ROCKWOOD ADDITIVES LIMITED / ROCKWOOD CLAY ADDITIVES GMBH

TECHNICAL BULLETIN/Laponite®

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Using Laponite® to improve the stability of suspended actives in skin wash products

Adding Laponite® to surfactant systems thickened with polymers can generate a large increase in viscosity at low shear rates. This synergistic interaction between Laponite® and a wide range of polymer types is useful for preparation of formulations with improved rheological properties.

A starting formulation for a clear Shower Gel with suspended Jojoba Beads is shown below.

Ingredient	% by weight	% active	INCI
Water	59.60		aqua
Laponite® XLG	0.15	0.15	lithium magnesium sodium silicate
Add Laponite powder to water with stirring, mix for 15 minutes, add Aculyn dispersion and continue mixing for a further 15 minutes.			
Aculyn® 88	4.83	1.4	acrylates/ steareth-20 methacrylate crosspolymer
Add the following ingredients in order shown, mixing after each addition until homogenous. Adjust stirrer speed as required to avoid entrainment of air into the formulation.			
Steol® CS370	7.14	5.0	sodium laureth-3 sulphate
Empicol® SDD	10.61	3.5	disodium laureth sulphosuccinate
Velvetax® BK35	11.67	3.5	cocamidopropyl betaine
Propylene glycol	2.00	2.0	propylene glycol
Neolone® MXP	0.50		methylisothiazolinone, phenoxyethanol, methylparaben, propylparaben
Sodium hydroxide (10% solution)	3.00 (to pH 7)		sodium hydroxide
Florabeads Jojoba Lapis 28/60	0.5		jojoba ester
This formulation is based upon original work by the Rohm and Haas Company			

Laponite®-polymer combinations in "designer" rheology packages

Many types of polymeric thickeners used in personal care formulations such as xanthan gum, CMC, HEC, HASE polymers, guar and alkali swellable polyacrylates will form powerful synergistic interactions with Laponite® products. These interactions can develop useful advantages in a wide range of water based systems.

Laponite® creates a very high level of gel structure in combination with an unequalled degree of shear thinning. By varying the ratio of Laponite® to polymer in a formula, it is possible to design precise rheological profiles for a wide range of types of product that can be sprayed, or used in pump-pack, tubs, tubes or pourable applications.

The formulation shown above with 12% active surfactant content brings Laponite® together with Aculyn® 88, an acrylic based cross linked associative alkali swellable emulsion from Rohm and Haas.

The result of this combination of rheology control additives is a **clear liquid-gel** formulation which shows excellent suspension stability of Jojoba Beads. It can be easily dispensed from standard shower wash product containers.

⇒ The acrylic polymer develops the basic viscosity build in the formulation
⇒ Use of a low level of Laponite® generates a large increase in low shear rate viscosity

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Laponite® is a layered silicate rheology control agent

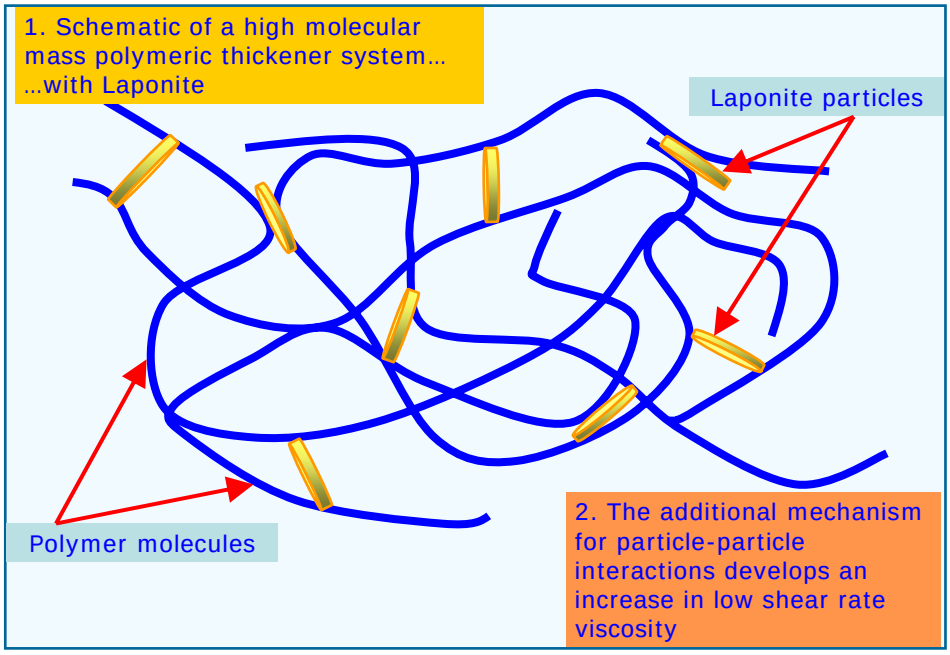
It is manufactured under controlled conditions from naturally occurring inorganic salts and minerals. Innovative formulations and new product development have extended the use of Laponite® in skin care applications that are formulated at "skin-friendly" pH levels.

High purity, unique thixotropic rheology light, non-tacky texture and the possibility to make clear formulations make Laponite® an ideal choice for rheology control of a wide range of products.

Application areas for Laponite® in personal care include:

- ❑ moisturising creams and lotions
- ❑ baby care
- ❑ sun care
- ❑ hair care
- ❑ depilatory cream
- ❑ toothpaste
- ❑ shower gels and skin cleansing lotions

A model to explain the origin of the synergistic interactions between Laponite and polymeric thickeners 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.

⇨ These interactions can be steric- when the polymer molecule chains, or side chains become twisted with each other.

⇨ The interactions may also be charge related- for example, formation of hydrogen bonds, or covalent associations between oppositely charged sections of the polymer molecule.

The diagram above is a schematic view showing how the colloidal sized particles of 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 a **relatively small quantity of Laponite** is added to a polymer based system has the effect of generating **large increases in viscosity levels at low shear rates**.