

# Cla-Web<sup>®</sup> Stabilizing Additive

Improve clay damage protection and enhance environmental performance

## FEATURES AND BENEFITS

- Provides superior performance at lower concentration on low and moderate clay content reservoirs.
- Offers improved environmental characteristics.
- Delivers long-term water-sensitive protection by rendering water swelling clays insensitive to changes in water salinity, resulting in excellent sustained permeabilities.
- Can be batch mixed or metered on-the-fly as a liquid additive to save on mixing time.

## Overview

Clay swelling, dispersion, and migration due to water-sensitive clay minerals in the producing formation can substantially reduce permeability of formation sands and proppant packs, resulting in greatly reduced well productivity.

To reduce the risk of formation damage, Cla-Web<sup>®</sup> stabilizing additives can be applied to hydraulic fracturing treatments, where it binds to the formation surface to prevent fines migration and clay swelling.

## Clay stabilization for low permeability formations

In addition to temporary clay stabilization during the treatment, the Cla-Web additive provides long-lasting clay stabilization in low permeability formations. The Cla-Web agent molecule is very small and can enter the matrix of low permeability formations like tight sand and shale. The molecule is ion-exchange resistant, rendering treated clay minerals insensitive to water, further preventing clay swelling and dispersion.

Like the proven performance of our Cla-Sta family of compound additives, which are optimized for moderate-to-high permeability formations, Cla-Web additives work by adsorbing onto formation surfaces, altering clay particles to reduce their interaction with flowing fluids, even at high flow rates.

Using Halliburton's proprietary RockPerm<sup>®</sup> clay control service, we can customize the design of your Cla-Web treatment to your reservoir. This process involves identifying the types of clay minerals present in the formation and their relative concentrations.

## Superior performance at lower concentrations

In low permeability formations, Cla-Web additives provide several performance improvements compared to current, widely used potassium chloride (KCl) substitutes:

- Superior performance at a lower concentration, compared to competitive KCl substitutes.
- Improved environmental characteristics (not classified as a hazardous material under 49 CFR Part 173 – Subpart D or under the United Nations Recommendations).
- Renders water swelling clays insensitive to changes in water salinity, resulting in excellent sustained permeabilities.
- Can be batch mixed or metered on-the-fly as a liquid additive to eliminate the time required in dry mixing.
- Applicable over bottomhole temperature range from 50 to 500°F (10 to 250°C).

## Compatibility and treatment optimization

The performance of the Cla-Web additive is demonstrated using capillary suction time (CST) testing, which is commonly used to compare KCl substitutes used for temporary clay control (Figure 1). This test provides insight of relative performance among additives and can be used to help optimize treatment concentrations. Core and sand pack testing demonstrate that the Cla-Web agent is an effective clay stabilizer, through its ability to render water-sensitive clay insensitive.

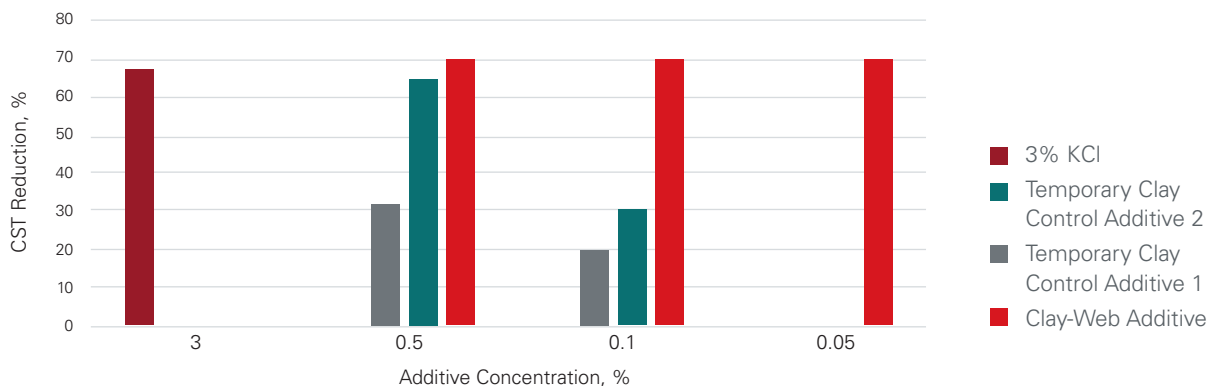
This means that variation in the ionic content of water will not cause clay swelling or dispersion. This reduces concern over matching fracturing treatment water to formation water, as well as concerns around the mixing of different waters produced from various parts of the formation.

Capillary suction time (CST) and mechanical stability test (MST) testing is also part of the RockPerm clay control service. Both provide rapid and inexpensive methods to help optimize a treatment for low to moderate water sensitivity. They require a small amount of formation material, such as drill cuttings or core sample fragments. These methods allow for relative comparisons of several competitive products.

Core testing is an additional service that provides the most authoritative data to base recommendations. These tests require that enough core sample is available to statistically represent the formation.

Our team of experts use these results to provide recommendations on the optimal Cla-Web additive design and application method to maximize clay protection and productivity from the well.

### CST data in Ohio sandstone



**Figure 1** > CST testing is one method used to compare the effectiveness of clay control additives; the higher the % of CST reduction, the better the protection against swelling clays. This chart compares CST reduction for various clay control additives. Note that the Cla-Web agent outperforms other temporary clay control additives and shows excellent performance, especially at low concentrations.

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