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Application Note

Analysis of VOC by P&T and GC/MS using nitrogen as a purge gas

Using Nitrogen as a purge gas

Introduction

Helium has been successfully used as a purge gas for volatile organic analysis for many years because it is inert and works extremely well for P&T concentration. Traditionally, VOCARB traps or mixed bed traps containing Tenax, silica gel, and carbon molecular sieve (CMS) have been used. Despite the success of this pairing, Helium (He) is a non-renewable resource and supplies will eventually run out. Decreasing availability has caused significant price increases and long lead times for He cylinders, prompting many labs to look for an alternative source.

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Nitrogen (N2) is inert, plentiful, and relatively inexpensive making it a reasonable alternative purge gas. However, we have found that the VOCARB and mixed bed traps do not work as well when using N2 instead of He as a purge gas. Increased tailing has been observed as well as more compounds having high Relative Standard Deviation (RSDs) in the calibrations using these traps. It is best to avoid manual integrations because of tailing as well as having the need for linear regression when calibration RSDs are too high.

After exhaustive testing it was found that the silica gel in the #10 trap absorbs N2 during purge and during desorb this causes erratic behavior within the GC inlet. This results in a 30-40% drop in response when switching to N2 as a purge gas so that the lower concentrations in the calibration are less responsive and some compounds have a higher %RSD. Countless sorbents and configurations were tested and the effort was worthwhile. The 8260 Nitro Trap was specifically designed for N2 purge which gives similar excellent results as the #10 with He.

This application notes presents data using EPA Method 8260D. Calibrations and QC using the #10 trap with He purge and 8260 Nitro Trap with N2 purge are presented.

Methodology

EPA Method 8260D was used as guidance for testing. The only changes labs will need to make to their current method are in the P&T temperature parameters. GC/MS parameters can remain the same. As with the #10 trap, the 8260 Nitro Trap does not require a dry purge for moisture removal which keeps the cycle time fast. There is no need for the lab to change current GC/MS parameters or do method development. An OI Analytical 4760 P&T was used for sample concentration and a 7890A/5975C GC/MS was used for chromatographic separation and detection.

A 4100 Sample Processor was used to automate the analysis. Please see Table 1 for instrument parameters. A multipoint calibration from 1 ppb to 200 ppb was analyzed for most compounds. Method Detection Limit (MDL) studies and Initial Demonstrations of Proficiency (IDC) were analyzed. Calibrations and QA/QC samples were analyzed in both water and soil mode.

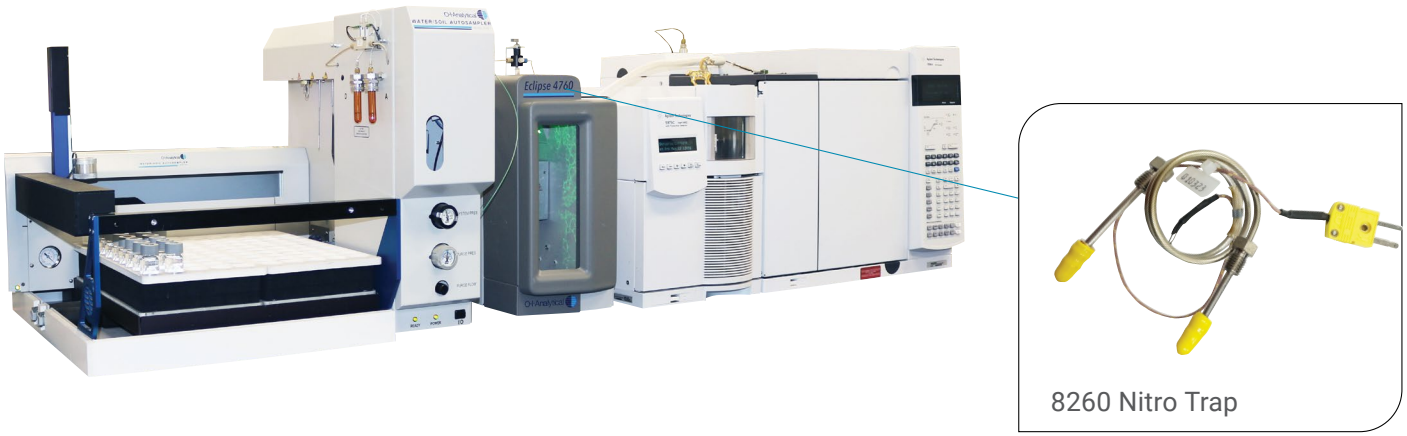


Figure 1. 4100, 4760, 7890A/5975C

Table 1. Instrument Parameters

Purge-and-Trap	Eclipse 4760 P&T Sample Concentrator
Trap	#10 Trap or 8260 Nitro Trap
Purge gas	Zero grade Helium or Nitrogen at 40 mL/min
Purge time	11 min
Sparge mount temperature	45 °C
Sample temperature (purge)	45 °C
Sample temperature (bake)	45 °C
Desorb time	0.5 min
Bake time	6 min
Trap temperature	Ambient during purge 180 ˚C (#10) or 210 ˚C (8260 Nitro) during desorb pre-heat 190 ˚C (#10) or 220 ˚C (8260 Nitro) during desorb 210 ˚C (#10) or 230 ˚C (8260 Nitro) 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 Sample Processor Methods	
Sample type	Waters only	Soils only
Needle rinses	1	0
SAM A (µL)	5	5
SAM B (µL)	0	0
SAM C (µL)	0	0
SAM D (µL)	0	0
Purge time (min)	11.0	11.0
Desorb time (min)	0.5	0.5
P&T rinses	3	2
Rinse water	Hot	Hot
Water stir rime (min)	0.0	N/A
Water settle time (sec)	5	N/A
Soil add water to vial (#loops)	N/A	1
Soil pre-heat stir (min)	N/A	0.5
Soil pre-heat/purge temp ˚C	N/A	45
Soil stir during purge	N/A	Yes

Autosampler	4100 Water/Soil Sample Processor
System Gas	Zero grade Nitrogen
Purge Gas	Zero grade Helium or Nitrogen
LV20 pressure	8.0 psi
Loop-based time settings	Default
Rinse water	80 °C
Soil sample transfer	150 °C
Soil oven	150 °C
Soil lift station	45 °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	125:1
Oven program	Hold at 40 °C for 1.5 min 18 °C/minute to 180 °C 40 °C/minute to 220 °C Hold at 220 °C for 4 min Total GC run is 15.75 min

Mass Spectrometer	Agilent 5975C
Mode	Scan
Scans/second	5.19
Solvent delay	1.35 min
Transfer line Temperature	240 °C
Source temperature	230 °C
Quadrupole Temperature	150 °C
Draw out plate	6 mm

Results

Please see Table 2 for calibration results and Table 3 for water only QA/QC results. All method acceptance criteria were met.

Table 2. Calibration Results (RF = Response Factor)

Analyte	Compound	Liquid RF #10 He	% RSD #10 He	Solid RF #10 He	% RSD #10 He	Liquid RF 8260 Nitro N_2	%RSD 8260 Nitro N_2	Solid RF 8260 Nitro N_2	% RSD 8260 Nitro N_2
1	Pentafluorobenzene (IS)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2	Dichlorodifluoromethane	0.281	8.30	0.256	7.80	0.345	9.80	0.355	9.83
3	Chloromethane	0.515	6.12	0.427	8.54	0.512	9.81	0.485	10.92
4	Vinyl chloride	0.431	6.44	0.360	6.92	0.499	5.21	0.482	8.06
5	Bromomethane	0.286	7.94	0.248	7.77	0.263	7.96	0.269	17.30
6	Chloroethane	0.312	6.53	0.264	8.20	0.297	9.06	0.319	10.01
7	Trichlorofluoromethane	0.584	7.38	0.540	5.34	0.804	4.95	0.807	8.90
8	Ethyl ether	0.261	7.07	0.242	7.09	0.268	7.48	0.256	5.13
9	1,1-Dichloroethene	0.381	7.47	0.351	6.74	0.454	6.31	0.438	6.54
10	Carbon disulfide	1.018	7.59	1.055	6.36	1.043	5.01	1.425	5.79
11	1,1,2-Trichloro-1,2,2-trifluoroethane	0.387	7.30	0.356	6.27	0.452	5.28	0.483	10.38
12	Methyl iodide	0.792	7.14	0.758	5.35	0.885	4.45	0.881	6.16
13	Acrolein(2x)	0.073	9.58	0.072	13.22	0.052	6.14	0.053	6.97
14	Allyl chloride	0.245	6.97	0.221	4.86	0.263	6.79	0.256	6.57
15	Methylene chloride	0.402	7.58	0.398	5.72	0.425	11.73	0.479	8.61
16	Acetone(5x)	0.035	20.07 r^2=0.998	0.045	22.83 r^2=0.998	0.025	32.07 r^2=1.00	0.022	31.25 r^2=0.999
17	trans-1,2-Dichloroethene	0.491	6.68	0.452	6.64	0.530	7.62	0.505	5.44
18	Methyl tert-butyl ether	1.002	6.67	1.069	6.77	1.146	7.57	1.222	7.51
19	Acetonitrile(4x)	0.042	8.51	0.048	12.89	0.029	16.30	0.020	9.34
20	Chloroprene	0.949	4.75	0.856	6.08	0.965	3.04	0.902	3.97
21	1,1-Dichloroethane	0.948	5.60	0.875	5.32	0.960	3.52	0.957	5.87
22	Acrylonitrile	0.150	10.91	0.160	11.44	0.108	10.40	0.100	16.36
23	cis-1,2-Dichloroethene	0.497	7.35	0.487	6.97	0.528	6.19	0.533	7.05
24	2,2-Dichloropropane	0.413	15.01	0.451	8.91	0.652	8.32	0.700	6.72
25	Bromochloromethane	0.263	7.30	0.266	5.53	0.255	6.57	0.280	6.18
26	Chloroform	0.834	6.48	0.810	6.08	0.868	4.11	0.878	5.80
27	Methyl acrylate	0.605	4.92	0.488	7.57	0.320	3.75	0.328	9.50
28	Carbon tetrachloride	0.681	6.81	0.694	5.77	0.761	4.68	0.759	6.38
29	Tetrahydrofuran	0.231	17.75	0.187	15.17	0.115	12.46	0.104	13.53
30	Dibromofluoromethane (SS)	0.564	4.81	0.577	1.92	0.553	3.51	0.603	2.50
31	1,1,1-Trichloroethane	0.711	6.19	0.709	4.93	0.830	4.21	0.809	4.84
32	2-Butanone(5x)	0.050	9.01	0.047	9.75	0.028	23.41 r^2=0.995	0.026	16.01
33	1,1-Dichloropropene	0.601	3.65	0.591	7.11	0.605	1.07	0.597	6.14
34	1,4-Difluorobenzene (IS)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
35	Benzene	0.991	3.93	0.939	4.45	1.084	6.08	1.032	6.98
36	Methacrylonitrile	0.251	4.77	0.201	8.20	0.157	14.47	0.152	9.94
37	1,2-Dichloroethane-d4 (SS)	0.070	4.46	0.066	1.52	0.066	6.81	0.066	3.72

Analyte	Compound	Liquid RF #10 He	% RSD #10 He	Solid RF #10 He	% RSD #10 He	Liquid RF 8260 Nitro N_2	%RSD 8260 Nitro N_2	Solid RF 8260 Nitro N_2	% RSD 8260 Nitro N_2
38	1,2-Dichloroethane	0.422	4.61	0.404	9.63	0.388	7.85	0.404	10.14
39	Trichloroethene	0.330	4.44	0.316	7.03	0.355	4.11	0.331	4.27
40	Dibromomethane	0.180	6.24	0.168	8.43	0.158	9.61	0.163	8.06
41	1,2-Dichloropropane	0.271	2.50	0.266	3.86	0.249	5.57	0.254	3.84
42	Bromodichloromethane	0.353	4.34	0.340	5.35	0.347	5.01	0.346	4.86
43	Methyl methacrylate	0.208	5.02	0.154	5.81	0.122	9.51	0.107	12.02
44	2-Chloroethyl-vinyl-ether	0.198	4.43	0.144	6.41	0.099	6.31	0.088	22.18 r^2=0.996
45	cis-1,3-Dichloropropene	0.393	4.13	0.380	6.03	0.309	4.63	0.318	11.26
46	Chlorobenzene-d5 (IS)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
47	Toluene-d8(SS)	1.141	2.39	1.201	0.65	1.387	2.82	1.414	5.17
48	Toluene	0.665	2.44	0.680	7.18	0.823	6.08	0.819	10.18
49	2-Nitropropane	0.158	7.37	0.122	8.26	0.123	11.83	0.094	7.81
50	4-Methyl-2-pentanone(5x)	0.052	3.71	0.038	6.32	0.049	10.29	0.039	10.76
51	Tetrachloroethene	0.261	2.60	0.268	6.70	0.323	4.46	0.313	6.27
52	trans-1,3-Dichloropropene	0.408	7.26	0.391	7.02	0.365	3.88	0.359	10.68
53	Ethyl methacrylate	0.360	5.25	0.300	7.26	0.311	6.51	0.283	7.07
54	1,1,2-Trichloroethane	0.215	3.05	0.200	7.42	0.206	8.44	0.197	4.67
55	Chlorodibromomethane	0.358	4.66	0.343	6.45	0.368	3.66	0.359	3.72
56	1,3-Dichloropropane	0.405	3.23	0.373	5.54	0.347	1.86	0.339	5.74
57	1,2-Dibromoethane	0.314	2.28	0.267	5.67	0.257	3.88	0.244	3.45
58	2-Hexanone(5x)	0.378	6.66	0.229	8.08	0.250	16.14	0.156	8.90
59	Chlorobenzene	0.849	2.45	0.836	5.97	0.866	2.35	0.854	5.90
60	Ethylbenzene	1.346	2.70	1.315	6.80	1.545	6.69	1.447	8.19
61	1,1,1,2-Tetrachloroethane	0.297	2.97	0.325	6.83	0.425	7.54	0.429	11.69
62	m,p-Xylenes(2x)	0.525	4.37	0.517	5.69	0.588	4.05	0.554	6.63
63	o-Xylene	0.494	3.90	0.505	5.20	0.629	6.07	0.611	11.06
64	Styrene	0.822	7.42	0.796	6.10	0.816	3.41	0.768	3.25
65	Bromoform	0.253	10.01	0.207	8.87	0.222	4.75	0.188	6.39
66	Isopropylbenzene	1.294	5.47	1.308	4.44	1.713	3.49	1.595	8.06
67	cis-1,4-Dichloro-2-butene	0.200	7.36	0.135	9.18	0.121	11.22	0.088	10.09
68	1,4-Dichlorobenzene-d4 (IS)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
69	4-Bromofluorobenzene (SS)	0.898	3.84	0.884	2.20	0.803	1.25	0.823	4.08
70	n-Propylbenzene	2.922	4.76	3.045	5.02	3.349	3.40	3.430	6.41
71	Bromobemzene	0.715	2.88	0.722	8.16	0.668	3.19	0.718	6.25
72	1,1,2,2-Tetrachloroethane	0.761	3.81	0.621	5.72	0.706	6.72	0.646	5.45
73	2-Chlorotoluene	1.925	3.65	2.018	5.99	2.246	3.01	2.336	5.07
74	1,3,5-Trimethylbenzene	2.071	4.56	2.194	4.86	2.544	5.44	2.626	8.20
75	1,2,3-Trichloropropane	0.255	4.24	0.203	7.82	0.225	6.80	0.192	9.19
76	trans-1,4-Dichloro-2-butene	0.357	7.33	0.249	9.62	0.228	9.53	0.173	16.15
77	4-Chlorotoluene	1.849	3.08	1.884	8.67	1.808	2.29	1.863	5.70
78	tert-Butylbenzene	1.827	3.27	1.923	5.45	1.985	13.96	2.092	21.61 r^2=0.999
79	1,2,4-Trimethylbenzene	2.066	4.88	2.259	5.66	2.584	3.08	2.622	7.15
80	sec-Butylbenzene	2.441	4.83	2.782	4.94	2.972	7.92	3.229	13.23
81	p-Isopropytoluene	2.094	6.39	2.408	5.95	2.631	6.20	2.767	11.58

Analyte	Compound	Liquid RF #10 He	% RSD #10 He	Solid RF #10 He	% RSD #10 He	Liquid RF 8260 Nitro N_2	%RSD 8260 Nitro N_2	Solid RF 8260 Nitro N_2	% RSD 8260 Nitro N_2
82	1,3-Dichlorobenzene	1.329	2.88	1.439	9.59	1.424	3.43	1.478	6.31
83	1,4-Dichlorobenzene	1.362	2.17	1.476	11.89	1.400	2.62	1.464	7.10
84	n-Butylbenzene	1.700	7.49	2.133	5.84	2.173	3.64	2.483	5.46
85	1,2-Dichlorobenzene	1.181	3.63	1.313	6.66	1.393	2.98	1.511	6.66
86	1,2-Dibromo-3-chloropropane	0.188	7.84	0.139	7.72	0.276	5.26	0.163	9.04
87	Hexachlorobutadiene	0.201	9.49	0.346	9.63	0.366	7.28	0.506	7.28
88	1,2,4-Trichlorobenzene	0.538	10.48	0.759	11.79	0.908	5.48	1.142	10.40
89	Naphthalene	1.913	13.03	1.949	13.46	3.165	7.94	2.854	11.09
90	1,2,3-Trichlorobenzene	0.492	12.64	0.676	10.84	0.824	7.89	1.063	11.53

Table 3. #10 and 8260 Nitro Trap MDLs and IDCs for Liquids

Analyte	Compound	#10 MDL % Recovery	#10 MDL (ppb)	#10 IDC % Recovery	#10 IDC % RSD	8260 Nitro MDL % Recovery	8260 Nitro MDL (ppb)	8260 Nitro IDC % Recovery	8260 Nitro IDC % RSD
1	Pentafluorobenzene (IS)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2	Dichlorodifluoromethane	80.0	0.11	83.9	5.32	106	0.27	82.7	6.27
3	Chloromethane	121	0.13	93.2	3.78	140	0.17	95.8	3.22
4	Vinyl chloride	101	0.17	93.0	3.41	108	0.21	98.9	2.29
5	Bromomethane	136	0.24	90.9	4.22	186	0.36	102	2.73
6	Chloroethane	125	0.25	93.1	2.95	148	0.24	99.3	1.89
7	Trichlorofluoromethane	87.5	0.16	90.8	5.17	111	0.29	96.0	2.74
8	Ethyl ether	100	0.13	95.5	6.43	121	0.11	101	3.15
9	1,1-Dichloroethene	98.0	0.08	93.3	3.80	126	0.27	99.7	2.85
10	Carbon disulfide	87.5	0.10	93.0	3.33	111	0.18	99.6	2.58
11	1,1,2-Trichloro-1,2,2-trifluoroethane	84.0	0.14	87.6	4.86	116	0.38	91.7	4.18
12	Methyl iodide	92.3	0.09	95.9	2.77	114	0.14	99.8	4.51
13	Acrolein(2x)	111	0.32	91.9	3.63	179	0.69	100	1.91
14	Allyl chloride	99.3	0.12	95.4	5.53	121	0.21	98.6	3.24
15	Methylene chloride	97.3	0.17	93.5	3.94	123	0.25	94.5	4.57
16	Acetone(5x)	81.6	1.38	105	6.21	241	3.67	99.0	6.09
17	trans-1,2-Dichloroethene	109	0.16	95.9	4.92	122	0.13	99.6	3.41
18	Methyl tert-butyl ether	96.8	0.13	91.1	4.93	123	0.15	99.1	3.35
19	Acetonitrile(4x)	109	2.19	110	8.90	114	4.34	101	6.36
20	Chloroprene	98.5	0.12	96.5	3.82	112	0.13	100	1.41
21	1,1-Dichloroethane	98.0	0.11	96.1	5.26	110	0.14	101	2.93
22	Acrylonitrile	108	0.24	96.3	5.59	153	0.43	90.2	2.69
23	cis-1,2-Dichloroethene	106	0.15	95.9	5.72	117	0.16	99.4	4.00
24	2,2-Dichloropropane	98.0	0.17	80.7	3.18	132	0.23	90.7	2.34
25	Bromochloromethane	100	0.20	93.4	6.65	124	0.25	96.7	4.05
26	Chloroform	98.3	0.09	95.7	5.15	114	0.12	99.9	2.82
27	Methyl acrylate	96.5	0.09	102	5.18	124	0.54	101	2.06
28	Carbon tetrachloride	97.0	0.08	89.9	3.39	109	0.20	101	2.25
29	Tetrahydrofuran	122	0.26	91.7	3.27	133	0.64	99.6	4.79
30	Dibromofluoromethane (SS)	98.1	6.37	93.8	5.39	116	3.46	100	3.34
31	1,1,1-Trichloroethane	94.8	0.10	91.0	3.70	110	0.16	101	2.48

Analyte	Compound	#10 MDL % Recovery	#10 MDL (ppb)	#10 IDC % Recovery	#10 IDC % RSD	8260 Nitro MDL % Recovery	8260 Nitro MDL (ppb)	8260 Nitro IDC % Recovery	8260 Nitro IDC % RSD
32	2-Butanone(5x)	105	0.87	102	4.83	127	2.77	118	10.9
33	1,1-Dichloropropene	97.0	0.07	96.2	2.60	104	0.11	98.7	1.38
34	1,4-Difluorobenzene (IS)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
35	Benzene	102	0.07	96.4	1.97	110	0.13	97.5	1.66
36	Methacrylonitrile	129	0.16	100	3.18	113	0.43	97.4	2.39
37	1,2-Dichloroethane-d4 (SS)	98.9	5.31	94.8	4.55	113	12.67	99.1	3.37
38	1,2-Dichloroethane	119	0.09	95.7	3.66	133	0.11	97.8	1.99
39	Trichloroethene	105	0.13	99.7	1.18	102	0.08	99.0	1.02
40	Dibromomethane	100	0.11	96.7	1.88	121	0.22	96.8	2.71
41	1,2-Dichloropropane	98.3	0.14	98.6	2.00	106	0.17	96.9	1.52
42	Bromodichloromethane	95.3	0.11	99.4	1.64	99.8	0.15	97.6	1.52
43	Methyl methacrylate	103	0.12	107	6.04	114	0.24	99.6	1.90
44	2-Chloroethyl-vinyl-ether	95.5	0.13	106	6.46	100	0.20	103	2.38
45	cis-1,3-Dichloropropene	95.8	0.09	103	2.83	94.3	0.15	99.5	1.62
46	Chlorobenzene-d5 (IS)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
47	Toluene-d8(SS)	102	2.14	100	1.71	103	1.96	99.6	1.19
48	Toluene	112	0.09	99.2	1.74	110	0.17	96.8	1.42
49	2-Nitropropane	109	0.32	100	5.76	151	0.46	106	5.14
50	4-Methyl-2-pentanone(5x)	86.8	1.01	104	2.94	112	1.67	102	3.87
51	Tetrachloroethene	104	0.12	98.0	1.35	100	0.18	97.5	1.07
52	trans-1,3-Dichloropropene	93.0	0.13	105	3.59	85.8	0.19	97.9	2.49
53	Ethyl methacrylate	94.3	0.16	107	4.22	121	0.23	101	1.33
54	1,1,2-Trichloroethane	97.0	0.14	102	2.31	118	0.18	95.6	1.08
55	Chlorodibromomethane	91.3	0.13	103	1.35	87.8	0.13	98.8	1.21
56	1,3-Dichloropropane	100	0.14	102	3.53	106	0.17	99.6	1.39
57	1,2-Dibromoethane	91.0	0.14	101	1.90	102	0.15	99.5	1.08
58	2-Hexanone(5x)	97.2	0.30	106	5.70	143	1.32	100	5.24
59	Chlorobenzene	96.3	0.10	100	1.07	98.0	0.11	98.1	0.73
60	Ethylbenzene	108	0.11	97.7	0.77	119	0.20	97.1	1.01
61	1,1,1,2-Tetrachloroethane	93.8	0.15	97.4	2.00	108	0.16	98.0	1.92
62	m,p-Xylenes(2x)	93.4	0.24	100	0.87	106	0.27	99.3	0.70
63	o-Xylene	95.5	0.12	98.1	1.76	113	0.14	99.1	2.05
64	Styrene	92.0	0.07	102	0.68	100	0.15	96.6	0.89
65	Bromoform	85.3	0.13	103	1.21	85.3	0.15	98.6	2.17
66	Isopropylbenzene	90.0	0.09	95.4	2.25	110	0.15	101	2.05
67	cis-1,4-Dichloro-2-butene	103	0.19	98.9	2.79	113	0.36	95.7	4.36
68	1,4-Dichlorobenzene-d4 (IS)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
69	4-Bromofluorobenzene (SS)	96.0	6.36	101	4.19	92.3	2.76	100	2.37
70	n-Propylbenzene	90.8	0.10	99.7	3.78	94.5	0.10	101	1.96
71	Bromobemzene	93.0	0.06	101	4.74	90.5	0.18	99.7	2.63
72	1,1,2,2-Tetrachloroethane	97.3	0.14	103	4.23	106	0.09	99.3	1.69
73	2-Chlorotoluene	91.8	0.11	99.3	2.84	92.3	0.09	101	1.63
74	1,3,5-Trimethylbenzene	91.3	0.10	98.4	2.16	86.5	0.07	104	2.18
75	1,2,3-Trichloropropane	89.5	0.18	103	5.86	111	0.30	98.6	2.59
76	trans-1,4-Dichloro-2-butene	98.0	0.14	106	7.20	108	0.14	95.7	2.90
77	4-Chlorotoluene	93.3	0.11	102	3.18	93.3	0.11	98.5	2.40
78	tert-Butylbenzene	89.3	0.11	98.3	2.77	72.3	0.09	108	2.77

Analyte	Compound	#10 MDL % Recovery	#10 MDL (ppb)	#10 IDC % Recovery	#10 IDC % RSD	8260 Nitro MDL % Recovery	8260 Nitro MDL (ppb)	8260 Nitro IDC % Recovery	8260 Nitro IDC % RSD
79	1,2,4-Trimethylbenzene	91.0	0.09	99.9	1.25	92.3	0.13	101	2.06
80	sec-Butylbenzene	89.3	0.11	97.1	1.74	85.5	0.10	106	2.16
81	p-Isopropytoluene	89.8	0.08	98.3	0.77	86.3	0.07	104	2.09
82	1,3-Dichlorobenzene	100	0.11	101	1.31	96.0	0.18	98.1	0.78
83	1,4-Dichlorobenzene	109	0.15	100	1.01	110	0.16	99.6	0.82
84	n-Butylbenzene	93.5	0.06	97.5	2.15	97.0	0.14	100	1.67
85	1,2-Dichlorobenzene	102	0.08	99.8	1.59	101	0.06	100	1.35
86	1,2-Dibromo-3-chloropropane	88.0	0.22	98.1	2.28	88.3	0.19	102	3.09
87	Hexachlorobutadiene	99.8	0.27	91.1	3.80	96.3	0.27	98.6	1.95
88	1,2,4-Trichlorobenzene	92.8	0.12	91.0	3.33	110	0.16	98.8	2.35
89	Naphthalene	94.5	0.08	93.7	2.11	101	0.09	102	1.93
90	1,2,3-Trichlorobenzene	98.0	0.13	90.1	1.76	107	0.17	99.8	2.64

Figure 1. 50 ppb Water Standard Using #10 Trap and Helium

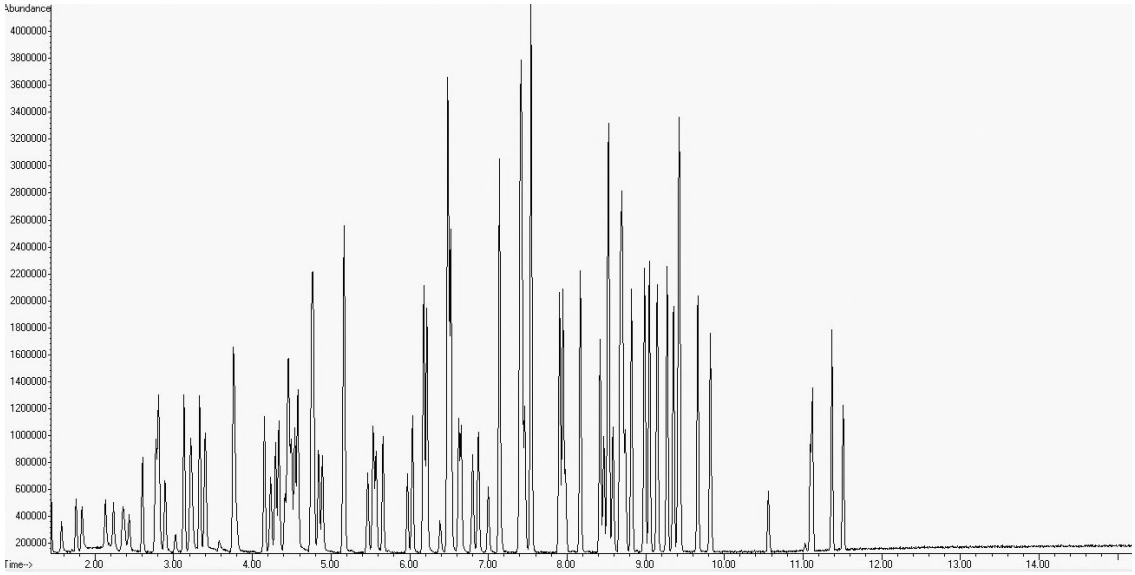


Figure 2. 50 ppb Soil Standard Using #10 Trap and Helium

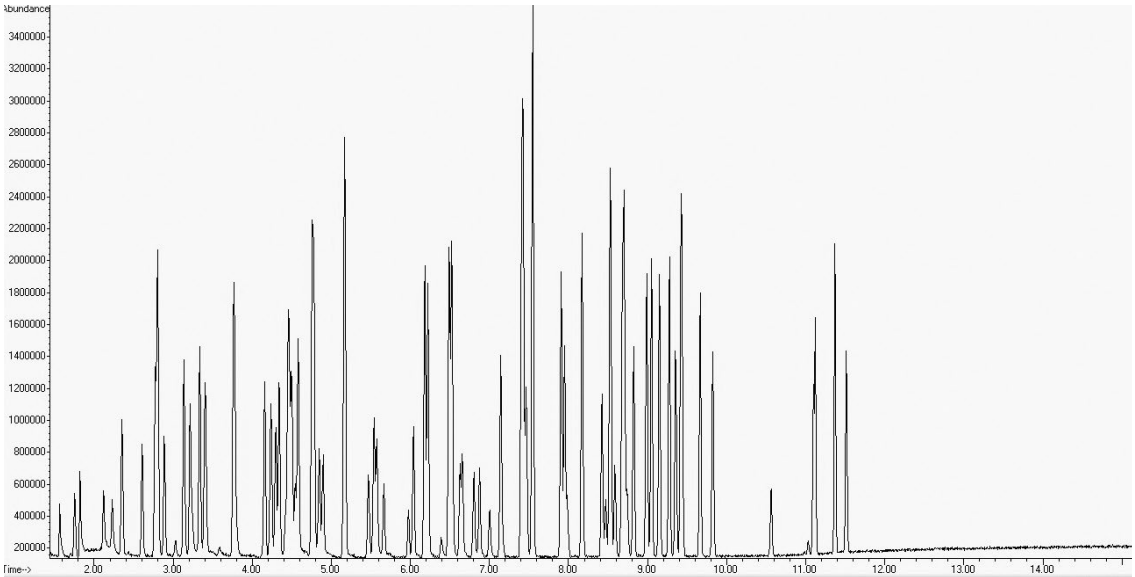


Figure 3. 50 ppb Water Standard Using 8260 Nitro Trap and Nitrogen

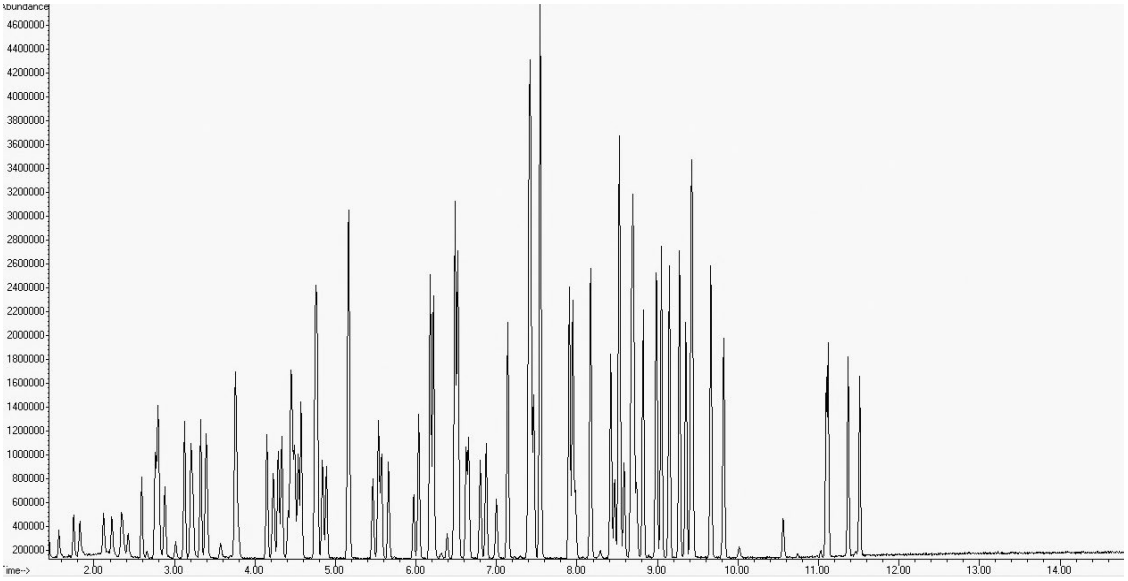
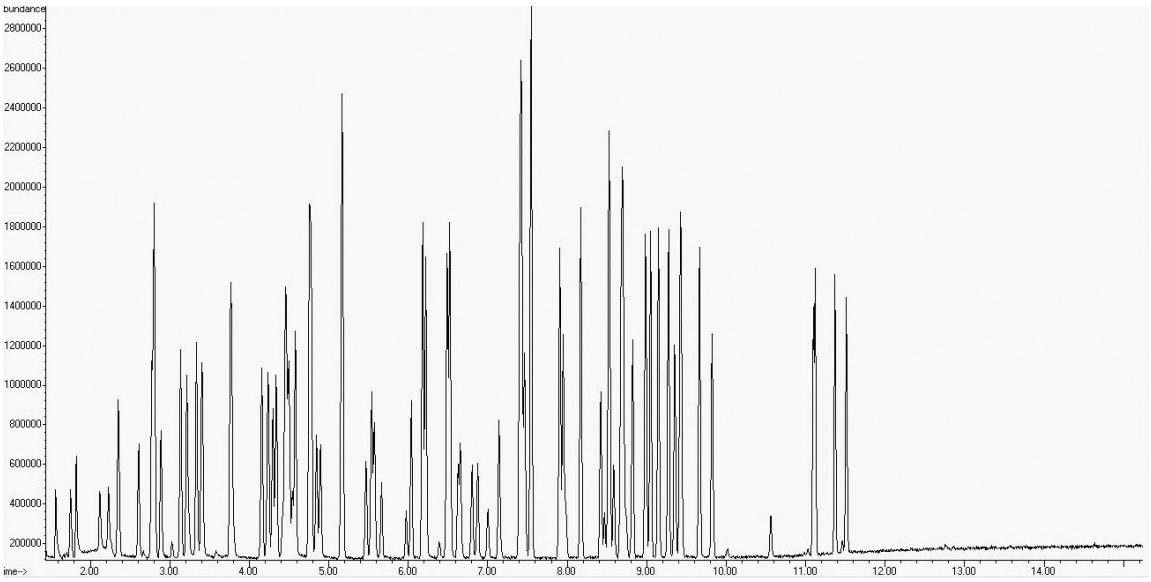


Figure 4. 50 ppb Soil Standard Using 8260 Nitro Trap and Nitrogen



Conclusion

The results demonstrate that the 8260 Nitro Trap delivers acceptable performance when using Nitrogen as a purge gas without compromising data quality.

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