APPLICATION REPORT

Solutions for Your TOUGHEST
MIXING Applications in

CHEMICALS

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Xanthan Gum in Chemical Applications

SILVERSON®
HIGH SHEAR MIXERS/EMULSIFIERS

Xanthan Gum in Chemical Applications

Xanthan gum is a polysaccharide widely used for its thickening and stabilizing effect on emulsions and suspensions, particularly in the Food industry. It is also used in many chemical applications such as adhesives, ceramic glazes, drilling muds, foundry compounds, latex emulsions, lubricants, paints and coatings, paper, pesticides, textiles etc.

The Process

Xanthan gum can be dispersed into hot or cold systems, and many grades are available, including some designed for easy dispersion. Xanthan gum powders have a strong tendency to form lumps when added to water and a number of dispersion and hydration methods are used to try to overcome this. These vary according to the scale of production, other ingredients used etc. but include:

- Slow addition of the powder into the vortex in an agitated vessel. Once dispersed mixing continues to allow the product to hydrate.
- Xanthan gum may be premixed with other powdered ingredients which reduces the formation of agglomerates by separating the particles.
- Similarly the gum may be dispered into non-aqueous phase liquids such as oils, alcohols or glycols. This is then added to the aqueous phase allowing the gum to hydrate

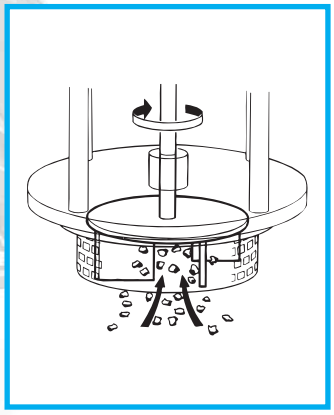
The Problem

Dispersion of gums and thickeners using conventional agitators can give rise to several problems:

- Agglomerates can easily form, even when the above steps are taken to reduce the risk. Agitators do not produce sufficient shear to rapidly break these down.
- Potential full yield is difficult to obtain using traditional methods.
- Many formulations contain unnecessarily high levels of gum to compensate for poor yield, increasing raw material costs.
- Once viscosity increase has started, agitation of the solution and therefore powder dispersion becomes increasingly difficult.
- Long mixing times are required to complete dispersion/hydration. This can degrade the gel.
- Premixing powders or non-aqueous phase liquid with the gum adds to process time and costs.
- Unhydrated gum can gradually hydrate during storage or subsequent processing, leading to undesired changes in product viscosity.
- It is not possible to create high percentage gum solutions with traditional methods. Solutions of this type may be required in certain applications where water is limited in the formulation.

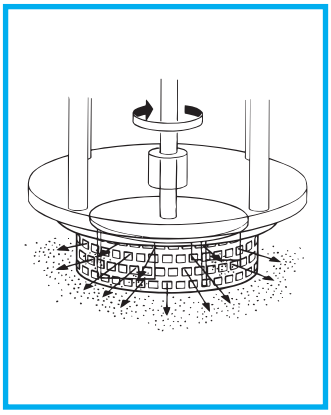
The Solution

A Silverson High Shear mixer can produce an agglomerate-free dispersion and fully hydrate Xanthan gum in a fraction of the time taken by conventional methods. This is achieved by the mixing/shearing action of the Silverson rotor/stator workhead. Operation is as follows:



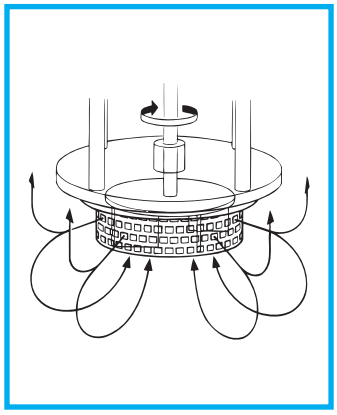
Stage 1

The vessel is charged with liquid and the mixer is started. The gum is added to the water as rapidly as possible. The high speed rotation of the rotor blades creates a powerful suction which draws the liquid and powder into the workhead where they are rapidly mixed.



Stage 2

Centrifugal force drives the powder and liquid towards the periphery of the workhead, where they are subjected to intense high shear in the gap between the rotor and stator wall. The product is forced out of the stator and projected radially back into the body of the mix.



Stage 3

Fresh materials are simultaneously drawn into the workhead. In a short mixing cycle all the material passes many times through the workhead, progressively reducing the particle size and exposing an increasing surface area to the surrounding liquid, accelerating hydration.

The Advantages

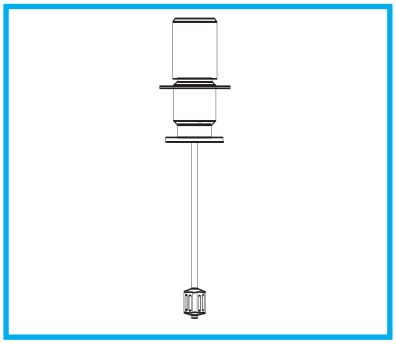
- Maximized yield/functionality allows products to be formulated with reduced gum content, cutting raw material costs.
- Agglomerate-free mix.
- Rapid mixing times.
- Consistent product quality and repeatability.
- Premixing of gum with powders or non-aqueous phase is not required.
- Operator error is effectively eliminated.

The batch size, formulation, type of ingredients and the viscosity of the end product dictates which Silverson model is best suited to processing requirements - see overleaf.

CHEMICALS

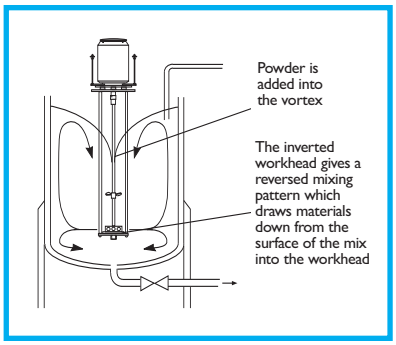
Silverson Ultramix

- Ideal for larger batches
- Capable of rapidly incorporating large volumes of powders
- Suitable for higher viscosity mixes
- Single-piece dynamic mixing head designed for CIP



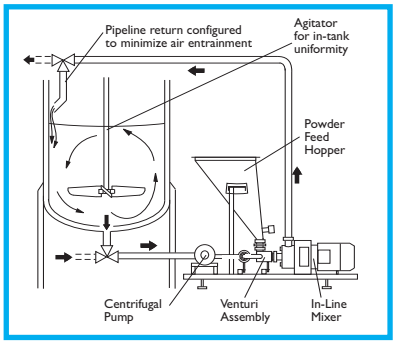
High Shear Batch Mixers

- Suitable for batches of up to 400 Gallons
- Can be used on mobile floor stands
- Can easily be moved from vessel to vessel
- "V" Range mixers (illustrated) available for bulk powder incorporation



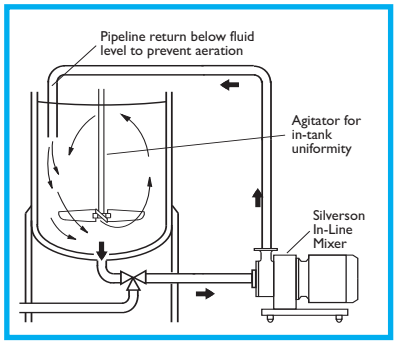
Silverson Flashblend

- Ideal for larger batches
- Capable of rapidly incorporating large volumes of powders
- Minimized aeration
- Minimized cleaning requirements
- Controlled powder addition rate
- Minimum operator input required
- Suitable for higher viscosities



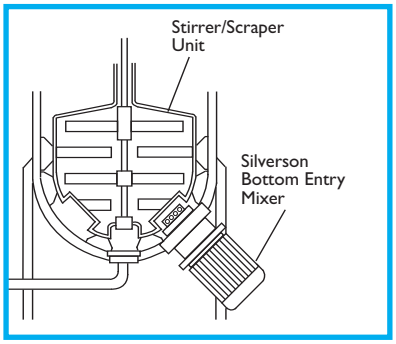
High Shear In-Line Mixers

- Ideal for larger batches
- Easily retro fitted to existing plant
- Must be used in conjunction with an efficient in-tank agitator to wet out powder
- Aeration free
- Self pumping
- Can be used to discharge vessel
- Ultra Hygienic models available



High Shear Bottom Entry Mixers

- Suitable for use on high viscosity products in conjunction with an anchor stirrer/scraper.
- No immersed shaft- reduces cleaning requirements
- Two-speed units available. Variable speed can be obtained with an inverter



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