BOOK REVIEWS

Fatty Acids. Their Chemistry, Properties, Production, and Uses. Second Completely Revised and Augmented Edition. Part 2. Edited by KLARE S. MARKLEY. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1961. ix + 771 pp. 16 × 23 cm. Price, $27.50.

This second part of the edition of Dr. Markley's "Fatty Acids" is completely new. As was done in Part One, which is reviewed in *J. Am. Chem. Soc.*, **83**, 4303 (1961), outstanding specialists have coöperated with him by covering their fields of special interest. Besides editing the entire work, Dr. Markley, of the U. S. International Cooperation Administration, has covered salts and esters of fatty acids, and esterification and hydrogenation reactions. Dr. Norman O. V. Sonntag, of National Dairy Products Corporation, has discussed dehydration, pyrolysis and polymerization, as well as halogenation, dehalogenation and dehydrohalogenization. Dr. Daniel Swern of the U. S. Department of Agriculture has written the chapters on chemical oxidation, and oxidation by atmospheric oxygen, defined more simply as autoxidation. The treatment of each subject is thorough and unusually well documented; more than 2,300 references are cited.

Dr. Markley, in discussing salts of the fatty acids, is chiefly concerned with the heavy metal salts or soaps of the higher molecular weight fatty acids, and especially those having industrial applications. Methods of preparation, properties, characteristics and uses are discussed. In his discussion of esters he describes types of reactions, effect of structure, kinetics and esterification practices. Reactions involving the esterification of polybasic acids and polyhydric alcohols are given. Recent work in the preparation of sorbitol and mannitol esters, and esters of carbohydrates, cellulose and starch indicate the complete coverage given to the theoretical and practical aspects of this subject. Dr. Markley's warm feeling for his work is apparent. By describing carefully the large amount of work that has been done he hopes to stimulate renewed interest in fatty acid research.

Dr. Swern reports on the important subject of chemical oxidation of fatty acids, especially unsaturated ones. He gives the known mechanisms of reactions with ozone, chromium compounds and nitric acid, but is careful to point out that complete explanations are still not available. Oxidation reactions with hydrogen peroxide and the peracids are given in detail. Epoxidation and oxidation with ozone are also covered quite fully. Because of its prevalence, and practical and theoretical importance, the action of atmospheric oxygen on fats and fatty acids is discussed in considerable detail. Several theoretical concepts of autoxidation are presented, such as the cyclic-peroxide theory, the ethylene oxide theory and the hydroperoxide theory. Dr. Swern's coverage is unusually complete. He points out the need for reinvestigating earlier work on oxidation studies because of improved methods of separation and identification of oxidation products.

Dr. Sonntag defines pyrolysis as the conversion of one substance into another by the agency of heat or of heat with the aid of a catalyst. He interprets the pyrolytic reactions that take place by giving the recent significant work in this field. Thermal and chemical dehydration are discussed in detail. Some of the subjects covered specifically are the preparation and properties of fatty acid anhydrides, the dehydration of aliphatic hydroxy acids and alcohols, the decarboxylation of fatty acids, the pyrolytic decomposition of fatty acids to olefins, the pyrolytic decomposition of carboxylic esters, the pyrolysis of fatty alcohols and fatty acid chlorides, and the polymerization of unsaturated fatty acids and monoesters. In the chapter on halogenation, Dr. Sonntag discusses both addition and substitution reactions. Reactions with many halogenating agents, such as thionyl chloride, sulfur monochloride, phosphorus halides, oxalyl chloride and phosgene, are described. The analytical aspects of the various reactions, as well as the mechanisms involved, are emphasized. Dr. Sonntag covers his field with authority. The text is replete with reactions and explanations.

This volume should have a wide appeal, for it covers subjects and reactions that are significant in several industries. Much of the information is closely related to current research in the petroleum, chemicals, protective coatings, paints and plastics industries. Throughout the text practical applications are as well dealt with as the theoretical explanations.

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The Identification of Organic Compounds. A Manual of Qualitative and Quantitative Methods. Fifth Edition (Second English Edition). By STIG VEIBEL, Dr. Phil., Professor of Organic Chemistry in the University of Technology, Copenhagen. G. E. C. Gads Forlag, Vimmelskaftet 32, Copenhagen K, Denmark. 1961. xvi + 426 pp. 15 × 21.5 cm. Price, d. kr. 48.00.

The present edition of Professor Veibel's book follows the same system employed previously. Page by page comparison shows that, aside from a few deletions, the material from the previous edition has been transferred without change and has been supplemented by a sufficient number of newer methods of characterization to result in a twenty per cent. increase in length.

The author's aim, as he stated in the preface to the first English edition, is to provide "... a critical selection of methods for the detection and estimation of the principal functional groups, but not so restricted in scope that the student might get the impression that the methods recommended were the only practical, or even possible, ones." Unlike most of its counterparts, this book does not attempt to classify compounds according to their solubilities. Nor does it present the student with a "systematic," if arbitrary, sequence of, hopefully, general tests to identify what functional groups are present. Furthermore, no tables listing physical properties such as melting points, boiling points, refractive indices, etc., are provided for "parent" substances or derivatives.

The first three chapters, which comprise fifteen per cent. of the book, cover some methods for determining physical constants, detection and estimation of the elements and a few comments concerning the general properties of unknown substances. This section deals principally with quantitative elemental analysis and requires a great deal of supplemental information concerning experimental techniques (*e.g.*, semi-micro manipulations), solubility, the separation of mixtures and the isolation of pure substances. There is no discussion of infrared or ultraviolet spectroscopy (leading references are given) and the newer chromatographic techniques are not discussed in any detail (gas chromatography receives a single line).

The remainder of the book divides the subject matter into twenty-three classes of compounds on the basis of functional groups and for each class considers the detection of the functional group(s) by chemical means, several methods for the determination of equivalent weights by functional group analysis, and the preparation of solid derivatives. The most noteworthy feature is the emphasis that the author has placed upon the determination of the equivalent weight by non-instrumental functional group analysis. In this area he has drawn heavily upon his own work. This emphasis on functional group analysis is substantially greater than that found in most courses in organic qualitative analysis presented in this country. On the other hand, the methods considered are perhaps less sophisticated than those introduced in many courses in advanced analytical chemistry. In any event, this book could well prove to be useful in promoting greater use of quantitative methods in organic analysis.

The identification of an organic compound requires, however, a good deal more than knowing the equivalent weight.