

Measuring pH of 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.

How is pH measured?

Food processors may be required to monitor the pH of the product that you produce; this is required of processors manufacturing acidified foods such as salsa or pickles, and often recommended as a food safety measure for acid foods such as some formulated sauces.



Depending on the pH of the product, you may be able to use **paper pH strips** (often referred to as litmus paper) to measure pH, or required to use a **pH meter**. **Paper strips** that measure pH rely on a color change in the paper to indicate product pH. The color-change of the paper is compared to a standard and pH is recorded. Paper strips may be used to measure pH **if the product pH is less than 4.0**. Paper strips are an inexpensive way to test pH, but are less accurate and may be difficult to read. A pH meter measures pH 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 matrix; the pH of added acid and low-acid ingredients have equilibrated.

When do I take a sample for pH testing?

When acid is added to a kettle and all ingredients are heated together before filling jars, the sample for pH testing is often taken from the kettle, cooled, and pH tested. Alternately, when hot acid is directly added to ingredients in a jar, such as when hot brine is added to raw beans for pickling, the sample for pH testing is taken from the jar after processing and cooling. Sample pH is measured within 24 hours of bottling. Remember, pH is temperature sensitive and is most accurate when measured on a room temperature product.

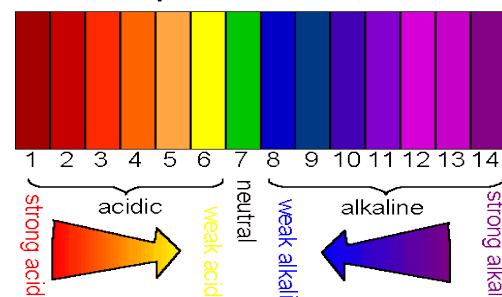
What should I look for if I need to purchase a pH meter?

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 at least ± 0.02 units. A pH meter with an accuracy of ± 0.10 is not a good choice.
- **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 immersed in the food slurry. A non-clogging tip is useful if measuring the pH of foods that are not easily blended.
- **Temperature.** pH readings are affected by temperature. For accuracy, the pH meter is 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). Temperature compensation in a pH meter is not, however, required.



pH Scale



pH Testing supplies recommended for small food businesses.

pH Meter

Hanna Instruments
1-800-504-2662
<https://hannainst.com/>

pH 'Checker Plus'
\$56



Notes:

- Inexpensive and easy to use
- Resolution ± 0.01 pH
- No temperature compensation
- Battery powered

pH Calibration Buffers

Hanna Instruments (see above)
Nelson Jameson
<https://nelsonjameson.com/>

pH 4.0
pH 7.0



Notes:

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

pH Paper



Hydrion pH Test Paper

- Range 3.0-5.5
- Foods with pH of 4.0 or below

Testing the pH of Food Product

Take a sample. From the batch kettle or a processed jar, take a representative sample of your food product and set aside to cool. Test pH within 24 hours and prior to product release.

Sample preparation. Regardless of whether you use pH paper or a meter, you will prepare the sample for testing the same way.

1. Smooth sauce or pudding-type product: Measure the pH directly by immersing a calibrated pH probe or pH paper into the product.
2. Chunkier product like salsa, or a product where the liquid and solids are distinct like pickled beets or beans, you will have to do some sample preparation before measuring pH.
 - a) Chunky 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) Dilly beans: the pickling solution is distinct from the vegetable item, and 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. Blend the product, adding a small amount of distilled water if necessary, to produce a slurry. Water must be distilled; adding a small amount of distilled water will not change the pH of the product. You can purchase distilled water at many grocery stores or drug stores.

Measure pH.

- Use a calibrated meter. 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. Use a meter when pH is greater than 4.0, and for most accurate results.
- Use pH (litmus) paper in the proper range when equilibrium pH is 4.0 or below. pH paper in the range of $\sim 3.0 - 5.0$ is recommended.

Record the results in your batch log. Product may not be released into commerce until you have recorded pH for the batch in the proper range.

