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pH Electrode Maintenance

Before taking into use

Look if there is a visible tape around the reference diaphragm or aperture, which might have been placed in factory against drying. Make sure it is completely removed before using the electrode. **A pH electrode is active and stable only after wetting!** For this purpose, an electrode that has been stored dry must be immersed for **at least ten hours** in the reference electrolyte solution (3...4 M KCl, article code B520 or B020).

Refillable electrodes

Avoid a low pressure inside a refillable electrode! Therefore always remove the closure from the refilling aperture during the measurements as well as during the calibration. This allows the saltbridge solution to flow through the ceramic liquid junction and prevents contamination of the electrolyte. For the same reason, the inside level should always be higher than the outside level of the measuring solution. Close the refilling aperture again when storing the electrode.

Storage

Note: never store your electrode in distilled water!

Proper electrode storage maximises electrode performance and extends electrode life:

- Fill an electrode bottle almost completely with the reference electrolyte solution (mostly 3...4 M KCl), place it on the electrode and make sure it is properly closed to prevent leakage during the storage.
- It is also possible to use a 1:1 mixture of pH 4 buffer and 3..4 M KCl solutions. Mostly is it the best to use a non-coloured buffer solution as otherwise the porous reference diaphragm might become coloured also.

For long-term storage information refer to the appropriate pH electrode instruction manual.

Cleaning

The pH electrode wears away by being used. If the electrode tends to respond slower and calibration becomes difficult, even after cleaning, it should be replaced by a new one.

Use the Consort cleaning solution **B530** to clean the electrodes for general use. This action is preferably done on a regular time base to ensure a continuous good operation as much as possible.

- If deposits are visible, use a soft brush to remove them if possible.
- Place the with distilled water rinsed electrode in the cleaning solution for 10-15 minutes.
- Rinse it again with distilled water before storing the electrode in a 3M KCl electrolyte solution

(or other depending on the used electrolyte).

Depending on the possible contaminants, use the guide below to choose the appropriate solution:

- **stubborn deposits and bacterial growth:** soak the electrode in a 1:10 dilution of household laundry bleach for 15 minutes.
- **protein-containing materials/deposits (cheese, meat, blood, ...):** the electrode should stand in a Pepsine cleaning solution 1% pepsin in 0.01 M to 0.1 M HCl (Consort article **B231**) overnight and then be cleaned with distilled water before use.
- **inorganic deposits:** soak the electrode in 0.1 M tetra sodium EDTA for 15 minutes.
- **oil and grease:** rinse the electrode with mild detergent (B530) or methanol.
- **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.
- **Sulfides:** Sulfides react with the Ag from the reference electrode and solution. This forms dark deposits at the diaphragm of the reference electrode. Clean your electrode regularly with Thiourea to prevent blocking of the diaphragm.

After any of the cleaning procedures, thoroughly rinse the electrode with distilled water, drain and refill the reference chamber, and soak the electrode in storage solution for at least 1 hour.

Unclog/Restore a pH electrode

First check the interior wire. If corrosion is evident, replace the electrode.

To unclog a clogged junction, soak the electrode in pH 4 buffer solution or 3M KCl solution at 60°C for 15 minutes. Allow it to cool in unheated solution and rinse it with distilled water.

Restore a dry electrode by soaking it in tap water after rinsing out the refill chamber with distilled water and refilling with the proper solution.

If neither of these methods restore the electrode to normal condition, replace it.

pH Glass electrode rejuvenation

The performance of a pH glass electrode may become less in time. This can be observed as: slower response, instability and less accuracy. These effects might be improved by maintenance. If maintenance doesn't improve the performance, rejuvenation of the electrode might enlarge its life.

Rejuvenation can be applied using one of the following methods (in order of preference):

- Soak the electrode in 1 M HCl.
- Immerse the electrode alternately in 0.1 N HCl and 0.1 N NaOH. When properly cleaned afterwards, this method will also reduce sodium ion effects.
- Use a mixture of acetone and isopropyl alcohol (50/50) to wipe the glass bulb. Then soak the electrode for 1 hour in buffer pH 4.
- Last resort:
 1. Immerse the glass bulb in a 10% Ammonium biFluoride (NH₄HF₂ *) for 10-20 SECONDS.
 2. Immediately rinse in running tap water.
 3. Immerse in 5 M HCl for 10-20 SECONDS to remove excess biFluoride.
 4. Rinse in tap water and store in 0,1 N HCl solution.

*** NH₄HF₂ etches the glass! This will cause the bulb to become thinner and will shorten the life of the electrode.**

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