APPLICATION SHEET

APV Cavitator Technology in Ketchup and Barbeque Sauce Production

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

Tomato ketchup is one of the most popular condiments, and it is made in many varieties. Barbecue sauces are similar in formulation, as both products are composed of tomato paste, sweeteners, vinegar, salt, flavours and spices.

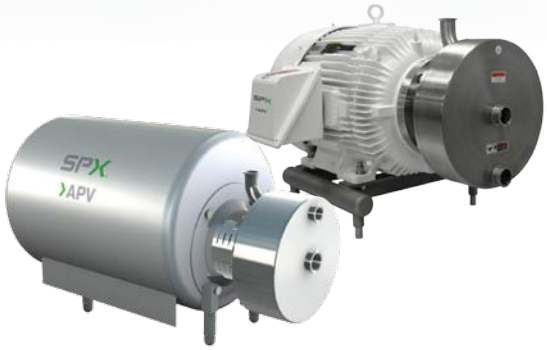
The most important qualities of these products are their flavour, viscosity, and shelf-stability without the separation of water or "syneresis". The APV Cavitator and its break-through microscopic mixing technology give processors new ways to achieve these product properties, with key benefits.

For some formulations, high viscosity comes from the tomato fibre and pectin naturally found in hot break tomato paste. Ketchup is typically preheated to pasteurisation temperature and passed through a homogeniser to increase the fibre surface area, allowing it to trap free water and to increase the viscosity. It is then deaerated to remove oxygen before filling.

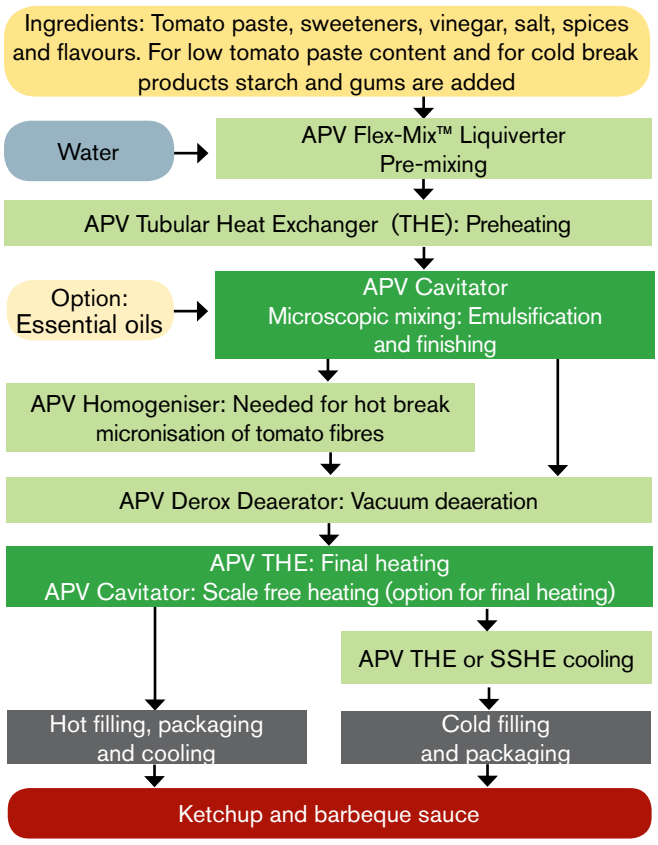
When a recipe with lower tomato paste content or cold break tomato paste is used ketchup and barbecue sauce may be thickened using cooked starch and/or hydrocolloids like CMC, xanthan, or guar gums.

Achieving consistent viscosity, appearance and texture is a significant challenge for all of these recipes. The Cavitator can pre-emulsify all ingredients before the homogeniser, reducing the homogenising pressure in some cases. It can completely hydrate starches and gums, creating high viscosity with lower levels of these ingredients. It can also be used for final heating when starch or other ingredients that foul heat exchangers are present.

Optimum flavour profiles depend on a uniform and consistent dispersion of the often costly spices and essential oils. Another benefit of the Cavitator is the excellent dispersion of such materials into viscous products.



Processing diagram for ketchup and barbeque sauce processing



The Cavitator can also pass spice particles and onion and garlic bits without damage, unlike a homogeniser. Heat-sensitive ingredients like volatile essential oils can be injected and thoroughly dispersed at the Cavitator, after the preheating section, for maximum retention of flavour..

The principle of the APV Cavitator

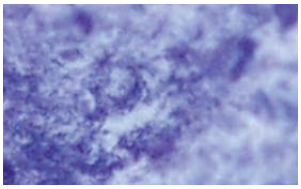
The heart of the technology is a rotor spinning in a liquid chamber. The rotor has a number of radial holes. The spinning action generates internal liquid frictions (disk friction) and the holes generate hydrodynamic cavitation. The cavitation creates high shear ensuring a very efficient microscopic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

Use of the APV Cavitator in ketchup and barbeque sauce

The Cavitator can be employed to completely hydrate any powdered ingredients like starch or gums, before they are metered into the batch tank or continuous process stream. It can also be used for final heating of recipes containing these ingredients, to minimise fouling and extend run times. In addition, the Cavitator can be used to pre-emulsify ketchup ingredients before the homogeniser so that tomato fibre can be micronised at lower pressures. Finally, the Cavitator can thoroughly disperse flavour ingredients that are heat-sensitive or volatile so they can be injected continuously at the final heating stage.

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

Hydration of starch



Conventional technology

The APV Cavitator technology

Features and benefits of using the Cavitator

- The intense microscopic mixing action produces a uniform distribution of all ingredients, controlled simply by adjusting the motor speed electronically, rather than by mechanically adjusting a clearance as in a colloid mill or homogenising valve.
- The accurate control of mixing can be used to produce a very consistent product viscosity and appearance, as well as full flavour development with reduced amounts of flavourings and sweeteners.

- Whole spices and other small particles may pass through the Cavitator without damage from the cavitation shock waves, and without building up inside the equipment as they might in close-clearance devices.
- The Cavitator is also ideal for performing the final heating stage when high-fouling starches and gums are present, providing longer run times.
- In addition, when used to hydrate powdered ingredients, the Cavitator can completely eliminate any fish eyes or clumping for a very smooth texture. This means less thickening agent may be needed since its full functionality will be available, thus saving cost.
- Very low maintenance requirements and inexpensive repair parts contribute to reduce OpEx.
- The Cavitator has a highly reliable, sanitary design meeting EHEDG standards and with 3-A certification.

Tomato ketchup

Barbeque sauce

SPX Flow Technology, Pasteursvej, DK-8600 Silkeborg,
P: +45 70 278 278 F: +45 70 278 330
E-mail: ft.emea.silkeborg.reception@spx.com

APV-16021-GB Version 01/2013 Issued 06/2013