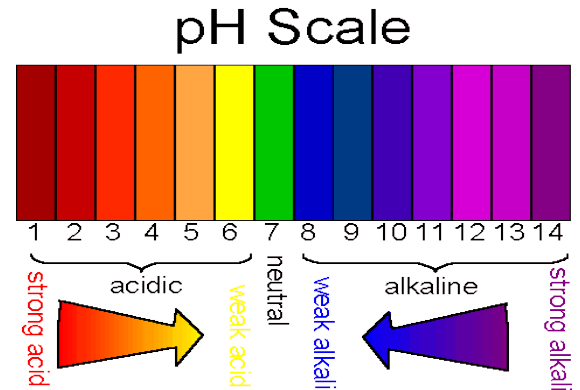


# Measuring pH of Acidified Foods

## What is pH and why do I need to measure it?

pH measures the amount of **acidity** or **alkalinity** in a food or solution using a numerical scale between 1 and 14. A pH value of 1 is most acidic, a pH value of 7 is neutral, and values above 7 are referred to as **basic** or **alkaline**. **Acidified** foods have a **pH value less than or equal to 4.6**. The proper pH of a canned food product can be critical to ensuring the safety of the product. It is very important that pH testing be done correctly and accurately.



## How is pH measured?

As processor of acidified foods, you will be required to monitor the pH of the product that you produce. Depending on the pH of the product, you may be able to use **paper pH strips** (often referred to as litmus paper), or required to use a **pH meter**. **Paper strips** that measure pH rely on a color change in the paper to indicate product pH. Paper strips can be used to measure pH **if the product pH is less than 4.0**. Paper strips are an inexpensive way to test pH, but can be inaccurate or difficult to read. A pH meter measures the amount of hydrogen-ion (acid) in solution using a glass electrode immersed in the solution. A pH meter **must** be used when product pH is **greater than, or equal to, 4.0**. If you are canning acidified foods, accurately monitoring and recording the product pH is key to knowing that you are selling a safe product.



## What is equilibrium pH?

**Equilibrium pH** is the pH of a food product after the added acid has reached throughout the food; the pH of the acid brine and the food have equilibrated. When you monitor pH as part of process monitoring, it is the equilibrium pH that you are measuring. For a proper pH reading, you should test the pH of the product roughly 24 hours after processing, once the jars have cooled to room temperature and stabilized. pH is temperature sensitive and must be measured on a room temperature product. Do not take the pH of a product just before or right after canning because it will not be an accurate measure.

## What should I look for if I need to purchase a pH meter?

If you are required to check your product pH with a meter, there are several things to consider.

- **Accuracy.** Accuracy is listed as a range of  $\pm 0.XX$  pH units. This means that the meter may read so many pH units above or below the actual pH of the product. Purchase a pH meter with an accuracy of  $\pm 0.02$  units or better. For instance, a pH meter with an accuracy of  $\pm 0.01$  is a good choice. A pH meter with an accuracy of  $\pm 0.10$  is not a good choice, it is not accurate enough for all products.
- **Calibration.** All pH meters must be calibrated (checked against a known standard) to assure accuracy. Standards are colored liquids of known pH. Purchase a meter that uses at least a 2-point calibration; for acidified foods you will calibrate your



meter with pH 4.0 and 7.0 buffers.

- **Electrode.** The electrode is the part of the instrument that is immersed in solution. When considering which pH meter to purchase, consider the cost of replacement electrodes. Some electrodes have special non-clog tips and these may be useful if you will be measuring the pH of foods that are not easily blended.
- **Temperature.** pH readings are affected by temperature. In order to get an accurate reading, the pH meter must be calibrated at the same temperature as the samples being tested. More expensive meters will compensate for **slight** variations in sample temperature (too warm or too cold). If you take care to calibrate your pH meter just before you monitor product pH, and test the pH of room-temperature samples (after equilibrium pH has been reached), you do not necessarily need to purchase a meter with temperature compensation. If you can afford a meter with this feature, it's nice to have.

### What should I purchase?

The cost of a pH meter ranges from under \$100 to well over \$500. As a starting point, there are several styles that small processors in the state are currently using. \*These examples are provided only as suggestions and are not meant to exclude other similar options.

#### Cole Parmer\*

625 East Bunker Court  
Vernon Hills, IL 60061-1844  
800-323-4340  
<https://www.coleparmer.com/>

Oakton 700 Benchtop Meter  
EW-35419-03  
Meter w/  
electrode\*  
\$547



#### Notes:

- Benchtop model
- Easily calibrated
- pH resolution  $\pm 0.01$
- Automatic temperature compensation

Oakton Basic pH 5+  
Handheld pH Meter\*  
\$282



#### Notes:

- Portable model
- Easily calibrated
- pH resolution  $\pm 0.01$  pH
- Battery powered
- Automatic temperature compensation

#### Hanna Instruments

3820 Packard Road, Suite 120  
Ann Arbor, MI 48108  
1-800-504-2662  
<https://hannainst.com/>

Hanna Instruments\*  
pH 'Checker Plus'  
(used in class demo)  
\$41.00



#### Notes:

- Inexpensive and easy to use
- Resolution  $\pm 0.01$  pH
- No temperature compensation
- Battery powered

#### Nelson Jameson\*

2400 East Fifth Street  
Marshfield, WI 54449  
800-826-8302  
[www.nelsonjameson.com](http://www.nelsonjameson.com)

pH Calibration Buffers\*  
pH 4.01 - #034-3030  
pH 7.00 - #034-3075  
\$8.99 each



#### Notes:

- Store in a cool, dark location.
- Keep tightly sealed.



Hydrion pH Test Paper \*  
#220-3352  
\$5.26

- Range 3.0-5.5
- Can be used with foods with equilibrium pH of 4.0, or below



LaMotte Chlorine Test Strips\*  
200/vial  
#387-3425  
\$4.60

- Range 10-200 ppm Cl
- Used to check the strength of chlorine sanitizing solution

### **Testing the Equilibrium pH of an Acidified Food Product**

- 1. Open one jar and take a representative sample of your food product once it has cooled, usually 12 to 24 hours after processing.** You should sample each batch. Heat processing will drive the acid into your food product; sampling after processing (and cooling) will give you an accurate reading of the equilibrium pH.
- 2. If your product is a smooth sauce or a pudding-type product, you can measure the pH directly by immersing a pH probe or pH paper into the product.**
- 3. For a chunkier product like salsa, or a product where the liquid and solids are distinct like beets or pickles, you will have to do some sample preparation before measuring pH.**
  - a) For a chunky sauce like salsa, blend the product in a blender to a smooth consistency. Then you can measure pH with a calibrated pH meter or pH paper.**
  - b) For a product like pickles where the pickling solution is distinct from the vegetable item, using a colander, strain the solids, draining out the liquid from the jar. Retain the solids.** In Wisconsin, you are not required to test the pH of the liquid, only of the solid. **Rinse the solids with distilled water.** Place the rinsed solids into a blender.
  - c) Blend the product, adding distilled water if necessary, to produce a slurry.** Added distilled water will not change the pH of the product and will allow for effective blending. You can purchase distilled water at many grocery stores or drug stores.
- 4. Using a calibrated pH meter, or paper pH test strips, measure pH.**
  - The pH meter must be calibrated using a 2-point calibration with pH 4.0 and 7.0 buffers. The pH meter must be calibrated each day that you use it. A pH meter must be used to monitor the pH of foods with an equilibrium pH greater than 4.0.
  - Paper pH test strips can be used for foods with an equilibrium pH of 4.0 or below.
- 5. Record the results in your batch log.**

**Note:** Your Scheduled Process will direct you in how to prepare the sample for pH testing and whether you can use pH paper or if you have to use a calibrated pH meter.