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Chloride Sealed Electrode Sensor Bundle

Product Number: ENCHL-A018A

Overview

Chloride is not an element but rather an ion or element that has gained or lost electrons. In this case, chloride is formed when the element chlorine gains an electron. Its chemical symbol is Cl- . Chloride forms various salts including common table salt. Chloride, along with sodium helps transfer electric impulses through the nervous systems and helps the body maintain a balance between acids and bases.

The Chloride Sealed Electrode Sensor can be connected to all einstein™ data loggers.

Typical experiments

Water Quality

- Chloride in water sources

Chemistry

- Chloride in Soil
- Chloride in combustible materials
- Chloride in Etching Baths

How it works

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

Sensor specification

Concentration Range:	5 x 10^{-5} M to 1M (1.8 ppm to 35,500 ppm)
Resolution (12-bit):	0.15 mV
Minimum Sample Size:	3 mL in a 50 mL beaker
Default Sample Rate	10 samples per second
pH Range:	2 to 12 pH
Temperature Range :	0 to 80 °C
Reproducibility :	± 4%
Electrode Resistance	Less than 1 MΩ
Interfering Ions	CN^-, Br^-, I^-, OH^-, S^{2-}

Note: Sensor cables sold separately

Contents

The Chloride Sealed Electrode Sensor comes equipped with:

- The Chloride Sealed Electrode Sensor
- ISE (Ion Selective Electrode) Amplifier
- 1 oz. CL^- Ionic Strength Adjuster (ISA)
- 1 oz. CL^- 10 ppm as Cl Standard
- 1 oz. CL^- 1000 ppm as Cl Standard

Solutions

ISA 5M $NaNO_3$: 425 g $NaNO_3$ in 1000 mL DI water

10 ppm as Cl Standard (0.000282 M Cl^-): Dissolve .01649 g NaCl in 1000 mL DI water

1000 ppm as Cl Standard (0.0282 M Cl^-): Dissolve 1.649 g NaCl in 1000 mL DI water

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 as Cl 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.

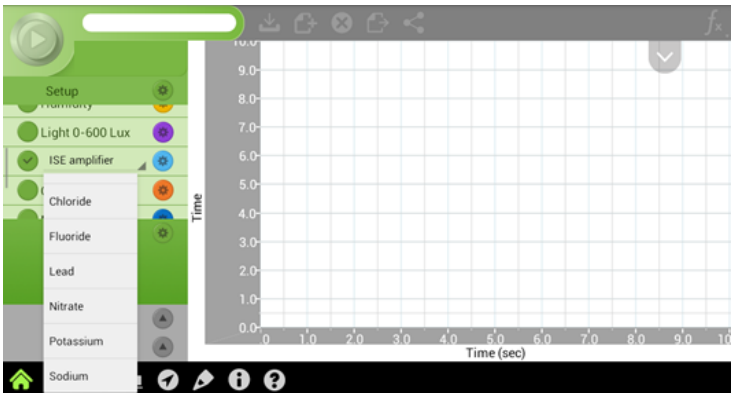
In addition to the aforementioned contents you will also need:

- Wash Bottle with Distilled (Dl) or deionized water.
- Several clean beakers.
- 0.1mL and 10mL pipettes.

Data logging, Calibrating and Analysis

MiLAB™ Android & IOS

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 MiLAB
5. MiLAB will automatically detect the ISE amplifier and show it in the Launcher View
6. Tap ISE amplifier and select the Chloride electrode



7. Make sure the icon is checked ( ) to enable it for logging

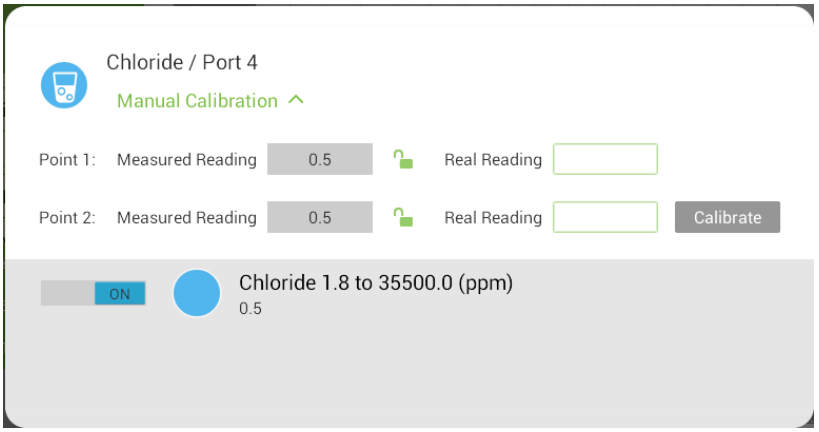
Calibration in MiLAB™

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 then 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

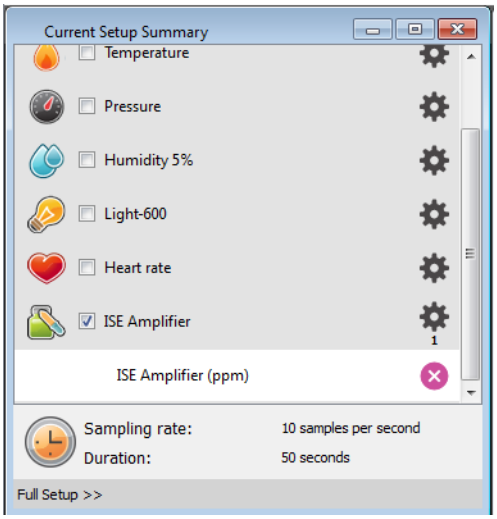
Note: It is best to calibrate the electrode with one Real Reading below your expected reading and one Real Reading above your expected reading. For example if you expect a reading of around 100 ppm it is best to calibrate with one Real Reading below 100 ppm and one Real Reading above 100 ppm

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

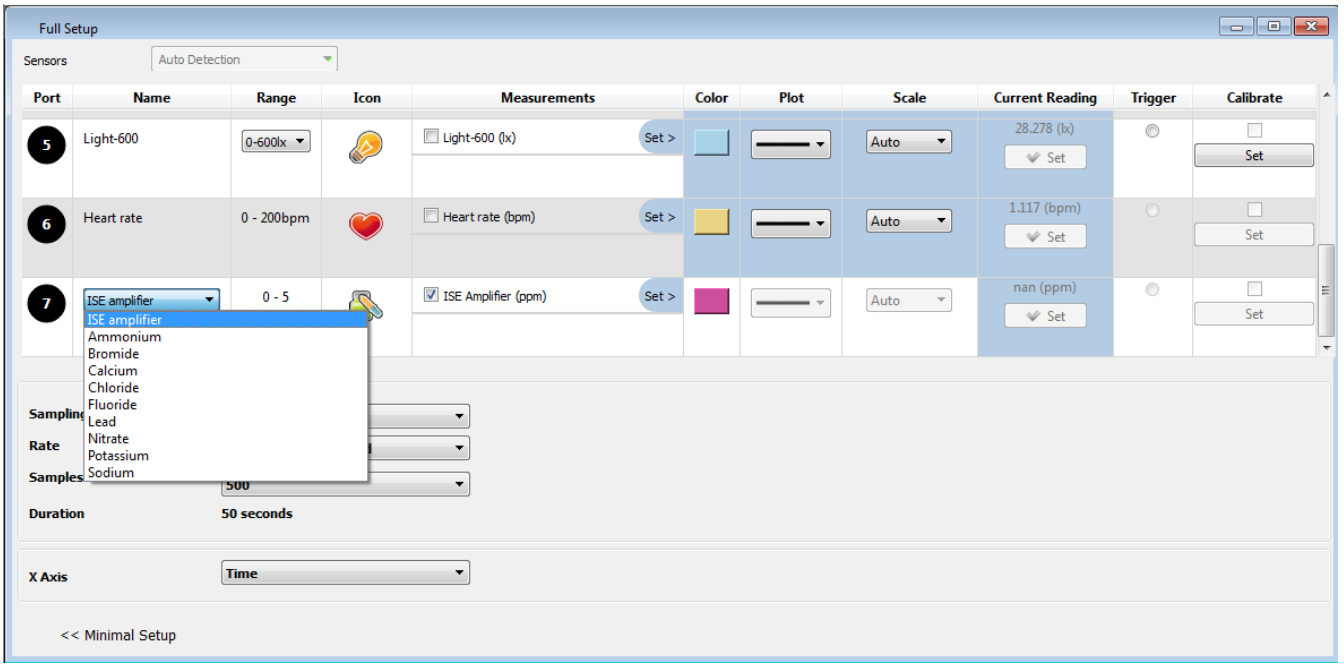
MiLAB™ Desktop

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



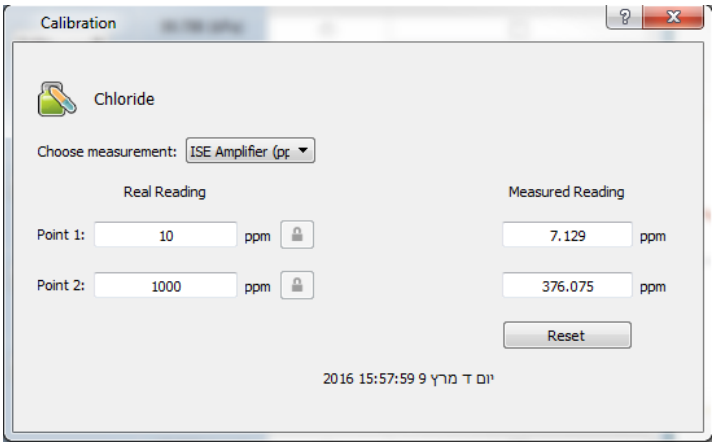
Calibrating in MiLAB™Desktop

Calibrating in MiLAB 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

1. Start MiLAB™ ( ) and select the Chloride 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 a stable 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 Dl water and place the tip in a diluted standard solution (10 ppm) between measurements.

Long Term:

Rinse the electrode thoroughly with Dl 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 as Cl 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.