



REFERENCE SHEET

REFERENCE MATERIAL

IAEA-406

ORGANOCHLORINE COMPOUNDS AND PETROLEUM HYDROCARBONS IN A FISH HOMOGENATE

Date of issue: November 2000

PESTICIDES AND PCBs

Recommended Values (Based on dry weight)

Analyte	Concentration ng/g	95% Confidence Interval ng/g	N*
HCB	1.5	0.95 - 2.0	28
pp' DDE	9.2	6.2 - 11	37
pp' DDD	2.8	2.0 - 3.7	32
op DDE	0.76	0.48 - 1.3	4
Heptachlor	0.32	0.23 - 0.46	10
Aldrin	0.75	0.61 - 1.2	12
α Chlordane	2.8	2.0 - 4.1	13
PCB No 28	0.57	0.43 - 1.3	18
PCB No 31	0.29	0.23 - 0.47	5
PCB No 52	1.3	1.0 - 2.2	15
PCB No 101	3.1	2.2 - 3.4	18
PCB No 110	1.4	1.3 - 2.0	5
PCB No 138	4.0	2.5 - 6.3	23
PCB No 149	2.0	1.7 - 2.4	6
PCB No 153	3.7	2.9 - 6.0	22
PCB No 156	0.27	0.21 - 0.59	6
PCB No 170	0.54	0.38 - 0.81	7
PCB No 180	1.2	1.0 - 1.2	14

PETROLEUM HYDROCARBONS

Recommended Values (Based on dry weight)

Analyte	Concentration ng/g	95% Confidence Interval ng/g	N*
Pyrene	4.5	2.1 - 9.1	7

* Number of accepted laboratory results which were used to calculate the recommended values and confidence intervals about the median value.

Systematic numbering of PCB congeners

IUPAC No.

	Trichlorobiphenyl
18	2,2',5
28	2,4,4'
31	2,4',5

	Tetrachlorobiphenyl
44	2,2',3,5'
45	2,2',3,6
49	2,2',4,5'
52	2,2',5,5'
66	2,3',4,4'

	Pentachlorobiphenyl
87	2,2',3,4,5'
95	2,2',3,5',6
99	2,2',4,4',5
101	2,2',4,5,5'
105	2,3,3',4,4'
110	2,3,3',4',6
118	2,3',4,4',5

	Hexachlorobiphenyl
128	2,2',3,3',4,4'
138	2,2',3,4,4',5'
141	2,2',3,4,5,5'
149	2,2',3,4',5',6

IUPAC No.

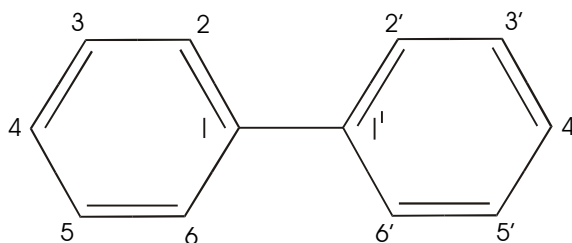
	Hexachlorobiphenyl, <i>continued</i>
151	2,2',3,5,5',6
153	2,2',4,4',5,5'
156	2,3,3',4,4',5

	Heptachlorobiphenyl
170	2,2',3,3',4,4',5
174	2,2',3,3',4,5,6'
177	2,2',3,3',4',5,6
180	2,2',3,4,4',5,5'
183	2,2',3,4,4',5',6
187	2,2',3,4',5,5',6

	Octachlorobiphenyl
194	2,2',3,3',4,4',5,5'
195	2,2',3,3',4,4',5,6
198	2,2',3,3',4,5,5',6
199	2,2',3,3',4,5,5',6'
200	2,2',3,3',4,5,6,6'
201	2,2',3,3',4,5',6,6'

	Nonachlorobiphenyl
206	2,2',3,3',4,4',5,5',6

	Decachlorobiphenyl
209	2,2',3,3',4,4',5,5',6,6'



CHLORINATED PESTICIDES

Information Values (Based on dry weight)

Analyte	Concentration	95% Confidence Interval	N*
	ng/g	ng/g	
α HCH	0.79	0.23 - 1.7	10
β HCH	0.75	0.20 - 2.3	6
Lindane	0.27	0.11 - 0.80	23
pp' DDT	3.0	1.8 - 5.6	37
op DDD	0.88	0.43 - 3.0	3
op DDT	2.9	0.90 - 4.4	6
Heptachlor Epoxide	0.99	0.37 - 1.6	14
Dieldrin	3.5	1.4 - 7.0	23
Endrin	1.9	0.86 - 5.1	16
α Endosulfan	3.5	0.94 - 4.7	12
β Endosulfan	1.4	1.0 - 1.6	7
Endosulfan Sulfate	3.6	3.1 - 5.6	6
γ Chlordane	0.70	0.63 - 1.0	7
Cis Nonachlor	0.86	0.77 - 1.4	3
Trans Nonachlor	4.1	3.9 - 4.1	3
Aroclor 1254	33	26 - 58	11
Aroclor 1260	13	11 - 15	6

PCB CONGENERS

Information Values (Based on dry weight)

Analyte	Concentration	95% Confidence Interval	N*
	ng/g	ng/g	
PCB No 18	0.38	0.11 - 0.93	5
PCB No 44	0.46	0.46 - 0.52	5
PCB No 45	0.18	0.03 - 0.33	3
PCB No 49	0.41	0.36 - 0.44	4
PCB No 66	0.67	0.49 - 0.96	4
PCB No 87	0.82	0.69 - 1.4	4
PCB No 95	1.1	1.0 - 1.2	3
PCB No 99	0.91	0.89 - 1.2	3
PCB No 105	0.71	0.48 - 0.88	9
PCB No 118	2.5	1.9 - 3.7	20
PCB No 128	0.8	0.51 - 1.4	5
PCB No 141	0.41	0.40 - 0.43	4
PCB No 151	0.67	0.62 - 0.75	4
PCB No 174	0.30	0.29 - 0.37	3
PCB No 177	0.18	0.16 - 0.19	4
PCB No 183	0.32	0.28 - 0.35	4
PCB No 187	1.1	0.96 - 1.2	6
PCB No 194	0.13	0.10 - 0.25	4
PCB No 195	0.04	0.03 - 1.5	3
PCB No 198	0.068	0.009 - 0.500	3
PCB No 199	0.16	0.013 - 0.17	3
PCB No 200	0.10	0.009 - 1.1	3
PCB No 201	0.12	0.07 - 0.23	3
PCB No 206	0.05	0.03 - 3.1	3
PCB No 209	0.07	0.07 - 1.1	4

* Number of accepted laboratory results which were used to calculate the information values and confidence intervals about the median value.

PETROLEUM HYDROCARBONS

Information Values *(Based on dry weight)*

Analyte	Concentration ng/g	95% Confidence Interval ng/g	N*
UVF equivalent ROPME oil	8400	3500 - 16000	4
Total Aliphatics	33000	28000 - 34000	3
Resolved Aliphatics	24000	8800 - 310000	4
n - C 17	91	30 - 260	8
Pristane	3500	720 - 6200	11
n - C 18	240	38 - 560	10
Phytane	200	13 - 310	6
Σ n Alkanes (C 14 - C 34)	4500	2800 - 22000	8
Total Aromatics	26000	7200 - 53000	5
Resolved Aromatics	35000	8100 - 55000	4
Naphthalene	24	16 - 440	9
Phenanthrene	22	8 - 220	12
1 Methyl Phenanthrene	12	3.6 - 92	4
2 Methyl Phenanthrene	4.7	3.3 - 10	3
Anthracene	19	15 - 43	4
Chrysene	2.3	2.2 - 4.4	5
Fluoranthene	4.9	4.0 - 9.6	9
Benzo (b) Fluoranthene	2.3	0.78 - 9.5	4
Benzo (k) Fluoranthene	2.8	0.38 - 130	4
Benz (a) Anthracene	0.81	0.24 - 0.91	5
Benzo (a) Pyrene	2.9	0.62 - 3.0	5
Benzo (ghi) Perylene	0.78	0.28 - 1.3	4
Acenaphthylene	8.0	1.1 - 26	3
Acenaphthene	1100	0.29 - 2300	4

* *Number of accepted laboratory results which were used to calculate the information values and confidence intervals about the median value.*

The values listed above were established on the basis of statistically valid results submitted by laboratories which had participated in an international intercomparison exercise organized in 2000. The details concerning the criteria for qualification as a recommended or information value can be found in the report (IAEA/AL/125; IAEA/MEL/69), "World-wide and Regional Intercomparison for Determination of Organochlorine Compounds and Petroleum Hydrocarbons in Fish Homogenate IAEA-406" [1]. This report is available free of charge upon request.

Intended Use

This sample is intended to be used as a reference material for the determination of chlorinated compounds and petroleum hydrocarbons in fish samples. It can also be used as a quality control material for the assessment of a laboratory's analytical work, for the validation of analytical methods and for quality assurance within a laboratory.

Origin and preparation of the material

A large batch of fish powder was received from an aquaculture farm for use as an intercomparison material. This material was received already freeze-dried and ground. It was further sieved through a 250 µm stainless steel sieve.

The fish powder fraction of particle size less than 250 µm was further homogenized by mixing in a rotating drum for two weeks. Then, aliquots of about 35 grams were packaged into glass bottles with aluminium screw caps and sealed with Teflon tape.

Homogeneity

The homogeneity of the material for organochlorine compounds and petroleum hydrocarbons was checked by determining the concentration of some compounds (chlorinated pesticides and petroleum hydrocarbons) 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.

Dry weight determination

The moisture content of the lyophilized sample as determined by drying to a constant weight at 105°C, was found to be 11 %. Since the moisture content can change with the ambient humidity and temperature, it is recommended that the water content of this material always be determined in a separate sub-sample (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.

Instructions for use

The recommended sample size for analysis is 2 g for petroleum hydrocarbons and 5 g for organochlorine pesticides and PCBs. Analyst are reminded to take appropriate precautions in order to avoid contamination of the material during handling. The material should be stored in the dark and kept in a refrigerator.

Legal disclaimer

The IAEA makes no warranties, expressed or implied, with respect to the data contained in this reference sheet and shall not be liable for any damage that may result from the use of such data.

References

- [1] Villeneuve J-P., de Mora S. J. and Cattini C., World-wide and Regional Intercomparison for Determination of Organochlorine Compounds and Petroleum Hydrocarbons in Fish Homogenate IAEA-406 IAEA/AL/125 (IAEA/MEL/69), IAEA, Monaco, 2000.

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