

The crushed sediment is heated in an inert atmosphere of helium over a programmed temperature range. The resulting pyrogram is shown in Figure 2.

Hydrocarbons present in the free or adsorbed state (S_1) are thermally distilled at 300°C and measured by a flame ionisation detector (FID). Hydrocarbons are then cracked from the kerogen (S_2) during a temperature ramp from 300° to 550°C and also measured by FID. CO_2 released during the kerogen cracking process (S_3) is trapped and subsequently measured by a thermal conductivity detector.

The amount of free hydrocarbons in the sediment (S_1) represents milligrams of hydrocarbons distilled from one gram of rock and is a measure of both in situ and out-of-place petroleum.

Free hydrocarbon richness is described by the following:

| S_1 (mg/g or kg/tonne) | |
|--------------------------|-----------|
| 0.20 - 0.40 | fair |
| 0.40 - 0.80 | good |
| 0.80 - 1.60 | very good |
| > 1.60 | excellent |

The total amount of hydrocarbons present in the free state and as kerogen is a measure of the potential yield (genetic potential) of the sample ($S_1 + S_2$) and is expressed as mg/g of rock.

Source rocks are classified accordingly:

| $S_1 + S_2$ (mg/g) | Source Rock Quality |
|--------------------|---------------------|
| 0.00 - 1.00 | poor |
| 1.00 - 2.00 | marginal |
| 2.00 - 6.00 | moderate |
| 6.00 - 10.00 | good |
| 10.00 - 20.00 | very good |
| > 20.00 | excellent |

The Production Index (PI) represents the amount of petroleum generated relative to the total amount of hydrocarbons present ($S_1/(S_1 + S_2)$). It is a measure of the level of maturity of the sample. For oil prone sediments PI ranges from 0.1 at the onset of oil generation to 0.4 at peak oil generation. For gas prone sediments, PI shows only a small change with increasing maturity.

The temperature at which the maximum amount of S_2 hydrocarbons is generated is called T_{max} (Figure 2). This temperature increases with the increasing maturity of sediments.