Laponite® in synergistic combinations with polymer thickeners

Fields of use

Laponite creates a very high level of gel structure combined with an unequalled degree of shear thinning and it is often used as an additive to modify the rheology of systems based upon polymer thickeners. This combination of thickeners will often develop a synergistic boost in viscosity levels that can give useful performance advantages and/or higher cost efficiveness. This effect has been seen with many different types of polymeric thickeners including xanthan gum, CMC, HEC, guar gum, HASE polymers and polyacrylates.

Fig. 1. Schematic of a high molecular mass polymeric thickener system

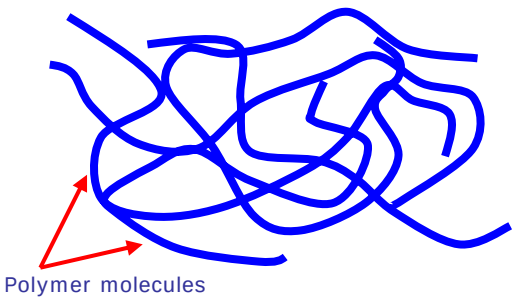
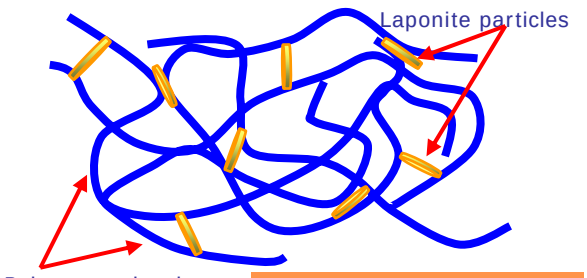


Fig. 2. High molecular mass polymeric thickener system...with Laponite



The new mechanism for particle-particle interactions develops an increase in low shear rate viscosity

The origin of the synergistic interactions between Laponite® and polymeric thickeners

A model to explain this effect is outlined below:

Polymeric thickeners build viscosity in water when the molecules of the polymer, usually long chains and often with branches, develop interactions with each other. See Fig. 1.

These interactions can be steric:

- when the chains become twisted with each other.

The interactions may also be charge related:

- the formation of hydrogen bonds, or
- covalent associations between oppositely charged sections of the polymer molecule.

In Fig. 2 there is a schematic view showing how Laponite can interact with polymeric thickeners. The positive charges on the edges and the negative charges on the surfaces of Laponite platelets develop electrostatic associations with oppositely charged sections of the polymer molecules.

This additional mechanism for particle-particle interactions that is created when Laponite is added to a polymer based system has the effect of generating large increases in viscosity levels at low shear rates.

Applications that can benefit from Laponite- polymer synergy

By varying the ratio of Laponite to polymer thickener in a formula, it is possible to engineer precise and controlled rheological profiles in water based systems. This allows the development of products for a wide range of application areas such as paints, coatings, household cleaners, personal care and many others.
For more information- please contact the Laponite team on help@laponite.com

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