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A new environmentally and equipment-friendly blend for matrix acidizing and acid fracturing of limestone formations

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Abstract

Mineral acids have been used for wellbore cleanup, matrix acidizing and acid fracturing. Hydrochloric acid (HCl) has been used as the main acid for limestone stimulation purposes. The main concerns with use of HCl acids are health and safety of the field crew, corrosive nature of the acids for the flow lines and equipment and environmental effects of the produced HCl. Moreover, fast reaction times and the fact that HCl is consumed rapidly during the reactions; make this type of acid a less favorable option for wells with multi-stage hydraulic fractures.
UltraFrackTM is an environmentally- and equipment-friendly product of Earthborn Clean Products. UltraFrackTM is a conversion to an organic base to maintain very low pH as a vehicle for aggressiveness, along with the creation of buffers and surface tension relievers for the effectiveness and safety. Low pH, linear reaction with limestone, small amount of residue after reaction and longevity are the characteristics of this product.
The main objective of this work was to validate the application of UltraFrackTM for stimulation and matrix treatment of limestone formations. Below is a summary of the results:

- Beaker tests: UltraFrackTM dissolves the same mass and volumes of limestone rock samples with slower reaction rates and leaves fewer residues compared to HCl.
- Rheology tests: A shear-thinning behavior was observed for UltraFrackTM.
- Core floods using HCl and UltraFrackTM were performed at 25 °C. The results showed slightly lower permeability for the core that was treated with HCl compared to the core that was treated using UltraFrackTM.

Biography

Reza Barati has completed his PhD from the University of Kansas. He worked for the Enhanced Oil Recovery Institute before joining the Chemical and Petroleum Engineering Department at the University of Kansas as an Assistant Professor. His current research interests are: Hydraulic fracturing and acidizing of unconventional reservoirs, characterization and simulation of tight oil and gas reservoirs, oilfield nanoparticles, co2 EOR mobility and conformance control and enhanced water-flooding through modifications of injection-brine.