

Optigel®

RHEOLOGICAL ADDITIVES
FOR AQUEOUS PHASES



ROCKWOOD®
ADDITIVES

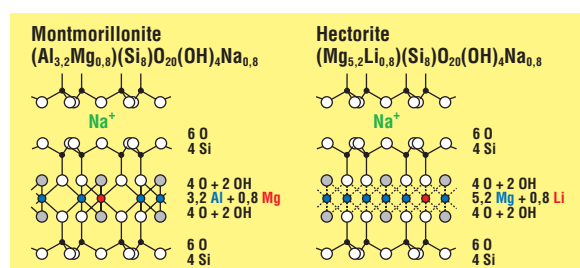


Optigel® – Rheological Additives for Aqueous Phases in Cosmetics and Personal Care

Technology

Optigel® products of Rockwood are smectite based rheological additives for aqueous phases, used in the personal care and cosmetic industry. Smectites are a group of layered silicate minerals, which occur naturally, but can also be produced synthetically. The most important members of the smectite group are montmorillonite and hectorite.

For montmorillonite commonly the INCI names »Bentonite« and »Magnesium Aluminum Silicate« are used as synonyms.

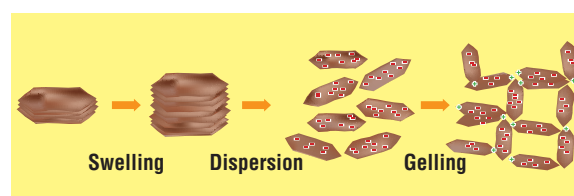


Smectites have a platelet structure. The platelets are very thin, about 1 nm. The platelet diameter is about 500 – 1000 nm (1 µm) for natural smectites (Optigel® products) and 50 – 100 nm for synthetic smectites. Thus synthetic hectorites (INCI: Sodium Magnesium Silicate) are true nanoparticles and form clear gels in water. Rockwood is offering synthetic hectorites under the name Laponite®.

Due to their chemical structure, the surface of the platelets has a negative charge. Sodium cations between the silicate layers are hydrated when Optigel® is added to water and the stack of smectite platelets will swell. Due to their structure, the platelet edges form positive charges so that gel structures similar to a house of cards can be formed through electrostatic attraction. This gel structure can be easily broken by mechanical shear stress and is rebuilt quickly when the system is no longer sheared.

The house of cards structure is the basis and explanation for the thixotropic stabilisation effect of smectite based gellants. The minimum force required

for breaking up the house of cards structure – which in rheology is called the »yield point« – prevents the settling or floating of particles, including pigments, and increases the storage stability of fluid systems. The main function of all Optigel® products is the thixotropic stabilization of aqueous systems. Depending on the grade, a low to very high thickening effect is connected with the stabilization. Natural smectites for use in cosmetics and personal care are carefully selected, refined, and optionally sterilized. The organically modified Optigel® grades show a high to very high thickening effect.



Products and Characteristics

All Optigel® products listed below are supplied as fine, free flowing powders.

Product	Optigel® CL	Optigel® CK	Optigel® WX	Optigel® WM
INCI Name	Magnesium Aluminum Silicate	Bentonite	Bentonite (and) Xanthan Gum	Bentonite (and) Cellulose Gum
Colour of powder	white	off-white	off-white	off-white
Aspect of gel	milky white	yellowish-greyish	yellowish-greyish	yellowish-greyish
pH-stability	2 - 13	2 - 13	2 - 12	5 - 11
Thickening effect in water	low	medium	high	very high
Stabilizing effect	high	high	very high	high

Further Optigel® grades are available for special applications. In the USA Rockwood manufactures similar products under the names Gelwhite® and Bentolite®. Please contact us for more information about this, as well as concerning the synthetic layered silicates Laponite®.

Incorporation

In order to obtain maximum efficiency, the use of high shear equipment (dissolver, mill) for incorporation of Optigel® is recommended. The procedure typically is as follows:

1. Charge water to the dispersion vessel.
2. Add Optigel® under agitation.
3. Mix at high speed for 10 – 15 minutes.
4. Add additional ingredients.

Pregels can be made at concentrations between 3% (Optigel® WM) and 15% (Optigel® CL).

Apart from mechanical shear forces, heat evolution during paste preparation and aging of pregels overnight also support optimum dispersion. The addition of dispersing agents such as tetrasodium pyrophosphate at 5 – 10% based on weight of Optigel® can speed up full dispersion and improve performance in the final formulation.

Properties in Formulation

Various properties make Optigel® the preferred rheological additive for water phases in personal care:

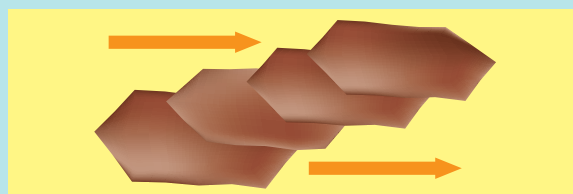
- ◆ **Electrolyte stability:** Sodium salts are tolerated. Higher concentrations of other soluble salts may affect the efficiency of Optigel®.
- ◆ **Surfactant compatibility:** Optigel® can be used with anionic, nonionic and amphoteric surfactants.
- ◆ **Solvent tolerance:** Optigel® can be used in the presence of up to 30% alcohol or other water-miscible solvents.
- ◆ **Temperature stability:** Products formulated with Optigel® remain stable in the heat and cold.
- ◆ **Opacity:** Optigel® forms milky, turbid gels. If clear, transparent gels have to be formulated, Laponite® should be used.

Multifunctional Benefits

Optigel® products provide a unique combination of rheological and cosmetic benefits:

- ◆ Thixotropic thickening
- ◆ Anti-settling effect, suspension of beads, pigments and other particles
- ◆ Prevention of phase separation and syneresis

- ◆ Stabilization of O/W emulsions
- ◆ Suitability for aerosols and pump sprays: Thixotropic gels with Optigel® atomise well.
- ◆ Reduction of running and dripping
- ◆ Uniform film formation: Pigments and sunscreen actives remain dispersed in the product and are evenly applied to the skin. This can help maintaining a high SPF.
- ◆ Skin feel: Due to the uniform shape of the platelets and their ability to glide easily over one another, Optigel® adds smoothness and improves “lubricity” without being sticky. Cosmetic products with Optigel® are soothing to the skin.



- ◆ **Sebum absorption:** Optigel® products have an oil absorption of about 40 g per 100 g smectite mineral. Optigel® is used in clay masks for absorption of sebum and body secretions.

Applications

Due to these benefits, Optigel® rheological additives are used in the following cosmetic and personal care products:

- ◆ Creams, lotions
- ◆ Anti-wrinkle lotions (Optigel® WX)
- ◆ Depilatories
- ◆ Facial masks
- ◆ Shower gels
- ◆ Sunscreens
- ◆ Shampoos (especially for suspension of zinc pyrithione antidandruff agents)
- ◆ Make-up
- ◆ Eye cosmetics
- ◆ I & I hand cleaning pastes



ROCKWOOD®
ADDITIVES

Rockwood Additives Limited, Rockwood Clay Additives GmbH, Rockwood Specialties (Singapore) Pte. Limited and Southern Clay Products, Inc. are wholly owned subsidiaries of Rockwood Specialties Group, Inc.

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