# UNOGEL℠

## WATER-CUT® Process as a Relative Permeability Modifier Gel

The Science of Enhanced Oil Recovery

**Injection Well Treatments**

TIORCO's UNOGEL gel reduces flow in fractures without entering the matrix. Many reservoirs are either naturally fractured or contain solution channels resulting from excessive or incorrectly applied stimulation fluids, or from long-term injection of water or $CO_2$. Carbonate reservoirs are especially prone to secondary porosity development. Secondary porosity can be the single reservoir attribute that makes for a high profitable petroleum reservoir - but many times it is detrimental to controlling the sweep of improved oil recovery.

Many $CO_2$ operations can't sustain the economics of purchasing, processing, and injection more $CO_2$ than necessary, and waterfloods have secondary oil that may never be recovered without contacting either higher oil saturation fracture systems or injecting into the less conductive matrix. Because UNOGEL gels reduce the flow in fractures without entering the matrix, its low leak-off properties are ideal for conformance improvement in dual porosity reservoirs.

For high temperature applications above 255°F or 124°C, the UNOGEL controllable gelation system is used.

**Production Well Treatments**

TIORCO's UNOGEL gel treatments for producing well treatments are the same low-concentration, high molecular weight polymers used in injection well treatments. Because UNOGEL gels enter fractures only and do not enter the matrix zone, isolation is seldom required.

Producing oil from naturally fractured reservoirs can be highly profitable as long as the fracture are in good contact with matrix that is full of oil. Unfortunately, natural fractures are commonly vertically oriented and extend into an underlying aquifer. Many times excessive water production is the result of this condition, or the fractures are being fed by injection wells that intersect the same fracture network. In both cases, water is preventing adequate draw-down on the high oil saturation matrix rock and oil cannot be economically produced.

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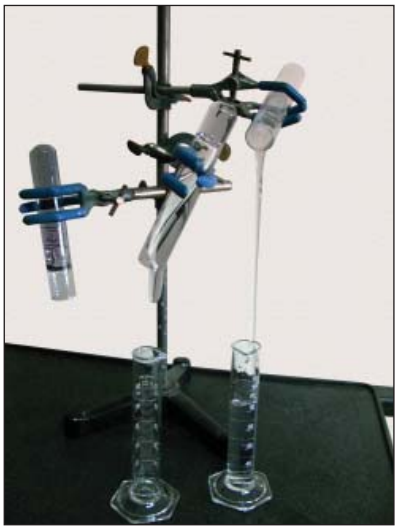
UNOGEL

- Polymers
  - WATER-CUT® 100
  - WATER-CUT® 204
  - WATER-CUT® 210C
- Crosslinker
  - WATER-CUT® 644
- Stabilizer
  - WATER-CUT® 646



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