

pH Meter Guide



pH is a measurement of acidity or alkalinity in a food using a numerical scale from 1 to 14. A pH below 7 is acidic, a pH of 7 is neutral, and a pH value above 7 is basic or alkaline. Monitoring pH levels during food processing is an important step in the production of some food since pH values affect microbial growth.

Acidity and pH

The acidity of food can be determined by measuring its pH value. To preserve food using acidity alone, it needs to have an equilibrium pH value of 4.6 or lower. Equilibrium pH is the pH of a food after all components of the food have achieved the same acidity. Foods with a pH greater than 4.6 are considered low acid foods.

Foods with a pH less than 4.6 can be called acid foods. An acidified food is a low acid food with acidic ingredients added to it to lower the pH (e.g., vinegar).

pH and micro-organisms

pH affects the growth of micro-organisms. At about pH 7, most pathogenic bacteria grow well. At pH 4.6 or below, most pathogenic bacteria cannot grow and *Clostridium botulinum* will not produce toxin. However, some spoilage micro-organisms can grow in low pH foods.

What is a pH meter?

A pH meter is an electronic device used to measure the pH of a solution or food. It has an electrode (measuring probe) connected to an electronic meter that displays the pH reading.

How to select a pH meter

A pH meter should be easy to use, offer reliable results and have a long life span. Things to consider include:

- **Accuracy:** It is the most important factor in measuring pH. It is recommended to use a pH meter with an accuracy of at least ± 0.02 units.
- **Electrode:** It is the part of the pH meter immersed in the sample. Select an electrode suitable for the food you are testing. For instance, some electrodes have spear tips that are more suitable for measuring the pH of semi-solid food.
- **Use:** Bench top models are suitable for laboratory use. If the pH meter will be taken into the plant, then a handheld model may be more appropriate.

Temperature

Temperature can affect pH readings. To get an accurate reading, the pH meter must be calibrated at the same temperature as the samples being tested. Usually, pH meters are used and calibrated at room temperature.

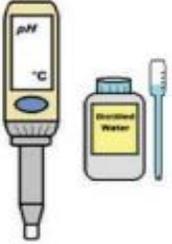
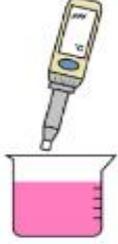
Calibration

A pH meter must be calibrated against a known standard to assure accuracy each time it is used. Standards are buffer solutions with a known pH (e.g., 4.00, 7.00, 10.00). A pH meter, with at least a two-point calibration, provides the best results.

Two-point calibration

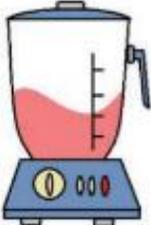
Always do at least a two-point calibration. When measuring the pH of an acidic food, calibrate with a neutral buffer (pH 7.00) and an acidic buffer (pH 4.00). If you are measuring pH of an alkaline food, calibrate with a neutral buffer (pH 7.00) and a basic buffer (pH 10.00).

Two- Point Calibration (Acidic or Acidified Product)*

			
<p>Step 1 Use distilled water to rinse the electrode. Gently dab dry using a non-abrasive tissue. If the electrode has become contaminated with a difficult to remove soil (ex: fat), follow the manufacturer's directions to clean it.</p>	<p>Step 2 Place the electrode in a pH 7.00 buffer solution. Wait for the meter to stabilize, and then adjust the pH meter until it reads 7.00. The immersion mark on the electrode should be in the buffer solution when it is measuring pH.</p>	<p>Step 3 Remove the meter from the solution and clean it by rinsing with distilled water. Gently dab dry using a non-abrasive tissue.</p>	<p>Step 4 Place the electrode in a pH 4.00 buffer solution. Wait for the meter to stabilize, and then adjust the pH meter until it reads 4.00. Remove the meter from the solution and rinse it with distilled water. Gently dab dry using a non-abrasive tissue. Replace the electrode in a pH 7.00 buffer solution. If pH meter does not read a pH of 7.00, repeat the calibration.</p>

*Follow manufacturer's directions for calibrating pH meters where they are different from the above.

How to Measure the pH of Food

			
<p>Step 1 Prepare a uniform sample. If necessary, remove any oil by decanting and measure the non-oil part.</p>	<p>Step 2 If the food is a solid or a semi-solid, blend it to make a slurry.</p>	<p>Step 3 To make blending easier, add up to 50 ml of distilled water per 100 grams of food. This will not change the pH of your sample. Distilled water is sold in many grocery or drug stores.</p>	<p>Step 4 Place the electrode in the sample to measure pH. Stir the sample while measuring, if possible. Record the result.</p>

For more information on food safety please contact the Food Safety and Inspection Branch at foodsafety@gov.mb.ca.