



pH System:

A successful pH reading is dependent upon all components of the system being operational. Problems with any one of the three: electrode, meter or buffer will yield poor readings.

Electrodes:

Over 90% of pH measurement problems are related to the improper use, storage or selection of electrodes.

Meters:

A pH meter is a sophisticated voltmeter capable of reading small millivolt changes from the pH electrode system. The meter is seldom the source of problems for pH measurements.

Buffers:

These solutions of known pH value allow the user to adjust the system to read accurate measurements. For best accuracy:

Standardization should be performed with fresh buffer solutions.

Buffer used should frame the range of pH for the samples being tested. Buffers should be at the same temperature as the samples. (For example: if all your samples are at 50 °C, warm your buffers to 50 °C using a beaker in a warm bath.) Buffer values are dependent upon temperature.



Trouble shooting & Technical Tips

Quick operational check of pH probe

The condition of a new or used pH probe may be checked quite quickly by performing the following steps:

- Set pH meter to mV
- pH 7 buffer should read 0 ± 30 mV (Readings outside this range indicate a problem with the reference)
- pH 4 buffer should read + 150 to + 180mV relative to the reading at pH7 (Readings outside this range indicate a problem with the pH glass membrane).



Storage of probes:

The pH glass bulb should always be kept in an aqueous ionic solution, preferably with an excess of hydrogen ions, to maintain hydration & probe response. A pH 4 buffer is suitable for short term storage (during the day). For long term storage (overnight or longer), the probe should be kept in storage solution using a rubber boot. This "wet storage" also prevents the reference frit from becoming clogged with crystals from the filling solution. The reference hole may also be closed to prevent evaporation of the filling solution.

Cleaning of probes:

Inability to calibrate at pH 7 indicates either a contaminated reference chamber, a blocked junction or a poisoned half-cell.

If you have a refillable probe, drain the chamber & refill with correct reference filling solution. If the half-cell has been poisoned then the probe will need to be replaced. Contamination of the bulb results in slow response & diminished slope.

- Inorganic deposits – immerse the probe tip in 0.1M HCl for 5 minutes.
- Organic Oil/Grease Films – Wash probe tip with liquid detergent & water or a suitable solvent eg: Ethanol or Acetone (NOTE: Acetone should not be used on epoxy body probes)
- Protein – Soak the probe tip in protein cleaning solution (EUTEC-DPC-BT). After cleaning, rinse the probe tip with distilled or deionised water & soak in storage solution.

Ageing of probes

Once the pH glass membrane is hydrated, it is continually ageing, both on the inside & the outside of the membrane. This is evident by the slope gradually decreasing with time & it is generally found that the maximum life of a pH probe is about three years. The ageing process accelerates exponentially with increasing temperature such that the life is reduced to about three weeks at 120°C.

Important: As with any procedure involving strong chemicals etc., please note: observe appropriate safety precautions