عنوان مقاله:

A Simulation Study of Nanoparticle Transport in Porous Media: Effects of Salinity and Reservoir Parameters

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خلاصه مقاله:

Although experimental studies confirmed the effectiveness of nanoparticles in enhanced oil recovery applications, no comprehensive investigation has been carried out to reveal the effect of different subsurface factors on this improvement. Proper application of nanoparticles mainly depends on their ability to travel long distances within a reservoir without agglomeration, retention, and blocking the pore throats. This study strengthens our understanding of the effect of the main subsurface factors on the nanofluid-assisted enhanced oil recovery. To this end, a transport approach utilizing the kinetic Langmuir model is developed and validated using experimental data. After that, the effects of reservoir rock type and its properties (clay content and grain size), the salinity of injected fluid, and the reservoir temperature on the transport and retention of nanoparticles in porous media concerning enhanced oil recovery methods are investigated. Since the concentration of nanoparticles in the injected fluid and on the rock surface (as deposited) control the mobility and wettability alteration, the effect of subsurface factors and salinity of injected fluid on this deposition is also analyzed. The results showed that the rock type and its properties significantly affect the transport and retention of nanoparticles in porous media. Brine salinity also has the most significant impact on the amount of nanoparticles deposited on the rock surface. The surface covered by nanoparticles increased from ۱۰% to ۸۲% after changing salinity from ۳ wt % NaCl to the API brine.

کلمات کلیدی:

Enhanced oil recovery, Nanofluid flooding, mobility control, transport and retention of nanoparticles, Wettability Alteration