

METHOD STATEMENT

Determinand:

Semi-volatile organic compounds (SVOC) within the approximate boiling point range 100-500°C

Matrix:

Surface waters, groundwaters, effluents and leachates

Principle of Method:

Neutral, acidic and basic organic compounds, within the approximate boiling point range 100-500°C are isolated using a combination of liquid/liquid partition and/or solid phase extraction (SPE). The compounds are quantified by Electron Impact GCMS in the full scan mode.

Analysis of SVOCs is done using a Modified EPA Protocol.

Sampling and Sample Preparation:

Samples should be collected in glass bottles with PTFE lined screw caps.

Samples should be stored between 5 ± 3°C.

Samples are stable for 7 days (In-House Data) from sampling.

Interferences:

Any co-extracted substance with a corresponding GC retention time, and with the same ions as those being monitored, may interfere.

Performance of Method:

Range of Application: Typically MRL (Minimum Reporting Level) to 100µg/l without dilution

COMPOUND	CAS Number	LOD (µg/l)	MRL (µg/l)
1,2,4-Trichlorobenzene	120-82-1	0.2088	1
1,2-Dichlorobenzene	95-50-1	0.2218	1
1,3-Dichlorobenzene	541-73-1	0.2726	1
1,4-Dichlorobenzene	106-46-7	0.2201	1
2,4,5-Trichlorophenol	95-95-4	0.2233	1
2,4,6-Trichlorophenol	88-06-2	0.2008	1
2,4-Dichlorophenol	120-83-2	0.2067	1
2,4-Dimethylphenol	105-67-9	0.2098	1
2,4-Dinitrotoluene	121-14-2	0.218	1
2,6-Dinitrotoluene	606-20-2	0.3297	1
2-Chloronaphthalene	91-58-7	0.2031	1
2-Chlorophenol	95-57-8	0.216	1
2-Methylnaphthalene	91-57-6	0.7413	1
2-Methylphenol	95-48-7	0.2122	1
2-Nitrophenol	88-75-5	0.2028	1
3&4-Methylphenol	108-39-4, 106-44-5	0.2645	1
4-Bromophenyl phenyl ether	101-55-3	0.2068	1
4-Chloro-3-methylphenol	59-50-7	0.2159	1
4-Chlorophenyl phenyl ether	7005-72-3	0.2306	1
4-Nitrophenol	100-02-7	0.5319	5
Acenaphthene	83-32-9	0.2167	1
Acenaphthylene	208-96-8	0.2057	1
Anthracene	120-12-7	0.2128	1
Benzo(a)Anthracene	56-55-3	0.2457	1



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COMPOUND	CAS Number	LOD (µg/l)	MRL (µg/l)
Benzo(a)Pyrene	50-32-8	0.2265	1
Benzo(b)Fluoranthene	205-99-2	0.4049	1
Benzo(ghi)perylene	191-24-2	0.3284	1
Benzo(k)Fluoranthene	207-08-9	0.2605	1
Benzyl butyl phthalate	85-68-7	0.2895	1
Bis(2-chloroethoxy)methane	111-91-1	0.2288	1
Bis(2-chloroethyl)ether	111-44-4	0.204	1
Bis(2-chloroisopropyl)ether	108-60-1	0.2057	1
Bis(2-ethylhexyl)phthalate	117-81-7	2.1976	5
Carbazole	86-74-8	0.2195	1
Chrysene	218-01-9	0.3345	1
Dibenz(ah)anthracene	53-70-3	0.3029	1
Dibenzofuran	132-64-9	0.2037	1
Diethylphthalate	84-66-2	0.4831	1
Dimethylphthalate	131-11-3	0.2049	1
Di-n-butylphthalate	84-74-2	0.2955	1
Di-n-octyl phthalate	117-84-0	0.311	1
Diphenylamine	122-39-4	0.2216	1
Fluoranthene	206-44-0	0.2036	1
Fluorene	86-73-7	0.2148	1
Hexachlorobenzene	118-74-1	0.2015	1
Hexachlorobutadiene	87-68-3	0.3597	1
Hexachloroethane	67-72-1	0.3524	1
Indeno(1,2,3-cd)Pyrene	193-39-5	0.9317	1
Isophorone	78-59-1	0.2179	1
Naphthalene	91-20-3	0.8362	2
Nitrobenzene	98-95-3	0.6114	1
N-Nitroso-di-n-propylamine	621-64-7	0.2735	1
Pentachlorophenol	87-86-5	0.2221	1
Phenanthrene	85-01-8	0.2008	1
Phenol	108-95-2	0.2262	1
Pyrene	129-00-0	0.2062	1

		Ground Water		Surface Water		Tip Leachate		Trade Effluent		Finham FE	
		20%	80%	20%	80%	20%	80%	20%	80%	20%	80%
1,2,4-Trichlorobenzene	Rec	97.7	101.6	94.7	98.4	91.7	95.4	92.8	95.0	92.9	94.6
	%RSD	5.78	6.43	7.01	9.86	6.27	6.72	7.92	8.20	6.96	6.60
1,2-Dichlorobenzene	Rec	97.0	101.8	92.9	98.2	89.8	95.3	92.4	95.7	90.9	94.7
	%RSD	4.87	5.70	10.25	10.44	8.41	5.54	7.41	6.63	9.33	5.55
1,3-Dichlorobenzene	Rec	95.8	100.6	91.0	96.8	87.5	93.9	91.3	94.7	88.9	93.3
	%RSD	4.92	5.72	12.59	10.65	10.52	5.40	8.09	6.44	11.24	5.46
1,4-Dichlorobenzene	Rec	95.9	100.6	91.4	96.9	88.1	93.9	90.5	94.1	89.3	93.3
	%RSD	5.11	5.88	11.42	10.56	9.42	5.58	7.70	6.61	10.20	5.53
2,4,5-Trichlorophenol	Rec	99.0	107.0	100.4	105.1	97.0	100.7	101.5	103.0	95.9	97.2
	%RSD	7.44	6.29	6.96	8.18	7.20	6.03	6.41	6.47	5.66	8.47
2,4,6-Trichlorophenol	Rec	97.9	103.2	93.5	97.3	86.6	89.8	96.1	96.3	87.7	87.6
	%RSD	7.82	9.12	9.19	9.92	8.36	6.97	9.12	8.88	6.99	10.08
2,4-Dichlorophenol	Rec	101.0	105.1	99.9	102.0	96.5	98.8	101.4	100.9	96.8	96.7
	%RSD	6.13	7.94	8.37	9.27	7.31	6.78	8.21	7.69	7.75	6.94



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		Ground Water		Surface Water		Tip Leachate		Trade Effluent		Finham FE	
		20%	80%	20%	80%	20%	80%	20%	80%	20%	80%
2,4-Dimethylphenol	Rec	128.6	109.3	132.7	111.9	132.3	109.0	98.54	98.77	99.03	99.24
	%RSD	12.57	7.54	19.34	9.77	15.92	6.71	11.15	6.67	8.25	9.13
2,4-Dinitrotoluene	Rec	99.4	107.5	98.4	105.7	97.2	103.1	97.3	101.4	98.0	101.7
	%RSD	4.91	5.36	6.25	9.18	5.51	4.88	5.80	5.36	5.82	6.33
2,6-Dinitrotoluene	Rec	101.1	107.1	100.6	105.3	98.6	102.5	98.1	101.7	99.0	101.2
	%RSD	4.65	4.60	6.34	8.51	5.87	5.19	6.43	5.68	6.42	6.49
2-Chloronaphthalene	Rec	101.3	105.1	99.1	101.6	96.1	98.2	95.1	96.7	96.9	97.4
	%RSD	4.30	4.63	5.12	8.97	4.71	6.26	6.58	7.02	5.77	6.43
2-Chlorophenol	Rec	98.8	101.9	97.2	100.1	94.9	97.1	96.5	97.1	95.4	95.8
	%RSD	3.73	5.54	4.68	8.64	3.60	4.21	4.86	4.99	4.10	4.85
2-Methylnaphthalene	Rec	101.9	105.2	99.9	101.8	96.6	98.5	98.0	98.9	97.5	97.4
	%RSD	5.20	5.02	5.73	9.51	5.04	6.20	7.03	7.21	6.31	5.89
2-Methylphenol	Rec	99.7	103.3	93.0	97.5	95.4	98.9	97.0	98.0	97.2	98.0
	%RSD	4.91	6.15	7.82	10.80	4.62	6.12	5.68	6.20	6.24	6.31
2-Nitrophenol	Rec	100.6	105.3	98.3	101.8	94.2	97.3	98.6	100.5	96.0	96.4
	%RSD	5.50	5.90	5.95	7.76	5.46	4.95	7.07	5.88	6.60	8.04
3&4-Methylphenol	Rec	98.3	102.6	95.1	98.7	99.4	99.9	101.7	99.3	97.4	97.3
	%RSD	8.59	6.57	8.49	9.22	7.05	5.38	6.09	4.00	6.53	5.33
4-Bromophenyl phenyl ether	Rec	101.0	104.8	98.0	100.5	96.0	98.0	97.0	98.6	95.3	95.0
	%RSD	4.60	4.61	5.30	8.85	4.99	6.90	7.53	7.89	5.89	6.48
4-Chloro-3-methylphenol	Rec	97.6	102.6	99.2	102.3	99.0	101.1	102.3	101.8	98.9	97.9
	%RSD	6.37	7.11	8.46	9.74	7.47	5.81	7.24	6.67	6.87	6.45
4-Chlorophenyl phenyl ether	Rec	102.3	106.0	99.3	102.1	97.2	99.9	96.3	98.5	98.2	97.2
	%RSD	4.24	5.18	5.36	9.25	5.33	6.36	6.12	6.50	5.92	6.37
4-Nitrophenol	Rec	89.7	98.5	93.6	100.9	96.4	97.3	101.6	98.8	93.1	92.9
	%RSD	8.96	7.78	9.12	15.43	8.49	6.64	12.87	7.40	11.08	9.03
Acenaphthene	Rec	101.6	105.7	99.2	102.0	96.4	99.3	97.1	99.3	97.5	97.9
	%RSD	4.24	4.79	4.91	9.09	4.69	6.20	5.82	6.94	5.42	6.26
Acenaphthylene	Rec	100.8	102.4	98.6	98.7	96.2	96.5	95.9	96.6	97.0	95.2
	%RSD	4.37	4.26	4.77	8.48	4.79	5.32	6.03	6.21	5.51	5.39
Anthracene	Rec	98.8	102.9	96.6	98.8	94.7	95.9	93.2	94.9	94.2	94.8
	%RSD	4.23	4.86	5.47	9.73	4.24	6.45	6.25	5.91	4.79	6.56
Benz(a)anthracene	Rec	100.4	104.8	97.8	99.8	96.2	97.6	95.9	97.3	95.0	95.1
	%RSD	4.39	4.80	5.63	9.56	4.14	6.18	7.14	6.96	5.10	6.57
Benzo(a)pyrene	Rec	96.7	99.4	92.3	93.8	92.5	92.9	91.3	93.5	91.2	90.9
	%RSD	5.57	5.62	6.79	9.50	5.84	7.42	8.72	7.79	6.60	8.02
Benzo(b)fluoranthene	Rec	100.9	105.3	95.9	99.9	95.8	98.8	92.0	95.1	94.4	95.4
	%RSD	4.64	5.96	5.93	9.13	6.27	7.12	7.10	7.17	5.20	7.30
Benzo(ghi)perylene	Rec	105.3	108.3	101.9	103.2	101.3	102.2	97.5	98.6	99.5	99.4
	%RSD	7.77	6.31	7.00	8.79	7.11	7.79	9.36	7.80	7.93	8.32
Benzo(k)fluoranthene	Rec	100.8	104.4	95.7	98.8	95.0	97.3	90.6	93.7	93.9	94.6
	%RSD	4.15	5.94	5.23	8.49	6.53	6.30	7.17	6.10	4.92	7.49
Benzyl butyl phthalate	Rec	106.3	107.5	104.6	103.0	102.7	100.7	100.4	97.6	101.8	97.9
	%RSD	6.15	5.13	7.68	8.97	6.23	4.75	6.77	4.71	6.73	5.19
Bis(2-chloroethoxy) methane	Rec	68.2	74.1	47.9	49.1	70.2	71.9	64.0	73.8	74.9	75.1
	%RSD	18.80	16.19	30.45	35.75	11.52	13.79	13.66	15.55	10.19	9.98
Bis(2-chloroethyl) ether	Rec	96.8	102.8	98.0	101.5	95.4	98.2	97.2	97.5	96.7	97.4
	%RSD	5.73	5.10	5.28	8.48	5.15	3.92	6.39	4.49	4.99	5.01
Bis(2-ethylhexyl) phthalate	Rec	100.3	103.6	97.1	97.9	99.0	96.8	95.0	94.0	93.0	93.2
	%RSD	11.20	5.86	15.27	9.72	16.57	7.40	15.58	8.62	14.27	7.96
Bis(chloroisopropyl) ether	Rec	101.9	106.4	100.2	103.2	97.3	99.9	98.0	99.9	98.2	99.1
	%RSD	4.78	4.74	4.89	9.26	4.60	5.60	5.28	5.73	5.10	5.50
Carbazole	Rec	102.0	106.3	99.8	102.4	98.6	100.4	98.9	101.1	99.4	99.5
	%RSD	3.82	5.57	4.85	9.89	4.66	5.16	4.29	5.13	4.58	6.00



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		Ground Water		Surface Water		Tip Leachate		Trade Effluent		Finham FE	
		20%	80%	20%	80%	20%	80%	20%	80%	20%	80%
Chrysene	Rec	99.6	104.4	96.8	99.1	94.3	95.9	91.7	95.0	93.8	94.5
	%RSD	4.43	4.73	4.53	9.35	4.21	6.78	7.73	7.67	4.53	6.88
Dibenzo(ah) anthracene	Rec	106.3	109.0	102.4	103.9	103.7	102.9	99.2	101.2	102.0	100.8
	%RSD	7.15	5.76	6.71	8.06	7.03	6.97	7.61	6.64	8.14	7.21
Dibenzofuran	Rec	101.9	106.5	99.4	102.7	96.7	100.3	98.2	99.5	97.9	98.6
	%RSD	4.15	5.08	4.96	9.56	4.81	6.15	7.22	6.23	5.44	6.34
Diethylphthalate	Rec	104.9	109.4	103.1	106.8	101.2	104.1	100.1	102.6	102.9	102.7
	%RSD	4.31	5.19	5.74	9.23	5.42	5.19	5.14	5.32	5.04	5.93
Dimethylphthalate	Rec	100.8	104.1	99.5	103.3	97.4	100.2	97.0	99.0	98.6	98.9
	%RSD	3.40	4.83	4.84	7.97	4.94	5.26	5.14	5.50	4.93	6.27
Di-n-butylphthalate	Rec	101.0	106.2	97.7	101.7	97.7	100.0	93.9	97.3	96.4	97.8
	%RSD	6.68	5.89	7.64	9.54	7.77	5.35	7.09	5.58	5.51	5.59
Di-n-octyl phthalate	Rec	104.2	108.9	101.1	103.4	102.2	102.2	104.1	103.2	95.5	99.2
	%RSD	7.87	5.83	9.79	8.81	7.17	7.62	14.74	9.79	10.71	8.21
Diphenylamine	Rec	102.2	104.6	100.7	101.3	100.8	100.6	100.8	102.3	101.2	98.2
	%RSD	5.52	4.49	5.15	7.29	4.92	4.56	5.26	5.36	5.53	4.82
Fluoranthene	Rec	102.1	105.8	99.9	101.7	97.8	99.2	94.0	96.4	95.5	96.1
	%RSD	3.41	5.17	4.17	8.96	4.45	5.95	4.96	6.44	4.87	5.78
Fluorene	Rec	102.5	106.7	100.0	103.0	97.6	100.6	97.2	99.4	99.0	98.9
	%RSD	4.26	5.20	5.34	9.48	4.98	5.85	5.81	5.95	5.58	6.16
Hexachlorobenzene	Rec	99.9	104.0	96.7	99.3	94.4	96.3	93.8	96.0	92.9	94.2
	%RSD	4.75	4.72	5.09	9.10	5.25	7.66	9.13	9.18	5.93	7.32
Hexachlorobutadiene	Rec	92.3	93.4	89.2	89.8	86.3	87.6	86.8	87.7	86.3	84.6
	%RSD	5.89	5.79	7.05	8.44	7.29	7.12	7.82	8.78	7.78	5.90
Hexachloroethane	Rec	94.1	98.4	88.9	95.0	86.1	92.2	88.8	92.1	87.4	91.6
	%RSD	6.16	5.92	13.74	10.46	12.22	6.22	8.33	7.10	12.52	5.85
Indeno(1,2,3-cd) Pyrene	Rec	104.5	107.3	102.6	102.6	102.2	102.4	99.3	99.7	99.7	99.1
	%RSD	9.73	6.17	9.18	9.35	8.82	8.92	9.54	8.47	9.69	8.76
Isophorone	Rec	102.7	106.2	101.8	104.8	99.1	102.0	100.2	102.2	100.0	100.9
	%RSD	4.91	4.25	5.55	6.78	5.44	5.18	7.04	5.76	5.44	5.78
Naphthalene	Rec	99.3	104.6	96.9	100.7	95.0	98.3	96.2	97.9	95.7	97.0
	%RSD	6.67	5.34	6.57	9.09	5.33	5.46	5.09	5.81	5.60	5.44
Nitrobenzene	Rec	102.0	105.7	101.9	104.4	98.7	101.4	98.9	100.4	107.1	108.6
	%RSD	4.17	5.06	4.40	9.28	4.03	4.97	5.01	5.36	5.48	5.28
n-Nitroso-di-n-propylamine	Rec	90.9	98.8	94.8	98.6	89.7	93.8	93.6	96.2	89.4	93.9
	%RSD	11.43	8.20	10.95	11.08	7.50	6.80	8.87	6.64	7.50	6.15
Pentachlorophenol	Rec	91.5	97.6	94.5	93.6	85.2	83.4	106.7	100.8	79.0	77.1
	%RSD	12.83	9.57	9.38	8.24	13.02	7.78	7.56	6.25	10.07	12.25
Phenanthrene	Rec	101.0	105.5	98.6	101.3	96.3	98.6	96.3	98.2	96.1	96.2
	%RSD	4.01	4.70	5.06	9.59	4.64	6.14	6.25	5.77	5.02	6.06
Phenol	Rec	87.3	95.4	85.8	89.7	87.9	90.4	91.0	93.9	88.3	89.8
	%RSD	7.46	8.24	4.34	12.48	5.40	4.46	7.71	5.19	7.51	5.96
Pyrene	Rec	101.3	105.0	99.4	100.9	97.2	98.2	92.5	95.1	94.8	95.3
	%RSD	3.38	5.38	4.12	9.22	4.44	6.03	4.89	6.72	4.78	5.94



METHOD STATEMENT



Uncertainty of Measurement

The reported uncertainty is an expanded uncertainty calculated using a coverage factor of 2, which gives a level of confidence of approximately 95%.

Determinand	Uncertainty of Measurement %
1,2,4-Trichloro benzene	15.88
1,2-Dichlorobenzene	15.95
1,3-Dichlorobenzene	18.24
1,4-Dichlorobenzene	18.18
2,4,5-Trichlorophenol	21.36
2,4,6-Trichlorophenol	30.87
2,4-Dichlorophenol	19.08
2,4-Dimethylphenol	45.67
2,4-Dinitrotoluene	20.26
2,6-Dinitrotoluene	20.96
2-Chloronaphthalene	12.53
2-Chlorophenol	16.53
2-Methylnaphthalene	11.03
2-Methylphenol	16.20
2-Nitrophenol	14.27
3&4-Methylphenol	12.22
4-Bromophenyl phenyl ether	13.32
4-Chloro-3-methylphenol	18.27
4-Chlorophenyl phenyl ether	13.66
4-Nitrophenol	35.54
Acenaphthene	18.48
Acenaphthylene	19.60
Anthracene	15.17
Benz(a)anthracene	14.48
Benzo(a)pyrene	22.71
Benzo(b)fluoranthene	20.76
Benzo(ghi)perylene	18.78
Benzo(k)fluoranthene	19.20
Benzyl butyl phthalate	16.43
Bis(2-chloroethoxy) methane	59.32
Bis(2-chloroethyl) ether	14.11
Bis(2-ethylhexyl) phthalate	19.85
Bis(chloroisopropyl) ether	11.28
Carbazole	19.59
Chrysene	21.41
Dibenzo(ah) anthracene	22.62
Dibenzofuran	11.53
Diethylphthalate	13.82
Dimethylphthalate	12.42
Di-n-butylphthalate	16.72
Di-n-octyl phthalate	18.18
Diphenylamine	18.63
Fluoranthene	18.85
Fluorene	17.89
Hexachlorobenzene	16.04
Hexachlorobutadiene	35.30
Hexachloroethane	24.79



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Determinand	Uncertainty of Measurement %
Indeno(1,2,3-cd) Pyrene	26.82
Isophorone	10.99
Naphthalene	19.88
Nitrobenzene	18.72
n-Nitroso-di-n-propylamine	19.10
Pentachlorophenol	39.39
Phenanthrene	19.44
Phenol	24.06
Pyrene	18.45

References

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