Thermal Desorption for PAH Analysis

Application Note
Environment

Author:

C. Zawodny

Polyaromatic hydrocarbons are produced when coal, gas, and oil as well as wood, and other organic materials are combusted. Even the grilling of meat produces some of these compounds. They are present in petroleum products as creosote and asphalt. They are very common environmental contaminants. The few natural sources of PAH's are produced by forest fires and volacanos. Chemically PAH's are a class of semivolatile compounds that are known as fused rings. The common environmental contaminants range in molecular weight from 128 (naphthlene) to 276 (benzo(g,h,i)perylene). Most of them have mutagenic properties and are suspected carcinogens. Due to the health risks associated with these semivolatile materials, the EPA has developed a number of methods to qualitate and quantitate these compounds. EPA methods such as 8100, 8270, 610, and 625 use GC/MS to qualitate and quantitate semivolatiles present in soils, solids, and liquid wastes.

A quantitative PAH standard mix was purchased at a concentration of 2000μg/ml in methanol. Dilutions were made to give concentrations of 5,10,15, 35, 100, 300, and 500ng/μl respectively. Each concentration was run multiple times. The spiked sampling tube with Tenax was thermally desorbed at 340°C for 10 minutes and analyzed using a GC/MS. Figure 1 is a chromatogram of the standard showing the PAH components. Figures 2 and 3 show selected PAH compounds with area plotted against nanograms and a .99 correlation coefficient.

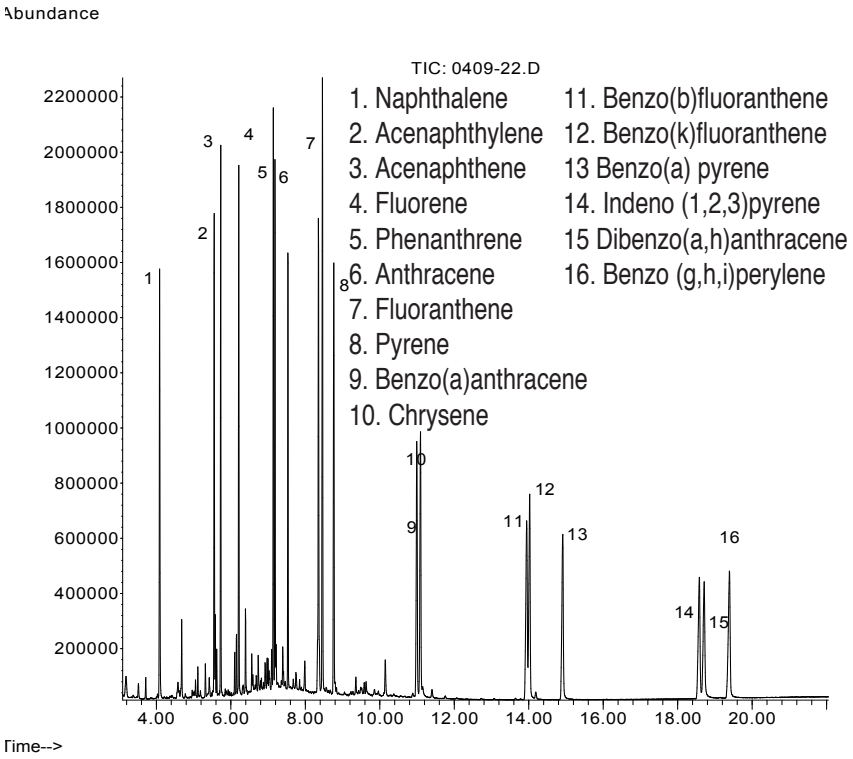

Figure 1. Chromatogram of thermally desorbed PAHs

CDS Autosampler Dynatherm 9300

Valve Oven:	300°C	
Transfer Line:	325°C	
Tube Heat:	340°C	10 minutes
Trap Heat:	340°C	10 minutes

GC/MS

Column:	HP-5MS (30m x 0.25mm x .25μm)
Carrier:	Helium, 50:1 split
Injector:	300°C
Program:	75°C/2min, 25°C/min to 245°C, 4°C/min to 300°C, hold 1 min.

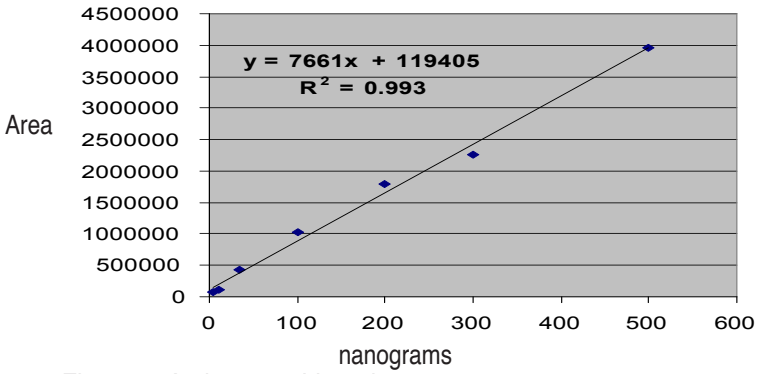

Figure 2. Anthracene Linearity

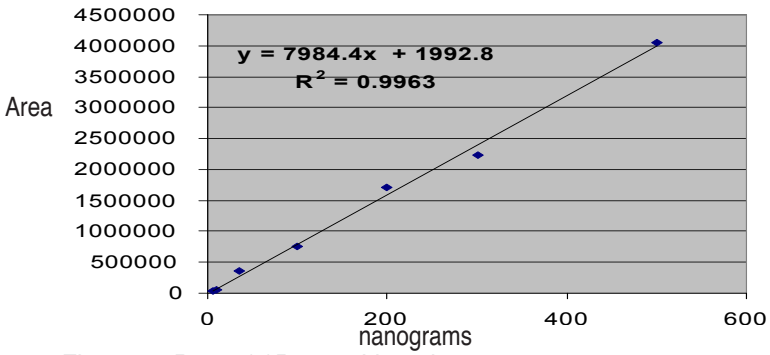

Figure 3. Benzo(a)Pyrene Linearity