

Introduction

GC and GC/MS analysis of VOCs can be performed in the lab after samples are gathered from the field. However, since most samples originate outside the lab, the majority of VOC emissions testing is performed by mobile labs equipped with transportable instruments to ensure fast response and accurate on-site results. One of the most important environmental mobile lab tasks is to identify and quantify the wide range of VOCs in air pollutants. In general, most of these pollutants come from stationary or organized emission such as petrochemical plant, vehicle exhaust, and accidental or unorganized emission, for example, solvent leakage during the transportation. On-site air pollutants monitoring requires an automated sample preparation such as thermal desorption and a fast GCMS system which can quickly provide both qualitative and quantitative results.



Sample preparation is critical in the field analysis process, with an impact to data quality, test accuracy, and analysis speed. The most important criteria for field environmental measurements are ease of use, fast cycle time, bench space, and data quality. The Agilent 7667A mini Thermal Desorber fulfills those requirements. The 7667A mini Thermal Desorber provides truly mobile features including a much smaller size, lower power consumption, ease of installation, and so forth.

Method performance

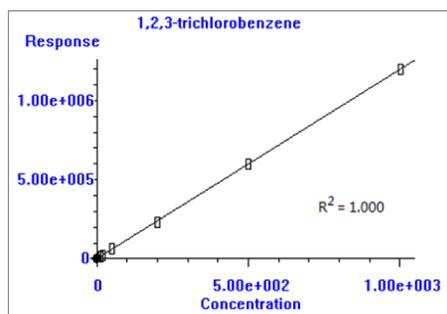
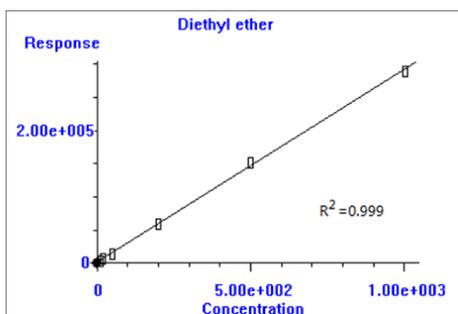
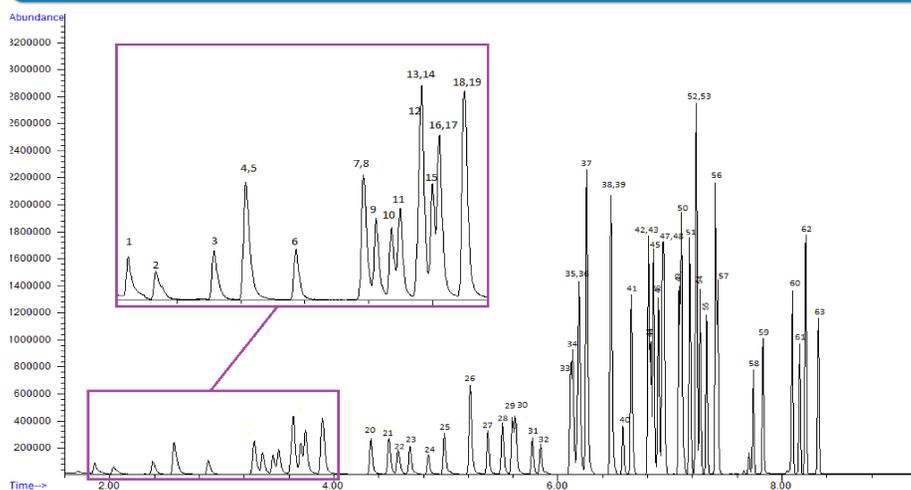


Fig 1. Chromatogram of 200-ng VOCs on Tenax tube and part of calibration curves

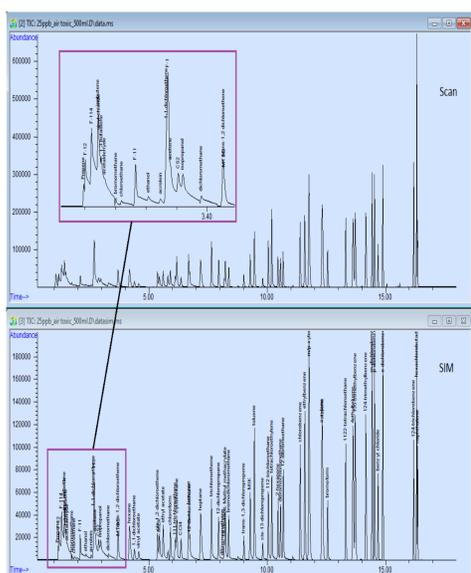
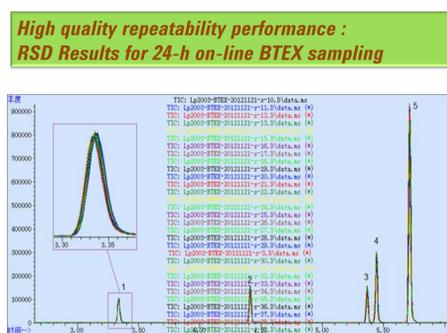


Fig 2. Scan & SIM picture of 500ml 25-ppbv T017 gas on an Air Toxic tube.



#	Compound	RT RSD% (n=84)	Area RSD% (n=84)
1	benzene	0.033	1.83
2	toluene	0.035	2.84
3	ethylbenzene	0.037	2.92
4	m/p-xylene	0.039	2.50
5	o-xylene/Stryene	0.044	2.87

Experimental

Instrument	Agilent 7667A mini TD (Enhanced) 5975T LTM/GC-MS
TD operation mode	On-line sampling or Desorbing
TD Tube	Tenax
Tube temp. program	40°C to 300°C @500°C/min
Valve box temp.	150°C
Transfer line temp.	150°C
Desorption time	1 min
Cleaning	100 ml/min @ 5 min
Inlet Temp.	200°C
Column flow (He)	0.8 ml/min (constant flow)
Split ratio	80:1
Column	LTM DB-624 2.0m×0.18 mm×1.0 μm
LTM program	50°C (1 min) >120°C (0 min) @ 20°C/min > 220°C (1.5 min) @ 50°C/min
GC Total Run Time	10 min
Scan Mass Range	35-28 0amu
Source Temp.	230°C

Results and Discussion

Real sample analysis: Tunnel inside air monitoring

Analysis of the tunnel air can provide key messages of detail VOC species from vehicle emission during transportation. Some typical compounds like toluene, benzene and xylene are trapped in the Tenax tube and detected by GC/MS.

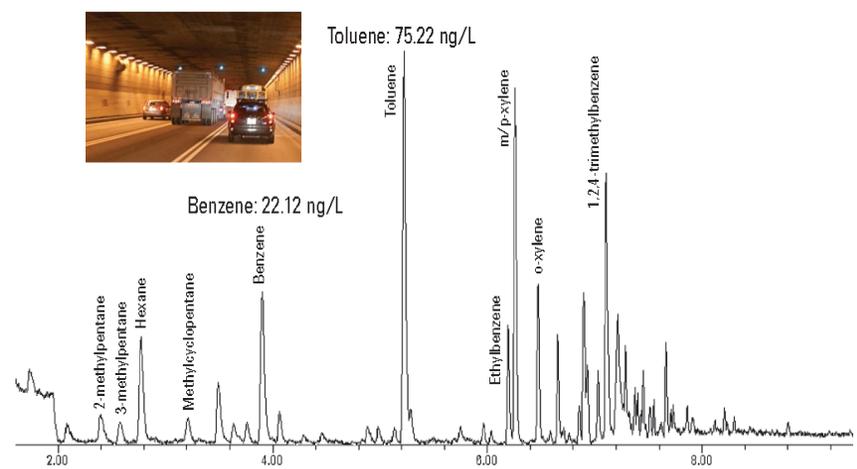


Fig 4. Chromatogram of tunnel inside air on a Tenax tube

Real sample analysis: chemical lab room air monitoring

The off-line mode supports on-site sampling using the personal pump allowing the 7667A and the 5975T to reach places where the mobile lab cannot. This function is particularly useful for industry emission and solvents waste identification.

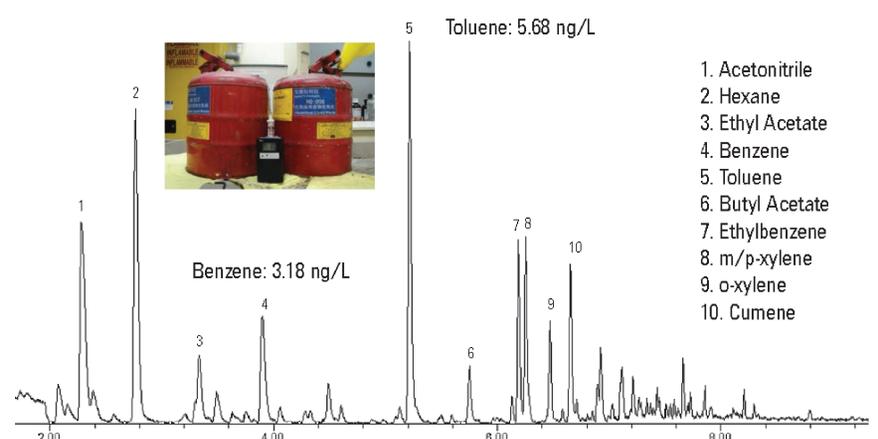


Fig 5. Chromatogram of chemical lab air on a Tenax tube

Carryover is always a big concern related to sampler concentration technology. High quality items such as O ring seals inside of the system help 7667A mini TD deliver very low carryover after injection of high concentration samples. Cleaning function of this system can also help to remove contaminations. The second desorption after injection of 1,000-ng VOCs standards shows no carryover.

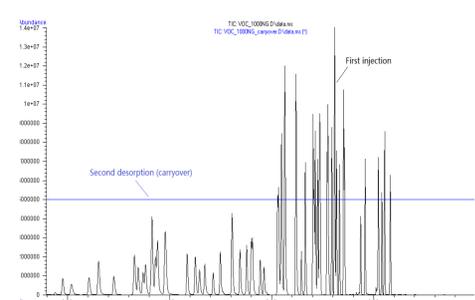


Fig 6. Overlapped chromatograms of 1000ng VOCs standards and second desorption as carryover



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