

Wax aggregation inhibition in crude oil by oxirane ester copolymer

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Abstrak

Wax deposition can cause a serious problem in the distribution process of crude oil through a pipeline. At low temperatures, wax molecules can interact to form a wax aggregate. One way to reduce the wax aggregation is to introduce an additive compound into the crude oil. In this study, 15 crude oil models were prepared by mixing gasoline, kerosene, oil, wax, and asphaltene. Oxirane ester copolymer (OEC) additive was introduced into the crude oil models with various concentrations and volumes, and its effect on the crude oil models' pour point and viscosity were evaluated. OEC interactions with wax and asphaltene were observed by FTIR, and the wax aggregation process was observed using cross polarized microscopy (CPM). The optimum pour point of crude oil was reached at a temperature of 6oC and optimum viscosity at 10 cSt for the selected model 4. OEC additions of 5% and 10% require 500 and 300 µL, respectively, to achieve the optima pour point and viscosity. OEC was able to inhibit the wax aggregation, as evidenced from the interaction between OEC-wax at 722 cm⁻¹ and OEC-asphaltene at 1604 and 1494 cm⁻¹ of FTIR spectra. The distribution of the wax aggregate was observed using CPM, with the value of the wax appearance temperature (WAT) at 28.7oC. This research can be the basis for designing or selecting a molecule for use as a pour point depressant in accordance with the characteristics of crude oil, particularly since each source of crude oil has different characteristics.