



# Fully Automated Sample Preparation (ISO 20122) for MOSH/MOAH Determination in Seasoning Oils

## Highlights

- Comparison of manual epoxidation procedure according to DIN 16995 with fully automated sample preparation (epoxidation and saponification) according to ISO 20122
- Automated data evaluation using GERSTEL ChromOH
- High throughput automation

## Introduction

Mineral oil contaminants in food can originate from a variety of sources, from contamination of the crop environment to machine oils from harvesting and production machinery to contaminated packaging and materials that come into contact with food.

Since mineral oil-saturated hydrocarbons (MOSH) and mineral oil aromatic hydrocarbons (MOAH) pose a risk to human health, they need to be monitored in all types of food.

## Experimental

LC-GC coupling is used for measuring MOSH and MOAH. MOSH and MOAH are fractionated using normal-phase HPLC and the fractions are measured in parallel using a dual-channel GC-FID.

### Sample Preparation

The samples were four different seasoning oils that are used as ingredients for instant noodle soups.

The manual epoxidation was carried out according to a modified DIN EN 16995 procedure, while the fully automated sample preparation with saponification and epoxidation according to DIN 20122 was carried out on a GERSTEL MPS (MultiPurpose Sampler) standalone workstation.

In both cases, an online clean-up via activated aluminum oxide (AlOx) was used to remove interfering n-alkanes from the MOSH fraction during the HPLC run.

### Analysis

After injection the sample is separated into its MOSH and MOAH fractions on a normal phase HPLC system. The two fractions are then transferred to a dual-channel GC-FID system equipped with a GERSTEL Early Vapor Exit (EVE) to remove the excess solvent before measurement.

Quantification is carried out based on the internal standards using the specialized GERSTEL ChromOH data analysis software.



MPS workstation for MOSH/MOAH sample preparation

## Results and Discussion

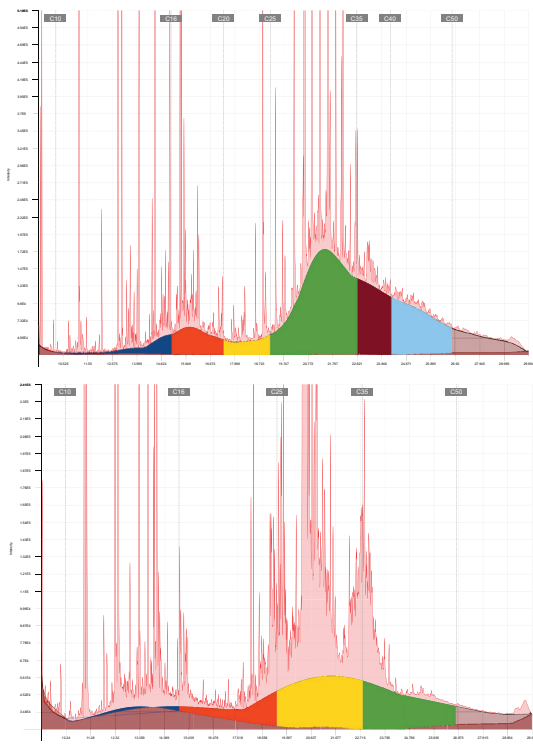
All tested seasoning oils contain high levels of MOSH and MOAH. The results of manual epoxidation and the fully automated sample preparation are comparable.

### Comparison of manual epoxidation and fully automated sample preparation, values in mg/kg

	MOSH		MOAH	
	manual epoxidation	fully automated	manual epoxidation	fully automated
Sample A	22.6	23.6	5.21	4.75
Sample B	43.2	44.3	14.0	12.2
Sample C	67.8	72.9	13.8	15.3
Sample D	33.7	35.8	9.62	7.59

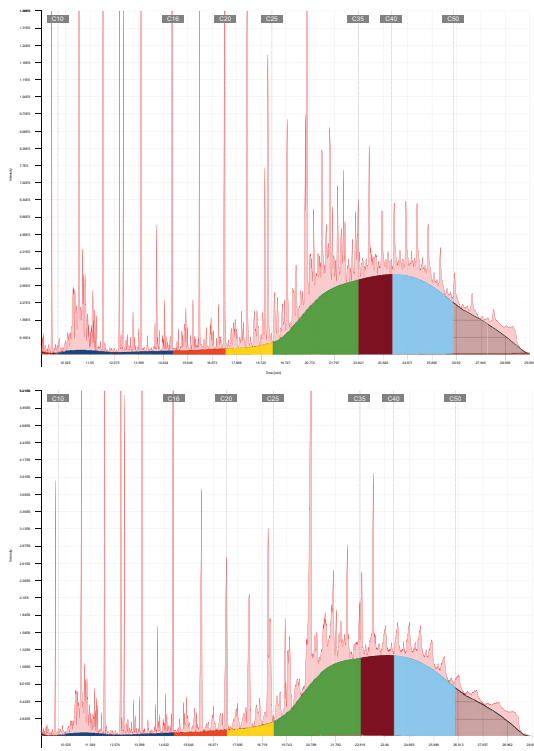
The chromatograms of sample A show MOSH and MOAH components that extend over a wide range of carbon numbers. Two

distinct humps can be seen in the MOSH fraction. These indicate contamination from two or more different sources.



**Chromatograms of MOSH and MOAH fractions, automated sample preparation, sample A**

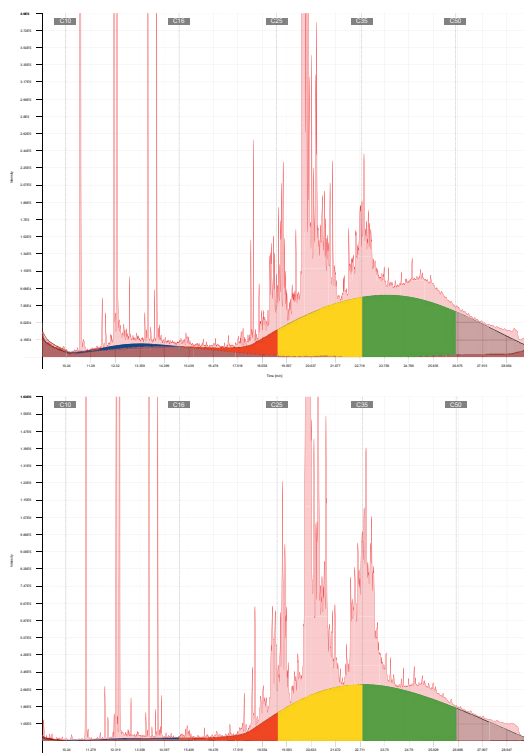
In sample C, the concentration maxima of the MOSH and MOAH fractions are shifted towards the higher carbon numbers and are between C30 and C45.



**Comparison of MOSH fractions, manual (upper trace) vs. automated (lower trace) sample preparation, sample C**

The chromatograms of the manually prepared samples and the fully automated samples are shown by directly comparing the MOSH and MOAH fractions.

The results are comparable and the chromatograms look very similar. This clearly shows that automated sample preparation has no disadvantages compared to manual preparation.



**Comparison of MOAH fractions, manual (upper trace) vs. automated (lower trace) sample preparation, sample C**

Herbs and spices are a very difficult matrix for MOSH/MOAH measurements, as many additional peaks appear in the chromatogram. Manual integration of the resulting unresolved complex mixtures requires expertise, but is still very subjective and can lead to huge deviations between different users.

This is avoided by using the GERSTEL ChroMOH Data Analysis with its universal algorithm for automatic integration.

### Conclusions

- Automated sample preparation leads to comparable and reproducible results
- Even difficult matrices can be automatically processed, and correct results are obtained
- Automated data evaluation helps especially with challenging samples and increases reproducibility and sample throughput