

INTRODUCTION

A pH meter might be the single most important analytical instrument in a winery. While there is no simple correlation between pH and titratable acid, the pH value is often used as an approximation by winemakers. The pH value of a must or wine is an important indicator of microbiological stability. Every winery should have at their disposal a good pH meter, and it is a good idea to have multiple pH meters and probes in case of broken or faulty equipment.

The type of pH meter—whether a bench-top or handheld model—will be determined by needs of the winery. It is important to properly maintain pH meters. Purchasers are often unaware that there is a certain level of work involved in preventing damage to and maintaining the functionality of a pH meter.

pH METERS AND MATERIALS FOR MAINTENANCE

- pH meters can be bench-top (Figures 1 and 2), handheld (Figure 3), or compact units (Figure 4).
- pH standards are used for calibration, conditioning, and reference points. It is ideal to have multiple standards and different pH levels; 4.005, 7.000, and 10.012 are the most common. There are meters available with more reference points (usually bench-top meters), which will make it more accurate.
- pH probe cleaning solution to remove wine stains and caked-on grape juice.
- pH storage solution to soak probe in and store probe between uses.

SELECTING A pH METER

The type of pH meter you select is determined by your needs and intended purpose of the pH meter in the winemaking process. When it comes to taking a pH reading there are three options: a bench-top meter, handheld meters, or pH strips. Strips are not a very accurate method; they are sensitive to storage conditions



Figure 1. Bench-top meter with probe.

and rely too heavily on one's visual acuity. Since pH strips are not a reliable method, bench-top meters and handhelds are the better choice.

A bench-top meter typically consists of a digital pad for reading pH levels and an adjustable arm with an electrode tip. The samples to be tested are physically carried to the bench for analysis. A stirring plate may be a convenient addition to the bench-top meter when tests call for the addition of another liquid to reach a preset pH reading.

Bench-top meters are good for running pH analyses and other analyses that require a fixed volume of wine. A sample can be taken once for all analyses to be done. However, because of the design and shape of these units, it is not advisable to carry it from tank to tank trying to take pH readings. The possibility of dropping it either in the tank or on the floor is high, and this can damage the meter.

Handheld meters are an option for those who would like a pH reading at the tank. Compact handheld meters can be carried in your pocket and used inside the fermenter, holding tank, barrels, and any other place that holds wine/juice. This is good because an immediate reading can be taken instead of taking a sample to have it analyzed. Handheld meters have the advantage of being portable and easy to carry. If a winery is buying juice from a supplier and wants to inspect it, they can take a reading there at the supplier's location.

¹Though this publication is geared toward winemakers, these guidelines apply to the selection and maintenance of all pH meters.

²Respectively, Extension Viticulture Specialist and Program Coordinator, Department of Extension Plant Sciences, New Mexico State University.



Figure 2. Bench-top meter with temperature.



Figure 3. Handheld meter with temperature.



Figure 4. Compact handheld meter with temperature.

OPERATING A pH METER

For the most part, operating a pH meter is as simple as turning it on, placing it in the sample, and reading the meter. However, to get an accurate reading every time, several steps must be followed. First, power on the meter and give it a visual inspection; see if it powers on and if the display is functioning, and inspect the probe and make sure it is in good shape. Make sure that the probe is not dry or covered with dry remnants of the last sample; dry wine on the probe must be cleaned off before use. If everything looks good, rinse the probe with distilled water; if it has been properly stored, the probe will have storage solution on it that must be rinsed off. After rinsing, check your pH meter against a standard or calibrate it completely. If you do not calibrate it, it must at least be checked against a standard. If it is within an acceptable range (± 0.01), you can continue. If the range is unacceptable, this is a good time to calibrate the meter. Once calibrated or checked against a standard, the pH meter is ready to be introduced into the wine/juice to be tested. After the results are received, it is important to rinse the probe with deionized or distilled water before the next sample. If neither of these is available, purified water or tap water may be used, but be sure to properly clean probes at the end of the day.

MAINTAINING ELECTRODES

Proper maintenance and storage of pH meters/electrodes is of great importance. To increase the life expectancy of a pH probe, follow a few simple and easy steps to maintain it. After each use, thoroughly clean the electrode. Rinse it with distilled water, and then use a

pH cleaner to remove any wine/juice stains. If you need to use a stain remover, rinse the probe once again with distilled water before storing it.

It is important to keep pH electrodes moist during storage; this ensures accurate readings in the future and prolongs the life of the electrode. Distilled water cannot be used for storage. A pH electrode storage solution, which is basically an electrolyte solution for storage, must be used. If you run out of storage solution, pH standards of 7.000 or 4.005 can be used for short-term storage until you can purchase more storage solution. Using pH meters is an integral part of good winemaking, and with good care and use they should provide accurate readings and last the intended lifetime of the product.

FURTHER RESOURCES

<http://www.hannainst.com/usa/knowledge.cfm>

<http://chemed.chem.purdue.edu/genchem/lab/equipment/phmeter/use.html>



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