ANALYSES OF OCP, PCB AND CB IN SOIL

The analysis of organochloropesticides (OCP), polychlorobiphenyls (PCB) and chlorobenzenes (CB) is performed in different matrices (soil and water) and for each matrix a specific sample pre-treatment (extraction) is performed. Both sample pre-treatment and analysis method have been validated for each matrix. The sample pre-treatment and analyses methods can be found in detail in this document.

OCP are a very diverse group of organic substances which are all toxic and exists of one or more chlorine atoms. The table below shows the list of OCP included in the validated analysis method.

Table 1: OCP

Hexachloorbutadiene
Pentachloorbenzene en hexachloorbenzene (HCB)
HCH (hexachloorcyclohexane, α-, b-, g-, d- en e-isomers)
Aldrin, dieldrin, endrin, isodrin en telodrin
Heptachlor en heptachlorepoxide
α-Chloordane en γ-chloordane
α-Endosulfan, β-endosulfan en endosulfansulfate
o,p-DDD en p,p-DDD (dichloro-diphenyl-dichloorethane)
o,p-DDE en p,p-DDE (dichloro-diphenyl-dichloorethene)
o,p-DDT en p,p-DDT (dichlor-diphenyl-trichloorethane)

PCB are a much more homogenous group of substances. The molecule consists of two benzene rings which bear two or more chlorine atoms. In total there are 209 different PCB. All PCB are very toxic and persistent (biological break-down is difficult and proceeds therefore very slowly). The table below shows the selected PCB included in the validated analysis method.

Table 2: PCB

PCB-28
PCB-52
PCB-101
PCB-118
PCB153
PCB-138
PCB-180

The chlorobenzenes (CB) are, with respect to their analysis, a separate group.
Monochlorobenzene en the dichlorobenzenes are relatively volatile and sample pre-treatment and subsequent analysis is performed separately from the other chlorobenzenes (analysis and quantification of these most volatile chlorobenzenes is performed with head-space GC-MS). The other (less volatile) chlorobenzenes are extracted and analysed in the same way as the OCP and PCB. Analysis of OCP PCB and (the less volatile) CB are performed in one GC-MS analysis. The table below shows an overview of the chlorobenzenes included in the analysis methods mentioned above.

Table 3: CB

Monochloorbenzene (headspace GC-MS)
1,2- Dichlorobenzene (headspace GC-MS)
1,3- Dichlorobenzene (headspace GC-MS)
1,4-Dichlorobenzene (headspace GC-MS)
1,2,3-Trichlorobenzene (GC-MS)
1,2,4-Trichlorobenzene (GC-MS)
1,3,5-Trichlorobenzene (GC-MS)
1,2,3,5-Tetrachlorobenzene (GC-MS)
1,2,4,5-Tetrachlorobenzene (GC-MS)
Pentachlorobenzene (GC-MS)
Hexachlorobenzene (HCB) (GC-MS)

OCP/PCB/CB analyses in soil

The sample (20 grams) is extracted with 50 ml of acetone for 15 minutes. After adding the internal standard, the sample is subjected to a clean-up step using GPC (gel permeation chromatography). The GPC column is eluted with MTBE/hexane (50/50, v/v). The eluate is analysed by GC-MS (gas chromatography-mass spectrometry).

Identification of the compounds of interest is based on both the retention time as well as on the ratio of two compound-specific m/z values in the mass spectrum. A compound is only considered to be positive identified if both criteria are met.

PCB-155 is used as internal standard.

OCP/PCB/CB analyses in water

The water is extracted with hexane; the organic phase is separated and then dried with sodium sulphate. After filtration, the organic phase evaporated and then analysed using the GC-MS.

Identification of the components is based on both the retention time as well as on the ratio of two-component-specific m/z values in the mass spectrum. Only if both conditions are met, there is a positive identification of the component.

When you have questions in relation to this information you can always contact your personal project coordinator.