SPXFLOW

APPLICATION SHEET

APV Cavitator Technology for Ice Cream Mix Production

A NEXT GENERATION MIXING, DISPERSION AND HOMOGENIZATION 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/homogenization and scale-free heating based on hydrodynamic cavitation.

Ice cream is a complex system of air (gas) dispersed as small cells in a partially frozen continuous fat phase. The fat is the inner phase in an emulsion where the milk solids and stabilizers are in a colloidal solution and sugar and salts form the true solution.

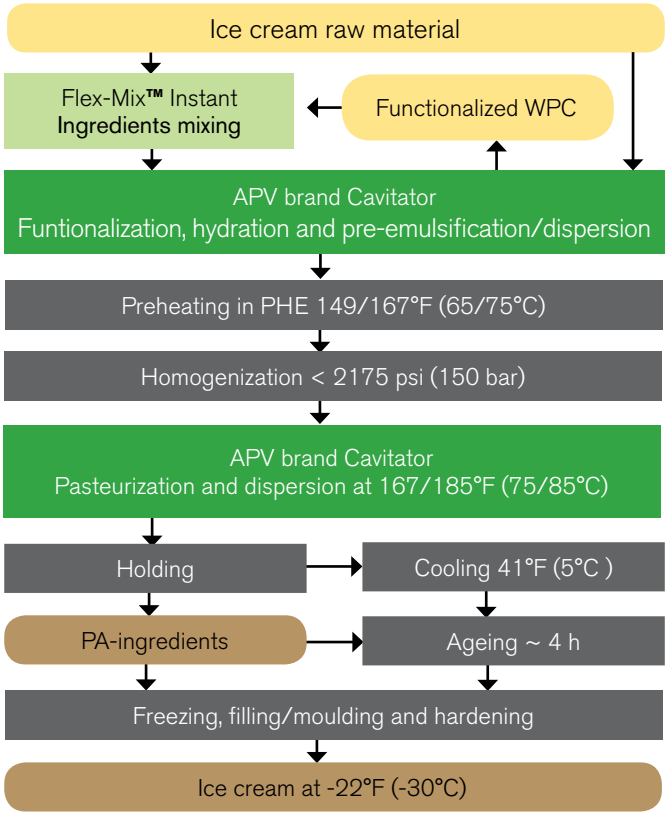
The key challenges in ice cream processing are getting the hydration right, in order to prepare the key ingredients during the emulsification state, and getting the right de-emulsification during the aging to the freezing state.

The APV brand Cavitator can help optimize the hydration of protein, emulsifier and stabilizer ingredients and functionalization of WPC.

THE PRINCIPLE OF THE APV BRAND CAVITATOR

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 homogenization effect and friction which generates heating away from the metal surface and thereby avoid fouling.

PROCESSING EXAMPLE FOR ICE CREAM



APV®

THE PRODUCTION PROCESS FOR ICE CREAM

The first step is powder mixing in the liquid media, using a vacuum mixing technology. Melted fat is pre-emulsified into the mixer in batch or semi continuous set up. Air and foam are eliminated due to the vacuum mixing and after pre-mixing the mix is transferred through the APV brand Cavitator for final emulsification and hydration of key components. The Cavitator is also used for microparticulation or functionalization of WPC and hydration of gums.

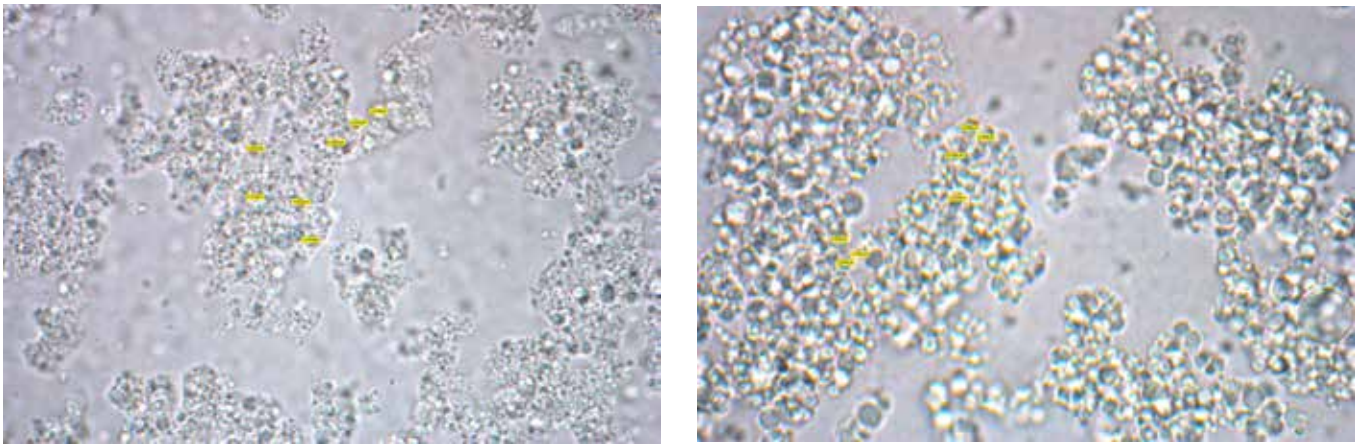
The ice cream mix is now preheated and pasteurized in a plate heat exchanger (PHE), homogenized and cooled, finally transferred to an aging tank where the mix is stored for at least 4 hours. After the aging step the mixture is whipped and frozen in a continuous freezer and filled before it is transferred to a cold storage condition where the final hardening of the ice cream takes place.

The Cavitator could also ideally be coupled to the PHE in a hybrid solution for combined scale free pasteurization and dispersion of the ice cream mix.

FEATURES AND BENEFITS OF USING THE APV BRAND CAVITATOR FOR ICE CREAM MIX

- The Cavitator is excellent for microparticulation of WPC in order to add new dimensions of functional properties to the WPC. In addition, it is very efficient for hydration of gums
- The Cavitator combines hydration and pre-homogenization in one step to obtain an excellent pre-emulsion
- The Cavitator process will result in a complete hydration of the key components. Many formulations contain unnecessary high levels of raw materials to compensate for insufficient mixing and hydration
- The Cavitator process results in small particles of pre-agglomerated ice cream mix. This leads to a potentially lower homogenizing pressure
- Thanks to the scale-free heating the run time can be extended with longer run times between Clean-In-Place (CIP) resulting in reduced operating costs on top of the other key benefits mentioned

Examples of Ice cream pre-mix production using conventional homogenization at 1958 psi (135 bar) (left picture) versus controlled cavitation at 60 Hz (right picture)



The microscopic pictures show comparable results for pre-agglomeration while difference in the particle size: 1µ for the homogenized pre-mix (left) and 2-3 µ for the cavitation pre-mix (right).

Based in Charlotte, North Carolina, SPX FLOW, Inc. (NYSE: FLOW) is a multi-industry manufacturing leader. For more information, please visit www.spxflow.com

SPX FLOW 611 Sugar Creek Road Delavan, WI 53115
P: (262) 728-1900 or (800) 252-5200 E: answers.us@spxflow.com

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