

EFFECT OF HIGH HYDROSTATIC PRESSURE ON FRUIT JUICES AND OTHER VEGETABLES AND THEIR DERIVATIVES

Amadeu Bernaus Ramírez, Universitat Autònoma de Barcelona June 2018

OBJECTIVES

- To present a treatment method that is increasingly used nowadays in food industry.
- To show the impact that high hydrostatic pressure produces on foods, specifically on juices.
- To compare high hydrostatic pressure with other thermal and non-thermal technologies.

HIGH HYDROSTATIC PRESSURE

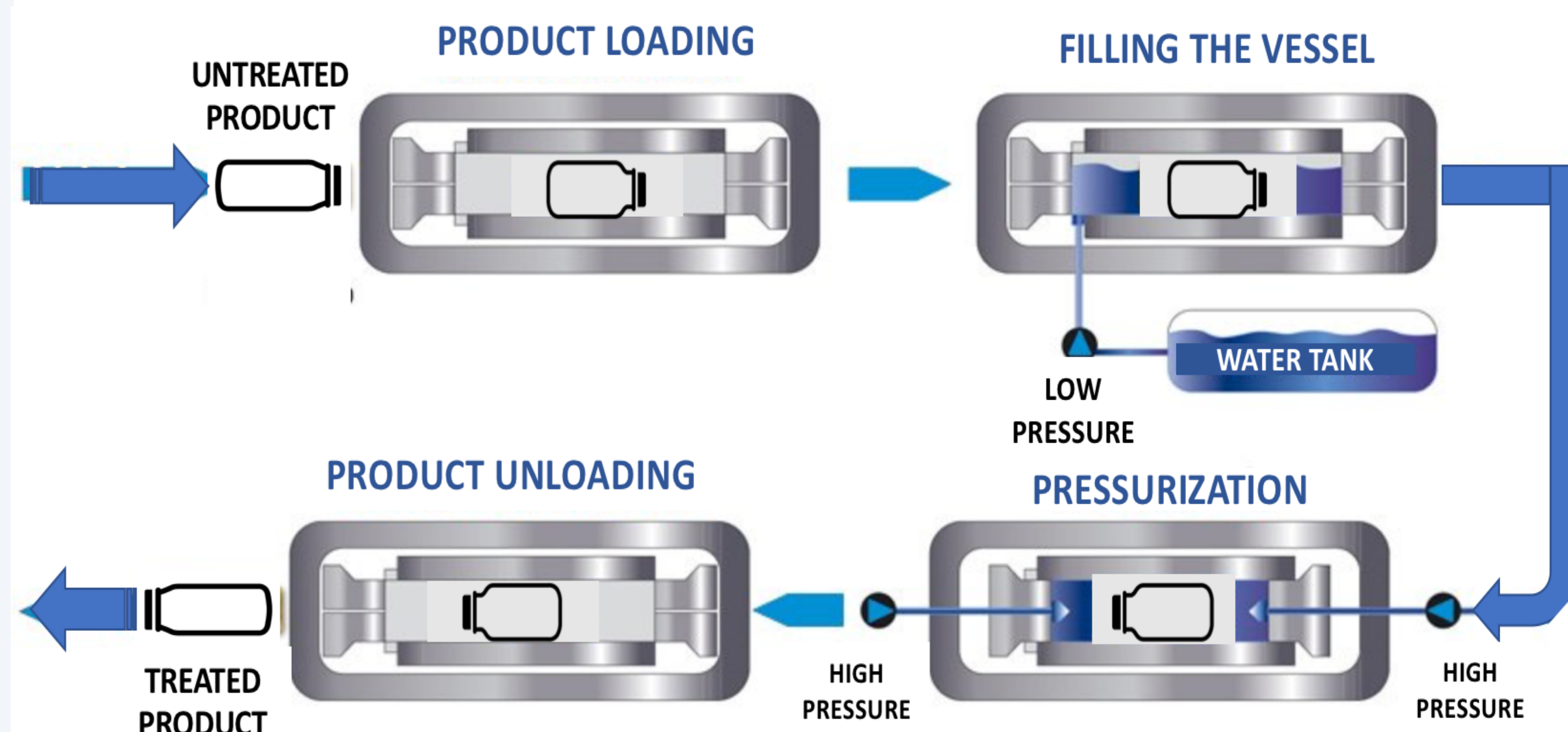


FIGURE 1. High hydrostatic pressure treatment process

PHYSICOCHEMICAL EFFECTS

Enzymes

- High pressure produces changes and therefore, enzymes lose activity.
- PME → 600 MPa 5/25 min, ↓18.8% - 49.6%
- PPO → 600 MPa 5/25 min, ↓45,1% - 81,2%

Antioxidants

- HHP disrupts cell walls improving the extractability of the phenolic compounds.
- Content and bioaccessibility of phenolic compounds increased by approximately 35%, in fruit drinks treated at 400 MPa/5 min

Vitamins

- 90% retention on average of ascorbic acid in samples treated at (400-600MPa).
- After HHP treatment, vitamin C did not show changes compared to untreated samples

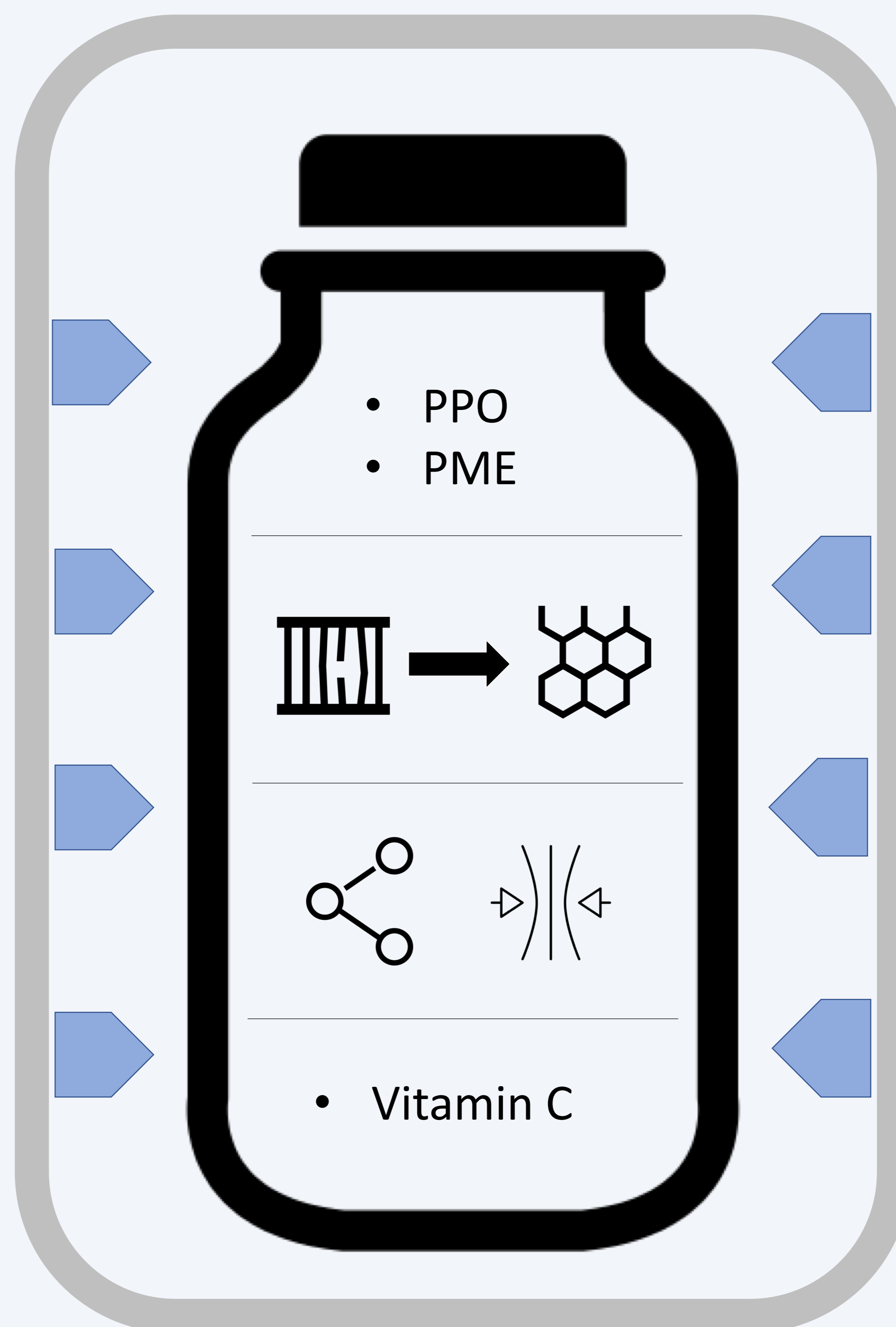


FIGURE 2. Simulation of the properties of a juice treated by HHP

ORGANOLEPTIC EFFECTS

Colour

- Juice colour showed few differences compared to untreated samples.

Taste

- The general acceptance of grape juice treated by pressure was quite similar to fresh juice.

Aroma

- Juices retain typical sensory and organoleptic characteristics of the fresh product.

MICROBIOLOGICAL EFFECTS

Spores

- 250MPa/↓T°C → 1st GERMINATION
- 2nd INACTIVATION
- Extremely resistant to pressure.

Bacteria

- Are inactivated by HHP, nevertheless pressure can cause them sublethal damage.

Mould & Yeasts

- Sensitive to HPP, but ascospores are resistant.

THERMAL TECHNOLOGIES

Pasteurization Flash Pasteurization Sterilization

- Loss of phenolic compounds, sensory and nutritional properties.
- Thermal treatment guarantees complete inactivation of microorganisms and enzymes throughout their shelf life.

NON-THERMAL TECHNOLOGIES

PEF UHPH Ultrasound

- Very similar effects compared to HPP.
- It has been seen that UHPH can totally inhibit enzymes and more microorganisms than HPP.

CONCLUSION

- Enzymes are partially inactivated, antioxidant activity is higher than untreated juices and vitamin remain stable.
- Spores are resistant but they can be inactivated in a two stage process, bacteria and moulds & yeasts are inactivated.
 - No significant changes are detected in L*, a*, b* and E after treatment, either in taste and aroma parameters.
 - The quality of HPP-treated fruit and vegetable products exhibit less variations than thermal treated samples.
 - The effects of the evaluated non-thermal technologies are similar to HPP ones.

BIBLIOGRAPHY

- Esquema de funcionamiento de una unidad de HPP. (Figure) retrieved May 29,2018 from: <https://www.hiperbaric.com/es/alta-presion>
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