

HIGH PRESSURE PROCESSING 101

An introduction to the science & applications

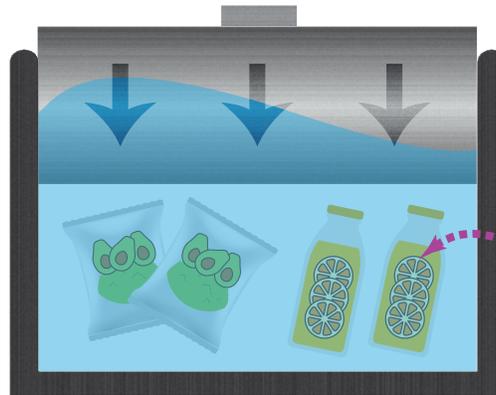
FOOD
PROCESSING
SCIENCE

OVERVIEW

High Pressure Processing (HPP) is a method of preserving food using very high pressures to **inactivate microbes and enzymes**.

In this process, also known as Pascalization, food is exposed to extreme pressures in an isostatic manner: meaning in an even, uniform direction from all sides. **Water** is usually used to transmit the pressure.

This means that even though the food is being squeezed, it **doesn't result in a squished product!**



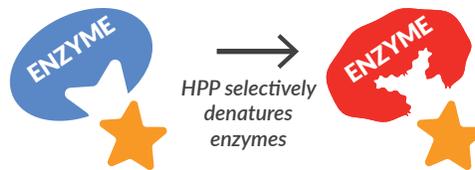
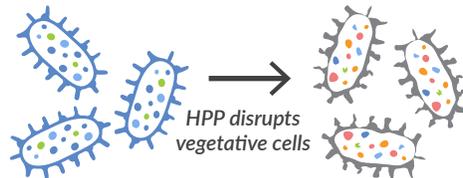
The use of a transmission fluid (i.e. water) ensures the pressure is exerted evenly on the products

HPP was first researched in 1890 focusing on milk pathogens!

SCIENCE

The extreme pressure used in HPP can **destroy vegetative microbes** by disrupting their normal cellular processes and also **denaturing certain enzymes**. This results in not only improved safety outcomes, but also **improved quality** and **extended shelf life**.

When combined with even higher pressures and elevated temperatures, **bacterial spores can also be inactivated** in a process known as High Pressure, High Temperature (HPHT). Although this isn't a common application yet.



This is how prepared **guacamole** is treated to prevent browning!

FUN FACTS!

Pressures used in HPP are equivalent to 3 school buses balanced on just one quarter!



HPP can alter cause the loss of red color in fresh meat by **oxidizing myoglobin**.



APPLICATIONS

Since HPP doesn't involve heat, it can aid in **preserving the flavor, texture, and nutritional quality of foods**. Products are usually processed in their final packaging, eliminating post-processing contamination risks.

HPP regimens usually range from **200 - 800 MPa for 1 to 10 minutes**, and are carried out in a batch or semi-continuous fashion. The HPP machines run anywhere from **\$500,000 to over \$3,000,000**.

DOs AND DON'Ts FOR HPP:

- | | |
|--|--|
| ✓ Medium-to-high moisture foods | ✗ Foods with air included (e.g. cake) |
| ✓ Vacuum-pack or flexible packaging | ✗ Foods in rigid packaging (glass) |
| ✓ Foods like juices, meat, fish, jellies, dairy products, RTE meals/sauces | ✗ Low moisture foods such as dry fruits, powders, spices |

HPP is also used to aid in the shucking of oysters and other crustaceans

