

3-MCPD Esters in Edible Oils: Analytical Aspects

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3-monochloropropane-1,2 diol (3-MCPD) is a neoformed compound whose content is regulated in acid-hydrolyzed vegetable proteins and soy sauces (EU regulatory limit of 0,02mg per kg). Other food products such as toasts, crackers, bakery products... may contain significant amount of 3-MCPD. Several studies about the 3-MCPD formation showed that in heat processed fat containing foodstuffs, 3-MCPD was formed from partially acylglycerols and chloride ions (1).

In refined vegetable oils, significant amount of fatty acid esterified 3-MCPD are detected especially in palm oil (2). According to the latest scientific knowledge, 3-MCPD esters are formed during oil refining especially the deodorization step. During this step, diacylglycerides can react with chlorides to formed 3-MCPD esters. It may be the reason why the high levels of 3-MCPD are detected in palm oil. We still don't know if 3-MCPD esters have the same toxic effect as free 3-MCPD. One reason is that digestion and bioavailability of 3-MCPD esters are not completely elucidated.

The current method of analysis of 3-MCPD esters is a two-step method. Firstly a transesterification with sodium methoxide (3) or an acidic hydrolysis with sulphuric acid/methanol (4) is realized. Secondly free 3-MCPD formed during the first step is derivatized with phenylboronic acid prior to analysis. The quantification is realized by GC/MS with deuterated free 3-MCPD as internal standard.

Quantification of 3-MCPD esters in the form of free 3-MCPD does not allow the distribution of the ester forms although the toxicity of 3-MCPD mono-esters and di-esters may be different from free 3-MCPD toxicity. It is the reason why it is important to develop a method to analyse separately free 3-MCPD, mono-esters of 3-MCPD and di-esters of 3-MCPD.

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