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**Effect of Alkali on Alkali–Surfactant Flooding in an Upper Assam Oil Field**

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**Abstract**

The effect of alkali on immiscible alkali–surfactant (AS) flooding is studied by injecting surfactant individually and surfactant along with alkali. First, reservoir core samples were characterized with the help of X-ray diffraction (XRD), scanning electron microscope (SEM) and thin slide analysis. Based on the clay content of the reservoir, surfactant was selected. Second, AS formulations were designed through dynamic interfacial tension (IFT) and wettability alteration analysis. Third, adsorption of surfactant on porous media was studied with or without alkali to find out the amount of surfactant adsorbed along with the isotherm mechanism. Fourth, core flooding experiments were conducted to find out the recovery efficiency after secondary brine flooding. XRD, SEM and thin slide analysis showed the presence of kaolinite, smectite, illite, silica, quartz in the rock sample. Based on the clay types, sodium dodecyl sulfate (SDS) was selected as surfactant for this study. Ultra-low dynamic IFT in the range of 10−3 was observed with SDS. Addition of alkali further reduced the IFT of the system. Initially, wettability of the reservoir under study was toward water wet, but during AS flooding it was altered to strongly water wet. Adsorption of surfactant on the porous media was reduced by the application of alkali. During secondary brine flooding, maximum recovery was found to be 49% of Initial Oil in Place. Another 14% of residual oil after secondary flooding was achieved by AS flooding.

**Keywords:**

Immiscible, Wettability, Formulation, Permeability, Porosity, Adsorption, Efficiency

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