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Original Article

Viscosity Reduction of Indian Heavy Crude Oil by Emulsification to O/W Emulsion Using Polysorbate-81

Girish D. Vegad, Arun Kumar Jana

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Abstract

Pipeline transportation is the most convenient means of transportation of crude oil continuously and economically from production site to refinery. However, transportation of heavy crude oil (HCO) through pipelines is difficult due to its high viscosity. The high viscosity of heavy crude oil is mainly due to the presence of poly-aromatic compounds like resins and asphaltenes. Emulsification of HCO using surfactant is believed to be the most favorable technique to reduce the viscosity of HCO for efficient pipeline transport. In the present study, oil-in-water (O/W) emulsion has been formulated using a non-ionic surfactant Polyoxyethylene (5) sorbitan monooleate (PS-81) at different pH, surfactant concentration, and oil content. Box–Behnken response surface method has been used to optimize two responses, apparent viscosity and emulsion stability index (ESI). The optimal values of the parameters found are 75%v/v oil content, 2.5%w/v surfactant concentration, and pH value of 7 at which experimental value of emulsion viscosity is 0.2162 Pa·s, at 150 RPM, with a reduction of viscosity by 95.8% and having ESI of 98.16 after 24 h at 30°C.

Conflict of Interest

The authors declare that they have no conflict of interest.

Supporting Information