

Real-Time Isotopic analyses $\delta^{13}\text{C}$ of $\text{C}_1, \text{C}_2, \text{C}_3$ and CO_2

GEOLOG can offer a complete set of carbon isotopic analyses at well site, thanks to an innovative patented analytical solution. GEOLOG was the first company able to perform isotopic analyses up to propane and including CO_2 at the well site. The value of which is having a continuous log throughout the well for increased gas characterization, and reducing risks incurred through conventional isotube collection, in real time.



Benefits

- To define the origin of gas: biogenic, mixed or thermogenic (asset evaluation)
- To establish the provenience of gas in cap rocks and to assess seal efficiency
- To determine maturity of gas (asset evaluation and regional evaluation)
- To identify possible source of gas (asset evaluation and regional evaluation)
- To assess compatibility between gas and associated oil (same source? same maturity?)
- To detect and quantify possible mixing of gases with different origin (oil and gas potential)
- To reinforce fluid contact identification
- Reservoir connectivity (reserves estimation and completion strategy)
- CO_2 origin (if occurring) – economical impact of CO_2 occurrence on completion and development strategy

Challenges and Solutions

Chemical analyses of gas compositions are fundamental, but sometimes these data are insufficient to fully understand gas origin, maturity and distribution.

For example, gas occurrence in the cap rock can be better explained by using isotopic data, allowing operators to understand if gas is indigenous or migrated from a reservoir, through slight but continuous leakages.

The frequent sharp increase in the isotopic value entering from the cap rock into the reservoir can be interpreted as an unmistakable signal of gas bearing levels, if supported by an increased concentration of gas.

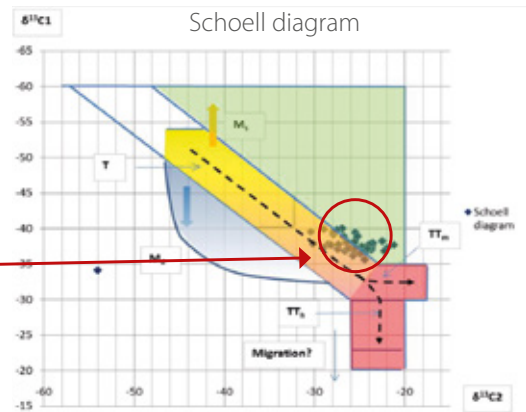
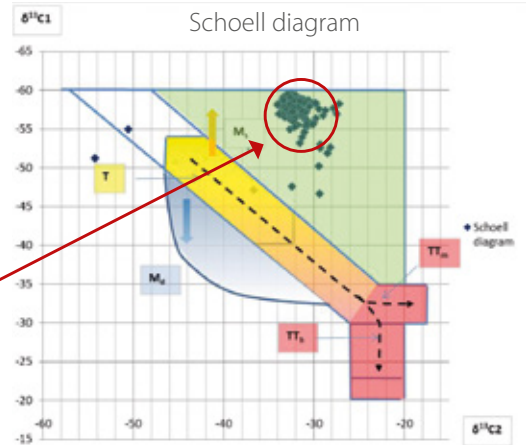
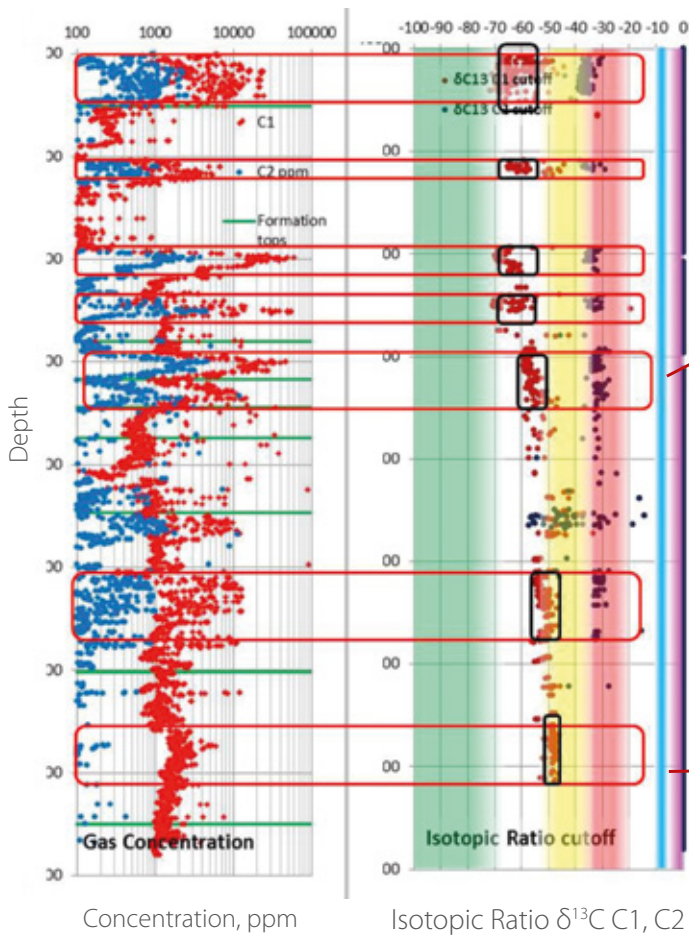
To understand the origin of gas, GEOLOG provides various models validated on case histories and based on integration of chemical and isotopic values.

By studying the isotopic data it can be seen that constant values across multiple reservoir zones implies an absence of permeability barriers between the reservoirs as the gases are from similar sources.

Capabilities

The Geol isotopes service can be used in all phases of the upstream cycle. In exploration it can be utilized to understand the origin of oil, to assess the oil and gas potential of the asset through source rock identification and migration pattern reconstruction.

Moreover if CO_2 is present, clear indications about its origin can be given. In appraisal and development phases Geol isotopes provides data to establish inter-well correlations, confirm interpretations made in exploration wells and to assess reservoir continuity.



The log charts on the left identify different isotopic marking of gases detected at different well targets. The shallower ones indicate mixing with bacterial gas. Only the lowest interval (the main reservoir target) shows a clear thermogenic origin. On the right, the crossplots between C1 and C2 isotopic ratio show the extent of migration and alteration of the hydrocarbons. This is only possible on site with GEOLOG's Geolotope service providing continuous well data and interpretation.

Specifications

$\delta^{13}C$ Analysis	Methane (C1), Ethane (C2), Propane (C3) and CO ₂
Limits of Detection	Minimum 500ppm to 30% of volume
Analysis Time	3 min (C1-C2), 8 min for full range

GEOLOG around the World

