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SWISS QUALITY TESTING SERVICES

MOSH / MOAH – Terminology explanation

MOSH =
Mineral Oil Saturated Hydrocarbons

These are saturated hydrocarbons from mineral oil. They consist of paraffins (aliphatic hydrocarbons) and naphthenes (cyclic hydrocarbons), which are usually highly alkylated and either originate directly from petroleum or were formed by the hydrogenation of aromatics and further transformation processes during refining.

MOAH =
Mineral Oil Aromatic Hydrocarbons

These are hydrocarbons from mineral oil that consist of highly alkylated mono- and/or polyaromatic rings. In partially hydrogenated mineral oils, saturated and aromatic rings also occur side by side. Hydrocarbons with at least one aromatic ring are attributed to MOAH, even if they consist predominantly of saturated carbons.

MOH =
Mineral Oil Hydrocarbons
Combination of MOSH + MOAH

MORE =
Highly Purified Mineral Oil (only MOSH)

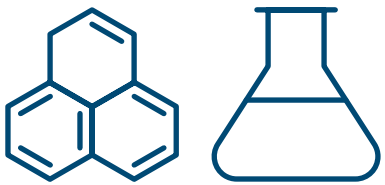
In the production of highly purified mineral oils (also called MORE: mineral oil refining products), the aromatic hydrocarbons are removed in a special process. They can enter the food as lubricants (food grade) in the form of approved, refined "mineral oil products" through the use of auxiliary and additional substances. MORE belong to the MOSH analogues.

POSH =
Polyolefin Oligomeric Saturated Hydrocarbons

These are saturated hydrocarbons that can migrate into food from polyolefins (e.g., polyethylene, polypropylene) and related products.

PAO =
Polyalphaolefin, Isoparaffins with short main chains and long side chains

The starting substances are either short-chain polyethylenes (e.g., hexenes or octenes) or olefinic fractions, which are obtained from the steam cracking process and are distillatively separated into relatively narrow volatility ranges. Low molecular weight PAOs are, for example, the main component of synthetic motor lubricating oils or lubricating oils used in the food sector; higher molecular weight PAOs (resins) are used for adhesives (e.g., hot melts).
(Allowed; however, avoidable to a certain degree!)



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MOSH/MOAH – Analysis Method

1 LC-GC-FID SCREENING
STANDARD METHOD

- **quantification**
- **mineral oil: Ratio of MOSH to MOAH** (3:1 to 5:1)
- **characteristic chromatographic fingerprints** (e.g. MOSH-MOAH "humps")

POSITIVE OR AMBIGUOUS RESULTS

2A LC-GC-HRMS
CONFIRMATION ANALYSIS

- **standard confirmation analysis**
- **recommended in case of suspected MOSH/MOAH contamination** (to exclude false positive findings)
- **target analysis for typical MOSH and MOAH markers** (e.g., diisopropylnapthalene, thiophenes, hopanes)
- **useful for complex matrices** (e.g., spices)

CUSTOMER REQUEST

CUSTOMER REQUEST OR FRENCH REGULATION (INK)

2B LC-GCXGC-TOFMS
(CONFIRMATION ANALYSIS)

- **additional information on the structure of detected hydrocarbons** (e.g., MOAH ring systems)
- **absolutely necessary for inks according to French legislation** ("French Regulation")
- **complex / time- and money-consuming analysis**

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MOSH/MOAH Overview Table

Matrices	Matrices examples		Limit of Detection (LOD)	Limit of Quantification (LOQ)	Unit	Sample quantity	Turnaround time	Sample shipping information
Packages (direct extraction)	Cardboard, foils, wood, jute sacks, etc.	**Sum MOSH/POSH** (C10 – C50)	1	5	**mg/kg** material	**Packaging:** 4 DIN A4 / (50 g) **Others:** Consultation with customer consultant	10 working days	**To avoid contamination during shipping, it is important to package the samples in an inert material.** **Suitable materials include, for example, aluminum foil or glass containers**
		Sum MOAH (C10 – C50)	1	5	**mg/kg** material			
Migrates (food simulants)	Ethanol 10%, Ethanol 20%, Ethanol 50%, Ethanol 95%, Acetic Acid 3%, Tenax, etc.	**Sum MOSH/POSH** (C10 – C50)	0.01	0.05	**mg/dm²**	**Packaging**: 4 DIN A4 / (50 g) **Customer migration solution:** 100 ml **Others:** Consultation with customer consultant	Direct analysis in customer migration solution: 10 working days Migration @ SQTS: 6 - 8 weeks	
		Sum MOAH (C10 – C50)	0.01	0.05	**mg/dm²**			
		Sum MOSH/POSH (C10 – C50)	0.06	0.3	**mg/kg** food			
		Sum MOAH (C10 – C50)	0.06	0.3	**mg/kg** food			
Inks / Auxiliary means / Formulation components		**Sum MOAH** (C10 – C50)	25	50	**mg/kg**	100 ml	10 working days	
		Sum MOAH (C10 – C50)	25	50	**mg/kg**			
Food (regular)	Meat, fish, vegetables, fruits, beverages, etc.	**Sum MOSH/POSH** (C10 – C50)	0.1	0.2	**mg/kg**	100 g	10 working days	
		Sum MOAH (C10 – C50)	0.1	0.2	**mg/kg**			
Food (dry)	Rice, pasta, flour, baby milk powder, etc.	**Sum MOSH/POSH** (C10 – C50)	0.05	0.1	**mg/kg**	100 g	10 working days	
		Sum MOAH (C10 – C50)	0.05	0.1	**mg/kg**			
Food (complex)	Chocolate, oils, spices, cocoa beans, etc.	**Sum MOSH/POSH** (C10 – C50)	0.25	0.5	**mg/kg**	100 g	10 working days	
		Sum MOSH/POSH (C10 – C50)	0.25	0.5	**mg/kg**			