Reference Electrode

KRE06

Ag/Ag^+ Reference Electrode

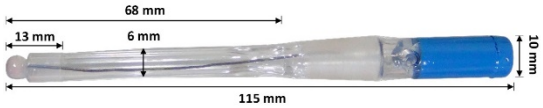
This is a single compartment silver/silver ion reference electrode. The electrode is supplied with electrolyte filling. The standard ground-joint 10/18 of the electrode, enables easy assembly with KLyte electrochemical cell tops.

Technical Specification

Reference system	Ag /$AgNO_3$
Purpose	For non-aqueous medium
Chemical reaction	$AgNO_3 + e \rightleftharpoons Ag_{(s)} + NO_3^-$
Typical variance	±5mV
Reference electrolyte	10mM $AgNO_3$+ 0.1M TDAB in CH_3CN
Outer Diaphragm	Silica-based porous frit
Electrode Plug-in-head (2mm)	Compatible with KLyte banana connector cable
Standard Ground-Joint sleeve	10/18
Temperature range (°C)	Depends on solvent
Shaft material	Borosilicate glass
Shaft diameter (Top)*	9mm
Shaft diameter (Bottom)*	6mm
Length*	115mm
Immersion length*	>13mm; <60mm

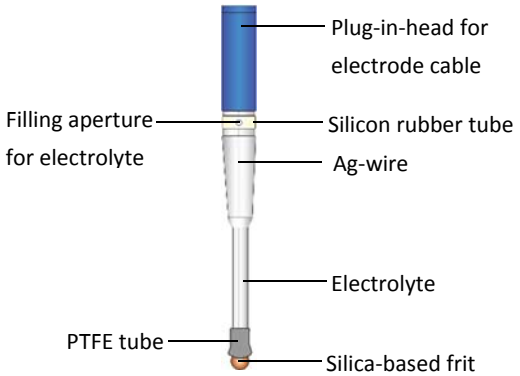
**Please refer to the image of electrode dimensions*

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. Proper maintenance and careful handling ensure good reproducibility and longer life-time of the reference electrode.



Single compartment reference electrode with Ag/Ag^+ reference system

- **Conditioning:** At 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. This electrode is supplied with filled electrolyte of 10mM $AgNO_3$ (silver nitrate), 0.1M TDAB (1,3,5 -Tris (diphenylamino) benzene) in CH_3CN (acetonitrile). It should be kept vertically dipped in a sealed storage container containing the same electrolyte as the filled one for 30mins for conditioning.
- **Nature of the electrode and storing:** The non-aqueous electrodes are less stable than the aqueous reference electrode due to the volatile nature of the organic electrolytes which slowly evaporates, and the silver ions also diffuse out through the diaphragm. This electrode should be calibrated daily before performing each experiment vs. a redox couple such as ferrocene. The electrode can be stored for short-time inside the storage container containing the same electrolyte as the filled one. The container should be airtight to minimize the evaporation of the storage solvent.
- **Electrolyte filling procedure:** For refilling, carefully remove the silicon rubber tube from the filling aperture by holding the glass tube in one hand and pushing the silicon rubber tube upwards/downwards with the other hand. Using a syringe to refill is recommended. 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. Approximately 10mL refilling solution is supplied with the reference electrode.

Note: *The value of the standard potential will vary depending on the solvent used, the concentration of silver nitrate, nature, and concentration of supporting electrolyte (here TDAB). It is also changed by the introduction of salt bridges, which are used to decrease contamination of the sample solution by silver ions.*

- **Precautions:** Silver ions are reduced by dimethylformamide and are insoluble in methylene chloride; these solvents are therefore not suitable for this reference electrode.

The reference electrode should not be kept exposed to the sunlight (e.g., do not keep it near window sill). UV-light decomposes $AgNO_3$ to give metallic Ag and gives the electrode a black appearance. Fluorescent lights under laboratory conditions are safe.

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

The filling solution of non-aqueous electrode

Optional Parts:

KEC10A
Banana Cable Set

KEC10B
Banana Connector Pin

KA01 (Red),**KA02** (Black)
Alligator Clip

Kanopy Techno Solutions

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Product Information Leaflet

Ag/Ag^+ Reference Electrode
Product ID: KRE06

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