Stepan
OILFIELD SOLUTIONS

# PETROSTEP® VES-1

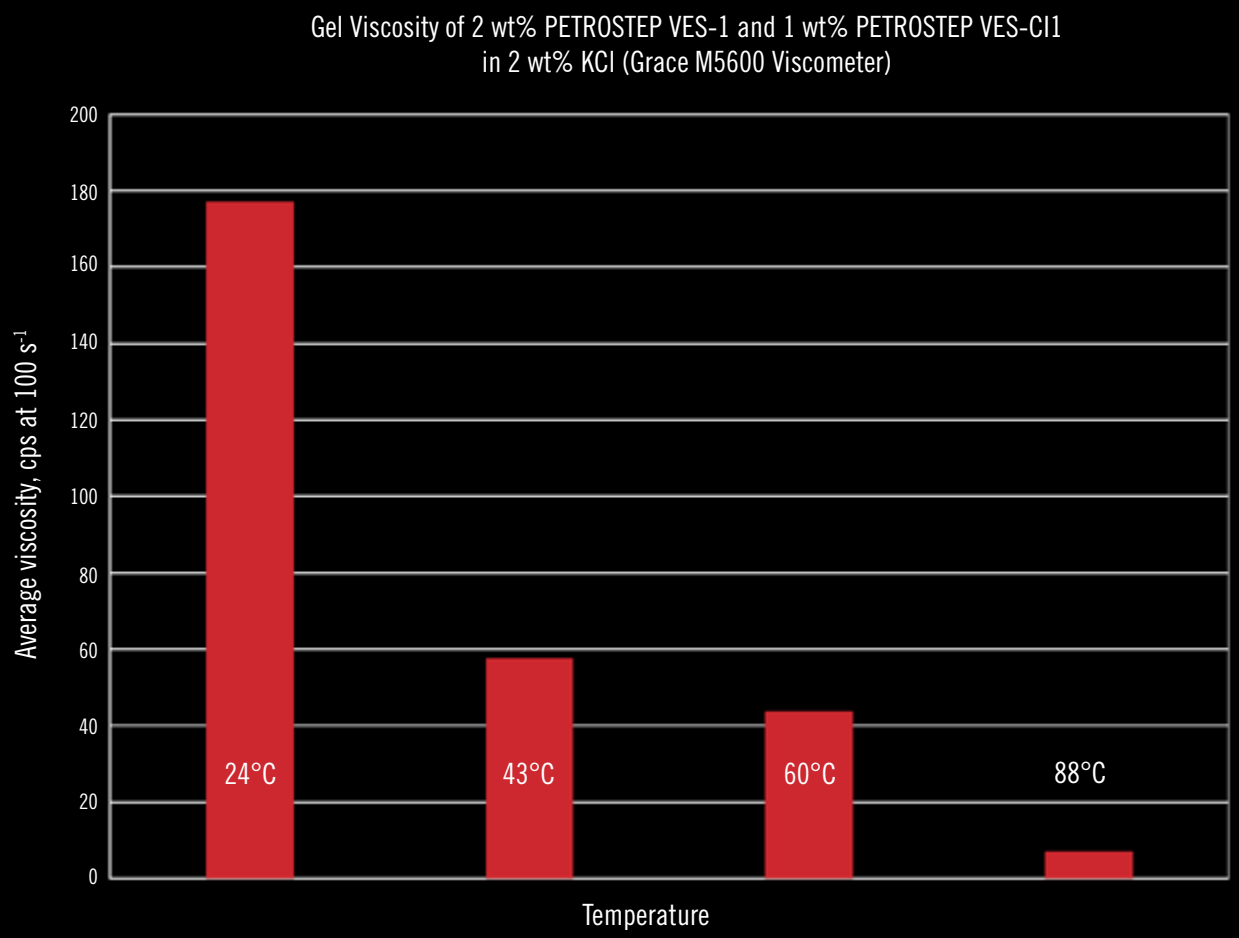
*Viscosifier*

Viscoelastic surfactants (VES) provide a polymer-free way to viscosify fluids for a range of oilfield applications, including stimulation treatments and wellbore cleanouts. These fluids are water soluble and will not leave insoluble polymer deposits in the formation.

Stepan Oilfield Solutions' PETROSTEP VES-1 can be used to build shear-thinning fluids that are effective at suspending solid particles under low shear conditions. The presence of the viscosifying surfactants also lowers the surface tension and may reduce the need for additional flow-back surfactants. Fluid viscosity can be adjusted by modifying PETROSTEP VES-1 concentration and water salinity.

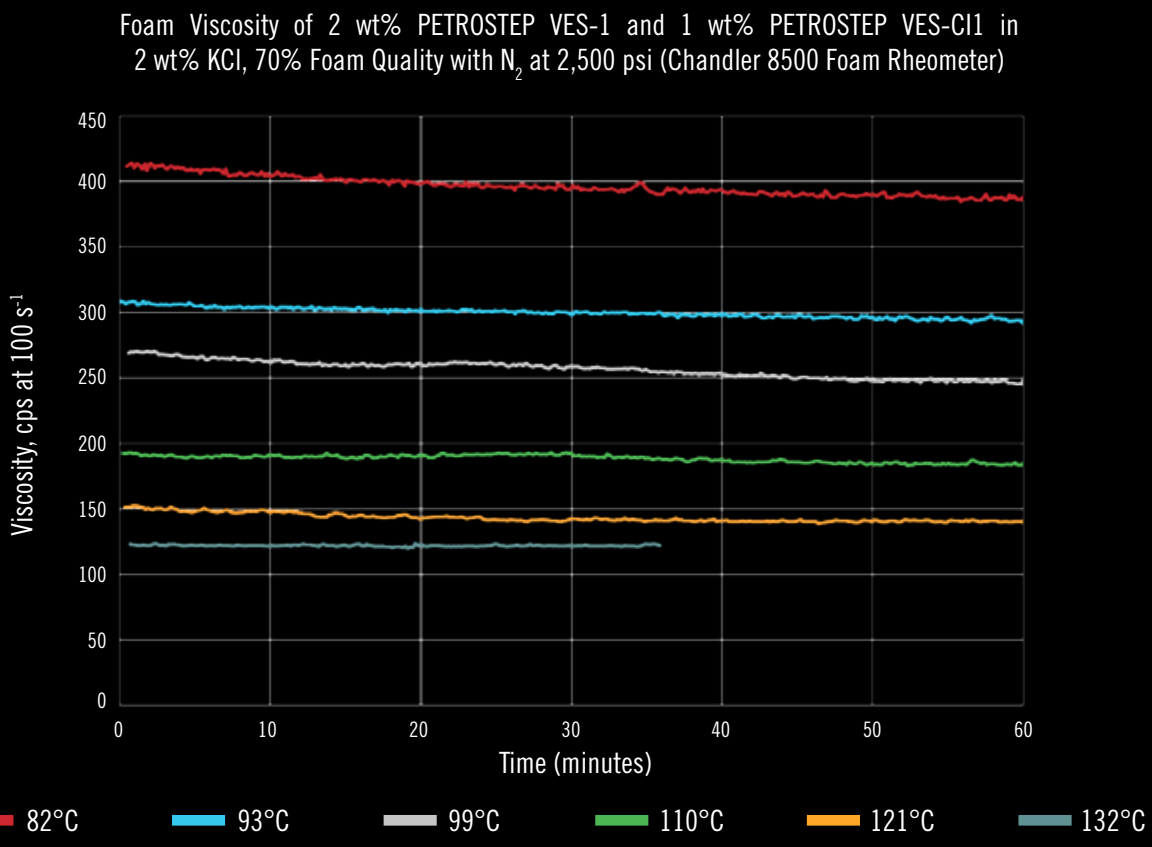
Figure 1 shows the effect of temperature on the viscosity of a 2 wt% PETROSTEP VES-1 gel in water containing 1 wt% PETROSTEP VES-CI1 and 2 wt% potassium chloride (KCl). PETROSTEP VES-1 can be used to viscosify water containing 1 – 10 wt% KCl and can maintain gel viscosities over 100 cps at 100 $s^{-1}$ up to at least 40°C.

## FIGURE 1



PETROSTEP VES-1 may also be incorporated into foamed fluid systems to provide viscous, stable foams at elevated pressures and temperatures, as shown in Figure 2. Foaming the PETROSTEP VES-1 system can provide higher viscosities than the base VES gel at equivalent surfactant loadings, and may be used in applications requiring improved high temperature viscosity.

## FIGURE 2




### TYPICAL PROPERTIES

- pH (10% in water): 7.5
- Viscosity at 25°C, cps: 68
- Density at 25°C, g/mL: 0.897
- Freezing Point: -12°C
- Flash Point (PMCC): 25.6°C

### APPLICATIONS

Viscosification of aqueous fluids and formation of a stable foam under pressure.

### DIRECTIONS FOR USE

- Use PETROSTEP VES-1 in combination with PETROSTEP VES-CI1, VES-CI2 or VES-CI3.
- Incorporate product combination into base fluid and mix thoroughly; contact Stepan Oilfield Solutions for further guidance regarding specific applications.
- Adjust product concentrations and salinity to meet viscosity requirements.

*For more information about PETROSTEP VES-1 and other PETROSTEP products, email oilfield@stepan.com or call 713.955.8100.*

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