

Poster

**Investigation of the impact of the SBR/BR ratio on the quantification of tire wear particles by pyrolysis-gas chromatography/mass spectrometry**

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Micro- and nanoplastic (MNP) pollution is increasingly raising the public concern as they are ubiquitously present in the environment. Among the different sources of MNPs the abrasion of the tire tread on the road surface producing tire wear particles is one the most common. Consequently tire wear particles are found in soil as well as in surface water and can end up to 100 meters from the roads.

The International Organization for Standardization (ISO) released the procedure ISO/TS 20593:2017 suggesting a pyrolysis-gas chromatography/mass spectrometry (Py-GC/MS) method for the analysis of tire wear particles in soil sediment and air. In order to detect tire wear particles a pyrolysis marker compound is suggested being 4-vinylcyclohexene (4-VCH) which is used for the quantification of styrene butadiene rubber (SBR) and butadiene rubber (BR). However each tire has a different composition including a different proportion of SBR and BR depending on the brand and the type of tire (e.g. summer winter four season car or truck tire). Therefore the importance of assessing the impact of the different SBR/BR ratios on the abundance of the pyrolysis marker is crucial to minimize the quantification error of the tire wear particles in the environment.

In the scope of this study the impact of the different proportions of SBR and BR on the abundance of the pyrolysis marker (i.e. 4-vinylcyclohexene) obtained and on the quantification of tire wear particles was investigated. For this purpose several samples containing a mix of known SBR/BR ratios have been analyzed as well as 5 different random tire samples. In addition alternative pyrolysis fragments to quantify tire wear particles were explored. During the measurements no internal standard was used but poly(4-fluororstyrene) was used as control.

Based on the obtained results the pyrolysis profile appeared to deviate depending on the SBR/BR ratio leading to a challenging the quantification of these polymers in tire samples.