Hyemin Park et al., J Pet Environ Biotechnol 2014, 5:4
http://dx.doi.org/10.4172/2157-7463.S1.006

OMICS Group Conferences
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2nd World Congress on
Petrochemistry and Chemical Engineering
October 27-29, 2014 Embassy Suites Las Vegas, USA

Experimental investigation of polymer adsorption-induced permeability reduction in low permeability reservoirs

Hyemin Park, Wonmo Sung, Jinju Han, Minkyu Lee and Youngho Jang
Hanyang University, Republic of Korea

The polymer retention during polymer flooding causes reduction in pore throat size which can be detrimental to oil recovery. Especially, in low permeability reservoir unlikely in high permeability system, EOR effect of polymer flooding would not excel comparing to water flooding because of the polymer adsorption on the grain surface. This phenomenon is more significant when polymer in higher concentration is injected. In this study, oil recovery process during polymer flooding for a quarter of 2D 5-spot pattern of low permeability sandstone slab, in which the injected polymer solution flows in different shear rates corresponding to streamlines was investigated. A series of experiments at various polymer concentrations were performed. From the experimental results, it was found that optimum polymer concentration should be carefully considered in the aspect of oil recovery, especially in the low permeability system. Particularly, in certain polymer concentration or higher, oil is recovered less than the one as expected in general. This was ascertained that it was dominantly affected by the polymer adsorption-induced permeability reduction.

smilehyemin@gmail.com