

The following documentation is a sample of my science education writing. Most of the writing I have worked on has been for other companies and is proprietary, however I teach food preservation classes to the public and can share the documentation I have written without violating any confidentiality agreements.

Water Bath Canning is relatively simple, however recipes include many extra steps to prepare the food and the USDA documentation is hard to read. The perceived complexity puts this aspect of home economics beyond the reach of the average modern person who has no canning role model. I put together this information so that students would feel comfortable canning at home after they have taken the class.

The purpose of the document below is to:

- Help the student understand the science behind home canning so that they can reason problems out for themselves without compromising safety
- Remind the student of the steps they need to follow when they do this at home
- Provide reputable, accurate resources for future questions

## Water Bath Canning

Canning, one of many methods of food preservation, was invented in the late 18th century. It essentially has two benefits.

- Vitamin and nutrition loss slows because food enzymes reactions, oxygen reactions and moisture loss are significantly reduced,
- Undesirable microorganism growth is significantly slowed or stopped.

Modern canning makes use of two methods.

- Water Bath Canning
- Pressure Canning

Water bath canning is appropriate for use with high acid foods. **Acidity/Alkalinity** is measured on the pH scale.

- The strongest acid measures 1.0 and the strongest alkali measures 14.0
- A pH of 7.0 is neutral. Most foods have a pH of less than 7.0
- Foods with a pH of less than **4.6** can be preserved with a water bath canner. This includes most fruits, tomatoes and pickles.

Choosing the correct canning method is important because acidity plays a role in microorganism suppression. **Botulism** is the most famous and most deadly of these microorganisms.

- Botulism spores are common in the air and not harmful in spore form.
- The spores can produce a tasteless, odorless toxin under specific conditions.
  - Low acidity (pH of 4.6 or higher)
  - Anaerobic conditions (no oxygen)
  - Temperature between approximately 40 and 120 degrees Fahrenheit

For more information about botulism, see the Colorado State University Extension page ... <http://www.ext.colostate.edu/pubs/foodnut/09305.html>

**Altitude** is another concern for home canners. Water boils at 203 degrees at 6000 feet and we have to boil the jars 15 minutes longer than at sea level in order to ensure those undesirable microorganisms are killed. Consult any reputable canning guide for boiling times at other altitudes.

## Canning Process

Canning can be confusing due to the number of steps.

1. Fill the canner half full with water before you start working and begin heating. The water must be at a full boil and can take a while to heat up.
2. Wash and sterilize the jars.
3. Put lids in 180 degree water in a saucepan
4. Keep jars in dishwasher or in 180 degree water until ready to use
5. Prepare food to be canned. Remove one jar at a time from the water and fill.
6. Measure headspace
7. Remove air bubbles
8. Wipe jar threads clean
9. Center lid and secure with screw band. Tighten, but not as tight as you can make it.
10. Place jar in canner rack. Repeat until all your jars are full.
11. Lower jars into canner
12. Bring water to a full boil and cover the canner
13. Start timer. If water stops boiling, bring it back to a boil and start the timer again.
14. When time is up, uncover canner and wait 5 minutes for steam to dissipate.
15. Put jars on a towel. Allow to cool for 12 - 24 hours.

After 12 to 24 hours, check the seals.

1. Press in the middle of the jar to make sure the lid does not spring up.
2. Remove the screw band and gently push on the lid. It should not move.
3. A dull sound when the lid is tapped with a spoon may indicate a bad seal.

If a jar didn't seal properly, reprocess or just put it in the refrigerator and eat it within a few days. The food can also be frozen safely.

Causes for unsealed jars can be too much air in the jar, insufficient headspace, food on the rim when the jar was closed or a bad lid.

Canned food can be stored in a cool, dark location for up to a year. Remove rings before storing and do not stack jars. Recheck the seals when opening and do not eat food that shows signs of spoiling.

Resources:

- National Center for Food Preservation  
[http://www.uga.edu/nchfp/how/can\\_home.html](http://www.uga.edu/nchfp/how/can_home.html)
- USDA Canning Guides  
[http://www.uga.edu/nchfp/publications/publications\\_usda.html](http://www.uga.edu/nchfp/publications/publications_usda.html)
- Ball Blue Book Guide to Preserving - I've seen this available in hardware stores and it comes with the canning set.