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H-17
CHANGES IN THE RHEOLOGY AND FTIR SPECTRA OF SOME EDIBLE VEGETABLE OILS AS EFFECT OF THERMAL TREATMENT

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During the frying process, being in direct contact with oxygen and moisture and as result of high temperature (150–200°C), various complex chemical reactions, such as thermoxidation, polymerization, fission and hydrolysis, take place in edible vegetable oils. This can induce an increase in their viscosity. The aim of this study is to assess the influence of duration of thermal treatment at 190°C on the rheological behavior of sunflower, rapeseed and palm oils. Because these oils have different contents of Saturated Fatty Acids, Mono Unsaturated Fatty Acids and Poly Unsaturated Fatty Acids we tried to establish if their different contents in fatty acids have influence on its rheology and FTIR spectroscopy. The content in unsaturated fatty acids influences the rheological characteristics of the studied edible oils, the viscosities measured at 25°C increase from 50.84 (2) mPa.s for original sunflower oil to 120.14 (6) mPa.s after 16 hours of thermal treatmen t. Rheological measurements being made at different temperatures from 5-70 or 80°C for sunflower and rapeseed oils and from 22.5–80°C for palm oils, an influence of their different contents in unsaturated fatty acids on the activation energy was observed. The duration of thermal treatment contribute towards the increase of the activation energy. The FTIR spectra of studied edible oils shows that the triglycerides, as major component in edible oils being dominant in the spectra. In the spectra obtained of the various samples, not all frequencies of the bands are exactly the same. The increase of trans disubstituted olefinic groups and the decrease of cis disubstituted olefinic groups could be explained by the isomerization of cis disubstituted olefinic groups as a consequence of thermal treatment of the oils, the variation of absorbance being influenced by the level of unsaturation of the oil.

Keywords: *Rheology, edible oils, thermal treatment, ftir spectra*

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INFLUENCE OF DEEP-FAT FRYING PROCESS ON PHOSPHOLIPID MOLECULAR SPECIES COMPOSITION OF SARDINA PILCHARDUS FILLET

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Introduction. Fish is an excellent source of essential nutrients such as essential amino acids, bioactive fatty acids, minerals, vitamins, chitin and antioxidants. The nutritional benefit of fish lies, predominantly, in its lipid fraction which is mainly composed of phospholipids (PL) and triacylglycerols (TAG) exceptionally rich of n-3 polyunsaturated fatty acids (n-3 PUFA). Recently, fish PLs have attracted a great deal of attention as they are considered more efficient carriers of n-3 PUFA than fish TAG in terms of n-3 PUFA absorption in different tissues. In addition, fish PLs have also exhibited antitumoral and anti-inflammatory effects. Unfortunately, fish PLs are highly susceptible to lipid oxidation and to thermal damage due to excessive heating. The n-3 PUFA chains in PLs are the primary targets of oxidation which can take place during cooking processes. Since most fish are consumed cooked, the nutritional value of the final cooked product is of major importance for human health. Especially, the determination of the effects of frying (a very popular method utilized for fish cooking) on the n-3 PUFA rich lipid fraction of fish will provide useful information to consumers and to food industry to establish the fish quality.
Purpose. This study was, therefore, conducted to determine the influence of deep fat frying process on PL composition of edible muscle (fillet) of Sardina pilchardus, a fish species commonly consumed in Mediterranean countries.
Design/methodology. The effects of deep-fat frying performed using different culinary fats (extra virgin olive oil, conventional sunflower oil and high-oleic sunflower oil) and different frying temperatures (160 and 180°C) on the phosphatidylethanolamine (PE) and phosphatidylcholine (PC) molecular species composition (the preponderant fish phospholipid classes) were investigated. For each frying test, ten fish fillets were introduced into an deep fryer (capacity 2 L), in a closed environment, for 5 min. The oil temperature prior to start frying has been set to established value (160 or 180°C) and it was controlled by a specific digital thermometer. Each cooking procedure was done in triplicate. The PL molecular species composition was determined by high pressure liquid chromatography (HPLC) coupled with a second order mass spectrometer (MS-MS) with electronebulization interface (ESI).
Findings. The deep-fat frying process caused significative changes on PE and PC molecular species composition of the fish fillet. However, these changes were not related to the nature of the culinary fat and to the frying temperature. In all cases, the deep fat frying process caused a significative increase of the proportion of the PE and PC species formed by the combination of palmitic and docohexanoic acids and a significative decrease of the percentage of the PE and PC species formed by two docohexanoic acid residues.

Keywords: *Deep fat frying, European pilchard, phosphatidylcholine, phosphatidylethanolamine*