

# **ASEPTIC PROCESSING AND PACKAGING, HTST PROCESSING**

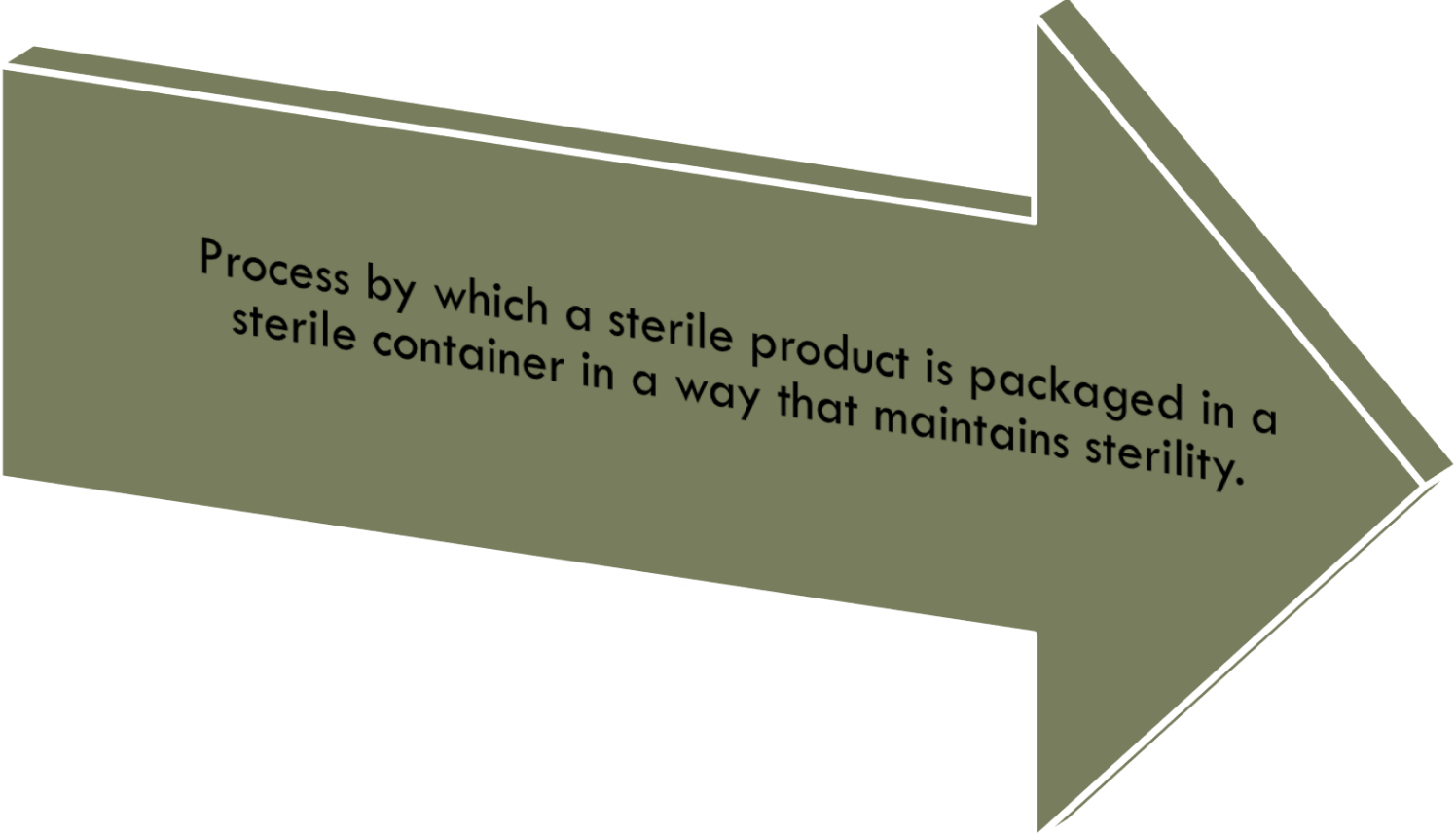


# What is Aseptic Processing?



# Asceptic processing

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Process by which a sterile product is packaged in a sterile container in a way that maintains sterility.

# Introduction

- The primary objective of thermal processing is to produce a **microbiologically stable** product and **inactivate enzymes**.
- Process by which a sterile product is packaged in a sterile container in a way that **maintains sterility**.
- Sterility is achieved with a flash-heating process which **retains nutrients and uses less energy** than conventional sterilization techniques.



□ Aseptic processing and packaging are essential, composed of five groups of operation.

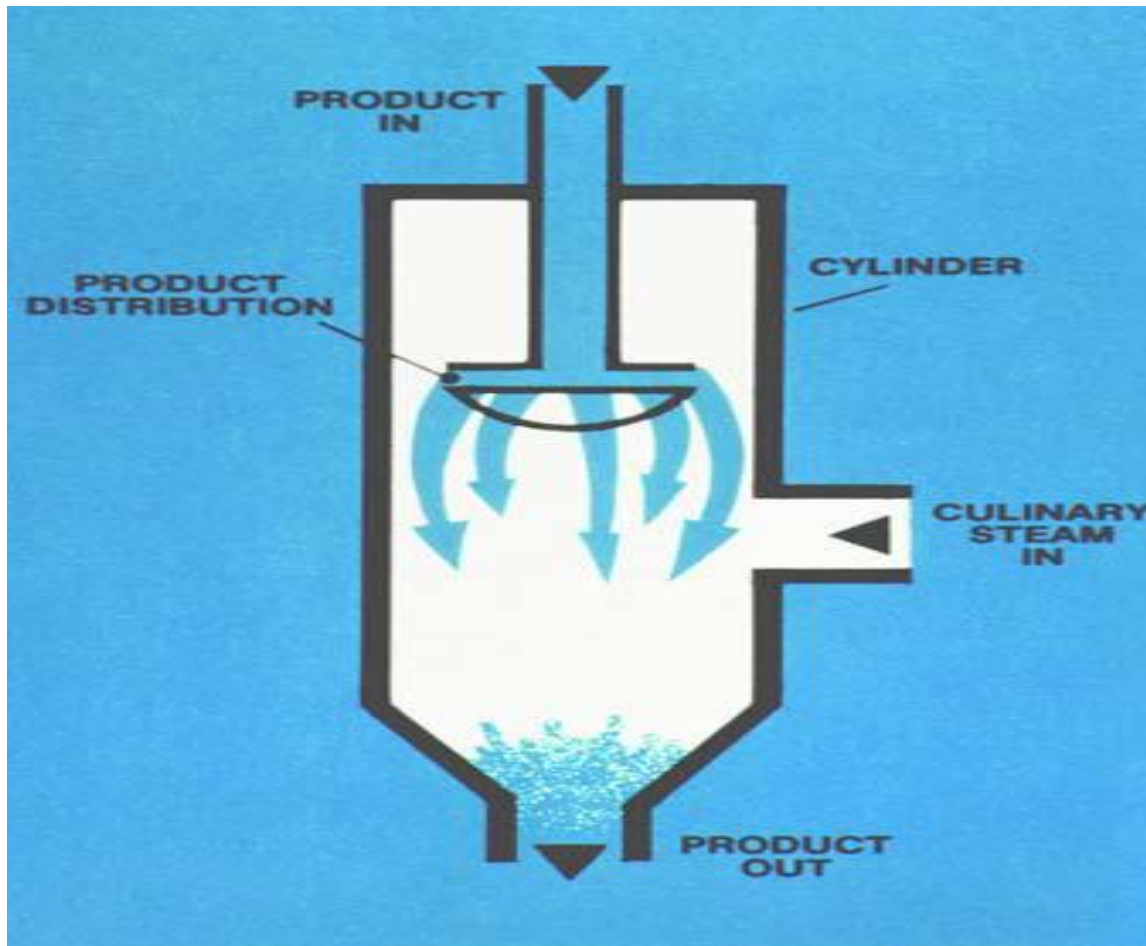
- Pre-sterilization of the equipment
- Food
- Container
- Filling and closure
- Maintenancy of sterility

# Types of heating

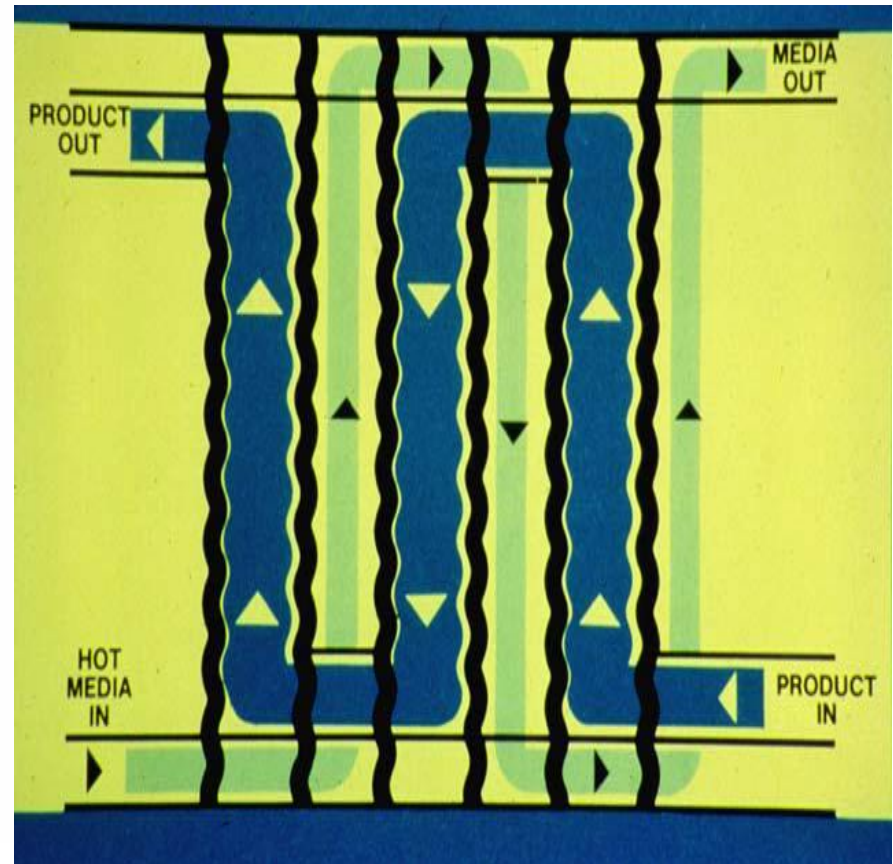
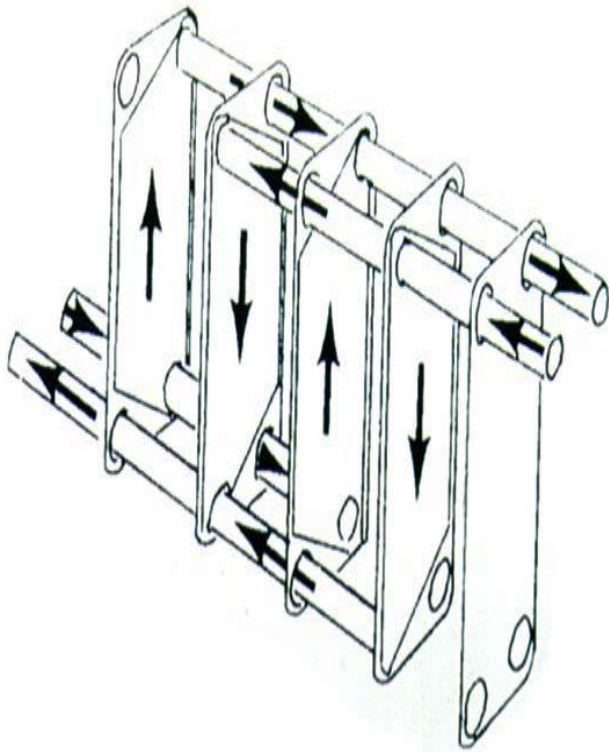
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- Direct heating, steam injection or infusion.
- Indirect heating – plate, tubular, and scrapped surface.
- Ohmic heating.

# Direct heating

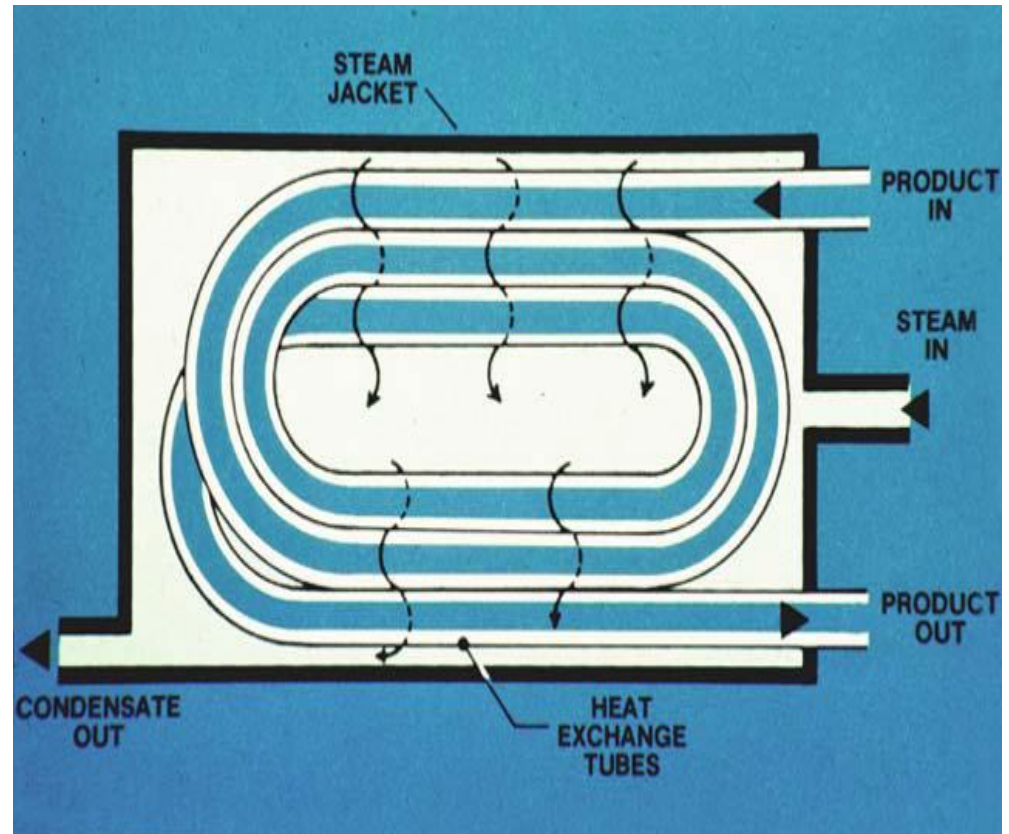
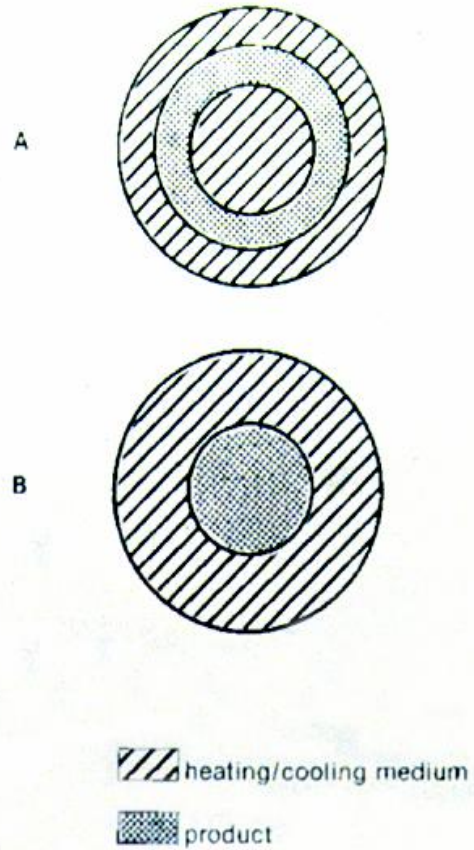


# Indirect heating – plate





# Tubular



# Biological validation

- To determine or validate the time/temperature sequence of the process that **will produce** required lethality.
- The protocol of the biological validation- **3 types**
  - **Standardized operations**
  - **Process validation operations**
  - **Spore validation operation**

# Sterilization of food contact surfaces and packaging

- 4 factors have to be adopted to the product and coordinated with each other.
  - ❖ Packaging material
  - ❖ Sterilization for the packaging material surface.
  - ❖ Packaging machinery
  - ❖ Packaging environment

# Aseptic packing

- Aseptic packing involves the filling and sealing of microbiologically stable product into sterilized container **under sterilized conditions.**
- Wide range of packaging materials.
- Principal types are
- Small-volume packages (**laminated cardboard brick and plastic thermoformed container**)
- Large –size container(**pouches, casks and tanks**)

# Different packaging materials...



# HTST Processing

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# Principle

- For every increase of  $10^{\circ}\text{C}$  in temperature beyond the maximum conditions of growth, there occurs a **10 fold increase** in the destruction of microorganism, responsible for product deterioration.

# HTST processing

- Ball and Olson (1957) have defined HTST processing as sterilization by heat for time ranges from **few seconds to 6 min**
- Applicable to certain in can methods of heating achieved in **flame sterilizer** and some **agitation cooker**.
- More applicable to continuous flow sterilization in which more efficient heat transfer is used.
- Milk industry continuous sterilization of milk is done by **UHT(Ultra Heat Treated)** above **135°C**



# Cont....

- Relatively long time and temperature upto 121°C employed.
- **Affects** the quality of the food in appearance, flavour and nutritional value.
- HTST technique
- Two methods are employed

# 1<sup>st</sup> method

- Food is heated to high temperature in bulk or on-steam.
- It **may or may not** be partially **cooled before filling**.
- The hot product is filled and sealed in the can.
- **Residual heat**- sterilise the container and lid.
- For foods of pH above 4.5 filling temperature is maintained above 100°C.
- Carried out at low pressures.

## 2<sup>nd</sup> method (Aseptic canning)

- Food is sterilized by heating to high temperature in bulk or on-steam.
- Cooled, filled and sealed in sterile containers.
- Process involves heating the product by pumping it through heat exchanger so that its temperature is raised to a controlled and pre-determined residence time to effect sterilization.
- Cooling to at least 35°C.
- Advantageous to heavy or viscous products.

# Drawbacks...

- Suitable only to **liquid and liquid containing small particles**.
- Problem of enzyme inactivation and **regeneration**.
- Certain enzymes like lipase and protease from *Pseudomonas* are capable of **surviving the UHT treatment**
- In some products like peas and spinach puree green colour is not retained.
- There is a fall in pH on storage of HTST products.

# Tank U



# References

- Food canning technology, edited by Jean Larousse and Bruce E. Brown. 1997 Wiley- VCH, Inc.
- Canned foods-thermal processing and microbiology A.C.Hersom & E.D.Hulland.
- Fish processing technology, K.Gopakumar.