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Laponite® S482 Aqueous Phase Gellant

General Description:

Laponite S482 is a modified synthetic magnesium aluminum silicate with pronounced platelet structure. When dispersed in water, Laponite S482 forms a transparent, pourable liquid up to a concentration of 25% solids. In resin formulations, however, significant thixotropy and a high yield value can be incorporated.

Typical Properties:

Physical Form: White, free-flowing powder
Brightness: (Elrepho R 457) ~85%
Specific Gravity: 20.83 lbs/gal (2.50 g/cm³)
Bulking Value: 0.048 gal./lb.
Particle Size: (Dry) 95% < 325 mesh (45 µm)
Moisture Content: 15% 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
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General Information:

Due to its good dispersability, Laponite S482 can be used as a powder additive in high gloss and transparent waterborne products. The preparation of pumpable 20-25% pregels of Laponite® S482 is also possible. It must be observed, however, that during the production of a (for example) 20% pregel, the viscosity can be high at first and therefore the material should be added slowly to the water. A 20% gel, however, shows good flow properties after 1 hour.

By using LAPONITE S482, stable systems can be produced. Due to the Thixotropic characteristics of this product, the application properties are significantly improved. LAPONITE S482 prevents settling of heavy pigments or fillers. As a Thixotropic agent, LAPONITE S482 reduces sagging and allows the application of thick coatings. LAPONITE S482 can be used to thicken and stabilize emulsion paints. Depending on the requirements, between 0.5% and 4% of LAPONITE S482 should be used (based on total formulation). As a Thixotropic anti-settling agent, LAPONITE S482 can also be used in: adhesives, emulsion paints, sealants, ceramics, grinding pastes, and water reducible systems.

Hints for Practical Use:

In deionized, or very soft water, low viscosity suspensions of up to 25% LAPONITE S482 can be prepared using low shear. These suspensions can be handled at low viscosity for several hours. If only hard water is available, it should be demineralized applying the usual methods (ion exchange, polyphosphates, Zeolite, etc.). Accelerated swelling can be accomplished by heat (35-60°C), high shear mixing, addition of electrolytes or a combination of these variables.

Suitable salts are:

Na₃PO₄ NaOH Na₂CO₃ NaNO₃ NH₃ MgSO₄ Mg(NO₃)₂

The benefits of LAPONITE S482 are maximized when a few guidelines are followed. The electrolyte concentration in the system (especially divalent cations) can have a dramatic effect on the properties of LAPONITE S482. For this reason, it is recommended that LAPONITE S482 be incorporated into deionized water. This will allow for better utilization of the LAPONITE S482. After mixing in deionized water for a few minutes, activation of the LAPONITE S482 can be accomplished with heat or by the addition of a small quantity of electrolyte. If neither heat nor electrolyte is used, LAPONITE S482 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 S482 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 S482 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.

As mentioned earlier, electrolytes can be used at extremely low levels to accelerate the hydration of LAPONITE S482. For example, an addition of 1.5% sodium carbonate (based on the weight of LAPONITE S482) 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 S482 solutions, since too much electrolyte can flocculate LAPONITE S482. In the case of sodium carbonate, an addition of 6-7% (based on the weight of LAPONITE S482) will flocculate the LAPONITE S482. 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 that gives the best results.

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 25% gels of LAPONITE S482 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 25% pregel is stored for several days, a completely dispersed gel is obtained which can be added into all formulations.

Compatibility with Polar Solvents:

LAPONITE S482 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 pure 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 S482 Pregel:

Pregels 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 quite often is not necessary, because LAPONITE S482 as supplied is sufficiently alkaline. In the acidic area LAPONITE S482 is not stable.

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

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