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[Home](#) > pH Probe

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Posted by Anonymous on Thu, 2015-07-16 11:35

pH Probe: Can anyone suggest a pH probe with data logging function/capabilities for use with our senior science groups?

Looking for any feedback on models you may have used, before I go out and buy one of our own.

Any and all feedback is much appreciated.

Voting:



No votes yet

Year Level:

9

10

Senior Secondary

Laboratory Technicians:

Laboratory Technicians

Showing 1-1 of 1 Responses

pH Probe

Submitted by sat on 24 July 2015

Answer reviewed 22 February 2023

There are many pH probes commercially available to use in schools. See the [School science suppliers](#)¹ for more information on suppliers of general science equipment, and also those that specialize in data loggers. Science ASSIST does not specifically recommend any one brand of data loggers. It does, however, provide the following information for consideration when selecting a pH probe for use with a data logger. It is also recommended that the references listed are consulted for more detailed information.

Background Information

The pH of a solution is a measure of the hydrogen ion (H^+) concentration of the solution. Solutions with a high concentration of H^+ have a low pH (i.e., acidic) and solutions with a low concentration of H^+ ions have a high pH (i.e., basic).

The pH probe measures the pH of a solution on a scale from 0 to 14, with 0 being the most acidic, 7 being neutral and 14 being the most basic. The probe consists of a pH electrode that requires special attention regarding its use and storage. Also, as pH is dependent upon the temperature, probes usually have an in-built temperature sensor. For those pH probes with a data logging capability, the measurements are continuously recorded and displayed by a connected computer, iPad, tablet or dedicated data logger. The selection of a pH probe will depend upon physical aspects of the probe as well as the specifications of the probe and the data logger that it will be connected to. Consideration should also be given to the ongoing care and maintenance of the probe.

Physical Aspects

Science ASSIST recommends that, before purchasing a pH probe, the following physical aspects should be taken into consideration.

- **Body Material:** There are 2 common choices for body material: non-conductive glass and epoxy (polymer). Glass body probes are able to withstand higher temperatures, but epoxy body probes are more durable, generally costs less than glass probes, and are probably best for school student use.
- **Types of electrodes:** The electrodes in pH probes can either be gel-filled or refillable. Most schools use gel-filled Ag–AgCl combination pH electrodes because they require less maintenance and resist high pressure. However, these sealed pH electrodes have a limited life since the chemicals inside are used up and are not replaceable.
- **The pH electrode bulb:** The bulb end is usually glass and may have a conical or spherical shape. The cone-shaped bulb has a larger surface area, thereby providing a faster reading, and is easier to clean and maintain. It lasts longer and is often cheaper as well.
- **Submersible or water resistant design:** Submersible pH probes can be used in water-testing applications.
- **Data loggers:** These are electronic devices that receive process and store data from various sensors such as a pH probe. Probes have an important role in the data logger process as they generally send a signal to an interface, which is linked to a computer, tablet or stand-alone system. There are a range of data loggers available. Some are portable and can be taken into the field, whilst others are stationary in the lab and are connected via an interface to a computer. The pH probe is used in conjunction with a data logger and consideration should also be given to the type of data logger it will be connected to. The following factors should be considered.
 - **Ease of use:** Ensure that the data logger is simple to use and assemble and does not require complex programming.
 - **Durability:** Robust data loggers last longer.
 - **Battery life:** Ensure that the data loggers have a long battery life

- **Incompatibility between different manufacturers:** Probes and data loggers are generally not interchangeable between manufacturers, although some brands may have conversion kits to enable the use of existing probeware. It is probably best for schools to select the same manufacturer for all their data logging requirements, from a cost as well as an operating point of view.
- **Software compatibility:** Software is usually Windows®- or Mac-based and should be able to perform quick and easy tasks such as configuring parameters and offloading data.
- **Measurement Accuracy:** Accuracy specifications may vary widely among different types of data loggers. Be sure to look for charts that indicate accuracy over an entire measurement range.
- **Resolution:** This is the number of increments of a value a data logger is capable of reporting. Consult an experienced data logger supplier who will be able to help you determine which product will best meet your needs.
- **Portability:** There are some portable stand-alone data loggers that can easily be used on field trips. Collected data can be easily offloaded to a computer via a USB interface.

Recommended Specifications

Science ASSIST also recommends that pH probes with the following specifications should be considered:

- Range: 0 to 14 pH
- Accuracy: ± 0.1 – 0.2 pH units (after calibration)
- Resolution is a very important feature of pH probes and should be around 0.01 pH.
- Maximum Sample Rate: 50 Hz
- Operating Temperature Range: -4°C to 80°C
- Response time: 90% of final reading in 1 second
- Isopotential pH: pH 7 (point at which temperature has no effect)

Care and Maintenance of the pH probe

One of the most common reasons for a pH probe to not work properly is that it is not properly calibrated or because it is dirty, clogged or coated with sample. Regular cleaning and calibration of the probe will restore performance and prolong the useful life of the electrode. The probe should be stored in the recommended pH storage solution between measurements. The glass bulb can be cleaned by soaking it in warm deionised water. Read the manufacturer's user manual for long-term storage and calibration.

Note: It should not be stored in distilled or deionised water and should not be allowed to dry out. Long-term exposure to pure water may damage the special glass membrane/bulb.

Probes should be rinsed after each reading and between samples with distilled or deionised water. To remove excess water, the end of the probe should be blotted gently with lint-free paper. The glass membrane of the probe should never be directly touched, as oils from the skin will damage the electrode.

Note: It is best to avoid the use of multiple probes in the same solution as they can electrically interfere with one another and result in erroneous readings. In addition, the probe should never be wiped, as wiping can create a static charge, which may also result in erroneous readings.

Perhaps registered users of this site may like to submit helpful feedback.

References

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