Canning

Food Science & Technology

Canning

- Is a method of preserving food in which the food is processed and sealed in an airtight container
- Prevents microorganisms from entering the food
- Is a form of long term food storage

Canning

- Removes oxygen
- Destroys enzymes
- Prevents the growth of unwanted bacteria, yeasts and molds
- Forms a high vacuum in jars creating a tight seal which keeps liquid in and air and microorganisms out

Canning Method

- Depends on the type of food being canned
  - food is divided into two categories
    - acid foods
      - are foods which contain enough acid to prevent the growth of bacteria
    - low acid foods
      - are foods which contain very little or no acid

Acid Foods

- Have a pH of 4.6 or lower
- Include the following:
  - most fruits
  - tomatoes
  - sauerkraut
  - foods large amounts of acid have been added to, such as pickles

Low Acid Foods

- Have a pH of greater than 4.6
- Include the following:
  - most vegetables
  - meats
  - poultry
  - seafood
  - soups
  - mixtures of acid and low acid foods such as spaghetti sauce

Canning Types

- Boiling Water Canning
  - 212°F at sea level
  - used for acid foods

Canning Types

- Pressure Canning
  - 240°F
  - used for low acid foods and mixtures of acid and low acid foods
  - prevents the development of *Clostridium botulinum*, the bacteria that causes botulism
    - *C. botulinum* forms protective, heat-resistant spores
    - to destroy the spore, a temperature above the boiling point must be used, which is created by added pressure
    - if the spores are not destroyed, they will germinate and produce toxins in the food when it is stored

Canning Processes

- Is determined by the type of food and the size of the jar to be used
- Can be a different amount of time for different jar sizes, size of the food, consistency of the canning liquid
  - time is determined by the length of time it takes to adequately heat the coldest spot in the jar

Packing the Jar

- Plays a large role in heat transfer through the product
- Can be completed by using one of the following packing processes:
  - raw or cold pack
  - hot pack

Raw or Cold Pack

- Places raw food directly in the jar and then hot, boiling liquid is poured over the contents

Fun Fact: The term **raw pack** is used when referring to this method when canning meat, poultry or seafood. The term **cold pack** is used when referring to this method when canning fruits and vegetables.

Hot Pack

- Involves cooking foods in liquid before packing and then the cooking liquid is poured over the food in the jar

Headspace

- Is the area in the jar between the inside of the lid and the top of the food or its liquid
- Is usually the following for certain foods:
  - jellies- ¼ inch
  - fruits, tomatoes and pickles- ½ inch
  - low acid foods- 1 inch to 1 ¼ inches

Headspace

- If too little, can result in the following:
  - food bubbling out during processing
  - proper seal may not occur because deposits can form on the rim
- If too much, can result in the following:
  - food at the top of the jar can become discolored
  - proper seal may not occur because not all of the air may be forced from the jar

Boiling Water Canning Procedures

- Place six inches of water in the canner
  - for hot packed jars, the water should be simmering at 180°F
  - for raw or cold packed jars, the water should be heated to 140°F
- Place jars on a rack in the canner so they do not touch the bottom of the canner
- The water should rise to one to two inches above the tops of the jars
  - more hot or boiling water can be added if necessary

Boiling Water Canning Procedures

- Begin timing when water is at a full boil
- After processing time, turn off canner, remove lid and wait five minutes before removing jars
- Remove jars straight out of canner and let cook for 12 to 24 hours
- Check seals
- Remove rings
- Store jars in a cool, dry, dark place

Advantages of Boiling Water Canning

- Include:
  - easy for beginners to learn
  - best method for fruits, high acid and pickled foods
  - inexpensive to start

Disadvantages of Boiling Water Canning

- Include:
  - temperature does not get high enough to ensure the destruction of microorganisms in food without high sugar or acid content
  - longer time period to complete canning process

Pressure Canning Procedures

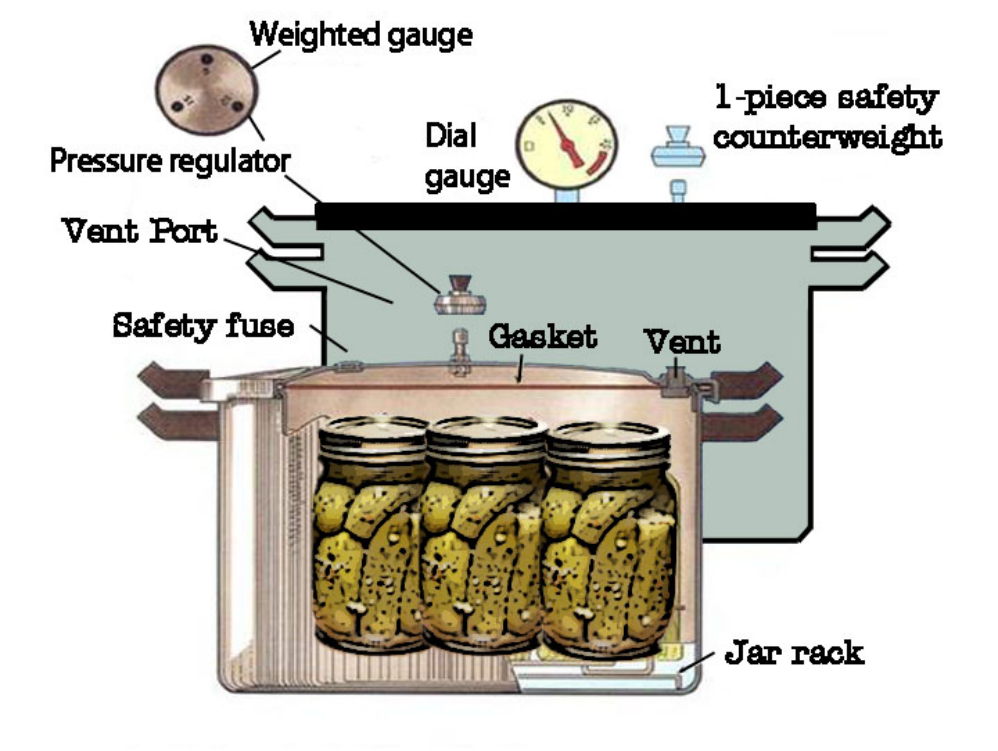
- Place two to three inches of water simmering or hot in a canner
- Place jars on rack in canner
- Put lid on canner with weight off or petcock open
- Allow a steady stream of steam to escape for 10 minutes

Pressure Canning Procedures

- Close vent or petcock
- Count time when correct pressure is reached
- Turn off heat at end of processing time and let pressure drop to zero
- Wait two minutes after pressure is at zero
- Remove weight or petcock and wait ten minutes

Pressure Canning Procedures

- Open canner and remove jars
- Cool jars 12 to 24 hours
- Check that the jars are sealed



Advantages of Pressure Canning

- Include:
  - best method for low acid foods, such as vegetables
  - foods reach a higher temperature
  - process is completed in a short period of time

Disadvantages of Pressure Canning

- Include:
  - startup cost is higher than boiling water method as a pressure cooker is required
  - can be dangerous if pressure is not monitored and released
  - some soft fruits can be damaged by high heat

Canning Safety Precautions

- Boiling Water Canning
  - make sure to use the proper type of jar and lid
- Boil jars for the proper processing time
- Do not touch hot jars with bare hands

Canning Safety Precautions

- Pressure Canning
  - check dial gauges
  - know your altitude, as this influences the pressure required for safe canning
  - handle gaskets carefully and never use those which are cracked or dried

Canning Safety Precautions

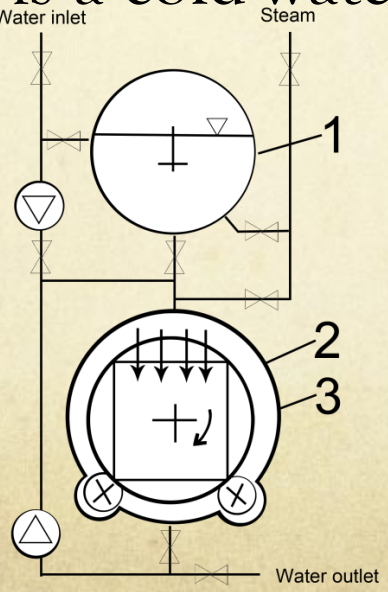
- Do not use jars with cracks or any evidence of nicks
- Do not fill racks to be extraordinarily heavy
- Take care around canners and pressure cookers; they are very hot
- Leave the proper amount of headspace
- Do NOT use jars made for commercial canning when home canning

Commercial Canning

- Uses continuous units of pressure canners called retorts
- Retorts include:
  - continuous retort
  - static retorts
  - agitating retorts

Continuous Retorts

- Allow the cans to be fed through an air lock, then rotated through a pressurized heating chamber
- Pass heated cans into a second section of the retort which is a cold-water cooler

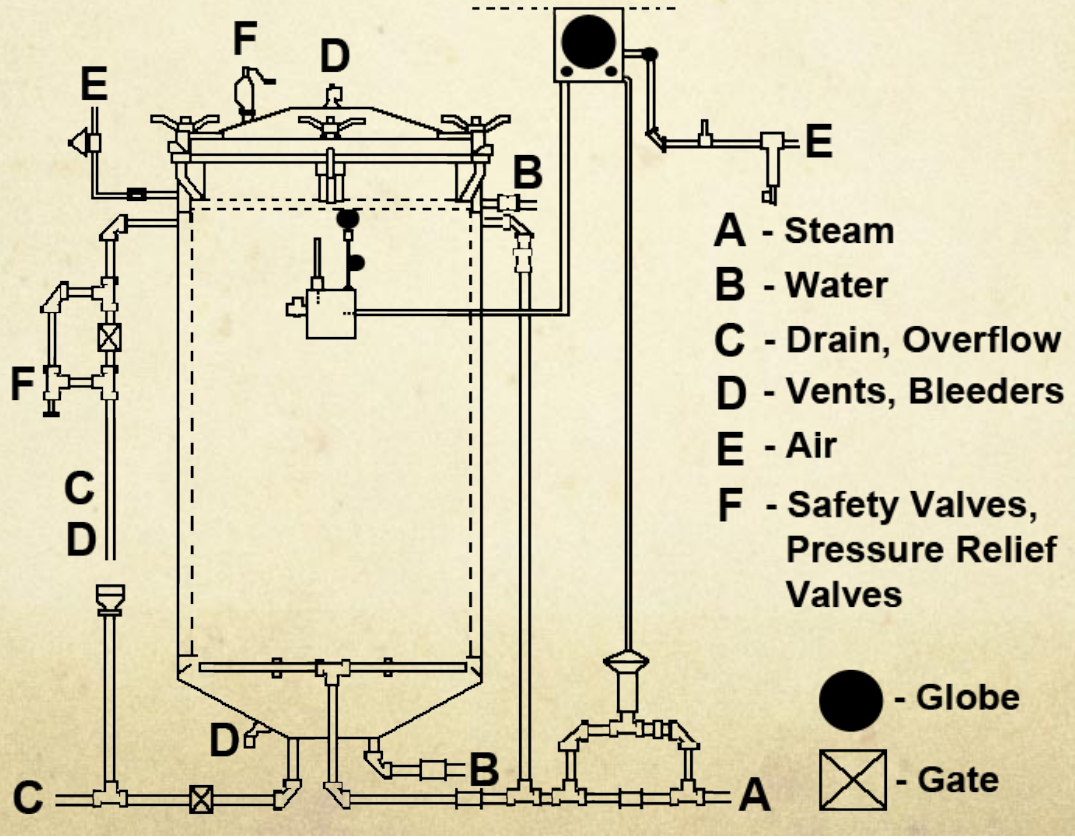


Static Retorts

- Are large pressure cookers capable of handling large numbers of cans

Agitating Retorts

- Mechanically move the cans
- Provide quicker heat penetration



Commercial Canning Safety

- All processes and facilities are approved by the Food and Drug Administration
- Cans are tested for the presence of lead
- HACCP systems identify all areas of possible contamination and are in place to prevent contamination from any source

Commercial Canning Safety

- Commercial canning reaches temperatures and pressure above those of a home canning operation
- Since the processing procedures differ from home canning, many commercially canned foods have a longer shelf life
- Canned foods are tested by the company and governmental agencies for the presence of contaminants

Canned Food

- Should be stored in a cool, dry, dark place
- Should not be stored where temperature extremes exist
- Should be used within one year for best quality