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Synthesis and evaluation of oleic acid based polymeric additive as pour point depressant to improve flow properties of Indian waxy crude oil

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Abstract

During production of crude oil, surface temperature is much less than reservoir temperature. As a result hindrance in flow occurs due to wax precipitation in surface flowlines and if the temperature goes below the pour point, crude oil completely stops flowing. This research paper aims at determining the effect of a laboratory synthesized novel Pour Point Depressant (PPD) on the pour point depression and rheological properties of a crude oil sample and comparing its performance with a commercial flow improver. Triethanolamine was polymerized to form its trimer and then esterified with oleic acid to form tri-triethanolamine di oleate. Characterisation of the crude oil sample and the synthesized PPD were performed as per ASTM methods and the effects of the PPD on pour point and rheology of crude oil were thoroughly analysed using pour point apparatus and Physica rheometer respectively. Effect of the synthesized PPD on different components and wax appearance of crude oil is also verified. Experimental investigations furnishes that the synthesized PPD and the commercial flow improver enhanced the flow properties of the crude oil, but the effects of the synthesized PPD are significantly better compared to the commercial one in terms of reduction in pour point, viscosity and yield stress which shows the potential of synthesized PPD to control the flow assurance problem caused by Indian waxy crude oils.

Keywords: Cloud point; Pour point depressants; Wax precipitation; Rheology; Crude oil.

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