

SpeedExtractor E-916:

Determination of bisphenol A in preserved food using the SpeedExtractor E-916

The determination of bisphenol A (BPA) especially in preserved food needs a fast and reliable extraction and analysis method. This is due to the controversial discussion among the toxicology of BPA and the human exposition towards this substance. The samples are extracted with the SpeedExtractor E-916 and analyzed with a LC-MS method. Based on the fact that the amount of BPA in the post-extraction runs was below the LOQ, extraction yields can be considered as complete.

1. Introduction

Bisphenol A is a monomer and is used for the production of polycarbonates which are used for baby bottles or different food boxes. BPA is also used as an additive for flame-retardants. In the presence of high pH or hot water BPA is hydrolyzed out of polycarbonate. With this background the toxicology of BPA and the human exposition to this substance is discussed controversially in the last years. The tolerable daily intake (TDI) of BPA is 0.05 mg/kg body weight per day and the sum of migration limit (SML(T)) in foodstuffs is 0.6 mg/kg food, which must not be exceeded.

2. Experimental

Equipment: SpeedExtractor E-916

Samples: Beans, poultry stew, artichokes and ravioli with an unknown BPA content – all canned goods.

Determination: The samples were separated from the liquid, homogenized and freeze dried until freeze drying. 0.8 g of each freeze dried sample was mixed with 11 g quartz sand (pre-extracted and dried), filled into a 10 mL extraction cell and spiked with 10 µL of internal standard (¹³C₁₂-bisphenol A).

As blank samples 10 g pre-extracted sand was spiked with 10 µL of internal standard (¹³C₁₂-bisphenol A).

The extraction was performed using the SpeedExtractor E-916, applied by the parameters specified in Table 1.

Table 1: Parameters for the extraction with E-916

Pressure	100 bar
Temperature	100 °C
Cell	10 mL
Solvent	Acetonitrile:Water-HPLC grade (50:50)
Vial	60 mL
No. of cycles	4 (4 th cycle post-extraction)
Heat-up	1 min
Hold	15 min
Discharge	2 min
Vial change	After 3 rd cycle 4 th cycle collected in new vial
Flush with solvent	1 min
Flush with gas	3 min

The analytics was done with LC-MS using the mass spectrometer Thermo TSQ Quantum Ultra AM.

For the quantification a standard serial solution with 10 different concentrations was prepared (concentration area 1 ng/mL – 500 ng/mL). For the internal calibration the standard solutions were fortified with a defined amount of ¹³C₁₂-bisphenol A. The evaluation was done using a second-order calibration function.

3. Results

No BPA was found in the post-extraction run (extract of 4th cycle). Therefore the extraction can be considered as complete. The determined bisphenol A contents in the samples are presented in Table 2.

Table 2: Determined bisphenol A contents (rsd in brackets, n=3 for beans, poultry stew and artichokes, n=6 for ravioli)

Product	Bisphenol A content [ng/g dry substance]
Beans	709 (11)
Poultry stew	141 (12)
Artichokes	295 (6)
Ravioli	229 (7)

In Figure 1 each determination of bisphenol A from the four preserved food samples with the LOQ (limit of quantification) as broken line are presented.

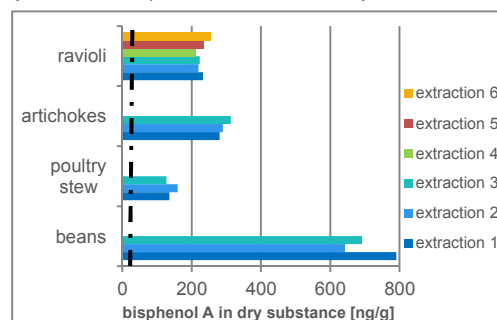


Figure 1: Determination of bisphenol A in different food samples with the LOQ (limit of quantification) in broken line.

4. Conclusion

The determination of bisphenol A with the SpeedExtractor E-916 provides reliable and reproducible results. Complete extractions can be considered due to the fact that no BPA was found in the post-extractions.

5. Acknowledgement

We sincerely thank Dr. Martin Schlummer and Ludwig Gruber and their analytical team from the Fraunhofer-Institut Verfahrenstechnik und Verpackung, Freising Germany.

6. References

Directives 2004/19/EC
Directives 2011/8/EU

Operation Manual of SpeedExtractor E-916

For more detailed information and safety considerations please refer to the Application Note no. 119/2013.