

Effect of pour point depressant (PPD) and the nanoparticles on the wax deposition, viscosity and shear stress for Malaysian crude oil

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ABSTRACT

Formation of wax can cause increase of pressure drop, blockages in the pipelines and interference with valve and instrumentation operation that causes loss of billions of dollars. Pour point depressant (PPD) is one of the wax treatment technique used widely in oil industry to alter the crude oil properties such as viscosity, wax appearance temperature (WAT) and pour point. The performance of PPD and nanoparticle, sodium cloisite Na⁺ was analyzed in this study, to identify their impacts on viscosity, shear stress and wax deposition of the Malaysian crude oil using Brookfield DV-III viscometer and cold finger equipment respectively. The viscosity was successfully reduced by 4% and 8% when the crude oil is treated with PPD and PPD/Nanoparticle blend respectively. Cold finger temperature, experimental duration and rotation rate of impeller affects the efficiency of PPD and PPD/Nanoparticle blend. Cold finger temperature at 15 °C provides the highest PIE of 88.27% with the usage of PPD/Nanoparticle blend. Therefore, PPD/Nanoparticle blend able to reduce the viscosity efficiently and gives higher PIE compare than PPD.

KEYWORDS

Crude oil; Nanoparticle; Pour point depressant; Shear stress; Viscosity; Wax deposition

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