

# CDSolutions

APPLICATIONS INFORMATION USING ADVANCED SAMPLE HANDLING TECHNOLOGY

## TO-17 Analysis using the CDS TDA 9300 Autosampler

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 using the CDS 9300 TDA which was interfaced to a GC/Ion Trap. Figure 1 shows the overlay of a calibration from 5 ppbv to 100ppbv of the TO17 standard.

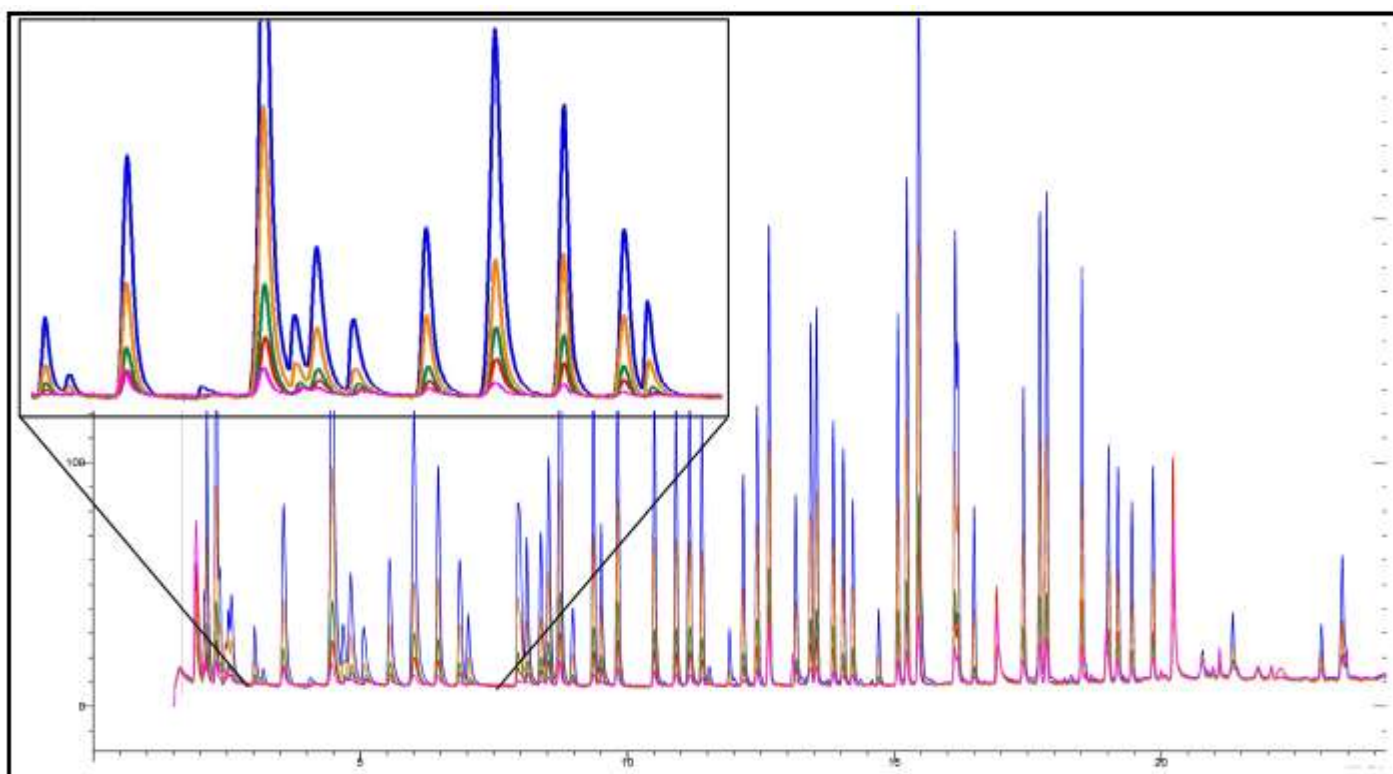


Figure 1. TO-17 standard (65 components), 5 ppbv through 100 ppbv.

## Linearity

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 Figure 2.

## Equipment

These samples were analyzed using the CDS TDA 9300 interfaced to the Varian CP 3800 Gas Chromatograph. The detector used was the Varian Saturn 2000 Ion Trap.

## CDS TDA 9300 Conditions

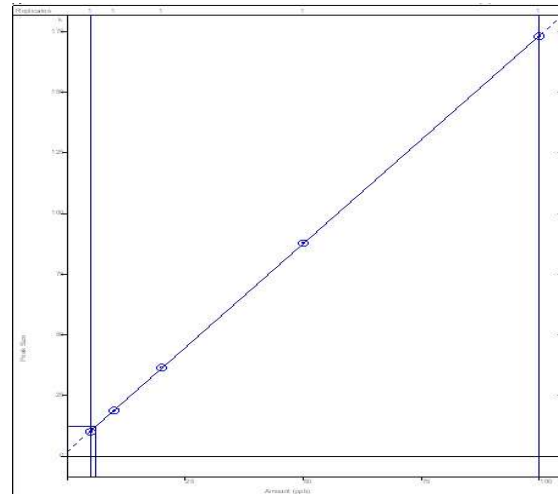
Valve Oven: 300°C  
Transfer Line: 300°C  
Dry Tube: 35°C/1min  
Tube Heat: 350°C/5min  
Tube Cool: 0.5 minutes  
Trap Idle: 40°C  
Trap Heat: 325°C/5min

Interconnect Line: 300°C

## GC Conditions:

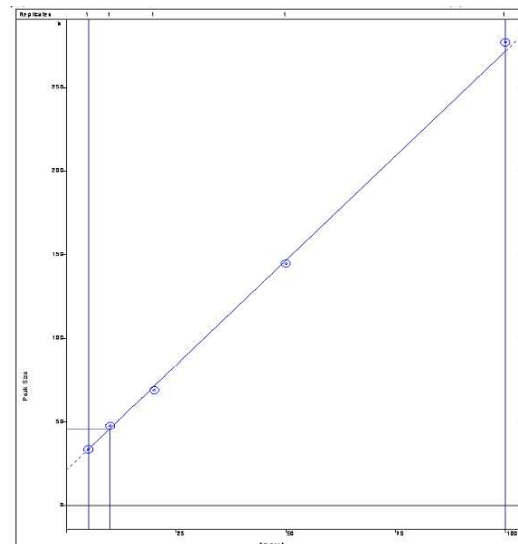
Carrier: Helium  
Column: CP-Select 624  
(30m x 0.25mm x 1.4µm)  
Detector: Ion Trap  
GC Program: 30°C/3.20min  
160°C/11°C hold 1 minute  
220°C/11°C/3min hold

## Dichlorodifluormethane calibration



**Linearity Corr: R<sup>2</sup>: 0.999519**  
**%RSD : 6.37**

## Toluene calibration



**Linearity Corr: R<sup>2</sup>: 0.999469**  
**%RSD : 8.24**

**Figure 2.** Linearity for Toluene and Dichlorodifluoromethane

CDS Analytical, Inc. has been a leader in the design and manufacture of laboratory instruments for sample preparation and analysis since 1969. We are dedicated to providing the best possible instruments for both research and routine analysis. Well known in the field of pyrolysis, CDS manufactures the Pyroprobe 5000, 5150, 5200 and 5250 autosampler for the introduction and analysis of solid materials by GC, MS and FT-IR. CDS offers a complete line of dynamic headspace instruments for the analysis of volatile organic compounds in environmental, pharmaceutical and food applications, including the model 8400 four-position autosampler for complex, multicomponent materials investigation. Our customers, their requirements and applications are important to us. To help meet your needs, we offer a wide range of analytical information and the services of our applications laboratory. If you would like additional information, please contact us at the address below, call us at 1 800 541 6593, or log onto [www. cdsanalytical.com](http://www.cdsanalytical.com).