Investigation of the Wetting Behavior of Carbonate Rocks using MgO Nanofluids

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In this study, wettability alteration of oil-wet carbonate surfaces using MgO nanofluids is reported. Nanoparticles have been synthesized in-house. Different MgO nanofluids using some ionic and non-ionic surfactants have been prepared. Wetting properties of oil-wet carbonate substrates aged in the above nanofluids have been investigated using contact angle measurements. The results show that MgO nanofluids can change the wettability of an oil-wet substrate to a water-wet, so that air-water contact angle is 0° and heptane-water contact angle is about 130°. SEM images confirm the formation of nano-structures on the aged substrates into the nanofluid. Furthermore, we performed an Amott-Harvey imbibition test to analyze the quantity of oil recovery enhancement using the selected nanofluid. For core plugs aged into oil, we obtained a 50% of oil recovery using the nanofluid.