

PFAS in leachate

Large-scale production of PFAS, also known as highly fluorinated substances, began as early as the 1950s and is still ongoing. PFAS spread easily in the environment and may reach all the way down to groundwater. Because PFAS are highly persistent and may have adverse effects on both humans and animals, it is important to investigate how PFAS can leach from different materials.

Background

PFAS, per- and polyfluoroalkyl substances, are synthetically produced organic compounds that are highly stable. They do not degrade in the environment but can remain for a long time and circulate in natural cycles.

This group of substances has been used in many different products because PFAS can be stable at high temperatures and repel grease and water. Examples of applications include impregnation of clothing and shoes, food contact materials, skin care products, cosmetics, car upholstery, fire-fighting foams and insulation in electronics. Their widespread use has contributed to contamination of water and the environment in many locations. Today, approximately 5,000 different PFAS substances are estimated to exist.

PFAS have been linked to several adverse health effects. For example, the thyroid gland, liver and lipid metabolism may be affected. Long-term exposure may also have negative effects on the endocrine system and the immune system. Research in this area is still ongoing.

Leaching

An important difference between PFAS and several other organic environmental pollutants is that many PFAS substances have relatively high water solubility. This applies particularly to fluorinated sulfonates and carboxylic acids. It is therefore relevant to investigate the leaching properties of the material with regard to PFAS.



Assessment

The Swedish Environmental Protection Agency's regulation NFS 2004:10 contains acceptance criteria for landfilling of waste, but does not include leaching criteria for several organic contaminants, including PFAS substances. For such parameters, the agency refers to the 2017 guidance document "Acceptance criteria for waste to landfill for parameters lacking leaching criteria". The guidance describes how waste should be assessed when relevant contaminants lack specific leaching criteria. This means that:

- contaminants that lack acceptance criteria still need to be investigated if they are relevant to the waste
- the assessment must show whether the waste meets the requirements for the relevant landfill class
- leachability should be included in the assessment when the properties of the substance make this relevant

More information is available on

<https://www.naturvardsverket.se/vagledning-och-stod/avfall/deponering-av-avfall/>.

Ordering

When ordering PFAS in leachate, the delivery note **"Delivery Note – Leaching test with subsequent PFAS analysis"** must be used. Other analyses, including other leaching parameters, cannot be ordered using this delivery note. They must instead be ordered using the standard delivery note for solid samples.

Information to be provided on delivery note

- Type of leaching test
- Pretreatment of leachate
- Applicable PFAS package for leachate

Method and method-related information

Leaching is performed according to a validated method. Please note that some adsorption of longer-chain PFAS substances to the equipment used may occur. This applies particularly to PFSA (>C10) and PFCA (>C12).

Type of leaching test:

Select a batch leaching test (EN 12457:1–3) or a column test (EN 14405) from the drop-down list:

Type of leaching test:
1-step batch test L/S=2 (PSL01)
1-step batch test L/S=10 (PSL02)
2-step batch test L/S=2, L/S=8 (PSL03)
Column, 1 fraction L/S=0,1 (PSLDZ)
Column, 2 fractions L/S=0,1, L/S=9,9 (PSLE1)

PFAS package for leachate:

Select the desired PFAS package, or a PFAS package in combination with PFAS TOP.

PFAS package for leachate:
PFAS 11 (PLWPL)
PFAS 21 (PLWLY)
PFAS 28 (PLW9M)
PFAS 35 (PLWXZ)
PFAS 11 (PLWPL) + TOP (PLWS6)
PFAS 21 (PLWLY) + TOP (PLWLU)
PFAS 28 + TOP (PLWBK)
PFAS 35 + TOP (PLWBL)

For more details about the content, please see our online catalogue <https://analyiskatalog.eurofins.se/>.

Pretreatment of leachate:

During the leaching test, the sample is mixed with water. Prior to analysis of the leachate, it is separated from the solid material. Select the desired separation technique.

Pretreatment of leachate:
Sedimentation (LX00Y)
Sediment. + centrifugation (LX00Y+LW1UQ)
Filtration 0.45 µm (LX00Z)

Sedimentation

The solid material is allowed to settle at the bottom of the sample vessel. The liquid phase is then carefully poured off, i.e. decanted. Please note that lighter particles may be carried along with the liquid phase.

Sedimentation and centrifugation

The solid material is first allowed to settle towards the bottom of the sample vessel. The material is then forced down by centrifugation, and the liquid phase is decanted. The method is particularly suitable for materials that absorb a large amount of water or that do not sediment easily.

Filtration

The sample is filtered through a particle filter with a pore size of 0.45 µm. This means that particle-bound PFAS substances are removed by filtration and that mainly the water-soluble fraction is detected.

In general, good recovery after filtration is obtained for PFAS substances shorter than approximately C10–C12. For PFSA, this often applies to somewhat shorter chain lengths than for PFCA. For example, the PFAS 11 package works well. Longer-chain PFAS substances can be analysed, but the results should normally be interpreted with some caution.

Recommendation

Centrifugation is the most common procedure in standards for leaching tests, for example EN 14405, which includes organic substances. We therefore recommend centrifugation in most cases.

Reporting

Reporting for a one-step batch test or column test with one fraction

For a one-step batch test or a column test with one fraction, the sample is registered under two sample numbers:

- Sample no. 1: Sample preparation and leaching package.
- Sample no. 2: Pretreatment of leachate and PFAS package.

Reporting for a two-step batch test or column test with two fractions

For a two-step batch test or a column test with two fractions, the sample is registered under three sample numbers:

- Sample no. 1: Sample preparation and leaching package.
- Sample no. 2: Pretreatment of leachate and PFAS package for L/S 2 or L/S 0,1.
- Sample no. 3: Pretreatment of leachate and PFAS package for L/S 8 or L/S 9,9.

Accumulated L/S 10 is calculated by the customer.

Leached PFAS parameters are reported in ng/l. A cost for sample preparation is normally added.

Turnaround time

The turnaround time is 15 working days for batch tests and 20–43 working days for column tests, depending on the number of fractions.

