

Fluoride Ion Selective Electrode Instruction Manual

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

Required equipment

- A pH/mV meter or specific ion meter
- A magnetic stirrer
- Plastic beakers

ⓘ Do not use the glass beaker.

Required solutions

- Distilled or Deionised Water:
To prepare all solutions and standards.
- Total Ionic Strength Adjuster Buffer - TISAB 01 (Order Code: ISA-F-01):
To keep a constant background ionic strength and adjust the pH.
- Total Ionic Strength Adjuster Buffer - TISAB 02 (Order Code: ISA-F-02):
Use when measuring in samples containing less than $2 \times 10^{-5} \text{ M}$ (0.4ppm) fluoride and containing no fluoride complexing agents (e.g., Fe^{3+} , Al^{3+} , etc.).
- Total Ionic Strength Adjuster Buffer - TISAB 03 (Order Code: ISA-F-03):
Use when measuring in samples containing more than 100ppm of aluminum or iron in the presence of 1ppm fluoride ion.
- 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 4.199 grams of reagent-grade sodium fluoride (NaF). 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.
- 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 2.21 grams of reagent-grade sodium fluoride. 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.
- Immerse the electrode in the weakest calibration standard to be used for 10 minutes.
- Rinse the electrode tip with distilled or deionised water prior to all measurements.

Electrode slope

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

1. Pour 50ml of distilled water and 50ml of Total Ionic Strength Adjuster Buffer (TISAB-01) into a 100ml 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 $56 \pm 4 \text{ mV}$ 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 a Total Ionic Strength Adjuster Buffer (TISAB). A typical addition would be 50ml TISAB to 50ml of standard and sample.
- Samples must fall in the pH range of 5 to 7. For best accuracy, use the recommended TISAB 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.
- Some samples are impossible to stir consistently. If this is the case it may be better not to stir but remember to treat any standards in the same way.
- Prior to sample measurement ensure that the electrode is thoroughly rinsed with deionised water.
- 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

- Storage: Rinse with distilled water, dry and clamp in air.
- Maintenance: The factors which reduce membrane life are damage to the membrane surface and hydrolysis of adhesives used to mount the membrane in position. DO NOT store in solution.

Specification

PARAMETER	SPECIFICATION
Concentration Range	$1 \times 10^{-6}\text{M}$ ~Saturation, 0.02ppm~Saturation
pH Range	5~7pH
Temperature Range	0~80°C, 32~176°F
Interferences	OH^- , Al^{3+} , Fe^{3+}
Cable Length	100cm
Dimensions	120 (L) \times 12 (Dia.)mm
Connector	BNC
