

Flowzyme™

Water-Based Non-Ionic Polymeric Synthesized Surfactant Complex w/CaTD7 Oxidoreductase/Carrier Molecules.

Flowzyme™ is a liquid non-ionic surfactant/polymer formulation proven to significantly lower cloud point and inhibit paraffin deposition. Flowzyme is used for its effectiveness in oil dispersion.

Mechanism

The Flowzyme mechanism is a two-fold process. First, the surfactant complex alters the interfacial tension of the hydrocarbon molecule. Second, CaTD7 activity initiates on the dodecane substrate site regions of the hydrocarbon molecule.

Surfactant Properties

Surfactants and polymers are two of the three important components in Flowzyme. Flowzyme is a surface active agent discovered after a series of nonionic surfactants were prepared in conjunction with another series of nonionic synthesized polymers. The surfactant/polymer interactions resultingly gave rise to the formation of association structures, thereby modifying the solution and interfacial properties. The molecular properties of the combined polymer and surfactant result in the morphologies of association complexes, *aka Flowzyme Surfactant*. Inference about the formation of nonionic surfactant/polymer complex of this type has been obtained from a large variety of experimental procedures and observations. The surfactant/polymer research has revealed thermodynamic properties of micellization and of adsorption to the hydrocarbon liquid/liquid interface at various temperatures and brine concentrations. The dispersion properties of the surfactant complexes were also researched and evaluated. Flowzyme surfactant resultantly is a chemical variant dispersant prepared by polymerization that has excellent adsorption and chemical stability.

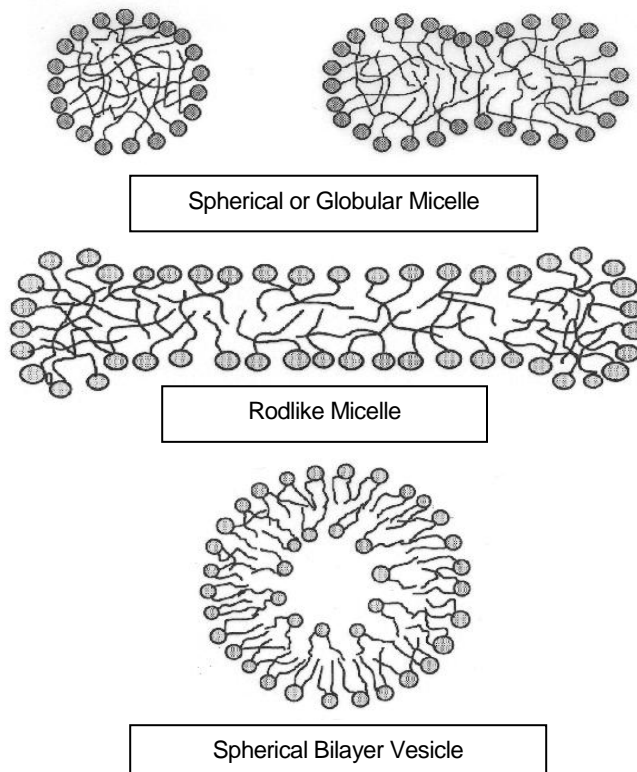


Figure 1. Molecular structures of known Flowzyme surfactant aggregates formed in dilute aqueous solution.

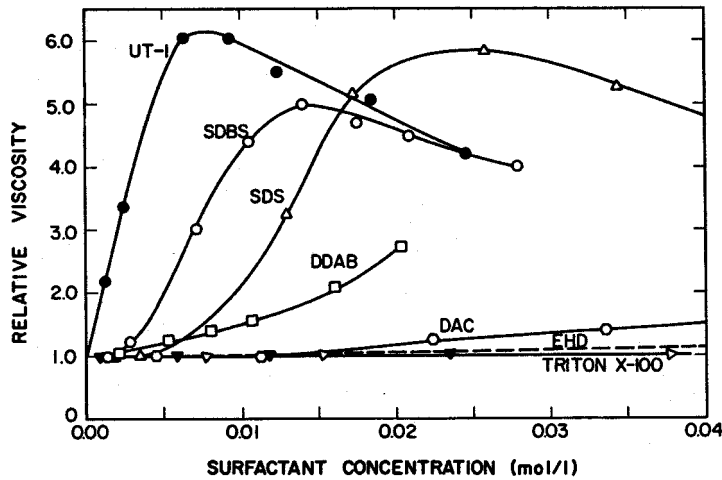


Figure 2. Influence of various types of surfactant on the relative viscosity of solutions containing 1000 ppm of the nonionic Flowzyme synthesized polymer.

CaTD7 Properties

Flowzyme contains a proprietary hydrocarbon CaTD7 oxidoreductase activator series. Induction is initiated with straight-chained and aromatic polycyclic hydrocarbons (substrate) in conjunction with the presence of a proprietary cationic energy carrier molecule (inducer). The duration and magnitude of induction, but not the initial kinetics, are dependent on the inducer dose. Through a series of GC mass spectra, the highest CaTD7 activity was found to take place in the dodecane region of the straight-chained hydrocarbon molecule. Activation energy is minor along the aromatic polycyclic regions of the hydrocarbon molecule. Compounds are currently being researched to modify the activity of this fluid system.

Manufacture

Flowzyme is manufactured under strict quality control guidelines. The CaTD7 production process takes place under well controlled conditions in closed tank installations. After production, CaTD7 is separated from the production strain, purified and mixed with inert diluents for stabilization before being mixed into the Flowzyme surfactant.

Application

Flowzyme can be injected directly into the oil production stream downhole or at the surface. Flowzyme is thermally stable up to 197°F. The typical dosage concentration is 250 ppm. When used in tank cleaning applications, the effective dosage range is 1,500 ppm – 2,500 ppm.

Benefits

Flowzyme surfactant can provide the following benefits:

- Lower wax formation in production system.
- Optimized oil transport in pipeline/flowline.
- Lower BS&W in transported oil.
- Reduces hot-oil/pigging frequency.
- Non-Regulated chemical product.

Compatibility

Flowzyme surfactant is compatible with all refinery catalysts. Flowzyme surfactant is not compatible with acid solutions.

Flowzyme™ Paraffin Inhibitor/Demulsifier Product Specifications

Part No. (330-gal tote)	330-1500	Viscosity	1.30 cps @ 60°F
Form	Liquid	Weight	8.51 lbs/gal
Specific Gravity	1.02	pH	6.5-8.0