

ABSTRACT

Nanofluids are effective for enhanced oil recovery (EOR). However, they have limitations in terms of stability at high temperatures and salinities, which hinder their application in oil fields. These limitations arise because nanofluids can alter rock permeability and causes defect in the pore structure of the rock. The purpose of this study is to improve thermal stability of nanofluid and enhance additional oil recovery. In this study, nanofluids were formulated using silica nanoparticles with varying diameter. To enhance thermal stability, alpha olefin sulfonate (AOS) surfactants and disodium laureth sulfosuccinate (DLS) co-surfactants were added in various concentration. The resulting silica nanofluids were characterized by compatibility test, thermal stability evaluations, TEM, PSA, contact angle, IFT, injectivity and core flooding. The results showed that the formulation using silica nanoparticles (NS02) with anionic surfactant AOS 0.3%-DLS 0.3% exhibited the best performance. This formulation was compatible for use at salinities below 3%, high stability for more than 3 months at temperatures <80 oC, had a particle size 6 nm, aggregate size of 80.43 nm, effectively reduce the contact angle from 60.84o to 27.68o and decreased the IFT from 1.3×10^{-1} mN/M to 3.3×10^{-2} mN/M. Injectivity analysis indicated that nanofluid could cause plugging, While result of core flooding result showed the highest incremental oil recovery of 12.3% OOIP with a total RF of 61% OOIP.

Keywords: EOR, nanofluid, silica nanoparticles, core flooding