1. Definition of PH meter

PH meter: A simple and speedy device to measure hydrogen-ion activity (acidity or alkalinity) in solution. It is measured on a scale of 0 to 14.

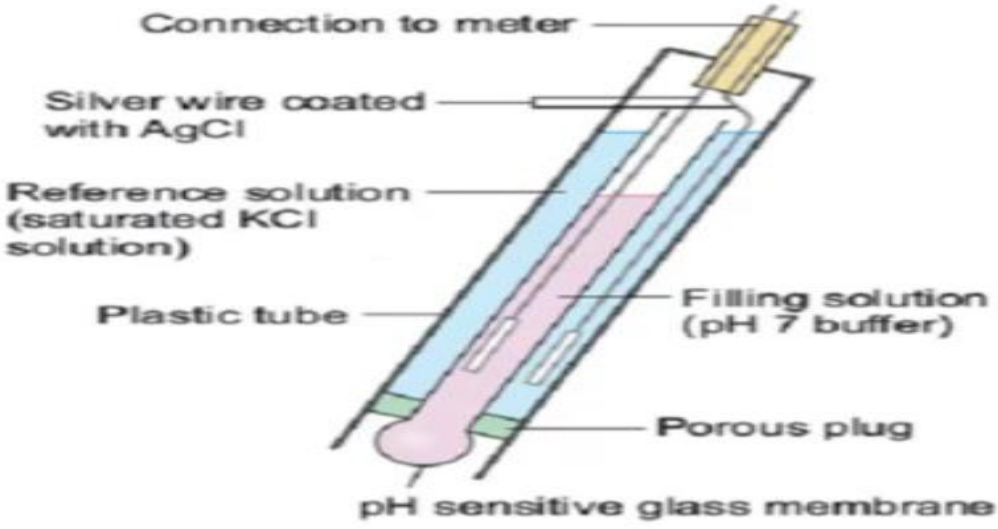
-**The pH meter was invented** in 1934 by the American chemist Arnold O. Beckman (1900-2004) to measure the sourness of lemons.

-The quantitative information provided by the pH value expresses the degree of the activity of an acid or base in terms of hydrogen ion activity. The pH value of a substance is directly related to the ratio of the hydrogen ion [H+] and the hydroxyl ion [OH-] concentrations. If the H+ concentration is greater than OH-, the material is acidic; i.e., the pH value is less than 7. If the OH- concentration is greater than H+, the material is basic, with a pH value greater than 7. If equal amounts of H+ and OH- ions are present, the material is neutral, with a pH of 7. Acids and bases have free hydrogen and hydroxyl ions, respectively.

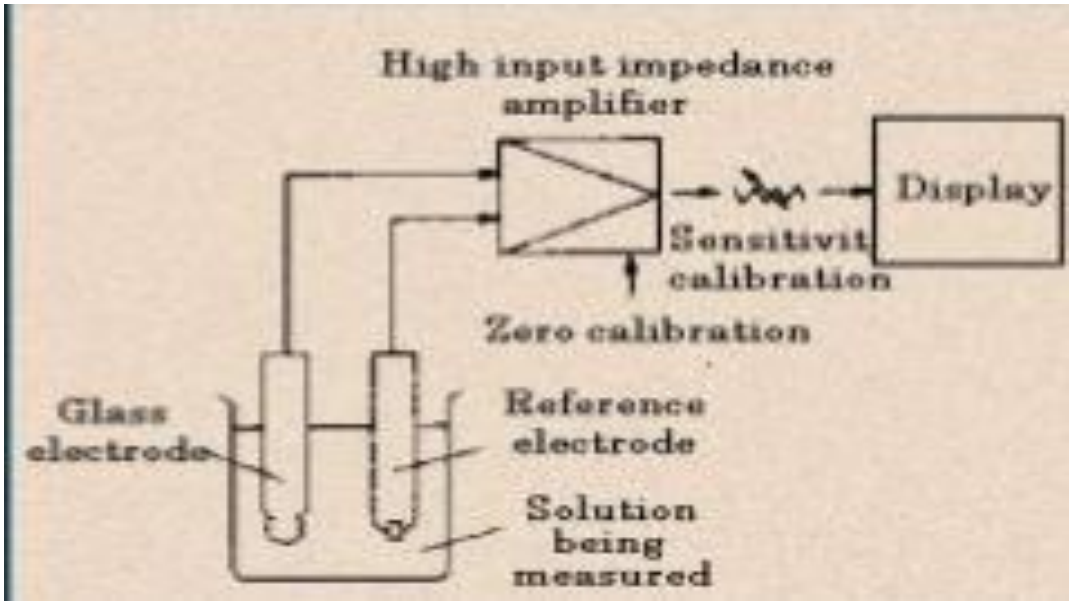
- The principles of pH meter acts as a volt meter that measures the electrical potential difference between a **pH electrode** and a **reference electrode** and displays the result in terms of the pH value of the solution in which they are immersed.

pH meter consists of a voltmeter attached to a pH-responsive electrode and a reference (unvarying) electrode.

-The pH-responsive electrode is usually **glass**, the glass electrode function is measured to establish an activity of hydrogen ions the solution to respond to changes in potential difference. And the **reference** is usually a **mercury–mercurous chloride (calomel)** electrode, although a **silver–silver** chloride electrode is sometimes used.

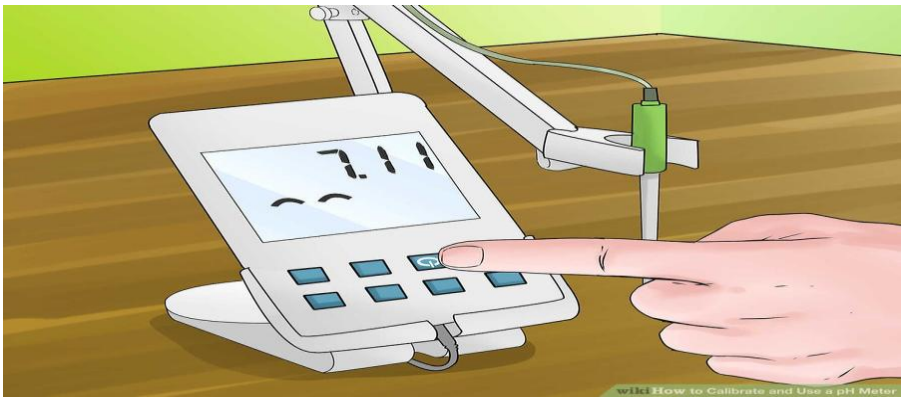


When the two electrodes are immersed in a solution, they act as a battery. The glass electrode develops an electric potential (charge) that is directly related to the hydrogen-ion activity in the solution (59.2 millivolts per pH unit at 25 °C [77 °F]), and the voltmeter measures the potential difference between the glass and reference electrodes. PH acidity of precision measurement products are used for the pH value of the liquid medium, including industrial processing, food industry, measurement, pH, meter also is widely used in industry, agriculture, scientific research, environmental protection and other fields.-



Part 1. Calibrating your pH Meter

1. **Turn on your pH meter.** Before you begin to calibrate and use your pH meter you will first need to turn it on and allow adequate time for the meter to warm up. This should generally take around 30 minutes, but check your pH meter's operating manual for exact times



2. Clean your electrode. Take the electrode out of its storage solution and rinse it with distilled water under an empty waste beaker. Once rinsed, blot dry with Kimwipes or Shurwipes.

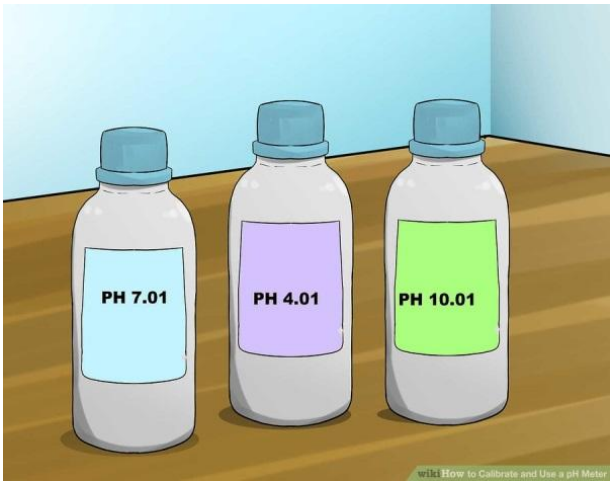
. Be sure to rinse your electrode in a waste beaker that is different from the beaker you will be calibrating in**.** Avoid rubbing the electrode as it has a sensitive membrane around it.

-If you find the electrode to be particularly dirty consult your operating manual for recommended cleaning solutions.

3. Prepare your buffers. You will generally need more than one buffer for calibrating a pH meter. The first will be a "neutral" buffer with a pH of 7, and the second should be near the expected sample pH, either a pH of 4 or 9.21. Buffers with a higher pH (9.21) are best calibrated for measuring bases, whereas buffers with a low pH (4) are best for measuring acidic samples. Once you have chosen your buffers allow them to reach the same temperature, as pH readings are temperature dependent. Pour your buffers into individual beakers for calibration.

. Check with your pH meter manufacturer, or current educational or professional institution, about acquiring pH buffer solutions.

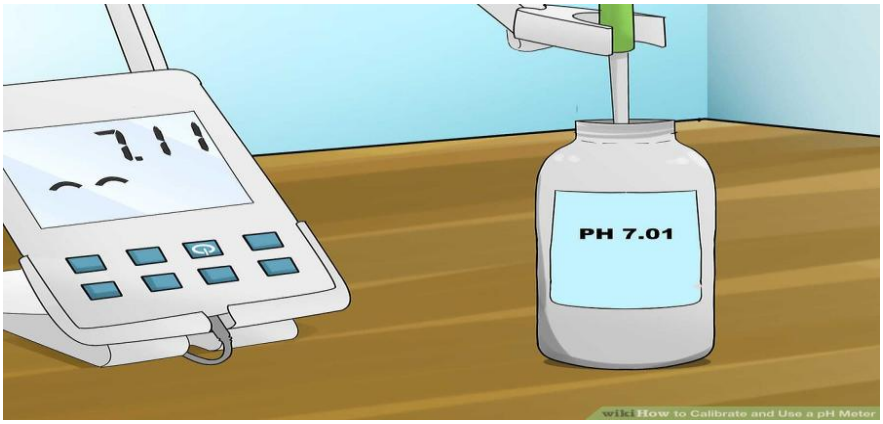
-Do not pour used buffer back into its original container



Part 2. Calibrating your pH Meter

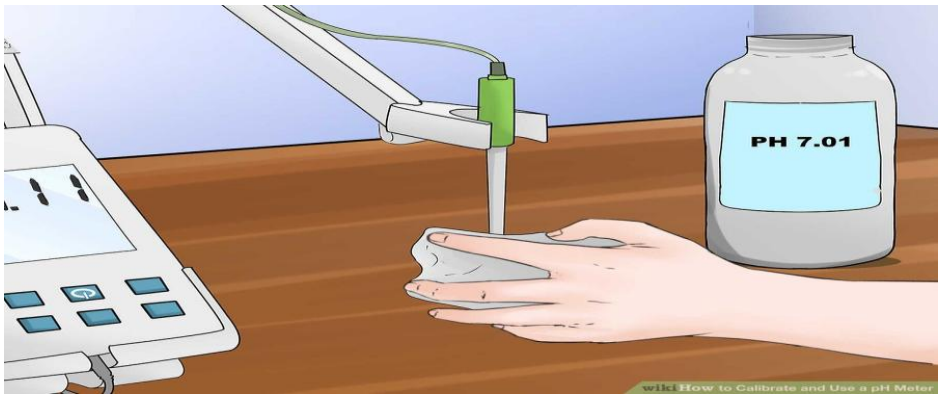
1. Place your electrode in the buffer with a pH value of 7 and begin reading. Press the "measure" or calibrate button to begin reading the pH once your electrode is placed in the buffer.

- Allow the pH to stabilize before setting by letting it sit for approximately 1-2 minutes.

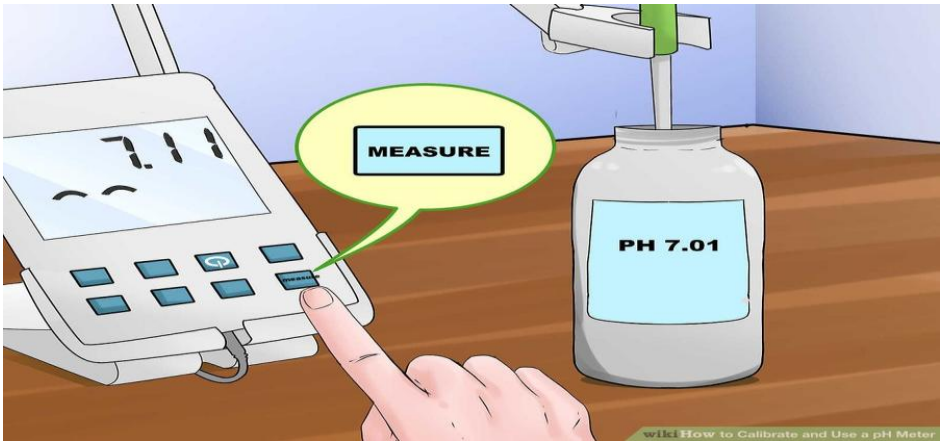


2. Set the pH once you have a stable reading, set the pH meter to the value of the buffer's pH by pressing the measure button a second time. Setting the pH meter once the reading has stabilized will allow for more accurate and tuned readings.

. Although not necessary, if you stir your buffer before measuring be sure to stir all other buffers and samples in the same way.

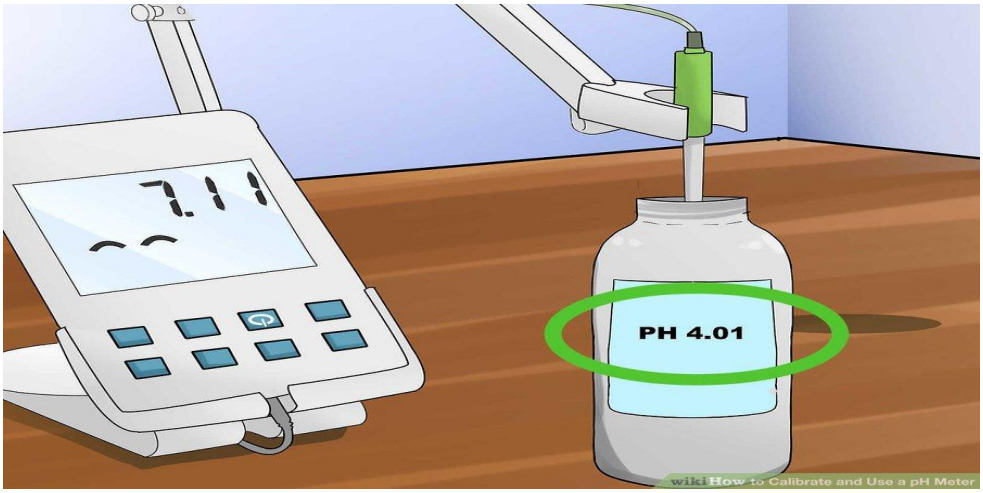


3. Rinse your electrode with distilled water. Rinse and pat dry with a lint-free tissue, like Kimwipes or Shurwipes, in between buffers.

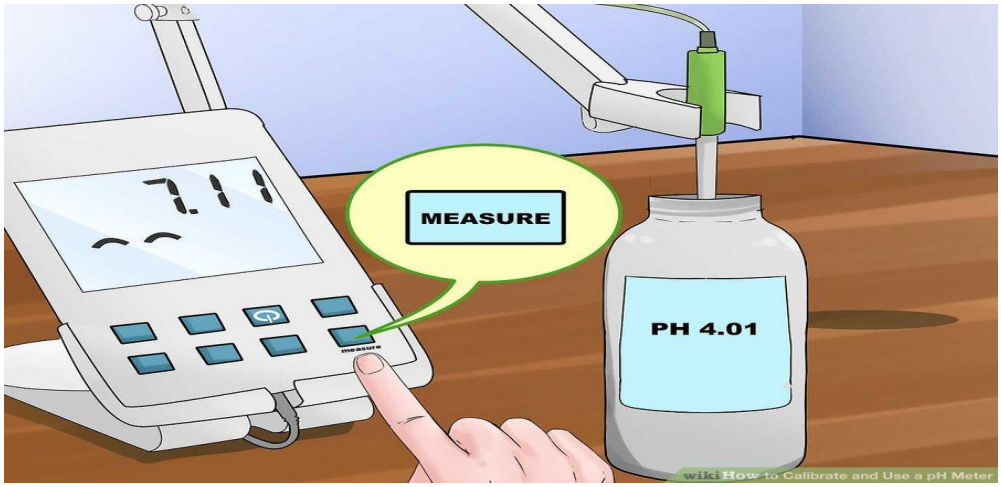


4. Place your electrode in the buffer with a pH value of 4 and begin reading. Press the measure button to begin reading the pH once your electrode is placed in the buffer.

. If you are not using a buffer with a pH value of 4 for calibration, use the buffer with a pH value of 9.21.



5. Set the pH a second time. Once your reading has stabilized, set the pH meter to the value of the buffer's pH by pressing the measure button.

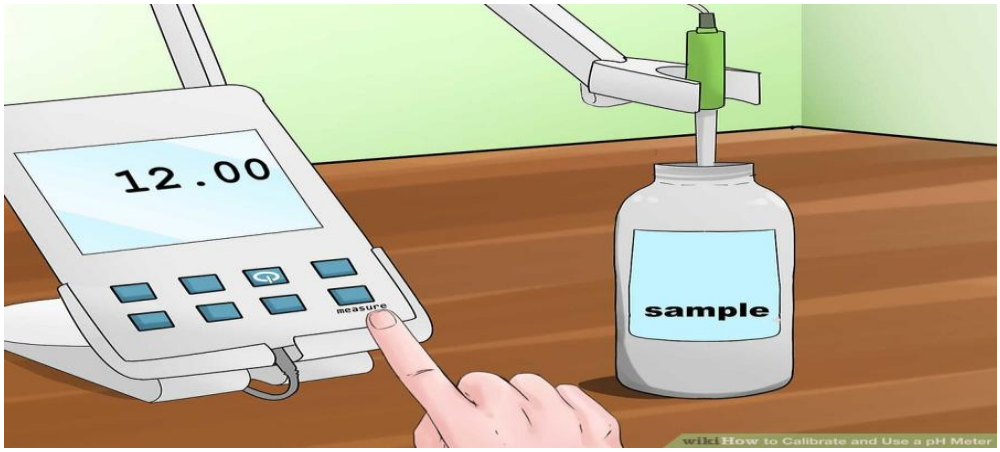


6. Rinse your electrode. You can use distilled water to rinse. Use a lint-free tissue, like Kim wipes or Shurwipes, in between buffers to dry the electrode.

Part 3. Calibrating your pH Meter

1. Place your electrode in your sample and begin reading. Once your electrode is placed in your sample, press the measure button and leave the electrode in your sample for approximately 1-2 minutes.

2. Set your pH level. Once the reading has stabilized, press the measure button. This is the pH level of your sample.



3. Clean your electrode after use. Rinse your electrode with distilled water and blot or dab dry with a lint-free tissue. You may store your pH meter once clean and dry.

. Consult your operation manual for optimal storage practices for your specific pH meter.