



# Harmonised action limits for MOAH in food

November 2022

## Background

Mineral oil hydrocarbons (MOH) are a **complex mixture of hydrocarbons**, which are chemical compounds of different sizes and structures. MOH are mainly derived from crude oil. Synthetic production is also possible from coal, natural gas and biomass. The group of MOH comprises both **aromatic hydrocarbons (MOAH)** and **saturated hydrocarbons (MOSH)**. Due to the difference in toxicological relevance (MOAH are more toxic), it is recommended that both fractions are quantified separately.

In the European Union (EU) certain MOH are **allowed as food additives** (E901, E902, E903, E904), meaning they are used as waxes, as surface treatment or glazing agent. Besides this authorized use, MOH can also be **present on food as a contaminant**, resulting from for example:

(i) **Pollution** from atmospheric precipitation or aquatic pollution

(ii) **Food processing:** use of anti-dusting and glazing agents, machinery contamination (e.g. lubrication oils), insecticide treatment from waxes, ...

(iii) **Packaging:** transfer from printing inks on paper and board packaging, batching oils to manufacture jute bags,



Due to this widespread probability of contamination, the analysis of mineral oil is relevant to a **large number of matrices**, the most important of which are:

- Rice, flour, cereals
- Chocolate and coffee
- Oils
- Dried and processed foods

## Legislation

Due to the particular toxicological relevance of MOAH in food, some EU Member States **requested some harmonized cut-off values** for enforcement throughout the EU. Consequently, a statement has been published by the EU Member States following the meeting of the European Commission's (EC) Standing Committee on Plants, Animals, Food and Feed (SC-PAFF) of April 21th 2022.

The statement urges that relevant authorities and food business operators perform **sampling** of appropriate samples and **investigate the potential presence of MOAH** in these food samples.

In addition, maximum concentrations for the sum of MOAH in food were established. The concerned Member states agreed that in case of an exceedance of these MOAH limits, the **product should be withdrawn and, if necessary, recalled** from the EU food market.

The maximum sum concentrations of MOAH in foodstuffs shall not exceed the following levels:

- **0.5 mg/kg** (for dry foods with a low fat/oil content ( $\leq 4\%$  fat/oil))
- **1 mg/kg** (for foods with a higher fat/oil content ( $> 4\%$  fat/oil))
- **2 mg/kg** (for fats/oils)

Considering this is not an official regulation, each Member State can decide how to implement the abovementioned maximum levels. In **Belgium**, the Federal Agency for the Safety of the Food Chain (FAVV-AFSCA) will **include** them as such **in their**

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**control programme**, which already included these limits and will consequently remain unchanged.

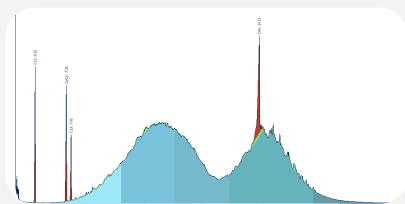
In addition to these levels for MOAH, various member states have also implemented **action limits for MOSH**. The limits for Belgium were set in 2017 by the FAVV in their publication 'Action limits for MOAH in food'.

## Analysis - variance reduction by design

At Primoris we use an **in-house semi-automated and validated on-line method** for the analysis of MOH, using a combination of liquid chromatography with gas chromatography (LC-GC). **Flame ionization (FID)** is used for the quantification of MOSH and MOAH. The coupled techniques are highly reproducible, allow processing of a larger number of samples per day and are less susceptible to contamination during the sample preparation.

The analysis itself is complicated by the presence of **naturally occurring** long chain n-alkanes or squalene, carotenoids and other olefins.

In order to guarantee qualitative results, these interferences first have to be removed by an auxiliary method. The chromatograms of both the MOSH and MOAH then form a **"hump" of unresolved peaks** with the same range of volatility.



The integration of these humps is done **semi-automated** by a software tool for chromatography data interpretation. Different processing methods were implemented for integration of MOSH and MOAH in specific matrices in order to **reduce variance** in the results.

In conclusion, variance in the results is reduced by means of automatization, both in sample preparation and analysis.

## Reliable results

Apart from a bullet-proof analysis method, the quality and reliability of the actual results is of the utmost importance. Consequently, our analyses are performed under BELAC accreditation conform the requirements of the standard EN ISO/IEC 17025:2017 on vegetable foods, vegetable oil and feed.

Apart from our internal quality control, we also partake in annual **independent proficiency tests** on relevant matrices such as rice, chocolate, cocoa butter and edible oils. The participation in these tests always yields very **solid results and excellent z-scores**, indicating our strong market position.



Furthermore, Primoris successfully participated in a study by the **Joint Research Center (JRC)** for the evaluation of analytical procedures, specifically for the analysis of **MOAH in infant formula**.

## Meet the experts

At Primoris we pride ourselves with our **dedicated R&D team**, whose goal on the one hand is to expand our current method portfolio and on the other hand to continuously develop our existing methods in order to keep them in line with the legislative framework and the evolving market demands.

As part of our R&D team, development scientist **Annelies Van Heyst** is our very own expert on mineral oil analysis, with 7 years of expertise specifically in mineral oil. As PhD researcher, she **specialised in this complex matter and associated analytical methods** and regulation, which later resulted in several scientific publications in international peer-reviewed journals. Furthermore, she participated in a training at the Bundesinstitut für Risikobewertung (BfR) in Berlin where she gained insight in the analytical methods and **interpretation of mineral oil data**.

## You can rely on us

Mineral oil is a complex matter and we are aware it is **stretched out over the entire supply chain**. However, we are here to help and will gladly assist you in clarifying any doubts you might have. In short: do not hesitate to **contact us** for more information!

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