CELLAR SCIENCE

Instructions

# Titratable Acidity Testing Kit


## Kit Contents:

- 10 mL Plastic Syringe
- Reaction Vial with Cap
- 4 oz Bottle of 0.1N Sodium Hydroxide (NaOH)
- Phenolphthalein Indicator in Glass Dropper Bottle

## Introduction:

Proper acid concentration is an essential aspect to manage if one wishes to create a balanced, long lasting wine. Acidity plays a role in the flavor, bottle stability and microbial inhibition of a finished wine. While the actual perfect amount of acid for your particular wine will vary with varietal, growing region and personal taste, there are some good guidelines that a winemaker can follow to help pinpoint the correct concentration for their wine. Remember that once your wine falls within the published range for its style, the most accurate and sensitive instrument for determining if you've gotten it right will be the tongue!

## Testing Procedure:

**1 )** Using the syringe, draw up 5 mL of wine and transfer to the plastic reaction vial.

**2 )** Add distilled water to the vial until it is 2/3 full. The exact amount of water used here is unimportant, it is simply to dilute the sample so that you can see the color changes more clearly. Add 3 drops of the phenolphthalein indicator.

**3 )** Clean and dry the syringe, and draw up 10 mL of sodium hydroxide.

**4 )** Begin adding the sodium hydroxide to the reaction vial, at a rate of about 0.5 mL at a time. After each increment of sodium hydroxide is added, cap and gently shake the vial. Upon its addition you should begin to see a magenta tinge to the solution where the sodium hydroxide is present. This will fade upon shaking the vial, taking a little longer to fade away each time.

### *White Wine:*

As you continue to add sodium hydroxide, more of the test solution will stay magenta for longer. Eventually you'll reach a point where a faint pink color stays for 30 sec or more. This is the endpoint of the reaction.

### *Red Wine:*

With red wines, as the test proceeds certain of the color pigments in the wine will begin to change shape in response to the change in pH. This change in shape causes the compounds to exhibit a different color, and the test solution will begin to turn gray. This is NOT the color change that you are looking for to determine the end of the test. Because of the grayness of the solution, it will be difficult to see the faint, persistent pink color when it arrives. However, you will see the grey color of the solution begin to turn slightly green. This IS the endpoint you are looking for.

### *Determining the Endpoint by pH:*

If you have a pH meter, you can use this to more accurately determine the endpoint of the test. With tartaric acid, achieving a pH of 8.2 indicates that all the acid has been neutralized and that no excess base has been added to the solution. It is important if you are going to use this method that you allow time for the pH reading to stabilize. Because of the specific chemical changes that are taking place, you will see the pH climb a little bit after each addition of Sodium Hydroxide, then begin to slide back; it is ok to add more base once the pH begins to slide. As the test progresses, the increment by which the pH rises with each addition of base will grow - be careful not to overshoot the endpoint as the test draws to an end, as this will lead to a false-high measurement for your acidity.

**5 )** Make a note of the amount of sodium hydroxide you used to reach the endpoint of the test, to the nearest 10th of a mL. This may require that you estimate a little bit, which is a common and acceptable lab practice. Remember to read the meniscus of the liquid in the syringe from the very bottom of the meniscus itself.

**6 )** Calculating the acidity from the amount of sodium hydroxide you used is simple. Just multiply the

mLs of sodium hydroxide by 1.5. This will give you the acidity of the wine or juice in g/L of acid. ***For example:*** You use 4.5 mL of sodium hydroxide to reach the endpoint of your reaction. 4.5 mL x 1.5 = 6.75 g/L of acid. It is common to see the acidity of a wine given in units of %TA. To convert between %TA and g/L of acid, simply move the decimal point by one place: 6.75 g/L = 0.675% acidity.

## Target Acid Values by Wine Style:

Remember that these are only guidelines and should not be taken as absolutes. The correct acidity for your wine will depend on the alcohol content, residual sweetness and your personal taste.

***Sherries:*** 5.0–6.0 g/L

***Fruit Wines:*** 5.0–6.5 g/L

***Dry Red Wine:*** 6.0–8.0 g/L

***Dry White Wine:*** 7.0–9.0 g/L

## Altering the Acidity of a Wine:

If you need to adjust the acidity of a wine or juice, there are multiple ways that you can get this done. If you need to increase the acidity of a wine, you can either blend it with a higher acidity wine or you can add Tartaric acid* directly. The addition of acid is very straightforward: If your juice is at 6.5 g/L and your target is 8.5 g/L, then you must add 2.0g of tartaric acid per liter of wine, which equates to 7.6 g/gal. The direct addition of acid is the preferable method if you are trying to increase the acidity of a juice or must prior to fermentation. Post fermentation, blending is preferred (if you have something you can blend with) due to the fact that some portion of the acid that you add directly will not "take" to the solution and will precipitate out during aging, leaving a different flavor balance to the wine from when you bottled it. However, if you do not have a higher acid wine to blend into the wine in question, then go ahead and add Tartaric - just be aware of this potential for acid loss in the bottle.

Acid level reduction can be a tricky business to get in to. In all cases, prior to or post fermentation, acid reduction by blending with a lower acid juice or wine is favored. Other options include dilution with water, which runs the risk of over diluting the components of the juice or wine which will be responsible for flavor, color and mouthfeel, as well as the sugar levels if you dilute an unfermented juice or must. The final option for acid reduction is the addition of potassium carbonate. Potassium carbonate removes tartaric acid in a ratio of 1 molecule of acid per molecule of carbonate, so you just follow the reverse of the procedure for adding tartaric acid to a wine. Your wine is at 8.5 g/L and you wish to be at 6.5 g/L; so add 2.0 g of potassium carbonate per liter of wine (7.6 g/gal). Keep in mind that the wine needs to be cold stored (45°F or less) for a couple of weeks for this treatment to be effective. The use of calcium carbonate, which works the same way as potassium carbonate but without the need for cooling, is not recommended unless there is no other recourse available to the winemaker, as there is the very real potential for a negative flavor impact from this treatment.

***Note:** Some texts leave open the option to use Acid Blend for adjustments of this type. Acid Blend is a 33/33/33 mix of Tartaric, Malic and Citric acids. Cellar Science recommends against the use of acid blend in any wine other than a non-grape fruit wine or mead. The reason for this is that the presence of the Citric acid makes the wine more susceptible to acetic spoilage, or vinegaring.*

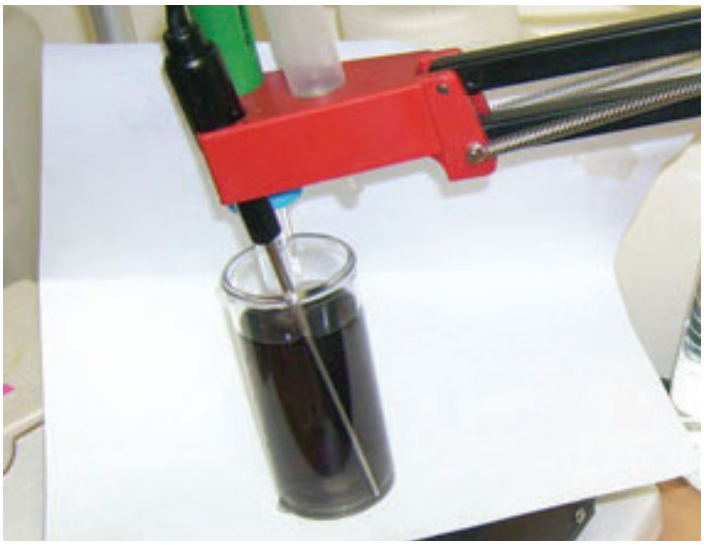
***Note:** Acids and bases (sodium hydroxide) are very real chemicals and have the potential to harm humans. The strength of the base used in this test is not of significant danger to individuals who do not have an abnormal sensitivity to sodium hydroxide, and incidental contact should not be harmful. If you have any doubt about your sensitivity to the substance, either wear latex laboratory gloves or wash your hands with baking soda (bicarbonate) after the test. The solid acids used in adjusting a wine or juice should be handled carefully and Cellar Science recommends having baking soda on hand in any environment where acids or bases are handled, as it can neutralize either. Remember that a chemical burn is not a heat burn and you do not notice it right away - wash your hands thoroughly if you have any doubt about your exposure. Finally, remember that all chemicals should be kept tightly closed and stored out of the reach of children and pets. Good Winemaking!*

## Determining the endpoint by color:

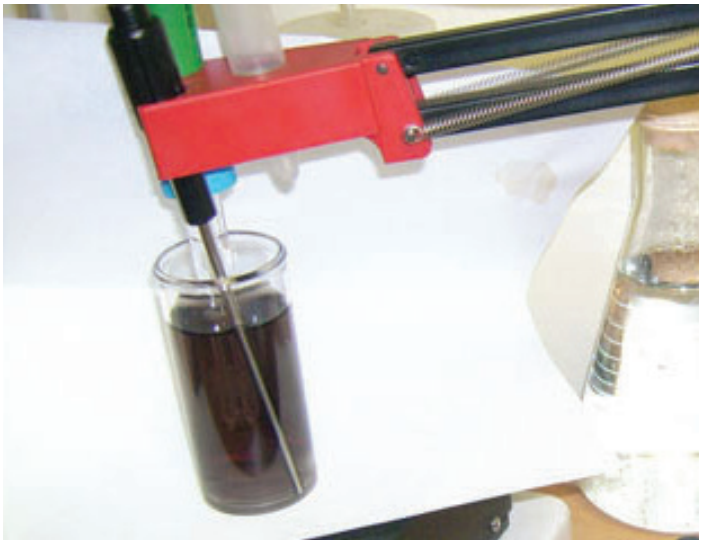
Here you will find a series of photos of the testing solution to help you determine the endpoint by color. As the test is being run, note the change in the color of the solution as the pH changes. This is red wine diluted in 40 mL of water.

### Solution is at pH 6.39

### Solution is at pH 8.12



### Solution is at pH 7.68



### Close-up of final color of wine at pH 8.20