Copper Ion Selective Electrode

# Instruction Manual

This electrode is designed for the detection and analysis of copper ions in aqueous solutions and is suitable for laboratory applications.

## Required equipment

- A pH/mV meter or specific ion meter
- A magnetic stirrer
- Beakers

## Required solutions

- Distilled or Deionised Water:
  To prepare all solutions and standards.

- Ionic Strength Adjuster (Order Code: ISA-CU):
  To keep a constant background ionic strength and adjust the pH.

- Copper Standard Solution 0.1M (for measurement in units of mol/L):
  To prepare this solution, half fill a 1 liter volumetric flask with distilled water and add 24.16 grams of reagent-grade copper nitrate ($Cu(NO_3)_2 \cdot 3H_2O$). Swirl the flask gently to dissolve the solid and fill to the mark with distilled water. Cap the flask and upend several times to mix the solution.

- Copper Standard Solution 1000ppm (for measurement in units of ppm):
  To prepare this solution, half fill a 1 liter volumetric flask with distilled water and add 3.80 grams of reagent-grade copper nitrate. Swirl the flask gently to dissolve the solid and fill to the mark with distilled water. Cap the flask and upend several times to mix the solution.

## Prior to use

- Remove the protective cap. Connect the electrode to meter. Rotate and push the BNC connector clockwise until it locks.
- Soak the electrode in 100ppm copper standard solution for at least 10 minutes.

## Electrode slope

If necessary, follow the steps below to check the electrode slope.

1. Pour 100ml of distilled water and 2ml of ionic strength adjuster into a 150ml beaker.
2. Place the beaker on the magnetic stirrer and begin stirring at a constant rate. Set the mode switch on the meter to mV.
3. Pipette 1ml of 0.1M or 1000ppm standard solution into the beaker. When the reading is stable, record the mV value “E1”.
4. Pipette 10ml of 0.1M or 1000ppm standard solution into the beaker. When the reading is stable, record the mV value “E2”.
5. Determine difference between the first and second mV readings. The slope value should be 28±4 mV at 25°C.

## Measurement

- The ionic strength of the standards and solutions should be kept constant between all standards and samples. This is achieved by the simple addition of an ionic strength adjustment buffer (ISAB). A typical addition would be 2ml ISAB to 100ml of standard and sample.
- Samples must fall in the pH range of 2 to 12. For best accuracy, use the recommended ISA to adjust the pH.
- Ensure that the temperature of all standards and samples are the same to reduce errors.
- Using a magnetic stirrer for laboratory analysis is recommended but not essential.
- Prior to sample measurement ensure that the electrode is thoroughly rinsed with deionised water.
- Avoid strongly acidic or alkaline samples, strong detergents and organic solvents.
- Begin calibration from the lowest concentration standard to avoid cross contamination. Calibration should cover the anticipated range of the samples.

Using an Ion Meter:

1.1 Calibrate the meter according to the manufacturer's instructions.
1.2 Rinse the electrode in deionised water and blot dry.
1.3 Place the beaker with sample on the magnetic stirrer, and begin stirring.
1.4 Place the electrode in the sample and record the stable reading.

Using a pH/mV Meter:

2.1 Turn function switch to mV measurement.
2.2 Using semi-logarithmic graph paper, prepare a calibration curve by plotting the mV values of standard solutions.
2.3 Place the electrode in the sample and record the stable mV value.
2.4 Using the calibration curve determine the unknown sample concentration.

## Storage and maintenance

- After use rinse with deionised water, replace protective cap and store dry in its box.
- If performance becomes sluggish carefully polish the membrane with a fine emery cloth or polishing strip, rinse with de-ionised water and immerse the tip in a 100ppm copper solution for 10 minutes.

## Specification

| PARAMETER | SPECIFICATION |
|---|---|
| Concentration Range | $1 \times 10^{-8}$~0.1M, 0.006~6400ppm |
| pH Range | 2~12pH |
| Temperature Range | 0~80°C, 32~176°F |
| Interferences | $Ag^{+}$, $Hg^{2+}$, $S^{2-}$, $Fe^{2}$, $Cl^{-}$, $Br^{-}$ |
| Cable Length | 100cm |
| Dimensions | 120 (L) × 12 (Dia.)mm |
| Connector | BNC |