

Thermal Maturity and Hydrocarbon Generation Histories of the Silurian Tannezuft Shale Formation, Ghadames Basin, Northwestern Libya

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Abstract : The Silurian Tannezuft Formation within the Ghadames Basin of Northwestern Libya, like other Silurian shales in North Africa and the Middle East, represents a significant prospect for unconventional hydrocarbon exploration. Unlike the more popular and extensively studied Sirt Basin, the Ghadames Basin remains underexplored, presenting untapped potential that warrants further investigation. This study focuses on the thermal maturity and hydrocarbon generation histories of the Tannezuft shales, utilizing calibrated basin modeling approaches. The Tannezuft shales are organic-rich and primarily contain Type II kerogen, especially in the basal layer, which contains up to 10 wt. % TOC, leading to its designation as 'hot shale'. The research integrates geological, geochemical, and basin modeling data to elucidate the unconventional hydrocarbon potential of this formation, which is crucial given the global demand for energy and the need for new resources. By employing PetroMod software from Schlumberger, calibrated modeling results simulate hydrocarbon generation and migration within the Tannezuft shales. The findings suggest dual-phase hydrocarbon generation from the Lower Silurian Tannezuft source rock, related to deep burial prior to Hercynian orogeny and subsequent Alpine orogeny events. The Ghadames Basin's tectonic history, including major Hercynian and Alpine orogenies, has significantly influenced the generation, migration, and preservation of hydrocarbons, making the Ghadames Basin a promising area for further exploration.

Keywords : tanezuft formation, ghadames basin, silurian hot shale, unconventional hydrocarbon

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