



Texan Shale Chemicals

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PRODUCT DATA SHEET TS-VFR EMULSION

PRODUCT DESCRIPTION

TS-VFR Emulsion is a Premium Anionic High Viscosifying friction reducer (TS-VFR) in Emulsion form. It offers good performance with good economics in Fresh water/Low Brine conditions. TS-VFR has a very high molecular weight. Addition of typical dosages based on lab tests amounts gallons per thousand gallons to water based high brine frac fluids can deliver friction reduction (pressure loss) of over 70% in a short period of time and also yield high viscosities capable of providing enhanced proppant transport characteristics. Due to its rapid hydration properties, it can be pumped continuously into stimulation fluids as supplied or by batch mixing before treatment. TS-VFR is APE (alkyl phenol ethoxylates) and NPE (nonyl phenol ethoxylates) free, thus making it environmentally friendly. It is a field tested and proven product in oil field operations.

APPLICATIONS

TS-VFR has been specifically optimized for use as a High Viscosifying Friction Reducer (TS-VFR) in Fresh Water to low TDS Brine conditions which can be added as supplied due to its excellent hydration properties. Due to its anionic nature, it is compatible with conventional non-ionic and anionic stimulation additives, and its compatibility range is wide ranging. It can achieve optimal performance at low dosages reducing overall treatment costs.

TEST METHODS

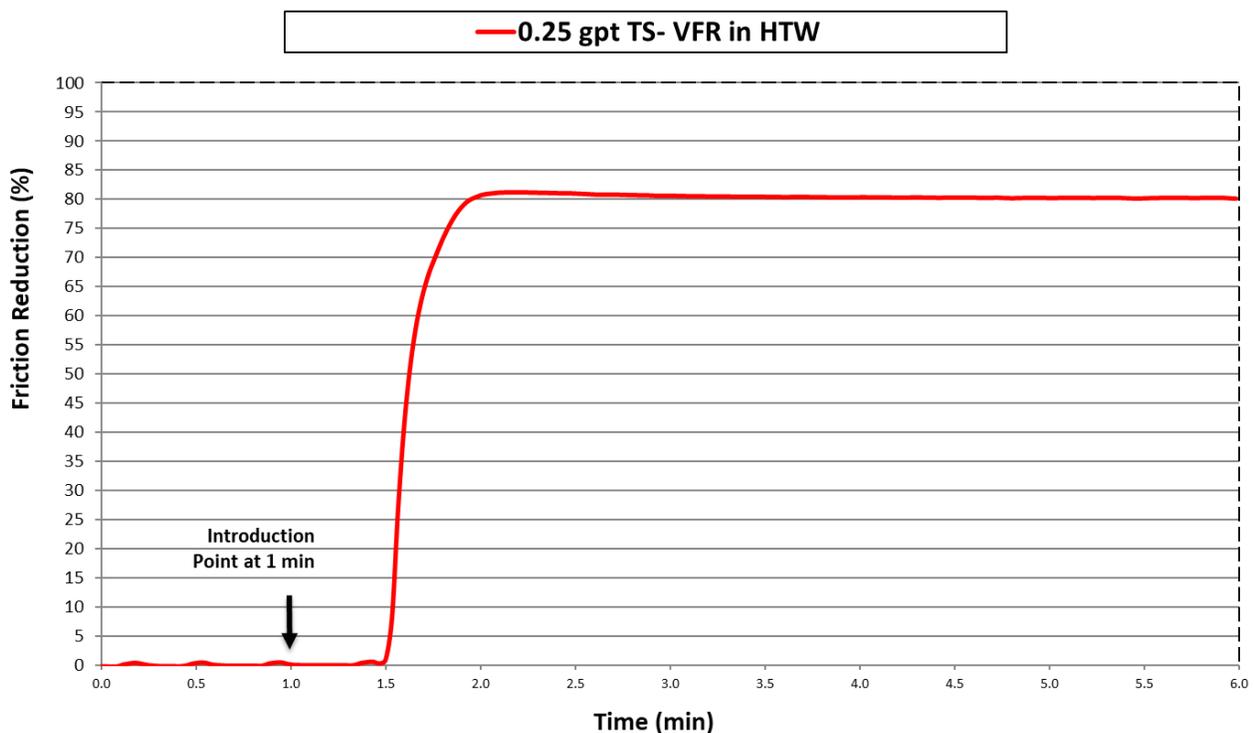
Test Method(s): Friction reduction properties of TS-VFR were tested on a custom Flow Loop at a flow rate of 6 gpm, generating 80,000 Reynold's number. The test section of the loop consisted of pipe having 3/8" O.D. Typical dosage of 0.25 gpt was used and the polymer was injected on the fly through the suction header of the mono-pump. Total test time was 10 minutes. TS-VFR was tested in Fresh Water Conditions at Room Temperature for Shear Rate Vs Viscosity at typical Dosages of 3 GPT from 1-1000 sec-1.

PERFORMANCE & RESULTS

The following figures represent the test results in Various Brines in 3/8" OD.

Figure 1. Performance of TS-VFR in FW AND 3/8"

Performance of Provided FR Products in 3/8" OD



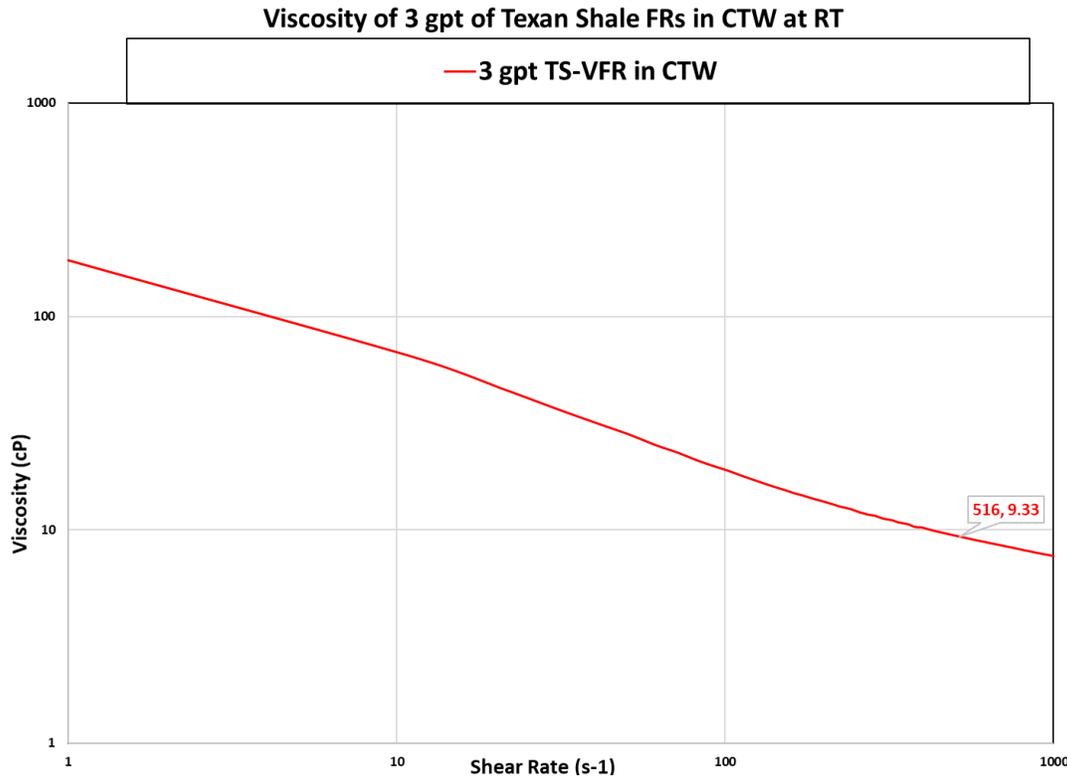


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The TS-VFR was tested from Shear rate rheology from 1-1000 sec-1 at a dosage typically used in the field 3 GPT.



The test results show that TS-VFR achieves a maximum FR value of 81.62% in Freshwater and with a rapid inversion time. The Viscosity reading of 9.33 CPS at high shear rate conditions such as 516 sec – 1 closely resembling the field conditions indicate that TS-VFR is an effective Friction reducer and a Viscosifier.

PROPERTIES

Form	Opaque Liquid
Ionic nature	Anionic
Flash Point	ND
Freeze Point	< 5 °C
Viscosity (cps)@Temp	> 20.5 mm ² /S @ 40 °C
Color	White / Off-White
Odor	Slight petroleum oil
Density	8.9 lb/gal
BTEX	ND at 1 PPM
PH Effective	5.5-8.5 at 5 g/L
Shelf Life	6 Months (recommended to store indoors between 0 – 35 °C.)

PACKAGING (customized packaging available upon request.)

Size	Packaging	Weight
55 gal.	Drum	475 lbs
275 gal.	Tote	2,300 lbs
330 gal.	Tote	2,800 lbs
5000 gal.	Bulk/ISO	45,500 lbs

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