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Recent development from a German working group about improvement of the analysis of MOSH/MOAH in edible oils

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Mineral oil hydrocarbons, of which individual components have been classified as toxicologically dangerous, are found in many foods, in particular in edible oils. A distinction is made between two different types of mineral oil hydrocarbons: saturated (Mineral Oil Saturated Hydrocarbons - MOSH) and aromatic hydrocarbons (Mineral Oil Aromatic Hydrocarbons – MOAH).

The actual analytical method EN 16995:2017 should be further improved in order to be able to reliably determine even small amounts of mineral oil contamination of a sample. In addition, the selectivity of the method should be improved in order to avoid an overestimation of the risk due to inaccurate detection of non-relevant components.

The occurrence of contaminations with mineral oil constituents is a significant issue not only for the oil-processing but also for the whole food industry. Trade requests for edible oils free of mineral oil components, so that the producers are on their way to develop minimisation strategies. For this purpose, they need precise and reliable results.

In our contribution we present our work in order to improve the precision data for analyses of MOSH and MOAH using LC-GC-FID. The different steps of the analysis procedure were examined and improved in a joined work with a group of experienced laboratories in Germany, Austria and Italy. Saponification of a higher sample amount enables an improved sensitivity of the determination in order to ensure a limit of quantification of MOSH and MOAH at 1 mg/kg in oils and fats. In addition, the epoxidation reaction has been adapted to enable a better removal of interfering substances and to safeguard almost complete recovery of MOAH present in the samples. The selection of the quantification standards was changed to rule out diminished internal sample recovery due to the epoxidation reaction. Another important item was the implementation of a suitability test to avoid bad reproducibility of results due to insufficient chromatographic performance, incomplete fraction transfer or discrimination of low or high boiling substances. A set of reference materials has been produced and used to improve calibration in the group of laboratories. All these steps were implemented into a national standard method and precision data have been determined, which allow a recommendation of this method for the analysis of MOSH and MOAH in oils and fats down to a range of 1 mg/kg.