

[KDS-1005]

pH Sensor

User's Manual



Our pH Sensor can be used for experiment or gauging the pH value of acid, base solutions, foods(food, fruit, vinegar, kimchi, etc)

※ **Note**

This sensor must be used for educational purposes only, under guidance of a qualified supervisor. Do not use this sensor for commercial purposes of industrial, medical research.

Using the pH Sensor

This sensor can be used with a computer and any of the following ScienceCube interfaces:

ScienceCube Lite II, Pro, Max Advance & Max V. Here is the general procedure to follow when using the pH Sensor with a computer:

1. Connect the pH Sensor to any of the analog ports on the interface.
2. Start the ScienceCube for Excel or Simple Logger software on the computer.
3. You are now ready to collect data. Click on Start and begin collecting data.
4. Measure the pH of some known solutions or pH buffers.
5. For the best accuracy, you may want to calibrate your pH sensor. Follow the calibration instructions on the screen. Additional calibration tips are described in the next section.

pH Electrode Specifications

Range	: pH 0 ~ 14
Resolution	: ± 0.0036 pH units
Temperature Compensation	: N/A (none)
Standard (buffering) solvent	: pH 4.0, 7.0, 10.0 (separate purchase)
Electrode	: complex electrode (Standard comparative electrode and glass electrode Ag/AgCl)
Gauging Principle	: Gauge the potential difference according to the different H ⁺ ion concentration
Sensor Reaction Velocity	: around 1.0 sec(90% Reading)
Temperature of usage	: 10°C ~ 50°C

How the pH Sensor Works

The pH Amplifier inside the handle is a circuit which allows a standard combination pH electrode to be monitored by a ScienceCube interface. The pH Sensor will produce a voltage of 2.5 volts in a pH 7 buffer.

The ScienceCube gel-filled pH Sensor is designed to make measurements in the pH range of 0 to 14. An epoxy body that extends below the glass sensing bulb of the electrode makes this probe ideal for the demands of a middle school, high school, or university level science class or for making measurements in the environment. The gel-filled reference half cell is sealed-it never needs to be refilled.

Executing pH Experiment

Execute [pH Calibration] from above before you begin the experiment. Do not place the electrode in solution for too long (maximum 5 minutes) during experiment. Afterwards, it is mandatory that you safe keep the sensor as shown above in [pH Sensor Safekeeping].

[Warning] Prohibited experiments

Do not experiment with acid or basic solution with density higher than 1.0 M as it will damage the electrode. Also, do not use sensor beyond the given range.

Preparing for Use

To prepare the electrode to make pH measurements, follow this procedure:

- Remove the storage bottle from the electrode by first unscrewing the lid, then removing the bottle and lid. Thoroughly rinse the lower section of the probe, especially the region of the bulb, using distilled or deionized water.
- When the probe is not being stored in the storage bottle, it can be stored



for short periods of time (up to 24 hours) in pH-4 or pH-7 buffer solution. It should never be stored in distilled water.

- Connect the pH Sensor to your ScienceCube interface, load or perform a calibration (as described in the next section), and you are ready to make pH measurements.
- When you are finished making measurements, rinse the tip of the electrode with distilled water. Slide the cap onto the electrode body, then screw the cap onto the storage bottle.

[Note] When the level of storage solution left in the bottle gets low, you can replenish it with small amounts of tap water the first few times you use the probe (but not indefinitely!). A better solution is to prepare a quantity of 3.3M buffer/KCl storage solution (see the section on Maintenance and Storage) and use it to replace lost solution.

Do I Need to Calibrate the pH Sensor?

Before a pH experiment, you must go through pH Sensor calibration process.

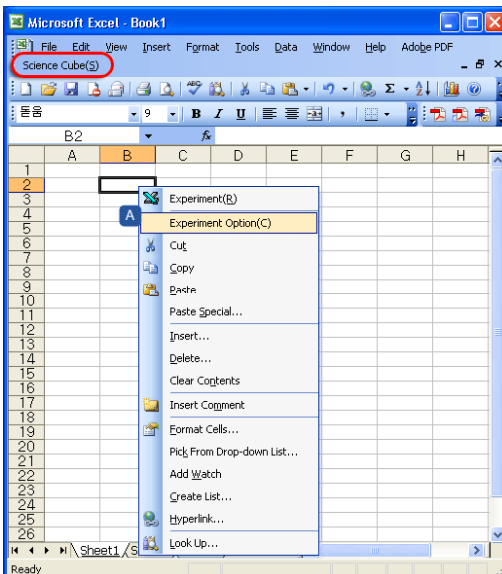
pH Calibration

1. Take the pH sensor from the KCl container it was kept in, wash it thoroughly with distilled water and lightly remove all moisture with hygroscopic(filter) paper. (Be careful not to rub on the glass electrode)
2. Soak sensor in pH 7.0 standard solution and [set zero point] from excel.
3. After you are done with step 2, rinse off the electrode with distilled water, remove all moisture with hygroscopic paper. Soak electrode again, this time in pH 4.0 standard solution and then [set zero point] from Excel. If the experiment solution is basic, set zero point while sensor is soaked in pH 10.0 standard solution.
4. Repeat steps 2, 3 to make sure calibration is processed precisely.
5. Rinse pH electrode with distilled water (and remove all moisture), place the sensor in the reagent you wish to experiment with. When it is soaked, gauge the pH figure.
6. When you've set the zero point as shown here, the setting will be saved

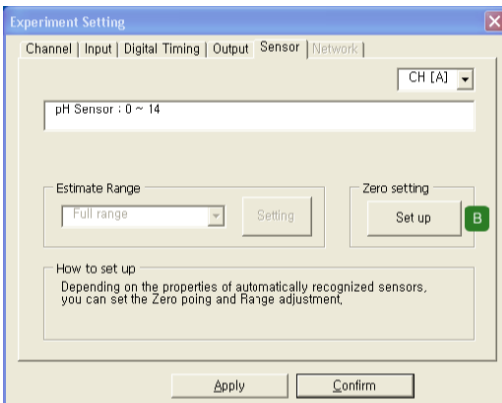
in the interface. When the interface is disconnected from the computer or when the sensor is disconnected, the initial setting will be restored.

Setting zero point for Excel

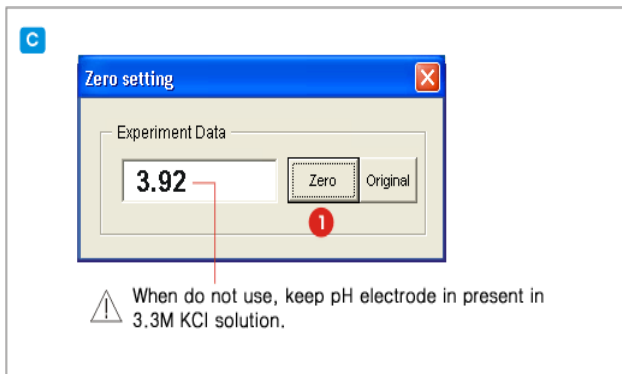
1. Select experiment settings from the extended menu on the right or the worksheet menu by clicking the mouse as shown below in image.



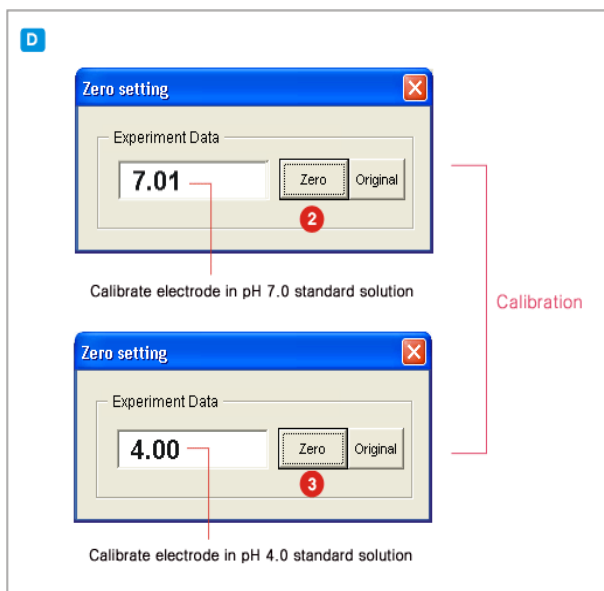
2. Select [Zero point settings] from [Experiment settings] -[sensor settings] as shown below in image



3. Confirm pH figure while sensor is still soaked in KCl solution as shown below in 1 of image. (The figure should show approximately 3.9 if in safekeeping solution)



4. Calibrate electrode in pH 7.0 standard solution and pH 4.0 standard solution as shown below in 2, 3 of image.



pH Buffer Solutions

pH Sensor's standard buffer solution needs to be 4.0, 7.0 and 10.0. These solutions can be purchased separately from Materials for Scientific Experiments store.



- pH 4.0 standard solution : 0.1M 1000mL KHP with 0.1M 2mL HCl
- pH 7.0 standard solution : 0.1M 1000mL KDP with 0.1M 582mL NaOH
- pH 10.0 standard solution : 0.05M 1000mL (sodium bicarbonate) with 0.1M 214mL NaOH

Maintenance and Storage

pH Sensor Safekeeping

When not in use, clean out the electrode with distilled water (remove all moisture with filter paper). Then place the complex electrode(glass) in the 3.3M KCl provided container for safekeeping.

For a short period up to a several hours, safekeeping electrode in pH 4.0 or 7.0 standard buffer solution is possible. However, for longer periods the electrodes must be soaked in the pH 4.0, 3.3M KCl solution provided.

If by negligence, the electrode has been kept dry, it should be soaked in the buffer container for at least 2 hours before use.

Electrode replacement period

When the pH figure gauged from 3.3 M KCl safekeeping solution has changed severely or if the reaction to gauging is slow than usual, discard the electrode and replace it with a new one.