MOSH and MOAH in Food Contact Materials

Quality of food in relation to contamination with non-food impurities has gained significant importance at consumer, governmental and industrial level. Presence of mineral oil in foodstuffs from direct and indirect food contact materials has received increased attention over the recent years (Stieger, 2015). Mineral oil contamination could originate from food packaging, processing aids, additives and lubricants. In case of food packaging, mineral oils could potentially migrate from the packaging into the food. The risks of mineral oil / mineral oil residues migration from packaged food should therefore be properly assessed.

Mineral oils are complex liquid hydrocarbon mixtures derived from petroleum or synthetically produced from raw material such as coal and natural gas. Two categories can be distinguished, i.e. the Mineral Oil Saturated Hydrocarbons (MOSH) and the Mineral Oil Aromatic Hydrocarbon (MOAH). MOSH in the range of C_{16} to C_{35} may accumulate in human tissue and could cause harmful health effects. The presence of MOAH is a potential concern as this is associated with carcinogenic and mutagenic properties (European Food Safety Authority, 2012).

Due to the identified health effects of MOSH and MOAH in combination with their potential migration into food, it is essential that the MOSH and MOAH content in food can be properly determined. The Technical Committee of the European Committee for Standardization (CEN/TC 275 – Food analysis – Horizontal methods) has nearly finalized a standardized method of analysis for the determination of saturated and aromatic hydrocarbons (from C_{10} to C_{50}) in vegetable fats and oils and foodstuff on basis of vegetable oils for which it has been inter-laboratory validated, with online-HPLC-GC-FID. This method has not been validated for other matrices/applications. The method can be used for the analysis of MOSH and/or MOAH.

A major challenge in the analysis of MOSH/MOAH in food is an accurate identification of the mineral oil fractions. Synthetic hydrocarbons can easily be mistaken as mineral oil hydrocarbons. A simple HPLC-GC-FID analysis does not differentiate between substances from mineral oils and substances from non-mineral oil sources, such as Tackifier Resins. When analyzing for the presence of mineral oils, the low molecular weight fraction of a Tackifier Resins could produce 'false positives' (Lommatzsch, Biedermann, Grob, & Simat, 2016).

Consequently, the MOSH/MOAH content is overestimated. Other resins like derivatives of rosin resins can also result in an overestimation of the MOSH/MOAH content.

Chemistry making a world of difference
European Chemical Industry Council
Avenue E. van Nieuwenhuyse 4 B - 1160 Brussels Belgium
Tel: +32 2 676 72 88 jwi@cefic.be www.harrpa.eu

Tackifier resins are used extensively in diverse end uses such as diapers, packaging, medical plasters, tapes, labels, coatings and chewing gum. For decades, they provide safe and efficient solutions, backed up by extensive regulatory clearances around the globe.

In the absence of a test method that can separate between mineral oil and non-mineral oil substances, it is very important to take the 'false positives' as produced by the HPLC-GC-FID tests into account before setting standards for MOSH and MOAH content of products and articles:

Recently developed HPLC-GC-FID analysis of resins generates false positive MOSH and MOAH peaks.

Resins are not MOSH or MOAH.

HARRPA - the Cefic sector group representing the Hydrocarbon, Rosin Resins and Pine Chemical producers in Europe – is committed to supporting the safe use of our products by both the industry and the consumers. Therefore, it has taken the initiative to develop an improved test method that can better distinguish between MOSH/MOAH and tackifier resins residues, thus contributing to establishing appropriate standards for the industry.

For further information, please contact your resin supplier or HARRPA secretariat at

Joël Wilmot – Cefic / HARRPA

Sector Group Manager
jwi@cefic.be

References

European Food Safety Authority. (2012). Scientific Opinion on Mineral Oil Hydrocarbons in Food. *EFSA Journal, 10*(6), 2704.

Lommatzsch, M., Biedermann, M., Grob, K., & Simat, T. (2016, October 17). Analysis of saturated and aromatic hydrocarbons migrating from polyolefin-based hot-melt adhesive into food. *Food additives & contaminants, Part A, 33*(3), 473-488.

Stieger, G. (2016, October 27). *Mineral oils in food*. Retrieved from Food Packaging Forum: http://www.foodpackagingforum.org/news/mineral-oils-in-food.