

Influence of Chemical Refining Process and Oil Type on Bound 3-MCPD Contents

Strijowski, U., Franke, K., German Institute of Food Technologies
Quakenbrueck, Germany

Free 3-chloro-1,2-propanediol (3-MCPD) is known as a substance which exhibits genotoxic effects in in-vitro tests but not in in-vivo studies. JECFA recommended a maximum tolerable daily intake of 2 µg/kg BW. So far, soy products were found with higher amounts of this free 3-MCPD and for these products a provisional maximum level of 0.02 mg/kg on a liquid basis had been fixed by the European Commission (Commission regulation 466/2001).

During the last few years the occurrence of 3-MCPD bound in 3-MCPD fatty acid esters (3-MCPD-ester) containing one or two fatty acids at the s_n-1 and s_n-2 position of the glycerol backbone was reported for refined fats and oils by several groups (Velíšek et al. and Weißhaar et. al.). So far, limited and contradictory knowledge is available about influences of raw materials and refining procedures on the formation of 3-MCPD-esters in oils. Especially, the influence of single refining steps on contents of bound 3-MCPD in different type of oils is ambiguous so far.

To get more impact into the influences of oil type and refining processes, own investigations were carried out for palm oil and rapeseed oil. The formation of 3-MCPD-esters as well as contents of potential precursors mono- and diglycerides and total chlorine and chloride were determined. For all oils the deodorisation step during refining process had the main impact on formation of 3-MCPD-esters whereas a direct effect of the other process steps could be neglected. Values for the liberated 3-MCPD in the range of 4 - 5 ppm for palm oil and 1 ppm for rapeseed oil were detected. Measurable amounts of total chlorine were found in palm oil having the highest 3-MCPD-ester contents. A considerable part of this total chlorine in the refined palm oil was embedded in the 3-MCPD-esters. On the other hand, content of diglycerides as the other potential pre-cursor were between 1 and 10% exceeding the 3-MCPD-ester contents by up to five magnitudes.