ADVANCED WINEMAKING - BASICS FINISHING YOUR WINE

"Finishing the wine does not mean drinking it...."

To winemakers, finishing a wine means terminating the fermentation, flavoring it with oak, aging it in bulk for a few months to a year, clarifying it for bottling, and bottling it. Most of these processes will be discussed below.

I've made many a bottle of wine without any conscious thought about finishing the wine. Given enough time, fermentation simply ends, the yeast die and settle out, the wine clarifies, and I bottle it and label the bottles. There are, however, times when you really do have to think about what is happening and what you want to do with the wine.

Stopping Fermentation

Sometimes you want to stop fermentation while there is still residual sugar in the wine, or you want to sweeten the wine before bottling. You do this because you want a sweeter than dry wine, a dessert wine, or you want to make a Madeira-type aperitif or table wine. Or, perhaps the wine simply refuses to cease fermenting and you wish to bottle it with the certain knowledge that it won't continue fermenting and pop your corks or blow up your bottles. Finally, you may want to stop the fermentation simply because the time is right for you to stop it -- perhaps you are going on vacation or having guests for an extended period. Whatever the reason, stopping a fermentation is as easy as starting one.

All yeast have a point at which the alcohol they produce becomes toxic to them. In other words, they reach a point where they die off of /alcohol toxicity/. When a wine approaches that level, which varies from yeast strain to yeast strain, the yeast begins to feel the toxicity of their own byproducts. A few of their number may survive to produce much higher levels of alcohol over time, but their existence is increasingly precarious and easily interrupted.

The addition of crushed Campden tablets to the wine at this point may be enough to stop the fermentation. The culprit that does in the yeast is sulfite. Each Campden tablet contains one-half gram of sulfite in the form of sodium or potassium metabisulfite. The metabisulfite reacts with the compontents of wine and free sulfur in the form of sulfur dioxide (SO2) gas is created. This gas is both dissolved in the wine and released into the airspace above the wine. The amount of Campden to add to your wine depends on the yeast used and, to some degree, the amount of residual sugar or other nutrients acceptable to the yeast. Each Campden tablet provides approximately 45-55 parts per million (ppm) of free sulfur. Over time, this free sulfur bonds with other reduction compounds or escapes as a gas and is diminished.

Sulfite, by itself, does not actually kill off the yeast. Instead it creates an environment increasingly hostile to yeast and deadly to most other microorganisms such as bacteria. Wine yeasts, however, can be quite tolerant of sulfites. For that reason a stabilizer is also added to the wine.

Potassium sorbate, sold as a chemical or behind a product name such as /Sorbistat K/, is a commercial wine stabilizer that should be used in conjunction with Campden. In other words, it works better /with/ sulfites present than without, and it works better than sulfites alone. Potassium sorbate disrupts the reproductive cycle of yeast. Yeasts present are unable to reproduce and their population slowly diminishes through attrition.

Potassium sorbate is added in the amount of 1/2 teaspoon per gallon of wine. Sorbic acid results and stabilizes the wine. Usually the crushed Campden and potassium sorbate are dissolved in a cup

or two of the wine to be stabilized and stirred thoroughly. Allow the stirred wine to sit a few moments and look for small white lumps of undissolved powder. If present, continue stirring until the wine is clear without any undissolved lumps. This is then added to the larger batch and stirred in well with a sanitized glass rod or wooden dowel.

A few words of caution about potassium sorbate are in order. It /does/ impart a taste to the wine, however slight, and you might want to avoid it if you intend to enter your wine in competition. Also, avoid sorbate if you intend to keep your wines a very long time. The "slight" taste tends to get stronger over time and after several years can be quite disappointing.

Another stabilizer is sodium benzoate, sold as a chemical or as /Stabilizing Tablets/. Its action is much the same as potassium sorbate. One crushed tablet per gallon of wine, added in conjunction with one crushed Campden tablet per gallon, is usually sufficient to stop fermentation. It can be added to the wine at the same time as sweetener and just before bottling, although I recommend allowing the wine to sit for several days after stabilizing to allow any dead or dying yeast to settle out as lees. It is less obnoxious, in my opinion, than potassium sorbate, but it does contain sodium. Use your own judgment.

Finally, a product called /Wine Conditioner/ can be used for simultaneously stabilizing and sweetening a wine. /Wine Conditioner/ is a mixture of potassium metabisulfite, potassium sorbate and non-fermentable sugar. It comes with instuctions.

These figures depend on the amount of residual sugar and other nutrients left in the wine, for even an 18% yeast will die out once its food supply is completely consumed, even if this occurs at 12% alcohol. A treatment of crushed Campden and potassium sorbate or sodium benzoate would then be sufficient to halt fermentation prior to sweetening the wine.

Many winemaking books tell you to stabilize, sweeten to taste, and then bottle your wine. I insert a step in the process--two if required--prior to bottling. I suggest that you stabilize, sweeten to taste, wait 10 days, rack if necessary, and then bottle. The important thing is to wait the 10 days and rack if necessary. The 10-day wait is to allow all dead yeast cells sufficient time to settle out as lees and is usually a sufficient period, although I have seen yeast sediments form as late as two months after stabilization. If you /really/ want to be sure you don't end up with yeast deposits in your bottles, stabilize and then bulk age your wine for 3-4 months. The wine can then be racked one final time or bottled directly off the lees, depending on your racking skill. Certainly it should be racked--actually, /must/ be racked--if you intend to then filter the wine.

Cold Stabilization

Sometimes called chill proofing, cold stabilization is a good method of smoothing out an overly acidic wine. It also aids stabilization and oaking and helps refine wines that possess a "bite."

When fermentation is complete, the wine is racked into a clean secondary and moved into a cold garage, workroom or storage shed, or into a refrigerator, and allowed to age for several weeks to months at temperatures just above freezing. For overly acidic wines, a portion of the tartaric acid will precipitate out as crystals. The wine is later removed from cold storage, racked off the crystals and bottled.

A fermenting wine brought down to very low temperatures and held there for several weeks will stabilize. Some yeasts can tolerate cold better than others, but as the wine approaches its freezing

temperature almost all yeasts will expire. The freezing temperature of wine depends on its alcohol content. A 12% alcohol wine will not freeze until chilled below 25 degrees F., so bringing it down to 32 or 30 or 28 degrees F. for two weeks will not endanger it but will kill off the yeast. However, do /not/ put your wine in a freezer and leave it there as it will undoubtedly freeze solid and break the carboy.

An old refrigerator with shelves removed is perfect for year-round cold stabilization and doesn't take up too much room in the garage, basement or workroom. Adjust the temperature to its lowest setting. If the refrigerator has an internal freezer compartment, remove the divider between the freezer and refrigeration compartments so the temperature in the refrigeration compartment can drop even lower. Your goal is to get the temperature down to 40 degrees F. or lower. Leave one or two shelves in if you make your wine in gallon batches, but never ever try to put a 5-gallon carboy on a refrigerator shelf.

If you do not have an extra refrigerator available, there is a field expedient method of cold stabilization. First treat the wine with potassium sorbate and potassium metabisulfite to prevent further yeast reproduction. Then put the carboy in a plastic garbage can just big enough to leave 2-3 inches of air all around the carboy. Fill that space with ice cubes or crushed ice and sprinkle about ¼ to ½ pound of salt on the ice. Stir the ice a bit with a wooden spoon and then let nature take its course. You may get some ice formation on the insides of the carboy, but it shouldn't grow very thick. It is prudent to mark the wine level on the neck of the carboy before starting. If the wine level rises more than ¼ inch (5 mm), remove the carboy until the inside ice melts and then put it back inside the ice slurry. Add ice and salt as necessary. When the slurry loses its frigidness in a day or two, dump out the water and repeat. You'll have to keep it ice cold for at least two weeks, but this does work.

Oaking With Chips

For oaking, use White Oak or French Oak chips only. Three ounces of chips will treat a 5-gallon carboy. Place the chips in a cloth bag with a couple of marbles and tie it off with string. Sink this in boiling water for about five minutes. This removes any harsh tannins from the wood and sterilizes it and the marbles. Then remove the bag, allow it to drip drain long enough for it to cool down enough to handle, and then work the bag into the mouth of the carboy of wine after racking but before topping up--the oak will displace some of the wine and raise the surface level up to where it should be. Fit the airlock and move the carboy to the cold place or refrigerator. Taste the wine after six weeks. If the flavor is not what you want, continue aging it until it is. This typically takes 2-3 months for French Oak and 3-4 months for American White Oak.

Do /not/ use any other type of oak unless specifically sold for this purpose (for example, I have seen Spanish Oak and Portugese Oak chips advertised for winemaking use). Rack the wine with the bag of chips still in the carboy. It may be a little work getting the bag out later, but if it went in it will come out.

Clarifying Wine

Most wines will clarify on their own given enough time and appropriate rackings, but occasionally one won't. The problem could be a pectin or starch haze, or perhaps a metallic contamination from using copper, zinc, iron, or aluminum utensils. Problems such as these have their own remedies

(see Wine Problems). Sometimes, however, the cause of cloudiness is simply very finely suspended particles of the material from which the wine is made, or it may be excessive tannin or suspended dead yeast cells. These too will clear up over time as the particulates settle out into lees, but perhaps at the cost of adding off-flavors to the wine.

If your wine has not naturally cleared after three rackings 60 days apart, try putting it in a colder place--not necessarily in the refrigerator. A drop of 10° F. will often cause a wine to begin clarifying, but not if the wine was over-heated to begin with. Wine should generally be fermented at 60-70° F. It is from this range that a 10-degree drop will often produce results. If this does not work after 30 days and you have ruled out pectic and starch hazes, give it more time or try a fining agent. A fining agent is a material added to wine that settles by gravity, dragging down with it particulates one wishes to remove from the wine. The addition of a fining agent to the wine will usually clarify it. If it doesn't, something else--most likely a bacteria infestation--is the culprit and you should seriously consider dumping the batch down the drain. Filtering will also clarify many wines, but filtering can definitely alter the taste and character of the wine and for that reason I do not usually recommend filtering.

There are many fining agents--some good and some better. All tend to change the taste of the wine somewhat, even if only slightly, and for that reason you should only use fining agents if you absolutely have to. But before we look at some of the various fining agents available, let's first take a look at how fining agents work.

The purpose of fining is to remove suspended particles from a wine that are causing problems now or could cause problems in the future. Many of the unwanted suspended particles in wine possess either a positive (+) or a negative (-) electrical charge while in a low pH, colloidal state. Therefore, it is possible to precipitate these particles by introducing materials which will have an opposite electrical charge when in the wine. When such particles are introduced, they are attracted to and combine with the oppositely charged suspended particles already in the wine. The result is relatively large and massive combined particles, usually with a neutral charge (the positive and negative charges having cancelled each other), that readily precipitate in the wine and even drag other suspended material with them as they fall. This is the theory, anyway.

The most common positively charged (+) particulate is protein, although some metallic compounds also carry positive charges. Protein is easily removed using negatively charged (-) fining agents such as _tannin_, _yeast_, _bentonite_, and _Kieselsol_. There are, however, numerous negatively charged particulates, including _tannin_, phenolics, anthocyanins, yeast, and bacteria. These are removed using positively charged fining agents such as _gelatin_, _albumin_, _casein_, _Isinglass_, _chitin_ (_/Chitosan/_), and _/Sparkolloid./_ Just a cursory look at these groupings should lead to the realization that red wines, with their natural (or added) tannin, should not suffer from haze caused by proteins, but white wines easily could. This is why commercial white wines are routinely protein stabilized with _bentonite_ fining and red wines are not. Young red wines, when cloudy at all, usually can trace their cloudiness to pectin or a negatively charged particulate.

Both temperature and wine pH affect the fining process. The precipitation of the large, combined particles will be hastened at low temperatures and slowed at warmer temperatures. Thus, if at all possible, wine should be fined in the winter or at least chilled or cooled prior to fining. Secondly, as the pH of a wine increases, the strength of the relative charge of suspended particles decreases. For example, at a high pH, organic protein fining agents may not have enough of a positive charge to sufficiently bind with the negatively charged particulates. Thus, they may actually increase the

turbidity of the wine when it is chilled or warmed. This effect is often called "overfining" and naturally should be avoided. In the case of a high pH wine, _/Sparkolloid/_ (with its pH-independent strong positive charge) should be used.

Now let us look at some of the fining agents, both traditional and modern.

Bentonite is a very fine clay which is readily available from North American winemaking suppliers. It has a negative charge in wine and removes proteins well. It is usually sold as a powder or as coarse but uniform grains or beads, but it can also be sold suspended in a gel.

Bentonite is added according to the need for it. That is not a very precise answer, but let me explain. A dose rate of 1-6 grams per gallon is usually desired. The lesser amount is for wines that are almost clear, but a slight, unsightly haze persists. The greater amount is for wines that have real clarity problems. You have to judge the degree of severity yourself, but do not want to use more than necessary as it will impart an "earthiness" to the wine if over-done. The best thing to do is give the wine plenty of time to clarify on its own. I never add _bentonite_ to a wine that hasn't been given six months and three rackings to clear.

Bentonite must be hydrated before being used. Measure out the desired quantity (say, 2 grams). Pour 3/4 cup of boiling water into a small bowl (for 4 grams of _bentonite_, use 1-1/2 cups of boiling water) and add the _bentonite_. If you do not have a gram scale, one measured teaspoon of _bentonite_ weighs 5.4 grams. Use a small whisk and mix the _bentonite_-water into a slurry. Mix for at least two minutes, working out any lumps that form. You want a creamy consistency. Cover and set aside for 24 hours. Do NOT skip this step! The _bentonite_ will settle, so grab the whisk and whip it into a slurry again.

The wine should be recently racked before adding _bentonite_, as you do not want a lees deposit present when you add the slurry. Sterilize a wooden dowel or glass rod. Remove the airlock from the wine. While slowly adding the _bentonite_, use the dowel or rod to stir the wine. The _bentonite_ has to be thoroughly mixed with the wine to work, so stir well. Clean the mouth of the secondary to remove any _bentonite_ that may have gotten on it and refit the airlock. Keep the wine at room temperature (moving it into a cold garage will cause some of the _bentonite_ to go back into suspension). The _bentonite_ will attract positively-charged particles as it settles out. When the wine is clear, give it another few days and carefully rack it off the _bentonite_ deposits. A treatment should take no more than two weeks. Bottle at once.

Kaolin is a similar clay and is used the same way as _bentonite_. It is difficult to find in the United States, but I have seen it listed in a winemaking supplier's catalog.

Egg white is an excellent fining agent for removing haze caused by excessive tannin. Separate an egg and gently beat the white in a small amount of the unclarified wine. C.J.J. Berry insists that one must add a pinch of salt to the white before beating it. I will certainly not argue with him. Use half the beaten white per 5-gallon carboy. Simply pour the beaten _egg white_ into the wine and stir well with a long sterilized rod. Refit the airlock and set aside for ten days. The wine should clarify. Rack and bottle it at once.

A slightly misty or off-color white wine can often be clarified and decolored using _egg shells_. _Egg shells_ are first cleaned and then dried in an oven. This makes them brittle. They are then easily crushed into very small pieces and these are stirred into the wine. They will slowly sink and over time collect carbon dioxide bubbles absorbed in the wine. These will cause the _egg shell_ particles to rise and eventually leave the captured bubbles at the surface, thereby allowing them to

sink again. This process may go on for some time. These tiny bits of agitated calcium slowly absorb off-colors and drag suspended particles to the bottom. I have found they are better at correcting the color than at clarifying the wine, but they do have an effect and don't seem to change the taste.

Another kitchen remedy for tannic white wines is adding two or three drops of _whole milk_ per gallon of wine. The proteins in the milk precipitate the tannins in the wine and the result is a fine coating of lees.

/Sparkolloid/ is a commercial clarifier widely available in North America. _/Sparkolloid/_ is prepared by hydrating and then boiling. It is sometimes added, along with pectic enzyme, to grape juice prior to fermentation to settle pulp solids and thus contribute to slower fermentations and cleaner-tasting wines. The instructions for its use are supplied with the product.

/PolyClar/ is another commercial product I have used on occasion. It comes in various formulations (_/PolyClar AT/_, _/PolyClar V/_, and _/PolyClar VT/_ [Polyvinylpolypyrrolidone or PVPP]) your supplier can detail for you. It, too, comes with instructions for use.

/Kieselsol/ is a _silica gel_ used instead of _tannin_ for fining white wines. It is often used in combination with _gelatin_, as the _/Kieselsol/_ pulls down the _gelatin_ and removes the threat of overfining.

Isinglass (_/Drifine/_), _casein_ (_Potassium Caseinate_ [_/Kolorfine/_]), and _gelatin_ (both liquid and dry) are all long-used fining agents. These are fairly easy to acquire from North American winemaking suppliers and usually come with instructions for their use. I have used them on occasions--especially _gelatin_--and find that they work well in some instances and not so well in others. However, _gelatin_ is sometimes used after _bentonite_ fining to compact the fluffy lees _bentonite_ is prone to leave.

There are many other fining agents, including _albumin_ and powdered _ox blood_, that I will not delve into. The use of fining agents for the first time may be a little intimidating to some people, but experience demystifies the process considerably.

Degassing Wine

It is not uncommon for wine to absorb carbon dioxide, the gas created as a byproduct of fermentation. This especially tends to occur when fermentation slows to the point that bubbles escape the airlock at a rate slower than one bubble every 15 minutes. The positive pressure of CO2 in the headspace between the wine and the airlock bears equally on the wine and the liquid inside the airlock. Some of that CO2 is simply absorbed into the wine. The result is a wine that fizzes when poured. It may not fizz as much as a sparkling wine, but it greatly detracts from a wine that is supposed to be a still (nonsparkling) wine.

There are several ways to release this gas and return the wine to a true still wine. The simplest way is to simply stir the wine with a wooden dowel or a plastic rod. Stir the wine vigorously for about a minute and then replace the airlock and let the wine settle down for 30-45 minutes. Then repeat the procedure several times until the wine stops giving up CO2 gas. I use a plastic rod used to pull curtains closed. I heated one end of the rod in boiling water for a few minutes, layed the heated end on a wooden cutting board, and gently tapped it with a wooden mallet to flatten the end of it into a narrow "paddle" shape. I sanitize it by standing in upright (paddle-end down) in a 22-inch hydrometer test jar for 5 minutes filled with sulfite solution. I then put the paddle end into the

carboy and attach the other end to an electric drill. This is undoubtedly safer than using a wooden dowel because the plastic cannot absorb bacteria or mold the way the wooden dowel can.

There are several products out there which are essentially a long rod with spring-loaded folding blades at one end. The opposite end is inserted in an electric drill and the blade end inserted into the carboy. The blades unfold inside the carboy and the electric drill is turned on. The propeller-style blades are raised and lowered throughout the body of wine to degasse a greater volume. After 30 seconds or so, the drill is turned off and the rod is withdrawn from the carboy. The airlock is refitted and 30-45 minutes later the procedure is repeated. This procedure works much faster and better than simply stirring with a rod or dowel, but my "paddle" works just fine for me and so I'm staying with it.

A word of caution when using an electric drill. Obviously, you do not want to get the electric cord or the electric motor wet, so be careful. Also, when you first insert the paddle or propeller-type device, tap the trigger a few times for just a couple of seconds to see how much gas is in the wine. If there is a lot, foam will erupt from the mouth of the carboy that -- at worse -- could shoot up into the electric drill before you realize what is happening and electrocute you. Just to be safe, wear heavy duty rubber gloves. At the very least it will be a mess to clean up, and of course will reduce the volume of your wine. Go slowly and be safe -- and don't forget the rubber gloves!

After a wine is degassed, it should sit for a while under airlock to "recover" from the procedure, as degassing a wine tends to "flatten" its taste for a couple of months. After sitting under airlock for the prescribed period, the wine can be bottled.

Filtering

A brilliantly clear wine is more appealling than a cloudy or hazy one. The cloudy or hazy wine may taste fine, but it does not look /finished/. This is why virtually all commercial wines are filtered. Sterile filtration is the ultimate act of clarifying a wine, leaving it sparkling clear,and pleasing to look at and virtually incapable of refermenting.

Filtration removes yeast, bacteria, and grape or fruit debris from the wine. This not only renders the wine instantly clear , it also makes the wine more stable because yeast or bacteria that could feed off residual sugar have been removed. As a result, the amount of SO2 and other chemical preservatives can be reduced.

There is another side to filtering a wine. As wine ages, certain flavor compounds combine and settle out and leave a sediment. This process smoothes the wine's flavor and "bite" and is a desirable thing. Filtration removes these compounds right away, long before they can ever become sediment, but filtering can also remove compounds that give subtle and complex flavors to the wine. Thus, there is a trade-off.

Because filtration removes the small particles in the wine, if there are too many such particles the filter will clog and cease working. Very young or very cloudy wines will clog a filter too quickly to clear much of the wine. A clogged filter surface stops the flow of wine and can shorten the life of a powered pump filter. Therefore, you should only filter a wine that is almost clear already. It should have been racked at least twice, fined and racked again.

In fact, filtering is literally the last thing you should do to your wine before you bottle it. If you are going to cold stabilize your wine, do it before filtering. If you are going to bulk age it, do that

before filtering it. Indeed, you should even add your crushed Campden and potassium sorbate (or sodium benzolate) to the wine before filtering. The Campden is especially important as filtering introduces a certain amount of oxygen into the wine. Because sulfites are antioxidants, their presence during filtration protects the wine from oxidation. You should have at /least/ 50 ppm of sulfite (one crushed Campden tablet per gallon) before filtering.

There are basically three filtration systems. By far the cheapest type is a gravity flow filter. A filter body, containing a filter pad, is connected to the lower end of a siphon tube and the siphoning action pushes the wine through the filter. Wine leaving the filter flows directly into bottles. While inexpensive, this type of system is slow in the beginning and becomes slower still as the filter pads collect dead yeast and other particles from the wine. The second type is a hand pumped filtration system. A hand pump is used to push the wine through the tubing to the filter unit. This is faster than the first type requires two people to operate--one to steady and pump the unit and the other to switch bottles. The third type system is any number of powered pump filtration units. Typically, a powered mechanical pump pushes the wine through a filter or creates a vacuum which pulls the wine through the filter. These units are fast, efficient and much more expensive that the first two type systems.

Almost all filter systems come with three sizes of filter medium. This medium is typically a filter pad, but can also be a cartridge.

The coarsest pads or cartridges, usually called number 1 pads or cartridges, remove very large particles only. Use of this particular filter does not result in brilliantly clear wine and I have never found a reason to use one of them.

The medium pads, usually called number 2 pads, will remove haze-causing particles from red and white wine without stripping too much color and flavor. After a wine has gone through a number 2 pad it will show a significant change in clarity and brightness. Number 2 pads are the ones used for most wines and the only ones to use on red wine. These pads /must/ be used before using a fine (number 3) pad.

Number 3 pads are for /sterile filtering/. One pass through these pads will remove 80% of the yeast cells in the wine and two passes will reduce the yeast population to the point where further fermentation is unlikely. They will leave wine as clear and bright as water. However, these pads are so fine that they are capable of removing both color and flavor compounds from wine. Delicately flavored wine can be ruined, and red wine can be stripped of color and left pink. These pads are used mainly on white wines that contain residual sugar.

Bulk Aging

The biggest mistake the home winemaker makes is bottling his or her wine too early. When fermentation and clarification are complete and no new lees form, the wine is finished except for aging and bottling. Wine ages best in bulk because it takes longer for bulk amounts to be affected by temperature changes than for bottled quantities.

Two things quickly deteriorate the quality of wine. Heat is the first and greatest enemy of wine. Sunlight is the second. Wine ages best in the dark at 50-60° F. A cellar is the best environment because it is cool, dark and subject to the least amount of vibration and temperature fluctuation. Absent a cellar, an interior closet as far from the central heating unit and washer/dryer as possible is the next choice.

Bulk aging is the aging of wine in the secondary container in which it was made and with the airlock in place. This usually means carboys of 6-1/2, 5, 3, 2-1/2, 2, or 1 gallon sizes. The larger sizes are preferred, but I don't know any home winemaker who makes all of his or her wines in 6-1/2 and 5-gallon batches.

Full bodied red wines should be bulk aged for at least a year. Two years is better and three years is ideal. Few people achieve the ideal.

Light red and rose' wines should be bulk aged for at least six months. A year is better.

Full-flavored white wines should be bulk aged for at least six months, but a year is better.

Light, fruity white wines should be bulk aged for at least three months, but six months is even better.

Bulk aging in a carboy has one distinct drawback. You can't make any more wine in that particular carboy until the aging is complete. Even if you have four 5-gallon carboys, having one sitting idle for a year or two aging wine reduces your winemaking capabilities by 25%. Somehow, that seems wasteful.

Many stores sell drinking water in 5-gallon plastic bottles. The water costs $4 or so and the store requires a $6 deposit on the bottle. These bottles are made of food-grade plastic and are ideal for wine undergoing bulk aging. If you use bottled water anyway, this is a pretty good deal. If you're willing to forfeit the deposit, you can acquire 5-gallon aging bottles for only $6 each. Be advised, however, that some people are of the opinion that oxygen can permeate this plastic and oxidize wine thus aged. I have looked in vain for scientific evidence of this and have not yet found it. Use your own judgement.

The only drawback in using the 5-gallon plastic water bottles is that their mouths are bigger than glass carboys and you may not be able to find rubber stoppers big enough to seal them. A number 9½ robber bung fits most of these bottles. However, you may have to trim a thin edge of the top off as it tends to curl inward and prevent the bung from seating. An alternative is to cut a square from a quart-sized zip-lock freezer bag (thicker than the standard sandwich bags) and secure it over the top with a strong rubber band. Be sure to top up to within an inch of the top to reduce the threat of oxidation. Should a malo-lactic fermentation set in during bulk storage, the gas given off will escape under the rubber band but air will not enter the same route. It works well, but be sure to sterilize the plastic covering before putting it on the bottle.

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