NON EMULSIFIER

TNE-1

SUMMARY:

When water-based fracturing fluids encounter formation fluids and oils, emulsions can form. These emulsions can then restrict the flow path and cause formation damage, ultimately reducing production from that frac interface. TNE-1 is a cost-effective, versatile and thermally stable non-emulsifier designed to reduce emulsion tendencies between frac fluids and formation oils. By lowering interfacial tension and surface tension between the water/oil interface, TNE-1 effectively inhibits emulsion formation.

ADVANTAGES:

- Ability to lower interfacial surface tension.
- Water-soluble.
- Exhibits demulsification properties with most crude oils, condensates, and formation water.
- Non-ionic charge makes TNE-1 dispersible and non-reactive with common fracturing and acidizing additives.
- Customizable to rock type.

MIXING & BLENDING INSTRUCTIONS:

- Pumped on-the-fly in the slurry at an optimized concentration between 0.1 - 2 GPT.
- Since the fluid is non-ionic, TNE-1 is dispersible and compatible with common hydraulic fracturing additives and formation types.

TECHNICAL LAB RESULTS:

Demulsification Test:

As illustrated in the figures below, when TNE-1 is tested for demulsification tendencies with Spraberry crude, it breaks the emulsion and achieves 100% phase separation within one minute of contact with formation crude.

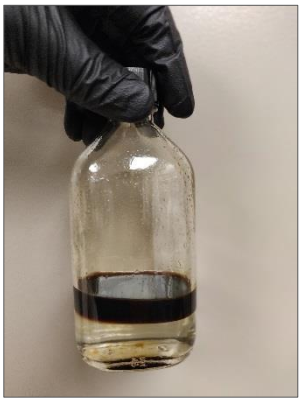

Fig. 1. Spraberry crude with 1 GPT TNE-1

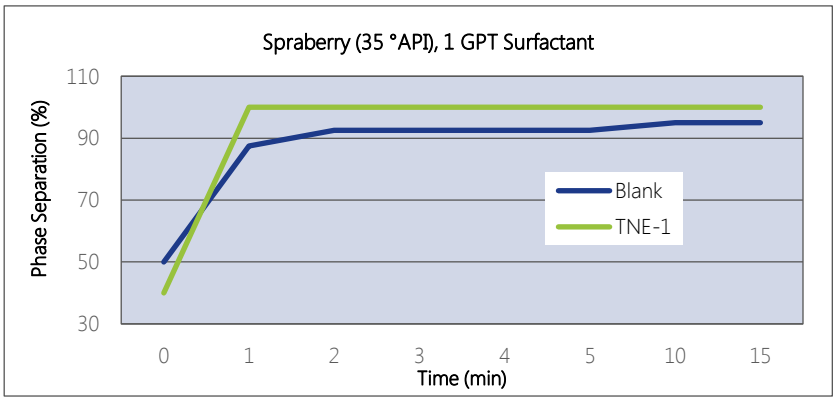

Fig. 2. Spraberry (35 °API), GPT Surfactant.

Interfacial Tension (IFT):

When IFT testing was carried out with Wolfcamp C and Spraberry oil, it was demonstrated that TNE-1 reduces the IFT of crude oil of both the Wolfcamp and Spraberry oils by significant amounts (see table below). The reduction of IFT is important because as IFT is reduced, the ability for unrestricted flow increases.

Table 1. IFT numeric for Wolfcamp Oil TNE-1 @ 1 GPT

Sample	Temp (Deg °C)	IFT (mN/m)
Wolfcamp C	50	0.53
Wolfcamp C Blank	50	10.0
Spraberry	50	.82
Spraberry Blank	50	2.7