

Py-GC-MS for determining Microplastic Release from Take-Away Containers

Cristina Di Fiore¹, Fabiana Carriera¹, Monica Maio² and Pasquale Avino^{1,3}

¹Department of Agricultural, Environmental and Food Sciences (DiAAA), University of Molise, Campobasso, 86100, Italy;

²Department of Biosciences and Territory, University of Molise, c/da Fonte Lappone, Isernia, 86090, Italy;

³Institute of Atmospheric Pollution Research, Division of Rome, c/o, Ministry of Environment and Energy Security, Rome, 00147, Italy.

Introduction

This research study examines the release of microplastics from containers made of three different polymer types, such as polypropylene (PP), polystyrene (PS), and polyethylene terephthalate (PET).

Objective

To assess microparticle release from food containers under different simulated conditions and confirm their polymeric composition.

Image Title



Methodology

Experiments simulated three food contact conditions using Milli-Q water at room temperature, 100 °C, and pH 4.5. Containers were exposed for 20 minutes with agitation. Solutions were filtered (1.6 µm) to collect microparticles, quantified via optical microscopy. Micro-Raman analyses, using 0.2 µm stainless-steel frits, confirmed the polymeric nature of the particles.

Results

The findings reveal that PET and PS containers released microplastics in varying amounts: 9 and 1 particles at room temperature, 7 and 3 in acidic conditions, and 17 and 30 at 100 °C, respectively. The detected particles measured between 13 and 32 µm. Notably, no microplastic release was observed from PP containers under any tested conditions.

Conclusion

These results show significant microplastic release from PET and PS containers, raising concerns about ingestion and potential airborne contamination. Their small size may allow inhalation, highlighting the need for further research on airborne microplastic pathways and related health and environmental impacts.

Key Sources

Human health; microplastics; ingestion; pollution;