

Methodology

Determining wax in sunflowerseed oil

The problem of determining wax in sunflowerseed oil has been an industry concern for some time. In crude sunflowerseed oils, the wax concentration can range from 0.02 to 0.3%. After dewaxing, the remaining wax is usually in the range of 0-150 ppm. The determination of waxes in the dewaxed oil is difficult, not only because of the relatively low level of wax remaining (which may require a considerable amount of time to crystallize), but also because wax crystallization can be inhibited by trace impurities in the oil, especially phosphatides.

Because of these factors, the present AOCS Cold Test Method Cc 11-53 (73) can give misleading results when applied to sunflowerseed oil. The method also is time-consuming and not really suited to process control. Other methods, based on gas liquid chromatography and gravimetric procedures, have been used and are reasonably accurate, but these methods also are time-consuming.

To overcome the problems associated with the AOCS Cold Test Method, Brimberg and Wretensjo (*JAOCS* 56:857 [1979]) developed a rapid method based on turbidity measurements. The turbidity measurements technique required approximately 10 minutes. This method was suitable for partially refined sunflowerseed oil, but it could not be applied to crude oils due to the inhibition of wax crystallization caused by impurities in the oil.

In 1982, Morrison (*JAOCS* 59:284) reported on a modification of the method of Brimberg and Wretensjo. Morrison's method also was turbidimetric, but used a 50:50 mixture of acetone and oil. After the mixture was placed in an ice bath, the turbidimetric measurement was completed within five minutes. This modification permitted application of the method to crude and processed sunflowerseed oil.

The National Sunflower Association has asked AOCS to give serious

consideration to organizing a joint project to develop a rapid, standard method for estimating the wax content in crude and processed sunflowerseed oil. Most likely, such a method will be based on a nephelometric procedure. A rapid nephelometric procedure for phospholipids already has been adopted; a similar method for wax in sunflowerseed oil would permit more than one method to be performed by a single instrument.

The proposal is still in the planning stages. If undertaken, the project probably will be handled by the newly reorganized Seed and Meal Analysis Committee. Anyone with suggestions or who is interested in participating in the project should contact the AOCS Technical Director at AOCS Headquarters, PO Box 3489, Champaign, IL 61821-0489, telephone 217-359-2344.

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Publications

Book reviews

Toxic Oil Syndrome: Mass Food Poisoning in Spain, edited by Philippe Grandjean and Stanislaw Tarkowski (World Health Organization, 1211 Geneva 21, Switzerland, 1984, 92 pp., 12 Swiss francs).

This slender volume is a report of a WHO Working Group in a meeting held in Madrid in March 1983, to review what was known about the mass poisoning that broke out in Spain during May 1981. Designated as the "toxic oil syndrome," the mass poisoning, which led to over 200 deaths and more than 20,000 injuries, was traced to the sale of contaminated cooking oil in the Madrid area and in the provinces to the northwest of Madrid. Adulterated rapeseed oil treated with aniline to mark it for industrial use only was sold house to house as

olive oil at bargain prices. Despite research and testing by scientists all over the world, the toxic agent has not been identified.

The volume consists of five short sections followed by six annexes. The first section contains a summary of what was known about the origin and extent of the toxic oil epidemic, clinical observations, chemical studies of oil samples and toxicological research. The second section contains epidemiological, clinical and toxicological observations by participants at the WHO meeting. The brief third and fourth sections deal with recommendations for future actions to aid the victims and prevent recurrence of a food-mediated mass poisoning. These are followed by a set of conclusions and suggestions for additional investigation and medical research.

The first four annexes are reports by individual authors. These

discuss the discovery of the toxic oil as the cause of the epidemic, the case-control investigations of the toxic oil syndrome and consumption of the illegally marketed oil, the clinical and pathological features of the toxic oil syndrome and the analysis of the aniline-denatured oil, plus speculations about the processing (refining) of the oil prior to its distribution. The last two annexes are an address by the Spanish Minister of Health and Consumer Affairs to the WHO Working Group and a list of participants.

The book serves as a summary of the information available in 1983 about the mysterious toxic oil syndrome. Many questions remain unanswered; the final report remains to be written. In 1983, there were too many gaps in the evidence to allow the conclusion that toxic oil was definitely the cause. New evidence has filled in

some of the gaps; it now appears more certain that denatured rapeseed oil caused the mass poisoning, although the specific toxic agent or agents have yet to be identified. However, several Spanish investigators claim that organophosphate pesticides were the cause of the mass poisoning. On March 30, 1987, a trial in Madrid began with 38 defendants facing a total of thousands of years in prison in connection with the charge that contaminated rapeseed oil sold in 1981 led to hundreds of deaths and thousands of injuries. It can be expected that a wealth of additional information will result from the trial, at which hundreds of experts will be heard. In the meantime, this volume serves as an initial review of the toxic oil syndrome as well as a tragic story demonstrating the need for strict and effective food safety enforcement.

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Fats (Lipids) in Baking and Extrusion, contributions at a Lipidforum Symposium, April 1983, edited by Reinhold Marcuse (Lipidforum, Scandinavian Forum for Lipid Research and Technology, Box 5401, S-402 29, Göteborg, Sweden, 1984, 138 pp., SEK 130 plus postage).

This book contains contributions from a symposium organized by the Scandinavian Forum for Lipid Research and Technology (Lipidforum) held in 1983 at Göteborg. The text is a review of research done in the late 1970s and early 1980s on the effect of lipids (added and indigenous), including emulsifiers, on bread quality. In addition, an overview on the technology of breadmaking, which focuses on some of the more specialized Scandinavian bakery products, is presented.

As often is the case in a collection published from a symposium, some contributions were much more substantial than others.

There were several good papers reporting on some very interesting research topics in the lipids/baking area. There also were papers obviously directed toward the baking industry, rather than the scientific community.

The first paper by Y. Pomeranz provided considerable insight as to how native polar lipids and added shortening, in conjunction with gliadin and glutenin, affect loaf volume and crumb quality. There were several papers addressing the mechanism of lipid-starch interaction. The papers by K. Larsson and A.-C. Eliasson were disappointing because they were too brief, since the topics are complex and quite pertinent to the main symposium topic. An in-depth discussion, rather than a short summation, would have been much more informative. Although the effect of emulsifiers as antistaling agents on bread quality is well documented, there continues to be some disagreement on the mechanism for the antistaling effect. An in-depth discussion may have shed some light on the subject.

Three papers on extrusion and lipids were presented in the text. The technical or scientific information provided by the two introductory papers was minimal. The research presented in the third paper was rather limited in scope.

Individuals in the baking technology or cereal science area might find the text valuable as a partial update. However, there is an enormous amount of literature on lipids and emulsifiers in baked goods not covered in this text. As an example, W.F. Adams and G. Schuster, in the only two chapters on emulsifiers in baked goods in the text *Emulgatoren für Lebensmittel*, cite over 400 references.

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Hazardous Chemicals Desk Reference, by N. Irving Sax and Richard J. Lewis Sr. (Van Nostrand Reinhold Co., 115 Fifth Ave., New York, NY 10003, 1987, 1,084 pp., \$69.95).

The awareness of potentially haz-

ardous chemicals and their increasing use by persons not chemically trained emphasize the need for a book like this. It is divided into two main sections. The first section contains chapters dealing with the safe storage and handling of chemicals, respirators, the selection of chemical-protective clothing, fire protection, and first aid in the workplace. All of these contain valuable information that should be read by persons using hazardous chemicals. The second section of the book contains information on approximately 5,000 materials selected from the 6th edition of *Dangerous Properties of Industrial Materials*. However, the reader still will need to consult other sources such as government regulations, manufacturers' information and industrial literature to obtain more detailed information on a specific chemical.

The inclusion of two cross-references as appendices allows the use of either alphabetical or the CAS Number cross-reference system. A serious omission from the listings appears to be the lack of information concerning safe disposition of these materials; the inclusion of this material would have made the book much more useful. Even so, the book contains much valuable information on hazardous chemicals and should be available to those who have the safety officer-type responsibility in laboratories and other organizations.

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Palm Oil, Critical Reports on Applied Chemistry, Vol. 15, edited by F.D. Gunstone (published for the Society of Chemical Industry by John Wiley & Sons, 605 Third Ave., New York, NY 10158, 1987, 100 pp., \$59.95).

The book is divided into five chapters with a total of eight contributors. There is a short table of contents in the front that lists the subject and author of each chapter. In addition, each chapter begins with a more detailed table of contents.

The book is concise and very

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readable. It includes the latest available technology and practices in growing and producing palm oil and palm oil products; it does not contain information that is not already general knowledge in the edible oil industry.

It would be a good, easy-to-read reference book for readers who need some quick general information, particularly those with a nontechnical background. It is a well-organized general reference volume.

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Enzymes and Their Role in Cereal Technology, edited by James E. Kruger, David Lineback and Clyde E. Stauffer (American Association of Cereal Chemists Inc., 3340 Pilot Knob Rd., St. Paul, MN 55121, 1987, 403 pp., \$90.00).

The monograph is an update of a similar volume published 40 years ago. It covers all cereals, but wheat and barley continue to be heavily emphasized. The enzymes of greatest interest continue to be the proteases, oxidases and ester hydrolases. The monograph is organized into 13 chapters, each prepared by an expert in the field. The contributor list is international, reflecting worldwide technology.

The earlier chapters deal with the fundamentals of enzyme technology, while the later chapters focus on applications of enzymes in end-product processing. Reflecting developments of the last 40 years, chapters have been added on genetics and grain development physiology. The chapters are all easily read.

This monograph is an welcome update, and it should prove a valuable reference source.

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Ecology and Metabolism of Plant Lipids, American Chemical Society Symposium Series 235, edited by Glenn Fuller and W. David Nes (American Chemical Society, 1155 16th St. NW, Washington, DC 20036, 1986, 374 pp., 1986, \$69.95 US and Canada, \$83.95 elsewhere).

The complex ecology of plant-microbe and plant-insect relations is often mediated by lipids. This book is derived from an ACS symposium on this topic held in April 1985. The contributions were received for publication in 1986, thus appearing to have been written after the meeting.

The broad definition of lipids as water-insoluble, organic solvent-soluble compounds leads to inclusion of a very diverse set of chemical structures in this class. The 22 chapters reflect this great diversity. They include six chapters that deal with fatty acids and their derivatives and 15 chapters that concern sterols, terpenes and other branches of the isopentanoic pathway.

In their introduction, the editors emphasize the importance of lipids in the interactions of plants with other organisms. Such interactions operate in both directions and are positive and negative. Thus lipids produced by plants serve as both insect attractants and repellents. Plant cuticular lipids serve as barriers against fungal and insect attack, whereas lipids produced by fungi may elicit plant defense mechanisms. The chemistry and biosynthesis of some of the complex structures involved in these interactions are presented in several chapters. For example, the involvement of monoterpenes in the resistance of conifers to bark beetles is described (Chapter 6) and the role of cutin in plant resistance to fungi is detailed (Chapter 10). In addition, there are several presentations on sterol metabolism in fungi, insects and higher plants.

As is usually unavoidable in books derived from symposia, this work is more a collection of specialized topics than a coordinated synthesis. However, it represents a first attempt to cover the diverse area of research on lipid interactions between plants and other organisms. We are at a very primitive state in understanding most of these interactions. Therefore, the work in this book is of greatest interest to basic researchers. However, it can be expected that under-

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"Frying: A New Paradigm," 2nd Edition (1987)
Monograph by M. M. Blumenthal, Ph.D. \$50.

Publications

standing these phenomena will eventually lead to new strategies to control diseases and pests of plants.

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Protein Engineering: Tutorials in Molecular and Cell Biology, edited by Dale L. Oxender and C. Fred Fox (Alan R. Liss Inc., 41 East 11th St., New York, NY 10003, 1987, 384 pp., \$36).

With original contributions by over 30 investigators, **Protein Engineering** is a comprehensive treatise outlining methodologies and principles used to analyze the structure and biological function of proteins. This volume is divided into four main subject areas, specifically examining (a) high-resolution biophysical techniques for determining protein structure (e.g., X-ray crystallography and nuclear magnetic resonance); (b) methods for modifying protein structure (e.g., site-directed mutagenesis and DNA synthesis) and analysis of the resultant modified proteins (e.g., protein purification, genetic strategies and kinetic analysis); (c) protein stability and design principles; and (d) the properties of various purposely modified proteins.

This hardcover volume is printed on quality paper and the text is supported by a large number of useful illustrations. The

appendix contains color and color-stereo versions of some of the same black and white illustrations in text chapters, together with reproductions of some newly determined structures. Because of its systematic, cross-sectional approach, the book should be of interest to individuals from a variety of disciplines and educational backgrounds (from advanced undergraduates to professional scientists). Also, as stated by the editors in the preface, this book will "be useful as a supplement to introductory biochemistry textbooks, and as a means for independent study by students and others with formal biochemical training."

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New books

Topics in Lipid Research: From Structural Elucidation to Biological Function, edited by R.A. Klein and B. Schmitz, Royal Society of Chemistry, Burlington House, Piccadilly, London W1V 0BN, England, 1987, 336 pp., £37.50 or \$65.

Annual Review of Nutrition, Vol. 7, 1987, edited by Robert E. Olson, Ernest Beutler and Harry P. Broquist, Annual Reviews Inc., 4139 El Camino Way, P.O. Box 10139, Palo Alto, CA

94303-0897, 1987, 587 pp., US \$31, elsewhere \$34.

Soybean Utilization, by Harry E. Snyder and T.W. Kwon, Van Nostrand Reinhold Co., 115 Fifth Ave., New York, NY 10003, 1987, 346 pp., \$49.95.

Other Publications

The Institute for Local Self-Reliance has published a report, **Substituting Agricultural Materials for Petroleum-Based Industrial Products**, which focuses on nonfuel uses for plant material in the chemical industry. The 35-page report can be obtained from ILSR-Publications, 2425 18th St. NW, Washington, DC 20009, USA. Cost is \$37.

Additives in Foods, Part 1: Preservatives and Antioxidants, Layman's Guides No. 25, by Pamela M. Tew is available from the British Food Manufacturing Industries Research Association. The 17-page pamphlet covers function, applications and usage levels of major compounds and health concerns. Member price is £10; nonmembers is £20. Contact: British Food Manufacturing Industries Research Association, Randalls Road, Leatherhead, Surrey, England.

The publication **Nickel** can be obtained from The Nickel Development Institute, 7 King Street East, Toronto, Ontario, Canada. The quarterly brochure is available free to anyone interested in nickel applications.

New Products

LINEAR ALCOHOL

Exxon Chemical has developed a linear alcohol from which ethoxylates, sulfates, ethoxysulfates and other specialty surfactants can be derived. The company says EXXAL L1315 has low odor and low color, and it biodegrades and wets rapidly. It has applications in wetting agents, foaming agents, industrial products and household detergents. Contact: Peter Ellis, Exxon Chemical Co., PO Box 3272, Houston, TX 77253-3272.

DISPLAY EQUIPMENT

Pope Scientific's Digi-King line of digital display equipment is designed for long-range monitoring in production plants and research facilities. Digits are available in three sizes: 2.25", 4.75" and 7". Models can be connected to instruments such as analog/digital converters, BCD signal indicators, counter/timers and thermometers. Contact: Pope Scientific Inc., PO Box 495, Menomonee Falls, WI 53051.

BALANCE

Brinkmann Instruments Inc. introduces the Sartorius automatic analytical filter-weighing balance. The balance has a weighing range to 200 g and readability to 0.1 mg. It also accommodates standard 8" x 10" filters. Contact: Brinkmann Instruments Inc., Cantiague Road, Westbury, NY 11590.

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