

Analysis Spectroscopic by Fourier Transform Infrared of Butter Made from Vegetable Oil and Pure Cow Milk Subjected at Thermo-Oxidation Processes

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Abstract: During the hydrogenation process of vegetable, oils originates isomer with *trans* fatty acids (TFA). Various investigations have been made to know the effect of TFA on health and it has been reported in the literature that if they are consumed in large proportions increases low density lipoprotein causing an imbalance in cholesterol, which causes cardiovascular problems. As a result, some countries have legislated and regulated the TFA content in foods. The purpose of this work is to study the FA of the butters produced from hydrogenated vegetable oil (MV) and pure cow's milk (MPV) with and without oxidation by Fourier Transform Infrared Spectroscopy (FTIR) spectroscopy. The butters were acquired at a local supermarket and oxidized at 200 °C by 30 min. Infrared Radiation (IR) measurements were carried out in the Attenuated Total Reflectance mode and in the region of 400-4000 cm⁻¹. IR spectra of the two butters with and without oxidation present absorption bands around 968 and 3006 cm⁻¹, which are characteristic of the functional groups *trans* and *cis*, respectively. The MV presented a greater intensity; in addition, it was more stable to heat treatment. With FTIR is possible to define precisely the peak associated with the functional group *cis*.

Key words: Butter, *trans* fatty acids, infrared spectroscopy, thermo-oxidation.

1. Introduction

Fats and edible oils during the thermal process originate various chemical reactions that lead to the formation of hydroperoxides, volatile and aromatic compounds [1]. Furthermore, when the temperature increases above of 220 °C *trans* fatty acids are generated, as it was reported by Eder [2], who investigated the formation of *trans* fatty acids with infrared spectroscopy in unsaturated oils and indicated that the formation of *trans* fatty acids is 1% or less per hour when deodorizes at 240-250 °C. *Trans* fatty acids are also formed during the hydrogenation process of vegetable oils up to 60% [3]. Various investigations carried out to study the effect of *trans* fatty acids on health have reported that these

fatty acids consumed in high quantities causing an imbalance in cholesterol, situation more harmful than the consumption of saturated fatty acids [4]. *Trans* fatty acids and other compounds as cytotoxic α and β -unsaturated aldehydes are considered as potential promoters of degenerative diseases such as Cancer, Atherosclerosis, and Alzheimer's disease, as these components can be absorbed through fried foods made from oxidized fats and oils [5].

Edible oils and fats have been analyzed using chemical and instrumental methods. Firstly, the main values are acidity, iodine and peroxide. Secondly, stands gas chromatography and infrared spectroscopy [6] are the main techniques. However, the chemical methods do not describe the total fat content or type of glycerides of fatty acids and also are expensive; they carried out in a long time and require great amounts of

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