

Analysis is carried out in the SIM mode with a total of 33 ions being recorded over different time spans.

Operating conditions are:

Instrument: 5987HP GC mass spec data system
Column: 60m x 0.25mm ID cross linked methyl-silicone DB-1 (J&W) column of 0.25 micron film thickness connected directly to the ion source
Injector: OCI-3 (SGE)
Carrier gas: hydrogen
Oven Conditions: 50° to 274° C at 8°/min
274° to 280° C at 1°/min
EM Voltage: 2,000 - 2,300V
Electron Energy: 70eV
Source temperature: 250° C

GC/MS mass fragmentograms are examined for particular 'biomarker' compounds which can be related to biological precursors. These allow the characterisation of petroleum with regard to thermal maturity, source, depositional environment and biodegradation.

The significance of selected parameters from branched/cyclic GC/MS analysis is outlined below:

1. 18α (H)-hopane/ 17α (H)-hopane (Ts/Tm)

Maturity indicator. The ratio of 18α (H) trisnorhopane to 17α (H) trisnorhopane increases exponentially with increasing maturity from approximately 0.2 at the onset to approximately 1.0 at the peak of oil generation, ie. Tm decreases with maturity. This parameter is not reliable in very immature samples.

2. C_{30} hopane/ C_{30} moretane

Maturity indicator. The conversion of C_{30} 17β , 21β hopane to 17β , 21α moretane is maturity dependent. Values increase from approximately 2.5 at the onset of oil generation to approximately 10. Once the hopane/moretane ratio has reached 10, no further changes occur. A value of 10 is believed to represent a maturity stage just after the onset of oil generation and hopane/moretane ratios are therefore useful mainly as indicators of immaturity in a qualitative sense.

3&4. C_{31} and C_{32} 22S/22R hopanes

Maturity indicator. An equilibrium between the biological R- and the geological S- configuration occurs on mild thermal maturation. A ratio of S:R = 60:40, ie, a value of 1.5, characterises this equilibrium which occurs before the onset of oil generation. The C_{32} hopane pair is often more reliable for this purpose since co-elution sometimes affects the C_{31} ratio.