F.9. NON-TARGET GC–MS ANALYSIS OF MIGRATING COMPOUNDS FROM PET FOOD PACKAGING INTO LIPID-RICH FOOD MATRICES

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Abstract. The food packaging industry represents a dynamic and indispensable sector of the global economy. Among packaging materials, plastics are widely used due to their low cost, lightweight structure, flexibility, and excellent barrier properties. However, increasing concerns have emerged regarding the potential migration of chemical substances from plastic materials into food. These substances may include monomers, additives, and non-intentionally added substances (NIAS), which can migrate into food products throughout the entire life cycle of the packaging. Migration processes are strongly influenced by physicochemical factors such as temperature, light exposure, oxygen, and humidity. In addition, plastics used in food packaging are generally transparent to microwave radiation, which may facilitate the migration of packaging components into food during heating. The present study aimed to evaluate the migration of potentially toxic compounds from plastic food packaging into foods with high lipid content, including edible oils and complex food matrices. The extraction of potential migrants from packaging materials was performed using food simulants, namely ethanol solution (20% v/v) and iso-propanol (HPLC grade). The identification and quantification of migrated compounds were carried out by gas chromatography coupled with mass spectrometry (GC–MS), using a fused silica capillary column Rtx-5MS (5% diphenyl–95% dimethylpolysiloxane, 30 m × 0.25 mm internal diameter, 0.25 µm film thickness). The obtained spectra were interpreted using the NIST08 and FFNSC 1.2 spectral libraries. The results indicated that PET containers commonly used for edible cooking oils do not present significant contamination risks associated with conventional plasticizers. Nevertheless, trace levels of flame retardants, residual monomers, and other NIAS were detected. These compounds are not included among the authorized additives for food-contact materials and remain insufficiently characterized with respect to their migration behavior and toxicological profiles. The findings of this study highlight the importance of applying advanced non-target analytical approaches for the detection and characterization of unintentionally added substances and for assessing the potential combinatorial effects associated with chemical migration from food packaging materials.
Keywords: PET packaging; chemical migration; NIAS; lipid-rich foods; food simulants; GC–MS.

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