WI10

Organoclay as Emulsifier for Water in Oil Polymeric Gel Formulations used in Conformance Control

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SUMMARY

The new emulsifier can form high quality water in oil (W/O) emulsions and improve the thermal stability of emulsified polymers or acid solution. The stability of the emulsion can be controlled by controlling emulsifier concentration; the emulsion system can withstand high salinity much better than current surfactants used in oilfields. These emulsifiers will be appropriate for wellbores having high pressure and high temperature (120°C) with high salinity field water (221,673 ppm).

Abstract

The produced water in oil and gas wells causes serious problems. This includes loss of productivity, corrosion, scale and environmental concerns. Generally, polymer gels are well suited for water shut-off; nevertheless without a proper placement, there is a risk of significant reduction in hydrocarbon production. In recent work, new approach has been developed, which has the advantage of selectively reducing the water production without considerably damaging the hydrocarbon recovery. Emulsifying water soluble polymer gels into Oil phase, this emulsified polymeric gels, designed to separate into a water phase and an oil phase in the porous media at reservoir conditions. In the pore space the water phase, which contains the polymer mixture (gelant), gels up while the oil phase remains mobile. The breaking of the emulsified system and then the gelation are a function of temperature, time, salinity of mixing water and concentration of the different phases. Accordingly, Organoclay (OC) has been proposed as a substitute for classical surfactants used in such application. Currently, many nanomaterials have been developed for several applications in various fields of endeavors. Layered silicate clay minerals are one of the most well-known nanomaterials due to their high surface area of the dispersed nano-sized particle, availability, low-priced and more importantly environmentally friendly. Also, the new emulsifier is expected to enhance the properties of emulsified gel solutions and most importantly improving the gel strength. The new emulsifier can form high quality water in oil (W/O) emulsions and improve the thermal stability of emulsified polymers or acid solution. The stability of the emulsion can be controlled by controlling emulsifier concentration; the emulsion system can withstand high salinity much better than current surfactants used in oilfields. These emulsifiers will be appropriate for wellbores having high pressure and high temperature (120°C) with high salinity field water (221,673 ppm).