Application Brief

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BTEX Analysis with the Agilent 990 Micro GC System

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Abstract

This Application Brief describes the use of an Agilent 990 Micro GC for the analysis of BTEX in air. The method delivered good resolution of xylene isomers, excellent repeatability, and a short run time.

Introduction

BTEX is a group of volatile compounds that includes benzene, toluene, ethylbenzene, and xylenes. BTEX compounds are often used as marker compounds for environmental contamination.

The Agilent 990 Micro GC is portable, energy-efficient, and can provide fast analysis of gas samples. This Application Brief used a 990 Micro GC equipped with a 10 m Agilent J&W CP-Wax 52 CB column for the analysis of BTEX in air. The three isomers of xylenes were well resolved on the selected wax channel. The analysis time was approximately 140 seconds. The detection limit and instrument repeatability were evaluated based on BTEX calibration gas standard.

Experimental

An Agilent 990 Micro GC configured with a 10 m Agilent J&W CP-Wax 52 CB straight channel was used for BTEX analysis. The 10 m polar column was selected for its effective separation of *p*-xylene and *m*-xylene. Table 1 shows the analytical conditions.

Figure 1 provides a representative chromatogram of 50 ppm BTEX on a 10 m CP-Wax 52 CB channel. Xylene isomers are well separated on this length of wax column. The system repeatability was evaluated by 20 consecutive analyses of 50 ppm BTEX sample. The area RSD% was between 1 and 2.5%. The RT RSD% was better than 0.01%. The excellent repeatability is important for qualification and quantitation analysis with a high level of confidence (Table 2).

Table 1. BTEX analysis conditions on 10 m Agilent J&W CP-Wax 52 CB channel.

Agilent 990 Micro GC Configuration and Parameters	
Channel Type	10 m, Agilent J&W CP-Wax 52CB channel, straight
Injector Temperature	110 °C
Column Pressure	220 kPa
Column Temperature	50 °C
Carrier Gas	Helium
Injection Time	80 ms

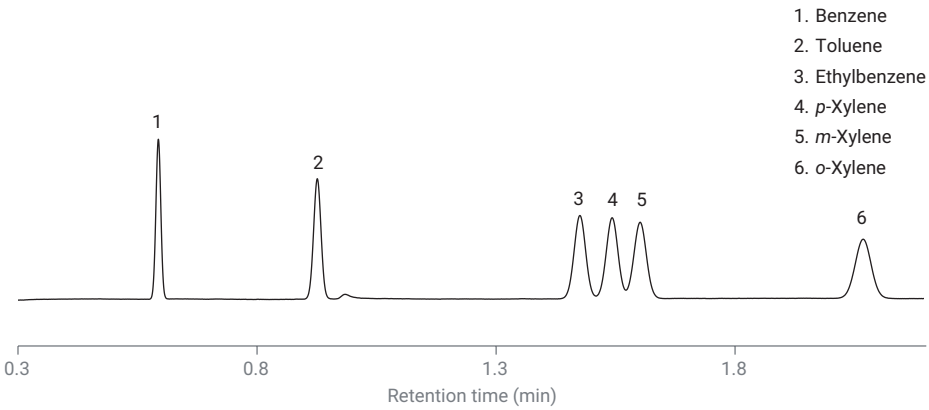

Figure 1. Chromatogram of 50 ppm BTEX on Agilent J&W CP-Wax 52 CB GC channel.

Table 2. RT and area repeatability of 20 runs of 50 ppm BTEX calibration standard.

Compound	RT(min)	RT RSD%	Area (mv × s)	Area RSD%
Benzene	0.594	0.005	0.174	0.86
Toluene	0.926	0.006	0.193	0.85
Ethylbenzene	1.476	0.002	0.2	0.92
p-Xylene	1.543	0.005	0.194	2.27
m-Xylene	1.602	0.006	0.194	2.51
o-Xylene	2.068	0.01	0.188	1.75

To evaluate the detection limit of BTEX on this channel, 50 ppm calibration standard was diluted with air to 6 ppm. Figure 2 shows the chromatogram of 6 ppm diluted sample. The peak adjacent to the right of toluene is the moisture in air. The detection limit of benzene, toluene, ethylbenzene, and xylenes at applied experimental conditions were calculated with signal-to-noise (S/N) ratios at 2 and shown in Table 3. For the real sample analysis, longer injection time, such as 150 to 200 ms can be used to further reduce the detection limit of BTEX.

Conclusion

This Application Brief demonstrates a fast analysis of BTEX in air by the Agilent 990 Micro GC. Xylene isomers were resolved on a 10 m Agilent J&W CP-Wax 52 CB channel with good resolution. The excellent RT and area repeatability show lab quality results achieved on the portable 990 Micro GC. The analysis time is less than 150 seconds, which can help accelerate decision making at contaminated sites, and is especially suitable for emergency response.

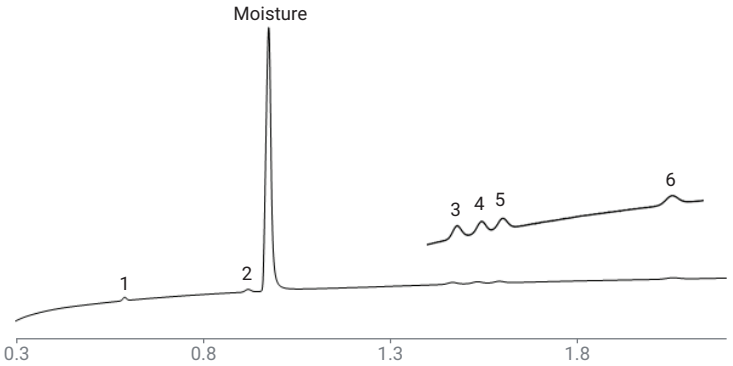

Figure 2. Chromatogram of 6 ppm BTEX in air on the Agilent J&W CP-Wax 52 CB GC channel.

Table 3. Calculated MDL for BTEX components.

Compounds	Benzene	Toluene	Ethylbenzene	*p*-Xylene	*m*-Xylene	*o*-Xylene
Calculated MDL (ppm)	0.50	0.59	0.83	0.83	1.00	1.25

Reference

1. Vattaire, P.; van Loon, R. Analysis of BTEX in Air Using the Agilent 490 Micro GC. *Agilent Technologies Application Note*, publication number 5990-9527EN, **2011**.

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Printed in the USA, October 10, 2019
5994-1375EN

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