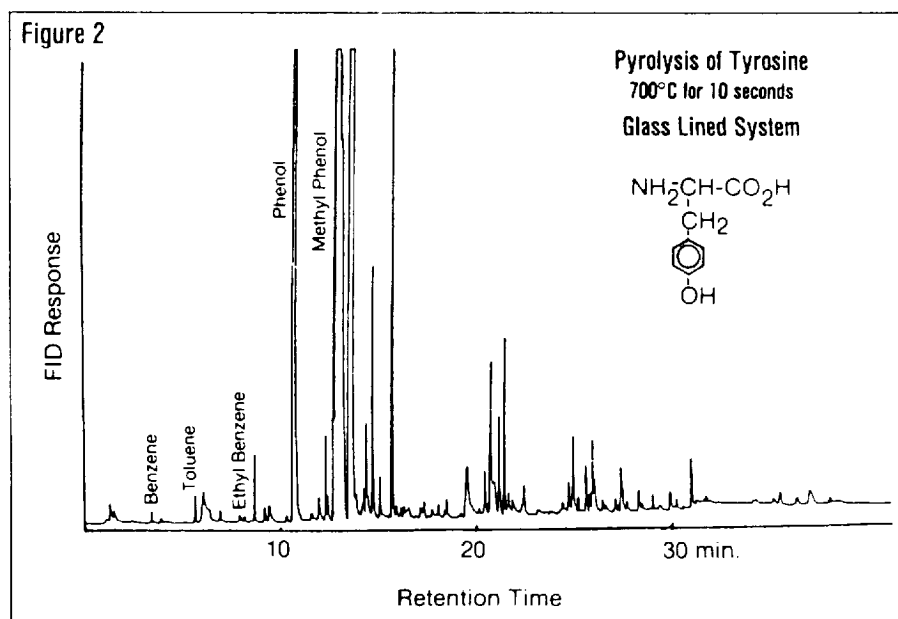
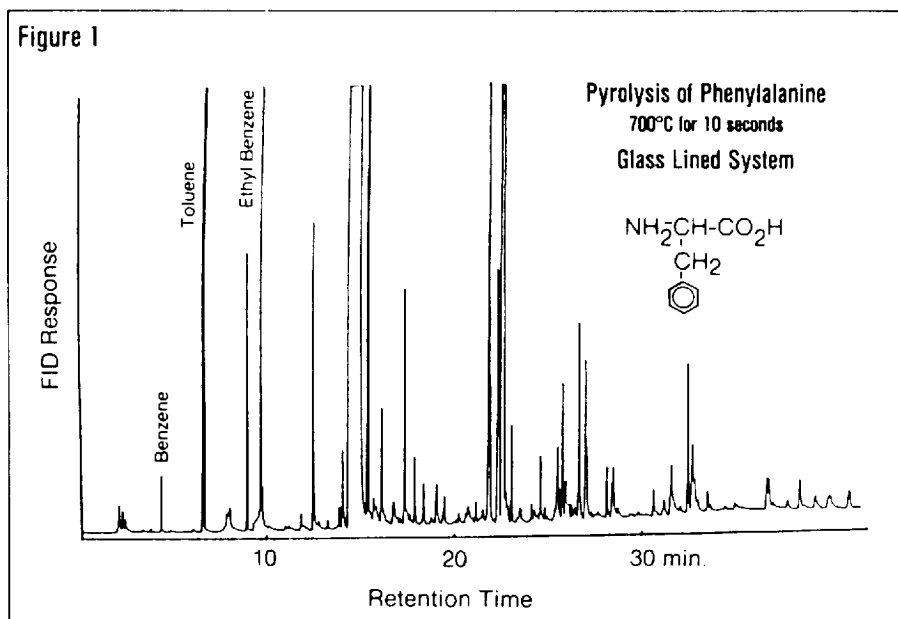


APPLICATIONS INFORMATION USING ADVANCED SAMPLE HANDLING TECHNOLOGY

Pyrolysis Gas Chromatography of Amino Acids

Pyrolysis GC has been employed to analyze many solid materials by gas chromatography, including fuel sources, paints, fibers and many synthetic polymers. Biochemicals may also be analyzed using pyrolysis GC, but the polar nature of many biopolymers produces pyrolysates which may be adsorbed or destroyed by the metal surfaces used in some pyrolysis systems. The use of a glass lined pyrolysis system greatly increases the sensitivity and recovery of trace polar compounds, permitting the use of smaller samples. The glass lined Pyroprobe 124 used in these examples consists of a glass lined 330 sample concentrator equipped with a Pyroprobe 122. Samples were placed into quartz tubes and pyrolyzed in the quartz lined interface of the sample concentrator. The pyrolysates were transferred through glass lined stainless steel tubing to an internal trap, then backflushed without splitting to the gas chromatograph, where they were refocused cryogenically directly onto the capillary column.

Figure 1 shows the chromatogram resulting from the Pyrolysis of Phenylalanine at 700°C. Aromatic hydrocarbons could be produced by splitting



(cont'd from front page)

off benzene, by breaking the bond between the two carbons to form toluene, or by removing both of the functional groups to form ethyl benzene. That the CH₂-CH bond is the most favored site for bond breaking can be seen readily from the predominance of toluene over the other species in the pyrogram.

In the case of Tyrosene, production of any aromatic hydrocarbons would involve the removal of the -OH group from the benzene ring - an unlikely pathway at best. This is easily seen in the pyrogram of Tyrosene (Figure 2) which shows almost no benzene, toluene or ethyl benzene at all. On the other hand, scission of the bond para to the -OH would produce phenol, and breaking the CH₂-CH bond would result in methyl phenol - clearly the favored cleavages.

Equipment

PYROLYSIS

Pyroprobe 124, consisting of a Pyroprobe 122 interfaced to a glass lined 330 Sample Concentrator

Parameters

PYROLYSIS

700°C for 10 seconds
Interface temperature 275°C
Coil probe with quartz tubes

SAMPLE CONCENTRATOR

Valve oven: 275°C
Internal trap: Tenax at 35°C
Sample flow: Helium at 30ml/minute
Trap backflush: 15 minutes at 275°C

Cryogenic trap: 15 at -100°C then 10 minutes at 250°C

GAS CHROMATOGRAPH

Varian 3700 Gas Chromatograph, equipped with a 50mm x 0.25mm SE-54 capillary column and a flame ionization detector
Program: 50°C to 290°C at 7°C/minute
Carrier: Helium at 20psi

For more information on this and related applications, we recommend the following readings:

J. Piskoz, D. Radlein, D. Scott, "On the Mechanism of the Rapid Pyrolysis of Cellulose," J.A.A.P., 9, (1986) 121.

T. Munson and J. Vick, "Comparison of Human Hair by Pyrolysis Capillary Column Gas Chromatography and GCMS," J.A.A.P., 8, (1985) 493.

D. Knorr, T. Wampler, and R. Teutonicao, "Formation of Pyrazines by Chitin Pyrolysis," J. Food Sci., 50, (6), 1762.

H. Stern, A. Kotula and M. Pierson, "Differentiation of Selected Enterobacteriaceae by Pyrolysis-Gas-Liquid Chromatography," Appl. and Envirokn. Micro., Dec. 1979, 1098.

H. Engman, H. Mayfield, and W. Bertsch, "Classification of Bacteria by Pyrolysis-Capillary Column Gas Chromatography-Mass Spectrometry and Pattern Recognition," J.A.A.P., (1984)139.

Additional literature may be obtained by contacting your Chemical Data Systems representative, or by writing to the CDS Applications Lab.

ABOUT CDS

CDS Analytical, Inc. is a leader in the design and manufacture of laboratory instruments for sample preparation and analysis. With 20 years experience in the field, CDS is dedicated to providing the best possible instruments for both research and routine analysis. Well known in the field of analytical pyrolysis, CDS manufactures the Pyroprobe 1000 and 2000 for the introduction and analysis of solid materials by GC, MS and FT-IR. CDS offers a complete line of purge and trap instruments for the analysis of volatile organic compounds in the environmental, food and pharmaceutical areas, as well as custom systems for complex, multicomponent materials investigation. Our customers, their requirements and applications are important to us. To help meet their 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, or call us at 1 800 541 6593.