

ACID TESTING

PART A. MUST AND FINISHED WINE

Introduction

The fruit acids contained in wine musts are tart tasting compounds which are necessary both for good flavor and for good fermentation behavior. Acid testing provides control of this important characteristic, even though fruit and grapes may vary in acidity.

Total acid titration is a test in which an alkaline solution of known strength is added to a measured sample of wine or must liquid until all the acid in the sample has been neutralized. The volume of added alkaline solution is then a reliable measure of the total acid content (and tartness) in the wine or must. An indicator solution which changes color when all the acid has been neutralized is added to the test samples so that the neutral point can be identified.

As this test is applied to wine or must, it cannot give pinpoint accuracy and this should not be expected. The test is geared to avoid over-acidity while assuring adequate levels for good fermentation behavior. Low acid levels increase the likelihood of oxidation and “off” odors or flavors and cause a flat tasting wine with reduced keeping properties. On the other hand, excess acid is difficult to remove from an overly tart wine. The following test procedures are designed to provide adequate but conservative acid levels so that the winemaker will have latitude to adjust tartness to personal taste shortly before bottling. When acid testing, omit acid blend entirely from the recipe, until the amount needed is determined through acid testing.

When using winegrape concentrate or juice, or canned or frozen fruit, the must may be acid tested immediately when the batch is assembled. When fresh fruit or grapes are involved however, part of the acid content is not yet released to the liquid and is therefore not measurable. To obtain a more accurate measure, as soon as the must is prepared (except for acid addition), prepare a test sample as follows: Stir the must well and remove about two cups of the mixture to a mixing bowl. Stir into it 1/4 teaspoon of pectic enzyme powder and knead it into the mixture by hand (squeezing well) for about one minute. Cover the bowl and let stand for about 24 hours at about 70 to 75 °F. Repeat the hand squeezing and kneading again and then pour the whole mixture through a strainer. Use samples of this liquid for the acid test.

Equipment

- Two large identical wide mouth containers, one pint or more in size
- Stainless steel or plastic teaspoon
- Distilled water
- Sodium hydroxide solution, 0.2 normal
- Color indicating solution (phenolphthalein)
- 10 cc plastic syringe
- 15 cc sample measure (can be made from a used medicine vial by delivering 15 cc water with the syringe and marking at that level)
- White surface (paper is ok) and bright lighting

Procedure

1. Using the 15 cc measure, deliver 15 cc solids-free must to each of the large glass containers.
2. Working on a white background, stir and add distilled water to both containers as necessary to produce a fairly thin color (the bottom of the container should be visible through the liquid). The containers must be filled to the same depth. Add about 50 cc. of distilled water for white musts and up to 400 cc for dark ones.
3. Add an equal amount of the color solution to each glass container also. About two to four drops is generally adequate, but be sure the amount is the same so we have duplicate containers.
4. Draw 10 cc of sodium hydroxide solution into the syringe, and recap the hydroxide bottle immediately. Begin the test with one container. Add about 1 cc of sodium hydroxide solution and stir, and repeat the addition and stirring until the test sample does not get significantly darker or change color with further hydroxide addition. Expect color changes during the test when working with red, purple or blue juices and ignore the changes. Look down through the liquid to evaluate darkness and lack of change. The usual final condition for various reds is a muddy black/gray color.
5. Refill the syringe and repeat the same procedure on the second sample, but this time, add only enough hydroxide to just reach the same color and darkness as that of the first sample in side by side comparison. The volume of hydroxide added is now just enough to have neutralized all the acid in the sample. This volume is call the endpoint and is converted to percent acid in the must as follows:

Read the volume of hydroxide added from the syringe in cc's. Each cc translates to 0.10% acidity in the must or wine. For example, if 4.5 cc hydroxide was required to just reach maximum darkness, the acid level is 0.45%

Some uncertainty in identifying the endpoint is normal. Make the call to the high side of the uncertainty range. This will result in a more conservative acid addition and allow latitude for later fine tuning by taste. Remember, to not expect high accuracy in the test. For our purposes, it is simply not needed. Approximate recommended starting acid levels are:

Red and fruit wines - 0.60 to 0.65%

White and sweeter wines - 0.70 to 0.75%

Port and sherry - 0.50%

To adjust acidity, one level measuring teaspoon of acid blend addition per gallon raises the acid level by 0.15%. If a must tests to 0.45% and we wish to have 0.60% acid, we will need to increase the acidity by 0.15%. Since one teaspoon per gallon gives this increase, five gallons of must will require an addition of five teaspoons of acid blend. To increase acidity 0.10%, 2/3 teaspoon per gal. (3 and 1/3 teaspoons in 5 gal.) acid blend should be added, and to increase by 0.20%, 1 and 1/3 teaspoons per gal. (6 and 2/3 teaspoons in 5 gal.) would be added.

7. Be sure to discard the test samples and clean and rinse the test equipment thoroughly. The chemicals used are poisonous. Store your acid testing supplies out of reach of children. Use the glassware, etc. for acid testing only. With the ability to acid test, recipes can be devised from scratch and every batch can have proper acid balance regardless of variation in the fruit.

PART B. DURING ACTIVE FERMENTATION

In order to avoid the error in acid measurement caused by the temporary acidity of volatile acids which are present during active fermentation, normal acid testing needs to be done on wine must before fermentation begins. Volatile acids such as carbon dioxide gas (CO₂) released during fermentation or sulfur dioxide gas (SO₂) from sulfite use would cause a high-side error in the acid measurement. The normal test procedure as described in part A. measures total acidity and cannot discriminate between volatile (temporary) and fixed (permanent) acids. Total acid = volatile acid +fixed acid.

Since some of the acid contained in fruit solids may not be released to the liquid before fermentation begins, we may wish to repeat the acid test after the solids are removed (while the wine is still fermenting) so that adjustments can be made as soon as possible. We can apply the normal test procedure to an actively fermenting must, if special sample preparation to eliminate the volatile acids is carried out first on a small sample as follows:

Measure an exact volume of solids-free liquid to be tested, for instance 8 fl. oz. (one measuring cup), into a stainless steel or enamel sauce pan. Cook this liquid down to approximately half volume and cool it to room temperature. Then pour it back into the original measurement container. Using small amounts of distilled water, rinse the residue from the sauce pan into the measurement container also. Then add only the additional distilled water necessary to reach the original volume (one cup in this example) and stir thoroughly.

Since the cooking will have eliminated all volatile acids and stopped any active fermentation, normal acid testing applied to this liquid gives only the fixed acid content. Note that during both bulk and bottle aging, acidity may be reduced by the formation of sediments composed in part of acid compounds. Acid testing a well aged wine could yield results lower than the fixed acid levels measured earlier in that same wine.



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