Comparative Evaluation of Vanishing Interfacial Tension Approach for Minimum Miscibility Pressure Determination

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Abstract : Minimum miscibility pressure (MMP) plays a great role in determining the displacement efficiency of different gas injection processes. Experimental techniques for MMP determination include industrially recommended slim tube, vanishing interfacial tension (VIT) and rising bubble apparatus (RBA). In this paper, MMP measurement study using slim tube and VIT experimental techniques for two different crude oil samples (M and N) both in live and stock tank oil forms is being presented. VIT measured MMP values for both 'M' and 'N' live crude oils were close to slim tube determined MMP values with 6.4 and 5 % deviation respectively. Whereas for both oil samples in stock tank oil form, VIT measured MMP showed a higher unacceptable deviation from slim tube determined MMP. This higher difference appears to be related to high stabilized crude oil heavier fraction and lack of multiple contacts miscibility. None of the different nine deployed crude oil and CO2 MMP computing correlations could result in reliable MMP, close to slim tube determined MMP. Since VIT determined MMP values for both considered live crude oils are in close match with slim tube determined MMP values, it confirms reliable, reproducible, rapid and cheap alternative for live crude oil MMP determination. Whereas VIT MMP determination for stock tank oil case needed further investigation about stabilization / destabilization mechanism of oil heavier ends and multiple contacts miscibility development issues.

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