

ANALYSIS AND CHARACTERIZATION OF OILS, FATS AND FAT PRODUCTS, Vol. 1, ed. H. A. Boekenooogen (Interscience Publishers, John Wiley & Sons, Inc., New York, N. Y. 10016, 421 pp., 1964, \$12.75).

The present volume is the first of a projected series of volumes designed to provide those interested in the analysis and characterization of lipids and related substances with important developments in analytical methods and methodology.

The editor in his introduction divides the development of lipid methodology into four periods: 1) a short period about 1815 when Chevreul applied systematic procedures to conclude that fats and oils are composed

NEW BOOKS

of glycerol and fatty acids; 2) a period of 100 years from 1825 to 1925 when chemical and physical techniques were developed to characterize fats and oils and identify component fatty acids; 3) a period after 1925 concerned with quantitative analysis of fatty acids and the development of powerful analytical tools such as chromatography and spectroscopy, and 4) the current period concerned with increasing application of modern tools to identification and quantitation of minor and major components of lipids. The present volume and others to follow are intended to fill an information

gap in the present era of rapid development of analytical methods by publishing from time to time chapters on a wide variety of subjects.

Volume 1 comprises 9 chapters, a number of which originate from European industrial laboratories. The first chapter by J. Baltes is concerned with a review of "Classical Chemical Methods in Fat Analysis," with emphasis on the European literature. "The Assay of Essential Fatty Acids," by R. Reiser and M. C. Williams is a particularly welcome review of available methods for linoleic, arachidonic, and related fatty acids. Biological, chemical, and physical methods are evaluated, and the chapter is concluded with a summary of recommended methods including rat bioassay, isotope dilution, isomerization and ultraviolet spectrophotometry, quantitative paper chromatography, and gas chromatography. "The Application of Urea Inclusion Compounds in Fat Analysis," by Moreno and Roncero includes a general discussion of the theory and analytical applications of urea inclusion compounds. The application of urea fractionation to procedures for determination of alcohols and fatty acids in naturally occurring lipids is only lightly touched. The authors are careful to point out the limitations of this technique due to incomplete reaction and occlusion of foreign components.

"Dilatometry of Fats" is reviewed by Hannewijk, Haighton, and Hendrikse. Polymorphism, phase diagrams, and solubility of triglycerides in oil are dealt with in a brief introduction. The chapter continues with a discussion of the principles of dilatometry and descriptions of the apparatus and procedures used for dilatometric measurements. A number of special dilatometric investigations are reviewed including dilatations at low temperatures, dilatations of fat fractions and dilatation measurements in solvents. The chapter is concluded with a brief review of melting point determination, calorimetry, and differential thermal analysis of fats. "The Analysis of Butter and Cheese" is reviewed in considerable detail by Van Ginkel and Roos. Classical methods for determination of fat, moisture, nitrogen, and salt are critically evaluated, cheese sampling problems are discussed, and methods for detecting foreign fat are described.

"The Analysis of Monoglyceride and Related Emulsifiers," by G. F. Longman, includes a comprehensive survey of methods for determination of monoglycerides as well as related emulsifiers such as polyglycerol esters and polyoxyethylene glycol esters. Various methods based on periodic acid oxidation are examined as is the method of Quinlan and Weiser based on silica gel column chromatography. The use of recommended methods is illustrated by outlining results of analysis of five emulsifier products. "The Determination of Fats in Oils, Especially in Linseed Oils" is discussed by E. L. Delvaux and J. E. Bertrand. The

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authors emphasize the difficulties inherent in available methods. "Nuclear Magnetic Resonance Spectroscopy as a Tool in Fat Chemistry" is outlined by R. Keuning. Some examples are given of its application to qualitative and quantitative analysis of lipids. The concluding chapter on "The Use of Ion-Exchangers for the Analysis of Detergents," by P. Voogt, reviews the use of ion-exchangers and discusses their application to analysis of detergents.

The variety of subject matter presented, some of which is highly specific, will have a widely variable appeal to different readers. The chapters of most interest to me were those concerned with analyses of essential fatty acids, butter and cheese, and monoglycerides. Others would undoubtedly make different selections.

Organization of the chapters is excellent, and each chapter is supplied with an introductory table of contents and a list of references. The volume also has an author and subject index, is printed on good paper, and is very easy to read. It is highly recommended to Government and industrial laboratories and to others interested in the broad aspects of lipid methodology.

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ADVANCES IN PETROLEUM CHEMISTRY AND REFINING, Vol. IX, edited by John J. McKetta, Jr. (Interscience Publishers, Division of John Wiley & Sons, Inc., New York, London and Sydney, xv + 439 pp., \$20).

The "Advances" series was designed as "a collection of progress reports written by leading authorities" on topics selected from five basic areas, which collectively are intended to cover all aspects of the petroleum industry.

This ninth volume of the series includes eight contributions in four of these areas, there being none on "Unit Operations and Design." In the "Economics and Future Trends" category is an article on "Advances in Large Scale Oxygen Production." Under "Refining Processes" are two reports: one on "Hydrodealkylation" and the other on "Formulation and Structure of Lubricating Greases." The "Petroleum Processes" section contains four contributions: "Thermal Cracking of Pure Saturated Hydrocarbons"; "The New Elastomers"; "Mechanisms of Carbonium Ion, Carbene, and Carbanion Reactions"; and "Synthetic Ammonia." The final article, on "Chemistry of Fuel Instability" is unaccountably classified under "Mechanical Equipment."

All of the articles are timely and well written, and they fulfill their purpose of providing brief résumés of the current state of knowledge of the areas covered. Not all, however, will appeal to the same readers, since the type of material covered and the viewpoints of the authors differ widely.

Thus while both the "Oxygen" and

"Ammonia" articles deal with products of great current interest because they show promise of considerable expansion in the near future, the former article deals mainly with the mechanical aspects of the production of oxygen, nitrogen, and the rare gases, and will appeal mainly to engineers interested in these products or similar cryogenic operations. On the other hand, the "Ammonia" article deals with both practical and theoretical aspects of the preparation of synthesis gas from various raw materials and the ammonia synthesis itself, covering the thermodynamics, kinetics, and catalytic problems of the processes involved as well as the plants and their component parts.

Three of the articles in the present volume supplement contributions in earlier volumes on the same general topics. The chapter on "Greases" brings up to date that on "Modern Grease Technology" which appeared in Volume VI (1962), concentrating on important advances of the last ten years as revealed both in the patent literature and in publications of basic research. A section on aerospace applications of grease technology and a brief listing of "Research Gaps" are of special interest.

The "Thermal Cracking" chapter, which is restricted to a discussion of paraffin and naphthene cracking, similarly supplements the more general discussion on "Thermal Cracking, Visbreaking and Thermal Reforming" in Volume VI. The present article is an excellent critical review, with special emphasis on the kinetics of cracking under "conditions of technological interest"—i.e., atmospheric pressure and higher.

Likewise, the "Elastomers" contribution may be regarded as supplementing, in a narrow field, the more general article on this subject in Volume IV of the "Advances" series. The present discussion covers recent progress (during approximately the last ten years) in the production of hydrocarbon elastomers by polymerization in anhydrous solutions with organometallic catalysts, particularly those which produce stereospecific products.

Petroleum chemists will find the chapters on "Hydrodealkylation," "Reaction Mechanisms" and "Fuel Instability" especially interesting. The first covers both benzene and naphthalene production, and discusses the reactions of various hydrocarbon types under hydrodealkylation conditions; the thermodynamics, kinetics, and mechanisms of the thermal reactions; a review of the few available catalytic data; and a description of a number of commercial processes. The second is a well-organized, concise review of ionic and carbene mechanisms, and will appeal to those who do not require the more detailed reviews now available. It provides an extensive bibliography, with some references as recent as 1964. Finally, the chapter on "Fuel Instability" offers an equally well-organized

brief discussion of recent applied studies and fundamental research on autoxidation of fuels (particularly gasoline), on the role of metals, sulfur and nitrogen compounds, and on the function of inhibitors of various types.

This volume will be a useful addition to any library concerned with current developments in petroleum technology. Its usefulness would be enhanced if an adequate cumulative index were provided: that in Volume IX is little more than an alphabetized list of chapter titles, with only occasional and unsystematic cross-indexing of key words. For example, the article on "Hydrodealkylation" is indexed under the title word, but not under "Aromatics," "Benzene," or "Naphthalene." Likewise, the present paper on "Thermal Cracking" is so indexed, but not under "Cracking, Thermal," although an earlier article on the same subject is indexed both ways.

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NEW METHODS OF ANALYTICAL CHEMISTRY, by R. Belcher and C. L. Wilson (Reinhold Publishing Co., New York, 1964, \$13.50). This book comes in a hard cover, clearly printed, 5½ by 8¾ inches, 347 pages, with a subject and an author index. It is essentially a reference text. The chapter headings are Titrimetric Standards (19), Indicators (44), including chemiluminescent, metallochromic and metallofluorescent indicators, Titrants (16), Organic Reagents (18), Inorganic Reagents (4), Selective Spectrophotometric Methods (15), Precipitation from Homogeneous Solution (16), Solvent Extraction (15) and Miscellaneous Methods (28). The format is similar to the first edition published in 1955, but almost all of the text is new. Methods described in the earlier edition can now be found in standard texts and are no longer included. In this second edition the authors have collected methods that have, since 1955, been described in the literature and have selected those which they consider to be a definite improvement, based on their personal experience with the method or because of the reputation of the original investigator. Therefore, one finds listed many uncommon chemical species such as potassium hydrogen bis-(3,5-dinitrobenzoate), lucigenin, tris-1,10-phenanthroline osimum-II perchlorate, calcichrome, phloroglucinol, chloramine-T, ascorbic acid, tetraphenylphosphonium chloride, argentic oxide and quercetin.

Each section begins with a discussion of the chemical species, followed by methods for preparing or making of the reagent, its scope and limitations of usefulness and the references to the literature.

The book is a useful reference text for those who must determine a wide variety of inorganic anions and cations in trace or moderate concentrations. Reactions in nonaqueous solvents are not discussed and very little attention is given to the determination of organic compounds. Only those who are looking for an improved method to determine metallic impurities without searching the literature will find this an excellent reference text.

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ADVANCES IN ANALYTICAL CHEMISTRY AND INSTRUMENTATION, Vol. 3, edited by C. N. Reilley (Interscience Publishers, 523 pp., 1964, \$15.00). In the introduction to the series, of which this is the third volume, the editor states that the purpose of these *Advances* is to draw together the significant developments which are appearing in increasing numbers in order that these can become everyday working knowledge and be translated into practice. A further aim of the series is to present the material from the standpoint of the non-specialist but to retain a scholarly level of treatment. These goals are achieved to a remarkable degree in this third volume.

Eight subjects, all by recognized authorities in the field, are covered in the present volume. The chapter headings are as follows: Atomic Absorption Spectroscopy, Photometric Titration, Analytical Applications of Enzyme-Cata-

lyzed Reactions, Ion Sources and Detectors for the Mass Spectroscopic Study of Solids, Galvanic Analysis, Linear Elution Adsorption Chromatography, Concepts and Column Parameters in Gas Chromatography, and Thin-Layer Chromatography. The treatment of atomic absorption spectroscopy is quite brief and is occasioned, no doubt, by the relative newness of this topic. The literature is covered through 1962 but much has transpired in this field since that time. The subject is timely but those considering the field should consult additional sources.

The inclusion of enzyme-catalyzed reactions in this series may be somewhat of a surprise since these have not been considered generally as analytical tools. As the authors point out, however, today "dozens of kinds of enzymes are commercially available in purified form with high specific activity and at reasonable prices" and many of the previously valid objections are disappearing. The analyst who hasn't considered enzymes as analytical tools will find the information brought together here most helpful.

In the chapter on linear elution adsorption chromatography, author L. R. Snyder calls attention to the declining popularity of adsorption chromatography during the past decade. It is his feeling that "much of the blame seems attributable to the absence of a useful theory of adsorption chromatography." He then reviews the fundamental investigations of the LEAC technique including the theoretical treatment and a "beginning in the development of a quantitative theory of adsorption chromatography." Those analysts who have used or are using adsorption chromatography will find this discussion most stimulating.

The final chapter on thin-layer chromatography is nearly a book in itself. The authors, in nearly 100 pages, cover the subject in detail. This discussion should be particularly helpful to those considering the thin-layer field but the practicing chromatographer will also find much of value here. In addition to presenting theory, they have included detailed descriptions of the types, properties, and sources of adsorbents, and of the equipment which is available. This is one of the better summaries of thin-layer chromatography that have appeared.

In all, approximately one-half of the volume is devoted to chromatography, including the discussion of the fundamentals involved in the choice of GC column parameters. Undoubtedly it will find widest use by those interested in this area, although the chapters on or related to instrumentation are, for the most part, excellent, up-to-date (several 1964 references) summaries of the subject. An accumulative index covering Volumes 1-3 completes the book.

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• Names in the News

D. L. Duensing, vice-president and director of marketing for Armour Grocery Products Co., was recently appointed vice-president and assistant general manager of Armour Meat Products Co.

R. T. Boyers, general sales manager of Armour Grocery Products, was named to succeed Duensing.

Raymond Myers, research professor of chemistry at Lehigh University, has been elected 1965 Chairman of the American Chemical Society's Division of Organic Coatings and Plastics Chemistry. Chairman-Elect is R. H. Helmreich, Dow Chemical Company; Vice-Chairman—F. P. Greenspan (1952), FMC Corporation; Secretary-Treasurer—J. C. Cowan (1941), USDA.

A. E. Griffin has been appointed Director of Marketing of Ziegler Chemical & Mineral Corp., Great Neck, N. Y. His activities will center on the manufacture and distribution of acid-refined tall oil at Ziegler's Kirby plant in Severn, N. C.

Nopeo Chemical Company, Newark, N.J., has elected three new assistant vice-presidents: L. J. Owen, C. H. Lighthipe, and R. T. Whelan. The three executives will continue their current assignments in the operating divisions and will assume expanded administrative responsibilities.