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New and improved analysis of

Microplastic and Rubber Particles

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Microplastics & Rubber Analysis

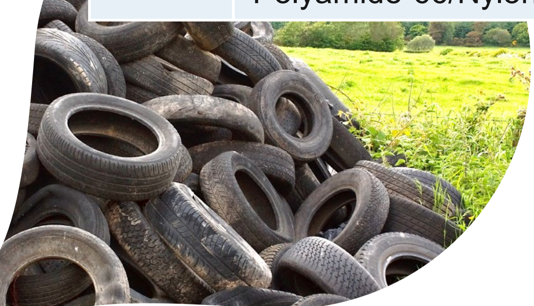
The presence and impact of microplastics (MPs) have become increasingly prominent concerns in the context of environmental issues. Microplastics are typically defined[1] as synthetic polymer particles ranging from 1 to 1000 µm, while larger microplastics are categorized as those between 1 and 5 mm in size. These particles originate either from the direct production of plastic materials or through various environmental degradation processes.

Quantifying the exact amount of microplastics released into nature remains challenging due to the vast number of sources and significant uncertainties. Major contributors include road traffic, artificial turf fields, boats, building facades, plastic manufacturing processes, and wastewater treatment plants.

New method

Qualitative and quantitative analysis of 10 synthetic polymers[2] and rubber components from tyre wear.

Synthetic polymers		Rubber components		Reporting (mass concentration)
PE	Polyethylene	NR/PIP	Natural rubber/ polyisoprene	- µg/L of individual polymer types and as a sum of MPs
PS	Polystyrene			
ABS	Acrylonitrile butadiene styrene	BR/PBD	Butadiene rubber/ Polybutadiene	- µg/L of rubber components
PMMA	Polymethyl methacrylate	SBR	Styrene-butadiene rubber	- Comment regarding qualitative identification of rubber
PC	Polycarbonate			
PVC	Polyvinyl chloride			
PET	Polyethylene terephthalate			
PA-6	Polyamide-6/Nylon-6			
PA-66	Polyamide-66/Nylon-66			



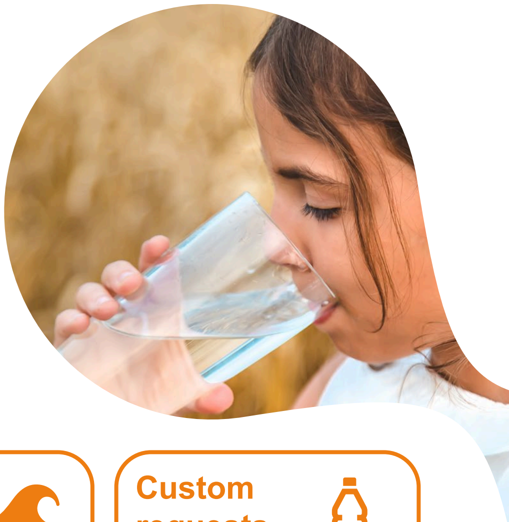
[1] https://www.iso.org/obp/ui/#iso:std:iso:tr:21960:ed-1:v1:en
[2] https://www.frontier-lab.com/products/multi-functional-pyrolysis-system/194709/

Analytical Methods

Microplastics present in liquid samples can be efficiently isolated using vacuum-assisted filtration. Pyrolysis-Gas Chromatography-Mass Spectrometry[3] (Pyr-GC/MS) allows for the determination of mass concentration and identification of synthetic polymers. During pyrolysis, the entire sample is heated until it vaporises, enabling analysis in the gas phase. This process makes Pyr-GC/MS a robust method that yields consistent results in a relatively short time.

When samples contain high levels of particulates or other contaminants, additional preparation steps, such as chemical digestion and density separation, are required. For regulatory purposes, mass determination via Pyr-GC/MS is considered suitable for environmental samples and is expected to become the leading analytical technology for quantifying MPs.

Compared to particle-counting and surface-identification techniques such as μ-FTIR and μ-Raman, Pyr-GC/MS has the significant advantage of overcoming the challenge of complex environmental matrices that can obscure microplastics. Furthermore, Pyr-GC/MS can also quantify rubber particles[4], enabling the estimation of tyre and road wear particles (TRWP). Tyre rubber is composed of a blend of natural and synthetic rubber, along with various additives to enhance mechanical and chemical properties.



Water matrices we test

Drinking water

Water for human consumption: drinking water, tap water, other clean water

Clean water

Liquid matrices with low amounts of particulate: drinking water, clean water, sea water, clean process water

Waste water

Liquid matrices with high amounts of particulate: waste water, process water, seawater

Custom requests

We are flexible on requests. If there are any specifications or special requests, we are happy to collaborate.

See next page for additional order code information.

[3] Marten Fischer and Barbara M. Scholz-Böttcher Environmental Science & Technology 2017 51 (9), 5052-5060 DOI: 10.1021/acs. est.6b06362

[4] Tomasz Lachowicz, Janina Zięba-Palus & Paweł Kościelniak (2013) Chromatographic Analysis of Tire Rubber Samples as the Basis of Their Differentiation and Classification for Forensic Purposes, Analytical Letters, 46:15, 2332-2344, DOI: 10.1080/00032719.2013.800536

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Water sampling methodology

- Samples require 2 x 1 L flasks
- + 1 Empty container for control for each batch of samples

It is recommended to fill and rinse bottles three times during the sampling process. The sampler should take care to minimise the risk of polymer contamination. Wear clothing made entirely of natural fibres (e.g., 100% cotton) during sampling, and avoid synthetic fabrics such as fleece. When possible, perform the sampling upwind (against the wind direction) to reduce airborne contamination. Replace the screw top or lid as soon as possible after sampling.

There is no need for conservation or cooling of samples prior to shipment to the laboratory, except for fish fillet (frozen).

All samples are handled in a polymer-particle-free laboratory. Blanks are routinely conducted throughout the analytical process to ensure high-quality assurance.

Water microplastics tests overview*

Order code	Matrix	Detail	Analysis
MX130	Drinking water	>0.7 µm	10 polymers
MX131	Clean water	27-1000 µm	10 polymers
MX136	Clean water	27-1000 µm	Rubber components
PMX70	Clean water	MX131 + MX136	10 polymers + rubber components
MX132	Clean water	10 µm	10 polymers
MX136	Clean water	10 µm	Rubber components
PMX70	Clean water	MX132 + MX136	10 polymers + rubber components
MX141	Wastewater	27-1000 µm	10 polymers
MX146	Wastewater	27-1000 µm	Rubber components
PMX72	Wastewater	MX141 + MX146	10 polymers + Rubber components
MX142	Wastewater	10-1000 µm	10 polymers
MX147	Wastewater	10-1000 µm	Rubber components
PMX74	Wastewater	MX142 + MX147	10 polymers + rubber components
MX145	Wastewater	27-1000 µm	Polyurethane

* Note: We update our test methodologies regularly to in response to client and regulatory requirements. Please contact us for the last test specifications and order codes.

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