

## TDTS 17

### The GC/FID sensitivity of the UNITY thermal desorber

The overall sensitivity of a TD-GC method depends on a number of factors including split ratio, desorption efficiency and general GC performance.

UNITY and ULTRA-UNITY – Markes' manual and fully automated two-stage TD systems – incorporate an electrically-cooled, sorbent trap for (re)focusing and releasing organic compounds ranging in volatility from acetylene to n-C<sub>36</sub> and above. Sorbent traps overcome the water incompatibility issue associated with capillary cryofocusing, but their design needs to be a careful compromise between quantitative retention and efficient desorption.

Markes' focusing (cold) traps are heated at rates approaching 100 °C/s in the initial stages of desorption, and elutes volatiles in a narrow band of vapour (100–200 µL) at flows down to 2 mL/min. Once eluted from the trap, analytes are immediately transferred to high-resolution fused-silica capillary tubing, and are subject to minimal dispersion effects. This facilitates splitless operation with high-resolution capillary

chromatography and optimum concentration enhancement. For example, the trace volatiles from 100 L of air or gas may be retained on a sorbent tube and subsequently transferred to an analyser in 100 or 200 µL of carrier gas. This equates to a concentration enhancement factor of  $5 \times 10^5$  or  $10^6$ .

Figure 1 shows the signal from 30 pg of benzene analysed using a UNITY/capillary-FID system. The signal-to-noise ratio is at least 20:1, equating to a concentration of 10 ppt in 1 L of air, or 1 ppt in 10 L of air.

#### Trademarks

ULTRA™ and UNITY™ are trademarks of Markes International Ltd, UK.

*Applications were performed under the stated analytical conditions. Operation under different conditions, or with incompatible sample matrices, may impact the performance shown.*

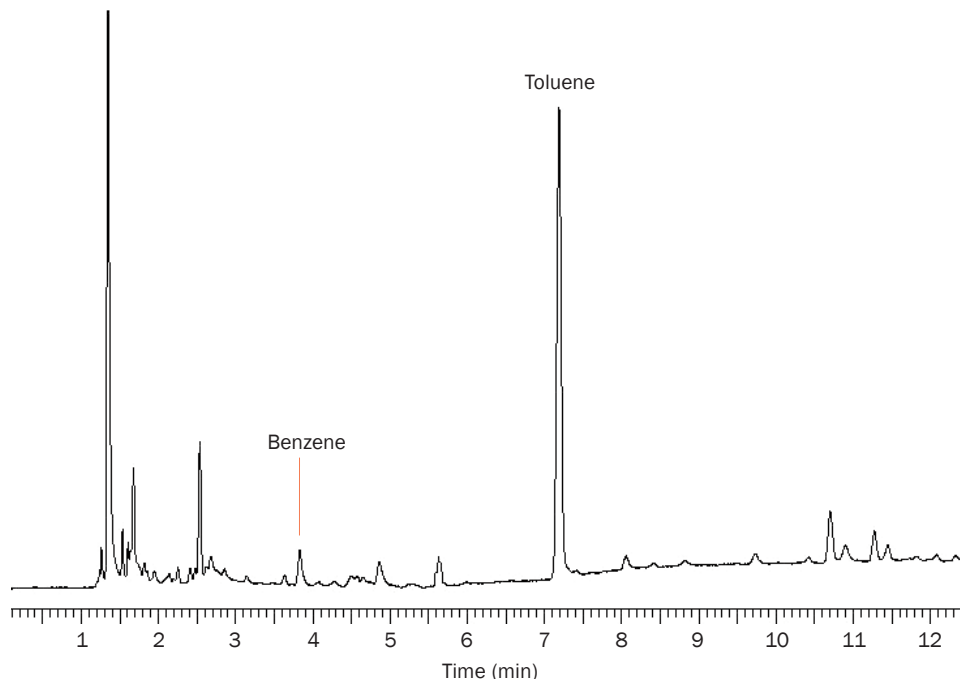


Figure 1: Chromatogram showing 30 pg of benzene analysed by TD-GC/FID.