

Custom-Engineered Demulsifier Enhances Oil Dehydration

Eliminating periodic buildup of an interfacial layer in the oil-water separator improves the quality of the oil and discharged water, North Sea

Frequent buildup of an interfacial layer—caused by asphaltenes and naphthenates—in an oil-water separator was eliminated by a new demulsifier specifically designed for the application. Erasing the need for weekly removal of the layer dramatically reduced spikes in the water content of exported crude oil.

Interfacial layer hampered separation efficiency and required removal every week

On a platform offshore Denmark, an operator was having intermittent issues during separation of emulsified water from oil. Asphaltenes and naphthenates were causing a viscous interfacial layer—rag layer—to build up between the water and oil phases in the inlet separator, disrupting emulsion destabilization and water removal. This layer had to be extracted from the separator once a week via the oil train, and sometimes it became unstable and broke up. The result was significantly higher water content in the exported oil. The disruption in the separator also resulted in more oil in water (OIW) discharged into the sea. The operator turned to Schlumberger for a solution to the negative environmental and economic impact.

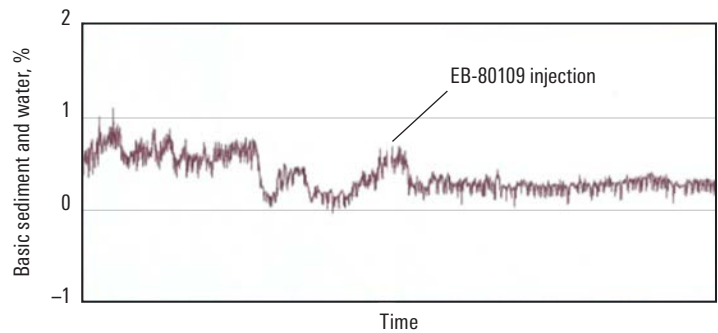
Specially engineered chemical treatment prevented formation of the layer

After extensive testing—and a full-scale test in the process system—Schlumberger identified the raw materials, including proprietary dendritic demulsifier bases, that could effectively address the challenge. Dendrimers, or hyperbranched polymers, are tree-like structures grown from a central core and exhibit high thermal stability and low viscosity.

The selected materials have improved emulsion-breaking abilities as well as environmental profile. A new demulsifier, EB-80109, was designed and injected into the onsite system as part of a field trial to destabilize the interface and promote coalescence of water droplets.

Operations continued uninterrupted even after 12 weeks

The basic sediment and water (BS&W) content in the oil has stabilized to very low levels, and the system continues operating after more than 3 months with no need to remove any interfacial layer. The OIW values vary between 0.6 and 3.6 mg/L and are well within the limits required for discharging effluents into the sea. An added benefit is a 33% decrease in the amount of demulsifier used.



Injection of the new demulsifier stabilized and reduced the basic sediment and water level in oil to 0.3%–0.5%, suitable for export.