

# CDSolutions

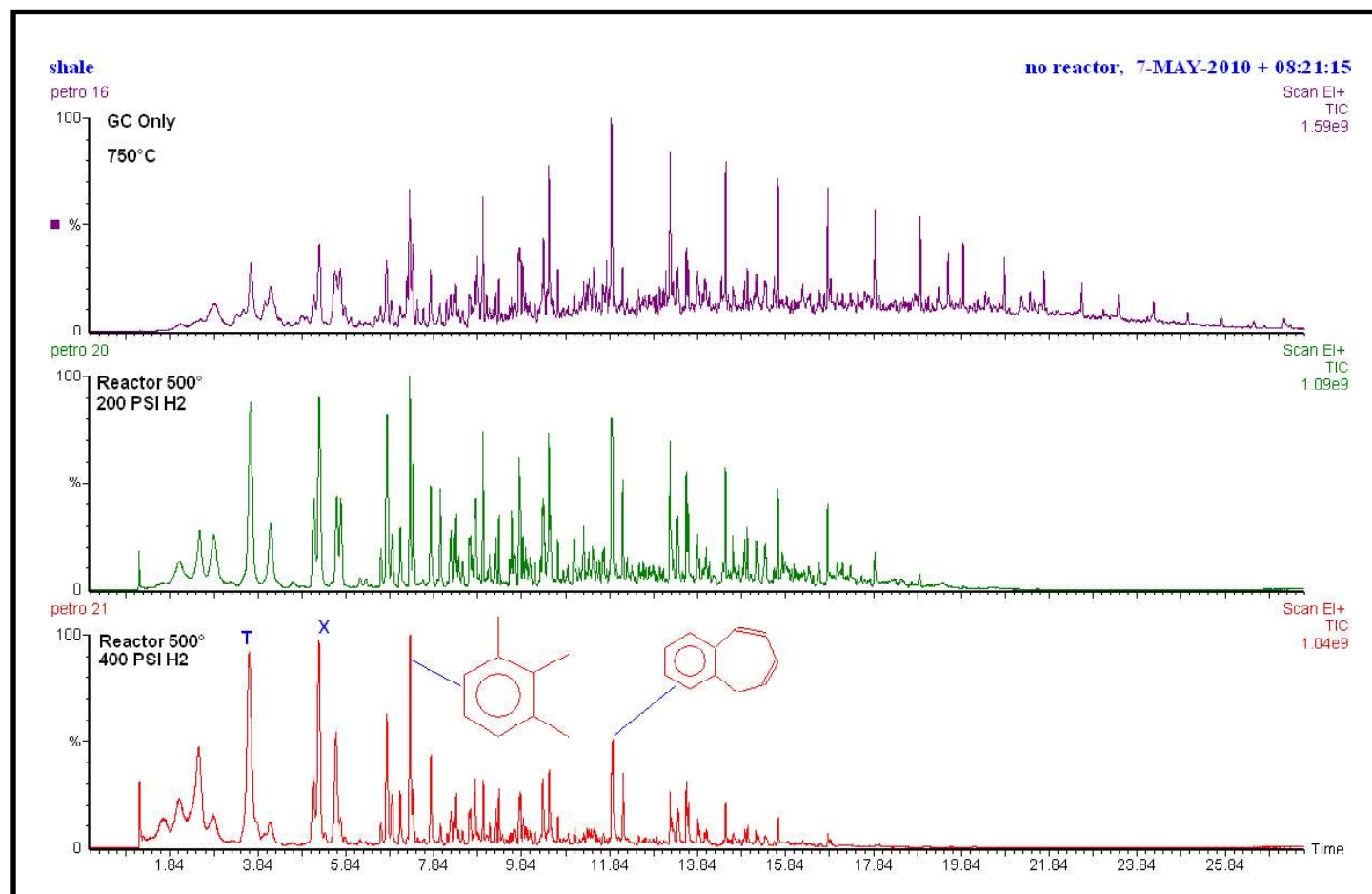
## APPLICATIONS INFORMATION USING ADVANCED SAMPLE HANDLING TECHNOLOGY

### 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. Typical results look like the top chromatogram in the figure below, showing a series of long chain aliphatics interspersed with aromatics and branched compounds.

This same process may be used as the sample preparation step in a more sophisticated analysis that adds the ability to operate at elevated pres-

sure and send the products through a catalytic reactor for conversion. 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. In addition, further cracking takes place in the reactor, and there is some conversion to aromatics. This is mainly caused by the elevated pressure, as seen in the lower chromatogram, in which the hydrogen pressure is 400 PSI and the production of aromatics is further increased.



## Instrument Conditions

### 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

### GC/MS

Column: 30m 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: 35 to 600 AMU

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

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.

Additional literature on this and related applications may be obtained by contacting your local CDS Analytical representative, or directly from CDS at the address below.

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).