The pH METER

A pH meter measures the potential of a solution by use of a pH cell, or, in some cases, an ion specific cell, commonly referred to as an electrode. pH meters range from small, battery powered portable instruments to larger, laboratory table top instruments. The laboratory instruments tend to be more versatile for pH and specific ion measurements.

Most of the electrode systems in use today are known as combination electrodes that contain both a specific application cell for pH or a specific ion, and a reference cell. The bottom of the electrode contains a glass membrane or an ionically conducting membrane that allows the system to measure solution potential which is read as either pH or a millivolt measurement on the pH meter display. The electrode membranes must be hydrated in order to work properly and will dry out in the open air. For that reason, electrodes must be stored in a solution, often a pH 7 buffer.

To use the pH meter, turn on the instrument using the switch on the back. Allow the pH meter to warm up for a few minutes.

Figure pH-1. A laboratory pH meter

To Calibrate the pH Meter

Place a beaker under the electrode and rinse the electrode with distilled water from a wash bottle. Remove the excess water from the electrode by touching it with a laboratory wipe or a soft paper towel. Do not rub the electrode with the towel.

Place some pH 7.0 buffer solution in a clean beaker. Lower the pH electrode into the solution. Press the temperature button and adjust the temperature. (Usually about 20°C) Press the pH button. Allow the reading on the pH meter to stabilize. If the reading on the pH meter is not 7.0, adjust the meter, using the OFFSET knob, to 7.0. (See Figure pH-2)

Remove the electrode from the solution, place another beaker under the electrode and rinse with distilled water. Remove the excess water from the electrode by touching it with a laboratory wipe or a soft paper towel.

Depending on the range of pH measurements you intend to make, place some buffer solution, either pH 4.0 or pH 9.0, in a clean beaker. Lower the pH electrode into the solution. Allow the reading on the pH meter to stabilize. If the reading on the pH meter is not 4.0 or 9.0, adjust the meter, using the SLOPE knob, to 4.0 or 9.0.

The pH meter is not calibrated. DO NOT make any further adjustments using the SLOPE or OFFSET knobs.

Leave the electrode immersed in buffer solution.

To Measure pH

Place a beaker under the electrode and rinse the electrode with distilled water from a wash bottle. Remove the excess water from the electrode by touching it with a laboratory wipe or a soft paper towel. Do not rub the electrode with the towel.

Place some of your sample solution in a clean beaker. Lower the pH electrode into the solution. Allow the reading on the pH meter to stabilize. Record the reading.

Remove the electrode from your sample solution, place another beaker under the electrode and rinse with distilled water. Remove the excess water from the electrode by touching it with a laboratory wipe or a soft paper towel. Measure the next sample solution or place the electrode into a beaker of buffer solution.

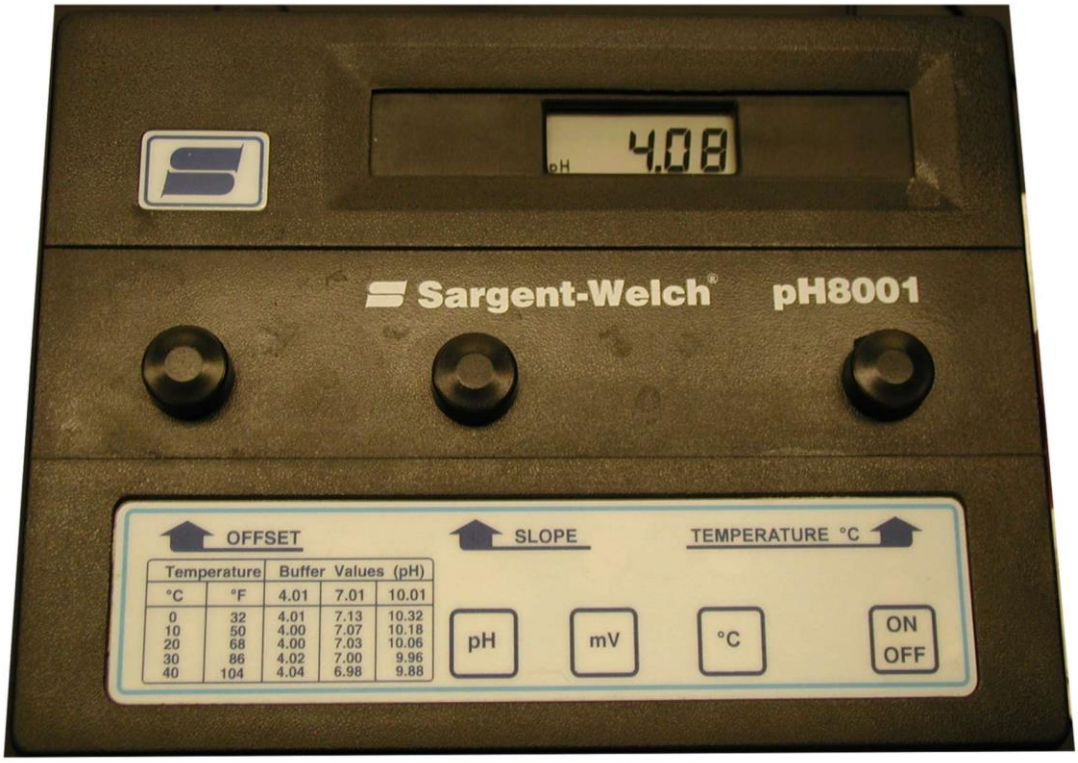

Figure pH-2. The front panel of the pH meter