

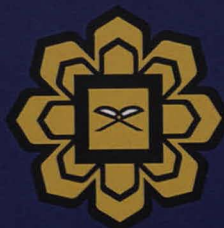
**EXPERIMENTAL METHODS
IN MODERN BIOTECHNOLOGY**

Editors

Ibrahim Ali Noorbacha

Mohamed Ismail Abdul Karim

Hamzah Mohd Salleh

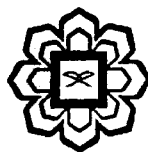


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Application of Fourier Transform Infrared Spectroscopy Edible Fats and Oils Analysis

Mohamed Elwathig Saeed Mirghani

Abstract

Publications during the last 35 years show the acceptability of Fourier transform infrared (FTIR) spectroscopy, as a modern analytical technique that using mid-infrared region of electromagnetic radiation (5 to 25-40 microns). The new simple, easy, reliable, cost-effective and environmentally friendly FTIR spectroscopic methods are real addition to the modern technology of food industry that offer a rapid, accurate, and routine techniques to assess various quality parameters in oils and fats and their products. The FTIR spectroscopy technique can prevent the use of time- and work-consuming chemical methods and eliminate the use of toxic chemicals that are hazardous to the analysts as well as to the environment. The objective of this article is to represent a review of latest developments in the use of FTIR spectroscopy new techniques used for the assessment of different quality parameters of oils, fats and their products.

1. Introduction

Fats and oils are considered important components of the diet, with respect to being the important principal source of energy, essential fatty acids as important dietary requirement and fat-soluble vitamins A, D, E and K (Hay, 1980), which can only be digested, absorbed, and transported in conjunction with fats. In addition, fats elicit important characteristic flavors, aromas, palatability and texture in foods, as well as regulating the food intake due to the strong satiety signals that elongate intervals of the hunger sensation.

Chemically, fats and oils are esters of glycerol and fatty acids that replacing the hydroxy groups of the glycerol by fatty acids to form triacylglycerols (TAG) with small amount of mono- and diacylglycerols and many other compounds, which by origin are either fat incorporated or fat-soluble (Hoffmann, 1989). The fatty acid chains in TAG vary in number of carbon atoms in the chain (chain length), the number and position of double bonds for the individual fatty acids, and their position on the glycerin. The variations in the structure and number of carbon atoms in these fatty acids are largely define the physical and chemical properties of fats and oils (O'Brien, 1998a). The melting point (MP), boiling point (BP) and the refractive index (n_D) all increase by increasing chain length, whilst the density (d) decreases with increasing chain length (Hoffmann, 1989). Fats of terrestrial animals contain a large proportion of saturated fatty acids in their TAG and are therefore solid at room temperature. Vegetable oils however, generally contain unsaturated fatty acids in their TAG and are liquid at room temperature (Mead *et al.*, 1986). The fats of certain marine fishes can contain a large proportion of polyunsaturated fatty acids, making them a liquid at room temperature.

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