

Automated Analysis of BTEX in Soil

Soil samples may be analyzed for volatile organic compounds, including benzene, toluene, ethylbenzene and xylene, by adding water to the soil sample and then purging the vessel to a sorbent trap. Recovery is enhanced by having a magnetic stirring bar agitate the water/soil mixture during the trapping step. The CDS 7400 Autosampler is capable of adding 5 or 10 ml of water and an internal standard, controlling the vessel temperature, stirring the sample and purging the vessel to a sample concentrator. Up to 72 samples may be processed automatically.

For this analysis, the 7400 was interfaced to a CDS Analytical 7000 purge and trap instrument equipped with a Vocarb 3000 sorbent trap. After the 5 ml of water was added, the sample vessel was purged for 11 minutes to the trap, which was then dried and thermally desorbed to a GC/MS. The gas chromatograph was equipped with a standard 5% phenyl methylsilicone column, programmed from 40° to 210°C at 10°C/minute. Helium was used as the purge gas and the GC carrier gas, with a 20:1 split.

Figure 1 shows the chromatogram of BTEX compounds purged from soil at the 50 PPB level. Peak area ratios to the internal standard using the total ion chromatogram were used to prepare a linearity plots between 5 and 100 PPB. The plot for toluene is shown as Figure 2.

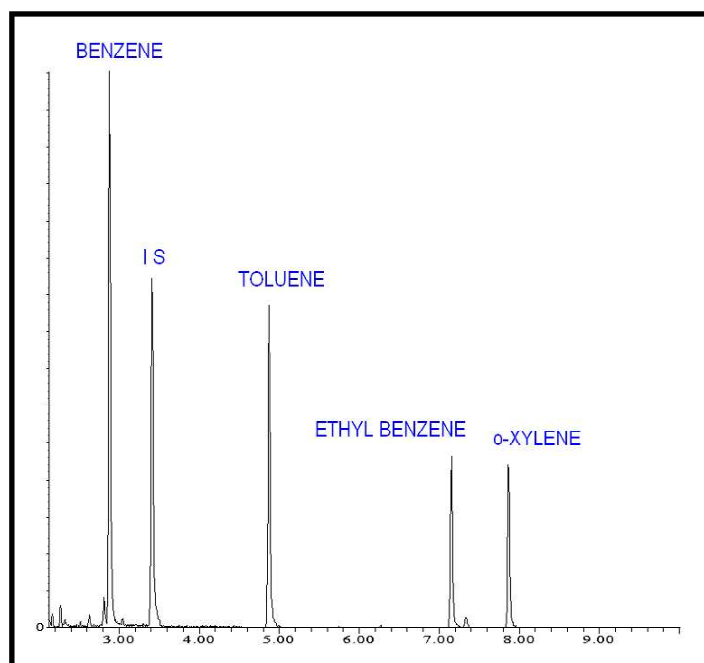


Figure 1. BTEX compounds in soil at 50 PPB each.

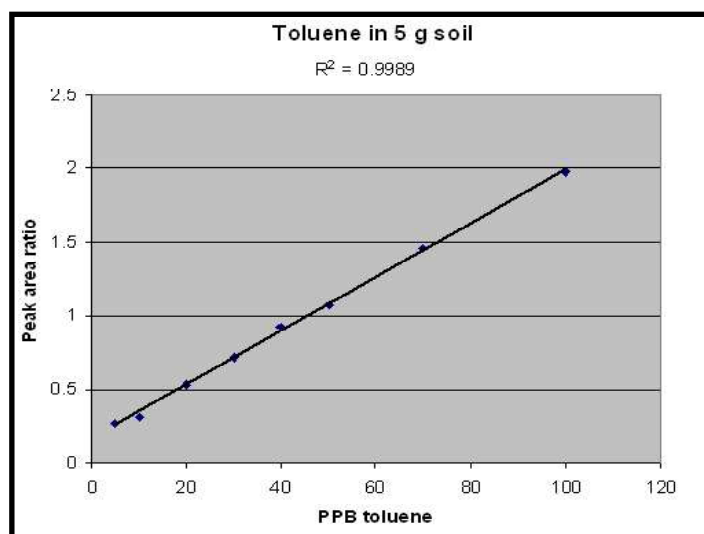


Figure 2. Linearity of Toluene purged from 5 grams of soil, from 5 to 100 PPB.

Experimental Conditions

7000 P&T

Valve oven: 130°C
Transfer line: 130°C
Purge time: 11 minutes
Purge flow: 35 ml/min
Trap dry: 35°C for 1 minute
Desorb preheat: 245°C for 0.6 minutes
Trap desorb: 250°C for 2 minutes
Trap bake: 260°C for 10 minutes

Gas Chromatograph

Injection port: 300°C
Split ratio: 20:1
Column: 30 m x 0.25 mm 5% phenyl methylsilicone

Oven program

Initial: 40°C for 4 minutes
Ramp: 10°C/minute
Final: 210°C for 1 minute

Mass Spectrometer

Mass range: 35 to 550
Source: 230°C

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