

## pH and ORP electrode Care and Maintenance

### Unpacking

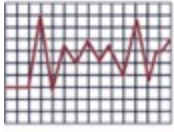
- Remove the electrode from its package and check that it is undamaged. If damaged, contact your supplier for replacement. Most electrodes are rugged in design but some are fragile. Care should be taken when unpacking and handling all electrodes.

### Preparations for Use

- All electrodes are shipped with a wetting cap covering the measuring end. This cap contains a solution of pH 4 buffer saturated with potassium chloride for single junction combination electrodes and a solution of potassium nitrate in pH 4 buffer for double junction electrodes. Mono measuring electrodes, pH and ORP, are shipped in pH 4 buffer.
- Gently remove the wetting cap from the electrode by unscrewing the bottle from the cap and then sliding the cap and o-ring off of the electrode body. Save the cap for future long term storage. Some electrodes are shipped with slide on caps sealed with Teflon tape, these caps are simply pulled off.
- During shipping the air space inside the pH glass internal may have moved into the bulb. Grasp the electrode near the cable end and gently swing it through an arc to force the internal electrolyte into the pH bulb.
- Rinse the electrode with distilled water and it is ready for use.

### Tips and Techniques

- Stirring the buffers and samples improves the stability and speed of response of the measurement.
- Rinse the electrode with distilled water between samples and lightly blot the water on a paper towel before immersing it in the next sample. Never wipe the pH bulb since this may scratch the delicate gel layer impairing response.
- Rinsing the electrode with a small amount of the sample before immersing it will eliminate any contamination of the sample.
- Automatic Temperature Compensation (ATC) compensates for the change in the electrodes slope due to temperature, in accordance with the Nernst factor. It does not compensate for changes in the actual pH of the sample that occur with a change in temperature. The pH of a sample at 25°C is most likely different than the pH of that same sample at 75°C.
- The temperature of the electrode, the sample and the calibration buffers should be the same. Allow the electrode to come to temperature equilibrium with the sample before recording the measurement value. Measurements made more than 20°C from the calibration temperature should include a one point calibration at that temperature for maximum accuracy.
- Low ionic strength samples, highly viscous samples and salt brines all slow the speed of response of the electrode. While the electrode will be stable to a change in pH buffers after 10-15 seconds it may take up to 5 minutes for the electrode to stabilize in a difficult sample.

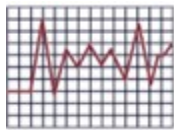


## Calibration

- Calibration should be carried out according to the procedure supplied with the pH meter. Different meters use different methods, the method being dictated by the sophistication of the meters electronics.
- The calibration should use two or more pH standards. It is recommended that pH 7 buffer be used to check the zero point and either an acid or alkaline buffer that brackets the sample be used to set the slope.
- An electrode measuring many samples a day should be calibrated at least once a day. The frequency of calibration will depend on the level of accuracy required and the coating/fouling nature of the samples being measured.
- Electrodes that are continuously monitoring a sample should be checked at least once a week or whatever period experience dictates.
- Grab sample calibration is a technique where the process electrode has been calibrated and placed on line for some period of time. Its output is then verified by measuring the pH of a sample with another electrode. The grab sample should be measured as soon as possible to avoid errors caused by changes in the samples temperature or changes in the samples pH due to exposure to the atmosphere.
- Redox electrodes are generally not calibrated, however ORP standards are available with mV values of 230 mV, 470mV, and 640mV.

## Electrode Cleaning

- Slow response and large offsets may indicate the electrode has become coated. The nature of the coating will dictate the type of cleaning technique that should be used.
- Soft coatings, like foodstuffs or bacterial films are best removed using a squirt bottle or the water jet from a faucet. If this is not successful then wiping with a soft wet cloth is the best choice.
- Hard coatings, like calcium or lime scale are best removed with a solvent appropriate for the particular coating. A 5% solution of HCl would be a good choice for the calcium scale. If unsure of the proper solvent to remove a hard mineral coating alternate between a 5% HCl and a 4% NaOH for 10 minutes each. After treating the electrode with these strong acids or bases rinse the electrode with water and soak it in pH 4 buffer for at least ½ hour.
- Greasy and oily coatings are best removed with a detergent solution or a solvent that will not attack the electrodes body. Methanol and isopropyl alcohol are good choices for solvents. Acetone, MEK, THF, or trichloroethane will irreparably harm the electrode. A soft toothbrush can be used with the detergent to remove stubborn coatings.
- The pores of the reference junction may become clogged and surface cleaning may not restore proper function. The electrode should then be heated to 60°C in 3 molar KCl and allowed to cool in the same solution. Rinse it with distilled water and soak in pH 4 buffer for ½ hour before testing. If the reference cell is refillable, the electrolyte should be removed and replaced with fresh electrolyte before treating as above.



# PULSE INSTRUMENTS

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- Electrodes age with time and eventually become desensitized. Extended periods of service at temperatures greater than 80°C or exposure to de-ionized water accelerate this phenomena. As a last resort dip the electrode in a 10% ammonium bifluoride solution for 10-20 seconds, then rinse it with tap water and soak it in 5-6 molar HCl for 30 seconds. Rinse it with tap water and soak it in pH 4 buffer for ½ hour before testing.
- The platinum or gold sensing tip of an ORP electrode should be cleaned just like a pH electrode. The surface can also be cleaned with an abrasive as a last resort. Gently scour the platinum with a 600 grit wet emery cloth or preferably a 1-3 micron alumina polishing powder.

**Important:** Good laboratory practices should be used and protective gloves and safety glasses should be worn while handling any solvents or chemicals. If you are unsure of the proper technique for handling a chemical or of its hazardous properties it is best to discard the electrode eliminating the risk of danger.