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Application Note

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Analysis of Volatile Organic Compounds(VOCs) in Drinking Water by USEPA Method 524.2

GENERAL LABORATORY SERIES

Introduction

EPA Method 524.2 is a general purpose method for the identification and measurement of purgeable volatile organic compounds in surface water, groundwater, and drinking water in any stage of treatment. The method is for a broad range of organic compounds with varying volatility, polarity, solubility in water, and purge efficiency which can be a challenge to the laboratory. It is critical that the entire volatiles system is configured for optimum performance in order to routinely meet method requirements and maintain high sample throughput.

Although purge and trap is considered a mature technology, significant advances in methodology and instrumentation continue to develop. This application note provides information for optimizing a volatiles system and explores the effect of different purge volumes on results.

Figure 1. OI Analytical Eclipse 4760 Purge and Trap and the 4100 Autosampler

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Experimental

The instrumentation used for this study included an OI Analytical 4760 Purge and Trap (P&T) Sample Concentrator, an OI Analytical 4100 Water/Soil Sample Processor, and an Agilent 7890A/5975C Gas Chromatograph/Mass Spectrometer (GC/MS). The required parameters for the method were used including an 11 minute purge at 40 ml/minute and ambient temperature with a 4 minute desorb.

A calibration was run with 0.5, 1, 2, 5, 10, 20, and 40 ppb concentrations for most compounds. Some compounds such as polar compounds and poor purgers were run at a higher level for all QC samples. Five Initial Demonstration of Capability (IDOC) samples were analyzed at 10 ppb. Nine Method Detection Limit Studies (MDLs) were performed over a three day period using 0.25 and 0.5 ppb standards. Two drops of 1+1 Hydrochloric acid were added to all samples and standards to prevent dehydrohalogenation of Pentachloroethane and to a lesser extent, other halogenated compounds such as Dichlorobutanes and 1,1,2,2 – Tetrachloroethane to other halogenated compounds especially Tetrachloroethene and Trichloroethene.

The method was run using 5ml, 10ml, and 25ml purge volumes. All other method parameters were kept constant.

Table 1. Instrument Parameters

Purge-and-Trap	Eclipse 4760 P&T Sample Concentrator
Trap	#10 trap; Tenax® / Silica gel / CMS
Purge Gas	Zero grade Helium at 40 mL/min
Purge Time	11 min
Sparge Mount Temperature	45 °C
Sample Temperature (purge)	Ambient
Sample Temperature (bake)	45 °C
Desorb Time	4.0 min
Bake Time	5 min
OI #10 Trap Temperature	Ambient during purge 180 °C during desorb pre-heat 190 °C during desorb 210 °C during bake
Water Management	120 °C during purge Ambient during desorb 240 °C during bake
Transfer Line Temperature	140 °C
Six-port Valve Temperature	140 °C

Autosampler	4100 Water/Soil Sample Processor
System Gas	Zero grade nitrogen
Purge Gas	Zero grade helium
LV20 Pressure	8.0 psi
Loop-based Time Settings	Default
Rinse Water	80 °C
Soil Sample Transfer	150 °C
Soil Oven	150 °C

Gas Chromatograph	Agilent 7890A
Column	Restek Rtx-VMS 30 meter, 0.25 mm ID, 1.4 µmdf
Carrier Gas	Zero grade helium
Inlet Temperature	240 °C
Inlet Liner	Agilent Ultra Inert, 1 mm straight taper
Column Flow Rate	0.8 mL/min
Split Ratio	75:1
Oven Program	Hold at 40 °C for 2 min 14 °C/minute to 180 °C 30 °C/minute to 220 °C Hold at 220 °C for 4 min Total GC Run is 17.33 min

Mass Spectrometer	Agilent 5975C
Mode	Scan 35 - 300 amu
Scans/Second	5.19
Solvent Delay	1.60 min
Transfer Line Temperature	240 °C
Source Temperature	300 °C
Quadrupole Temperature	200 °C
Draw Out Plate	6 mm

Results and Discussion

Calibration response factors, relative standard deviations, MDLs, and IDOCs easily met the method criteria.

For the most part, the Response Factors (RFs) for the 5 ml purge were better than the 25 ml purge with 10 ml purge falling somewhere in between. Responses for poor purgers and polar compounds such as Ethers, Ketones, Nitriles, Acrylates, Brominated compounds, etc. were probably better because of the better purging efficiency using a 5 ml purge. The 10ml purge was not quite as efficient as the 5 ml purge but was definitely better than the 25 ml purge.

MDLs were lowest on many compounds using the 25 ml purge with many being comparable using 10 ml. It is important to note that the MDLs were not reduced be a factor of 5 when going from a 5 ml to 25 ml sample size.

Table 2. Calibration Data

Compound	Quant Ion	Cal Range (ppb)	Avg RF 5 ml	% RSD 5 ml	AVF RF 10 ml	% RSD 10 ml	Avg RF 25 ml	% RSD 25 ml
Fluorobenzene(I.S.)	96	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dichlorodifluoromethane	85	0.5-40	0.297	6.94	0.221	5.97	0.221	6.86
Chloromethane	50	0.5-40	0.336	9.56	0.303	4.68	0.319	5.13
Vinyl chloride	62	0.5-40	0.266	4.46	0.228	2.82	0.233	5.27
Bromomethane	94	0.5-40	0.206	6.19	0.182	4.91	0.181	6.96
Trichlorofluoromethane	101	0.5-40	0.597	5.86	0.433	5.54	0.450	5.22
Chloroethane	64	0.5-40	0.169	8.89	0.146	6.69	0.143	5.53
Ethyl ether	59	0.5-40	0.208	3.16	0.156	5	0.103	5.44
1,1-Dichloroethene	96	0.5-40	0.220	3.95	0.205	8.21	0.186	5.79
Carbon disulfide	76	0.5-40	0.714	5.02	0.668	3.61	0.656	5.60
Methyl iodide	142	0.5-40	0.453	4.18	0.407	3.8	0.388	5.07
Allyl chloride	76	0.5-40	0.153	7.41	0.136	4.12	0.133	5.87
Methylene chloride	84	0.5-40	0.256	6.52	0.234	4.64	0.190	7.0
Acetone	43	5-200	0.058	16	0.023	R=0.998	0.018	R=0.999
trans-1,2-Dichloroethene	96	0.5-40	0.269	7.65	0.250	6.81	0.236	4.25
Methyl tert-butyl ether	73	0.5-40	0.684	5.58	0.440	5.4	0.294	4.85
1,1-Dichloroethane	63	0.5-40	0.489	4.72	0.441	3.36	0.440	4.82
Acrylonitrile	52	1-40	0.072	11.46	0.029	10.05	0.019	14.42
cis-1,2-Dichloroethene	96	0.5-40	0.295	8.60	0.271	3.94	0.237	4.26
2,2-Dichloropropane	77	0.5-40	0.381	7.09	0.303	9.64	0.310	8.32
Bromochloromethane	128	0.5-40	0.153	7.44	0.130	6.36	0.084	6.26
Chloroform	83	0.5-40	0.578	4.56	0.519	4.9	0.489	8.54
Methyl acrylate	55	0.5-40	0.222	7.84	0.118	8.52	0.062	9.71
Carbon tetrachloride	117	0.5-40	0.533	5.6	0.409	4.48	0.434	5.48
Tetrahydrofuran	71	2.5-200	0.028	5.5	0.013	4.11	0.007	7.71
Dibromofluoromethane(S.S)	113	*	0.327	0.83	0.293	1.97	0.278	4.74
1,1,1-Trichlroroethane	97	0.5-40	0.533	4.71	0.433	5.03	0.456	5.41
2-Butanone	43	2.5-200	0.098	6.38	0.042	9.94	0.025	12.23
1,1-Dichloropropene	75	0.5-40	0.405	4.1	0.361	4	0.360	3.92
1-Chlorobutane	56	0.5-40	0.513	3.63	0.445	4.11	0.483	4.21
Benzene	78	0.5-40	1.039	3.36	1.001	4.12	0.934	4.27
Methacrylonitrile	67	0.5-40	0.103	6.46	0.056	8.26	0.028	5.47
Propionitrile	54	5-200	0.028	7.17	0.013	11.24	0.007	11.24
1,2-Dichloroethane-d4 (S.S.)	65	*	0.440	2.23	0.295	4.19	0.241	4.53
1,2-Dichloroethane	62	0.5-40	0.509	6.59	0.335	5.98	0.238	5.6
Trichloroethene	95	0.5-40	0.305	8.13	0.283	4.25	0.271	4.51
Dibromomethane	93	0.5-40	0.199	3.3	0.152	5.38	0.089	7.12
1,2-Dichloropropane	63	0.5-40	0.255	5.43	0.253	5.46	0.206	5.61
Bromodichloromethane	83	0.5-40	0.452	4.19	0.394	4.47	0.299	4.49
Methyl methacrylate	69	0. 5-40	0.140	14.41	0.084	11.86	0.044	11.75

Compound	Quant Ion	Cal Range (ppb)	Avg RF 5 ml	% RSD 5 ml	AVF RF 10 ml	% RSD 10 ml	Avg RF 25 ml	% RSD 25 ml
cis-1,3-Dichloropropene	75	0.5-40	0.401	6.77	0.345	11.34	0.259	11.7
Chlorobenzene-d5(I.S.)	117	0.5-40	N/A	N/A	N/A	N/A	N/A	N/A
Toluene-d8(S.S)	98	*	1.160	1.94	1.177	2.37	1.227	2.53
Toluene	92	0.5-40	0.805	6.44	0.821	5.25	0.822	5
Chloroacetonitrile	48	5-200	0.010	12.44	0.005	14.3	0.003	7.96
2-Nitropropane	41	2.5-200	0.104	1.52	0.045	7.55	0.027	3.92
1,1-Dichloro-2-propanone	43	2.5-200	0.239	5.8	0.113	5.52	0.066	4.09
4-Methyl-2-pentanone	43	2.5-200	0.281	9.99	0.145	7.39	0.088	9.93
Tetrachloroethene	166	0.5-40	0.447	10.09	0.455	5.76	0.432	3.96
trans-1,3-Dichloropropene	75	0.5-40	0.590	6.78	0.498	6.35	0.331	6.00
1,1,2-Trichloroethane	83	0.5-40	0.297	8.1	0.265	9.01	0.147	6.15
Ethyl methacrylate	69	0.5-40	0.388	7.94	0.272	8.55	0.152	12.75
Chlrodibromomethane	129	0.5-40	0.453	4.76	0.395	8.81	0.252	7.97
1,3-Dichloropropane	76	0.5-40	0.544	2.96	0.459	4.27	0.277	4.04
1,2-Dibromoethane	107	0.5-40	0.363	4.4	0.280	5.04	0.156	4.69
2-Hexanone	43	2.5-200	0.190	15.39	0.094	9.56	0.054	11.72
Chlorobenzene	112	0.5-40	0.999	4.54	1.035	3.53	0.939	3.38
Ethylbenzene	91	0.5-40	1.549	7.91	1.537	11.16	1.629	11.3
1,1,1,2-Tetrachloroethane	131	0.5-40	0.431	9.1	0.418	9.64	0.356	9.13
m,p-Xylenes	106	1-80	0.589	9.79	0.594	15.74	0.637	11.58
o-Xylene	106	0.5-40	0.497	11.6	0.505	11.96	0.546	10.51
Styrene	104	0.5-40	0.929	13.49	0.924	R=1.00	0.894	16.05
Bromoform	173	0.5-40	0.352	5.03	0.247	5.71	0.144	7.31
Isopropylbenzene	105	0.5-40	1.404	11.72	1.336	16.12	1.572	13.27
1,4-Dichlorobenzene-d4(I.S.)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4-Bromofluorobenzene(S.S)	95	*	0.865	2.76	0.842	4.11	0.840	3.18
Bromobenzene	156	0.5-40	0.880	6.69	0.862	4.74	0.745	3.84
n-Propylbenzene	91	0.5-40	3.482	5.32	3.494	8.28	4.028	10.93
1,1,2,2-Tetrachloroethane	83	0.5-40	0.911	7.3	0.707	12.78	0.370	7.29
2-Chlorotoluene	91	0.5-40	2.279	4.81	2.279	6.64	2.591	8.79
1,3,5-Trimethylbenzene	105	0.5-40	2.377	9.62	2.288	13.59	2.763	13.87
1,2,3-Trichloropropane	110	0.5-40	0.295	6.79	0.186	9.93	0.104	8.68
trans-1,4-Dichloro-2-butene	53	0.5-40	0.289	6.98	0.161	5.51	0.102	5.47
4-Chlorotoluene	91	0.5-40	2.091	8.57	2.170	9.22	2.350	10.36
tert-Butylbenzene	91	0.5-40	1.346	6.54	1.258	7.4	1.531	12.43
Pentachloroethane	167	0.5-40	0.601	9.51	0.548	14.95	0.487	9.81
1,2,4-Trimethylbenzene	105	0.5-40	2.376	11.03	2.317	14.27	2.748	14.66
sec-Butylbenzene	105	0.5-40	2.992	9.62	2.921	11.59	3.494	12.26
p-Isopropyltoluene	119	0.5-40	2.359	11.14	2.276	13.16	2.799	14.61
1,3-Dichlorobenzene	146	0.5-40	1.565	4.34	1.599	4.59	1.543	4.25
1,4-Dichlorobenzene	146	0.5-40	1.594	3.22	1.580	3.52	1.444	3.61
n-Butylbenzene	91	0.5-40	2.243	8.33	2.205	9.96	2.730	13.57

Compound	Quant Ion	Cal Range (ppb)	Avg RF 5 ml	% RSD 5 ml	AVF RF 10 ml	% RSD 10 ml	Avg RF 25 ml	% RSD 25 ml
Hexachloroethane	117	0.5-40	0.689	15.01	0.658	14.53	0.714	9.93
1,2-Dichlorobenzene	146	0.5-40	1.436	3.2	1.371	4	1.152	4.46
1,2-Dibromo-3-chloropropane	75	0.5-40	0.206	16.4	0.106	R=1.00	0.056	11.61
Nitrobenzene	51	5-200	0.030	7.22	0.013	R=0.999	0.008	11.11
Hexachlorobutadiene	225	0.5-40	0.524	12.19	0.489	13.05	0.542	5.93
1,2,4-Trichlorobenzene	180	0.5-40	0.903	6.59	0.783	4.52	0.729	11.49
Naphthalene	128	0.5-40	1.935	8.51	1.188	11.23	0.766	15.58
1,2,3-Trichlorobenzene	180	0.5-40	0.881	7.61	0.729	4.99	0.581	10.02

I.S. =Internal Standard S.S. = Surrogate Standard

*I.S.- S.S. for 5ml purge = 10ppb, 10ml purge = 5ppb, 25ml purge = 2ppb

Table 3. IDOC and MDL Results

Compound	MDL 5 ml	IDOC % REC 5ml	IDOC % RSD 5 ml	MDL 10 ml	IDOC % REC 10 ml	IDOC % RSD 10 ml	MDL 25 ml	IDOC % REC 25 ml	IDOC % RSD 25 ml
Dichlorodifluoromethane	0.094	95.7	5.77	0.109	97.2	4.44	0.094	93.3	6.29
Chloromethane	0.066	97.6	2.28	0.064	100	1.87	0.042	95.1	3.50
Vinyl chloride	0.074	102	3.32	0.089	104	2.63	0.062	99.8	5.23
Bromomethane	0.090	98.3	2.73	0.072	101	0.71	0.053	93.5	4.35
Trichlorofluoromethane	0.051	96.7	3.12	0.097	100	2.76	0.060	93.7	5.17
Chloroethane	0.096	92.1	1.35	0.124	99.7	1.94	0.076	98.7	5.07
Ethyl ether	0.110	98.9	3.98	0.077	102	2.29	0.049	97.5	2.39
1,1-Dichloroethene	0.099	101	3.15	0.078	98.9	3.48	0.042	97.0	4.37
Carbon disulfide	0.070	97.5	2.65	0.089	101	2.60	0.156	96.4	4.09
Methyl iodide	0.065	99.0	1.77	0.039	100	3.22	0.037	96.6	2.39
Allyl chloride	0.102	97.6	3.67	0.077	104	2.42	0.040	98.0	3.06
Methylene chloride	0.054	99.8	3.59	0.028	101	2.81	0.056	95.0	2.40
Acetone	3.48	106	9.52	1.79	111	3.70	1.627	97.1	7.73
trans-1,2-Dichloroethene	0.494	97.6	3.26	0.144	100	2.10	0.032	96.7	2.74
Methyl tert-butyl ether	0.097	97.3	2.85	0.063	101	3.94	0.050	98.9	1.49
1,1-Dichloroethane	0.046	99.0	2.97	0.024	103	2.66	0.022	98.16	1.94
Acrylonitrile	0.172	98.2	7.14	0.203	97.7	4.34	0.300	91.8	7.51
cis-1,2-Dichloroethene	0.104	96.1	2.88	0.070	101	2.54	0.037	98.3	1.97
2,2-Dichloropropane	0.094	98.9	2.76	0.060	96.1	5.79	0.046	91.0	4.28
Bromochloromethane	0.076	96.5	3.62	0.072	95.9	3.24	0.064	97.5	0.66
Chloroform	0.066	98.5	2.73	0.042	98.2	2.64	0.032	93.8	1.20
Methyl acrylate	0.086	99.4	3.78	0.106	98.4	1.57	0.116	100	2.93
Carbon tetrachloride	0.048	95.6	2.21	0.072	98.9	3.56	0.050	94.6	2.79
Tetrahydrofuran	0.596	98.3	4.75	0.568	98.4	2.06	0.717	97.8	4.55
Dibromofluoromethane(S.S)	0.888	95.4	2.02	0.357	96.7	2.31	0.136	93.2	2.03
1,1,1-Trichlroroethane	0.069	97.7	1.58	0.054	99.6	2.97	0.055	94.9	2.63
2-Butanone	0.851	102	3.77	0.396	97.7	2.95	0.678	94.6	1.21
1,1-Dichloropropene	0.077	99.1	2.77	0.079	103	1.48	0.032	99.5	3.39
1-Chlorobutane	0.205	103	1.85	0.096	103	2.01	0.089	98.1	2.22
Benzene	0.042	98.6	2.63	0.033	103	2.21	0.0616	98.9	1.90
Methacrylonitrile	0.141	98.2	1.91	0.154	97.2	2.25	0.139	100	3.80
Propionitrile	1.023	101	5.74	0.640	89.8	4.11	1.335	91.5	7.44
1,2-Dichloroethane-d4 (S.S.)	0.844	94.5	2.10	0.420	96.3	3.61	0.130	95.3	1.98
1,2-Dichloroethane	0.061	94.3	2.23	0.038	99.4	2.63	0.025	96.3	1.18
Trichloroethene	0.052	98.8	2.53	0.052	102	0.97	0.033	99.7	2.26
Dibromomethane	0.061	98.1	3.40	0.074	98.7	2.52	0.037	95.9	0.81
1,2-Dichloropropane	0.058	102	2.94	0.053	105	1.21	0.029	102	1.49
Bromodichloromethane	0.083	97.4	1.54	0.040	100	2.38	0.044	97.9	1.19

Compound	MDL 5 ml	IDOC % REC 5ml	IDOC % RSD 5 ml	MDL 10 ml	IDOC % REC 10 ml	IDOC % RSD 10 ml	MDL 25 ml	IDOC % REC 25 ml	IDOC % RSD 25 ml
Methyl methacrylate	0.128	104	4.23	0.087	103	1.43	0.083	104	1.91
cis-1,3-Dichloropropene	0.097	103	2.17	0.056	105	0.74	0.043	105	1.49
Toluene-d8(S.S)	0.584	98.2	0.2	0.182	97.6	0.53	0.099	100	1.08
Toluene	0.091	101	1.40	0.057	103	1.33	0.032	106	2.54
Chloroacetonitrile	1.418	110	2.35	2.096	101	7.08	1.476	90.6	8.03.
2-Nitropropane	0.490	99.7	2.51	0.528	94.0	2.82	0.333	98.1	1.47
1,1-Dichloro-2-propanone	0.355	102	2.51	0.322	98.0	1.92	0.228	100	2.21
4-Methyl-2-pentanone	0.331	110	2.57	0.275	106	3.70	0.145	107	1.18
Tetrachloroethene	0.053	98.6	2.08	0.088	98.2	1.55	0.053	98.4	3.81
trans-1,3-Dichloropropene	0.037	105	1.52	0.045	106	2.16	0.053	107	1.99
1,1,2-Trichloroethane	0.098	96.4	2.09	0.044	95.6	1.51	0.037	99.2	1.64
Ethyl methacrylate	0.094	104	2.56	0.071	103	2.25	0.034	112	1.28
Chlrodibromomethane	0.063	98.9	2.23	0.060	94.9	1.96	0.033	96.1	1.80
1,3-Dichloropropane	0.105	99.8	1.10	0.046	99.8	1.76	0.029	103	1.95
1,2-Dibromoethane	0.064	97.4	1.86	0.034	98.0	1.48	0.054	99.5	2.56
2-Hexanone	0.350	111	2.02	0.290	104	1.19	0.159	110	1.97
Chlorobenzene	0.497	108	1.18	0.040	102	1.37	0.044	103	1.67
Ethylbenzene	0.068	106	0.74	0.038	109	1.34	0.034	110	2.53
1,1,1,2-Tetrachloroethane	0.056	97.3	0.61	0.053	94.7	2.61	0.035	95.1	1.78
m,p-Xylenes	0.060	109	0.48	0.070	113	1.57	0.072	109	2.63
o-Xylene	0.055	108	1.53	0.023	105	2.80	0.047	109	1.92
Styrene	0.060	111	2.15	0.024	97.0	2.03	0.025	114	2.00
Bromoform	0.090	98.1	1.16	0.043	97.2	2.35	0.052	96.4	1.64
Isopropylbenzene	0.034	108	1.24	0.029	110	1.88	0.020	110	2.55
4-Bromofluorobenzene(S.S)	0.554	100	3.30	0.489	98.2	1.16	0.133	104	2.13
Bromobenzene	0.090	102	2.13	0.080	102	1.45	0.063	104	1.41
n-Propylbenzene	0.024	105	0.79	0.055	109	0.90	0.033	110	2.81
1,1,2,2-Tetrachloroethane	0.145	96.9	3.63	0.054	95.1	1.41	0.059	98.0	1.46
2-Chlorotoluene	0.042	104	1.49	0.042	108	0.92	0.042	107	2.51
1,3,5-Trimethylbenzene	0.036	108	1.87	0.038	116	1.55	0.032	111	2.59
1,2,3-Trichloropropane	0.148	96.1	2.83	0.118	98.9	2.37	0.152	95.1	1.55
trans-1,4-Dichloro-2-butene	0.203	102	2.09	0.087	102	3.98	0.188	101	2.23
4-Chlorotoluene	0.051	110	1.88	0.040	110	1.29	0.103	109	2.40
tert-Butylbenzene	0.048	105	1.37	0.070	105	1.47	0.050	111	3.02
Pentachloroethane	0.132	94	3.14	0.062	93.0	1.15	0.105	94.5	1.73
1,2,4-Trimethylbenzene	0.051	110	1.23	0.036	115	1.66	0.091	111	2.51
sec-Butylbenzene	0.024	109	1.29	0.059	114	0.75	0.045	110	2.96
p-Isopropyltoluene	0.046	109	1.78	0.038	112	1.44	0.054	111	3.50
1,3-Dichlorobenzene	0.047	102	1.52	0.039	104	1.80	0.054	101	1.58
1,4-Dichlorobenzene	0.036	99.0	1.67	0.031	103	1.46	0.048	102	1.41

Compound	MDL 5 ml	IDOC % REC 5ml	IDOC % RSD 5 ml	MDL 10 ml	IDOC % REC 10 ml	IDOC % RSD 10 ml	MDL 25 ml	IDOC % REC 25 ml	IDOC % RSD 25 ml
n-Butylbenzene	0.034	106	1.77	0.055	110	1.65	0.042	109	4.07
Hexachloroethane	0.079	90.5	1.47	0.060	94.6	2.17	0.055	93.6	2.73
1,2-Dichlorobenzene	0.071	102	1.54	0.028	104	2.25	0.059	103	1.47
1,2-Dibromo-3-chloropro-pane	0.191	88	2.64	0.282	108	2.63	0.204	94.0	1.80
Nitrobenzene	1.864	98.7	2.94	1.893	104	5.49	2.80	95.1	0.59
Hexachlorobutadiene	0.100	95.1	2.72	0.080	93.6	5.38	0.058	90.6	7.22
1,2,4-Trichlorobenzene	0.076	97.2	32.	0.067	99.0	3.90	0.065	97.2	5.34
Naphthalene	0.078	99.3	2.77	0.067	97.4	3.17	0.064	99.8	3.49
1,2,3-Trichlorobenzene	0.091	99.8	3.63	0.083	99.2	4.49	0.063	98.8	7.14

S.S. = Surrogate Standard

* S.S. for 5ml purge = 10ppb, 10ml purge = 5ppb, 25ml purge = 2ppb

Figure 2. 5 ml 10 ppb Standard

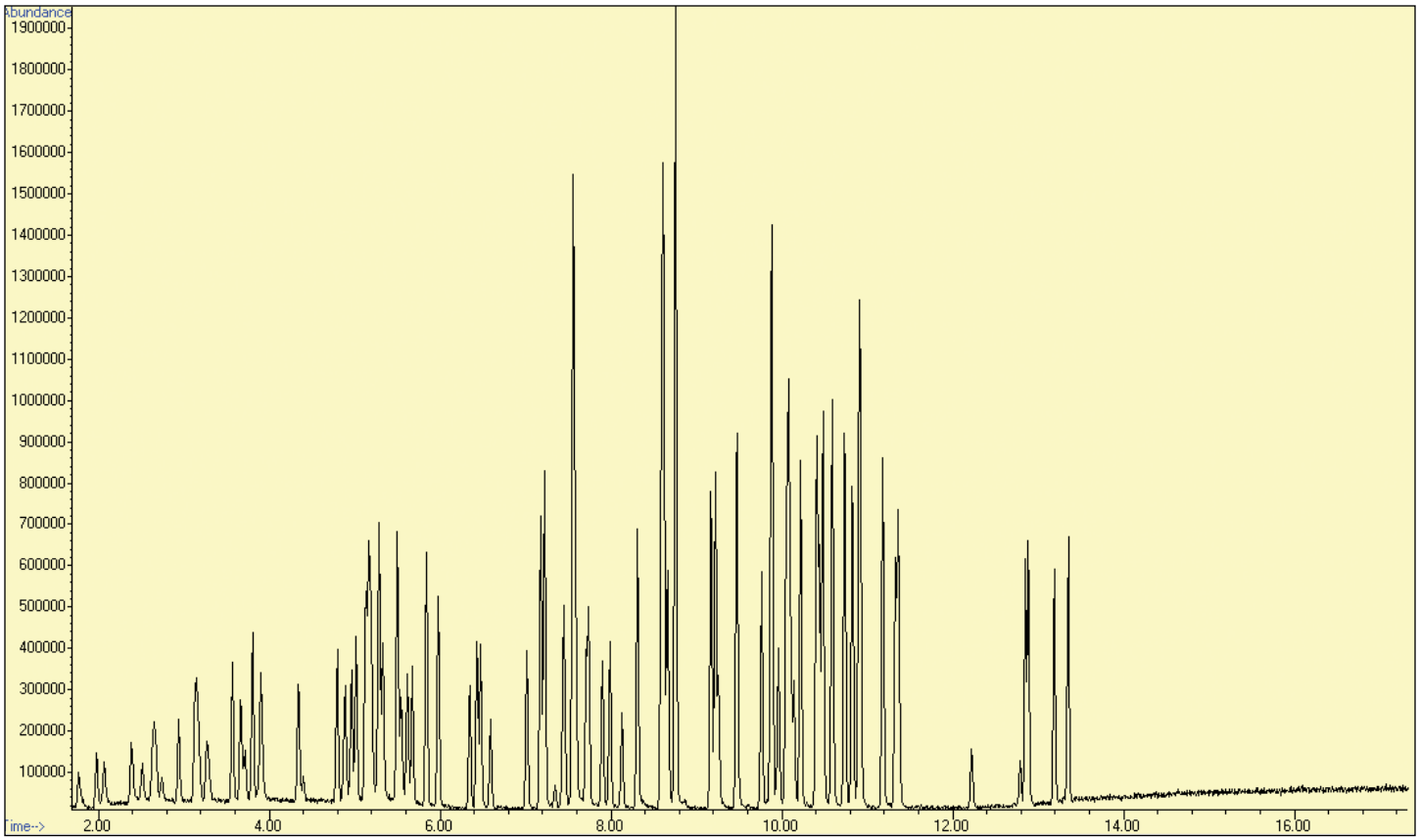


Figure 3. 5 ml Blank

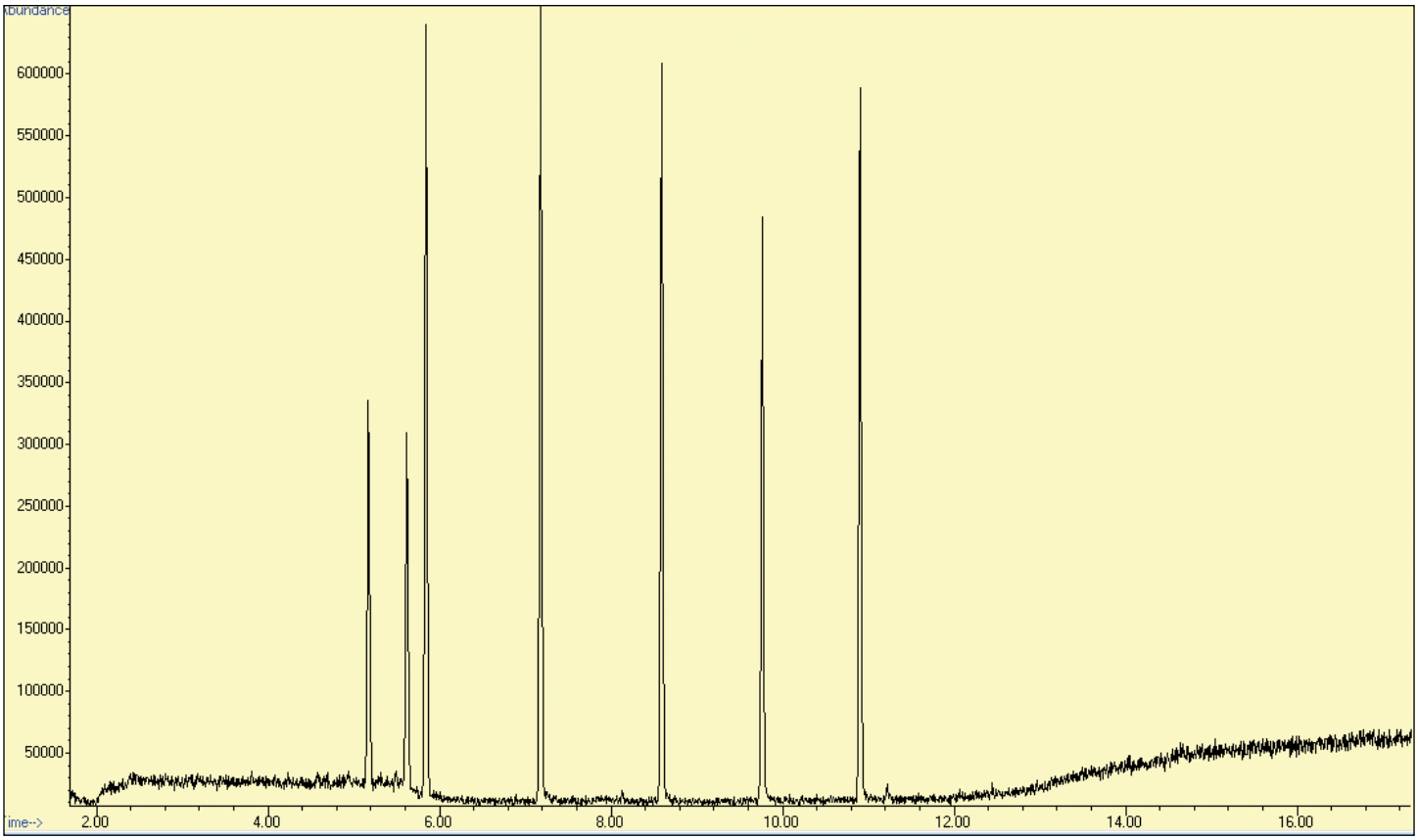


Figure 4. 10 ml 10 ppb Standard

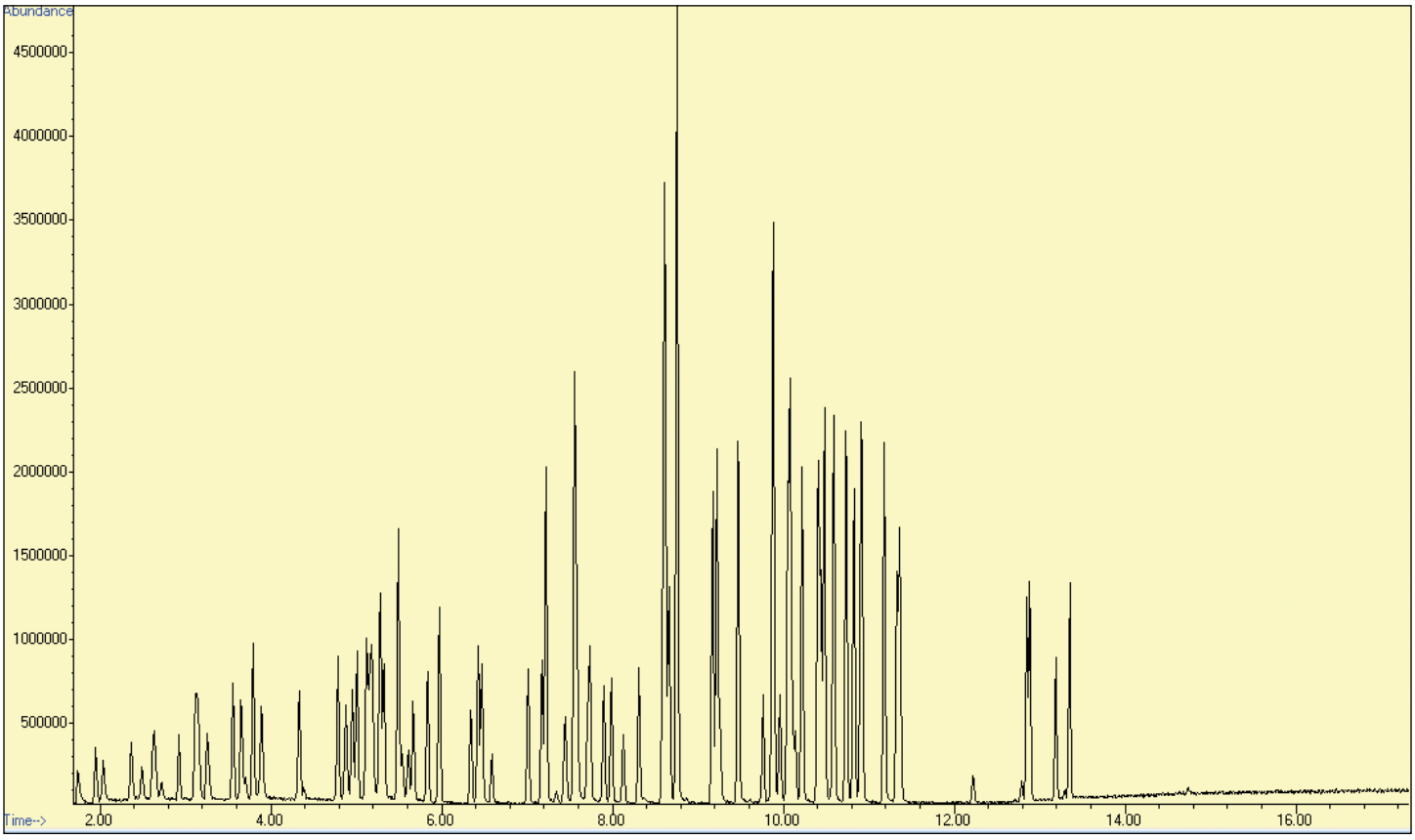


Figure 5. 10 ml Blank

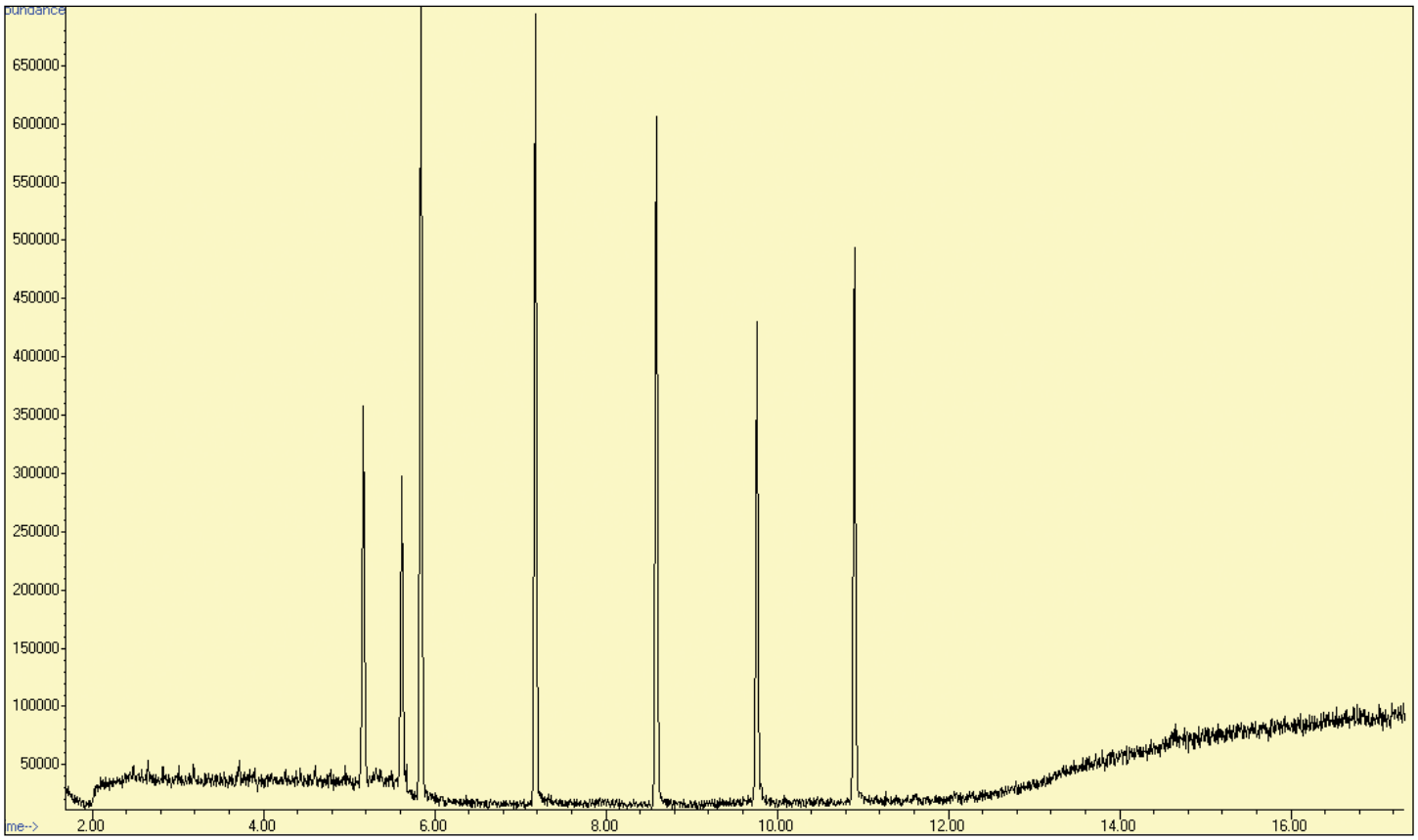


Figure 6. 25 ml 10 ppb Standard

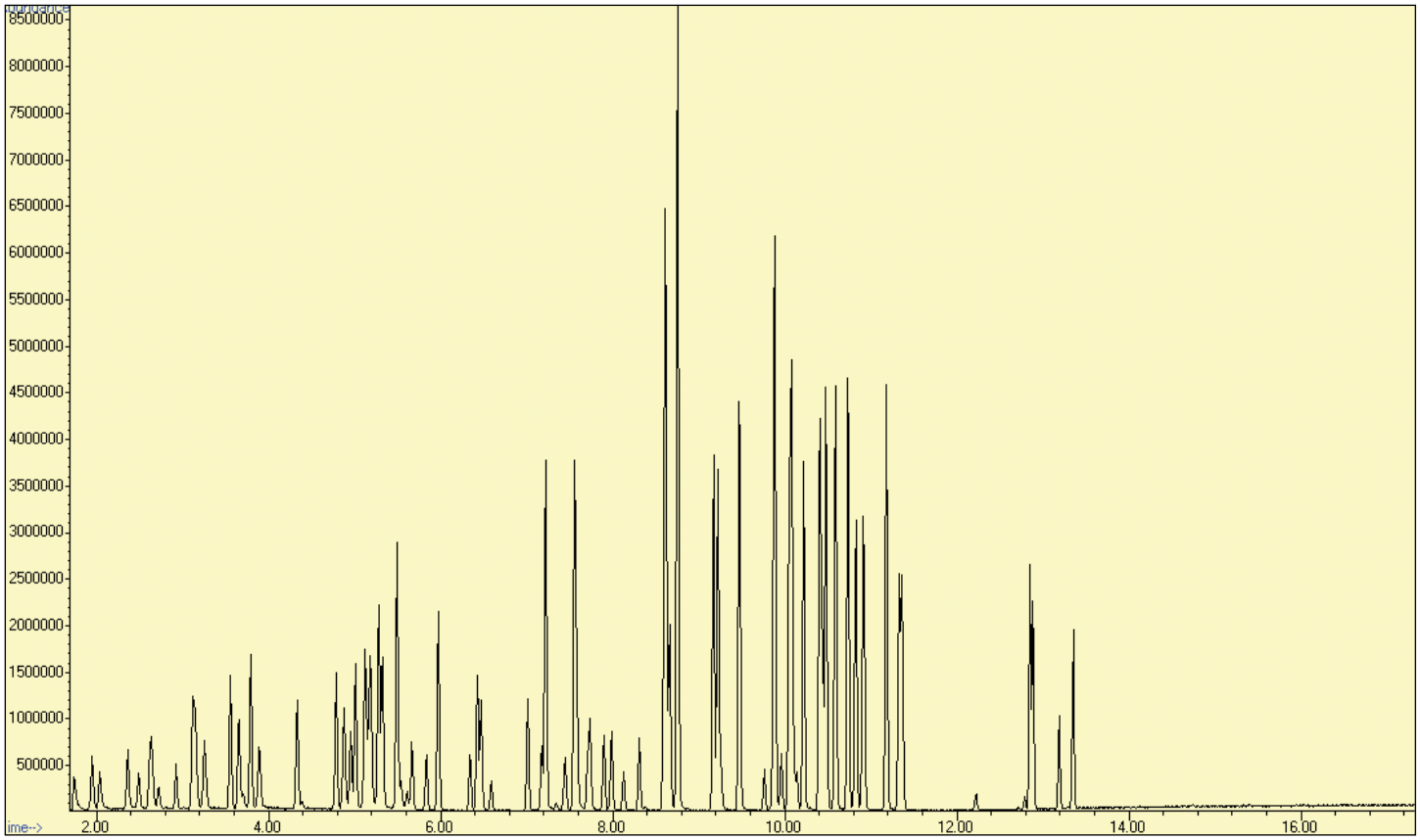
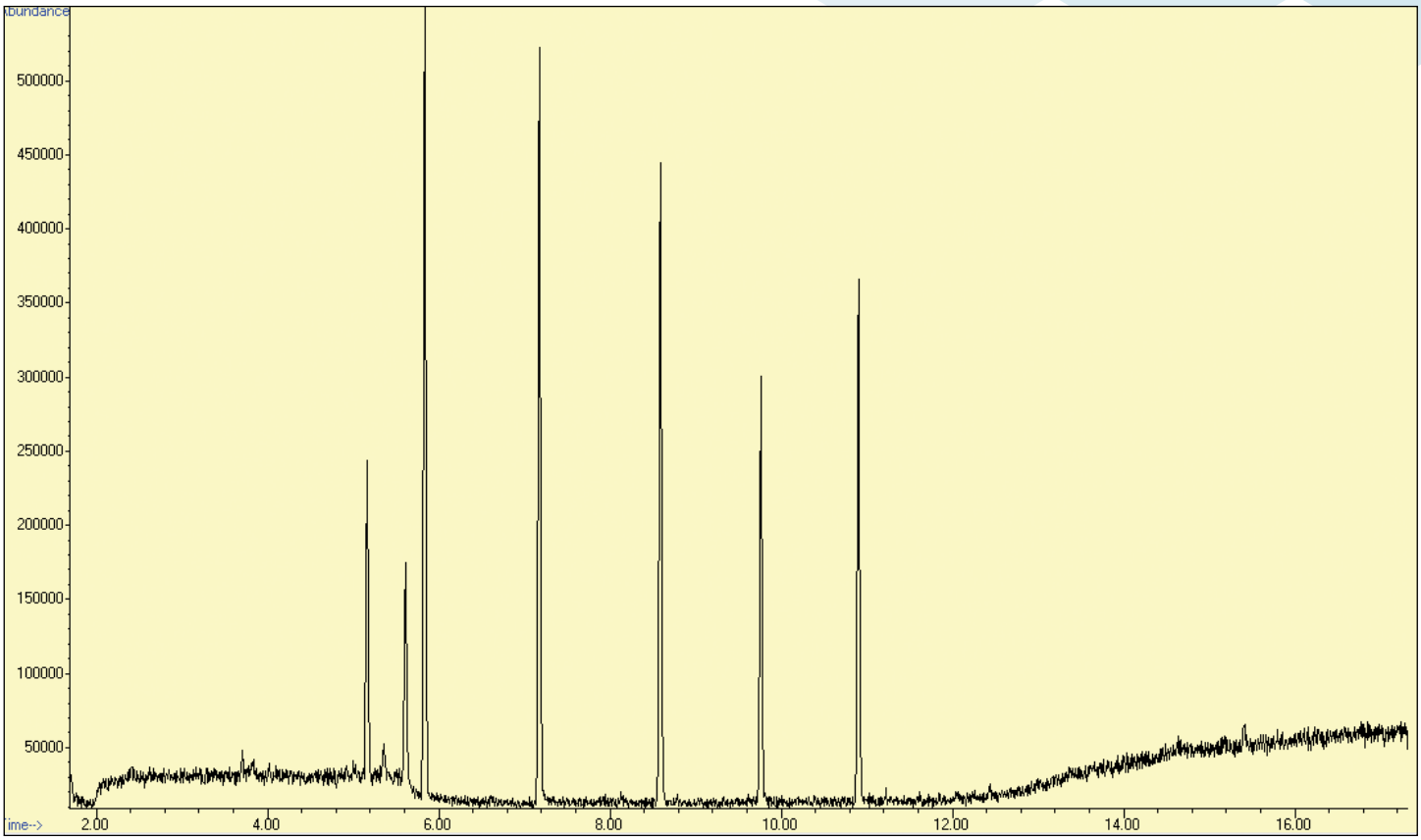


Figure 7. 25 ml Blank



Conclusion

In general the 5ml sample size gave better results for response while the 25ml sample size yielding better MDLs. With the 10ml purge falling in between it looks to be a good compromise between the two.

The instrument configuration and operating conditions described here for volatile organics analysis produce excellent method performance for the target analytes specified in USEPA Method 524.2. The system is cost-effective and easy to use and maintain. Optimized purge and trap design and method parameters permit fairly rapid cycle time and stable results resulting in efficient sample throughput in the laboratory.

Reference

Method 524.2, Revision 4.1, Measurement of Purgeable Organic Compounds in Water by Capillary Column Gas Chromatography/Mass Spectrometry. U.S. Environmental Protection Agency. Cincinnati, Ohio. 1995.

SW-846 Method 8260D, Revision 4, Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry

(GC/MS). U.S. Environmental Protection Agency. Cincinnati, Ohio. 2018.

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