INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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SHORT ABSTRACT

The study indicated that alkaline-surfactant-alternated-gas/CO_2 (ASAG) flooding is a promising enhanced oil recovery (EOR) method that can be effectively applied for reservoirs with permeability as low as 6 mD and producing medium gravity acidic crude oil. The alternate injection of gas/CO_2 and alkaline-surfactant (AS) solution in short slugs can result in higher additional oil recovery due to in-situ foam formation and ultra-low IFT environment. In fact, it is the integrated synergy of all the components in the injected fluids that resulted in better oil recovery by ASAG flooding compared to tertiary continuous gas injection (CGI), CO_2-WAG, surfactant-alternating-gas/CO2 (SAG), and AS flooding. The performance of ASAG flooding is found to be influenced by certain operational parameters that are required to be adjusted for optimum process efficiency. The optimum conditions for the best oil recovery by ASAG flooding were obtained with 1:1 slug ratio, 0.25 PV slug size, gas-alternated-chemical (GAC) injection scheme, 0.2 ml/min CO_2 gas injection rate, and 2 PV of total fluid injection. Additionally, liquid and gas tapering injection schemes had a favorable effect on the additional oil recovery due to the efficient use of injected fluids and better fluid mobility control. Further, the application of salinity gradient during ASAG flooding helped achieve better incremental oil recovery due to the attainment of the lowest oil-water IFT and generation of the most stable foam. Moreover, low-cost surfactant preflush can be potentially employed during ASAG flooding to minimize primary surfactant adsorption and maximize the oil recovery under reservoir conditions.