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Experimental Study on LoSal Enhanced Oil Recovery Mechanisms in a Part of an Oil Field of Upper Assam Basin, India

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Low Salinity (LoSal) Enhanced Oil Recovery (EOR) is an emerging EOR technology where the salinity of the injection water is reduced/controlled to improve the oil recovery versus conventional high salinity water flooding. Earlier studies have shown that different LoSal EOR mechanisms such as Fine Migration, pH increase, Electrical Double Layer (EDL) Expansion, Multicomponent Ion Exchange (MIE) etc. affects the oil recovery efficiency through wettability alteration of the reservoir rock. The present study is based on the laboratory study of 'Fine Migration' and 'pH increase' mechanisms in a part of an Oil Field of Upper Assam Basin.

The analysis of crude oil, brine and reservoir rock of the study area shows the presence of polar organic compounds, divalent cations and clay minerals which are the prerequisite for the LoSal mechanisms to occur. The core flooding experiments were conducted in the laboratory by flooding oil saturated core plugs using different saline water (1404 ppm, 1100 ppm & 200 ppm). Injection of 1100 ppm and 200 ppm low saline water gives higher oil recovery efficiency (33.82% & 40.47% of OOIP) compared to 1404 ppm flooding (32.71% of OOIP) which is the formation brine salinity of the study area. The Scanning Electron Microscopic (SEM) analysis of the migrated fine sediments separated from the effluent low saline water shows the presence of illite and mixed-layer. The pH of the 1100 ppm & 200 ppm effluent water is increased by 0.29 & 0.33 respectively.

The study shows that the 'Fine Migration' and 'pH Increase' LoSal mechanisms works in the study area which contributes to the improved oil recovery efficiency.

Keywords: LoSal, EDL, MIE, Wettability, SEM

Biography:

Dr. Minati Das is a professor in the Department of Petroleum Technology, Dibrugarh University, India. She has six years of industrial experience in Oil & Natural Gas Corporation Ltd. as Reservoir Engineer and Assistant Director (Reservoir) and thirty two years of postgraduate teaching experiences (reservoir engineering). Her research area of interest is in 'Petroleum Geology' and 'Reservoir Engineering'. She has established a Centre of Excellence (CORE) in the Department of Petroleum Technology in Clastic Petroleum Reservoir Engineering under Mission REACH, TIFAC (Technology Information Forecasting and Assessment council), under Department of Science and Technology, Govt. of India. She is a member of Editorial Board in different national & international journal and published more than thirty number of research papers.