Contribution ID: **235** Type: **Poster (+) Presentation**

Study on Oil Recovery Effect and Mechanism of the Supercritical CO2 Huff-n-Puff Process in Tight Cores with Nuclear Magnetic Resonance (NMR)

Thursday, 3 June 2021 14:40 (1 hour)

At present, we are facing two challenges of the increasing demand on energy rescources and the increasing discharge of CO2. In one hand, the newly exploited oil and gas reserves consist of high proportion of low permeability reservoirs, which are difficult to be developed. On the other hand, astonishing amount of CO2 is discharged into the atmosphere accompanying the fossil energy consumption in industrial activities, which results in the serious greenhouse effect. Due to the capability not only on enhancing oil recovery from unconventional oil reservoirs but also on storing large amount of greenhouse gas in underground formations, CO2 huff-n-puff process is becoming an exciting research topic in recent years.

In this paper, two sandstone cores with 2.5cm in diameter, 7cm in length and gas permeabilities of 1.7mD and 2.6mD were employed and liquid paraffin was employed as the oil phase. After saturating the tight cores with the oil, CO2 huff-n-puff processes were carried out in both cores to see the effect of soaking time on oil recovery rates under the conditions of 50℃ and 25MPa. For core No.1, the soaking period is 1-day, while the soaking time was set to 5-day for core No.2. To understand the oil recovry mechanism of the Supercritical CO2 (ScCO2) huff-n-puff process, both cores were cut half after the completion of the process and the oil distribution in the entire core as well as the front half (the part close to the CO2 injection and discharge hole) and back half of the core were scrutinized with help of the Nuclear Magnetic Resonance (NMR) measurement. Following conclusions have been obtained,

1) The oil recovery rate after 5 days is 17.2%, which is higher than 15.2% after 1 day's huff-n-puff process, indicating the longer soaking time could explore more oil from the tight cores at the first cycle of huff-n-puff process.

2) NMR measurement results show that more oil in the large pore space (pore-throat radius larger than 0.05μm) of the core is produced after the completion of ScCO2 huff-n-puff process, while the oil phase in the space with smaller pore-throat sizes is rarely mobilized. The NMR results further show that the oil content in the large pores of the front part is obviously lower than that of the back part of the core, which indicates that a round of huff and puff operation mainly produced the oil in the large pore spaces from the front part of the core, while a considerable part of the oil in the rear core has not been effectively developed

3) Extended huff and puff time can significantly improve the oil recovery efficiency of the front part of the core, but there is little difference between the peak values of NMR test curves of 5-day and 1-day huff and puff process at the back part of the core, which indicates that extended huff and puff time has better oil production effect on the front part of the core.

Time Block Preference

Time Block B (14:00-17:00 CET)

References

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