

Reference Electrode



KRE02

Ag/AgCl/Cl⁻ Reference Electrode (with Teflon Body)

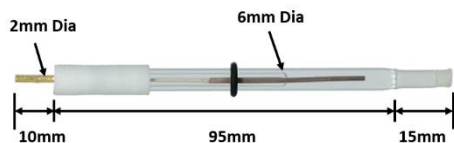
This is a single compartment silver/silver chloride reference electrode. The electrode is supplied with electrolyte filling, and electrolytes of desired concentrations can also be refilled easily.

Technical Specification

Reference system	Ag/AgCl/Cl ⁻
Purpose	For aqueous medium
Chemical reaction	$\text{AgCl}_{(s)} + e^- \rightleftharpoons \text{Ag}_{(s)} + \text{Cl}^-$
E°	207mV vs. NHE (at 25°C)
Typical variance	±5mV
Reference electrolyte	3M KCl solution
Outer Diaphragm	Porous frit
Electrode Pin (2mm)	Compatible with KLyte Alligator clip
Temperature range(°C)	5-80 (Approx.)
Material	Borosilicate glass tube
Diameter	6mm
Length*	120mm
Immersion length*	>12mm

*Please refer to the image of electrode dimension

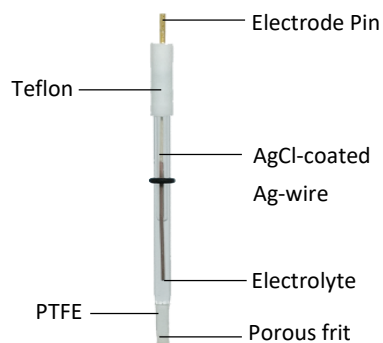
Electrode dimensions



Note: This ecofriendly reference electrode is widely used as an alternative for the saturated calomel electrode (SCE). The later contains liquid mercury and its salts, which are known to be a health hazard and harmful to the environment.

Maintenance and Handling

The reference electrodes are highly sophisticated, as well as delicate accessories. A small perturbation in an external parameter can change the performance of the electrode. Proper maintenance and careful handling ensure good reproducibility and longer life-time of the reference electrode.



Single compartment reference electrode with Ag/AgCl/Cl⁻ reference system

- **Conditioning:** At first, the user needs to make sure to remove the silicon-rubber protection cap at the end of the electrode tubing and rinse the electrode body with double-distilled water. The protection cap should be removed as gently as possible so that the bottom frit does not come out and damage the electrode. The reference electrode then must be conditioned by dipping its bottom part in the KCl solution (same as the filling solution) for two days, at room temperature.
- **Storing the electrode:** The lower part of the electrode should always be immersed in the KCl solution (same as the filling solution) when not in use. Otherwise, the solution inside the pores will dry out causing, high resistance, an increase in noise, or even the potential out of control. It can be restored by refilling it with deionized water and keeping its bottom part (immersion length, ~60mm) immersed in deionized water overnight. Then again, refilling it with KCl solution of the desired concentration and keeping it dipped in the same KCl solution overnight.
- **Electrolyte filling procedure:** The reference electrodes are shipped pre-filled with 3M KCl

reference electrolyte. For refilling, carefully unplug the Teflon tube by holding the glass tube; use a syringe to refill the glass tubing. Tab the tube for removing the air bubble and insert it in the Teflon cap.

Note: Concentration other than 3M can also be refilled as per the requirement of the experiment. In that case, one should keep in mind that the value of the standard potential will vary depending on the concentration.

- **Using in high-temperature measurement:** The operating temperature range of the Ag/AgCl, 3M KCl reference electrode is approximately from 5°C to 80°C. It should be noted that the electrode potential is a temperature-dependent quantity. Hence, it is advisable to conduct high-temperature analysis by isolating the reference electrode with a salt-bridge and keeping the reference electrode at room temperature.
- **Precautions:** The reference electrode should be kept vertically in the storage vial and not exposed to the sunlight (e.g., do not keep it near window sill). UV-light decomposes AgCl to give metallic Ag and gives the electrode a black appearance. Fluorescent lights under laboratory conditions are safe.

The Ag/AgCl reference electrode cannot be used in NH₃ buffer as AgCl forms a soluble complex with NH₃.

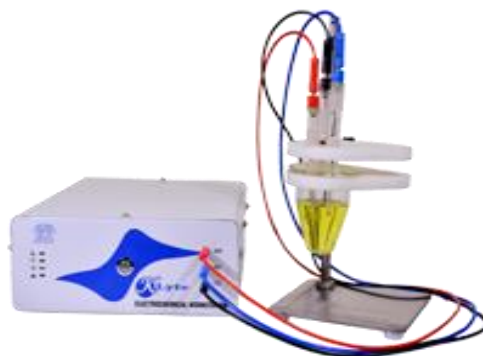
The Ag/AgCl reference electrodes should not be exposed in certain chemicals that form a precipitate of some silver compounds. For example, it cannot be used in the basic medium. In the presence of [OH⁻] ions, it forms Ag₂O or AgOH and gives rise to a mixed Ag/AgCl/Ag₂O potential, which is pH-dependent. The Ag₂O also builds in the pores of the frit resulting in high impedance. The Ag/AgCl electrode cannot be used in sulfide containing electrolytes due to the formation of insoluble Silver sulfide.

The impedance of the reference electrode should be low (less than 10kΩ). The common cause for high impedance is the blockage of the junction frits. Adsorption of organic materials or precipitation of insoluble salts in the junction can both cause clogging and hence results in high impedance (more than 1MΩ). It is advisable to use salt-bridge to prevent the electrode frits from clogging.

Included Parts:



Storage vial for reference electrodes.



Optional Parts:



KEC10A
Banana Cable Set



KEC10B
Banana Connector Pin



KA01 (Red), KA02 (Black)
Alligator Clip

Our Valuable Clients



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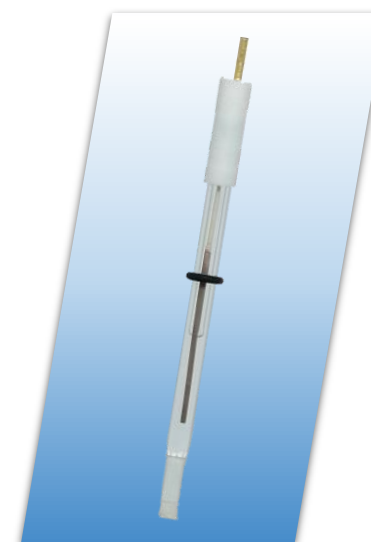
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Product Information Leaflet



Ag/AgCl/Cl⁻ Reference Electrode (with Teflon Body)

Product ID: KRE02

A complete solution for your
Electrochemistry research initiative...