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pH Sensor

Product Number: ENPH-A016 (pH sensor with electrode)
Product Number: ENPH-F052 (pH sensor with flat electrode)

pH sensor with electrode

ENPH-A016

pH sensor with flat electrode

ENPH-F052

Overview

The pH sensor replaces the traditional pH meter adding powerful capabilities such as collecting the pH data and displaying the results in an interactive graph. The pH sensor is capable of measuring the entire range of 0 - 14 pH and is used for various experiments in Biology, Chemistry and Water Quality.

This sensor is now also available with a sturdier flat electrode which enables testing even smaller samples than the conventional electrode.

The pH sensor can be connected to all types of einstein™ data loggers.

Typical experiments

Chemistry

- Acid – Base titration
- Acidification of milk and others foods

Water Quality

- Investigation of Water Quality

Biology

- pH measurements in tissue extracts
- Alcoholic fermentation of yeast

How it works

The pH electrode contains two half-cells. One contains a reference element of known H^+-concentration. The other, at the bottom of the electrode, is an H^+- sensitive glass membrane. The adaptor measures and amplifies the potential difference between the two half-cells. The pH level (pH= – log (H^+)) is calculated from the potential difference.

Sensor specification

Range:	0 to 14 pH
Accuracy:	±2% over entire range after temperature compensation
Resolution (12-bit):	0.004 pH
Recommended Sampling Rate:	10 samples per second
Response Time for 95% of the Reading:	5 seconds
Operating Temperature:	0° C to 80° C
Sensor Storage:	Store the pH electrode in its storage solution when not in use

Note: sensor cables sold separately

Technical Notes

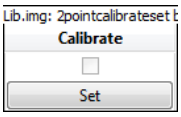
- For a more accurate reading, keep track of the solution's temperature and compensate for the temperature. We recommend using an einstein™Temperature sensor for this task.
- When calibrating the pH sensor, be sure to use fresh and clear pH buffers.

Calibration

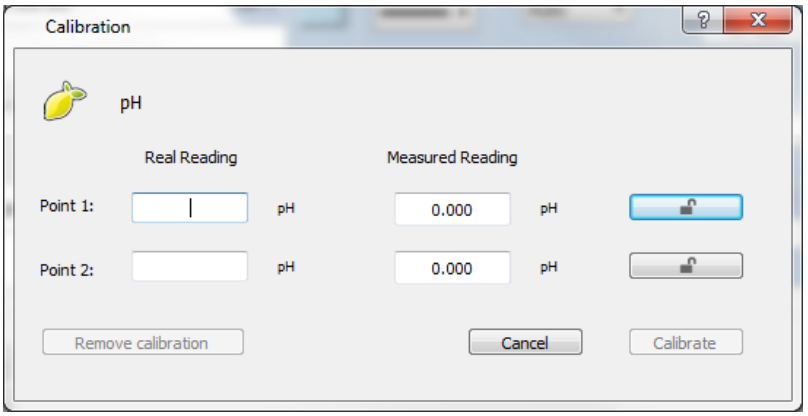
Calibrating in MiLAB™ Desktop

Two Point Calibration

1. Go to the Full Setup window and in the Calibrate column click Set



2. The Calibration window will appear

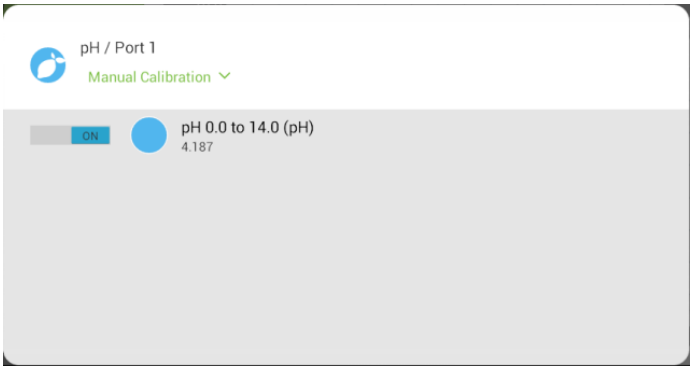


3. Insert the pH electrode into a pH 4 buffer and, wait for the readings to stabilize. Enter 4 as the Real Reading on the first line and click the lock button
4. Rinse the electrode with DI water, blot dry. Do not rub dry.
5. Insert the pH electrode into a pH 7 buffer or a pH 10 buffer and, wait for the readings to stabilize. Enter 7 or 10 as the Real Reading on the second line and click the lock button
6. Click Calibrate

Calibrating in MiLAB

Two Point Calibration

1. Tap the Settings button next to the sensor's name



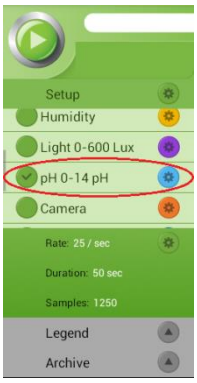
2. Tap Manual Calibration

3. Insert the pH electrode into a pH 4 buffer and, wait for the readings to stabilize. Enter 4 as the Real Reading on the first line and click the lock button
4. Rinse the electrode with DI water, blot dry. Do not rub dry.
5. Insert the pH electrode into a pH 7 buffer or pH 10 buffer and, wait for the readings to stabilize. Enter 7 or 10 as the Real Reading on the second line and click the lock button
6. Click Calibrate. This calibration setting will last as long as the sensor is connected and MiLAB™ is on.

Data logging and analysis

MiLAB™

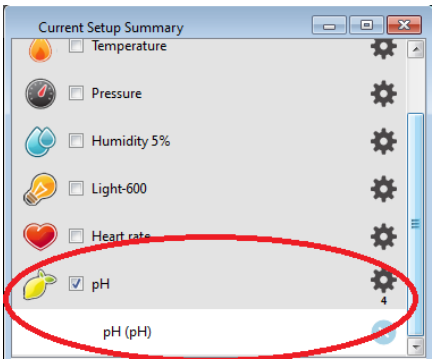
1. Take your einstein™ Tablet OR pair your einstein™LabMate with your Android or iOS tablet via Bluetooth
2. Insert the sensor cable into one of the sensor ports
3. Launch MiLAB
4. MiLAB will automatically detect the sensor and show it in the Launcher View



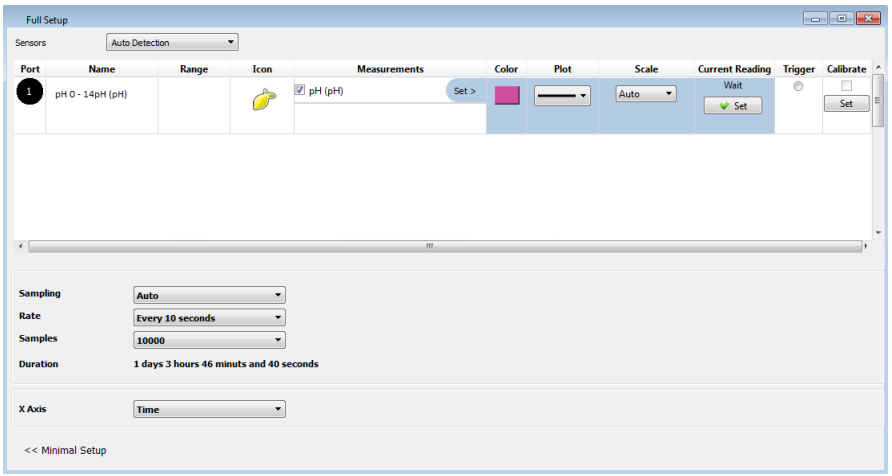
5. Make sure the icon next to the sensor is checked ( ) to enable it for logging

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 sensor cable into one of the sensor ports
3. Launch MiLAB
4. MiLAB will automatically detect the sensor and show it in the Current Setup Summary window



5. Click Full Setup, located at the bottom of the Current Setup Summary window to program the data logger's sample rate, number of samples, units of measurement, and other options



6. Click the Run button ( )on the main toolbar of the Launcher View to start logging

Experiment set up

The pH sensor comes with:

- One pH sensor
- One electrode (either regular or flat)
- One storage bottle with storage solution

Preparation of the electrode for initial use

Remove the protective bottle or cover from the electrode and thoroughly rinse the electrode with distilled water. Blot carefully with a clean lab wipe.
During shipment, air bubbles may have migrated into the electrode sensing bulb. Hold the electrode up to the light and inspect the sensing bulb for air bubbles. If air is seen, carefully shake the electrode downward (like a thermometer) to dispel the air bubble from the sensing bulb at the tip of the electrode.

Maintenance

1. After using the sensor, remove the electrode from the sample and rinse with Dl water. Blot the electrode dry with a lab wipe. The electrode is now ready for use.
2. When not in use, store the pH electrode in the supplied bottle containing the storage solution.
3. The recommended storage solution is comprised of 50% pH 4 buffer and 50% 4M KCl salt. If this storage solution isn't available then a fresh pH 4 buffer can be used as well.

Cleaning the Electrode

Do not use strong solvents (e.g. acetone, carbon tetrachloride, etc.) to clean the pH electrode.
If the electrode has become coated with oil or grease, carefully wash the electrode under warm tap water

using dish-washing detergent. Rinse thoroughly with fresh tap water followed by a rinse with DI water. Soak the electrode in pH electrode storage solution for 30 minutes after this cleaning procedure.
If the electrode has been exposed to protein or similar materials, soak in acidic pepsin for 5 minutes. Rinse thoroughly with DI water. Soak in storage solution for 30 minutes.
If the previous cleaning procedures fail to restore response, soak the electrode in 0.1 N HCl for 30 minutes. Rinse thoroughly with distilled water.

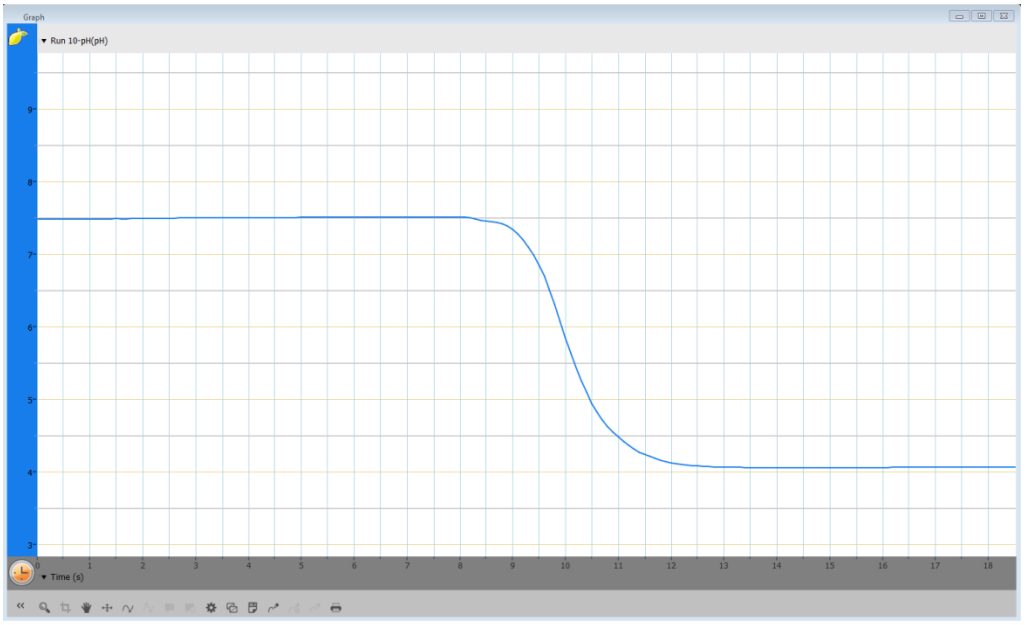
An example of using the Sensor

The pH of Water vs. Cola

For this experiment you will need:

- pH sensor
- Glass of water
- Bottle of cola

1. Connect the pH electrode to the sensor and the sensor to the einstein™device
2. Put the pH electrode into a glass of water (the glass should be filled up to 2 cm (1”) of water)
3. Select Run to start measuring the pH.
4. Add some cola and wait.
5. Select Stop when the measurement is stable.



Above is a graph typical of such an experiment

Troubleshooting

If the pH sensor isn't automatically recognized by MiLAB, please contact Fourier Education's technical support.

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
Phone (in the US): (877) 266-4066

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