THE BEVERAGE PEOPLE

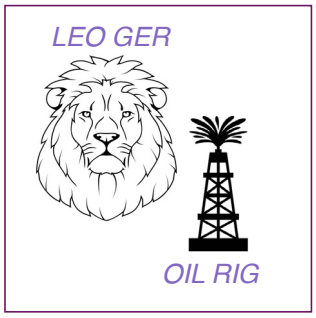
2016 SUMMER WINE NEWSLETTER AND CATALOG

The Evil Twins: Oxidation and Reduction

By Bob Peak

When we talk about problems in wine, we often run across chemical reactions called "oxidation" or "reduction." Since we usually talk about just one of those reactions at a time, it ends up sounding like that one stands alone. In reality, though, oxidation and reduction are more properly called "half reactions" and they work together to create a complete reaction. When I used to work in environmental labs, we often noted that to get one thing clean, you need to get something else dirty. In a parallel example, to get one thing oxidized, you need to get another thing reduced. That field of chemistry is named with the abbreviation redox.

Keeping it as clear as I can, I will need to go through some redox basic chemistry before discussing the direct effects on wine. Oxidation and reduction are all about the exchange of electrons. Those negatively-charged particles that schoolroom charts depict as whizzing around atomic nuclei are naturally in balance with the positively-charged protons in the nucleus when an atom is in its most fundamental elemental state. We call that the zero oxidation state. Other configurations of electrons are possible for each element, but only in certain favored patterns. When an atom loses electrons, we call that oxidation and when one gains electrons it is reduction. Since it is challenging to remember which is which, my old chemistry professors gave us a mnemonic device based on a lion to help remember: LEO-GER (see, the lion is growling…). LEO is "loss of electrons is oxidation" and GER is "gain of electrons is reduction." Younger colleagues here at *The Beverage People* have told me, at least at UC, they instead present the mnemonic OIL RIG. Oxidation is loss, reduction is gain. So if either of those works for you, keep it in mind when we get to actual wine reactions!



Oxygen is the principal oxidizer in wine and indeed gives the reaction its name.

For our hobbies, the oxygen comes as a component of atmospheric air. The air is about 21% oxygen, 78% nitrogen, and one percent all other gases. When air is introduced into winemaking, oxidation will result. It is important to note, however, that it is not always bad! (More on that below). As with other elemental forms, when oxygen is in the air as O2, it is in the zero oxidation state. When it oxidizes another atom or compound, it experiences the gain of electrons described above as it is reduced. Electrons are negatively charged, so it goes from being at the zero state (O^0) to either the minus one or minus two state from one or two extra electrons (O^{-1} or O^{-2}). The minus two form of oxygen is strongly favored and is the most common result when oxygen is reduced in the process of oxidizing

Evil Twins cont. pg. 2-3

What's New at the Shop

Well, besides the big news that *The Beverage People* is now owned by Gabe and Jane Jackson, and that Bob is retiring February 14, 2017 and Nancy is retiring May 26, 2019, not much!!!!!

Actually there are lots of new items in the shop, see page 3, and upgrades in the quality of them as well. We think this is going to be a great year for home winemaking and beginning in August we will be **open later until 6:30 Monday-Friday** to give you even better service!!

New cont. page 3

Winemaking from Berries, Flowers and Pears

By Bob Peak

This 2016 Newsletter/ Catalog you are reading is all about wine. Almost everything in it is about grapes and grape products. After all, we are located in the heart of wine country and some of the best wine grapes in the world are grown all around us. Some of our winemaking customers grow their own grapes (and so do I) and many more purchase fresh grapes from local growers. Check out the binder at the store where growers list grapes for sale and allow home winemakers access to buying them. Grape wine is often also made from frozen must, grape concentrates, and wine kits.

But that's not the whole wine story! While beer is defined as a beverage made from grain and mead is made from honey, just about every other fermented alcoholic beverage is wine. Many, many fruits beyond grapes can be employed. So can vegetables, herbs, spices, and flowers. This article explores the bounty of these products all around us and includes references to the basic ways of using them.

On page 9, you will find our basic procedures for fruit wines and for ciders. It will also be helpful to refer to the guides for red grape wine and white grape wine on pp. 6-8. Taken together, these provide guidelines that will allow you to make wine from almost anything!

So what will it be? You can grow seasonal fruits like berries and melons right in your own back yard. If you plan a little further ahead, you can grow trees bearing stone fruits like peaches, nectarines, or apricots. Pome fruits that thrive in local back yards include apples, pears, quince, and loquat. And do not discount the warmer-climate home-growns like figs and citrus. All of these fruits can be used to make delicious wines!

Other Fruit cont. pg. 4

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something else.

In wine, alcohol is not directly oxidizable by air; after all, vodka is very shelf stable! However, many of the complex compounds in wine are phenolics that do react with oxygen. Having done so, there can be a daisy chain of reactions that may result in oxidation of alcohol itself. Most common are undesirable byproducts of the phenolic

reactions. Some of these are mediated by enzymes and some others (called non-enzymatic oxidation) are not. Oxidation of alcohol is one of the latter and results in the development of acetaldehyde, a compound that gives a nutty or bruised apple aroma to the wine. Other non-enzymatic effects include loss of aroma and brown color development from oxidation of red pigments. All these reactions are faster at high pH than at low pH.

Among the enzymatic reactions, the enzyme tyrosinase is present in sound fruit. While it can facilitate oxidation, it is inhibited by sulfite. One of many good reasons to sulfite your must! The other major oxidation enzyme is laccase. It is not present in sound fruit, but occurs in moldy grapes. Sort those grapes before crushing and remove moldy fruit, because laccase is not sulfite sensitive and oxidation will continue after crush. Both enzyme pathways lead to suppression of aroma compounds and development of brown colors. At crush, sulfite the must with about 50 ppm (mg/L) of sulfite. If you cold soak, you may want to do another sulfite addition halfway through your soaking period. Since the reactions are faster at high pH, plan a tartaric acid addition if pH is high or titratable acidity (TA) is low. Inoculate with yeast as soon as sulfite dissipates or promptly at the end of the cold soak to get fermentation started quickly. Specialized yeast nutrients like OptiRed® can help stabilize color against browning.

Now that you are off to a great start on your fermentation, it is time for me to reverse my advice on aeration! That's right, yeast needs oxygen to grow vigorously and produce healthy cell membranes that will withstand rising alcohol levels. Early air exposure can also help maintain color stability. So for the first few days of a red wine fermentation, aerate the must. You can do this by using a small fan to blow off the layer of carbon dioxide gas in your fermentor just before a punchdown, and splash the must vigorously as you punch to mix in some air. Once fermentation slows down and the cap begins to fall, reverse course on air again. Use more gentle punchdowns and do not vigorously aerate.

The next stage is pressing and we are back to minimizing oxygen exposure. Work quickly and minimize splashing as you press and transfer the new wine. Avoid hard pressing to minimize extraction of highly reactive phenolic compounds that facilitate later oxidation. Get the wine into a closed container fitted with an airlock. If you have not already inoculated for malolactic fermentation, do so right away. When the last stages of primary fermentation are finished along with ML (if desired), get the wine into topped-up containers with fermentation locks and begin your sulfite program. Maintain free sulfite levels according to the pH chart on page 13.

In bulk aging, a very small amount of oxygen can help stabilize color and round out the tannic profile. Barrel aging is ideal for the small additional transfer needed and the barrel allows the oxygen in via a very slow transfer through and between the staves and whenever the barrel bung is pulled out, as for sulfite additions. Headspace is any container will greatly increase the oxygen transfer and is a virtual guarantee of oxidation and browning. Top up all carboys, tanks, and barrels! (Commercial winemakers will sometimes age in stainless steel tanks with deliberate "microoxygenation" to simulate barrel aging, but there are no reliable home systems for that.)

Researchers find that about 60 ppm of oxygen addition, over the life of the wine, leads to the best overall profile and stability. Each racking will introduce 5 to 7 ppm.

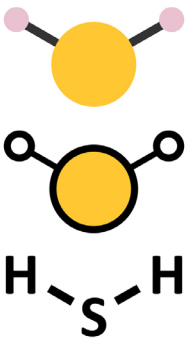
When you bottle, some additional air exposure is inevitable. Make sure your sulfite level is properly adjusted, work quickly, and consider purging with an inert gas to minimize oxygen transfer. Even with careful protection, most wines will go into "bottle shock" where rapid oxidation reactions occur, aromas are suppressed, and flavors are subdued. Mark your calendar three to six weeks after bottling before drinking to allow the condition to resolve.

Except for the occasional benefits described above, avoid aerating your wine! While some improvement comes about from the right exposure to air, problems of browning and oxidation are much more likely. Top up all containers, rack with a pump or siphon instead of pouring, and keep your sulfite at recommended levels right up to bottling. While sometimes your friend, oxygen is more often the enemy of fine wine.

So what's wrong with its counter-part, reduction?

So what's wrong with its counterpart, reduction? For that situation, the most common bad actor is sulfur. While oxygen, as noted earlier, spontaneously adopts 0, -1, or -2 oxidation states, sulfur is much more versatile. Sulfur can be found in -2, -1, 0, +1, +2, +3, +4, +5, or +6 oxidation states. Because you already know LEO GER (or OIL RIG), you recognize that the zero oxidation state is sulfur in its elemental form (that familiar yellow powder) and that +1 through +6, having lost negative electrons to develop positive states, are oxidized forms. The positive charges have come about when sulfur loses electrons for those forms and they are not the ones that concern us for "reduction." (Some of them do come up in winemaking, primarily the +4 state in the sulfur dioxide we keep telling you about, but that's another story.)

As for reduced sulfur, that is the -1 and -2 oxidation states, the -2 version is much more common. In the simplest wine-related compound, it appears as ***hydrogen sulfide*** or H_2S. Since hydrogen, H, is usually 0 or +1, in this case at +1 it combines with sulfur at -2 to form the stable molecule hydrogen sulfide. ***Hydrogen sulfide*** is one member of a much larger group of compounds that all include a reduced sulfur atom (or two). Collectively, they are all volatile and they all stink; they are called the ***VRS*** or volatile reduced sulfur compounds. ***Hydrogen sulfide*** is often described as smelling like rotten eggs. Other members of the family may smell like onions, garlic, canned corn, or asparagus. So if you get stinky wine, and it is not the nutty/bruised apple odor of oxidation, suspect ***VRS***.



Where did the *VRS* come from? There are four common pathways researchers have identified.

1. Enzymatic reduction of inorganic oxidized sulfur. Since we have been making you add sulfite to your wine, and sulfate is naturally present in grape juice, there are oxidized forms of sulfur available. The reduction of those compounds by certain bacteria, called (reasonably enough) sulfate reducing bacteria, will result in hydrogen sulfide and a stink. Anyone out there with a water well may have run across this stink; it is not uncommon in groundwater wells. However, these bacteria do not thrive in the presence of

Evil Twins continued

alcohol, acid, and the low pH of wine and are rarely encountered there. Probably not the source of your wine stink.

2. *The tendency of some yeast strains to produce large amounts of VRS.* The yeast producer will usually warn you of this or we can advise you at ***The Beverage People***. In most circumstances, the best bet is to simply avoid using those yeast strains. You can almost always find a different strain with equal or better fermentation characteristics but without the ***VRS*** tendencies. Indeed, decades ago, we stopped selling the famous old yeast strain ***Montrachet*** for exactly that reason: too stinky.

3. *Residue of sulfur dust from the vineyard or sulfur in the barrel from a burnt sulfur stick or disk.* Leftover elemental sulfur in contact with your wine causes a couple of ***VRS*** problems. The first is that it provides a readily available supply of 0 state sulfur that can easily be reduced to -2 and ***VRS***. The second is that it inhibits microorganisms — that's how vineyard sulfur fights mildew! If it is stressing your yeast, ***VRS*** is a common byproduct. The best action is prevention. One common recommendation (which I follow in my hobby vineyard) is to stop sulfuring at veraison—the "coloring up" stage of the grapes. That should leave about 5 weeks for sulfur to dissipate before harvest. (If you still need to fight mildew, products like ***Kaligreen***, ***Stylet oil***, or ***Elevate*** do not contain sulfur.) To avoid sulfur in the barrel, inspect closely before use to make sure none has dripped while burning. If it has, wash it with a jet of water and rinse.

4. *Degrading of certain amino acids by yeast releasing sulfur.* By preference, yeasts use ammonia nitrogen and certain so-called "primary" amino acids as nitrogen sources to build their own amino acids and proteins. However, if those are in short supply, the yeast will switch to another metabolic pathway that breaks down certain amino acids that contain sulfur, like cysteine and methionine. If that happens, ***hydrogen sulfide*** is released into the wine. This seems to be by far the most common source of sulfur stink that I encounter in homemade wines. The best treatment, again, is prevention. Use a complete nutrient like ***Fermaid K***, supplemented if necessary with ***diammonium phosphate*** (DAP), following the instructions on page 10 of this catalog. Adequate nutrient addition should prevent the problem.

If despite your best efforts your wine does exhibit a VRS stink, it can be treated.

The most direct treatment is to add ***copper sulfate*** solution. Copper bonds with sulfide and drops out, where you can rack off of it after a couple of days. Commercial wineries are allowed to add up to 6 ppm of copper as treatment, but the maximum allowed residue is 0.5 ppm. If you use 1% copper sulfate solution (p. 16), you can add up to 0.75 mL per gallon and not exceed the maximum residual level. If it improves the situation but does not completely correct it, you can probably safely add another 0.75 mL per gallon. If it takes more than that, you will want to determine your copper level. Bring us a sample and we will send it over to ***Signature Wine Labs*** for analysis. If it comes back above 0.5 ppm copper, you can treat with yeast hulls to remove the excess copper.

For a gentler approach to removing ***VRS***, you can use the inactivated yeast formulation ***Reduless®***. This is a version of yeast hulls naturally enriched in copper. When ***VRS*** contacts it, it bonds to the copper and the entire combination drops out, allowing you to rack clean wine. A companion product called ***Noblesse®*** can freshen the aroma of treated wine.

So that's the evil twins. The ***VRS*** "reduced" stink is generally far more offensive than the nutty, bruised apple stink of oxidation. However, ***VRS*** can usually be completely removed with little or no negative effect on the wine. Oxidation damage is permanent. Top up every container, keep your sulfite levels up, and avoid excess aeration to make fresh, clean-tasting wine that is safe from the evil twins!

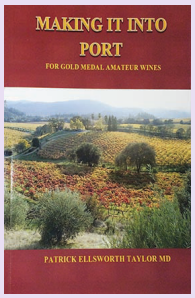
New at the Shop 2016

FL42 Plum and FL45 Tart Cherry Purees are perfect for fruit winemaking. Pour 4 cans into a carboy and add water and sugar to 20°Brix, Tartaric Acid to 0.65 and ferment with Prise de Mouse Wine Yeast for 2 weeks. Ready to rack and age, refer to page 1 for more fruit winemaking ideas.

WE25-RR Crusher/Destemmer comes with rubber rollers, 1 HP motor, auger grape feed and all stainless body and stem grate. Top of the line winemaking equipment for your best grapes from ***Enoitalia*** and ***The Beverage People***.

It's a great pleasure to now offer *Variable Volume Stainless tanks*, built in Germany by ***Speidel*** and the world-class traditions of German engineering and craftsmanship are reflected in these tanks. These new tanks come with heavy rubber lid gaskets, plugged thermometer port and stainless 1/2" full port valves. Sizes included in this line are 110, 220 and 290 liters.

Besides our great quality basket presses, like our newest #20 for apples, our grape press lineup includes ***Speidel*** *Water Bladder* presses in three sizes. These just take all the work out of winemaking at home!!



BK31 Making It Into Port by Taylor gives you the information you need to take that late harvest - high sugar zinfandel to the WOW level it deserves.

TE54 Digital Refractometer gives quick readouts of grape sugar from just a drop of juice.

TE47 Refrig/Freezer or heater Thermostat Controller, 10-220 degrees F. DIGITAL thermostat overrides the appliance thermostat to control the temperature of a fridge or freezer. Bright 3-digit LED display. LED indicator will light whenever your cooler (or heater) is in operation. Includes general use sensor probe for cooler (or heater).

Oh My, continued from page 1

Vegetables from the garden can also contribute to your winemaking hobby. Tomato wine (I've made some), bell pepper or chili pepper wine, and even sweet corn wine are possibilities. And do not overlook foraging or growing flowers and herbs for wine making. Popular choices in this category include dandelions, rose hips, rose petals, elder flowers, basil, rosemary, and cilantro.

Beyond your own garden, many people in our region like to visit the brambles of Himalayan blackberries that overrun creek beds and road sides. Foraged at the height of their summer ripeness, they can produce remarkable full-bodied red wine. We are also blessed with an abundance of farmer's markets where fruit from a bit further afield can be picked up throughout the season. If you are buying in quantity for winemaking, and are willing to settle for some of the less visually appealing specimens, the farmer will sometimes make you a special price. I have made fruit wines from farmer's market melons, peaches, and pomegranates. If none of these are available to you, everyone can buy fruit at the supermarket. For out-of-season winemaking demonstrations, I have sometimes bought over 100 lbs. of table grapes through the produce manager of my local store. From personal experience, I can tell you that Perlette seedless makes a very nice light-bodied white wine and Black seedless makes an entirely acceptable rosé or red wine! You can even experiment with exotics like coffee and tea.

Having selected something to ferment, we will get down to how to do it. One easy way to initiate fermentation is to first get juice. Once you have that, you can make a wine as described for ***White Wine*** page 8 or follow ***Cider procedures*** page 9.

Grape crushers and destemmers like the ones we rent are, unfortunately, quite fruit-specific. Beyond wine grapes, about the only fruit you can process in them is table grapes. Grape presses, on the other hand, can be quite versatile. If you can first shred or grind firm fruits like apples and pears, you can pour the results into a pair of nylon mesh bags (one on each side of the center shaft) in a grape press and squeeze out juice. We have one customer who macerated figs in port wine and then pressed off the results! We also rent special-purpose apple mills with electric grinders and manual basket presses built in. These can be extended to similar fruits, including pears and quince. Conventional counter-top citrus juicers are easy to use and electric juicers for other fruits and vegetables can be very efficient (if slow to yield five gallons).

If the fruit, flowers, or herbs you are using do not lend themselves to pressing for juice, you can follow some variation on the ***Fruit Wine procedure***. To various extents, wines made this way are part corn sugar and part something else. For ingredients like coffee, tea, or herbs, you will be making essentially a flavored corn sugar wine (not that there is anything wrong with that!). For stone fruits, melon chunks, or cut tomatoes, you will be deriving some of the sugar from the fruit and the rest from corn sugar. For any of them, place cut pitted fruit, lightly crushed berries, or bruised herbs in a nylon mesh bag and put it in a bucket. Boil water with your needed amount of corn sugar (see below) and pour it over the bag. From there, follow the instructions in the ***"Fruit Wine"*** procedure, page 9.

To calculate your sugar balance, decide about what level of alcohol you want in your finished wine. Divide that figure by 0.55 to estimate the sugar (in Brix, or percent sugar by weight) that you need to start. Figure that sugared juice weighs about 10 lbs/gallon, so a five-gallon batch of prepared juice would weigh about 50 lbs. Multiply your estimated batch weight by your Brix percentage to find out your total sugar budget.

For example:
5 gallons of wine at 11% alcohol:
(11%) / (0.55) = 20° Brix
5 gallon ~ 50 lbs. x 0.2 = 10 lbs. of sugar total

Having determined your total sugar budget, subtract the sugar you are likely to get from your fruit. Table 1 displays some representative sugar contents from USDA. Since sugar in g/100 g is the same as percent, multiply the pounds of fruit you are using times that value from the table and divide by 100 to determine the pounds of sugar your fruit will provide.

Table 1: Some Sugar Values

Fruit	Sugar, g/100 g	Sugar in juice, g/100 g*
Apples	9.5-11	9.5
Apricots	9.2	13
Bananas	12.2	---
Blackberries	4.5-5	7.7
Blueberries	10	---
Cherries, sour	8.5	---
Cherries, sweet	12.8	---

**Limited data available. For data on more fruits, do a USDA Nutrient database search at: http://ndb.nal.usda.gov/ndb/nutrients/index, with nutrient choice total sugars, Food group fruits and fruit juices, and measurement per 100 g.*

To continue our example, suppose we are making apricot wine and we have 18 lbs. of apricots from the tree.
So, our sugar from apricots is:
(18 lbs. x 9.2 g/100 g) / (100) = 1.66 lbs.
To achieve our desired 10 lbs. of sugar, we will need (10 – 1.66) = 8.34 lbs. of corn sugar in our boiling water.

There you have it! Get your fruit, calculate your sugar needs, and make some wine. See the box below for bottling choices.

A: ***Dry and Still***. Bottle with a cork in a wine bottle.
B: ***Dry and Sparkling***. Bottle like beer with 1.2 ozs. per gallon of Corn Sugar (priming) in a beer bottle or champagne bottle with a crown cap seal.
C: ***Sweet and Still***. Sweeten with sugar, add sorbate to stabilize, and bottle like wine with a cork in a wine bottle.
D: ***Sweet and Sparkling***. Sweeten with sugar, add sorbate to stabilize, force carbonate in a keg, counter-pressure fill into beer bottles with crown caps.

For conditions A, B, and C, you can use a conventional bottle filler to fill your bottles. Use either the single bottle filler or a three- or five-spout filler (p. 22). Clean and sanitize, begin gravity flow to the filler, with a racking cane if necessary, and fill. For condition D, you will need a special-purpose counter-pressure filler and a draft beer setup. (see http://www.thebeveragepeople.com/pdf/webbeerpdf/Kegging.pdf).

A: For still, dry wine follow the White Wine bottling procedures on page 8.

B: For sparkling, dry wine, follow the beer priming and bottling procedures at the website: http://www.thebeveragepeople.com/bottling-instructions.html

C: For still, sweetened wine, first rack the wine to a bottling bucket. Sweeten to taste with a simple syrup made by boiling cane sugar with a small amount of water, cool it, and stir into the bottling bucket. Add potassium sorbate granules at a rate of ¼ oz. in five gallons to stabilize and prevent refermentation and unintended carbonation. Follow the white wine bottling procedure.

D: For sweetened, sparkling wine, follow the guidelines again for kegging at: http://www.thebeveragepeople.com/pdf/webbeerpdf/Kegging.pdf with the following variations. Rack the wine into a stainless steel soda keg, sweeten and add sorbate as in "C" above, then purge the keg with carbon dioxide. Chill and force carbonate for a day or two. Chill the needed number of sanitized 12-oz. or 22-oz. beer bottles. Fill them under pressure with a counter-pressure filler and top with crown caps. You should now have shelf-stable, sweetened, carbonated wine (or cider).

Enhanced Winemaking Products Chart

	Name	Description	Purpose	Time of Application	Use Rate	Package
NUTRIENTS	**Go-Ferm**	Nutrient from inactivated yeasts	Yeast rehydration support	Just prior to yeast inoculation	1.25 g per gal	3 oz.
	Fermaid K	Complete nutrient mix with minerals and vitamins	Yeast nutrition during fermentation	1/3 and 2/3 of fermentation	1 g per gallon, twice	3 oz., 1 lb.
	DAP	Simple nitrogen nutrient	Nitrogen supplement beyond Fermaid K	Near beginning of fermentation	1 or 2 g per gallon, based on nutrient needs	2 oz., 8 oz., 1 lb.
	Opti Red	Yeast-derived nutrient, high in polysaccharides	Red wine color retention, smooth character	At first punchdown	100 g per 1,000 lbs. of must	50 g
	Optimum White	Yeast-derived nutrient, rich in glutathione and polysaccharides	Inhibits white wine browning, preserves aromas	While racking juice	1 g per gallon of juice	50 g
	Acti ML	Inactived yeasts rich in amino acids	Rehydration nutrient for ML bacteria for red wine	Prior to ML inoculation	50 g for 60 gal	50 g
	Opti ML Blanc	Formulated from inactivated yeasts to meet peptide needs	Rehydration nutrient for ML bacteria for white wine	24 hours before adding ML bacteria	20 g per HL (26 gal)	50 g
ENZYMES	**Pectic Enzyme**	Pectinase enzyme preparation	Improve juice yield	At crusher	1 oz. per 200 lbs. of fruit	1 oz.
	Lallzyme EX	Pectinase with hemicellulases	Red wine juice yield and pigment extraction	At crusher	10 g per 1,000 lbs. of grapes	10 g
	Lallzyme Cuvee Blanc	Pectinase with glycosidases	White wine juice yield and aroma enhancement	At crusher	10 g per 1,000 lbs. of grapes	10 g
TANNINS	**FT Rouge Soft**	Quebracho wood tannin product	Soft round body for red wines	At first punchdown	50 to 250 g per 1,000 lbs. of red grape must	100 g
	FT Blanc Soft	Gall nut tannin product	Protects white wine against oxidation and enhances mouthfeel	While racking juice off gross fruit lees	1 to 3 g for every 5 gal.	50 g
	Tannin Complex	Oak and quebracho wood tannin product	Protects against oxidation and improves color stability in aging	First or second racking after primary fermentation	1 to 6 g per 5 gallons (less near bottling)	50 g
	Tannin Refresh	Untoasted French oak tannin product	Imparts a light oak nuance without smoky or toasty notes	After malolactic fermentation	½ to 4 g per 5 gal.	10 g, 100 g
	Tannin Riche	100% toasted French oak tannin product	Finishing tannin to impart mid-palate character, oakiness	Up to 3 weeks before bottling	½ to 1 g (whites) or ½ to 3 g (reds) per 5 gal.	10 g, 50 g
OTHER	**Flashgum R Liquide**	25% solution of Gum Arabic	Prevents colloid precipitation, imparts sweetness without sugar	Last product addition before bottling	1.5 to 5 mL per gal.	4 oz., 1 L
	Reduless®	Yeast hulls rich in copper	Removes reduced sulfur aroma compounds	As soon as odor is detected in finished wine	0.4 to 0.6 g per gal.	10 g, 100 g
	Noblesse®	Yeast derived treatment product	Use with reduless for sulfides, or alone for alcohol burn	During mixing or racking of wine	1 g per gal.	2 oz.

Winemaking Step by Step

EQUIPMENT

For most beginners, the hardest thing about making wine is simply figuring out, in advance, what equipment is going to be needed. This list should set most of these fears to rest. *(See the back of the catalog for rental equipment choices and rates.)*

You will need the following:

1. Siphon Hose and Racking Tube
2. Hydrometer and Test Jar
3. Acid Testing Kit
4. Sulfite Test
5. Crusher or Crusher/Destemmer
6. Press or Pressing Bag
7. Thermometer
8. Scoop with Handle
9. Funnel
10. Bottle Filler
11. Small Bucket or Pail
12. Punch Down Tool
13. Mesh Colander or Strainer

For every 75 lbs. of grapes:

1. 10 Gallon Food grade Bucket and Lid
2. 5 gallon glass carboy with a fermentation lock and a #6 1/2 drilled rubber stopper. Or a PET plastic carboy with a #10 drilled rubber stopper and fermentation lock.
3. Extra jugs, each with a fermentation lock and #6 drilled rubber stopper. These could be gallon size or smaller.
4. Twenty–five wine corks.
5. Two cases wine bottles.
6. Corker.

INGREDIENTS

1. Wine Yeast, 1 gram per gallon of must or juice. (see pg. 11 for recommendations)
2. Grapes, 16 lbs. per gallon of wine.
3. Tartaric Acid as needed.
4. Sulfite as needed.
5. Yeast Food as needed.
6. Fining Agent (optional)
7. Malolactic culture for some wines.

RED WINE PROCEDURES

1 **Crush (break the skins) and de-stem the grapes**. For most grape varieties, about 90% of the larger stems should be removed.

2 **Test for total acidity following the instructions in your acid testing kit.** If the acidity is less than .6%, add enough tartaric acid to bring it to that level. If you have a pH meter, also test the pH.

3 **Test for sugar with your hydrometer.**
Correct any deficiencies by adding enough sugar to bring the reading up to at least 22° Brix or add water to bring the sugar down to a range between 22° and 26° Brix.

4 **When these tests and corrections have been completed, the must should be sulfited.** Estimating that you will get roughly one gallon of juice yield for every 16 lbs. of grapes, calculate the anticipated amount of juice. Using this estimate, add enough sulfite to give you a sulfur dioxide (SO_2) level between 50 and 130 parts per million (ppm). (See pages 12 & 13.) The amount needed will depend on the condition of the grapes, with moldy grapes getting the most concentrated dose. Extremely clean grapes may be fermented with little or no SO_2. (If using Lallzyme EX® enzyme, wait 15 or 20 minutes after sulfiting, then add enzyme.)

5 **Unless you have found it necessary to add more than 65 parts per million SO_2 in step 4, yeast should be added immediately.** If using more than 65 parts per million SO_2, you must wait six hours before doing so. Add 1 -2 grams of dry wine yeast per gallon evenly across the surface of the crushed grapes (now called "must"). Stir it in thoroughly after eight to twelve hours. Also, begin your nutrient program according to the instructions on page 10.

6 **The must should be stirred twice a day until fermentation begins.** The beginning of fermentation is obvious, as the grape skins are forced to the surface, forming a solid layer, called a cap. Once the cap has formed, mix it back down into the fermenting juice twice a day using your hand or a stainless steel punch-down tool until it is ready to be pressed. (If using FT Rouge Soft Enological Tannin and/or Opti-Red® Specific Inactivated Yeast, sprinkle them over the must and mix in at the first punch-down.)

7 **Throughout fermentation, the temperature of the must is usually between about 60 and 75°F.** For better color extraction from the skins, it is helpful to allow the temperature to rise at least once to the 80-90°F range. The fermentation itself generates some heat, which helps warm the must along with warm fall weather. If it is late in the season you may need a heater.

8 **When the wine has reached 0° Brix** the grapes **should be pressed to separate the wine from the skins.** This is usually about 1-2 weeks of fermentation at 70-80°F. During pressing, collect the wine into a bucket under the press and funnel the wine into secondary fermentors. Attach fermentation locks, and allow the containers to settle until all visible signs of fermentation have ceased (several days to a week or so). Top full when all activity ceases even if you have to add wine from another batch, or buy a similar wine, remember, you get to drink it later.

Winemaking Equipment from crush to bottle.

Crushing and stemming your grapes.

Time Line for Red Wine Fermentation.....

...5 to 14 days	...1 to 2 weeks	...after 1 month	...after 4 to 6 months	...after 6 months	...before new harvest
Active yeast fermentation of Must in primary fermentors	Pressed wine moved to secondary fermentors (leave a little room for foam for a day or two, then top up.)	Rack off gross lees and top up containers, add oak or cellaring tannins, if desired.	Rack off lees again, test for ML, add sulfite and store in cool place for aging, topping and sulfiting every couple months. If desired, add additional oak.	Rack off lees, add sulfite, fining or filtering, and keep containers topped up.	Rack to bottling container, add sulfite, cork and store.

9 **Add an ML (malolactic) culture** (optional) to the wine which, in the case of direct pitch strains like *Enoferm Alpha™ or Viniflora™* , **is added to the secondary fermentors after pressing.**

10 **When the wine has begun to clarify in 1-2 weeks, rack the wine off the gross lees** into clean, sanitized storage containers (glass, stainless steel, or oak). Top up the containers and let stand for a month. If ML fermentation is still active do not add sulfite during this time.

11 **After one month, rack the wine away from the lees again,** add sulfite to 25 or 30 ppm, and keep in topped up containers for four to six months. You must top up barrels, and visually inspect the carboys. This is a good time to add oak alternatives such as sticks or cubes. Add sulfite every few weeks. If you inoculated for ML, test the wine to be sure it is complete.

12 **Rack off the lees again,** and retest to see if the ML fermentation has finished. If completed, raise the sulfite to 20-30 ppm and store in a cool place for aging. If ML fermentation has not completed, keep the sulfite level below 20 ppm and warm the storage containers for a month to encourage completion. (If using Tannin Riche Enological Tannin from French oak, mix it with the wine during a racking at least 3 weeks before bottling.)

13 **Usually during the summer** (just before you need your storage containers for the next year's crush), **carefully rack the wine to a sanitary bottling container, then siphon into bottles and cork them.** Keep the bottles neck-up for one week to allow the corks time to expand, then move the cases to their side or upside down for storage. Bottling time is your last opportunity to make sure the wine will be bottle stable, so test and adjust the sulfite to 30 ppm. If this is a sweet wine, add Sorbistat to keep the wine from further fermentation. Most red wines will benefit from at least one year's additional aging.

White Wine Procedures, see next page.

Pressing the fermented red grapes.

WHITE WINE PROCEDURES

1 **Crush the grapes** to break the skins**.** It is not necessary to de-stem them, but it does not hurt if you happen to have a stemmer/crusher. Keep the grapes as cool as possible.

2 **Test for total acidity.** If the acidity is less than .65%, add enough tartaric acid to bring it up to that level.

3 **Test for sugar with your hydrometer.** Correct any deficiencies by adding enough sugar to bring the reading up to 20° brix for most varieties (22° for Sauvignon Blanc and Chardonnay.) If higher than 26° brix, add water to lower it between 22° and 26°.

4 **When these tests and corrections have been completed, the must may be sulfited.** Estimating that you will get roughly a gallon of juice from every 16 lbs. of grapes (varies with the variety), add enough sulfite to give you a sulfur dioxide (SO_2) level between 50 and 120 parts per million (ppm.) Note: The amount needed will depend on the condition of the grapes, with moldy grapes getting the most concentrated dose. Very clean grapes may get by with little or no sulfite.

5 **Stir in** pectic enzyme (pectinase) **at the rate of one ounce to every 200 lbs. of grapes, or use** Lallzyme® Cuvée-Blanc. Place the crushed grapes in a covered container to macerate from 2 to 12 hours. If left to stand longer than 2 hours at this stage, the crushed grapes should be refrigerated.

6 **The grapes are then pressed to separate the juice from the skins.** Funnel the juice into topped up containers, cover, and let stand for approximately 24 hours.

7 **Siphon the clear juice away from the layer of settlings (called "gross lees") into a glass, stainless steel, or oak fermentor which is filled no more than 3/4 full.** (If using FT Blanc Soft Enological Tannin, mix it with the juice during the transfer to the fermentor(s). This is also the time to add Opti-MUM White® Specific Inactivated Yeast if desired.) Yeast should be added, 1g per gallon and a fermentation lock attached to the fermentor. Add nutrients according to the instructions on page 10.

8 **When visible signs of fermentation end, the wine must be racked off the lees,** and placed in topped up storage containers (glass, stainless, or oak). Add sulfite, 30 - 40 ppm. and let stand for a month.

9 **Rack off the lees.** If the wine isn't clearing, fine with Sparkolloid or a Bentonite slurry. Clarity occurs by three months. Sulfite and store full containers in a cool place.

10 **In a couple of months, rack and sulfite the wine again, placing it back in topped up containers.** For oak flavor add oak sticks or cubes. If additional high-quality French oak character would benefit your wine, use Tannin Riche enological finishing tannin.

11 **In late Spring, before the onset of very hot weather, carefully rack the wine from the lees.** Test the wine for free sulfite content with a sulfur dioxide test kit to determine how much SO_2 is needed to bring the level to 30-35 parts per million.

12 **Siphon into bottles, cork them, and set them aside for whatever bottle aging is needed.** If you wish to sweeten the wine, do so with simple syrup (two parts sugar to one part water, boiled), and add 1/2 tsp. Sorbistat per gallon to inhibit any remaining yeast. White wines may be enjoyed 6 weeks after bottling.

Time Line for White Wine Fermentation.....

...1 to 2 weeks	...1 month	...2-4 months	In the spring
Active yeast fermentation of juice in primary fermentors about 3/4 full	Rack finished wine to clean fermentors, topped full. Settle out lees. Add sulfite.	Rack off lees and fine or filter. Add sulfite and cold stabilize. Oak additions.	Rack to bottling container, add sulfite, fill and cork bottles.

Fruit Wine Procedures, see next page.

Placing the wood blocks and press head into the press before pressing the grapes.

FRUIT WINE PROCEDURES

Use the following procedures for 5 gallons of Berry or Stone Fruit Wines:

Smash sound, ripe berries (or pit stone fruit), tie loosely in a straining bag and place in open top fermentor.

Heat 6 quarts **water with Corn sugar** and bring to a boil. Remove from heat, cool and pour into the fermentor over the fruit.

Add the remaining **water**, **Yeast Nutrient, Pectinase and Tartaric Acid.** Add 5 crushed **Campden Tablets.**

Cover with loose plastic sheet or lid and allow to cool and dissipate the sulfite, waiting for 12 hours or overnight.

Stir in the **Yeast.** Once fermentation begins, **stir or push** the pulp down into the liquid twice a day.

After 5-7 days, strain and press the pulp. Funnel the fermenting wine into closed fermentors, such as glass or plastic carboys, and attach a fermentation lock. *Note: if this fermentation is very active, you may need to divide the wine between two carboys so it won't foam out and spill.*

When bubbles are no longer actively rising through the wine, siphon the wine back together into one full carboy. **Optional: Fine with Sparkolloid see pg.15 for mixing Sparkolloid,** add 3 Campden Tablets and store for four weeks with an airlock.

Rack (siphon) away from the sediment, top full with a neutral wine and leave under airlock for 3 weeks up to 4 months.

For **bottling**, **rack into an open container**, and add 3 crushed **Campden Tablets.** Sweeten with **sugar syrup** to taste and add 1/2 teaspoon **Sorbistat** per gallon to stabilize. Siphon into bottles, cork, and set aside to age for at least 3 weeks.

Berry, Plum, or Cherry Wine Recipe

20 lbs. Blackberries or
15 lbs Raspberries or
15 lbs. Pitted Plums or
22 lbs Cherries or
15 lbs Sour Cherries
(omit acid addition for sour cherries)
12 lbs. Corn Sugar
4 gallons Water
2 1/2 tsp. Yeast Nutrient
2 1/2 tsp. Pectinase
8 tsp. Tartaric Acid
5 g Epernay II Wine Yeast

Original Brix: 20
Total Acid: .6-.65%

Equipment needed For 5 gallons of Fruit Wine or Cider

1. 6.5 Gallon Food grade Bucket and Lid.
2. Nylon Bag to fit bucket.
3. One 5 gallon glass carboy (water bottle) with a fermentation lock and a #6 1/2 or #7 drilled rubber stopper. Or PET plastic carboy with a #10 drilled rubber stopper and fermentation lock.
4. Racking tube and flexible tubing.
5. Bottle filler
5. Corks or crown caps.
6. Two cases wine or beer bottles.
7. 25 pack of Campden Tablets
8. Corker or Capper

Optional:
1. Hydrometer (Saccharometer) and Test Jar
2. Acid Testing Kit

CIDER PROCEDURES

Crush the apples. Use only sound, fully ripe fruit. *(We rent an electric grinder and press.)*

Stir in **Pectinase** to accelerate break down of the fruit pectins. Use 1/2 oz. per 100-150 lbs. of fruit, with a contact time of 2-4 hrs, to achieve better runoff at press.

Press to separate the juice from the skins and other solids. Funnel the collected juice into closed containers, filled no more than 75% full. Add 5 crushed **Campden Tablets.** Settle the juice and wait for the sulfite to dissipate - 6 hours.

For each 5 gallons of juice, add 1-2 teaspons of **Yeast Food (Fermaid K)**. Stir and add 5-10g of **Yeast.** Attach a fermentation lock, and allow fermentation to proceed.

When visible signs of fermentation end, the cider must be racked off the lees and placed in topped up glass or stainless steel storage containers. Let it stand for a month.

During the racking at the end of fermentation, add sulfite using 3 crushed **Campden Tablets**.

After a month, rack and sulfite again then rack it back into topped up containers. Store for two or three more months.

Carefully rack away from the lees. If your cider is going into extended bottle storage, sulfite by adding 3 crushed **Campden Tablets**. Beverages such as this may often be enjoyed within two months of bottling. If you plan to drink some that soon, don't add additional sulfite to that portion at bottling time.

Siphon into bottles, cork or cap them, and set them aside for whatever bottle aging is needed. If you would rather sweeten the cider at bottling time, the following instructions will apply.

Cider Ingredients

100-150 lbs. Apples
or 5 gallons of juice
1 oz. Pectinase
2 teaspoons Yeast Food
10 g M-2 Yeast
25 pack Campden Tablets

Brix: 10-13
Total Acid: .6-.65%

Sweetening

To sweeten 5 gallons of cider, boil 1 cup of cane sugar with 1/2 cup of water for 5 minutes. Only stir in 1/2 of this and taste before you decide to add the rest. You may like it at this level of sweetness. If not, by all means add more.

You will also add 1/2 tsp. **Sorbistat** per gallon to to stabilize the cider and prevent re-fermentation in the bottles. Force carbonation in a keg is also an option. See our beer catalog for instructions on kegging.

JUICE TESTING FOR SUGAR, ACID, PH & NUTRIENTS

There are three tests deemed most essential in the majority of winemaking situations. By testing these three things: Sugar, Acid, and pH, you will have the minimum level of information needed to make wine. Instruments and kits are available at *The Beverage People* for testing these parameters at home. (See pg.14)

In addition to the three tests mentioned above you may also want to find out the level of nutrients in your juice. Adequate nutritional levels help ensure a healthy yeast fermentation, and also help avoid problems such as: stuck fermentations, or the rotten egg smell of Hydrogen Sulfide (H_2S.)

As far as nutrients are concerned, there are two tests a home winemaker would utilize: one for *Ammonia*, and one for *Assimilable Amino Nitrogen*. The results of these two tests are added together to determine the total amount of *Yeast Assimilable Nitrogen (YAN)* present in the sample. When these figures have been combined, the result (logically enough) is called *Yeast Assimilable Nitrogen Combined (YANC)*. It is this *YANC* figure, in combination with the sugar level of the must, that tells us the nutritional requirements of our juice. If you are interested in these numbers, you will need to use a commercial lab.

There are no home tests for nutrients, therefore you will want to crush your grapes and deliver a settled sample of juice to your nearest laboratory. (A 250ml bottle is the minimum volume requirement for most chemical analysis.) *There are three labs near the store:* Vinquiry in Windsor (707) 838- 86122, Signature Wine Labs in Santa Rosa (707) 838-3027, and ETS in Healdsburg (707) 433-7051 or St. Helena (707) 963-4806. *Contact them to find out information on cost. For Signature Wine Labs testing, drop off your sample and pay in advance at The Beverage People*. By sharing results with our staff, we can advise you on actions to take with your results.

Remember that you are sending juice, and that means it is subject to fermentation. A laboratory must receive your samples before fermentation begins! Unless you take your clarified juice to the lab yourself, you should use one of two storage methods:

Freeze the juice in the sample jar (with the lid loose) **or pasteurize the juice**, heating it up to 180°F., keeping it there for 2-5 min. Do not boil. Cool, freeze, and ship via next day air. Talk over sampling and shipping with your chosen laboratory before you start.

Adjusting Nutrients

Because different strains of yeast have different nutrient requirements, talking about YANC levels can quickly turn complex. For our discussion here, we will consider the **natural juice level of YANC** in one of 3 levels: Low YANC < 125 ppm, Medium YANC 125-225 ppm or High YANC > 225 ppm.

The yeasts are also divided into three levels of nutritional need: Low, Medium and High-Very High (see table on page 11). Once you know your YANC level, it may influence your choice of yeast. Choosing one with an appropriate nutrient need will minimize your nutrient additions.

After your **Yeast** choice is made select a nutrient addition program from the following table: *Low, Medium or High YANC* level and then the **Yeast Nutrient** program of *Low, Medium or High-very High*.

Note: all of this advice is based on "moderate" sugar levels up to 22° Brix. For high- sugar musts, choose yeast both low in nutrient requirements and high alcohol tolerant. Increase the yeast pitch 50% and add both 1 gram DAP amd Fermaid K per gallon of juice when 1/3 of the sugar has been fermented.

Yeast Nutrient Needs

YANC LEVEL	*Low*	*Med*	*H-VH*
LOW	**A**	**B**	**E**
MEDIUM	**C**	**D**	**E**
HIGH	**C**	**C**	**D**

Nutrient Programs

NOTE: When in doubt, use Program D.

A) Add enough DAP to bring your YANC up to 150 ppm about 8-12 hours after pitching yeast.

For program A, use these levels:

50 ppm or less YANC, add 2 grams DAP per gallon.

50-100 ppm YANC, add 1 1/2 grams DAP per gallon.

100 -125 ppm YANC, add 1/2 gram DAP per gallon.

125+ ppm YANC, add no DAP

In addition, about 1/3 of the way through fermentation, add 1 g/gal. of Fermaid K (or Yeast Food).

B) Do all of program A, plus:

Add an additional 1/2 g/gal. DAP and do a second addition of 1 g/gal. Fermaid K when roughly 2/3 of the sugar has been consumed.

C) Add no DAP. Add 1 g/gal. Fermaid K about 1/3 of the way through fermentation.

D) Follow program C, plus add another g/gal. of Fermaid K about 2/3 of the way through fermentation.

E) Follow program A, plus add 1 g/gal. DAP and 1 g/gal. Fermaid K about 2/3 of the way through fermentation.

Which Nutrient...When?

Go-Ferm is an important nutrient used when building a yeast culture before the primary fermentation. Do not use during fermentation. See the web-site or package for complete instructions for use.

Opti-Red® (yeast derived nutrient) is added at the time of the first punchdown for red grapes.

OptiMUM-White (yeast derived nutrient) is added to white grape juice after racking off of the gross fruit lees near the beginning of fermentation.

Fermaid K (yeast food) is the go-to all-purpose nutrient for wine fermentations. Use at the rate of 1 oz. per 32 gallons at 1/3 drop in original brix. Repeat at 2/3 drop. Use with DAP if you know you need more nitrogen. Contains: ammonia salts, amino acids, sterols, unsaturated fatty acids, yeast hulls, vitamins, magnesium and pantothenic acid.

Diammonium Phosphate - DAP will raise the level of free nitrogen for a healthy fermentation. Contains only ammonium phosphate. Use varies, but 1 oz. per 32 gallons is a good starting addition.

Autolyzed Yeast is used to restart sluggish and stuck fermentations. Contains dried yeast providing amino nitrogen, B vitamins and yeast hulls from autolyzed yeast.

Yeast Hulls help prevent stuck and sluggish fermentations and with Autolyzed Yeast to restart fermentations. This is the pure cell wall membrane of whole yeast cells and is more concentrated than autolyzed yeast. Also used to absorb toxic compounds like copper sulfate.

YEAST RECOMMENDATIONS

Locate your grape variety or style, read about the yeast characteristics for the recommended strain(s).

To find fermentation specifics read down fermentation specifics, read down	Assmans-hausen	Beaujolais 71 B	Brunello BM45	CSM	Epernay 2	French Red (BDX)	ICV D254	M-2	RP15 "Rockpile"	ICVD21	Prise de Mousse	Rhone L2226	RC212	Steinberger	QA23	Uvaferm 43	WS
Varietal	Pinot Noir	Zinfandel Syrah	Sangiovese	Bordeaux	Zinfandel	Bordeaux	Chard Red Rhones	Chard, Cabernet	Syrah	Big Reds	White, Red	Rhone	Pinot Noir	German White	Dry Whites	Restarts, Zin, Late Harvest	Pinot Noir, Zinfandel
Fruit Wines	YES	YES			YES						YES	YES	YES	YES	YES		
Enhances Fruit		YES			YES		YES	YES		YES					YES		
Enhances Mouthfeel	YES						YES	YES		YES					YES	YES	
Sensory Effect *	EVC	Estery	EVC	EVC	EVC	EVC	EVC	Estery	Complex	Estery	Neutral	EVC	EVC	EVC	EVC	YES	Complex
Reduces Vegetal Character	YES			YES	YES			YES									
Stabilizes Color	YES			YES		YES	YES		YES	YES		YES					YES
Cold tolerant					YES						YES			YES			
Use to Restart											GOOD	GOOD				EX-CELLENT	GOOD
Temperature Range F.	68-86	59-86	64-82	59-89	50-80	64-86	50-85	59-86	59-90	59-90	50-86	59-82	68-86	40-70	59-90	55-95	60-86
Vigor	Slow	Average	Average	Average	Average	Average	Fast	Fast	Average	Average	Fast	Fast	Average	Slow	Fast	Fast	Fast
Alcohol Tolerance %	15	14	16	14	15	16	16	16	17	16	18	18	16	14	16	18	18
High Alcohol Tolerant			YES			YES		YES	YES	YES	YES	YES	YES			YES	YES
Nutri tional Need **	Medium	Low	Very High	High	Medium	High	Medium	Medium	Low	Low	Low	High	High	Low	Low	Low	Low
Reaction to Oxygen ***	Medium			Low			Medium		Low	High	High	Medium			Low		Low
Comments	Enhances spiciness	Fruit wines	Extended Macerations	Alternate to BDX	Can be stopped	Ideal Fermentor	Complex flavor Mineral Aromas	Complex	Red fruit, Mineral Tones	Bold Flavors Mouthfeel	Late Harvest	Late Harvest	Good Color	Easiest to Stop Fermenting	Aromatic	Restarts Very Well, Red Fruit Character	For High Brix Juice

Notes to Text

*Sensory Effect: EVC = Enhances Varietal Character, Estery = Enhances Fruitiness, Neutral = No Enhancements

** See page 10 for Nutrient recommendations, especially for Medium and High Categories.

*** Also try additions of Oxygen with active stirring during fermentation to yeasts that react to O_2 additions.

Sulfite, Grapes and Winemaking

Sulfur has been burned in wine containers to purify them since the days of the Roman Empire, and probably much earlier. The ancients may not have known about the world of microorganisms, but they recognized that sulfur helped make their wines last longer. We now know that sulfur dioxide gas (SO_2) released by burning sulfur was the effective agent for retarding spoilage, and we have a more precise way of adding it these days. We make up solutions of sulfurous acid/water to known parts per million of SO_2. These solutions are stored and added in tablespoons or milliliters to the volume of wine.

After more than 35 years of teaching home winemakers the importance of adding sulfite to wine and monitoring the results with various testing methods, we are concerned that people are still not testing or scheduling SO_2 additions often enough.

While we have seen improvement during these years, many wine samples are still reported with only a few parts per million of SO_2. These wines may not even yet show the effects of oxidation, but given enough time in this unprotected state, the fruitiness will fade, browning will occur and the taste will become pruney and harsh. To avoid this you need to understand the basics of why sulfite works so well to protect your wine.

When you add sulfite to wine, sulfur dioxide ionizes to the sulfite ion, $SO_3^=$, and bisulfite ion, HSO_3^-. A small fraction remains in the "molecular" form, SO_2. It is this molecular form that protects the wine from spoilage organisms and oxidation. As sulfite reacts with other wine components, it becomes "bound" to them and is no longer available to participate in producing "molecular" sulfite.

We cannot measure molecular sulfite directly. Rather, we measure "free" sulfite, and use a table of wine pH values to predict the amount of 'molecular' sulfite we will achieve.

This is why it is so important to frequently measure your free sulfite. No matter how high your total sulfite (within reason), it is only the free sulfite number that really counts. Don't just guess and toss some sulfite in, analyze it first, then add it. To this end, we offer some advice on ways to keep up with testing your SO_2.

Methods for Testing Free SO_2

Aeration-Oxidation(AO) Method for Free SO_2

This is the original primary laboratory method for sulfite measurement in wine that helps define what "free" SO_2 means. Advances in technology and simplification have brought a complete home-use aeration-oxidation (AO) system down to a price that makes sense for many hobbyists. (See page 21.) It uses the same technology and chemicals as a full laboratory setup, but at a fraction of the cost. The kit as packed contains sufficient supplies for numerous tests, except there is only one ounce (30 mL) of 25% phosphoric acid reagent. That is sufficient for three tests and has the advantage of shipping without a hazardous material shipping surcharge. If you can come in to our store, we can sell you a 250 mL bottle of 25% phosphoric acid to supplement your kit, but we cannot ship it. If you are outside the area, look into sourcing this reagent locally.

In the AO method, a wine sample is placed in a flask and phosphoric acid is added to force the sulfite ion into molecular SO_2. A small air pump pushes air bubbles through the sample. Since sulfur dioxide is a gas, it dissolves in the air stream and transfers to a trapping solution. In the trapping solution, hydrogen peroxide oxidizes the sulfur dioxide into sulfuric acid. Also in the trapping solution is an acid-base indicator that changes color as the sample gas accumulates. After the 10 or 15 minute transfer period, the trapping solution is titrated with sodium hydroxide solution to measure the acid formed. The free sulfite level can be calculated from the titration results.

Ripper Method for Free SO_2

We sell the 10 pack box of Titrets, based on the Ripper method, but they are only recommended for white wine. The Ripper method is an iodine titration that is often faster, easier, and cheaper than A/O. It is limited by the chemistry involved. Any substance that reacts with iodine — including some tannins — will be measured as sulfite. Further, the acidification of the sample for the titration tends to release some sulfite bound to anthocyanins (color compounds) in red wine, making it appear "free" when it is not.

These Ripper limitations have been largely overcome through a combination of equipment and techniques from Vinmetrica. That company produces proprietary instruments for sulfite analysis (SC-100A, TE162, p. 21) and for sulfite plus titratable acidity (SC-300, see p. 14) that rely on amperometric titration with iodine instead of a visual endpoint or a straight oxidation-reduction (redox) detection. Allowing very rapid titration to overcome release of additional sulfites and showing a very sharp endpoint on the meter to improve precision, they have reduced the discrepancy between AO and Vinmetrica Ripper to only 2 to 3 mg/L (ppm) for most wine samples. Those differences are small enough that the convenience and ease of use will make the Vinmetrica meters attractive choices for many users.

Laboratory Testing

If you would rather not do sulfite analysis yourself but you want to do a good job keeping up with your levels, a wine testing laboratory can do it for you. Find a commercial lab or perhaps a university lab near you to minimize shipping of samples. For those of you who live in Northern California Wine Country, we can make it very easy for you. Come by the store and pick up a free sample vial (or use your own screw cap container of 60 mL or more) and fill it all the way up with wine. You don't want to lose sulfur dioxide gas into the headspace of a partially-filled container. Bring your vial back full and pay for the free SO_2 test here at the store. Our lab services partner, Signature Wine Laboratory of Santa Rosa, will pick up the sample and will test it using approved techniques. If you authorize them to (which we recommend) they will email us a copy of your report when they email it to you as well. Give us a call if you would like to discuss your results! (Signature gives a 15% discount to home winemakers which we pass along. Many other lab tests are available, too.)

Scheduling SO_2 Additions

Initial sulfite may be added at 50-65 ppm to grapes or juice that is free of rot or mold. The presence of a lot of mold, or grapes in otherwise bad condition, might require twice that amount. Under average conditions the information that follows should keep about 20 to 30 ppm of free SO_2 available throughout the wine's cycle of production through bottling.

After ML fermentation is complete add 30 ppm, and five days later add 30 ppm again, and AGAIN one week later. Now get the wine tested for free SO_2. The test results may surprise you, as the amount of SO_2 you have added seems like a lot, but has been working to clean up the wine after fermentation and will be dissipating at a rapid rate initially.

Above pH 3.5, you will notice that the amounts of free sulfur dioxide required become quite high. It is best to lower the pH by adding tartaric acid early in the fermentation cycle to lower the pH.

Continue testing every 6-8 weeks, adding SO_2 as required to keep at least 20-30 ppm. available in the wine.

Sources of SO_2

SO_2 is available as Campden tablets, effervescent Inodose metabisulphite tablets or by powdered sodium or potassium metabisulfite. A premeasured Campden Tablet equals 65 ppm in one gallon (13 ppm in a five gallon jug) and is very convenient for those making small amounts of wine. Crush the tablet to a powder to add it.

The 2 gram Inodose tablets add 528 ppm per gallon or 9 ppm per 60 gallons. The 5 gram Inodose tablets add 1320 ppm per gallon or 22 ppm per 60 gallons. The tablets can by dissolved in water to accurately dose carboys. Metabisulfite

powder is added in a liquid preparation to adequately disperse it, and because it is very potent. This is also the least expensive method and accurate to measure for any size container.

pH and SO_2

It is generally recognized that only a small amount of molecular SO_2 (.5 to .8 ppm.) needs to be present to provide bacterial stability in wine, but pH has an important effect on how much free SO_2 is needed in order to provide that amount, and that's why both pH and SO_2 need to be tested.

Regard the Table of Molecular SO_2 below. The amount of free SO_2 needed is based on the pH of the wine. A fairly safe amount for protection of the wine is either .5 ppm for Red Wines or .8 ppm for White Wines. If you know the pH, simply make sure you have the corresponding level of free SO_2, or slightly more, present in the wine during storage and bottling.

Molecular SO_2 needed for Stability

pH	.8 ppm. White Wine	.5 ppm Red Wine
2.9	11 ppm.	7 ppm
3.0	13	8
3.1	16	10
3.2	21	13
3.3	26	16
3.4	32	20
3.5	40	25
3.6	50	31
3.7	63	39
3.8	79	49

Preparing Metabisulfite Solutions

10% Solution

Using a gram scale, **weigh out 100 grams of Sodium or Potassium Metabisulfite and dissolve in 1 Liter of water**. Tightly stopper and store labeled: poison. When adding your sulfite additions make sure you measure carefully.

Replace your solution every 3-4 months.

10% Solution of Metabisulfite

(Add ppm SO_2 to desired amount.)

Must/Wine (gallons)	10	20	25	30	40	50	75
	(Add milliters of 10% solution)						
1	.6	1.3	1.6	2.0	2.6	3.3	4.9
5	3.3	6.6	8.2	9.9	13.1	16.4	24.6
10	6.6	13.1	16.4	19.7	26.3	32.9	49.3
25	16.4	32.9	41.1	49.3	65.7	82.1	123.2
60	39.5	78.8	98.5	118.3	157.7	187.2	295.7

3% Solution

Dissolve **four ounces of sodium or potassium metabisulfite powder,** in one gallon of distilled water. This is a weaker solution than the 10% solution given above. However, at this concentration, the solution is still quite strong and should be labeled: poison.

Replace your solution every 2 or 3 months.

3% Solution of Metabisulfite

(Add ppm of SO_2 to desired amount.)

Must/Wine (gallons)	10	21	33	43	65
	(Add tablespoons of 3% solution)				
1	.15	.32	.50	.66	1.00
5	.75	1.60	2.50	3.30	5.00
10	1.50	3.20	5.00	6.60	10.00

Removing Excess SO_2

If you ever need to lower your SO_2 due to a mistake in calculation try splash racking or stirring vigorously to aerate. If the FREE SO_2 is still too high do the following: for every 10 ppm free SO_2 you want to remove, add 1 ml. of 3% hydrogen peroxide per gallon of wine. An oxidative reaction occurs immediately. Use only fresh 3% Hydrogen Peroxide, available at the drugstore. Use this method to remove up to 100 ppm - any more than this and the wine will oxidize and lose its flavor.

Please Note: Avoid confusing the above two solution strengths. If you have a scale that weighs in grams, and have access to a pH meter, you should use the 10% solution instructions. Have on hand Pipets or Syringes graduated in .1 ml to .5 ml, 1 ml to 10 ml volumes and a Graduated Cylinder, with a volume of 100 ml, for large additions. Otherwise, use the weaker 3% solution, using household measuring spoons.

HOME WINE LAB TESTING...SUGAR, pH, ACID and Free SO_2

Having your wines tested at a commercial wine laboratory provides reliable, accurate information. But sometimes it's fun to do your own testing. Or maybe you live too far away to take advantage of commercial lab testing. Sugar, pH, Acid and SO_2 are readily addressable with home testing techniques.

SUGAR There are three principal methods for measuring sugar content at home: a refractometer, a hydrometer, or a Clinitest® kit. To make a harvest decision in the vineyard, the refractometer is the clear choice. Using the refractometer is very easy. First, calibrate it with a few drops of 20° brix reference solution. Then rinse the prism with distilled water and dry it with lens paper or a clean paper towel. Squeeze the juice of one grape onto the prism, close the cover,

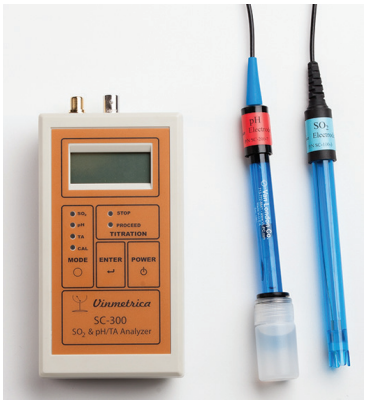
and point the refractometer at a bright section of sky. Read the brix level, write it down, and go on to measure another grape until you have taken a representative sample of your crop. Be aware that you may estimate a little high, since you will probably not sample the immature, under-ripe, and second crop grapes that may find their way into your picking bins on harvest day. For a more thorough sample, collect 20 to 100 grapes in a zip-lock bag, crush them with your fingers, and measure the brix level of the resulting mixed juice.

Once fermentation begins, the refractometer can no longer be used, because alcohol confounds the refractive index measurement upon which the sugar reading is based. So, it is time to turn to your hydrometer. Originally invented by Hypatia of Alexandria, the hydrometer has a 1500-year history of reliable service. Gently place the hydrometer in a plastic or glass measuring jar (which minimizes the amount of sample needed), then fill the jar until the hydrometer floats. Spin it gently to free any attached bubbles, then note the reading at the liquid level on the hydrometer stem. Most hydrometers are calibrated in Balling (which is the same as brix), specific gravity, and potential alcohol. Note that the third scale in no way measures alcohol directly—it is just a calculated estimate of alcohol potential based on a measurement of sugar content. Continue to take readings periodically as your wine ferments until you get to zero or below, indicating the end of fermentation.

Finally, when fermentation is all over and you want to assess the final "dryness" of your wine, turn to the Clinitest® kit. These tablets, produced for measuring sugar in urine for diabetic patients, can be adapted to measure low levels of sugar (up to one percent) in finished wine. Follow the kit instructions and compare the developed color with the chart provided. Wine is usually considered "dry" at a sugar level of 0.4% or below.

pH Wine pH is of interest primarily as a stability factor. As displayed in our molecular SO_2 table (see page 13), the effectiveness of free sulfur dioxide in protecting wine is strongly dependent on the pH. The lower the pH value, the more stable the wine in the long run. While low pH wines also taste sharper than high pH wines, the real driving force for flavor is TA—not pH. That fact highlights the value of doing both tests on your must and wine: TA for flavor and pH for stability.

If you use the ***MILWAUKEE MW102 pH Meter*** *(shown above) or* ***Vinmetrica SC-300*** (shown below) for measuring TA, you can record the initial pH value of your wine in the same manner. Another pH measurement option at *The Beverage People* is a hand-held pH meter. The ***Waterproof pH Testr 20*** from ***Oakton*** that has the feature of a watertight housing with 0.01 pH resolution. All pH meters, portable or benchtop, require calibration prior to use. Add our buffer set for a true two-point calibration for any of these meters. Calibrate with the pH 7 first, finishing with pH 4. That sequence maximizes the precision in the area of wine pH—at or below pH 4. After rinsing with distilled water, store the electrode in Storage Solution (pg. 21).



ACID Commercial labs use a sophisticated autotitrator to execute the traditional winemaking method for Titratable Acidity. They report in grams per 100 milliliters—roughly equivalent to percent.

At *The Beverage People*, we offer several home tests for TA. The most popular is the ***Country Wines*** titration kit with phenolphthalein indicator and sodium hydroxide titrating solution. This is based on the primary lab procedure for the same test, which we also offer (see below). Executed carefully at the kitchen table, it can give precise and accurate results on white wine. Because the visual endpoint of the titration is pink, many users have a bit more difficulty seeing the endpoint in grayish-pink "red" must. If you use this kit for newly crushed red grapes, take your juice sample quickly, before the full red color develops.

Our other three TA methods use full laboratory-scale equipment. The ***Indicator Method Titration Kit*** and the ***pH Meter Titration Kit*** both use a Class A buret to add measured amounts of 0.1 N Sodium Hydroxide solution to a wine sample. The indicator method uses the pink color change of phenolphthalein

to determine the endpoint and is subject to the same red-wine limitations as the ***Country Wines*** kit. The pH Meter Method, on the other hand, uses the ***MW102*** digital pH meter from Milwaukee Instruments for endpoint detection. That meter is unaffected by the sample color. Even finished, dark red wines can be accurately measured for TA with this system. Detailed

Wine Lab cont. page 15

Wine Lab continued from page 15

instructions are included with both kits.

The ***Vinmetrica SC-300*** is essentially equivalent to the ***MW 102*** method for titratable acidity and uses a digital pH meter. It has the additional capability, however, of running a separate free SO_2 measurement as described in the next section.

FREE SO_2 As described on page 12, the ***Titrets*** kit, employing the Ripper method, is the simplest test for free sulfur dioxide. Unfortunately, it is only recommended for white wine and is not especially accurate even then.

More advanced systems for the Ripper method are produced by ***Vinmetrica.*** The ***SC-100A*** **(***shown right)* uses a platinum electrode for an amperometric titration with a digital endpoint. Noting the volume of titrant dispensed to reach the endpoint, the user can calculate the free sulfur dioxide level. The ***SC-300*** meter uses exactly the same electrode and method for the measurement of free SO_2 and has the further advantage of incorporating a fully functional digital pH meter and pH electrode. That means that the combined system can do all of the testing described here under pH, Acid, and Free SO_2, providing a comprehensive solution for home winemakers who want to set up a compact laboratory.

Our primary method for determining free SO_2, is aeration-oxidation as described on page 12. The version available at *The Beverage People*, the ***MT140,*** contains all of the supplies and glassware needed to run the test on a basic level. For greater convenience and to extend the number of samples that can be analyzed, we recommend also purchasing the ***TE114 Accessory Kit.*** That kit includes an additional 250 mL bottle of 25% phosphoric acid (allowing 25 more sample analyses), a wash bottle for your distilled water to make it easy to dilute samples and rinse glassware, a second 10-mL serological pipet to reduce the need to rinse pipets during every analysis, and a 1-mL syringe to facilitate the color adjustment of the trapping solution that may be needed at the beginning of each testing cycle. Note that the accessory kit is an in-store purchase only as hazardous materials regulations prevent us from shipping the phosphoric acid.

PROCEDURES FOR FINING

Most wine will clarify during aging, with periodic rackings to remove sediments. To remove oxidation or reduce bitterness, fine with Polyclar or Whole Milk. To soften tannins, use either Egg Whites or Gelatin, followed by Sparkolloid.

Always add Metabisulfite when adding a fining agent, to prevent oxidation during the mechanical stirring needed to blend in the agent.

Two of the most commonly used fining (clarifying) agent are used as follows.

Sparkolloid is used at the rate of 1 to 1.5 grams per gallon, so to fine five gallons of wine, begin by measuring out 5 to 7.5 grams of dry Sparkolloid. Then take about 2 cups of water, stir in the Sparkolloid, and heat it on the stove in a saucepan.

Simmer gently (bubbles, but not boiling) for 15-20 minutes. Add the hot mixture into the wine. Stir gently, but thoroughly. Let stand three to four weeks and carefully rack away from the sediments of the Sparkolloid and the lees. It's a very fluffy sediment, so be prepared to lose an inch of wine.

Bentonite requires that a slurry be made up a **day in advance.** Measure out a 750 ml. bottle of water, and heat it to boiling. Slowly stir in 1 oz. of Bentonite. Mix it thoroughly for about one minute in a blender and funnel back into the 750 ml. wine bottle. Close with a silicone or rubber stopper and let it stand for a day. Shake up the slurry to thoroughly mix is back into solution and then thoroughly stir 1/4 cup into each five gallons of wine. Rack as usual after 1 to 2 weeks.

Fining Agent	Rate of Use	Best Used For	Preparation	When
Sparkolloid	5 - 7 g/ 5 gallons	All wines	Heat 1 - 2 cups of water with Sparkolloid, simmer 15 minutes and stir into wine.	Post fermentation three weeks before racking.
Bentonite	1/4 cup of slurry per 5 gallons (See directions above)	All wines	Slurry with juice or water in blender	Rack in 1-2 weeks Allow 3 weeks to settle before bottling.
Isinglass	1 Tablespoon/ 5 gallons	White wines that haven't clarified with Sparkolloid.	Soak in 2 Cups water with 1/2 teasp. Citric Acid for 30 minutes. Add to wine.	Prior to a racking.
Gelatin	1/4 oz./ 5 gallons	Red wines with excess tannin.	Dissolve in 10 oz. hot water, let sit for 10 minutes. Stir thoroughly into wine.	After fermentation up to three weeks before bottling.
Egg Whites	1/2 egg white/ 5 gallons	Red Wines with excess tannin.	Whipped to a soft froth with some wine and water then mixed in thoroughly.	In barrel/glass a month or more before bottling.
Polyclar (Divergan F)	2.5-12.5 g/ 5 gallons	White wines to remove oxidation reduce bitterness.	Thorough mixing Fluffy, difficult to rack off cleanly.	Before, during or after fermentation.
Non-Fat Milk	100-250 ml/5 gallons	White wines to reduce bitterness, adds sweetness.	Follow with Bentonite Fining	Rack after 4 days A month prior to bottling.
Whole Milk	100-250 ml/5 gallons	Reduce harshness absorb aldehydes.	Follow with Bentonite Fining	Rack after 4 days A month prior to bottling.

BARREL CARE

Care of a New Barrel

Brand new oak barrels are about as sanitary as they can be because the wood has been heated over direct fire in the process of making the barrel. This is done in order to bend the staves into place, and also to enhance various flavor accents (such as vanilla and caramel).

Swelling up a Barrel

Like any wooden container, however, a new barrel must be filled with water to make the wood swell and eliminate leaks. These leaks will often seal themselves in only a few hours, or a couple of days. However, the barrel should be continually refilled until the leaks stop, and the water should be changed each day to prevent off flavors caused by bacteria and or mold growth.

Acidifying a New Barrel

It is recommended that an acidic environment be created in a new barrel, which is about to receive wine for the first time. Dissolve in water 2 Tablespoons of ***Citric Acid*** for every five gallons of barrel capacity. Fill the barrel and check to make sure it isn't leaking. Drain the acid water and fill the barrel with wine.

Cleaning at each Wine Racking

Once a barrel has been used for wine storage, additional cleaning and sanitation measures are required. At each racking, rinse the barrel thoroughly with water to remove debris. Follow by rinsing the barrel with an acid wash. Dissolve 2 Tablespoons of ***Citric Acid*** in five gallons of water, sloshing this mixture around the interior surfaces of the barrel for 5 to 10 minutes. Drain, and refill the barrel with wine.

Preparing for Storage

It is always best to keep a barrel full of wine. When this is not possible, start by removing the organic matter that has penetrated into the surface of the wood. This is done with a solution of ***Proxycarb***, a sodium percarbonate based cleaner.

Use 4 oz. (or 8 Tablespoons) of ***Proxycarb*** for every 15 gallons of barrel capacity. Dissolve in a small amount of water, and funnel the mixture into your barrel. Fill the barrel the rest of the way with water. You may leave this mixture in the barrel for as little as 20 minutes or as much as 24 hours. If the barrel has VA (volatile acidity), double the amount of ***Proxycarb*** and leave for 24-48 hours.

Drain and rinse the barrel several times with water. Re-acidify the barrel using one ounce or 2 Tablespoons of ***Citric Acid*** for every five gallons of water. Slosh this all around and drain. Now prepare for storage.

Cleaning Step by Step

1. Drain wine from barrel and hose out visible solids until clear.
2. Add 4 ounces (8 Tablespoons) of Proxycarb for every 15 gallons of barrel and fill with water, let stand 2 - 24 hours.
3. Drain out cleaner and rinse until water is clear.
4. Acidify barrel with one ounce (2 Tablespoons) Citric Acid for every 5 gallons water. Either make this into a volume to fill barrel, or just slosh around a 5 gallon volume and then drain.
5. No water rinse is required after the citric rinse.

Short Term Storage

If it will be less than two months before the barrel is used again, drain the barrel, and fill with a ***Sulfite*** and ***Citric Acid*** solution. Use one teaspoon of ***Potassium or Sodium Metabisulfite*** powder, along with 1/3 teaspoon of ***Citric Acid*** for every 15 gallons of barrel capacity. Add enough water to fill the barrel and bung the barrel tightly. Check to make sure sulfur can still be detected inside the barrel, replacing the solution if necessary. Rinse with water before refilling with wine.

Long Term Storage

If it will be more than two months before the barrel is used again, drain the barrel and leave it upside down overnight. Next burn a ***Sulfur Strip*** in it, hanging it down at least 6 inches below the bung on a wire. Replace the bung. Remove the sulfur strip after about 15 minutes, and bung the barrel tightly. Burning sulfur releases sulfur dioxide gas into the barrel's interior.

Repeat every two weeks (as needed) until a flashlight reveals no shiny dampness in the bottom of the barrel. Bung up the barrel and store it in a dry place until needed, allowing enough time to soak up and acidify the barrel before the next use.

COPPER TREATMENT

Burnt rubber? At Sonoma Raceway, it's a normal aroma. But if you smell it when you rack your wine, you have a problem. "Burnt rubber" is one of many unpleasant descriptors applied to the **volatile reduced sulfur (VRS)** compounds than can occur during the fermentation and aging of wine. Much easier to prevent than correct, these compounds interact with each other, and the wine, in very complex ways. Simply stated, if you detect this kind of aroma, fix it quick!

The simplest, and generally first, **VRS** to appear is **Hydrogen Sulfide**, **H_2S**. It is commonly described as smelling like rotten eggs (peuw!). Since humans can detect the smell when the concentration in wine is only one or two parts per billion, it doesn't take much to make the wine very unpleasant. While "over sulfuring" in the vineyard (by the vineyard manager) is the most frequently cited cause (by the winemaker), those of you who grow your own grapes and then make the wine have no one else to blame! (Try to go at least 35 days between the last sulfur application and harvest). But let's face it: a much more frequent cause is lack of nutrients—primary amino nitrogen or certain vitamins—during primary fermentation. You can address prevention of that problem by analyzing your juice nutrient level as decribed on pg 10.

But let's suppose the odor shows up anyway (which it may). The most conservative treatment is to aerate the wine during racking—splash it into the receiving vessel (but be sure your free SO_2 level is up where it should be prior to the splash racking—otherwise you may oxidize your wine, turning it brown and Madeira-like). A more effective solution is to treat with copper. When exposed to copper, the sulfide combines with the copper to make copper sulfide, which is not soluble in wine. While some books will tell you to just run the wine over a sheet of copper, our experience has not found this technique highly effective. Instead, the direct addition of a small amount of 1% copper sulfate solution is usually quite effective. Add it at a rate of 3/4 of a milliliter (mL) for every gallon of wine. This will give you a maximum level of 0.5 ppm (mg/L), which is the level allowed in commercial wine. If you must treat the wine again to completely clear the sulfide aroma, you may want to remove residual copper by adding yeast hulls (at a rate of 5 grams per gallon), stirring frequently, and racking again in a few weeks. For the copper treatment alone, rack after a couple of days to leave the black copper sulfide behind (at part-per-million levels you may never see it, but it's there!).

If you have not promptly removed **H_2S**, your wine may go on to develop more complex **VRS compounds**. Next in line are the **mercaptans: methyl mercaptan** smells like burnt rubber or rotten cabbage and **ethyl mercaptan** smells like burnt matches or dirty ashtrays. These are not volatile enough to remove by aeration, but copper (just as for H_2S) still works. **To check for possible effectiveness, clean a copper penny in a mild acid solution (a little citric or tartaric in some water). Place your now-bright penny in a wine glass, add wine, and swirl. Let it stand for a minute or two, and the bad smell should go away if you have a copper- treatable problem. Follow the instructions in this article and your wine should clean up.**

So let's go back to the top: 35 days after last sulfur before harvest. Adequate nutrients. Aerate (with SO_2 present) if necessary. Treat with copper if the sulfide aromas don't go away.

2016 WINEMAKING EQUIPMENT

Basket Presses

Wooden cage with steel base on legs, lets you quickly and smoothly press fermented red grapes or crushed white grapes.

Model	*Basket Number*	*Basket Diameter*	*Height*	*Capacity In Gal.*	*Retail Price*
WE37	#20	8"	12"	2.5	$289.99
WE02	#25	10"	14"	5	$369.99
WE03	#30	12"	17"	7	$399.99
WE04	#35	14"	19"	12	$449.99
WE05	#40	16"	21"	18	$579.99
WE06	#45	18"	24"	25	$749.99
WE07	#50	20"	26"	34	$879.99

Piston Top Basket Press with Hydraulic Ram on frame with wheels. Very easy to use, with tilt frame for draining. *Press capacity is about one barrel equivalent to a #50 basket press.*

WE50 Piston operated, manual Hydraulic Press on wheels #50 20" x 26" cage $2399.00

Speidel water bladder presses are top of the line, with quality manufacturing and attractive features. *Water bladder presses are easy to use, they get better juice extraction than ratchet style presses, and are gentle on the fruit.*

WE59	40 Liter	18.5"	20"	10.5	$ 989.99
WE55	90 Liter	17"	23"	20	$1379.99
WE46	160 Liter w/ wheels	21"	28"	40	$2799.99

Crushers

Crushers: Manual rollers crush by simply turning the flywheel supplied.
Dimensions of WE12 and 13 Bins: 21" x 32", WE35: 21" x 21"

WE12 Double roller grape crusher with paint finish $299.99
WE13 Double roller grape crusher, stainless $349.99
WE35 Boxed double roller grape crusher, stainless (OK for UPS) $349.99

Crusher/Destemmers

Crusher/Destemmers: Manual and electric models are available, both will process around one ton per hour. Imported from Italy from Enoitalia and feature rubber rollers.
Features: Stainless Steel Receiving bin, Enamel coated body or Stainless steel, screwfeed and auger on electric models and fly wheel operation for manual models. Overall dimensions: 47" x 19.6" x 25". Stainless Steel Grate that slides out for easy cleaning. Electric models are 110 V, 1 HP motors.

WE14 Manual, paint grade crusher/destemmer $449.99
WE15 Manual, stainless crusher/destemmer $569.99
WE18 Electric 110V, stainless crusher/destemmer screwfeed & extended hopper w/auger $979.99
WE25RR Electric 110V, **ALL** stainless crusher/destemmer screwfeed & extended hopper w/auger $1299.99
WE20 Support Stand for above units $329.99

Variable Capacity Tanks

Speidel *Stainless Wine Tanks include: Floating lid and Heavy Duty White Rubber Gasket, 1/2" Full Port Ball Valve, and 1/2" second Port (comes plugged, thermometer sold separately).* ***(Marchesio)*** *include: Floating Lid and Vinyl Gasket, Drain Valve and no second Port.*

WE43 110 Liter Stainless tank (29 g.) $449.99
WE40 220 Liter Stainless tank (58 g.) $589.99
WE42 290 Liter Stainless tank (77 g.) $649.99
WE44 400 Liter Stainless tank (106 g.) ***(Marchesio)*** ... $749.99
WE45 500 Liter Stainless tank (132 g.) ***(Marchesio)*** ... $849.99

Wine Botle Fillers

WE19 Plastic Model 3 Spout Bottle Filler. $159.99
WE28 All Stainless 3 Spout Filler
Filler comes w/drip tray *(shown above)* $499.99
WE29 All Stainless 5 Spout Filler
Filler comes w/drip tray $629.99

Equipment is priced for pick up at the store. Call for a freight quote for delivery.

KITS AND JUICE

"Premium" Wine Equipment Kit

Complete with a ten gallon primary fermentor and lid, a six-gallon PET Plastic Bottle secondary fermentor, an air lock and stopper, 25 Campden tablets, a siphon assembly, a bottle filler, Mini-Floor Corker, 25 Corks, Country Wine Acid Testing Kit, Hydrometer and Test Jar, a Bottle Brush, TDC cleaner, BTF Sanitizer and the book *Home Winemaking Step By Step, Iverson*.

BNW01 .....$224.99

*(Note: For **White or Blush Wine**, kit includes 5 gallon PET Plastic Bottle in place of the bucket and lid.*

Canned Grape Concentrates

Choose your Varietal, 46 oz 68° Brix.

(CO06) **Burgundy** $19.99
(CO03) **Cabernet Sauvignon**, $19.99
(CO08) **Chardonnay**, $18.99
(CO02) **Chenin Blanc**, $16.99
(CO05) **Muscat** $21.99,
(CO01) **Zinfandel** $19.99
(CO07) **Petite Sirah** $18.99

Seedless Fruit Purees

Each can of fruit puree from Oregon is seedless, with all the goodness preserved in the processing, full of aroma and a deep rich taste and color.

Use two cans to flavor a mead or four cans to make wine. The classic 5 gallon wine recipe will yield 24 wine bottles of superb fruit wine. Finish it with the addition of a simple syrup just to smooth the flavor and intensify the berry taste. Reminds us of summer even in the dead of winter and tastes great for several years, if you can wait that long, but is ready to drink in three months. 49 oz. can.

FL46 **Apricot Puree** $21.99
FL47 **Blackberry Puree**.....$21.99
FL42 **Plum Puree**.....$15.99
FL44 **Raspberry Puree**.....$19.99
FL48 **Sweet Cherry Puree**.....$14.99
FL45 **Tart Cherry Puree** $20.99

FRUIT HANDLING

MS35 **Grape Picking Shears,** $8.99
MS16 **Grape Picking Knife,** Plastic handle $6.99
MS31 **Tote Bins for grapes,** Cross stacking, nesting tub Hold 30 lbs $18.99
QE36 **Grape Masher. (Cap punch tool) 24" long** $36.99

Mesh Pressing Bags:

PS31 **14" X 17"** w/drawstring..... $6.99
PS16 **20" X 22"** $5.99
PS15 **24" X 20"** w/drawstring.....$11.99
PS20 **26" X 28"** w/drawstring.....$14.99
QE39 **Stainless Coarse Mesh Strainer** 10 1/4" $16.99
PS51 **China Cap Strainer,** 12" perforated stainless, cone shaped high-volume strainer for all fruits $24.99

YEAST & BACTERIA

Dry WineYeasts

Choose your yeast strain from the information chart provided on page 11. Use one to two grams per gallon and see pages 4 and 6 for directions on how to use the yeast. (***Shelf life is 3-4 months.)***

WINE YEAST	All $2.29 10 g	Varies $18.99 up 4 oz
Assmanshausen	WY38	WY37
Epernay 2	WY22	WY12
French Red	WY30	WY20
Prise de Mousse	WY23	WY13
Rhone #L2226	WY35	WY34
Beaujolais 71B	WY25	WY15
Brunello BM45	WY45	WY47
CSM	WY53	WY56
Enartis Ferm WS	WY11	WY07
ICVD21	WY41	WY16
ICV D254	WY44	WY43
M2	WY50	WY49
QA23	WY65	WY67
RC212	WY55	WY57
RP-15	WY24	WY42
Steinberger	WY29	WY19
Uvaferm 43	WY28	WY18

Malolactic (ML) Bacteria Cultures

WY32 **ML Culture**, ***Wyeast #4007*** *125 ml*. inoculates 5 gallons directly. With instructions. $7.99
WY51 **ML Culture, *Enoferm Alpha Strain***, 2.5 g. pack inoculates 66 gallons directly. With instructions.....$29.99
WY66 **ML Culture**, ***Enoferm Beta Strain***, 2.5 g. pack inoculates 66 gallons directly. With instructions.....$30.99
WY52 **ML Culture**, ***Viniflora™ CH16***, 2.5 g. pack inoculates 66 gallons directly. With instructions.....$27.99

Malolactic Prevention

WY60 **Lysozyme liquid "Lyso-easy"** 250 ml. $30.99

SUPPLIES

Acids

A17 **Ascorbic,** 1 oz. $4.50
A05 **Citric**, 2 oz. $1.69
A14 **Malic,** 2 oz. $1.99
A10 **Tartaric,** 2 oz. $2.99
A24 **Acid Blend,** Citric, Tartaric & Malic, 2 oz. $1.99

Acid Reduction Agent

FN39 **Potassium Bicarbonate** (With Instructions) 4 oz. ..... $ 4.99

Sugar

AD15 **Corn Sugar**, 5 lbs $6.99
AD16 **Corn Sugar**, 10 lbs $11.99

Enzymes

QR04 **Pectic Enzyme**, 1 oz. $1.85
QR61 **Lallzyme ® EX Red Wine Enzyme** 10 g $5.99
QR63 **Lallzyme ® Cuvee Blanc White Wine Enzyme** 10 g $6.99

Yeast Nutrients

QR11 **Yeast Nutrient**, Diammonium Phosphate**,** 2 oz. $1.99
QR42 **Go-Ferm ®,** Mixing instructions are included for preparing yeast starters. This is not a fermentation nutrient. 3 oz..... $4.99
QR33 **Autolyzed Yeast**, 2 oz. $2.99
QR16 **Yeast Hulls**, 2 oz. $3.99
QR06 **Fermaid K™** Yeast Food. Complete nutrient mix with trace minerals, use 1 oz. per 30 gallons. 3 oz. $3.99

Optimized Yeast Nutrients

QR72 **Opti-Red ® Yeast Derivative Nutrient**, 50 g..... $4.99
QR74 **OptiMUM-White ® Yeast Derivative Nutrient**, 50 g $5.99

Optimized Malolactic Nutrients

QR38 **Acti-ML** Nutrient for MLF for 66 gal. 50g. $5.99
QR35 **Opti ML Blanc** Nutrient for White or Rosé MLF for up to 66 gallons. 50g. $5.99

Sulfites

CS24 **Sodium Metabisulfite**, 4 oz. $2.99
CS20 **Potassium Metabisulfite**, 1 lb. $5.99
CS17 **Campden Tablets**, Pack of 25. ..... $.99
CS16 **Campden Tablets**, Pack of 100. ..... $2.99
CS33 **2 g IO Inodose Effervescent SO_2 Tablets**, 3 pack. One tablet delivers 9ppm SO_2 in 60 gallons of must or wine..... $2.99
CS34 **5 g IO Inodose Effervescent SO_2 Tablets**, 3 pack. One tablet delivers 22ppm SO_2 in 60 gallons of must or wine..... $3.59

Fermentors

Note: All Plastic Carboys take a #10 Stopper, All current Glass Carboys takes a #6.5 Stopper. Also see Breather Silicone Bungs which fit all of the Carboys without the use of an Airlock.

GL45 **5 Gallon Plastic Better Bottle™** $29.99
GL58 **5 Gallon PET Plastic Bottle** $26.99
GL59 **6 Gallon PET Plastic Bottle** $30.99
GL02 **3 Gallon Glass Carboy** $32.99
GL01 **5 Gallon Glass Carboy** $37.99
GL40 **6 Gallon Glass Carboy** $46.99
GL04 **6.5 Gallon Glass Carboy** $54.99
P01 **6 Gallon Plastic Bucket** with Wire Handle $11.99
P02 **Lid for 6.5 Gallon Bucket** $2.99
P61 **13 Quart Stainless Steel Pail** with Bail Handle..... $21.99
P17 **Poly Drum Liner**, 6 mil, fits up to 60 gal..... $5.99
P04 **10 Gallon Heavy-Duty Plastic Bucket** with molded handles. $18.99
P05 **10 Gallon Lid** $7.99

Note: Check the web for larger sizes of ingredients, cleaners and sanitizers.

20, 32 and 44 Gallon Buckets and Lids are available for pickup at the retail store.

Drilled Rubber Stoppers

	SKU	Top	Bottom	Price
#2	FST09	13/16"	5/8"	$ 0.69
#6	FST12	1 1/16"	29/32"	$ 1.09
#6.5	FST13	1 11/32"	1 1/16"	$ 1.29
#7	FST14	1 7/16"	1 3/16"	$ 1.39
#8.5	FST16	1 11/16"	1 7/16"	$ 1.99
#9	FST17	1 3/4"	1 15/32"	$ 1.99
#10	FST19	1 31/32"	1 5/8"	$ 2.79
#10.5	FST20	2 5/64"	1 3/4"	$ 2.99
#11	FST21	2 13/64"	1 7/8"	$ 4.29
#12	FST23	2 1/2"	2 1/8"	$ 4.79

Most sizes are available solid, at the same price.

Air Locks and Breather Bungs

FST04 **Three Piece Fermentation Lock** $1.29
FST05 **S-Shape One Piece Fermentation Lock** $1.29
FST47 **Carboy Silicone Breather** (fits all carboys) $8.99
FST42 **Breather #11 Silicone** - 2" $7.99
FST510 **Breather #10, Silicone-** fits PET plastic $7.99
FST49 **Breather #9 Silicone** - 1.5" $7.99
FST57 **Breather #7 Silicone-** fits glass carboys $4.99

Solid Barrel Bungs

FST29 **Silicone Bung Solid #8** (Fits 1L Flask)..... $2.99
FST40 **Silicone Barrel Bung - Joined Size** 45 x 54 mm.. . $7.99

Cleaning and Sanitizing

CS12 **Soda Ash**, Barrel cleaner 1 lb. $1.99
CS29 **Sodium Percarbonate**, All purpose cleaner 1 lb. .. $4.99
CS26 **TDC™ Glass Cleaner,** 4 oz $4.99
CS31 **TDC™ Glass Cleaner,** 1 Liter. $13.99
CS02 **BTF™ Sanitizer,** 4 oz $6.99
CS03 **BTF™ Sanitizer,** 32 oz $18.99
QE29 **Bottle Brush**..... $4.99
QE30 **Carboy Brush** $5.99
QE31 **Double Ended Keg Faucet Brush** $3.99
QE45 **Bottle Washer -The Blast** $14.99
QE09 **90 Bottle Draining Tree** $44.99
QE44 **Carboy Draining Stand** $8.99

Oak Alternatives

Liquid Oak Extract, from pure Dark French Oak, 4 oz.
B42 Use 2-3 oz. per 5 gallons. $6.99

Oak Chips, 1 lb. Use up to 3 oz. per 5 gallons of red wine.
Specify: B46 **American Medium** $5.99, B24 **French Medium** or B25 **French Dark** $7.99

Oak Cubes, 8 oz. Use 2-3 oz. per 5 gallons. *Specify*: B44 **French Medium Plus** (Dark), or B32 **French Medium** $12.99

WINESTIX™ Carboy Sticks Two per bag. Use 1 per carboy. *Specify*: B91 **American Light,** B92 **American Medium,** or B93 **American Medium Plus** $8.99
B94 **American Dark** $10.99
Specify: B95 **French Light,** B96 **French Medium,** or B97 **French Medium Plus** $9.99
B98 **French Dark** $11.99

Chain-O-Oak™ Staves (Tank or Barrel Insert)
(30% surface of new oak in a 60 gallon barrel.)
B78 **American Medium** or B79 **American Dark** $59.99
B74 **French Medium** $69.99 or B75 **French Dark**. $69.99

Cellaring Tannins

QR65 **FT Rouge Soft -** Enological Tannin, 100 g $7.99
QR67 **FT Blanc Soft -** Enological Tannin, 50 g.....$5.99
QR70 **Tannin Riche** derived from 100% Toasted French Oak. Adds finesse to average wine. Use 1/4 to 3g per 5 gallons of red wine, 10g ..$5.99 or QR69 50g size. $24.99
QR79 **Tannin Complex** derived from traditional oak and the Quebracho tree from South America. Use 1 to 6 g for every 5 gallons of wine, 50g..... $10.99
QR77 **Tannin Refresh** Unique tannin product derived from untoasted French Oak. Increases complexity without the aromas of smoke or toast.Use 1/4 to 4 g for every 5 gallons of wine, 10g .....$5.99 or QR78 100g size. $39.99

Oak Barrels

Small American Toasted Oak Barrels:
B02 **American Oak, 2 gallon** *(SCT)*..... $149.99
B03 **American Oak, 3 gallon** *(SCT)*..... $169.99
B04 **American Oak, 5 gallon** *(SCT)*..... $214.99

Vinegar Barrels are Paraffin/Wax Lined (P):
B10 **American Oak, 2 gallon** *(P)* $134.99
B11 **American Oak, 3 gallon** *(P)* $139.99
B12 **American Oak, 5 gallon** *(P)* $149.99

Charred Oak Barrels for Spirits:
B49 **American Oak, 3 gallon** *(SCC)* $169.99
B08 **American Oak, 5 gallon** *(SCC)* $214.99

Barrel Spigots

Wood Spigots (see website for prices and sizes)

Racking Equipment

HS03 **5/16" i.d. hose per foot**.....$ .69
HS04 **3/8" i.d. hose per foot**.....$ .69
HS14 **7/16" i.d. hose per foot**.....$ .79
HS05 **1/2" i.d. hose per foot**.....$ .89
HS06 **1/2" i.d. Thick-wall hose per foot** $1.09
FST02 **Hose Shutoff Clamp for 3/8" hose** $1.69
FST03 **Hose Shutoff Clamp for 1/2" hose** $2.99
QE11 **Racking Tube** 24" length fits **5/16"**or **3/8" i.d. hose** .$3.99
QE33 **Racking Tube** 22" length fits **7/16"** or **1/2" i.d. hose** $5.99
QE50 **Racking Tube** 30" length fits **7/16"** or **1/2" i.d. hose** $6.99
QE15 **Racking Tube Holder** fits **Tube** QE11 .....$2.99
QE35 **Racking Tube Holder** fits **Tube** QE33 .....$2.99

Auto-Siphon Racking Tubes:
QE07 **Mini-Auto-Siphon** for **5/16" or 3/8"** hose $12.99
QE42 **Auto-Siphon** for **5/16" or 3/8"** hose $13.99
QE43 **Auto-Siphon** for **7/16" or 1/2"** hose $19.99
QE14 **Racking Tube Holder** fits QE07 or QE42.....$3.99
QE16 **Racking Tube Holder** fits QE43 .....$4.29

Pumping Equipment

PS09 **Pump- diaphragm style,** 110V motor with 1/2" ports. Also will need to add two PS48 Hose Barb fitings ($2.99 each) to connect to 1/2" thick wall hose**.**.....$189.99
F31 **Filter/Strainer** for Pumps (Use with 1/2" hose) $29.99
PS47 **1/2"Female Hose Barb** for F31 above. Need two...$1.99
PS36 **Procon Brass Pump**, 4 GPM, 1/4 HP $399.99
FX06 **Brass pump hose barb fitting**, 1/2"x1/2" $2.99
PS35 **Procon Stainless Pump**, 4 GPM, 1/4 HP.....$499.99
PB05 **Stainless pump hose barb fitting**, 1/2"x1/2" $7.99

Fining Agents

FN06 **Sparkolloid™,** 1 oz. .....$ 1.99
FN32 **Bentonite,** 2 oz. .....$ .99
FN07 **Isinglass,** 1 oz.. .....$ 10.99
FN03 **Fining Gelatin,** 75 bloom, grade B, 1 oz. .....$ 1.99
FN22 **Polyclar VT (PVPP)** (With Instructions) 1 oz. .....$ 1.99
FN46 **Flashgum R ® Gum Arabic Liquide.** 25% solution, 4 oz. .....$ 6.99

Sulfur Reducing Agents

FN47 **Reduless®,** 10g. Yeast hulls with copper .....$ 3.99
FN91 **Noblesse®,** 10g. .....$ 4.99
TE24 **Copper Sulfate Solution (1%),** 4 oz. .....$ 4.00

Filtering

F05 **Buon Vino Super Jet Filter,** Plate & frame filter includes electric diaphragm pump $495.00
(Must use with F31 above. Filter prevents damage to pump)
Pads for Super Jet Buon Vino (Set of Three):
F09 **8 Micron Coarse** ...$4.99, F22 **2 Micron Medium** $4.99
F21 **0.5 Micron Sterile** $5.99
F03 **10" Cartridge Filter Housing**, Clear, poly housing, Use with 10" filters below.....$44.99
10" Filter Cartridges:
F10 **3 Micron Coarse** $12.99
F11 **1 Micron Fine** $12.99
F12 **.5 Micron Sterile** $14.99
Hose Barb for Filter Housing *Need two. Specify size:*
PS02 Fits **3/8" hose** ...$1.29 or PS03 Fits **1/2" hose**....$1.99

WINE LABORATORY

Sugar & Alcohol Testing

TE40 **Economy Hydrometer** has Brix, Specific Gravity, and Potential Alcohol scales, 9" $10.99

TE42 **Deluxe Hydrometer 3 scale with Thermometer** Use with the tall test jar below, 11" $15.99

TE39 **Hydrometer Proof and Traille**.....$10.99

TE65 **Residual Sugar Test Kit.** 36 tests. $34.99

TE23 **Refractometer**, 0-32° Brix, Automatic Temperature Compensation, boxed w/padded carrying case $69.99

TE54 **Digital Refractometer**, 0-80° Brix, Automatic Temperature Compensation, boxed w/padded carrying case $149.99

TE32 **20° Brix Calibration Solution,** 2 oz..... $3.99

TE13 **Vinometer,** Estimates alcohol in dry wine $7.99

Sulfite and Acid Testing Kits

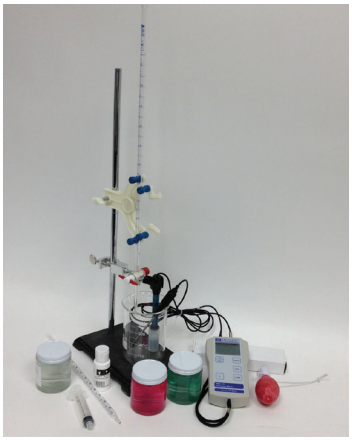
TE102 **Economy Aeration-Oxidation Free SO2 Test Kit** See page 12 for list of supplies, Instructions included...$119.99

TE26 **Country Wines Acid Test Kit** $11.99

TE29 **Sodium Hydroxide Refill** (Neutralizer) (for TE26) 4 oz., 0.1 normal $5.49

TE116 **Phenolphthalein Refill** (Indicator) (for TE26) 1 oz.....$4.49

TE103 **TA Titration Kit - INDICATOR Method Includes:** Buret Stand, 10-mL Class A glass Buret with Teflon Stopcock, Buret Clamp, 10-mL Syringe, 10-mL Graduated Pipet, Pipet Safety Bulb, 250-mL Flask and 0.1 N Sodium Hydroxide, Phenolphthalein Indicator solutions.....$109.99



TE104M **TA Titration Kit - pH Meter Method Includes**: the TA Titration Kit above minus the 250 mL Flask and adds the Milwaukee pH meter, pH Buffer Kit and 400 mL Borosilicate Glass Beaker $249.99

TE164 **VINMETRICA SC-300 - Combination TA Titration, Free and Total SO_2, and pH Tester** - The Vinmetrica SC-300 analyzer gives accurate SO2, pH and TA values. Kit includes everything to perform ~50 sulfite tests & 30 TA tests: SC-300 meter, SO_2 and pH electrodes, all reagents, transfer and sampling pipettes, syringes and two titration beakers $419.99

TE162 **VINMETRICA SC-100A - Sulfite Tester** The Vinmetrica SC-100A analyzer gives accurate SO2 . Kit includes everything to perform ~50 sulfite tests. SC-100A meter, SO_2 electrode, all reagents, sampling and transfer pipettes, syringe and titration beaker.....$269.99

pH Testing

TE203 **Milwaukee pH Meter** Manual, portable pH Meter, Milwaukee model MW102, 0-14pH, ATC. Comes with 9V Battery, pH and Temperature Probes, and 4, 7 sachet buffer solutions. Resolution 0.01 pH and 0.1 degree C. Accuracy (25C) .02 pH.. .....$129.99

TE203-RP **Replacement Electrode** for MW10 .....$49.99

TE73 **Waterproof pH Testr20** Digital, battery operated, accuracy to 0.01 pH. Automatic temperature compensated, double junction electrode can be replaced. $104.99

TE35 **Replacement Electrode** for pH Testr20.....$69.99

TE206 **Complete pH Buffer Solutions Set** with 4 oz. each of pH 4.0 and 7.0 in jars. Store cool. $6.99

TE209 **Electrode Storage Solution** 2 oz. $6.99

TE72 **pH Buffer Capsules** pH 4.0. and 7.0 Capsules, to dissolve in 100ml. distilled water to calibrate your meter. $3.99

Malolactic (ML) Testing

TE20 **Malolactic Chromatography Kit**, 6 papers, 4 oz Solvent, 100 pipets, 3 Acid Standards, funnel and Instructions.....$59.99

TE17A **Replacement Solvent**, 4 oz. $18.99

TE22 **Replacement Paper**, **3 Sheets** $6.99

TE18 **Replacement Acid Standards-** Set of 3 (Lactic, Malic, Tartaric) $9.99

TE19 **Replacement Capillary Pipets,** 100 pack $10.99

Labware

Regular Test Jar for 10" Hydrometer.

TE55 **Plastic,** 10".....$4.99

TE08-PMP **100 ml. Graduated Cylinder** ***Plastic*** **(*Clear Polymethylpentene*)** $10.99

Labware continued on next page

VINMETRICA SC-300

VINMETRICA SC-100A

TE08 **100 ml. Graduated Cylinder** *Glass* $12.99
TE111 **250 ml. Graduated Cylinder** *Glass*.....$16.99

Tall Test Jar for 11" Hydrometer
TE56 **Plastic** 1 1/2" x 14" $5.99

TE12 **1 ml. Syringe,** .....$ .99
TE28 **10 ml. Syringe,**.....$1.25
TE62 **10 ml. Pipet,** Pack of 20 .....$17.99
TE36 **10 ml. Pipet,** Each. $1.29

TE231 **100 ml. Graduated Beaker** *Borosilicate glass***.** $2.99
TE232 **400 ml. Graduated Beaker** *Borosilicate glass* $4.99
TE233 **1000 ml. Graduated Beaker** *Borosilicate glass* $12.99

TE86 **100 ml. Graduated Beaker** *Polypropylene***.**.....$.99
TE87 **400 ml. Graduated Beaker** *Polypropylene*.....$1.99
TE92 **1000 ml. Graduated Beaker** *Polypropylene* $2.99

TE83 **1000 ml.** *Polypropylene* **Beaker** *w/handle* $13.99
TE84 **2000 ml.** *Polypropylene* **Beaker** *w/handle* $12.99
TE85 **3000 ml.** *Polypropylene* **Beaker** *w/handle* $22.99

TE82 **125 ml.** *Borosilicate* **Erlenmeyer Flask.** (#5 stopper) .$8.99
TE10 **500 ml.** *Borosilicate* **Erlenmeyer Flask.** (#6.5) $8.99
TE09 **1000 ml.** *Borosilicate* **Erlenmeyer Flask.** (#8) $14.99
TE127 **2000 ml.** *Borosilicate* **Erlenmeyer Flask.** (#10) $18.99

Thermometers

TE50 **Wine Thermometer,** 0-220°F., 1.75" Dial x 8" Stem, with pan clip, recalibratable, Stainless, USA.....$29.99
TE90 **Must or Juice Thermometer,** 2" Dial x 12" Stem, with pan clip, recalibratable, Stainless, USA.....$37.99
TE37 **Floating Glass Thermometer,** 8"(40-210°) F. and 0-100°C).....$8.99
TE81 **Fermometer Strip,** Monitors temperature from 36 to 78°F., stick to tanks or carboys to read surface temperature $2.99

Wine Thieves

TE49 **Wine Thief,** Plastic, One piece.....$5.99
TE48 **Wine Thief,** Plastic, Assembled of 3 pcs $7.99
TE51 **Wine Thief,** Glass 12" $12.99
TE77 **Glass Straight Wine Thief**, 18" $49.99
TE05 **Glass Angled D- RingWine Thief,** 18" $59.99

Digital Scales

TE38 **Pico™** 0.1 to 500g, 0.005 ozs. to 1.1 lbs., perfect for winemaking additives $39.99
Shown to the right.

TE98 **Primo Digital Scale** - 1g to 5Kg (also measures 1 oz. to 11 lbs.) NSF Listed $44.99

FINAL STEPS

Wine Handling

QE34 **Orange Carboy Handle,** 3, 5 and 6 gallon size $7.99
QE47 **Blue Carboy Handle,** 6.5 gallon size $7.99
MS02 **Carboy Carrier,** Nylon Web $14.99
P16 **10 Quart Plastic Pail**, Pour out lip and Handle..... $12.99
P18 **14 Quart Plastic Pail**, Pour out lip and Handle..... $20.99
P61 **13 Quart Stainless Steel Pail** with Bail Handle..... $21.99
All funnels are white, food-grade plastic.
QE37 **Barrel Funnel,** 16" $19.99
QE24 **Carboy Funnel,** 8" Anti-Splash $10.99
QE23 **Funnel,** 10" $9.99
QE22 **Medium,** 6" Bottle Funnel $4.99
QE21 **Small,** 4" Bottle Funnel $2.99

Barrel Maintenance

CS24 **Sodium Metabisulfite**, 4 oz. $2.99
CS20 **Potassium Metabisulfite**, 1 lb. $5.99
B39 **Sulfur Strips,** 2 strips .....$ .59
B38 **Sulfur Strips** Bundle of 70 strips $18.99
B40 **Sulfur Disks aprox. 15** (5 g) $4.50
B65 **Sulfur Disk Holder**, Stainless Steel $15.99
MS06 **Mildewcide**, Barrel Coating, 16 oz. $9.99
B13 **Hoop Nails**, Pack of 20.. .....$1.75
B14 **Spiles for Barrels** (Fills holes) Pack of 10 .....$1.99

Bottles

(Note: actual shipping rates will apply)

GL61 **Claret 750 ml.** Green Push-Up 12/cs $11.99
GL05 **Claret 750 ml.** Flint Push-Up 12/cs.....$11.99
GL66 **Burgundy 750ml.** Antique Green 12/cs.. .....$11.99
GL16 **Claret 375ml.** Flint (clear) 12/cs $12.99
GL03 **Claret 375ml.** Green 12/cs.....$19.99
GL63 **Claret 375ml.** Flint 12/cs Screw Top.....$12.99

Corkers and Cappers

BE01 **Double Lever Italian Corker**.....$36.99
BE19 **Mini-Floor Corker,** *Nylon Jaws* $74.99
BE21 **Heavy Duty Floor Corker,** *Chrome Jaws* $179.99
BE03 **"Colt" Strong Top Lever Crown Capper** $59.99
BE05 **Emily Hand held Crown Capper** $20.99

Bottle Fillers

QE17 **Bottle Filler,** for 5/16"or 3/8" hose $4.99
QE02 **Bottle Filler,** with spring for 5/16" or 3/8" hose. ...$4.99
QE20 **Bottle Filler,** for 7/16" or 1/2" hose $6.99
WE19 **Plastic tray 3 Spout Bottle Filler,** $159.99
WE28 **Stainless Steel Model 3 Spout Bottle Filler,**
Includes bottle tray.....$479.99
WE29 **Stainless Steel 5 Spout Bottle Filler,**
Includes bottle tray.....$629.99

Wine Corks and Bottle Closures

WC11 **1 3/4"Chamfered Corks,** 25 pack.....$10.99
WC06 **1 3/4"Chamfered Corks,** 100 pack.....$40.99
WC14 **1 3/4" Twin Disk Corks,** 100 pack $29.99
WC07 **1 3/4" All Natural Corks,** 100 pack.....$40.99
WC13B **1 3/4" Twin Disk Corks,** 1000 pack.....$269.99
WC02B **1 3/4" All Natural Cork,** 1000 pack $344.99
TC20 **Plastic Champagne Stopper**.....$ .15
TC21 **Champagne Wire** .....$ .10
TC18 **28 mm. Black Top Bar Top Cork**.....$ .29
TC28 **28 mm. Black Top Bar Top Cork,** 100 pack.. ...$ 26.99
S01 **28 mm. Metal Screw Cap**.. .....$ .20
S02 **38 mm. Metal Screw Cap** .....$ .39
S03 **28 mm. Plastic Polyseal Cap** .....$ .45
S04 **38 mm. Plastic Polyseal Cap** .....$ .90
BE11 **Crown Caps**, 144 caps $4.99

Bottle Design

Bottle Sealing Wax Available in 7 colors $12.99
SL26 *Black*, SL27 *Burgundy*, SL28 *Gold*, SL29 *Silver*, SL31 *Blue*, SL30 *Red*, or SL32 *Green*.
Heat Shrink Plastic Sleeves, Apply to bottle neck with boiling water (212°F.) or heat gun. *Specify*: SL18 *Silver,* SL33 *Green,* SL20 *Gold*, SL19 *Burgundy, or SL49 Black*.
Heat Shrink Sleeves quantity of 12.....$ 1.29

Gum-Backed Label Making Paper. L38--*White*, 8 1/2 x 11 solid sheet, 18 Sheets $7.49
L46 **Removable White Matte Labels**, Laser & Inkjet, 4" X 5", 4 per sheet, 12 Sheets $4.99
L47 **Standard White Matte Labels**, 4 " x 3.3", 6 per sheet 10 Sheets $2.99
MS15 **Label Glue,** 16 oz. $9.99
MS24 **Iceproof Label Glue,** 32 oz.....$12.99
MS26 **Manual Label Gluer,** Glue Pot. $369.99

Finishing Supplies

MS42 **Private Preserve™,** Nitrogen gas blend in a can .$10.99
FN35 **Wine Conditioner**, Sucrose with Potassium Sorbate. Treats about 10 to 20 gal. to taste. 500 mL.....$7.99
FN18 **Potassium Sorbate,** 1/2 oz. treats 10 gallons. Stir into sweetened wine and bottle. .....$.99
FN39 **Potassium Bicarbonate,** lowers acidity in wine/must. Treat wine with 3.4g per gal. to lower .1 TA, 4 oz. $4.99
MS33 **Wine Agitator** - The Whip, Nylon, Degasser, 15" .$11.99

Miscellaneous

KEG58 **Food Grade Lubricant,** 4 oz. $5.99
MS03 **Silicone Spray Lubricant,** 10 oz. $11.50
MS09 **Gondola Enamel,** Food grade paint, 16 oz. $10.99
MS43 **Wine Away™** 12 oz. Spray bottle $9.99
QE19 **Stainless Transfer Dipper** with handle, 2 qt.....$7.99
MS70 **Spray Bottle, 32 oz.** Use with sanitizer.....$3.49

WINEMAKING BOOKS AND VIDEO

BK140 ***Home Winemaking Step by Step*** Iverson.....$17.95
BK20 ***Micro Vinification*** Dharmadhikari and Wilker.....$46.99
BK12 ***Techniques in Home Winemaking*** Pambianchi.....$ 21.95
BK40 ***Modern Winemaking*** Jackisch $49.99
BK31 ***Making It Into Port*** Taylor.$9.95
BK54 ***How and Why to Build a Wine Cellar***, Gold.....$20.00
MG13 ***WineMaker Magazine*** current issue $4.99
BK142 ***Winemaker's Recipe Handbook*** Massaccesi .....$ 4.99

ADDITIONAL BOOKS ON RELATED TOPICS

Grapes

BK80 ***Great Grapes,*** Proulx $3.99

Cider

BK70 ***Cider, Making, Using and Enjoying***, Proulx & Nichols $14.99
BK 165 ***The New Cider Handbook,*** Jolicoeur $39.99
BK79 ***Making the Best Apple Cider*** $3.99

Mead

BK77 ***Making Mead***, Morse $19.99
BK05 ***The Compleat Meadmaker***, Schramm $19.99

Other Hobbies

CH73 ***The Cheesemaker's Manual***, Morris $39.99
CH74 ***Making Artisan Cheese,*** Smith $21.99
CH98 ***Artisan Cheesemaking at Home***, Karlin.....$29.99
BK100 ***American Farmstead Cheese***, Kindstedt $40.00
BK01 ***Brewing Quality Beers,*** Burch $7.95
BK84 ***Making Vinegar at Home***, Romanowski $6.99
BK03 ***Homemade Vinegar,*** Watkins $7.99
BK36 ***The Compleat Distiller***, Nixon & McCaw $25.00
BK76 ***Home Sausage Making,*** Reavis $16.99

The Beverage People
1845 Piner Rd. Suite D
Santa Rosa, CA 95403
(707) 544-2520

Postmaster: Please deliver July 13-19

PRSRT STD
U.S. Postage
PAID
DMS INC

Our Hours:
Monday through Friday 10 - 6:30 *Saturday* 10-5

Rental Equipment

CRUSHERS

Apple Mill, Grinder and Press, motorized	$50.00
Grape Crusher, Manual	$20.00
Grape Crusher/Destemmer, Manual	$50.00

PRESSES

#30 7 gallon Basket	$30.00
#35 12 gallon Basket	$40.00
#45 25 gallon Basket	$50.00

FILTERS/PUMPS

Transfer Pump Brass with hose	$10.00
Transfer Pump Stainless with hose	$20.00
Buon Vino Plate Filter includes one set of pads	$35.00

BOTTLING

3-Spout Bottle Filler	$15.00
Wine Bottle Corker	$10.00
Glue Labeller, Manual	$10.00

Rentals are 24 hrs. from **noon to noon**.
Reservations are accepted **up to 7 days** in **advance**.
We require a **$50 cleaning deposit** on most equipment. **Cancellations must be made by noon the day prior** to your reservation. **Please do not leave phone messages.** Call 544-2520 during business hours to manage your reservation.

Got Grapes?

Our grape listing book is a resource for both the winemaker and the grower. Local grape growers can list their grapes for sale. Winemakers can source their fruit by coming in to the shop and taking a look at the listings. If you would like to place a listing, please send us a list of grapes available, pricing, and any other information about your grapes you would like to include. Don't forget to provide your name, address and phone.

USPS and UPS Orders

*Call **(707) 544-2520** or place your orders online at: **www.thebeveragepeople.com** for fast service and low shipping rates. Use our **Flat-rate UPS $7.99** shipping for destinations in CA, OR, WA or NV. **Priority mail** is a great choice for most parcels under 15 lbs and should arrive in 2 or 3 days all across the USA.*

Fall Classes

Winemaking for Beginners

If you are new to winemaking, or just want a refresher, plan to attend our **beginning winemaking class**. You will be given a step by step run through of the winemaking process with demonstrations of equipment and testing supplies. Held in the store classroom, class is on Saturday, **August 27th 2:00 - 4:30 pm. Class fee is $30.00**. RSVP by calling the store.

Oak Choices for You

Learn about the contribution of oak to wine flavor and aging. Nancy Vineyard will explain how to take care of barrels and oak alternative products. Maggie McBride from ***Scott Laboratories***, will join us to explain the use of tannins; Sacrificial, Cellaring and Finishing. There will be wine, of course, and time for questions. Please join us. **First 30 reservations receive a complimentary 10% discount on oak and tannin products that same evening.** Held in the store classroom. Class is on Wednesday, **August 31 from 6:00 -7:30 p.m. Class fee is $10.00**. RSVP's requested.

Want to make great Port Wine?

Now is your opportunity to have instructions and questions answered about the wonderful process of making port wine. Our guest lecture will be given by Pat Taylor, local award winning home winemaker and author of ***Making It Into Port***. **$10.00 fee includes a copy of Pat's book. August 25, from 6:00 -7:30 p.m.** RSVP by calling the store.

Cidermaking tips and tricks for fresh or Hard Cider

Come join Bob Peak for a cidermaking class. Local apples make great sweet cider and with some tips we can help you successfully produce great hard cider, too. Class is on Saturday, **August 13 from 2:00-4:00 p.m. Class fee is $20.00**. RSVP's requested.

Wine Competitions

Our local Harvest Fair Wine Competition

http://www.harvestfair.org for entry forms, late August.

Additional Wine Competition Deadlines

Drop off entries to the store no later than:

Geyserville	*http://amateur-wines.com*	*March 8*
Sonoma/Marin Fair	*http://sonoma-marinfair.org*	*March 30*
California State Fair	*http://www.castatefair.org*	*April 13*
Marin County Fair	*http://www.marinfair.org*	*May 6*
Orange County Fair	*http://www.ocws.org*	*May 28*