a field of tremendous practical significance.

The chapter on thermodynamic properties and coexisting phases is brief and the bibliography restricted. The remaining chapters deal with gas compression and circulation, gas viscosity, refractivity and dielectric properties as functions of pressure. The volume concludes with a chapter on liquid pressure-volume-temperature relationships.

An appendix in three parts is included comprising tables of relevant properties of hydrogen, nitrogen, carbon dioxide, and methane, Joule-Thomson coefficients for nitrogen, air, helium, and argon, and refractive indices for carbon dioxide.

The printing is good and the illustrations excellent.

F. G. KEYES

**The Chemistry of Powder and Explosives.** Volume I. By TENNEY L. DAVIS, Ph.D., Professor of Organic Chemistry, Massachusetts Institute of Technology. John Wiley and Sons, Inc., 440 Fourth Avenue, New York, N. Y., 1941. xi + 216 pp. 50 figs. 14.5 × 22.5 cm. Price, \$2.75.

Manufacturing plants for military explosives are rapidly increasing in number and will require many persons with some training in the chemistry of explosives. Such training will also be necessary to fulfil the requirements for explosives inspectors.

To meet these demands of the engineering defense training program, various educational institutions are offering intensive courses in Chemistry of Powder and Explosives. This book of Professor Davis is therefore most timely and should be of great aid to students in such courses.

The text is divided into four chapters. Chapter one, "Properties of Explosives," concerns the modes of behavior of explosive substances and the phenomena, both chemical and physical, which they exhibit.

Chapter two describes "Black Powder," its development, manufacture, uses and analysis.

Chapter three, "Pyrotechnics," limits its discussion to civil pyrotechnics. In his preface the author says: "Civil pyrotechnics is a much broader subject than military pyrotechnics. Military pyrotechnics differ in no important respect from similar devices for civil and recreational purposes." This chapter will appeal to the layman as well as to the student.

Chapter four, "Aromatic Nitro Compounds," to quote from the preface, "deals with the chemistry of a large and important class of explosive substances, among which TNT stands as the most important of the military high explosives, with Tetryl second in importance, while the whole class includes substances which are used, or may be used, in shells, bombs, grenades and other devices of war." For the complete comprehension of the subject matter in this chapter an elementary knowledge of structural organic chemistry is desirable, yet the non-specialist will find much that is interesting and instructive.

Scattered throughout the text are brief historical citations and illustrations which do much to vitalize the subject.

A second volume which is to follow will discuss the topics

of Nitric Esters, Smokeless Powder, Dynamite, Ammonium Nitrate and Primary Explosives.

W. L. JENNINGS

**Organic Syntheses.** An Annual Publication of Satisfactory Methods for the Preparation of Organic Chemicals. Vol. XXI. By NATHAN L. DRAKE, *Editor-in-Chief*, HOMER ADKINS, C. F. H. ALLEN, W. E. BACHMANN, R. L. SHRINER, LEE IRVIN SMITH and A. H. BLATT, *Secretary*. John Wiley and Sons, Inc., 440 Fourth Avenue, New York, N. Y., 1941. 120 pp. 15.5 × 23.5 cm. Price, \$1.75.

This new volume of "Organic Syntheses" is a valuable contribution to a series of organic publications, which is widely used and is very familiar to the younger generation of organic chemists in this country. Thirty-eight methods for the preparation of organic compounds are described by different contributors. These cover a wide variety of products illustrating new techniques being applied in the modern fields of organic research. The editorial board have retained successfully the general characteristics of the earlier editions. Also following each preparation is given a list of valuable literature references adding much to the usefulness of the book. Experimentalists who have made use of the earlier volumes of this series will find in this new book a tool of immediate value to the young workers, who do not enjoy the privilege of consulting a well equipped chemical research library. This volume should be found in every progressive and up to date library of chemistry.

TREAT B. JOHNSON

**Die biogenen Amine und ihre Bedeutung für die Physiologie und Pathologie des pflanzlichen und tierischen Stoffwechsels.** (The Biogenic Amines and their Significance in the Physiology and Pathology of Plant and Animal Metabolism.) By M. GUGGENHEIM, Dr. phil. et med. h. c., Basel, Switzerland. Third edition. Verlag von S. Karger, Stapfelberg 2, Basel, Switzerland, or Nordemann Publishing Co., Inc., 215 Fourth Ave., New York, N. Y., 1940. 564 pp. 17 × 24 cm. Price, \$11.25 or Swiss fr. 48.00.

This volume is dedicated to the late Professor George Barger who reviewed almost the entire manuscript before publication. It is a successful attempt to bring to date the material contained in the earlier editions (1920 and 1924) which were based largely on Barger's monograph "The Simpler Natural Bases (1914)." The interim of fifteen years between the second and the present edition has been one of much activity and the latter is published none too soon.

For active chemists, and particularly for beginners in the field, the first chapter is exceptionally useful. General and particular methods for the separation of proteins and the isolation of water-soluble bases are outlined with adequate references to key processes and later literature. Precipitants are discussed in detail and the chemical reactions of the various types of bases are given.

The following ten chapters deal with the ten separate classes into which the author has divided the naturally occurring amines. These are: 1, alkylamines, 2, quater-

nary alkylamines, 3, alkamines (hydroxy-alkylamines), 4, betaines and  $\omega$ -amino-acids, 5, diamino-acids and diamines, 6, guanidine bases, 7, imidazol compounds, 8, phenyl-alkyl amines, 9, indol bases and 10, bases of unknown constitution.

Since there appears to be no English equivalent for "Biogenous Amine," it might be well to adopt the literal translation, namely, "Biogenic Amines" to distinguish this group of bases of animal and vegetable origin from the alkaloids proper which are almost exclusively of vegetable origin.

The form of all of the chapters is essentially the same. There is first a section devoted to the formation, occurrence and biochemical behavior of the amines followed by a section on their pharmacological action. The final section deals with their physical and chemical properties as well as their isolation, identification and quantitative determination. The sections devoted to formation, etc., are replete with mechanisms which have been proven to obtain either in whole or in part together with the author's own valuable speculations. This will prove a great impetus to further serious research. Of particular use to the chemist are the numerous outlines of synthetic methods and the transformations which synthetic substances undergo in the animal body.

The work is in general complete with adequate references, which are conveniently given on the same page. The author being more of a biologist than a chemist has omitted an occasional reference of importance to chemistry. The most recent synthesis of gramine from indol, formaldehyde and dimethylamine, in view of its biochemical importance, should have been included. It is unfortunate that the author, with his extensive knowledge, has not seen fit to discuss the natural occurrence of acetyl-ornithine in his very able discussion on ornithine, its derivatives and their precursors and catabolites. On the other hand, the chapter on the phenylalkyl amines is a model of completeness which few reviews have equalled. A complete list of these bases as well as their hydroxy and keto derivatives is given and their chemical, physiological and pharmacological properties are adequately recorded.

There are a number of errors in the structural formulas obviously overlooked in proof reading. There is no author index but the subject index is satisfactorily complete.

In conclusion it is safe to say that this volume will find an extensive use in the hands of organic chemists, biochemists, physiologists and pharmacologists. It is a work which lends itself to easy consultation and in many cases reference to the original literature will not be necessary.

R. H. F. MANSKE

**Advances in Enzymology and Related Subjects.** Vol. I. By F. F. NORD and C. H. WERKMAN. Interscience Publishers, Inc., 215 Fourth Avenue, New York, N. Y., 1941. 433 pp. Price, \$5.50.

"Advances in Enzymology" is edited by F. F. Nord and C. H. Werkman and appears to be a continuation of the series, "Ergebnisse der Enzymforschung," published by Nord and R. Weidenhagen in Germany over a period of years from 1932 to 1939. This first American volume is indeed welcome as it considers the progress made in the

field of enzyme chemistry since the last volume of "Ergebnisse der Enzymforschung" appeared in 1939. It is also encouraging to see this type of publication originate in the United States.

A review of protein structure by H. B. Bull introduces this volume. This is appropriate, proteins playing the role they do in enzyme chemistry. It is, however, difficult, if not impossible, to review satisfactorily such a subject as this in forty-odd pages, and we find that the treatment is often too superficial to be of any great value. As an example of this we may take the dismissal of the highly controversial work of K $\ddot{o}$ gl and his collaborators on *d*-glutamic acid with the sentence, "Some workers believed that they were able to show that, in tumor tissue, glutamic acid occurs partly as the unnatural isomer (related to *d*-lactic acid)" and the mention of only one of the numerous investigations stimulated by K $\ddot{o}$ gl's reports. The gross structure of proteins, particularly where physical measurements have contributed to our knowledge, is presented in a more satisfactory way. A sentence, found not far from consideration of the arrangement of peptide chains within proteins, might be repeated for the benefit of those protein chemists who do not see it in the original. This reads, "As long as we realize that what we say is almost pure speculation, no harm will come to us, but we must be careful not to take ourselves too seriously."

It is valuable to have an up-to-date report of the recent progress in the study of the specificity of proteinases, by M. Bergmann and J. S. Fruton. The treatment here is, in the writer's opinion, the best of several recent reviews by the same authors.

Actually a large part of the present volume (130 pages) is devoted to the topic of photosynthesis. J. Franck and H. Gaffron contribute a paper, "Photosynthesis, Facts and Interpretations," and C. B. van Niel a report, "The Bacterial Photosyntheses and their Importance for the General Problem of Photosynthesis." These are both complete and up-to-date.

Further papers in this volume are the following: "Physikalisch-chemische Gesichtspunkte zum Problem der Virusaktivit $\ddot{a}$ t," by L. Holzapfel; "Metabolic Generation and Utilization of Phosphate Bond Energy," by F. Lipmann; "The Chemical Nature of Catalase," by J. B. Sumner; "Enzymes and Trace Substances," by D. E. Green, "Untersuchung enzymatischer Prozesse in der lebenden Pflanze," by A. L. Kurssanov, and "Die Verdauung bei den niederen Vertebraten," by H. J. Vonk.

WILLIAM F. ROSS

**Die Methoden der Fermentforschung.** (Methods of Investigation of Enzymes.) Edited by Prof. Dr. EUGEN BAMANN, T $\ddot{u}$ bingen, and Prof. Dr. KARL MYRB $\ddot{a}$ ck, Stockholm. Lieferung 8. Georg Thieme Verlag, Rossplatz 12, Leipzig C 1, Germany, 1941. 20  $\times$  27.5 cm. 86 figures. 459 pp. Price, RM. 34.50.

Lieferung 8 contains articles by Zeile on peroxidase and on catalase. The catalase article is somewhat disappointing since it is not critical. Berzin has written an interesting review of the thiol-disulfide system and the reversible activation of such enzymes as papain and urease.

There are several articles primarily of interest to the

plant physiologist, such as that of Steiner on the assimilation of carbon dioxide by green plants, of Engel on carbon dioxide assimilation by autotrophic bacteria and of Laine and Virtanen on nitrogen assimilation. Langenbeck gives a brief but stimulating discussion of ferment models.

Lieferung 8 contains worthwhile chapters describing the r $\ddot{o}$ le of enzymes in brewing, the fat industry, malting, bread making, textiles, leather, pharmacy, etc.

The subjects included are: Aspartase; Peroxidase; Catalase; Hydrogenase; the Thiol-Disulfide System; Ascorbic Acid; Quinone-like Substances; Carbon Dioxide Assimilation by Green Plants; Carbon Dioxide Assimilation by Autotrophic Bacteria; Nitrogen Assimilation; Antienzymes; Ferment Models; Enzymes in the Fermentation Industries; Enzymes in the Fat Industry; Enzymes in the Malt Industry; Enzymes in Bread Grains and in Meal; Enzymes in the Milk Industry; Enzymes in Honey; Filtration Enzymes; Enzymes in the Textile Industry; Enzymes in the Leather Industry; Enzymes in Pharmacy; Enzyme Alteration and Stabilization in Galenical Pharmacy; Methods for the Estimation of Enzymes in the Clinic; Enzymatic Reactions in Carcinoma; the Enzymes of Phosphorylitic Degradation;  $\alpha$ -Galactosidase of Yeast.

JAMES B. SUMNER

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## BOOKS RECEIVED

October 10, 1941–November 10, 1941

HARRY L. FISHER. "Natural and Synthetic Rubbers." American Society for Testing Materials, 260 S. Broad Street, Philadelphia, Pa. 31 pp. \$0.50.

SIDNEY J. FRENCH. "Torch and Crucible." Princeton University Press, Princeton, N. J. 285 pp. \$3.50.

GLENN L. JENKINS and WALTER H. HARTUNG. "The Chemistry of Organic Medicinal Products." John S. Swift Company, Inc., 2100 Locust St., St. Louis, Mo. 457 pp. \$3.80 less 20% discount.

H. MARK and R. RAFF. "High Polymeric Reactions, their Theory and Practice." Interscience Publishers, Inc., 215 Fourth Ave., New York, N. Y. 476 pp. \$6.50.

"Mathematics." Vol. I, No. 1, May, 1941. Research Publications, Illinois Institute of Technology, Chicago, Ill. 116 pp. Free to libraries and individuals.

JOHN H. PERRY, Editor. "Chemical Engineers' Handbook." Second Edition. McGraw-Hill Book Company, Inc., 330 West 42nd St., New York, N. Y. 3029 pp. \$10.00.

C. J. PHILLIPS. "Glass, the Miracle Maker." Pitman Publishing Corporation, 2 West 45th St., New York, N. Y. 424 pp. \$4.50.

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