

Assay of Hydrocarbons in Soil using the 7400 Autosampler

Application Note

Environment

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When combined with a Model 7000 Purge & Trap, the CDS Model 7400 Soil and Water Autosampler provides an automated way of analyzing soil samples for volatile organic compounds. Samples are placed in standard 40 ml vials, which are automatically transferred to a temperature controlled zone for purging to the trap of the 7000. Five milliliters of water and an internal standard are added automatically, and the sample is stirred continuously with a magnetic stirring bar while being purged.

Figure 1 shows the chromatogram of volatiles purged from a 5 gram sample of soil. The temperature was controlled at 40°C while the sample was purged with helium for 11 minutes at 35 ml/min. For less volatile samples, or to enhance the recovery of water soluble compounds, the temperature of the sample may be increased, up to 80°C.

Purging a series of soils of known concentration produced linear graphs, like the one shown for ethylbenzene in Figure 2. The R squared value for this graph is 0.998, and similar graphs for other compounds permit the calculation of concentrations for the various hydrocarbons. In this sample, the level of benzene was calculated to be 10 PPB, ethylbenzene, 15 PPB, toluene 87 PPB, and xylene, 102 PPB.

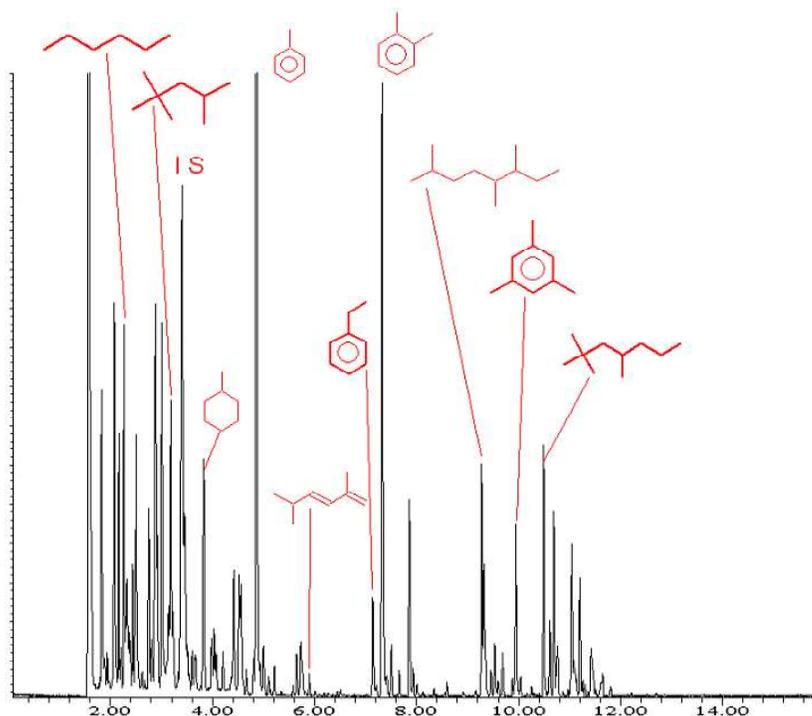


Figure 1. Hydrocarbons from 5g of soil.

Instrument Conditions

CDS Model 7400 Autosampler Purge and Trap

Sample temp: 40°C
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

GC/MS

Column: 5% phenyl (30m x 0.25mm x 0.25mm)
Carrier: Helium, 20:1 split
Injector: 300°C
Oven: 40°C for 4 minutes
10°C/min to 210°C for 1 minute

Mass Range: 35 to 550amu
Source Temp: 230°C

Ethylbenzene in Soil

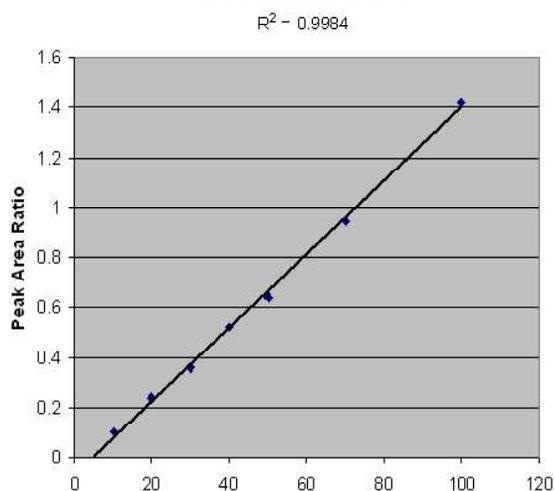


Figure 2. Peak area ratio vs. concentration for Ethylbenzene in soil. standard, overlaid.



After adding water and internal standard, the 7400 places the soil vial into an analytical holder, which is raised into the heated zone for purging.