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# The Role of Viscoelasticity on Enhancing Polymer Flooding Recovery of Residual Oil

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## Abstract

Polymer flooding is considered as the simplest chemical Enhanced oil recovery method and the most widely used technique among others. Until recently it is thought of as a mobility control method, however, this changed when field and lab works showed promising results regarding the reduction in residual oil saturation associated with elastic polymers. Thus, polymer viscoelasticity has been considered as a screening factor that could influence the recovery of residual oil when polymer flooding applied as an enhanced oil recovery.

This thesis aims to outline the effect of elasticity of partially hydrolyzed polyacrylamide (HPAM) on the recovery of residual oil and investigate whether the more elastic polymers could enhance the recovery of oil better than that of polymers with lower elastic properties. This was accomplished by preparing polymers with similar viscosities (different molecular weights and thus different concentrations) but different elasticities in order to separate the viscous effect and observe the elastic effect on recovery alone. These polymers were tested through core flooding experiments using oils with different viscosities. Also, these polymers were set to 2D micro-model tests to visualize their elastic effects.

The core-flooding results showed an increase in recovery and reduction in residual oil for both oils after quaternary flooding with the higher elastic polymer. However, this result was not observed with the micro-model tests which was explained by the pressure curves that indicated that -with the selected flow rates- both polymers did not reach the shear-thickening region yet. Due to limitations with the pressure gauge and pump, the flow rates were kept low. Therefore, the elasticity of polymers would be a helpful screening criteria for EOR applications because it could contribute to reducing the residual oil saturation if the right conditions were present.