way of transformation of formazan groups,[10, 11] are in progress.

Thanks are due to Prof. G. Zemplén for valuable advice given and to E. Moczar for assisting in the experiments.

(10) V. C. Barry, *Nature*, **152**, 537 (1943).

(11) V. C. Barry, T. Dillon and W. McGottrick, *J. Chem. Soc.*, 183 (1942).

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RECEIVED JUNE 16, 1955

BOOK REVIEWS

Synthetic Methods of Organic Chemistry. An Annual Survey. Volume 9. By W. THEILHEIMER. Interscience Publishers, Inc., 250 Fifth Avenue, New York, N. Y. 1955. xvi + 491 pp. 16.5 × 23.5 cm. Price $18.90.

Nine years ago this reviewer had the privilege of commenting on the first volume of Theilheimer's "Synthetic Methods." Now the ninth volume has appeared, covering the years 1952–1954: the author is to be complimented upon having kept abreast of the ever-swelling tide of research results and upon having done so with adherence to the high principles formulated at the outset.

An added feature, presented beginning with Volume VIII, consists in a few introductory pages of "Trends in Organic Chemistry" in which the author presents a condensed survey of synthetic methods recently introduced, perfected, modified, or disinterred, that appear to be of broad significance and applicability; there is, *e.g.*, a paragraph devoted to methods of peptide syntheses.

The series has, to all intents and purposes, become one of the standard resources of every research library, and this reviewer feels that any further discussion of the collection, including the good-natured controversy over the system of symbols, would be redundant if it were to go beyond an expression of gratification at the successful continuation of a very worthwhile enterprise.

RESEARCH DEPARTMENT
CIBA PHARMACEUTICAL PRODUCTS, INC. HANS HEYMANN
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Physical Chemistry. A Series of Monographs. Edited by ERIC HUTCHINSON, Stanford University, California. Volume III. **Degradation of Vinyl Polymers.** By H. H. G. JELLINEK, Senior Lecturer in Physical and Inorganic Chemistry, University of Adelaide, South Australia. Academic Press Inc., Publishers, 125 East 23rd Street, New York 10, N. Y. 1955. 329 pp. 15.5 × 23 cm. Price, $8.50.

The author states, and the reader will concur, that the book should be of interest to the polymer chemist concerned with fundamental aspects of degradation reactions and also to the polymer chemist in the applied field. The latter may be somewhat dismayed by the montage of differential equations confronting him in the first chapter. If he will begin at page 31, he can avoid much of the mathematical derivations and will find the ideas and experimental data just as interesting.

The author demonstrates an excellent familiarity with the whole field of polymer degradation. The book is admittedly written from the standpoint of reaction kinetics and is a theoretical treatise of mechanisms of polymer degradation. However, considerable experimental data are presented, much of it the work of the author himself. Chapters 2, 3 and 4 will be of especial interest to the applied chemist in the field of polymers. Since this chemist is interested in the degradation of polymers from the standpoint of being able to prevent that degradation, he will find fruitful suggestions and ideas coming into his mind while digesting the author's suggested mechanisms. He will, however, be disappointed that the very important field of photodegradation of polymers is relegated to one paragraph each in the chapters on "Degradation in Solution and Bulk Degradation *in vacuo*." The chemist interested in fundamental studies will find quoted many of the postulated mechanisms of chemical reaction such as oxidation, hydrolysis, pyrolysis. Though it is unthinkable that he would agree with all of the mechanisms presented, they represent the latest published hypotheses.

The presentation is factual; the editing, excellent. Errors are at a minimum. For the kineticist it is recommended reading; for the applied polymer chemist it should be a required course.

PLASTICS DIVISION RESEARCH DEPT.
CELANESE CORPORATION OF AMERICA O. V. LUKE, JR.
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Solubilization and Related Phenomena. Physical Chemistry. A Series of Monographs. Volume IV. By MARY EVELYN LAING MCBAIN AND ERIC HUTCHINSON, Department of Chemistry, Stanford University, Stanford, California. Academic Press, Inc., Publishers, 125 East 23rd Street, New York 10, N. Y. 1955. xv + 259 pp. 15.5 × 23.5 cm. Price, $7.00.

Although dedicated to the memory of J. W. McBain and introduced by a selection from his writing, this book is not a compilation of contributions from the Colloid Chemistry Group at Stanford University, but an attempt to organize the voluminous literature on solubilization and to proceed as far as the state of knowledge permits toward a theoretical treatment of the subject. The fact that the concepts the authors advance in the light of recent work on colloidal electrolytes are sometimes at variance with those supported by Professor McBain during his active research in the field does not disturb them and would probably not have troubled McBain, who had a thorough respect for the logic of experiment.

The phenomena of solubilization by strictly micellar systems are presented in a brief but excellent historical chapter and in a longer chapter bearing the noncommittal title, "Data and Facts of Solubilization." The latter, which occupies nearly half the book, is in fact a well organized and readable survey into which the authors have introduced a considerable body of stimulating discussion based on their view of solubilization as a partition between the solvent proper and a micellar pseudo-phase. The chapter opens with a summary of the experimental methods available for the study of solubilization. This is brief, in keeping with the condensation characterizing most of the volume; it is regrettable that the scale of the work does not permit a more detailed and critical consideration of the experimental procedures and the assumptions implicit in their use. The remainder of the chapter is devoted to the effect of such variables as constitution, extraneous solutes, temperature and mixed micelle formation, with specific sections on emulsion polymerization, solubilization in non-aqueous systems and solubilization phenomena in two-phase systems. In the effort to compress a large volume of information into small compass it is perhaps inevitable that minor inaccuracies should appear; those noted do not affect the major conclusions drawn and will not be listed here.

There is a relatively detailed preliminary chapter on the formal thermodynamics of micellar systems and on the methods for measuring the critical micelle concentration.

A chapter titled "The Mechanism of Solubilization" is devoted to a critical consideration of the X-ray evidence for various micellar structures and for the changes in these structures when solubilization occurs. The authors' conclusion that "there appears to be no reason to postulate any mechanism (for solubilization) other than that of ordinary solution of the solubilizate in the hydrocarbon center of the micelle" appears to be based on their belief that the interpretation of the X-ray evidence is incorrect or inconclusive. It is consistent with the authors' treatment of solubilization as a partition phenomenon, but will be considered a serious over-simplification by some investigators familiar with the solubilization of amphipathic non-electrolytes. A short chapter is devoted to co-solvency, blending and hydrotropy, and one to the physiological effects of solubilization. The latter, interestingly, minimizes the importance of solubilization in some transport processes previously explained by this mechanism. The chapter on practical applications is brief and sometimes superficial. In their discussion of rust inhibition by oxidation products in lubricating oils the authors indulge in speculation which reflects unfamiliarity with the experimental facts and is at variance with the sound thermodynamic approach apparent elsewhere in the volume.

The book is well printed and adequately indexed. The references cited bring the coverage of the literature three years further than the extensive review published by Klevens in *Chem. Revs.* in 1950. As the authors indicate, the field of solubilization by micelles is today in too active a stage of development to allow the writing of a definitive monograph. In the meantime colloid chemists are indebted to them for providing a readable and stimulating survey of the present state of the subject.

NAVAL RESEARCH LABORATORY
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Vitamins and Hormones. Advances in Research and Applications. Volume XII. Edited by ROBERT S. HARRIS, Professor of Biochemistry of Nutrition, Massachusetts Institute of Technology, Cambridge, Massachusetts, G. F. MARRIAN, Professor of Medical Chemistry, University of Edinburgh, Edinburgh, Scotland and KENNETH V. THIMANN, Professor of Plant Physiology, Harvard University, Cambridge, Massachusetts. Academic Press, Inc., Publishers, 125 East 23rd Street, New York 10, N. Y. 1954. xi + 305 pp. 15.5 × 23.5 cm. Price, $7.50.

"Vitamins and Hormones" is the twelfth of a series of volumes dealing with subjects of current biochemical interest. These reviews cover developments during recent years and include the necessary background to provide a complete picture of the subject. Eight topics are covered; five dealing with nutrition and three with endocrinology.

The first review deals with the chemistry of vitamin B_{12} and pertains to its isolation, chemistry and analytical procedures. The reader will find the discussion on pseudovitamin B_{12} and related compounds of special interest in view of the various substances related to this vitamin that have been described.

The second chapter on intestinal synthesis of vitamins in the ruminant provides a comprehensive review of the recent work on the nutrition of the preruminant calf as well as vitamin synthesis in the rumen of the adult animal.

Chapter three deals with the biochemistry and pathology of hypervitaminosis A. A detailed account is given of pathological changes which occur in animals and man. The reviewer, however, questions the statement that the "disturbance of the physiologic equilibrium between vitamin A and other factors, caused by the hypervitaminosis A, provide another starting point for fundamental research into the biochemistry of vitamin A." An example of apparent interaction between excess vitamin A and vitamin K is given. It seems questionable, however, whether the toxicity of vitamin A is simply the result of a displacement of other vitamins as postulated in this paper.

Chapter four comprises an excellent review of the vitamin A requirements of animals along with a discussion of the dietary factors influencing absorption and utilization of this vitamin.

The fifth chapter deals with nutrition and liver disease in man. This includes a discussion of Kwashiorkor, alcohol and cirrhosis, and of liver degeneration in diabetes and in hepatic coma. This is a valuable review of a clinically important but nutritionally perplexing subject.

Three endocrinological subjects are covered. The first of these deals with light regulation of hormone secretion and is a compilation of a mass of experimental observations relating to photoperiodism in invertebrates, amphibian and warm blooded animals. Special emphasis is given to the effect of light on reproduction in birds, mink and ferrets. Attention is also given to the influence of light on such phenomena as hibernation, fat deposition, and hair and feather cycles.

The second chapter dealing with endocrinology gives an interesting discussion of the estrogenic agents occurring in plants. This includes a list of plants exhibiting estrogenic activity and a detailed treatment of the chemistry of genestin and of related isoflavonones which exhibit estrogenic activity.

The last chapter deals with the effect of estrogens on fowls and their industrial applications. This provides an account of the biochemical and morphological changes induced by estrogenic agents as well as a description of their use in improving carcass quality in commercial meat birds. This paper is of timely importance in view of the widespread use of this practice in poultry production and its more recent extension to other animals.

The organization of the book makes for easy reading. A complete table of contents is included and a complete outline appears at the beginning of each chapter. The writers have made comprehensive literature searches as judged by the extensive bibliographies at the end of each paper. The index is both by author and subject. The only criticism that might be made is the absence of any papers dealing with the biochemical aspects of vitamin metabolism that have been characteristic of previous volumes in this series.

AMERICAN CYANAMID CO., RESEARCH DIVISION
LEDERLE LABORATORIES E. L. R. STOKSTAD
PEARL RIVER, NEW YORK

Methods of Enzymology. Volume. I. Preparation and Assay of Enzymes. Edited by SIDNEY P. COLOWICK and NATHAN O. KAPLAN, McCollum-Pratt Institute, The Johns Hopkins University, Baltimore, Maryland. Academic Press, Inc., Publishers, 125 East 23rd Street, New York 10, N. Y. 1955. xxv + 835 pp. 16.5 × 23.5 cm. Price, $18.00.

Oppenheimer's "Die Fermente" (seven volumes) and Baumann and Myrbaeck's "Die Methoden der Fermentforschung" (four volumes) represent the methods used in the development of enzymology of that period. This work appears to represent some of the earlier useful procedures as well as those employed in more recent investigations.

"Methods in Enzymology" is unique in that it is written by a large number of well known investigators. According to the preface the number of contributors to the four volumes is three hundred. This volume contains one hundred and twenty-six contributions. The length of the papers varies from one page to many pages. Thus some of the procedures are quite condensed and it will be necessary for the reader to occasionally consult the several available one-volume texts, and the original articles for complete understanding of the procedures.

The first section describes procedures for making tissue slices and tissue homogenates, methods for the extraction of mitochondria, chloroplasts and enzymes from bacteria and from different biological materials. The second section contains seventy-one contributions concerning enzymes of carbohydrate metabolism. In the third section there are twenty-four methods concerning enzymes of lipid metabolism. In the fourth section there are thirteen methods dealing with the enzymes of the citric acid cycle.

Concerning the subject matter of this volume the editors' scope to provide methods for the purification of enzymes, the assaying of enzymes and crude extracts, has been exceedingly well met. This book is a priceless addition to the enzyme reference literature.

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