Technical Note: 10140

Maximizing Speed and Separations for Semi-Volatile Analysis on the DSQ II GC/MS Using EPA Method 8270D

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Key Words

- DSQ II GC/MS
- EnviroLab Forms 2.0 Software
- Split Injection Method
- US EPA Method 8270D

Overview

Summary

A method was developed using the DSQ™ II Series GC/MS which allows analysts to easily and reliably meet EPA Method 8270D performance criteria. The method successfully lowers the cost of analysis by using method parameters which increase the lifetime of consumable parts and decrease the frequency of instrument maintenance. Instrument productivity is increased by selecting parameters which allow for a short run time of analysis. The utility and ease of use of EnviroLab™ Forms 2.0 layered application software to perform the 8270D method is also highlighted.

Methods

A split injection was used to maintain a clean system and to prolong the lifetime of consumable parts. An elevated flow rate of 3 mL/min was used with a TRACE™ TR-8270 column, (30 m, 0.25 mm, 0.5 µm, P/N 26RF223P) to reduce the residence time of analytes in the column and to shorten analysis time. The contact of target compounds with active sites in the column was minimized.

Results

Analysis time of the 120 BNA target compounds and internal standards was less than 20 minutes, as measured from injection to detection of the final eluting compound. Over a concentration range of 5 to 160 ng/µL, the 120 base, neutral and acid (BNA) compounds analyzed had an average RSD of 7%. The average instrument detection limit (IDL) at a 99% confidence level was determined to be 0.180 ng/µL. Ten replicate injections were made at 50 ng/µL resulting in an average RSD for the 120 target compounds of 2.0%.

Introduction

Environmental laboratories performing EPA Method 8270D require quick start ups, minimal maintenance, and high throughput. In the analysis of semi-volatiles for this method, several quality control checks are put into place to assist the analyst in keeping the entire instrument in control. The diverse compound classes analyzed, including phenols, amines, aromatics, alcohols, and solvents, increase the difficulty in maintaining operation within control limits. Several factors directly affect the precision and accuracy of the analysis: the injection, the separation, and the detection.

This analysis details optimization of the above parameters utilizing a TRACE GC Ultra™, AS3000 liquid autosampler, and the single quadrupole DSQ™ II mass spectrometer. It is also designed to reduce the contact of target compounds with active sites in the column, which leads to a reduction in the residence time of analytes and increases the speed of analysis.

The EPA Method 8270 Productivity Solution (Thermo Scientific P/N 120291-kit), was used for this study. The solution-oriented package is designed to transform an instrument system into an application-specific analyzer. Prior knowledge of the method is not required for the successful validation of the instrument to occur in less than three days by running a tuning check compound, calibration curve, and instrument detection limit study. EnviroLab Forms 2.0 reporting software links the appropriate instrument and processing methods from the acquisition software, Xcalibur™, so the batches can be run automatically. The Productivity Solution contains two manuals: Standard Operating Procedure, How to User Guide with removable Quick Start Guide, all of the consumables required for operation of the instrument for a two-week period, and three CDs: EnviroLab Forms Software, Interactive EPA Method 8270 Productivity Solution, and Factory Validation Data. The Productivity Solution also includes a column, liners, septa, ferrules, standard solutions, and easily replaceable ion volumes via the vacuum interlock.

Methods

Instrument Parameters

AS 3000 Autosampler:

Hot Needle Injection: 5 sec pre-injection delay
(0.5 µL air gap) with 5 µL syringe
Injection Volume: 1 µL
Injection Depth: Standard

TRACE GC Ultra:

Inlet Temperature: 250 °C
Injection Mode: Split
Split Flow: 60 cc/min
Oven Program: 40 °C, 0.5 min; 14 °C/min, 90 °C;
22 °C/min., 310 °C, 8 min.
Column: TRACE TR-8270; 30 m, 0.25 mm, 0.5 µm;
P/N 26RF223P
Constant Column Flow: 3 mL/min
Transferline Temperature: 310 °C

Thermo SCIENTIFIC

DSQ II Mass Spectrometer:

Ion Source Temperature: 275 °C
Filament Delay: 2.2 min
Chrom Filter Width: 2.5 seconds
Detector Gain: 0.8 (1332 V)
Emission Current: 25 µamps
Full Scan : 35-500 m/z at 5 scans/sec

Sample Injection

A 1 µL injection was made in the split mode with a split flow of 60 cc/min and a column flow of 3 cc/min. Either a split or splitless injection may be used as specified in EPA Method 8270D. (For splitless injection, a different column is recommended: TRACE TR-8270 30 m, 0.25 mm ID with 1.0 µm film.[1] Excellent sensitivity in full scan mode of the DSQ II allows the split injection to be utilized, thus splitting the bulk of the sample matrix away from the analytical column and mass spectrometer. This results in less instrument maintenance and more time for sample analysis. The Total Ion Chromatogram (TIC) for the mid level standard is shown in Figure 1. Note the separation and symmetrical peak shape for the first elutors: N-nitrosodimethylamine (NDMA) and pyridine at 2.46 minutes (Figure 2). These target compounds can be adversely affected by co-eluting solvents. The final peaks are the less volatile polynuclear aromatics (PNAs), which also show excellent peak symmetry. Excellent chromatography reduces the number of components requiring manual integrations, which leads to faster data reviewing; but more importantly, better precision and accuracy in a less than 20 minute run time.

SSL injectors operated at an elevated injection temperature of 275 °C to 300 °C can be problematic since more septum bleed is transferred to the column and the mass spectrometer. Also, liner deactivation is decreased more rapidly at temperatures above 250 °C, resulting in more frequent liner replacements. However, the method developed in this study used a hot needle injection technique at 250 °C, which requires that the autosampler draw an air gap after the sample is drawn up into the syringe. The needle is then inserted into the injector and allowed to heat for a period of time. The plunger is depressed quickly. This injection technique gives the best reproducibility with minimal discrimination for the high boiling point compounds. As shown in Figure 3, the first injection of the day was free of septum bleed peaks, and the peak shape for the performance mix did not show excessive tailing of benzidine or pentachlorophenol, and no breakdown products for DDT were observed. The liner selected was a standard deactivated 5 mm splitless liner. To avoid irreversible adsorption of phenolic compounds, no glass wool was used.

Compound	5 ng/µL	10 ng/µL	20 ng/µL	40 ng/µL	80 ng/µL	160 ng/µL	Ave. RF	% RSD
N-nitroso-di-N-propylamine	0.649	0.659	0.718	0.681	0.723	0.702	0.689	4
hexachlorocyclopentadiene	0.185	0.199	0.209	0.225	0.227	0.232	0.213	9
2,4-dinitrophenol	0.068	0.085	0.102	0.114	0.128	0.14	0.106	25
4-nitrophenol	0.148	0.164	0.188	0.2	0.213	0.232	0.191	16

Table 1: Response Factors for SPCCs from Calibration Curve

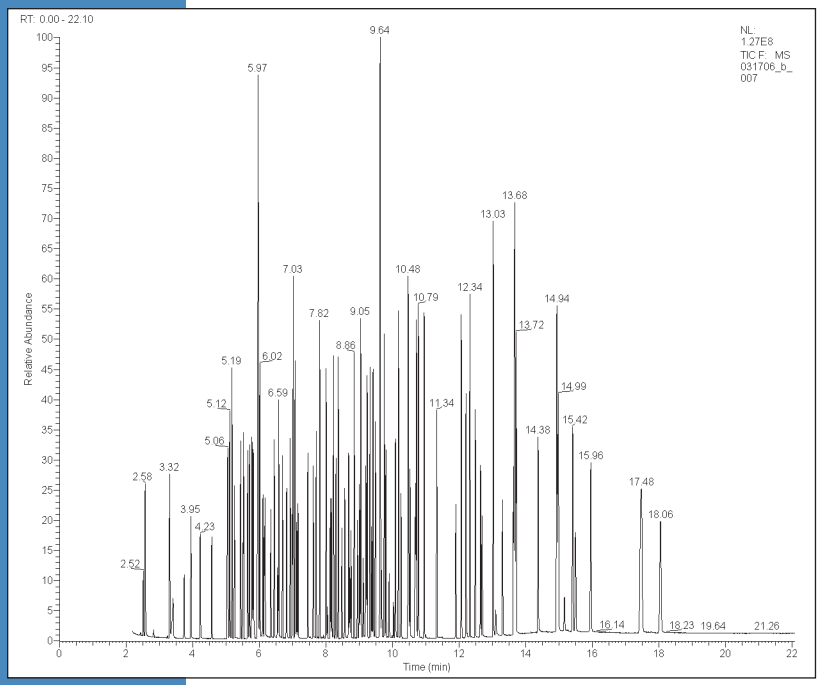

Figure 1: TIC of Mid Point Standard 40 ng/µL

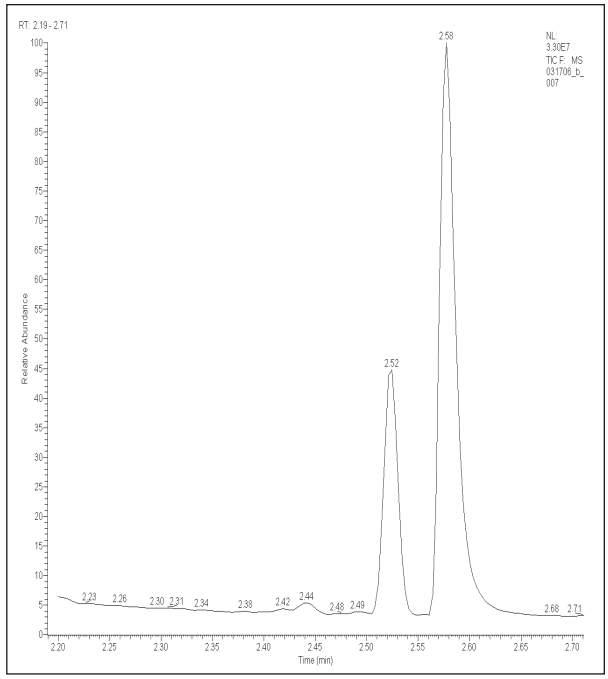

Figure 2: Separation of NDMA (2.52 min.) and Pyridine (2.58 min.)

Separation

A 5% phenyl 95% dimethylpolysiloxane phase TR-8270 column with dimensions of 0.25 mm x 30 m and a film thickness of 0.5 µm was used (P/N 26RF223P). The column and inlet are tested for activity by injecting the performance mix at the start of the shift (Figure 3). A calibration curve or mid point check standard is then run. The system performance check compounds (SPCCs) must have response factors of > 0.05 to ensure that there is minimal activity in the column and liner for the more active compounds: N-nitrosodi-N-propylamine, hexachlorocyclopentadiene, 2,4-dinitrophenol, and 4-nitrophenol. The SPCC RFs for the calibration curve are listed in Table 1. The scan rate was set to 5 scans/second. Some critical separations for target compounds with identical mass ions are shown in Figures 4, 5, and 6.

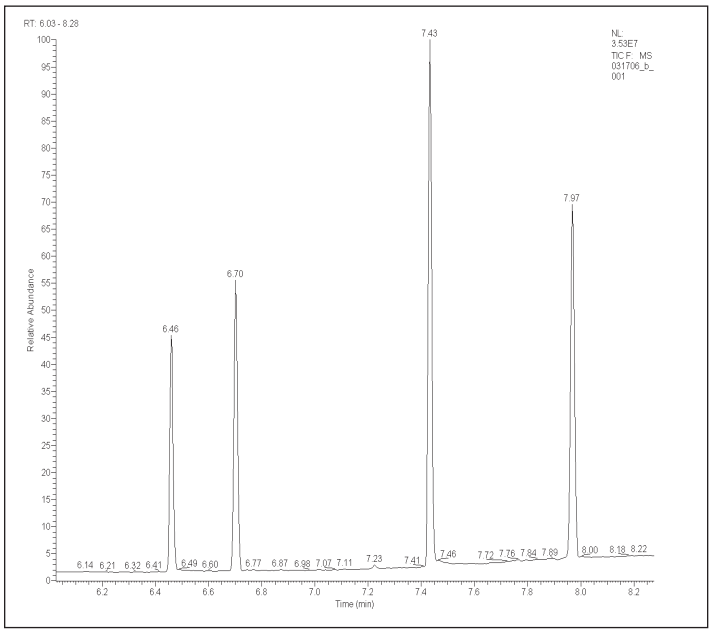

Figure 3: Injection of Performance Mix, 50 ng Pentachlorophenol, DFTPP, Benzidine, DDT

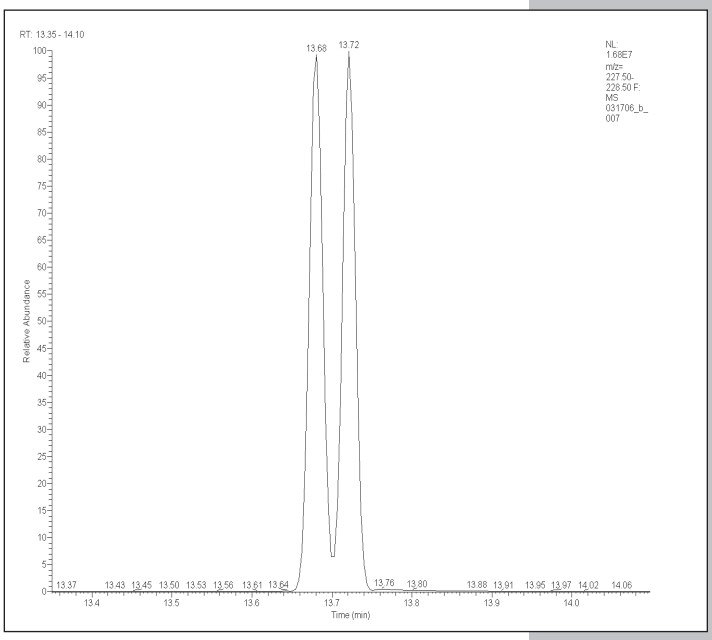

Figure 5: Benzo(a)anthracene and Chrysene (m/z 228)

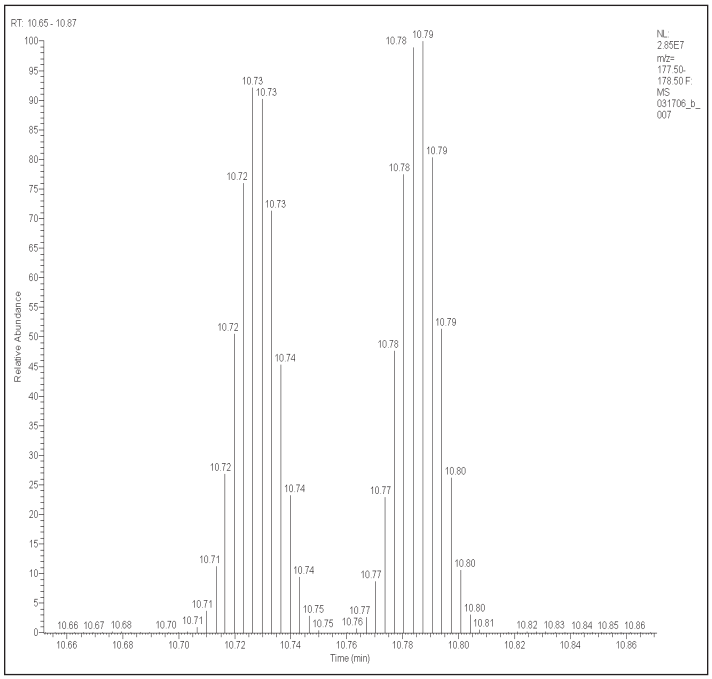

Figure 4: Separation of Phenanthrene and Anthracene (m/z 178) 12 scans across each 2.4 second wide peak

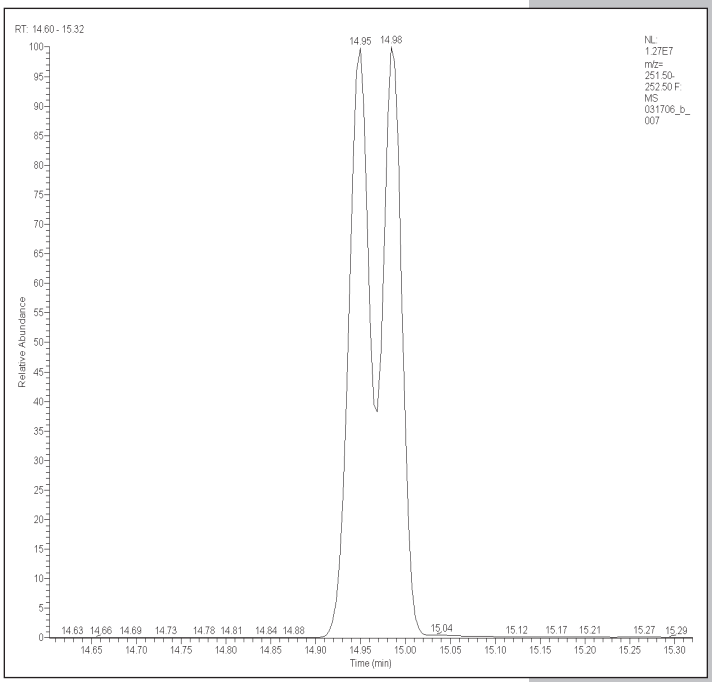

Figure 6: Benzo (b & k) Fluoranthene (m/z 252)

Detection

The mass spectrometer is tuned automatically via Target Tuning software to meet the tuning criteria for DFTPP (Figures 7 and 8). A typical spectrum for DFTPP is shown in Figure 9 and an EnviroLab™ Forms 2.0 Tune Report in Figure 10. The emission current and multiplier voltage are then set to provide good sensitivity and a linear working range of 5 to 160 ng/µL for all 120 compounds in this method. The ion volume is constructed of a material that virtually eliminates irreversible adsorption of the more active compounds in the target list. The results for the linearity study are shown in Table 2. The IDLs were determined by replicate injections of 1 ng/µL (Table 3).

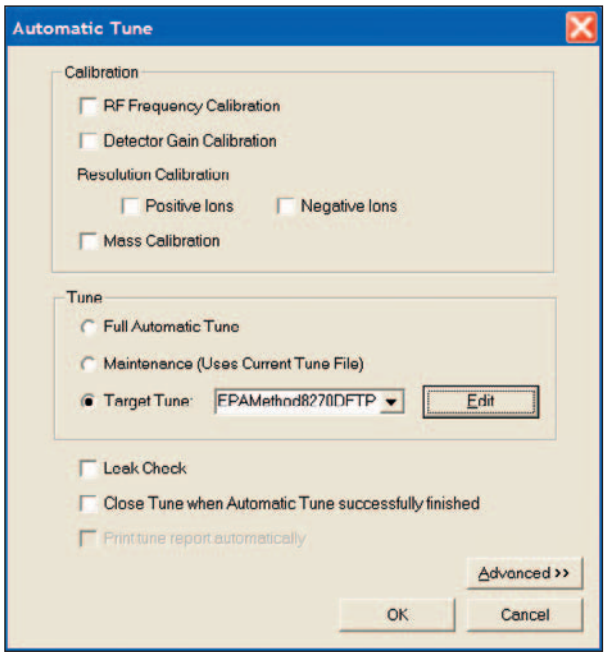

Figure 7: Launching Target Tune for DFTPP

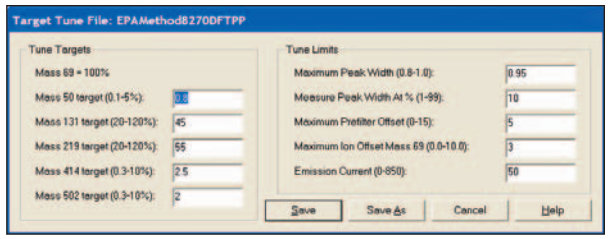

Figure 8: Target Tune Parameters for DFTPP

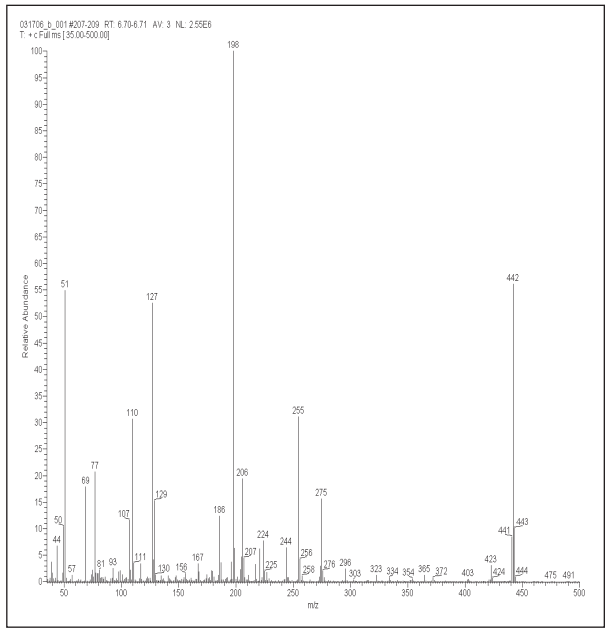

Figure 9: DFTPP Spectrum

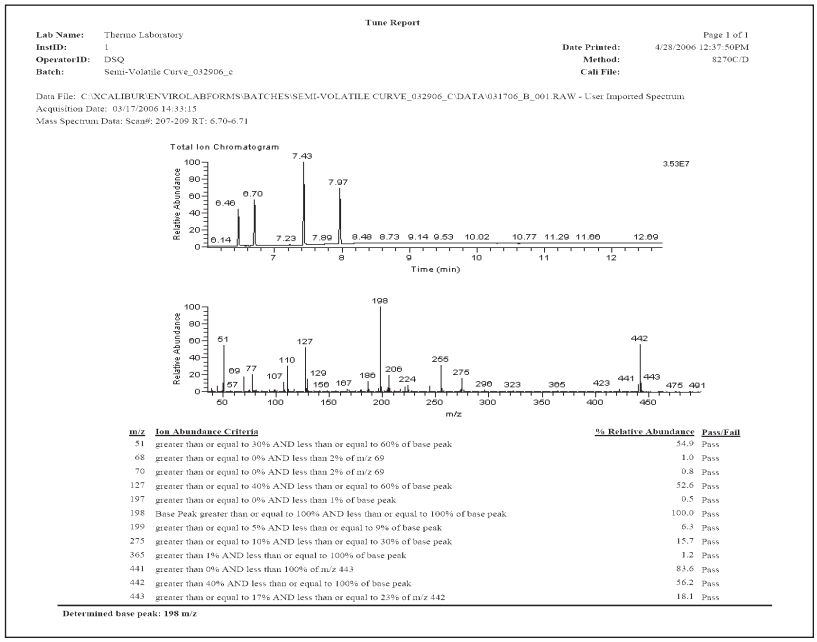

Figure 10: DFTPP Tune Report

Calibration Report

Lab Name:	Thermo Scientific Laboratory
Inst ID:	Thermo Scientific GC-MS
Method:	EPAMethod8270Curve_032406_h.mext
Operator ID:	Thermo Scientific User (EPAMethod8270)
Batch:	EPAMethod8270Curve_032406_h
Cali File:	EPAMethod8270Curve_032406_h.cxml

Compound Name	1	2	3	4	5	6		RRF	% RSD or R^2
N-Nitrosodimethylamine	0.539	0.554	0.566	0.567	0.566	0.557	A	0.558	1.96
Pyridine_RCRA	1.832	1.920	2.011	1.924	1.911	1.876	A	1.912	3.12
2-Picoline	2.105	2.121	2.277	2.041	2.148	2.123	A	2.136	3.65
N-Nitrosomethylethylamine	0.942	0.960	0.981	0.948	0.964	0.963	A	0.960	1.40
Methyl_methanesulfonate	0.696	0.684	0.689	0.610	0.567	0.545	A	0.632	10.57
2-fluorophenol(sur)	1.507	1.600	1.669	1.626	1.609	1.665	A	1.613	3.66
N-Nitrosodiethylamine_APP	0.838	0.848	0.937	0.897	0.914	0.935	A	0.895	4.77
Ethyl_methanesulfonate	1.075	1.135	1.155	1.103	1.095	1.078	A	1.107	2.88
phenol-d5(sur)	1.883	1.963	2.076	2.104	2.122	2.054	A	2.034	4.54
Phenol(CCC)	2.118	2.190	2.335	2.327	2.410	2.312	A	2.282	4.70
Aniline	2.560	2.910	3.127	3.039	3.054	3.058	A	2.958	7.01
Bis(2-chloroethyl)ether	1.971	1.997	1.999	1.985	1.976	1.967	A	1.982	0.67
Pentachloroethane	0.455	0.486	0.481	0.478	0.472	0.468	A	0.473	2.30
2-chlorophenol	1.563	1.649	1.736	1.707	1.790	1.782	A	1.704	5.07
1,3-Dichlorobenzene	1.631	1.627	1.702	1.635	1.640	1.580	A	1.636	2.38
1,4-Dichlorobenzene(CCC)	1.651	1.644	1.719	1.625	1.668	1.619	A	1.654	2.19
Benzyl_alcohol	1.027	1.055	1.071	1.102	1.109	1.117	A	1.080	3.26
1,2-Dichlorobenzene	1.544	1.535	1.599	1.572	1.585	1.513	A	1.558	2.10
2-methylphenol	1.282	1.309	1.372	1.359	1.408	1.395	A	1.354	3.64
1,4-DICHLOROBENZENE-D4_(IS)	3881060	4044654	4176190	4183477	3740226	3803909	I	4.80	
Bis(2-chloroisopropyl)ether	3.677	3.679	3.770	3.737	4.015	4.010	A	3.815	4.12
N-Nitrosopyrrolidine_APP9	0.798	0.863	0.889	0.916	1.032	1.038	A	0.923	10.36
3-Methylphenol&4-methylp	1.628	1.711	1.813	1.747	1.859	1.764	A	1.754	4.59
Acetophenone	0.681	0.702	0.699	0.693	0.717	0.658	A	0.692	2.94
o-toluidine_APP9	0.712	0.785	0.800	0.766	0.810	0.800	A	0.779	4.63
N-Nitroso-di-N-propylamine	0.649	0.659	0.718	0.681	0.723	0.702	A	0.689	4.48
Hexachloroethane	0.650	0.658	0.675	0.650	0.662	0.666	A	0.660	1.44
nitrobenzene-d5(sur)	0.283	0.289	0.299	0.323	0.338	0.348	A	0.313	8.60
Nitrobenzene	0.141	0.151	0.152	0.156	0.173	0.177	A	0.158	8.83
N-Nitrosopiperidine	0.245	0.259	0.274	0.276	0.292	0.287	A	0.272	6.42
Isophorone	0.755	0.803	0.820	0.786	0.830	0.812	A	0.801	3.37
2-Nitrophenol(CCC)	0.112	0.121	0.128	0.128	0.140	0.141	A	0.128	8.50
2,4-Dimethylphenol	0.427	0.457	0.456	0.460	0.467	0.476	A	0.457	3.61
Bis(2-chloroethoxy)methane	0.618	0.644	0.659	0.656	0.695	0.682	A	0.659	4.19
2,4-Dichlorophenol(CCC)	0.220	0.243	0.257	0.260	0.279	0.277	A	0.256	8.63
1,2,4-Trichlorobenzene	0.346	0.353	0.361	0.349	0.355	0.328	A	0.349	3.26
NAPHTHALENE-D8_(IS)	14246670	14599310	15578546	15395766	13563182	13922405	I	5.53	
Naphthalene	1.480	1.515	1.483	1.477	1.525	1.403	A	1.480	2.90
2,6-Dichlorophenol	0.232	0.233	0.247	0.257	0.274	0.270	A	0.252	7.12
p-Chloroaniline	0.576	0.646	0.651	0.647	0.660	0.635	A	0.636	4.77
Hexachloropropene_APP9	0.136	0.151	0.151	0.146	0.157	0.150	A	0.148	4.75
Hexachlorobutadiene(CCC)	0.119	0.122	0.121	0.117	0.124	0.116	A	0.120	2.58
N-Nitroso-di-N-butylamine	0.280	0.307	0.302	0.304	0.328	0.323	A	0.308	5.60
4-Chloro-3-methylphenol(C	0.332	0.358	0.360	0.359	0.374	0.364	A	0.358	3.90
Safrole_APP9	0.275	0.294	0.295	0.280	0.300	0.287	A	0.288	3.35
2-Methylnaphthalene	0.764	0.798	0.776	0.750	0.787	0.734	A	0.768	3.07
1,2,4,5-Tetrachlorobenzene	0.544	0.546	0.591	0.575	0.575	0.559	A	0.565	3.29
Hexachlorocyclopentadiene	0.185	0.199	0.209	0.225	0.227	0.232	A	0.213	8.66

2,4,5-Trichlorophenol	0.248	0.258	0.287	0.291	0.302	0.318	A	0.284	9.29
2,4,6-Trichlorophenol(CCC)	0.280	0.294	0.331	0.346	0.355	0.372	A	0.330	10.88
2-fluorobiphenyl(sur)	1.366	1.344	1.418	1.465	1.373	1.394	A	1.393	3.13
Isosafrole_APP9	0.250	0.247	0.274	0.267	0.255	0.256	A	0.258	4.00
2-Chloronaphthalene	1.217	1.235	1.296	1.294	1.249	1.232	A	1.254	2.67
2-nitroaniline	0.243	0.257	0.295	0.321	0.337	0.36		0.302	0.9992
1,4-Naphthoquinone_APP9	0.351	0.389	0.447	0.474	0.486	0.495	A	0.440	13.18
Dimethyl_phthalate	1.279	1.269	1.350	1.394	1.328	1.336	A	1.326	3.49
1,3-dinitrobenzene	0.107	0.115	0.14	0.146	0.151	0.161		0.136	0.9993
2,6-dinitrotoluene	0.178	0.193	0.218	0.22	0.233	0.251		0.216	0.9989
Acenaphthylene	1.884	1.912	2.031	2.022	1.988	1.979	A	1.969	3.01
3-nitroaniline	0.206	0.24	0.262	0.278	0.302	0.324		0.268	0.9988
ACENAPHTHENE-D10_(IS)	7959056	8557005	8437560	8148218	7736601	7601387	I	4.70	
Acenaphthene(CCC)	1.187	1.190	1.233	1.210	1.203	1.180	A	1.201	1.63
2,4-dinitrophenol	0.068	0.085	0.102	0.114	0.128	0.14		0.106	0.9982
4-nitrophenol	0.148	0.164	0.188	0.2	0.213	0.232		0.191	0.9986
Pentachlorobenzene	0.347	0.346	0.363	0.363	0.368	0.364	A	0.359	2.67
2,4-dinitrotoluene	0.222	0.246	0.281	0.292	0.309	0.328		0.28	0.9993
Dibenzofuran	1.720	1.705	1.849	1.809	1.722	1.680	A	1.748	3.79
1-Naphthylamine	0.923	1.128	1.284	1.340	1.338	1.351	A	1.227	13.92
2,3,4,6-Tetrachlorophenol	0.146	0.156	0.169	0.171	0.183	0.190	A	0.169	9.54
2-Naphthylamine	0.994	1.286	1.339	1.404	1.414	1.385	A	1.304	12.21
Diethyl_Phthalate	1.185	1.272	1.339	1.348	1.369	1.361	A	1.312	5.43
4-Chlorophenyl_phenyl_eth	0.719	0.725	0.762	0.724	0.760	0.705	A	0.732	3.15
5-nitro-o-toluidine	0.243	0.265	0.301	0.32	0.352	0.37		0.308	0.9993
Fluorene	1.385	1.354	1.389	1.352	1.326	1.252	A	1.343	3.75
4-nitroaniline	0.225	0.252	0.287	0.307	0.331	0.343		0.291	0.9997
2-methyl-4,6-dinitrophenol	0.066	0.073	0.086	0.089	0.105	0.104		0.087	0.9990
Diphenylamine(CCC)	0.773	0.771	0.796	0.772	0.779	0.751	A	0.774	1.88
Azobenzene	0.451	0.441	0.462	0.442	0.469	0.508	A	0.462	5.36
2,4,6-tribromophenol(sur)	0.091	0.091	0.103	0.103	0.114	0.118	A	0.103	10.86
1,3,5-Trinitrobenzene_APP9	0.047	0.050	0.056	0.057	0.060	0.063	A	0.055	10.74
Phenacetin	0.320	0.359	0.396	0.398	0.424	0.410	A	0.384	9.93
4-Bromophenyl_phenyl_eth	0.182	0.187	0.194	0.190	0.201	0.197	A	0.192	3.73
Diallate_APP9	0.298	0.304	0.317	0.313	0.331	0.315	A	0.313	3.64
Hexachlorobenzene	0.190	0.189	0.202	0.184	0.191	0.178	A	0.189	4.27
4-Aminobiphenyl	0.813	0.909	0.997	0.948	0.990	0.911	A	0.928	7.27
Pentachlorophenol(CCC)	0.075	0.080	0.088	0.087	0.094	0.095	A	0.087	9.10
Pentachloronitrobenzene	0.038	0.039	0.042	0.041	0.045	0.045	A	0.042	6.92
Pronamide	0.272	0.286	0.305	0.304	0.313	0.301	A	0.297	5.00
dinoseb	0.078	0.098	0.119	0.124	0.142	0.149		0.118	0.9990
PHENANTHRENE_D10	12048839	13118470	12950023	12712263	11813606	11880964	I	4.63	
Phenanthrene	1.269	1.237	1.266	1.232	1.215	1.218	A	1.239	1.87
Anthracene	1.280	1.255	1.305	1.285	1.301	1.242	A	1.278	1.96
Carbazole_app9	1.301	1.309	1.339	1.298	1.309	1.256	A	1.302	2.05
Di-N-butyl_phthalate	1.163	1.222	1.349	1.355	1.412	1.407	A	1.318	7.75
Isodrin_APP9	0.122	0.121	0.125	0.119	0.126	0.122	A	0.122	2.14
Fluoranthene(CCC)	1.234	1.226	1.270	1.198	1.213	1.131	A	1.212	3.82
benzidine	0.322	0.91	1.197	1.195	1.384	1.32		1.055	0.9985
Pyrene	1.807	1.948	2.087	1.978	1.915	1.854	A	1.932	5.09
p-terphenyl-d14(sur)	0.843	0.865	0.942	0.925	0.892	0.897	A	0.894	4.12
p-Dimethylaminoazobenzen	0.194	0.227	0.258	0.266	0.265	0.283	A	0.249	13.06
Chlorobenzilate_APP9	0.227	0.244	0.277	0.271	0.283	0.305	A	0.268	10.40
3,3'-dimethylbenzidine	0.557	0.949	1.172	1.183	1.17	1.218		1.042	0.9997
Butyl_Benzyl_Phthalate	0.659	0.728	0.811	0.812	0.798	0.813	A	0.770	8.23
Kepone_APP9	0.040	0.047	0.050	0.050	0.054	0.057	A	0.049	11.52
2-acetylaminofluorene	0.357	0.398	0.503	0.532	0.56	0.612		0.494	0.9986
3,3'-Dichlorobenzidine_APP	0.377	0.425	0.478	0.481	0.477	0.500	A	0.456	10.14

Chrysene	1.299	1.315	1.356	1.292	1.255	1.305	A	1.304	2.51
CHRYSENE-D12_(IS)	8719088	8903877	8383272	8234398	7842507	7668523	I	5.81	
Benz(a)anthracene	1.217	1.239	1.302	1.241	1.214	1.213	A	1.238	2.75
Bis(2-ethylhexyl)phthalate	0.958	1.078	1.208	1.250	1.258	1.315	A	1.178	11.36
Di-n-octylphthalate(CCC)	1.424	1.630	1.937	1.928	2.047	2.108	A	1.846	14.30
7,12-Dimethylbenz(a)anthra	0.394	0.401	0.504	0.528	0.547	0.558	A	0.489	14.92
Benzo(b)fluoranthene	1.192	1.362	1.392	1.342	1.430	1.382	A	1.350	6.13
Benzo(k)fluoranthene	1.240	1.377	1.353	1.336	1.306	1.384	A	1.333	4.02
hexachlorophene	0.018	0.027	0.038	0.048	0.062	0.073		0.044	0.9946
Benzo(a)pyrene(CCC)	1.059	1.145	1.260	1.246	1.263	1.269	A	1.207	7.13
PERYLENE-D12_(IS)	8715413	8252312	7976885	7676516	7118851	6874903	I	8.92	
3-Methylcholanthrene	0.549	0.598	0.633	0.643	0.640	0.643	A	0.618	6.14
Indeno(1,2,3-c,d)pyrene	1.233	1.266	1.288	1.245	1.258	1.240	A	1.255	1.61
Dibenz(a,h)anthracene	1.063	1.177	1.176	1.142	1.212	1.192	A	1.160	4.58
Benzo(g,h,i)perylene	1.093	1.171	1.173	1.144	1.175	1.186	A	1.157	2.95

ROW	SAMPLE ID	FILE NAME	SAMPLE NAME	FILE DATE	COMMENT
1	5 ng/µL	031706_b_003	5 ng/µL	3/17/2006 3:16:48 PM	
2	10 ng/µL	031706_b_004	10 ng/µL	3/17/2006 3:45:46 PM	
3	20 ng/µL	031706_b_005	20 ng/µL	3/17/2006 4:14:51 PM	
4	40 ng/µL	031706_b_006	40 ng/µL	3/17/2006 4:44:11 PM	
5	80 ng/µL	031706_b_007	80 ng/µL	3/17/2006 5:13:22 PM	
6	160 ng/µL	031706_b_008	160 ng/µL	3/17/2006 5:42:35 PM	

Table 2: Linearity study results showing a 6 level injection ranging from 5 to 160 ng/µL

Curve Type: A = Average RF; L = Linear; Q = Quadratic; I = Internal Standard

Manually Modified:

Method Detection Limit Report

Lab Name:	Thermo Scientific Laboratory
Inst ID:	Thermo Scientific GC-MS
Method:	EPAMethod8270MDL_032406_g.mex
Operator ID:	Thermo Scientific User (EPAMethod8270)
Batch:	EPAMethod8270MDL_032406_g
Cali File:	EPAMethod8270Curve_032406_e.cxm

Method Detection Limit Summary

Component	Avg Conc	Std Dev	TSTAT	% RSD	MDL
N-Nitrosodimethylamine	0.935	0.040	3.140	4.315	0.127
Pyridine_RCRA	0.727	0.047	3.140	6.493	0.148
2-Picoline	0.955	0.044	3.140	4.659	0.140
N-Nitrosomethylethylamine_APP9	1.065	0.075	3.140	7.016	0.235
Methyl_methanesulfonate	1.066	0.114	3.140	10.651	0.357
2-fluorophenol(sur)	0.913	0.038	3.140	4.215	0.121
N-Nitrosodiethylamine_APP9	0.929	0.035	3.140	3.777	0.110
Ethyl_methanesulfonate	0.984	0.062	3.140	6.321	0.195
phenol-d5(sur)	0.908	0.027	3.140	2.941	0.084
Phenol(CCC)	0.919	0.015	3.140	1.587	0.046
Aniline	0.968	0.028	3.140	2.912	0.088
Bis(2-chloroethyl)ether	0.949	0.023	3.140	2.441	0.073
Pentachloroethane	0.996	0.078	3.140	7.816	0.244
2-chlorophenol	0.931	0.024	3.140	2.533	0.074
1,3-Dichlorobenzene	1.001	0.015	3.140	1.468	0.046
1,4-DICHLOROBENZENE-D4_(IS)	3849225	109296			
1,4-Dichlorobenzene(CCC)	1.022	0.040	3.140	3.914	0.126
Benzyl_alcohol	0.924	0.018	3.140	1.934	0.056
1,2-Dichlorobenzene	0.977	0.020	3.140	1.998	0.061
2-methylphenol	0.923	0.020	3.140	2.221	0.064
Bis(2-chloroisopropyl)ether	0.954	0.021	3.140	2.186	0.065
N-Nitrosopyrrolidine_APP9	0.893	0.053	3.140	5.990	0.168
3-Methylphenol&4-methylphenol	1.841	0.057	3.140	3.086	0.178
Acetophenone	0.962	0.042	3.140	4.387	0.133
N-Nitroso-di-N-propylamine(SPCC)	0.861	0.033	3.140	3.811	0.103
o-toluidine_APP9	0.925	0.038	3.140	4.111	0.119
Hexachloroethane	0.952	0.048	3.140	4.999	0.149
nitrobenzene-d5(sur)	0.898	0.048	3.140	5.342	0.151
Nitrobenzene	0.923	0.028	3.140	2.998	0.087
N-Nitrosopiperidine	0.888	0.031	3.140	3.511	0.098
Isophorone	0.874	0.030	3.140	3.452	0.095
2-Nitrophenol(CCC)	0.864	0.019	3.140	2.227	0.060
2,4-Dimethylphenol	0.907	0.051	3.140	5.639	0.161
Bis(2-chloroethoxy)methane	0.942	0.039	3.140	4.145	0.123
2,4-Dichlorophenol(CCC)	0.775	0.341	3.140	44.042	1.071
1,2,4-Trichlorobenzene	1.004	0.031	3.140	3.079	0.097
NAPHTHALENE-D8_(IS)	14067303	639458			
Naphthalene	1.026	0.024	3.140	2.339	0.075
2,6-Dichlorophenol	0.923	0.040	3.140	4.378	0.127
p-Chloroaniline	0.938	0.024	3.140	2.592	0.076
Hexachloropropene_APP9	0.926	0.018	3.140	1.912	0.056
Hexachlorobutadiene(CCC)	0.973	0.035	3.140	3.560	0.109
N-Nitroso-di-N-butylamine	0.836	0.057	3.140	6.873	0.180
4-Chloro-3-methylphenol(CCC)	0.930	0.050	3.140	5.414	0.158
Safrole_APP9	0.946	0.031	3.140	3.323	0.099
2-Methylnaphthalene	1.047	0.030	3.140	2.882	0.095
1,2,4,5-Tetrachlorobenzene	0.983	0.053	3.140	5.382	0.166

Hexachlorocyclopentadiene(SPCC)	0.800	0.032	3.140	4.037	0.101
2,4,5-Trichlorophenol	0.833	0.037	3.140	4.426	0.116
2,4,6-Trichlorophenol(CCC)	0.827	0.055	3.140	6.602	0.171
2-fluorobiphenyl(sur)	0.999	0.021	3.140	2.099	0.066
Isosafrole_APP9	0.920	0.059	3.140	6.425	0.186
2-Chloronaphthalene	1.007	0.033	3.140	3.297	0.104
2-Nitroaniline	4.234	0.021	3.140	0.502	0.067
1,4-Naphthoquinone_APP9	0.741	0.049	3.140	6.643	0.155
Dimethyl_phthalate	0.995	0.038	3.140	3.818	0.119
1,3-Dinitrobenzene_app9	3.819	0.026	3.140	0.669	0.080
2,6-Dinitrotoluene	3.944	0.024	3.140	0.618	0.077
Acenaphthylene	0.967	0.023	3.140	2.408	0.073
3-Nitroaniline	4.514	0.045	3.140	0.987	0.140
ACENAPHTHENE-D10_(IS)	8066830	283809			
Acenaphthene(CCC)	1.135	0.020	3.140	1.803	0.064
2,4-Dinitrophenol(SPCC)	5.760	0.058	3.140	1.006	0.182
4-Nitrophenol(SPCC)	4.586	0.053	3.140	1.148	0.165
Pentachlorobenzene	1.039	0.034	3.140	3.275	0.107
2,4-Dinitrotoluene	3.860	0.020	3.140	0.529	0.064
Dibenzofuran	1.051	0.033	3.140	3.159	0.104
1-Naphthylamine	0.787	0.028	3.140	3.542	0.088
2,3,4,6-Tetrachlorophenol	0.838	0.022	3.140	2.585	0.068
2-Naphthylamine	0.880	0.030	3.140	3.402	0.094
Diethyl_Phthalate	0.937	0.047	3.140	5.039	0.148
4-Chlorophenyl_phenyl_ether	1.042	0.030	3.140	2.866	0.094
5-Nitro-o-toluidine_APP9	4.310	0.049	3.140	1.147	0.155
Fluorene	1.028	0.030	3.140	2.937	0.095
4-Nitroaniline	3.810	0.033	3.140	0.855	0.102
2-Methyl-4,6-dinitrophenol	3.998	0.049	3.140	1.214	0.152
Diphenylamine(CCC)	0.968	0.028	3.140	2.879	0.087
Azobenzene	0.888	0.047	3.140	5.259	0.147
2,4,6-tribromophenol(sur)	0.803	0.070	3.140	8.725	0.220
1,3,5-Trinitrobenzene_APP9	0.819	0.059	3.140	7.220	0.186
Phenacetin	0.758	0.041	3.140	5.461	0.130
4-Bromophenyl_phenyl_ether	0.960	0.038	3.140	3.912	0.118
Diallate_APP9	0.924	0.049	3.140	5.327	0.155
Hexachlorobenzene	1.030	0.062	3.140	6.061	0.196
4-Aminobiphenyl	0.907	0.028	3.140	3.094	0.088
Pentachlorophenol(CCC)	0.757	0.040	3.140	5.250	0.125
Pentachloronitrobenzene	0.838	0.085	3.140	10.087	0.265
Pronamide	0.834	0.043	3.140	5.141	0.135
Dinoseb	4.917	0.042	3.140	0.846	0.131
PHENANTHRENE_D10	12537232	292885			
Phenanthrene	1.100	0.045	3.140	4.090	0.141
Anthracene	0.989	0.031	3.140	3.155	0.098
Carbazole_app9	0.990	0.022	3.140	2.253	0.070
Di-N-butyl_phthalate	0.847	0.032	3.140	3.772	0.100
Isodrin_APP9	0.953	0.050	3.140	5.257	0.157
Fluoranthene(CCC)	1.014	0.028	3.140	2.732	0.087
Benzidine	3.569	0.056	3.140	1.562	0.175
Pyrene	0.957	0.036	3.140	3.726	0.112
p-terphenyl-d14(sur)	0.923	0.025	3.140	2.758	0.080
p-Dimethylaminoazobenzene	0.676	0.034	3.140	5.100	0.108
Chlorobenzilate_APP9	0.762	0.040	3.140	5.214	0.125
3,3'-Dimethylbenzidine_APP9	2.818	0.037	3.140	1.318	0.117
Butyl_Benzyl_Phthalate	0.747	0.030	3.140	4.057	0.095
Kepone_APP9	0.744	0.065	3.140	8.683	0.203

2-Acetylaminofluorene_APP9	4.706	0.037	3.140	0.788	0.116
3,3'-Dichlorobenzidine_APP9	0.804	0.051	3.140	6.369	0.161
Chrysene	1.019	0.027	3.140	2.680	0.086
CHRYSENE-D12_(IS)	8670436	312154			
Benz(a)anthracene	1.075	0.039	3.140	3.614	0.122
Bis(2-ethylhexyl)phthalate	0.697	0.031	3.140	4.468	0.098
Di-n-octylphthalate(CCC)	0.679	0.026	3.140	3.859	0.082
7,12-Dimethylbenz(a)anthracene	0.598	0.037	3.140	6.230	0.117
Benzo(b)fluoranthene	0.886	0.030	3.140	3.373	0.094
Benzo(k)fluoranthene	0.900	0.040	3.140	4.493	0.127
hexachlorophene	8.890	0.048	3.140	0.536	0.150
Benzo(a)pyrene(CCC)	0.831	0.039	3.140	4.745	0.124
PERYLENE-D12_(IS)	8616792	371004			
3-Methylcholanthrene	0.836	0.049	3.140	5.879	0.154
Indeno(1,2,3-c,d)pyrene	0.982	0.051	3.140	5.201	0.160
Dibenz(a,h)anthracene	0.908	0.029	3.140	3.203	0.091
Benzo(g,h,i)perylene	0.911	0.036	3.140	3.990	0.114

Method Detection Limit Report

Lab Name:	Thermo Scientific Laboratory
Inst ID:	Thermo Scientific GC-MS
Method:	EPAMethod8270MDL_032406_g.mex
Operator ID:	Thermo Scientific User (EPAMethod8270)
Batch:	EPAMethod8270MDL_032406_g
Cali File:	EPAMethod8270Curve_032406_e.cxm

Method Detection Limit Data

Component	4	5	6	7	8	9	10
N-Nitrosodimethylamine	0.902	0.883	0.919	0.983	0.939	0.925	0.993
Pyridine_RCRA	0.698	0.743	0.750	0.788	0.743	0.639	0.729
2-Picoline	0.889	0.918	0.987	1.024	0.965	0.962	0.940
N-Nitrosomethylethylamine_APP9	1.002	0.939	1.046	1.092	1.140	1.091	1.144
Methyl_methanesulfonate	0.848	0.999	1.080	1.090	1.121	1.127	1.200
2-fluorophenol(sur)	0.871	0.893	0.909	0.970	0.963	0.884	0.899
N-Nitrosodiethylamine_APP9	0.873	0.893	0.947	0.945	0.934	0.935	0.977
Ethyl_methanesulfonate	0.903	0.926	1.060	1.068	0.969	0.973	0.985
phenol-d5(sur)	0.913	0.889	0.875	0.954	0.927	0.908	0.888
Phenol(CCC)	0.911	0.926	0.923	0.910	0.896	0.934	0.936
Aniline	0.912	0.972	0.992	0.984	0.968	0.992	0.953
Bis(2-chloroethyl)ether	0.969	0.978	0.953	0.928	0.946	0.911	0.957
Pentachloroethane	0.857	0.929	1.020	1.013	1.009	1.085	1.056
2-chlorophenol	0.961	0.889	0.943	0.920	0.936	0.920	0.947
1,3-Dichlorobenzene	0.981	1.011	1.023	0.998	0.985	1.009	0.999
1,4-DICHLOROBENZENE-D4_(IS)	3666098	4002913	3866256	3766894	3934990	3858923	3848502
1,4-Dichlorobenzene(CCC)	0.991	1.010	0.997	1.010	1.012	1.024	1.109
Benzyl_alcohol	0.943	0.931	0.902	0.947	0.911	0.906	0.927
1,2-Dichlorobenzene	0.960	0.978	0.946	1.001	0.974	0.998	0.984
2-methylphenol	0.913	0.916	0.923	0.944	0.902	0.904	0.957
Bis(2-chloroisopropyl)ether	0.962	0.936	0.937	0.996	0.948	0.956	0.945
N-Nitrosopyrrolidine_APP9	0.936	0.846	0.916	0.971	0.816	0.895	0.867
3-Methylphenol&4-methylphenol	1.803	1.744	1.878	1.849	1.850	1.838	1.924
Acetophenone	0.939	0.912	0.913	0.985	1.022	0.996	0.968
N-Nitroso-di-N-propylamine	0.849	0.896	0.842	0.817	0.859	0.914	0.853
o-toluidine_APP9	0.951	0.944	0.882	0.944	0.977	0.883	0.894
Hexachloroethane	0.876	0.988	0.962	0.963	0.967	0.897	1.008
nitrobenzene-d5(sur)	0.974	0.866	0.896	0.954	0.861	0.884	0.851
Nitrobenzene	0.952	0.927	0.900	0.924	0.964	0.905	0.888
N-Nitrosopiperidine	0.884	0.889	0.921	0.921	0.891	0.887	0.827

Isophorone	0.860	0.855	0.871	0.912	0.920	0.860	0.841
2-Nitrophenol(CCC)	0.865	0.842	0.886	0.876	0.876	0.833	0.869
2,4-Dimethylphenol	0.983	0.905	0.904	0.968	0.879	0.862	0.849
Bis(2-chloroethoxy)methane	0.960	1.002	0.963	0.959	0.908	0.913	0.892
2,4-Dichlorophenol(CCC)	0.949	0.003	0.874	0.928	0.881	0.886	0.900
1,2,4-Trichlorobenzene	1.018	1.002	0.968	1.058	1.019	0.980	0.980
NAPHTHALENE-D8_(IS)	12928902	14327394	14078748	13592334	14290942	14319064	14933740
Naphthalene	1.049	1.054	1.001	1.018	1.049	1.013	0.999
2,6-Dichlorophenol	0.995	0.947	0.925	0.895	0.910	0.917	0.868
p-Chloroaniline	0.949	0.951	0.891	0.920	0.956	0.942	0.959
Hexachloropropene_APP9	0.913	0.950	0.942	0.936	0.912	0.926	0.902
Hexachlorobutadiene(CCC)	1.009	0.978	0.930	0.987	1.011	0.967	0.925
N-Nitroso-di-N-butylamine	0.819	0.769	0.780	0.872	0.939	0.835	0.836
4-Chloro-3-methylphenol(CCC)	0.977	0.915	0.937	0.985	0.965	0.873	0.858
Safrole_APP9	0.897	0.976	0.937	0.973	0.976	0.946	0.916
2-Methylnaphthalene	1.056	1.033	1.034	1.094	1.075	1.030	1.005
1,2,4,5-Tetrachlorobenzene	1.003	1.055	0.993	1.026	0.959	0.953	0.895
Hexachlorocyclopentadiene(SPCC	0.775	0.836	0.834	0.815	0.775	0.810	0.752
2,4,5-Trichlorophenol	0.821	0.846	0.795	0.849	0.863	0.879	0.777
2,4,6-Trichlorophenol(CCC)	0.778	0.894	0.834	0.873	0.871	0.774	0.764
2-fluorobiphenyl(sur)	0.984	0.988	0.981	1.033	1.024	0.995	0.986
Isosafrole_APP9	0.915	0.832	0.874	0.942	0.954	1.016	0.906
2-Chloronaphthalene	0.965	1.003	1.028	1.037	1.011	1.047	0.962
2-Nitroaniline	4.247	4.254	4.231	4.241	4.246	4.230	4.190
1,4-Naphthoquinone_APP9	0.734	0.785	0.703	0.798	0.791	0.689	0.689
Dimethyl_phthalate	0.983	0.948	0.962	1.033	1.042	1.027	0.973
1,3-Dinitrobenzene_app9	3.796	3.826	3.853	3.853	3.806	3.803	3.795
2,6-Dinitrotoluene	3.921	3.939	3.958	3.960	3.944	3.909	3.980
Acenaphthylene	0.976	0.980	0.964	1.002	0.966	0.953	0.927
3-Nitroaniline	4.556	4.536	4.526	4.570	4.486	4.449	4.475
ACENAPHTHENE-D10_(IS)	7653338	8338612	8012078	7791908	8328603	7985393	8357875
Acenaphthene(CCC)	1.134	1.125	1.161	1.143	1.152	1.131	1.098
2,4-Dinitrophenol(SPCC)	5.837	5.806	5.755	5.786	5.732	5.658	5.744
4-Nitrophenol(SPCC)	4.691	4.581	4.573	4.610	4.551	4.565	4.530
Pentachlorobenzene	1.041	1.095	1.051	1.055	1.003	1.036	0.993
2,4-Dinitrotoluene	3.887	3.855	3.849	3.865	3.873	3.867	3.823
Dibenzofuran	1.039	1.038	1.054	1.107	1.077	1.042	1.003
1-Naphthylamine	0.788	0.783	0.773	0.826	0.815	0.782	0.741
2,3,4,6-Tetrachlorophenol	0.820	0.864	0.846	0.846	0.855	0.801	0.832
2-Naphthylamine	0.850	0.864	0.876	0.936	0.902	0.874	0.857
Diethyl_Phthalate	0.858	0.913	0.964	0.985	0.982	0.955	0.903
4-Chlorophenyl_phenyl_ether	1.038	1.065	1.043	1.081	1.057	1.004	1.002
5-Nitro-o-toluidine_APP9	4.374	4.354	4.275	4.358	4.275	4.281	4.255
Fluorene	0.986	1.004	1.045	1.063	1.065	1.016	1.019
4-Nitroaniline	3.788	3.790	3.808	3.835	3.801	3.871	3.778
2-Methyl-4,6-dinitrophenol	4.102	3.988	4.004	3.951	3.976	3.990	3.977
Diphenylamine(CCC)	0.941	0.941	0.953	1.003	0.989	0.998	0.947
Azobenzene	0.849	0.886	0.817	0.887	0.964	0.916	0.894
2,4,6-tribromophenol(sur)	0.849	0.867	0.864	0.854	0.752	0.724	0.714
1,3,5-Trinitrobenzene_APP9	0.750	0.732	0.817	0.849	0.897	0.858	0.832
Phenacetin	0.788	0.719	0.730	0.743	0.834	0.766	0.726
4-Bromophenyl_phenyl_ether	0.978	0.916	0.968	1.028	0.966	0.929	0.937
Diallate_APP9	0.892	0.883	0.878	0.939	1.006	0.970	0.900
Hexachlorobenzene	1.018	0.927	1.074	1.085	1.105	1.015	0.987
4-Aminobiphenyl	0.917	0.856	0.910	0.947	0.914	0.890	0.916
Pentachlorophenol(CCC)	0.724	0.762	0.831	0.717	0.782	0.731	0.754
Pentachloronitrobenzene	0.763	0.846	0.792	0.913	0.989	0.793	0.770
Pronamide	0.804	0.785	0.808	0.872	0.903	0.854	0.815

Dinoseb	4.971	4.915	4.933	4.939	4.934	4.878	4.847
PHENANTHRENE_D10	12079178	12984207	12622599	12265123	12582683	12542408	12684425
Phenanthrene	1.047	1.083	1.065	1.171	1.147	1.077	1.107
Anthracene	0.980	0.996	0.980	1.029	1.023	0.977	0.937
Carbazole_app9	0.981	0.973	0.980	1.030	1.002	0.998	0.963
Di-N-butyl_phthalate	0.844	0.847	0.823	0.901	0.874	0.839	0.804
Isodrin_APP9	0.905	0.924	0.956	1.057	0.919	0.955	0.954
Fluoranthene(CCC)	0.993	1.001	1.016	1.065	1.037	0.992	0.994
Benzidine	3.680	3.569	3.531	3.593	3.560	3.535	3.513
Pyrene	0.937	0.944	0.940	1.017	0.984	0.969	0.909
p-terphenyl-d14(sur)	0.918	0.932	0.940	0.960	0.918	0.911	0.879
p-Dimethylaminoazobenzene	0.706	0.679	0.647	0.693	0.664	0.723	0.623
Chlorobenzilate_APP9	0.774	0.783	0.733	0.769	0.830	0.728	0.715
3,3'-Dimethylbenzidine_APP9	2.844	2.826	2.832	2.814	2.861	2.804	2.745
Butyl_Benzyl_Phthalate	0.745	0.742	0.700	0.781	0.747	0.787	0.725
Kepone_APP9	0.812	0.809	0.714	0.706	0.788	0.743	0.635
2-Acetylaminofluorene_APP9	4.766	4.716	4.724	4.715	4.692	4.685	4.647
3,3'-Dichlorobenzidine_APP9	0.869	0.817	0.763	0.855	0.820	0.781	0.725
Chrysene	1.034	1.008	0.996	1.012	1.074	1.012	0.998
CHRYSENE-D12_(IS)	8185607	9025853	8913514	8488085	8691762	8439805	8948424
Benz(a)anthracene	1.031	1.020	1.079	1.103	1.131	1.087	1.071
Bis(2-ethylhexyl)phthalate	0.699	0.678	0.699	0.705	0.754	0.695	0.651
Di-n-octylphthalate(CCC)	0.674	0.674	0.646	0.717	0.710	0.679	0.655
7,12-Dimethylbenz(a)anthracene	0.588	0.548	0.575	0.636	0.649	0.619	0.571
Benzo(b)fluoranthene	0.918	0.841	0.870	0.918	0.907	0.885	0.860
Benzo(k)fluoranthene	0.890	0.899	0.952	0.942	0.883	0.904	0.830
hexachlorophene	8.998	8.872	8.872	8.872	8.872	8.872	8.872
Benzo(a)pyrene(CCC)	0.867	0.846	0.830	0.882	0.778	0.834	0.782
PERYLENE-D12_(IS)	8060406	8701666	8472403	8262231	8932868	8788232	9099739
3-Methylcholanthrene	0.815	0.818	0.795	0.853	0.905	0.891	0.773
Indeno(1,2,3-c,d)pyrene	0.956	0.906	0.932	1.032	1.025	1.027	0.998
Dibenz(a,h)anthracene	0.891	0.877	0.900	0.953	0.938	0.881	0.914
Benzo(g,h,i)perylene	0.863	0.894	0.905	0.965	0.894	0.956	0.899

Method Detection Limit Report

Lab Name:	Thermo Scientific Laboratory
Inst ID:	Thermo Scientific GC-MS
Method:	EPAMethod8270MDL_032406_g.mex
Operator ID:	Thermo Scientific User (EPAMethod8270)
Batch:	EPAMethod8270MDL_032406_g
Cali File:	EPAMethod8270Curve_032406_e.cxm

ROW	SAMPLE ID	FILE NAME	SAMPLE NAME	FILE DATE	COMMENT
4	MDL1	EPAMethod8270MDL_0	MDL1	3/17/2006 7:29:57 PM	
5	MDL2	EPAMethod8270MDL_0	MDL2	3/17/2006 7:59:18 PM	
6	MDL3	EPAMethod8270MDL_0	MDL3	3/17/2006 8:28:50 PM	
7	MDL4	EPAMethod8270MDL_0	MDL4	3/17/2006 8:58:23 PM	
8	MDL5	EPAMethod8270MDL_0	MDL5	3/17/2006 9:27:51 PM	
9	MDL6	EPAMethod8270MDL_0	MDL6	3/17/2006 9:56:59 PM	
10	MDL7	EPAMethod8270MDL_0	MDL7	3/17/2006 10:26:20 PM	

Table 3: MDLs Determined by Replicate Injections of 1 ng/µL

EnviroLab Forms 2.0

Data is acquired using Xcalibur™ instrument control software and then processed automatically using the EnviroLab Forms 2.0 software. The list of reports available is shown in the screen shot of the software in Figure 11. A master method is available for each EPA Method. Reports may be saved in different formats: *.pdf, *.doc, *.xls, or *.rtf format. All reports can be conveniently printed and exported into different formats, including *.pdf, *.doc, *.xls, *.rtf, or *.xml for easy input into any LIMS, along with Word, Excel, and Rich Text.

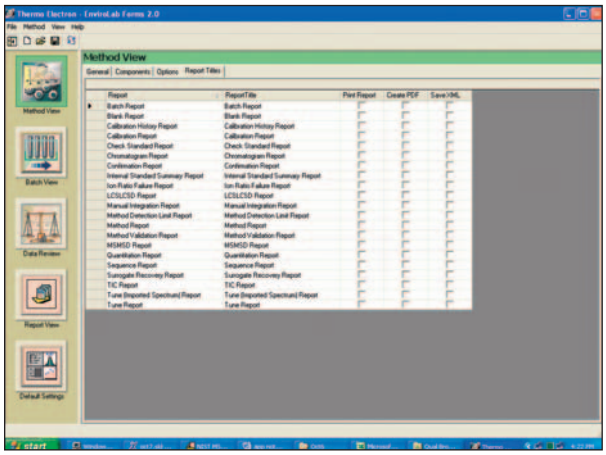

Figure 11: Reports Available in EnviroLab Forms 2.0

Instrument Performance in Matrix

The overall robustness of the split method was demonstrated by running replicate injections of diesel over a one-month period. Throughout the study, the liner was not changed, and only a daily septum replacement was made. A performance mix was run first to check for ion ratio criteria for DFTPP, and liner performance followed by a mid-level check standard.

Five replicate injections of a diesel-spiked sediment extract were then run. The diesel solution was made by sonication of 2 grams of sediment in 100 mL of methylene chloride. The extract was blown down to a final volume of 2 mL, and 25 µL of diesel fuel was added. The final solution was 1 g/mL of sediment (12.5 mg of diesel/g of sediment). The TIC of the diesel spiked sediment extract is shown in Figure 12. The drift in response factors for the CCCs in each check standard is tabulated in the chart in Figure 13.

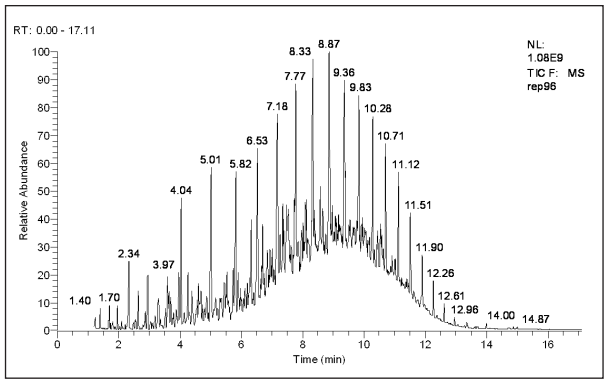

Figure 12: TIC of diesel sediment extract

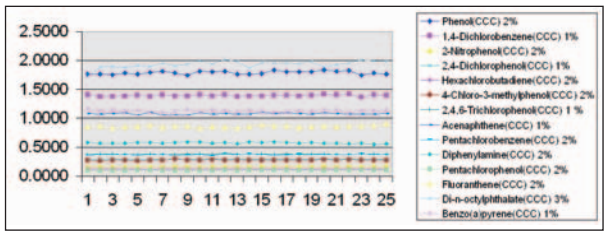

Figure 13: Drift of CCCs during robustness study

Conclusion

The DSQ II successfully met the QC criteria for EPA Method 8270D in the split mode of injection utilizing the TRACE GC Ultra. The Target Tune easily met the tuning criteria for the method each day, as well as each time it was injected. The liner was changed once throughout the analysis of over 2,000 samples during the study period and continued to show good peak shape for benzidine and pentachlorophenol, and no breakdown of DDT was observed.

This method provides fast chromatography while maintaining excellent separations of the chromatographic peaks. The high flow rate through the column was used to allow higher concentrations to be injected and to keep the interactions of active compounds to a minimum. The pumping capacity of the DSQ II showed no problems with long term use of a 3 mL/min flow rate. The EnviroLab Forms 2.0 software matches the workflow used in environmental laboratories. It is designed to allow an easy fit of the DSQ II system into the current laboratory workflow and to be simple enough for the novice user to be instantly productive.

References

1. EPA Method 8270D *Semi-volatile Organic Compounds by Gas Chromatography/Mass Spectrometry*, Rev. 4 1998.

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