



TO-17 Analysis

Application Note

Environmental

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TO-17 is the EPA method for the determination of VOC's in ambient air by pulling of a known volume of air through a tube packed with a variety of sorbent materials. The sorbent tube is then thermally desorbed and analyzed using gas chromatography and mass spectrometry. The detection limits for all VOC's in air range from 0.5ppb to 2ppb, with a linear range up to 200 ppb. The list of compounds includes the gases (Dichlorofluoromethane, Vinyl chloride), heavier alkyl halides (Chloroform, Trichloroethylene), as well as the aromatics (Benzene through Trichlorobenzene). A multibed sorbent tube is used to collect these compounds, with the higher molecular weight compounds retained on the front sorbent and the gases retained on the later, stronger adsorbents.

A cylinder containing 65 compounds at 1 ppm concentration was purchased from Restek. A one liter Tedlar bag was filled to capacity with the compound mixture. One end (non frit or exit end) of a standard six inch Tenax/Carboxen 1000/Carbosieve SIII packed thermal desorption tube was attached to a portable vacuum pump. The other end was attached to the one liter Tedlar bag. The flow rate was monitored using an accurate flow meter integrated within the vacuum system, set for 200ml/min for 5 minutes. The tube was then thermally desorbed. Figure 1 shows the overlay of a calibration from 5 pppv to 100ppbv of the TO17 standard.

The inset in Figure 1 expands an overlay of the same compounds at various concentrations from 5 to 100 ppbv. The technique provides excellent linearity, as shown in the calibration curves for Dichlorofluoromethane and Toluene in Figures 3 and 4.

Instrument Conditions

CDS Autosampler Dynatherm 9300

Valve Oven: 300°C
Transfer Line: 300°C
Tube Heat: 350°C 5 min
Trap Heat: 325°C 5 min

GC/MS

Column: CP-Select 624 (30m x 0.25mm x 1.4µm)
Carrier: Helium, 50:1 split
Injector: 300°C
Oven: 30°C for 3.2 minutes
11°C/min to 160°C, hold 1 min
11°C/min to 220°C, hold 3 min

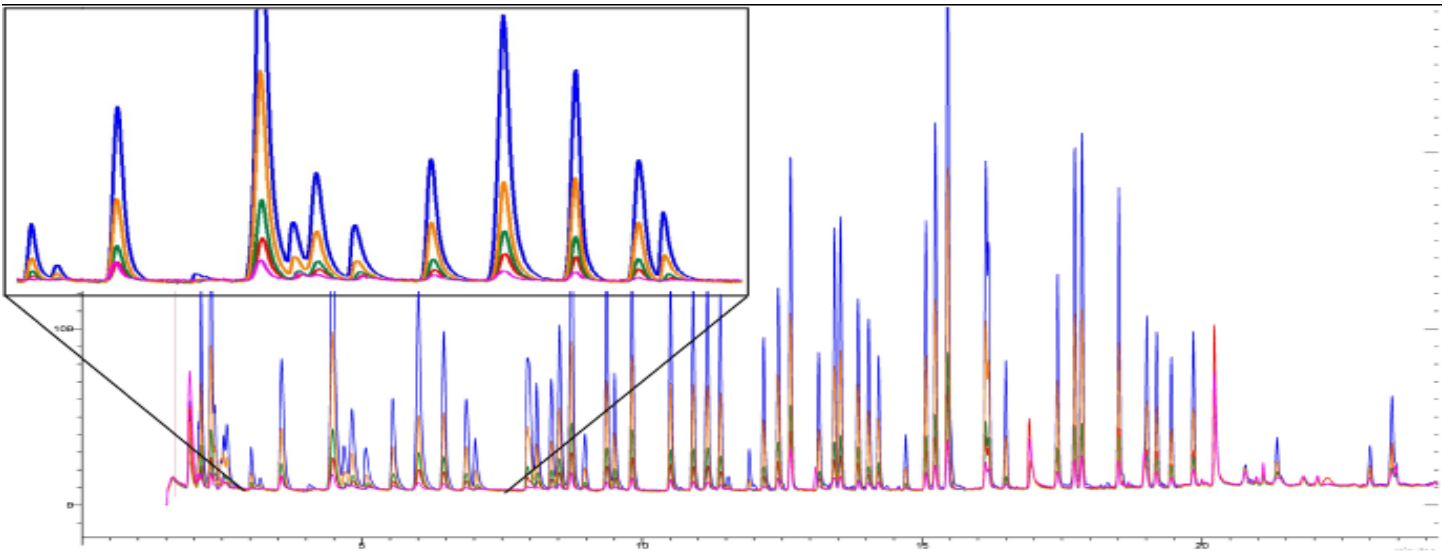


Figure 1. TO-17 standard (65 components), 5 ppbv through 100 ppbv.

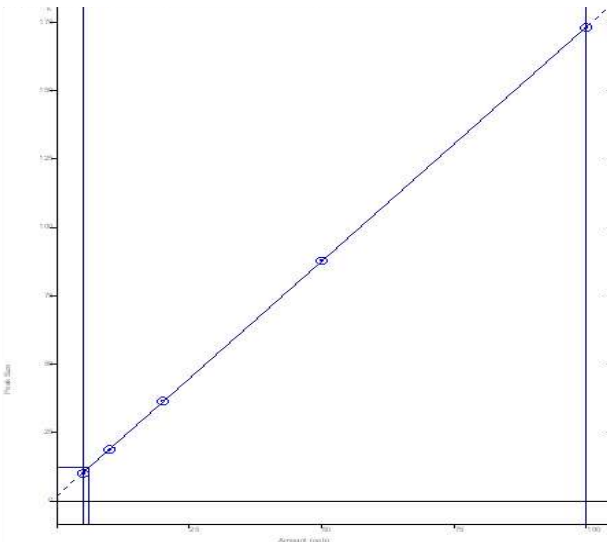


Figure 3. Dichlorodifluoromethane Calibration
 Linearity R2: 0.999519
 %RSD: 6.37

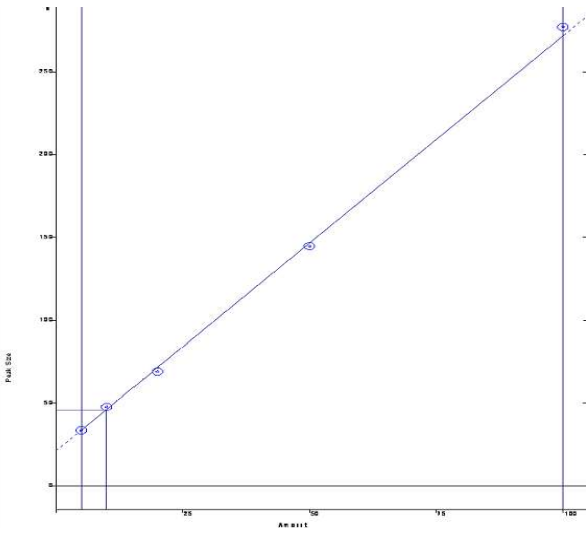


Figure 4. Toluene Calibration
 Linearity R2: 0.999469
 %RSD: 8.24