THE UPPER JURASSIC PETROLEUM SYSTEM OF NE IRAQ

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Motivation of study

Iraq is one of the few countries with significant potential for discovery of major oil and gas fields. Two major petroleum systems occur in Mesozoic strata, the Mid-Upper Jurassic and the basal Cretaceous. These petroleum systems in Arabia are generally well separated by widespread evaporites of the Hiff Fm., its equivalents in central to NE Iraq being the carbonates/anhydrites of the Gotnia Fm. Where missing or replaced by the clastic Iasbarin Fm., a differentiation of the two Petroleum Systems becomes difficult. We here report on the Ajeel field of northern Iraq, covering the time interval from the Mid-Jurassic (Aalenian) to the Early Cretaceous (Barremian) to identify source intervals, determine maturity and conduct oil/source rock correlation with Miocene (Euphrates/Jenbi Fm.) oil reservoirs.

Objectives

1. Describe the depositional regime of the Mid-Jurassic to Lower Cretaceous sedimentary sequence
2. Identify potential source rocks within this interval
3. Determine thermal maturity of source units and oil generation potential
4. Fingerprint source rocks bitumens for correlation with reservoir oil composition.

Study Area

The studied oil fields and wells are located in the Autonomous Region of Kirkuk, NE Iraq, south-west of the Kirkuk supergiant oil field. During the Upper Jurassic and Lower Cretaceous the paleogeographic setting comprised a shallow water shelf with several shelf basins within an wide carbonate platform possessing several evaporitic depo-centres.

Lithostratigraphy

Sedimentation regime in the Jurassic-Trassic petroleum systems is governed by salinity changes, resulting in oxic accumulation of shale, marl, carbonate, and anhydrite. Highest source potential occurs in the basal Chia Gara, the Najmah/Naskeletan and uppermost Sargelu Fms. The central Chia Gara and Lower Sargelu Fm. contain less effective source units. Maturity of source rocks is in the (lower) oil window allowing for charging Miocene reservoirs. Thermal maturity of source and oil is not fully complaint arguing for additional deep-seated sources or kitchen areas. Anhydrites of the Gotnia Fm. in other areas may provide a effective seal but seem to be permeable for Jurassic oils to reach the Miocene reservoirs in the greater Kirkuk area.

Conclusions

Oils are generated from the Sargelu, Naqelkiinan/ Najmah and Chia Gara Fm. type II-S kerogen. Residual oils from reservoir rocks and production oils from Ajeel, Habas, & Hamrin fields show distributions of terpanes and (thio)aromatics identical to the multiple source units. Triterpane show low Tr vs. pentacyclic terpanes, a predominance of the C29,hexanes, presence of 2-methylhexanes, lack of gammacerane, and occurrence of a 29,30-bisnorhopane (29,30-BNH). A clear source-reservoir relations could thus be established.

References


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