

Clay Stabilizer KHF002L

1. Introduction

Clay stabilizers are routinely added to aqueous-based fracturing fluids to help prevent damage to the formation caused by clay migration and swelling. These clay stabilizers are either a temporary or permanent type, and they are often used in combination.

The clay stabilizer KHF002L is a KCl substitute for KHF002 which can be used to prepare the salt water for mixing fracturing fluid. The additive can also stabilize the reactive clays in the formation temporarily during fracturing and flowback operations.

2. Physical Properties and Hazards

Additives	Form	S.G.	Water Solubility	Health Hazard	Physical Hazard	pH
KHF002L	Colorless liquid	1.08-1.13	Soluble	Moderate- Eyes	None	7.0-8.0

3. Chemical Properties and Application

Temporary Clay Stabilizer KHF002L is an organic efficient liquid clay stabilizer. It is NOT liquid KCl, but it can be substituted for KCl in most applications.

KHF002L has been used at temperatures up to 350°F without any adverse effect on fluid rheology.

KHF002L can be batch mixed, or continuously mixed into the fracturing fluid using a liquid-additive system. This eliminates the time-consuming step of batch mixing dry KCl in the base fluid. KHF002L can be used in most aqueous-based fracturing fluids and is compatible with most additives used in the fracturing fluid systems.

4. Treatment

The recommended KHF002L concentration is 2 Gal/1,000 Gal (2 L/m³). For specific formations such as high reactive clay content, the KHF002L concentration can be further optimized using laboratory core tests.

5. Packaging

KHF002L is supplied in 55 gallons high density polyethylene (HDPE) drums or 265 gallons HDPE totes. Keep it away from extreme conditions such as places near flames or direct sunlight.

Flowback Additive KHF007S

1. Introduction

Surface active reagents were generally used in aqueous-based stimulation fluids to lower the interfacial tension that restricts fluid flow in the rock matrix. KHF007S surfactant lowers the capillary pressure by both improving the wettability of the pore throat and reducing the interfacial tension.

Both laboratory testing and field results have shown that KHF007S can provide superior cleanup due to the wetting properties and surface tension reduction that leads to lower capillary pressures. The use of KHF007S results in less swabbing time, faster cleanup and more complete recovery of stimulation fluids.

2. Physical Properties and Hazards

Additives	Form	S.G.	Water Solubility	Health Hazard	Physical Hazard	pH
KHF007S	Light yellow liquid	1.00-1.05	Soluble	Eyes, skin, inhalation	Fire	7.0-9.5

3. Chemical Properties and Application

KHF007S promotes fracturing fluid cleanup of the proppant pack and the invaded rock matrix because the contact angles resulting from the use of KHF007S are higher than those for other conventional cleanup surfactants. In addition, the surface and interfacial tension values from the use of KHF007S are also lower than most conventional surfactants used. This leads to significantly lower capillary pressures which reduces the force required to initiate flow of the stimulation fluid and therefore, KHF007S should provide better and quicker fluid recovery following a stimulation treatment.

KHF007S are compatible with all additives used in Guar-based fracturing fluids such as OPTiFrac. Lab testing indicates that KHF007S can be used for temperature applications up to 350°F.

KHF007S can reduce the surface tension to as low as 22 Dynes/cm at 30°C.

4. Treatment

The CMC value for KHF007S is low. However, 1-2 Gal/1,000 Gal is the generally recommended concentration for most fracturing fluids.

5. Packaging

KHF007S is supplied in 55 gallons high density polyethylene (HDPE) drums or 265 gallons HDPE totes. Keep it away from extreme conditions such as places near flames or direct sunlight.

Breaker KHF043

1. Introduction

After the cross-linked fracturing fluid is completed, it needs to be broken to facilitate flowback and reduce the damage of fracturing fluid to the formation. Liquid breaker KHF043 is a peroxide breaker, it can make the strong suspension fracturing fluid break quickly and improves flowback speed.

2. Physical Properties and Hazards

Additives	Form	S.G.	Water Solubility	Health Hazard	Physical Hazard	pH
KHF007S	Light yellow liquid	1.00-1.05	Soluble	Eyes, skin, inhalation	Fire	7.0-9.5

3. Chemical Properties and Application

Liquid breaker KHF043 is used to break cross-linked fluid in strong suspension fracturing fluid. Liquid breaker KHF043 is a peroxide breaker, it makes the strong suspension fracturing fluid break quickly and improves flowback speed.

KHF043 is compatible with most additives used in fracturing fluid systems.

4. Treatment

KHF043 concentration depends on the dosage of thickener and application temperature. Typical concentrations range from 0 to 3 Gal/1,000 Gal of fracturing fluid.

5. Packaging

KHF043 is supplied in 55 gallons high density polyethylene (HDPE) drums. Keep it away from extreme conditions such as places near flames or direct sunlight.

Crosslinker KHF048

1. Introduction

Crosslinkers are generally introduced to polymer-based fracturing to improve rheological properties of the fracturing fluids. Crosslinker KHF048 is a zirconium chelate crosslinker used for crosslinking guar-based fluids for high temperature applications. Crosslinking of zirconium fluids are temperature dependent.

2. Physical Properties and Hazards

Additives	Form	S.G.	Water Solubility	Health Hazard	Physical Hazard	pH
KHF048	Yellow liquid	1.15-1.20	Soluble	Moderate- Eyes	Moderate-Fire	5.5-6.5

3. Chemical Properties and Application

Crosslinker KHF048 is a zirconium crosslinker used for crosslinking PAM based fracturing fluids. KHF048 is a temperature-responsive crosslinker. When the temperature rises to the cross-linking temperature, the cross-linking agent cross-links with the polymer, so as to avoid the viscosity reduction caused by high-speed shearing of the fracturing fluid in the string, and effectively reduce the friction pressure.

KHF048 can be used to crosslink most PAM based fracturing fluids. It is compatible with most additives used in fracturing fluid systems which are engineered for use up to 300°F.

4. Treatment

Batch mixing KHF048 into the fluid is NOT recommended. If the KHF048 must be batch mixed, it is added only after the polymer is fully hydrated. 2.0 to 3.0 Gal/1,000 Gal of KHF048 is generally sufficient to obtain good crosslink property and fluid stability at any temperature.

5. Packaging

KHF048 is supplied in 55 gallons high density polyethylene (HDPE) drums. Keep it away from extreme conditions such as places wet and humid or direct sunlight.

Gelling Agent KHF071

1. Introduction

Gelling Agent KHF071 is a high-yielding PAM slurry for continuous or batch mixing of fracturing fluids. Its hydration rate is faster compared to PAM powder, and is easier to meter, disperse and hydrate in water.

2. Physical Properties and Hazards

Additives	Form	S.G.	Water Solubility	Health Hazard	Physical Hazard	pH
KHF071	Amber liquid	1.03-1.08	Soluble	Eyes, nose, throat	Fire, water Slick	N/A

3. Chemical Properties and Application

For fracturing applications, specially-treated free-flowing dry PAM powder is liked by the operating companies due to the absence of diesel and similar oils. However, its metering and use at the well site are difficult. When mixed with water, these PAM powder can form fish eyes, and thus many times cannot achieve the desired maximum viscosity on hydration. For this reason, PAM powder is dispersed in diesel or mineral oils, and provides much better cross-linking properties (viscosity) allowing much lower gel loading and leads to better fracture conductivity.

In addition to proppant carrying in hydraulic fracturing, this slurry can also be used as a pad for both hydraulic and acid fracturing. Together with crosslinker, the gelling agent KHF071 provides wide range of delay time and rheological property at temperature and shear. The fluid is stable up to 300°F.

4. Treatment

For slick water fluids, the loading of PAM slurry is 0.5-3.0 Gal/Mgal. For sand-carrying fluids, the loading of PAM slurry is 3-10 Gal/Mgal. The gel loading is dependent on the formation bottom hole temperature, pumping time, and cool down. Typically, higher the temperature, higher is the gel loading required to achieve the required viscosity.

5. Packaging

KHF071 is packed in 55 gallons HDPE drum or 265 gallons HDPE IBC tank. Keep it away from extreme conditions such as places near flames or direct sunlight. Store at temperatures lower than 30°C.