

Reference Electrode



KRE03

Saturated Calomel Reference Electrode

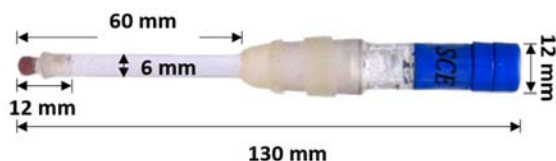
This is a dual compartment Hg/Hg₂Cl₂ (saturated KCl) reference electrode. This electrode is supplied with electrolyte filling and the electrolyte can be refilled easily. The standard ground-joint 14/23 enables easy assembly with KLyte electrochemical cell tops.

Technical Specification

Reference system	Hg/Hg ₂ Cl ₂ /Cl ⁻
Purpose	For aqueous medium
Chemical reaction	Hg ₂ Cl _{2(s)} + 2e ⁻ ⇌ 2Hg _(l) + 2Cl ⁻
E°	241mV vs. NHE (at 25°C)
Typical variance	±10mV
Refilling electrolyte	Saturated KCl solution
Inner Diaphragm	Glass-frit (G4)
Outer Diaphragm	Silica-based porous frit
Electrode Plug-in-head	Compatible with KLyte banana connector cable (4mm)
Standard Ground Joint sleeve	14/23
Temperature range (°C)	10-60 (Approx.)
Shaft material	Borosilicate Glass
Shaft diameter (Top)*	12mm
Shaft diameter (Bottom)*	6mm
Length*	124mm
Immersion length*	>12mm; <60mm

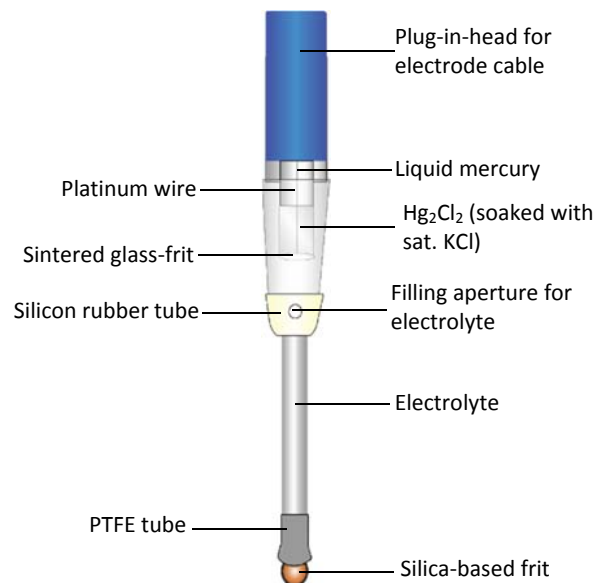
*Please refer to the image of electrode dimensions

Electrode dimensions



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. Therefore, it must be handled carefully. Proper maintenance and careful handling ensure good reproducibility and longer life-time for the reference electrode.



Dual compartment Saturated Calomel (SCE) reference electrode with Hg/Hg₂Cl₂/Cl⁻ reference system

- **Conditioning:** The electrode is shipped with electrolyte filling. Before using the electrode, first, the user needs to make sure to remove the silicon-rubber black cap at the end of the electrode tubing and rinse the electrode body with double-distilled water. The black 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 in KCl solution (slightly less than saturated) for two days at room temperature. Keeping the solution just below saturation allows enough ionic transport to prevent formation of salt crystals in the glass pores and also the impedance of the electrode remains low.

- **Storing the electrode:** This is a double junction electrode with a sintered glass frit that separates the Hg/Hg₂Cl₂ mixture from the bridging electrolyte. The silica-based porous glass frit at the tip of the electrode allows ionic transport into the electrode. Hence, the frit must always be kept wet with electrolyte and should be stored in KCl solution. Otherwise, the solution inside the pores will dry out, causing high resistance, an increase in noise, or even potential out of control. In this case the electrode can be restored by refilling it with only deionized water and kept immersed in deionized water overnight. Afterwards, refilling it with saturated KCl solution and keeping it dipped in the KCl solution overnight.
- **Electrolyte refilling procedure:** To refill the electrode with saturated KCl solution, carefully remove the silicon rubber tube from the filling aperture by holding the glass tube in one hand and pushing the silicon rubber tube downwards with another hand. Use a syringe to refill. The solution level should be full, and there should not be any air bubble trapped inside. The refilling solution should be inserted slowly to avoid generating much pressure. Pressure may cause the diaphragms (porous silica-based tip) to be popped out or damaged.
- **Using in high-temperature measurement:** The temperature range of the KLyte Hg/Hg₂Cl₂ (saturated KCl) reference electrode is approximately 10°C to 60°C. This electrode is unstable at higher temperature as Hg₂Cl₂ disproportionate to liquid Hg and HgCl₂. It is advisable to conduct high-temperature measurement by isolating the reference electrode with a salt-bridge and keeping the reference electrode at room temperature.

➤ **Precautions:** This electrode contains liquid mercury and its salt which are hazardous material. Hence this electrode should be handled carefully.

The electrode should be kept upright within the storage bottle and never in direct sunlight.

This electrode is used in acid solution. It should not be used in a strong alkaline medium ($[\text{base}] > 0.1\text{M OH}^-$) or in a solution containing cations that may form an insoluble precipitate of hydroxides.

This electrode cannot be used in non-aqueous/organic solvents, NH_3 buffers and sulfides.

The impedance of the reference electrode should be low (less than $10\text{k}\Omega$). 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 $1\text{M}\Omega$). 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



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Product Information Leaflet



Saturated Calomel Reference Electrode
Product ID: KRE03

Contact us



www.kanopytech.com



contact@kanopytech.com



+91-8604355668, +91-8004567307

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