

Gas Chromatography

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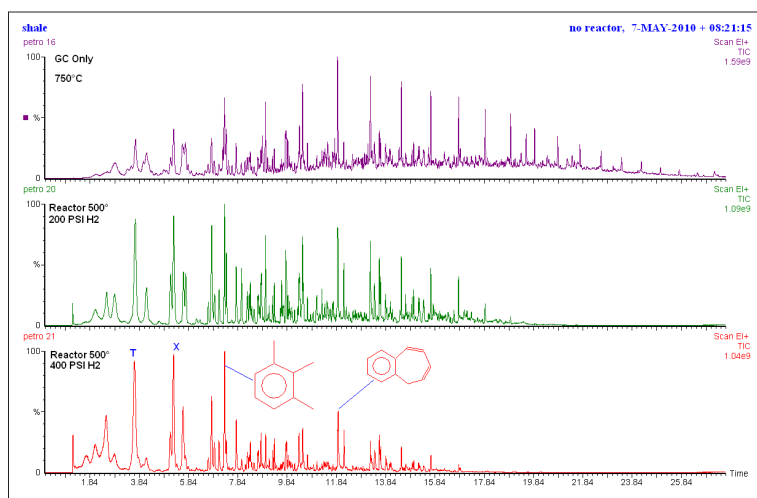


A PerkinElmer Co-marketer

Pyrolysis of Oil Shale in Hydrogen at Elevated Pressure

The oil content in source rocks like shale has long been determined using analytical pyrolysis. The ground rock is heated, releasing the petroleum compounds which are then transferred to the GC for analysis. Results from these analyses typically resemble the top chromatogram in the figure below, a series of long chain aliphatics interspersed with aromatics and branched compounds.

This same process may be used as an integrated sample preparation step for a more sophisticated analysis, with an on-line catalytic reactor for conversion at elevated temperatures and pressures. In the middle chromatogram, the same shale has again been pyrolyzed, but this time in hydrogen at 200 PSI. The pyrolysis products are then carried through a platinum reactor where double bonds are reduced. Further cracking takes place in the reactor, and there is some conversion to aromatics. This is due primarily to the elevated pressure, as demonstrated in the lower chromatogram, in which the hydrogen pressure is 400 PSI and the production of aromatics is increased.



INSTRUMENT CONDITIONS

PerkinElmer Clarus® GC/MS

Column: 30 m x 0.25 mm 5% phenyl
Carrier: Helium, 50:1 split
Injector: 325 °C
Program: 40 °C for 2 minutes, 10 °/min to 300 °C
Mass range: *m/z* 35 – 600

CDS® Pyroprobe 5200 HP-R

Interface: 325 °C for 4 minutes
Pyrolysis: 750 °C for 15 seconds
Valve oven: 325 °C
Trans. line: 325 °C
Reactor: 500 °C, Platinum
Pressure: 200 PSI, 400 PSI
Carrier: Hydrogen
Flow: 40 mL/minute
Trap: 325 °C for 4 minutes

MORE INFORMATION

Chemical examination of some petroleum source rocks by laser pyrolysis mass spectrometry and flash pyrolysis gas chromatography mass spectrometry, Greenwood, P., Sherwood, N. and Willett, G., J. Anal. Appl. Pyrolysis, 31 (1995) 177-202.

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