

Rock-Eval measurements

A Rock-Eval is a device developed by the Institut Francais de Pétrole to perform standard measurements on (bulk) organic material in sediment. From these measurements information can be derived about the type of organic material, the degree of coalification and the potential of the sediment for oil or gas generation. The information is used in oil and gas exploration for the reconstruction of the temperature history of sedimentary basins.

Measurements

S1	quantity of free hydrocarbons (gas + oil), in mg/g of rock
S2	quantity of thermally generated (cracked) hydrocarbons, in mg/g of rock
S3	quantity of CO ₂ generated during pyrolysis of the sample, in mg/g of rock
S4	quantity of CO ₂ generated during oxidation of the sample, in mg/g of rock
Tmax	Temperature in °C, at which the largest quantity of hydrocarbons is released upon cracking
PI	Production Index; $PI = S1/(S1+S2)$
PC	quantity of carbon that can be pyrolysed
RC	quantity of carbon that remains in the sediment following pyrolysis
HI	Hydrogen Index in mg/g of rock, $HI = (S2*100)/TOC$
OI	Oxygen Index in mg/g of rock, $OI = (S3*100)/TOC$
TOC	Total Organic Carbon, $TOC(\%) = PC + RC$
MinC	Mineral Carbon, the quantity of C contained in minerals

Description of the method of analysis

The sample is pyrolysed according to a set temperature programme (300°C, 3 min. const. => with 25°C/min. to 650°C) and subsequently oxidised in a second furnace (300°C, 3 min. const. => with 20°C/min. to 850°C). Hydrocarbons that are released are measured using a Flame Ionisation Detector (FID) and form the so-called S1 and S2 peak. In addition, the CO and CO₂ generated are measured during the pyrolysis using an Infrared (IR) cell. This provides information on the oxidation status of the organic material. CO and CO₂ are measured during the oxidation and that provides information on the TOC and MinC.

Quality

In assessing the reliability of the measurements, it is noted that Rock-Eval data are not reliable if the TOC value is less than 0,5%. The Tmax value is unreliable if the S2 peak is too low.