Method Summary

Determination of WHO12 and EC7 Polychlorinated Biphenyl Congeners by GC-MS in Soils

Scope and Range

Polychlorinated biphenyls (PCBs) are a mixture of up to 209 different chlorinated biphenyl isomers (i.e. isomers exhibiting different numbers of chlorine atoms). The physio-chemical properties of PCBs such as stability and excellent dielectric strength make them suitable for use as transformer oils, dielectric fluids, hydraulic fluids and flame retardants.
Production of PCBs is now banned due to the mammalian toxicity of this class of compounds and their environmental persistence. 12 of the PCB congeners targeted in this method are considered by the World Health Organisation (WHO) to be 'dioxin-like' due to their toxicity and certain features of their structure, thus pose a greater risk human health than other congeners such as those included in the EC7 suite which are considered to be the most prevalent in the environment by the Environmental Protection Agency.
This method describes a procedure for the detection, identification and quantification of 18 individual PCB congeners in soils, sediments and similar materials.
This method is accredited to ISO17025 and MCERTS standard for sand, loam and clay matrices.

The LOD is set at 3µg/kg for all analytes based on 10g of as received soil being used for extraction. The LOD will increase if less sample is available for extraction and/or dilutions are required.
The linear calibration range for the method is to 0.0050 µg/ml to 1.0000 µg/ml, which equates to 3.0µg/kg to 1000µg/kg in the soil sample.

References

EPA Method 8082A, Polychlorinated Biphenyls by Gas Chromatography.

National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) Schedule B3.

Principle

10 g of as received sample is weighed into a 100 ml Syrup bottle and 20 ml of hexane:acetone:triethylamine (50:45:5% v/v) are added. The vial is capped with a screw top and shaken manually to dislodge the sample into the solvent. The samples are then put onto a shaker for 30 minutes, and then water is added to remove the acetone part of the solvent. Samples are centrifuged to separate the extract if needed. 1ml of extract is then transferred to a 2 ml vial and capped. The samples are spiked with 10µl of working internal standard before being loaded onto the instrument.

Samples are analysed on a Gas Chromatographic system, equipped with an auto-sampler unit and a Mass Selective Detector (MSD) capable of detecting the PCB component target/qualifier ions.

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Interferences

Solvents, reagent glassware and other sample processing hardware may yield artefacts and/or interferences to sample analysis. All these materials must be demonstrated to be free from interferences under the conditions of the analysis. This is undertaken by analysis of method blanks.
Interferences co-extracted from the sample will vary considerably from source to source. If analysis of an extracted sample is prevented due to interferences, it may be necessary to clean up by column chromatography. If this does not remove the interference, then the detection limit should be raised.