Evaluation of Metallic Oxides as Wettability Altering Agents in Sandstone Rocks

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Abstract :

The present work aims to evaluate the ability of different types of metal oxides nanoparticles to alter the wettability of sandstone rocks. It is believed that the rocks are naturally water-wet and with their aging in contact with the asphaltenes in crude oil have become oil-wet. Thus, for this work, it was necessary to extract the asphaltenes from crude oil from sandstone reservoirs in order to hydrophobize fragments of mica crystals – which represents the silica of the sandstone. The efficiency of the metal oxides was evaluated in altering the wettability of these fragments of mica by contact angle measurements. The nanoparticles of the metal oxides were characterized by CHN and FTIR spectra, which indicated the presence of carbon in some types of nanoparticle after the inversion test. The concentration of the oxides of best performance for the alteration of the wettability was carried out and with the best systems of these tests dynamic transport tests were carried out in non-consolidated media constituted by sand in order to verify possible retention of the nanoparticles in the porous media. Finally, oil displacement tests were performed with the objective of evaluating the efficiency of injection of the nanoparticle types with higher performance in the previous tests.