pH Electrode Maintenance Guide

Electrode Preparation

Before use

1. Remove the wetting cap
2. Shake to remove bubbles
3. Rinse with deionized water
4. Open SafeLock™
5. Check the electrolyte level*
6. Connect the electrode
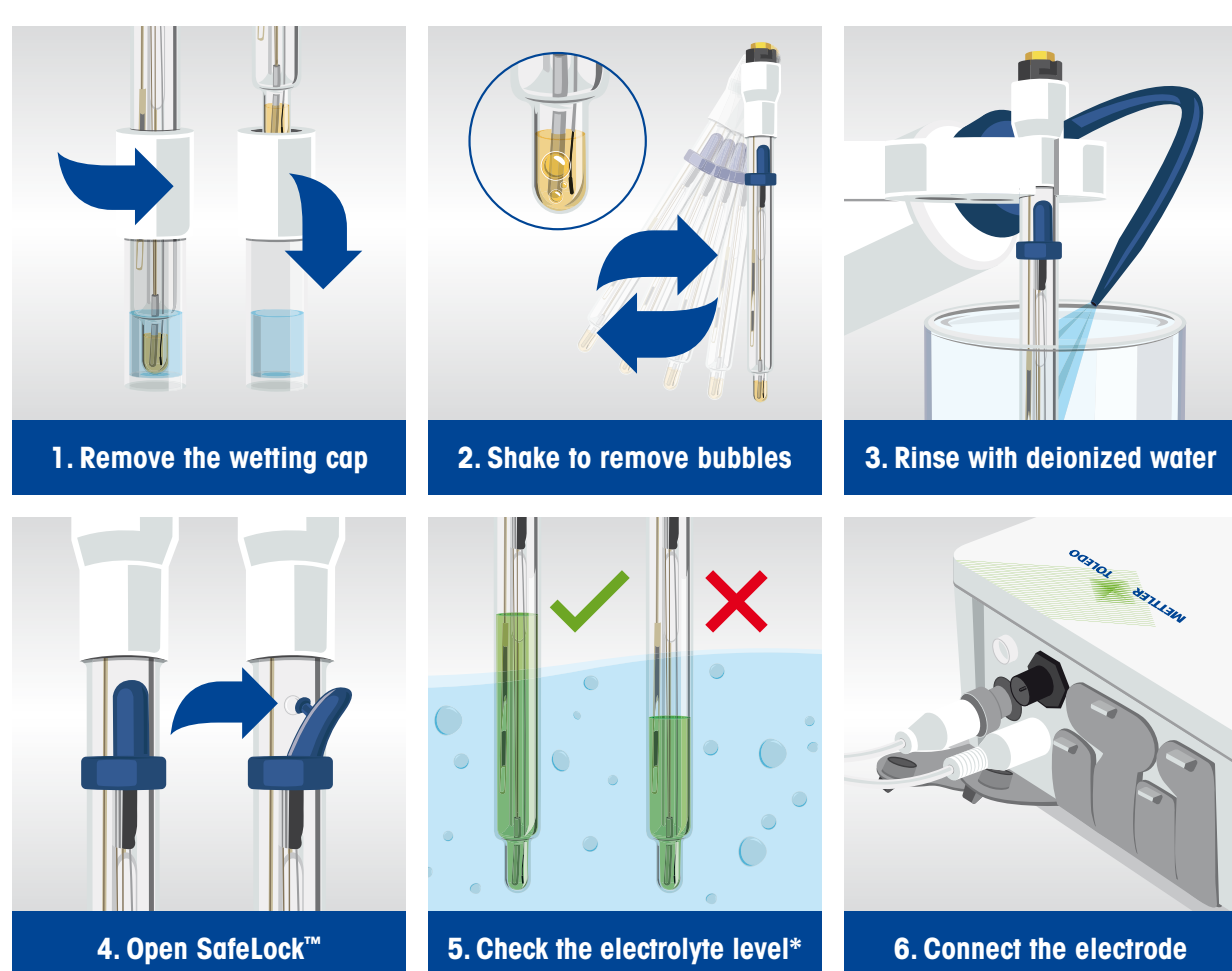
▶ www.mt.com/phlab-electrodepreparation

* Artificially colored green for illustration purpose

Electrode Calibration

1. Take a minimum of two pH buffers bracketing the sample pH.
2. Use a fresh amount of aliquot of non-expired pH buffer for every calibration point.
3. Pour enough to submerge the sensor junction.
4. Stir the buffers (if required).
5. Start the calibration and take the temperature of buffers into account.
6. Rinse electrode thoroughly with deionized water and blot dry with tissue.
7. Repeat steps 2–6 for next buffer.
8. Evaluate as shown in table below.

Slope / Offset	± 0–20 mV	± 20–35 mV	> 35 mV
95–105%	✔	✔	✔
90–95%	✔	✔	✔
85–90%	✔	✔	✔
< 85% or >105%	✘	✘	✘

✔ Electrode in good condition
✔ Electrode requires cleaning soon*
✔ Cleaning and regeneration required*
✘ Electrode worn out and needs replacement

▶ www.mt.com/phlab-electrodecalibration

Typical sample level

Junction submerged
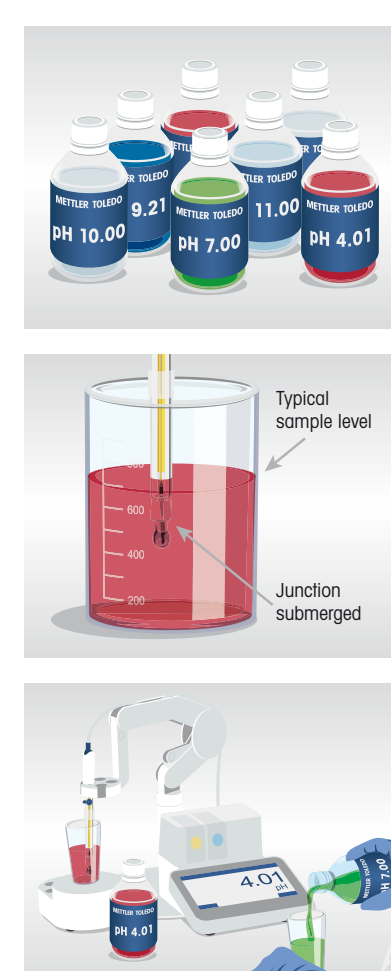
* Refer to the Electrode Troubleshooting section below

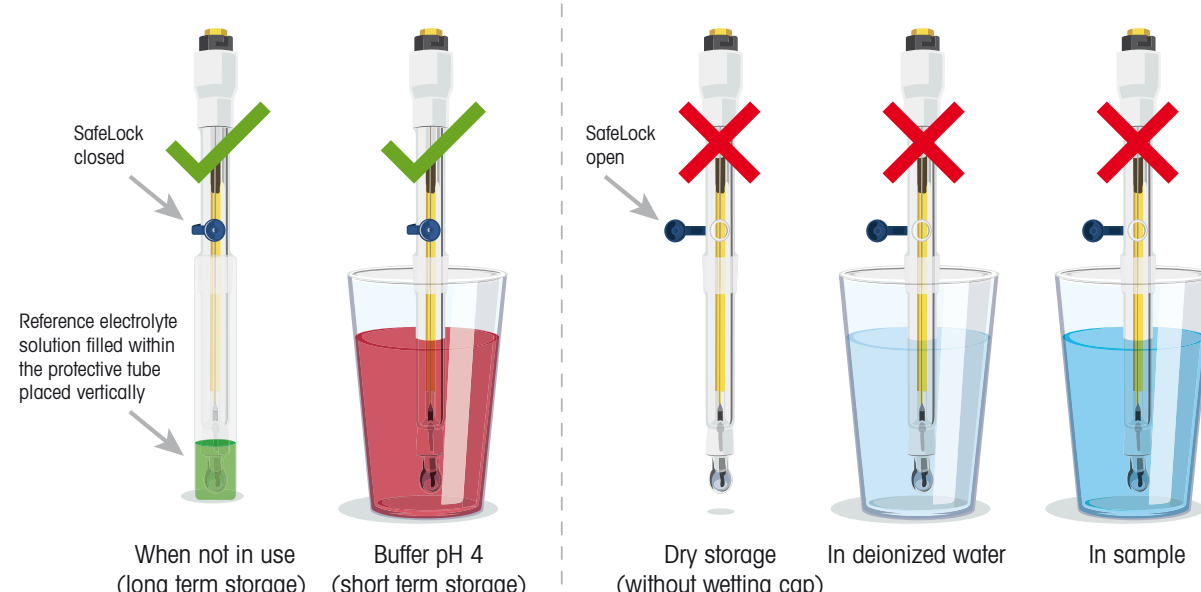## Good Measuring Practices (pH / Titration)

During use

1. Take suitable electrode according to the sample to be measured.
2. Rinse the electrode with deionized water and blot dry with tissue.
3. Ensure that the electrode junction is immersed in sample/buffer.
4. Ensure that the reference electrolyte level is above the sample solution level.
5. Calibrate the sensor before use.
6. Perform kinetic electrode test if required (for titration only).
7. Maintain uniform stirring and temperature conditions for calibration and sample measurement (pH / Titration).
8. Rinse the electrode thoroughly between consecutive measurements.

▶ www.mt.com/phlab-electrodemeasurement

Electrode Storage

After use

SafeLock closed	SafeLock open

Reference electrolyte solution filled within the protective tube placed vertically

When not in use (long term storage)
Buffer pH 4 (short term storage)
Dry storage (without wetting cap)
In deionized water
In sample

Long term	In reference electrolyte solution (specific for each electrode).
Short term	Buffer pH 4/7.
Never	Never store the electrode dry or in distilled water as this will affect the pH-sensitive glass membrane and thus shorten the lifetime of the electrode.

▶ www.mt.com/phlab-electrodestorage

Electrode Troubleshooting

1. Symptoms, causes and regeneration procedure for pH sensitive glass membrane

Inspection

Environment

Is instrument ok?
• Cross-check with another instrument

Is electrode cable ok?
• Cross-check with another cable

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Electrode

Presence of an air bubble?
• Refer image 2 in electrode preparation

Reference electrolyte level?
• Refer image 5 in electrode preparation

Glass membrane activation?
• Refer table 1 in this section

Clogged junction?
• Refer table 2 in this section

Incidence

Symptom \ Cause	Ageing of glass	Scratches on membrane	Broken membrane or shaft	Gel layer destroyed or dehydrated	Dry storage of electrode	Calcium on glass membrane (whitish film)	Oil, fat or tar residues (visible?)	Deposits of unknown substances (visible?)
Reduced slope (80–90%)	◉	◉	—	—	—	◉	◉	—
Very small slope (<80%)	◉	—	◉	◉	◉	◉	—	—
Slow response	◉	◉	—	◉	◉	◉	◉	◉
Fluctuating reading	◉	◉	◉	◉	◉	◉	◉	◉
Zero point shift	◉	—	◉	—	—	◉	◉	◉
Reason	High temperature, age of electrode	Abrasion, solid particles, incorrect cleaning	Mechanical or temperature shock	Ion deficient media, non-aqueous applications	Wrong storage	Measurement media	Measurement media	Measurement media, no cleaning
Restoration procedures	Regeneration*	Replace electrode	Replace electrode	Rehydration with electrolyte	Rehydration with electrolyte	Dip the glass in acetic acid / dilute hydrochloric acid until deposits are dissolved. Follow up with regeneration	Clean with degreasing agent, then with deionized water. Condition the electrode in pH buffer 4	Clean with degreasing agent, then with deionized water. Condition the electrode in pH buffer 4

◉ Possible   ◉ Probable   ◉ Highly probable   * Immerse the electrode glass membrane in regeneration solution for not more than 2 minutes

2. Clogged junction: Causes and cleaning procedures

Type of contamination		Cleaning agent	Reaction time	Remarks
Silver sulfide		Thiourea	5–60 minutes	Leave until coloration disappears
All possible types of contamination	First recommendation for removing unknown substances	HCl 0.1 M	Approximately 12 hours	Can also be used for internal cleaning
	Second recommendation for removing unknown substances	Chromic-sulfuric acid mixture	Approximately 30 minutes	Also cleans deposits very well. Electrode must be regenerated after this
Proteins		Pepsin/HCl cleaning solution	>1 hour	Can also be used for internal cleaning
		NaOH 2%	Approximately 20 minutes	Rinse the electrode with deionized water followed by conditioning in pH buffer 4
Lipophilic substances		Ethanol, acetone	Approximately 30 minutes	Highly suitable for edible oils. Always recondition the pH electrode in buffer pH 4 or 0.1M HCl
Calcium, scale		Acetic acid	Approximately 30 minutes	Electrode must be regenerated after this procedure
Soaps, tensides		Hot water (80 °C)	Approximately 12 hours	Thorough washing with deionized water followed by conditioning in pH buffer 4

▶ www.mt.com/phlab-electrodetroubleshooting

▶ www.mt.com/pH

METTLER TOLEDO