

## Overview

Swelling clay present in the unconventional reservoirs can potentially stifle the frac-length and effectiveness of completions. A reduction in drainage area or rapidly closing fractures can dramatically decrease the productivity of a given well. Understanding the bulk clay content or even the clay speciation of a given interval is informative, but actually testing the compatibility of fluids with different lithotypes encountered is the traditional method of determining fresh-water or treated drilling or completions fluids.

CST simulates the shear and chemical forces present in drilling and completions to measure the hydrating properties of shale. For this test, the mixing time and shale-solids content are held constant while the chemical characteristics such as pH are varied. Results can be graphed as fluid type versus time.



## Capillary Suction Time (CST)



### Why CST

- Is there a concern for swelling clay or other mineral compatibility issues treating with fresh water? Fresh water completions are obviously less expensive than any treated fluids.
- What is the optimal concentration or fluid combination to keep costs as low possible without sacrificing the effectiveness of completions and in turn production for each stage or perf cluster?

Features	Benefits
CST is a very fast and reliable way to test fluid compatibility on multiple lithotypes with multiple fluids.	Completions are more than 50% of total well costs. The materials are more than 65% of that cost. Even slight reductions per stage can mean huge savings.
Using XRD, XRF and Pyrolysis to outline the lithotypes allows for selection of representative samples for testing.	We can determine how risky each fluid is for each stage. If there is no benefit in using, a treated fluid we save money on that stage. If the treated fluid is of benefit we determine the lowest concentration to not waste money "over-spiking" the fluid.
Can be done on cuttings or small rock samples at a fraction of what it would cost in the lab and turned around faster.	Maximize production and minimize costs on a stage by stage (or perf by perf) basis.