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The application of acrylic acid as precipitation inhibitor for ASP flooding

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Abstract

Alkaline-Surfactant-Polymer (ASP) flooding has shown an incredible interest for enhancing oil recovery for both sandstone and carbonate reservoirs. However, the main constraint of ASP flooding in carbonate reservoirs is the presence of undesired minerals either within the reservoir rock or reservoir brine. These minerals could react with the added chemicals to form their insoluble salts as precipitations. In this paper, the performance of the acrylic acid was evaluated in the presence of sodium metaborate as an alkaline, alpha olefin sulfonate as a surfactant and AN-125 SH as a polymer. The effect of various acrylic acid concentrations on alkalinity, interfacial tension reduction and polymer viscosity were investigated using hard brine with a total salinity of 59,000 ppm. Fluid-fluid compatibility test indicates that acrylic acid has the potential to prevent any precipitation when hard brine is used. The acrylic acid to alkali ratio of 0.6:1 was found to be the optimum ratio for keeping the solution without precipitations for 30 days at 80C^{o}. It was also observed that the combination of ASP with acrylic acid has a positive effect on interfacial tension and solution viscosity. This makes the new system more flexible for offshore application in which hard brine or sea water can be used to prepare ASP slug without any negative effects.

Biography

Dr. Khaled A. Elraies has obtained his PhD degree in record time at the age of 29 years from Universiti Teknologi Petronas, Malaysia. He has been appointed as a faculty member in the Petroleum Engineering Department of UTP since January 2011. He supervised five Msc students and acted as the postgraduate studies coordinator of the petroleum engineering department. Dr Khaled is a prolific writer and has authored and co authored over 25 research papers. He has also jointly authored a book chapter on “The Application of a New Polymeric Surfactant for Chemical EOR. His research interests are water injection, chemical EOR, ASP flooding and CO2 flooding.