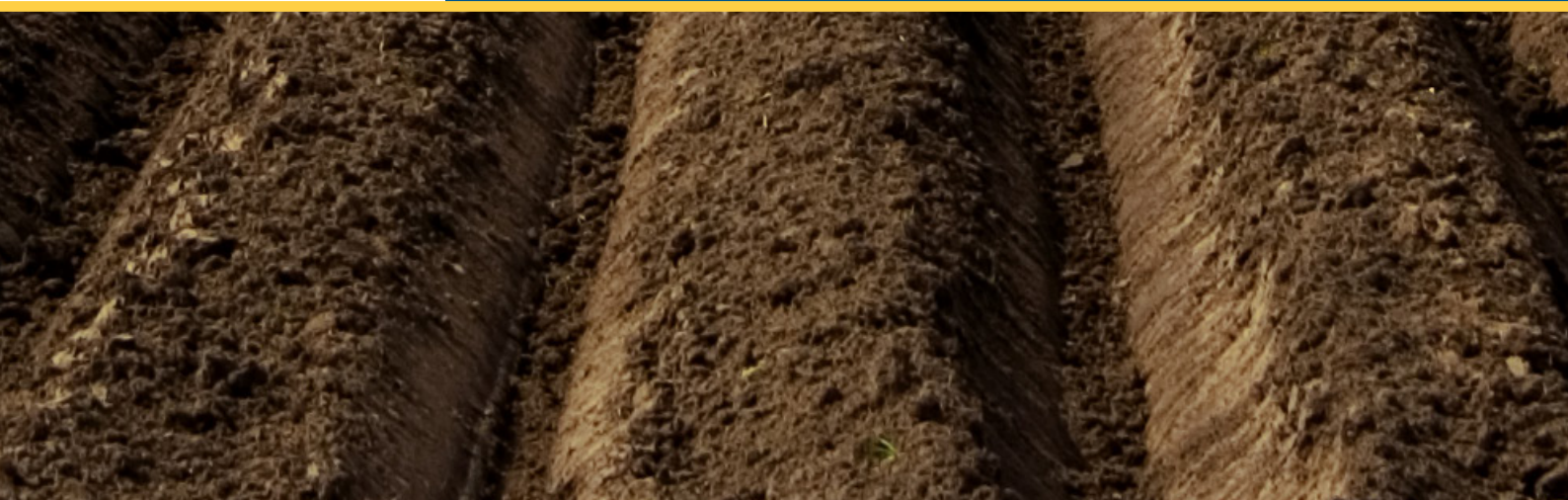




SOIL/SLUDGE/SEDIMENT

Product Catalogue ALS
EUROPE



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150
YEARS IN OPERATION

13k+
STAFF

350+
LOCATIONS

65+
COUNTRIES

As one of the world's largest and most diversified testing services providers, ALS has sites strategically located around the world to provide accurate and timely services. We have operations in more than 350 locations, in 55 countries, and on six continents. We have teams of experts around the world available to provide specialised business solutions that align with client needs. Major hub laboratories are located in Australia, Asia, North America, South America, Europe, the Middle East and Africa.

ALS Life Sciences in Europe employs over 1300 professional laboratory and support personnel represented in 13 countries at 31 locations. The European network consists of modern, analytical, ISO 17025 accredited laboratories and national service centres. Main laboratories are located in the Czech Republic, Sweden, Portugal, United Kingdom & Ireland, Turkey and Denmark. National service centres and smaller laboratories are located in Norway, Finland, Poland, Slovakia, Romania and Spain.

While varying in size and capabilities, the network performs an extensive range of physical, chemical, microbiological, biological, radiological and ecotoxicological analysis to meet the needs of local and regional clients.

Inter-office support and courier arrangements facilitate timely access to the full range of services and on-time delivery of results.

ALS Life Sciences Europe has also a number of centres of excellence dedicated to specialty services and industrial applications. These laboratories utilise the latest high-resolution technology in order to meet very stringent demands from clients worldwide:

ALS operates the best equipped laboratory globally for determination of metals (elements). Examples of analyses include chemical composition, impurities, and stable as well as radiogenic isotopes.

ALS carries out analyses of ultra-trace level organic compounds (dioxins, PCBs, PBDE and other flame retardants) and runs radiochemical testing.

Both laboratories have vast experience from matrices including environmental, food, and pharmaceuticals in addition to clinical, specialized industrial and research applications.



**WATER FRAMEWORK
DIRECTIVE**



ISOTOPE ANALYSIS

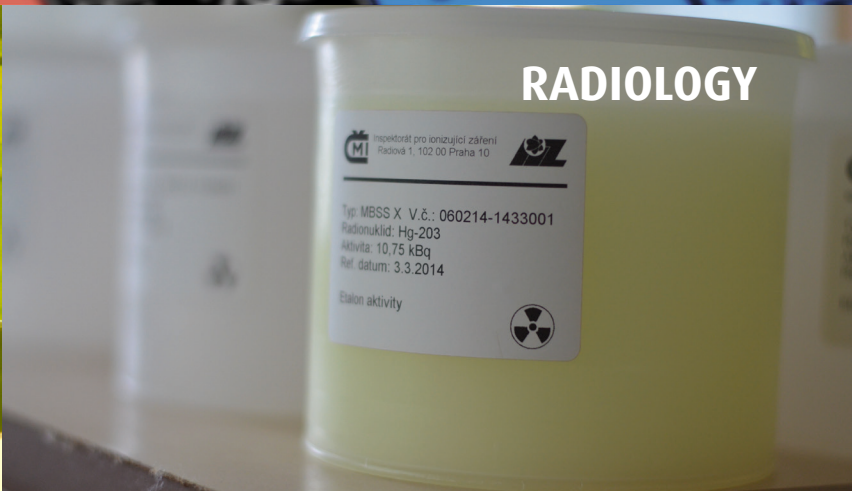
**FOR FURTHER INFORMATION ON WATER
ANALYSES, CONSULT www.alsglobal.eu**



ELEMENT SPECIATION



PESTICIDES



RADIOLOGY



DIOXINS



ECOTOXICITY

PREMIUM ANALYSES



This logo indicates:

- ✓ Premium Metal Analysis
- ✓ Premium Radiometric Testing
- ✓ Premium Ultra-trace Level Organic Analysis

These analyses are performed in custom facilities using state-of-the-art analytical instrumentation by teams with more than 20 years of expertise in the field.

Analytical Services

This catalogue represents a mere fragment of the full range of parameters, matrices, LOQ and other analytical capabilities, which ALS can provide. Contact your local sales representative to discover more and get the parameters you really need, with the associated quote, logistics services and reporting features.

ALS Quick

Standard turnaround time (TAT) for most analyses is 5 to 10 business days.

Nevertheless, many projects and manufacturing processes require quick information. Quick decisions have to be made. Reliability of laboratory results and possibility to use express services for results delivery when needed, is a key factor for choosing a laboratory.

At ALS Life Sciences, expedited services and rush analyses are available for most analyses. All data routinely produced under ALS Quick procedures are available just after the quality validation on our on-line portal. Contact your local sales representative to know more and take advantage from ALS Quick services.



LOQ

Limits of quantification (LOQ) mentioned in this catalogue are orientative only. They may vary depending on sample composition or may differ based on new technological considerations. Contact your local sales representative for a quote with actual LOQ.

Enjoy our product catalogue and feel free to contact us to let us provide you with the Right solutions!



Indicator and inorganic parameters

Parameter	LOQ	Sample amount*
conductivity	1 mS/m	plastic, 50 g
pH	-	plastic, 20 g
chloride	40 mg/kg DW	plastic, 20 g
fluorine, total	300 mg/kg DW	plastic, 50 g
cyanide (easily releasable; free or toxic)	0.1 mg/kg DW	plastic, 50 g
cyanide, total	0.1 mg/kg DW	plastic, 50 g
cyanides, complexing	0.1 mg/kg DW	plastic, 50 g
ammonia and ammonium ions	0.5 mg/kg DW	plastic, 50 g
nitrate	20 mg/kg DW	plastic, 50 g
nitrite	0.05 mg/kg DW	plastic, 50 g
nitrate nitrogen	4 mg/kg DW	plastic, 50 g
nitrite nitrogen	0.02 mg/kg DW	plastic, 50 g
Kjeldahl nitrogen	50 mg/kg DW	plastic, 50 g
nitrogen, organic	5 mg/kg DW	plastic, 50 g
nitrogen, total	50 mg/kg DW	plastic, 50 g
phosphorus (total)	0.05% DW	plastic, 50 g
silica (as SiO ₂)	0.1% DW	plastic, 50 g
sulfur from sulfides	1 mg/kg DW	plastic, 50 g
sulfur (total)	0.01% DW	plastic, 50 g
sulfate	0.1% DW	plastic, 50 g
sulphur total - gravimetry, sulphur total as SO ₃	0.1 % DW 0.25 % DW	plastic, 50 g
dry matter	0.1%	plastic, 10 g
loss on ignition (550°C)	0.1% DW	plastic, 50 g
loss on ignition (1100°C)	0.1% DW	plastic, 50 g
FOS/TAC ratio	0.01	plastic, 50 g
specific gravity	0.01 g/cm ³	plastic, 50 g
organic dry matter	0.1% DW	plastic, 50 g
powder density	0.01 g/dm ³	plastic, 1,5 kg
TIC (total inorganic carbon)	0.1 % DW	glass, 50 g
TC (total carbon)	100 mg/kg DW	glass, 50 g

* Sample amount in dry weight (DW). Sample amount can be less, based on the different parameters required for the package. Please contact your local sales representative.

Total grain size analysis

Parameter	LOQ	Sample amount*
12 fractions (< 0.002 mm - > 2 mm):		
< 0.002 mm	0.01%	plastic, 500 g
0.002 - 0.004 mm	0.01%	
0.004 - 0.008 mm	0.01%	
0.008 - 0.016 mm	0.01%	
0.016 - 0.032 mm	0.01%	
0.032 - 0.063 mm	0.01%	
0.063 - 0.125 mm	0.01%	
0.125 - 0.25 mm	0.01%	
0.25 - 0.5 mm	0.01%	
0.5 - 1 mm	0.01%	
1 - 2 mm	0.01%	
> 2 mm	0.01%	

*sample amount in dry weight (DW).

**SPECIFIC FRACTIONS CAN
BE ARRANGED. ASK US!**

Microbiological parameters

Parameter	Sample amount
Campylobacter	sterile glass, 50 g
<i>Clostridium perfringens</i>	sterile glass, 50 g
coliform bacteria - enumeration	sterile glass, 50 g
<i>Enterobacteriaceae</i>	sterile glass, 50 g
<i>Enterococci</i>	sterile glass, 50 g
<i>Escherichia coli</i>	sterile glass, 50 g
helminths	sterile glass, 50 g
helminthi (living stage) - enumeration	sterile glass, 50 g
<i>Listeria monocytogenes</i>	sterile glass, 50 g
moulds - enumeration	sterile glass, 50 g
<i>Salmonella</i>	sterile glass, 50 g
<i>Shigella</i> spp.	sterile glass, 50 g
thermotolerant coliforms	sterile glass, 50 g
yeast - enumeration	sterile glass, 50 g
<i>Yersinia enterocolitica</i>	sterile glass, 50 g

Note: Depending on the combination of requested parameters, the total amount of sample necessary for analysis can be diminished. Please contact your local sales representative for further information.

Elemental analysis - N, C, H, S

Parameter	LOQ (%)	Parameter	LOQ (%)
nitrogen - elemental	0.10	carbon - elemental	0.10
sulfur - elemental	0.10	hydrogen - elemental	0.10

Minimum sample amount: plastic, 30 g
Method: GC-TCD
Note: Elemental oxygen can be calculated in certain cases.

Metals (group 1)

Parameter	LOQ (mg/kg DW)	Parameter	LOQ (mg/kg DW)	Parameter	LOQ (mg/kg DW)
Sb	0.5	Fe	10	Ag	0.5
As	0.5	Pb	1	Sr	0.1
Ba	0.2	Li	1	Tl	0.5
Be	0.01	Mn	0.5	Sn	1
Cd	0.4	Hg	0.2	V	0.1
Cr	0.5	Mo	0.4	Zn	3
Co	0.2	Ni	1		
Cu	1	P	5		

Minimum sample amount: plastic, 50 g
Method: ICP-OES

**LOW LIMITS METALS
 AVAILABLE.
 ASK US!**





Metals (group 2)

Parameter	LOQ (mg/kg DW)	Parameter	LOQ (mg/kg DW)	Parameter	LOQ (mg/kg DW)
Al	1	K	5	Te	1
Bi	1	Se	2	Ti	0.2
B	1	Si	50	Zr	5
Ca	50	Na	15		
Mg	5	S	30		

Minimum sample amount: plastic, 50 g
Method: ICP-OES

Metals (group 3)

Parameter	LOQ (mg/kg DW)	Parameter	LOQ (mg/kg DW)	Parameter	LOQ (mg/kg DW)
Ge	5	Nb	1	Rb	1
Au	1	Os	5	Ta	1
Hf	5	Pb	1	W	1
Ir	5	Pt	1	U	1
La	1	Rh	1		

Minimum sample amount: plastic, 50 g
Method: ICP-OES

Total chromium, Cr (III) and Cr (VI)

Parameter	LOQ (mg/kg DW)	Parameter	LOQ (mg/kg DW)
Cr (III) - calculation	0.5	Cr	0.5
Cr (VI) - IC	0.06		
Dry matter at 105°C			

Minimum sample amount: plastic, 50 g
Method: ICP-OES, ion chromatography

Hexavalent chromium - Cr (VI)

Parameter	LOQ (mg/kg DW)
chromium (VI)	0.06

Minimum sample amount: plastic, 50 g
Method: ion chromatography

Mercury

Parameter	LOQ (mg/kg DW)	Sample amount
mercury total digestion	0.01	plastic, 50 g
mercury - low limit total digestion	0.001	plastic, 50 g

Minimum sample amount: plastic, 50 g
Method: atomic fluorescence spectrometry

ELEMENT SPECIATION

www.elementspeciation.com

Methylmercury

Parameter	LOQ (µg/kg)
methylmercury	0.05

Minimum sample amount: plastic, 10 g
Method: GC-ICP-SFMS

Organotin compounds

Parameter	LOQ (mg/kg DW)	Parameter	LOQ (mg/kg DW)	Parameter	LOQ (mg/kg DW)
monobutyltin	0.001	monoethyltin	0.001	diphenyltin	0.001
dibutyltin	0.001	dioctyltin	0.001	triphenyltin	0.001
tributyltin (TBT)	0.001	tricyclohexyltin	0.001		
tetrabutyltin	0.001	monophenyltin	0.001		

Minimum sample amount: glass, 20 g
Method: GC-ICP-SFMS

Arsenic speciation

Parameter	LOQ (mg/kg DW)	Parameter	LOQ (mg/kg DW)
As (III)	0.01	monomethylarsonate MMA (V)	0.02
As (IV)	0.04	dimethylarsinate	0.01

Minimum sample amount: plastic, 1-10 g
Method: LC-HG-ICP-MS

ASBESTOS - QUALITATIVE DETERMINATION OF FIBRES

Asbestos can be present as contamination in soil where asbestos containing-material has been exposed during a longer time period, or where asbestos has been released by friction and then mixed with soil.

Parameter	Parameter
actinolite	chrysotile
amosite	crocydolite
anthophyllite	tremolite

Minimum sample amount: plastic, 250 g
Method: optical microscopy
Note: Chrysotile, amosite and crocydolite asbestos can be distinguished; however, anthophyllite cannot be so easily separated from tremolite and actinolite.

ASBESTOS

www.asbestos.alsglobal.eu





Volatile organic compounds (VOC-EPA 8260)

Parameter	LOQ (mg/kg DW)	Parameter	LOQ (mg/kg DW)
1,1,1,2-tetrachloroethane	0.01	ethyl tert-butyl ether (ETBE)	0.05
1,1,1-trichloroethane	0.01	ethylbenzene	0.02
1,1,2,2-tetrachloroethane	0.1	hexachlorobutadiene	0.1
1,1,2-trichloroethane	0.04	chlorobenzene	0.01
1,1-dichloro-1-propene	0.1	chloroethane	0.1
1,1-dichloroethane	0.01	chloromethane	1
1,1-dichloroethene	0.01	chloroform	0.03
1,2,3-trichlorobenzene	0.02	indane	0.1
1,2,3-trichloropropane	0.01	isopropyl benzene	0.1
1,2,4-trichlorobenzene	0.03	m, p-xylenes	0.02
1,2,4-trimethylbenzene	0.1	methyl tert-butyl ether (MTBE)	0.05
1,2-dibromo-3-chloropropane	0.1	naphthalene	0.1
1,2-dibromoethane (EDB)	0.1	n-butylbenzene	0.1
1,2-dichlorobenzene	0.02	n-propylbenzene	0.1
1,2-dichloroethane	0.05	o-xylene	0.01
1,2-dichloropropane	0.1	p-isopropyltoluene	0.1
1,3,5-trichlorobenzene	0.05	sec-butylbenzene	0.1
1,3,5-trimethylbenzene	0.1	styrene	0.04
1,3-dichlorobenzene	0.02	sum of 3 dichlorobenzenes	0.06
1,3-dichloropropane	0.1	sum of 3 trichlorobenzenes	0.1
1,4-dichlorobenzene	0.02	sum of 4 trihalomethanes	0.11
1,4-dioxan	5	sum of 5 chlorinated ethenes	0.05
2,2-dichloropropane	0.1	sum of BTEX	0.11
2-chlorotoluene	0.1	sum of BTEXS	0.15
4-chlorotoluene	0.1	sum of TEX	0.1
benzene	0.01	suma of xylenes	0.03
bromobenzene	0.1	tert-amyl ethyl ether (TAEE)	0.05
bromodichloromethane	0.02	ter-amyl methyl ether (TAME)	0.05
bromochloromethane	0.2	tert-butyl alcohol (TBA)	0.8
bromomethane	0.1	tert-butylbenzene	0.1
bromoform	0.04	tetrachloroethene	0.02
cis-1,2-dichloroethene	0.02	tetrachloromethane	0.01
cis-1,3-dichloro-1-propene	0.1	toluene	0.05
dibromochloromethane	0.02	trans-1,2-dichloroethene	0.01
dibromomethan	0.1	trans-1,3-dichloropropene	0.1
dichlorodifluoromethane	0.1	trichloroethene	0.01
dichloromethane	0.08	trichlorofluoromethane	0.1
diisopropylether (DIPE)	0.02	vinylchloride	0.1

Minimum sample amount: glass, 30 g
Method: GC-MS

Trihalomethanes (VOC)

Parameter	LOQ (mg/kg DW)	Parameter	LOQ (mg/kg DW)
trichloromethane	0.03	bromodichloromethane	0.02
tribromomethane	0.04	sum of trihalomethanes	0.11
dibromochloromethane	0.02		

Minimum sample amount: glass, 30 g
Method: GC-MS

Fuel additives/acetone

Parameter	LOQ (mg/kg DW)	Sample amount
MTBE (methyl tert-butyl ether) TBA (tert-butyl alcohol)	0.05 0.8	glass, 30 g
ETBE (ethyl tert-butyl ether) TAME (tert-amyl methyl ether)	0.05 0.05	glass, 30 g
ethanol diisopropylether (DIPE) tetraethyl lead (TEL)	20 0.02 0.5	glass, 30 g
acetone	0.1	glass, 30 g

Method: GC-MS

Organic indicator parameters

Parameter	LOQ (mg/kg DW)	Sample amount
anionic tensides (surfactants)	0.2	glass, 50 g
AOX	30	glass, 50 g
TIC (total inorganic carbon)	100	glass, 50 g
TC (total carbon)	100	glass, 50 g
TOC (total organic carbon)	100	glass, 50 g
EOX (Cl)	1	glass, 50 g
extractable compounds	20	glass, 30 g
TOX (total organic halogens)	10	glass, 50 g
phenol index	0.2	glass, 250 g
formaldehyde	0.5	glass, 50 g

Polycyclic aromatic hydrocarbons (EPA PAH)

Parameter	LOQ (mg/kg DW)	Parameter	LOQ (mg/kg DW)
naphthalene	0.01	chrysene	0.01
acenaphthylene	0.01	benzo(b)fluoranthene	0.01
acenaphthene	0.01	benzo(k)fluoranthene	0.01
fluorene	0.01	benzo(a)pyrene	0.01
phenanthrene	0.01	dibenzo(ah)anthracene	0.01
anthracene	0.01	benzo(ghi)perylene	0.01
fluoranthene	0.01	indeno(123cd)pyrene	0.01
pyrene	0.01	sum of PAHs	0.16
benzo(a)anthracene	0.01		

Minimum sample amount: glass, 50 g

Method: GC-MS

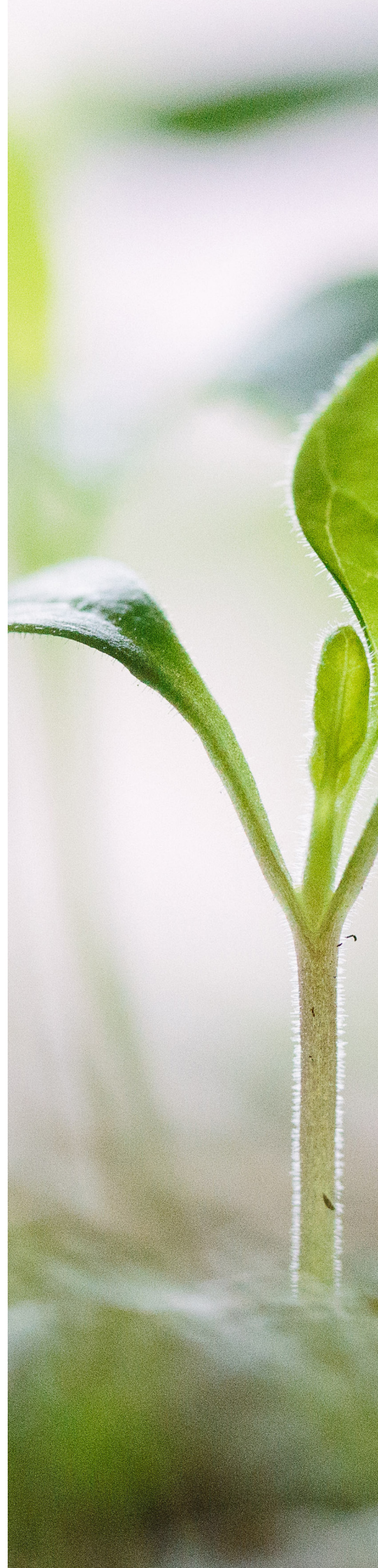
Total petroleum hydrocarbons by GC-FID

Parameter	LOQ (mg/kg DW)	Parameter	LOQ (mg/kg DW)
fraction C10-C12	2	fraction C35-C40	5
fraction C12-C16	3	fraction C10-C40	20
fraction C16-C35	10		

Minimum sample amount: glass, 50 g

Method: GC-FID

CUSTOMISATION OF VOC PACKAGE? CONTACT US!





Petroleum hydrocarbons by FTIR*

Parameter	LOQ (mg/kg DW)	Parameter	LOQ (mg/kg DW)
total extractable aliphatics	21	total extractable aromatics	20
non-polar aliphatics	21		

*perchloroethylene extraction

Minimum sample amount: glass, 50 g
Method: FTIR

Total petroleum hydrocarbons (qualitative determination)

Parameter
type of petroleum contamination and chromatogram profile

Minimum sample amount: glass, 50 g
Method: GC-FID

Petroleum hydrocarbons - fractions C5 - C40 with aliphatic and aromatic fractions

Parameter	LOQ (mg/kg DW)	Parameter	LOQ (mg/kg DW)
fraction C5-C6	1	fraction C16-C35	30
fraction C6-C8	2	fraction C35-C40	5
fraction C8-C10	2	fraction C5-C10	5
fraction C10-C12	5	fraction C5-C40	55
fraction C12-C16	10		

ALIPHATIC FRACTION

aliphatic fraction C5-C6	1	aliphatic fraction C16-C35	30
aliphatic fraction C6-C8	2	aliphatic fraction C35-C40	5
aliphatic fraction C8-C10	2	aliphatic fraction C5-C10	5
aliphatic fraction C10-C12	5	aliphatic fraction C5-C40	55
aliphatic fraction C12-C16	10		

AROMATIC FRACTION

aromatic fraction C5-C7	2	aromatic fraction C16-C21	10
aromatic fraction C7-C8	1	aromatic fraction C21-C35	20
aromatic fraction C8 - C10	2	aromatic fraction C35-C40	5
aromatic fraction C10-C12	5	aromatic fraction C5-C10	5
aromatic fraction C12-C16	10	aromatic fraction C5-C40	55

Minimum sample amount: glass, 50g
Method: GC-FID

PERSISTENT ORGANIC POLLUTANTS

www.dioxin-laboratory.com

Organochlorinated pesticides

Parameter	LOQ (mg/kg DW)	Parameter	LOQ (mg/kg DW)
1,2,3,4-tetrachlorbenzene	0.01	o,p-DDE	0.01
1,2,3,5+1,2,4,5-tetrachlorbenzenes	0.02	o,p-DDT	0.01
pentachlorobenzene	0.01	p,p-DDD	0.01
hexachlorobenzene	0.005	p,p-DDE	0.01
alpha-hexachlorocyclohexane	0.01	p,p-DDT	0.01
beta-hexachlorocyclohexane	0.01	alpha-endosulfane	0.01
delta-hexachlorocyclohexane	0.01	beta-endosulfane	0.01
gamma-hexachlorocyclohexane	0.01	hexachlorobutadiene	0.01
aldrin	0.01	hexachloroethane	0.01
dieldrin	0.01	trifluralin	0.01
endrin	0.01	alachlor	0.01
isodrin	0.01	methoxychlor	0.01
telodrin	0.01	sum of DDT-4 isomers	0.04
heptachlor	0.01	sum of DDT-6 isomers	0.06
cis-heptachlor epoxide	0.01	sum of 4 hexachlorocyclohexanes	0.04
oxychlordane	0.01	sum of 3 tetrachlorbenzenes	0.03
chlordane-trans	0.01	nonachlor-trans	0.01
chlordane-cis	0.01	nonachlor-cis	0.01
endosulfane sulfate	0.01	mirex	0.01
o,p-DDD	0.01	PBB 153	0.01

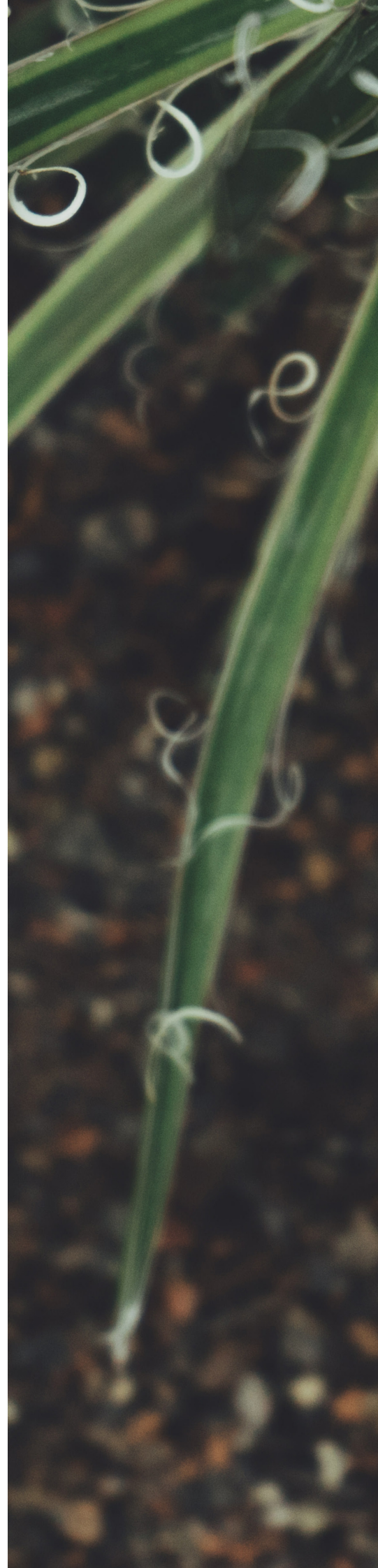
Minimum sample amount: glass, 50g
Method: GC-ECD

Acidic pesticides - direct injection

Parameter	LOQ (mg/kg DW)	Parameter	LOQ (mg/kg DW)
acifluorfen	0.01	MCPP (isomers)	0.01
bentazone	0.01	propoxycarbazone sodium	0.01
bromoxynil	0.01	triclopyr	0.01
dicamba	0.01	triclosan	0.01
diclofop	0.01	4-CPP	0.01
DNOC	0.01	2,4-D	0.01
fluroxypyr	0.01	2,4-DP (isomers)	0.01
ioxynil	0.01	2,4-DB	0.01
MCPA	0.01	2,4,5-T	0.01
MCPB	0.01	2,4,5-TP	0.01

Minimum sample amount: glass, 50g
Method: LC-MS-MS

**DIFFERENT FRACTIONS
NEEDED FOR PETROLEUM
HYDROCARBONS?
CONTACT US!**





Pesticides - direct injection

Parameter	LOQ (mg/kg DW)	Parameter	LOQ (mg/kg DW)
acetochlor	0.01	simazin	0.01
alachlor	0.01	simetryn	0.01
ametryn	0.01	terbuthylazin	0.01
atrazine	0.01	terbuthylazin-desethyl	0.01
atrazine-2-hydroxy	0.01	terbuthylazin-hydroxy	0.01
atrazine-desethyl	0.01	terbutryn	0.01
atrazine-desisopropyl	0.01	hexaionon	0.01
carbofuran	0.01	chlorfenvinphos	0.01
cyanazin	0.01	chlorotoluton	0.01
desmetryn	0.01	chlorpyrifos	0.01
dimethoat	0.01	isoproturon	0.01
diuron	0.01	malathion	0.01
fonofos	0.01	metamitron	0.01
phosalon	0.01	metazachlor	0.01
phoshamidon	0.01	methidathion	0.01
prometon	0.01	metalochlor (isomers)	0.01
prometryn	0.01	metribuzin	0.01
propazin	0.01	pendimethalin	0.01
sebuthylazin	0.01	phorat	0.01

Minimum sample amount: glass, 50g
 Method: LC-MS-MS

Organic acids

Parameter	LOQ (mg/kg)	Parameter	LOQ (mg/kg DW)
formic acid	7.5	valeric acid	7.5
acetic acid	7.5	isovaleric acid	7.5
propionic acid	7.5	caproic acid	15
butyric and isobutyric acids	7.5	lactic acid	7.5

Minimum sample amount: glass, 100 g
 Method: capillary electrophoresis

Nonylphenol, octylphenol and their ethoxylates

Parameter	LOQ (mg/kg DW)	Parameter	LOQ (mg/kg DW)
4-tert-octylphenol	0.01	nonylphenol	0.1
4-tert-octylphenol monoethoxylate	0.01	nonylphenol monoethoxylate	0.1
4-tert-octylphenol diethoxylate	0.01	nonylphenol diethoxylate	0.1
4-tert-octylphenol triethoxylate	0.01	nonylphenol triethoxylate	0.1

Minimum sample amount: glass, 50 g
 Method: GC-MS

Nonylphenol and nonylphenol ethoxylates

Parameter	LOQ (mg/kg DW)	Parameter	LOQ (mg/kg DW)
nonylphenol	10	nonylphenol diethoxylate	10
nonylphenol monoethoxylate	10	nonylphenol triethoxylate	10

Minimum sample amount: glass, 50 g
 Method: GC-MS

Phenol and cresols

Parameter	LOQ (mg/kg DW)	Parameter	LOQ (mg/kg DW)
phenol	0.1	2,3-dimethylphenol	0.1
o-cresol	0.1	2,4+2,5-dimethylphenols	0.2
m,p-cresol	0.2	3,5-dimethylphenol	0.1
2,6-dimethylphenol	0.1	sum of cresols	0.3
3,4-dimethylphenol	0.1		

Minimum sample amount: glass, 50 g

Method: GC-MS

Chlorophenols

Parameter	LOQ (mg/kg DW)	Parameter	LOQ (mg/kg DW)
2-monochlorophenol	0.02	2,4,6-trichlorophenol	0.02
3-monochlorophenol	0.02	3,4,5-trichlorophenol	0.02
4-monochlorophenol	0.02	2,3,4,5-tetrachlorophenol	0.02
2,3-dichlorophenol	0.02	2,3,4,6-tetrachlorophenol	0.02
2,4+2,5-dichlorophenols	0.04	2,3,5,6-tetrachlorophenol	0.02
2,6-dichlorophenol	0.02	pentachlorophenol	0.006
3,4-dichlorophenol	0.02	sum of 3 monochlorophenols	0.06
3,5-dichlorophenol	0.02	sum of 6 dichlorophenols	0.12
2,3,4-trichlorophenol	0.02	sum of 6 trichlorophenols	0.12
2,3,5-trichlorophenol	0.02	sum of 3 tetrachlorophenols	0.06
2,3,6-trichlorophenol	0.02	sum of 19 chlorophenols	0.366
2,4,5-trichlorophenol	0.02		

Minimum sample amount: glass, 50 g

Method: GC-MS

Chlorobenzenes

Parameter	LOQ (mg/kg DW)	Parameter	LOQ (mg/kg DW)
1,2-dichlorobenzene	0.02	1,2,3,4-tetrachlorobenzene	0.01
1,3-dichlorobenzene	0.02	1,2,3,5+1,2,4,5-tetrachlorobenzenes	0.02
1,4-dichlorobenzene	0.02	monochlorobenzene	0.01
1,2,3-trichlorobenzene	0.02	pentachlorobenzene	0.01
1,2,4-trichlorobenzene	0.03	hexachlorobenzene	0.005
1,3,5-trichlorobenzene	0.05	sum of chlorobenzenes	0.4

Minimum sample amount: glass, 80 g

Method: GC-ECD, GC-MS

Phthalates

Parameter	LOQ (mg/kg DW)	Parameter	LOQ (mg/kg DW)
dimethylphthalate	0.8	di-n-octylphthalate (DNOP)	0.8
diethylphthalate	0.8	bis(2-ethylhexyl)phthalate (DEHP)	0.8
di-n-propylphthalate	0.8	butylbenzylphthalate (BBP)	0.8
di-n-butylphthalate (DBP)	0.8	di-cyclohexylphthalate	0.8
di-isobutylphthalate	0.8	sum of phthalates	8
di-pentylphthalate (DPP)	0.8		

Minimum sample amount: glass, 50 g

Method: GC-MS



Polychlorinated biphenyls (PCB 7)

Parameter	LOQ (mg/kg DW)	Parameter	LOQ (mg/kg DW)
PCB 28	0.003	PCB 138	0.003
PCB 52	0.003	PCB 153	0.003
PCB 101	0.003	PCB 180	0.003
PCB 118	0.003	Sum of PCB	0.021

Minimum sample amount: glass, 50 g
Method: GC-ECD

Coplanar PCBs and indicator PCBs

Parameter	Parameter	Parameter
NON-ORTHO PCB		MONO-ORTHO PCB
PCB 77	PCB 105	PCB 156
PCB 81	PCB 114	PCB 157
PCB 126	PCB 118	PCB 167
PCB 169	PCB 123	PCB 189
DI-ORTHO PCB		INDICATOR PCB
PCB 170	PCB 28	PCB 138
PCB 180	PCB 52	PCB 153
	PCB 101	PCB 180
	PCB 118	

LOQ is 0.001 ng TEQ/g DW for total coplanar PCBs and 17 ng/g DW for sum of indicator PCBs.

Minimum sample amount: 25 g

Method: HRGC-HRMS

Note: Homologue groups can be determined. Dioxins and dioxin-like PCBs can be determined together. Please contact your local sales representative for further information.

Dioxins (PCDD/F)

Parameter	Parameter	Parameter
2,3,7,8-PCDD/F CONGENERS		
2,3,7,8-TCDD	OCDD	1,2,3,7,8,9-HxCDF
1,2,3,7,8-PeCDD	2,3,7,8-TCDF	2,3,4,6,7,8-HxCDF
1,2,3,4,7,8-HxCDD	1,2,3,7,8-PeCDF	1,2,3,4,6,7,8-HpCDF
1,2,3,6,7,8-HxCDD	2,3,4,7,8-PeCDF	1,2,3,4,7,8,9-HpCDF
1,2,3,7,8,9-HxCDD	1,2,3,4,7,8-HxCDF	OCDF
1,2,3,4,6,7,8-HpCDD	1,2,3,6,7,8-HxCDF	
OTHER CONGENERS		
tetra-CDD	hepta-CDD	hexa-CDF
penta-CDD	tetra-CDF	hepta-CDF
hexa-CDD	penta-CDF	

LOQ is 4 ng I-TEQ/kg DW for total 2,3,7,8-PCDD/F congeners

Minimum sample amount: 25 g

Method: HRGC-HRMS

Note: Results can also be expressed according to WHO factors. Dioxins and dioxin-like PCBs can be determined together. Please contact your local sales representative for further information.

DIOXIN TESTING

www.dioxin-laboratory.com

Polybrominated diphenylethers

Parameter	LOQ (µg/kg DW)	Parameter	LOQ (µg/kg DW)	Parameter	LOQ (µg/kg DW)
BDE 28	25	BDE 100	20	BDE 183	64
BDE 47	270	BDE 153	20	BDE 209	640
BDE 99	63	BDE 154	20		

Minimum sample amount:

glass, 25 g

Method:

HRGC-HRMS

Note:

Homologue groups and other congeners can also be determined. Please contact your local sales representative.

ECOTOXICOLOGICAL TESTING

Test on aquatic species

For tests requiring homogenisation and leach, the sample is grinded and homogenised at a grain size < 10 mm, then the leach is prepared at a ratio 1:10 during a 24 hours period. Volume of leach and therefore the amount of input material depends on the type of test.

Fast ecotoxicological test - Microtox

Parameter
Bacterial bioluminescent test on <i>Vibrio fischeri</i> + homogenisation + preparation of leach

Minimum sample amount:

glass or plastic, 100 g

Basic test

Parameter	Sample amount
acute toxicity on fish <i>Poecilia reticulata</i> (LC ₅₀) +homogenisation +preparation of leach 3 litres	glass or plastic, 1000 g
acute toxicity on aquatic arthropods <i>Daphnia magna</i> (EC ₅₀) +homogenisation +preparation of leach 2 litres	glass or plastic, 200 g
acute toxicity on green algae <i>Scenedesmus subspicatus</i> (<i>Desmodemus Subspicatus</i>) (IC ₅₀) +homogenisation +preparation of leach 1 litre	glass or plastic, 150 g
acute toxicity on the seed crop plants <i>Sinapis alba</i> (IC ₅₀) +homogenisation +preparation of leach 1 litre	glass or plastic, 100 g
acute toxicity - growth inhibition of duckweed (<i>Lemna minor</i>) +homogenisation +preparation of leach 2 litres	glass or plastic, 500 - 1000 g

Limit test

Parameter	Sample amount
acute toxicity on fish <i>Poecilia reticulata</i> (LC ₅₀) - limit test 10 ml/l +homogenisation +preparation of leach 3 litres	glass or plastic, 400 g
acute toxicity on aquatic arthropods <i>Daphnia magna</i> (EC ₅₀) - limit test 10ml/l +homogenisation +preparation of leach 1 litre	glass or plastic, 100 g
acute toxicity on green algae <i>Scenedesmus subspicatus</i> (<i>Desmodemus Subspicatus</i>) (IC ₅₀) - limit test 10ml/l +homogenisation +preparation of leach 1 litre	glass or plastic, 100 g
acute toxicity on the seed crop plants <i>Sinapis alba</i> (IC ₅₀) - limit test 10ml/l +homogenisation +preparation of leach 1 litre	glass or plastic, 100 g





Verification test

Parameter	Sample amount
acute toxicity on fish <i>Poecilia reticulata</i> - verification test +homogenisation +preparation of leach 3 litres	glass or plastic, 400 g
acute toxicity on aquatic arthropods <i>Daphnia magna</i> - verification test +homogenisation +preparation of leach 1 litre	glass or plastic, 100 g
acute toxicity on green algae <i>Scenedesmus subspicatus</i> (<i>Desmodemus Subspicatus</i>) - verification test +homogenisation +preparation of leach 1 litre	glass or plastic, 100 g
acute toxicity on the seed crop plants <i>Sinapis alba</i> - verification test +homogenisation +preparation of leach 1 litre	glass or plastic, 100 g
acute toxicity - growth inhibition of duckweed (<i>Lemna minor</i>) - verification test +homogenisation +preparation of leach 1 litre	glass or plastic, 250 - 500 g

Note: depending on the combination of requested parameters, the total amount of sample necessary for analysis can be diminished. Please contact your local sales representative for further information.

Test on terrestrial species

Acute toxicity

Parameter	Sample amount
acute toxicity on enchytraeids (<i>Enchytraeus crypticus</i>) - sediment	glass or plastic, 1 kg
acute toxicity on springtails (<i>Folsomia candida</i>) - sediment	glass or plastic, 1 kg
acute toxicity on the growth of higher plants (<i>Lactuca sativa</i>) - sediment	glass or plastic, 2 kg

Phytotoxicity test

Parameter	Sample amount
index of germination of seeds - <i>Lepidium sativum</i> +homogenisation +preparation of leach 1 litre (1 hour leach)	glass or plastic, 500 g
relative seed germination - <i>Lepidium sativum</i> +homogenisation +preparation of leach 1 litre (1 hour leach)	glass or plastic, 500 g

Nitrification activity

Parameter	Sample amount
nitrification activity and inhibition of nitrification	glass or plastic, 1 kg

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ECOTOXICOLOGY PACKAGE?
CONTACT US!**

Radiochemical parameters - alpha and beta activities

Parameter	LOQ (Bq/kg DW)	Sample amount
gross alpha activity	500	plastic, 2 g
gross beta activity	500	plastic, 2 g
gross beta activity corrected for K 40 K K	500 0.15 5 (mg/kg DW)	plastic, 5 g

Radiochemical parameters

Parameter	LOQ (Bq/kg DW)	Sample amount
lead-210	25	plastic, 5 g
polonium-210	50	plastic, 5 g
radium-226	30	plastic, 5 g
strontium-90	5	plastic, 80 g
strontium-90 - low limit	0.5	plastic, 200 g
uranium (photometry), calculation of U-238 activity	50	plastic, 5 g

Gamma spectrometry - artificial radionuclides emitting gamma ray

Parameter	LOQ (Bq/kg DW)	Parameter	LOQ (Bq/kg DW)	Parameter	LOQ (Bq/kg DW)
Cs 134	1	Co 60	0.2	Am 241	1
Cs 137	1	I 131	1		

Minimum sample amount:

plastic, 500 g

Method:

HRGS (with correction to matrix composition)

Note:

Other artificial radionuclides can be determined. Please contact your local sales representative for further information.

Gamma spectrometry - natural radionuclides emitting gamma ray

Parameter	LOQ (Bq/kg DW)	Parameter	LOQ (Bq/kg DW)	Parameter	LOQ (Bq/kg DW)
Ac 227	1	Ra 226	1	Th 234	10
K 40	10	Ra 228	1	U 235	1
Pb 210	50	Th 227	1	U 238	10
Pa 231	5	Th 228	1		
Ra 223	1	Th 230	50		

Minimum sample amount:

plastic, 500 g

Method:

HRGS (with correction to matrix composition)

Gamma spectrometry - natural radionuclides emitting gamma ray - construction material

Parameter	LOQ (Bq/kg DW)	Parameter	LOQ (Bq/kg DW)	Parameter	LOQ (Bq/kg DW)
Ra 226	1	Th 228	1	Index of mass activity	0.05
K 40	10				

Minimum sample amount:

plastic, 700 g

Natural isotopes of uranium and thorium

Parameter	LOQ (Bq/kg DW)	Parameter	LOQ (Bq/kg DW)	Parameter	LOQ (Bq/kg DW)
Th 232	0.1	U 238	0.1	U 234	1
Th 230	8	U 235	0.1		

Minimum sample amount:

plastic, 5 g

Method:

ICP-SFMS



Inspektorát pro ionizující záření
Radiová 1, 102 00 Praha 10



Typ: MBSS X V.č.: 060214-1433001

Radionuklid: Hg-203

Aktivita: 10,75 kBq

Ref. datum: 3.3.2014

Etalon aktivity



RADIOLOGICAL ANALYSES

www.radiological-analysis.com

SPECIFIC REQUIREMENTS FOR SEDIMENT

Local legislation or specific determinants can be matrix dependant and therefore influence the type of analytical testing that may be required. Here ALS Life Sciences highlight determinants specific to Sediments likely to be used on agricultural land.

Sediment for use on agricultural land – risk parameters

Parameter	LOQ (unit)	Parameter	LOQ (unit)	Parameter	LOQ (unit)
As	5 mg/kg DW	Hg	0.5 mg/kg DW	PAU	0.12 mg/kg DW
Be	0.1 mg/kg DW	Ni	0.5 mg/kg DW	PCB	0.14 mg/kg DW
Cd	0.3 mg/kg DW	Pb	5 mg/kg DW	Petroleum hydrocarbons C10-C40	20 mg/kg DW
Co	0.5 mg/kg DW	V	0.5 mg/kg DW	DDT – sum of 6 isomers	0.06 mg/kg DW
Cr	0.5 mg/kg DW	Zn	0.5 mg/kg DW	skeleton 2-4 mm	0.01 %
Cu	0.5 mg/kg DW	BTEX	0.17 mg/kg DW	skeleton over 4 mm	0.01 %

Minimum sample amount: plastic, 250 g
Method: ICP-OES, AAS-AMA, GC-MS, GC-ECD, GC-FID

Sediment for use on agricultural land – ecotoxicological tests

Parameter	Parameter
toxicity test on enchytraeids (<i>Enchytraeus crypticus</i>)	inhibition of nitrification
toxicity test na springtails (<i>Folsomia candida</i>)	growth inhibition of higher plants (<i>Lactuca sativa</i>)

Minimum sample amount: plastic, 2 kg of sediment and 2 kg of soil

Sediment for use on agricultural land – microbiology

Parameter	Parameter	Parameter
thermotolerant coliform bacteria	enterococci	Salmonella sp.

Minimum sample amount: 5x sterile glass, 5x 200 g for one sample

Sediment for use on agricultural land – properties

Parameter	LOQ (unit)	Parameter	LOQ (unit)
pH (CaCl ₂)	1	Ca	5 mg/kg DW
Loss on ignition – organic matters	0.1 % DW	Mg	5 mg/kg DW
N – total nitrogen	50 mg/kg DW	K	5 mg/kg DW
NH ₄ -N – ammoniacal nitrogen	0.4 mg/kg DW	P	5 mg/kg DW
NO ₃ -N – nitrate nitrogen	4 mg/kg DW		

Minimum sample amount: plastic, 250 g
Method: ICP-OES, spectrometry

Sediment for use on agricultural land – grain size analysis – fine particles and texture

Parameter	LOQ (unit)	Sample amount
particles <0,01mm	0.01 %	plastic, 100 g
texture	-	





WATER FRAMEWORK DIRECTIVE

Sediment analysis

Priority substances and hazardous substances including pesticides, chloroalkanes and brominated diphenyl ethers can be determined at set environmental quality standards (EQS levels).

**SEDIMENT
DETERMINATIONS
ACCORDING TO WATER
FRAMEWORK DIRECTIVE
CONTACT US TO DEFINE
YOUR NEEDS!**

**WATER FRAMEWORK
DIRECTIVE**

www.wfd.alsglobal.eu

SPECIFIC REQUIREMENTS FOR SLUDGE

Local legislation, sample matrix or geographically specific determinations can influence the type of analysis that may be required. Please contact ALS for further information if the testing you require is not listed here.

Sludge amount and sludge index

Parameter	LOQ	Parameter	LOQ
suspended matter	5 mg/l	sludge index	20 ml/g
sludge amount	0.1 ml/l		

Minimum sample volume: glass, 1000 ml

Sludge for use on agricultural land

Parameter	LOQ (unit)	Parameter	LOQ (unit)
loss on ignition at 550 °C	0.1 % DW	Cr - chromium	0.5 mg/kg DW
total nitrogen	50 mg/kg DW	Cu - copper	0.5 mg/kg DW
amoniacal nitrogen (N-NH ₄)	0.4 mg/kg DW	Hg - mercury	0.3 mg/kg DW
nitrate nitrogen	4 mg/kg DW	Ni - nickel	0.5 mg/kg DW
Ca - calcium	5 mg/kg DW	Pb - lead	5 mg/kg DW
Mg - magnesium	5 mg/kg DW	Zn - zinc	0.5 mg/kg DW
K - potassium	5 mg/kg DW	AOX	30 mg/kg DW
P- phosphorus	5 mg/kg DW	PCB - sum of congeners	0.12 mg/kg DW
pH	1 mg/kg DW	thermotolerant coliform bacteria	-
As - arsenic	5 mg/kg DW	enterococci	-
Cd - cadmium	0.4 mg/kg DW	<i>Salmonella sp.</i>	-

Minimum sample amount: glass, 400 g + sterile glass, 500 g
 Method: ICP-OES, AAS-AMA, GC-ECD, spectrometry, coulometry





PASSIVE SAMPLING

Passive sampling offers several advantages over conventional sampling. The sampler is deployed for extended periods of time (often days or weeks), enriching trace analytes to facilitate their detection and quantification. The results obtained are concentrations averaged over the sampling time. ALS offers passive samplers for metals in soil/sediment.

PS Metal

PS Metal is used to sample metals in situ in soil and sediment. The simple plastic sampler contains a filter, a hydrogel, and an ion exchange resin. Metal ions in water diffuse through the filter and the gel, and finally accumulate in the ion exchange resin. The longer the sampling time, the larger the amounts of ions accumulated. The ions are then eluted from the resin with acid, and can be determined by ICP-AES or ICP-MS.

Analyses for PS Metal

Analytical package
Basic metal package (Al, Cd, Co, Cr, Cu, Fe, Mn, Ni, Pb, U, Zn)
Extended metal package (Ag, Al, Ba, Ca, Cd, Ce, Co, Cr, Cu, Dy, Er, Eu, Fe, Gd, Ho, La, Lu, Mg, Mn, Nd, Ni, Pb, Pr, Sm, Sr, Tb, Tm, U, Yb, Zn)

LOQs depend on sampling times. Please contact your local sales representative for further information.

The sampler for sediment is in the shape of a narrow wedge that is pushed into the sediment. The final result is a concentration profile with high spatial resolution.

Metal toxicity is strongly influenced by the complex reactions that take place in natural aquatic systems. In many cases, the concentration of trace metal that is available for aquatic organisms differs from both the total concentration and from that of dissolved metal. In sampling with PS Metal, particle-bound and strongly complexed metal will be excluded in a manner which corresponds to their non-availability for biota. Consequently, PS Metal is not directly comparable to either total or dissolved concentrations in an ordinary water sample. Quantitative results can be calculated for all elements that are included in our PS Metal analytical packages.

IF YOU CONSIDER **PASSIVE SAMPLING** AS AN **INTERESTING TOOL**, DO NOT HESITATE TO CONTACT US FOR FURTHER INFORMATION.

PERFLUORINATED COMPOUNDS (PFC)

As a result of the growth of the synthetic chemical industry over the last 50 years, many thousands of new fluorinated molecules have been synthesised and through various mechanisms, have become almost ubiquitous in the environment. A multitude of poly- and perfluoroalkyl substances (PFAS), valued for their ability to repel both water and oils, have been used for decades for diverse applications such as water repellent “outdoor” fabrics, stain resistant carpets, non-stick frying pans and firefighting foams.

PFOS (perfluorooctane sulphonate) and PFOA (perfluorooctanoate) are the best known examples of PFAS. Their potential impact on human health has already been recognized internationally as they are extremely persistent, bioaccumulative and toxic.

As a result, PFOS is restricted under the Stockholm Convention and classed as a persistent organic pollutant (POP), with PFOA being actively considered for inclusion.

PFOS is also listed in the European Union Priority Substances Directive (2013/39/EU) with Environmental Quality Standards (EQSs) in fresh, surface water, coastal waters and biota.

However, more recently, regulators’ in differing countries interest and concern has expanded to take in a much wider number of the PFAS now known to be present in the environment such as perfluorinated or polyfluorinated alkyl substances compounds (PFAS) which have entered the environment from aqueous film forming foam (AFFF) and multiple other products. Perfluorinated compounds do not break down or biotransform under natural conditions in the environment. Whereas, the polyfluorinated compounds are sometimes termed “precursors” as they can biotransform to form more simple Perfluorinated alkyl acids such as PFOA.

As a result, there are significant analytical challenges to overcome when considering how to assess soil and groundwater contaminated with PFAS as there are multiple analytes to consider, not just PFOS and PFOA, with many of the perfluorinated compounds being of unknown composition.

Routine analysis of these compounds is undertaken by Liquid Chromatography - Triple Quadrupole Mass Spectrometry (LC-QQQ). This analytical technique is very selective and sensitive, allowing for compounds which have been calibrated for to be detected at low concentrations, typically around 1 ng/l or less in water and 1 ug/Kg in soil. However LC-QQQ does not measure compounds which have not be calibrated for and there could be many thousands of these in the PFAS category.

To allow assessment of the polyfluorinated “precursors” of unknown composition, which are not in the standard analytical suites, the Total Oxidisable Precursor (TOP) Assay has been developed.

The TOP assay has four steps

- Analyse the routine analysis list of PFAS (pre-oxidised sample)
- Oxidise a portion of the sample to convert polyfluorinated precursors to target perfluorinated compounds
- Analyse the oxidised sample for routine list of PFAS (post-oxidised sample)
- Compare pre-oxidised sample results to post-oxidised sample results. The difference is the polyfluorinated “pre-cursor” concentration of the sample which may biotransform to the measured perfluorinated compounds over time in the natural environment.





TOP Assay Compound List

Parameter	LOQ	Unit
Perfluorobutanoic acid (PFBA)	0.003	mg/kg DW
Perfluoropentanoic acid (PFPeA)	0.003	mg/kg DW
Perfluorohexanoic acid (PFHxA)	0.003	mg/kg DW
Perfluoroheptanoic acid (PFHpA)	0.003	mg/kg DW
Perfluorooctanoic acid (PFOA)	0.003	mg/kg DW
Perfluorononanoic acid (PFNA)	0.003	mg/kg DW
Perfluorodecanoic acid (PFDA)	0.003	mg/kg DW
Perfluoroundecanoic acid (PFUnDA)	0.003	mg/kg DW
Perfluorododecanoic acid (PFDoDA)	0.003	mg/kg DW
Perfluorotridecanoic acid (PFTrDA)	0.003	mg/kg DW
Perfluorotetradecanoic acid (PFTeDA)	0.003	mg/kg DW
Perfluorobutane sulfonic acid (PFBS)	0.003	mg/kg DW
Perfluorohexane sulfonic acid (PFHxS)	0.003	mg/kg DW
Perfluoroheptane sulfonic acid (PFHpS)	0.003	mg/kg DW
Perfluorooctane sulfonic acid (PFOS)	0.003	mg/kg DW
Perfluorodecane sulfonic acid (PFDS)	0.003	mg/kg DW
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	0.003	mg/kg DW
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	0.003	mg/kg DW
Perfluorooctane sulfonamide (FOSA)	0.003	mg/kg DW
N-Methyl perfluorooctane sulfonamide (MeFOSA)	0.003	mg/kg DW
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	0.003	mg/kg DW
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	0.003	mg/kg DW
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	0.003	mg/kg DW

Method: LC/MS/MS
 Minimum sample volume: plastic, 80 mg



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