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Numerical Simulation Of The Effects Of Phase Mobility Alteration On Waterflood Oil Recovery Process.

¹Nnadi, John Wogunka, ²Wopara Onuoha Fidelis and ³Godwin Chukwuma
Jacob Nmegbu.

In this work, a model based on Eclipse 100 numerical simulator was developed to investigate the effect of phase mobility alteration during waterflooding operation. The model concept on the simulator was used for properties identical to the Niger Delta formation. Three case scenarios were considered in the study of the effect of phase mobility alteration on waterflood oil recovery - the analysis of the system on a natural drive; under intense water injection; and addition of different polymer concentrations to the injected water for phase mobility study. Precisely, polymer concentrations of 0.254, 0.525 and 0.702 lb/stb were added respectively to the model. The result showed that the addition of polymers at an optimum concentration led to a significant decrease in water cut of about 57%. This indicates that polymers reduce the relative permeability of the rock to water there by reducing water flow and fractions produced. From the result obtained, it was also found that the addition of polymers delayed the water-break through time and increased recovery. However, from the recovery plot, continuous addition of polymers did not necessarily lead to an exponential increase in oil recovery. Also continual increase in the concentration of polymers showed that the decrease in water cut was not significant thereby indicating the need to establish an optimal concentration for the case scenarios. 0.702lb/stb was established as the optimal polymer concentration for this study. The simulation result also indicated that a recovery factor of 38% was obtained as a result of using polymer flooding.

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