

#7683 TIP TYPE CALCIUM ION SELECTIVE ELECTRODE INSTRUCTION MANUAL

1. Structure of the Tip Type Ion Electrode

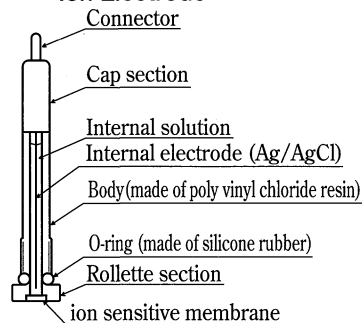


Figure 1. Structural diagram

3. Preparation of the Standard Solution

Accurately weigh out 2.769 g of commercially available guaranteed reagent grade calcium chloride and dissolve it in pure (deionized) water. Add enough pure (deionized) water to make 1 L. This solution is your 1000 mg/L Ca²⁺ standard solution. Dilute 100 mL, 10 mL, and 1 mL of this solution with 1 L of pure (deionized) water to produce 100 mg/L, 10 mg/L and 1 mg/L Ca²⁺ standard solutions. Add 0.1 mol/L of potassium chloride (7.5 g/L KCl) as a supporting electrolyte to each of these solutions. In addition, add the same concentration of supporting electrolyte as the standard solution to the sample liquid to obtain an even higher level of accuracy in your measurements.

4. Precautions

- (1) The electrode is composed of organic materials inside plastic and therefore has a limited life span. The life span is over a year when stored in open air.
- (2) If the test sample is strongly acidic (less than pH5) or highly alkaline (greater than pH11), add sodium hydroxide or sulfuric acid to change the solution to within a 5 to 11 pH range.
- (3) Although potassium chloride was used for the supporting electrolyte in the standard solution, barium chloride, or sodium chloride may be used instead.
- (4) If there is any drift in the electrode potential or lack of sensitivity in the electrode, perform the following steps and try again.
 - ※ Bubbles may have become attached to the ion sensitive membrane inside the electrode. Grip the top part (connector end) of the tip with your fingers and shake it as you would shake a thermometer to free the bubbles.
 - ※ Because of heat generated from the stirrer, the temperature of the solution is slowly rising, causing a drift in the electrode potential. If this is the case, lay a

2. Replacing the Electrode

- Replacement method
Attachment and removal of the tip electrode from the main unit is via a single screw. Grip the rollette part of the tip electrode with your fingers and rotate it.
- Precautionary notes
The ion sensitive membrane section is made from a special plastic. Take care not to scratch it or touch it with your fingers. In addition, do not wipe the ion sensitive membrane with an organic solvent.

sheet of adiabatic material such as styrofoam between the stirrer and the beaker in order to prevent temperature changes.

5. Electrode Characteristics

(1) Calibration characteristics

Figure 2 shows the relationship between the concentration of the calcium ion and the output electrode potential.

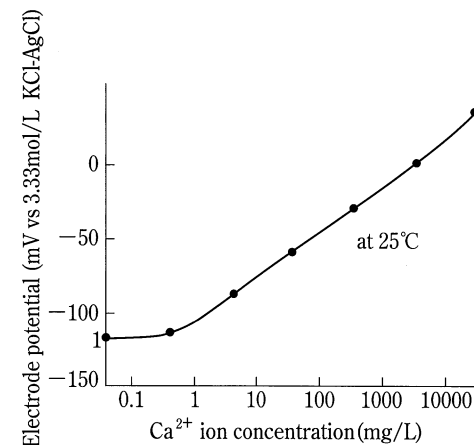


Figure 2.

(2) Influence of pH

The calcium ion electrode is affected by the pH in strongly acidic or highly alkaline regions. Use the electrode within the 5 to 11 pH range.

(3) Influence of temperature

The calibration curve of the electrode varies with temperature. You must maintain the standard solution and the sample solution at the same temperature during measurement.

(4) Influence of coexisting ions

The calcium ion electrode is influenced by various other ions. The influence of the coexisting ions can be shown in the following equation. K is the selectivity constant and is used as a standard for quantitatively indicating the influence of the coexisting ions.

$$E = E_0 + \frac{2.303RT}{2F} \log \left(a_{Ca^{2+}} + \frac{1}{K} a_x \right)$$

where $a_{Ca^{2+}}$ is the calcium ion concentration a_x is the concentration of interfering ions. The values for the selectivity constant K are listed in the specifications section of the combination type ion electrode instruction manual.