

Mitigation of mineral oil compounds in edible oils and fats

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Mineral oil components (MOH) are divided into the group of mineral oil saturated hydrocarbons (MOSH) and the group of mineral oil aromatic hydrocarbons (MOAH). MOH are often found at a much higher level in edible oils than in other foods. According to current knowledge, the input sources are distributed along the entire production chain. Therefore, a systematic investigation of these input paths and their contributions to the overall contamination of edible oils with MOH was necessary in order to develop and implement appropriate minimization options.

MOH contamination of the oil production chain in Germany was studied at multiple stages and showed low levels in most cases. Transfer of plant protection agents was not observed at significant level in field experiments. Some contamination was observed from extraction solvents used for industrial scale extraction of oilseeds and from exhaust-air cleaning techniques of extraction plants in order to recover residual extraction solvents. The fate of a given contamination during oil extraction by screw presses and during subsequent refining was also highlighted. The most important step to remove a contamination was the deodorization step. Different procedures were tested in order to maximize the removal of MOH and to minimize formation of other contaminants like trans-fatty acids, 2-, 3-MCPD-esters and glycidyl esters, while maintaining natural tocopherol contents.

The minimization of MOH in food products was a great challenge for manufacturers as results from different laboratories often showed limited comparability using the actual CEN method 16995:2017, so that a reliable basis for important decisions was missing to identify and evaluate even small sources of entry. For reliable and sensitive detection at step level an improved method with a lower limit of quantification at 1 mg/kg was developed as a German standard and precision data was successfully evaluated according to ISO method. This method has been accepted at CEN level for an enlarged additional collaborative study and is now in use for this purpose at 40 experienced laboratories worldwide.