New Books

L.A. Witting, and J.F. Gerecht, Book Review Editors

Analysis of Essential Oils by Gas Chromatography and Mass Spectrometry, Yoshiro Masada (John Wiley & Sons Inc., New York, NY, 1976, 334 p. $37.50).

This book is a compilation on the analysis of essential oils and is arranged in groups according to botanical family. It is an English edition of an earlier all-Japanese edition.

Part One, comprising about seven-eighths of the book, is a full-English section. Sixty-four essential oils are classified botanically; the origin, physico-chemical properties, chemical composition, chromatograms with known assignments of peaks, mass spectrum of one component of the oil (often a characteristic or major component), a section of Japanese translation on botanical origin etc., and bibliography. Part Two is in Japanese and deals briefly with such topics as essential oils, components of essential oils, terpenes, gas chromatography and recent advances, mass spectrometry, and interpretation of spectra.

The main contribution of the author involves the gas chromatographic analysis of the oils with assignments of peaks based on mass spectra. The identifications by GC-MS although incomplete are of valuable help to analytical chemists in the fragrance industry engaged in quality control of these oils and also for those chemists and perfumers interested in the composition of essential oils. The author has used a 34 m x 0.25 mm glass capillary open tubular column coated with carbowax 20M for all analyses. The chromatograms are excellent and are useful as good standards. Where previous workers have used gas chromatography and mass spectrometry in the analysis, such data have been included.

The geographical sources of the oils used for the analysis are not mentioned; it is well-known that composition of the same oil varies according to origin. The major or characteristic peaks in some chromatograms are not indentified: (e.g., vetiver, cedarwood, costus). In the case of patchouli, the major peak, patchouli alcohol, is erroneously identified as eugenol. Otherwise, the author has done an excellent job in the assignments. The author has selected some oils and given elaborate details with regard to physico-chemical properties and chemical composition of different varieties etc. (e.g., pepper, citronella, peppermint, hops, cardamon, basil), but has only given brief treatment to others (e.g., jasmin, rose, sandalwood, vetiver, cedarwood).

Bibliography is not updated. A person using this volume as a source book on recent literature on individual oils will find nonuniform treatment of various oils; e.g., there are no references for neroli and ajowan, one for costus, three for petitgrain, four each for spearmint, patchouli, clove etc.; the number rises to 27 for geranium, 50 for lavender and 123 for peppermint! A more critical and thorough scrutiny of literature and inclusion of important relevant references would have been more appropriate.

Overall, the book is a welcome addition to the fragrance laboratory bookshelf and partially fills the need for a modern treatment of essential oils and their quantitative composition based on recent instrumental techniques such as gas chromatography and mass spectrometry.

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Anionic Surfactants Parts I and II, Vol. 7 of the Surfactant Science Series, Edited by Warner Linfield (Marcel Dekker, New York, NY, 1976, Part I – 328 p. $35.00; Part II – 359 p., $39.75).

This volume is the long-awaited addition to Surfactant Science Series on anionic detergents which are used more widely and in much greater tonnage than the other types. As with most edited books written by a number of authors, the style of the chapters varies considerably and there is some overlapping of material, but glaring redundancy is avoided quite well.

Each chapter covers a different type of material, thus the book may be best reviewed through the title and content of each chapter.

Chapter 1, "Soap and Lime Soap Dispersing Agents" by Warner Linfield, is largely a summary of the work of the USDA's Eastern Regional Research Laboratory in this area.

Chapter 2, "Petroleum-Based Raw Materials for Anionic Surfactants" by Geroge E. Hinds, covers linear and branched chain alkyl-benzenes and phenols, alkenes, alcohols, and carboxylic acids derived from this source.

Chapter 3, by Frank Scholnik on "Non-petrochemical Raw Materials," discusses fatty, rosin, and tall-oil acids and lignosulfonates. Some derivatives of these materials and U.S. production figures are included.

"The Mechanisms of Sulfonation and Sulfation" are the subject of Chapter 4 by Ben E. Edwards. This comprehensive section discusses all the methods of introducing these hydrophillic groups.

Samuel Shore and Daniel Berger cover the preparation, properties, and applications of "Alcohol and Ether Alcohol Sulfates" in Chapter 5. This section also contains an extensive list of the trade names of these types of compounds.

"Sulfated Monoglycerides and Sulfated Alkanolamides" are discussed by James Weil and Alexander Stirton. This short chapter covers the field very well.

"Sulfated Fats and Oils" is the subject of Chapter 7 by Bernard Dombrow. It covers the field but is necessarily somewhat dated since very little recent work in this area has been published. A helpful list of trade names and manufacturers of these products is included.

Chapter 8, by George Feighner is a comprehensive coverage of "Alkylarylsulfonates." It not only includes manufacture, properties and applications of these work-horse detergents, but also a section on this type of hydrotropes.

Claire and Bernard Bluestein's report on "Petroleum Sulfonates" includes the aromatic sulfonates recovered from mineral oil processing, paraffin sulfonates, and lignosulfonates. This chapter covers a wide latitude from the very familiar to the Strecker reaction and decarboxylation of sulfoacids.

Chapter 10, by Harold Green treats "Olefin Sulfonates." The preparation of this type compound involves complicated carbonium ion chemistry and is comprehensively covered by the author.

Alexander Stirton and James Weill in Chapter 11 on "Alpha-sulfomonocarboxylic Acids and Derivatives" discuss not only the products prepared in the conventional way from saturated fatty acids and SO_3, but a few unusual products such as sulfonated oleic acid and sulfonated aroylacrylic acid derivatives.

"Sulfopolycarboxylic Acid Derivatives" are covered by the editor in Chapter 12. This chapter not only includes the

well-known sulfosuccinate esters but also sulfoitaconates, sulfophthalates, sulfotricarballylates, and others.

Chapter 13, by Llewellyn Burnette treats "Sulfoalkyl Esters and Amides of Fatty Acids." This chapter, in addition to the preparation and properties of the well-known Igepon A and T products, includes a discussion of the variation of properties with structure. The composition of some typical products such as bars, shampoos, etc. which utilize these materials is included.

David Whyte in the short but completely adequate Chapter 14 covers the chemistry, processing, and properties of "Alkyl Glyceryl Ether Sulfonates."

In Chapter 15, "Phosphorus Containing Anionic Surfactants," Eric Jungermann and Henri Silberman discuss both the chemistry and applications of these compounds. This is a very comprehensive treatment of this largely unexplored area and should stimulate further research by surfactant chemists.

John Spivack in the final chapter, "N-Acylated Amino Acids as Surfactants," discusses the various methods of preparing and the applications of these compounds.

Anionic detergents are very adequately covered in this volume of the series, and it can be recommended to anyone interested in the field. However, on the negative side: The binding is cheap; it is published in two separate books probably because of the quality of the binding; the price is high for the quality; and, finally, the typographical errors are numerous, but in most cases obvious and therefore not misleading.

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Grenzflächenaktive Äthylenoxid-Addukte: ihre Herstellung, Eigenschaften, Anwendug und Analyse, Nikolaus Schönfeldt (Wissenschaftliche Verlagsgesellschaft mbH, Stuttgart, 1976, 1283 p., DM 265).

The 1.5 billion pound per year question is—who was C. Schöller? Schöller—possibly the least well-known industrial chemist of our times—is the man who, in the summer and fall of 1930, invented the modern class of nonionic surface-active agents based on ethylene oxide. Working in the Ludwigshafen laboratories of BASF, he went from preliminary experiments to small-scale production in a matter of months. Less than fifty years later, the world-wide production of ethylene-oxide-based surfactants is, on the basis of this reviewer's estimate, at least the figure cited above.

And if Schöller must take credit for the creation of this industry, surely Nikolaus Schönfeldt is his prophet. No worker in this field can be unfamiliar with his 1959 treatise, published under a slightly different title, nor with its 1969 English translation and revision. The present volume, some three times as long as the 1959 version, is not a revision of the earlier book, but rather an extension. Thus, for the work prior to 1959 (especially in the case of patents), the earlier book remains invaluable. In the nature of things, the present work does include material (primarily background information) found in the 1959 edition. However, most of the 3,000 literature references, and virtually all of the carefully selected 3,800 patents represent work carried out since 1959.

The present volume is organized in much the same way as the earlier one. Following a short first chapter describing the manufacture of ethylene oxide, the second chapter is devoted to the preparation of the ethylene-oxide adducts. The first section of this chapter, dealing with the kinetics of the reaction, and with the distribution of the polymer homologues, has been contributed by Dr. Bengt Weibull, who must be regarded as the definitive authority in this area.

Chapter III covers the description of the various adducts, in terms of physical and functional properties, while Chapter IV (the longest of the book) covers the applications of this class of surfactants. Chapter V covers the field of modified nonionic surfactants (e.g., ether sulfates), and the final chapter discusses their analysis. There follow five indexes: of products, of patents, of names, of firms, and, finally, a subject index. The product index is reminiscent, in its format and coverage, of the well-known annual McCutcheon publication, and in view of the fact that McCutcheon covers both U.S. and foreign products, it might well have been omitted.

This last is the only negative comment I can make. In breadth of coverage and freedom from errors this book is exemplary. Since a book of this size is unlikely to be translated into English, workers in the field will probably find it necessary to dig out their college German grammars. The effort will be worthwhile. The extremely high price (about $111 at the current exchange rate) will make personal copies a rarity, but at less than 9 cents per page, this book is still a bargain.

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Spray Drying, K. Masters (John Wiley & Sons, New York, NY, 1976, 627 p., $42.50).

In reviewing *Spray Drying* I feel compelled to briefly describe its contents to elucidate the board coverage given the subject of this text. The book has five sections which are: (1) Basic Principles and Definitions – describes various process layouts, sprayed particle data, drying theory, and basic spray dryer equipment. (2) The Process Stages of Spray Drying – discusses all types of atomization, spray-to-air contact, drying, and separation and recovery of product. (3) Operational Practice – covers control systems for the various stages, safety mechanisms and concerns, and measurement techniques for critical parameters of operation. (4). Survey of Auxiliary Equipment – describes various types of heaters, fans, pumps, air-particle separators and conveyors, and their design, application and integration in a spray drying system. (5) Applications of Spray Drying in Industry – gives a fairly complete picture of applications in fields as diversified as detergents, plastics, foods, dyestuffs, and timber. A sixth section is devoted to tables which are readily available elsewhere and lists the books' some 600 literature references. All these sections provide detailed background in physical and engineering equations which describe and predict key process variables for each process stage. This is the second edition of *Spray Drying,* the first was published in 1972. These editions are ostensibly the same with the second edition containing an added section on process layouts, and updated industrial applications and references.

To those who might hope this book is a panacea for the problems of scientifically describing the spray drying process, be forewarned, it's not. Spray drying is still very much an art with scattered areas illuminated by science. A tremendous amount of research, scientific application, and discovery remains to be done before spray drying can be considered a science capable of predicting a spray dryer's performance for a given material. To date, empirical results are the best determinants of feasibility.

Regardless of the empirical nature of present-day spray drying, *Spray Drying* has value as a guide and handbook of current scientific and practical knowledge in this field. Spray drying is a growing field finding new applications daily, yet it's been sadly neglected in the technical literature, especially Unit Operations Texts. This book fills the void very neatly. Perhaps its most valuable asset is a com-

prehensive listing of literature references, which allows easy research for the interested reader.

Who should be interested in this book? – Anyone interested in spray drying, and *JAOCS* readers in particular. Although drying water slurries is most common, you should understand that organic solvents can also be removed from slurries to yield free-flowing solids with possible benefits in: easier handling, increased product quality, new product forms, reduced shipping costs, and solvent recovery and recycle. If these prospects wet your appetite, you are interested in spray drying. Because it presents both detail and a general overview, *Spray Drying* is a must for engineers, designers, researchers, students or anyone else interested in or currently involved with spray drying.

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back copies

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CAS preparing 9th index

The American Chemical Society's Chemical Abstracts Serivce (CAS) division is working on its 9th Collective Index to Chemical Abstracts.

The new index will be an index to 2,024,013 papers, patents, and other documents cited in Chemical Abstracts from 1972 through 1976. The final index will total approximately 100,000 pages in 62 volumes with 20 million index entries. CAS expects to have 23 volumes to subscribers by the end of 1977 and the remainder by the end of 1978. •

Mazer announces expansion

Mazer Chemicals Inc. has announced a $500,000 construction program at its headquarters complex in Gurnee, IL, that will double its present capacity, according to an announcement from Robert Mazer, firm president.

The program will increase production and warehouse capabilities as well as provide increased research and development, and administrative facilities, the announcement said.

Two 10,000-gallon reactors will be used in an expansion of chemical processing operations. Mazer said more than $100,000 of lab equipment will be added for expanded research and development work on current and new product formulations.

Mazer produces chemical specialties for use in a variety of industries for use as emulsifiers, coupling agents, defoamers, plasticizers, thickeners, opacifiers, and lubricants. Last year the 14-year-old firm constructed new administrative offices at a cost of approximately a half million-dollars. •