

CDSolutions

APPLICATIONS INFORMATION USING ADVANCED SAMPLE HANDLING TECHNOLOGY

Formaldehyde Detection using PFPH and Thermal Desorption with the CDS 9300 TDA Autosampler

Formaldehyde is a chemical widely used in industry, including the manufacture of construction materials as well as certain household products. It has been identified as a health hazard causing eye and throat irritation along with it being a suspected carcinogen.

Detection of formaldehyde has been done using liquid chromatography and 2,4-dinitrophenyl hydrazine derivatives of the suspected gaseous carbonyl compound. Solvent extraction of the 2,4-DNP-Hydrazones and analysis by LC completes the analysis.

The use of Pentfluorophenyl Hydrazine (PFPH) coated Tenax enables qualification of formaldehyde present in liquids using thermal desorption and GC/MS to detect the resulting hydrazone derivative. To coat the tube, a standard 6 mm Tenax packed sorbent tube was placed in a graduate (25 ml), and a solution of 2000 ppm of PFPH in hexane was added so that the tube was covered. After about five minutes, the tube was removed and placed (frit first) into a Dynatherm Model 60 Tube Conditioner using its spiking stand. Helium (50-100ml/min) purged the tube until no further hexane liquid was expelled. With the helium flow still on, a 38 ppm standard of formaldehyde in water was spiked onto the tube which was removed after about two minutes. The tube was placed into a CDS 9300 TDA station and thermally desorbed at 150°C for 15 minutes to transfer the analytes to an Agilent 6890 GC with an Agilent 5975 as the detector.

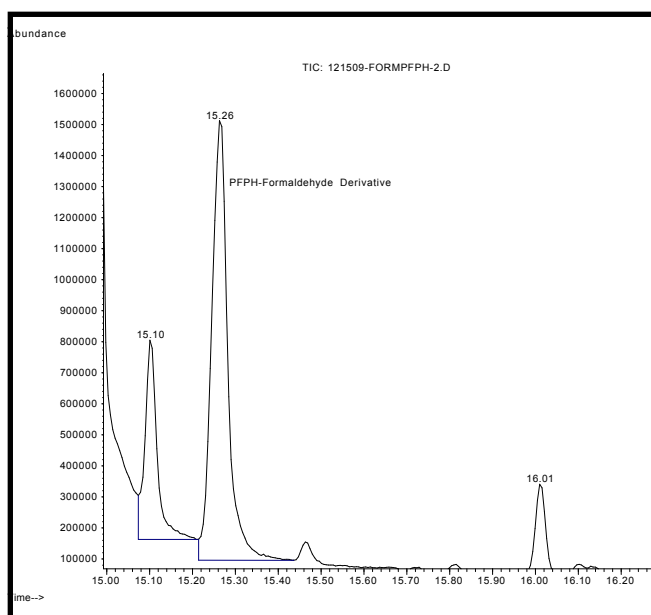


Figure 1. PFP-Formaldehyde Hydrazone derivative peak.

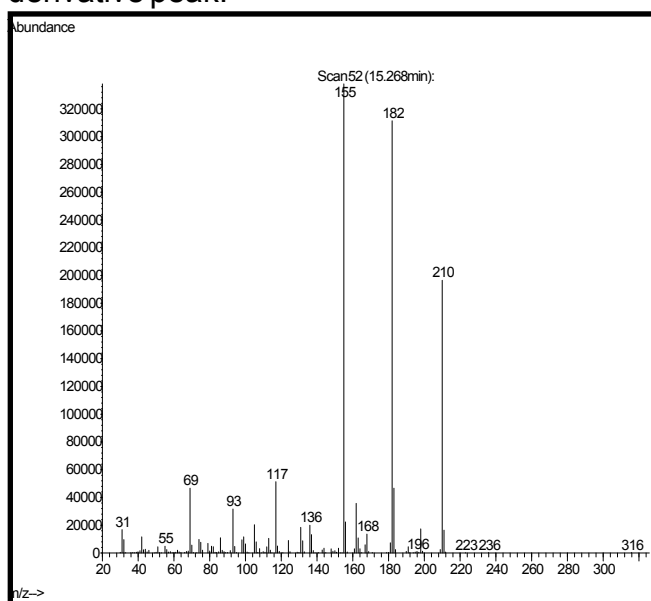


Figure 2. Mass spec of the derivative.

Figure 1 shows the PFP-Formaldehyde Hydrazone derivative peak eluted at 15.26 minutes, and Figure 2 shows the mass spectrum of this peak. Note ions 155 and 182, which represent ion fragments common to PFPH and its derivatives. Ion 210 is the definitive molecular ion for the PFP-Formaldehyde Hydrazone.

CDS 9300 TDA Conditions

Valve Oven: 275°C
Transfer Line: 250°C

Tube Idle: 40°C
Tube Heat: 100°C 5.00 Minutes
Tube Cool: 0.00 Minutes

Trap Idle: 40°C
Trap Heat: 275° 5 mMinutes

Aux Line: 300°C

GC Conditions

Column: VF 5MS (30m x 0.25mm x 0.25µm)
Detector: MSD
GC Program: 7°C to 100°C, 8°C to 250°C
(Hold 2 Min)

GC Delay: 14.9 Minutes

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

HO and YU, Environ. Sci Technol, 2004,
38, 862-870

CDS Analytical, Inc. has been a leader in the design and manufacture of laboratory instruments for sample preparation and analysis since 1969. We are dedicated to providing the best possible instruments for both research and routine analysis. Well known in the field of pyrolysis, CDS manufactures the Pyroprobe® 5000, 5150, 5200 and 5250 autosampler for the introduction and analysis of solid materials by GC, MS and FT-IR. CDS offers a complete line of dynamic headspace instruments for the analysis of volatile organic compounds in environmental, pharmaceutical and food applications, including the model 8400 four-position autosampler. CDS also manufactures the Dynatherm line of thermal desorption instruments including the 9000 series for air monitoring and the 9300 TDA. Our customers, their requirements and applications are important to us. To help meet your needs, we offer a wide range of analytical information and the services of our applications laboratory. If you would like additional information, please contact us at the address below, call us at 1 800 541 6593, or log onto [www. cdsanalytical.com](http://www.cdsanalytical.com).