A Study on Variation in Bubble Point Pressure of Oil Reservoirs

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Abstract

The pressure at which the first bubble of a gas is liberated from the oil at isothermal pressure reduction is called bubble point pressure or saturation pressure. This property comes under PVT properties which is strongly pressure volume and temperature dependent. It is measured in lab experimentally through PVT cell named as constant composition expansion (CCE) test, at reservoir pressure and temperature. Sincethese experimental facilities are not always available, other means for estimating bubble point pressure have been developed.

In reservoir evaluations, from material balance calculations to simulation, fluid properties are always needed to estimate the oil in place volumes, surface volumes, and the variables that interact with the flow. The variations of such properties are also required during reservoir depletion to evaluate the reservoir. Bubble point pressure is a parameter used either directly or indirectly, in every oil property modeling or correlation. Thus an error in bubble point pressure will cause errors in evaluating and estimation of oil properties. This will propagate additional errors throughout all reservoir and production engineering calculations.

Virtually, oil reservoirs are classified depending on the initial pressure into saturated and under saturated reservoirs. Furthermore, the under saturated reservoirs exhibit different behaviors depending on the drive mechanisms, hence geological factors dependence on the bubble point pressure can't be ruled out while analyzing the performance of oil reservoirs.

In this paper variation in bubble point pressure of different under saturated reservoirs will be studied. This will be accomplished by taking field examples of solution gas drive reservoirs. Factors affecting bubble point pressure using PVT module of eclipse will be enlisted, and qualitative analyses in the light of geological engineering will be outlined.

In the conclusion it shows bubble point pressures of different under saturated oil reservoirs under different drive mechanism behaves differently below and above the bubble point pressures, and this behavior is important to recognize while predicting accurately the oilrecovery.