

BENTONITE - Additive for Paints, Coatings and Construction Material

VISCOGEL – ORGANO-BENTONITE RHEOLOGY ADDITIVES FOR WATER BASED SYSTEMS (PART 1)

We have already reported in detail (see "Bentonite - a versatile applicable natural product" inside acat 2/2008) on the geological formation, extracting, processing (activation) and of the application possibilities of bentonite. Now, we want to discuss more in detail the application possibilities of bentonite in paints, coatings and construction materials. As this comprises a wide range first the solvent applications and subsequently, in a second part the aqueous applications are dealt with.



Wanted

Concerning application the ideal coating should meet the following requirements

- Application of thick layers in a single operation
- No reduction of the coating at the edges
- No defects in appearance - gloss – matt - structure
- Easy to apply
- Cost-effective

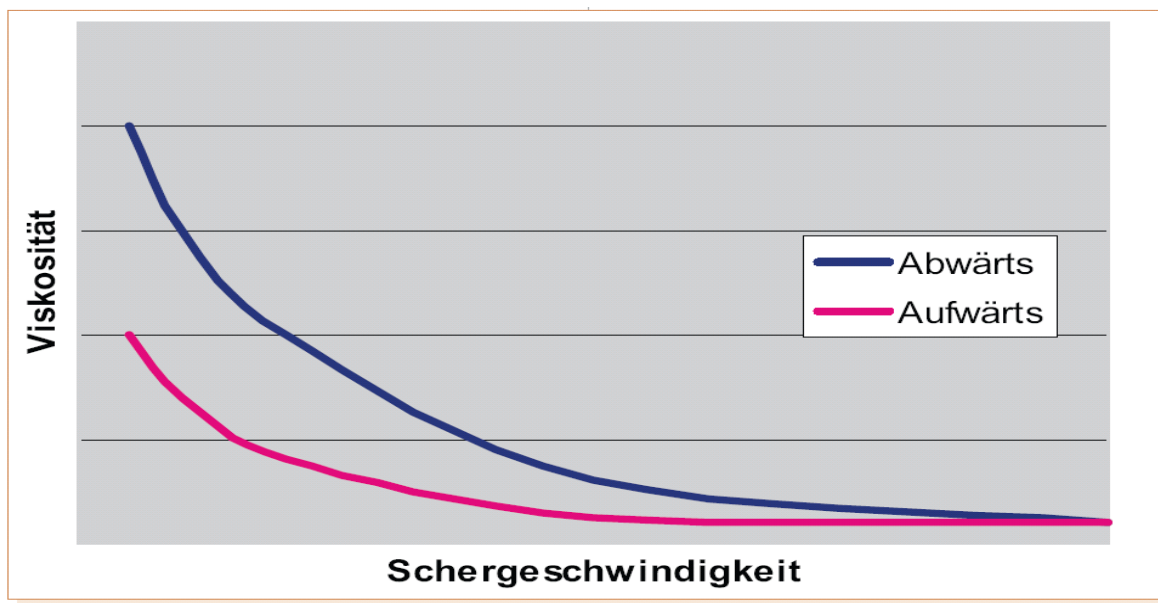
Viscogel is a brand of Laviosa (www.laviosa.it) for the organic modified aluminium phyllosilicate - montmorillonite.

The organic component is a quaternary organo ammonium compound: di-methyl-di-hydrogenated-tallow ammonium or di-methyl- benzyl-hydrogenated-tallow ammonium, or a combination of them.

Many of these requirements are in contrast to each other and to the physical laws. How should a colour know that it must not expire at the edges and perpendicular surfaces, but at the same time it should run well on the plane surface to avoid application marks (for example, the brush stroke) and to generate gloss? In fact these ideal requirements cannot be achieved to 100 percent. But with suitable

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raw materials and additives including bentonites, more than just a good compromise can be achieved.

Offered Properties

Bentonites are thixotropic in behaviour. This means that like in pseudo-plastic behaviour the viscosity is changed by the addition of bentonites. An important factor is time. Initially viscosity decreases with continuing shear stress and with delay it increases up to the initial value, when shearing is stopped.

The viscosity curve shows a typical „hysteresis loop“, an upwards and downward curve. This property causes a good compromise between

anti-sagging, flow and anti-settling during storage.

Anti-Sagging

To evaluate "stability" the coating is applied with a doctor blade with increasing layer thicknesses of the individual stripes. Subsequently the test sheet is placed vertically and evaluated.

Anti-Setting

During storage heavier particles tend to settle. Using organo-bentonite this tendency is reduced or the sediment can be easily stirred

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To evaluate "stability" the coating is applied with a doctor blade with increasing layer thicknesses of the individual stripes. Subsequently, the test sheet is placed vertically and evaluated.

again. For the evaluation settling or aging tests are carried out. Tests with a temperature of 60 ° C and lasting two weeks simulate storage of about eight to twelve months.

Application

Organo-bentonites have a positive influence on rheological properties, on anti-sagging, and they reduce settling in containers. They are used in paints and coatings – for decorations as well as for industrial applications (corrosion protection, automotive), as basic or top coat, gloss or matt, surface wood or concrete...

Asphalt or metal, one or two components, in air-or oven-drying systems - bentonites meet all requirements.

Features such as the prevention of pigment settling, an optimal colour distribution, layer thickness, reduction of atomization, etc. are highly appreciated for printing inks.

In the case of lubricants, the addition of organo-bentonite has a positive effect on the required rheology of the products, especially at higher temperatures and higher speeds. Bentonites are also used in cosmetics and in the coatings of food packaging because they have excellent skin compatibility (even around the eyes) and they meet the EEC requirements for food.



Organo-Bentonites are also used in paints and coatings

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Processing - Self-Activating Products

Self-activating organo-bentonites need for dispersion a relatively low mechanical energy and they do not need a chemical activator to delaminate the lamellas. In most manufacturing processes it can be added directly as a powder. It is not necessary to produce a pre-gel.

Further Advantages are:

- Higher dosing rates are possible compared to types that must be activated
- Post-additive adjustment in finished products is possible as only low shear forces are required
- Can be used in systems with low PVK where the achievable shear force is low

Conventional Organo-Bentonites

Conventional organo-bentonites need mechanical energy and a chemical activator to break down the lamellas of the individual

stacks. The used shears as well as the addition of a polar substance play a decisive role. They penetrate into the plates and try to separate them. This is countered by the Van der Waals forces, which strive to keep the particles together. By external force, the individual lamellas can be moved, but they have the tendency to return to their initial state, so the formation of a thixotropic gel structure is also possible.

For the optimal increase of viscosity type and amount of the polar activator are decisive. Useful polar activators are low molecular alcohols such as methanol and ethanol that are mixed at a ratio of 95:5 with water. Water is needed as it ensures the formation of the hydrogen bonds between the hydroxyl groups of the individual lamellas, which are necessary for the formation of the network.

DEPENDING ON THE POLARITY OF SOLVENTS THE FOLLOWING PRODUCTS ARE RECOMMENDED

Polarity / Use	Activation	Standard Types	High-performing Types
Low to medium polarity	Conventional activation	Viscogel [®] B4 Viscogel [®] B8	Viscogel [®] S4 Viscogel [®] S8
	Self- activation	Viscogel [®] ED	Viscogel [®] SD
Medium to high polarity	Conventional activation	Viscogel [®] B7	Viscogel [®] S7
	Self- activation		Viscogel [®] ED-2
High dispersable	Self- activation		Viscogel [®] XD
	Conventional activation	Viscogel [®] GM	Viscogel [®] S4 Viscogel [®] SD