

Non-acid Intensifier KMA008A

1. Introduction

Hydrofluoric acids are widely used in oilfields to remove damages in sandstone formations. There are usually two ways to prepare hydrofluoric acids. One is using concentrated (generally 20%) HF, and the other is to obtain HF by reaction between a precursor and HCl to avoid hazards of handling HF directly. KMA008A is a HF precursor for acid systems used in sandstone matrix stimulation treatment.

2. Physical Properties and Hazards

| Additives | Form | S.G. | Water Solubility | Health Hazard | Physical Hazard | pH |
|-----------|----------------|-----------|------------------|---------------|-----------------|----------------|
| KMA008A | White crystals | 1.40-1.60 | Soluble | Eyes, skin | Dust | 2.0-2.5 (0.5%) |

3. Chemical Properties and Application

KMA008A is ammonium bifluoride which can be used to prepare most sandstone acidizing systems at various applicable well conditions.

Instead of preparing HF from concentrated acids, HF precursor can be used to prepare hydrofluoric acids to avoid hazardous handling situations. In addition, the kinetics of forming HF from reactions between protons and KMA008A is controllable by using weak acids such as organic acids.

KMA008A is compatible with most additives and acid systems for sandstone acidizing. The mixing or preparation procedures are described in individual acid system manual.

4. Treatment

1-5% weight is typically enough for most acid system design. 2% weight is considered the optimum concentration in most fluid systems.

5. Packaging

KMA008A is supplied in plastic-lining bags with net weight of 25 kg/bag. It should be stored in shaded areas with good ventilation. Keep it away from high temperature, humidity and direct sunlight.

Chelating Agent KMA018

1. Introduction

CST (Chelate Stimulation Technology) is effective stimulation technologies for carbonate formations such as calcite, dolomite, and chalks. The combination of acids and chelates in KMA018 makes it effective in scale and carbonate acidizing treatment especially at high well temperatures.

In addition, KMA018 provide better protection on tubulars and field equipment and much less tendency in emulsion/sludge tendency with crude oils compared to traditional acid treatment fluids.

2. Physical Properties and Hazards

| Additives | Form | S.G. | Water Solubility | Health Hazard | Physical Hazard | pH |
|-----------|----------------------------------|-----------|------------------|----------------|-----------------|---------|
| KMA018 | Colorless to light yellow liquid | 1.24-1.28 | Soluble | Corrosive-Mild | Corrosive-Mild | 3.5-4.5 |

3. Chemical Properties and Application

KMA018 is mild acidic nature with pH of 3.5-4.5, which provide CST advantages in various aspects of scale removal, carbonate acidizing, corrosion, compatibility and HSE.

KMA018 is combination of acids and chelates to enable CST system to dissolve carbonate scales and formation rocks.

Regarding to matrix stimulation, KMA018 can be used in both calcite and dolomite formations to create effective wormholes in order to maximize the effectiveness. Especially at high temperature wells, KMA018 slow down the reaction rates between stimulation fluids and formation rock so that high density wormholes are created in carbonate matrix.

Due to the chelate nature chemically, KMA018 provide advantages over traditional acid systems in HSE footprint and corrosion inhibition. KMA018 has no emulsion and sludge tendency with typical crude oils. Laboratory testing indicates that KMA018 CST fluids shows much lower corrosion rates than HCl and organic acids such as acetic and formic acids especially at temperature higher than 250°F.

KMA018 is compatible with most OPT acidizing products at typical concentrations such as KMA001S, KMA054, KMA002, and KMA005. Iron reducing and control agents are generally NOT required in CST systems because KMA018 itself is capable of stabilizing both ferric and ferro ions in the solution. Other additives required in CST KMA018 fluids should be tested in FETC or location lab.

4. Treatment

KMA018 is either directly or diluted in 50% solution before used in the fields to stimulate carbonate formations or remove carbonate scales.

5. Packaging

KMA018 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.

High Temperature Inhibitor Aid KMA031

1. Introduction

Destructive reactions between metals and acids cause serious corrosion problems in acidizing operations especially at high temperatures. Corrosion inhibitors are generally required in acids to minimize these destructive reactions without introducing adverse effect on reactions between acids and formations. For high temperature or chemically aggressive environment, inhibitor aid is also required to prevent tubulars and downhole tools from strong acid corrosion. KMA031 is an effective inhibitor aid used in hydrochloride and mud acid systems to prevent tubular or equipment from serious acid corrosion at very high temperatures.

2. Physical Properties and Hazards

| Additives | Form | S.G. | Water Solubility | Health Hazard | Physical Hazard | pH |
|-----------|-----------------------------|-----------|------------------|------------------------|-----------------|--------------|
| KMA031 | Colorless to white crystals | 2.55-2.75 | Soluble | Eyes, skin, inhalation | Fire | 7.0-8.0 (1%) |

3. Chemical Properties and Application

KMA031 is an inorganic salt which can be used in most strong acid systems to prevent tubular and tool materials from acid corrosion at very high temperatures.

KMA031 is soluble in acids. KMA031 is effective for most metals including carbon steel and chrome steel. It can also be used in most acid systems made using hydrochloride. Very low corrosion and pitting problems are observed on tubulars and tools using acids containing KMA031.

KMA031 is compatible with most additives and acid systems. Attention is required for KMA031 design if it is used for sour gas (H₂S and CO₂) wells or protection of special tubular or tool materials.

4. Treatment

5 to 30 lbs/1000 gal is the typical concentration of the Corrosion Inhibitor Aid used in most acidizing jobs. A lab test at the BHST is highly recommended before any acid treatment using this additive.

5. Packaging

KMA031 is supplied in 25 kg plastic lined paper bags. Keep it away from extreme conditions such as places near flames, direct sunlight and moisture.

Corrosion Inhibitor KMA044

1. Introduction

KMA044 is a quaternary ammonium based surfactant, a synergistic blend of solvents, and a highly effective dispersion package that enables it to inhibit corrosion in all hydrochloric (HCl) and HCl-hydrofluoric (HCl-HF) acid up to 392°F. This corrosion inhibitor can be used for mild steel to very exotic tubulars.

2. Physical Properties and Hazards

| Additives | Form | S.G. | Water Solubility | Health Hazard | Physical Hazard | pH |
|-----------|-------------------------------|-----------|------------------|---------------|-----------------|-----|
| KMA044 | Dark red to dark brown liquid | 1.03-1.08 | Soluble | Eyes, skin | None | 0-3 |

3. Chemical Properties and Application

KMA044 contains no propargyl alcohol, which makes this product environmentally friendly. This product disperses well in acid solutions, resulting in good inhibitor distribution and pipe protection. It can provide acid-corrosion protection for as long as 24 hours. KMA044 provides corrosion protection in all HCl and HCl-HF blends up to 392°F. It can increase the upper temperature limit by use of acid corrosion inhibitor intensifiers, and is compatible with intensifiers such as organic acids, metal halides, and antimony compounds for higher temperature.

KMA044 is not suitable for emulsified acid systems. It contains special surfactants that can disrupt the stability of emulsified acids.

4. Treatment

The recommended concentration range is 1 to 40 Gal/1,000 Gal (1 to 40 L/m³) of the total acid blend. Concentration is dependent on acid type, strength, bottomhole temperature, contact time, and additional additives.

5. Packaging

KMA044 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.