

EFFECT OF PAN FRYING CONDITIONS ON THE FORMATION OF 3-MCPD AND GLYCIDYL ESTERS IN DIFFERENT VEGETABLE OILS

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ABSTRACT

3-monochloropropane-1,2-diol esters (3-MCPD-E) and glycidyl esters (G-E) are undesirable heat-induced contaminants. Vegetable oils may contain these contaminants since they undergo a refining process that is performed at elevated temperatures. Vegetable oils are mainly used for frying purposes and the safety of the oils is a major concern for both consumers and the industry. The purpose of the current work, was to evaluate the effect of frying time (5, 10 and 15 minutes) and temperature (160°C, 180°C and 200°C) on 3-MCPD esters and glycidyl esters of vegetable oils during pan-frying. For this purpose three refined oils (sunflower, hazelnut, corn), olive oil and margarine were used for frying trials performed with potatoes. The frying oils were analyzed in terms of 3-MCPD and glycidyl ester contents, according to DGF C VI 18 (10). The method is based on alkaline transesterification and performed with gas chromatography-mass spectrometry instrument. Results have shown that, the 3-MCPD-E contents of sunflower, corn, hazelnut and margarine samples ranged in 0.18-0.20, 0.42-0.64, 0.18-0.20 and 1.50-1.79 mg/kg respectively. The G-E contents of the same oils varied in 0.10-0.12, 0.02-0.10, 0.08-0.14 and 0.56-0.73 mg/kg, in the same order. The margarine samples had higher content of 3-MCPD-E and G-E than other frying oils, whereas no contaminant formation was detected for virgin olive oil. All oils' glycidyl ester levels were within the limit of 1 mg/kg established by international regulations. Frying conditions did not have clear and certain formation pattern for 3-MCPD and glycidyl esters in different oils.

Keywords: 3-MCPD esters, glycidyl esters, pan frying, temperature, time