

Good Manufacturing Practices Part 117 Online Course

Purchasing pH Meters

More than 90% of the scheduled processes approved by Cornell's Food Venture Center require the processor to check the pH of the product before it is bottled or shipped. The pH measurement is an indication of the degree of acidity of a food product. Since pH often determines whether or not the product will be safe to consume, it is very important that pH testing be done correctly and accurately.

By law, if the product pH is less than 4.0, it can be checked with simple pH papers (often called litmus strips). Although this method is inexpensive, it has drawbacks: 1. if the product being tested is thick or highly colored, the color of the strip may not be easy to determine; 2. if the product pH is normally close to 4.0, for example 3.8 or 3.9, you may not be able to detect a formula deviation that sends the product above its safe pH level. It is therefore recommended that the manufacturer invest in a digital pH meter.



Here are the most frequently asked questions about pH meters.

1. Where can I get a pH meter?

The best place to purchase a meter is through a scientific supply company. A list of examples is provided at the end of the document. However, they can also be purchased from many online sources.

2. How much do they cost?

The price for pH meters ranges from under \$100 to over \$1000. Generally, good quality meters with desirable features are available for under \$300. Keep in mind that better quality meters generally last longer and take relatively more abuse.

3. What should I look for in a pH meter?

Accuracy: This should be the first consideration. Accuracy is listed as a range of $\pm 0.X$ pH units. This means the meter may read so many pH units above or below the actual pH of the product. Since you will be using or losing batches depending on the pH reading, a narrow accuracy range is important. Considerations include:

- Inexpensive pH meters are generally less accurate (greater accuracy range).
- For food processors of products with pH between 4.0 and 4.6, a pH meter with an accuracy of $\pm 0.01 - 0.02$ pH units is sufficient and required.
- For flavored vinegars with a very low pH unlikely to get anywhere near pH of 4.0, a less expensive model with an accuracy of ± 0.1 pH units is sufficient.

Calibration

All pH meters must be calibrated (checked against a known standard) to assure accuracy. Most meters can be calibrated to at least two standards at the same time.

Calibration Standards or Buffers

You should order at least 2 buffers, pH 7 and pH 4, for your two-point calibration. The pH 4 is necessary because your meter should be calibrated to a standard that is no more than 3.0 pH units from your product. Sometimes buffers are sold in sets of 4, 7 and 10. The pH 10 buffer is generally not needed in the food industry.

Electrodes

The Electrode is the part of the instrument that is immersed in the product. Since oil in a product can easily clog the electrode causing erroneous readings the following considerations apply:

- For very oily, emulsified products (such as salad dressings) where the oil isn't easy to separate, the use of an electrode, such as "sure flow," with a non-clog tip is required.
- For products with only small amounts of oil, those that can be tested before the oil is added, or where the oil can be separated out, standard electrodes supplied with most meters are sufficient.
- For pickled products or other products with large chunks, it is recommended to grind up the large pieces and insert the electrode into the puree for accurate testing of the product. This is important for determining the pH of the most central area of an acidified product and ensuring that it is within the accepted pH parameters.

When pricing meters, make sure that you know if the model you are considering comes with the electrode or if it will have to be purchased separately. Special electrodes with non-clog tips are often more expensive, but they will last longer and give better and faster results under adverse conditions.

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. In most cases, this means the product should be cooled or warmed to room temperature before testing. Meters with temperature compensation are available at additional cost. The compensation works for small temperature changes, but will not work for large ones, i.e. between hot-fill (160–200°F) and room temperatures.

Shop Carefully

Talk to the sales representative of the companies and ask lots of questions! You want and need an accurate, easy to use instrument, but there's no need to pay several hundred dollars to get a good one. Below is a partial list of companies that supply pH meters. For a more comprehensive list, contact [Cornell's Food Venture Center](#).

Cole-Parmer | foodtechsource.com

625 East Bunker Court
Vernon Hills, IL 60061-1844
800-323-4340
800-247-7600
847-247-2929 (fax)

VWR | us.vwr.com/store

Philadelphia Regional Distribution Center
200 Center Square Road
Bridgeport, NJ 08014
800-932-5000 (orders)
609-437-2600

Hanna Instruments | hannainst.com

270 George Washington Hwy
Smithfield, RI 02917
800-HANNAUS (426-6287)

Weber Scientific | weberscientific.com

2732 Kuser Road
Hamilton, NJ 08691
800-328-8378

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