

Alkali-Surfactant-Polymer (ASP) Flooding: Theoretical and Practical Aspects of CEOR for Alaskan Heavy Oil Reservoirs

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Enhanced oil recovery is essential to recover bypassed oil and to improve recovery factor. Alkaline surfactant polymer flooding is a Chemical EOR (CEOR) method which can be used for recovering heavy oil containing organic acids from sandstone formations. It involves injection of alkali to generate in situ surfactants, surfactants to reduce IFT between displacing and displaced phase and polymer to improve mobility ratio and thus sweep efficiency, and is followed by extended waterflood. Concentration of alkali, surfactant and polymers used in the process depends upon oil type, salinity of the solution, pressure, temperature and injection water quality.

Petroleum Development Laboratory (PDL) plans to undertake studies to evaluate and understand CEOR and its effect on recovery, determination of Critical Micelle Concentration (CMC), optimal salinity, concentration of alkali, surfactant and polymer for heavy oil reservoirs on ANS. Also, effects of waterflooding and improvement with ASP flooding will be monitored and compared. Effect of infill drilling, altering chemical combination on recovery will also be evaluated.

Study of these effects on oil recovery will be analyzed theoretically by conducting literature survey and studying Society of Petroleum Engineers (SPE) publications and practically with Computer Modeling Group (CMG) simulator tuned for Alaskan reservoirs. CMG model will be prepared with Alaskan reservoir properties and 5 spot well pattern using STARS simulator. Runs for different chemical combinations with varying ASP concentrations will be carried out during simulation to analyze the effect on recovery. If proved, effective, use of these chemicals for Alaskan reservoirs to increase recovery factor can help to replace current limited supply of miscible gas injection (MI) to CEOR.