Experimental Study of Enhanced Oil Recovery Potential of Nanoparticle (Silicon Dioxide) Coated with Guar Gum

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Abstract

A major part of world's producing fields are near depletion and exploring and exploiting newer fields are severe with high risks involved. The recoverable oil under natural recovery is approximately 20–40% which implies that about 60–80% of residual hydrocarbon remains untapped and mostly considered as difficult to exploit, hence the need for enhanced oil recovery (EOR) options. Medium to heavy oil reservoirs have lower recoveries due to the fluid properties. High cost of injected chemicals used for EORs has opened research areas to discover novel, low-cost, and environmentally friendly stable chemicals that can be used as substitute chemical EOR process. Two core samples (B2 and B3) from the Niger Delta are used to experiment the effectiveness of the mixtures biopolymer-nanoparticles (BpNp) through a core flooding procedure while Core B1 was water flooded. A mixture of biopolymer and silicon nanoparticle (BpNp) at two different weight concentrations of 1.5 and 2.5 was carried on core B2 and B3. Results recorded for water flooding and BpNp were 48.6%, 55.7%, and 61.7%. An incremental oil recovery of 7.1% and 13.1% is recorded over water flooding for Core B2 (1.5% wt. concentration of BpNp) and Core B3 (2.5% wt. conc. of BpNp). A simulation study should accompany the validity of these results while considering multiple sensitivity analysis of different polymers and nanoparticles.

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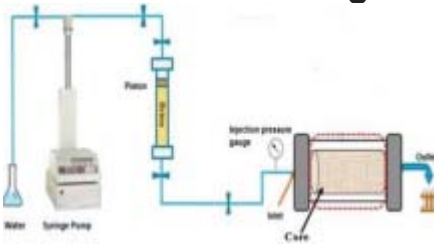

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