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Why High Pressure Processing (HPP) Considered a Better Alternative to Thermal Processing?

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"The food industry is adapting high-pressure processing very rapidly because it retains the fresh like character of the food products while guaranteeing safety by inactivating foodborne pathogens,"

Dr. Worobo (Source: www.Refrigerated&frozenfood.com)


Food quality plays a major role under food preservation and safety, attracting the consumers while marketing the processed product. The basic requirement for a shelf stable product is inactivation of microorganisms present in the food. Thermal treatments, viz., pasteurisation and sterilisation have been carried out using heat since ages past. Those treatments which are powerful in killing microorganisms have found to be destructive on the quality and poor consumer acceptance. In order to increase the shelf life of a product without compromising on the nutrient loss and aesthetic appeal, the right choice of technology is essential. One such kind of technology catching up fast in the food industries is High Pressure Processing also known as Cold Pasteurisation. High Pressure Processing is found to be a good alternative when the sensory attributes (flavour, texture and colour) change during heat pasteurisation. Even though the effect of high pressure processing of foods has been known since the 19th Century, HPP products were developed in the 90's. High Pressure Processing gained its popularity in the food industries since 2000. It is one of the successful technologies under non-thermal method of processing in the area of food preservation.

High Pressure Processing is a non-thermal method of processing or in other words a cold processing technique, in which the flexible packed and sealed food is subjected to high levels of pressure transmitted by water (hydrostatic pressure), to inactivate its microorganisms, for extending the shelf life and to ensure the food safety of the product. It is considered to be a natural process that helps in maintaining the nutrients present in foods. According to research studies, the heat labile vitamin C was found to be unaffected during

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High Pressure Processing. High Pressure Processing is suitable to fruit and vegetable products, juices and beverages, meat products, dairy etc. The efficiency of a High Pressure Processing system depends on factors viz., the pressure applied, temperature, holding time, the microorganism targeted and the type of food to be processed.

Advantages and Applications

High pressure Processing helps in Inactivation of microorganisms, pathogens and vegetative spores; Improvement of sensory qualities and preservation of nutrients; Reduction or elimination of chemical preservative; uniform treatment and reduced processing time; beneficial to consumers since ready to eat fresh and processed foods without additives can be stored and consumed for a long period of time. Commercially it is used for pasteurisation of fruits and vegetable products, meat products etc. and also in preserving the high value ingredients (nutrients flavour) present in food.

Working Principle

High Pressure Processing works on Le Chatelier's principle and Isostatic principle. According to the first principle, whenever pressure is applied to a system in equilibrium, the system will react so as to counteract the applied pressure, reactions that result in reduced volume will be promoted under high pressure, and such reactions may result in inactivation of microorganisms or enzymes.

The second principle states that, food products, when compressed by uniform pressure from every direction, return to their original shape when the pressure is released.

Components and Process of Operation

High Pressure Processing system comprises of pressure vessel, pressurisation fluid, intensifier and pump. The process may be of batch or continuous type. HPP is normally carried out between 400 to 600 Mega Pascal (MPa), at room temperature. According to researchers, the pressure applied was found to effectively kill pathogens like salmonella, listeria, and E. coli.^{1, 2, 3&4}

Foods packed in flexible packaging materials and sealed are loaded into the pressure vessel. The vessel after filling with pressure transmitting fluid (water) is closed/sealed. The packaging material used must be able to withstand the high pressures and also having high barrier properties. A pump connected to the pressure vessel pressurises the water, and this pressure is then transmitted, to the food through its packaging via the water. The food packages surrounded by the pressure transmitting fluid are subjected to the same pressure existing in the pressure vessel. After holding the product at the desired pressure and time, the vessel is decompressed by releasing the pressure transmitting fluid. The processed product is then removed from the vessel and stored/distributed in the conventional manner.⁵

Conclusion

In the present time, there is an attraction towards additive free, nutrient rich processed products in the consumer market. One kind of a promising technology involving non thermal method of processing is High Pressure Processing. Inactivation of microorganisms, retention of nutrients without loss in vitamins and natural flavour, colour etc. could be achieved in the method of High Pressure Processing, which is now an emerging technology in the food industries. Method of High Pressure Processing is catching up fast in countries like New Zealand, Australia and other European countries.

References

1. Dogan C. and Erkmen O. Ultra high hydrostatic pressure inactivation of Escherichia coli in milk, and orange and peach juices. *Food Science and Technology International*, 2003: 9(6): 403-407
2. Dogan C. and Erkmen O. High-pressure inactivation kinetics of Listeria monocytogenes inactivation

- in broth, milk, peach and orange juices, *J Food Eng.*, 2004: 62: 47–52.
3. Alev Bayındırlı a, Hami Alpas a , Faruk Bozog˘lu a , Mirzahan Hızal. Efficiency of high pressure treatment on inactivation of pathogenic microorganisms and enzymes in apple, orange, apricot and sour cherry juices, *Food Control*, 2006: 17: 52–58.
 4. Daher D., Gourrierc S.L. and Pérez-Lamela C. Effect of high pressure processing on the microbial inactivation in fruit preparations and other vegetable based beverages. *Agriculture*, 2017: 7:72.
 5. Goutham Matta (2015). High Pressure Processing.
<https://www.slideshare.net/zgoutham/high-pressure-processing-of-food>