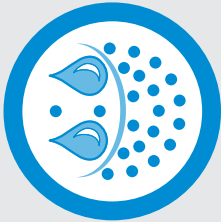


MOBILITY AND SWEEP IMPROVEMENT SOLUTIONS



MOBILITY AND SWEEP IMPROVEMENT



CONFORMANCE IMPROVEMENT



INDEPTH CONFORMANCE IMPROVEMENT



WATER SHUTOFF



RESIDUAL OIL RECOVERY



PRODUCTION ENHANCEMENT



REFRAC DIVERSION

APPLICATION

Reservoir water flooding often results in rapid water breakthrough to the producers due to fingering effects from the viscosity differential between the injected fluid and the oil. Polymer flooding is a proven Enhanced Oil Recovery (EOR) method in which high molecular weight, water-soluble polymers are added to the injection water to increase viscosity. This improves the mobility ratio and sweep efficiency of the flood, resulting in increased oil production and added reserves. This process is most effectively applied in the early stages of waterflooding, when the mobile oil saturation is high, but there are also significant benefits in late-field life. As an alternative to traditional polymer flooding, Colloidal Dispersion Gel (CDG) is a low dose polymer flood technology that can deliver improved mobility and sweep efficiency at one third of the typical chemical usage. TIORCO's novel polymer technologies are designed to address the following issues:

- Poor mobility ratio in heavy oil reservoirs
- Viscous fingering
- Poor sweep efficiency
- Early water breakthrough

PRODUCT DESCRIPTION

TIORCO's mobility control and sweep improvement solutions are carefully selected based on the unique requirements of each field. Our team of experts will work with you to design the optimal solution for your application. Water quality, rock permeability, and oil viscosity are only a few of the factors used to determine which solution will ensure maximum oil production.

TIORCO's Provisco™ polymers for mobility and sweep improvement provide improved oil recovery in traditional, high salinity, high shear, and/or high temperature EOR applications. These products are available in both powder (dry) or latex (liquid) form over a wide range of molecular weights and chemistries.

TIORCO's low dose polymer solution (CDG) is a flowing, lightly crosslinked polymer technology that utilizes a high molecular weight polymer at low concentrations combined with an inorganic crosslinker.

VALUE

TIORCO Provisco polymers are high-performance products that provide superior mobility control over traditional waterfloods. These solutions achieve optimal viscosity at a lower dose, providing a cost-effective process to recover additional reserves compared to industry standard polymers.

TIORCO's CDG technology can reduce polymer loadings by two-thirds while saving you at least 30% over traditional polymer flooding. This proven technology has been used in over 70 field applications with a high rate of success.

Both the TIORCO Provisco polymers and CDG are proven technologies that have the benefit of:

- Implementation at any time of the reservoir life
- Easily tailored to your specific reservoir conditions
- Increase oil recovery by 5-10% OOIP

CRITICAL DESIGN FACTORS

- Known injection water chemistry, including iron content and oil field additives
- Laboratory testing required to evaluate dose rate to achieve target mobility ratio
- Average reservoir permeability above 50-100 mD
- Reservoir temperature <200°F (93°C)
- Reservoir characterization and waterflood performance review
- Sufficient injectivity and void replacement to perform mobility control project
- Onshore and offshore applications

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GOALZERO

SAFETY MATTERS

The safety of our associates, customers and communities is vitally important. From the way we operate, to the products we develop, to how we partner with customers, our goal is zero: zero accidents, zero incidents and zero environmental releases.

At Nalco Champion, safety is more than a metric, it's a mindset. It's how we conduct ourselves, every day, everywhere it matters.

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