

ing. The ferric chloride color reaction also appears to be useful in this respect. The analytical application of these observations is being investigated.

We are indebted to E. F. Shelberg and L. F.

Reed for microanalyses and to E. O. Krueger for determination of absorption spectra.

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RECEIVED NOVEMBER 16, 1945

NEW BOOKS

Willis Rodney Whitney, Pioneer of Industrial Research, by JOHN T. BRODERICK, Fort Orange Press, Inc., Publishers, 883 Broadway, Albany, New York, 1945. 324 pp. 14.5 X 21 cm. Price, \$3.00.

W. R. Whitney was born in Jamestown, New York, on August 22, 1868. He graduated from the Massachusetts Institute of Technology in 1890 and was appointed assistant instructor in general chemistry. In 1892, he became full instructor; and it was after serving two years in that job that he went to the University of Leipzig for post graduate study under Wilhelm Ostwald, and received there the degree of Doctor of Philosophy in 1896. Then he spent six months at the Sorbonne in Paris studying organic chemistry under Charles Friedel.

He returned as instructor to the Massachusetts Institute of Technology. It was in colloids that his main interest lay, and he intended to devote his future researches chiefly to the colloid field. It seemed to him that colloid chemistry was the chemistry of living things, and in colloids was to be found the key to an understanding of many vital processes. He looked forward to help in the building up of a new branch of chemistry, now called biochemistry.

But the year 1900 brought a call to forsake the work and environment in which he was finding such satisfaction. He was approached by Edwin Wilbur Rice, Jr., then Vice President and Technical Director of the General Electric Company, with the proposal that he undertake the formation of a research laboratory for investigations in the electrical field.

Whitney was doubtful as to the advisability of accepting this offer and Rice then proposed that he try an experiment, dividing his time between Boston and Schenectady until he determined which place offered the more attractive prospects. He did this for three years and in 1904 decided to move to Schenectady. Under Whitney's direction the Research Laboratory grew and prospered. In 1928 Whitney was appointed Vice President of the Company in charge of research.

One of the big pieces of work done in Whitney's laboratory was Coolidge's development of ductile tungsten. Tungsten powder was mixed with starch paste, squirted through fine dies and reduced in hydrogen. Then Coolidge mixed tungsten powder with cadmium, mercury and bismuth instead of starch paste. Finally, Coolidge succeeded in drawing pure tungsten into wire and this is the process by which tungsten lamps are made in all countries at present.

The scientific star in Whitney's firmament was Langmuir. With the nitrogen-filled lamp he reduced the rate of evaporation of tungsten at high temperatures and obtained high light efficiencies with low heat losses. We now have good, clear, long-lived tungsten lamps.

Whitney's hobbies are interesting. Mr. Broderick quotes him as saying, p. 297: "A few years ago I was a guest on board the flag ship of our Atlantic Fleet. At the officers' mess, the Admiral carelessly started me talking about my turtle hobby. I told him there were at least three kinds of turtles, water, mud, and land. Nature had perpetuated these varieties to remind us of the history of growth, and so we find among turtles, first the self-

satisfied, exclusively marine type, then the compromise, the half-land and water, or mud, and finally, the wholly land, or tortoise type. I had been reading about their brains. I reviewed the literature, which shows that the water turtle, if placed upon a shelf at high elevation, will immediately jump off and commit suicide. Fearful of everything new, and ignorantly assuming that water is always at hand, he jumps from a fancied log into the imaginary water and gets a real surprise. Water turtles are so inexperienced and stupid that even when blindfolded they do not hesitate, but jump at once. These show quick reflex action, but no reflection. The superior land turtle, on the other hand, has been ashore. He has had experiences which he remembers. Put on the same shelf, he will creep cautiously to the edge, look carefully about, and only jump when it seems safe. If blindfolded he prefers to sit still and work the bandage off before taking any chances.

"Now the interesting thing is that it is only among the land turtles that cortex, or grey matter, begins to show in animal brains. Water turtles are deficient in it."

This book gives an interesting sketch of an extremely interesting and able man. Whitney set the standard for a research director, possibly for all time.

WILDER D. BANCROFT

Annual Review of Biochemistry. JAMES MURRAY LUCK, *Editor*, Stanford University, and JAMES H. C. SMITH, *Associate Editor*, Carnegie Institution of Washington, Division of Plant Biology, Stanford University, California. Volume XIV. Annual Reviews, Inc., Stanford University P. O., California, 1945. x + 856 pp. 15.5 X 23.5 cm. Price, \$5.00.

Volume XIV of the Annual Review of Biochemistry contains 28 articles dealing with topics similar to those in its preceding volumes. These are written by experts in their respective fields and cover practically all the important aspects of biochemistry of current interest. The large amount of factual material presented has been arranged in a clear, critical and discerning manner, successfully interpreting the trends of research and stimulating renewed attack upon disputed problems.

Some of the articles, such as "The Chemistry of the Carbohydrates," "The Chemistry of the Lipids," "The Chemistry of the Amino Acids and Proteins" are primarily of a chemical nature, although the interrelationship of chemistry and biology in them is obvious. These are perhaps of equal interest to chemists and biologists. The articles on "Biological Oxidations and Reductions," "Enzymes that Hydrolyze the Carbon-Nitrogen Bond: Proteinases, Peptidases, and Amidases," "Nonproteolytic, Nonoxidative Enzymes" and "The Chemistry and Metabolism of the Compounds of Phosphorus," although bearing different titles, deal essentially with similar subject matter, the role of enzymes in living cells. The review on "Biological Oxidations and Reductions" by Lardy and Elvehjem and that on "The Chemistry and Metabolism of the Compounds of Phosphorus" by Kalckar, particu-

larly emphasize the function of enzymes in biological systems from the point of view of chemical dynamics and energetics. Upon reading these articles one is impressed with the fact that enough information has accumulated in this field to encourage the belief that continued exploration will some day give us a clear understanding of the chemical events in living cells.

Greenstein in his article on "The Biochemistry of Malignant Tissue" attempts to give "a brief assessment of what the biochemical approach to the cancer problem has so far achieved and as an illustration of the possibilities of the reciprocal enrichment of the fields of normal and of abnormal physiology."

A timely discussion of a comparatively new but rapidly growing field in microbiological chemistry is presented for the first time in the Annual Reviews by Oxford in his article "The Chemistry of Antibiotic Substances Other than Penicillin." Unfortunately, due to war restrictions the most important substance of this group, namely, penicillin, could not be discussed. As stated by this author, "The present review is admittedly written from the standpoint of the organic chemist in the hope that it may provide a basis for future generalizations concerning the relationship between molecular structure and antibiotic action."

In spite of the progressive war-time difficulties encountered by the editors, the present volume is the largest yet published, containing 856 pages. The realization that the productivity of this field has not been seriously diminished is gratifying. To workers and students whose research in biochemistry has been interrupted by the war, the "Annual Review of Biochemistry" will undoubtedly prove of immense service by helping them to reorient themselves in their respective branches of the field.

W. Z. HASSID

Physical Methods of Organic Chemistry. Vol. I.

ARNOLD WEISSBERGER, Editor. Interscience Publishers, Inc., 215 Fourth Avenue, New York 13, N. Y., 1945. vii + 736 pp. 15.5 × 23.5 cm. Price, \$8.50.

In his preface, the Editor states that the science of physics has become increasingly important to the organic chemist and that the chemist in order to acquaint himself with a certain physical method has in the past been compelled to search through periodicals and specialized books. The present work has been compiled with the hope of relieving him of much of this burden.

The present volume has been compiled by twenty authors and covers the following topics: I. Determination of Melting and Freezing Temperatures; II. Determination of Boiling and Condensation Temperatures; III. Determination of Density; IV. Determination of Solubility; V. Determination of Viscosity; VI. Determination of Surface and Interfacial Tension; Parachor; VII. Determination of Properties of Monolayers and Duplex Films; VIII. Determination of Osmotic Pressure; IX. Determination of Diffusivity; X. Calorimetry; XI. Microscopy; XII. Determination of Crystal Form; XIII. Crystallochemical Analysis; XIV. X-Ray Diffraction; XV. Electron Diffraction; XVI. Refractometry.

There can be no doubt that a text covering these topics was needed and that the Editor has done a commendable job in assembling it and in obtaining the assistance of so many outstanding contributors. There also can be no doubt that this book will be of great value to those who want to acquaint themselves with the various physical methods successfully applied in organic chemical research with the least trouble and time-consuming search for pertinent literature.

However, since authors and Editor welcome suggestions for improvement, the following are offered. A subject index would materially improve the purpose for which the

book was written. A number of chapters, and I am referring in particular to topics in which I am active, call for amplification and in some instances for a reduction in personal opinions of the author, if the book is to really serve the purpose for which it was intended. To be more specific, the chapter on viscosity by H. Mark, for example, claims that only the capillary viscosimeters of Ostwald and Ubbelohde are applicable to systems of a viscosity between 10^{-2} to 10^2 poises and no other method is even mentioned. However, these viscosimeters are not reliable when dealing with systems which show structural viscosity. The Stormer, MacMichael, Hoeppler and Gardner-Holdt viscosimeters are not even mentioned. In the excellent chapter on surface and interfacial tension, W. D. Harkins takes issue with the pendant drop method without even giving the reader a detailed discussion of the technique or an illustration of the equipment. The fact that this technique has proved to be very valuable in the study of solutions of capillary active agents cannot be denied, and, therefore, should find its proper place in a book dealing with physical methods. The chapter on microscopy by E. E. Jelley would have been of greater value to the organic chemist if it had offered more information on the applicability of microscopic techniques and less theory. Nearly the entire chapter is devoted to the microscopy of crystals, although most organic matter is amorphous. The electron microscope is barely mentioned; the ultramicroscope, the ultraviolet light microscope, fluorescence, illumination by incident light (Ultropak), micromanipulation, azimuth stops, etc., are not even mentioned.

For those who are interested in the theory on which the various methods are based, this book is highly recommendable. Those who expect an up-to-date summary of physical methods, their applicability and limitations in organic chemical research might be somewhat disappointed.

E. A. HAUSER

BOOKS RECEIVED

October 10, 1945–November 10, 1945

S. R. DE GROOT. "L'Effet Soret." N. V. Noord-Hollandsche Uitgevers Maatschappij, Amsterdam, Holland. 191 pp.

JACK DE MENT. "Fluorochemistry." Chemical Publishing Co., Inc., 26 Court St., Brooklyn 2, New York. 796 pp. \$14.50.

RUDOLF HÖBER. "Physical Chemistry of Cells and Tissues." The Blakiston Company, Philadelphia 5, Pa. 676 pp. \$9.00.

H. D. SMYTH. "A General Account of the Development of Methods of Using Atomic Energy for Military Purposes under the Auspices of the United States Government, 1940–1945." Superintendent of Documents, Government Printing Office, Washington 25, D. C. 182 pp. \$0.35.

R. C. WALKER. "Electronic Equipment and Accessories." The Chemical Publishing Co., Inc., 234 King St., Brooklyn 31, New York. 393 pp. \$6.00.

"Index of Microfilms." Series A. Lots 1–1737. An Alphabetical Index to the Principal Subjects of the First 100 Reels of Microfilm Copies of Documentary Photographs, Including the Photographic Survey of the United States Produced under the Direction of Roy E. Stryker for the Farm Security Administration and the Office of War Information in 1935–1943. 26 pp. Available upon application to the Information and Publications Office, The Library of Congress, Washington 25, D. C.