

5th Euro-Global Summit and Expo on

Food & Beverages

June 16-18, 2015 Alicante, Spain

Dispersive micro extraction with $CoFe_2O_4$ /oleic acid nano-particles coupled to gas chromatographymass spectrometry for the determination of alkyl phenols in infant formulas

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lkyl phenols (APs) are a group of environmentally persistent contaminants classified as endocrine disrupting chemicals. ${
m A}$ Food samples may contain some of these compounds because of the pollution from raw food materials or food-making process. Migration from packaging material is another important factor for the occurrence of these pollutants in foods. This study describes a dispersive micro extraction with magnetic nano-particles (CoFe₂O₄/oleic acid) procedure for the determination of the APs, 4-tert-butylphenol (TBP), 4-pentylphenol (PP), 4-hexylphenol (HP), 4-tert-octylphenol (TOP), 4-octylphenol (OP) and 4-nonylphenol (NP) in infant formulas using gas chromatography coupled with mass spectrometry (GC/MS). Trichloro acetic acid was used to precipitate the proteins from infant formulas. To the supernatant (10 mL diluted to 25 mL with water), 1.2 g of K_3 HPO₄ and 500 μ L of acetic anhydride were added. 2-Chloro-5-bromoanisole was used as internal standard. Then, the acetylated APs were absorbed using 100 mg of CoFe₂O₄/oleic acid particles by shaking for 10 min. Desorption was carried out in 3 mL of ethanol by shaking for 10 min. Finally, the ethanol was filtered and evaporated to dryness. The residue was reconstituted in 50 µL of methanol and 1 µL was injected into the GC-MS. Helium was used as mobile phase with constant flow-rate of 1 mL min⁻¹ and cyanopropyl-phenyl methyl polysiloxane as stationary phase. The analytes eluted with retention times between 6.4 and 10.1 min and were quantified under the selected ion monitoring (SIM) mode using the target ion. Most of the infant formulas analyzed did not contain the analytes, while some samples contain APs at levels of between 1221 ng g⁻¹ for TOP and 11 ng g⁻¹ for HP. Detection limits were in the 0.07-0.26 ng mL⁻¹ range and recoveries between 90 and 118% were obtained with RSDs around 12%.

Biography

Marta Pastor Belda is a researcher at the Applied Instrumental Methods research group which is based on the Department of Analytical Chemistry of the University of Murcia (Spain). At present, their research lines focus on the miniaturization of the sample preparation stage aiming for its simplification, a decrease in waste generation as well as for obtaining the best performance from generally available lab instrumentation.

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