

Effect of Graphene Oxide Nanoparticles on a Heavy Oilfield: Interfacial Tension, Wettability and Oil Displacement Studies

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Abstract : Nanotechnology has played an important role in the hydrocarbon industry, recently, due to the unique properties of graphene oxide nanoparticles, they have been incorporated in different studies enhanced oil recovery. Nonetheless, very few studies have used graphene oxide nanoparticles in coreflooding experiments. Herein, the use of Graphene oxide (GO) nanoparticle was explored, exploited and evaluated. The performance of Graphene oxide nanoparticles on the interfacial properties in the presence of different electrolyte concentrations representative of field brine and pH conditions was investigated. Moreover, wettability behavior of the nanofluid at the oil/sand interface was studied used contact angle and Amott Harvey evaluation. Experimental result shows that the adsorption of GO on the sandstone surface changes the wettability of the sandstone from being strongly crude oil-wet to intermediate crude oil-wettability. At 900 ppm formation brine with 8 pH solution and 0.09 wt% nanoparticles concentration, Graphene oxide nanofluid exhibited better performance under the different electrolyte concentration studied. Finally, heavy oil displacement test in sandstone cores showed that oil recovery of Graphene oxide nanofluid had 7% incremental oil recovery over conventional waterflooding.

Keywords : nanoparticle, graphene oxide, nanotechnology, wettability, enhanced oil recovery, coreflooding

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