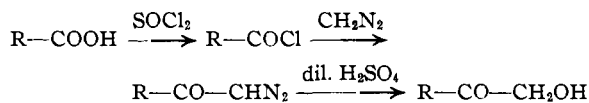
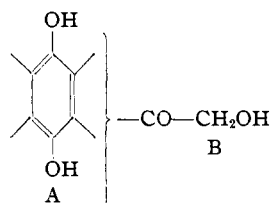


Then the original material might be regenerated by the following series of reactions



We have carried out this series of operations starting with luciferase-oxidized luciferin. Since a trace of active luciferin remained in the starting material, tests with untreated fractions were run parallel to those with chemically treated fraction. The test consisted essentially of adding hydrosulfide to the test substance followed by luciferase and bubbling air through solution. The untreated fraction gave a constant dim light while a flash of much greater intensity followed by dimmed luminescence was observed in case of the treated fraction. The whole series of experiments was repeated with the same results. Interpretation of these observations and also the earlier ones, strongly suggests the validity of our hypothesis. Therefore, we propose the following partial structure for luciferin



Oxidation of A comprises the reversible oxidation of luciferin by oxygen.^{5,6} The degradation of B forms the irreversible step in the luminescent reaction. The supply of *Cypridina* is extremely limited and the ease of auto-oxidation of luciferin renders chemical purification difficult. Therefore, we are attempting to confirm these observations and to determine the complete structure of the luciferin molecule by a synthetic approach.

We wish to thank Dr. E. N. Harvey for many stimulating discussions concerning this work. We are indebted to Dr. Aurin M. Chase for his many helpful suggestions and also for the samples of purified luciferin.

(6) A. M. Chase, *J. Cellular Comp. Physiol.*, **15**, 159 (1940).

FRICK CHEMICAL LABORATORY
PHYSIOLOGY LABORATORY
PRINCETON UNIVERSITY PURNENDU NATH CHAKRAVORTY
PRINCETON, NEW JERSEY ROBERT BALLENTINE
RECEIVED JUNE 3, 1941

NEW BOOKS

Physical Chemistry for Colleges. By E. B. MILLARD, Professor of Physical Chemistry, Massachusetts Institute of Technology. Fifth Edition. McGraw-Hill Book Co., Inc., 330 West 42nd Street, New York, N. Y., 1941. ix + 600 pp. 70 figs. 16.5 × 23.5 cm. Price, \$3.75.

The fifth edition of this well-known and widely used book has received painstaking revision, but the topics treated and the general arrangement of subject material remain essentially unchanged. In many instances the explanatory matter has been reorganized and revised to conform with the newer concepts; the derivations of some of the equations have been improved; the thermodynamic treatment has been expanded and the chapter on thermochemistry has been completely rewritten. New problems have been added and in all the book has been expanded by some seventy-six pages. It is certain that those who have been using this book as a text will appreciate the improvements which have been made.

F. E. BARTELL

Laboratory Manual of Elementary Organic Chemistry. By GEORGE HOLMES RICHTER, Assistant Professor of Organic Chemistry, The Rice Institute. John Wiley and Sons, Inc., 440 Fourth Avenue, New York, N. Y., 1940. 128 pp. Price, \$1.25.

It is the author's stated purpose to provide a series of experiments which will be of special interest to students specializing in the biological sciences. It is in the accomplishment of this aim that this book differs from the usual organic laboratory manual. The major objective of each experiment is the illustration of an organic chemical reaction or principle, and this is accomplished in most cases by the use of compounds and reactions which are of importance to biology or medicine. In a short discussion following each of these exercises this relationship and the uses of the substances involved are pointed out.

The experiments appear to be carefully written with appropriate attention given to details of manipulations and safety.

The manual is quite suitable for a general organic chem-

istry course but it should be of special value to that group for which it is designed.

WILLIAM P. CAMPBELL

Elektrochemisches Praktikum. (Electrochemical Laboratory Manual.) BY ERICH MÜLLER, Professor und Direktor des Laboratoriums für Electrochemie und physikalische Chemie an der technischen Hochschule, Dresden. Fifth edition. Verlag von Theodor Steinkopff, Residenzstrasse 32, Dresden-BI., Germany, 1940. 90 figs. 15 × 23 cm. xvi + 276 pp. Price, RM. 11.25.

This excellent textbook of experimental electrochemistry has had a long and useful career. In the present edition a few of the exercises given in the prior editions have been omitted and a single new exercise, namely, one on chromium plating, has been added. The previous editions contained many references to appropriate chapters in the "Elektrochemie wässriger Lösungen" by F. Foerster. Since this book is out of print, these references have now been replaced by brief but adequate expositions of the theoretical questions involved.

The experiments cover a wide field and serve not only to familiarize the student with electrochemical technique but to elucidate the principles of the science. An important advantage of the experiments is the use of simple and inexpensive but entirely adequate apparatus for their execution. However, I think that today these experiments could with advantage be supplemented by instruction in the use of the more complicated but marvelously convenient and compact electrical measuring instruments now widely available.

This new edition, like its predecessors, affords excellent instruction in experimental electrochemistry; instruction which would be invaluable not only to a student specializing in electrochemistry but as part of the broad training of every chemist.

ARTHUR B. LAMB

Die Methoden der Fermentforschung. (Methods of Enzyme Investigation.) Edited by Prof. Dr. EUGEN BAMANN, Tübingen and Prof. Dr. KARL MYRBÄCK, Stockholm. Lieferung 5. Georg Thieme Verlag, Rossplatz 12, Leipzig C 1, Germany, 1940. 123 figs. 20 × 27.5 cm. 580 pp. Price, RM. 42.

Lieferung 5 contains many interesting articles covering such topics as: electrophoretic methods, chromatography, direct and indirect evidence of active groups in enzymes, choline oxidase and animal phosphatases. Bamann tells of Willstätter's methods for isolating lyo- and desmoenzymes. Leucocytes are said to contain four lyoamylases and four desmoamylases. The reviewer finds this difficult to accept.

One of the novel methods for enzyme purification depends upon the production of foam, causing either the enzyme or the impurities to concentrate in the foam. One of the diagrams of the foaming apparatus is upside down.

An interesting article by Kraut gives directions for the reversible splitting of enzymes into the apoenzyme and the coenzyme. Agner's method for splitting catalase reversibly into protein and hematin is given, but no mention is

made of the fact that Agner's work has been contested. One wonders, therefore, whether the reversible dissociation of liver esterase and yeast dipeptidase should be accepted.

Weidenhagen's interesting classification of animal saccharase as an α -glucosidase, identical therefore with maltase, sets animal saccharase apart from yeast saccharase, otherwise known as B h-fructosidase.

The chapters covered in the first part of Lieferung 5 are: Algae, Yeasts, Moulds, Lower and Unicellular Animal Organisms, Tissues, Isolation and Characterization of Lyo- and Desmo-enzymes, General Procedures for Enzyme Concentrations and Separations, Determination of General Properties of Enzymes, Irradiation of Enzymes, Enzyme Reactions in Heavy Water.

The chapters covered in the second part of Lieferung 5 are: Lipases, Cholinesterase, Tannase, Chlorophyllase, Phosphatases, Phytase, Lecithinases, Sulfatases, Stereochemical Specificity of Esterases, Synthetic Activity of Esterases.

Classified as carbohydrases are chapters described as: General Properties of Carbohydrases, Plant Saccharase, Maltase, α -Glucosidase, Galactosidases, Mannosidase, Trehalase, Szillarenase, etc., Heteroglycosidases, Glucuronidase, Thioglycosidase.

JAMES B. SUMNER

BOOKS RECEIVED

May 10, 1941-June 10, 1941

SAUL B. ARENSON. "Chemical Arithmetic." Second edition. John Wiley and Sons, Inc., 440 Fourth Avenue, New York, N. Y. 130 pp. \$1.50.

JOSEPH A. BABOR and ALEXANDER LEHRMAN. "Introductory College Chemistry." Thomas Y. Crowell Co., 432 Fourth Avenue, New York, N. Y. 663 pp. \$3.50.

"Die Methoden der Fermentforschung." Edited by EUGEN BAMANN and KARL MYRBÄCK. Lieferung 7. Georg Thieme Verlag, Rossplatz 12, Leipzig C 1, Germany. 415 pp. RM. 31.20.

TENNEY L. DAVIS. "The Chemistry of Powder and Explosives." Volume I. John Wiley and Sons, Inc., 440 Fourth Avenue, New York, N. Y. 216 pp. \$2.75.

HERBERT DINGLE. "The Special Theory of Relativity." The Chemical Publishing Co., Inc., 234 King St., Brooklyn, N. Y. 94 pp. \$1.50.

LOUIS F. FIESER. "Experiments in Organic Chemistry." Second edition. D. C. Heath and Co., 285 Columbus Avenue, Boston, Mass. 488 pp. \$2.80.

HENRY C. SHERMAN. "Chemistry of Food and Nutrition." Sixth edition. The Macmillan Co., 60 Fifth Avenue, New York, N. Y. 611 pp. \$3.25.

ENRIQUE V. ZAPPI. "Tratado de Química Orgánica." Tomo Segundo, 1st Parte. "Compuestos Aromaticos, Ciclanicos y Hetero-ciclicos Substancias Naturales." El Atteneo, Florida 340, Buenos Aires, Argentina. 520 pp.