



APV Cavitor Technology in Hydration of Hydrocolloids and Proteins

A NEXT GENERATION MICROSCOPIC MIXING AND SCALE FREE HEATING TECHNOLOGY

The powerful forces of cavitation produce results that far exceed those of conventional technology

Controlled cavitation is a new breakthrough technology for microscopic mixing, dispersion/homogenisation and scale-free heating based on hydrodynamic cavitation.

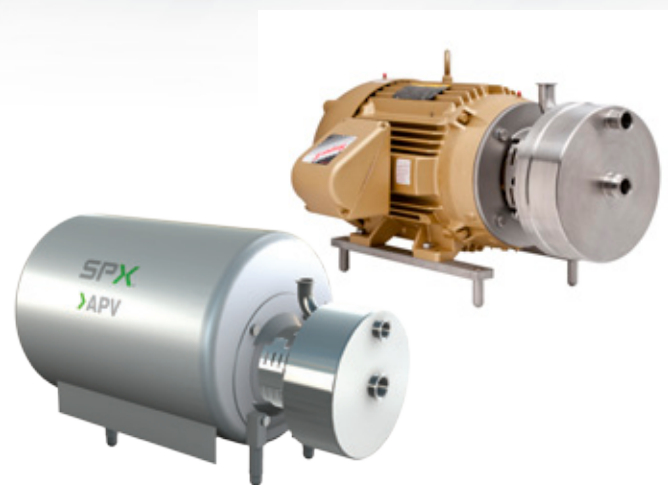
Hydrocolloids are commonly known as “gums.” Some examples of gums or minor ingredients are: Carrageenan, alginates, xanthan gum, locust bean gum, guar gum, pectin, gelatin, CMC. Examples of major hydrocolloids/proteins ingredients are starch vegetable and animal proteins; e.g. WPC.

Hydrocolloids are added to foods to produce different properties; e.g. affecting viscosity, gelling, thickening and stabilisation of foods. Furthermore the proteins affect the emulsification functionality.

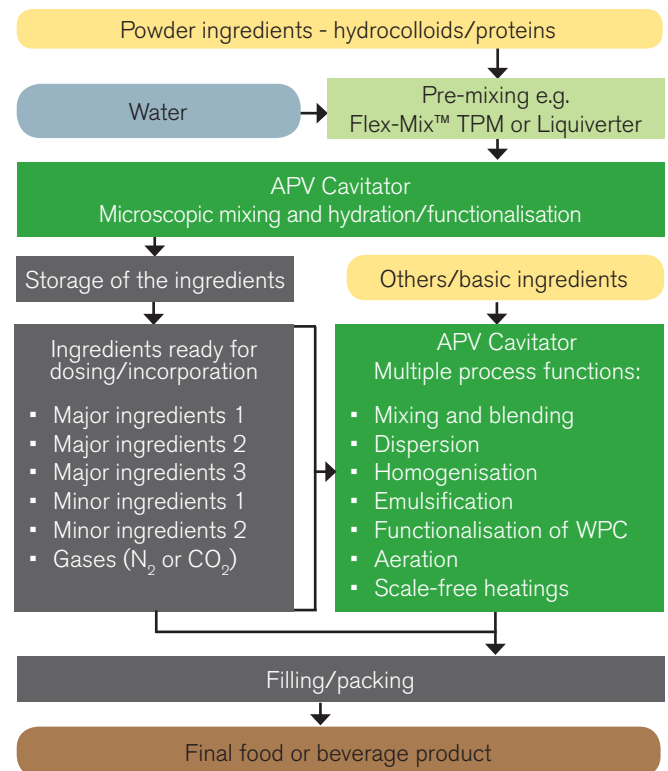
A key challenge in hydration of hydrocolloids is to ensure an efficient and fast hydration to maximise the yield and functional properties and minimise the process cycle and cost. The Cavitor offers a wide range of benefits to the food and beverage industry that meet the needs of our customers..

The principle of the APV Cavitor

The heart of the technology is a rotor spinning in a liquid chamber. The rotor has a number of radial holes. The spinning action generates internal liquid frictions (disk friction) and the holes generate hydrodynamic cavitation. The cavitation creates high shear ensuring a very efficient microscopic mixing effect and friction which generates controllable scale-free heating.



Processing diagram for powder hydration



Use of the APV Cavitator in hydration of hydrocolloids & proteins

A pre-mixing of the powder ingredients with water is needed prior to the cavitation process. An efficient pre-mixing can take place in the APV Flex-Mix™ TPM or Liquiverter. The pre-mix is then fed to the Cavitator for a final microscopic mixing resulting in a very efficient dissolving and complete hydration without any lumps or fish eyes that are often a problem in conventional mixer systems. Dependant of the hydrocolloids or protein type a single pass might be sufficient and even at lower temperature than normal.

In addition to hydration the Cavitator can be used for multiple functions in food & beverage processing as shown on the process diagram. This also includes microparticulation (MP) of WPC types to enhance functional properties like water binding, emulsification and a creamy mouth feel. The MP process combines denaturation and creation of ideal particle size distribution.

Example of CMC hydration:

The APV Cavitator resulted in a payback time of < 1 year in reduced batch cycle time, cleaning, labor costs, and reduced consumption of gum

Features and benefits of using the Cavitator in hydration of hydrocolloids and proteins

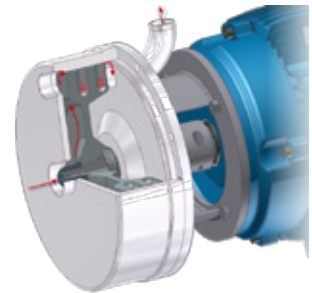
The controlled cavitation technology offers several unique features and benefits in hydration and functionalisation of hydrocolloids and protein powders:

- The excellent microscopic mixing effect eliminates powder agglomerates or "fish eyes" and ensures a fast and short hydration time of major ingredients like starch and proteins and further minor ingredients like gums etc., in some cases even at lower temperature.

Example of Tea hydration:

Test with the APV Cavitator confirmed a hydration time of approximately half an hour compared to > 5 hours for conventional hydration

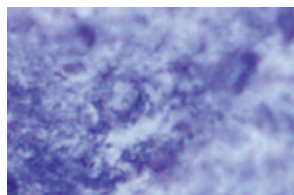
- The results are often significant savings on raw material, improvement of functional properties and reduced process cycles or longer plant up-time and consequently reduced OpEx.
- Functionalisation of WPC through a microparticulation process for very accurate particle size distribution at 1 µ to enhance water binding, emulsification properties and creamy taste.
- The Cavitator can be configured for gentle mixing of shear sensitive ingredient like proteins
- The Cavitator is highly flexible for a wide range of process functions in addition to mixing and functionalisation. This includes emulsification, low pressure homogenisation, dispersion of minor ingredients in high viscous products and gas dispersion for foaming or carbonation.
- The scale free heating feature enables more gentle heating and longer run times resulting in fewer and shorter CIP cycles with significant OpEx savings and enhanced product quality.
- Highly reliable and sanitary design meeting 3A and EHEDG standards
- Low maintenance time and cost also contribute to the overall reduced OpEx
- The APV Cavitator can be delivered as a single unit or as a plug & play skid mounted system.



Example of Guar Gum dispersion:

The APV Cavitator resulted in a superior dispersion of guar gum in egg white. This improved quality, reduced the amount of gum and the cleaning time and cost

Hydration of starch



Conventional technology



The APV Cavitator technology

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