

Optimization and validation of GC-MS method for NIAS determination in food contact materials

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Summary: This scientific work is focused on the measurement of the migration of Non-Intentionally Added Substances (NIAS) from a polyurethane seal towards dry food matrices. Migration tests are carried out using a food simulant and the techniques suitable for analytes quantification are GC-MS and HPLC-MS.

Keywords: NIAS, migration, GC-MS

1 Introduction

NIAS are compounds present in materials that come into contact with food and which, however, have not been added for a technical reason during the manufacturing process. Monitoring and controlling consumer exposure to these substances is, therefore, essential to ensure the safety of food products. The migration of aniline, acetyltributylcitrate, bis(2-ethylhexyl)adipate, 2,6-tertbutylhydroxytoluene (BHT) and 1,4-butanediol from a polyurethane manifold, used as a gasket in contact with dry food matrices, into the food simulant Tenax[®] [1] and into six different food matrices (rice, flour, powdered milk, cocoa powder, sugar, corn starch) is studied.

The aim of this study is the optimization of a complete analytical method that allows the identification and quantification of the specific migration of the analytes, which could occur following contact of a polyurethane product with dry foods.

2 Experimental

Contact tests are performed by contacting the polymer to be tested, obtained by cutting out a sheet, with the simulant food and the other food matrices, applying a 1 g/4 dm² simulant/sample surface area ratio (Fig. 1). Contact tests are conducted in an oven at 70 °C for 3 days to simulate the worst conditions inside the silo [2]. The analytes are extracted from food simulant and food matrices by solvent extraction, which is then recovered and evaporated. The quantitative analysis is carried out using the gas

chromatography technique hyphenated to the mass spectrometry and the identification is carried out according to the relative retention time and the mass spectrum is recorded in full scan or in SIM mode.



Fig. 1. Migration test with food simulant preparation

3 Results

Recovery tests are performed to evaluate the efficiency of the method. The recovery trial provides different results depending on the food matrix and analyte considered. Therefore, both the humidity and the fat content in the food matrices under investigation are also determined, in order to evaluate their different behavior towards the migration of the analytes.

4 Conclusions

The results obtained show how it is necessary, in evaluating the migration of NIAS from polymeric products intended for contact with food towards the food itself, to take into account the fact that the process is influenced not only by the chemical nature of the migrant, but also by the physical-chemical nature of the simulant or food matrix used.

References

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