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Fluoride Sealed Electrode Sensor Bundle

Product Number: ENFLU049

Overview

Fluoride is often added to drinking water and to toothpaste to prevent dental decay. In high concentrations, though, it is harmful to health. The Fluoride sensor measures the concentration of fluoride ions (F^-) in aqueous solution.

The Fluoride Sealed Electrode Sensor can be connected to all types of einstein™ data loggers.

Typical experiments

Water Quality

- Studying the concentration of fluoride ions in water from different sources
- Studying the rate of dissolution of salts containing fluoride ions

How it works

The Fluoride sensor contains a Permafil (non-refillable) electrode containing fluoride ions inside a membrane. When inserted into a solution containing fluoride molecules the Fluoride in the solution is attracted to the fluoride ions in the membrane. By measuring the electrical potential of this attraction, the sensor can determine the level of fluoride in the solution. Because they only attract other fluoride molecules sealed electrode sensors work well even in solutions containing numerous elements.

Sensor specification

Concentration Range:	1 x 10-6 M to saturation (0.02 ppm to saturation)
Resolution (12-bit):	0.15 mV
Minimum Sample Size:	5 mL in a 50 mL beaker
Default Sample Rate	10 samples per second
pH Range:	5 to 7 pH @ 1 x 10-6 M
5 to 11 pH at saturation	
Temperature Range :	0-80 °C
Reproducibility :	± 4%
Electrode Resistance	Less than 50 MΩ
Interfering Ions	OH-

Note: Sensor cables sold separately

What's included?

The Fluoride Sealed Electrode Sensor comes equipped with:

- The Fluoride Sealed Electrode Sensor
- ISE (Ion Selective Electrode) Amplifier
- 1 oz. F^- Ionic Strength Adjuster (ISA) (AJ0FL1)
- 1 oz. F^- 1000 ppm as F Standard (SD2020 / SD0FL2)
- Polishing Strip (6A0029-3)

Solutions

1000 ppm as F Standard (0.0526 M F^-): 2.210 g NaF in 1000 ml DI water

10 ppm as F Standard (0.0526 M F^-): 22.10m g NaF in 1000 ml DI water

ISA Total Ionic Strength Adjustment Buffer (TISAB):
Dissolve all of the chemicals below in 1000 mL DI water

14.0 mL glacial acetic acid
82.0 g sodium acetate
58.4 g sodium chloride
4.0 g CDTA monohydrate (1,2-Cyclohexylenedinitrilotetraacetic acid monohydrate)

Experimental set up

Electrode Preparation

1. Remove the protective plastic cover from the tip of the electrode and gently shake the electrode downward like a thermometer to remove any air bubbles trapped inside. Caution: Do not touch the PVC membrane with your fingers.
2. Rinse the electrode with DI water and blot dry. Do not rub dry.
3. Condition the electrode by soaking it in the provided 10 ppm F^- standard solution for 30 minutes.
4. After the conditioning period, rinse the tip of the electrode with DI water and blot dry.
5. The electrode is now ready to use.

This sensor must be calibrated before use (see the **Data Logging, Calibrating and Analysis** below).

Two solutions of different concentrations (depending on the range of measurements) are used to calibrate the electrode. ISA is added to all solutions to ensure that the samples and the standards have the same ionic strength.

In addition to the aforementioned contents, you will also need:

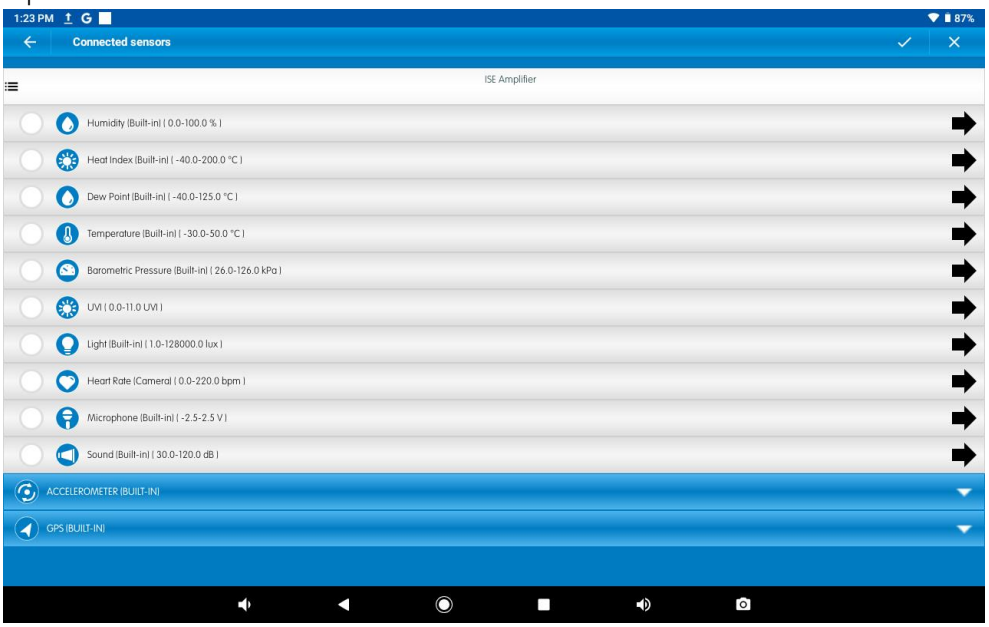
- Wash Bottle with Distilled (DI) or deionized water.
- Several clean beakers.
- 1mL, 10mL pipettes.

Data logging, Calibrating and Analysis MiLABEx™

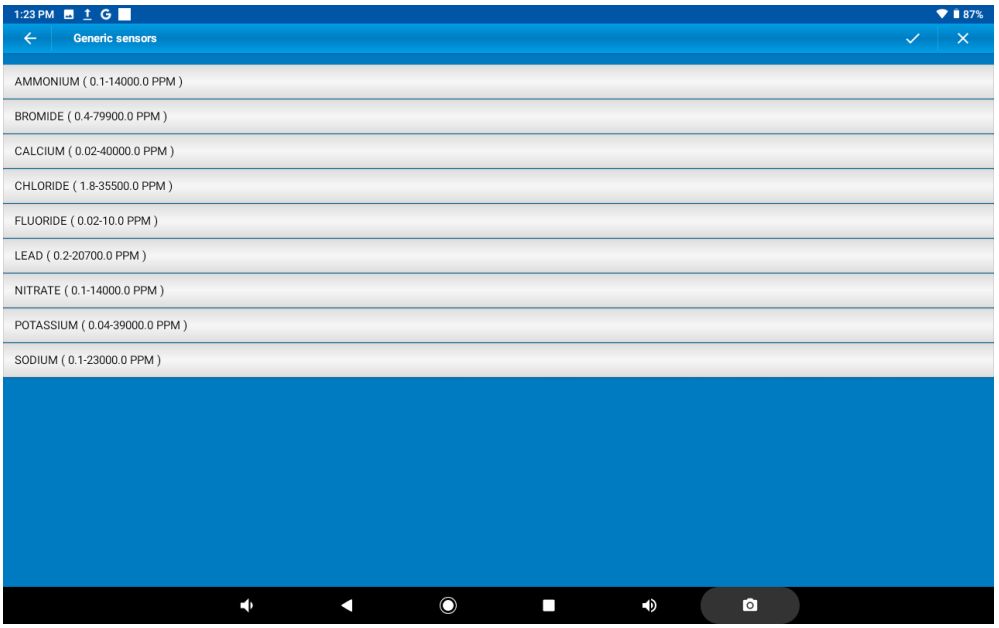
Android

1. Take your einstein™ Tablet or pair your einstein™LabMate™ with your Android via Bluetooth
2. Insert the electrode into the ISE amplifier

3. Insert the ISE amplifier cable into one of the sensor ports
4. Launch MiLABEx
5. MiLABEx will automatically detect the ISE amplifier
6. Tap on LAB – Start your experiment
7. Tap on Sensors



8. Tap on ISE Emplifier
9. select Fluoride sensor and then tao on V to confirm selection



10. Tap on the arow to go to Sensors Settings Calibrate the sensor as instructed below
11. Return to the Lab
12. You are ready to Experiment

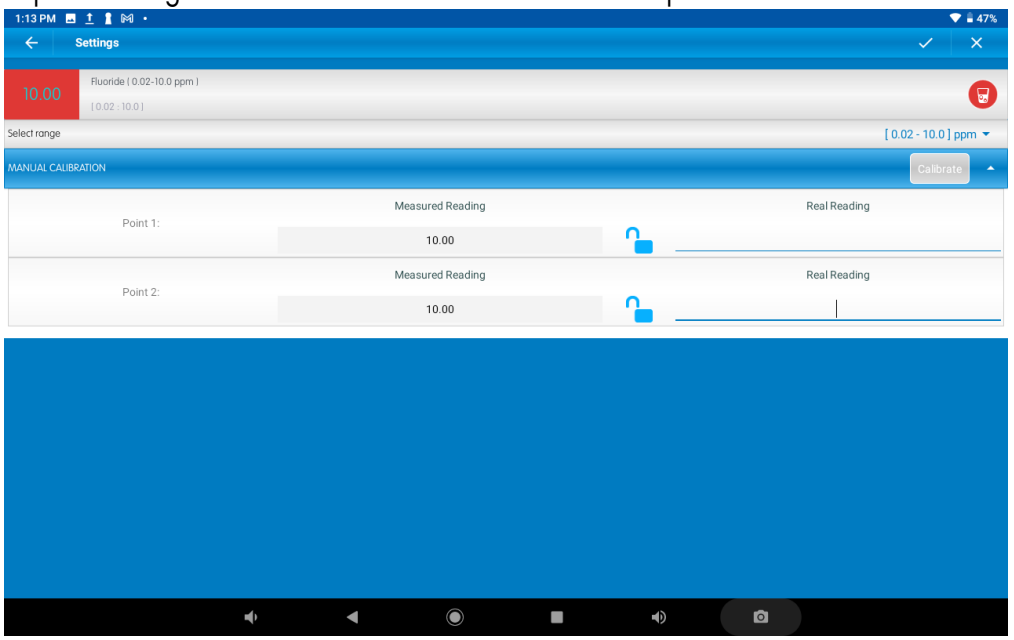
Calibration in **MiLABEx™**

Preparing the calibration solutions

1. Add 10 ml of the 10 ppm solution into a 50 mL beaker.
2. Add 0.2 ml of ISA and stir thoroughly.
3. Add 10 ml of the 1000 ppm solution into a 50 mL beaker.
4. Add 0.2 ml of ISA and stir thoroughly.

Calibrating the sensor

1. Tap the Settings button next to the sensor's name and tap "Manual Calibration"



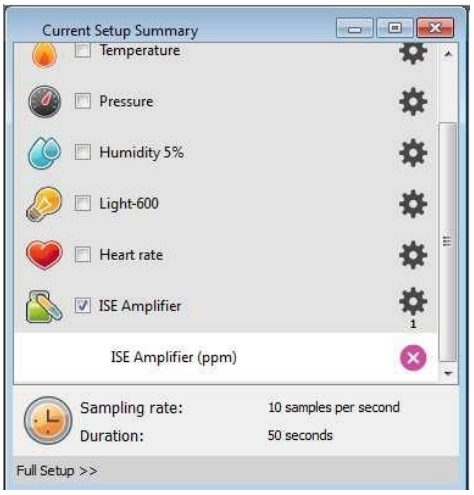
2. Prepare the electrode as described in "Electrode preparation" above
3. Tap the "Real Reading" box of Point 1
4. Enter the value "10"
5. Rinse the electrode with DI water, blot dry and place in the beaker with the 10 ppm solution. Wait for a stable reading, and then tap the "Lock" icon
6. Tap the "Real Reading" box of Point 2
7. Enter the value "1000"
8. Rinse the electrode with DI water, blot dry and place in the beaker with the 1000 ppm solution. Wait for a stable reading, and then tap the "Lock" icon
9. Tap "Calibrate"
10. You are ready to run your experiment

Note: It is best to calibrate the electrode with one Real Reading below your expected reading and one real Reading above your expected reading. For example, if you expect a reading of around 100 ppm it is best tocalibrate with one Real Reading below 100 ppm and one Real Reading above 100 ppm

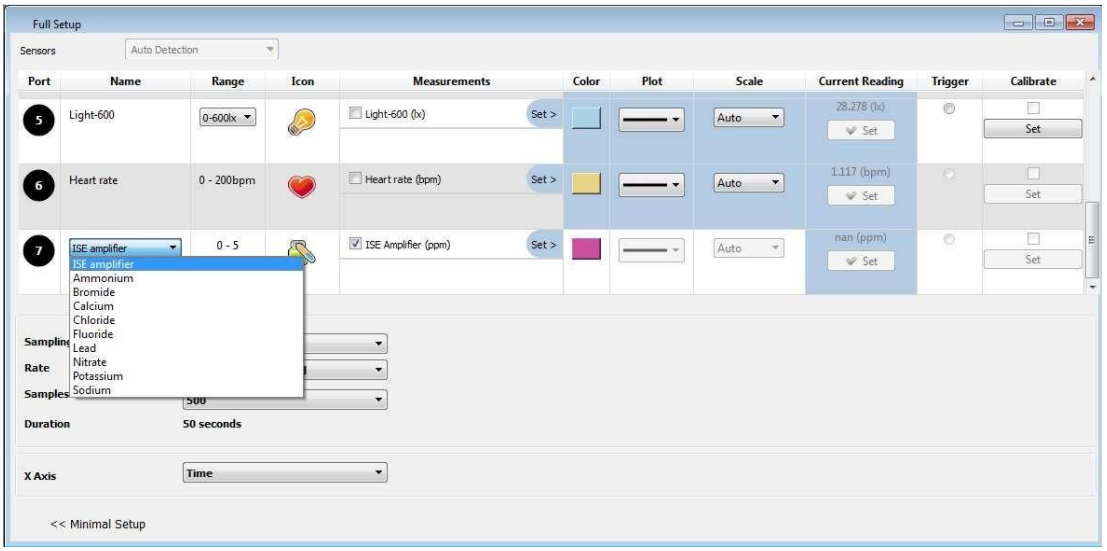
Note: You can prepare your own ppm solutions for calibration, using the strength of your solution as the "Real Reading"

MiLABEx™ Desktop

1. Pair your einstein™LabMate™ with your PC, MAC, or Linux machine via Bluetooth, or connect it via the USB cable (found in the einstein™LabMate™ box).
2. Insert the electrode into the ISE amplifier
3. Insert the ISE amplifier cable into one of the sensor ports
4. Launch MiLABEx and open LAB – start your experiment
5. MiLABEx will automatically detect the ISE amplifier and show it in the **Current Setup Summary** window



6. Click **Full Setup**, located at the bottom of the **Current Setup Summary** window to set which ISE electrode you are using and to program the data logger's sample rate, number of samples, units of measurement, and other options



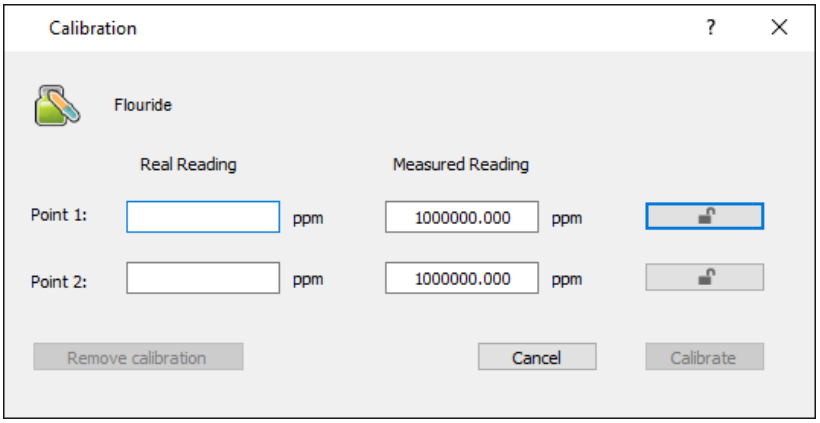
Calibrating in **MiLABEx™** Desktop

Preparing the calibration solutions

1. Add 10 mL of the 10 ppm solution into a 50 mL beaker
2. Add 0.2 mL of ISA and stir thoroughly
3. Add 10 mL of the 1000 ppm solution into a 50 mL beaker
4. Add 0.2 mL of ISA and stir thoroughly

Calibration Process

1. Start MiLABEx™ and select the Fluoride electrode as described above.
2. Under the Calibrate column tap "Set" to bring up the Calibration menu



3. Prepare the electrode as described in "Electrode preparation" above.
4. Tap the "Real Reading" box of Point 1
5. Enter the value "10"
6. Rinse the electrode with DI water, blot dry and place in the beaker with the 10 ppm . Wait for a stable reading, and then click the "Lock" icon
7. Tap the "Real Reading" box of Point 2
8. Enter the value "1000"
9. Rinse the electrode with DI water, blot dry and place in the beaker with the 1000 ppm solution. Wait for astable reading, and then click the "Lock" icon
10. Click "Calibrate"
11. Tap the Run button on the main toolbar of the Launcher View to start logging

Note: It is best to calibrate the electrode with one Real Reading below your expected reading and one Real Reading above your expected reading. For example if you expect a reading of around 100 ppm it is best to calibrate with one Real Reading below 100 ppm and one Real Reading above 100 ppm

Note: You can prepare your own ppm solutions for calibration, using the strength of your solution as the "Real Reading"

Maintenance and Electrode Storage

Short Term:

Rinse the electrode thoroughly with DI water and place the tip in a diluted standard solution (10 ppm) between measurements.

Long Term:

Rinse the electrode thoroughly with DI water, blot and store dry. Replace the cap to protect the sensing element.

Follow procedures in the sections **Electrode Preparation** before using the electrode again.

Troubleshooting

If the slope of the Fluoride ion selective electrode is not within the normal range, the electrode may not be able to function properly during measurements. The following procedure may restore the electrode.

1. Polish the solid state sensing element with the provided polishing strip.
2. Soak the electrode in the 10 ppm as F standard solution for 2 hours before use.
3. Repeat "Electrode Calibration Process" again. **Note: All standard solutions should be prepared fresh. ISA must be used in all solutions.**

Technical support

For technical support, you can contact the Fourier Education's technical support team at: Web: www.einsteinworld.com/support
Email: support@fourieredu.com

Copyright and Warranty

All standard Fourier Systems sensors carry a one (1) year warranty, which states that for a period of twelve months after the date of delivery to you, it will be substantially free from significant defects in materials and workmanship.
This warranty does not cover breakage of the product caused by misuse or abuse.
This warranty does not cover Fourier Systems consumables such as electrodes, batteries, EKG stickers, cuvettes and storage solutions or buffers.