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THE EFFECT OF AN ACRYLIC POLYMER WAX CONTROL ADDITIVE AS A COLD FLOW SOLUTION FOR WAX CHALLENGES

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Maintaining flow in the production and transportation of crude oil is a critical challenge in both on-shore and off-shore environments. Problems such as wax deposition and flow restriction from gelling can occur with changes in temperature and pressure during production, as well as changes in crude oil composition when oil streams are combined. Traditionally, solvent, thermal and mechanical methods have been used as wax remediation treatments. However, chemical treatments are now increasingly employed to mitigate flow assurance problems caused by the naturally occurring paraffins in crude oil. Due to the unique composition of every crude oil, there is no single product capable of treating all flow assurance problems. An acrylic comb polymer has been developed as a dual Pour Point Depressant (PPD) and Wax Inhibitor (WI). A PPD lowers the temperature at which wax crystals form a network which gels and solidifies the oil and a WI reduces the amount of wax which is deposited on pipe walls and other surfaces. This polymer has a strong PPD and/or WI effect in several crude oils yet its mode of action is not fully determined. Cross Polarized Microscopy (CPM) was used to observe the effect of the polymer on wax crystal morphology in several crude oils and to shed light on the mechanism of Pour Point Depression and Wax Inhibition. Early results suggest that the polymer modifies the structure of the wax crystals, making them less angular and less dispersed throughout the oil. It is possible that this reduces the ability of the wax crystals to form a network and gel the oil, or to deposit on metal surfaces. This material also displays a range of other properties and results which makes it an attractive solution to wax challenges in cold flow applications.

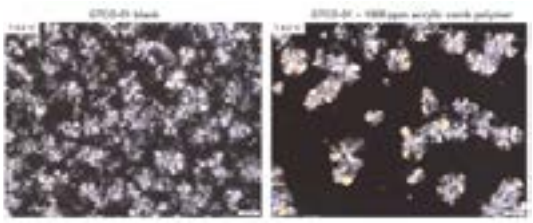

Figure 1: A visual comparison of the wax crystals in an Asian crude oil (with and without polymer). Details of crude oil: Pour Point=39°C, API=33°, Wax Appearance Temperature=54°C. The most common chain lengths in the wax profile are C20 to C35.

Recent Publications

1. Davies C et al. (2013) The development and field application of new surfactant chemistries for applications to heavy oils. Society of Petroleum Engineers. Pages:10.

Biography

Jessica Gould gained her PhD in Synthetic Inorganic Chemistry under the supervision of Professor Martin Schröder at The University of Nottingham. She currently works as a Lead Research Scientist at Croda Europe Ltd specializing in the development of acrylic polymers for a wide range of applications from Personal Care to Battery Additives. Since joining Croda in 2013 she has developed a wide range of expertise in synthesis of new products focusing on tailored dispersants and rheology modifiers.

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