Bailey's Industrial Oil & Fat Products

SIXTH EDITION

VOLUME 5
Edible Oil & Fat Products
Processing Technologies

EDITED BY

Fereidoon Shahidi

BAILEY'S INDUSTRIAL OIL AND FAT PRODUCTS

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Edible Oil and Fat Products: Processing Technologies

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Memorial University of Newfoundland

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BAILEY'S INDUSTRIAL OIL AND FAT PRODUCTS, 6E

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Preface

Oils and fats are important components of foods, and they, or their derivatives and products thereof, play an important role in non-food applications. In food, oils and fats provide a concentrated source of energy as well as a carrier of fat-soluble components. They also serve as a heat transfer medium for food processing and render desirable texture and flavor as well as mouthfeel to products. Oils and fats originate from plant and animal sources. Although plant sources include oilseeds, tropical fruits, and alga, the latter may originate from land-based animals, fish, marine mammals, and derived sources. The main components of food lipids are triacylglycerols, but minor components are also important for quality characteristics, stability, and application areas. Both the type of fatty acids and their degree of unsaturation as well as the type and content of minor components affect the keeping quality of the oil, and certain minor components such as phytosterols might also be used for fingerprinting and authentification of the source materials.

The physical state of fats and oils and their crystal structures are important for application of such products. In addition, formulation of products for special applications such as bakery, confectionary, frying, salad dressing, margarines, and spreads requires special characteristics that make the products suitable for such purposes. Thus, each source material will be important for its physical and chemical characteristics and hence suitability as a food component.

Recent developments in the area of oils and fats has led to the production of specialty lipids from novel sources such as fruit seeds, nuts, and other minor plant sources. In addition, preparation of structured lipids for a myriad of applications has been of interest. Minor components of oils and fats may be isolated during processing and used as nutraceutical and functional food ingredients. Examples are lecithin, phytosterols, tocopherols, and tocotrienols, among others. Obviously, the health-promoting potential of such products is also of interest.

The processing technologies employed for production of fats and oils, and associated components, to make them shelf-stable with acceptable sensory characteristics and flavor as well as secondary processing technologies for production of specific products are important considerations in this area. Food commodities

may be produced, and some components may also be used in animal feed and other applications. There are many areas where oils and fats are used for non-food purposes. Thus, detergents, soaps, glycerine and polymers, inks, lubricants, and biodiesel may be derived from fatty acids and their derivatives. Many applications would provide alternatives to the use of synthetic material or environmentally friendly substitutes in non-food applications.

The sixth edition of Bailey provides a comprehensive description of topics relevant to the oils and fats industry in six volumes as compared with five volumes in the fifth edition. The additional volume (volume 3) is mainly on specialty oils and fats and their byproducts or minor components as well as on those of low-calorie fat substitutes and structured lipids. An article on fish oils and one on marine mammal oils are also included in this volume. However, the material covered in other volumes is often substantially different from the available in the fifth edition as new articles are introduced, and when the title appears the same, substantial updating of the references and introduction of new material has occurred; new authors in some cases have made these contributions. Thus, the first volume includes three new articles on crystallization and physical properties of oils and fats. There are also new articles on antioxidant theory and regulatory status as well as on mechanisms and measurements of lipid oxidation. A new article has been introduced on quality assurance of oils and fats. Meanwhile, the second volume presents the main sources of food lipids, and new articles on sesame oil and rice bran oil have been introduced. The fourth volume provides a description of application areas, and here again new articles on confectinary lipids as well as on frying oils and snack food production have been added. The fifth volume on processing technologies introduces new articles on supercritical, membrane, and extrusion technologies. Finally, the sixth volume on nonedible uses of fats and oils has new articles on biodiesel, hydrolic fluids, lubricants, inks, as well as pharmaceutical and cosmetic uses of lipids. An article on the use of soybean oil in edible film and adhesive production is also included. Thus, the sixth edition is substantially different from what was available in the fifth edition.

I am indebted to many authors for their state-of-the-art contributions as well as to primary and secondary reviewers for different articles. The advisory committee members served an important role in providing invaluable comments. In addition, staff from John Wiley and Sons provided considerable help in different aspects related to production and assembly of the work. This series serves as a primary source of and as a compendium of information on oils and fats for the industry, academia and government scientists, and technical personnel, and as a reference for senior undergraduate and graduate students in food science, nutrition, dietetics, biochemistry, and related disciplines. An integrated table of contents allows better search of materials of interest, and the last volume has a cumulative index. Extensive bibliography throughout the series also provides the reader with the opportunity to consult primary references for additional information.

FEREIDOON SHAHIDI

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