

## How to maintain the quality of an pH-electrode

### 1. Storing

An electrode should never be stored dry. When not used it should always be stored in the watering cap which is delivered with the electrode. The watering cap should be filled with the following solutions dependent on the type of electrode you use:

- **Combination and reference electrodes:**  
In case of electrodes with liquid electrolyte always use the electrolyte for storing which is filled inside the electrode. For low maintenance electrodes with stiffened electrolyte you can use usually KCl 3 mol/l.
- **Single glass electrodes:**  
Should be stored in deionized water.

After possible dry storage the electrode has to be watered for at least 24 hours in the above mentioned storing solutions.

### 2. Cleaning

Precipitations or any kind of dirt on the sensor surface or the diaphragm can shorten the life-time of the electrode tremendously. Also any kind of particles or dirt inside the reference electrode must be removed as fast as possible. It is always preferred to clean the electrode with chemicals and not mechanically. A mechanical treatment often destroys the electrode completely.

In case of the deposits on the **outside of the electrode and the diaphragm** the following cleaning methods are recommended:

- **Inorganic adhering substances:**  
Store the electrode for several minutes at room temperature in solutions such as HCl 0.1 mol/l or NaOH 0.1 mol/l. In case of that the substances aren't dissolved by the first time increase the temperature of the solution gently up to a maximum of 50°C before increasing the concentration.
- **Organic adhering substances:**  
Rinse the electrode with suitable organic solvents (e.g. ethanol or acetone, etc). The Sensor can also be wiped off with a soft, moist cloth. Just observe the resistance of the plastic shaft to the used solvents.
- **Proteins:**  
Store the electrode for approx. 1 hour in a pepsin/HCl solution.
- **Sulfides (on the ceramic diaphragm):**  
Store the electrode in a thiocarbamide/HCl solution (7.5% in HCl 0.1 mol/l) until color is removed.

After cleaning rinse off the electrode with distilled water and condition it for at least one hour in electrolyte solution. Don't forget to recalibrate the measuring equipment before performing further tests.

## Cleaning of the reference electrode:

- Dirt/particles inside the reference electrode  
Replace the former electrolyte and wash the electrode with fresh electrolyte. In case there is still something inside repeat the step once again. It is also possible to use hotter electrolyte (e.g. 45°C). It isn't recommended to clean the inside of the electrode with chemicals because the reference system may be damaged irreversibly.
- KCl crystallized inside  
Place the electrode in a warm water bath (e.g. 45°C) until the KCl is totally dissolved. Exchange the former electrolyte against fresh one.

## 3. Increasing the life-time

The life-time of an electrode can be increased by observing the following points:

- Calibrate the electrode in suitable intervals in order to find out if it still works well.
- Always clean the electrode directly after the measurement with deionized water and store it in the recommended way.
- Check the complete electrode (surface/diaphragm/reference) for precipitations. If necessary clean the electrode in the recommended way.
- Observe that the measurement in aggressive and/or hot media can shorten the life-time. When the electrode was used for measuring in aggressive media it is important to rinse the electrode after the measurement and to follow the storage procedures.
- In case you use an electrode with liquid electrolyte always take care that the refilling hole is opened during measurement and calibration. It should be closed during storage.
- Only single glass electrodes can be stored in deionized water. The life-time of reference and combination electrodes is reduced tremendously when stored in deionized water.
- Never store the electrodes dry.
- Never use electrodes as a stirrer.
- Never try to clean the electrode mechanically.