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## NEW BOOKS

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**Organic Chemistry.** By LOUIS F. FIESER and MARY FIESER. D. C. Heath & Company, 285 Columbus Avenue, Boston, Massachusetts, 1944. 1112 pp. Illustrated. 16.5 × 24 cm. Price, \$8.00.

One expects a good organic textbook not only to acquaint the students with the numerous, often bewildering, facts and theories, but to do it in such a manner as to captivate his interest, if not to raise a genuine enthusiasm for the subject. A more advanced text, such as the present, is also expected to lay out for the benefit of the student a map of the entire field of organic chemistry with the aid of which he may later find his way through current literature. It should also tell the reader about the growth of the ideas which have led to the construction of this map and about extensions which may be expected in the near future. Fieser and Fieser's textbook comes close to the ideal fulfillment of all these expectations. Its style is so readable and narrative, its presentation so interesting and intriguing, that the reviewer can well envisage the willingness of students to read and study many chapters without their having been told to do so.

In Fieser and Fieser's book the student is introduced to the subject matter along more or less conventional lines. A brief historical review of early organic chemistry leads up to Kekulé's theory of valence and its electronic counterpart. This is followed by the usual chapters on hydrocarbons, halides, alcohols, etc., the discussion of aliphatic compounds on the whole being separated from that of aromatic substances. In treating the various subjects the authors do not present a mere compilation of reactions and facts which so frequently discourages the student. They offer the material in a form made highly digestible by the interspersing of interesting and refreshing comments on the usefulness and peculiar properties of the various compounds. The leading theme of the authors' presentation is the creativeness of organic chemistry; it cannot fail to impress the student and to stimulate his imagination.

From the very beginning the authors have endeavored to make the student realize that the many reactions he will be required to learn are not mere blackboard equations but that they are of definite practical value. Wherever feasible they have illustrated the reactions, complete as to conditions and yields, by examples taken from the literature, such as "Organic Syntheses." This is of significant pedagogical value since it acquaints the student with the importance of experimental conditions and the deplorable fact that the yields of most organic reactions are far from quantitative. A distinctive feature of the text is the explanation of the origin of most of the names of organic compounds, which to the student without classical education may appear so meaningless. The definition of commonly used terms, however, is not always clear. Thus on page 89 saponification is defined as "the conversion of an acid into a metallic salt" while on page 182 it is referred to as the alkaline hydrolysis of an ester. Another very recommendable feature of the book is a chapter of forty-five pages in which the various aspects of stereochemistry are treated in a particularly lucid and interesting manner.

About one-third of the book is devoted to the discussion of aromatic compounds. The authors themselves point out in the preface that the treatment of this material is more extensive than the relative importance of the subject alone would justify. They feel, however, that "this apparent emphasis is in part merely because expansion at this stage of the book is practicable." The reviewer cannot help but get the impression that some of this expansion might have been more profitably turned to the chemistry of heterocyclic compounds which has been treated as a stepchild in this otherwise so complete book. A multitude of heterocyclic compounds are mentioned and their structural formulas given throughout the book, but there is no

special chapter dealing with the various ring systems, their preparations and general properties. Thus, for example, the Skraup quinoline synthesis is only sketchily mentioned in the chapter on dyes in connection with the synthesis of Alizarine Blue. In respect to this important branch of organic chemistry Fieser and Fieser's book appears to be unbalanced. The student may get an incorrect impression on the relative importance of organic compounds when he finds many pages devoted to the chemistry of carcinogens, but few if any to ring systems occurring in important alkaloids such as cocaine. He will find five pages of discussion on the chemistry of the wood pigment lapachol and related substances, but will look in vain for information of the chemistry of anthocyanins and similar pigments. He will be impressed by the importance of steroid chemistry, which is treated on more than fifty pages, but he will search fruitlessly for some concrete information on nucleic acids, which are not even mentioned in the index.

A most laudable feature of the book are the special chapters on discussion of significant applications of organic chemistry to technology and to medical and biological sciences. The topics covered in these supplementary chapters are as follows: petroleum (28 pp.), rubber (25 pp.), fats and waxes including surface active agents (22 pp.), proteins (45 pp.), microbiological processes (23 pp.), role of carbohydrates in biological processes (19 pp.), metabolism of fats and proteins (22 pp.), synthetic fibers, plastics and resins (35 pp.), steroids (54 pp.), accessory dietary factors (25 pp.) and advances in chemotherapy (15 pp.). The authors suggest that these chapters be used as optional reading, but the reviewer found them so interesting and informative that he would like to make them obligatory reading at least for the more advanced students. The authors have endeavored to intersperse these chapters throughout the book "at such points as the subject matter can be fully understood." The reviewer doubts, however, the ability of the average student to understand fully those special chapters which are introduced at a relatively early stage. Thus the essays on petroleum and rubber mention many aromatic and heterocyclic compounds the chemistry of which is not dealt with until later in the text.

The authors express their regret that lack of space did not permit them to give literature references throughout the book, but they offer instead pertinent reading references at the end of every chapter together with a series of well selected questions. Some very fine drawings of special equipment are presented in the first part of the book; neque absunt feles quattuor scriptoribus carissimi.

The external appearance of the book is excellent. It has been carefully edited, but for some minor errors, well printed and handsomely bound. This text is an outstanding contribution to the chemical literature. It will be read with delight and treasured highly by students and teachers alike.

WERNER BERGMANN

**Thermodynamic Charts.** Also Special Tables for Turbine Calculations. By FRANK O. ELLENWOOD and CHARLES O. MACKAY, Cornell University. Second edition. John Wiley and Sons, Inc., 440 Fourth Ave., New York, N. Y., 1944. iv + 46 pp. 21.5 × 28.5 cm. Price, \$2.75.

The present volume is a second edition of the charts and tables reviewed in *THIS JOURNAL* in 1940. The edition embodies corrections noted in the first edition and also certain modifications and additions. Plates 8 and 9 have been redrawn to include a pressure scale for saturated liquid. Also in the case of ammonia and freon, specific volumes for liquids have been added. A change in the mode of numbering the plates also makes for convenience.

Finally, an entirely new form of chart, Plate 10, has been added, steam and water mixtures, for quantities less than 0.8.

The quality of the paper is good but reflects the limitations of the present circumstances. The type character and drawing of the charts is everything that could be desired.

F. G. KEYES

**Eruptive Rocks, Their Genesis, Composition and Classification**, with a Chapter on Meteorites. By S. JAMES SHAND, Professor of Geology, Columbia University, New York. Second Edition, Revised and Enlarged. 1943. John Wiley & Sons, Inc., 440 Fourth Avenue, New York, N. Y.; Thomas Murby & Sons, 40 Museum Street, London. xvi + 444 pp. 3 plates; 47 figures. 14.5 × 21.5 cm. \$5.00.

At last we have a book on rocks which the chemist can read with satisfaction. Books on petrography and petrology, usually written by an author with mineralogical or geological leanings, have been about as readable for the chemist as a technical book on botany or psychology. Professor Shand has wholeheartedly adopted the physico-chemical approach to the problems of the formation, emplacement, and crystallization of the eruptive rocks, and has made them interesting to the reader who has specialized in chemistry. He calls them "eruptive" rather than "igneous" rocks because there is so much evidence of fluidity at temperatures lower than those we usually associate with fire and with lava flows. The sedimentary rocks are so completely different in origin from the eruptive, and withal constitute such a thin veneer on the Earth's accessible crust, that they are best studied and described by totally different methods, not considered in this book.

One feature of eruptive rocks which receives more explicit attention than in most petrographic works, yet, in the reviewer's opinion, deserves even more than it receives here, is their heterogeneity. Minerals are by nature homogeneous, or at least reproducible, being chemical compounds and crystalline solutions. The species of the organic world have a characteristic structure and are likewise reproducible. But rocks, though they occur in recognizable natural units, are never twice alike. Compounded from a relatively small number of oxides, the eruptive rocks cover a wide though definitely limited range of compositions, but each is very imperfectly mixed. No industrial chemical product that was as variably inhomogeneous as the average rock could hold its market. There is no doubt that more than one rock analysis in H. S. Washington's well-known collection would never have been made if the chemist had had enough professional pride and independence to tell the collector that his alleged sample was representative of nothing whatever, and that a truly representative sample of that particular rock would have to weigh several hundred pounds. Heterogeneity is so important a character that it should be given quantitative statement in rock descriptions, perhaps using the language of the specialist in statistics, sampling, and probability.

The author devotes a thoughtful chapter to the possible physico-chemical causes of heterogeneity and the formation of rock complexes, recognizing as one important cause the "differential movement of the crystals and the residual liquid," which includes what the chemist would call simply "filtration." Most treatments of the subject have inclined too much to the simple concept of "magma chambers" with walls and roof, a little reminiscent of the discoveries made in Jules Verne's "Trip to the Center of the Earth." There is admittedly plenty of evidence that some eruptive rocks have had room to circulate underground, but the more usual relation of liquid and crystalline phases, at least in the deeper crust, must have been like that of petroleum dispersed through an oil-sand. This concept permits the introduction of a chemical phenomenon not considered by the author, namely, adsorption. Exposure of a liquid to a very large surface of a solid phase can bring about the removal of constituents without waiting for the solution to crystallize, as in the clarification and decoloriz-

ing of oils by adsorbent clays. Furthermore, the movement of a magma through capillary openings under pressure is capable of converting gravitational energy into heat, thus furnishing an explanation of why lavas often seem to be hotter at their outpouring than they are in the deep interior.

No science can get on without a satisfactory classification and nomenclature, and in this respect petrology is still in a bad state. The author presents some very sensible proposals, again with a sound physico-chemical foundation, which should help to bring us out of the present chaos of ill-defined and non-descriptive rock names. Further, in classifying his rocks he adopts without reservations the principle that "what the petrographer cannot learn through the microscope, he must be prepared to seek in the crucible."

A final chapter discusses the mineralogy and petrology of meteorites, which are coming to be recognized as a valuable index to the composition of the Earth and the other planets.

This review would not be complete without mention of the genial sense of humor which keeps breaking through the author's rock descriptions and petrologic hypotheses.

ROBERT B. SOSMAN

**Cellulose and Cellulose Derivatives.** A Monograph Prepared by a Staff of Specialists under the Editorship of EMIL OTT, Director of Research, Hercules Powder Company, Wilmington, Delaware. (High Polymers Series, Volume 5.) Interscience Publishers, Inc., 215 Fourth Avenue, New York, N. Y., 1943. xix + 1176 pp. Illustrated. 15.5 × 23.5 cm. Price, \$15.00.

In his introduction, Dr. Ott says: "The object of this book is to have, in a unified presentation, the most important modern scientific and technical information concerning cellulose and its derivatives, and to have this information in such form that it becomes a thorough introduction for work on any cellulose problem by any person with reasonably wide technical training." In the main, this objective has been reached, and with eminent success. The monograph has been written by 36 scientists, who know their respective fields and their coöperative efforts have produced a noteworthy book.

The monograph is divided into ten chapters, several of which might themselves be termed monographs-in-miniature. Chapter I (pp. 5-25) by Ward deals briefly with the occurrence of cellulose. Chapter II (pp. 27-199), written by Purves, Sookne, Harris, Rutherford, and Mark, supposedly deals with the chemical nature of cellulose and its derivatives, but it is misnamed, because the usual cellulose derivatives are dealt with much later in the book. Actually this chapter deals very effectively with the constitution of cellulose, its polymolecularity, its association with other carbohydrates, with its base-exchange properties and with its degradation products. Cellulose tests are included, and the chapter contains some excellent writing, especially by Dr. Purves. Chapter III (pp. 201-423) on the structure and properties of cellulose fibers is the work of Sisson, Ritter, Hock, Mark, Valko and Clark. Chapter IV (pp. 425-446) dealing with carbohydrates associated with cellulose is briefly but adequately handled by Norman. A chapter on lignin (V, pp. 447-472) is well written by Brauns. Chapter VI (pp. 473-555) on cellulose from natural sources was written jointly by Koon, Lewis, Hinner, Ward and Wells. Chapter VII (pp. 557-604) on bleaching of textiles and pulps is by Hatch. An excellent and very comprehensive chapter (VIII, pp. 605-850) on cellulose derivatives is the well-integrated work of Spurlin, Barshia, Mahn, Fordyce, Genung, Nicoll, Conaway, Bass, Barry, Young and Kline. This is the first time that we have had, in English, a scientific and critical survey of the important field of cellulose esters and ethers. The men who have written this part of the book are outstanding industrial research chemists, and the companies here represented are E. I. du Pont de Nemours & Company, Hercules Powder Company, Eastman Kodak Company, and The Dow Chemical Company, each of which has pro-

duced leaders in the field of cellulose derivatives. This chapter takes up the kinetics and equilibria involved in cellulose reactions, the inorganic and organic esters, alkali and other metal derivatives, the xanthates, and the cellulose ethers. Chapter IX (pp. 851-1052) describing the physical properties of cellulose and derivatives is that of Spurlin, Huggins, Pfeiffer, Osborn, Mark and Nickerson. The final chapter (pp. 1055-1110) by Gloor deals with technical applications.

No one reviewer can hope to evaluate critically so monumental a work. Perhaps the most impressive chapter is the one on cellulose derivatives, but there are others like Chapter II (in which Purves' clarity, critique and historical sense are so apparent) that are certainly runners-up.

A criticism might perhaps be levelled at the rather haphazard organization in the book. For example, some of the properties of cellulose, given in Chapter IX (*e. g.*, the excellent sections by Spurlin on cellulose solutions and polymolecularity) might well be placed before Purves' first section in Chapter II. Viscose formation is discussed on pages 809-826, but the microscopy of the rayons is given on pp. 310-320. Koon's exposition on the morphological features of wood (in Chapter VI) could have been left exclusively to Dr. Ritter in Chapter III. A part of Gloor's final chapter, which is largely orienting in nature, should have come much earlier in the book.

To his sorrow, the reviewer knows some of the difficulties in attaining effective organization in a book, and Ott also was probably aware of these pitfalls.

Despite its minor shortcomings, the monograph is, in its truest sense, a great piece of work. Some of the material cannot be found elsewhere in the literature (*e. g.*, Olmstead's work on the statistical theory of the cellulose degradation processes, in Chapter II). The bibliographies are excellent. Most of the evaluations have been made carefully and critically. The typography is very good. Therefore, the book must be recommended to advanced students, to research workers and technologists whose problems touch the field of cellulose and its derivatives. Its value to such workers cannot be overstressed.

LOUIS E. WISE

**The Chemistry and Technology of Food and Food Products.** Prepared by a group of specialists under the editorship of MORRIS B. JACOBS, Ph.D., Senior Chemist, Department of Health, City of New York. Set of 2 volumes. Volume I, xviii + 952 pp. 79 figs. 218 tables. Interscience Publishers, Inc., 215 Fourth Avenue, New York 3, N. Y., 1944. 17.5 × 25.5 cm. Price, \$10.50. Price for set of 2 volumes (second one ready September, 1944), \$19.00.

In this encyclopedic work on the chemistry and technology of foods issued in two volumes, the first of which is the only one available as yet, Volume I is stated to deal only with the fundamental aspects of chemistry which are applicable to all foods, and with the history, statistics, definitions, standards, composition and particular chemistry of a number of food groups. The later volume is to comprise unit operations of food processing, sanitary and quality food control, preserving and production methods for the principal foods.

A careful reading indicates without question that the aims proposed for Volume I have been for the most part very well attained. In a work of such scope, written by numerous individuals, it is inevitable that there should be considerable variation in the method of treatment in different portions of the book. As regards the chemistry involved in the various sections there is every gradation from the scholarly chapters on carbohydrates, lipids and proteins to the decidedly "popular," but very readable discussion of tea and coffee.

The biological side of the material, as enzymes, food spoilage and the fate of the foodstuffs in the body is well treated. The chapters on meat products, poultry and eggs, baking and bakery products, and fish afford a wealth of detailed information and are among the best in the book. A great deal of scattered and valuable material has been

assembled into small compass. In the chapter on cereal grains, the longest in the book (95 pages), for example, the discussion ranges in great detail from the microscopic structure of the kernel to the chemistry, composition, manufacture and uses of all the cereal grains, even down to cottonseed and peanut flours. There are in most parts of the book many references to the literature and each chapter is followed by a list of selected references.

So much ground has been covered, and excellently in both theory and practice, that it seems hardly just to mention the few slips observed. The reviewer, however, cannot refrain from remarking that the writer of Chapter I has a very poor idea of the essential parts of a modern polarimeter.

A. G. WOODMAN

## BOOKS RECEIVED

August 10, 1944-September 10, 1944

SIR WILLIAM CECIL DAMPIER. "A Shorter History of Science." The Macmillan Company, 60 Fifth Avenue, New York, N. Y. 189 pp. \$2.00.

VICTOR R. DEITZ. "Bibliography of Solid Adsorbents." A Contribution from the United States Cane Sugar Refiners and Bone Char Manufacturers and the National Bureau of Standards, Washington, D. C. Distributed on order by Dr. J. M. Brown, Chairman, Revere Sugar Refinery, 333 Medford St., Charlestown 39, Mass. Printed by Lancaster Press, Lancaster. Pa. 877 pp. \$12.00.

NATHAN L. DRAKE, Editor-in-Chief, *et al.* "Organic Syntheses." Volume 24. John Wiley and Sons, Inc., 440 Fourth Avenue, New York, N. Y. 119 pp. \$2.00.

FRANK O. ELLENWOOD AND CHARLES O. MACKEY. "Thermodynamic Charts." Second Edition. John Wiley and Sons, Inc., 440 Fourth Avenue, New York, N. Y. 46 pp. \$2.75.

I. M. HEILBRON AND H. M. BUNBURY, Editors. "Dictionary of Organic Compounds." Volume One. New, Revised and Enlarged Edition. Oxford University Press, 114 Fifth Avenue, New York (11), N. Y. With 1943 Supplement to Volumes II and III. 1072 pp. \$30.00. (Complete set of Volumes I, II and III with Supplements, \$75.00.) Price of separate Supplements, \$1.00 each.

RALPH W. KERR, Editor. "Chemistry and Industry of Starch." Academic Press, Inc., Publishers, 125 E. 23rd Street, New York, N. Y. 472 pp. \$8.50.

FREDERICK C. KOCH AND MARTIN E. HANKE. "Practical Methods in Biochemistry." Fourth Edition, Revised. The Williams and Wilkins Company, Baltimore, Md. 353 pp. \$2.25.

P. C. L. THORNE AND E. R. ROBERTS. "Ephraim's Inorganic Chemistry." First American Photo-Reprint Edition of the Fourth Revised English Edition. Norman Publishing Company, Inc., 215 Fourth Avenue, New York (3), N. Y. 921 pp. \$8.75.

D. WRIGHT WILSON. "A Laboratory Manual of Physiological Chemistry." Fifth Edition. The Williams and Wilkins Company, Baltimore, Md. 269 pp. \$2.50.

"Determination of Particle Size in Sub-Sieve Range." Report of Discussions. Published jointly by the British Colliery Owners Research Association, General Buildings, Aldwych, London, W.C. 2, and The British Coal Utilisation Research Association, Rickett Street, West Brompton, London, S.W. 6, England. 69 pp.

"Transactions of the Electrochemical Society." Vol. 84. Eighty-fourth General Meeting, New York City, October 13, 14, 15 and 16, 1943. Published by The Electrochemical Society, Inc., at the Office of its Secretary, Columbia University, New York City, 1944.