Comparison of Direct and Indirect Quantification Methods of 3-MCPD Esters and Glycidyl Esters in Food via Stable Isotope Dilution Analysis

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After 3-MCPD esters and glycidyl esters have been analysed in food, especially in refined edible oils and fats, a lot of efforts have been undertaken by industry as well as by research institutes to minimise the concentrations of the esters due to the fact that after consumption a cleavage of the esters to harmful free 3-MCPD and glycidol has been shown. Thus, there is a huge demand for robust, quick, and sensitive quantification methods. Therefore, many groups tried to establish reliable methods: on the one hand, so-called indirect methods revealing the sum of MCPD esters and the sum of glycidyl esters, and so-called direct methods, with which the individual esters can be quantified.

The lecture will highlight the development of direct quantitation methods for 3-MCPD esters as well as for glycidyl esters via LC-MS techniques on the basis of synthesised stable isotopically labelled internal standards. The obtained data, not only for edible fats and oils, but also for complex food, will be discussed by comparison of the direct methods using stable isotope dilution assays (SIDA) for each individual glycidyl ester as well as for the most important 3-MCPD esters and an indirect method (“3-in-1” method developed by Dr. Kuhlmann, SGS Hamburg, Germany) resulting in the respective sum of 3-MCPD esters and glycidyl esters.
Further, the influence of the fatty acid composition and of parameters during the refinery process (time, temperature, etc.) on the formation pathway as well as on the formed amounts of 3-MCPD esters and glycidyl esters will be presented.