

Source Rock Evaluation and Thermal Maturation a Case Study using HAWK Pyrolysis Results from Middle Jurassic Najmah Formation in Qashaniyah Field, North Kuwait

Jalal Dashti¹, Ibrahim Nasr, Donata Scanavino, Ragab Khalil and Yasser Hammad²

1 Kuwait Oil Company, Kuwait.

2 Baker Hughes.

Abstract:

Given current history moment and industry economical microclimate we have been looking to better ways on identifying how to effectively measure production insights and find a more cost effective solution to better evaluate return of investment (ROI). Mud gas data as well as cutting samples are available for the majority of the wells and an accurate analysis might play a key role on this.

The primarily aim of this study is to evaluate Najmah formation on Qashaniyah Field (North East Kuwait) in QA-A well data with different advanced analysis techniques. Pyrolysis analysis on cutting from an Hydrocarbon Analyzer With Kinetics (HAWK) has been used to determine Vitrinite reflectance (%Ro), Thermal Maturity and Total Organic Content (TOC). These information have then been integrated with well Mud gas data in combination with inorganic geochemistry data from X-Ray Fluorescence (XRF), and X-Ray Diffraction (XRD).

Najmah Formation is a tight, fractured formation predominately carbonates with abundant kerogen and bituminous matter deposited during Middle Jurassic and with a quite huge spotted extension in Kuwait.

This application has confirmed that Najmah' organic matter has a quality that varies from good to excellent and the formation itself is capable to generate a significant amount of hydrocarbons and related ROI. Specifically the advanced cutting analysis have identified the organic matter types (gas prone as the HI is less than 150) that is usually produced from kerogen (mixed type II and III).

The Pyrolysis data have also been used to determine the formation thermal maturity of the QA-A well based on calibration of measured %Ro. Production index (PI) and Tmax against calculated %Ro has been utilized to obtain a thermal maturity model. In addition to the thermal maturity in this case study we have being also looking on how a calculated TOC from mud gas data logs looks compared to the measured TOC pyrolysis analysis in cuttings. This information is critical on evaluating how much is the mobile vs immobile hydrocarbon content present in the reservoir that in combination with the Organic matter maturity represent key component for production evaluation.

This case study gives an alternative cost effective and near real time solution in case of exploration and development fields to validate best production process and protocols by using data and information that are usually collected during well operations.