

## EPA TO-1 Analysis

### Application Note

#### Volatile emissions

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In our highly technological age volatile emissions occur from a variety of sources. Included in this list are industrial sites, commercial facilities, and hazardous waste storage. Many of the emissions that emanate from these sites have been categorized as toxic. The toxicity of these compounds makes it imperative that a qualitative and quantitative knowledge of them be known. Prolonged exposure to these compounds can seriously impact human health.

TO-1 compound determinations are based upon polarity as well as boiling point. The TO-1 analysis is for nonpolar compounds with a boiling point range of 80°C-200°C.

A quantitative standard of TO-1 compounds in methanol was purchased. The concentration of the stock standard was 2000 $\mu\text{g}/\text{ml}$ . An appropriate dilution was made to give a concentration of 25 $\text{ng}/\mu\text{l}$  as a working standard. Multibed sampling tubes consisting of Tenax TA, Carboxen 1000, and Carbosieve SIII were spiked with the TO-1 working standard of concentrations of 25,50,75,100, 150, and 200 $\text{ng}$  respectively. Each concentration was run in triplicate. The spiked sampling tubes were thermally desorbed at 225°C for 5 minutes to a sorbent trap. The trap was desorbed at 250°C for 2.5 minutes. Figure 1 shows a qualitative plot of the TO-1 standard. Figure 2 shows an area /nanogram plot of benzene. The correlation coefficient is 0.997.

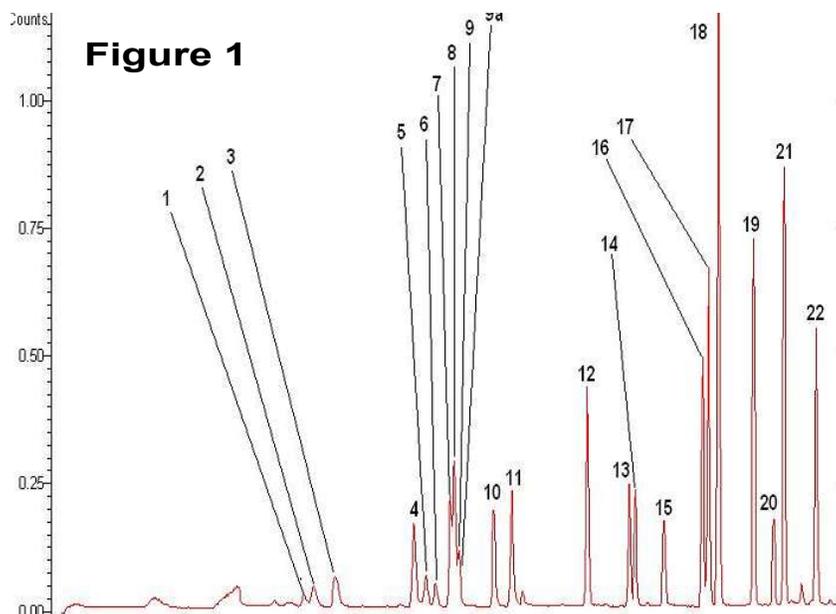


Figure 1. TO-1 standard

## Autosampler-Dynatherm 9300

Valve Oven: 250°C  
Transfer Line: 250°C  
Tube Heat: 225°C 2.5 minutes  
Trap Heat: 250°C 5 minutes

## GC/MS

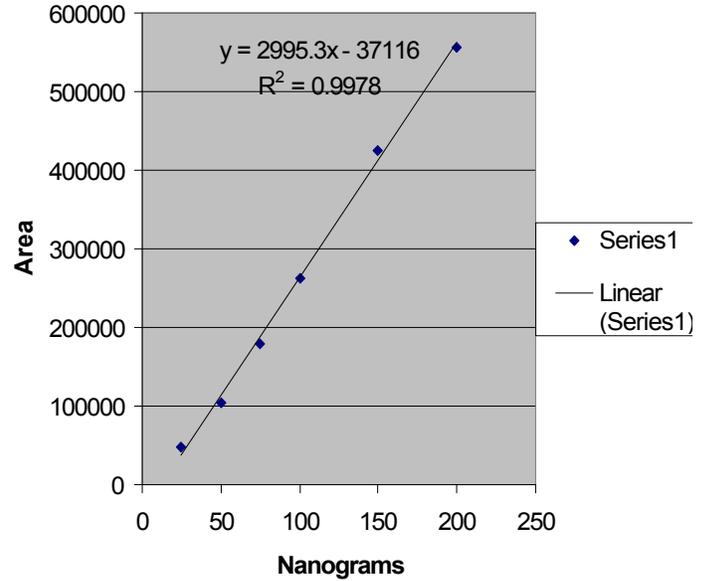
Column: CP-Select 624  
(30m x 0.25mm x 1.4µm)  
Carrier: Helium, 20:1  
Injector: 250°C  
Program: 30°C/1.5 min, 15°C/min to 220°C,  
hold 5 min

## Figure 1 Compound Identification

1. Allyl Chloride
2. Methylene Chloride
3. Acrylonitrile
4. Chloroform
5. 1,1,1-Trichloroethane
6. Carbon Tetrachloride
7. Benzene
8. 1,2-Dichloroethane
9. Heptane
10. Trichloroethylene
11. 1,2-Dichloropropane
12. Toluene
13. Tetrachloroethylene
14. 1,3-Dichloropropane
15. 1,2-Dibromoethane
16. Chlorobenzene
17. Ethyl Benzene
18. o, m-Xylene
19. p-Xylene
20. Tribromoethane
21. Isopropylbenzene
22. Bromobenzene

## Benzene TDA Linearity

## Figure 2



## Figure 2. Benzene Linearity