

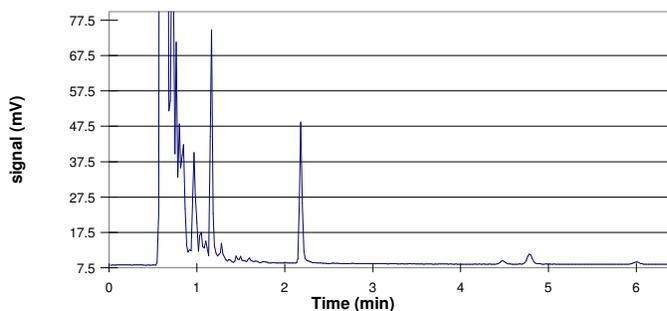
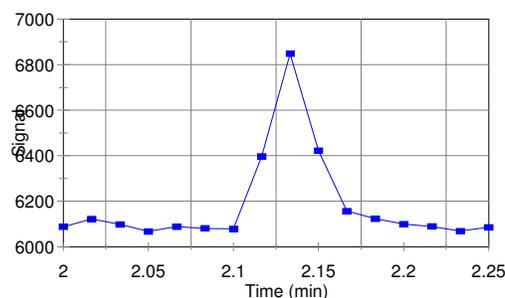
Measurement of BTEX in Air Samples at p.p.b. Levels Without a Concentrator

Introduction: Advanced Industrial Chemistry Corporation set out to evaluate the argon ionization detector as an instrument capable of measuring benzene, toluene, ethyl benzene, and the xylenes (BTEX) in air.

Experimental: The detector was installed on a HP 5890 gas chromatograph using a J&W DB-1701 (30 meter X 0.32 m.m. i.d. X 0.32 micron film thickness) column operating in an isothermal mode at 30 °C while the detector was maintained at 125 °C. Column head pressure was maintained at 22 P.S.I. using a packed column pressure controller. The standards and sample were introduced via an automated six port sampling valve with a 30 microliter loop. The electrometer used was an Hnu PI-52 electrometer operating with a -9 Volt bias. The argon used was Grade 5 from BOC gases straight out of the bottle and controlled at 20 mL/min by the make-up gas flow controller on the G.C.

The gas standard was a certified standard mixture in nitrogen prepared by SpecGas, Inc. (Ivyland, PA) containing 100 p.p.b. of BTEX.

Results: To the right is an expanded view of the benzene peak from a 30 microliter injection of a 100 p.p.b. standard. It is evident from the expanded view that there is still a very good signal to noise ratio for the benzene even at this low level. At 100 p.p.b. and 30 microliters injected, the benzene peak in this chromatogram represents about 10 picograms on column. The peak is about five seconds wide yielding an L.O.D. of 2 picograms/second.



To the left is a chromatogram of a sample collected in an evacuated cannister at waist level while fueling a vehicle. The cannister was subsequently filled to 42 pounds with dry lab nitrogen which translates to approximately a 3X dilution of the sample. This sample was also analyzed using the 30 microliter loop injection.

While there are a great number of early eluting contaminants in the chromatogram, the benzene (1.1 min.) and toluene (2.1 min.) peaks are still clearly resolved from the balance of hydrocarbons in gasoline. Of note is the substantially lower levels of ethyl benzene and the xylenes in the chromatogram. Based on a calibration against the standard cylinder and accounting for the dilution factor, the levels of benzene and toluene in the sample are estimated to be under 1 p.p.m.

Conclusion: Using the dielectric barrier discharge detector, an evacuated cannister, and a loop injection system, we were able to obtain and analyze an air sample with less than 1 p.p.m. BTEX constituents.