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# Experiment studies on $N_2$-viscosity depressant with steam stimulation for shallow thin super-heavy oil reservoirs

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On the basis of the characteristics of thin layers, low reservoir temperature and super heavy oil of Block X of CF oilfield in China, a new technology of HDNS (including Horizontal well, viscosity Depressant, Nitrogen and Steam) was proposed and a series of experiments were conducted to analyze the mechanisms of HDNS. The self-designed equipment, which includes the steam generation system, gas injection system, chemical injection system, the sand-parking sample system, the temperature-controlled system, the metering system of produced fluids and the data collecting system, was used for the simulation. Experiments shows that the displacement efficiency increases with the increase of the steam temperature and the injecting rate of steam, but too high steam injection rate will decrease the displacement efficiency because of steam channeling. Compared with steam huff and puff the displacement efficiency of viscosity depressant assisted steam (DS), increases about 20% because of the thermal chemical effect. The viscosity depressant, $N_2$ assisted steam huff and puff (DNS) can increase the displacement efficiency in about 18% by using the synergistic effects of viscosity depressant, $N_2$ and steam. In the process of DNS stimulation, the viscosity depressant can reduce the viscosity of super heavy oil combined with the effect of steam, which is called as thermal chemical effect. The $N_2$ can prevent the steam channeling in the reservoir and decrease the heat loss in the process of steam stimulation. The DNS stimulation can effectively reduce the oil viscosity and the steam injection pressure, expand the steam sweep efficiency. By using this technology, Block X of CF oilfield has been successfully developed in these years.

## Biography

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