Mineral oil contaminations in dry food samples

SpeedExtractor E-916:
Optimization of pressurized solvent extraction (PSE) for the rapid and efficient determination of MOSH and MOAH in dry food samples

Many food samples are contaminated with mineral oil coming from different sources. One possible source of contamination is the migration from cardboard packaging made of recycled fibers [1]. Other sources of contamination with mineral oils can be related to the food production process.

Mineral oils are complex mixtures of hydrocarbons. Mineral oil contamination can be classified as mineral oil saturated hydrocarbons (MOSH), which are open chain paraffins, isoparaffins and cyclic naphthenes and mineral oil aromatic hydrocarbons (MOAH), comprising mainly alkylated 1-3 ring compounds.

Two PSE methods with different selectivity have been optimized for mineral oil extraction from dry foods.
Method A: for extracting superficial contamination (MOH migrated from packaging into dry foods).
Method B: for extracting total contamination present in dry foods, coming from different sources.

1. Introduction

Different dry food samples were extracted by pressurized solvent extraction (PSE) using the SpeedExtractor E-916. The MOSH and MOAH fractions were analyzed by LC-GC. A clean-up step after extraction was not necessary.

2. Experimental

Equipment: SpeedExtractor E-916 with 10 mL cells, LC-GC 9000, Brechbühler

Samples: Dry food samples (pasta)

Extraction: All parts and filters were pre-cleaned prior to extraction. The samples were loaded into the cells.

Internal standard solution was added to the sample. Table 1 shows the optimized conditions for extraction with method A and B.

Table 1: Method SpeedExtractor E-916

Method parameters	Method A	Method B
Temperature	100 °C	100 °C
Pressure	100 bar	100 bar
Solvent	*n*-Hexane 100 %	*n-Hexane/Ethanol (50% :50%)*
Cells	10 mL	10 mL
Vials	60 mL	60 ml
Cycles	1	2
Heat-up Hold Discharge	1 min 5 min 2 min	1 min / 1 min 5 min / 5 min 2 min / 2 min
Flush with solvent	1 min	0 min
Flush with gas	1 min	1 min
Total extraction time	20 min	28 min

The determination of the MOSH and MOAH fraction was performed using LC-GC.

3. Results

Here an example of a sample with a deep pre-existing contamination before and after storage in recycled cardboard is described. As shown in Fig. 1, PSE method A was selective for mineral oils migrated from the packaging (superficial contamination), while method B extracted total contamination included deep contamination. Interesting to note that, by applying in sequence the two methods (B after A), it was possible to evidence deep contamination. The two methods provided complementary data, useful for migration studies [2].

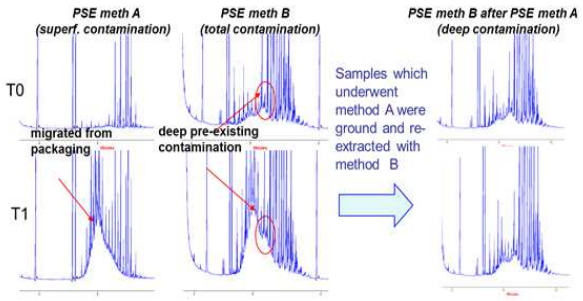

Fig 1: LC-GC chromatograms of MOSH and MOAH fraction.

4. Conclusion

The extraction of mineral oil contaminations on dry food samples can be performed by PSE using the SpeedExtractor E-916. The extracts can be injected directly into the LC-GC system. The results obtained with the SpeedExtractor E-916 show good correlation to those obtained using the reference method [3].

5. Acknowledgement

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6. References

[1] S. Moret, M. Sander, G. Purcaro, M. Scolaro, L. Barp, L. Conte, Talanta 115 (2013) 246-252

[2] S. Moret, M. Scolaro, L. Barp, G. Purcaro, M. Sander, L. S. Conte, Food Chemistry 157 (2014) 470-475

[3] *S. Biedermann-Brem, K, Grob, Eur. Food Res. Technol 232 (2011) 1035-1041*

Operation Manual SpeedExtractor E-916 / E-914

For more detailed information please refer to the Application Note no. 149/2015.