



## TECHNICAL SPECIFICATIONS AND USER GUIDE FOR FLUORIDE ION SELECTIVE ELECTRODE

CleanGrow's fluoride ion combination probe is a dual electrode designed for the detection of fluoride ions ( $F^-$ ) in aqueous solutions and is suitable for both laboratory and field applications. This model includes a reference electrode and an ion selective electrode for monovalent fluoride ions ( $F^-$ ). This guide contains information about the operation and maintenance of the probe.

The probe is an all solid state ion selective electrode based on carbon nanotube technology. It does not contain any internal filling solution and can work in all positions and stored dry.

Special maintenance is not required, however, before use and after long storage periods it needs to be conditioned in conditioning solution.

### TECHNICAL SPECIFICATIONS

- Slope at 25°C:  $54 \pm 5$  mV / decade
- Concentration range: 0.1 – 10,000 ppm ( $5 \times 10^{-6}$  – 0.5 M)
- pH working range: 4 – 8
- Working temperature: 5 – 50°C
- Response time: < 120 s
- Dimensions: Standard diameter 11 mm, length 125 mm
- Connector type: BNC with 1 m cable length

### MAIN INTERFERENCES

Only the hydroxyl ion ( $OH^-$ ) interferes with fluoride measurement and hence the pH must be kept below pH 8.

### REQUIRED SOLUTIONS

- Fluoride standard solution usually from the sodium or ammonium salt.
- Distilled/Deionised water
- TISAB solution:

For samples with a high ionic background ( $>0.01$  M), pH out of range or with the presence of complexing ions, TISAB needs to be added to keep the pH and ionic strength constant and to avoid the complexation of fluoride. A concentration of 10 – 50% needs to be added in the same ratio to the calibration solutions and samples.



#### COMPLEXING IONS

Concentration of complexing ions permitted without affecting fluoride measurement:

$\text{Al}^{3+}$  (0.04 ppm),  $\text{Ca}^{2+}$  (330 ppm),  $\text{Cu}^{2+}$  (0.4 ppm),  $\text{Fe}^{3+}$  (0.3 ppm),  $\text{Mg}^{2+}$  (500 ppm)

#### TISAB PREPARATION

This is prepared by adding 2.7 mL of acetic acid (98 – 99%) to 200 mL of deionised water. Add 17.6 g of sodium acetate (anhydrous), 8 g of sodium chloride and 1 g of CDTA to this solution and shake well. Transfer to a 250 mL volumetric flask and fill to the line with deionised water.

#### REQUIRED EQUIPMENT

- Magnetic stirrer
- Plastic laboratory labware (not glass)

#### BEFORE USE

- Remove the protective cap from the tip of the probe
- Condition the probe with a 1000 ppm fluoride solution for 10 minutes or for at least 2 hours if the probe has not been used for a long period of time.

#### MAINTENANCE AND STORAGE

- Store in a cool, dry place.
- Store and transport below 50°C
- When finished measurements put the protective cap back on the probe.
- Do not leave the probe uncapped for long periods of time.
- Do not hit or scrape the tip of the probe.

#### MEASURING HINTS

- The addition of 10% TISAB is usually adequate for buffering the calibration solutions and samples.
- All samples and standards should be at the same temperature for precise measurement.
- Calibration and measurements times must be similar to avoid drift effects. We recommend an acquisition time of at least 2 minutes.
- During calibration and measurement moderate magnetic stirring is recommended to obtain the best performance.
- After putting the probe into a new sample wait for a stable signal (at least 2 minutes).



- Always rinse the probe with deionised water and dry between measurements. Use a clean, dry tissue to prevent cross-contamination or shake the probe slightly to remove remaining water drops.
- Shake the probe slightly when immersed in the solution to avoid air bubbles enclosing on the tip of the probe.

#### SAFETY AND HANDLING

Fluoride salts are mildly toxic but can be lethal by acute poisoning. It may cause hypocalcemia, fluorosis or other related illnesses. Therefore, all users should wear protective equipment such as glasses and gloves.