Effects of Polymer Adsorption and Desorption on Polymer Flooding in Waterflooded Reservoir

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***Abstract*— Polymer Flooding is one of the most well-known methods in Enhanced Oil Recovery (EOR) technology, resulting in favorable conditions for displacement mechanism to lower residual oil in the reservoir. Polymers can lower mobility ratio by increasing the viscosity of injected water, hereby increasing volumetric sweep efficiency. Moreover, polymer adsorption onto the rock surface can help decrease reservoir permeability contrast. Due to absolute permeability reduction, the effective permeability to water is also reduced. Once the polymer is adsorbed onto the rock surface, polymer molecules can be desorbed with a chaser. This study is performed to further evaluate the effects of the adsorption and desorption process of polymer solutions to yield benefits on the oil recovery mechanism. A reservoir model is constructed by the reservoir simulation program called STAR® from Computer Modeling Group (CMG). Various polymer concentrations, starting times of polymer flooding process and polymer injection rates were evaluated with selected degrees of polymer desorption including 0, 50 and 100%.**

According to the results, polymer desorption lowers polymer consumption, especially at low concentrations. Polymer desorption causes polymer re-employment that is previously adsorbed onto rock surface, resulting in an increase of sweep efficiency in the further period of polymer flooding process. Furthermore, the results show that waterflooding followed by earlier polymer flooding can increase the oil recovery factor whereas the higher injection rate also enhances the recovery. Polymer concentration has relationship with polymer consumption due to the two main benefits described above. Therefore, polymer slug size should be optimized based on polymer concentration.

***Index Terms*: Enhanced oil recovery technology, polymer adsorption and desorption, polymer flooding, reservoir simulation.**

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