Mudzyme DLA

Minimize formation damage caused by drill-in fluids

Applications

- Water-based filter cake breaker system
- Barefoot, sand screen, and gravel-pack completions
- Producer or injector wells
- Newly-drilled wells, workover, and remediation operations

Features and benefits

- Minimizes possible formation damage caused by drill-in fluids
  - Enzymatically degrades starch and biopolymer in filter cakes
- Acid generation and enzyme reaction rates can be controlled
  - Allows delay of filter cake destruction
  - Allows time to install the lower completion
- Can be put into the completion brine or pumped with the gravel pack
  - Reduces rig time and costs
- Compatible with Na^+ and K^+ brine systems
  - Can achieve densities up to 11.5 ppg (1.38 sg)
- Environmentally friendly system components
  - Requires no special handling restrictions
- Can operate at near neutral pH
  - Noncorrosive to downhole equipment

The Baker Hughes **Mudzyme™ DLA water-based drill-in fluid filter cake breaker system** provides a single-step, environment-friendly approach for solubilizing the starch and xantham gum in water-based drill-in fluid filter cakes. The Mudzyme DLA system works synergistically with in-situ organic acid generators to allow for a more engineered delay in filter cake breakdown by controlled downhole generation of acid.

The rate and efficiency of enzymatic reactions are affected by several key parameters. These include temperature, pH, ionic strength and type of ion. Temperature and ionic strength are usually dictated by well parameters, but with the use of the DLA organic acid generators, a time dependent pH can be engineered for an initial delay followed by an increased period of optimal conditions to provide maximum efficiency. Figure 1 shows that Mudzyme DLA system allows for increasing breakthrough as compared to a standard Mudzyme formulation.

Mudzyme DLA is a customizable solution that can be formulated based on the particular application and is efficient at bottomhole temperatures up to 275°F (135°C). The Mudzyme DLA system is effective in monovalent brines such as seawater, Potassium chloride (KCl), Sodium chloride (NaCl), and Sodium bromide (NaBr), but it is not compatible and should not be used with a mutual solvent.

The Mudzyme DLA system is an efficient and effective alternative to traditional low-pH acid treatments that can be used to break water-based reservoir drill-in filter cakes. The use of the DLA organic acid generators mitigate common issues of using straight acid, such as special transport and surface handling requirements

Recommended treatment

The Mudzyme DLA system formulation will vary based on operational requirements. Typical system components and recommended treatment levels are shown in Table 2.

Environmental information

For information concerning environmental regulations applicable to this product, contact the Health, Safety, and Environmental department of Baker Hughes.

Packaging

The Mudzyme DLA system is usually blended at the rig site. The Mudzyme DLA must be pumped within 24 hours and the pH is adjusted at the rig site.

Table 1. Typical properties

pH of solution	4.0 to 8.0
Temperature range	Up to 275°F (135°C)
Brine compatibility	Monovalent

Figure 1. Mudzyme DLA system breakthtough test

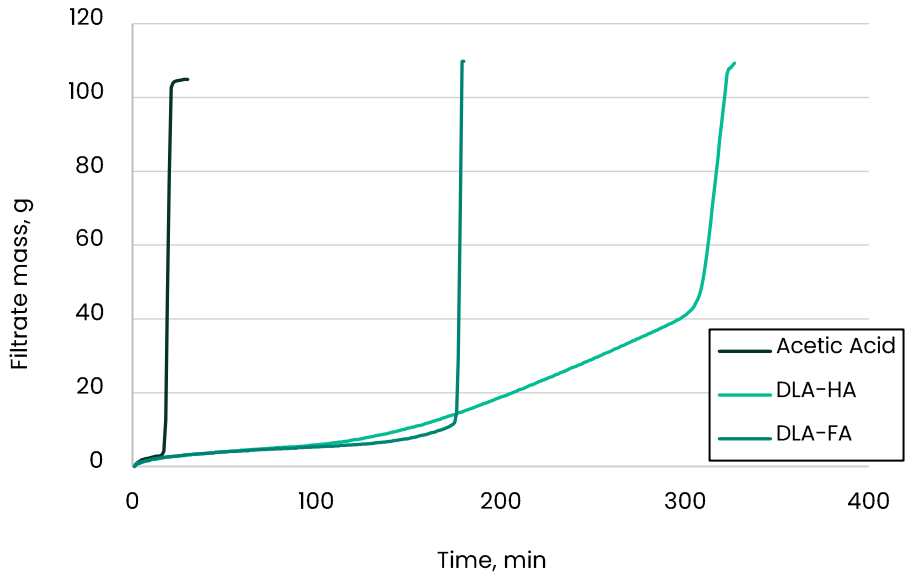

Table 2. Typical components of the Mudzyme DLA breaker system

Product	Function	Recommended treatment levels
Mudzyme™ S	Starch-specific enzyme	1% by volume
Mudzyme™ X	Xanthan-gum-specific enzyme	5% by volume
Mudzyme™ SA	pH control and buffer when using organic acid	2% fl wt for acetic acid 4% fl wt for formic acid
Mudzyme™ FB	pH control and buffer when not using organic acids	0.4 lbm/bbl (0.18 kg/bbl)
DLA-FA™	Formic acid generator	10 - 15% by volume
DLA-HA™	Acetic acid generator	10 – 15% by volume

Baker Hughes