allied academies

Oil & Gas 2018 &
Petroleum Engineering 2018, Volume 2
DOI: 10.4066/2591-7331-C2-006

Joint Event

International Conference on

Petroleum Engineering, Oil and Gas

December 06 -07, 2018 | Dubai, UAE

A novel approach for formulating CO_2 foam based fracturing fluid by synthesized grafting copolymerization to enhance its stability for HPHT shale reservoirs

Sahil Chaudhary
DIT University, India

An eco-friendly CO2 foam based fracturing fluid is developed which can be used at HPHT conditions for shale reservoirs with high goethite content. Results observed were compared to the conventional fracturing fluids which were previously published.

For the formulation of the fracturing fluid, gum acacia and Lactic Acid is grafted together in the presence of Potassium per sulphate (KPS). Base solution of the fracturing fluid is prepared using 80% of CO2 liquid and 14% brine solution. Lecithin is used to emulsify CO2 liquid and brine solution. Grafted polymer is mixed with the base solution. An Propylene glycol, oxygen scavenger, biocide, cross linker and other additives has been added in smaller proportions nearly 0.15% in the base fluid. Sodium Lauryl Sulphate and Palmitic acid is added in the base solution as foaming agent. After mixing the formulation at high rate for 10-15 minutes, 4-5% proppant is added in the developed fracking fluid.

The series of test has been conducted and the results are compared with the conventional fracking fluid. FTIR has been used for the characterization of grafted Copolymer and the effective synthesized co-polymerization is shown by the Infrared spectra of gum acacia (GA), Lactic acid (LA) and grafted copolymer (GA-g-LA). Rheological properties have been evaluated of the base gel and foam separately. In this paper, the viscosity of grafted copolymer polymer fracturing foam at high pressure high temperature (HPHT) as a function of surfactant concentration, salinity, and shear rate are presented. Pressurized foam rheometer was used to find out the viscosity of CO2 foam at different surfactant concentrations (0.25–1 wt%) and salinity (0.5–8 wt%) over a wide range of shear rate (10–500 s−1) at 1500-3000 psi and 200-400 °F. The viscosity is found between 70-125 cP at for different concentrations. The foam quality has been evaluated by adding 0.25% w, 0.5%w and 1%w of surfactants. Half-life and proppant carrying capacity of the best quality foam been determined at different temperature ranges. Half-life time was found to be 145 minutes at 250ºF. The results of effect of salinity and effect of shear rate have been discussed in detail. The result showed that at foam quality of 80% & 70% proppant loading is 5.5%vol and 3%vol. Use of grafted copolymer results in higher viscosity and proppant carrying capacity which is beneficial for HPHT fracturing conditions.

The use of grafted copolymer enhanced the properties of fracturing fluid. GA-g-LA is a novel approach and has not been used in well stimulation industry. Grafting increased the stability of fracturing fluid at HPHT wells. This could be brought in practice in the coming time and can be used in deep wells.

e: sahilchaudhary617@gmail.com

Notes: