



Materials/Equipment

- pH meter & probe
- Buffer solutions (3, 4, 7)
- Labeled containers for buffer solutions
- Lint-free tissue (KimWipes)
- Distilled water in a squirt bottle
- Waste beaker
- Stir bar(s) and stir plate
- Standard solutions:
 - potassium bitartrate
 - a box wine of known pH
- Sample(s) to be tested

Procedure

Setup

1. Remove the protective cap from the pH probe (or remove from the storage solution) and loosen or remove the cap from the fill hole if applicable.
2. Use the squirt bottle to rinse the pH probe with distilled water over a waste beaker.
3. Blot (don't wipe) the pH probe with a lint-free tissue to remove excess moisture.
4. Pour calibration (buffer) solution from the stock bottle into a separate container to use as a working solution. There should be enough volume in each working container to submerge the probe. Label the container with the pH of the buffer solution.
5. Place a stir bar into each container of working buffer.

Calibration: Specific calibration methods vary by manufacturer. Consult the manufacturer's instructions to adapt these steps for your brand and type of pH probe. Following are instructions for the Hanna Edge pH meter.

1. Press the "CAL" button to initiate the calibration sequence.
2. The 1st calibration (buffer) solution value will appear on the screen as a prompt. Place the indicated calibration solution on the stir plate and immerse the probe in the solution. The probe should not touch the sides or bottom of the container. Adjust the stirring speed so that the liquid is moving but no vortex forms. Arrange the beaker and probe so that the stir bar does not touch or impede the probe.
3. Allow the pH reading to stabilize. Press "CFM" to store the value.
4. A prompt for the 2nd calibration (buffer) solution value will appear on the screen.
5. Remove the pH probe from the first calibration solution, rinse with distilled water into the waste beaker, blot (don't wipe) with lint-free tissue, then immerse the probe into the 2nd buffer solution.
6. Follow steps 2-3 for each additional buffer solution.
7. Press "CAL" again to end the calibration session.

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Confirmation and Measurement: Before measuring the pH of juice and wine samples, confirm the calibration by comparing the probe reading to a known standard (see FAQ for examples). The same protocol is used for measuring a standard or a sample.

1. Rinse the probe with distilled water, blot with a lint free tissue, then place the pH probe in a beaker of the standard solution or sample. Ensure the liquid is moving over the probe using a stir bar/plate or by gently swirling the beaker. Avoid contact between the probe and the sides or bottom of the container.
2. Your probe may require that you press "measure".
3. Allow the pH to stabilize and record pH value.
4. If measuring a standard, confirm the measured value of the standard is within 0.03 pH units from the known value. If the value is out of range, re-calibrate the probe.
5. In between each sample, rinse the probe thoroughly with distilled water, then blot with lint-free tissue to dry.
6. When finished with all samples, place the probe back in the storage solution (replace the cap) and replace the fill hole cap if applicable.

Frequently Asked Questions

Calibration

How often do I need to calibrate my pH meter/probe?

The pH meter/probe should be calibrated prior to each use. If used repeatedly throughout the day, calibrate at the start of the day, and as needed if pH "drift" starts occurring. Check the standard every 1-2 hours to ensure calibration is still correct.

Why do I need to calibrate with more than one point?

Each calibration solution provides a reference for hydrogen ion concentration at that pH. The meter then calculates a line between the two points to interpret hydrogen ion concentration of each sample. At least two points are necessary to calculate a line. For juice and wine, use buffer 3 or 4 and buffer 7. A three-point calibration can be done to refine this calibration. If using three points, use 3, 4, and 7. Ideally, calibration points should be both above and below the expected sample pH. The last calibration point should be the one that is closest to the expected sample pH.

How do I know if my calibration is accurate?

The accuracy of calibration should always be checked against a standard of known pH. One option is to use a supersaturated solution of potassium bitartrate (cream of tartar), which can be prepared using a small scoop (5 grams) of KHT in 50 mL of distilled water. Stir the sample with a stir bar to suspend. Not all of the white powder will dissolve, which indicates supersaturation. This solution has a pH of 3.56 +/- 0.02. Another option is to purchase a box wine from the supermarket and have the pH measured by a trusted service lab. The pH should remain stable for 3-6 months.

What should I do if my calibration is not accurate?

If the pH probe does not produce an accurate reading of the standard solution, run the calibration protocol again. If that doesn't help, refresh the working buffer solutions, then recalibrate again. If the measurement is still not accurate, clean the probe and/or exchange the probe fill solution.

Care & maintenance of the pH probe

Store the pH probe immersed in storage solution, with the cap on.

Do not leave the probe immersed in sample or distilled water longer than one hour.

How often should I clean the probe?

Over time, the electrode junction may become impeded by particles from samples, resulting in a reduction in the flow of ions from the juice/wine into the probe. These particles can be removed by soaking the probe junction in a cleaning solution (see manufacturer recommendations for your probe). After cleaning, allow the probe to re-equilibrate in the storage solution for one hour, then recalibrate.

The probe should be cleaned if calibration is very slow, if calibration does not result in standard values within 0.03 pH units, or if the sensitivity (reported by the meter) shifts below 95% or greater than 105%. Juice samples will foul the probe more quickly than wine samples. During harvest (if the probe is in daily use), cleaning once per week is recommended.

How do I know if the probe needs to be replaced?

If the buffer conditions are correct, the electrolyte fill solution is clean and topped off, and the probe has been cleaned, the sensitivity of the probe should be between 95% and 105%. If not, it may be time to replace the probe. General winery use will often allow 1-2 years of quality pH measurements before replacement is needed.

Care & Maintenance of buffer solutions

Stock solutions of calibration buffer should be used within 3 months after opening. Never place the pH probe directly into the stock bottle of buffer solution. To avoid contamination, always pour the amount needed for calibration into separate beakers. These can be re-used for up to a week, then discard and refill from the stock solution.

Drift and Bounce

To avoid pH readings that fail to stabilize,

- Always blot the pH probe, as opposed to rubbing or wiping
- Samples should not contain solids. Settle and decant or strain samples if needed.
- Buffer solutions and samples should be between 20 – 25 °C
- Clean the probe and exchange the electrolyte fill solution regularly.