

# COMBINATION pH ELECTRODE INSTRUCTION MANUAL

## Introduction

This combination pH electrode comes in many styles and is designed for maximum reliability, accuracy, and ease of use. The outer body can be glass, epoxy, or other plastic materials. The plastic body electrode is available with a permanent non-removable bulb guard or a removable guard which is shipped attached to the cable. The reference half-cell can be refillable or permanently sealed at the factory and non-refillable. The refillable electrode will have one or two fill hole(s) located underneath the cap at the top of the electrode. All styles of electrodes are shipped with an electrode soaker bottle wetting solution.

## Preparation

1. Remove the electrode soaker bottle covering the pH bulb and rinse the bulb area with deionized water or pH buffer. Gently shake the electrode downward in the same manner as a clinical thermometer to remove any air bubbles which might be trapped behind the pH bulb.
2. For electrodes shipped with fill hole plugs, remove the shipping tape covering the rubber fill hole plug and withdraw the plug to expose the fill hole. For electrodes shipped with a sleeve over the fill hole(s), slide the rubber sleeve down and remove the shipping tape to expose the fill hole. Fill the refillable electrodes with the proper fill solution(s) to a level just below the fill hole(s).
3. Attach the removable bulb guard if provided with an epoxy electrode by sliding the guard over the end of the electrode.
4. If stored dry for any extended time, immerse the pH bulb in pH buffer for thirty minutes. This hydrates the pH bulb and wets the reference junction for optimum performance. The electrode is now ready for use.

## Required Material

1. pH Meter: This electrode will work with any pH and/or millivolt meter commercially available. Consult the pH meter instruction manual for specific details on connecting the pH electrode to the meter or operating the meter.
2. Buffers: For precise electrode standardization, two buffers are required, of which one should be close to the desired sample pH.

## Electrode Standardization

1. Place the electrode in fresh pH 7.00 buffer and stir. Allow meter reading to stabilize for 30 seconds to one minute. Adjust the meter to read 7.00 with the standardization control.
2. Rinse the electrode in distilled water and place the electrode in fresh pH 4.00 buffer or fresh pH 10.00 buffer depending on whether the sample is acidic or basic. Stir and allow the meter reading to stabilize for 30 seconds to one minute. Adjust the meter reading to second pH value with either the slope or temperature compensator adjustment. If impossible, see cleaning procedure.
3. Rinse the electrode with distilled water. Place in sample and stir. Allow meter reading to stabilize for 30 seconds to one minute. Record reading. For best accuracy, the temperature of the buffers and samples should be identical and at room temperature.

## Electrode Storage

For best results, always keep the pH bulb wet, preferably in pH 4.00 buffer with 1/100 part of saturated KCl added. Other pH buffers or tap water are acceptable storage media, but avoid storage in distilled water. The electrode storage bottle filled with buffer will provide an ideal storage chamber for long periods.

## Electrode Cleaning

Electrodes which are mechanically intact with no broken parts can often be restored to normal performance by one of the following procedures.

1. **Salt Deposits:** Dissolve the deposit by immersing the electrode in 0.1 M HCl for five minutes, followed by immersion in 0.1 M NaOH for five minutes, and thorough rinsing with distilled water.
2. **Oil/Grease Films:** Wash electrode pH bulb in a little detergent and water. Rinse the electrode tip with distilled water.
3. **Clogged Reference Junction:** Heat a diluted KCl solution to 60-80°C. Place the sensing portion of the pH electrode into the heated KCl solution for approximately 10 minutes. Allow the electrode to cool while immersed in some unheated KCl solution.
4. **Protein Deposits:** Dissolve the deposit by immersing the electrode in a 1% pepsin solution with a background of 0.1 M HCl for five minutes, followed by thorough rinsing with distilled water.

If these steps fail to restore normal electrode response, replace the electrode.