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# Accelerated solvent extraction to identify an accurate polyethylene mass for microplastic analytics in environmental samples?

Maren Meurer<sup>\*†1</sup> and Altmann Korinna<sup>‡1</sup>

<sup>1</sup>Federal Institute for Materials Research and Testing - BAM – Unter den Eichen 87 12205 Berlin, Germany

## Abstract

It is of high priority to capture the extent of microplastics (MP) contamination for understanding its impact and consequences to our environment. However, due to a lack of standardized methods, MP analysis as well as its quality assurance, is still a challenge. The thermal extraction desorption-gas chromatography/-mass spectrometry (TED-GC/MS) as a novel innovative thermoanalytic method can detect MP particles in environmental samples based on their decomposition products. According to MP analysis, a distinctively larger polyethylene (PE) content in comparison to other synthetic polymers was detected in environmental samples. Various substances within the matrix which have a similar molecular structure to PE, like fats and oils, might interfere with its marker and lead to an overestimation. In this investigation an automated extraction method, the accelerated solvent extraction (ASE), is introduced as quality control tool before TED-GC/MS measurement. Thereby, not the extract like usually used, but the solid filtrate is analyzed. The aim is to clean the environmental samples from solvent removable compounds which could lead to false positive signals and thus receive a more accurate PE mass. Consequently, a sample mimicking environmental samples with a defined matrix and a known polymer mass was generated. The common polymers polyethylene, polypropylene, polystyrene and styrene-butadiene rubber, used as an indication for tire wear, were added to the matrix. Different parameters for ASE extraction were varied such as different solvents, filters and purge time. Finally, a PE recovery rate of 91 % after extraction could be reached.

**Keywords:** Polyethylene, ASE, TED, GC/MS

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<sup>\*</sup>Speaker

<sup>†</sup>Corresponding author: [maren.meurer@bam.de](mailto:maren.meurer@bam.de)

<sup>‡</sup>Corresponding author: [korinna.altmann@bam.de](mailto:korinna.altmann@bam.de)