
 BOOK REVIEWS

Physical Chemistry of High Polymers. By MAURICE L. HUGGINS, Research Associate, Kodak Research Laboratories, Rochester, N. Y. John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1958. xiii + 175 pp. 15.5 × 23.5 cm. Price, \$6.50.

Dr. Huggins has presented a compact introduction to a number of topics relating to Polymer Chemistry, based upon a series of lectures he gave as a Visiting Professor in Japan during 1955 and 1956. A (condensed) listing of chapters follows: Nomenclature; Synthesis; Composition and Structure; Chain Configurations; Thermodynamics of Polymer Solutions (3 chapters); Viscosity of Dilute Solutions; Plastic Flow; Long-Range Elasticity; Addition Polymers; Condensation Polymers; Cellulose and Starch; Polypeptides; Collagen; Corpuscular Proteins.

The emphasis given to various topics is based largely upon the author's own research contributions. These contributions have been numerous and significant, and have ranged across many areas of polymer chemistry. Even so, a certain unevenness of depth results. Some topics (notably, thermodynamics of polymer solutions) are developed in considerable detail and on an advanced level. Other topics (in particular: addition polymerization and copolymerization; and long-range elasticity) are presented cursorily or on an elementary level.

The treatment of both types of topic tends to be clear and cogent, and the book should be of interest to all polymer chemists.

POLYMER RESEARCH LABORATORY
THE DOW CHEMICAL COMPANY TURNER ALFREY, JR.
MIDLAND, MICHIGAN

The Lipids. Their Chemistry and Biochemistry. Volume III: Biochemistry. Biosynthesis, Oxidation, Metabolism and Nutritional Value. By HARRY J. DEUEL, Jr., Dean, Graduate School, and Professor of Biochemistry, University of Southern California, Los Angeles. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1957. xxxvi + 1065 pp. 16 × 23.5 cm. Price, \$25.00.

This third volume of the series contains a total of 1065 pages with very full indexes (author index 53 pages, subject index 62 pages and 12 pages of Plant and Animal Sources of Lipids).

Contents: Chapter I, General Consideration of Lipid Digestion, Absorption Transport and Storage.

Chapter II, Biosynthesis of Triglycerides, Phospholipids and Fatty Acids, building stones, sites of synthesis, role of Enzymes and CoEnzyme A, Hormones and other factors.

Chapter III, Oxidation and metabolism of Triglycerides and Fatty Acids, Hydrogenation, Enzyme systems involved, Pathways, Ketonuria, Ketosis in animals, comparative Ketolytic effect of sugars. The metabolism of the Polyunsaturated Acids. Factors affecting oxidation, Parenterally administered Fats, Oxidation and metabolism of Glycerol.

Chapter IV, The conversion of fat to carbohydrate. Odd and even numbered Fatty Acids. Evidence from Isotopes. Insulin, Acetic acid and its derivatives.

Chapter V, Oxidation and Metabolism of the Phospholipids, Degradation, Effect of Deficiency.

Chapter VI, Acetic, Formic and Propionic Acids in the intermediary metabolism of Fats. Glycogen, Cholesterol, Protoporphyrin, Uric Acid, Amino Acid syntheses.

Chapter VII, Metabolism of Branched Chain, Hydroxy and Ketoacids; Di- and Tri-carboxylic Acids, Fatty Acid Amides, Aldehydes and Hydrocarbons, Waxes, Squalene, Aromatic Hydrocarbons, Naphthalene and Anthracene.

Chapter VIII, Metabolism of Cholesterol and related Sterols in Animals, Absorption, Transport and Changes in the G. I. Tract, Cholesterol in Blood, Nature, factors influencing the blood content, Biosynthesis, effect of Fat, Cholesterol and other Sterol feeding, Excretion in Intestine and Urine.

Chapter IX, Metabolism and nutritional value of Carotinoids and Vitamin A. Digestion, Absorption, esterifica-

tion, storage in Vertebrates and invertebrates. Distribution in tissues, Hypervitaminosis: This chapter is nearly 100 pages long indicating the thorough treatment of the topic.

Chapter X, Metabolism and nutritional value of Vitamins D, similar treatment to the Carotinoids—about 60 pages.

Chapters XI and XII, Similar treatment of Vitamins E and K.

Chapter XIII, The essential Fatty Acids, Chemical relations importance, preparations, analysis and bioassay. Requirements, Interconversions. Functions and Distribution.

Chapter XIV, The nutritional value of Fats, Essentiality, effect on various functions, effect on stress, on Galactose and Calcium absorption, on vitamin requirements, on Bacteria and lower organisms. Factors affecting the nutritional value of Fats. Animal vs. Vegetable Fats. Nutritional indices, pregnancy, lactation multigeneration. Effects of heating and rancidity. Modified fats and oils, mono- and di-glycerides, Acetoglycerides, optimum levels in man and experimental animals.

The three volumes constitute a monumental piece of work containing as far as can be determined the sum of present knowledge in this field. The work has especial value because it was done by a man actively engaged in work in the field and not by an arm-chair student.

In spite of great and continuing advances in the field in recent years, these books will remain the best source of knowledge of the Fats and related substances for many years to come. The third volume is perhaps the best of the three and while the price is high (\$25.00) the value is there. There is of course considerable repetition in the three volumes, but that is necessary for a good understanding.

MEDICAL SCHOOL
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Handbuch der Mikrochemischen Methoden. Volume II. FRIEDERICH HECHT and MICHAEL K. ZACHERL, Editors. Verwendung der Radioaktivität in der Mikrochemie. Radiochemische Methoden der Mikrochemie. By E. BRODA and T. SCHÖNFELD. Messung Radioaktiver Strahlen in der Mikrochemie. By T. BERNERT, B. KARLIK and K. LINTNER. Photographische Methoden in der Radiochemie. By H. LAUDA. Springer-Verlag, Molkerbastei 5, Wien 1, Austria. 1955. 423 pp. 17.5 × 25 cm. Price, \$19.30; Subscribers to Handbuch, \$15.45.

Volume II of the "Mikrochemischen Methoden" series is essentially a handbook of applied radiochemistry, with particular emphasis on analytical methods. Such material is not ordinarily included in treatises on microchemistry, thus preserving what seems to the reviewer to be a proper distinction between the methods of trace analysis (which, in spite of their great sensitivity, generally are carried out by ordinary macroscale manipulations) on the one hand, and true micromethods on the other.

The somewhat different point of view adopted in the present "Handbuch" is expressed in an introductory statement: "Infolge der grossen Empfindlichkeit, mit der radioaktive Strahlungen nachgewiesen werden können, ist auch die Empfindlichkeit der radiochemischen Analyse ausserordentlich gross. Die radiochemische Analyse bewährt sich daher vor allem im Rahmen der Mikrochemie."

The question as to whether the second volume of this series ought really to be included in a compilation of microchemical methods is perhaps irrelevant. Most workers in the field of applied radiochemistry will welcome its existence, whatever the reason for its preparation. As a practical guide to the application of the techniques of radiochemistry to chemical research, this is an excellent book. The authors are acknowledged experts in their respective fields, and they treat their subject matter with exceptional thoroughness. The volume obviously is written primarily for chemists, since such aspects of radiochemistry as nuclear structure, decay systematics, nuclear reaction mechanisms, etc., are treated very briefly or not at all.

Of the three major sections into which the subject matter of this volume is divided, the first and predominant portion is devoted to methods of separation and identification of radioisotopes, sample preparation, the behavior of trace concentrations of elements in phase separations, isotope dilution methods and activation analysis. A concluding section deals with the biological effects of radiation and radioactive materials and suggests precautionary measures for handling radioactive substances. These safety rules appear to be adequate for activities up to about the millicurie level.

The second division of this volume is devoted to counting equipment. The physical principles of the operation of ionization chambers, scintillation counters, crystal counters and spark counters are treated in some detail. There are useful discussions of scattering and counting yields, background corrections, and of the statistical evaluation of counting data.

The concluding portion of this "Handbuch" deals somewhat briefly with the use of photographic methods in radiochemistry.

After an introductory section on the photographic process itself, the authors discuss the properties of various commercially available emulsions in terms of their applicability to the study of different types of radioactive decay. Directions are given for the development and fixation of plates and films and for their microscopic examination. The attention of the reader is directed to errors arising in photographic methods from fogging, fading, shrinkage and distortion of the emulsion.

A final section discusses some of the applications of the methods of autoradiography to radiochemistry.

Volume II of "Mikrochemischen Methoden" can be strongly recommended to all who have an interest in the practical application of radiochemistry to chemical research. An especially valuable feature of this volume is its thorough documentation, which extends to more than 2000 references.

DEPARTMENT OF CHEMISTRY
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B. B. CUNNINGHAM

Calcul des Fonctions D'Onde Moléculaire. Centre National de la Recherche Scientifique, 13, Quai Anatole France, Paris 7, France. 1958. 415 pp. 16 × 24.5 cm. Price, 3,400 Fr.

This volume consists of a collection of about thirty-five papers, on the general subject of molecular wave functions. The papers were presented at a colloquium sponsored by the Centre National de la Recherche Scientifique of France. Comments and discussion by members of the colloquium are included. The papers give a comprehensive view of current applications of quantum mechanics to general problems of molecular structures, and of application to selected specific cases. The volume is attractively bound and it is clearly printed on good quality paper.

DEPARTMENT OF CHEMISTRY
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A. B. F. DUNCAN

Organic Syntheses with Isotopes. Part II. Organic Compounds Labeled with Isotopes of the Halogens, Hydrogen, Nitrogen, Oxygen, Phosphorus, and Sulfur. By ARTHUR MURRAY, III, and D. LLOYD WILLIAMS, University of California, Los Alamos Scientific Laboratory, Los Alamos, New Mexico. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1958. ix + pp. 1147-2096. 15.5 × 23.5 cm. Price, \$25.00.

The first part of this volume, which dealt with compounds of isotopic carbon, was reviewed in an earlier issue (THIS JOURNAL, 81, 2030 (1959)). Most of the remarks made in the earlier review are also applicable to Part II. The entire volume represents an excellent contribution to chemical literature.

Part II, and only Part II, contains the index for the entire volume. This index, which appears to be very complete, follows *Chemical Abstracts* usage with the addition of isotopic designations.

In Part II, as in Part I, the authors have attempted "to treat all labeling syntheses mentioned in the literature

through 1955." Descriptions of syntheses are presented in sufficient detail so that preparations may be carried out without further recourse to the literature. In addition, for the isotopes of hydrogen, the halogens and oxygen, there are tables listing exchange reactions that have been used to synthesize compounds containing these isotopes.

A major fraction of Part II, some 450 pages, is concerned with the hydrogen isotopes, but tritium syntheses take up only 50 pages of this section. The book was written before the recent upsurge of tritium's popularity, mostly occasioned by Wilzbach's discovery that organic compounds can be labeled by simple exposure to tritium gas. However, anyone who wishes a specific labeling of either hydrogen isotope in a given molecule will find it worthwhile to read the synthetic procedures that are outlined in this book.

This volume (both parts) should be in all chemical libraries. Its price is so high (\$50.00), however, that it will have a limited appeal to individual purchasers.

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RICHARD M. LEMMON

Catalysis. Alkylation, Isomerization, Polymerization, Cracking and Hydroreforming. Volume IV. Edited by PAUL H. EMMETT, W. R. Grace, Professor of Chemistry, The Johns Hopkins University, Baltimore, Maryland, Reinhold Publishing Corporation, 430 Park Avenue, New York 22, N. Y. 1958. vi + 706 pp. 16.5 × 23.5 cm. Price, \$19.50.

The first five volumes of this series dealt primarily with the fundamental theories and mechanisms of catalysis. Volume VI is designated as "hydrocarbon catalysis" and it is concerned with some of the more important catalytic reactions pertaining to petroleum refining and petrochemicals.

The chapters consist of: 1. Catalytic Alkylation of Paraffins (42 pages) by R. M. Kennedy; 2. Catalytic Isomerization of Hydrocarbons (148 pages) by F. E. Condon; 3. Mechanism of Polymer Formation and Decomposition (150 pages) by R. Simha and L. A. Wall; 4. Polymerization of Olefins (66 pages) by A. G. Oblad, G. A. Mills and H. Heinemann; 5. Catalytic Cracking (87 pages) by H. E. Voge; and 6. Catalytic Reforming of Pure Hydrocarbons and Petroleum Naphthas (194 pages) by G. F. Ciapetta, R. M. Dobres and R. W. Baker.

All the chapters were written by recognized experts and all of the chapters with the exception of Chapter 3 deal with strictly catalytic reactions. It is to the credit of the Editor that he was able to embrace in this volume the various reactions which use catalysts which act in part at least by virtue of their acidic properties.

The chapter on Isomerization is probably one of the most comprehensive review articles in this field and it deserves special commendation.

In the chapter on Catalytic Cracking prime attention was paid to the basic knowledge of the reaction and to the theories which explain the reaction. The chemistry of the cracking catalyst was purposely omitted as it is to be discussed in another volume of this series.

Catalytic Reforming consists of three parts. Parts 1 and 2 deal with the reactions of pure hydrocarbons in the presence of metal oxides and in the presence of dual function catalysts. The third part summarizes the characteristics of the various commercial processes. The authors undertook a painstaking job in classifying and summarizing the various papers published on this subject. Although hydroforming reactions are of the most important catalytic reactions in the field of petroleum, relatively little attention was paid to the mechanism of these reactions. For that reason probably this chapter did not dwell too much upon the mechanism of hydroisomerization. It is regrettable that throughout the chapter degrees Centigrade and Fahrenheit were used interchangeably.

Chapter 3 deals with reactions involving large molecules; their formation and their breakdown. The chapter is very well and clearly written and presents an excellent summary of this subject. Most of the reactions discussed in this chapter are concerned with free radical initiated polymerization. For that reason it is debatable whether these reactions could be classified as catalytic. The inclusion, however, of "non-catalytic" polymerization reactions next to "catalytic"