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Apr 2024

Sodium Sealed Electrode Sensor Bundle

Product Number: ENSOD051

Overview

Sodium is highly abundant in the lithosphere (Earth's outer shell) where it occurs as rock salt deposits as well as being the most abundant salt in saltwater seas. Sodium compounds are used in a variety of ways from seasoning food to making glass, to name just a few.

The Sodium Ion sensor measures the concentration of sodium ions in an aqueous solution. The Sodium Sealed Electrode Sensor can be connected to all types of einstein™ data loggers.

Typical experiments

Environmental Quality

- Water quality studies
- Soil quality studies

Chemistry

- Effect of salt concentration on the conductivity of a solution
- Factors that affect salts solubility

Biology

- Factors that affect cell membrane permeability

How it works

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

Sensor specification

Concentration Range:	4×10^{-6} to 1 M (0.1 to 23,000 ppm)
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:	Above 9 pH
Temperature Range :	0 to 80 ºC
Reproducibility:	±4%
Electrode Resistance	10 to 20 MΩ
Interfering Ions	H+, K+

Note: Sensor cables sold separately

Contents

The Sodium Sealed Electrode Sensor comes equipped with:

- The Sodium Sealed Electrode Sensor
- ISE (Ion Selective Electrode) Amplifier

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- 1 oz. Na+ Ionic Strength Adjuster (ISA) (AJ0NA1)
- 1 oz. Soaking Solution (RFNH31)
- 1 oz. Na+ 1000 ppm as Na Standard (SD2044 / SD0NA2)

Solutions

1000 ppm as Na Standard (0.0435 M Na$^+$):	2.542 g NaCl in 1000 mL DI water
10 ppm as Na Standard (0.0435 M Na$^+$):	25.42 mg NaCl in 1000 mL DI water
ISA Ionic Strength Adjuster Buffer:	Dissolve the following chemicals in 1000 mL of DI water 200.0 g ammonium chloride 270.0 mL ammonia aqueous solution

Experimental set up

Electrode Preparation

1. Remove the plastic protective vial 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 glass membrane with your fingers.**
2. Rinse the electrode with DI water, blot dry. **Do not rub dry.**
3. Condition the electrode in the provided 10 ppm as Na 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 te 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

Android

1. Take your einstein™ Tablet or pair your einstein™ LabMate with your

Android or iOS tablet 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 and tap LAB start an Experiment

5. MiLABEx™ will automatically detect the ISE emplifier

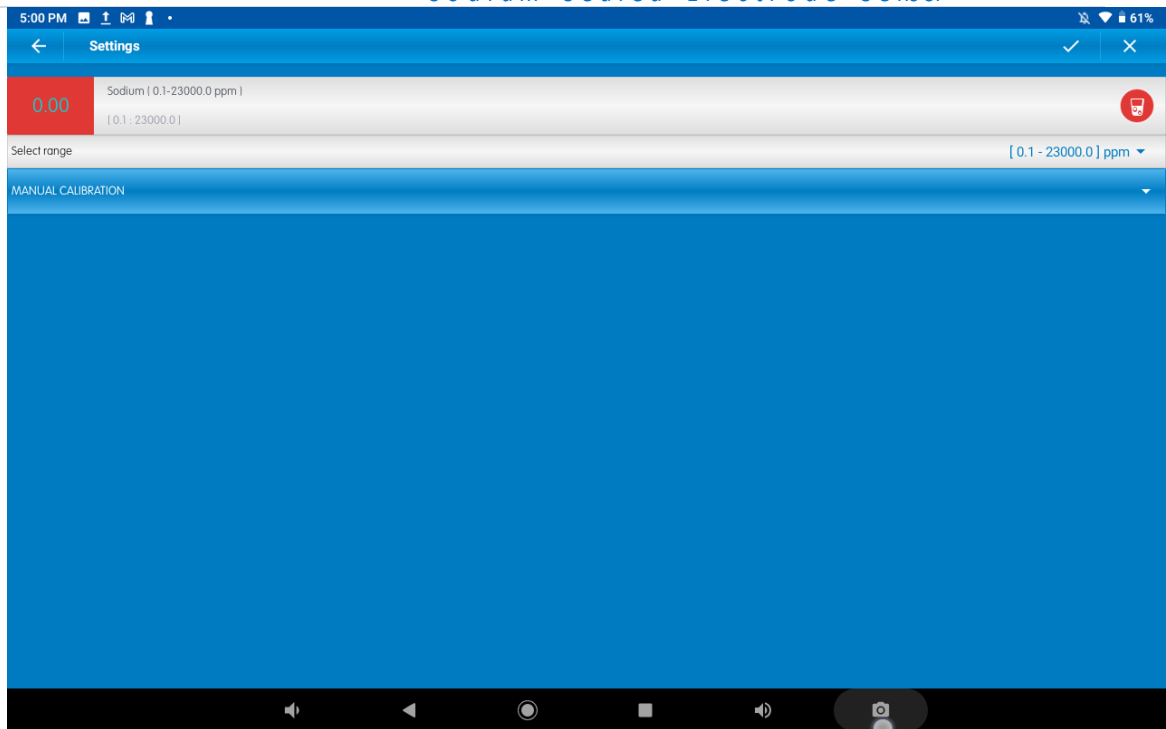6. Tap on Sensors to select the Sodium electrode.
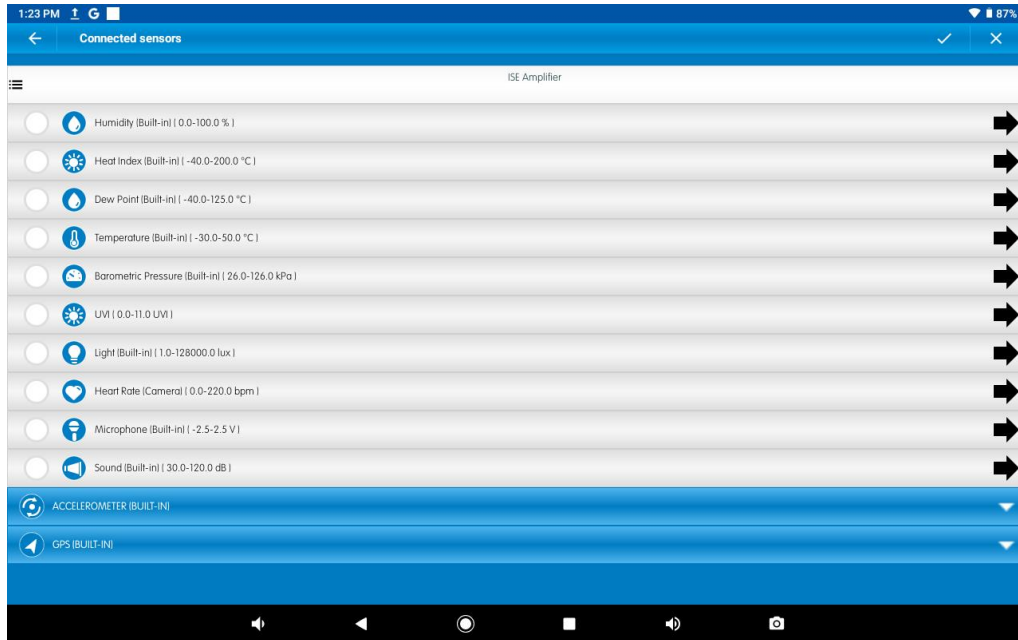
7. Tap on ISE emplifier and select Sodium
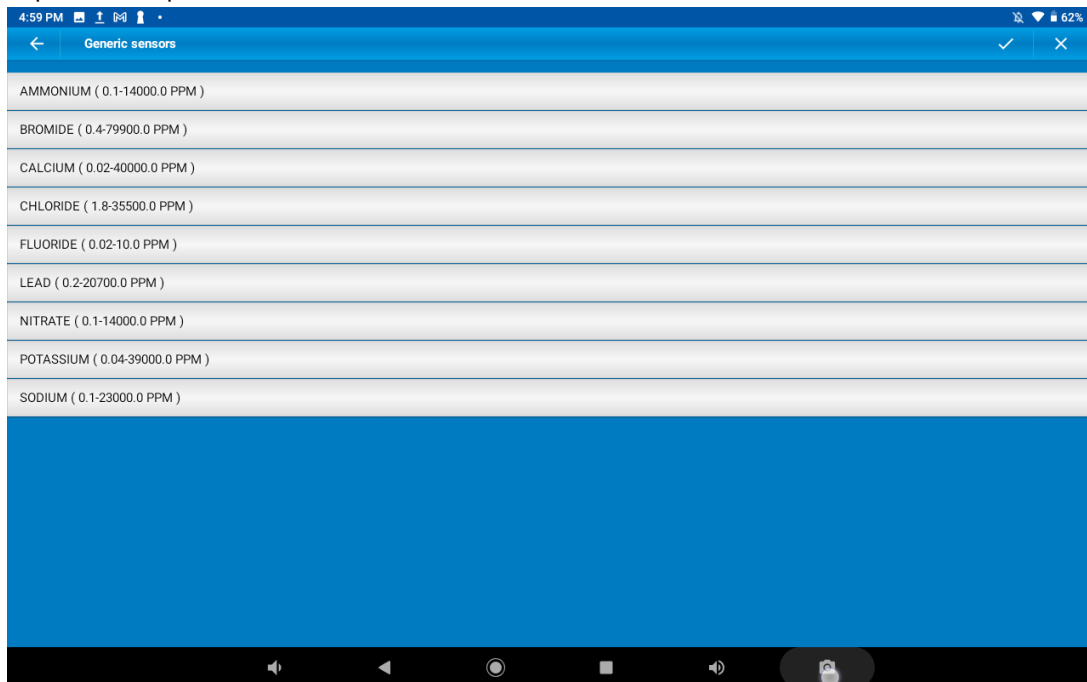
8. Make Sure the icon is checked to enable it for logging

9. Tap on the arrow icon to go to sensors settings and calibration

10. Tap on manual calibration

11. Calibrate according to the process defined below

12. Tap V to save the settings

13. Tap V to save the sensors setting and go back to LAB

14. You are ready to start an Experiment

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 MiLAB

5. MiLAB will automatically detect the ISE amplifier and show it in the **Current Setup Summary** window
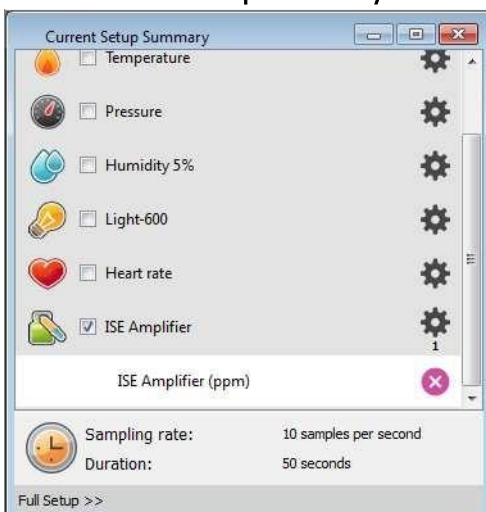
6. Click **Full Setup**, located at the bottom of the **Current Setup Summary** window to set which ISE electrode you are using and to program the data logger's sample rate, number of samples, units of measurement, and other options
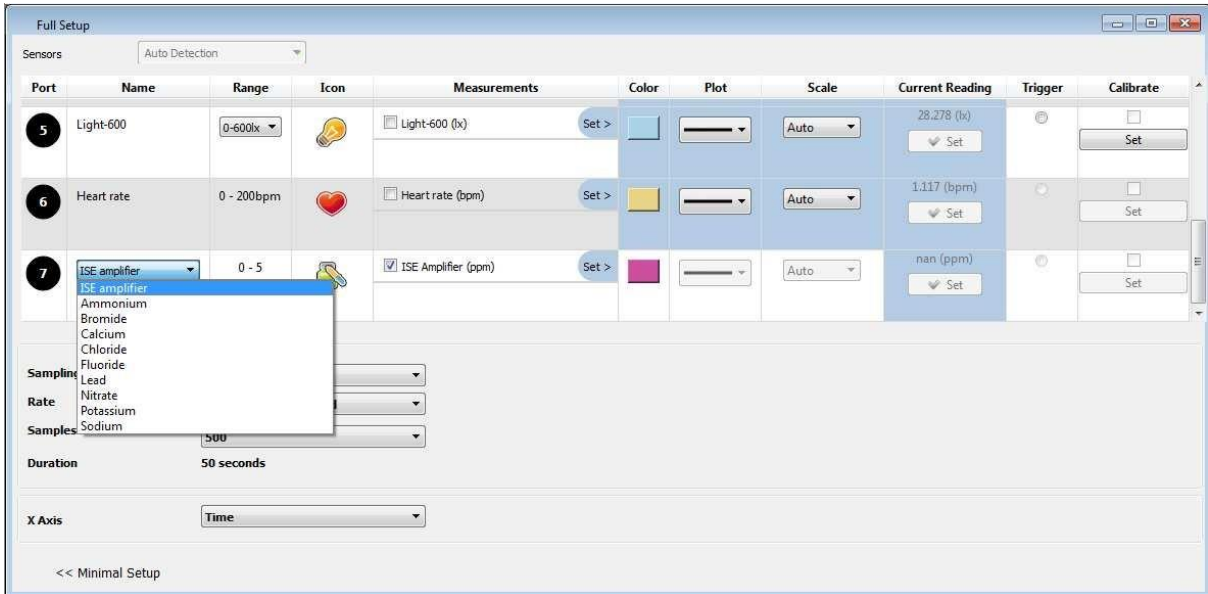
Calibration

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 in MiLABEx Android

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

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 solution. Wait for

   a stable reading, and ten tap 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 a stable reading, and then tap the "Lock" icon

10. Tap "Calibrate"

11. 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 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"

Calibrating in **MiLABEx™** Desktop

1. Start MiLABEx™ and select the Sodium 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

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 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 electrode slope is not within the normal range, the following procedure may restore the electrode.

1. Soak the electrode in the 10 ppm standard solution for 10 minutes before use.
2. Repeat the procedure outlined **Electrode Preparation** again.

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.