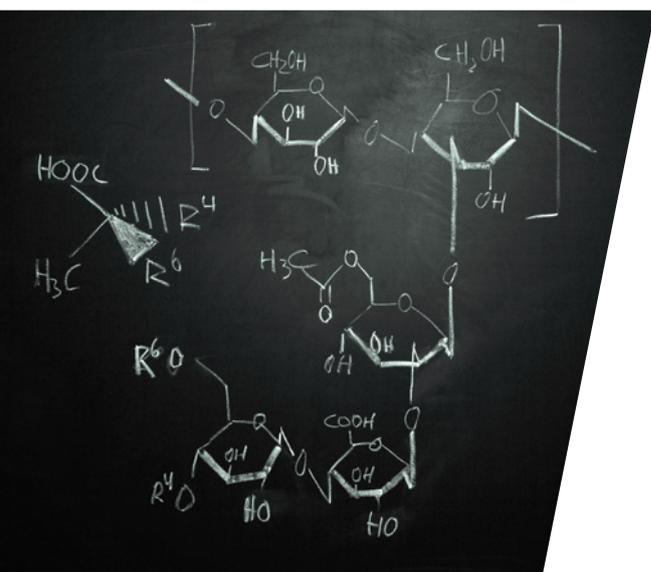




Thickening Agents

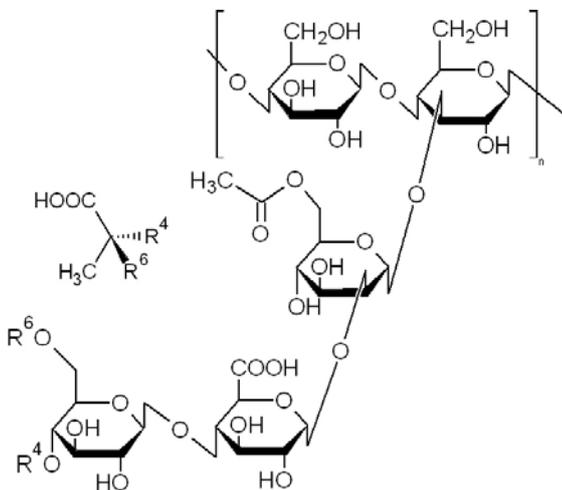
Biopolymers for viscosity control of aqueous systems.



 **Deuteron**[®]
ADDITIVES TO YOUR SUCCESS

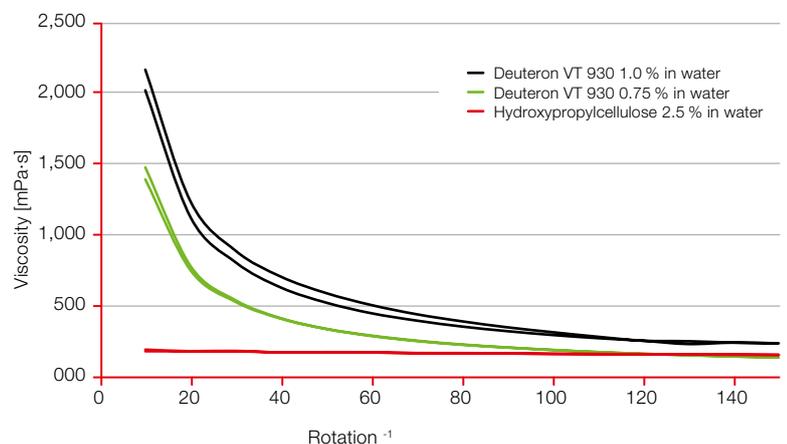
/ Deuteron thickening agents: Anionic heteropolysaccharides.

For over 30 years we have been selling xanthans which have found increasing use in the coating industry over the years. They are used world-wide as thickening agents in aqueous systems. In this brochure, we want to provide you with detailed information about our various xanthans. Xanthans, in their typical structure, are polysaccharides made of β -D-glucose-units. Due to the carboxyl groups on the side chains xanthan-molecules are anionic; they are essentially anionic hetero-polysaccharides.



Our thickening agents consist of pure xanthan gums and types with delayed swelling properties caused by a surface treatment with glyoxal as well as through granulation. Due to the compact powder structure of our xanthans, especially the granulated types, there is less dust formation and therefore easier handling. There are two fluid thickening pastes available for absolutely dust-free application, in which xanthan is pre-wetted with solvents.

The swelling of xanthan gums in aqueous coatings results in a pseudo-plastic (shear thinning) rheological behaviour. When the shear force (painting, spraying, rolling) is removed, the xanthan-containing systems regain their initial viscosity almost instantly. This is a typical behaviour and ideally suited for many technical applications to ensure good anti-settling properties at low processing viscosity and good process behaviour/stability. Purely Newtonian thickeners, such as cellulose derivatives, do not offer these possibilities.



Pseudo-plastic behaviour of Deuteron xanthans compared with newtonian properties of a cellulose thickener.

Our xanthans do not swell in organic solvents, however it is possible to mix finished thickener solutions with organic solvents. Here there is a high tolerance of up to 40% with respect to the solvent. The xanthans remain largely viscosity-stable. In the case of Deuteron SR 28 the solvent acceptance can be lower, which has to be separately tested in each system. Xanthan solutions are largely pH-value-stable. There is nearly no change in viscosity in the range between pH 2 and pH 12.

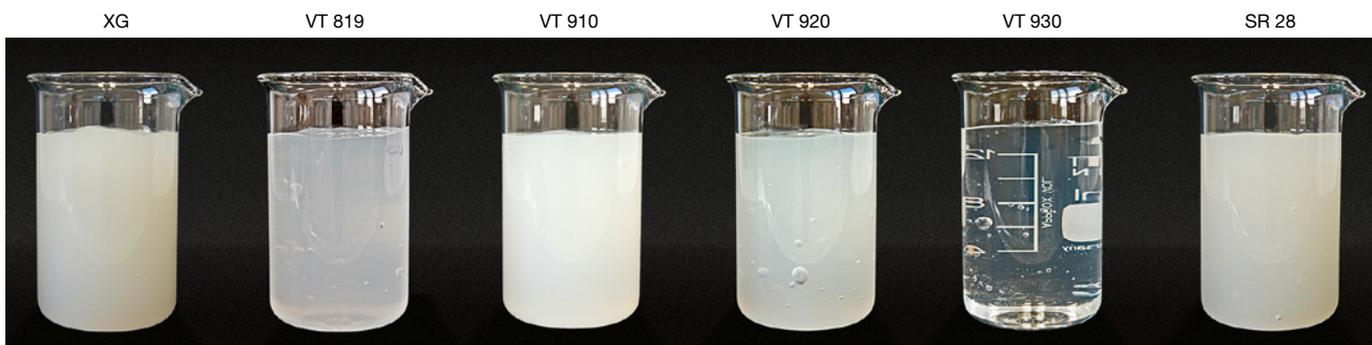
Our thickening agents are based on anionic heteropolysaccharides and have been part of our product range for over thirty years. Our customers worldwide rely on our xanthan gums as stabilisers and thickening agents for aqueous systems. We supply the gums in various forms and thus offer you alternatives for a wide range of applications. Profit from the flexibility our thickening agents give you.

/ Properties and advantages:

- Structure-viscosity, rapid recovery of viscosity following shear forces.
- Very good anti-sedimentation properties due to the shear thinning viscosity.
- High effectiveness at low addition rates.
- Easy-to-use versions available.
- Dust-free liquid variant available.
- Clear variant available.
- FDA / food-grade variants available.

/ Compatibility:

- Compatible with all other conventional thickeners and stabilizing agents.
- Very good pH- and temperature resistance.
- Good stability in high and low ionic solutions.
- High tolerance against organic solvents.
- Alcohol based solutions are stable up to 40% isopropanol and 50% ethanol.
- Stable when exposed to frost and thaw.



As xanthans are biopolymers it is mandatory to stabilise them against microorganisms using biocides that are conventional in the coating industry. Intermediate products based on xanthan thickeners must be stabilised with preservatives. Many of the conventional products in the coating industry are suitable for this purpose.

Xanthan solutions are preferably prepared under high shear forces using a dissolver. Additionally, we offer variants with delayed swelling properties which can be incorporated without high shear force without clumping.

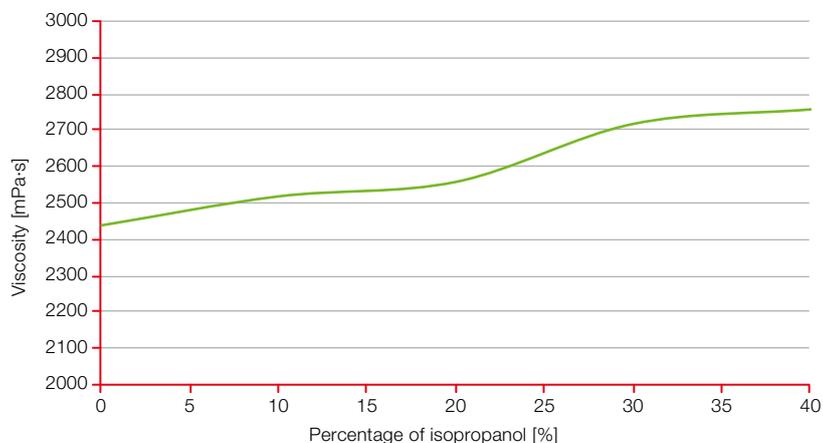
Problems with viscosity stability and/or optimal effectiveness can only occur under extreme conditions. This must also be tested in combination with any used acids or bases. However, the incorporation of xanthans should, if possible, take place in the neutral range and the pH value should be adjusted later.



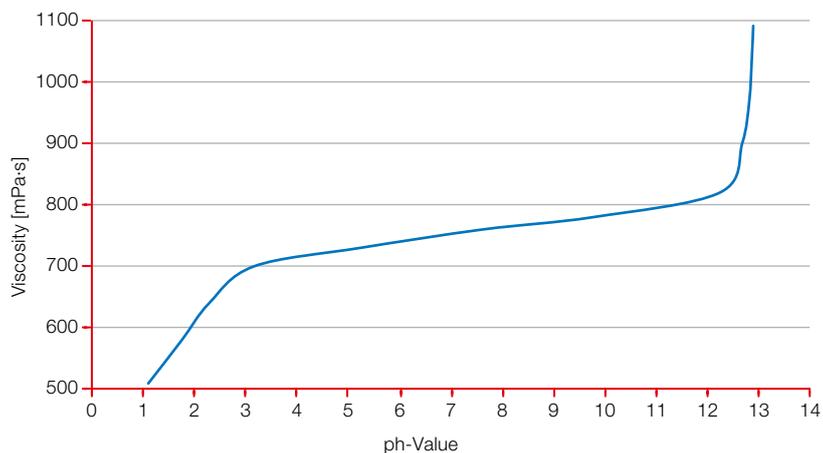
Swelling properties of Deuteron VT 819 (left) and Deuteron XG (right)

Due to the ease with which they can be incorporated, our liquid xanthan-products can be used as a post-additive as well to adjust viscosity. Careful dosing is manda-

tory and the preparation of pre-dilutions is possible. Use of xanthan as a dispersion agent is not possible, because the viscosity decreases with shear force. The high viscosities necessary for dispersion purposes cannot be reached this way. It is the case for all xanthans that excessive use of shear forces can cause a loss of effectiveness. For that reason, the xanthans should not be added to the millbase. In these cases, the rheological stabilisation should only be carried out after grinding.



Solvent tolerance of Deuteron XG, 1% in water / Isopropanol.



pH-stability of 1% Deuteron XG at different pH values.

We recommend a quantity of 0.1 % to 1.0 % to be used calculated based on the water content for all of our thickening agents. The optimal quantity must be determined by own trials. The dosage can be higher for our liquid thickener products and special requirements.

/ Standard Thickener

These products are powdered thickeners that swell relatively quickly when processed on contact with water. To prevent clumping, slow and const dosing helps. High shear forces are required to activate these products.

/ Deuteron XG

A highly effective powdered xanthan. No additional treatment.



/ Slow-swelling xanthans

A specialised chemical surface treatment using glyoxal provides these products with delayed swelling behavior of the xanthan particles in water. Since the surface modification has to be overcome first, the water has enough time to settle around each particle during processing, before excessive and overly rapid swelling causes clumping. At low shear forces, full swelling is already assured. For the preparation, a pH-value of \leq pH 7 is advantageous. By alkalisating it to pH 9 - 11, the surface-modification is removed and maximum viscosities can be set fast.

/ Deuteron VT 819

A highly effective powdered xanthan with specialised chemical surface treatment that swells slowly. Especially suitable for preparations with low ion content/ conductivity



/ Deuteron SR 28

A highly effective powdered xanthan in combination with a galactomannan. When low quantities are used, stable gels are already possible. It shows a higher base viscosity than pure xanthans but can be disadvantageous in terms of pH-stability.

/ Deuteron VT 910

A highly effective powdered xanthan with specialised chemical surface treatment that swells slowly.

/ Xanthans with coarse particles

Thanks to their significantly coarser particles these products achieve a delayed swell effect free of clumping without chemical surface treatment. This effect is not as strong as it is with the glyoxal-treated types, but does make it easier to work. The easy dispersing properties require no high shear forces. Additionally, it prevents dust.

/ Deuteron VT 920

Xanthan gum in granulate form. FDA, pharma and cosmetics-approved



/ Deuteron VT 930

Xanthan gum in granulate form. White, transparent type thanks to a specialised purification process. FDA, pharma and cosmetics-approved.

/ Pasty-like xanthans

These liquid products are pre-wetted using water-soluble solvents. The xanthans themselves are however not able to swell nor are they soluble in these solvents. The water displaces the solvent on the surface of the xanthans relatively slowly which prevents rapid, spontaneous swelling. This prevents clumping and makes it possible to work with them without needing high shear forces. Handling is especially easy and dust-free. Simply stirring them into the existing recipe with low shear force suffices.

/ Deuteron VT 855

A highly effective xanthan stabilised and pre-wetted in ethyl lactate.

/ Deuteron VT 856

Deuteron VT 856 contains ethoxypropanol instead of lactic acid ester.



	XG	VT 819	SR 28	VT 910	VT 920	VT 930	VT 855	VT 856	
Base	Xanthan	Xanthan	Xantha-galactomannan	Xanthan	Xanthan	Xanthan	Deuteron XG	Deuteron XG	
Delivered as	Powder	Powder	Powder	Powder	Pulvergranulat	Pulvergranulat	Liquid	Liquid	
Surface treatment / Solvent	No	Glyoxal	No	Glyoxal	No	No	Ethyl lactate	Ethoxypropanol	
Concentration approx.	100	100	100	100	100	100	40	40	%
Shear force necessary	Yes	No	Yes	No	Moderate	Moderate	No	No	
Dosage	0.1-0.5	0.1-0.5	0.1-0.5	0.1-0.5	0.1-0.5	0.1-0.5	0.1-2.0	0.1-2.0	%
Viscosity (form of delivery)	-	-	-	-	-	-	5,000	11,000	mPa·s
Food / Pharma / Cosmetic	No	No	No	No	Yes	Yes	No	No	
Viscosity 1% in Water approx.	2,400	2,700	3,400	2,500	2,200	2,200	660*	520*	mPa·s
Appearance	Milky / Yellowish	Milky / Yellowish	Milky / Yellowish	Milky / Yellowish	Turbid / White	Clear / White	Milky / Yellowish	Milky / Yellowish	

Typical values of anionic heteropolysaccharides.

Equivalent to the active content of 40%.

This leaflet intends to give technical advice without warranty and does not claim to be complete.

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