



New and improved analysis of **MICROPLASTIC AND RUBBER PARTICLES**



Environment Testing

MICROPLASTIC AND RUBBER ANALYSIS

The presence and effects of microplastics (MPs) have drawn more and more attention among current environmental issues. MPs are defined¹ as synthetic polymers 1–1000 µm, whereas large microplastics are defined as 1–5 mm. MPs are generated either from production of plastic particles or through various degradation mechanisms in the environment.

It is difficult to give an exact figure of the amount of MPs that are released into nature. The sources are numerous and the uncertainties are large. Among the biggest sources, road traffic has been pointed out together with artificial turfs, boats, building facades, plastic production and waste water treatment plants.



Qualitative and quantitative analysis of 10 synthetic polymers² + rubber components from tire wear

Synthetic polymers		Rubber components	Reporting (mass concentration)
PE	Polyethylene	NR/PIP BR/PBD SBR Natural rubber/polyisoprene Butadien rubber/Polybutadiene Styrene-butadiene rubber	<ul style="list-style-type: none">• µg/L og µg/kg of individual polymer types and as a sum of MPs• µg/L or µg/kg of rubber components• Comment regarding qualitative identification of rubber
PP	Polypropylene		
PS	Polystyrene		
ABS	Acrylonitrile butadiene styrene		
PMMA	Polymethyl methacrylate		
PC	Polycarbonate		
PVC	Polyvinyl chloride		
PET	Polyethylene terephthalate		
PA-6	Polyamide-6/Nylon-6		
PA-66	Polyamide-66/Nylon-66		

Analytical methods

MPs present in liquid samples can easily be isolated on filters using vacuum assistance. By using Pyrolysis–Gas Chromatography–Mass Spectrometry³ (pyr–GC/MS) one can find the mass concentration and identify synthetic polymers. During pyrolysis, the whole sample is heated which evaporates the sample to gas, and this way pyr–GC/MS proves that it is a robust method that provides coherent results in shorter time. For samples where the amount of particulate and contaminants other than MPs are present, sample preparation steps using chemical digestion and density separation are needed.

For regulatory purposes, the mass determination

by pyr–GC/MS is fit for purpose for environmental samples and is expected to become the most relevant analytical technology for quantifying MPs. Using pyr–GC/MS for microplastic analysis has a great advantage over particle-counting and surface identification tools such as µ–FTIR and µ–Raman, as more environmentally realistic matrices contains more particles that can hide the presence of MPs. Pyr–GC/MS technology also offers the possibility to quantify rubber particles⁴ for calculation of tire and road wear particles (TRWP). Rubber from tires are made of a combination of natural and synthetic rubber in addition to additives added to improve mechanical and chemical properties.

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/>

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



Drinking water (MX130)

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

Clean water (MX131)

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



Waste water (MX141)

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

Sediment (MX541)

Marine sediments, sand, other inorganic matrices

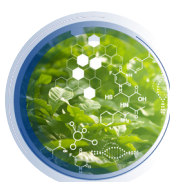


Salts (MX530, MX531)

Raw salt, table salt, sugar, other water-soluble solids

Fish fillet (MX561)

Fish fillets, analysis of other food products are available on demand



Polymer screening (MX550)

Tires, rubber, other polymer containing matrices

Custom requests

We are flexible on requests, with filters of 0.2, 1.6, 10 and 27 μm pore size. If there are any specifications or special requests, we are happy to collaborate.



Further information about order codes, see next page.

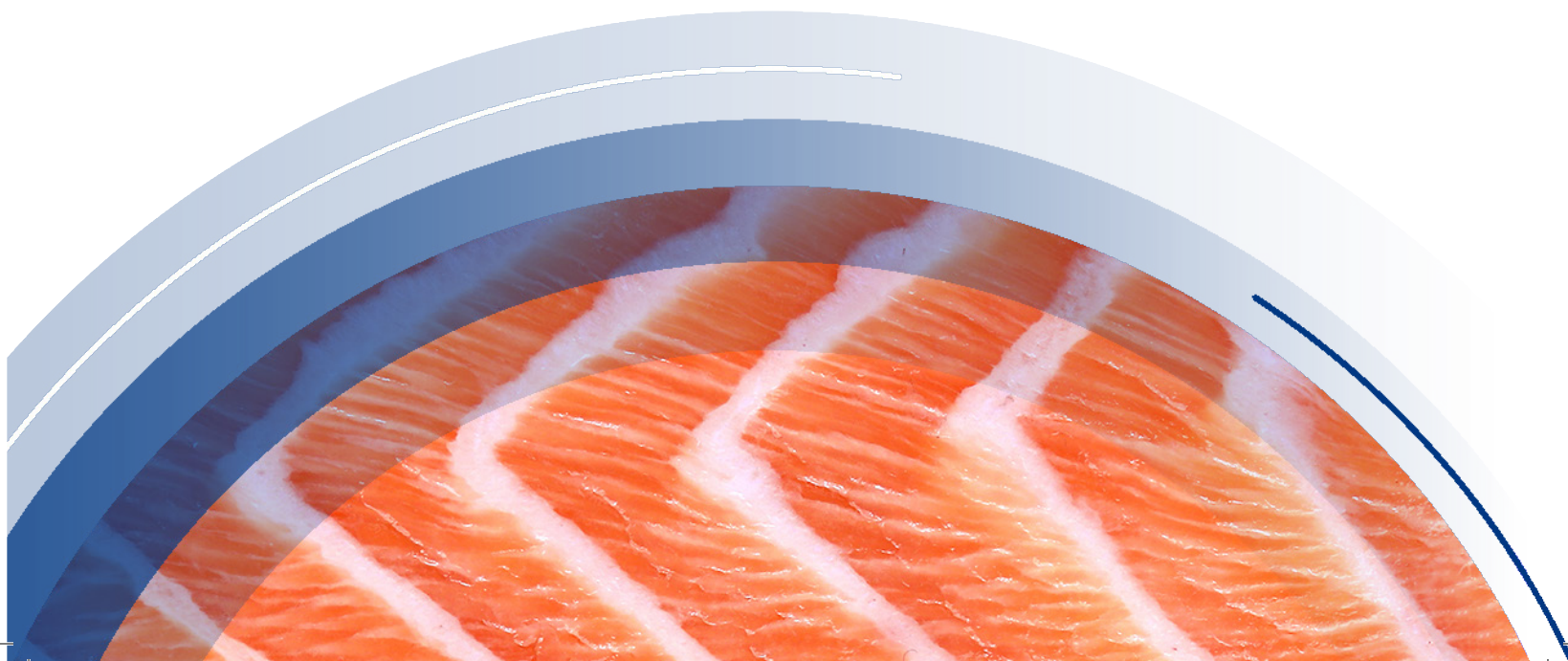
Minimum sample amount (!)

Liquid samples	2 x 1 L flasks
Sediments	250–500 g in glass or approved bag
Salts	50–100 g in glass or approved bag
Fish fillet	250–500 g wrapped in aluminium, preferably NQC-cut.
Solid matter for polymer screening	> 1 mg
+ 1 empty container for control for each batch of samples (all sample types)	

The filling and rinsing of bottles three times in the sampling process is recommended. The sampler should carefully take into account the presence of polymer contamination risk. Please wear all natural fiber clothing when taking samples (e.g. 100% cotton). Do not wear synthetic fleece. It can also be advantageous to perform the sampling against the wind direction. Put screw top/lid back on as soon as possible after sampling.

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

The samples are treated in a polymer-particle free lab facility. We carry out blanks throughout the analytical process to ensure the best quality assurance.



Order code	Matrix	Comment	Analysis
MX130	Drinking water	>0.2µm	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
MX141	Waste water	27-1000 µm	10 polymers
MX146	Waste water	27-1000 µm	Rubber components
PMX72	Waste water	MX141+MX146	10 polymers + rubber components
MX541	Sediments	27-1000 µm	10 polymers
MX546	Sediments	27-1000 µm	Rubber components
PMX73	Sediments	MX541+MX546	10 polymers + rubber components
MX530	Water-soluble solids	27-1000 µm	10 polymers
MX531	Water-soluble solids	>0.2µm	10 polymers
MX536	Water-soluble solids	27-1000 µm	10 polymers
PMX71	Water-soluble solids	MX530+MX536	10 polymers + rubber components
MX550	Solid matter	-	Polymer screening
MX561	Fish fillet	10-1000µm	10 polymers

QUESTIONS AND SHIPMENT

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