Saber Mohammadi et al., J Pet Environ Engineering 2015, 6:5
http://dx.doi.org/10.4172/2157-7463.C1.013

OMICS International
conferenceseries.com

International Conference and Expo on
Oil and Gas

November 16-18, 2015 Dubai, UAE

Monitoring wettability alteration of porous media by silica nanoparticles: An experimental approach

Saber Mohammadi[1], **Masoud Sharif**[2] and **Fariborz Rashidi**[2]
[1]Research Institute of Petroleum Industry, Iran
[2]Amirkabir University of Technology, Iran

Understanding the porous media wettability is crucial for optimizing EOR (Enhanced Oil Recovery) processes. The oil-water wetting preferences strongly affect all facets of reservoir performance, mainly in water flooding process as an EOR technique. The use of nanotechnology has recently gained momentum in oil and gas industry. However, the role of nanoparticles on wettability conditions of porous media has remained a topic of debate in the available literature. In this work, the effect of hydrophilic silica nanoparticles on wettability of reservoir rock is investigated through contact angle measurement of oil-water-rock system, and pore-scale water flooding in five-spot glass micro-models at different temperatures and concentration of nanoparticles. Obtained results showed that the wettability of oil-wetted rocks in presence of silica nanoparticles changes from oil-wet to water wet. Furthermore, as the temperature of the system and concentration of nanoparticles increase the effect of nanoparticles on wettability alteration of reservoir rock is much more pronounced. Also, the wettability alteration occurred in less time in this situation. The results of flooding experiments with nanosolution illustrated that the oil recovery factor and breakthrough time of displacing fluid increases in presence of nanoparticles dispersed in water upto concentration of 0.50 wt%; for concentration of nanoparticles more than 0.50 wt%, the recovery factor decreased due to reduction of porous medium permeability as well as plugging of pores-throats by dispersed nanoparticles. Results of this work reveal the potential applications of silica nanoparticles on wettability alteration of porous media as well as on improvement of oil recovery efficiency during water flooding process.

Biography

Saber Mohammadi is currently a Research Assistant at Research Institute of Petroleum Industry (RIPI), Tehran, Iran. He is also completing his PhD in Petroleum Engineering at Amirkabir University of Technology, Tehran, Iran. He holds an MSc degree from Sharif University of Technology, Tehran, Iran, and BSc degree from Petroleum University of Technology, Ahwaz, Iran (all in Reservoir Engineering). His academic experience includes research on experimental-simulation studies of different EOR processes in heavy oil reservoirs, micro-scale transport phenomena, micro-model experiments, and application of nanoparticles in heavy oil recovery. He has authored/co-authored more than 40 technical papers which have been presented and/or published in international conferences and journals.

mohammadisab@ripi.ir

Notes: