



REFERENCE SHEET

REFERENCE MATERIAL
IAEA-383
ORGANOCHLORINE COMPOUNDS
PETROLEUM HYDROCARBONS AND STEROLS
IN
SEDIMENT SAMPLE

Date of issue: November 1998

PESTICIDES AND PCBs

Recommended Values
(Based on dry weight)

Analyte	Units	Concentration *	Confidence Interval **	N ***
pp' DDE	ng/g	1.2	0.75 - 1.8	30
Aroclor 1254	ng/g	36	24 - 48	10
PCB No 28	ng/g	1	0.77 - 1.4	12
PCB No 31	ng/g	0.76	0.38 - 1.2	6
PCB No 52	ng/g	2.5	1.1 - 2.8	14
PCB No 101	ng/g	2.9	1.3 - 4.2	16
PCB No 105	ng/g	0.99	0.77 - 1.5	12
PCB No 110	ng/g	2.4	1.8 - 3.6	6
PCB No 118	ng/g	3.3	2.2 - 4.1	17
PCB No 128	ng/g	0.63	0.52 - 0.87	10
PCB No 138	ng/g	4.4	2.6 - 6.1	15
PCB No 149	ng/g	3.2	2.3 - 3.7	8
PCB No 153	ng/g	4.3	2.3 - 5.4	17
PCB No 170	ng/g	0.82	0.62 - 1.3	11
PCB No 180	ng/g	2.5	1.9 - 3.4	17
PCB No 183	ng/g	0.47	0.34 - 0.57	6
PCB No 187	ng/g	1.3	0.63 - 1.5	10
PCB No 194	ng/g	0.54	0.31 - 0.73	7
PCB No 209	ng/g	2.1	1.2 - 3	7

* Median values expressed on a dry-weight basis.

** 95% confidence intervals of the median,

*** Number of accepted laboratory means which were used for calculation of recommended, information values and confidence intervals.

PESTICIDES AND PCBs

Recommended Values
(Based on dry weight)

Analyte	Units	Concentration *	Confidence Interval **	N ***
n - C 17	ng/g	380	330 - 470	11
Phenanthrene	ng/g	160	140 - 190	17
2 Methyl phenanthrene	ng/g	31	24 - 38	7
1 Methyl phenanthrene	ng/g	24	18 - 28	10
Anthracene	ng/g	30	25 - 34	9
Chrysene	ng/g	170	120 - 220	16
Fluorene	ng/g	27	24 - 34	9
Fluoranthene	ng/g	290	260 - 350	16
Pyrene	ng/g	280	210 - 350	19
Benzo (b) fluoranthene	ng/g	150	96 - 190	8
Benzo (k) fluoranthene	ng/g	73	48 - 76	8
Benz (a) anthracene	ng/g	105	83 - 130	16
Perylene	ng/g	58	41 - 130	7
Benzo (e) pyrene	ng/g	160	120 - 210	12
Benzo (a) pyrene	ng/g	120	77 - 140	16
1 Methyl naphthalene	ng/g	14	11 - 28	6
Naphthalene	ng/g	96	52 - 110	12
Benzo (ghi) perylene	ng/g	110	69 - 230	16
Acenaphthylene	ng/g	47	31 - 59	8
Acenaphthene	ng/g	16	13 - 21	8

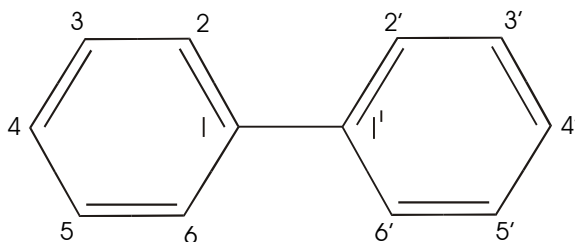
* *Median values expressed on a dry-weight basis.*

** *95% confidence intervals of the median,*

*** *Number of accepted laboratory means which were used for calculation of recommended, information values and confidence intervals.*

Systematic numbering of PCB congeners

IUPAC No		IUPAC No	
	Trichlorobiphenyl		Hexachlorobiphenyl
18	2,2',5	153	2,2',4,4',5,5'
28	2,4,4'	156	2,3,3',4,4',5
31	2,4',5	158	2,3,3',4,4',6
	Tetrachlorobiphenyl		Heptachlorobiphenyl
44	2,2',3,5'	170	2,2',3,3',4,4',5
49	2,2',4,5'	174	2,2',3,3',4,5,6'
52	2,2',5,5'	177	2,2',3,3',4',5,6
66	2,3',4,4'	180	2,2',3,4,4',5,5'
	Pentachlorobiphenyl	183	2,2',3,4,4',5',6
87	2,2',3,4,5'	185	2,2',3,4,5,5',6
95	2,2',3,5',6	187	2,2',3,4',5,5',6
97	2,2',3',4,5	189	2,3,3',4,4',5,5'
99	2,2',4,4',5		Octachlorobiphenyl
101	2,2',4,5,5'	194	2,2',3,3',4,4',5,5'
105	2,3,3',4,4'	195	2,2',3,3',4,4',5',6
110	2,3,3',4',6	199	2,2',3,3',4,5,6,6'
118	2,3',4,4',5	200	2,2',3,3',4,5',6,6'
	Hexachlorobiphenyl	201	2,2',3,3',4,5,5',6
128	2,2',3,3',4,4'	205	2,3,3',4,4',5,5',6
137	2,2',3,4,4',5		Nonachlorobiphenyl
138	2,2',3,4,4',5'	206	2,2',3,3',4,4',5,5',6
141	2,2',3,4,5,5'	207	2,2',3,3',4,4',5,6,6'
149	2,2',3,4',5',6		Decachlorobiphenyl
151	2,2',3,5,5',6	209	2,2',3,3',4,4',5,5',6,6'



CHLORINATED PESTICIDES

Information Values (Based on dry weight)

Analyte	Units	Concentration *	Confidence Interval **	N ***
HCB	ng/g	38	17 - 57	35
a HCH	ng/g	0.29	0.13 - 3.7	8
b HCH	ng/g	0.57	0.26 - 9.7	5
g HCH (lindane)	ng/g	0.46	0.16 - 1.1	23
pp' DDD		1.8	0.8 - 3.6	28
pp' DDT	ng/g	2.4	0.86 - 6.1	24
op DDE	ng/g	0.21	0.062 - 0.73	3
op DDD	ng/g	1.2	0.54 - 2.5	6
op DDT	ng/g	0.39	0.067 - 0.82	3
Heptachlor	ng/g	1	0.51 - 2.5	9
Heptachlor epoxide	ng/g	1.5	0.42 - 5.9	8
Aldrin	ng/g	1.4	0.84 - 5.9	8
Dieldrin	ng/g	0.27	0.1 - 0.57	13
Endrin	ng/g	1.1	0.4 - 1.8	8
a Endosulfan	ng/g	0.31	0.15 - 0.57	6
Endosulfan sulfate	ng/g	1.7	0.92 - 7.1	3
a Chlordane	ng/g	0.47	0.06 - 0.73	3
g Chlordane	ng/g	1.4	0.8 - 1.9	3
Aroclor 1260	ng/g	22	14 - 34	10

* Median values expressed on a dry-weight basis.

** 95% confidence intervals of the median,

*** Number of accepted laboratory means which were used for calculation of recommended, information values and confidence intervals.

PCBs CONGENERS**Information Values**
(Based on dry weight)

Analyte	Units	Concentration *	Confidence Interval **	N***
PCB No 18	ng/g	0.5	0.27 - 0.78	4
PCB No 44	ng/g	1.1	0.92 - 1.2	4
PCB No 49	ng/g	1.1	0.89 - 1.3	5
PCB No 66	ng/g	2	1.8 - 3.1	4
PCB No 87	ng/g	0.7	0.55 - 0.91	3
PCB No 95	ng/g	3.6	2.7 - 4.5	4
PCB No 97	ng/g	0.41	0.26 - 0.9	3
PCB No 99	ng/g	1.3	0.59 - 1.8	5
PCB No 137	ng/g	0.17	0.09 - 0.22	3
PCB No 141	ng/g	0.64	0.34 - 1.1	4
PCB No 151	ng/g	0.58	0.37 - 1.1	3
PCB No 156	ng/g	0.47	0.24 - 0.78	7
PCB No 158	ng/g	0.39	0.18 - 0.57	4
PCB No 174	ng/g	0.67	0.42 - 0.92	4
PCB No 177	ng/g	0.56	0.35 - 0.73	4
PCB No 185	ng/g	0.14	0.073 - 0.18	3
PCB No 189	ng/g	0.07	0.041 - 1.4	4
PCB No 195	ng/g	0.24	0.13 - 0.29	5
PCB No 199	ng/g	0.091	0.01 - 0.35	3
PCB No 200	ng/g	0.16	0.051 - 0.22	3
PCB No 201	ng/g	0.71	0.28 - 0.74	3
PCB No 205	ng/g	0.033	0.027 - 0.05	3
PCB No 206	ng/g	0.48	0.44 - 1.1	5
PCB No 207	ng/g	0.094	0.05 - 0.19	3

* Median values expressed on a dry-weight basis.

** 95% confidence intervals of the median,

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PETROLEUM HYDROCARBONS

Information Values
(Based on dry weight)

Analyte	Units	Concentration *	Confidence Interval **	N***
UVF equival.	mg/g	13	1.8 - 28	6
Chrysene				
UVF equival.	mg/g	96	12 - 225	7
ROPME oil				
Total aliphatics	mg/g	52	14 - 85	6
Resolved aliphatics	mg/g	9.6	6.7 - 24	9
Unresolved aliphatics	mg/g	52	11 - 79	7
Pristane	ng/g	87	36 - 240	10
n - C 18	ng/g	83	42 - 230	10
Phytane	ng/g	57	43 - 150	9
S n - Alkanes	mg/g	6.1	5.3 - 6.8	8
Total aromatics	mg/g	8.8	1.5 - 22	5
Resolved aromatics	mg/g	2.5	0.4 - 6	7
Unresolved aromatics	mg/g	6.6	1.1 - 16	5
Biphenyl	ng/g	29	19 - 30	3
2 Methyl naphthalene	ng/g	36	26 - 43	4
2,6 dimethyl naphthalene	ng/g	13	7.1 - 23	4
Indeno(123cd) pyrene	ng/g	150	130 - 160	8
Dibenz (ah) anthracene	ng/g	20	18 - 41	5

* Median values expressed on a dry-weight basis.

** 95% confidence intervals of the median,

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Designation

This material can be useful when evaluating the accuracy of analytical procedures for the determination of chlorinated compounds, petroleum hydrocarbons and sterols in sediment samples, in the elaboration of new analytical procedures for sediment samples, and for educational purposes.

Description of the material

About 30 Kg of sediment from the lagoon of Venice (Italy) was collected. This sediment was deep-frozen, freeze-dried, ground and sieved through a 250 µm stainless steel sieve. This powder, with a particle size of less than 250 µm was homogenized by mixing in a rotating drum for two weeks. Then, aliquots of about 35 grams were packed into glass bottles with aluminium screw caps and sealed with teflon tape.

Homogeneity

The homogeneity of the material for organochlorine compounds, petroleum hydrocarbons and sterols was checked by determining the concentration of some compounds (chlorinated pesticides, petroleum hydrocarbons and sterols) in 10 replicate analyses taken randomly in the bulk of the powder. A one-way variance analysis indicated that the material could be considered homogeneous.

Moisture determination

The moisture content of the lyophilized sample as determined by drying to a constant weight at 105°C, was found to be 2.0 %. Since the moisture content can change with the ambient humidity and temperature, it was recommended that the water content of this material always be determined in a separate subsample (not that taken for analysis) by drying to a constant weight (~24 hours) at 105°C. Results should always be reported on a dry weight basis.

Establishment of "recommended values"

An intercomparison exercise for determination of chlorinated compounds, petroleum hydrocarbons and sterols in IAEA-383 was carried out in 1997-1998 and the results returned by the participating laboratories were used to establish "recommended values" for the concentrations of some compounds in this material.

More details about this intercomparison can be found in separate IAEA report.

Important note

The analysts are kindly requested to communicate any meaningful results from analysis of this material to:

International Atomic Energy Agency
Marine Environmental Studies Laboratory
4 Quai Antoine 1er
BP. N° 800
MC 98 012 MONACO Cedex

These results will be used in the future for updating of the "recommended values" which are the best estimates as of November 1998. As usual, the origin of these additional results will be kept confidential.

References

International Atomic Energy Agency, Marine Environment Laboratory - MESL, Report IAEA/AL/ 115 (IAEA/MEL/ 65), World-wide and regional intercomparison for the determination of organochlorine compounds, petroleum hydrocarbons and sterols in the sediment sample IAEA-383, Monaco (1998).

Issued by

Marine Environment Laboratory (MESL)
International Atomic Energy Agency
B.P. No 800
MC-98012 Monaco

Supplied by

Analytical Quality Control Services (AQCS)
Agency's Laboratories, Seibersdorf
International Atomic Energy Agency
P.O. Box 100
A-1400 Vienna, Austria

Prepared by

J. P. Villeneuve, F. Carvalho, C. Cattini

