CDS olutions

APPLICATIONS INFORMATION USING ADVANCED SAMPLE HANDLING TECHNOLOGY

Evaluation of Source Rock using EGA and Pyrolysis GCMS

To understand the organic matter of sedimentary rock as an evaluation of potential fuel output, geochemists use techniques which involve heating the rock to determine the amount of free hydrocarbons, and the amount of hydrocarbons and fixed gases produce during thermal cracking. With the Pyroprobe, not only the quantity of these products can be determined, but the chemical nature of them. First, the rock is heated to 300°C with the resulting hydrocarbons transferred to a GC-MS for separation and identification (Figure 1). After the first GC run is completed, the procedure is repeated a second time, but heating to 600°C to release cracking products (Figure 2).

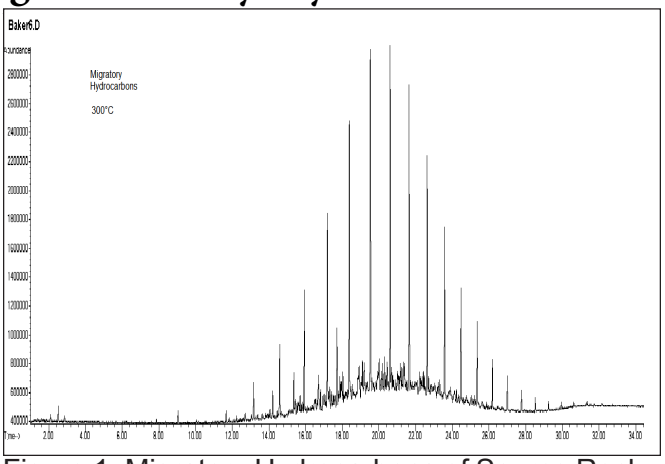

Figure 1: Migratory Hydrocarbons of Source Rock.

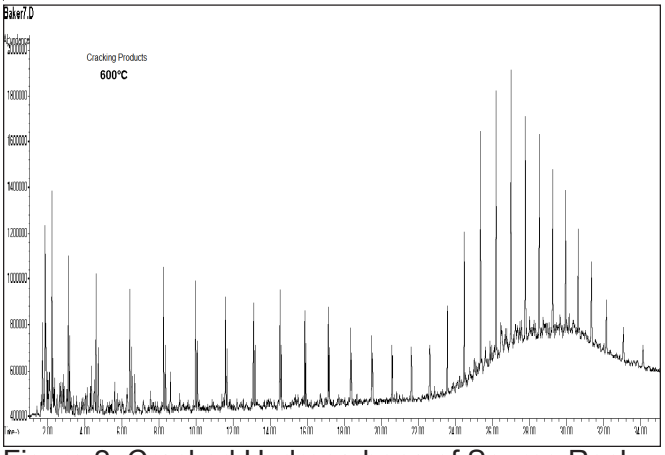

Figure 2: Cracked Hydrocarbons of Source Rock.

Migratory Hydrocarbons and Thermal Cracking composite peaks can be determined by replacing the GC column with a one-meter length of 0.1 mm fused silica, and keeping the GC at 300°C. This is shown in Figure 3. As the rock is heated, hydrocarbons from the rock are transferred rapidly to the detector as they are made. The interfacing, inlet pressure and split ratio are used just as they would be for GC-MS analysis, but rather than producing a chromatogram of individual compounds, the results are composite peaks of the materials made during the heating process.

Figure 3 also shows the value for Tmax at 508°C. This is the temparature at which the maximum amount of hydrocarbons are released during the second step.

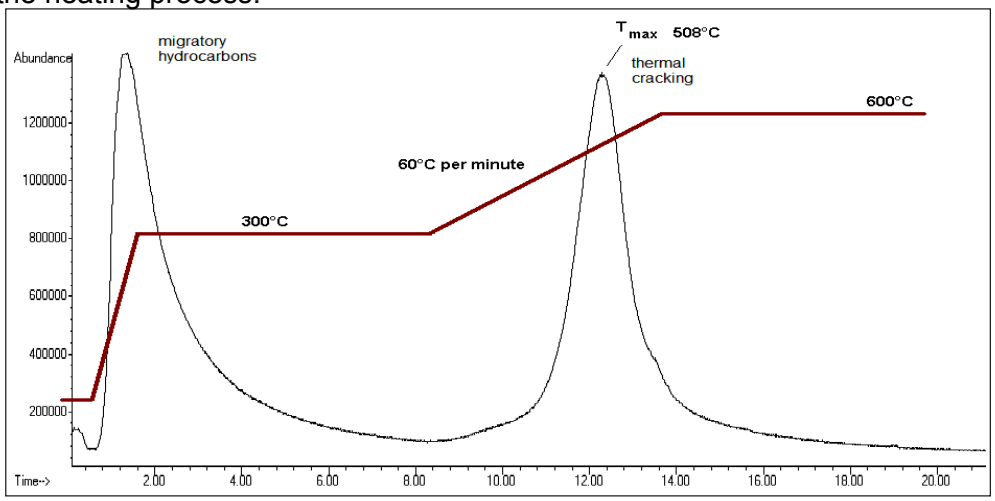

Figure 3: Composite Peaks of Source Rock.

Fixed gases created during thermal cracking can also be determined by interfacing the CDS Model 5500 Fixed Gas Analyzer to the vent of the Pyroprobe (not shown).

Equipment
This sample was analyzed using a CDS Model 5200 Pyroprobe interfaced to a gas chromatograph/mass spectrometer.

Model 5200 Conditions (GC/MS Analysis)
Interface:

Initial: 50°C
Final: 300°C 4 minutes

Trap:
Initial: 50°C
Final: 300°C

Probe Coil: 300°C or 600°C for 1 min

Transfer Line: 325°C
Valve Oven: 300°C

GC Conditions (GC/MS Analysis)

Carrier: Helium
Injector: 300°C
Split: 50:1
Column: 5% phenyl (30m X 0.25mm)
Detector: MS
Range: 35 - 550

GC Program:
Initial: 40°C for 2 minutes
Ramp: 10°C/min.
Final: 300°C

Model 5200 Conditions (Composite Peaks)

Interface:
Rest: 50°C
Initial: 300°C (8 minutes)
Ramp: 60°C per Minute
Final: 300°C

Pyroprobe:
Initial: 400°C
Ramp: 60°C per minute
Final: 600°C

Transfer Line: 300°C
Valve Oven: 300°C

GC Handshaking must be turned off, GC manually started when Pyroprobe method is started.

GC Conditions (Composite Peaks)

Carrier: Helium
Injector: 300°C
Split: 50:1
Column: fused silica 1m, .1mm ID
Detector: MS
Range: 35 - 550

GC Program:
Initial Hold: 300°C for 20 minutes

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