

Article

Migration of Plastic Additives and Non-Intentionally Added Substances from Packaging into Edible Oils and Beverages: A Combined GC–MS and Hydrolysis–Capillary Electrophoresis Approach

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Abstract

The present study aimed to investigate the migration of potentially hazardous compounds from plastic food packaging into edible oils, bottled water and soft drinks available on the market in the Republic of Moldova. GC–MS screening was applied to identify plastic additives and unintentionally added substances (NIAS). The influence of key extraction parameters, including solvent type, extraction time, pH, alcohol content and sugar concentration, was systematically investigated. The optimized procedure demonstrated satisfactory analytical performances, with recoveries ranging from 81 to 96%, repeatability below 5% and detection limits between 0.006 and 0.01 mg/L. To allow a comprehensive assessment of total phthalate contamination, an additional analytical approach based on the hydrolysis of phthalate esters and the determination of *o*-phthalic acid using capillary electrophoresis with spectrophotometric detection was proposed. The method showed a linearity range of 0.1–5.0 mg/L and a limit of quantification of 0.07 mg/L. The combined chromatographic and hydrolysis-capillary electrophoresis approaches provide a reliable tool for the integrated determination and evaluation of phthalate residues in aqueous-alcoholic systems and beverages, accessible to laboratories performing food quality control.

Keywords: phthalate esters; aqueous-alcoholic matrices; capillary electrophoresis; *o*-phthalic acid; hydrolysis method; beverage contamination



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