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## LAPONITE® SH Aqueous Phase Gellant

### General Description:

LAPONITE SH is a synthetic magnesium silicate thickener for water based systems and water/solvent mixtures. When dispersed in water, LAPONITE SH forms highly viscous, transparent gels having significant Thixotropy and high yield values, at low concentrations.

### Typical Properties:

Physical Form: White, free-flowing powder  
Brightness: (Elrepho R 457) ~85%  
Specific Gravity: 20.83 lbs/gal (2.50 g/cm<sup>3</sup>)  
Bulking Value: 0.048 gal./lb.  
Particle Size: (Dry) 95% < 325 mesh (45 µm)  
Moisture Content: 12% maximum  
Temperature Stability: Up to 400°C

### Application Areas:

- Emulsion paints
- Putties
- Adhesives
- Ceramic frits / glazes / slips
- Grinding pastes and abrasives
- Silicon resin based external paints
- Artist paints / finger paints
- Water reducible systems

### General Information:

LAPONITE SH is purely inorganic and stable against diluted acids and bases. Gels produced with SH also withstand oxidation or microbial degradation. LAPONITE SH is compatible with most emulsions, pigments, or extenders. Higher concentration of electrolytes should be avoided since otherwise the gel structure can be damaged.

By using LAPONITE SH, stable systems can be produced. Due to the Thixotropic characteristics of this product, the application properties are significantly improved.

LAPONITE SH prevents settling of heavy pigments or fillers. As a Thixotropic agent, LAPONITE SH reduces sagging and allows the application of thick coatings. LAPONITE SH can be used to thicken and stabilize emulsion paints. Depending on the requirements, between 0.5% and 4% of LAPONITE SH should be used (based on total formulation). As a Thixotropic anti-settling agent, LAPONITE SH can also be used in: adhesives, emulsion paints, sealants, ceramics, grinding pastes, and water reducible systems.

### **Hints for Practical Use:**

The benefits of LAPONITE SH are maximized when a few guidelines are followed. The electrolyte concentration in the system (especially divalent cations) can have a dramatic effect. Use of “hard” water will result in loss of clarity and less than optimum viscosity. After mixing with high shear in Deionized water for a few minutes, activation of the LAPONITE SH can be accomplished with the combination of heat and high shear. If neither heat nor shear is used, LAPONITE SH will with low shear incorporation slowly hydrate and gel overnight. However, the thickening efficiency and the clarity will not be at their maximums.

The use of heat during mixing to activate LAPONITE SH is the best approach. Heat will produce the clearest gel having the greatest efficiency. Any amount of applied heat will provide advantages over allowing it to hydrate under ambient conditions. However, the more heat that can be applied, the quicker the LAPONITE SH will hydrate. For example, it can be expected that if the solution is heated to 35°C and then removed from the heat, a gel will form after about ~6 to 8 hours. If the solution is heated to 60°C, the gel will form in ~1 to 2 hours.

Electrolytes can be used at extremely low levels to accelerate the hydration of LAPONITE SH. For example, an addition of 1.5% sodium carbonate (based on the weight of LAPONITE SH) will result in immediate gelation. The addition of 0.5% sodium carbonate will result in a gel in ~1 to 2 hours, but will have greater clarity than the 1.5% addition. Care must be taken if electrolytes are to be used to activate LAPONITE SH solutions, since too much electrolyte can flocculate LAPONITE SH.

In the case of sodium carbonate, an addition of 6-7% (based on the weight of LAPONITE SH) will flocculate the LAPONITE SH. The use of more than 5% of a monovalent cation or more than 1% of a divalent cation is not recommended due to impaired thickening and clarity. Please note that the quality of the Deionized water will affect the electrolyte level which gives the best results. Suitable electrolytes are Na<sub>3</sub>PO<sub>4</sub>, NaOH, Na<sub>2</sub>CO<sub>3</sub>, NaNO<sub>3</sub>, NH<sub>3</sub>, MgSO<sub>4</sub> Mg(NO<sub>3</sub>)<sub>2</sub>. If tap water is to be used, gelation may occur rapidly depending on the hardness of the water. This is even true under ambient conditions due to the electrolytes present.

Clarity of the gel will typically be poor. Even if the gel is heated, the clarity will not improve to a level comparable to the level possible in Deionized water.

### **Incorporation as a Pregel:**

In Deionized water 5% gels of LAPONITE SH can be prepared with low initial viscosity. The viscosity increases rather slowly unless heat or shear is applied. Additional components therefore can be incorporated while maintaining the low viscosity level. If the 5% pregel is stored for several days, a completely dispersed and thick gel is obtained which can be added into all formulations. If pregels with a low viscosity and a solid content up to 15% are required, the addition of organic or inorganic dispersing agents is necessary. The optimum level of the dispersant is around 5% (referring to LAPONITE SH).

### **Compatibility with Polar Solvents:**

LAPONITE SH is also an effective Thixotropic agent in the presence of organic solvents. The amount of solvent, however, is limited and should not exceed the following concentrations:

Methanol: 50%

Ethanol: 30%

Isopropanol: 30%

Ethylene Glycol: 50%

Compared to DI water, the viscosity of a water/solvent gel is higher. At higher concentrations of organic solvents, the gel loses transparency and stability.

### **pH Stability of LAPONITE® SH**

Pregels of LAPONITE SH in water are stable from neutral and across the alkaline pH range. The optimum efficiency is obtained between pH 9 and 12. An adjustment of the pH to be on the alkaline side often is not necessary, because LAPONITE SH as supplied is sufficiently alkaline. If necessary, TEA or DMEA should be avoided to prevent seeds and loss of clarity. Adjustment on the acid side should be made towards the end of the formulation. Formulations between pH 3 – 5 are stable, but not optimum for clarity and viscosity.

### **Other formulation considerations:**

Choice of pH adjustment, surfactants, dispersants, and order of addition can have a dramatic effect on the viscosity and clarity of LAPONITE SH solutions.

### **Use Levels:**

Typical use levels for LAPONITE SH are between 0.5 - 4% but may vary depending upon other system components and desired properties.

### **Storage Stability:**

LAPONITE SH has an effective shelf life of 12 months if stored dry in its unopened, original packaging at near ambient conditions.

For additional information or technical assistance contact Southern Clay Products, Inc. toll free at 800-324-2891.

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