

[Direct analysis of airborne microplastics collected on quartz filters by pyrolysis-gas chromatography/mass spectrometry](#)

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Abstract:

This paper reports the direct analysis of polymer components in the airborne particulates collected on quartz filters by pyrolysis (Py)-GC/MS. The airborne microplastics (AMPs) were collected with three classification stages depending on different aerodynamic diameters using a multi-nozzle cascade impact (MCI) sampler. The quartz filter holding AMPs was punched directly into several pieces without pretreatment procedures. Three pieces were introduced into a sample cup, and Py-GC/MS measurements were done to analyze AMPs. Evolved gas analysis (EGA) of AMPs showed the volatilization of phthalates, the generation of sulfur dioxide and nitrogen oxide, and the thermal decomposition of polymer components as the heating temperature increased. In thermal desorption (TD)-GC/MS prior to Py-GC/MS, polycyclic aromatic hydrocarbons were detected in addition to phthalates and some aliphatic carboxylic acids. The following Py-GC/MS results indicated the presence of polyethylene, polypropylene (PP), polystyrene (PS), styrene-butadiene rubber (SBR), and natural rubber in AMPs. Among these polymers, PS, PP, and SBR were quantified using the indicator ions of their characteristic pyrolysis products. The analytical results showed that PS and PP seem to accumulate in the smaller aerodynamic diameter stage, while SBR appears to collect in the larger one. The analytical method using Py-GC/MS described herein is a powerful one that requires no pretreatment of the AMP samples.

\* Excerpted from online journal website (Click the title)

Frontier Labs Products used:

Multi-Shot Pyrolyzer (EGA/PY-3030D), Ultra ALLOY<sup>+</sup>-5, UADTM-2.5