

STEP N2 is a linear gel system which includes the addition of nitrogen. Nitrogen provides the benefits of creating additional viscosity, as well as enhancing cleanup. Nitrogen is chemically inert, and will not have adverse effects in the reservoir. In addition, nitrified treatments make use of less water, which provides benefits in water sensitive formations, and reduces overall water consumption.

STEP N2 is typically made up of the gellant SWG-201, a derivatized guar polymer. Either the liquid version, SWG-201L, or the solid version can be used in conjunction with a dry-add hydration unit. This provides the benefit of rapid hydration and a clean, low residue break. This is also compatible with STEP's clay control additives, scale inhibitors, and most potential additives. In addition, a foaming surfactant is typically used, which should ideally be tested for compatibility with formation fluids to ensure no emulsions are created.

Operational Benefits:

- Hydrates rapidly to form a viscous linear gel
- Easy to mix, no formation of fish eyes
- Compatible with most chemical additives
- Clean gel, little to no residue upon breaking
- Foaming with nitrogen creates additional viscosity beyond linear gel
- Nitrogen is chemically inert, and enhances cleanup

Technical Data:

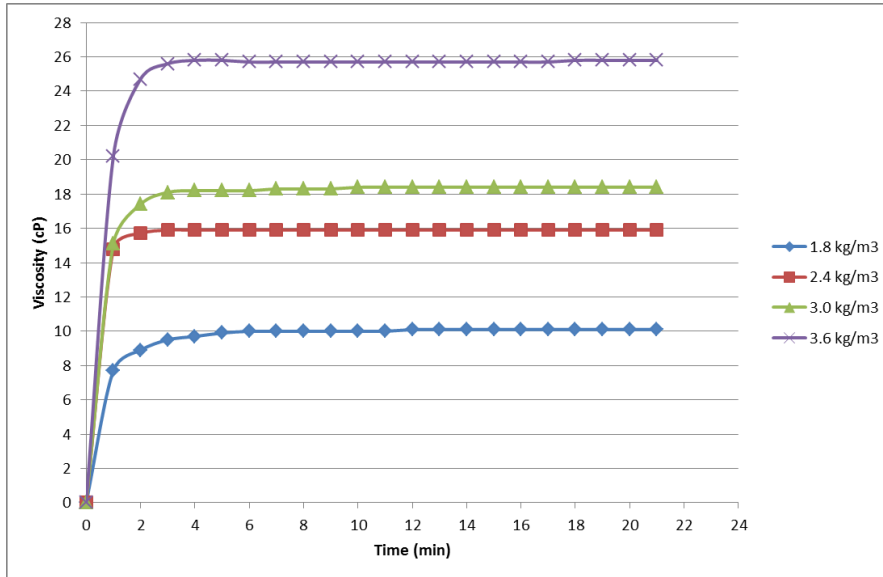


Figure 1: Hydration of various loadings of SWG-201

Temperature (°C)	Gel Loading (per m ³)	Breaker Loading
20	3.0kg (6.4 L)	0.3 L/m ³ SBE-1
	3.6 (7.7 L)	0.4 L/m ³ SBE-1
30	3.0kg (6.4 L)	0.2 L/m ³ SBE-1
	3.6 (7.7 L)	0.25 L/m ³ SBE-1
40	3.0kg (6.4 L)	0.1 L/m ³ SBE-1
	3.6 (7.7 L)	0.1 L/m ³ SBE-1
50	3.0kg (6.4 L)	0.4 kg/m ³ SBO-1
	3.6 (7.7 L)	0.5 kg/m ³ SBO-1
60	3.0kg (6.4 L)	0.3 kg/m ³ SBO-1
	3.6 (7.7 L)	0.3 kg/m ³ SBO-1
70	3.0kg (6.4 L)	0.1 kg/m ³ Encap LT
	3.6 (7.7 L)	0.1 kg/m ³ Encap LT
80	3.0kg (6.4 L)	0.1 kg/m ³ Encap HT
	3.6 (7.7 L)	0.2 kg/m ³ Encap HT
90	3.0kg (6.4 L)	0.1 kg/m ³ Encap HT
	3.6 (7.7 L)	0.1 kg/m ³ Encap HT

Figure 2: Proposed Breaker Loadings of STEP-LG