Cannery waste water treatment

Canning

Canning is the method of preservation of food in which the food is processed and sealed in containers (of metal, glass and thermostable plastic) through agency of heat.

Canning provide a shelf life ranging from 1to 5 year.

Heating is the principle factor to destroy the Microorganisms and the permanent sealing is to prevenet re- infection.

Types of Foods are Canned:

(a) Low acid foods: (pH range of 5.0 to 6.8) This large group is commonly referred to as the low acid group.such as most vegetables, meats ,poultry, seafood, dairy .

(b) Acid foods: (pH values between 4.5 and 3.7) Fruits such as pear, oranges, apricots and tomatoes fall in this class.

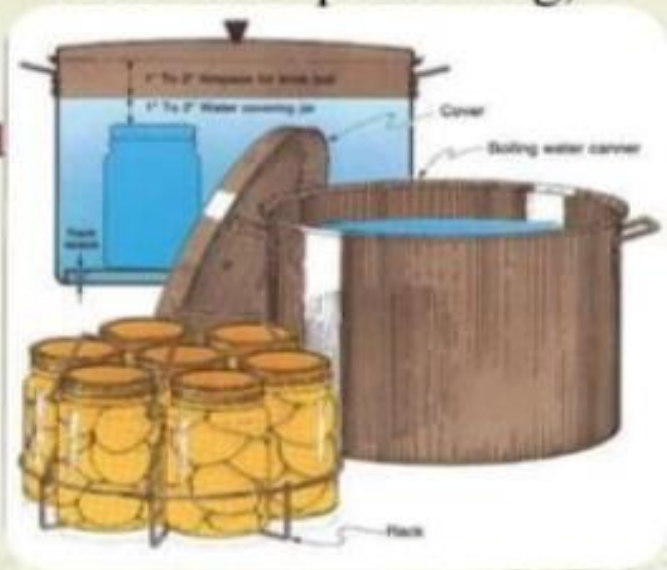
(c) High acid foods: (pH values range from 3.7 down to 2.3) Foods Such as pickled products and fermented foods. also Jams and Jellies are in this classification.

Canning method

Water Bath Canning

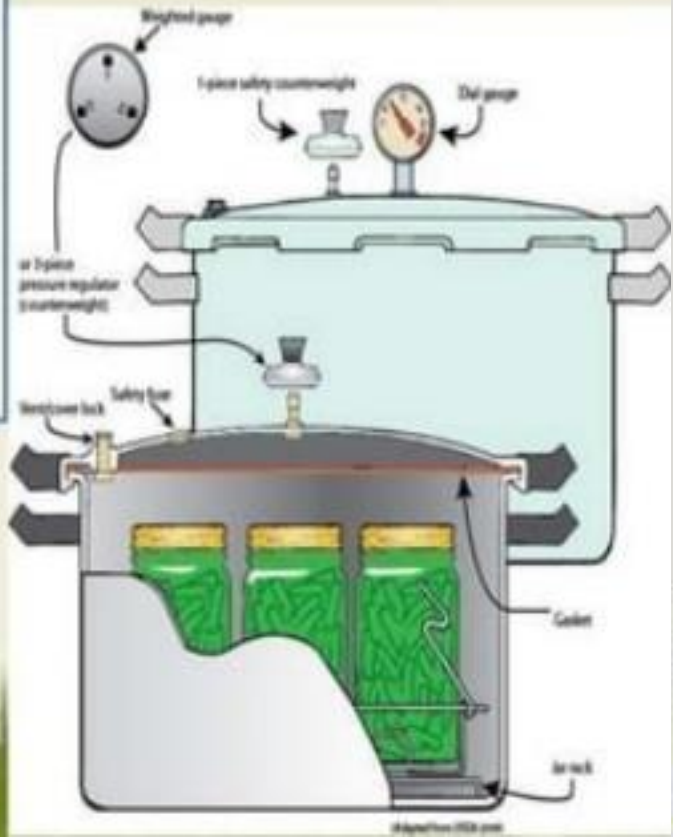
- Water bath canning is a shorter, lower-temperature canning process that is ideal for high-acid foods.
- The high acidity of the foods kills bacteria, allowing for the water bath method.
- Types of fruits and vegetables ideal for water bath preserving, include:

Fruits and fruit juices - Tomatoes with added acid
Jams and jellies - Pickles and relishes
Salsas - Chutneys
Vinegars - Condiments



PRESSURE CANNING

- Pressure canning heats contents to 240° F, eliminating the risk of food borne bacteria.
- Preservation of low-acid foods like many vegetables, meats, poultry and seafood use of pressure canning helps to keep foods fresh and safe to eat.
- Mixture of high-acid foods and low-acid foods can be preserved for longer period with pressure canning method.



Process

- **Selection**
- **For canning , fruits and vegetables should be absolutely fresh.**
- **Over ripe fruit is generally infected With microorganism and lack of poor quality.**
- **Vegetables should be free from soil and dirt.**
- **It should be free from insects damage and malformation.**

- **Sorting and Grading**
- **Generally done by hand or grading machine (screen graders, Roller graders, Rope or cable graders)**
- **Grading is done with respect to size and colour.**
- **Washing**
- **Washing is done in different ways such as soaking in water, with cold and hot water spray.**
- **Spray wash is most Efficient method.**
- **Vegetables are soaked in diulte solution of potassium permanganate to disinfect them.**

- **Peeling**
- **Metal blade is used to remove outer skin or peel of vegetables.**
- **Hand peeling by machine , mechanical peeler are used.**
- **Blanching**
- **Treatment of fruits and vegetables with boiling water or steam for short period followed by cooling prior to canning called blanching.**
- **Eliminate the no. Of microorganism.**
- **Loosing the skin of fruit and vegetables.**
- **Inactivate the enzymes, thus Prevent the discoloration.**

- **Can filling**
- **Can are washed and subject to a steam jet remove any dust or foreign matter.**
- **Before filling of content a small amount of syrup (for fruits) and brine (for vegetables) is poured in the can to provide a medium to the content.**
- **Syruping and brining**
- **Cans are filled with 35-40%t sugar syrup and 1-2% brine at temprature of 79-82°c.**
- **Objective of this step isto improve the taste of canned food and fill the inter space between fruits and vegetables.**

- **Clinching and lidding**
- **Canes after being filled, are covered loosely with Lid and Passed.**
- **Lidding is now replaced by clinching in which lid is partially seamed to the can by single first roller action of double seamer.**
- **Exhausting**
- **Cans are passed through a water at 82-87°C or moving conveyor belt through a steam box.**
- **Time varies from 5- 25 min on the nature of substance.**
- **It reduse the risk of Corrosion of tin plate and pin holing during storage.**

- **Sealing**
- **After exhausting the cans are sealed by special closing machines known as double seamers.**

- **Processing/sterilization**
- **Processing consists of heat treatment which is sufficient to eliminate the growth of Microorganisms.**
- **Fruits are processed at 100°C and vegetables at 116-120°C.**
- **Washing and cooling**
- **Cans are closed and pass through a detergent spray washer to remove the dirt and grease.**
- **Detergent spray wash followed by fresh warm water rinse (66°C).**
- **Immediately after processing the cans are cooled in Water at temperature of 36-42°C.**

- **Labeling and storage**
- **After canning process, the cans are labeled,packed and stored at dry place.**
- **Storage temperature of sterile canned meat product should not be above 21.1°C.**

Advantages of canning

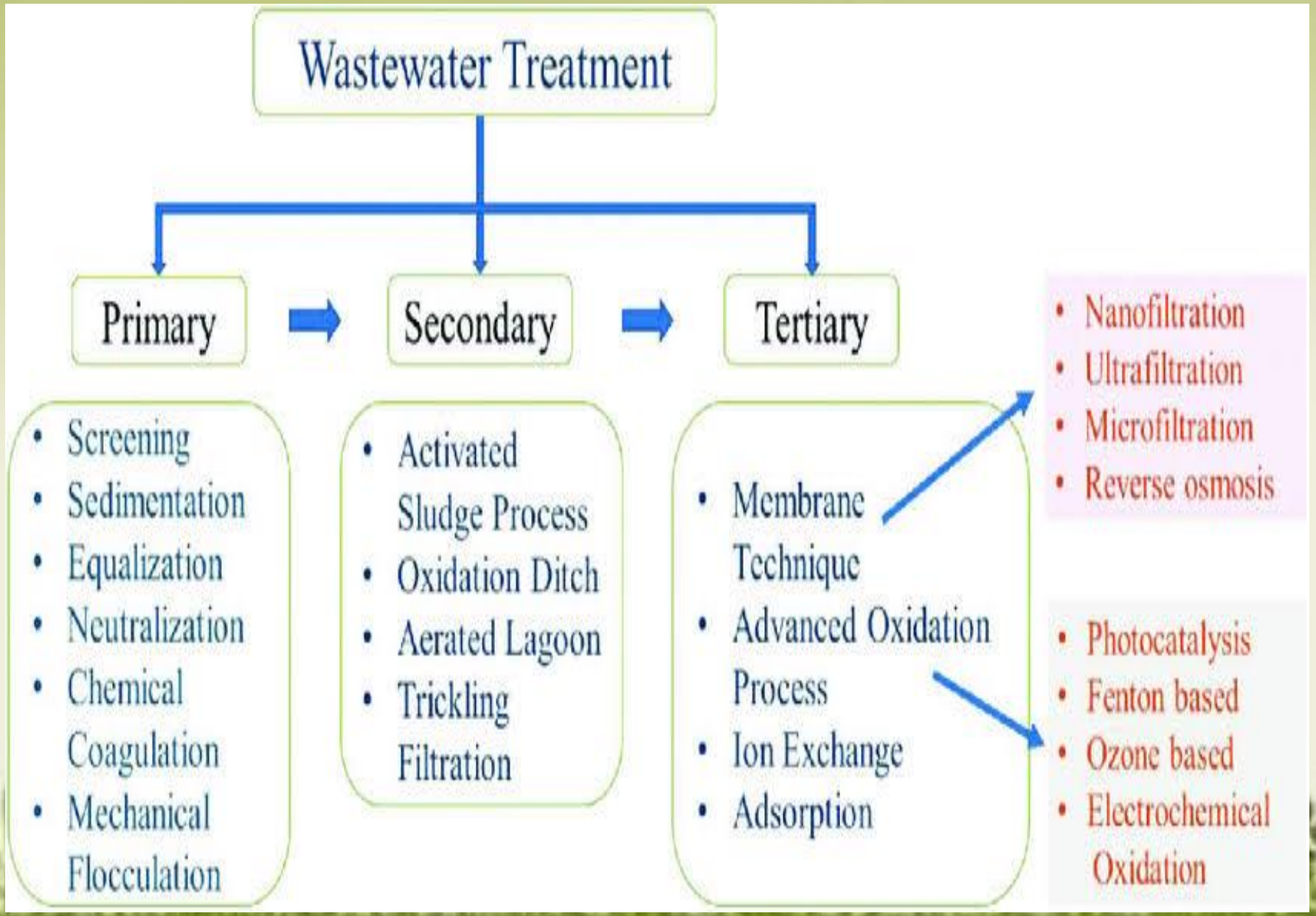
- Canning alters food chemically by changing the moisture, pH, or salinity levels to protect against microbes, bacteria, mold, and yeast.
- It also limits food enzyme activity.
- Can keep canned foods on shelves from 1-2 years or longer
- Can be economical when using home grown or locally grown produce.
- Canning your own food is an excellent way to reduce your environmental impact.

Disadvantages of canning

- ✓ Glass jars can be break.
- ✓ Seals can be broken causing spoilage.
- ✓ Canning is time consuming.
- ✓ Most canning is done in the heat of summer and can increase air conditioning costs.
- ✓ Canned food does not taste as good as fresh food does.
- ✓ It also requires a significant investment of time and equipment.

Material in Wastewater of canning industries:

- **Protein**
- **Starch**
- **Some simple sugars**
- **Volatile fatty acids**
- **Oil in two forms, macromolecule and emulsion**
- **Profit**
- **Detergent**
- **Disinfectants**
- **Water**


Wastewater Treatment
Primary
Secondary
Tertiary
• Screening
• Sedimentation
• Equalization
• Neutralization
• Chemical Coagulation
• Mechanical Flocculation
• Activated Sludge Process
• Oxidation Ditch
• Aerated Lagoon
• Trickling Filtration
• Membrane Technique
• Advanced Oxidation Process
• Ion Exchange
• Adsorption
• Nanofiltration
• Ultrafiltration
• Microfiltration
• Reverse osmosis
• Photocatalysis
• Fenton based
• Ozone based
• Electrochemical Oxidation

Wastewater treatment method of canning industries:

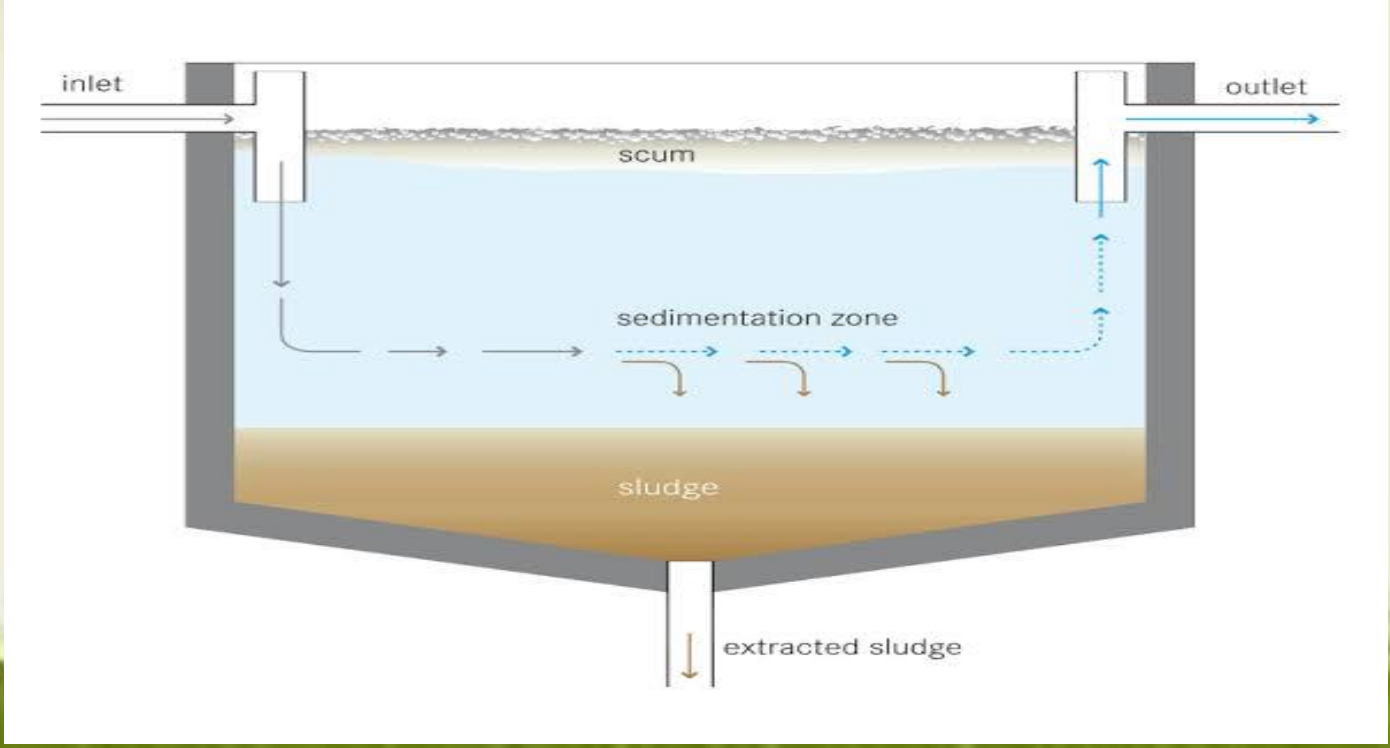
- **Physical and chemical purification**
- **Screening**
- **In order to separate large floating objects and heavy inorganic particles, the garbage collector is used in the physical purification stage.**
- **Fat removal by CPI method**
- **In this method, macromolecule fats become floating and are collected from the syste**m.

- **Coagulation and flocculent process**
- **some of the compounds in the wastewater, they do not have the ability to settle or separate by gravity and spontaneously.**
- **The existing bonds between the particles of these materials and water, which is an important factor in their non-separation from wastewater, should be broken by injecting flocculating materials and chemical polymers,**
- **The production of flocs or clots, they are settled by gravity and removed from Sewage is separated or neutralized as ineffective compounds.**

- **Chemical Wastewater Treatment Processes**
- **These chemical processes, which induce chemical reactions, are called chemical unit processes and are used alongside biological and physical cleaning processes to achieve various water standards.**
- **chemicals such as chlorine, hydrogen peroxide, sodium chlorite, and sodium hypochlorite (bleach) act as agents in the purification of wastewater at treatment facilities.**
- **There are several chemical unit processes, including chemical coagulation, chemical precipitation, chemical oxidation,ion exchange, and chemical neutralization and stabilization, which can be applied to wastewater during cleaning.**

- **Biological treatment**
- **Biological wastewater treatment or secondary treatment is defined as a set of biological methods in which the separation of biodegradable organic substances is possible under certain conditions using the activity of microorganisms.**
- **In this stage, carbonaceous organic materials and inorganic pollutants such as phosphorus and nitrogen are removed.**

- **Sedimentation tank**
- **The wastewater from the biological purification enters this tank and after passing the appropriate retention time and the activated sludge settles on the bottom of the tank, the treated wastewater is discharged through the metal overflows installed on top of the sedimentation tank.**



- **Excess sludge digester**
- **Additional sludge is undergo the process of digestion and stabilization while reducing the organic matter of the sludge and the number of pathogenic organisms, the sludge is used as fertilizer for It prepares agricultural uses.**

- **Disinfection**
- **The final treated wastewater must be disinfected for discharge into the environment. The wastewater will be disinfected by injecting disinfectants in this pond and then it will be reusable.**

Thank you