

An Evaluation of Solubility of Wax and Asphaltene in Crude Oil for Improved Flow Properties Using a Copolymer Solubilized in Organic Solvent with an Aromatic Hydrocarbon

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Abstract : Wax and asphaltene are high molecular weighted compounds that contribute to the stability of crude oil at a dispersed state. Transportation of crude oil along pipelines from the oil rig to the refineries causes fluctuation of temperature which will lead to the coagulation of wax and flocculation of asphaltenes. This paper focuses on the prevention of wax and asphaltene precipitate deposition on the inner surface of the pipelines by using a wax inhibitor and an asphaltene dispersant. The novelty of this prevention method is the combination of three substances; a wax inhibitor dissolved in a wax inhibitor solvent and an asphaltene solvent, namely, ethylene-vinyl acetate (EVA) copolymer dissolved in methylcyclohexane (MCH) and toluene (TOL) to inhibit the precipitation and deposition of wax and asphaltene. The objective of this paper was to optimize the percentage composition of each component in this inhibitor which can maximize the viscosity reduction of crude oil. The optimization was divided into two stages which are the laboratory experimental stage in which the viscosity of crude oil samples containing inhibitor of different component compositions is tested at decreasing temperatures and the data optimization stage using response surface methodology (RSM) to design an optimizing model. The results of experiment proved that the combination of 50% EVA + 25% MCH + 25% TOL gave a maximum viscosity reduction of 67% while the RSM model proved that the combination of 57% EVA + 20.5% MCH + 22.5% TOL gave a maximum viscosity reduction of up to 61%.

Keywords : asphaltene, ethylene-vinyl acetate, methylcyclohexane, toluene, wax

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