

Utilisation of HPSEC Method for the Quality Survey of Cottonseed Oil Without Any Food Additive in Deep-Frying Medium

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During deep-frying, oil is exposed to elevated temperatures in the presence of air and moisture. Under these conditions a number of chemical reactions occur, including oxidation, hydrolysis, and polymerization of unsaturated FA, that change the composition of the frying medium as well as produce volatile chain-scission products, nonvolatile oxidized derivatives, and dimeric, polymeric or cyclic substances. Therefore, the oil quality as well as the composition of the oil is of great importance, since during deep-frying the oil becomes part of the food [1].

The purpose of this study is to determine quantification of polymerized triacylglycerols, triacylglycerols, diacylglycerols and fatty acids for cottonseed oil samples without any food additive (antioxidant agents, antifoam agents, emulgators etc.) as a deep-fat frying medium by high performance size exclusion chromatography. For this purpose, a combination of adsorption and size-exclusion chromatographies was used. Oil samples taken from each hour were dissolved in THF and whole samples were analyzed. Additionally polar and non polar compounds of oil samples were separated by silica gel column chromatography according to the IUPAC method. After elution, for determine distribution of polymerized triacylglycerols, oxidized triacylglycerols, diacylglycerols and fatty acids in polar compounds, polar fractions were dissolved in THF for further analysis by HPSEC. Analysis were performed on a Agilent 1200 series HPLC consisted of a series a 20 µL loop, a PL-gel guard column of 5 cm length 7.6 mm i.d., and a series of two PL-gel columns, each of 30 cm length 7.6 mm i.d. The columns were packed with highly cross-linked styrenedivinylbenzene copolymer, with particle diameter of 5 µm and pore diameters of 500, and 100Å, respectively. Analysis were performed in a HPSEC system with a THF as the mobile phase and were detected by a refractive index detector (RI) adjusted to 35°C.. In experiments it was tried to optimize several parameters (flow rate, temperature, column etc.).

As expected, oils showed increasing contents of polymerized triacylglycerols, oxidized triacylglycerols, diacylglycerols and fatty acids with increasing frying time. In whole samples polymerized triacylglycerols increased only from 1.14 to 5.12% within 10 h of continuous frying process, which was well below a limit of 12% oligomer TG and the amount of polar compounds increased from 6.4% as initial value to 15.41% after 10 h of frying, which was below the limit of 24%, defined in the German Society of Fat Sciences is established for the assessment of used frying fats and oils. **REFERENCES**

[1] Abdalbasit Mariod et.al. "Frying Quality and Oxidative Stability of Two Unconventional Oils" JAOCS, Vol. 83, no. 6 (2006).