

## The geochemical characteristics of the Fengcheng Formation from the northwestern of the Mahu Sag, Junggar Basin, China

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The organic-rich sediments of the Fengcheng Formation in the northwestern of the Mahu Sag, Junggar Basin, China are the significant tight oil exploration target, however, their geochemical characteristics have not been well documented. The petroleum geochemistry was used to determine their thermal maturity, organic matter (OM) sources, depositional conditions and hydrocarbon generation potential.

Vitrinite reflectance and  $T_{max}$  suggest a low thermal maturity of the studied Fengcheng sediments, in agreement with maturity-related hopane and sterane ratios and detection of hop-17(21)-enes. The major algae and bacteria input to the Fengcheng Formation were identified by  $\delta^{13}C_{EOM}$ ,  $\delta^{13}C_{saturates}$  versus  $\delta^{13}C_{aromatics}$ , canonical variable, n-alkanes distribution, tricyclic terpane (TT), gammacerane,  $\beta$ -Carotane, diagnostic steranes, hopanes and aryl isoprenoids. Limited higher plant input can be inferred from trace amount of terrigenous OM biomarkers and minor contents of vitrinites and inertinites. The Fengcheng sediments have low  $C_{22}/C_{21}$  TT and  $C_{29}/C_{30}$  hopane, and high  $C_{24}/C_{23}$  and  $C_{26}/C_{25}$  TT, in agreement with their lacustrine sedimentary conditions, which was hypersaline and anoxic as suggested by low Pr/Ph, DBT/P,  $C_{20}/C_{23}$  and  $C_{21}/C_{23}$  TT ratios, high  $\beta$ -carotane/ $nC_{17}$  and gammacerane index, and detection of hop-17(21)-enes.

The OM enrichment in the studied samples are attributed to the reducing environments, the booming of algae and the important bacterial contribution. These source rocks in the studied area primarily contain type I to II<sub>1</sub> kerogen, and have good to very good hydrocarbon generation potential, and their thickness is large, implying a good petroleum exploration potential.