



Contribution ID: 159

Type: **Poster Presentation**

Experimental Study on the Recovery of Immature and Low-Maturity Shale Oil Using In-Situ Combustion

Thursday, 22 May 2025 10:35 (1h 30m)

The Gulong shale oil resources in the Songliao Basin are abundant, predominantly concentrated in the Qing-shankou and Nenjiang Formations. Immature to low-maturity shale is widely distributed, particularly in the first and second members, with a maturity level (R_o) generally below 0.75%. In-situ transformation methods can convert the organic matter within immature and low-maturity shale into recoverable oil and gas. Among these methods, in-situ combustion heating is a promising technique, though it is still in the early stages of development. This study presents laboratory experiments on in-situ combustion heating for immature and low-maturity shale oil. The optimal combustion temperature range was identified as 400–450 °C based on an analysis of heavy-component combustion products. The experiments showed that organic carbon combustion in shale oil from the Daqing area releases heat, consuming 2.25% of the total mass at 450 °C. With an organic carbon energy release of approximately 40 MJ/kg (comparable to conventional crude oil at 41 MJ/kg) and a reference recovery rate of 65% under field conditions using red-light fire flooding, it was estimated that 20% of the dissipated heat could transfer to the top and bottom cover layers. Moreover, 1 m³ of shale oil can achieve a temperature of 478.77 °C using its self-generated energy, which is equivalent to injecting 702.6 tons of 400 °C steam into the reservoir. This process facilitates steam heating, in-situ upgrading of immature and low-maturity shale oil, and supports green electric heating initiatives. This study underscores the potential of in-situ combustion heating as a viable and efficient technique for the recovery of immature and low-maturity shale oil. It provides a theoretical basis for advancing the green, low-carbon, and efficient development of these resources.

Country

China

Acceptance of the Terms & Conditions

[Click here to agree](#)

Student Awards

Water & Porous Media Focused Abstracts

References

Primary authors: ZHANG, Hong (Northeast Petroleum University); Dr ZHAO, Fajun (Northeast Petroleum University)

Co-authors: Dr WU, Xiaolin (State Key Laboratory of Continental Shale Oil); Dr LIU, Xin (State Key Laboratory of Continental Shale Oil); Dr QIAN, Yu (Exploration and Development Research Institute, Daqing Oilfield Limited Company); Dr LI, Jiawei (大庆油田勘探开发研究院)

Presenter: ZHANG, Hong (Northeast Petroleum University)

Session Classification: Poster

Track Classification: (MS17) Complex fluid and Fluid-Solid-Thermal coupled process in porous media: Modeling and Experiment