HYBRID CHEMICAL
TECHNOLOGIES

HIGH VISCOSITY FRICTION REDUCER

FR-9120

FR-9120 is a powder 20 mesh size anionic friction reducer that is typically used with high brine fluids. The polymer is compatible with additives and anions in water. The polymer can be tailored to slick water or slick-visc treatments as this product gains significant viscosity in fresh and brine water, allowing for water recycling and avoiding disposal costs.

Table 1: Physical Properties	
Appearance	White/slight yellow powder
Bulk Density (kg/m^3)	700-800
Flash Point	N/A
Odour	Mild
pH (1% in water)	7.5

10 minute Hydration Profiles:

The FR-9120 was tested in fresh water, 3% KCl and modified API brine (8% NaCl, 2% $CaCl_2$). The friction reducer was added to the mix water, sheared at 1500 RPM on a Waring blender for 30 seconds and transferred to an Ofite 900 Viscometer to record viscosity at minute intervals. The fluid was sheared at 511/sec shear rate (F1B1R1 Ofite 900 Configuration). The FR-9120 was tested at loadings of 0.55, 1.1 and 1.65 kg/m^3 loadings, see the figures below for hydration profiles in fresh water, 3% KCl and modified API brine:

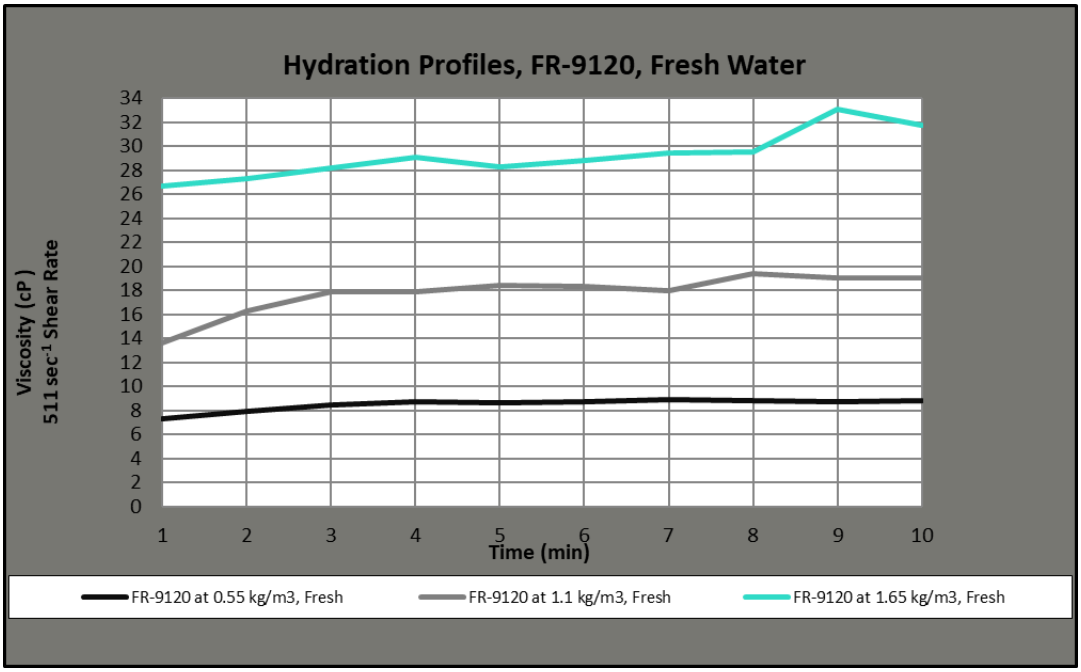

Figure 1: Hydration Profiles, FR-9120 in Fresh Water

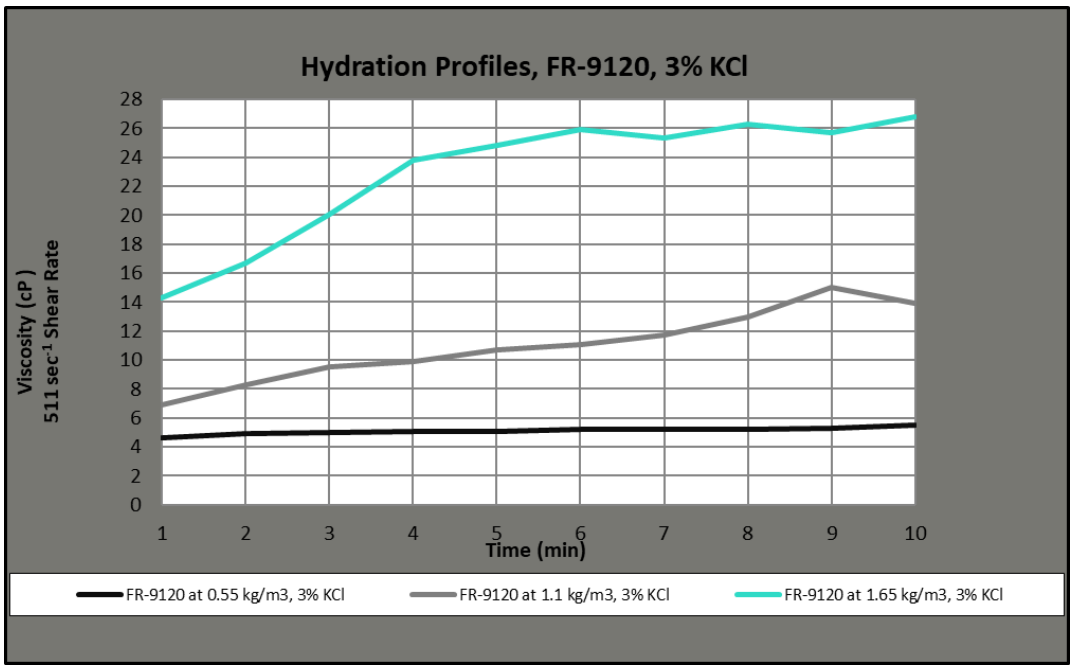

Figure 2: Hydration Profiles, FR-9120 in 3% KCl

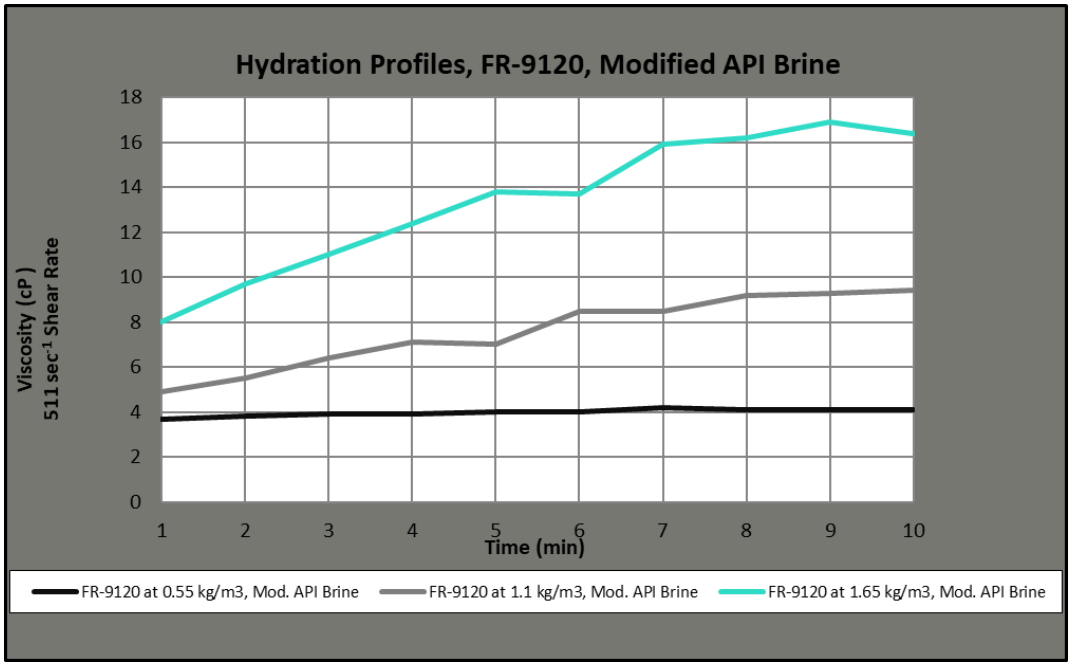

Figure 3: Hydration Profiles, FR-9120 in Modified API Brine (8% NaCl, 2% $CaCl_2$)

Friction Reduction Testing:

Friction reduction testing with FR-9120 was completed on the Friction Flow Loop in fresh water, 3% KCl and modified API brine. The water is circulated through the friction flow loop at 42 L/min, through 0.5" diameter pipe. A baseline is first established using the base fluid, with no friction reducer added. At 30 seconds, the friction reducer is injected into the fluid stream. The friction reduction is evaluated over a 10-minute duration. The friction reducer was tested at the minimum loading, 0.1 kg/m^3.

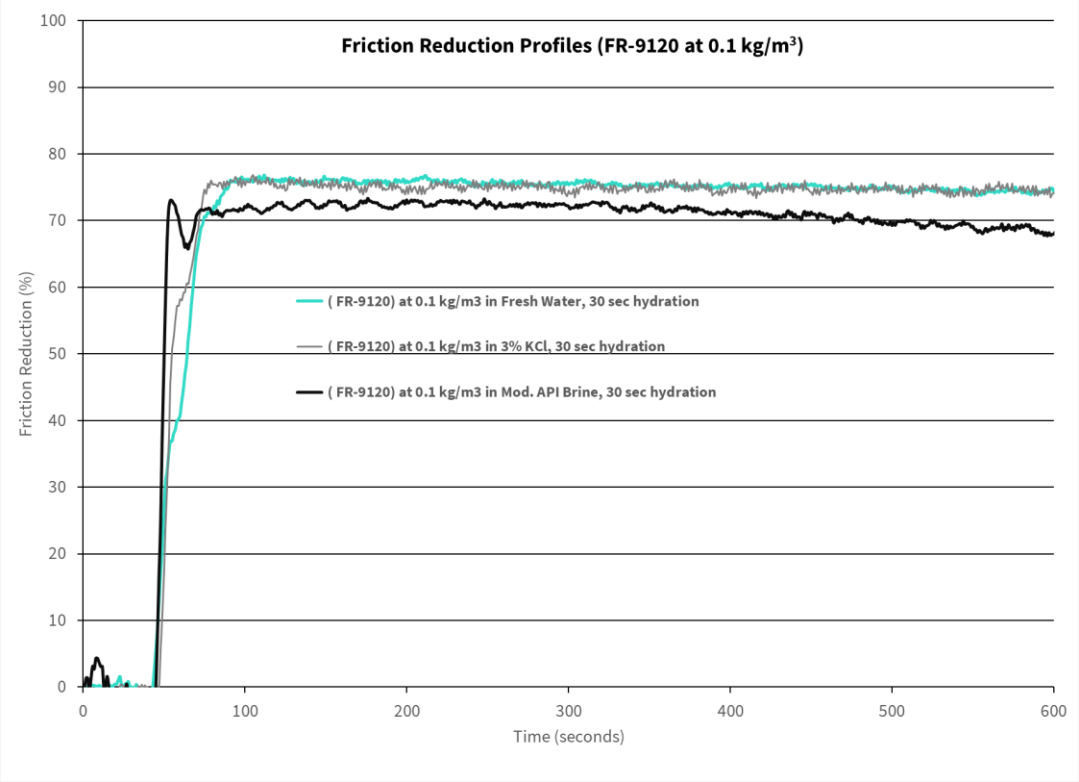

Figure 4: Friction Reduction Profiles, FR-9120 at 0.1 kg/m^3