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Enhanced oil recovery using calcium carbonate and silicon dioxide nanoparticles

Gisele Javornik

Universidade Federal de Santa Catarina – Florianópolis, SC - Brazil

Abstract

In petroleum exploration, after the extraction of the easily recovered oil fraction from the well, the use of enhanced oil recovery methods is necessary for extraction of the remaining oil. Enhanced oil recovery (EOR) is a challenge for several research areas. Many studies have been focusing in different EOR strategies, motivated by the world´s large demand for energy, which alternative energy sources have not been able to meet yet. Nanotechnology can potentially change the mechanisms and processes of EOR. In this work an experimental study using nanofluids for EOR is presented. Aqueous solutions of the surfactant sodium dodecyl benzene sulfonate (SDBS) at different concentrations (3.0 to 17.5 mg/L) with 30 mg/L of nanoparticles of calcium carbonate and silicon dioxide were tested for EOR. The adsorption of SDBS on $CaCO_3$ and SiO_2 increased with the concentration of SDBS. However, SiO_2 showed higher adsorption capacity than $CaCO_3$ at high concentrations of SDBS (13.5 and 17.5 mg/L). No significant change in viscosity of the SDBS solution was observed with the addition of the nanoparticles. Permeability tests in a packed sand bed column showed that both nanoparticles are partially retained after 2 h of continuous flow.

Biography

Regina de Fatima Peralta Muniz Moreira received her BSc (1982) in Chemical Engineering and obtained her PhD in Chemistry in 1994 (UFSC, Brazil). After postdoctoral studies (Universidade do Porto, Portugal) in 1998, she returned to her professor position at UFSC (Brazil). Since 2002, she has a grant from a Fellowship of the National Council for Scientific and Technological Development. She works in the field of heterogeneous reactions with particular focus on solid–fluid reactions. Her research interests comprise surface phenomena including heterogeneous catalysis and adsorption processes. Prof Moreirapublished over 80 scientific papers and has five patents.