

Identification of Emulsion Fluid Behavior Associated with ESP Failure in UG Wells, Kuwait

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Abstract

Water and oil emulsions stabilized by colloidal hydrocarbons or clay particles can form in the critical matrix during production and reduce well productivity. If emulsions restrict production, then it became necessary to understand their behavior in order to design the optimum treatment methods. The main aim of this paper is to understand emulsion fluid behavior associated with ESP failures in several UG wells, in order to build correlation of fluids viscosities of UG oil at different Water/Oil mixing ratios at specified pressure/temperature conditions. Seven atmospheric oil samples were collected from several UG wells, homogenized by shaking, kept at ambient condition for 24 hours for settlement and monitor the water content. Once the water content become $<3\%$ wt, viscosity measurements at reservoir pressure and temperature on the dewatered oil were performed. Water and oil were mixed different ratios: 25/75. 50/50. 75/25. 85/15 & 90/10 respectively to form emulsion and measure the viscosity at specified pressure and temperature. The viscosity measurement results were interpreted and plotted to provide correlation. It was concluded that water/oil mixing ratio of 25/75 slightly increased compared to viscosity of dewatered oil, however it showed a significant increase at the higher mixing ratios of 50/50. 75/25 & 85/15 and the viscosity was inverted at a mixing ratio of 90/10. It was recommended to design an ambitious holistic program in order to assure solving the formation of emulsion during all the steps of oil production by establishing a cost effective technology matrix and best practices to de-risk and reduce nonproductive time of wells through understanding emulsion effect, chemical selection and field optimization for oil fields.