Determination of MCPD Esters and Glycidyl Esters in Oils and Fats

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Monochloropropanol (MCPD) esters and glycidyl esters are food-borne contaminants formed during high temperature processing of fat-based matrices. Since they were first detected in processed food, they immediately became cause of concern because of their suspected toxicity.

The analytical determination of these two classes of compounds is currently based on two alternative approaches which involve either the conversion of all the esters into the correspondent free form (2-MCPD, 3-MCPD and glycidol) that is then quantified (indirect methods), or the quantification of the individual esters separately (direct methods). Even though no standard method has been generally accepted yet, several methods for the analysis of MCPD esters have been developed and, in some cases, also evaluated by interlaboratory comparison. On the other hand, the development of the analytical methodology for the quantification glycidyl esters is slightly behind.

Up to now, two methods for the indirect quantification of the total glycidyl ester content have been published. Both methods involve a first step of cleavage of the esters in alkaline media followed by the conversion of glycidol into a halogenated derivative (3-MBPD or 3-MCPD). It is well known that in alkaline media glycidol can be formed ex-novo, thus the accuracy of these methods greatly depends on the effective suppression of these undesirable side reactions. Next to the indirect determination, a method for the direct determination of the individual glycidyl esters separately has been validated earlier this year. This approach presents the major advantage of providing information on the glycidyl ester composition, but at the same time, it also reveals some issues concerning both the sample preparation (clean-up) and the LC/MS analysis.

In this speech, an alternative indirect method (based on acid transesterification) for the analysis of glycidyl esters is presented and compared with other methods currently available.