INFICON

APPLICATION NOTE

Quantitative Method for EPA 8260B Compounds Using the HAPSITE® ER Portable GC/MS Chemical Identification System with Headspace Sampling System

INTRODUCTION

EPA standard method 8260B describes a set of procedures and conditions for collection and analysis of volatile organic compounds (VOCs) for solid wastes. Several sample collection techniques, including headspace sampling, are permitted. Gas chromatographic separation followed by mass spectral (MS) detection and identification of the collected VOCs is required to characterize the matrix analytes. The HAPSITE ER Gas Chromatograph/Mass Spectrometer (GC/MS), along with the Headspace Sampling System (HSS) in portable mode, allows for the EPA 8260B method to be performed on site, eliminating the risk of sample contamination. After the sample has been collected, the VOCs are purged from the sample and are collected into the headspace created above the liquid sample.

INFICON has developed a quantitative method for the HAPSITE ER utilizing the HSS accessory for monitoring analytes listed in the 8260B method. The method contains a calibration library of 58 analytes listed in the 8260B method at detection limits in the low to mid µg/L (low to mid ppb) range. Using the HAPSITE ER-HSS configuration along with the quantitative method allows the user to analyze data on-site.

EXPERIMENTAL

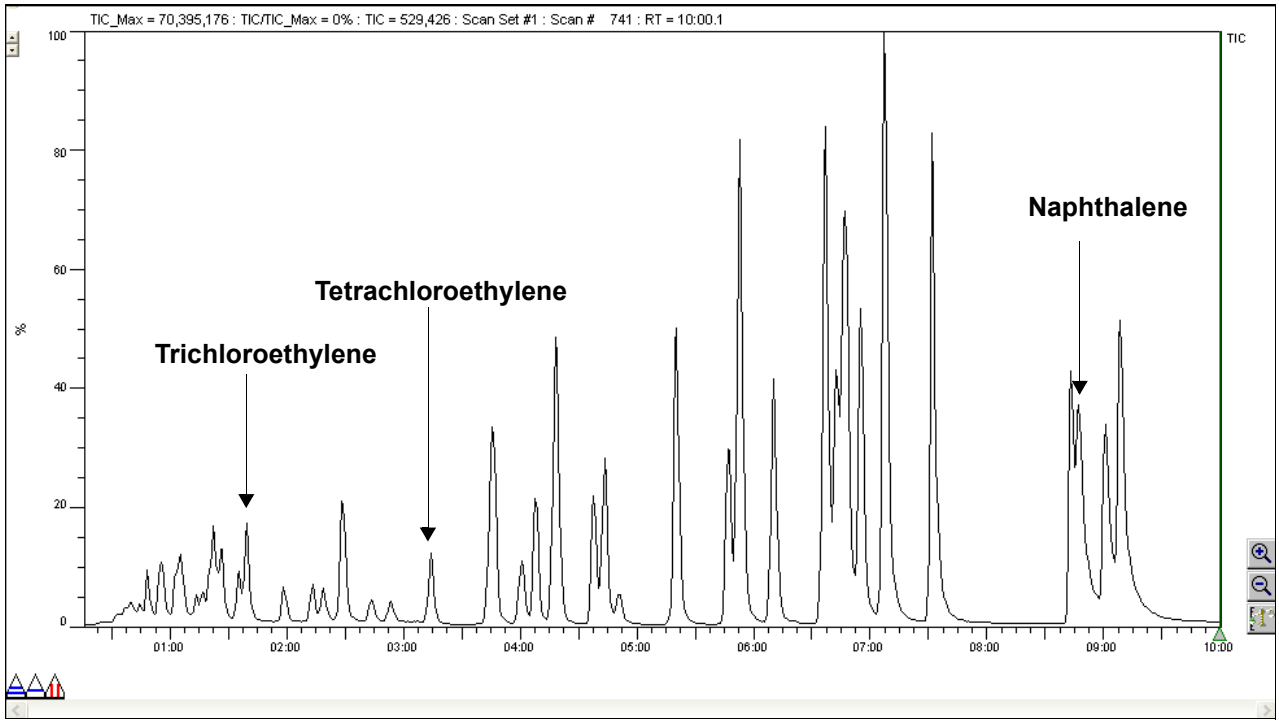
Five concentrations in the low to mid µg/L (low to mid ppb) range were prepared for this calibration. Various volumes of Restek 8260B MegaMix® standard, along with the INFICON HSS Internal Standard Mix (IPN 071-478), were manually injected into five 40 mL vials containing 20 mL VOC-free water. The samples were then allowed to equilibrate in the HSS at 60ºC for about 20 minutes.

Following the analysis of the calibration standards, a 58-compound calibration library was built and stored in the method file. Figure 1 displays a chromatogram labelled with the method parameters. Table 1 contains the 58 compounds including quantitation ions (Q. Ion), retention times, and RSD of average Rf.

CONCLUSION

The calibration library included in the methods for the HAPSITE ER with the HSS is in compliance with the 8260B method, and quantitative results can be obtained quickly when this method is utilized. Concerns about sample contamination are also minimized as a result of on-site sample collection.

Figure 1: Example Chromatogram of the Analytes in the Restek 8260B MegaMix Standard



Column: HP-1MS, 15 m, 0.25 mm id, 1.0 µm df

Temperature Profile: 60°C (hold 2 min, 30 sec.) to 100°C at 10°C/min., to 180°C at 26°C/min. (hold 26 sec)

Table 1: Q. Ion, Retention Time, and RSD of Average Rf of the 8260B MegaMix Standard

Compound	Q. Ion (AMU)	Retention Time (min:sec)	RSD of Average Rf (%)
Vinyl Chloride	62	00:38.3	34.04
Bromomethane	94	00:40.9	29.63
Chloroethane	64	00:41.3	29.27
Trichloromonofluoromethane	101	00:45.5	29.88
1,1-Dichloroethene	61	00:49.1	24.15
Methylene Chloride	84	00:49.6	33.75
trans-1,2-Dichloroethene	96	00:55.7	23.00
1,1-Dichloroethane	63	00:57.3	28.90
MTBE	73	00:57.8	21.55
cis-1,2-Dichloroethene	96	01:03.9	23.46
Bromochloromethane	130	01:05.6	32.01
Trichloromethane (Chloroform)	85	01:06.6	16.24
2,2-Dichloropropane	77	01:07.4	27.94
1,2-Dichloroethane	62	01:14.5	22.35
1,1,1-Trichloroethane	97	01:18.0	27.22

Table 1: Q. Ion, Retention Time, and RSD of Average Rf of the 8260B MegaMix Standard (Continued)

Compound	Q. Ion (AMU)	Retention Time (min:sec)	RSD of Average Rf (%)
1,1-Dichloropropene	75	01:23.7	29.53
Benzene	78	01:23.9	29.06
Carbon Tetrachloride	117	01:26.2	25.11
Dibromomethane	93	01:36.1	27.47
1,2-Dichloropropane	63	01:36.8	23.37
Bromodichloromethane	83	01:40.0	28.24
Trichloroethylene	95	01:40.7	28.93
cis-1,3-Dichloropropene	75	01:59.8	23.11
trans-1,3-Dichloropropene	75	02:14.6	20.41
1,1,2-Trichloroethane	97	02:20.2	27.61
Toluene	91	02:29.8	26.83
1,3-Dichloropropane	76	02:30.9	20.36
Dibromochloromethane	129	02:45.0	26.39
1,2-Dibromoethane	107	02:54.7	29.46
Tetrachloroethylene	166	03:15.2	25.16
1,1,1,2-Tetrachloroethane	131	03:47.5	23.41
Chlorobenzene	112	03:47.8	21.64
Ethylbenzene	91	04:09.4	23.72
Bromoform	173	04:18.7	24.18
m-and *p*-Xylene	91	04:20.2	31.44
Styrene	104	04:39.3	28.14
1,1,2,2-Tetrachloroethane	83	04:45.0	20.99
o-Xylene	91	04:45.0	29.26
1,2,3-Trichloropropane	75	04:52.4	18.86
Bromobenzene	77	05:21.7	27.72
Isopropylbenzene	105	05:21.7	28.61
2-Chlorotoluene	91	05:48.7	28.45
4-Chlorotoluene	126	05:54.6	27.93
n-Propylbenzene	120	05:54.8	30.77
1,3,5-Trimethylbenzene	105	06:12.1	24.78
t-Butyl benzene	119	06:39.1	26.71
1,2,4-Trimethylbenzene	120	06:39.4	28.21
1,3-Dichlorobenzene	146	06:43.5	20.69
1,4-Dichlorobenzene	146	06:49.4	28.45

Table 1: Q. Ion, Retention Time, and RSD of Average Rf of the 8260B MegaMix Standard (Continued)

Compound	Q. Ion (AMU)	Retention Time (min:sec)	RSD of Average Rf (%)
sec-Butyl benzene	105	06:55.9	27.16
p-Isopropyltoluene	119	07:07.7	30.06
1,2-Dichlorobenzene	146	07:10.1	18.45
n-Butyl benzene	91	07:32.8	28.68
1,2-Dibromo-3-chloropropane	157	07:36.7	29.82
1,2,4-Trichlorobenzene	180	08:45.0	25.47
Naphthalene	128	08:48.6	28.07
1,2,3-Trichlorobenzene	180	09:02.0	28.62
Hexachlorobutadiene	225	09:10.2	24.05