Axel Semrau®

LC-GC System MOSH/MOAH

Product Information

Introduction

Foodstuffs are frequently found to contain undesired mineral oil residues, which originate in many cases from the packaging materials. A migration of hydrocarbons into the foodstuffs can occur in particular through the use of printing inks containing mineral oils. This effect is found more with recycled packaging, but also when using packaging containing fresh fibres. The prerequisite for this migration is unhindered contact between food and packaging, as is the case with a large number of foodstuffs such as rice, for example.

In many products there is a particular increase in the concentration of MOSH - mineral oil saturated hydrocarbons and MOAH - mineral oil aromatic hydrocarbons. Hydrocarbons that lie in the boiling range between C_{16} and C_{25} are considered to be particularly migration-intensive. The health concerns in relation to this contamination of foodstuffs have already been clearly stated in December 2009 by the Federal Institute of Risk Assessment (Bundesinstitut für Risikobewertung - BfR). In its assessment, the BfR came to the conclusion that the transfer of mineral oils to foodstuffs should be minimized as a matter of urgency. Measurements are recommended. Since then, special attention has been paid to the detection of these mineral oil contaminations in foodstuffs.

Axel Semrau® has developed an application system for this analysis that is based on LC-GC coupling. This method was presented by the BfR for this analytical problem and offers high sample throughput, reproducible values and good sensitivity.

The system makes LC-GC measurements possible with a reproducibility that is comparable with a normal split/splitless injection in a gas chromatograph. The sensitivity enables the detection of a concentration of 0.6 mg/kg MOSH; the linearity covers the entire range of concentrations of MOSH found in food.

Direct coupling drastically reduces the risk of contaminations, which is very high using manual methods.

The particular highlight of the system is its equipment with two FIDs, allowing the parallel measurement of MOSH and MOAH in a single pass. This doubles the sample throughput and halves solvent consumption.

Due to a modification of the reaction conditions, epoxidation can be automated. It is available as add-on and can be done during the runtime of other samples. Alternatively, it can be automated offline by use of the Epoxidation Workbench. Therefore, samples can be prepared for measurement on multiple LC-GC systems.

The LC-GC solutions by Axel Semrau® are preassembled in the application laboratory, tested and delivered to the user ready for operation. This ensures the fastest possible commencement of routine measuring operations.

Benefits of LC-GC coupling

- high sample throughput
- high degree of automation
- no risk of contamination
- excellent reproducibility
- best possible sensitivity
- investment safety
- expandable to other applications

System components

The application system consists of the following components:

- Agilent 1260 HPLC pump with UV detector and degasser (alternatively Knauer Azura HPLC system or Shimadzu LC 20)
- CHRONECT Robotic consisting of CTC PAL3 autosampler and CHRONOS software
- Agilent 7890B or Shimadzu GC 2010 with two FIDs for simultaneous determination of MOSH and MOAH
- CHRONECT LC-GC
- data system with control and evaluation software
- accessories and consumables
- instruction and commissioning, training, support

Sample chromatograms

The LC-GC coupling supplies three chromatograms at the same time:

- the signal of the UV detector from the HPLC
- the FID signal of the MOSH fraction
- the FID signal of the MOAH fraction

The illustrations on the following pages show examples of these chromatograms.

Note: A German manual is available for this LC-GC system.

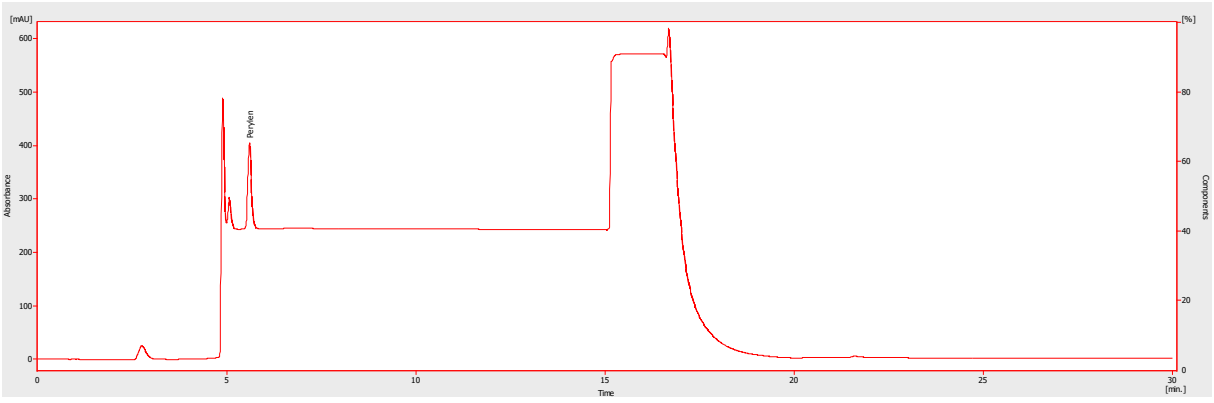

Figure 1: HPLC chromatogram.

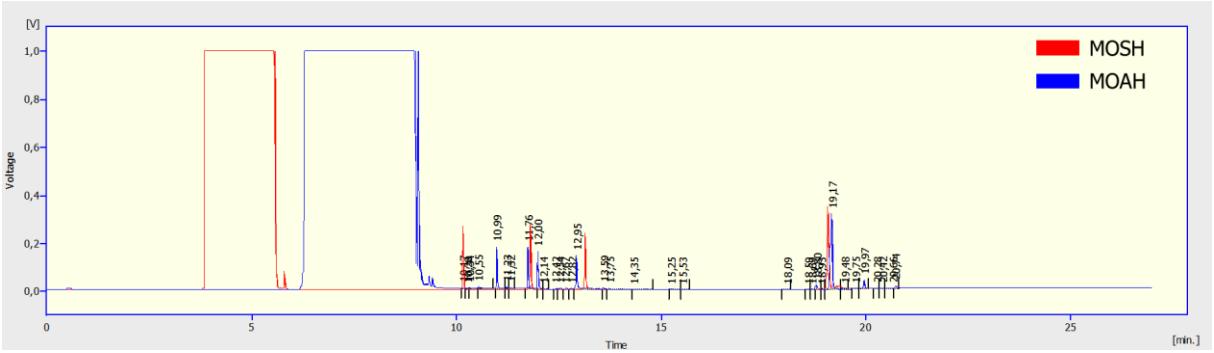

Figure 2: LC-GC injection of the BfR standard solution and resulting signals from the MOSH (red) and MOAH channel (blue).

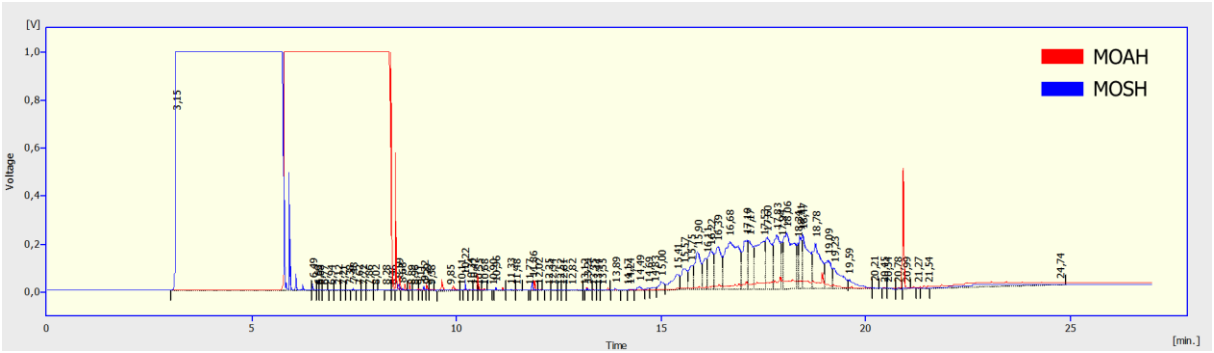

Figure 3: LC-GC measurement of a BAM lubricating oil standard with MOSH (blue) and MOAH (red).

Subject to technical changes

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This LC-GC solution is a development by Axel Semrau®