

Standard Operating Procedure: pH Meter

*Created by JJung, V1, 12/2023

About the pH Meter: pH meters are used as a way to accurately measure the pH level of a given solution. This is accomplished through the pH probe, which contains two electrodes (sensor electrode, reference electrode) to measure hydrogen ion activity in the solution. The ion exchange creates a voltage, which is measured via the pH meter. The voltage is then converted into a pH value which is shown on the display of the instrument.



Safety

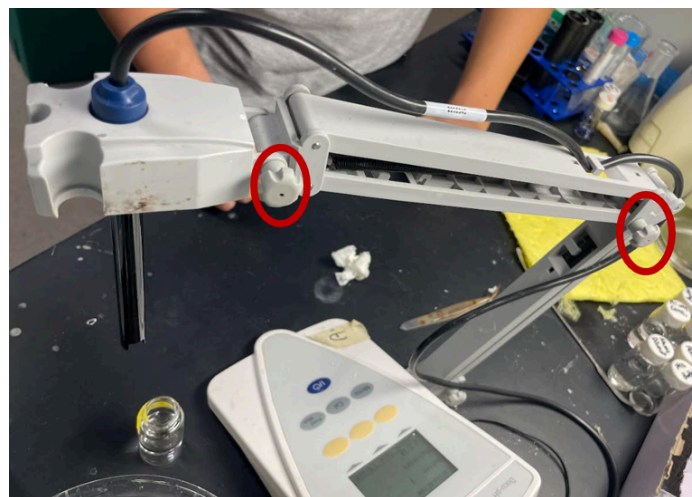
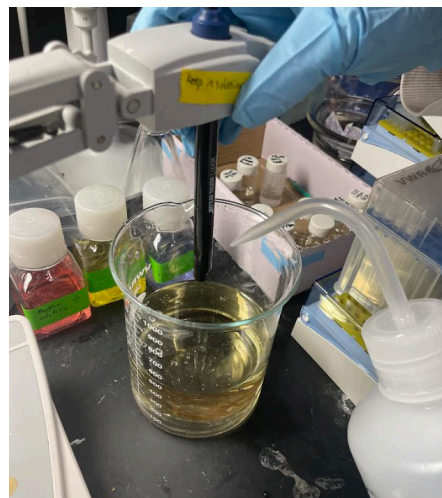
PPE: Safety glasses, appropriate gloves, and FR/CP lab coats should be worn at all times when operating the instrument.

Chemical Hazards: Avoid contamination of the pH buffer solutions (as well as your samples) by thoroughly rinsing with deionized water and wiping the pH probe after every measurement over a waste beaker (see image)

Keeping the pH probe in solution: Ensure the pH probe stays in an electrolyte solution at all times when not in use. The pH probe contains electrodes with electrolytes. If the probe is not kept in solution, the electrodes will become oxidized, resulting in the degradation of the instrument.

pH Probe is fragile: Be gentle with the pH probe to ensure that the pH probe does not break. Avoid pushing the probe all the way down into your glassware and limit physical contact if possible.

Adjustable Arm: Ensure that the adjustable arm is tight enough so that the probe does not hit the counter, but loose enough so that the arm can move. This can be adjusted through the knob on the adjustable arm. If the arm is too loose, the probe can hit the counter with enough force to shatter the probe.



Deionized water: DI water is used to clean the pH probe to avoid cross contamination of the solutions. More DI water can be obtained from the sink (see image)

Operating Procedures

Before Starting

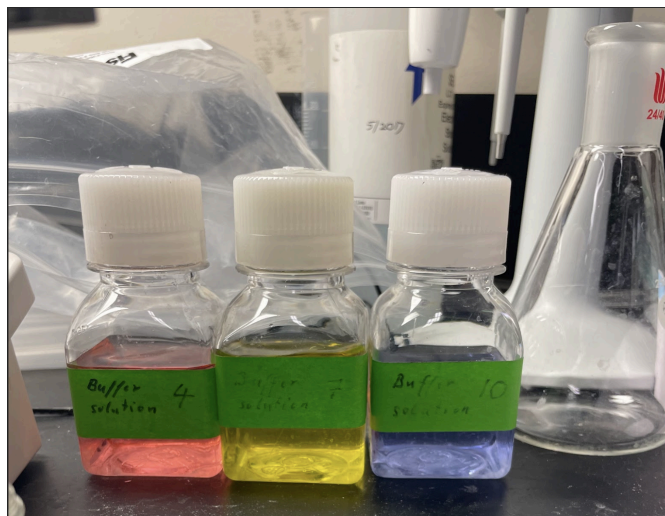
Check pH probe: ensure that the pH probe and any other instrument part is not broken. If the instrument is broken, inform one of the graduate students so that a new order can be placed as soon as possible.

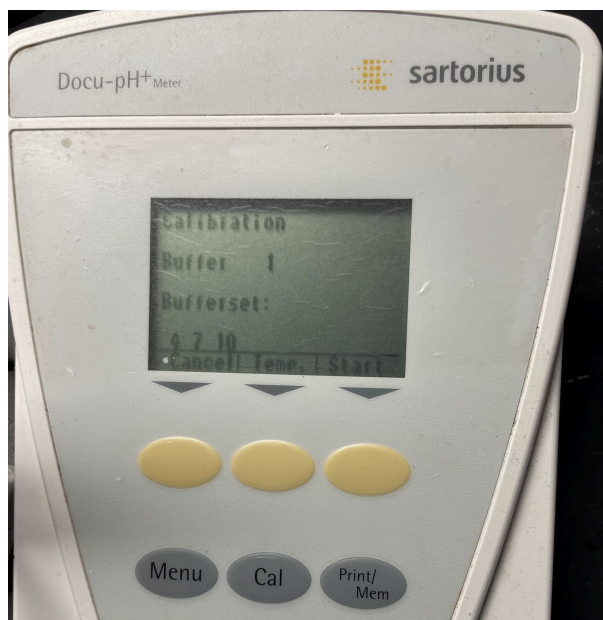


Ensure that the device is plugged in properly: The instrument has a power cable that should be plugged into an outlet. In the image, the left thin cable is the power cord. Ensure that the power brick is plugged into an electrical outlet so the device can turn on. The right cable corresponds to the pH probe. Ensure that the probe is plugged in firmly for accurate measurements.

Calibration: For accurate measurements, the instrument should be calibrated every time before use. **If the pH meter has been calibrated at the start of the day and has not been turned off, there is no need to recalibrate until the next day.** There are 3 different colored buffer solutions right by the instrument (see image).

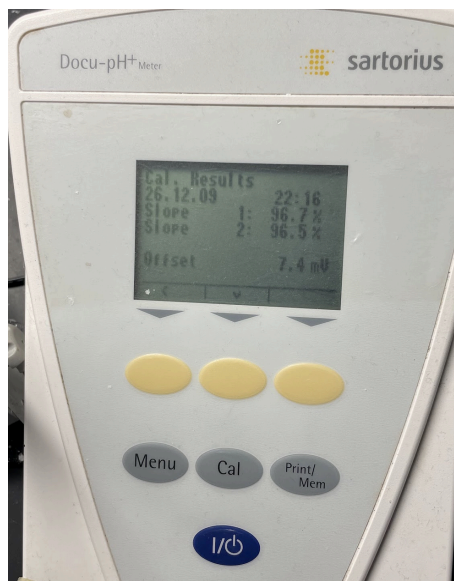
From left to right: pH 4, 7, and 10 buffer solutions. These solutions are used to calibrate the instrument. Turn on the instrument. Remove the pH probe from the electrolyte solution and wipe clean. **Ensure that the buffer solutions do not get contaminated.**





To calibrate, press “Cal” on the instrument. Rinse the probe with deionized water over the waste beaker and wipe clean. Remove the cap from the pH 4 buffer solution and submerge the probe. Gently stir the solution for a short period of time. Do not push the probe all the way down to the bottom of the buffer solution. Try to keep the pH probe submerged, but above the bottom of the container.

Then press “start” or the yellow button all the way to the right of the instrument. Once the calibration for pH 4 is complete, the screen will move onto the next buffer automatically. Remove the probe from the solution, rinse with deionized water, wipe clean, then repeat the procedure for the other two buffer solutions.



Upon completing the calibration of the last solution, you will see a calibration result. Press the yellow button on the very left to return to the main screen. The device is now ready to be used to measure pH levels of your samples.

Using the pH meter

After calibration, remove the pH probe from any solution it was in. Rinse with deionized water and wipe the probe clean. Submerge the probe into your sample, and stir gently. Allow for some time for the pH meter to stabilize. Once the reading is stable, there will be a large “S” shown on top of the pH reading on the display. This indicates that the reading is stable. This is the pH level of your sample.



Cleaning Up

After measuring the pH levels of your samples, remove the probe from your sample and rinse with deionized water and wipe clean. **Place the pH probe back into the electrolyte solution.** Press the power button to shut off the instrument **if you will be the last person to use the instrument for the day.** Ensure all calibration solutions are capped and placed in the positions that they were found in.

pH Meter Checklist

Before using the pH Meter:

- ☐ I have read the SOP
- ☐ I have been trained

Setting up the pH Meter:

- ☐ Check for any damage to the instrument.
- ☐ Ensure that the power and pH probe are plugged in correctly.
- ☐ Turn on the instrument.
- ☐ Calibrate the pH meter.
- ☐ Adjust the arm knob.

Using the pH meter:

- ☐ Rinse with DI water
- ☐ Wipe pH probe clean
- ☐ Submerge into the sample solution
- ☐ Stir gently
- ☐ Allow for reading to stabilize

Cleaning up:

- ☐ Rinse and wipe pH probe clean
- ☐ Submerge into the electrolyte solution
- ☐ Power down the instrument if no one else will be using the instrument for the day
- ☐ Return any buffer solutions back to their original positions
- ☐ Throw away any wipes that were used

Maintenance:

- ☐ Obtain new buffer solutions if the calibration solution has been contaminated