

# Sediments and dredged materials – where lyophilisation can help



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**Sediment contamination is an important environmental issue because of its potential toxic effects on water, biotic resources, and on human health.**

Among the large variety of contaminants (heavy metals, organic pollutants, radioactive nuclides) from industrial, urban, and marine activities which are associated with sediment particles, organochlorine pesticides (OCPs), polychlorinated biphenyls (PCBs) and polycyclic aromatic hydrocarbons (PAHs) are proven to have significant harmful effects on environment and potentially human health.

ALS provides lyophilisation (freeze-drying) of sediment for environmental analysis. Freeze-drying of sediment is performed prior to extraction and analysis for polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), and organochlorine pesticides (OCPs). The use of freeze-drying eliminates or reduces the undesirable effects of water from the sample as well as prevents losses of targeted analytes.

The most significant benefits of lyophilization versus processing of wet samples are lower detection limits and more quantitative determinations. In addition to lower detection limits and better recoveries, freeze-drying of samples allows for complete homogenization of the sample matrices. Thus, improved precision is realized. This is particularly significant when analysing heterogeneous samples (e.g. high organic sediments, harbour dredging, etc.).



ALS has been active in research and development of procedures for preparation and analyses of sediment, tissue, and water samples. Our laboratory specializes in the analysis of sediment for low-level chemical constituents and has developed procedures for providing data of high technical quality.

By using state-of-the-art technology and a suitable combination of lyophilization, microwave extraction and gas chromatography with a tandem mass detector, ALS has obtained a reliable, efficient and fast procedure for monitoring persistent organic pollutants in a diverse spectrum of sediments at the level of ultra-trace concentrations.

## Technical characteristics of PAH, PCB and OCP methods in lyophilised sediment on GC-MS/MS

### Required amount of sample after lyophilization 10g

Parameter	Limit of quantification (mg/kg DW)	Parameter	Limit of quantification (mg/kg DW)
PAH (16 compounds)		OCP (22 compounds)	
Naphthalene	0.01	Hexachlorobenzene (HCB)	0.0001
Acenaphthylene	0.01	Pentachlorobenzene	0.01
Acenaphthene	0.01	4.4'-DDE	0.0001
Fluorene	0.01	Hexachlorobutadiene	0.01
Phenanthrene	0.01	2.4-DDE	0.0001
Anthracene	0.01	4.4'-DDD	0.0001
Fluoranthene	0.01	4.4'-DDT	0.0001
Pyrene	0.01	Hexachlorocyclohexane Alpha	0.0001
Benz(a)anthracene	0.01	Hexachlorocyclohexane Beta	0.0001
Chrysene	0.01	Hexachlorocyclohexane Gamma	0.0001
Benzo(b)fluoranthene	0.01	alpha-Endosulfan	0.01
Benzo(k)fluoranthene	0.01	Heptachlor	0.01
Benzo(a)pyrene	0.01	Heptachloroepoxide-cis	0.01
Indeno(1 2 3-cd)pyrene	0.01	Heptachloroepoxide-trans	0.01
Dibenz(a,h)anthracene	0.01	Hexachloroethane	0.01
Benzo(g,h,i)perylene	0.01	Telodrin	0.01
Sum of 16 PAH	0.16	Aldrin	0.01
PCB (7 congeners)		dieldrin	0.01
PCB 52	0.0001	endrin	0.01
PCB 28	0.0001	2,4-DDT	0.0001
PCB 180	0.0001	isodrin	0.01
PCB 153	0.0001	2,4-DDD	0.0001
PCB 138	0.0001		
PCB 118	0.0001		
PCB 101	0.0001		
Sum of 7 PCBs	0.0007		

For further details, please contact your local ALS representative..