

# X-Tend<sup>®</sup> Acid Stimulation Service

Non-Viscous, Polymer-Free Retarded HCl Acid System

## OPTIMIZING STIMULATED RESERVOIR CONTACT

### OVERVIEW

This latest development in hydrochloric acid (HCl) fluid systems allows deeper penetration of live acid into the formation, thus increasing stimulated reservoir contact compared to conventional HCl systems. This innovative fluid system is applicable to matrix acidizing, acid fracturing, and wellbore cleanup treatments in carbonate formations.

X-Tend system lowers the HCl reaction rate by binding to the carbonate surface, minimizing near-wellbore (NWB) facial dissolution, and allowing the stimulation fluid to contact more reservoir rock before completely spending. The low viscosity of this fluid system (< 2 cP) allows higher pumping rates without incurring high friction pressures, compared to other chemically retarded acids such as emulsified acid blends.

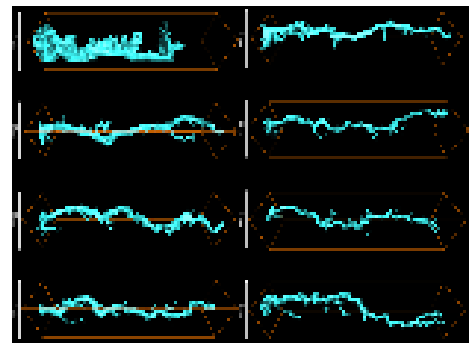
### MULTIFUNCTIONAL PROPERTIES

- » This engineered acid stimulation solution allows for deeper penetration of live HCl by chemically delaying the HCl reaction in order to ultimately maximize the stimulated reservoir volume
- » In addition to the delayed acid reaction properties, this fluid system provides in-situ scale inhibition properties once the well is brought into production
- » The HCl-based system has iron-control properties, substantially reducing the need for additional additives typically used for ferric ion (Fe<sup>3+</sup>) stabilization

### ACID-RETARDING PROPERTIES

Extensive laboratory testing has been performed using this new HCl fluid system and benchmarked against straight HCl and emulsified acid at different temperatures and permeability ranges. X-Tend delays the acid reaction on the carbonate surface almost independently of the pumping rate.

Furthermore, this unique system can be injected below or above the optimum rate, even at 28% HCl acid strength. Figure 1 shows how the number of pore volumes to achieve breakthrough (PVBT) has been significantly reduced by X-Tend acid compared to straight 15% HCl, and displays similar performance to emulsified acid, for the conditions shown.



X-ray processed images of treated cores for plain 15% HCl acid (left) and X-Tend (right, at 15% HCl acid) with flow rate at 1, 3, 5, and 8 mL/min.

### APPLICATIONS

- » Matrix acidizing, acid fracturing, or wellbore cleanup treatments in calcite-rich reservoirs, including limestone, dolomite, and chalk formations
  - » In matrix acidizing, X-Tend generates longer wormholes and improves efficiency of delivered acid volume
  - » In acid fracturing treatments, X-Tend can be used during the main fracturing stages or during the closed- fracturing acidizing stage
  - » For wellbore cleanouts at high temperatures, X-Tend can be used to minimize NWB facial dissolution due to the high reactivity of HCl at elevated temperatures
- » This system is applicable to cased-hole, openhole, and/or slotted liner completions

## FEATURES AND BENEFITS

- » The use of HCl as the calcite-dissolving component provides the best dissolution capacity available. Treatment fluid can be formulated using up to 28% HCl, when needed
- » Due to its chemically retarded properties, it can be pumped below the optimum injection rate with little to no risk of NWB facial dissolution
- » With on-the-fly mixing, HCl retardation can be adjusted based on the concentration of the retarding agent
- » This is a polymer-free system
- » Due to the low viscosity, low friction pressures are expected, and the treatment can be bullheaded or pumped through coiled tubing or jointed pipe
- » Standard corrosion inhibitors for HCl can be used at similar dosages
- » This system has similar delayed characteristics as emulsified acid, but without the high friction pressure produced by the emulsion and with a safer environmental profile (no diesel or emulsifiers involved)
- » This fluid system can be integrated with Halliburton diversion technologies such as AccessAcid<sup>SM</sup> stimulation service or Guidon AGS<sup>TM</sup> acid diversion system to optimize fluid distribution along the pay zone

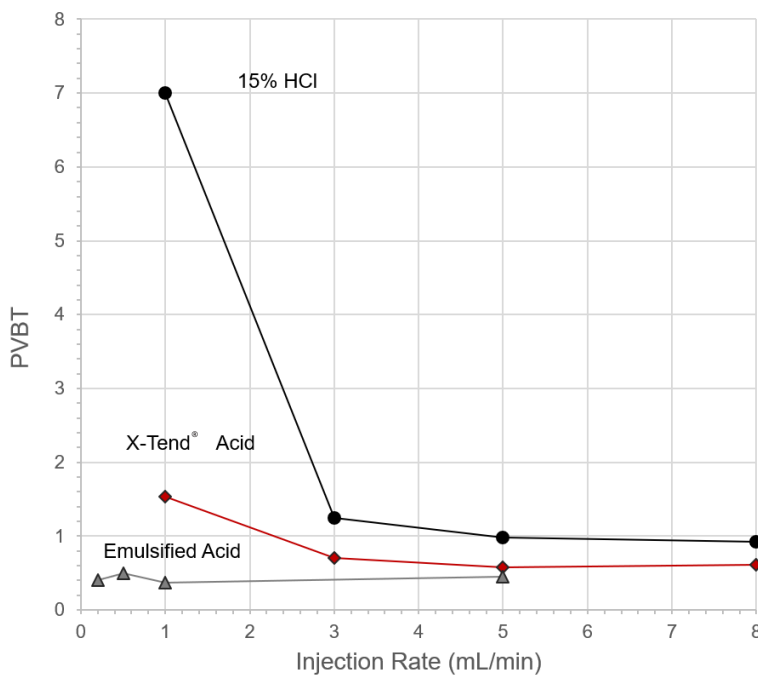


Figure 1: The number of pore volumes to achieve breakthrough (PVT) has been significantly reduced by X-Tend acid compared to straight 15% HCl, and displays similar performance to emulsified acid, for the conditions shown.

For more information, contact your local Halliburton representative or visit us on the web at [www.halliburton.com](http://www.halliburton.com)

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