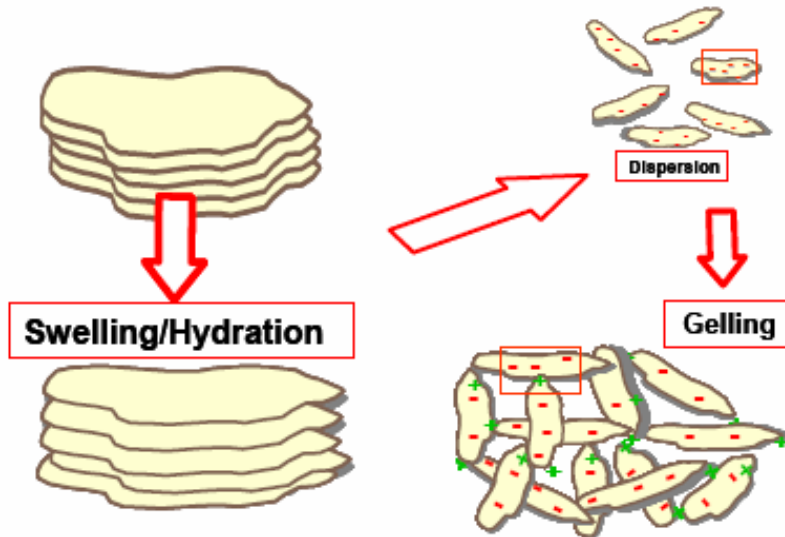


Structure / Rheology

Optigel® SH products give transparent suspensions when dispersed in water. This is due to their much smaller platelets. The synthetic materials have a platelet thickness of approx. 1 nm and their diameter is approx. 50 nm. The natural Bentonites have the same layer thickness. However, the Bentonite platelet diameter ranges between 500 and 1,000 nm—more than 10 times larger. The smaller platelets of the Optigel® SH are more “mobile” so that the interactions between the lamella will break down faster, but also rebuild faster. Due to this interaction, the synthetic platelets produce an extremely pseudoplastic rheology. Therefore, Optigel® SH and its modifications are mainly used for stabilization (anti-settling / anti-sagging / storage stability), and pigment orientation in spray applications.

Dispersion

An essential condition for the efficiency of all layered silicates is that the material must be incorporated into water under high shear conditions so that all lamella are separated before building up an optimum “House of Cards” gel structure (Graph 3).



(How Optigels Work—Graph 3)



Optigel SH, 4%
in DI Water

Optigel® SH should be mixed in water or in a water/resin mixture before adding surfaceactive components (wetting agent / dispersing agent) for optimum efficiency.

Optigel® SH can be dispersed as powder in the grind phase of the formula, or more commonly as a pregel that can be added at any stage of the process. A pregel will typically contain between 3-4% Optigel® SH in deionized water in order to be pumped.

Master Gel

Given an optimum dispersion, a content of 3-4 % Optigel® SH is sufficient to form a highly viscous gel structure that is pumpable (after 24 hours – or full viscosity development). This “mastergel” is only usable therefore if the formulation allows the addition of the mastergel with a water content of 96 - 97 %.



Incorporation of Optigel® S Grades as Powder

Optigel® SH can be incorporated as powder into the grind base if the shear forces of the available mills are high enough (sand mill, ball mill, shot mill, rotostator, etc.). If these shear forces are not available, we offer two modified Optigel® S-grades that are easier to disperse: Optigel® S403 and Optigel® S482.

Optigel® S403

Optigel® S403 contains an inorganic dispersant which facilitates dispersion in water. Optigel® S403 can be dispersed as powder in a formulation, or used in a pregel. High shear forces are still recommended. With Optigel® S403, 4-6 % Mastergels can be produced for use as a pregel. Due to the nature of the dispersant, the Optigel® S403 mastergel has a higher conductivity.

Optigel® S482

Optigel® S482 is truly a unique product that allows pregel concentrations up to 25%. Optigel® S482 contains an inorganic “liquefier” which covers the surface of the Optigel® SH lamella, preventing the interaction of the lamella and the building of a “House of Cards” structure. In the final formulation, this liquefier is adsorbed onto other surfaces offered by fillers, pigments, or resins. The “House of Cards” structure, which was blocked by the liquefier, is then allowed to form.

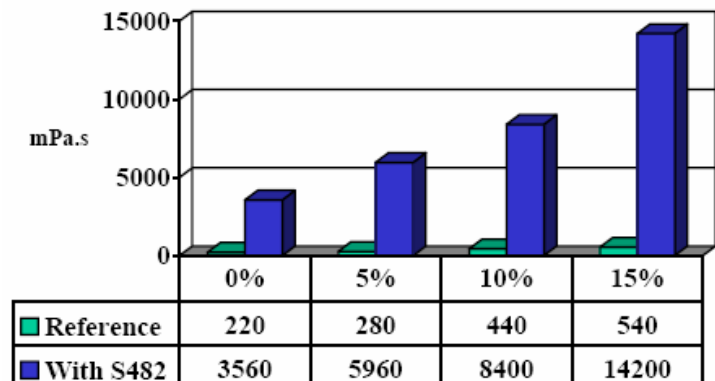
When incorporated into water only, Optigel® S482 gives a water thin and clear suspension. The liquefier used with Optigel® S482 is also ionic and contributes to an increase of the conductivity of the “master gel”. Using TiO₂ we can show how the transfer of the “liquefier” onto other surfaces can increase the viscosity of acrylate resin systems containing a fixed amount of Optigel® S482. (See Graph 4)

Formulation:

Acrylic Dispersion: 142.50 g
Defoamer: 0.45 g
Optigel® S482: 7.50 g
Titanium Dioxide: 7.50 or 15 or 22.5 g

The transfer of the liquefier and the subsequent formation of the gel structure does not exclusively require pigment and/or filler surfaces. Even the surface of binders can have this effect. One example is the thickening effect when adding Optigel® S482 to Neorez R974. The viscosity of the system increases by Optigel® S482 addition indicating that the thickening effect takes place and the liquefier is “neutralized” by adsorption on the resin surface. The compatibility of this “concept” with the different resins has to be checked individually.

Viscosity of an acrylate dispersion with and without Optigel S482 at various TiO₂ levels



(Graph 4)

For more information on how Southern Clay Products can assist you, please contact us at (800) 324-2891 or visit us on the internet at www.scprod.com.



Southern Clay Products, Inc. • 1212 Church Street • Gonzales, Texas 78629
Tel: (830) 672-2891 • Fax: (830) 672-1903

ROCKWOOD
ADDITIVES

ChemBrief