

Van London Company
COMBINATION ANTIMONY pH ELECTRODE INSTRUCTIONS

INTRODUCTION

This combination Antimony pH electrode comes in many styles. The outer body can be epoxy or other plastic materials. The reference half-cell can be refillable or non-refillable (permanently sealed at the factory). The refillable electrode will have one or two fill holes located underneath the cap at the top of the electrode. Each electrode is shipped with a protective boot filled with a membrane/junction wetting agent (1:1 pH4 buffer/KCl). Crystals which may form around the protective boot will in no way affect electrode performance.

The Antimony pH electrode is a rugged electrode which is useful over the pH range 1 to 9. The electrode's response is linear between 2 and 8 pH, becoming progressively nonlinear at the pH extremes. Precision of plus or minus 0.1 to 0.2 pH units can be attained with careful calibration. The probe has the disadvantage of having a very large temperature coefficient which makes it very sensitive to temperature changes and subject to abnormal pH shifts with temperature.

PREPARATION

1. Remove the protector boot covering the pH element and rinse the whole pH area with deionized water or pH buffer. Save the boot if the electrode will be stored.
2. Reference electrodes that are refillable: 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 any fill solution(s) shipped with the electrode to a level just below the fill-hole(s). The fill hole should be left unplugged whenever the electrode is in solution.
3. Prior to first usage, or after long-term storage, immerse the Antimony electrode in pH buffer for thirty minutes. This wets the reference junction for optimum performance. The electrode is now ready for use.

REQUIRED MATERIALS

Meter: This electrode will not work with **every** pH and/or mV meter commercially available. The main problem encountered in the use of an Antimony pH electrode with a standard pH meter is caused by the large difference between the millivolt output of the Antimony probe and that of a normal glass pH electrode. In order to make the pH scale read correctly, the pH meter used must have a sufficient "zero adjustment" range to compensate for the -400 mV offset of the Antimony Electrode. Some pH meters are capable of this, but many are not. Consult the meter instruction manual for specific details on connecting the pH electrode to the meter and performing a "zero adjustment". If the zero adjustment is not possible, reading millivolts, instead of pH, is recommended for calibration and measurement.

Buffers: For precise electrode standardization, two buffers are required, of

which one should be close to the desired sample pH. pH 7.00 (at 25°C) buffer is recommended for initial standardization followed by pH 4.01 (at 25°C) or pH 10.01 (at 25°C) buffer to span (slope) the electrode.

ELECTRODE STANDARDIZATION

1. Place the electrode in fresh pH 7.00 buffer and stir. Adjust the meter to read the pH buffer value according to the meter instruction manual. If impossible, use the millivolt mode and record the millivolt reading.
2. Rinse the electrode in distilled water and place the electrode in either fresh pH 4.01 buffer or fresh pH 10.01 buffer depending on whether the sample is acidic or basic. Stir and allow meter reading to stabilize for 30 seconds to one minute. Adjust the meter reading to pH buffer value according to the meter instruction manual or use the millivolt mode and record the millivolt reading.
3. Rinse the electrode with distilled water. Place in sample and stir. Allow meter reading to stabilize for 30 seconds to one minute. Note the pH reading or calculate the pH from the millivolt values recorded. For best accuracy, the temperature of the buffers and samples should be at room temperature.

ELECTRODE STORAGE

For best results, always keep the reference junction wet, preferably in pH 4.01 buffer with 1/1 saturated KCl added. Other pH buffers or tap water are acceptable storage media. The protective boot filled with buffer will provide an ideal storage chamber for long periods. **NOTE: Electrodes should not be stored for a period longer than 6 months for best results. Electrode stock should be rotated accordingly.**

TROUBLESHOOTING HINTS

Symptom	Possible Causes	Next Step
Noisy or Unstable Display	defective meter solution not grounded air bubble on pH billet	check meter with shorting plug ground meter and electrode remove electrode and reattach
Drift (reading slowly changing in one direction)	pH billet contaminated reference clogged	see CLEANING hints see CLEANING hints
Low Slope (<140 mV from pH 7 to 4)	buffers contaminated pH billet contaminated reference clogged defective electrode	use fresh buffers see CLEANING hints see CLEANING hints check electrode operation

ELECTRODE CLEANING

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

General Cleaning: If the electrode surface becomes contaminated, its function can usually be restored by light grinding with a fine grade of abrasive paper until a bright surface is obtained. If no abrasive paper is available, soak the electrode in 1:10 dilution of household laundry bleach in a 0.1-0.5% liquid detergent solution in hot water with vigorous stirring for 15 minutes. Place junction under warm, running tap water for 15 seconds. Drain/refill the reference chamber. Soak the electrode in storage solution for at least 10 minutes.

Salt Deposits: Dissolve the deposit by immersing the electrode in 0.1 M HCl for five minutes, followed by immersion in 0.1M NaOH for five minutes, and thorough rinsing with distilled water.

Oil/Grease Films: Wash electrode pH area in a little detergent and water. Rinse electrode tip with distilled water.

Clogged Reference Junction: Heat a diluted KCl solution to 60-80°C. Place the reference 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.

Protein Deposits: Dissolve the deposit by immersing the electrode in a 1% pepsin solution with a background of 0.1M HCl for five minutes, followed by thorough rinsing with distilled water.

After any of these special cleaning procedures, remember to drain/refill the reference chamber, if refillable. Soak the electrode in storage solution for at least 10 minutes.

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

SPECIFICATIONS

pH Range:	pH 1 to 9
Slope:	50 +/- 5 mV/pH unit at 25°C
Offset (Asymmetry Potential):	-400 mV +/- 25 mV
Accuracy:	+/- 0.2 pH unit
Response Time:	< 20 sec (95% response)
Stability:	< 10 mV drift/24 hours
Operating Temperature Range:	20 to 30°C
Operating Pressure Range:	variable, consult product literature
Electrode Length:	variable, consult product literature
Electrode Width:	variable, consult product literature
Cable Length:	variable, consult product literature