

Solid Waste Analysis

Halogen Determination in Waste and Recycling

Highlights at a glance

- Fast, flexible, and scalable AOX column sample preparation with the APU series
- Sample feeding for batch and column method without operator intervention
- Matrix-optimized combustion by double furnace configuration
- Flame sensor technology for soot-free combustion of organic matrices (EOX/TX)
- Wide range coulometer for chlorine detection from 10 ng to 1,000 µg
- Large sample boats for low density solids
- Robust measurement setup for direct solid waste analysis



Besides heavy heavy metals, waste is also analyzed for other toxic and ecotoxic components, such as halogenated organic compounds. These are analyzed using the sum parameters AOX, EOX, and TX.

AOX in sludge and waste

AOX (adsorbable organically bound halogens) serves as a rapid screening method to determine contamination by organic halides, e.g. in aqueous eluates, soil, sewage sludge, and sediments. AOX is also determined in paper and cardboard recycling.

EOX in waste and soil samples

Extractable organically bound halogens (EOX) are mostly determined in solids such as soil, waste, asphalt, etc. For example, excavated soil is tested for contamination by halogenated

compounds to ensure that it can be reused for agricultural purposes. If the analysis shows that this is no longer possible, EOX and other parameters are used to determine the landfill class.

TX in refuse derived fuels, used oil, pulp and paper, and polymer recycling

An important sum parameter in waste recycling is the total chlorine/halogen content (TX). As acid and salt formers, chlorine and other halogens can poison catalysts during material recycling, for example, and impair the quality of the recycled products. When waste is processed for use as secondary fuel, low chlorine content is critical to the fuel quality. Chlorine can lead to the formation of HCl which can cause corrosive damage to exhaust system, or it can lead to the formation of dioxins.



Solids analysis with the multi EA 4000



Environmental monitoring with the multi X 2500

AOX sample preparation with APU sim, APU 28, and AFU 3

Our sample preparation systems allow for maximum throughput at minimum operation effort. Column method according to international regulations (e.g., ISO 9562, EPA 1650), as well as batch method (e.g., EN 16166, ISO 11480) is supported.

Column method (APU sim, APU 28):

- Fast AOX column sample preparation
- Full SPE-AOX automation
- Excellent particle handling

Batch method for soil and sludge (AFU 3):

- Filtration into frit containers
- Simultaneous preparation of up to three samples
- Less manual effort compared to polycarbonate membrane filters

AOX, EOX, and TX analysis with multi X 2500

The multi X 2500 can be flexibly configured for the analysis of all halogen parameters in any sample matrix. Integrated safety features ensure safe combustion, regardless of the sample condition. The analyzer can run EOX and TX samples in one sequence, as well as AOX samples prepared according to column or batch method.

- Vertical and horizontal operation for matrix-optimized analysis
- Customized and flexible automation solutions
- Flame sensor technology for soot-free combustion
- Suitable for all halogen sum parameters: AOX, EOX, TX, POX

Total chlorine determination with multi EA 4000

This analyzer is the best choice for fully automatic determination of the TX content in solid waste samples. Particularly high halogen concentrations can be determined easily thanks to the split-mode function, in which only 10% or 20% of the combustion gases are transferred for detection. Together with the high-concentration coulometric cell, chlorine content as high as several percent can be determined.

- Sample representativity ensured: high sample weights up to 3 g
- TX measurements from ppm up to the % range
- Best suited for all kinds of combustible waste

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