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Feasibility Study of Surfactants for Designing Injection Fluids for Hydrocarbon Reservoir with Harsh Conditions: Application for Enhanced Oil Recovery

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Sympathize the feasibility concept between injected fluids and reservoir crude oils are dominant for developing conventional and enhanced oil recovery (EOR) methods for optimization of production for high temperature and high salinity carbonate reservoirs. Chemical methods with surfactants, polymers and alkalies are gaining importance where surfactants-assisted methods are expected to play a major role in enhancing future crude oil production. A number of surfactants which exhibit ultra-squat IFT and excellent micro-emulsion phase behavior with crude oils of low to medium API gravity are sufficiently soluble at high salinity to produce stable mellifluous solutions. Such solutions often show phase separation or we can say phase behavior after a few days at reservoir temperature, while compared to the residence time in a reservoir for an effective surfactant flooding. The behavior of surfactants in aqueous solution shows the feasibility of surfactant flooding in harsh condition carbonate reservoir. Anionic surfactants such as ABS, AOS with large hydrophobes produce lowest IFT but are often sufficiently water soluble at appropriate salinity. The stability of the oil-water emulsion is visualized with respect to time, temperature and the salinity of the brine and attentiveness of the surfactants.

In this research work, we used one crude oil sample and two polar surfactants like (Alkyl Benzene Sulphonate- ABS) and (Alkyl Olefin Sulphonate- AOS), at harsh condition for carbonate reservoir to understand the feasibility of surfactants at high temperature and high salinity. Pre-screening test is performed for surfactant solution at desired temperature to check the cloud formation/ turbidity of solution. Dynamic light scattering (DLS) experiments were conducted on both the surfactants aqueous solution at varying salinity. Study result defines the average size of the oil components trap in it. The UV- visible spectroscopy test for surfactant thermal stability at different temperatures with varying salinity was conducted. The absorption spectra of surfactant aqueous solution shows peak in results as the stability of surfactants at particular temperature and salinities. The fluorescence spectroscopy result shows the presence of oil components in the micro-emulsion phase. The Fourier-transform infrared spectroscopy is being used to define the infrared spectrum of any composition present in oil sample.

Keywords: Enhanced Oil Recovery, Surfactant Flooding, Surfactant pre-screening test, Micro-Emulsion, Dynamic light scattering, UV-visible spectroscopy, Fluorescence spectroscopy, Fourier-transform infrared spectroscopy.

Biography:

Suryapratapsingh Bhadauria is currently pursuing Master of Technology course in Petroleum Engineering. His expertise in defining the feasibility of various surfactants used in Enhanced oil recovery and open and contextual identification is based on phase behavior of solutions that means how is it change with the effect of high temperature and salinity, under the guidance of Uttam Kumar Bhui (Associate Prof.). He had acquired a sound overall knowledge of leading edge engineering principles, research and development, with emphasis on designing, modeling and testing of various surfactants used oil industries. He is proficient in the use of various experiments like UV-visible spectroscopy, Fluorescence spectroscopy, Zeta-particle, etc. He had done Bachelor of Technology in Mechanical Engineering from Gujarat Technological University, Gujarat, India and his expertise is mostly on Production, Manufacturing, Management Strategy, etc. His personal attributes include leadership and sound judgment as well as creativity, analytical and Managerial role and interact with various peoples from different backgrounds based on oil industries and done internship based on his research work.