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Recovery of tight oil reservoir considering wettability alteration by adding surfactant additive agent

Based on contact angle and interfacial tension measurement, this paper concentrated on adding surfactants agent into fracturing fluids to increase oil output after hydraulic fracturing. Cationic, anionic and nonionic surfactants were added into slickwater to perform a serious of one end open (OEO) imbibition experiments at a certain concentration. Scanning electron microscope (SEM) and nuclear magnetic resonance (NMR) method were also applied in the detection before and after the imbibition process. Results demonstrated that core samples changed from oil-wet to intermediate-wet or water-wet after soaked in surfactants, cationic surfactant shows a better performance in changing contact angle while different kinds of surfactants have a similar

ability in lowering IFT. In the soaking duration, NMR transverse relaxation time (T₂) spectrum showed that oil recovered by counter-current imbibition mainly distributed in intervals of 10-1000 ms while oil remained uncovered mainly distributed in intervals of 0.1-10 ms. T₂ spectrum moved towards left side and this indicated that aqueous phase migrate from larger pores to smaller ones. Both laboratory experiments and field applications have indicated that adding surfactants into fracturing fluids can significantly increase oil outputs for tight oil-wet reservoirs. Application of this technology can be a good way to solve low production problems for this type of reservoir.

Biography

Shuai Li has completed his PhD degree from Research Institute of Petroleum Exploration & Development, China with majoring in oil and gas engineering. He has also completed a bachelor's degree in 2011 and a master's degree in 2014 from China University of Petroleum, Beijing, both in petroleum engineering. He has been also a visiting student at the Pennsylvania State University, USA from year 2017 to year 2018.

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