Detection of Picogram and Sub Picogram Semi Volatile Compounds by Full Scan GC/MS Using the High Efficiency Source " A Game Changer"



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Objectives

Evaluate new HES capability to produce scan detection limits for SVOCs that were formerly only approached by SIM.

Determine instrument detection limits (IDLs) for a few SVOCs across the classes of compounds typical to this analysis.

Tentatively identifying unexpected unknowns in samples that would escape SIM,

Included in a target analyte lists for GC/MS methods such as EPA methods 8270, 625 and 525 methods









Source Radiator Assembly







Additional lenses improve ion Transition and Focusing





This analysis was performed using the 5977B GC/MS with the HES.

The system tested a mixture of Semi volatile compounds which were purchase from Supelcotm. The standards were prepared following a standard dilution scheme. The extended calibration range of 2.5 μ g/L – 1000 μ g/L shows superior dynamic range.

The system acquired a ten point calibration curve using the following concentrations; 5, 10, 20, 40, 50, 80, 100, 200, 500, 800, 1000 μg/l.

Following the analytical curve the system acquired eight replicate injections at the low point of the curve to produce a MDL typical for an analytical laboratory.



Analysis of Semi-Volatile Compounds



Parameters for SVOC analysis

HES Autotune

Linearity: Semi-Volatiles Analysis





Semi-Volatiles Analysis: Anthracene

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			Ş	Sample				Anthrace		A	Inthracene Resul	ts		Qu., 0	Qu Ph	henanthr	ene-D10 (IS	Qu (2u						
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T	a	coustandard 5 ppb.D	Cal	1	11/12/2015 1:12 AM	5		5.0000	13.644	5253	5.2413	5.2413	104.8	9.4	19.5 1	3.558	40207	9.0	0.7						
	а	ccustandard 10 ppb.D	Cal	2	11/12/2015 1:43 AM	10		10.0000	13.644	7753	9.4556	9.4556	94.6	11.7	20.9 1	3.559	32896	9.8	0.9						
	а	ccustandard 20 ppb.D	Cal	3	11/12/2015 2:14 AM	20		20.0000	13.644	13236	18.2521	18.2521	91.3	11.5	20.4 1	3.559	29093	8.8	0.7						
	а	ccustandard 50 ppb.D	Cal	4	11/12/2015 2:45 AM	50		50.0000	13.645	41255	54.0919	54.0919	108.2	11.7	20.8 1	3.559	30597	9.4	1.0						
	а	ccustandard 80 ppb.D	Cal	5	11/12/2015 3:16 AM	80		80.0000	13.644	66844	76.9646	76.9646	96.2	11.1	20.9 1	3.558	34842	8.9	0.7						
	a	ccustandard 100 ppb.D	Cal	6	11/12/2015 3:47 AM	100	4	100.0000	13.644	71544	91.8705	91.8705	91.9	11.5	21.8 1	3.559	31241	9.4	0.7						
	a	ccustandard 200 ppb.D	Cal	7	11/12/2015 4:19 AM	200		200.0000	13.644	127358	189.0659	189.0659	94.5	11.6	21.0 1	3.559	27024	9.2	0.8						
	а	ccustandard 500 ppb.D	Cal	8	11/12/2015 4:50 AM	500		500.0000	13.644	332001	506.2679	506.2679	101.3	11.8 2	21.8 1	3.559	26308	9.1	0.8						
	9	ccustandard 800 ppb.D	Cal	9	11/12/2015 5:21 AM	800	2	800.0000	13.644	664835	844.7751	844.7751	105.6	12.0 2	21.9 1	3.559	31572	8.8	0.8						
	а	ccustandard 1000 ppb.D	Cal	10	11/12/2015 5:52 AM	1000		1000.00	13.644	1145741	1117.1332	1117.1332	111.7	12.5 2	22.4 13	3.559	41145	9.3	0.8						
	5	ppb MdI 10.D	QC	1	11/12/2015 11:02 AM			5.0000	13.644	2237	4.4167	4.4167	88.3	12.0 2	20.6 13	3.559	20318	9.0	0.9						
•	5	ppb MdI 1.D	QC	- 1	11/12/2015 11:34 AM			5.0000	13.644	3943	4.9218	4.9218	98.4	11.2	21.4 1	3.559	32142	9.0	0.7						
	5	ppb MdI 2.D	QC	1	11/12/2015 12:05 PM			5.0000	13.644	3387	4.8423	4.8423	96.8	10.3	17.5 1	3.559	28057	8.6	1.0						
	5	ppb MdI 3.D	QC	1	11/12/2015 12:36 PM	10 10		5.0000	13.644	3193	4.8491	4.8491	97.0	11.0	20.8 1	3.558	26416	9.5	1.0						
	5	ppb MdI 4.D	QC	1	11/12/2015 1:07 PM	10 2		5.0000	13.644	2768	4.8515	4.8515	97.0	12.4	20.1 1	3.559	22891	9.1	1.1						
	5	ppb MdI 5.D	QC	1	11/12/2015 1:38 PM	12 2		5.0000	13.644	3555	4.7242	4.7242	94.5	10.0 2	21.0 1	3.559	30189	9.3	0.9						
	5	ppb MdI 6.D	QC	1	11/12/2015 2:09 PM	10 3		5.0000	13.644	3228	4.7843	4.7843	95.7	10.3	21.0 1	3.558	27069	9.3	0.6						
	5	ppb MdI 7.D	QC	1	11/12/2015 2:40 PM	2 3		5.0000	13.644	2862	4.8012	4.8012	96.0	13.2 2	22.9 1	3.559	23910	9.2	0.7						
	5	ppb MdI 8.D	QC	1	11/12/2015 3:11 PM	10 1		5.0000	13.644	3313	4.7903	4.7903	95.8	10.9	20.2 1	3.559	27744	9.1	1.5						
11	5	ppb MdI .D	QC	1	11/12/2015 3:42 PM			5.0000	13.644	3519	4.6725	4.6725	93.4	12.1	22.6 1	3.558	30213	9.1	1,1						
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Semi-Volatiles Analysis: Anthracene



Semi-Volatiles Analysis: 2-Fluorobiphenyl

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	8270 curve point 1	accustandard 5 ppb.D	Cal	5	5	1	11/12/2015 1:12 A	M	5.0000	11.2	538	3	5.3656	5.3656	107.3	39.4 F	30.8 F	0.2000	10.062	54305 1	2.6	7.9
	8270 curve point 2	accustandard 10 ppb.D	Cal	10	10	1	11/12/2015 1:43 A	M	10.0000	11.2	896	7	9.8314	9.8314	98.3	35.6	26.7	0.2000	10.062	49370 1	2.8	7.9
	8270 curve point 3	accustandard 20 ppb.D	Cal	20	20		11/12/2015 2:14 A	м	20.0000	11.2	1537	4	19.2433	19.2433	96.2	36.9	26.4	0.2000	10.062	43248 1	3.1	8.1
	8270 curve point 4	accustandard 50 ppb.D	Cal	80	90		1/12/2015 2:45 A	M	80,0000	11.2	7024		92 2900	92 2000	102.0	36.5	26.21	0.2000	10.063	44991	2.6	79
	8270 curve point 6	accustandard 100 ppb.D	Cal	100	100		1/12/2015 3:47 A	M	100,0000	11.2	8087		94 1278	94 1278	94.1	37.0 [26.4	0.2000	10.062	46509 1	2.5	7.8
	8270 curve point 7	accustandard 200 ppb.D	Cal	200	200		1/12/2015 4:19 A	M	200.0000	11.2	15383	ir	188,9800	188,9800	94.5	37.2	26.5	0.2000	10.063	44064 1	2.7	7.9
	8270 curve point 8	accustandard 500 ppb.D	Cal	500	500		1/12/2015 4:50 A	M	500.0000	11.2	33818	5	487.2889	487.2889	97.5	37.3 L	26.7	0.2000	10.062	37568 1	2.9	8.1
	8270 curve point 9	accustandard 800 ppb.D	Cal	800	800	1	1/12/2015 5:21 A	м	800.0000	11.2	63833	2	775.8164	775.8164	97.0	37.6 F	27.1	0.2000	10.062	44539 1	2.9	7.9
	8270 curve point 10	accustandard 1000 ppb.D	Cal	1000	1000	1	11/12/2015 5:52 AI	м	1000.0000	11.2	90077	6 1	971.6787	971.6787	97.2	38.0 F	27.4	0.2000	10.062	50182 1	2.8	8.1
	mdl 5ppb 10	5 ppb MdI 10.D	QC	5	5	1	11/12/2015 11:02	AM	5.0000	11.2	339	6	4.6621	4.6621	93.2	36.9 F	26.8	0.2000	10.062	39431 1	4.0	8.2
	mdl 5ppb 1	5 ppb MdI 1.D	QC	5	5		11/12/2015 11:34 /	AM	5.0000	11.2	385	3	4.7460	4.7460	94.9	36.9 1	26.5	0.2000	10.062	43948 1	3.9	8.0
	mdl Sppb 2	5 ppb Mdl 2.D		5	6		1/12/2015 12:05 1	PM	5.0000	11.2	3/4		4.6/66	4.6766	93.5	36.71	25.3	0.2000	10.062	43342	3.4	22
	mdl Sppb 3	5 ppb Mdl 3.D	OC	5	5		1/12/2015 12:36 P	M	5.0000	11.2	340		4.5220	4.5220	90.4	37.5	26.6	0.2000	10.062	40101 1	41	78
	mdl 5ppb 5	5 ppb MdI 5.D	QC	5	5		11/12/2015 1:38 PI	M	5.0000	11.2	370	ă 🗖	4,7139	4,7139	94.3	36.5 L	27.3	0.2000	10.062	42587 1	3.5	8.1
	mdl 5ppb 6	5 ppb MdI 6.D	QC	5	5		11/12/2015 2:09 PI	M	5.0000	11.2	349	oint	4.5928	4.5928	91.9	37.4	25.1 L	0.2000	10.062	41131 1	3.6	7.9
	mdl 5ppb 7	5 ppb Mdl 7.D	QC	5	5	1	11/12/2015 2:40 PI	M	5.0000	11.2	331	0	4.3760	4.3760	87.5	37.3 L	25.3 F	0.2000	10.062	40945 1	3.8	7.7
	mdl 5ppb 9	5 ppb MdI .D	QC	5	5	1	11/12/2015 3:42 PI	м	5.0000	11.2	369		4.5794	4.5794	91.6	35.6 F	26.4	0.2000	10.062	43621 1	3.5	8.0
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Slide 12

W(2 WALKER, DALE (A-SantaClara, ex1), 7/24/2016









MDLS: Semi-Volatiles Analysis

					Avg							
Name	RT	Transition	Avg Conc.	Std. Dev.	Conc./Std. Dev.	Conc. RSD	MDL	LOQ	LOD	Avg Height	Avg. Resp	Resp. RSD
1,4-dichlorobenzene	8.477	146	2.5604	0.0507	50.54	2	0.133	0.5066	0.152	1447	2634	5.9
1,2-dichlorobenzene	8.68	146	2.5889	0.0744	34.82	2.9	0.1951	0.7435	0.2231	1390	2503	5.8
Anthracene	13.662	178	2.3763	0.0471	50.49	2	0.1235	0.4707	0.1412	1960	3029	15.9
Benz[a]anthracene	17	228	2.894	0.094	30.79	3.2	0.2467	0.94	0.282	919	1600	23.3
2-fluorophenol	6.354	112	1.8707	0.1018	18.38	5.4	0.2671	1.0177	0.3053	371	1036	10.3
Phenol-d5-	7.853	99	2.0789	0.1061	19.59	5.1	0.2785	1.061	0.3183	585	1353	9.2
Phenol	7.872	94	2.0978	0.0753	27.85	3.6	0.1977	0.7533	0.226	605	1406	4.7
Aniline	7.968	93	2.0027	0.1123	17.83	5.6	0.2948	1.1232	0.337	974	1854	8.1
Bis(2-chloroethyl) ether	8.044	93	2.4595	0.1975	12.45	8	0.5183	1.9747	0.5924	836	1856	7.5
2-chlorophenol	8.149	128	1.8842	0.1333	14.13	7.1	0.3499	1.3333	0.4	412	942	9.7
1,3-dichlorobenzene	8.378	146	2.5532	0.0566	45.14	2.2	0.1485	0.5657	0.1697	1399	2575	5.9
Dibenz[a,h]anthracene	22.325	278	5.8961	0.4339	13.59	7.4	1.1388	4.3391	1.3017	224	970	23.9
Benzyl alcohol	8.604	108	2.6224	0.6737	3.89	25.7	1.768	6.7365	2.021	337	857	26.3
Dibenzofuran	12.202	168	2.6192	0.0787	33.28	3	0.2066	0.7871	0.2361	2574	3904	10.5
o-Cresol	8.732	108	2.9833	0.9942	3	33.3	2.6092	9.9416	2.9825	535	1434	34.2
Bis(2-chloro-1-methylethyl) ether	8.79	121	3.72	0.1907	19.51	5.1	0.5005	1.9072	0.5722	241	684	8.9
p-Cresol	8.924	108	2.4153	0.653	3.7	27	1.7138	6.5301	1.959	489	1153	27.4
N Nitroso-di-n-propylamine	8.953	70	2.8614	0.4659	6.14	16.3	1.2227	4.6589	1.3977	524	1448	20.4
Hexachloroethane	9.14	117	2.4922	0.1367	18.24	5.5	0.3586	1.3665	0.41	503	798	5.8
Nitrobenzene-D5	9.166	82	2.2607	0.0589	38.4	2.6	0.1545	0.5887	0.1766	861	1688	6.2
Nitrobenzene	9.192	77	2.1995	0.1304	16.87	5.9	0.3422	1.3038	0.3911	816	1458	9.3
Isophorone	9.484	82	2.0293	0.0875	23.2	4.3	0.2295	0.8746	0.2624	1078	1899	8.5
2,4-dimethylphenol	9.602	107	1.808	0.0766	23.61	4.2	0.2009	0.7657	0.2297	531	897	8.5
bis(2-chloroethoxy)-methane	9.721	93	2.2003	0.0797	27.62	3.6	0.2091	0.7968	0.239	1142	1805	4.6
2,4-dichloro-phenol	9.87	162	1.3744	0.1568	8.76	11.4	0.4116	1.5684	0.4705	253	457	16.6
1,2,4-trichlorobenzene	9.984	180	2.5619	0.0646	39.65	2.5	0.1696	0.6462	0.1939	1337	2057	6.7
Naphthalene	10.086	128	2.5072	0.033	76.08	1.3	0.0865	0.3295	0.0989	3723	5908	6.4
4-Chloroaniline	10.117	127	2.141	0.256	8.36	12	0.6718	2.5596	0.7679	795	1720	14.4
Hexachlorobutadiene	10.219	227	2.002	0.4507	4.44	22.5	1.1828	4.5068	1.352	553	621	25.5
4-chloro-3-methyl-phenol	10.629	142	2.6386	0.3667	7.2	13.9	0.9625	3.6673	1.1002	256	540	18.5
2 methylnaphthalene	10.863	141	2.4774	0.2275	10.89	9.2	0.597	2.2747	0.6824	1857	2953	7.5
2-fluorobiphenyl	11.24	172	2.2854	0.0579	39.49	2.5	0.1519	0.5787	0.1736	2365	3421	7.8
2 chloronaphthalene	11.396	162	2.3329	0.057	40.96	2.4	0.1495	0.5695	0.1709	1889	2857	8.4
2-Nitroaniline	11.472	65	2.0706	0.3219	6.43	15.5	0.8448	3.2188	0.9657	179	294	17.7
Dimethyl phthalate	11.635	163	2.2032	0.0793	27.8	3.6	0.208	0.7925	0.2378	1601	2510	6.9
2,6 Dinitrotoluene	11.71	89	2.3394	0.3694	6.33	15.8	0.9696	3.6943	1.1083	143	200	18.3
Acenapthylene	11.845	152	2.5816	0.2025	12.75	7.8	0.5315	2.0252	0.6076	2327	3699	7.6
3-Nitroaniline	11.896	92	0.465	0.3278	1.42	70.5	0.8603	3.2781	0.9834	119	215	25.8
Acenaphthene	12.024	152	2.9098	0.4256	6.84	14.6	1.117	4.2561	1.2768	1163	1805	11.4
2,4-dinitro-toluene	12.135	165	10.127	0.2458	41.2	2.4	0.6451	2.4578	0.7373	142	208	18.4
Diethyl Phthalate	12.358	149	5.1659	0.9011	5.73	17.4	2.3648	9.0105	2.7032	3467	4979	21.6



IDL's Extractor vs HES

1		MDL (pg)					
2		Extractor	HES				
з	2-Fluorophenol (surr1)	3.59	0.94				
4	Phenol-d5 (surr2)	2.30	0.86				
5	Phenol	1.85	0.80				
6	bis(2-Chloroethyl)ether	3.07	0.96				
7	2-Chlorophenol	2.15	0.74				
8	1,3-Dichlorobenzene	2.62	0.28				
9	1,4-Dichlorobenzene	2.14	0.56				
10	Benzyl alcohol	3.24	0.63				
11	1,2-Dichlorobenzene	1.47	0.20				
12	2-Methylphenol	4.10	0.55				
13	Bis(2-chloroisopropyl)ether	5.57	0.48				
14	3 &/or 4-Methylphenol	2.11	0.49				
15	N-Nitrosodi-n-propylamine	1.13	0.66				
16	Hexachloroethane	3.71	0.78				
17	Nitrobenzened5 (surr5)	1.55	0.53				
18	Nitrobenzene	4.35	0.49				
19	Isophorone	1.34	0.61				
20	2-Nitrophenol	7.94	0.89				
21	2,4-Dimethylphenol	1.49	0.94				
22	Bis(2-chloroethoxy)methane	3.79	0.17				
23	2,4-Dichlorophenol	4.69	0.80				
24	1,2,4-Trichlorobenzene	1.46	0.34				
25	Naphthalene	1.57	0.14				
26	4-Chloroaniline	2.71	0.56				
27	Hexachlorobutadiene	2.05	0.30				
28	4-Chloro-3-methylphenol	3.75	0.66				
29	2-Methylnaphthalene	1.66	0.25				
30	Hexachlorocyclopentadiene	3.18	1.11				
31	2,4,6-Trichlorophenol	3.07	0.89				



IDL's Extractor vs HES

32	2,4,5-Trichlorophenol	5.05	1.95
33	2-Fluorobiphenyl (surr6)	1.16	0.19
34	2-Chloronaphthalene	1.51	0.31
35	2-Nitroaniline	9.69	0.96
36	Dimethyl phthalate	1.20	0.39
37	Acenaphthylene	2.02	0.70
38	2,6-Dinitrotoluene	7.25	1.58
39	3-Nitroaniline	12.46	2.69
40	Acenaphthene	1.59	0.34
41	Dibenzofuran	1.91	0.18
42	2,4-Dinitrotoluene	15.13	2.23
43	Fluorene	2.11	0.28
44	Diethyl phthalate	2.37	0.68
45	4-Chlorophenyl phenyl ether	1.58	0.29
46	4-Nitroaniline	17.58	3.42
47	N-Nitrosodiphenylamine	3.65	0.60
48	2,4,6-Tribromophenol (surr7)	9.41	1.00
49	4-Bromophenyl phenyl ether	1.88	0.65
50	Hexachlorobenzene	1.70	0.63
51	Pentachlorophenol	3.79	2.00
52	Phenanthrene	1.18	0.18
53	Anthracene	1.93	0.87
54	Carbazole	1.71	0.41
55	Di-n-butyl phthalate	3.22	1.40
56	Fluoranthene	2.14	0.32
57	Pyrene	2.79	1.66
58	d14-Terphenyl (surr8)	2.15	1.56
59	Butyl benzyl phthalate	6.58	3.14
60	Benzo (a) anthracene	2.55	1.27
61	3,3'-Dichlorobenzidine	6.06	2.24
62	Chrysene	2.57	0.72
63	Bis(2-ethylhexyl)phthalate	6.70	3.00



IDL's Extractor vs HES

63	Bis(2-ethylhexyl)phthalate	6.70	3.00
64	Di-n-octyl phthalate	7.18	<mark>3.01</mark>
65	Benzo (b) fluoranthene	2.46	1.48
66	Benzo (k) fluoranthene	4.39	0.83
67	Benzo (a) pyrene	3.40	1.04
68	Indeno (1,2,3-cd) pyrene	10.82	2.58
69	Dibenzo (a,h) anthracene	6.63	3.18
70	Benzo (g,h,i) perylene	5.43	2.86



These results suggest a significant improvement in linearity and system stability at the lowest concentration level.

The HES of the Agilent 5977B GC/MSD offers the possibility of performing fewer analysis by eliminating the need to perform SIM reanalyze samples which would have been undetectable using a standard system. The detection limits are superior when compared to previous systems.

The signal improvement provided a more stable platform to perform day to day analysis over a wide dynamic range even at Sub picogram levels.



Three additional benefits for you as an instrument operator.

1. The ability to use smaller extraction volumes for liquid samples due to the increased sensitivity of the new HES source design.

2.The ability to use small volume injections which reduces the need for inlet maintenance

3. The Ability to Use high split ratios which allows you to use the system for analyzing samples at the levels typically used in an environmental laboratory



Improved Linierity Using, the Agilent 5977B GC/MSD, and a High-Efficiency Source For Organic Analysis

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Harry Prest, Melissa Churley And Dale Walker

¹Agilent Technologies Inc., 5301 Stevens Creek Blvd., Santa Clara, CA 95051 USA

ASMS 2016 XXXXX

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Agilent Technologies

Introduction

This poster demonstrates the use of the High Efficiency Source This poster demonstrates the use of the High Efficiency Source (HS) with its newly designed lenses, ion path, and magnet. These improvements provide for better system stability for multiple sample types, including both Volatile and Semi Volatile analysis. This source is available on multiple instrument platforms.

The 59778 HES was used to analyze these samples. The data shows the benefits of the HES when used to perform typical Semi Volatile laboratory analysis.

The Overall Linearity for the Semi Volatiles are shown here. The curve concentrations performed on the 59778 HES shows a wide dynamic linear range as well as excellent low level

stability for all compounds. Method

This analysis was performed using the 5977B GC/MS with the HES. The system tested a mixture of Semi volatile compounds which were purchase from Supelco^m. The standards were prepared following a standard dilution scheme. The extended calibration range of 2.5 µg/L – 1000 µg/L shows superior dynamic range.

The system acquired a ten point calibration curve using the following concentrations; 5, 10, 20, 40, 50, 80, 100, 200, 500, 800, 1000 µg/l.







Method, cont.





Better instrument linearity means more flexibility

Name	RT	Transition	Avg Conc.	Std. Dev.	Avg Conc./Std. Dev.	Conc. RSD	MDL	LOQ	LOD	Avg Height	Avg. Resp	Resp. RSD
,4-dichlorobenzene	8.477	146	2.5604	0.0507	50.54	2	0.133	0.5066	0.152	1447	2634	5.5
,2-dichlorobenzene	8.68	146	2.5889	0.0744	34.82	2.9	0.1951	0.7435	0.2231	1390	2503	5.8
inthracene	13.662	178	2.3763	0.0471	50.49	2	0.1235	0.4707	0.1412	1960	3029	15.5
lenz[a]anthracene	17	228	2.894	0.094	30.79	3.2	0.2467	0.94	0.282	919	1600	23.3
fluorophenol	6.354	112	1.8707	0.1018	18.38	5.4	0.2671	1.0177	0.3053	371	1036	10.1
herol-d5-	7.853	99	2.0789	0.1061	19.59	5.1	0.2785	1.061	0.3183	585	1353	9.3
herol	7.872	94	2.0978	0.0753	27.85	3.6	0.1977	0.7533	0.226	605	1405	4.3
iniline	7.958	93	2.0027	0.1123	17.83	5.6	0.2948	1.1232	0.337	974	1854	8.1
lis(2-chloroethyl) ether	8.044	93	2.4595	0.1975	12.45	8	0.5183	1.9747	0.5924	836	1856	7.5
-chlorophenol	8.149	128	1.8842	0.1333	14.13	7.1	0.3499	1.3333	0.4	412	942	9.1
,3-dichlorobenzene	8.378	146	2.5532	0.0566	45.14	2.2	0.1485	0.5657	0.1697	1399	2575	5.5
Nbenz[a,h]anthracene	22.325	278	5.8961	0.4339	13.59	7.4	1 1388	4.3391	1.3017	224	970	23.9
lenzyl alcohol	8.604	108	2.6224	0.6737	3.89	25.7	1.768	6.7365	2.021	337	857	26.3
Nibenzofuran	12.202	168	2.6192	0.0787	33.28	3	0.2056	0.7871	0.2361	2574	3904	10.5
Cresol	8.732	108	2.9833	0.9942	3	33.3	2.6092	9.9416	2.9825	535	1434	34.3
lis(2-chloro-1-methylethyl) ether	8.79	121	3.72	0.1907	19.51	5.1	0.5005	1.9072	0.5722	241	684	8.9
Cresol	8.924	108	2.4153	0.653	3.7	27	1.7138	6.5301	1.959	489	1153	27.
Nitroso-di-n-propylamine	8.953	70	2,8614	0.4659	6.14	16.3	1.2227	4,6589	1.3977	524	1448	20.4
fexachloroethane	9.14	117	2.4922	0.1367	18.24	5.5	0.3586	1.3665	0.41	503	798	5.4
litrobenzene-D5	9.166	82	2.2607	0.0589	38.4	2.6	0.1545	0.5887	0.1766	861	1688	6.3
litrobenzene	5.152	77	2.1995	0.1304	16.87	5.5	0.3422	1.5058	0.3911	816	1458	9.5
sophorone	9.484	82	2.0293	0.0875	23.2	4.3	0.2295	0.8746	0.2624	1078	1899	8.5
4-dimethylphenol	9.602	107	1.808	0.0766	23.61	4.2	0.2009	0.7657	0.2297	\$31	897	8.5
is(2-chloroethoxy)-methane	9.721	93	2.2003	0.0797	27.62	3.6	0.2091	0.7968	0.239	1142	1805	4.8
4-dichloro-phenol	9.87	162	1.3744	0.1568	8.76	11.4	0.4116	1.5684	0.4705	253	457	16.6
2.4-trichlorobenzene	9,984	180	2.5619	0.0545	39.65	2.5	0.1696	0.6462	0.1939	1337	2057	6.3
laphthalene	10.086	128	2.5072	0.033	76.08	1.3	0.0865	0.3295	0.0989	3723	5908	6.4
Chloroaniline	10.117	127	2.141	0.256	8.36	12	0.6718	2.5596	0.7679	795	1720	14.4
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cenapthylene	11.845	152	2.5816	0.2025	12.75	7.8	0.5315	2.0252	0.6076	2327	3699	7)
Nitroaniline	11.896	92	0.465	0.3278	1.42	70.5	0.8603	3.2781	0.9834	119	215	25
censphthene	12.024	152	2,9098	0.4256	6.84	14.6	1.117	4,2561	1.2768	1163	1805	11
4-dipitro-toluene	12 135	165	10 127	0.2458	41.2	2.4	0.6451	2 4578	0.7373	142	208	18
Contraction of the second	10.050	100	6 1669	0.0004	6.33	17.4	0.000	0.0405	0.7070	2462	1000	

Conclusions

preliminary results suggest a significant improvement in linearity and system stability at the lowest concentration level. These prominary results suggest a significant improvement in meany and system studing with the towast concentration ever. The HSs of the Against SYTS BC/MSD offers the possibility of performing fever analysis to eliminating the meal to divite and reanalyse samples which would have been over range on previous systems. The signal improvement provided a more stable platform to perform days to day analysis over a wide dynamic range.

