

ABSTRACT

THE MECHANISM OF SURFACTANT INJECTION FOR LIGHT OIL AT SANDSTONE RESERVOIR

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Enhanced Oil Recovery (EOR) method by injecting surfactant is being given special attention because the technique is seen to have significant potential to drive the residual oil in the reservoir. If we seen in the field application, surfactant injection still has not been success, one of the causes is the limited understanding of the mechanisms of fluid injection when conducted surfactant injection in the reservoir. This study introduce a new approach of surfactant injection with the understanding of integrated surfactant injection mechanism from sandstone field for light oil by compatibility tests, and a correlation of several parameters which determines the success of surfactant injection.

The application of surfactant injection requires proper planning. Injection of surfactant used to acquire the remaining oil from the reservoir through the IFT reduction mechanism, the formation of the microemulsion and wettability changes. The presence of clay content in sandstone lead to the possibility of the microemulsion adsorbed on the surface of the rock so that it would be a problem because the oil still will not be removed from the reservoir. So it is necessary to find the type of surfactant that can reduce IFT and also remove the oil from the surface of the rock.

From an overall tests found that surfactant with ethoxy carboxylate type most suitable because it has a homogeneous solubility with brine, form the middle phase, gives the value of IFT 10^{-3} Nm/m, low adsorption value, has more wetting properties than oil to rock, filtration ratio below 1.2 and from the continuous coreflooding test using Berea cores provide a maximum oil recovery of 83%. The addition of alkali and co-solvent in the surfactant formulation does not give the increasing of oil recovery significantly, while the pore volume greatly affected the oil recovery in coreflooding test and it gives an optimal result at 0.8 PV. The correlation against multiple parameters of surfactant injection mechanism showed that when the IFT value is low, formation of two phases, and good wetting result will provide improvements to increase the oil recovery for sandstone field that has a light oil characteristic and tendency of oil wet.

Keywords: surfactant injection, wettability, HLB, optimization, correlation