

Solutions for Your TOUGHEST  
MIXING Applications in

# PHARMACEUTICALS



Production of  
Cough Mixtures and  
Pharmaceutical Syrups



# Production of Cough Mixtures and Pharmaceutical Syrups

Traditional cough mixtures are formulated around a syrup at 60-75% concentration which is made from sucrose, maltodextrin, glucose, invert syrup, etc. The remainder is made up of thickening agents, stabilizers and active ingredients.

## The Process

Manufacturers of cough mixtures generally produce their own syrups as this offers greater control of product quality. The manufacturing process must achieve several functions:

- Dissolving of the sugars to form a syrup.
- Hydration of powdered ingredients.
- Blending ingredients of widely different viscosity.
- Suspension or dissolving of active ingredients.
- The end product must be smooth, agglomerate-free and homogeneous.
- Equipment should conform to GMP standards.

## The Problem

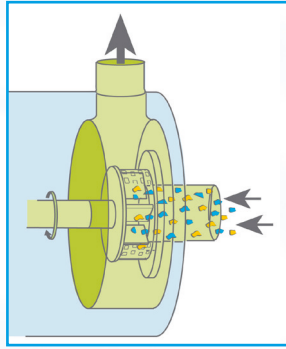
Using conventional mixers and agitators for this process leads to several potential problems:

- Conventional agitators cannot dissolve high concentrations of sugars at ambient temperature.
- Heating of the mixture will be required to aid solution. This is energy inefficient.
- The cooling process after this further adds to costs and process time.
- Crystallization of the syrup can occur during heating/cooling.
- Active ingredients can be damaged by heat.
- Thickening ingredients will form agglomerates which conventional equipment cannot disperse.

## The Solution

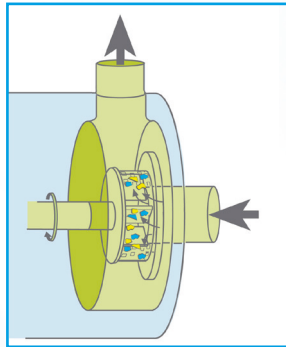
These problems can be overcome by using a Silverson High Shear mixer. The 3 stage mixing cycle illustrated below allows the sugars and active ingredients to be dissolved at ambient temperatures.

## Stage 1



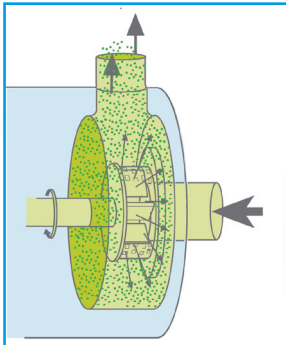
The vessel is charged with liquid and the mixer is started. The powdered ingredients are added without prior heating of the liquid. The high speed rotation of the rotor blades creates a powerful suction which draws liquid and solid ingredients into the workhead and rapidly mixes them.

## Stage 2



The high shear action of the mixer rapidly breaks down the sugar granules in the gap between the rotors and the stator wall, exposing the largest possible surface area of sugar to the water. This greatly accelerates the solubilization process. The active ingredients are similarly reduced to a low particle size and fully dispersed into the surrounding liquid.

## Stage 3



As the product is forced out through the stator, fresh powdered and liquid ingredients are drawn into the workhead and processed as before. A circulatory mixing pattern is set up within the vessel, ensuring all material is passed through the workhead many hundreds of times. This rapidly creates a very fine and stable suspension.

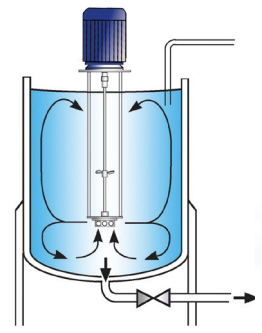
## The Advantages

- A Silverson high shear mixer can produce 66% sucrose syrup at ambient temperature.
- The heat of dissolution is imparted in the form of shear.
- Consistent product quality and repeatability is obtained.
- An agglomerate-free mixture is produced.

The batch size, formulation, type of ingredients and the viscosity of the end product dictate which machine from the Silverson product range is best suited to individual processing requirements:

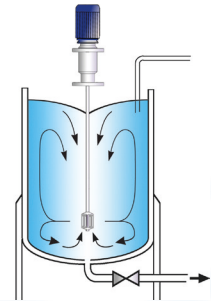
### High Shear Batch Mixers

- Suitable for batch sizes up to 800 US gallons
- Can be used on mobile floor stands
- Sealed units available for pressure/vacuum operation
- Small units available for R&D and pilot production



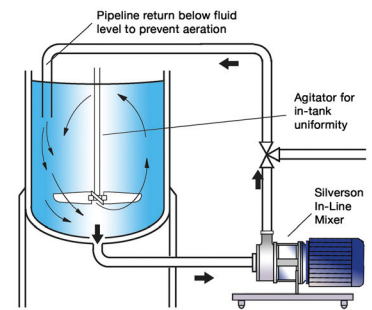
### Silverson Ultramix

- Ultra Sanitary CIP design
- Excellent in-tank movement
- Capable of rapidly incorporating large volumes of powders.
- Ideal for higher viscosity mixes
- Low maintenance



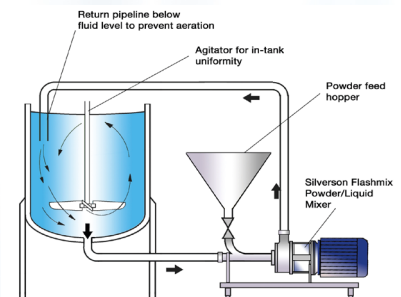
### High Shear In-Line mixers

- Ideal for larger batches
- Aeration free
- Easily retrofitted to existing plant
- Self-pumping
- Can be used to discharge vessel
- Ultra Sanitary models available



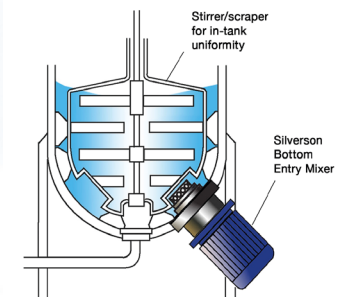
### Silverson Flashmix

- Ideal for larger batches
- Capable of rapidly incorporating large volumes of powders
- Minimized aeration
- Minimized cleaning requirements
- Suitable for higher viscosity mixes
- Suitable for operation at higher temperatures
- Minimum operator input required



### High Shear Bottom Entry mixers

- Suitable for use on high viscosity products in conjunction with an anchor stirrer/scraper
- Ultra Sanitary models available



For more information click here to go to [www.silverson.com](http://www.silverson.com)

Silverson Machines, Inc. 355 Chestnut Street, East Longmeadow, MA 01028

Ph: (413) 525-4825 sales@silverson.com

Information contained in this report is believed to be correct and is included as a guide only. No warranty is expressed or implied as to fitness for use or freedom from patents. Silverson Machines reserve the right to change product specification without notice.

Issue No. 3PA4