



MINERAL OIL HYDROCARBONS (MOSH/MOAH)

WHAT IS MOSH/MOAH??

MOSH/ MOAH is the term describing mineral oil hydrocarbons that can migrate from packaging materials into foodstuffs during transportation and production. MOSH and MOAH are acronyms specifying complex mixtures consisting of a variety of chemical components.

MOSH represents the general category of saturated aliphatic and cyclic hydrocarbons. There are two specific groups of saturated hydrocarbons under MOSH known as POSH (polyolefin oligomeric saturated hydrocarbons) and PAO (poly alpha olefins). POSH, which are oligomers from polyolefins, can migrate and PAO, as isoparaffins, have found widespread application in products such as adhesives (e.g. hot melts) and as lubricants in the food industry or in synthetic engine lubricating oils. The MOAH fraction consists primarily of alkylated aromatic hydrocarbons.

WHAT ARE THE SOURCES OF CONTAMINANTS?

The input pathways of mineral oils are varied and extend across all stages of food production (raw materials, storage and transportation, production and packaging materials). The primary sources of MOSH/MOAH contamination are adhesives, printer inks and packaging materials particularly those made of recycled materials. Other sources include machine and hydraulic oils used to produce package food. The use of corrugated cardboard-lined transport containers or jute or sisal bags impregnated with oil containing mineral oil (batching oil) can also contribute to contamination. Mineral oils are used in production processes as lubricants and release agents. The substances of the MOSH/MOAH fraction can however also enter foodstuff via the exhaust gases from harvesting machinery.

WHICH FOODS ARE AFFECTED?

Based on fact, the foods affected include dry foods with large surface areas such as flour, grit, rice, coffee, cocoa powder, milk powder, spices, bread crumbs and breakfast cereals. Oils and fats such as palm oil, olive oil, sunflower oil, rapeseed oil and cocoa butter, as well as coconut milk, chocolate, fatty sweets, butter and vegetable fats, are also susceptible to contamination with MOSH/ MOAH due to their lipophilic properties. The Commission Recommendation (EU) 2017/84 of January 2017 laid the foundation for the monitoring of mineral oil hydrocarbons in Europe.

The data collected will be used by the EFSA (European Food Safety Authority) as the basis for assessing exposure and risk. The European Reference Laboratory (EU- RL) is developing specific guidelines for sampling, analysis and evaluation explicitly for this purpose.

HOW DO MOSH/ MOAH ENTER FOOD PRODUCTS?

The answer is through direct and indirect contact as well as through the gas phase. The risk of contamination depends on several factors, including food properties, the concentration of MOSH/ MOAH in the contamination source, the type, intensity and duration of the contact and the temperature.

WHAT HEALTH RISKS DO MOSH/ MOAH POSE?

Some short-chain saturated hydrocarbons of the MOSH fraction are known to accumulate in different organs of the body. There is evidence from animal tests of damage to the liver and lymph nodes. A number of alkylated aromatic hydrocarbons of the MOAH fraction are carcinogenic, including, for example, several representatives of polycyclic aromatic hydrocarbons (PAHs). The complexity of carbon blends and the lack of scientific data make it difficult to make a conclusive toxicological assessment of MOSH and MOAH.

WHICH ARE THE ANALYTICAL METHODS USED?

Our partner lab GBA, Germany offers precise and reliable analysis for mineral oil hydrocarbons using online coupled HPLC-GC-FID method based on the BfR method of 2009 and DIN EN 16995. Various optimization steps have been realized in order to be able to make a more differentiated analytical assessment. After sample preparation, the analysis is conducted by means of an automated, on-line coupled liquid chromatography gas chromatography (LC-GC) and connected flame ionisation detection (FID). The LC acts as a preparative step by purifying the extracts and fractionates these extracts into the MOSH or MOAH fraction.

WHAT ARE THE LIMITATIONS ?

Our method determines the presence of MOSH and MOAH simultaneously in levels of up to 0.1 mg/kg. It can be used to examine all food items, several types of packaging materials such as plastic wrap, paper, cardboard, jute and sisal bags, as well as cosmetics and their raw materials. Due to certain sample properties, special processing methods are sometimes necessary.



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