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Foamability and foam stability of several surfactants solutions: The role of salinity and oil presence

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Foamability and foam stability are of main concerns in foam displacement for enhanced oil recovery. This work presents the output of systematic laboratory screening of foamability and foam Stability of several surfactants. The surfactants examined were Brij 700, Triton X-100, Triton X-405, Zonyl FSO, Hitenol H-10, Hitenol H-20, Noigen N-10 and Noigen N-20. Solution salinity and oil presence effects were explored. Foam was generated by sparging Carbon Dioxide gas at a fixed flow rate through surfactants solutions and R5 parameter as suggested by Lunkenheimera and Malysa (2003) were used for foam stability testing. The results indicate the foamability of all surfactants except for Triton X-405. Zonyl FSO and Hitenol H-10 were superior in term of foam stability with more stability as surfactants concentration increases. Equivalent optimum foam volumes were obtained for both surfactants but at higher concentrations of Hitenol H-10. Increasing solution salinity from 4% to 10% affected the foam stability negatively for low concentration solutions of Zonyl FSO but had no effect on foam stability of Hitenol H-10 solutions.

Foam stability and oil displacement efficiency were tested with different concentrations of Zonyl FSO and Hitenol H-10 solutions at 4% salinity. The presence of oil at the volume fraction implemented, affect the stability of the foam columns. The effect depends on the surfactant-type and surfactants concentrations where stability decreases at low Zonyl FSO concentration range and at all concentrations range tested of Hitenol H-10. In case of Zonyl FSO observations indicate that oil stayed in the lamellas skeleton and plateau boarders with no drain out. To the contrary, Hitenol H-10 was able to lift good portion of the oil column but oil was drained out of the foam structure within a short period of time.

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