



Acetaldehyde Analysis in PET Using PFPH and Dynamic Headspace

Application Note

Environment

Acetaldehyde is produced in the manufacture of Polyethylene Terephthalate containers. During manufacture the resin pellets are melted (>260°C) and injection molded into preforms. The preforms are stretch molded to form the bottle. It is at this stage that acetaldehyde is formed. Due to the off flavor it can give to bottled products as well as being a suspected cancer compound, characterization and quantitation are important.

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Pentafluorophenyl Hydrazine (PFPH) will form with many aliphatic and aromatic carbonyls PFP-HYDRAZONES. The analysis of PET uses cryoground PET (preferably) and a PFPH/hexane solution (2000ppm). A sample of the PET that has been sieved (~25mg) is placed in the bottom of a test tube. About 10 μ l of the PFPH solution is added to the bottom of the tube. The tube is placed into a headspace vessel of a Sample Concentrator which is interfaced to a GC/MS.

The sample was thermally desorbed at 185°C/15 minutes. The GC/MS program was: 30°C/4min, 7°C to 100°C, 8°C to 250°C, hold 2 minutes, solvent delay of 16.50 minutes. Figure 1 shows the PFP-PET Hydrazone at 17.09 minutes. Figure 2 is the mass spectrum of this peak. Note in figure 2 the ions 155 and 182. These are ion fragments that have commonality with PFPH and its derivatives. The ion 224 is the definitive molecular ion for the acetaldehyde-PFPH derivative and its quantitation.

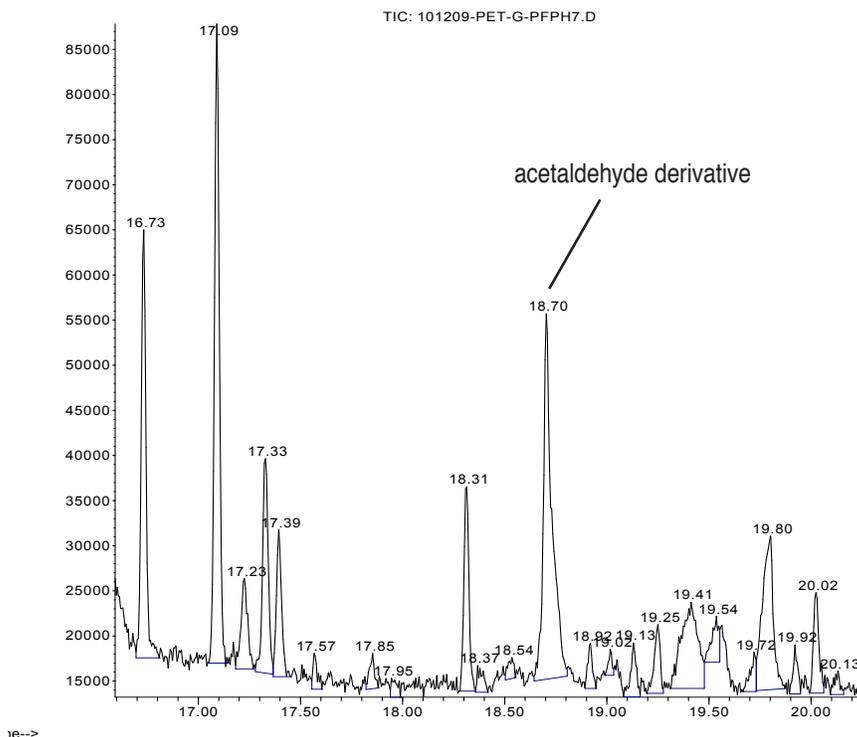


Figure 1. PFP-PET Hydrazone

Instrument Conditions**GC/MS****CDS Sample Concentrator**

Valve Oven: 300°C
Transfer Line: 275°C
Vessel Idle: 40°C
Vessel Heat: 185°C/15min
Trap Heat: 200°C/5min

Column: 30m x 0.25 mm 5%
phenyl
Carrier: Helium, 50:1 split
Injector: 350°C
Program: 30°C for 4 minutes,
8°/min to 250°C hold
2 min
Solvent Delay: 16.5 minutes

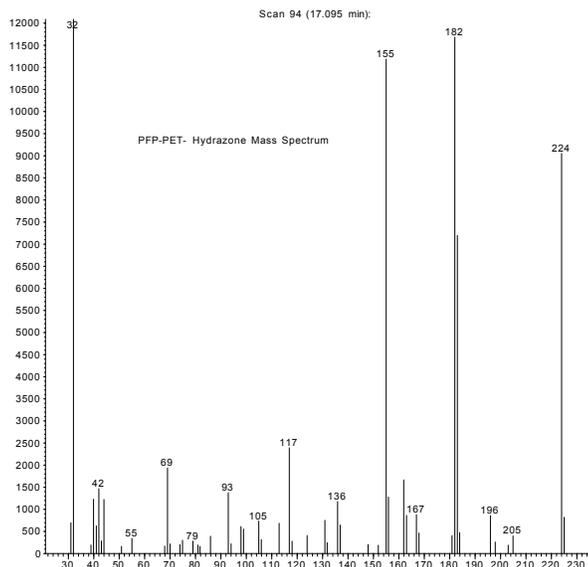


Figure 2. Mass spectrum of peak at 17.09 min.

FOR MORE INFORMATION
CONCERNING THIS APPLICATION, WE RECOMMEND THE
FOLLOWING READING

Ho and Yu, Environ. Sci Technol, 2004
38, 862-870