

A large, clear plastic bottle is shown floating in the ocean, partially submerged. The bottle is crumpled and appears to be drifting. In the background, there are snow-capped mountains under a blue sky with light clouds.

Analysis of Microplastics

ALS Scandinavia has since 2017 been able to offer analysis of microplastics. We have developed new methods to be able to analyse microplastics in several complex sample types. Today we can offer analysis of microplastics in water (drinking water and contaminated water) and in complex matrices, such as soil, sludge, sediment, biota (eg. fish and mussels) and food (eg. powdered milk, salt and honey). Besides quantifying the amount of plastic particles, we can also identify what type of plastic polymer we have found. We also offer analysis of particles from tyres and artificial turfs, called black particles.

Identification and quantification of microplastics

To be able to analyse microplastics in a sample, they must be separated from the rest of the sample. The separation technique to extract the particles varies depending on the sample type. For pure water (eg. drinking water), the particles are separated by filtration. For complex matrices such as soil, sludge, sediment, biota and food, inorganic and organic material is removed before filtration. Inorganic material such as mineral particles are removed from the sample by density separation. Organic material is degraded by oxidation and enzymatic treatment.

Identification and quantification is performed by μ -FTIR (Fourier Transform Infrared Spectroscopy). A beam of infrared radiation is passed through the sample. Some radiation is absorbed and some passes through or reflects. The resulting signal at the detector is a spectrum specific for the particular polymer type. The spectrum is compared with a reference library containing several types of polymers. Our library contains more than 40 000 reference spectra, which means that we can identify a large number of plastics.

Particles with diameter between 40 μ m (20 μ m for pure waters) and 5 mm are counted and identified with the exception of black particles.

Analysis of black particles and rubber particles

Black particles and rubber particles from for example abrasion of tyres and artificial turfs, are difficult to analyse with μ -FTIR, because of their high absorption of infrared radiation. Since infrared radiation does not pass or reflect for these particles, it is difficult to detect with μ -FTIR only. By using an ATR crystal in conjunction with the IR-instrument, black particles and rubber particles can be analysed. They are manually analysed and the analysis is separated from the analysis of other microplastics.

The analysis includes particles that usually can be found in tyres and granules; butadiene rubber (BR), isoprene rubber (IR), styrene-butadiene rubber (SBR) and ethylene propylene diene monomer rubber (EPDM rubber).

We have built a library with several rubber types to identify black particles. Particles with diameter between 40 μ m and 5 mm are counted and identified.



Microplastics - a large problem in microscopic scale

The definition of microplastics is small plastic particles less than 5 mm, with most microplastics being smaller than 1 mm. Microplastics are for example very tiny pieces of manufactured plastic (microbeads) used as additives to health and beauty products. Plastic pellets that are used as raw material in the industry are unintentionally spread to the environment during transport and production. These particles are called primary particles. Microplastics can also derive from larger plastic debris that degrades into smaller and smaller pieces. These particles are called secondary particles.

Studies show that important sources of microplastics in the sea are road wear and abrasion of tyres, artificial turfs, plastic fibres from textiles and industrially produced plastic pellets. Health and beauty products which contain microbeads (for example toothpaste and soap) also contribute to the contamination. Plastics that are disposed of in the environment instead of being recycled will eventually degrade into smaller plastic particles. It is uncertain how much of the particles from road wear and artificial turfs are transported to water recipients. However, microplastics from health products and synthetic clothes fibres in washing machines enter the sea via the wastewater.

Microplastics can be found both in the water and in the sediment. Plastics biodegrade very slowly and marine organisms such as mussels, oysters and fish may eat the particles. This can lead to starvation and even death. Additives in the plastic, for example flame retardants, may be toxic to the marine organisms and individuals higher in the food chain.

Our analysis packages

Our packages covers several matrices; pure waters, waste waters, soil and sediment, sludge, biota (eg. fish, mussels) and food (eg. powdered milk, salt, honey). For each matrix, we are able to offer two variants of packages, microplastics including and excluding black particles.

The packages including microplastics and black particles are called Plus-packages. The black particles must be analysed separately from the other microplastics, which makes this package more extensive.

Black particles are not always necessary to analyse. If you already know that particles from for example tyres are not present in the sample (may be for drinking water), we offer Bas-packages that do not contain the black particle analysis.

You can find our packages in the table below:

ALS packages for microplastics including black particles

A-7a-Plus Microplastics including black particles in pure water

A-7b-Plus Microplastics including black particles in waste water

A-7c-Plus Microplastics including black particles in soil, sediment

A-7d-Plus Microplastics including black particles in sludge

A-7e-Plus Microplastics including black particles in biota

A-7f-Plus Microplastics including black particles in food

ALS packages for microplastics excluding black particles

A-7a-Bas Microplastics excluding black particles in pure water

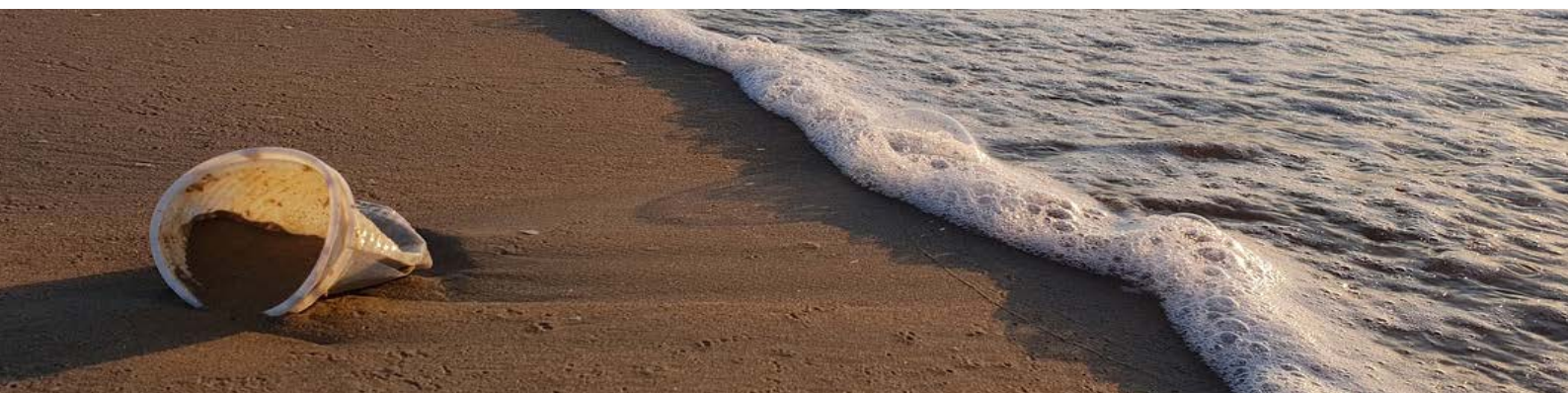
A-7b-Bas Microplastics excluding black particles in waste water

A-7c-Bas Microplastics excluding black particles in soil, sediment

A-7d-Bas Microplastics excluding black particles in sludge

A-7e-Bas Microplastics excluding black particles in biota

A-7f-Bas Microplastics excluding black particles in food



For more detailed information about our methods for microplastic analysis, please see our leaflet "Microplastics: General information about our analyses".



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