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Preface

About This Book

This book was written with the collective body of knowledge of an entire wine making community at the Internet website www.WinePress.US. It reflects hundreds of years of cumulative wine making

knowledge. Some of the community members are new, just starting out with their first batch of wine. Others have decades of experience, and a few even own their own wineries and work commercially. Wine makers at WinePress.US have fermented just about everything from grapes to dandelions. We have used just about every home wine making tool on the market, great and small and have concocted plenty of our own tools, tips, tricks, and advice. Now we want to pass it on to you.

Most books on wine making are written by a single person. Unfortunately, wine making is such a huge field filled with possibilities that we cannot explore it all in a lifetime. Through the experiences of *many* wine makers, we can give you a broader idea of what some of those possibilities are.

Wine is highly subjective. Everyone has their preferences, not only for wine, but also for techniques in making wine. In this book, we will try to give you a well-rounded viewpoint of all the possibilities and let you choose.

Wine making is also rife with "wine making voodoo." Although oenology (the study of wine) is serious science with complex chemistry, there still exists plenty of misinformation in the realm of *home* wine making. This information gets passed on from one person to another and is perpetuated by those who simply don't know any better. We aim to dispel any myths on the subject and give you the straight-up on what works and what doesn't. When people disagree, we'll tell you about that too.

Who This Book Is For

This book was written with both the beginner and the serious amateur in mind. We hope that someone about to make their first batch might enjoy this book, but it contains plenty of information on equipment, process, and technical issues to enlighten even those that have been making wine for many years. At the very least, it presents many viewpoints and up-to-date information on key issues.

This book is not intended for those needing commercial advice or support. It is also not meant to be a textbook for university courses. It hopes to serve the home wine maker who intends to make the best wines possible.

Wine Making 101

Getting Started

Although we will get into more advanced topics later, this section is specifically for those just starting out. If you already have some experience making wine, there is plenty of advanced material in later sections. Still, you might find it helpful to skim these elementary sections for anything you may have missed.

You've decided you want to make wine. Now you need to know what kind. There are actually several ways to get started. Once you have decided, read the rest of the beginner sections and we will get you on your way!

Wine Kits

Many people start with a wine kit which can be purchases through a local wine supply shop or the Internet. This usually includes grape juice concentrates and additional ingredients that have been packaged for distribution. You take the juice home and ferment it, just as if you picked and crushed the grapes yourself (but of course you didn't!). Wine kits have strict instructions and are usually foolproof. You end up with a great tasting wine that's at least as good as what you buy in stores. You also get the satisfaction of having made it yourself.

Using a kit allows you to make grape wine if you live in a part of the country where grapes are not available or at a *time of year* when they are not available.

Wine kits come in vintages and varieties just like real grapes because they *are* real grapes. In addition, they are less expensive than buying wine in the stores and can be ready to drink fairly quickly.

Grape Wine

If you are blessed with accessible grapes where you live, or even own property to grow them on, you might try making the wine directly from the grapes. This gives you control over the entire wine making process. Harvesting, crushing and stemming is a lot of work but equally rewarding as you drink down a glass of your very own wine and say "I made this!" Although grape wine is typically made from vinifera and hybrid wine grapes, wines can also be made from others types such as Concord, Niagara, and Muscadines. If you have local wineries or vineyards in your area, ask if they sell grapes or juice. You might be surprised.

Fruit Wine

Some would say that wine only comes from grapes. But technically, "wine" is fermented *fruit* juice, so non-grape wines are wines too! Note that when we say "fruit wine" in this book, what we really mean is "non-grape wine." You can ferment just about any kind of fruit you can think of, but we also include wine from vegetables, flowers, and spices. Fruit wine is for those looking for something different, although many choose to make it because local produce is less expensive or more easily acquired than wine grapes.

Mead

Mead is wine made from honey. Fermenting nothing but honey and water together makes a wonderful drink. However, as with fruit wines, you can add just about anything to mead. Each type of additive creates its own specially-named type of mead including Melomels (fruit), Pyment (grapes), Cyser (apples), and Metheglins (spices), to name a few.

Bare Essentials

All types of wine making require some fundamental tools, but there are some nice extras and tools that only pertain to certain forms of wine making. To simply get started, you will need the following:

Absolutely Required

- **Primary fermentor ($10)** – Usually a 6 gallon food grade plastic pail with lid for first-stage fermentation. An 8-12 gallon fermentor is recommended if you intend to make batches of 5 or 6 gallons. This allows room for foaming and fruit pulp.
- **Secondary fermentor / Carboy ($25)** – 5 or 6 gallon glass vessel. If you have the choice, get the 6 gallon size for practically the same price.
- **Racking Hose ($4)** – Just a length of clear, food-grade plastic hose used to siphon wine. Usually about 6 feet, but more wouldn't hurt.
- **Airlock and Rubber Stopper ($2)** – Keeps air out of your wine. The airlock goes in the stopper and the stopper goes onto the carboy or fermentor lid.
- **Bottles ($1 ea.)** - You can buy them new by the case or scavenge them for free.

- **Corks ($0.25 ea.)** - You *must* use new wine corks. Do not use old corks or corks meant for crafts.
- **Corker ($25)** – You can't put corks in by hand. $25 will get you a cheap, low-end corker.
- **Wine Yeast ($1)** – Required to ferment anything. You could use bread yeast, but don't.
- **Metabisulfite or Campden Tablets ($2)** – Chemical additive. Prevents oxidation.

TOTAL COST: ~$80

Practically Required

- **Racking Cane ($10)** – Hard plastic end piece that attaches to the racking hose. An *AutoSiphon* is especially convenient.
- **Hydrometer ($8)** – A tool used to measure sugar levels in wine. You can try to wing it, but you shouldn't.
- **Bottling wand ($5)** – A bottle filler with a spring-loaded tip. Attaches to a racking hose.
- **Long Stirring Spoon ($3)** – For stirring the wine in the primary. Get plastic if possible. Use a racking cane in a pinch.

RUNNING TOTAL COST: ~$100

Nice To Have

- **Floor Corker ($70)** – The only people who wouldn't recommend one are the ones that haven't tried one. Trust us.
- **Acid Test Kit ($10)** – Measures acid levels in wine. Especially useful for making fruit wines.
- **Mesh Bag ($8)** – Contains fruit pulp during fermentation. Most useful for fruit wines.
- **"Fermometer" ($4)** – Stick-on thermometer for your carboy.
- **Wine Thief ($10)** – Used to sample your wine. A turkey baster works in a pinch.
- **Scale ($10)** – For weighing fruit, honey, sugar, or grapes.

RUNNING TOTAL COST: ~$200

There are plenty of ways to cut corners when buying equipment. The easiest way is to get hardware used. Fortunately for you, people will buy up wine or beer making supplies, use them once, and decide they don't have the time or interest to do it again. You can snag these used supplies at a big discount from local newspaper or Internet listings. Some wine and beer supply shops sell dedicated starter kits that already contain all the required supplies you will need. If you have a local shop, talk to the shop owner. Most are avid wine and beer makers themselves and would be more than happy to help you with whatever you are making. If you are not close to a shop, you might try any of the various Internet stores listed in the suppliers section of this book.

You will also need something to ferment, of course! Depending on what you want, this could get expensive or could be absolutely free. If you already have something readily available, it will obviously be cheaper for you to pick your own fruit or grow your own grapes. But if you are counting costs, make sure you price whatever it is that you plan on fermenting and add that into your budget.

The good news about wine making hardware is that most of it is a one-time investment. Once you have it, you can continue to make wine very cheaply every year.

Wine Making Crash Course

Wine is the product of two basic ingredients: yeast and sugar. Yeast, a single-celled type of fungus, consumes sugar and expels carbon dioxide and alcohol as byproducts. The gas is vented out and what is left is an interesting drink that gives you a buzz.

Notice that all four types of wine making involve liquids with sugar in them: kits and grape wine naturally contain sugar in the grape juice. Fruit juices have sugar in them too, although more is often added. Mead is made from honey which is mostly sugar as well. Since all that is basically required to make alcohol is yeast and sugar, you could theoretically ferment plain sugar water (but please don't).

Most forms of wine making start in a primary fermentor (usually a plastic bucket). In this phase, the yeast is introduced to your wine (called *must* at this prototypical, non-alcoholic stage). There is a 12 to 24 hour period in which the yeast absorb nutrients and multiply like crazy. They eventually colonize your must and start devouring sugar wherever they can find it. What you will see is a foamy froth in the bucket accompanied by a crackling, fizzy sound and a bubbling airlock.

After about a week or two of this rather entertaining phase in the life of your wine, it is *racked*, or siphoned, into a *carboy* (secondary fermentor) . Here it slows down to a quiet and comfortable pace. Wines will typically continue to ferment for several days or weeks, getting increasingly slower as the alcohol level gets higher. Exactly how long depends on what you are fermenting and how.

Eventually, you will meet one of two conditions: your little yeasts will run out of food (sugar) and will revert to dormant-mode, or they will die from the excessive level of alcohol in the wine. In essence, they die from swimming around in their own filth. But what's bad for yeast is good for you in this case. Either way, you end up with a beverage containing approximately 10-14% alcohol.

After the fermentation completely stops, the wine is usually racked off of the dead yeast and into a clean carboy. Here it is allowed to sit undisturbed as it clears. Wine entering this phase is usually very cloudy and hazy but will eventually drop crystal clear in a few months time.

After the wine clears it is basically ready for bottling. The wine is stabilized and bottled. If you can resist, let the bottles rest and age for a good solid six months before opening.

As you can see, it takes six months just to make wine and another six months for it to minimally age. While different types of wine making take more or less time and aging, you can already see that this is not a hobby for the impatient. There are no “quick” wines. If you want alcohol sooner than that, you can try your hand at making beer or take a trip to the local liquor store. Waiting patiently is just as much a part of making wine as are grapes, barrels, and bottles. *Wine is made from patience*.

Legality and Safety Issues

Common questions that beginners ask are “Is this legal?” and “Will I go blind?” or “Will this stuff explode?”

Making your own wine is completely legal in the United States. Federal law states that you can make up to 100 gallons by yourself and up to 200 gallons if you live in a household with two or more adults. After that, you are considered a “winery” and require expensive licensing. Please note that there *are*

laws against selling, shipping, and distilling wine. And, of course, minors may not legally drink or possess any form of alcohol. Local jurisdictions may have their own specific laws which you should consult if in doubt.

Wine making is a very conservative and safe hobby. Stories you hear about people drinking their own backwoods moonshine and going blind might be exaggerated, but you might be interested in knowing where these stories come from.

The natural fermentation process produces consumable alcohol known as *ethanol*. (A bit of trivia for you: this is the same stuff that is added to gasoline for cars). There is a similar alcohol known as *methanol* which is an optical nerve poison and really can make you go blind. Rubbing alcohol, for instance, contains methanol and you should never drink it or add it to a drink. Methanol is not produced in natural fermentation processes in any significant quantity (you would have to drink about 80 gallons of wine in one sitting to get any effect). What little is produced is easily metabolized by your body. However, it can by concentrated through poor distillation practices. Home distillation in the U.S. is illegal, regardless. Please stay on the safe side and stick to making naturally fermented beverages.

"Will this stuff explode?" No, unless you are *especially* careless. If you put actively fermenting wine under pressure, you can create a small-scale bomb. But wine is always kept under an airlock which lets gas escape and keeps pressure normalized. Follow the directions in this book and you will not have any of these sorts of issues.

A Serious Word On Alcoholism

Alcohol has harmed the lives of many people, either through over-drinking or by the actions of someone else who drank too much. Please drink in moderation and remember that what is "moderate" for you may not be for someone else. If you offer someone else a drink or encourage them to taste your creations, make sure you ask if it is okay first. This applies in your own home and when giving wine as a gift. You certainly would not want to be responsible for encouraging someone's weakness for alcohol. If they mention that they used to be an alcoholic or are "trying to cut back," that's a clear signal for you to reach for the non-alcoholic drinks instead. If they need to drive home soon, stay on the safe side and do not offer *any* alcohol.

Beginner's Wine Making Terms

There are some terms in wine making you should be familiar with before you start. We'll remind you of what they are as we go along, but here are a few to get started:

- **Fermentor** – The vessel the wine is contained in. This is probably a plastic bucket or a glass carboy.
- **Carboy** – A large glass container. Generally comes in 1, 3, 5, 6, 7, and 12 gallon sizes.
- **Primary** – This term can either refer to the primary phase of fermentation (which lasts for about a week or two), or to the bucket or container that the primary fermentation takes place in.
- **Secondary** - This term can either refer to the secondary phase of fermentation (which lasts for 4-12 weeks), or to the carboy that the secondary fermentation takes place in.
- **Lees** – Spent or dead yeast cells. These usually fall out of suspension and build up on the bottom of the fermentor. The lees that falls out in the primary fermentation is known as *gross lees* and may contains fruit pulp, skins, and seeds. *Fine lees* is the what falls out of suspension during the later clearing process.
- **Racking** – Siphoning the clean wine off of the lees and pulp that builds up at the bottom of the fermentor.

- **Must** – The name for your wine before it has any significant level of alcohol in it. A fermenting wine.
- **Rehydration** – A process to acclimate your yeast to a new, wet environment. Yeast that do not get properly rehydrated often suffer loss of viability.
- **Pitching** – Adding your rehydrated yeast or yeast culture to the must. Usually, it simply involves pouring the mixture in and no more.
- **Sulfite** – Potassium or sodium metabisulfite. A chemical to prevent oxidation and to stun or kill wild yeasts and microbes. "Sulfite" is a loose term used to refer to potassium or sodium metabisulfite powder, Campden tablets, and other chemical additives which serve the same purpose.
- **Specific Gravity** – The density of a liquid as compared to water. Water has a specific gravity of 1.0. Usually, this indicates the level of sugar in the must.
- **Acid** – Usually this refers to Total Acidity, responsible for giving wine a tartness. The primary acid in grape musts that is responsible for most of the "bite" is Tartaric Acid.
- **Tannin** – Astringent, bitter elements which help balance acid and sweetness. Tannin helps wine age.

Taking Notes

Our final bit of wisdom before you begin: s*tart taking notes now!* The novice wine maker is often in a hurry for results and is more concerned with the finished product than the process. In this haste, there is usually little or no information recorded about the wine or the process of making it. Taking notes is a vital wine making practice. Without it, it will be difficult to repeat your successes and avoid your past mistakes.

Be sure to record as much information as you can about your wine including the dates you started, racked, and bottled the wine, the levels of sugar, acid, pH, SO_2, lists of ingredients and where you got them, yeast selection, recipes, and any special techniques you used in the process. Also record temperature, notes on fermentation speed, smell, taste, looks, any fining agents used, types of cork you bottled with, problems you encountered, and *any* other bits of information you can think of. If you create something wonderful, it will be even *more* wonderful if you can do it again next year!

Walkthroughs

Here we present a series of beginner "walkthroughs," step-by-step instructions to make a simple wine from either grapes, fruit, or honey. These walkthroughs are not meant to explain every detail of the wine making process, but should be enough to get a beginner up and running with a good overview of how wine making works. We will explain terms and techniques so that you can understand not only what to do, but *why* you are doing it. Later chapters in this book will assume you know most of these basic things. If you wish to be a rebel and make something more advanced without making the wines explained here first (which is fine by us!), at least read through the material.

Note that we intentionally left a kit wine walkthrough off the list because most kit wines come with detailed instructions of their own. You will find additional information on selecting and modifying wine kits in the Making Kit Wines section later on.

Grape Wine

For this walkthrough, you will need approximately 100 pounds of red or white wine grapes for a 5-

gallon batch or about 18 pounds for a 1-gallon batch. If you intend to make a 5 gallon batch of red wine, we strongly encourage you to buy an 8-12 gallon fermentor, or even two. A 6-gallon pail will be too small to contain all the grape skins and pulp. You might also consider splitting it between two 6-gallon fermentors. As a very basic rule of thumb, you want the fermentor no more than half full. This gives you room for expansion, floating pulp, and room to stir.

We are assuming the grapes will be fresh from the vineyard, but in case you have a frozen pail of juice shipped in, let it sit out in a warm place to thaw. For a 5-gallon pail, this might take two days. Do not artificially heat the juice to make it thaw faster. Do not thaw it in the refrigerator either.

The process of making wine differs depending on what variety of grape you have (red or white) and how you want to treat it. We have addressed both reds and whites in this walkthrough. For more details on the techniques in making grape wines, please see the section on Grape Wines later in the book.

Everything you need to make a proper grape wine was listed in the Bare Essentials section under Absolutely Required with a few exceptions: You need a wine press, crusher, and malolactic bacterial culture if you want to use it. If you intend on making red wine, plan to use the malolactic culture. You are not required to, but it enables malolactic fermentation which softens acids in the wine and makes it more drinkable.

For yeast, we recommend using *Pasteur Red* for red wines and *EC-1118* or *Premier Cuvée* for white wines. All of these should give you a vigorous fermentation and a dry finish.

Let's first outline a few steps that are common to both reds and whites. Understand these steps before you actually start on Day One's instructions.

Crushing and Destemming

Regardless of whether you have red or white grapes, they need to be destemmed and crushed. Crushing and destemming grapes usually requires machinery. When most people think of crushing grapes, they think of *stomping* grapes; Ladies in hiked-up skirts treading grapes in a large vat... that sort of thing. While you are more than welcomed to do this, most people use a crusher/destemmer machine or even a home-made pestle of some sort.

If you have a machine available to use, do so. If not, be prepared for some hard work! You may individually remove stems from each cluster of grapes and crush them either with your hand, with your (very sanitized) feet, or with a potato masher or equivalent instrument. It may be helpful to place a small amount of berries in a bucket or bowl, crush them, then add them to a larger primary fermentor.

Pressing

If you have a local wine or beer supply shop, they often rent out use of larger equipment like crushers, destemmers, and presses. Use a proper wine press for pressing the juice from the grapes. Just throw them in there and press down, but be careful not to *over* press them. Too much pressure may break open grape seeds which add bitter, undesirable flavors. If you do not have a wine press, you can make some attempt to use a nylon mesh bag or equivalent straining tool. It will definitely be more frustrating and you won't get as much juice, but it can be done. If you don't have a press, use more grapes than the recommended batch size because you can count on not getting as much juice back from the pressing.

Sterilizing

You can do this by mixing 10 crushed Campden tablets in ½ gallon of water. Stir to dissolve and keep this mixture around for future sterilizing, perhaps in a gallon jug or bottle with a cap. Using a sponge, wipe down all you equipment or flush them with the sterilizer solution. You do not have to let

equipment dry before using it. This is how you should treat all of your wine making equipment from now on.

Day 1

First, *wash and sanitize everything.* Make sure your primary fermentation bucket, lid, airlock, and rubber stopper are all clean, well rinsed, and odorless. If applicable, also your crusher, destemmer, and press equipment as well.

White Wine:

Starting a white wine is easy. All you have to do is crush the grapes and press the juice out. You will be fermenting the juice by itself.

Now remove all the stems and crush all of the grapes. After crushing, you will want to move directly to pressing. You need to crush the grapes before pressing to make sure all the berries are opened and all the juice is liberated. Press all of the juice out of the grapes and put the juice into your primary fermentor. The solids can be discarded immediately.

Red Wine:

Red wines ferment on the pulp and skins, so you simply want to destem and crush the berries and throw the resulting slurry into your primary fermentor. *Make sure your fermentor is at least twice the volume you intend to ferment.* Seriously! Skins, pulp, seeds, and lots of subsequent foam will take up a lot of space. The offing of gases will push all the solids up out of the liquid and take up even more space.

Red and White:

Next add crushed Campden tablets. Crushing tablets is made easier with two spoons placed together. Add one tablet per gallon of wine must. The Campden tablet contains *potassium metabisulfite* and some filler material. This chemical and the tablet itself are often referred to as “sulfite,” “meta,” or “K-Meta,” interchangeably. It is used to control oxidation and to suppress microbes that might be in the must.

If you have a hydrometer (and you really, *really* should), take a measurement of your wine must. Be careful to measure only clear juice. Strain out any solids if needed. Record your measurement for later. *If you don't take this measurement now, you won't be able to calculate your wine's final alcohol level!*

Add the yeast. Although you can get away with simply dumping the packet in the juice, you will get better results by properly *rehydrating* them. To make this simple, take a small jar (preferably with a screw-top lid) and add one half cup of very warm water to it. Manufacturers recommend this water be about 104° F. This is important, so use a thermometer if you have one. Otherwise, make a lucky guess! Mix the yeast packet in with warm water and let it sit for about 15 minutes with the lid loosened to allow for any escaping gas. Swirl the mixture around to make sure the yeast have dissolved into the water and *pitch* the whole works into your must. “Pitching” is a term for adding the yeast culture to the must. It really is a pitch. Just pour the liquid into the bucket. Don't shake, stir, or do any other sort of hocus-pocus.

Put a lid on your fermentor and insert the bung and airlock with water filled to the marked level. Place the fermentor in an undisturbed area at room temperature (favor slightly colder for white wines and slightly warmer for reds).

Day 2

If your yeast took to its new home, you will notice your airlock bubble every few seconds, assuming your fermentor lid is closed tightly. It's okay to peek inside the bucket if you want. At this early stage, the yeast actually needs air. Later on, you'll want to keep the fermentor closed if you can resist. You will (hopefully) notice inside that your “juice” has now gotten a bit of froth on top. This is good! It means the yeast is eating the sugar and expelling gas which in turn creates the bubbles. This also means that (...drum roll...) it's making alcohol! Take a whiff and you will probably smell the alcohol too, even at this early stage.

Your main task during the primary fermentation is to stir the wine once or twice a day. For red wines, you need to “punch down the cap.” Once fermentation begins, the fruit pulp and skins start to float to the top and they form a “fruit pancake.” The force of the fermentation will actually raise the fruit pulp out of the liquid and it will eventually dry out or even get moldy. By stirring it back into the liquid on a regular basis, you keep it wet. Keeping the solids in contact with the liquid helps extract the flavor and the color too.

Day Seven

By now, the bulk of the sugar in the must has been converted to alcohol (about 2/3 of it or more,). Your “must” can now properly be called “wine,” although it probably tastes awful.

Red Wine:

Before red wine goes from primary to secondary, it gets pressed. (If you do not have a grape press you will have to make due with mesh bags and a colander). First sanitize your secondary fermentor, wine press (or substitute tools), and any other needed tools.

Using a large bowl or “scooper” of some sort, start scooping out the must and pouring it into the wine press, preferably lined with a mesh beg . When it is mostly full, press the solids and discard. Repeat until you have pressed out most of the must. Leave the seeds and dead yeast (called the *gross lees*) at the bottom. Don't try to press it.

After everything is pressed out, the must should go into your secondary fermentor (your glass carboy). Sometimes you can have the wine draining off the wine press flow into a carboy. Be sure to use a funnel! Fill your carboy to within about five inches of the top. You need to allow room for further foaming and a rubber stopper.

White Wine:

White wines don't need pressing (you did that already). It is now time to rack your wine into the secondary fermentor (usually a glass carboy). Sanitize it along with all your racking equipment. Take a moment to read the section of this book called “Racking” for some tips and then come back (the best tip is to *practice first!*). When all your tools are sanitized, place your wine on a counter top taking care not to disturb the sediment on the bottom, and place your sanitized carboy on the floor.

Put one end of your racking hose in the wine and give the other end a good suck. Pinch the hose just before the wine reaches your mouth, drop it into the carboy and let go. Wine should start to flow from the primary into the secondary. The point of this exercise is to get the good wine off the *lees*, the dead yeast and dregs at the bottom of the wine. As the wine flows through the hose, be careful not to suck up too much lees from the bottom. Grab as much of the good wine as possible.

Fill your carboy to within about five inches of the top. You need to allow room for further foaming and a rubber stopper.

Red and White:

Re-sanitize your airlock and stopper, wipe the rim of the carboy with a clean paper towel, and insert the airlock into the jug. Clean up your primary fermentor and all your racking or press equipment immediately and thoroughly. Never let it sit long enough to get sticky, or worse, *dry*. It will only make your cleaning job harder later on. Cleaning is a large part of making wine, so get used to it!

Your wine is now in secondary fermentation! This is about at busy as wine making gets. You'll be bored for the next month or so as the wine slowly ferments dry. You should see bubbles racing up the neck of the carboy and the airlock steadily letting out bubbles every few seconds.

From here on, the yeast will start to slow down and will stop producing large amounts of CO_2 that until now has helped protect it from oxygen in the air. Oxygen is the main issue facing wine makers. Keep your wine away from air at all costs.

1 Month Later

The bubbles in the airlock should be getting pretty slow by now, perhaps even completely stopped. It is now time rack again. The pile of sediment on the bottom will eventually produce bitter, off-flavors in your wine if you let it decompose down there.

If you have two carboys, you can simply rack from one to the other. If not, you can use the poor-man's approach: Sanitize your original primary fermentor and rack into that. Quickly clean out the carboy your wine was just in and rack from the primary bucket *back* into the carboy. While this works, it exposes your wine to a lot more oxygen than the two-carboy approach.

Your wine is now in its last steps in the fermentation process. Fermentation does not continue at a constant speed. Towards the end it gets very slow. Put the airlock back on with new water in it, put the carboy away, and forget about it for three months.

3 Months Later

Guess what? It's time to rack again! Your wine should be finished fermenting by now. There should be a new layer of lees at the bottom. Rack one more time, apply airlock, and put it back where you got it.

Although your wine is probably done fermenting by now (if you kept it warm), it will most likely still be cloudy. Wine in a carboy should be *crystal clear.* If it isn't you need to let it clear on its own. All those microscopic bits of flotsam in the wine will eventually settle out over time. All you can do it wait.

3 More Months Later

Your wine should now be done fermenting and be clear as a bell. Time to bottle! (In the unlikely event that the wine is cloudy, consult the “Fining and Filtering” section of this book). Rack your wine off any sediment left over in the carboy and head on over to the section on Bottling. We don't know what kind of equipment you decided to buy, so you'll learn more about equipment, corks, and techniques in that section. In the six months it took to make this stuff, you should have had plenty of time to read it!

Bottle your wine and keep them upright for at least 24 hours to allow the corks to properly “set.” After this, lay the bottles down on their sides for at least 3-6 months before you drink it. We know that as a beginner you probably won't be able to wait that long, so we'll forgive you if you raid a few bottles before that time. But remember: one gallon of wine makes only five standard sized bottles. If you drink them all, you won't know how it tastes with some aging (considerably different). So you can either refrain from drinking it, or make a bigger batch next time!

And there you have it: your first grape wine. Feel free to read more in-depth sections of this book covering other aspects of wine making. There is much more to learn!

Fruit Wine

We are going to start with a simple apple juice recipe. This should allow you to make a crisp, dry, full-bodied apple wine without the fuss of picking, coring, crushing, or juicing apples of your own. Of course, if you like that sort of thing, we have recipes for that too, but this *is* the beginner's section. Because we will be working with purchased juice, this recipe should be fairly consistent and repeatable.

Before we start, you will need a few things not previously mentioned.

- As this is a 1-gallon recipe, you will need a 1-gallon glass jug to use as the carboy. Your primary fermentor can be up to a 6-gallon food-grade plastic pail with a lid. The extra head space will not harm your wine.
- You will need some simple wine additives which can be purchased from a beer or wine making store for very little money. Namely: *Acid Blend*, *Pectic Enzyme*, *Campden tablets*, and *Wine Tannin* (or "Grape Tannin").
- We suggest getting a *hydrometer* to measure the sugar level. This tool is optional but highly recommended.
- While you can use any kind of wine yeast, we are recommending you use Lalvin *EC-1118* or RedStar *Premier Cuvée* (which in reality are pretty much the same thing). Both of these will ferment to dryness and will leave a light, crisp wine that is easy to drink and enjoy. These types of yeast are also strong and vigorous fermentors and are basically foolproof.

Recipe Ingredients

- 1 Gallon Apple Juice (Preferably organic. Must contain no preservatives or sulfites)
- 1 lb. Table Sugar
- 1-½ tsp. Acid Blend
- ¼ tsp Tannin
- ½ tsp Yeast Nutrient
- ½ tsp. Pectic Enzyme
- 1 Campden Tablet
- 1 Packet Wine Yeast: Lalvin *EC-1118* or RedStar *Premier Cuvée*

Recipe Notes

The apple juice can be purchased in a jug from a grocery or health foods store. If you are really lucky, you can get it in a glass container and use *that* as the carboy! You could also use apple juice concentrate, but you will be using whole, pressed apple juice for this recipe.

The kind of sugar that fruit wine makers use is just plain, ordinary table sugar. Do not use brown sugar, sugar-free substitutes, or any other kind of sweeteners. *Plain old table sugar.* Got it?

Acid Blend is an ingredient that is a blend of Malic Acid, Citric Acid, and Tartaric Acid. You don't need to know what the individual acids do, but understand that acid in wine produces that zingy, tingly sensation on the tongue. Wines low in acid taste "flat" or "flabby".

Pectic Enzyme breaks down *pectin*, a substance found in the cell walls of fruits and plants. It's what makes jams and jellies what they are. For wine makers, the problem is that pectin often forms a haze or cloud and make clearing the wine difficult. Pectic Enzyme breaks down the pectin to allow the wine to clear. Since pectin is found in cell walls, the enzyme also helps in breaking down the fruit itself and allows for a better overall juice extraction.

Tannin is a component that is found naturally in grapes and other plants, usually in the woody parts like stems, and seeds. It gives wine an astringency or bitterness to compliment the other flavors. Imagine a cup of strong, unsweetened black tea. That mouth-drying, face-wrinkling effect is what tannin does in large quantities. Properly balanced, it gives wine a better mouth feel and helps it age gracefully..

Yeast Nutrients are vitamins and minerals to promote healthy fermentation. They come in a lot of forms, but you can usually use a proprietary blend like *Go-Ferm, Fermaid,* or *Superfood* for best results. You can also get vitamins like *Biotin* and nitrogen sources like *Diamonnium Phosphate* ("DAP") .

The Campden tablet contains *potassium metabisulfite* and some filler material. This chemical and the tablet itself are often referred to as "sulfite," "meta," or "K-Meta," interchangeably. It is used to control oxidation and to suppress microbes that might be in the fruit juice. Even though the juice you will be using for this recipe is probably pasteurized, it is a standard practice for fruit wines. Apples and their juice are especially prone to oxidation. Other fruit wines you may make in the future could contain whole fruit you pick, which carry all manner of microscopic organisms.

Directions

Day 1

First, *wash and sanitize everything.* You can do this by mixing 10 crushed Campden tablets in ½ gallon of water. Stir to dissolve and keep this around for future sterilizing, perhaps in a gallon jug or bottle with a cap. Using a sponge or rag, wipe down all you equipment or flush them with the sterilizer solution. Make sure your primary fermentation bucket, lid, airlock, and rubber stopper are all clean, well rinsed, and odorless. You do not have to let them dry. This is how you should treat all of your wine making equipment from now on.

Pour the apple juice into the primary fermentation bucket and also add one crushed Campden tablet. You can crush one up easily by using two spoons or a pill crusher. Next, measure out all of the remaining ingredients, excluding the yeast, and add that to the *must* (the name for the juice before it becomes wine).

When adding sugar to a fruit wine recipe, it is often by weight. However, this does not take into account the amount of sugar already in the fruit or juice itself. Although you can simply add the sugar according to the recipe, *we highly recommend you use a hydrometer* to add sugar up to a certain *specific gravity* (the density of the liquid). If you don't want to mess with a hydrometer (or don't have one), just add the sugar and be done with it. But be warned: it may be difficult to repeat this recipe if you don't take measurements and notes. If you want to try this, read the section on How To Use A Hydrometer and add sugar, stirring until completely dissolved, until the must reaches a specific gravity of 1.100 (about 14% potential alcohol).

If you have a hydrometer (and you should), take a measurement of your wine must. Record your measurement for later. This will tell you how much alcohol is in your finished wine.

Put the airlock filled with water to the necessary level (often indicated on the airlock) into the rubber stopper (also known as a *bung*), put the rubber stopper in the lid, and then put the lid on the bucket. (If your bucket's lid does not have a whole drilled in it to accept a rubber stopper, you'll have to make one with a drill bit, a really sharp knife, or a Dremel-like tool).

Everything should now be in the primary fermentation bucket except for the yeast. Although you can get away with simply sprinkling the packet into the juice, you will get better, faster results by properly *rehydrating* it. To make this simple, take a small jar (preferably with a screw-top lid) and add one half cup of very warm water to it. Manufacturers recommend this water be about 104° F. This is important,

so use a thermometer if you have one. Otherwise, make a lucky guess! Mix the yeast packet in with the warm water and let it sit for about 15 minutes with the lid loosened to allow for any escaping CO_2 created by the fermentation. Swirl the mixture around to make sure the yeast have dissolved into the water and *pitch* the whole works into your must. “Pitching” is a term for adding the yeast culture to the must. It really is a pitch. Just pour the liquid into the bucket. Don't shake, stir, or do any other sort of hocus-pocus.

Now put the lid with airlock back on and put the fermentor in a warm, out of the way place. Yeast likes the same temperature environment that you do, so it's best to get your wine started in a warm part of the house. 65°-80° F works well, with basic room temperature being ideal.

Now sit back and relax. You wine won't do much for the next 12-24 hours or so.

Day 2

If your yeast took to its new home, you will notice your airlock bubble every few seconds, assuming your fermentor lid is closed tightly. It's okay to peek inside the bucket if you want. At this early stage, the yeast actually need oxygen. You will (hopefully) notice inside that your “juice” has now gotten a bit of froth on top. This is good! It means the yeast is eating the sugar and expelling gas which in turn creates the bubbles. This also means that (...drum roll...) it's making alcohol! Take a whiff and you will probably smell the alcohol too, even at this early stage.

This is all very exciting, especially if it's your first time, but there isn't much to be done at this point. Just sit back and watch that airlock bubble its little heart out for about a week.

Day 7

By now, the bulk of the sugar in the must has been converted to alcohol (about 2/3 of it). Your “must” can now be properly called “wine,” although it probably tastes awful. From here on, the yeast will start to slow down and will stop producing large amounts of CO_2 that until now has helped protect it from oxygen in the air. Oxygen is the main issue facing wine makers. Keep your wine away from air at all costs after the primary fermentation.

It is now time to rack your wine into the secondary fermentor. Your “secondary” is a glass jug for this recipe. Wine makers refer to this bit of equipment as a *carboy*. First, sanitize it along with all your racking equipment (hose, cane, etc.). Take a moment to read the section of this book called “Racking” for some tips and come back (the best tip is to *practice first!*). When all your tools are sanitized, place your wine on a counter top taking care not to disturb the sediment on the bottom, and place your sanitized glass carboy on the floor.

Put one end of your racking hose in the wine and give the other end a good suck. Pinch the hose just before the wine reaches your mouth, drop it into the jug and let go. Wine should start to flow from the primary into the secondary. The point of this exercise is to get the good wine off the *lees*, the dead yeast and dregs at the bottom of the wine. As the wine flows through the hose, be careful not to suck up the lees. Grab as much of the good wine as possible.

Fill your carboy up to about 2-3 inches below the top. You need to allow room for further foaming and a rubber stopper. If you have excess liquid, you can probably throw it away. There won't be enough to make it worth saving.

Re-sanitize your airlock and stopper, wipe the rim of the carboy with a clean paper towel dipped in clean sanitizing solution, and insert the airlock into the jug. Clean up your primary fermentor and all your racking equipment immediately and thoroughly. Never let it sit long enough to get sticky, or worse, *dry*. It will only make your cleaning job harder later on. Cleaning is a large part of making wine, so get used to it!

Your wine is now racked and in secondary fermentation! You will probably be bored for the next month or so as the wine slowly ferments. You should see bubbles racing up the neck of the carboy and the airlock steadily letting out bubbles every few seconds.

One Month Later

The bubbles in the airlock should be getting pretty slow by now, perhaps even completely stopped. It is now time rack again. The pile of sediment on the bottom will eventually produce bitter, off-flavors in your wine if you let it decompose down there.

Repeat the racking procedures from last step. If you have two 1-gallon jugs, you can simply rack from one to the other. If not, you can use the poor-man's approach: Sanitize your original primary fermentor and rack into that. Quickly clean out the carboy your wine was just in and rack from the primary bucket *back* into the carboy. While this works, it exposes your wine to a lot more oxygen than the two-carboy approach.

Although your wine is now in its last steps in the fermentation process, it may take quite a while to completely finish up. Fermentation does not continue at a constant speed. Towards the end it gets very slow, especially so with some types of fruit. Put the airlock back on with new water in it, put the carboy away, and forget about it for three months.

3 Months Later

Guess what? It's time to rack again! Your wine should be about finished fermenting by now. There should be a new layer of sediment at the bottom. Rack one more time, apply airlock, and put it back where you got it.

Although your wine is probably done fermenting by now (if you kept it warm), it will most likely still be cloudy. Wine in a carboy should be *crystal clear* before it is bottled. If it isn't, you need to let it clear on its own. All those microscopic bits of flotsam in the wine will eventually settle out over time. All you can do it wait.

3 More Months Later

Your wine is now done fermenting and should be clear as a bell. Time to bottle! (In the unlikely event that the wine is cloudy, consult the “Fining and Filtering” section of this book). Rack your wine off any sediment left over in the carboy and head on over to the section on Bottling. We don't know what kind of equipment you decided to buy, so you'll learn more about equipment, corks, and technique in that section. In the six months it took to make this stuff, you should have had plenty of time to read it!

Bottle your wine and keep the bottles upright for at least 24 hours to allow the corks to properly “set.” After this, lay the bottles down on their sides for at least 3-6 months before you drink it. We know that as a beginner you probably won't be able to wait that long, so we'll forgive you if you raid a few bottles before that time. But remember: one gallon of wine makes only 5 standard sized bottles. If you drink them all, you won't know how it tastes with some aging (considerably different). So you can either refrain from drinking it, or make a bigger batch next time!

And there you have it: your first fruit wine. Feel free to read more in-depth sections of this book covering other aspects of fruit wine making now that you know the basics. Also read the many recipes for fruit wines. The sky's the limit!

Mead

Like fruit wines, the possibilities with mead are endless. Mead made by just fermenting honey on its

own is called “show mead”, but adding fruits, spices, grains, or other flavors to it creates more specialized drinks, all of which come with their own terminology. It all falls under the umbrella of “mead,” however. Since honey is the fundamental building block of all meads, we are going to make a basic show mead. Because those who are new to wine making often prefer a sweeter drink that *tastes* more like your mind's idea of a “honey wine,” we are going to make a *sweet* show mead. These are drinkable a bit earlier than more complex meads. It is recommended that you age this mead 6 months in the bottle before opening, but preferably more for a “good” mead.

Recipe Ingredients

- 3 lbs Fresh Honey
- ¾ tsp Yeast Energizer (Superfood), split into 3 roughly equal amounts
- ½ tsp Yeast Nutrient (Diammonium Phosphate), split into 3 roughly equal amounts
- 1 Packet Wine Yeast: 71B-1122

Recipe Notes

You can ferment any kind of honey, but honey is the key ingredient and has the most impact on the flavor of a mead. If you can find fresh, varietal honeys like orange blossom or raspberry, you will get a deeper, more intense flavor than using clover honey. Inside tip: “wildflower” or “clover” honey is an umbrella term that basically means “generic.” It is made from a variety of floral sources, so you really don't know what you are getting when you buy these honeys. By contrast, varietal honeys must by law contain a majority portion of *actual* varietal honey. This doesn't mean that they are necessarily bad. Some “wildflower” honey makes very good mead. Taste before buying if possible.

Yeast Nutrients and Energizers are vitamins and minerals to promote healthy fermentation. These provide vitamins and minerals that the yeast cells need for healthy reproduction and fermentation. They comes in many forms, but you can often use a proprietary blend like *Go-Ferm*, *Fermaid,* or *Superfood* for best results. You should also get *Diamonnium Phosphate* (“DAP”) which provides Nitrogen, the key to sustaining a good mead fermentation. For meads in particular, it is recommended that you give them a heavy dose of DAP, as Nitrogen is always lacking in honey.

Directions

Day 1

First, *wash and sanitize everything.* You can do this by mixing 10 crushed Campden tablets in ½ gallon of water. Stir to dissolve and keep this around for future sterilizing, perhaps in a gallon jug or bottle with a cap. Using a sponge, wipe down all you equipment or flush them with the sterilizer solution. Make sure your primary fermentation bucket, lid, airlock, and rubber stopper are all clean, well rinsed, and odorless. You do not have to let them dry. This is how you should treat all of your wine making equipment from now on.

Add the entire portion of the honey to the carboy (a funnel comes in handy here). Honey comes in many consistencies ranging from runny liquid to hard solid. If your honey is crystallized, you can either heat it slowly or mix in some hot water to thin it out a bit. Add the 1/3 of the yeast nutrients (Superfood and DAP) and 3 cups of cool water. Cover the top of the carboy with your hand, and shake until all of the honey and yeast nutrients are dissolved. Then add enough clean water to fill the carboy up to 3-4 inches from the top. You need to leave some room for foaming. Finally, put the airlock filled with water to the necessary level into the rubber stopper and put the rubber stopper in the carboy.

When adding honey to a mead recipe, it is often by weight or volume. However, this does not take into

account the level of water or sugar in the honey. Although you can simply add the honey according to the recipe, *we highly recommend you use your hydrometer* to add honey up to a certain *specific gravity* (the density of the liquid). If you want to try this, read the section on How To Use A Hydrometer and add honey, stirring until completely dissolved, until the must reaches a specific gravity of 1.120. If you don't want to mess with the hydrometer, just add the honey and be done with it. But be warned: it may be difficult to repeat this recipe if you don't take measurements and good notes.

Everything should now be in the carboy except for the yeast. Before we add the yeast, you should know that yeast needs oxygen in the beginning of fermentation. Stop up your carboy with a screw cap (if it came with one) or a solid bung and *shake the daylights out of it!* Do this for several minutes to oxygenate the must and give the yeast an easier time when it is added.

Now add the yeast. Although you can get away with simply dumping the packet in the must, you will get better results by properly *rehydrating* them. To make this simple, take a small jar (preferably with a screw-top lid) and add 1/3 cup of very warm water to it. Manufacturers recommend this water be about 104° F. This is very important, so use a thermometer if you have one. If you don't, just try to make a lucky guess! Mix the yeast packet in with warm water and let it sit for about 15 minutes with the lid loosened to allow for any escaping gas. Swirl the mixture around to make sure the yeast has dissolved into the water and *pitch* the whole works into your must. “Pitching” is a term for adding the yeast culture to the must. Just toss the mixture into the must and give it quick swirl.

Now put the airlock back on and put the carboy in a cool, out of the way place. Your mead will taste best if you are able to ferment in a cool place like a basement (60-65 degrees). However, it will still taste good if you don’t have a place that cool, you may just have to wait a little longer to drink it. Do not let the fermentation temperature exceed 75 degrees.

Now sit back and relax. Your mead won't do much for the next 24 hours or so.

Day 2

If the yeast took to its new home, you will notice your airlock bubble every few seconds. You will (hopefully) notice inside that your must now has a small amount of foamy froth on top. This is good! It means the yeast is eating the sugar and expelling gas which in turn creates the bubbles. Indirectly, this also means that (...drum roll...) it's making alcohol! Take a whiff and you will probably smell the alcohol too, even at this early stage.

Mead is a bit different from other fruit-based wines in that it doesn't produce much foam. At first glance it may appear to not be doing much, but give the carboy a small swirl and you should see a rush of foaming bubbles come out of suspension. Be careful not to shake the carboy too much or it will foam right out of the airlock like a volcano!

When you first notice airlock bubbling, it is time to add more yeast nutrients. Dissolve another 1/3 of both the Superfood and DAP in a little water. Slowly dump this mixture into the carboy, and gently swirl the carboy to mix it in.

Day 4

Your airlock should be bubbling regularly now, evidence of a healthy fermentation. As fermentation proceeds, the yeast is slowly depleting the nutrients that you have been adding to the must. About halfway through the fermentation, you need to give the yeast another pick-me-up.

Dissolve the other 1/3 of the yeast nutrients (both Superfood and DAP) in a little water and again slowly add this mixture to the carboy. Swirl gently to distribute the nutrients through the must.

Well, this is all very exciting, especially if it's your first time, but there isn't much else to be done at this

point. Just sit back and watch that airlock bubble its little heart out for about two to three weeks.

2-3 Weeks Later

By now, the bulk of the sugar in the must has been converted to alcohol and may even be finished fermenting. Your "must" can now be properly called "mead", although it probably tastes awful. From here on, the yeast will start to slow down and will stop producing large amounts of CO_2 that until now has helped protect it from oxygen in the air. Oxygen is the main issue facing wine makers. Keep your mead away from air at all costs after the primary fermentation.

It is now time to rack your mead into the secondary fermentor. Your "secondary" is a glass jug or carboy just like your first one. It is best to have two so that you can rack from one to the other. Failing that, you can rack from your carboy to a bucket, clean the carboy, and then rack back into the carboy.

Sanitize all your racking equipment and receiving fermentor. Take a moment to read the section of this book called "Racking" and come back. When all your tools are sanitized, place your mead on a counter top taking care not to disturb the sediment on the bottom, and place your sanitized carboy on the floor.

Put one end of your racking hose in the wine and give the other end a good suck. Pinch the hose just before the wine reaches your mouth, drop it into the jug and let go. Mead should start to flow from the primary into the secondary. The point of this exercise is to get the good mead off the *lees*, the dead yeast and dregs at the bottom of the fermentor. As the mead flows through the hose, be careful not to suck up the lees. Grab as much of the liquid as possible. Fill your carboy up to about 2-3 inches below the top. You need to allow room for a rubber stopper and further foaming if fermentation hasn't already stopped.

Re-sanitize your airlock and stopper, wipe the rim of the jug with a clean paper towel, and insert the airlock into the jug. Clean up your primary fermentor and all your racking equipment immediately and thoroughly. Never let it sit long enough to get sticky, or worse, dry. It will only make your cleaning job harder later on. Cleaning is a large part of making wine, so get used to it!

Your mead is now racked and in secondary fermentation! You will probably be bored for the next few months as you wait for the mead to stop fermenting (if it hasn't already) and eventually clear.

Three Months Later

Guess what? It's time to rack again! Your mead should be finished fermenting by now. There should be a new layer of lees at the bottom. Rack one more time, apply airlock, and put it back where you got it.

Although your mead is probably done fermenting, it will most likely still be cloudy. Mead in a carboy should be *crystal clear.* If it isn't you need to let it clear on its own. All those microscopic bits of flotsam in suspension will eventually settle out over time. All you can do it wait.

Three More Months Later

Your mead should be clear as a bell. There is one final addition we did not mention earlier. Either measure your acid level with an acid test kit or simply taste it. If it feels "flat," "languid," or "flaccid" than it probably needs an addition of some acid. You can add *acid blend* to the finished mead to make a more lively drink. Use the directions in your acid test kit to determine how much to add. Otherwise, you are going to have to add acid blend "to taste". Some meads need no additional acid. It depends largely on the honey you used.

Similarly, some honeys have more acidity than others and result in a "sharp" tasting mead. More sweetness is usually what is necessary to bring these meads back into balance. There is no real test to determine how much honey should be added – your tongue is the best guide! To add honey, dissolve ¼-

3/8 of a cup of honey in a measuring cup with an equal amount of cool water. Rack the mead, and then add this dissolved honey. Stir or swirl gently, and then taste it. This method will allow you to increase the sweetness slowly, and stop when you feel you have a mead that is pleasant to the tongue. After sweetening in this way, let your mead sit for an additional couple weeks, just to make sure that it is stable and safe to bottle. If it begins to ferment again, let it finish it's course and clear again.

Finally, it's time to bottle! (In the unlikely event that the mead is cloudy, consult the "Fining and Filtering" section of this book). Rack your mead off any sediment left over in the carboy and head on over to the section on Bottling. We don't know what kind of equipment you decided to buy, so you'll learn more about equipment, corks, and technique in that section. In the six months it took to make this stuff, you should have had plenty of time to read it!

Bottle your mead and keep the bottles upright for at least 24 hours to allow the corks to properly "set." After this, lay the bottles down on their sides for at least 3-6 months before you drink it. We know that as a beginner you probably won't be able to wait that long, so we'll forgive you if you raid a few bottles before that time. But remember: one gallon of mead makes only 5 standard sized bottles. If you drink them all, you won't know how it tastes with some aging (considerably different). So you can either refrain from drinking it, or make more next time!

And there you have it: your first mead. Feel free to read more in-depth sections of this book covering other aspects of mead making now that you know the basics. Be sure to read over the various mead recipes which include fruit and spices in the recipe section. Like fruit wines, you are limited only by your imagination.

Advanced Wine Making

Making Kit Wines

Making a kit wine, truth be told, is mostly a matter of following directions. Since the directions that come with most wine kits are fairly specific and thorough, we didn't spend any time on a walkthrough.

Wine kits can usually be purchased at local wine and beer supply shops or online through several retailers. They come in many forms from straight-up varietals to more exotic dessert wines. You can expect to pay anywhere from $50 to $130 on up. Be sure to buy a true wine kit. There are cheap knockoffs, mostly found in supermarkets or discount stores, that simply combine a packet of yeast and some canned concentrate in a box and sell it as a "wine kit." A true wine kit should provide everything you need to simply follow a recipe and end up with a great wine. Wine kits should include, at the minimum:

- Instructions - Step by step directions from the first day through bottling.
- Juice Concentrate - Sealed bag of juice concentrate.
- Wine Yeast - Package of wine yeast for fermentation.
- Additives – Usually some form of potassium metabisulfite and potassium sorbate for stabilization.
- Fining Agents - Additives needed to clear the wine of yeast and other particles prior to bottling.

Some more specialized kits may include additional items including oak powder or chips, corks, labels, an additional bag of skins or concentrate, and other flavor-enhancing organic ingredients.

Most standard wine kits aim to make 6 gallons (23 liters) of wine. That is precisely enough to make 30 standard-sized 750ml bottles. Some kits that make dessert or specialty wines make only 3 gallons. If you intend to buy a wine kit, make sure you have the appropriately sized carboy for secondary fermentation. You should not attempt to ferment a 3-gallon kit in a 6-gallon carboy (too much head space) or a 6-gallon kit in a 5-gallon carboy (not enough head space)

Choosing A Kit

Wine kits roughly break down as follows. Please note that the terms “Standard,” “Premium,” “Super Premium,” and “Ultra Premium” are ours. You may or may not find them labeled or sold that way.

- **Standard** ($45 to $55) – Contain 7-9L of concentrate and are available year round. These are usually simple no-frills wines.
- **Premium** ($65 to $90) – Contain 15-16L of concentrate, are available year round, and typically do not contain a source designation.
- **Super Premium** ($80 to $110) – Contain 15-18L of concentrate, may have a general source designation, and are generally available year round.
- **Ultra Premium** ($100 - $130+) - These kits start with 15 to 18L of concentrate, may contain grape skins, typically have a general or specific source designation, and are generally available year round with the exception of limited editions.

Generally speaking, kits with more concentrate produce wines of a higher quality. For instance, a kit that makes 6 gallons and includes 4 gallons of concentrate probably makes a better wine than another similar kit with only 2 gallons of concentrate. Of course, these higher quality kits are more expensive as well.

Look for brand names such as *Winexpert*, *RJSpagnols*, *Heron Bay*, and *Cellar Craft*, all of which are well spoken of in the WinePress.US community. You may also check out *Elite Vintners* online which customize wine kits to your taste.

If you are just getting started and have never purchased a wine kit before, it is recommended that you start with a white wine. Red wines take longer to age before they are considered “drinkable”. Plan on six or more months for reds to mature. Whites mature faster and will better suit the (often impatient) beginner. If you prefer reds, try to select a “young red” that will age faster for you. But do not expect to get a “big red” with all the subtle nuances and personality of something ten years old without actually waiting ten years.

It is also recommended that you start with a Standard or lower-end Premium wine. We note that some beginners will spend a lot of money on ultra-premium kits only to be disappointed when they drink the wine too early and conclude that it wasn't worth the money. Once you have a few bottles under your belt (or on your rack), it makes waiting much easier. At least you have something to drink!

Diverging From The Supplied Instructions

While you can (and probably should) follow the instructions perfectly if you have never made a kit wine before, there are a few minor areas where you may diverge from the standard instructions:

Better Degassing

Making wine as fast as the kit instructions dictate results in naturally cloudy, gassy wines. The cloudiness is fixed by adding fining agents. The gas also needs to be removed before bottling. If you don't, your wine will be “spritzy” or fizzy in the bottle and ultimately in the glass as well.

The default instructions usually tell you to stir the wine vigorously with a spoon. Putting motion in the wine moves trapped CO_2 and eventually it forms into bubbles large enough to escape the wine. However, this by itself may not be adequate to remove the gas in the wine. This is probably the #1 issue kit makers have with the default instructions. There are certainly better ways to go about it. Please read the section on “Degassing” in this book for a more thorough discussion of the options. At the very least, you are encouraged to use a “wine whip” (a stirring tool that attaches to a drill or cordless screwdriver) or a vacuum device (which doesn't introduce air into the carboy).

Extended Aging

Wine can be made from a kit in 4 weeks. This doesn't mean that you should *drink* the wine that early. If you do, you will probably be disappointed. A lot changes in a wine during aging. It gets smoother, more complex, and less “hot” tasting. Most kits will say the wine is drinkable about 3 months after bottling, but you are welcomed to wait even longer if you wish.

Many experienced kit makers choose to let the wine “bulk age” for several months *before* bottling. This allows for the natural drop of sediment instead of fining and the natural release of gas instead of forcing it out. Of course, it also helps the wine age and become drinkable.

Wines are meant to age anyway, regardless of how it was made. You can safely let your wines age in the carboy without causing any bad side effects.

Extended Time Line For Kit Wines

Use this as an outline for working with your kit. Many of the specific instructions are left out for brevity, but you should have these in your kit instructions. Much of what is presented here is optional or presents an alternative to the usual kit instructions.

DAY 1

- Rehydrate (or “top up”) your must to the full 6 U.S. gallons in the primary fermentor.
- (Optional) Add 1 to 1-1/2 level teaspoons of grape tannin if you intend to create a full-bodied red wine. Some red kits are lacking in tannin.
- (Optional) Add 1-2 ounces of toasted oak chips (or other oak alternatives) if you want oak fermentation and your kit doesn't come with any oak..
- Properly rehydrate the enclosed yeast. See “Yeast Rehydration” in the “Wine Chemistry” section. This will improve yeast viability tremendously.
- Pour the yeast into the carboy and close the fermentor lid with airlock.

DAY 2 - 5:

- Stir the must once or twice a day to break up any cap and introduce oxygen.

DAY 7 - 9:

- When the vigorous fermentation has subsided, rack the wine from the primary to the secondary.

DAY 28:

- Check the specific gravity. It should be under 0.995 for most kits (and as much as 1.000 for some big reds).

DAY 30:

- Check specific gravity again. If the value has *not* dropped since Day 28, move on to stabilization. If the specific gravity *has* dropped since Day 28, allow fermentation to continue until finished. Check the gravity on a daily basis until it remains unchanged for 2 consecutive days.
- Degas and rack the wine.

- (Optional) Add finings.

DAY 45:

- Rack the wine again. Top up the carboy with a similar dry wine if needed.
- (Optional) If you are making a red wine or chardonnay and want to add oak to your wine, add about 1-4 ounces of oak chips to the wine. Be sure to taste the wine at least once a week if you add oak. If the taste is where you want it, you may rack off the oak chips sooner than Day 80.

DAY 80:

- Rack wine and top up if needed.
- Discard oak chips if you decided to use them.

DAY 140:

- Degas and rack the wine. Top up if needed.

DAY 180:

- If wine tastes balanced, is free of defects, and free of excess CO2, bottle!

Wine Maker's Wisdom

“I'd recommend the absolute beginner follow the directions without deviating. Then they know what the very basic wine will taste like. After that, they can experiment with added oak, longer bulk aging, etc.” - Psyguy

“Rack off the lees and into a clean carboy prior to bottling. That way, if you bump the racking cane, you aren't bottling cloudy wine.” - Psyguy

“Once racked off the lees, the timing can be extended for some of the steps. You can bulk age a kit wine for several months prior to bottling if you have that level of self control.” - rockycreek

“You can add oak earlier, instead of waiting until after it's off the lees.” - rockycreek

“If you ferment to total dryness, the potassium sorbate is redundant - I've got dozens of packets I've never used as I always go for completely dry wines.” - rockycreek

Making Grape Wines

temperature

open top fermentors

time on skins

white contact time

rose and blush

brix / sweetness - start/finish targets

Red Wines

White Wines

Grape Varieties

Reds

Cabernet Sauvignon

Syrah / Shiraz

Merlot

Zinfandel

Pinot Noir

Chianti / Sangiovese

Whites

Chardonnay

Chenin Blanc

Gewürztraminer

Riesling

Viognier

Sau Blanc

Muscat

Niagara

Making Fruit Wines

Fruit wines often get a bad wrap, being labeled by wine snobs with derogatory terms like “country” or “scratch” wines, as if they were inferior to grape wines. But those who have made a successful

blackberry or peach wine can tell you there is no comparison. With fruit wines, you don't get imaginary “nuances” or “overtones” of fruit flavors, you get the real deal!

Fruit wines are a very broad field to experiment in and there is a lot to say. Most of the WinePress.US members are fruit wine makers and there is much experience to be shared.

Fruit Wines For the Uninitiated

Grapes are the only natural fruit that have the right balance of sugar, acid, tannin, and other components to make a wine from *just* the fruit. Other non-grape wines require some careful balancing to get them in line. A typical fruit wine recipe calls for 3-5 lbs of fruit, added table sugar, and water up to a desired level. There is often an addition of tannin and acid as well, depending on what you ferment.

Note again that when we talk about “fruit wine” in this book, we really mean “non-grape wines,” with the exclusion of mead which has its own category.

Some fruits ferment very well and produce a wine not unlike grape wines. These include blackberries, apples, and blueberries, among others. Some fruits are very difficult to deal with. Fresh peaches are hard to ferment well, as are most melons. And some fermentable fruits make a wine so exotic or unique, it cannot fairly be compared to any grape wine. Pineapple, raspberries, and carrots all come to mind. You can ferment pretty much any fruit or vegetable you can think of. Naturally, if it's poisonous or you are not completely sure what it is, don't attempt to ferment *that*.

You can make a fruit wine with two differing goals: either to make a wine that tastes like a grape wine, or to make a wine that tastes like the fruit you ferment. There is no wrong or right way. Just don't expect what you ferment to taste exactly like your favorite Cabernet you buy at the store. You may make something surprisingly good, or surprisingly awful (but hopefully not). If you follow our advice and recipes, you should do quite well.

Grape wine making tends to be process-driven, whereas fruit wine making is traditionally recipe-driven. Because of that, you'll often find recipes attached to fruit wine making in general. There are books filled with them (hey, even this one). Different fruits react to fermentation differently and a recipe tries to sum up these differences in a concise document. That is why we present a “prototype recipe” in this section to work off of, with more specific recipes later in the book. You should still be concerned about specific gravity, acid levels, and other important measurements. But for the adventurous soul, you can attempt to wing it by simply following the recipe.

How Fruit Effects The Wine

There is a great difference between a raw fruit and its resulting wine, but there are differences even between fruits in this behavior. Berries, in general, retain a good deal of their fruit character while, say, carrot wine is completely different than eating a carrot. All fruits and vegetables undergo some transformation and what you end up with is the “essence” of the fruit, not the lip-smacking, sweet, gooey juice that the fruit started out as. If that's really what you want, you might try making a liqueur or cordial, or maybe just a margarita! Just as grape wine doesn't taste like a fresh grape off the vine, don't expect any other fruit you ferment to taste just like the original fruit. That's the fun of fruit wine making; You are never quite sure how it will turn out in the end!

Most of the recipes in this book have specific amounts of fruit in them. What we have discovered as a community is that many of the “old” recipes for fruit wines were limited in the amount of fruit simply due to economy. However, we have also found that in some cases, there is a definite reason why it is limited. Raspberry wine may sound romantic, but it makes a wine that has some serious pucker-power to it. It's so tart that adding any more than the 3-4 lbs that the recipe calls for will create a wine that would be difficult to drink. Apples, peaches, and pears however, often get better with more fruit added.

Many even do well with just raw, pressed juice with no added water. You need to discover which fruits will allow you to add more and which ones are limiting. For now, do *not* assume that since 4 lbs of fruit was good that 8 will be better.

Notes on Fruit Selection

As a general rule, if you wouldn't *eat* it, don't *drink* it. Disgusting fruit makes disgusting wine. Only pick fruit that is *absolutely ripe*, regardless of how it looks on the outside. Good *looking* fruit is for grocery stores, not wine makers. In wine making, sugar content and flavor are the important factors. Don't be tempted to get under-ripe fruit just to increase your volume. A little good wine is better than a lot of bad wine. In fact, slightly over ripe fruit is preferred due to it's higher sugar content.

“What about fruit from the store?” As you may know, fruit sold in most grocery stores is specifically bred for shelf-life and looks. Looks sell. You simply will not find great fruit in most stores. Tree or vine-ripened fruits at the peak of their freshness usually don't transport well or keep long enough to sell. So you *can* buy fruit from a store, but you'll never achieve greatness in fruit wine if you don't start with great fruit. This usually means growing it yourself, getting it from a U-pick or farmer's markets, or even getting wild fruit.

Many people use frozen fruit or concentrates. Frozen fruit is usually better than store-bought fruit. Freezing allows fruit to ripen properly because transportation and handling are done in the frozen state with no risk of spoilage. Freezing also produces ice crystals that expand and shred the cellular structure of the fruit, so freezing is often beneficial for liberating the juice. Note that some fruits do not freeze too well (peaches come to mind). Use fresh fruit you hand-select if at all possible. Preservative-free frozen concentrates can produce decent wines, but most wine makers will use them to add body to other fresh fruits. Often a blend of subtle flavors can create a more unique final result.

The Prototype Recipe

Truth be told, most fruit wine recipes look exactly the same. They only vary in quantities. Although a few recipes present peculiar or even unintuitive advice, you can probably make a wine from just about anything using this simple “prototype recipe.” If you are trying an experiment, revert to these directions. Recipes presented in this book will use this exact same process unless otherwise noted. For a more detailed overview of the basic process, please read the beginner's walkthrough section on making fruit wines.

Recipe Ingredients

(These ingredients are for one gallon. To make a 5 or 6 gallon batch, scale all ingredients up except for the yeast.)

- 3-6 lbs Fruit
- 2-1/2 lb. Table Sugar
- Water to a gallon
- 1 tsp. Acid Blend
- 1/8 tsp Tannin
- 1/2 tsp Yeast Nutrient
- 1/2 tsp. Pectic Enzyme
- 1 Campden Tablet (crushed)
- 1 Packet Wine Yeast

Recipe Instructions

First Day (Preparation)

- Sterilize all fermentors and utensils.
- Prepare fruit by stoning, stemming, or pitting if needed. Remove any bugged, rotted, or under ripe portions.
- Add fruit into a mesh bag and tie off with a zip-tie, rubber band, or piece of string. Place the bag into the primary fermentor and mash the fruit while in the bag.
- Bring half of the water to a boil in a large stockpot. Put the other half in the refrigerator ahead of time.
- Dissolve sugar into the boiling water and immediately pour over the fruit in the primary fermentor. Stir well and continue to mash the fruit
- After 15 minutes, add the other half of the water, now chilled. The cold water should bring the hot must back down to near-room temperature.
- Measure the sugar and acid levels in the must and make any needed adjustments. (it is important to add the acid before adding the sulfite).
- Add sulfite to the must and stir. Cover and let the primary sit undisturbed for 12-24 hours.
- Start a yeast culture as outlined in the Fermentation section.

Second Day (Primary Fermentation)

- Add all other measured chemicals to the must and stir well.
- Pitch the yeast culture into the must
- Cover fermentor and fit with an airlock.
- If you ferment whole fruit, you will notice that the pulp will rise to the surface and form a “fruit pancake” on top called the *cap*. Give the fermentor a stir or a swirl once or twice a day to break up the cap.

Second Week (Secondary Fermentation)

- Rack off of gross lees into secondary fermentor when the specific gravity (SG) reaches 1.020-1.040. If the SG is higher than that, let it ferment in the primary for a few more days. Primary fermentation usually lasts from 5-9 days, depending on conditions.
- Discard the fruit solids.

First Month (Secondary Fermentation Continued)

- Rack off the lees after about 3-4 weeks in the secondary.

Third Month (Clearing)

- Rack again after about 3 months.

Sixth Month (Bottling or Bulk Aging)

- Fine or clear wine if needed.
- Rack one final time.
- Stabilize the wine if needed.
- Sweeten if desired.
- De-gas if needed.
- Bulk age or bottle wine.

Recipe Instruction Notes

Boiling Water

Boiling water is a controversial issue in fruit wine making. Some argue that the hot water will help extract the juice, flavor, and color from the fruit. Others suggest it carries a lot of the juice and flavor away. And still others argue that it makes no difference (likely the case). Those that have made a recipe both ways often report little or no difference. There are too many other factors which will influence the wine more than using or not using boiling water on fruit.

Flavor issues aside, boiling water does have a few clear advantages. First, it makes dissolving sugar simple. The entire content of the batch's sugar will dissolve almost instantly in hot water. Second, it kills microbes on the fruit without resorting to harsh chemicals. This might allow you to reduce your SO_2 level a bit. Finally, since many freeze their fruit prior to fermentation, the hot water thaws it out quickly.

Boiling water has one negative potential effect: it can set pectins in the fruit. People who make berry jam use the natural pectin in berries and other fruits to coagulate it into a jelly by heating it up. This is obviously not what you want for wine. Using boiling water may cause pectin haze in the wine later on. However, experience suggests that this rarely happens. Use of pectic enzyme to break up pectins is recommended regardless and prevents this haze from occurring. (Be sure to add the pectic enzyme after the water returns to room temperature. It is affected by heat.)

If you decide to use boiling water, a handy trick is to only boil about half of it. Reserve the other half and either freeze or chill it. After you have poured the hot water over the fruit, leave it to steep for 15 minutes to kill off any microbes. Then add the chilled water or ice to bring it back to room temperature immediately. You can now apply SO_2 and/or pitch the yeast.

Using A Mesh Bag

Putting the contents of the fruit into a mesh bag is simply a convenience. If you do this, racking from primary to secondary only requires that you remove and drain the bag. You can drain the bag by either suspending it and letting it drip or by setting the entire bag into a colander or strainer. If you have a wine press, you can also press the solids.

If you choose not to use a mesh bag to hold the pulp, you might still be interested in using one. You can fit one over the primary end of the racking hose when racking. This facilitates racking, but the mesh bag prevents pulp from getting sucked up into the hose. Getting something stuck in a cane or hose will be intensely frustrating.

Some fruits do not lend themselves well to using a mesh bag. Grapes, apples, pears, and possibly peaches in large batches will be too much for a mesh bag to contain. You may wish to just ferment on

free pulp and plan on using a press in those cases.

Freezing Fruit

It is usually recommended that you freeze the fruit before fermenting it. Expanding ice crystals shred the cellular structure of the fruit and this aid in juice extraction. Simply take the fruit and throw it into the freezer for a day or so.

It is certainly okay to use perfectly fresh fruit. In some cases, as with large quantities or with fruit having delicate flavors, it may be better to simply ferment the fruit as-is. Most grape wines are made using fresh grapes. For the home wine maker creating smaller batch sizes, it might be advisable to freeze the fruit first. This technique works especially well on berries, less well on melons and stone fruits.

Again, it makes little difference in taste. However, those without a wine press will appreciate the extra juice that freezing creates.

Recipe Adjustments

Fruit wine recipes invariably require some adjustment in the sugar and acid levels. For this reason, a hydrometer and an acid test kit are particularly useful. Both cost about $10 and no fruit wine maker should be without them. Although some prefer to simply taste the sugar and acid levels (and we recommend you do also), taste alone will not help you duplicate (or avoid) a recipe in the future.

On the very first day when the wine must is at room temperature and all the sugar has been stirred in, use your hydrometer to measure a small sample. This is your chance to plan your alcohol level in advance. Using the Potential Alcohol scale on the hydrometer, add sugar until you get to the desired level by stirring in small, measured amounts thoroughly and taking more readings. If you are trying to duplicate a recipe, add less sugar than the recipe calls for and slowly add sugar in until you achieve your desired specific gravity. Experienced fruit wine makers record their recipes, not by pounds of sugar, but by starting specific gravity. A good starting SG to to shoot for in a wine must is about 1.095.

Obviously, it's easy to add sugar but you can't remove sugar once it is in the must. If you end up with too much sugar, you can add more water. Adding water will decrease the specific gravity, but it will also dilute the wine's flavor and body.

Before you have pitched the yeast or added sulfite is also a good time to take a reading with your acid test kit. Fruit wines should be approximately %0.65 TA (Titratable Acidity). If it is substantially less (and it probably will be), add Acid Blend until you achieve this basic target, according to the directions. Generally speaking, 1 teaspoon of Acid Blend per gallon of must will boost your TA level by %0.15.

Yeast Selection

Cote des Blanc is a standard fruit wine yeast that performs well with just about everything. You can safely ferment reds or whites with this and do well. It enhances fruity aromas and has a lower alcohol tolerance (13-14%).

71B-1122 enhances fruit characteristics and flavors and lowers acid a bit. This is another general purpose fruit wine yeast strain. It may not perform well in low-acid musts due to it's tendency to process acids. It is highly recommended for berries and melomels (fruit meads).

Premier Cuvée and *EC-1118* produce crisp, clean, “snappy” wines with neutral flavors. It's good for processing heavier wines like apple. It tends to strip delicate white wines of flavor and aroma because of it's very vigorous fermentation, so be careful about using it on peaches, melons, and other more subtle flavors. It always ferments dry and will easily go to 18% or higher.

D-47 creates a more complex body and mouth feel but some report it produces earthy flavors. Most often used for meads and melomels.

K1V-1116 is another vigorous strain that usually ferments dry and up to 16-18% alcohol. It is gentler on flavor and aroma than EC-1118 is and works especially well on berries.

Pasteur Red, normally used for full-bodied red wines, also does well on heavier berries like blackberry, marionberry, and boysenberry. It works much better in warm conditions.

Sweetening

Fruit wines have an option not usually taken by grape wine makers: you can sweeten them after fermentation. There is no reason why you couldn't do this with grapes, but most grape wine makers would consider adding sugar to a grape wine adulterous. In some places, it's even commercially illegal. There are several ways to obtain a sweeter finish with fruit wines:

Post-Sweetening

The classic way is to stabilize the wine and add sugar to taste. This is done by adding a small dose of sulfite in addition to a dose of *potassium sorbate* to prevent further yeast multiplication (See the section on Stabilizing for details). After this is done, let the wine sit for up to a week and add a thick sugar syrup back into the wine until it reaches a level you like.

To be more accurate, it is best to take a measured sample of wine (about a glass or so) and add sugar to it in small increments, tasting as you go. When you like it, scale up your measurements to find out how much sugar to add to the entire batch.

If you choose to post-sweeten the wine, it is important that it be properly stabilized first. Failure to do so will lead to fermentation starting again on the sugar you add.

As an alternative, you can use what is often called *wine conditioner* or *wine finisher*. This is made of non-fermentable sweeteners and often adds perceivable body to the wine as well. Not everyone likes the taste or feel of wine conditioners.

Pre-Sweetening

Pre-sweetening means simply adding more sugar than the yeast can properly handle. For instance, if you chose to use Lalvin 71B-1122, which tops out at about 14% alcohol, you could put sugar in the original must measuring 15% or more potential alcohol. The yeast will eat through most of the sugar and then die just short of the total sugar content of the wine. This leaves a wine with a bit of residual sugar in it.

Care must be taken using this method. It is hard to predict exactly how much sugar the yeast will consume. It depends on a variety of factors including temperature, environment, and nutrient levels. The yeast may stop far short of your target or may go ahead and consume all of the sugar leaving you with a high-alcohol dry wine.

It may also be dangerous to add too much sugar into the must all at once. Excessive sugar actually starts acting as a preservative in the wine and puts the yeast into “sugar shock.” They essentially shut down and refuse to ferment any more, giving you a stuck ferment. If you want a lot of residual sweetness, try adding sugar in stages. A good rule of thumb would be to add 2/3 of the sugar into the primary, and the other 1/3 into the secondary.

Pre-sweetening wine is a bit like playing “Quarters.” It's a bit risky and hard to be exact, but initial impressions by the people who have done it are favorable and worth repeating.

Fruit Juice Reservation

Yet another way to sweeten the wine is to reserve some of the original fruit juice from the first day's events and freeze it. When the wine has been stabilized, you add back some of the reserved juice into the carboy. This works well for some kinds of fruits such as berries, but some other fruits will not survive many months in the freezer.

“Secondary Maceration” and “Refruiting”

These techniques are at the “frontiers” of fruit wine making and have not been tested enough to give a lot of feedback at this time. We present them as interesting options for the adventurous wine maker.

“Secondary maceration” is actually a technique borrowed from mead makers. This involves fermenting the fruit as usual, but when it is time to rack into the secondary you add *even more* fresh fruit. You place the fruit directly into the carboy and rack the wine onto it.

The primary fermentation is often vigorous and can drive off a lot of the flavor and aroma in whatever fruit you are fermenting, but especially so in delicate flavors such as peach. Adding more fresh fruit into the secondary allows this second round of fruit to bypass some of that turbulence. It ends up giving the wine a fruitier, less subtle flavor with more body and complexity than simply putting fruit in the primary. If you use this technique, you don't need as much fruit as you did in the primary. Shoot for about 1/3 of the initial amount. Remember, it is going to be in there for a month or so.

“Refruiting” is a term you probably won't hear anywhere else because we made it up! This technique is only for the very patient wine maker who works with seasonal fresh fruit. It works by fermenting a batch of fruit wine as you normally would and following it all the way through stabilizing. It is then put into bulk aging in a topped-up carboy and left to sit until the peak of the following season. *One year later*, when the fruit crop is ripe and bursting with flavor, you drop fresh fruit directly into the old carboy. If you work with berries or small fruits, you can get away with dropping the whole fruit in. Otherwise, you might have to mash, crush, or juice the fruit and pour it in. Stir it up a bit and let it sit for a few more months. Theoretically, this should infuse your one year old wine with a little bit of sugar and flavor from the fresh fruit.

It is important that your wine be stabilized or you may end up with continued fermentation. Alternatively, you could let it go ahead and ferment the newly introduced sugars as well. However, If your wine decides to ferment again, you *must leave adequate space in the carboy for the fruit pulp to rise*. If you don't, you could end up with a fruit volcano and a very large, pressurized mess. If you want to do a secondary maceration, make sure your carboy is no more than about 4/5 full, including fruit. You can reserve some top-up liquid in another container to add back to the main carboy after it has finished sitting on the fruit.

TODO: TALK ABOUT NO_WATER APPROACH

Wine Maker's Wisdom

“If you can locate a stainless steal weight of some kind, you can toss that into the mesh bag and it will stay at the bottom of the fermentor. Now you won't even have to stir it!” - leiavoia

aging fruit wines

letting clear

Making Meads

Types of Mead

"Mead" is simply a beverage made from fermenting honey. However, by adding some other ingredients you can create a variety of mead derivatives. They are all still "mead," but they all have their own names:

- **Show Mead (or Sack Mead):** Honey is the only main ingredient. It is called "show" mead because entries in the "mead" category in judged competitions may only contain honey for the flavoring. The flavor and quality of the honey itself, combined with the technique in making the mead, are the only things that can influence the final product.
- **Melomel:** Meads with added fruit. This is probably the most popular mead category. Fruit can be added to either the primary or the secondary fermentation.
- **Metheglin:** Mead with spices. Any kind of spice is fair game.
- **Pyment:** Mead made from honey and grapes. You can use either red or white grapes.
- **Cyser:** Mead with apple cider. Usually, apples are pressed into cider and the cider is then mixed with honey and fermented.
- **Braggot:** Mead with malt and sometimes hops. If pyment is "mead wine," then think of braggot as "mead beer."

In addition, some mazers (mead makers) have come up with additional specialty mead categories including *rhodomel* (rose mead), *morat* (mulberry mead), *hippocras* (pyment + metheglin), and other less important but often comical additions like *capsicumel* (hot chili pepper mead).

There are two basic ways to make mead. The classic way is much like making wine, but it is also possible to make a "short mead" which contains less alcohol and is intended to age faster. Short meads are more comparable to a beer than a wine.

Honey

Equipment

Fermentation Hardware

Primary Fermentors

For home wine making, primary fermentation usually takes place in a food-grade plastic bucket or pail. They come in several shapes and sizes with the basic sizes being (in US Gallons) 1, 2, 6, 8, 12, 24, 32, and even 45 gallons. However, the 6 gallon pail is by far the most common.

US and Imperial Gallons

Gallons measured in the U.S. are not the same as the "Imperial" gallon. Be sure you know which kind you are getting when you purchase carboys.

1.0 Imperial gallon = 1.2 US gallons

In practice you should get a primary bucket that is *at the very least* 33% larger than the volume you plan to make. Most people will get a primary that is twice the volume of the intended batch. So for a 5 gallon batch, you could use an 8 gallon bucket, or even a 12. Alternatively, consider splitting the batch between two 6 gallon buckets. You need this extra

space to allow for foaming, stirring, and the rising of solids. It is also nice to have enough room for the liquid to slosh around in when you move the fermentor.

If you are just starting, consider getting *several* fermentors. You can use them for more than just fermentation (washing, rinsing, crushing, picking fruit, storage). But if you could only get one, get a large one!

Care should be taken not to scratch the interior of a plastic fermentor if using it for washing. Bacteria can hide in the scratches and cause a problem with the wine.

Some other resources advise using an old “crock” or stoneware. This is old advice. If the glazing on these older style containers is cracked or damaged, it can result in lead leaching into your wine due to the high acidity of the must and wine. Get a proper food grade bucket or tank with an airlock and do this properly.

Secondary Fermentors

Carboy

Most of the time the secondary fermentation vessel is a glass jug, or a *carboy* as it is known in wine making circles, not unlike the kind used for bottled water dispensers. In fact, if you can snag a few of those old water jugs, they will work perfectly for wine making.

Basic glass carboys come in several sizes including 1, 2.5, 2.8, 3, 5, 6, 6.5, and 7 gallons. However, you'll find that the 5 and 6 gallon are the "standard" batch size, especially if you make kit wines.

Although you can certainly get by with just one carboy, it helps to have 2 or more. That way when you rack your wine you can siphon the liquid directly into another carboy without having to put it into a temporary bucket, wash out the carboy, and rack it back into the carboy.

If you could only get *one* carboy, get a larger one, preferably 6 gallons. It takes very little extra work or expense to make 6 gallons than to make a single gallon, so you might as well!

Normal glass carboys are the easiest fermentor to find. There is a good market for used ones. They are listed often on the Internet and for sale at garage sales. Certainly you have seen someone use them to collect spare change!

Demijohn

Although the actual meaning of the word “demijohn” is pretty flexible and can also include regular carboys, it usually refers to a very large glass vessel. This is how most beer and wine supply shops in the US will define it. In other parts of the world, a “demijohn” may simply refer to a normal size carboy. A demijohn is typically a large glass vessel like a carboy, but they get even larger and are usually accompanied by a plastic or wicker lidded basket with handles. Demijohns can be found in 8, 12, 14, and 16 gallon sizes.

A demijohn is a very attractive showpiece in your home, especially if it is filled with wine. It makes for good conversation, but it makes for a hassle as well. A 14 gallon demijohn full of wine will weigh about 130 pounds! Obviously, working with such a beast will take at least two people and a bit of heft. Needless to say, most home wine makers prefer 5 or 6 gallon carboys simply for the convenience.

Variable Capacity Stainless Steel Tank

You know your “hobby” has gotten out of control when you own one of these! Stainless steel does not react with wine and is suitable for long-term aging. Most wineries use stainless steel tanks of some sort.

While large wineries get them as big as a truck with computer-monitored temperature controls, there are options for the home wine maker as well. “SS Tanks” can be purchased for a few hundred dollars on the low end. They come in sizes ranging from 8 gallons on up to hundreds of gallons.

The great thing about variable capacity tanks is that they have a lid that forms an airtight seal against the edge of the tank at any level. This allows you to have a minimum amount of airspace regardless of whether you are fermenting 5 gallons or 50. It's a “one size fits all” fermentor. Of course, you pay for that versatility.

As you can imagine, you can't just hoist one of these bad boys up on the kitchen counter when it's time to rack. That's why most of these have some sort of spigot or valve at the bottom. When you get to this level of wine making, you will probably be working with pumps instead of gravity.

Plastic Carboy

Normal plastic jugs or bags are not usually suitable for long-term wine storage, but recently we have seen the introduction of the *Better-Bottle™,* made from PET plastic which is food-grade and doesn't impart “plasticy” flavors. Plastic also makes it virtually unbreakable and very light. The company that makes the Better-Bottle claims it is entirely better than glass. Adoption of the Better-Bottle has been slower in wine making circles than for beer because of the increased aging time. Most wine makers do not want to risk a batch of good wine on an experiment just to see if it works. However, many do use it with good results. The jury is still out on the Better-Bottle, but with so many positive qualities it's worth your time to investigate.

Racking Hose

Standard racking hose is just 5/16” (inner diameter) clear plastic tubing. You can buy it from a beer and wine store or from the hardware store just the same. Most of the racking accessories you'll find fit this size tubing. You can, however, buy larger and smaller sizes. The smaller size tubing is useful for small amounts of wine (a gallon or less) and for precision racking when needed. It also comes in handy during bottling when a bottling wand will not work because of the size of the bottle's punt. You can find this smaller tubing in the medical industry (used by dialysis patients, for example), and possibly from a hardware store or even a pet store (used in fish tanks).

It is highly recommended that you also invest in a hose clamp. This little gadget slides over the hose and can be squeezed shut and locked to stop the flow of liquid. Pressing again releases it just as easily. These cost pennies and there is no excuse for not having one.

Racking Cane

A racking cane is a solid, clear plastic “cane” that you can attach to a hose. You insert the cane into the “outbound” carboy. Canes are convenient because they are rigid, unlike a bare hose. You can rack with just a hose by itself (and many do), but a cane will make your job easier. They don't cost much. Worst-case scenario: it doubles as a stirring rod!

There is a better item called the *Auto Siphon™*. This is a combination racking cane and pump. Instead of taking a suck on the end of a hose with your germ-filled mouth, just put the Auto Siphon in the wine, pull the tube, and push it back down again. Wine magically shoots up through the Auto Siphon and through your hose. You don't get that little taste of wine at the end, but you don't get that fuzzy, light-headed feeling either! (Note: AutoSiphons do *not* fit 1-gallon glass jugs, only larger carboys.)

We don't get paid to endorse this product, but we still think every home wine maker should have one.

They cost about ten dollars.

Fermentation Accessories

Rubber Stopper ("Bung")

A rubber stopper or "bung" is simply a small, round, silicone or rubber piece that fits into the mouth of a carboy. They come either solid or with a hole in the middle to accept an airlock. The purpose of a bung is to form an airtight seal for your carboys. Bungs are inexpensive (less than a dollar) and come in sizes that can fit large and small carboys, barrels, and even individual bottles. Be sure to buy the right size bung for your carboy. A #7 or #6.5 bung fits most 5, 6, and 7-gallon carboys. Use a #6 for 1-gallon jugs and some odd-sized carboys.

Airlock

An airlock lets your wine expel gas but not let in air from the environment which will oxidize your wine. Airlocks are filled with water (or alcohol) which acts as a barrier. An airlock has a curve that allows the liquid to rest at the bottom. Gas coming from your wine will push up and through the airlock, pushing aside the liquid, and will produce a small bubble of gas which escapes the airlock. The liquid comes back down to its normal level and the process repeats itself. It's actually quite entertaining!

There are two main types of airlocks, each with small trade-offs. The *S-Type* lock is the cheaper of the two. It looks like an "S" resting on its side and has two main chambers. It is made from one solid piece of plastic and you can clearly see the bubbles going through it. Airlock bubbles are an indicator of how your wine is fermenting, so the S-Type lock makes it easier to observe.

The *Multipart* airlock comes in three pieces which makes it *much* easier to clean. Bubbles going through the multipart lock are also silent. S-Type locks can have a very audible "burp" which some people think is cute but can quickly get annoying if you don't keep your carboys stored out of the way. The downside to the multipart lock is that it makes it a bit more difficult to actually see the bubbles going through.

Carboy Cap

This typically orange cap has two outlets. It's often used for brewing beer, but can also be used for wine making. It also facilitates the alternative racking technique using positive pressure instead of suction.

Carboy Handle

Rubber-coated metal carboy handles fit around the neck of the carboy and provide a much easier way to lift and move your heavy carboys. They reduce the risk of slipping and dropping your carboys. If you use glass, you should certainly get and use one of these. Be sure to lift from the bottom, however. Lifting a full carboy by the handle puts a lot of stress around the neck which may break if not otherwise supported. They can be purchased for less than five dollars.

Carboy Cover

Because wine is somewhat photo-sensitive, you are encouraged to either cover your carboys or put them out of the light (basement, closet, or behind the couch). If you don't have the space, you can by a fitted carboy cover which blocks the light and somewhat insulates your wine. They have a small hole at the top which allows for the airlock to pass through. Some carboy covers have extra insulation and a

silver exterior to reflect light away.

The other advantage to having a cover, regardless of where you place the carboy itself, is that it protects the vessel if you are using glass. One inadvertent “clink” of a glass carboy against another could mean the instant end of your batch! Carboy covers cost five to ten dollars apiece. If that sounds like a lot, you can get by with an old T-shirt, a small blanket or sheet, or even the box that the carboy originally came with (assuming you have it). Just cut a hole in the bottom and flip it over. T-shirts, of course, already have a hole at the top. How convenient!

Mesh Bag

A nylon mesh bag tied off with a zip-tie or rubber band will hold your fruit pulp while in the primary fermentation. Using this, transferring your wine must into the secondary fermentor is a snap. Since all the fruit stays in the bag, there is no risk of getting fruit bits stuck in your racking hose or cane, and no chance of transferring unwanted pulp into the secondary. Mesh bags are ideal for fruit wine makers. For wines that have a great deal of pulp, such as grape or apple, mesh bags may not hold all of the fruit and they lose their usefulness. You can usually find two grades of mesh: course and fine. Course bags serve well in the primary, and fine bags do better for racking wine *through*, acting as a simple filter. Mesh bags also work wonderfully in wine presses to contain the pomace in the basket.

For a cheaper alternative, you can use paint straining bags which are essentially the same thing. These can be found for less than a mesh bag made for wine or beer making. They are cheap enough that they can be thrown away if you don't enjoy cleaning them up afterwards (and who does?).

“Brew Belt”

An electric heater that wraps around your fermentor and keeps it warm . This is useful if you have to ferment in a cold basement or garage. There are several kinds of brew belts, but the original brew belt is not recommended for glass carboys. There is also a version that is suitable for glass.

Long-Handled Stirring Spoon

This is useful for stirring the wine in the primary and turning the “cap” over. Stirring also helps introduce needed oxygen into the primary fermentation. Finding a long handled spoon may be difficult. Look for one in a culinary or kitchen supply store. A brew supply store may sell something like this for making beer and wine. Get plastic if possible and avoid wood which harbors bacteria and yeast. Use a regular plastic kitchen spoon or a racking cane in a pinch.

Bottling Hardware

Corkers

Inserting a cork into a bottle is not something that can be done by hand (Go ahead, try it!). There are a variety of machines that can help you with this. Commercial wineries often use a pneumatic corker that inserts corks fed into the machine through a funnel. Fancy ones even shoot a blast of inert gas into the bottles and fill them as well. Unless you have thousands of dollars to drop on one of these monsters, you will have to work with a mechanical home wine maker's corker that comes in several varieties:

Plastic Plunger Corker

This tool is deceptively cheap. It will cost you between five and ten dollars, but it isn't worth even that! You load the cork and (attempt to) push the cork into the bottle by hand. It's an excruciating process that can only lead to frustration and misery. We highly recommend *not ever* purchasing one of these,

even if you are short on cash.

Double Lever Corker / Compression Hand Corker

Next up are hand corkers. With the double-lever style, you load the cork into the chamber, fit it over the bottle, and press the handles down which compresses and insert the cork at the same time. The compression hand-corker does the compressing and the inserting in two separate steps. You can buy these for $20-$30 dollars. Although light-years beyond the plunger corker in design and usability, it's still a somewhat arduous task.

Hand corkers do not work well with #9 size corks, which means you're sort of stuck with #8 sizes which tend to leak.

Portuguese Floor Corker

If you bottle even a small quantity of wine on a regular basis, *you absolutely owe it to yourself* to purchase a floor corker. Floor corkers stand on the floor, obviously, and have a compression chamber and a lever-powered plunger which inserts the cork. Regardless of the type of floor corker you get, they make corking virtually effortless compared to the hand corkers.

The Portuguese floor corker is the smaller of the two and uses some plastic components. For the small-time wine maker, this is the recommended corker. You can expect to find one for $50-$70. Note: The Portuguese floor corker will not fit smaller 375ml bottles due to height. If you want to cork these, you can either get an Italian corker or put a small “booster” block of wood under the bottle when corking.

Italian Floor Corker

The top of the line is the Italian floor corker. It is larger and sturdier than the Portuguese model and uses longer lasting components including brass jaws in the compression chamber. Expect to pay $70-$100 for one of these. If you make a lot of wine, you will most certainly want to get one. After you have been spoiled on one of these, there is no going back!

In addition to the regular Italian corker, there is also what is sometimes labeled as a “Champagne” corker. This is very similar to the Italian, but with some minor design changes including an enlarged opening for champagne corks and the addition of a bottle capper (often sold separately) for capping champagne and beer bottles. If you are thinking “But I don't make beer!” think again: you can bottle your wine in a beer bottle under a crown cap with good results (and for a lot less money).

For those without the space for a floor corker, there is a compromise. Many suppliers offer a “bench” version which has all the goodness of a floor corker but bolts onto a bench. These are smaller, but not much cheaper.

Also note that all floor and bench corkers offer added power and the ability to cork larger #9 size corks which provide a better seal. Hand corkers generally don't handle these too well and you are stuck using #8 size corks which are prone to leaks when using standard wine bottles.

Bottle Capper

If you intend to make champagne or put your wine (or beer) in a pop-top beer bottle under a crown cap, you will need a bottle capper. The standalone capper resembles a double-lever corker, but has a bell-shaped piece of metal which folds and clamps the crown caps onto the bottle. They cost about $25. You can also purchase a Champagne corker which does corks *and* caps. If you cap a lot of beer or wine, you can also purchase a bench capper which is sturdier and more reliable.

Bottle Racks & Trees

A bottling tree or rack is a device with a lot of protruding dowels to hang bottles on while they dry. While convenient, the ungainly bottle tree takes up a lot of space when not in use. In a pinch, you could just as easily put your wet bottles upside-down in a cardboard box with a towel at the bottom.

Bottling Wand

Made of clear, hard plastic (and sometimes stainless steel), the bottling wand attaches to the end of a racking hose. It has a spring-loaded tip which blocks the flow of liquid except when you put pressure on the tip. To use, you put the tip of the wand against the bottom of the bottle you are filling which slowly releases wine into the bottle. Letting up on the wand makes the spring-loaded tip close up. This simple device has the added advantage of filling your bottle correctly each and every time. The wand displaces enough wine in the bottle to provide the correct ullage (head space) for corking. *Don't bottle without one.*

Bottle Washer

This is a device that screws onto the water faucet. When you turn the water on, it becomes pressurized and will blast the inside of a bottle with a powerful stream of water when triggered. It works great if you plan on picking up used bottles from the recycling bin or for washing and rinsing prior to bottling. They are not expensive, but also not necessary.

Bottle Sulfiter

It looks like a small bowl with a point in the middle. Loaded with a sulfite solution, you can press a clean bottle down on the point and it will spray a blast of the sulfite solution into your bottle. The solution drains out and you can immediately fill and cork. You might find this handy if you cork a lot of bottles at once. Otherwise, a simple pump-style spray bottle would also do the trick.

Automatic Bottle Fillers

These electric bottle fillers known by brand names Enolmatic, Fill-Jet, and others are definitely a luxury item. They will fill your bottles to the same exact level every time, pump the liquid in, which means you don't have to suck on anything, vacuum the air out of the wine bottle before filling, and even filter the incoming wine! This makes bottle filling as easy and convenient as it gets. However, they are very expensive. Expect to pay about $350.

Measuring Tools

Hydrometer

The single most important measuring tool in a wine maker's arsenal is the hydrometer. A hydrometer measures *specific gravity*, or the density of a liquid relative to water. It looks like a thermometer with a weight on the bottom. With a hydrometer you can tell how much sugar is dissolved into the must or wine before, during, and after fermentation. Sugar is converted into alcohol during fermentation, so if you know how much sugar is in the liquid before and after you ferment, you should be able to easily calculate how much *alcohol* your finished wine has.

A hydrometer will *not* magically tell you how much alcohol is in the liquid. You need to have a “before” and “after” recording. If you forget to take the reading before you ferment, you are out of luck.

Most decent hydrometers have two or three scales on them. Besides specific gravity, there are also

scales for *Brix* or *Balling* (measuring sugar levels), and *potential alcohol*.

While it possible to make wine without a hydrometer, it is not recommended. You will most certainly want to know how much sugar or alcohol is in the must or wine. Furthermore, you will be unable to repeat your successes and avoid your failures in the future without one. Making wine without a hydrometer is taking shot in the dark. A hydrometer can be had for less than $10 and will be the best investment you make.

Note that hydrometers come in various scale ranges. The most common used in winemaking has a high reading of 1.160 and a low reading of 0.990. Some specialize in key areas of the fermentation process, namely at the beginning and at the end.

Thermometer

You know what this does, but you may not know how many forms it takes. A classic rod thermometer is useful for yeast hydration and possibly for heating liquids. If you plan to do this often, however, you may be interesting in a *brewing thermometer* which has a dial and a metal clip to attach it to a stockpot.

Yeast is temperature sensitive creature and prefers a temperature similar to what you like ("room temperature"). At times, it is nice to know what the temperature of your wine is. Instead of inserting a thermometer into the carboy itself (which requires that you break the seal, exposing your wine to oxygen), you can get a self-adhesive *"fermometer"* to stick onto the side of the carboy. This strip has temperature sensitive numbers on it that show the current temperature of the whole carboy.

Fermometers are by no means required, but are nice for the price: a few dollars is your sacrifice. The good news is that a fermometer and a carboy are usually married for life and not easily separated. You won't need to buy new ones.

Wine Thief

Essentially a "big straw," a wine thief is used to draw off a sample of your wine. It comes in a few varieties. The older style is a tube with an open, pointed tip and another small opening on the back end. You put the thief into the wine and draw it back out with your thumb over the opening. This works like a plastic straw and soda pop, but it gets messy when you scale that idea up to this size. The newer style wine thief is a tube with a one-way valve on one end and an open back. You simply insert the tip into the wine and it fills up. When you withdraw it, the valve keeps the wine in. Pressing the tip against a surface opens the valve and lets the wine back out. This style wine thief will also let you drop your hydrometer directly into the tube for a quick reading.

A wine thief of any variety is handy, but not necessary. You can use a turkey baster in a pinch.

Graduated Cylinder

This is a glass or plastic column with measurement markings labeled on the side. Especially popular in science labs, a graduated cylinder is used to make accurate measurement of liquids. Good ones tend to be a bit expensive, but they are very accurate. You might appreciate one if you are apportioning liquid measures of some of the more exacting chemicals like sulfite. They are also useful for reading a hydrometer if it didn't come in a tube of its own.

Scales

If you work with fresh fruit, you will need a scale of some sort. For larger measures, a simple bathroom scale will do the trick. There is usually little need for great accuracy in such things. The problem lies with smaller measures. Weighing out sugar for fruit wines can be done reasonably well with a postal scale. Measuring chemicals by weight instead of volume requires a very accurate gram scale.

Acid Test Kit

Although often overlooked by beginners, an acid test kit is very useful. It measures the level of *total acidity,* which is what gives wine a spicy tingle. An acid test kit typically includes two chemicals and possibly a mixing cup and syringe. Many recipes often call for the addition of an acid blend. However, without knowing how much acid is already in the wine, there is no way to tell how much more you should add to the wine. Adding acid by a recipe's direction is dangerous and should be treated as a "best guess". A test kit will set you back about $10.

SO_2 Test Kit ("Titrets")

These one-shot tests measure the amount of sulfite, or free SO_2, in your wine. You can get by without them, but for the exacting wine maker, they come in handy. Titrets work with a chemical enclosed in a vacuum-sealed glass tube. You attach a hose to the small end of the tube and break a section of the glass which opens the vacuum and draws in wine. Using an applicator tool, you let wine into the tube until the color indicates a stopping point and then measure the liquid level to get a reading. Be aware that Titrets may overestimate the correct level of free SO_2.

Titrets run about two bucks a pop for the test itself, plus another seven or eight for the applicator.

pH Meter

A decent hand held pH meter is vital for giving correct doses of sulfite, among other things. Sulfite is more effective in wines that have a lower pH (that are more acidic). Without properly knowing your wine's pH, you may be under or over sulfiting you musts which could lead to poor results. Expect to pay at least $40 for a low-end meter.

Refractometer

This hand held tool is used to measure sugar levels like a hydrometer. Unlike a hydrometer, it measures the refractive index of the sample. You put a clear sample on a plate at one end and look through the other end like a telescope to get a reading. It can be used for grapes and other fruits in the field. That's about all it's good for though. Typically, they lose their accuracy and usefulness once the wine is fermented. They are designed to be used on fresh fruits in the field and for knowing when to harvest. They are quick and accurate for this job but can be very expensive ($50 for a cheap one) and are of limited use to the home winemaker. Digital refractometers are even more expensive, but are also more accurate.

Other Equipment

Filters

Used to filter wines to achieve enhanced clarity. Filters either work on gravity or with a motor. The latter is more expensive but takes considerably less time to filter a wine. Gravity fed filters are error prone and not very popular, we have found. Filters work with all wines, but especially well on white wines. Some models can double as a motorized transfer pump as well.

A filter works with paper pads that are rated with varying degrees of pore size. Filters pads can be "rough", filtering out large particles that cause haze, and "fine" sub-micron filters which filter out even yeast and bacteria, with varying degrees in between.

A gravity filter setup will set you back about $50 and a smaller motorized filter, such as the *Buon Vino MiniJet*, may cost between $100-$200 depending on where and how you get it. The MiniJet is good for

filtering about 5-6 gallons at a time. You can also get the *Buon Vino SuperJet* which can handle about 60 gallons at a time. Expect to pay up to $400 for that additional capacity, though.

Motorized Transfer Pump

Used to move wine from container to container without the need for one container to be higher than the other (as when siphoning using gravity). It can save time, risk, and muscle strain from lifting full containers, especially glass carboys. If you have a motorized filter, it can double as a pump for racking.

Motorized pumps and containers for larger volumes are expensive and relegated to wineries and high-volume wine makers. If you work with large barrels or SS tanks, you might be willing to shell out the several hundred dollars it takes to buy one.

Crushers / Destemmers

These are big ticket items. Crushers and destemmers on the high-end winery level costs tens of thousands of dollars, are computer controlled, and are totally automated. For the home wine maker, destemmers and crushers are manual machines. They usually have a crank and a trough for the grapes. Some machines both destem and crush simultaneously while other machines separate the two functions. Even these mechanical, hand-powered machines are expensive. Expect to pay upwards of $350 for a low-end model.

For smalltime wine makers, it is usually advised to borrow or rent one of these machines as needed. Many wine supply shops will provide this service.

Presses

There are several different kinds of presses available, but the *basket press* is the most widely used for home wine makers. Even some small wineries still use basket presses. This machine consists of a basket made of wooden slats, a central screw, and a plate on top to do the pressing. Turning the top presses the plate down into the basket. The resulting juice flows through the basket slats into a trough where it then drains into a receptacle. You can also purchase all-metal presses. Presses cost anywhere from $200-$500 depending on basket volume.

Like crushers and destemmers, it is recommended that you rent a press if that is an option. You may also find that building your own press is a viable alternative.

Powered Degassing Tools

The best degassing tool is *time*, but failing that you can use some additional tools such as a *Fermtech Wine Whip* or a *Fizz-X*. These tools attach to an electric hand-drill and agitate the wine, driving off CO_2. The whip is the cheaper alternative and costs about $5-$10. The Fizz-X agitator is $25-$30.

Mity-Vac

The Mity-Vac was originally designed for working on automotive break lines but has been adapted by wine makers for degassing wine. This powered tool can be inserted into a standard drilled bung with a tapered Mity-Vac attachment. It can then pull a vacuum on a glass carboy and extract any trapped CO_2 in the wine.

Bottle Pump ("Bottle Saver")

Originally intended to put a vacuum seal on an open bottle of wine, wine makers have adapted their use

to the wine making process. Bottle pumps such as those by Vacu-Vin and Trudeau can be adapted to fit a whole carboy and are used to (laboriously) degas wine with a lot of trapped CO_2 in it. Although you may want to use it for this, they are highly recommended for their original purpose of preserving opened wine as well.

Strainers and Colanders

If you don't have a wine or fruit press, you will have to make do with a strainer or colander. They are especially useful for letting a mesh bag drip. Make sure to get very large sizes.

Funnels

Look for a funnel large enough to deal with a high volume of liquid. You want something with an outlet that is large, but small enough to fit into a carboy. You probably won't miss having a funnel unless you work with making meads and melomels where you often need to insert ingredients directly into the carboy. Prefer plastic or stainless steel.

Cleaning

Bottle / Carboy Brush

Used to clean the insides of bottles and carboys. You will probably find that, although they sound useful, bottle brushes really do not work very well. Once in a great while you might have some gunk caked onto the inside of a bottle or carboy, but if you keep your equipment clean (and you should!) then you will never need to use one of these.

Sanitizers

Used to sanitize all of your fermentors and equipment that touch the wine. Many wine makers simply use a high-powered sulfite solution. Sulfite solutions are good because you often add sulfite to wine anyway. Trace amounts that get into the wine will not hurt.

Another very popular chemical is Iodophor, an iodine solution you mix in water. It is very effective and leaves a wonderfully clean smell (unlike sulfite). Iodophor is probably the most highly regarded sanitizer for those who do not use sulfite.

Other popular sanitizers include B-Brite and PBW (Powdered Brew Wash) which both contain “active oxygen” as the cleansing agent. Both start as powders and are mixed with water to create the sanitizing solution.

You can also use unscented household bleach. Use as per the directions. If you use bleach, be sure to rinse everything very well or you may end up with it in the wine. Also, some plastics do not react well with bleach solutions and may degrade or crack, especially hard plastics used on racking canes and other similar equipment.

Wine Maker's Wisdom

“Once in a while, some hapless wine maker will push a bung all the way into a carboy and be clueless as to how to get it out. After laughing, we tend to give two standard replies: First, if it fell in, it was too small. The correct size bung for your carboy is the one that just barely fits. You cannot possibly push it all the way in. So next time, buy the right size. Secondly, in the event that you do push one in, you can

dig it back out using a coat hanger wire with the tip folded back into a hook. Push the hook through the hole of the bung and pull it back out." - leiavoia

"With some simple bicycle hooks, you can hang a floor corker off the roof for easy storage." - leiavoia

"Use a plastic milk crate to set the [Better-Bottle] in. This will help you avoid airlock 'suck back' issues due to plastic flexing when handling." - fingerlakes

"If you put your glass carboy in a plastic milk crate, not only is it easier to carry around, but it prevents them from falling over or touching other glass carboys and breaking." - leiavoia

Vodka

Change airlocks

Barrels and Oak

Hundreds of years ago, wine was stored in oak barrels out of necessity. Barrels were easy to move since they were round and were lighter than stoneware. Somewhere in history, it was discovered that wine stored in certain varieties of oak actually tasted *better,* which led to the modern practice of purposefully aging wine in oak barrels for a length of time.

For the home wine maker, barrels may be out of reach due to cost. Wineries can often pay hundreds of dollars for a single barrel. Some French oak barrels may cost as much as $1500 each. All of this is for something that is only good for a few batches. After 3-4 years, the barrel loses its ability to impart oak flavor to the wine and will be sold in the used barrel market, used as neutral storage, or sold as a garden planter for pocket change.

Another limiting factor is size. The standard industry size for barrels is about 60 gallons. Most people do not have the ability to move a barrel of that size, even if they had room for it in the first place. Fortunately, there are several sources that produce barrels in smaller sizes: 20, 15, 10, 5, and even 1 or 2 gallons. Smaller does not necessarily mean cheaper. Expect to pay $150 minimum for a simple 5 gallon barrel.

If barrel aging is out of reach, there are "oak alternatives," including oak chips, beans, cubes, powder, and staves. These are added directly into a carboy or fermentor and are relatively inexpensive. They enable the home wine maker to add oak flavors to the wine without a barrel.

Wood, Grain, & Toast

Regardless of whether you go with barrels or oak alternatives, you have many options available to you. The first is the wood itself. Wood used to make oak barrels usually comes France, Canada, the US, or Hungary. Many feel that French oak is the more desirable variety and is always the more expensive. But American, Canadian, and Hungarian oak does (as some would say) equally well, often at half the price. French oak is often said to release flavor components slower, while American, Canadian, and Hungarian oak has more of a punch to it. Current research indicates that this is not always the case and may have more to do with the processing of the wood rather than the wood itself.

Some recent studies have shown that French oak releases more phenolics and solids into the wine over

time. American oak releases less overall, but it imparts more vanillin, the chemical component most responsible for conveying the perception of "oakiness." It would *seem* that, if anything, French oak may impart more depth of flavor to the wine over time. Similar studies have shown that many taste testers cannot perceive any difference between wines aged in French or American oak, provided that the process used in creating the barrels or alternatives is the same. Understand that this is a highly controversial field and there are plenty of people on both sides making their case. Although further research needs to be carried out on these matters, for the home winemaker it would seem silly to pay more for something that does virtually the same thing. However, we leave the choice to the reader and encourage you to experiment if you can afford to do so. If you are buying a barrel for the first time, it would be recommended to use American oak if it is cheaper for you (and it probably is).

Another factor is the *grain* of the wood. Oak with a tighter grain imparts its attributes to the wine slower and in a more controlled manner than oak with looser grains. In barrels, tighter grains reduce liquid evaporation. If you are going for long-term aging, you should probably look for tight-grained wood. For those using oak alternatives, this is almost a moot point.

The most important oak attribute is the *toast* of the wood. Both barrels and alternatives are charred over a fire to a certain level ranging from light to heavy. This attribute of the oak makes the biggest impact on the final flavor of the wine. Lighter toasts produce lighter flavors like vanilla and butter but are closer to tasting like actual untoasted wood. Heavier toasts produce stronger flavors like tobacco, caramel, and bitter chocolate. Heavy toasts are usually used on equally heavy wines like Cabernet-Sauvignon. Using a heavily toasted oak on a delicate wine will overpower it. Using a lighter toast on a heavier wine will produce a more "fruit-forward" flavor.

Oak Alternatives

Oak alternatives come in plenty of forms, but the most popular is probably *oak chips*. Different manufacturers sell different variations including beans, staves, cubes, and powder (oak dust). All achieve the same basic effect, but at different times and with subtle nuances. Larger oak products (like cubes or beans) will impart their flavors slower than chips or powder.

Oak chips come with all the same wood and toasting options as barrels do. They are cheap enough that you could easily buy a bag of each and experiment by splitting up your batch of wine several different ways.

To apply oak chips, just give them a good soak or rinse to clean off any dust or particles and add them directly to the wine. You can alternatively put the chips in a mesh bag. General recommendations are to add *up to* one ounce per gallon. Keep the oak in the wine for as long as you wish, but taste it every few days to make sure you do not over oak the wine.

Oak chips can be added before or after fermentation. Oak chips added before fermentation should be kept in a mesh bag (or equivalent) through the entire primary fermentation. After transferring to the secondary, you can either keep the chips with the wine for more oak flavor or reuse them on another batch (or on the barbecue!). Oak added during fermentation will exhibit a mellower, less assertive flavor profile than oak added afterwards.

Adding oak after the fermentation is complete and the wine has cleared will give you more precision. Simply drop the chips in the cleared wine and taste every few days until you have the desired flavor. You can then remove the chips or rack and bottle immediately. Tasting the wine after it has cleared will give you a much better impression of the flavor than trying to taste it during fermentation with all the yeast in the wine.

Barrels

Barrels have been in use for thousands of years, stretching back to at least Roman times. The craft of creating barrels (called *coopering*) is one that takes great skill and knowledge, not to mention labor. It is this labor that drives up the cost. Coopering for the wine industry is largely done by hand even to this day. The planks used in barrel making (called *staves*) are meticulously split by hand or with the aid or a hydraulic splitter in the traditional method. Recent American techniques use saws to cut the staves, but this exposes quarter-sawn edges of the wood to the wine and introduces undesirable oak components. This technique has been responsible for giving American oak a reputation for being “edgy” or more assertive. In reality, the technique has a larger impact on flavor and aroma than the wood itself.

Barrels are assembled without any glue or fasteners. The staves are fitted together with steel hoops. Driving the hoops further towards the middle of the barrel tightens the structure. Filling the barrel with wine makes the wood swell even more, making it completely airtight.

Types of Barrels

Like bottles, barrels come in basic shapes: Bordeaux and Burgundy. Bordeaux barrels are slightly longer and thinner than Burgundy barrels. The bulge around the middle of the barrel (or *bilge* as it is referred to) is more pronounced on the burgundy barrel, so *in theory* it leaves less room for oxygen in the head space. Long story short: the shape probably doesn't matter to most people, even those that run wineries.

Of greater importance is the size. Larger barrels have a lower surface-to-volume ratio than small barrels. Because of this, the oak elements of the barrel take longer to leach into the wine in larger barrels. This is of particular importance to the home wine maker who will probably be buying a barrel in the 5-20 gallon range. Wine aged in these sizes can absorb oak flavor in a matter of weeks when the barrel is new. After that, the wine may be over oaked. The only chance to recover from this is to blend it with another wine in need of more oak character. For these small sizes, it is good advice to have a series of wine batches to cycle through the barrel. When one is “done,” it can be either bottled or removed to a glass carboy. Meanwhile, another batch can be rotated into the barrel. This keeps the barrel wet and protected from spoilage.

In addition to costly new barrels, you may find reconditioned (“recooped”) barrels for sale from some distributors. These barrels have had up to 1/4” of the inside of the staves shaved to expose new wood. The barrels are then reassembled and sold. Reconditioned barrels often sell for less than a new barrel which makes them an attractive alternative for the home wine maker. The reconditioning process reduces the “oakiness” of the barrel somewhat and therefore the flavor extraction “lifetime” will not last as long as a brand new barrel, but it will contribute mellower flavors for several more batches. If you don't want a barrel that packs so much punch on the first fill, definitely consider buying a reconditioned barrel.

Barrel Aging

Exactly what happens when you leave wine in a barrel is not entirely understood by current research. It is also a field of great controversy and dispute. Many highly respected people with a great deal of knowledge on the matter give conflicting advice. All we can do is give you both sides of the story and let you decide.

There are two important features of aging wine in a barrel that a tank or carboy with oak chips lacks. First is *concentration*. Wood barrels have channels in the wood through which water and alcohol are wicked. Very slowly over time, these liquids reach the outside of the barrel and are evaporated into the atmosphere. This eventually concentrates the flavor, color, and aroma of the wine which is something a

glass or steel tank could never do.

Second, barrels oxidize wine over time. This takes place slowly and in stages. With enough time, dissolved solids in the wine change their chemical structure and there is a noticeable “smoothing” and rounding out of the flavor in the wine. This is somewhat similar to how bottle aging works. This process is different from oxidation when your wine is young and exposed to air. The slow rate of oxidation is what makes the difference. Massive oxidation that happens quickly (such as when wine is openly exposed) bypasses steps in chemical transformations in the wine and may ruin it. Slow oxidation makes these changes sequentially and actually benefits the wine.

How exactly this takes place is highly controversial. One theory states that barrels are completely airtight and that the only oxygen introduced is through the opening upon topping up the wine. This theory notes a vacuum that develops in barrels caused by the evaporation of liquid. Opponents to this theory feel that the vacuum, once present, causes air to seep into the barrel. These individuals feel that the air leached through the wood itself is much greater than anything that might come through the activity of opening up the bung and topping up.

The final benefit to barrel aging is in the wood itself, and this makes the biggest difference. Certain parts of the wood are chemically absorbed and sometimes broken down into beneficial components. This happens regardless of whether barrels or alternatives are used. The use of alternatives will impart the flavors and aromas of oak, but it will not concentrate or micro-oxidize the wine. Sometimes the oxidation assists in transforming the oak elements even further. Barrels do all of these things. Now you know why wineries use them so much!

Wine aged in barrels slowly evaporates. Because of this, you will need to top up the wine with either a similar wine or preferably a reserve of the wine already in the barrel. This should be done once per month. Longer periods create excessive head space (or *ullage*) which can lead to spoilage and over oxidation. You can limit the evaporation by keeping the barrel in a cool, humid area with low air circulation. This is why natural caves have worked so well in traditional wine making. A cellar or basement would be a good option. Keep your barrel away from direct sunlight and areas that undergo large temperature fluctuations.

Once you have wine in a barrel, keep a close eye how the wine is progressing. A new barrel can over oak a wine in as little as two weeks. An old barrel may take years to impart its flavor and aroma.

Oak barrels are only good for so long. After about 3-4 batches have gone through them, they are generally regarded as “used up.” The properties of the oak leech into the wine over time, but as time goes by the impact of the oak becomes less and less. Light wines in a brand new barrel may be fully oaked in few weeks. Subsequent batches of wine going into the barrel take progressively more time to achieve the same effect as oak components are leeched out of the wood's interior surface.

When the barrel is too old to be of any further practical use, you can continue to use the barrel with additional oak alternatives. Some wineries use “inner staves,” a technique of putting new wood inside an old barrel. The barrel provides the concentrating and oxidizing effect while the added wood contributes the flavor. Additionally, old barrels may be reconditioned to extend their life but this is probably out of the scope of the home wine maker.

Finally, there is always some discussion on how to orient the barrel. Some put the bung straight up (in the 12 o'clock position) while others rotate that barrel so that the bung is under the wine level (in the 2 o'clock position). After many studies it has been determined that it makes little or no difference which position is used so we recommend the 12 o'clock position for ease of use.

Barrel Care

Preparing A New Barrel

Once again, opinions differ on how to prepare a new barrel. The difference is in the use of chemicals in the process. Most professional and academic resources indicate that you should use nothing but clean water for a newly manufactured barrel. If you have a new barrel and want to reduce some of the harsh tannins before you put wine in, use the instructions for cleaning a used barrel.

Regardless of how you prepare a barrel, it is generally advised that you *not* put your very best wine in the barrel to "break it in." This practice is employed by many wineries who oak their basic, cheaper wines first, then the good stuff afterwards. Using chemicals may impact or reduce the flavor of the oak, especially if it has a medium to heavy toast.

To prepare a new barrel: start by filling the entire barrel with room temperature water. Do not use hot water, as this may fracture, warp, or crack the staves. Let the barrel sit bung-upright overnight. This helps swell the wood staves which tightens the barrel and readies it for wine. You will probably notice some leaking, which is normal. It should stop within a day or two as the wood swells. If swelling takes longer than a day or two, dump the water and refill the barrel. If it doesn't stop leaking in a week, contact the vendor for a refund. You may have a lemon.

After the wood has swelled and all leaking stops, rinse the barrel with warm water from a faucet sprayer or simply insert a garden hose and let it run long enough so that no wood bits, dust, or discoloration runs out. Immediately fill the barrel with wine.

Cleaning A Used Barrel

Prepare a used barrel (preferably one you used yourself) by washing it with Barolkleen (soda ash or sodium carbonate), an alkali substance, to soften up a new barrel and take out some of its harsher qualities before adding the wine.

- Add 1lb. of Barolkleen per 5 gallons of barrel space to a barrel filled half way with hot water. Slosh the barrel around to get all surfaces cleaned (up to 30 minutes). Fill the barrel completely and bung. Let sit for 48 hours.
- Drain the barrel completely and rinse with clean water. This can be done with a faucet sprayer or a garden hose. Since a lot of rinsing will be required, a garden hose will probably do a better job (unattended too).
- Drain and fill half way with water again. Add 1 tsp. citric acid and 1-1/2 tsp. sulfite powder per gallon of barrel space. Rock the barrel to contact all interior surfaces for up to 30 minutes. The sulfite kills microbes and the acid dissolves some substances that precipitate out of wine during aging. The acid also makes the sulfite more effective, so be sure to add the acid first.
- Drain once more and rinse with clean water. Immediately fill the barrel with wine.

A cleansed, used barrel will have a sweet smell to it. It should not have a musty, old, or off-odor to it. if it does, you are advised not to use it. Though expensive, you can always replace a barrel but never the wine if it goes bad.

Storing Barrels

Wine barrels can be stored filled or dry. For wet storage, repeat the directions for cleaning a used barrel after emptying the wine. However, instead of draining the sulfite/acid solution, simply fill the barrel completely and bung tightly. Top the barrel off with clean water every few weeks and replace the

sulfite/acid solution every 2-3 months. Wet storage prevents the staves from drying out but may continue to extract oak flavors from the barrel. This may or may not be what you want.

You can also store a barrel dry by burning sulfur wicks or disks inside the barrel and sealing it up. Wicks and disks are inexpensive and easy to come by. Disks are the newer, preferred option to wicks. Simply burn a disk inside the barrel, either in a special disk holder or suspended by a wire, and close the bung tight (thus suspending the wire in the barrel). Be careful not to let the burning disk or the falling ash to touch or fall into the barrel itself. Burn a new disk or wick every 2-3 months.

Fermentation

Fermentation is a *very* complex subject. There are university textbooks written on the subject. Our hope is to convey key ideas, give practical advice, and provide some valuable insights into what really happens during the process. We won't overwhelm you with boring chemical formulas, but there are a few points you will want to understand. We will concentrate on the more practical aspects of manipulating the fermentation process and what you can actually do about it.

Phases of Fermentation

A typical fermentation goes through a bell-curve of activity, but is generally split up into four "phases" for convenience. It is hard to give an estimate as to how long these phases last since it depends on too many factors. These are general guidelines only.

Lag Phase

This is the 12-48 hour period from the time you rehydrate the yeast to the time when fermentation is visible and apparent as foam or froth on top of the must. During this phase, the yeast is getting acclimated to the new environment's pH, acid, sugar, and SO_2 levels. It is also a period in which the yeast begins hording nutrients for a burst of activity in the next phase. The lag phase can be largely avoided in the actual must by using a yeast starter culture. This allows the yeast to get a "running start" when it is finally pitched into the must.

Growth

During this phase, the yeast is consuming large amounts of sugar and other micro-nutrients. There is a flurry of activity in the fermentor often marked by lots of foam and bubbles. Yeast cells during this phase are multiplying as fast as possible and will eventually colonize the entire must up to the limit of what it can hold. The sugar level drops the fastest during this phase, usually by about 2/3. This coincides with the "primary fermentation." The peak of the growth phase is generally around the fifth day. Oxygen is important at this point and you should make an effort to stir the must well in the primary fermentation. This introduces oxygen that the yeast will use primarily for multiplication. After the primary growth phase, air is no longer needed and will only oxidize the wine.

Plateau

The yeast at this point has reached "maximum occupancy" and stops multiplying quickly due to decreasing nutrient levels. Sugar levels continue to drop as well, but the speed is reduced somewhat. This phase usually coincides with the "secondary fermentation." (Note: academically, there is no such thing as a "secondary fermentation," but you will often see it split up this way in recipes and techniques. Many winemakers simply ferment to completion before moving the wine from the fermentor into carboys.) The number of yeast cells is somewhat constant in this phase and the apparent activity slows down. The focus is on consuming whatever remaining sugar is in the must. Keep air out

of the wine at all costs during this and later phases. The yeast will not make any further use of it and it will only degrade the quality of the wine.

Decline

When the bulk of the sugar and nutrients have been consumed, yeast cells begin to die off. Activity levels are minimal and only very strong yeast cells survive. If sugar levels are too high, yeast cells die off from excessive alcohol levels. In this environment, the declination phase may be prolonged. Eventually the yeast expire from lack of nutrients or the toxic alcohol levels and fermentation is complete.

Yeast Rehydration

Older books and resources on wine making suggest a variety of rather silly methods to add yeast to the must. Our favorite is to “sprinkle the yeast on a piece of toast and float the toast in the must.” Voodoo aside, here is the *proper* way to rehydrate a packet of active dry wine yeast, as per the manufacturers:

- Heat 1/3 cup water in a small jar to 104° F. The temperature is very important. Make sure it is no more than 104° but not less than about 98°. Use a thermometer if you have one. Rehydration at the correct temperature will greatly improve yeast viability. Rehydration at the wrong temperature may destroy the cellular structure of the yeast when it absorbs the water.
- Add the dry yeast to the jar and give it a swirl to wet all of it.
- Wait 15 minutes.
- Stir to thoroughly dissolve yeast and pitch into the wine must.

That's it!

Yeast Starter Cultures

It is highly recommended that you prepare a yeast *starter culture* to assist your wine in getting a good start. A yeast culturing technique also helps in fermenting fruits that spoil or oxidize quickly, such as melons. If nothing else, it reduces the time required to complete a fermentation.

A yeast starter culture adds a few ingredients into the basic rehydration plan and lets the yeast cells absorb nutrients and start multiplying before your must is prepared. By the time the must is ready, your yeast population is already rolling into the growth phase! Here is how to do it:

- Heat 1/2 cup water in a small jar to 104° F, just like normal rehydration. For this however, it helps to have a jar or bottle with a screw-on lid.
- Stir in 2 tsp. of sugar and a literal pinch of diammonium phosphate (DAP). You may also add a pinch of yeast hulls or Biotin if you have them available. If you have a proprietary blend of nutrients like Lalvin *Go-Ferm*, use that instead. You only need a little bit to get started. You will also add yeast nutrients into the must according to the usual directions.
- Add the dry yeast to the jar and give it a swirl to wet all of it.
- Wait 15 minutes.
- Stir to thoroughly dissolve yeast. You can do this easily by putting the lid on and shaking well. This also gets oxygen into the mixture which yeast like.
- Loosen the lid to allow for escaping gas. Keep the jar at or above room temperature, but not more than 95° F. You should start to see activity in as little as 30 minutes, but typically in about

2 hours.

- Let the culture ferment for at least 2 hours and for as long as 12. If you wait longer than this, your chugging yeast culture will slow down or stall.
- Pitch the culture into the must.

For some wines with unusual levels of sugar or acid, it often helps to take a few extra steps. For these situations, add ¼ cup of wine must to the culture jar every 4 hours after the first 4 hours. Do this 3 or 4 times before pitching. This incremental addition of wine must acclimates the yeast to its new home slowly. It's like getting into a swimming pool one inch at a time instead of diving straight in. Use this technique on very high sugar musts like desert wines, ice wines, sweet meads, and on acidic musts like orange, lemon, and raspberry.

Primary Fermentation

The primary fermentation corresponds to the Lag and Growth phases of yeast development. Musts generally lose up to 2/3 of their sugar levels during the primary. It can take anywhere from 3 to 12 days, generally a week.

Primary fermentation usually takes place in food-grade plastic pails. Exceptions include some forms of mead in which the primary is often performed directly in a glass carboy since no fruit is involved. White wines from pressed juices may also be fermented in glass carboys, but you should leave plenty of head space for foaming. You should also take care not to shake the carboy during fermentation. The resulting foam could flow right up through the airlock! Some white grape wines including Chardonnay and Sauvignon Blanc are fermented in barrels for an extra oak dimension. After barrel fermentation, the wine can either be kept in tanks or carboys or go through *sur lees* aging (aging on the lees) discussed in the "Aging" section. Obviously, for most home wine makers barrel fermentation is not an option.

Maceration

Maceration means fermenting on the fruit pulp. All red wines and most fruit wines are fermented on crushed pulp. For many fruits, and especially grapes, the skins contain much of the color, tannin, and other molecular components of the wine. The longer the fruit ferments on the pulp, the more is extracted. Therefore, the largest variable the wine maker has control over is timing.

On the one extreme, you can have *no* maceration. This is usually the case with white grape wines and cider-based wines where the fruit is pressed and the juice alone is immediately fermented. This usually produces a light, crisp wine that is drinkable earlier because of the reduced tannin content.

It is good to note how length of maceration affects what is extracted. In grape wines and probably most other fruit wines, tannin is extracted from the skins and pulp at a slower rate than pigments and coloring agents. If you aim to have a young, fruity, early-drinking wine, a five day maceration may be plenty. According to research, five days allows the color to be almost fully extracted. The majority of the tannins are typically extracted after 9-10 days, but extraction carries on after this at a diminished rate. If you want a "big red" with lots of flavor and aging potential, you may extend maceration to 1-2 weeks.

In the other extreme is *extended maceration* where the wine is kept on the fruit for as long as a *month!* In this scenario, the wine itself may actually finish it's fermentation and the fruit may sink to the bottom. If you wish to try this, be aware that the reduced CO_2 output of the fermentation will create an opportunity for air to spoil your wine. For this reason you need to keep the wine either under airlock or under a blanket of CO_2 or other inert gas from a tank (often Nitrogen or Argon). Mead makers often use the extended maceration technique by simply putting whole fruit directly into the carboy during the secondary fermentation. This can be kept there until the next racking. Getting fruit in and out of the

carboy is awkward, but it creates a much more fruit-forward wine that a regular fermentation could not. It also creates a wine with great aging potential.

Besides normal maceration, one might also consider *pre-fermentation maceration*. White grapes are often allowed to sit after crushing but before pressing. They are simply left in the vat for up to 24 hours (usually 8-16). This short time period allows enzymatic activity to break down cellular structure in the crushed pulp to impart flavor to wine without actually *fermenting* it on the fruit. It is strongly recommended to add pectic enzyme to the crushed fruit while it sits. Pectic enzyme breaks down pectins found in cell walls of the fruit. The pectic enzyme not only helps liberate the juice, but also helps prevent pectin haze later on.

An additional spin is *cold soaking*. You can add containers full of ice to the fermentor and drop the temperature of the must. This inhibits spoilage but does allow more time for enzymatic activity to start breaking down the pulp. You can cold soak most kinds of grapes for 1-4 days before the yeast is added.

Using An Airlock On The Primary Fermentor

One frequent point of debate is on whether or not you should keep the primary fermentor airtight. There are a few points of view on this:

Since we know that yeast need oxygen during the growth phase, many wine makers do not airlock the primary fermentor. Instead they secure a cloth over the lid or the drilled bung with a rubber band. Some drape a towel over the fermentor and cover it with a board. Also note that some fermentors are designed with a loose fitting lid. These let gases escape without the use of any airlock at all.

Others feel that all the oxygen required for fermentation is *already in* the primary fermentor or that the action of punching down the cap and stirring the must provide enough oxygen. These ones attach the fermentor lid tightly and secure an airlock from the very start of fermentation.

Fruit flies are often a concern. Regardless of how you approach the subject, your fermentor needs to be covered in some fashion. If it isn't, your wine is exposed to all sorts of ambient microbes and insects that could spoil the wine.

The fact is that either method will probably work just fine. There is success reported by those using both methods. You are encouraged to try it both ways and use what works best for you. There is so much CO_2 being driven off by the must that it probably doesn't matter if the primary is airtight or not. In such a case there is no advantage to either technique in terms of oxygen exposure, only in convenience.

Malo-Lactic Fermentation (MLF)

Temperatures

Vinegar!

Wine Chemistry

Important Measurements

There are a few important measurements that the wine making process revolves around. These are important to both commercial wineries and home wine makers. Although you can choose to ignore these elements of wine making, paying attention to them will help you produce a better, more consistent wine.

Specific Gravity (SG)

Technically, *specific gravity* (SG) is the measure of the density of a liquid as compared to water. Water has an SG of 1.0. Liquids that are heavier than water will be greater than 1.0 while lighter liquids will be less. Something twice as heavy as water would be 2.0 and something half as much would be 0.5.

95% of the solids in a ripe grape are sugar. Because of that fact, we know that most of the measured "density" in grape juice is actually sugar. This gives us a way to measure the sugar content of grapes. Juice with a higher SG has more sugar. This can apply to honey in mead easily but less so with other fruits.

When reading a *hydrometer,* which measures SG, if the liquid being measured contains a lot of pulp, the reading will be off (the liquid will appear to be more dense). Because of this, be sure to read samples that have been strained of solids.

Understanding the SG of a wine must is important because it allows you to find how much alcohol is in the wine when it is done fermenting. To do this, take one hydrometer reading before you pitch the yeast and another one afterwards. Subtract the final SG from the starting SG and that can tell you how much alcohol you have in your wine (the difference is what yeast converted to alcohol). If your hydrometer has a built-in *potential alcohol* (PA) scale, it is very easy to tell. If not, use this formula:

(starting SG - final SG) / 7.36 = alcohol content

Titratable Acidity (TA)

Also known as *total acidity* or just *acidity*, this measures the concentration of acid in the liquid. It is usually expressed in grams per liter (g/L). It tells you *how much* acid is in the wine, but not how *strong* it is. This is the difference between TA and pH. It happens that TA is easier to test (with an acid test kit) and so it often gets most of the attention. TA is usually used for making acid additions to the wine instead of the pH value.

pH

pH is another way to measure the acid in a wine. It measures the *strength* of the acids in the wine, but not the amount of them. Different organic acids have different strengths. Tartaric Acid is very harsh and contributes most of the "acidic" character to wine. Contrast that with Lactic Acid which is often described as smooth and buttery in feel.

pH is the measure of the concentration of hydrogen ions (H^+) in a liquid. More ions means more acidity. More acidity means a lower pH. Water has a pH of 7.0 (neutral) and wine typically has a pH of around 3.4 (acidic).

Knowing pH is important because of how some chemicals and microbes react to it. Bacterial growth is increased in less acidic (higher pH) environments. Therefore, having a wine that lacks acid is inviting spoilage organisms. This is also why malolactic fermentation has a hard time in low pH wines.

The most important reason to know your wine's pH is because sulfite works better in more acidic wines. If your wine is low in acid, it takes quite a bit more sulfite to get the same effect. If you don't know your wine's pH, you could be over or under sulfiting your wine which could ruin it!

Yeast Selection

Chemicals, and Additives

Sugars For Wine

Winemaker's Wisdom

“As a rough guide, we like to maintain at least 1ppm free for every .01 point in PH. In other words, if PH is 3.45, free SO2 should be at least 45ppm. At 3.6, free SO2 would be at least 60ppm.” -gregorio

“With your PH meter you only need 1/2 the TA kit. The Phenolphthalene has a reaction point of 8.2. The indicator is a color change when you use the indicator solution. Leave the indicator out, just use the Sodium Hydroxide and titrate to 8.2.” - Jay-CastleRock

Racking (Siphoning)

Racking is the wine maker's term for siphoning clean wine off of the gunk that builds up at the bottom of the vessel, called *lees*. This gunk is comprised of bits of fruit and pulp, but mostly dead yeast. This action is performed for several reasons at different stages in the wine making process. Before we learn about what those are, let's learn how to rack properly and some tricks that might help.

How To Rack

Simple racking is powered by gravity. You need two vessels: one containing the wine you want to rack, and the other empty and ready to receive the wine. You also need, bare minimum, a racking hose about 6 feet in length.

Place the empty vessel on the floor and the one full of wine on a surface higher than the empty one. This is the key. Usually this means placing it on a counter top or table. Note that the greater the difference in height, the faster this will go.

Take the racking hose and place one end in the wine. Now let out a good exhale and give the other end of the hose a good, strong suck. Wine should start flowing out of the first container through the hose. Just before it reaches you mouth, pinch the hose, drop it into the receiving vessel, and let go. If you did it right, wine should start flowing from one container to the other by itself.

This works because the weight of the wine flowing down the hose creates a suction strong enough to pull up more wine from the first container. It will continue to flow until the vessel is empty or you lift the first end of the hose out of the liquid. If you do this, it breaks the suction and you will have to start it over again. Keep the clean wine flowing into the new container until your first container gets down the level of the lees at the bottom. When it gets to this point, lift the hose out to stop the suction. You don't want to get any of that into your new vessel.

After you are finished racking, be sure to clean out your fermentor immediately. Do not put it off or it only gets worse. If you *absolutely* do not have the time, at least place a solid bung in the carboy. That will keep the interior from totally drying out.

That's how it works technically. That doesn't mean it's foolproof. Although fairly simple, there are some things you can do to make it go smoothly.

How To Rack *Well*

- Let the wine completely settle, especially if this is your second or third racking and the wine is clearing. This may involve moving the carboy to the elevated surface and letting it sit there for another day to settle out. Moving the carboy itself can stir up quite a bit of lees that you do not want to suck up. Stirring it all up and racking immediately would defeat the purpose of the activity. Be patient.
- Put the end of the hose at the bottom of the receiving carboy. The wine is vulnerable to oxygen at this point so take care not to let the wine splash, drop, or run down the side of the carboy.
- Place a book under one corner of the carboy when racking. This way, wine settles to one side of the vessel and you can retain more of the wine.
- Use a racking cane. This attaches to the racking hose. You don't absolutely need one, but it makes it easier to avoid sucking up things you would rather leave behind. Prefer a cane with a special tip that makes it less prone to disturb sediment.
- Use an *AutoSiphon*. This instrument combines the racking cane and a pump together so that you don't even need to put your mouth on the end of the hose. Simply insert the AutoSiphon, lift, and pump. Wine starts to flow and you never get your mouth (or the wine) dirty.
- Use a hose clamp. These inexpensive clamps can squeeze the hose shut which can start or stop the flow of wine. This is particularly useful when getting the flow started or at bottling time.
- Don't drop the racking cane or hose all the way to the bottom of the first carboy holding the wine. You don't want to suck up what is down there, so keep the end of the cane or hose well above the “gunk line” until the water level starts to drop. Only put the end down to the bottom when absolutely necessary (when there isn't much wine left)
- Hold onto the cane or hose firmly. Do not swish it around inside or you will stir up all the lees. Make slow steady movement. You can also get clamps or clips to help you with this.
- You will notice that some carboys have very rounded, sloping bottoms. This is bad. Lees and sediment drop out and settle on this slope, making it hard to rack all the way to the bottom. Prefer carboys with squared-off bottom edges.
- If you have an inert gas available to you, you can displace the air in the receiving vessel before racking to prevent oxidation. Nitrogen, CO^2, and Argon all work, but for the home wine maker, this is probably impractical, but there are “canned air” type products marketed for preserving individual wine bottles. These can be used for carboys as well. If you can get dry ice, you can lower a large chunk into the carboy and let it sublime into gas. Be careful not to put the dry ice directly on glass or it may shatter.
- Rack through a fine mesh bag on the first racking to leave behind sediment and pulp. It is better to put the bag on the beginning end instead of the receiving end of the hose. On the receiving end, you end up with a bag full of fine pulp which is not easily drained and not easily removed from a carboy either. You can accomplish all of this by simply tying the mesh bag onto the hose or racking cane with a rubber band. You might also try clean, nylon pantyhose.
- Practice! If you are new to wine making and haven't done much racking yet, try it out on clean water first. You will be glad you did.

Positive Pressure Racking

Although this alternative technique still uses gravity and a hose as usual, you can get it started easier by using an orange carboy cap. These caps have two outlets to attach racking hoses to. Place your racking

cane down through one of the outlets and attach a spare piece of hose to the other. You can either blow on the hose (really hard) or used compressed gas if you have it. The positive pressure in the carboy from incoming gas will force wine out of the main hose and start the flow. Using this technique, you never have to touch the wine, don't have to suck on anything, and do not need any special tools other than the carboy cap and racking cane (which are both very cheap).

“Zero” Racking

If you work with pressed juices such as from grapes, apples, pears, or other fruits, you may do a “zero” racking before fermentation starts. After the juice has been pressed, it will naturally settle into two distinct layers: the bottom layer contains the heavier pulp and sediment while the top layer contains clear juice. You may wish to siphon off the clear juice and ferment it separately. This results in a cleaner, crisper wine with subtler flavors and a simple profile. Zero racking is recommended for sparkling wine bases, apple and pear wines, and other crisp white wines.

To perform a zero racking, press and sulfite the fruit and let it sit undisturbed in a primary fermenter. If you can refrigerate the must, this will slow down oxidation and help it settle faster. Let the must settle for 24 hours, rack, and start fermentation immediately.

Racking Schedule

After the primary fermentation, the wine will be sitting on a pile of lees and fruit pulp called the *gross lees*. Depending on what you are fermenting, it can be quite thick, perhaps an inch or two. This is all material you want removed from the wine. Since you can't remove the gross lees from the wine, you remove the wine from the lees.

During an active primary fermentation, all of this junk is being tossed around in the wine because of all the activity and off-gassing. When the fermentation settles down after a week or two, most of this material will settle down to the bottom of the fermentor. This is the time for the first racking.

Times for subsequent rackings depend on what you are fermenting and how well it is going. A fermentation that finishes in three weeks will clear much faster and can be racked accordingly. A sluggish fermentation with “issues” will not follow an ordinary racking schedule. However, for most wines, you can rack according this basic outline:

- After primary fermentation (~7 days)
- 1 Month later
- 2-3 months later
- 2-3 months later
- Just before bottling

This is just a basic outline. You should rack when you see a deposit at the bottom of the carboy, not according to a hard schedule. If you leave the deposit there for an extended period of time (over three months), the dead yeast will decompose and cause off flavors and odors in the wine that are hard, if not impossible, to remove. This includes hydrogen sulfide which smells like rotten eggs! So if you see a deposit, rack. Just be careful not to rack more than once a month. Every time you rack, you expose your wine to oxygen which will eventually reduce the quality of the wine.

Sulfite Application

Sulfite should be applied just before every racking to make sure that its exposure to oxygen is minimal. However, without a pH meter and SO_2 testing kit, it will be hard to tell how much sulfite to add to the

wine. If you have these tools, definitely use them. Add just enough sulfite to keep your wine at a constant SO_2 level within 40-50ppm.

Otherwise, you could go by this very general advice: *add ½ Campden tablet per gallon at every other racking* (or equivalent amount of potassium metabisulfite). This advice isn't guaranteed to work for all wines due to variance in pH and oxygen exposure, but if you lack the tools to measure the sulfite levels, this may be as good as you can do.

Wine Maker's Wisdom

“I use the bottom half of a ball point pen (innards removed) as a washable mouthpiece to avoid the oral flora aspects of applying suction the old fashioned way :-)” - DownHill

“One tip that I sometimes do is put a wedge under the carboy and let the lees settle. This kind of makes it settle to the side. Once it is time to rack, you remove the wedge and put your racking cane on the side with the least amount of lees.” -1937 Waco EGC-7

“To avoid having to top up a carboy, I go from my fermenting bucket to the larger 6-gallon carboy with the ribs on it, and then rack to a smaller 6-gallon smooth sided carboy. Since the second carboy is a bit small, there is almost no top off.” -1937 Waco EGC-7

“I put the full carboy on a counter top and the one to be filled in a chair directly below it. I use the AutoSiphon, which is easy as pie (most of the time.) I'll get the racking going and hold the siphon higher in the wine to start. As the level of the wine starts to get close to the bottom of the siphon, I drop it down a few inches, continuing this until I get close to any sediment. Then I prop us one side of the carboy with a towel folded over a few times. Depending on how many times I've already racked, I don't mind getting a little bit of sediment, as I will undoubtedly get rid of that at the next racking. BUT, I don't get too much sediment, just a little to get the most actual wine as possible.” - Rob C

“If you have a Buon Vino Mini-Jet filter you can rack just using the pump (bypass the filter elements)” - rockycreek

“I don't use a self-starting siphon at all. All I do is insert my racking cane into the carboy, tape it in place (like draping a sweater over your shoulders), cover the top by cupping it in my hand, and then blow into the opening in my hand. I have yet to find an opening that I can't get a siphon started with.” - Curt

fill hose with water first

Aging

- aging bell curves for reds and whites (when are they "over the hill"?) If anyone has any graphs or additional info on this particular topic, i'd be interested.

- what improves/influences aging?

- temperature / humidity / cellaring / storage issues

- bulk aging

- "ages faster in small containers" theory

- sitting on compacted lees for too long produces off-flavors

- sur lees

- barrel aging (although this is discussed at length in the Barrel section)

- oaking

- soleras and "micro-soleras"

- mold on corks

Fining, Filtering, and Clearing

Most wines will clear naturally with time. There are ways to help it do this, but for stubborn wines that will not clear on their own, there are ways to help it along including *fining* (chemically removing particles) and *filtering* (mechanically removing particles).

Clearing a wine is not absolutely required. Cloudy wines are certainly drinkable, but never a sign of quality. Clarity even scores additional points in judged wine tasting competitions. Many wineries are boasting “Unfined / Unfiltered” on their labels to appeal to those that do not want unnecessary additives in their wine, but most commercial wines are fined or filtered in some way. Some home wine makers choose to do this as well, but again, it is not required. Fining or filtering often comes down to a wine maker's taste and style.

Wine that is noticeably cloudy should not be bottled. Cloudy wine will continue to drop sediment in the bottle over time. This is usually unsightly, especially in white wines. However, small deposits of sediment in heavy red wines are sometimes regarded as a sign of quality. They tend to drop sediment over time as various components undergo chemical changes and fall out of suspension. Most white and light-bodied red wines do not do this. Therefore, you should let the natural fermentation-related sediment drop in the carboy before bottling.

Clearing

The natural clearing process takes place after the wine is completely fermented. During fermentation, small particles in the wine naturally rise as CO_2 from the fermentation drives everything upwards and creates turbulence in the vessel. After fermentation, this turbulence is gone and allows particles to settle out. Clearing will naturally take place in about three months following the end of the fermentation, but can take up to a year.

Most wines clear gradually over time. There is no sudden indication of the wine being “officially” clear. Because of this, many wine makers choose to bulk or barrel age their wines in topped-up carboys for a year or longer to make absolutely sure the wine has dropped its sediment.

Changes in temperature will cause the liquid to move in patterns inside the carboy, so keep the carboy in a sheltered environment with low change in ambient temperature. You might try a closet, basement, or even crawlspace. Do not keep the wine in the garage if the temperature fluctuates too much. Keep the carboy away from sunlight or from windows and heater vents (where temperature differences are great). Try to keep the wine as stable and undisturbed as possible.

When bottling, be sure to move the carboy into the racking position and let it settle again for a short time before starting (up to 24 hours is fine). You would not want to clear the wine for a year and stir it up again just before bottling.

Note that natural clearing works better if the wine is *degassed* first. Removing dissolved CO2 in the wine will help precipitate suspended particles. Letting wines sit undisturbed will slowly release CO2 anyway, but you can degas first and let it clear faster.

Fining

Fining rids a wine of undesirable haze, odors, or flavors by using additives. These additives normally

bind with particles in the wine and precipitate out. The wine can then be racked as usual.

Fining agents are broken down into positive and negative charges to address different wine particles that carry a charge as well. Different fining agents cure different problems. Proteins in the wine are positively charged, so a protein haze is treated with negative fining agents such as bentonite or kieselsol (silica gel). Other particles in the wine can be treated with positive finings agents like isinglass (made from the swim bladders of some fish), chitosan (from shellfish), gelatin, and egg white. These latter agents are usually use to treat excess tannin which result in overly astringent red wine and browning and bitterness in whites.

It can be difficult to guess which agent to use in any given situation. It is generally best to start with bentonite or isinglass. Most of the time, these work just fine. More specific problems may need more experimentation.

Because it is possible to overfine, it is recommended that you work with a small sample and do a "bench test" before applying any agent to the entire batch of wine, especially if you work with larger volumes. If you hit your wine with every agent you can think of before you get the "right" one, it may hurt the wine's flavor or aroma.

By far the most popular fining agent for home wine makers is *SuperKleer*™ (or brand equivalent) which includes both kieselsol (+) and chitosan (-) and can clear just about any wine in as little as a few hours. The instructions typically recommend that you add one half first, wait a few hours for it to take effect, and then add the other.

Most fining agents work much better in cold temperatures. After adding and stirring the agent, it might be helpful to do a concurrent cold stabilization. Cold stabilizing together with bentonite fining is an especially useful cobination. The bentonite will help the potassium bitartrate (cream of tartar) precipitate, which in turn keeps the bentonite sediment from stirring up during racking.

Filtering

Filtering physically removes particles from the wine. This is usually accomplished with a set of paper filters, much the same way making coffee works. Wine is pumped (or gravity fed) through a paper membrane and into a receiving vessel.

Filters pads come in several sizes and filtration ratings. The smallest (0.45 micron) filter out all microbes including malolactic bacteria and yeast cells. This is known as a "sterile filter" and prevents any kind of continued fermentation in the bottle. Course filters (6.0+ micron) are for heavier particles. It is recommended that you use a course filter before using a smaller size.

Filters themselves are either motorized or gravity fed. The general consensus is that gravity-fed filters are slow, leaky, and error prone, although are considerably cheaper since. If you have the money, invest in a motorized filter. The most popular brand is the *Buon Vino Mini Jet* or *Super Jet*. The Mini Jet is intended for smaller 5-gallon batches while the Super Jet can handle up to 60 in one sitting. The *Enolmatic* brand can both filter and bottle, but it is more expensive.

It is often asked if filters strip wine of flavor or aroma. Generally, they do not. However, a brand new filter pad may lend the initial amount of filtered wine a "papery" taste. You should run several gallons of water through the filter pad before filtering actual wine. You can further improve by adding 2-3 tsp. of tartaric acid or acid blend per gallon of "dummy water." You may also choose to bottle the first bit of filtered wine separately if you suspect there might be a reduction in quality..

Cold Stabilization

Cold stabilization primarily corrects a number of cosmetic issues but is otherwise unnecessary for the

home wine maker . The main benefit of cold stabilization is the reduction in tartaric acid, usually reducing the TA by about %0.15 and raising the pH a tenth of a point or two. Tartaric acid is the primary acid that causes wine to have a “bite” or “sizzle” in it. As the chemical environment changes during fermentation, tartaric acid reaches a saturation point and can be precipitated out by dropping the temperature. This causes salts formed from the tartaric acid to fall to the bottom of the wine. This salt is often referred to as *wine crystals* or *cream of tarter* and can form even in the bottle after long term aging. It is a simple cosmetic defect and will not harm any of the wine's other qualities.

Cold stabilization is achieved by reducing the temperature to near, or slightly below, freezing (32˚F) for 2-3 weeks. This allows all the precipitate to cleanly settle on the bottom. After the cold period, rack the wine off the crystals at the bottom while the wine is still cold. Increasing the temperature before racking may dissolve the crystals back into the wine.

If you live in a part of the world where the temperature hangs around freezing during the winter, this process can be done by leaving the carboy outdoors for a time. Be careful that the wine does not sit in the sun or be exposed to other elements. Also be careful the temperature does not drop too far below freezing or the wine itself may freeze and shatter the carboy. If the temperature goes too high, you will be wasting your time.

A more controlled way to cold stabilize is to make some room in the refrigerator. A spare refrigerator, even one picked up cheap off someone's curb, will do nicely.

If you plan on fining with bentonite as well, it is best to add the bentonite at the same time you cold stabilize. Not only does this reduce the number of racking needed, but the bentonite acts as a “seed” and helps precipitate the excess acid.

Again, this step is largely unnecessary for the home wine maker, but can help tame wines with high acid content. Not all wines form wine crystals. Even if they do, it will not hurt the wine in any way.

Stabilizing

Yeast Fermentation Stabilization

Stabilizing prevents wine yeast from making any attempt to start fermenting again. Bottling a wine that isn't properly stabilized is a gamble that can lead to leaks and pushed-out corks, with explosions in rare and particularly careless situations. Fermentation depends on both yeast and sugar, so stabilizing aims to knock out at least one of those variables. In order to prevent further yeast fermentation, there are five options available:

Finish Dry

If the yeast is vigorous and consumes all the sugar in the must, it simply runs out of food and stops. Fermentation cannot continue because there is nothing to fuel it.

If you aim to finish dry, they key is to use a yeast that can handle the alcohol level in your finished wine. Some yeast strains die out faster than others in the presence of high alcohol. You can use a high-alcohol tolerant yeast such as EC-1118, K1V-1116, or Premier Cuvée to get the job done. These strains will ferment up to 16% alcohol if you are careful, and EC-1118 in particular will drive the alcohol content beyond 18% if you keep it happy. Some wine makers have been able to coax it up to and even past 20%. However, most wine musts have sugar levels yielding 14%, so as long as the yeast can produce that minimum amount, this technique can work for you.

Fruit wine makers have another option. Since most fruit wine recipes call for the addition of sugar, you can simply measure the sugar out to a desired level and use any yeast. If a yeast strain tops out at 12%,

you can add sugar to a level of 11-12% potential alcohol.

The downside to using this technique is that you may be put in a situation where you have to use a yeast that does not work well with your recipe. EC-1118 and Premier Cuvée are noted for being strong fermenters that ferment to dryness, but they are not noted for enhancing the flavor of the underlying fruit. They typically produce a very crisp flavor in the finished product. You also end up with a dry wine, which may or may not be your goal.

Finish Sweet

Finishing sweet uses the opposite technique of finishing dry. Instead of putting a high-alcohol yeast in a low-sugar must, you put a low-alcohol yeast in a high-sugar must. With a high enough sugar level, even the toughest yeast strains will eventually tire and give out as the alcohol level rises to intolerable levels.

For grape wines and kits where the sugar level is not adjustable, you can use a lower powered yeast like D-47, Montrachet, and RC212 which ferment to 12-14%. If you do have an option of modifying the sugar levels, you will naturally want to add enough sugar to overpower whatever yeast strain you intend to use. Aim for 1-2% potential alcohol above the alcohol tolerance of the yeast. This doesn't mean that you will actually get this much alcohol. For instance, if your yeast stops as 14% and you add enough sugar to increase the potential alcohol to 15%, your finished wine will still have 14% actual alcohol in it and about 1% worth of residual sugar.

When finishing sweet and if you are dead-sure the yeast has stopped working, you may attempt to bottle as-is. However, some wine makers using this technique have been victims of spontaneous refermentation as the yeast already present in the wine decide to “wake up” and ferment some more! If this happens, your corked bottles will either pop open and leak or just explode. To prevent this, you can use potassium sorbate or fortify before bottling. If you don't want to add anything to your finished wine, keep it in the carboy for up to a year in a warm location to make sure the yeast finishes the job. Also keep track of the specific gravity to make sure the alcohol level matches the yeast's normal tolerance. If it's any lower, you have a potential disaster.

Sorbate

Most wine makers choose to use *potassium sorbate*, or just “sorbate,” to stabilize a wine. Chemically, sorbate prevents yeast cells from reproducing by limiting their ability to expand their cellular membranes and “bud” offspring. **Note:** although sorbate prevents yeast cells from multiplying any further, *it does not kill them.* Yeast in the presence of sorbate will continue to consume sugars in the wine until it reaches its maximum alcohol tolerance and ceases fermentation.

Sorbate is used in conjunction with sulfite. The sorbate prevents further reproduction and the sulfite knocks the tired, remaining yeast right between the eyes. It is important to use both of these together. One without the other may not effectively stabilize the wine. Sulfite is also used to prevent malolactic fermentation by inhibiting the bacteria that causes it.

If you intend to put your wine through malolactic fermentation (MLF) or if there is even a possibility of it happening, *do not use sorbate*. MLF that takes place in a sorbated wine will produce a horrible smell often likened to geraniums. If this happens, your wine is ruined and there is nothing to undo its effects. You can however, induce and complete MLF and *then* use sorbate (with sulfite) with no harmful effects. Some wine makers prefer to use “Lysozyme” instead of sorbate in wines that have undergone MLF.

To use sorbate, add ¾ tsp of potassium sorbate per gallon of wine along with sulfite according to the normal directions. Stir and let the wine sit for up to a week before attempting to bottle. Although this is the minimum amount of time, it doesn't hurt to wait longer to be absolutely sure the yeast is finished

fermenting.

Fortify

The easiest and most sure-fire way to stop fermentation cold is to fortify the wine with spirits. Simply add high-proof grain alcohol or your favorite brandy to the wine in an amount that produces a final alcohol level intolerable for yeast. Usually, this starts around 15-16% for most yeasts strains.

Port wines and sherry are specifically made this way. In this process, spirits are added to increase the alcohol level to 18-22% during the fermentation. This stops an active fermentation dead in its tracks.

Be aware that while adding extra alcohol won't hurt the wine, it could offset its balance. Wine containing additional alcohol in it will leave a burning trail down your throat if it isn't accompanied by additional sweetness. Fortification is a technique that works, but may not accommodate your particular wine recipe.

Filter

Extremely fine filters (0.45 micron) can literally remove the yeast and microbes from the wine. This process is known as “sterile filtration” and is often used in commercial wineries. In addition to removing the threat of refermentation, it also clears the wine considerably. Some will argue that this may also strip some of the flavor components of the wine while others disagree.

Filtration obviously requires a filter and pads which many home wine makers do not have. If you wish to sterile filter your wine, you need a filter (preferably motorized, as opposed to gravity-fed which may take prohibitively long) and a 0.45 micron filter pad. It is recommended that you first use a coarser filter pad to remove larger particles before using the sterile filter. If you decide to sterile filter, you do not need to use sorbate.

Malolactic Fermentation Stabilization

Malolactic fermentation (MLF) can happen spontaneously in many wines, particularly grape wines. This process is the result of malolactic bacteria consuming sugars in the wine and producing CO_2, much like yeast. However, the bacteria doesn't *require* an abundance of sugar and MLF can happen even in dry wines. MLF can cause instability in the bottle due to the production of CO_2. Worse, if MLF occurs in the presence of sorbate, it produces its signature geranium smell which is a byproduct of the bacteria trying to process the sorbate. For these reasons, it is wise to stabilize the wine against MLF if you do not intend to make use of it.

MLF is best prevented from ruining wine by making sure it happens *first*. It is best carried out by inducing MLF near the end of the yeast fermentation. Once it finishes, it will not occur again and the wine can safely be bottled. Make sure that you make any needed acid adjustments before MLF begins. Adding it afterwards may cause it to restart. Also note that some yeast strains do not tolerate concurrent MLF, notably “killer” yeasts such as Lalvin K1V-1116 and EC-1118 which produce byproducts that are toxic to many forms of bacteria.

For some wines (mainly red grape wines) MLF is desirable, but for others it is not. For those wines where you specifically do not want it to occur, the best technique is to add sulfite to the wine up to 50 ppm free SO2. This inhibits the ML bacteria from getting started in the bottle.

Another more advanced option for inhibiting ML bacteria is *Lysozyme.* This natural antibacterial enzyme found in tears, saliva, and egg whites (among other things) can be used to retard, delay, or prevent MLF. Apply as per your supplied directions. If you did not receive any, use ¼ tsp. per gallon. You can add the enzyme at any point during the wine making process.

Degassing

Degassing is the process of removing excess CO_2 from a wine. While not totally necessary, it solves a number of problems:

- Excess CO_2 can slightly flatten or mask the aroma and taste of the wine.
- Wines that are not degassed will be “spritzy” or fizzy both in the bottle and in your glass when poured. Wines with no trapped gas will pour out smoothly and not produce bubbles in the glass. Still wines that make bubbles are highly suspicious.
- Trapped gas also helps particles stay in suspension longer. By degassing a wine early (just after fermentation), you can speed up the natural clearing process.
- Exceptionally gassy wines may push out corks if there is a dramatic rise in temperature.

Many home wine makers will completely skip the step of degassing by simply waiting for it to occur naturally. It has no serious impact on the wine itself, but degassing gives wine a slight edge in quality and perception.

Degassing Methods

Time

Usually the best method for removing excess CO_2 is to wait patiently. You may leave the wine in a carboy for as long as you wish, but a full year is usually enough to let the gas escape on its own. The natural motion of the wine over time will slowly release the trapped gas. This isn't a foolproof method. Some wines that are bulk-aged for long periods of time are still gassy. If that's the case, consider a more proactive approach.

Stirring

Stirring moves the wine and combines CO_2 into bubbles large enough to escape the liquid. This is why giving a carboy a swirl or a shake during fermentation usually yields a flurry of bubbles. Stirring does the same thing after fermentation when there is no more CO_2 being produced.

A racking cane will serve in a pinch. Just insert the cane and stir the wine gently for about 3-4 minutes. It's a good idea to make sure your sulfite levels are adequate before stirring since some air will be introduced in the process.

There are some better tools for stirring including a *Fizz-X* and a *Wine Whip*. The Fizz-X is a paddled stirring rod and the Wine Whip has a rod with an arc in it to create a good motion in the container. Both tools attach to a drill or powered screwdriver and can be run at speeds that would tire anyone's arm out in seconds. If you have the option, prefer an electric tool to a cordless battery operated one if the cordless tool cannot keep up constant RPMs. After 1-2 minutes of stirring with these powered tools, your wine should be rid of CO_2.

Make sure your carboy is not filled up past the neck. The release of bubbles will overflow the container if you stir too fast. It may help to siphon off a bit of the wine before you perform the stirring. You can add it back in afterwards.

Vacuum Tools

Stirring can be a bit messy and can also introduce some level of oxygen into the wine. When this is not desirable, you can try using a vacuum tool. Note that none of these tools were specifically designed for degassing wine, but enterprising wine makers find a way!

The first is a “bottle saver” vacuum pump that is used to pull the air out of an open bottle of wine. They are sold under many different brand names including *Vacu-Vin* and *Trudeau*. While they work well for saving wine, they can also pull a vacuum on an *entire carboy*. The vacuum will pull the trapped CO_2 right out of the wine. Bubbles will race up through the carboy with even a slight vacuum pressure if there is trapped CO_2. The trouble with using a bottle saver is that it takes a lot of work.

In order to attach the bottle saver pump to the carboy, you need to use one of the valves that come with the bottle saver. There are a variety of ways to attach the valve to a carboy. One easy method is to use *Lev's Vacu-Vin Adapter* which you can quickly build with materials you probably have on hand. See the appendix for more details.

Once attached, start pumping the vacuum pumper. You may start to see gas bubbling out with just a few pumps. Let it sit for a while after you've pumped it as far as it will go. Eventually the activity will die down. Then pump some more. As the gas bubbles come out of suspension the vacuum pressure lightens up a bit, so you have to keep pumping. Eventually you'll reach a point of diminishing returns (your arms get tired!). Then you can stop. If the vacuum is actively drawing out bubbles, there is no need to pump harder. Doing so increases the vacuum but may present an implosion risk on smaller 1-gallon carboys if you really “go at it.”

The alternative to the arm-numbing bottle saver technique is using a *Mity-Vac*, a tool originally designed for working on automotive break lines. This powered tool can be inserted into a standard drilled bung with a tapered Mity-Vac attachment. The power of this tool will pull out virtually all of the trapped gas in the wine.

Finally, if you have a Food Saver with a hose attachment, you can adapt the hose to a carboy bung as use the Food Saver as a vacuum. You can create an adapter using

There are a few tips and precautions when using vacuum tools:

- Always degas using a topped-up carboy. Carboys with excessive head space are a potential implosion hazard.
- Do not increase the vacuum pressure past 20 HG using the Mity-Vac. This could shatter the carboy.
- Degas wines that are warm (above room temperature). This helps release the CO_2.
- Go slow to start with and gradually increase pressure. Gassy wines will create a volcano of bubbles if you put on too much pressure right away.
- Vacuum tools will not work on plastic carboys.

When using any vacuum tool, you may never get the wine to a point where it produces no further bubbles. When continued effort does not release a substantial amount of bubbles, you can probably stop. This point is usually after an hour of using either a bottle saver or the Mity-Vac.

Blending

Bottling

Bottling Day is a very rewarding occasion. You finally get to see your finished creation put in a bottle and corked. Hopefully, you get to sample a bit too! There are still plenty of options to consider though, and more than a little controversy over those options. Let's get started with options about the bottling process itself.

Ways To Bottle Wine

There are actually a surprising number of ways to “bottle” your wine. Each has benefits and drawbacks. Before you bottle, consider each one. Most home wine makers use the traditional wine bottle and cork approach, but there are several other options.

Wine Bottle with Cork

This requires a standard wine bottle and a cork, obviously. There are numerous types of corks, which will be discussed later. Most wine makers choose this approach because it's reasonably easy. More importantly, it is the more “traditional” way to bottle wine. When people think “wine,” they think of bottles and corks. Not screw caps, not boxes, and hopefully not jugs. Bottling wine with a cork has a certain bit of romance and presentation factor that can't simply be ignored. Using traditional wine bottles is usually more convenient to the home wine maker because they are plentiful and easy to acquire.

Wine Bottle with Screw Cap

Some wine bottles are made with a thread on the top to accept a 28mm screw cap. You can purchase caps for these bottles very cheaply. Your choice will be between “polyseal” plastic caps or thin, metal caps with a pad lining like you find on many bottled consumer products. The polyseal plastic caps are indefinitely reusable and cost only pennies more. They are also much more attractive. If you decide to buy threaded bottles, favor the plastic caps. The liners on metal caps tend to where out or absorb colors and odors.

Note that wine bottles with threads are meant to be capped, not corked. You should *not* cork a threaded bottle. Threaded bottles often have a different neck taper and can cause a poor seal and leakage in corks. Some bottle types also have thinner glass and may break if force is applied by a corker. It is also possible to accidentally push corks inside the bottle when opening them which is particularly embarrassing.

Some wine makers choose to simply reuse old liquor bottles, both bottle and cap. This is perfectly viable, but unless you drink a lot of alcohol, you probably won't be able to get enough bottles for your wine making. You should not attempt to cork a liquor bottle either, as the throat size is often different from that of a standard wine bottle. There is actually a great variance in cap size among these bottles.

Beer Bottle with Crown Cap

Would you believe you can cap your wine in a beer bottle? You certainly can! Some would say it has every advantage over corks too. Beer bottles are approximately half the size of a standard sized wine bottle at 340ml. This makes them convenient if you can't drink an entire 750ml bottle of wine immediately after opening. Crown caps for beer bottles are substantially less expensive than corks. Suitable corks will cost at least $0.25 each. Crown caps cost pennies. They are so inexpensive, they are often sold *by weight*. And finally, a crown cap provides a perfect, airtight seal with no impurities, no chance for off-flavors or cork-taint, and no dust or “cork floaties.”

On the down side, some people argue that aging wines need to breath and so a cork is better (the issue of cork “micro-oxidation” is highly debatable). Beer bottles also have an image problem. No one wants good wine served to them in a beer bottle. Of course, if it's simply for your own consumption, no one cares but you!

Finally, do *not* attempt to cork a beer bottle. They have a different opening size, a drastic neck taper which produces a poor seal, and often have thinner glass which is a potential hazard. Beer bottles were never designed to be used that way and shouldn't be.

Keg

You could put your wine in a keg, although most people making traditional still wines wouldn't. But mead makers often keg their meads. If you are making a sparkling wine, it might actually make sense to keg it under pressure rather than bottle the wine. You will need a tap and gas system to dispense the wine this way. Care should be given to the type of gas used so that the acidity of the wine is not affected.

Having wine on tap means you always have something that tastes fresh and you don't waste a drop. Of course, if you make a lot of different wines, you would need to have a lot of kegs and that can get expensive. It's also harder to give away as a gift or to share.

Carboy

Finally, you could just let the wine sit there in the carboy indefinitely and drink when ready. A word of caution though: Every time you open a carboy you expose it to air. If you open a large carboy to sneak a sample from on a regular basis, you will eventually oxidize the wine (and a lot of it, at that). As the airspace gets larger, the oxidation gets worse and eventually the wine will spoil in one way or another. You should never store your carboys at anything less than full capacity. Some beginners feel that bottling is too much work, so they just keep the wine in a carboy or large flask and pour a drink every so often. This is a very bad idea. People doing this probably have no idea how bad their wine is getting and have probably never tasted their wines properly aged in a bottle. If you like the carboy idea, consider kegging instead.

Bottle Closures

How to seal wine in a bottle is the field of a hard-fought war. There probably is no area of wine making quite so controversial. There have been studies, taste tests, and experiments performed on every kind of bottle closure there is, with evidence for and against each one. At the time of this writing, there is no clear winner. We present to you the options and discussion on each type of closure along with practical pros and cons.

Traditional Corks

Corks have been used to seal wine bottles for *hundreds* of years. The entire concept of a cork goes hand-in-hand with wine making. This is a tough image to break. When people buy expensive wines, pulling out (or worse, unscrewing) anything other than a fine wood cork would cheapen the experience in the minds of many. This fact alone will keep corks on the scene for a long time to come.

Wood corks have come under fire in recent years due to a problem called “cork taint.” This occurs when trace amounts of chlorine used to bleach corks (which are normally much darker than you are accustomed to seeing them) along with certain microscopic fungi start to react with the wine. It produces a chemical called 2,4,6-trichloroanisole (TCA), among others, and results in a wine said to be “corked” and tasting like mushroomy, wet cardboard. There are other causes of cork taint, including certain chemicals leaching into the cork wood and also into wood barrels used for aging. Either way, cork taint is said to affect about 1%-5% of all wood cork-sealed bottles in the world. Even this figure is highly debated.

Recent technology and changes in the process of making corks has led to reduced levels of cork taint, but it still isn't a solved problem. Cork taint affects large wineries as well as the home wine maker. While it sounds like a big problem, most home wine makers rarely experience it these days (or at least can't detect it).

Besides cork taint issues, natural corks may also leak. This is mostly a problem facing home wine

makers and is usually easily remedied. Use larger sized corks and do not boil or soak your corks prior to bottling. Having a floor corker makes this easier.

Finally, some would say that the entire concept of shoving a piece of wood into a glass bottle to seal it is archaic and should be done away with as soon as possible. Proponents argue that a wood cork allows for micro-oxidation in somewhat the way a wood barrel does. While it has been shown that wood corks do “breathe” at least a little bit, it's just that: *only a little bit*. It would take 60 years to saturate a bottle of wine with oxygen. The aging process is effectively anaerobic. The effects of “micro-oxidation” on taste and aroma have not been adequately compared to other closure types at this time.

In terms of purchasing corks for wine making, you again have some options:

Natural Cork

This is a one-piece, traditional cork and is considered “high-end” compared to agglomerate type corks. These corks are usually graded based on their surface features. High quality corks have few fissures or flaws in them and have mostly smooth surfaces. Wineries selling top-quality wines can pay as much as two dollars just for the cork. Conversely, the lowest grade corks are often sold as craft material. When buying corks, *never* buy corks meant for crafts. Only buy corks specifically made for wine making.

Natural corks are the most expensive corks you can get for home wine making. Their quality recommends them for long-term aging. If you intend to age anything over 5 years, seriously consider using a natural cork.

You might also be able to locate “winery overruns.” These are corks that wineries purchased and stamped with their logo but did not get used. These are often sold at a discount by wine and beer suppliers. They have the quality of winery-grade corks without the painful price. If you can put up with having someone else's logo on the cork, they are a good investment.

Agglomerate

On the bottom of the cork totem is the *agglomerate*. It is manufactured by joining shredded cork bits with a binder into a molded cork. Many low-end wines use agglomerate corks because they are certainly the cheapest corks available. They are also easier to manufacture and more uniform, thus less prone to having flaws.

While cheap, agglomerates are often known to leak because they don't have the structural integrity that a solid natural cork has, especially if poorly bottled. But agglomerates are not necessarily bad. Many use agglomerates and age them for many years with no problems. But *on average*, there are more problems with agglomerates than other cork types.

Agglomerate corks are normally recommended for wines which you intend to drink young, usually 1-2 years. Any more than that and you are taking a certain risk by using them. We're not saying you can't. Certainly, many do. But if you have a top-notch wine that you spent a long time creating, why cheap out now, right at the end of the process?

Twin-Top

Twin-tops also go by others names such as “twin-discs,” “trifinos,” and “disc-agglomerates.” They are created using an agglomerate core and two solid pieces of cork bound one on each end. Since wine usually doesn't wick up the sides of a cork, the solid natural cork ends contain the wine better than a normal agglomerate and present a better face on the outside of the bottle.

Twin-tops are a happy medium between agglomerates and natural corks. They are less expensive than natural cork and, as some would claim, every bit as good. While twin-top corks are not normally rated

for any more than 5 years, many have used them well past this with great results.

Cork Size

Besides the type of cork, you also need to choose a *size*. Natural corks of all types come in several thicknesses for wine bottles: #7, #8, and #9 being the thickest. You should use a #9 if at all possible. This usually requires that you own a floor corker. If you own a hand corker, you may be stuck with #8 corks which are known to leak at times. You should *never* use #7 corks which are pretty much guaranteed to leak. Many supply shops don't even bother to sell them.

Besides the thickness, there is also length. A standard "short" cork is 1.5 inches. Longer 1.75 inch corks are considered more premium and are meant for longer aging. If you plan to drink your wine within two or three years, save your money and get the standard short corks. For those big reds and port wines you want to leave as an inheritance for your children, get the long corks. The difference in price is not great. Many people just use long corks on everything.

Note: A Bordeaux style bottle has a longer sealing surface in the neck. A long cork will seal along the full length of the cork. A Burgundy style bottle (with the tapered neck) will not benefit from the extra length. For this style bottle, the short cork will be sufficient and may cost less too.

Synthetic Corks

With continuing cork taint issues along with the need for a cheaper, more environmentally friendly wine closure, the synthetic cork has become much more popular in recent years.

When synthetics were first introduced into the market, they were hard and unattractive. While no more difficult to insert, these early models created embarrassing moments at dinner tables everywhere as the waiter struggled to open a simple bottle of wine. Removing these early corks was especially difficult using traditional corkscrews. Because of this issue, many wineries have stayed away from them.

Synthetic corks have come a long way since then. Modern synthetics are soft, supple, and easy to pull. They also come is a bewildering array of colors and designs.

The main draw of synthetic corks is that they form a perfect seal and are completely inert. They do not allow oxygen to interact with the wine which keeps the wine fresh and young through extended aging. Synthetics do not have any risk of cork taint. For large wineries, the economics of this alone may be reason enough to consider them.

Synthetic corks may be more expensive than a regular cork, but synthetics are not presented as "cheap alternatives" to natural corks. They were made to solve some of the issues that natural corks have, not to be less expensive.

How they affect aging is uncertain at this point. There have been some studies that highly rate synthetics and other studies that completely *berate* them. It is true that their air-exchange rate is virtually zero over time, so it depends on whether or not you think "micro-oxidation" is good or bad for wine.

Regardless of how well the wine itself performs, you can bet a synthetic cork will outlast the wine. Wines that are many decades old often need to be recorked because their natural corks simply get brittle and fall apart with age. A synthetic cork can last practically forever.

Screw Caps

Sometimes known as "Stelvins," these are metal screw caps that are usually pressed on to a threaded bottle by a machine, much like many other bottled consumer products. Stelvin screw caps create a perfect seal with no air exchange and are also completely inert. Some wonder why this technology,

which has been around for many years, has not been well receive by wine makers. The answer is mostly about image. Wines you “unscrew” feel cheap compared to wines you uncork. It has nothing to do with the wine itself. Most people want to hear the pop and sniff the cork and other traditional sorts of wine rituals.

Stelvin screw caps take some extra machinery to apply to bottles, so they are certainly out of reach for the home wine maker. It is possible to by regular metal or plastic caps to fit threaded bottles though. Even if you decided to buy new caps, it's often difficult to find enough bottles with threads to make it worthwhile. While replacement caps are inexpensive, you would probably have to purchase most or all of the bottles which can get expensive.

Bottles

Bottle Types

Bottles come in dozens of different types, colors, and sizes, but there are some standards you will see.

The typical bottle holds 750ml of wine. That's about enough for four full glasses of wine, five for lighter drinkers. However, bottles come in other standard sizes including a half-bottle (375ml) which is usually reserved for dessert wines, and a “split” or quarter-bottle (187ml) often served in some restaurants and on airplanes. (Note that although a “split” is technically a quarter-bottle, many people refer to the half-bottle as a “split” too). In large sizes, you often find a “magnum” or double-bottle (1500ml). There are even larger sizes named after Biblical kings, but you usually only see these as decorations and are not very practical for bottling. These larger sizes often hold champagne. You will occasionally encounter a 500ml bottle, usually used for ports and sweet or rare wines.

Although there are a variety of shapes and styles, they make no functional difference. Nevertheless, certain styles of wine are often associated with certain styles of bottles. The most common bottle is a *Bordeaux* bottle and is mid-sized with tall, angular shoulders, usually holding a red wine. The other very common bottle is the *Burgundy* style which has a broad base, sloping shoulders, and a longer neck. Burgundy bottles usually contain white wines. *Alsace* bottles (also called “Stretch” or “Hock” bottles) are noticeably taller than other styles and feature a very long, elegant curve. Riesling and Gewürztraminer are normally found in an Alsace bottle. *Port* bottles look much like a Bordeaux bottle but often feature an”Adam's Apple” in the neck. Theoretically, this is to catch sediment as the wine is poured. Port wines often have heavy deposits in the bottle from long-term aging.

Champagne bottles are entirely different. Champagne and sparkling wines are carbonated and under intense pressure. Bottles for these wines are made with double-thick glass and will be noticeably heavier than regular bottles. This extra-durable construction enables them to contain the pressure from the sparkling wine, up to 90 PSI, or roughly three times that of a car tire! If you make sparkling wines, you *must* use a Champagne bottle. Bottling sparkling wine in a regular bottle will create a fragile bottle-bomb.

Some other less common types include the “fluted” half bottle which looks like a very small Alsace style bottle. These narrow and elegant bottles often contain ice wines and other dessert wines. One of our favorite bottles is the *Bellissima* style, which comes in 375ml and 500ml. It looks like a very narrow, elongated version of a Bordeaux bottle. It features the same high shoulders but has a long neck and body, being nearly 14 inches tall! You will always have to buy these special bottles . They are coveted by home wine makers and usually are bottled with premium wines. Expect to pay 50%-100% more for these than regular wine bottles.

While the shape of the bottle does not affect the wine, it may not work with your wine rack. If you use a “box” style wine rack where the bottles are stacked on top of each other, Bordeaux bottles stack

wonderfully but other types create potential hazards. Be careful about stacking these bottles at all.

Some bottles have a “lip” or a rim around the opening called a “bartop” or a “flute”. While stylish and helpful for pouring, they can be a nuisance for the home winemaker. They do not fit all types of hand and floor corkers. You can still use them as small fermentors or for top-up wine. Otherwise, consider recycling them if you wind up with any.

Finally, a word on punts. The *punt* is the indentation at the bottom of the bottle. It is an artifact from bottle making techniques of yesteryear and serves no modern practical purpose. It is often associated with quality, though. Bottles with large punts tend to be larger due to the space displaced by the punt. All said, your wine will not care about the bottle punt, but you might.

Bottle Scavenging

Most home wine makers are bottle scavengers. With the quantities of wine being made and with brand new bottles costing more than a dollar each (for the cheap ones), it pays to get bottles from elsewhere and just clean them up. Glass is glass and it really doesn't matter where it has been as long as it's clean. Even beer and wine supply stores will tell you that they don't sell a lot of bottles, but they do keep them on hand for people not willing to put out the effort to clean up old ones. Reusing bottles is also environmentally friendly. Once you have a supply of bottles, it becomes easier to simply reuse your own than to go out an get more. But if you do need more, where can you get them?

WinePress.US members have come up with many great ideas for getting bottles:

- The obvious place to start is at home. You should rinse and save every bottle your drink.
- Ask friends, family, and neighbors to save their bottles for you. Whenever you visit, collect your payload and wash those up too. Be sure to ask them to rinse the bottles to prevent having to clean out mold.
- Recycle bins. Dumpster diving may not be glamorous, but recycle bins in residential or commercial areas invariably have wine bottles for the taking. Larger bins near restaurants are often absolute goldmines.
- Catered parties, seminars, meetings, conventions, etc. These often serve wine *by the case*. This has the advantage of netting you a whole box of wine bottles of the same type. Talk to local hotels with guest or conference rooms about these kinds of arrangements.
- Weddings. If they serve champagne or other wines, ask the server if you can collect the bottles when the party is over. These usually come with boxes too.
- Restaurants. Ask the manager to save the bottles until closing time. Whenever they close, they may put the bottles out for you. Some restaurants even serve 187ml splits because they don't want to open a whole bottle for a single customer. If you like these bottles, now you know where to go!
- Wineries. These are the single biggest sources for wine bottles. If you have a local winery, stop by and ask the owner or manager, especially after holiday weekends with high traffic. Let them know you are an aspiring home wine maker and want some bottles. After trading wine stories and maybe buying some of their wine (they like that, as you can imagine), ask about bottles. Wineries pay off in a couple of ways: every bottle they empty in the tasting room goes to recycling. Wineries are not usually allowed to reuse them. If you offer to take them away, even for a small fee if needed, most are more than happy to oblige. Some wineries also have overstock from their own bottling operations. Offer to buy these bottles at a huge discount. You may have to remove the labels (or not), but these bottles will be perfectly clean and unused. Not only this, but bottles from wineries are usually similar in type *and* they come with boxes and

dividers. You can even specifically target wineries that have “special” bottles you want. You can't ask for more than that!

If you build up a large enough collection of wine bottles, you can start making type-matches. You can keep the “matchies” and throw out (or give away) the rest of the weirdlings.

On a related note, keep in mind that you may want to give away some of your wine. Through experience, we have learned that if you give a bottle away, you should not expect to ever get it back, even if you ask for it. So save the uglier bottles in your collection and give *those* away. You don't want those back anyway!

If you have been collecting bottles and need boxes for them, you might try local liquor stores. They go through all kinds of boxes with dividers and will be more than happy to give you some. They all get recycled anyway.

Delabeling

To remove the foils and labels from wine bottles, first fill a wash basin or large sink with *scalding hot* water and some granular dish washing detergent (not liquid "dish soap"). Submerge the bottles in there and wait for one half hour or more. After soaking, you'll notice some bottle labels practically dissolve and fall to the floor. Others are a bit more difficult. (Side note: Australian labels must, by law, stay on the bottle for at least two hours when submerged. Guess which ones go direct the the recycle bin?)

You will need a flat razor for the next part, much like the kind painters use. These are often sold at hardware stores for pocket change. Take the razor and scrape *around* the bottle (so that the razor blade stays flush with the bottle surface) and scrape off the label and all the glue using plenty of very hot water.

The bottle rim is often adorned with a decorative shrink-wrap or foil. This is easily removed with this quick movement: take the razor and push the flat size of the blade straight up vertically across the wrapper. Gouge it all the way across so as to split it in two. Now simply peel off. The wrapper has no glue of it's own.

Some labels use a very stout kind of glue that laughs at your detergent and razor blade. Do your best to scrape the bulk of it off. For most glues, a steel wool pad will scrub it off. You might think steel wool would scratch the glass, but it doesn't. If this doesn't work, you have to resort to chemicals. Wait for it to dry and whip out a can of mineral spirits (or the odorless equivalent *Turpenoid*™ preferred by oil painters and sold in art supply stores). Put that on a paper towel and simply wipe the sticky residue away! Mineral spirits and turpentine (or Turpenoid) will work *much* better than citrus-based solvents, acetone, or denatured alcohol. Some of these other products are more expensive anyway.

After you have done all of this, rinse inside and out 3 times and put into storage. There should be no soap or glue residue and it should smell like glass (that is, like nothing at all).

Some bottles you'll swear are put on with an industrial epoxy of some kind. For these bottles it might just be good to throw the bottles in the recycle bin. It's just not worth the time.

One tool that helps in cleaning up bottles is a faucet-mounted pressure washer. This little device uses water pressure to blast the insides of your bottles clean at the touch of a bottle. They are especially handy for bottles from recycle bins and people's garages.

Bottling Procedures

Now that you know all about bottles and corks, it's time to put them together.

Bottling *requires* a bottler. Corks will eventually go in the bottle with any kind of corker. It just

depends on how much frustration you can handle. Hand corkers work, but they have trouble on larger (and better quality) #9 size corks. There is a full discussion of corkers in the Equipment section. To make a long story short: if you can reasonably afford it, get a floor corker. You will be glad you did.

To get started, you need to sanitize all your bottles. You can do this by giving them a quick soak in a sink or washbasin full of sanitizer and water. Alternatively, you can put them through a wet cycle in the dishwasher. Be careful about the dishwasher though. If there is any grit or food particles in the dishwasher, it may stick to your wine bottles the same way it sticks to your other dishes. On the other hand, it's the heat from the drier that makes the dishwasher effective. Using a sink or washbasin is probably the better solution. Either way, rinse the bottles out just before filling.

To get your wine ready, you can rack the wine into a new container if there is any sediment in the carboy. If not, you can bottle directly from the carboy the wine is currently in. To prepare for bottling, get the wine ready for racking as you normally would. Instead of putting the wine into a new carboy, though, you will be putting it directly into your sanitized wine bottles. This process is aided by a *bottling wand* which attaches to the end of the racking hose. With its spring-loaded tip, simply touch it to the bottom of the bottle and wine slowly fills it.

If you don't have a bottling wand, you might be able to get by with a *racking hose clamp*. This will at least help you control the flow of liquid through the hose. Without either of these tools, you will have to resort to pinching or putting your thumb over the end of the hose. That gets messy *really* fast. Do yourself a favor and buy either a wand or a clamp. They are both inexpensive, so there is no excuse!

Fill the bottles until the water level is one cork-length plus ½ to 1 inch below the surface. This extra bit of space is for compression. Normally, you would want to put as little air in the bottle as possible. However, putting a cork in the bottle creates a pressurized space. Since liquid does not compress, the airspace in the bottle will compress instead. If you leave less space in the bottle, you may have trouble inserting the corks, even with a floor corker. An easy way to fill most standard sized bottles using a bottling wand is simply to fill it all the way up to the lip of the bottle. When you take the wand out, the wine level should drop slightly from the wand's displacement. It should be at *just about* the perfect level for corking.

If you are using a natural cork, take note of this bit of controversy: There are some books and sources that instruct you to boil your corks for a time to soften them up. **Do not boil corks**. Boiled corks lose their integrity and very often leak. You can give your corks a brief cold soak, however. Make a bowl of water and crush a Campden tablet into it. Drop a few corks in the bowl and get them wet. Wet corks insert better and the little bit of sulfite is for the sanitation-paranoid. After one or two minutes in the water (no more!), cork your wine. This wetting process also helps get rid of dust and particles that come naturally with wood corks. White wines are especially sensitive to this because of their clarity. “Cork floaties” won't hurt your wine, but they do make it less attractive. Many wine makers cork completely dry to good effect. You end up with a better overall seal this way. Alternatively, you can do the cold soak routine, but it is not necessary.

Now it is time to cork! Place the cork in the corker's compression chamber, position the bottle, and press down. You should hear a solid “kuthunk!” and the cork is in. If the cork doesn't go all the way in, there may be two reasons. With a hand corker, you need to really brace the corker on the bottle harder. With a floor corker, the bit of air in the bottle is giving more resistance than the spring-loaded bottle pad. You can try to hold the pad up with one hand while you press the lever down with the other.

Most corkers also adjust for depth. Make sure your corker is set correctly and practice on a cork and empty bottle to get it right first.

If you get a cork seated improperly, pull it out with a corkscrew and use a *new* cork. Don't reset a cork after you've dug it out with a corkscrew.

After You Cork

After all your bottles are corked, give them all a clean water rinse, dry them, and sit them upright. Cleaning any residual drops of wine on the bottle prevents mold growth. You need to keep the bottles upright for about a day or so to let the bottle pressure normalize and to let the cork form it's tightest seal. Research shows that natural corks spring back to their near-full potential in about an hour but can take up to four. Waiting a day solves all your worries. Synthetic corks need no resting period and can be stored immediately.

After a day, you should keep the bottles on their sides with natural cork to keep the cork moist. This keeps the seal tight. If you store bottles upright, they may eventually dry out and oxidize.

Synthetic corks should be stored upright. At least one test has shown that they actually do *better* when stored upright, although there does not appear to be any physical reason for this. Synthetic corks form a virtually perfect seal. Feel free to store synthetic corks either way.

Capping

Crown capping requires a bottle capper. These usually come in either a hand-held double-lever version or a bench version.

First, sanitize everything including all bottles and caps and racking equipment. An easy way to sanitize caps is to bring a little bit of water to boil in a small pot. Take your crown caps and boil them for 30-60 seconds, then take the pot off the heat and let them sit until ready to cap.

Fill up a bottle and set one of the clean caps on top. Be careful not to touch the inside of the cap or the lid of the bottle with dirty hands. Using the capper, press the cap on firmly and straight down. If you press at an angle, it may not fit on correctly. As with regular corking, practice a few caps on an empty bottle.

Most models of hand cappers are made for beer bottles, not champagne bottles. If you intend to cap sparkling wines, you should invest in either a bench capper or a “champagne” corker with a capping attachment. Make sure it fits a champagne bottle before you buy it. Here's a cute trick: if you already have a hand capper, some models can be modified to work with champagne bottles. Just take a pair of pliers and pull the metal jaws out of the capper. Now it fits the bottles!

That's it! It's no more complicated than that. Our only other bit of advice is to put a paper towel or dish towel under the bottle when capping. Capping on a bare counter top is asking for an unexpected slip and a shatter as the bottle hits the floor. Oops!

Corking Champagne Bottles

If you are bottling your own sparkling wine, you have three options:

Traditional Cork and Wire

A champagne cork is noticeably larger than a normal cork. In order to get it into the bottle, you *must* have a champagne corker which has an enlarged compression chamber to hold a cork of that size. Cork the wine as usual but with a bit left over at the top to form the traditional “mushroom” shape. After corking, immediately tie down a wire assembly over the top. Corks and wires and not expensive and are often sold together.

Plastic Cork and Wire

Since most home wine makers do not own a champagne corker, plastic corks are sold which provide a

perfect, airtight seal that you can insert with your hands. They still need the wire assembly on top.

Crown Cap

It's not as romantic, but it's definitely the easiest method. You can finish your sparkling wine with a simple crown cap. While the cap is nothing special, note that a champagne bottle neck is larger than a beer bottle for which cappers are usually intended. You will probably need a bench capper or a champagne corker with a capping attachment to cap a champagne bottle. Before buying one, make sure the capper supports a champagne bottle. If you attempt to use a "small" capper on a champagne bottle, it may fracture the glass.

Labels and Decoration

After corking you may want to adorn your bottles with a few extras. These are completely unnecessary, but look great! Some wine makers prefer their bottles "naked." Not adding labels or decorations means less work when it's time to clean the bottle up for it's next filling.

Before applying any of these, make sure your bottles have gone through their "waiting period" after bottling, *just in case* something weird happens.

Foils

Commercially, there are two types of bottle-topping foils. One is an actual machine-applied metallic foil. The other is a heat-shrink plastic. Metallic foils are the higher quality but require a foil spinner to apply. These are extremely expensive (hundreds of dollars on the very low end). Virtually all home wine makers use the heat-shrink type because it is easy to purchase and apply.

There are several ways to apply these foils:

- **Hairdryer**. This is probably the worst way. It takes forever and produces bad results
- **Boiling water**. Bring a large pot of water to a light boil. Put the foil over the bottle. Holding the foil onto the top of the bottle with a wooden spoon, dunk the top of the bottle into the water. Voila!
- **Heat Gun**. This takes only 2-3 seconds at the most. It takes some practice, but a heat gun makes this work go very fast. Be careful: heat guns put out a tremendous amount of heat and are fire hazards.

Wax

Some commercial wines apply a bead of wax on top of the cork and may even imprint it with a seal. This wax does nothing in terms of aging, it is strictly decorative (however, it will prevent mold from growing on corks). Simply heat the wax and drip a blob onto the top of the bottle. You might use a hot knife to cut it flush with the bottle top. If you decide to apply the wax this way, you need to seat the cork about 1/8" to 1/4" lower into the bottle to make room for the wax.

Another way to apply to wax, used commercially on more expensive wines and ports, is simply to dip the entire bottle top in the hot wax. This not only looks classy, but it really does seal the bottle up airtight. For a more sophisticated look, try dipping the bottles at a 45° angle!

If you are curious about getting a seal made, you might talk to your local stationary or rubber stamp store.

Labels

Don't label anything until you have bottled the wine and applied wax or foil. Otherwise, you might end up ruining your label in the process.

Labels come in all shapes and sizes, so it's all up to you to decide what you want. Most home wine makers use a word processor and full sheets of self-adhesive labels. There is special software you can get for label making, but most won't do anything a word processor can't already do.

Although commercial winery labels are strictly regulated and must be approved by the government, none of this applies to home wine makers. For your own reference you may want to include the wine's defining features, such as alcohol level, pH, acid, and residual sugar levels. You may also find it helpful to put a batch number on it if you keep track of your batches in a log book (and you should!).

For those that want a label but not the hassle of creating and removing them, consider using garage-sale price tag stickers with a note or two scribbled on them.

Wine Maker's Wisdom

Stacking bottles:

“I use only Bordeaux style bottles (colored & clear) because they are stable when stacked on each other. Other styles such as Burgundy and Riesling types are a bit wobbly when stacked and I have broken a bottle or two by inadvertently hitting a stack and having a top bottle slide out.” - Peter Lynch

Wax dipping:

“Before dipping the entire neck, drip a small dollop of wax on the cork top and let it cool till it sticks. While dipping, air is often trapped under the cork and it causes the cork to be exposed while the neck is covered.” - Peter Lynch

“For melting wax and not wasting a ton, use a soup can. You can set it in a pan of boiling water as a double boiler. Plus you can just toss it with nothing to clean.” - Vatechtigger

“Bottle Keying”

“Wine is somewhat photosensitive, so you are better off bottling wine in dark bottles. However, you should put at least one bottle per batch in a clear bottle as a “key bottle.” Drink this bottle last. This way you can see what is going on inside as it ages. This helps you spot cork problems, falling sediment, cloudiness, and other issues. This is especially useful when riddling champagne.” - leiavoia

Proofs

“Consider bottling some of your batch in smaller beer bottles with caps. This way, you have “proofs” that you can open and taste as it ages without uncorking a whole bottle.” - leiavoia

The “fishing line trick”:

“Fishing line is placed inside the bottle neck and as the cork is inserted the compressed air travels up along the depression the line creates and makes the cork go in easier. Pull the fishing line out after the cork is in.” - Peter Lynch

Removing labels:

I bought an 18-gallon storage container and filled it to the half-way point with water and a couple of shots of bleach. I put the cover on it and let it sit for 2 weeks. Even the most difficult labels came off that way.” - MedPretzel

“A few squirts of Awesome (found in 99 cent stores) will dissolve almost any glue. The stuff isn't toxic and actually smells pretty good, too.” - SteveC

Corks:

“I'd recommend that anyone buying corks take a very realistic look at how long they keep their wines, and only buy what they need.” - rockycreek

“The natural corks I've used were supposedly of a very high grade but my experience with them has been a bit disappointing. If you want to use all natural cork for extended aging (5+ years), get only the best winery grade corks and a floor corker. If you plan to drink your wine sooner, a good agglomerate cork is perhaps a cheaper and viable alternative.” - Peter Lynch

“Never boil corks! A quick dip in sanitizing solution is all you really need, more for sanitation and lubrication than anything else. I've made the mistake of soaking the corks for a while, and they just puffed up and didn't go in as well as the simply dipped ones.” - MedPretzel

Cork Divots

“Put a cotton ball on top of the cork just before you cork it. This protects the soft cork from the plunger and avoids a substantial divot in the cork.” - leiavoia

Bottling:

“Sanitize even the cleanest looking bottles. Have a methodical system which you do every single time you bottle. Don't forget to get that 'half-bottle' at the end: Your reward!” - MedPretzel

“I like waxing the necks. It's a change of pace from shrink caps. Plus the wax is reusable.” - Cork-N-Cap

Drinking

- "Swirl, Sniff, Sip, Spit"

Laws on making wine

Age

Shipping

Sales

Distillation

Wine problems / How NOT to make wine

Other Wine Making Techniques: Sparkling, Port, and Ice Wines

Most of the wines that home wine makers create are “normal” still wines. There are plenty of other techniques in wine making to interest those looking for something more exciting or challenging to try.

Port Wine

Technically and traditionally, port wine (or “porto”) is fortified grape wine from the Douro Valley

region of Portugal. It has a long and murky history stretching back over three hundred years. Port wines are characterized by fortification with high-alcohol brandy, unusually long barrel aging, and a sweet caramel flavor caused by high residual sugar levels and slow oxidation. Port wines are usually sweet, but can be made dry. They are also traditionally red, but sweet white grapes make excellent ports as well. Port is considered a dessert wine in most cases. Good port is always pricey.

For home wine makers, "port" usually just means a fortified or high-alcohol wine. In the WinePress.US community and elsewhere, there are conflicting definitions for "port." Port wines typically have 18%-22% alcohol content, but there are *two* ways to achieve this.

The Traditional Method

Port is traditionally made by fermenting the wine just past half-way and then adding high-alcohol grape brandy to stop the fermentation. This brandy isn't the usual off-the-shelf liquor store brandy. It is 150 proof (77% alcohol) grape brandy and is government regulated in Portugal. By contrast, normal store-bought brandy is only 70-80 proof. This doesn't stop home wine makers from using the store-bought brandy, but there are alternatives. If it is available in your area, try Everclear™ or high-alcohol grain alcohol. This is flavor-neutral and very concentrated (190 proof). It even carries a "flammable" warning on it!

To make port the traditional way, start your wine as you normally would. High sugar content fruit is preferred, so start out with 26 Brix or even more if possible. Ferment the wine in the primary until it reaches about 10-14 Brix (depending on the sweetness you want left). Calculate the alcohol level currently in the wine and what is required to fortify the wine up to about 20% (again, according to preference) using the Pearson Square or the fortification formula. Add the brandy or alcohol and the fermentation should cease within hours, if not minutes.

The wine is now fortified, but it is still full of yeast and fruit pulp. If you want to extend the maceration, you can leave the fruit in the primary fermentor for a few more days. The added alcohol in the must will help leach color and flavor out of the fruit, so it is highly recommended that you leave it in there at least for a little while if the fermentation went too fast to extract much from the fruit. Keep in mind that your wine is no longer producing CO_2 and will be susceptible to oxygen. If you have access to compressed gas, you might consider letting CO_2 into the wine either in spurts a few times a day or as a constant flow. Keep a lid on the fermentor at all times from now on.

If you don't want extended maceration, rack the wine into a secondary fermentor immediately to let it clear. Follow normal racking procedures. Your wine should clear faster than normal because there is no fermentation activity.

The Natural Method

The goal of the natural method is to push the alcohol beyond normal levels without introducing foreign alcohol. This is done by using a sugar-feeding technique on the yeast. There are some yeast strains that ferment up to 18% alcohol naturally and can be coaxed into producing even more through sugar-feeding. These super strains include EC-1118, Premier Cuvée (essentially the same thing) and to a lesser extent K1V-1116.

Start your fermentation as usual using one of the above listed yeast strains, but do *not* add enough sugar to make a lot of alcohol at this point. Adding too much sugar in the beginning will send your yeast into "sugar shock" and you will have a stuck ferment. These strains are noted for being high-alcohol fermentors, but they do not tolerate high sugar levels. Begin the fermentation by fermenting just the fruit itself.

Ferment the wine until it is near-dry (the exact level is not important). Then add enough sugar to

increase the potential alcohol level another 2%-4% and let that ferment dry. Make the sugar additions smaller and smaller as the alcohol level goes up. By doing this in stages, the yeast will produce more alcohol than if you add all the sugar at once. Yeast are actually inhibited by high sugar levels (a condition known as *glucose intolerance*) and perform better in low sugar environments. Eventually, the yeast will die off and you are left with a stable, very high alcohol wine. Now you can add *even more* sugar or fruit to sweeten it up to wherever you want it.

The natural method lends itself very well to the "secondary maceration" technique listed in the Making Fruit Wine section, where you add more fresh fruit directly into the carboy. As you add fruit, it will continue to ferment. If you add fruit instead of sugar, the flavor will be *intensely* fruity but your final alcohol measurement will probably be inaccurate.

Aging (Either Method)

Regardless of which method you use, the true key to making *great* port is barrel aging. Obviously, this makes port making somewhat exclusive. You are more than welcome to drink your wine as-is. Most home wine makers do.

To go the extra mile, you need an oak barrel with special requirements. It needs to be neutralized or "used up." Most barrels impart oak flavor to wine for only a few years and are subsequently sold as planters or decorations. Barrels for port should *not* impart strong oak characteristics to the wine, so a neutralized barrel is preferred. You want the barrel for its micro-oxidation properties, not the oak flavor. Aging wine in the barrel will concentrate the wine and give port its characteristic caramel flavor and browned color. The good news is that once you have a neutral barrel, you can continue to use it for port for many years. Port wineries often have barrels that are *decades* old.

Commercial port wines are aged for two years at the absolute minimum, but those are a special kind of young port. Most are aged for an average of 5-10 years and some stretch back 20, 25, or even 30 years. Tawny ports are often aged using a *solera* system which mixes the wines from different vintages over time to produce a consistent wine of average age but of no particular vintage.

Sparkling Wine

There are a few ways to make sparkling wine. There's the dangerous, traditional way of bottle fermentation, and the "cheap and easy" way of forced carbonation. Regardless of which method you use to get bubbles in the wine, you need to have a wine to start with.

The Cuvée

Pronounced "koo-VAY," this is the base wine that will eventually make your sparkling wine. Traditionally, this is almost always a crisp, dry, acidic, white wine. There are sparkling red wines on the market, but they are rare (not bad, just not popular). There is nothing preventing you from sparkling a red wine. The wine used for commercial champagne and sparkling wine often comes from chardonnay or pinot noir made without fermentation on the skins. For fruit wines: apples, pineapples, peaches, apricots, yellow plums, and other fruits that have a simple flavor profile make good sparkling wine.

The cuvée is often blended in commercial wineries to produce a consistent wine with specific characteristics that suit sparkling wines: high acid (0.75-0.90%), low alcohol (10-12%), simple flavor, and dryness. These conditions are best met by picking grapes that are ripe but shy of their peak sugar potential. With fruit wines, you can engineer this condition by not adding so much sugar to start the batch. If you intend to have the wine undergo malolactic fermentation, you need an even higher acid level since some of it will be converted, but malolactic fermentation is usually not desired in sparkling wines.

Prepare the wine as you normally would. Once the fermentation is complete and the wine is dry and perfectly clear, you are ready for the carbonation phase. Before carbonation, you need to make sure that both yeast and malolactic fermentations are either completed or stabilized. Carbonation can happen in two basic ways. First, we'll discuss the easy way.

Carbonation

The easy way to make sparkling wine is to *cheat* and just force CO_2 into a still wine. Technically (and legally) speaking, wine that is made by forcing CO_2 into it with a pressure system is called "carbonated wine," not "sparkling wine." The bubbles will be larger and more soda pop-like than traditionally crafted sparkling wines and champagnes. This requires a keg system which you can often purchase for about $100 or less. The good news is that the wine is instantly carbonated and ready to drink, plus you don't have to deal with frozen glass shrapnel. That's always nice!

NEED INFO

Méthode Champenoise ("Champagne Method")

Before we say anything else, let's square up to this fact: making sparkling wine the traditional way is *dangerous*. It involves fragile glass, extreme pressure, freezing, and tricky maneuvers that can lead to severe injury if improperly handled. It also takes a long time to make (one year minimum), so sparkling wines made via the Champagne Method are definitely the domain of the advanced wine maker having a lot of patience and skill.

The Champagne Method requires that you put the cuvée through a second fermentation using a little bit of priming sugar *inside the bottle*. The fermentation is allowed to run its course and the bottle is laid down to rest for at least six months. Many high quality champagnes are aged for over *five years* in the bottle. After this, the wine is *riddled*, a process where the spent yeast are slowly shaken upside down into the neck of the bottle. The bottle is then opened and *disgorged*. The spent yeast are blasted out and the remaining wine is corked, capped, or even served directly.

Step 1: Tirage Preparation

Once the base wine is ready, the champagne bottles need to be filled with wine plus a *dosage* which includes a newly activated yeast culture, additional sugar, yeast nutrients, and a little bit of bentonite. This is the recipe for the secondary bottle fermentation phase known as *tirage* (rhymes with "garage").

Begin the process by starting a new yeast culture as outlined in the "Fermentation" section of this book. The yeasts used for tirage are typically Premier Cuvée, EC-1118, and DV-10 if you can find it. While the starter is being prepared, you also need to create a very small batch of bentonite.

Prepare the bentonite a day in advance using the normal procedure (See "Fining and Filtering") with 1/25 tsp bentonite per gallon or roughly ¼ tsp. per 6 gallons (we told you it wasn't much!). The bentonite will keep the yeast from clinging to the bottle walls after fermentation and during the riddling phase.

Carbonation is caused by the fermentation of additional sugar in the bottle. The more sugar you add, the more pressure will build up inside the bottle. Full-strength, high quality commercial champagne can reach pressures of up to 8 atmospheres. A sparkling wine with 3-4 atmospheres of pressure is often referred to as a c*rémant* (creamed), while those near 5-6 atmospheres are called m*ousseux* (mousse). Fizzy wines that lack enough carbonation to be true sparkling wines are called *pétillant*.

You must be very precise with your sugar measurements. We recommend you try the lower pressures (3-4 atmospheres) by adding less sugar until you gain more experience with making sparkling wines.

Pressures in the range of 6-8 atmospheres can be extremely dangerous if mishandled. The general formula for adding sugar is: 0.58 oz. (or 4.15 tsp.) sugar per gallon creates 1 atmosphere of pressure.

Stir the sugar into the cuvée until *completely dissolved.* Undissolved sugar will produce irregular results and possible hazards if you put too much sugar into any one bottle. It may help to dissolve the sugar in a sample of wine and add it back into the main carboy.

Atmospheres	Sugar Per US Gallon	Sugar Per 750ml Bottle
1 (Pétillant)	0.6 oz. (4.15 tsp.)	0.11 oz. (0.75 tsp.)
2 (Pétillant)	1.2 oz. (8.30 tsp.)	0.22 oz. (1.5 tsp.)
3 (Crémant)	1.7 oz. (12.45 tsp.)	0.33 oz. (2.25 tsp.)
4 (Crémant)	2.3 oz. (16.60 tsp.)	0.44 oz. (3 tsp.)
5 (Mousseux)	2.9 oz. (20.75 tsp.)	0.55 oz. (3.75 tsp.)
6 (Mousseux)	3.5 oz. (24.90 tsp.)	0.66 oz. (4.5 tsp.)

Once the bentonite is rehydrated and the yeast culture has started, dissolve both into the cuvée and stir thoroughly. Alternatively, you can mix the sugar, yeast, and bentonite (together known as the *liqueur de tirage*) in a wine sample and add a fraction of the sample to each bottle. Mixing the ingredients into the bulk wine before filling bottles is probably the easiest and less error prone way if you have a standard-size batch.

Start filling champagne bottles with the wine which now has the added sugar, bentonite, and yeast. Firmly cap each bottle with a high quality crown cap and lay the bottles down to rest on their sides.

You might use *bidules* which are small plastic cups that go in the neck of the bottle to collect sediment during the riddling process. They are not necessary, but they make the disgorging process slightly easier. These need to go in the bottle neck after filling and just before you cap.

A Word On Bottles And Caps

Not all champagne bottles are made the same. Furthermore, there are some bottles that *look* like champagne bottles but are not. These may have held cheaper sparkling wines or ciders but were never intended for the méthode champenoise. They are generally referred to as “sparkling wine bottles” and should be avoided. You need to use high quality bottles that either held champagne made with the méthode champenoise or say “fermented in this bottle.” If you collect used bottles, you are taking a risk. Also note that European bottles will not always take an American crown cap. To be sure, buy brand new bottles. Considering the time and the risk involved, it's worth the price.

Caps are the other common cause of failure in the process. The intense pressure will loosen poorly applied caps and even pop them off, spilling your wine everywhere. Use high quality caps and make sure you use a sturdy bench capper or champagne corker with a capping attachment to do the job. Cheaper hand cappers are intended for bottling beer, not champagne. Their smaller size can crack the bottle if pressed hard. However, with some modification, these can be used also. Most models of simple hand cappers have two metal “jaws” that grab the neck of the bottle. These can be easily removed with pliers and a firm tug. With the jaws removed, you can now use it to cap champagne!

Step 2: Tirage (Bottle Aging)

Fermentation can take several weeks or months to complete, but afterwards the wine is kept on its side to age. Champagne in tirage can age for *decades* in some wineries. You can certainly get away with six

months, but decent sparkling wines are recommended to stay in tirage for 2-3 years, with 5-6 years for higher quality wines. The great thing about bottle fermentation is that you can do some of each! You can take a bottle at 6 months, disgorge, and drink it right there on the spot while you let the other bottles continue to age. You do not need to process the entire batch at once.

This long aging is said to improve the flavor through yeast autolysis, the process of the yeast literally decomposing at the bottom of the bottle. While this is usually a bad thing, in small quantities it can impart nutty flavors and aromas that some feel enhance the wine. Not everyone agrees though, so ending tirage after 3-6 months may be fully warranted, depending on your own personal tastes. It doesn't hurt to open a bottle and find out.

Keep in mind that your bottles are under intense pressure. An inadvertent bump, drop, or other disturbance could destroy the bottle and send glass shrapnel and foam everywhere. Because of this, *you must wear eye and hand protection when handling the bottles in any way, shape, or form*. Accidents happen!

Leaking is also a potential issue. One great trick is to keep your bottles in a portable cooler. This provides a flat area to lay the bottles and if something springs a leak or shatters, the wine will only make a mess *inside* the cooler. A cooler also helps regulate the temperate and the light. Keep your bottles away from direct sunlight or heating vents. Increases in temperature will raise the pressure in the bottle to hazardous levels.

Finally, make sure you keep the bottles in the same position during aging. You can put a mark on the bottle so that you always know which way it “up” and can return the bottles to their correct positions after handling. This keeps the sediment all in one place. Whether or not there is a good reason for doing this is speculative, but it's traditional nonetheless! Some wine makers will give the bottle a little shake every few months to redistribute the sediment (this would seem to contradict the previous advice, but that's often how it is in wine making).

Step 3: Riddling

After aging, you need to get the spent yeast out of the bottle. This is usually done through a process called *riddling* (or *remuage*, pronounced “rem-YOO-wazh”). During the process, the bottles are kept in a *riddling rack* and progressively tilted downwards and turned. Bottles start at a 45° angle. Every few days, each bottle is given a hard jolt to the left and another immediately to the right to create a backspin and dislodge the sediment. The bottle is then returned to the rack with 1/8 of a turn (when looking at the bottom of the bottle) from its original position. In addition, the bottle is tilted progressively more upside-down. This process slowly rolls the sediment into the cap which prepares it for an easy disgorgement. Some sources recommend doing a riddling every several days while others recommend once per day. Some sources recommend 1/8 turn and others recommend 1/4 turn. It most likely makes no difference. At the end of the riddling process all the bottles should be standing fully upside down “on point.”

A riddling rack looks like a sandwich board with a hinge at the top, making an A-frame. The board is drilled with 1.5” holes into which the bottles are inserted neck-first.

To aid in riddling, a slash of white paint or other mark is traditionally put on the bottom of the bottle to show the current turning degree.

Step 4: Disgorging

Now the fun part! Bottles need to be skillfully opened and the sediment, now collected into a plug in the cap, needs to be purged from the bottle.

Before you do anything, refrigerate the bottles for at least 2-3 days before disgorging. The low

temperature holds back the bubbles and will keep you from losing too much wine in the process. It's also good advice to have some wine glasses ready in case you *do* lose some wine. (You might want to "lose" a little for yourself as a reward!)

There are two basic ways to do the actual disgorging:

A La Volee ("With The Flight")

This is the traditional method but takes a great deal of skill. With the bottle "on point," get your bottle opener ready on the cap (opening *away* from you) and quickly rotate the bottle from the 6 o'clock position (straight down) to the 10 o'clock position (almost upright). When it hits 10 o'clock, open the cap and let the sediment plug fly out while you turn the bottle near upright. Bubbles will stream out and should go into a nearby glass.

Freezing

Though less romantic, the more practical and widely used method is freezing the neck of the bottle for easier disgorgement. Make a shallow mixture of ice and salt in a bucket and put the bottles head first into the ice. Put the bucket with bottles in the refrigerator. The salt lowers the potential temperature and will eventually allow the wine in the bottle neck to freeze.

When you can start to see ice crystals form in the neck, hold the bottle up at a 45° angle pointing away from you. Uncap the bottle. The frozen yeast plug should shoot out. Hold your thumb over the top to keep the flow of bubbles in until it dies down.

If you live in a colder part of the country, consider disgorging right around January and simply flip the bottles upside down in the snow.

Step 5: Topping Up and Final Bottling

You *will* lose some of the wine in the disgorgement process. You need to top up the bottles with additional wine or with brandy or cognac (also refrigerated). You can also add sugar to a desired sweetness level. The yeast should be dead at this point, so you can safely add sugar without refermentation issues. This table shows the basic range of sweetness that champagnes are typically sold at and the recommended number of teaspoons of sugar to add to each 750ml bottle to achieve that level

Name	Sugar Level (g/L)	Teaspoons per bottle
Natural / Extra Brut (driest)	0	0
Brut	0-15	0 – 2.25
Extra Dry	12-20	2.25 – 3.75
Sec	17-35	3.75 – 6
Demisec	33-50	6 - 9
Doux (sweetest)	50+	9+

After topping up, you need to bottle or cap the wine quickly. Letting the wine sit out for too long will cost you your hard-earned carbonation. See the chapter on "Bottling" for more details on bottling and capping champagne bottles. After bottling, let it sit for at least 2-4 weeks for the sugar dosage to meld with the wine.

The Contained Yeast Method

A new development in making sparkling wine is to put the yeast inside something so that you don't have to bother with the riddling and disgorging process. One method is to put the *liqueur de tirage* inside a section of dialysis tubing. Tie one end off in a simple, tight knot, inject the *liqueur de tirage*, and tie off the other end. Put the entire tube segment in the bottle with the wine and cap it. Treat the bottle as you normally would. When enough time has passed, just uncap the bottle and discard the tube. This method has not been extensively tested, so we can't comment on the taste or effect on the wine. Since you are fermenting each bottle individually, you are welcomed to try it on a few bottles if you can find the tubing.

Sherry

Ice Wine

Cellaring / racks

Recipes

Appendix

Fining Agents

Bentonite (-)

Application: Clearing white wines of protein haze.

Pro: Works predictably well against most hazes. Often the only fining agent used by many wine makers.

Con: Leaves a fluffy lees that is easily disturbed when racking. May inhibit fermentation due to stripping of Nitrogen components. Earthy flavor if over fined. Thins red wines.

Instructions: 3tbsp + 1 pint boiling water (0.5g/L) --- 1-2 tsp slurry per gallon. Blend in blender until creamy. Let sit for24 hours ("agglomerated bentonite" can be used after 2 hours) [5lbs/1000gal]. 2 weeks then rack.

50 grams of bentonite powder into one litre of hot water = 5% slurry. 4.5cc per L application.

0.75 tsp per gallon

x0.2 – 1.5 g/L

xxx – 0.2 oz per gallon

Kieselsol (Silicon Dioxide) (-)

Application: Clearing white wines.

Instructions (liquid form): 0.1-0.5 ml / L wine. (About ¼ – ½ tsp per gallon).

Preparation: Use as is.

Notes: Kieselsol is usually used with gelatin. Apply the gelatin the day after applying the kieselsol (there is some debate as to which should be added first, but most academic resources indicate the kiesolsol should go first). Kieselsol has a very low potential to over-fine.

Gelatin (+)

Application: Reduces tannic astringency in red wines. Reduces some browning, bitterness in whites. Works well for pressed portions of red wine which often contain undesirable astringency.

Instructions: 50-100 mg / L for red wine. 20-40 mg / L for white wine.

Preparation: Bring small amount of water to boil. Remove from heat and add gelatin. Stir until dissolved.

Notes: Gelatin is usually used with kieselsol. Apply the gelatin the day after applying the kieselsol (there is some debate as to which should be added first, but most academic resources indicate the kiesolsol should go first). Gelatin comes in both powder and liquid forms. Gelatin has a high potential for over-fining which produces protein haze, bitterness, and color stripping. Use wine-grade gelatin only (it is different from the typical kind sold at grocery stores).

use: For non-flavoured gelatin powder use 1 g / 20ml solution and 18ml of solution per 19 L carboy. (0.1-0.2 g gelatin / L wine (less for white more for reds).)

20-40mg per litre + more to reduce astringency (assumes dry form – liquid form also sold – 0.66 cc p/ L)

1/2 teaspoon per gallon of wine

Rack filter after 2 weeks.

Isinglass (+):

better for white wines since it doesn't need tannins to work on. won't hurt tannin levels. used on sparkling wines. gentler than gelatin.

may add fishy odor if not prepared correctly.

0.2 – 0.5 lb / 1000 gal.

1ml / L

Casein (+)

milk protein

0.2 – 2.0 lb p/ 1000 gal

removes color, browning, and haze from whites. removes excess oakiness. Polyclar and gelatin work better.

Egg White (+)

reduces tannin in red wines.

1/5 – ½ egg white per 19 L. + wine + literal pinch salt. beat lightly, not stiff. Salt makes globulin soluble in water.

works great on red wines. Softens. less aggressive than gelatin.

potential loss of color. not for whites

Sparkolloid (+)

highly effective at removing haze. does not effect color or flavor or aroma.

0.1 – 0.4 g/L – add to boiling water, stir well, remove from heat after 3 minutes. add to wine while hot. (do not use with gelatin?) Recommend filtering afterwards.

stir 1/2 tsp. per gallon into one quart of briskly boiling water. Boil for three minutes, stirring well to completely dissolve. Use 1/2 cup of the prepared solution for every gallon of wine.

Activated Carbon (=)

high potential for over fining. Can cause oxidation. 3lb / 1000 gal. Deodorizer (H2S) and color stripper. Last resort. Rack ASAP.

0.025 to **0.6 grams per litre**

Polyclar (=)

no prep needed. Reduces bitterness and browning agents in reds and whites. Reduces "oxidized" flavors, making fresher wines. Filter afterwards. Not primarily a clarifier.

1-6 lbs / 1000 gal. --- 0.5g/L

0.12 to **0.72 grams per litre**.

MATERIAL	Charge	PURPOSE	TYPICAL DOSE	750 ml Trial Dose in grams	Typical dose in grams for 23 liters
AAA Carbon	Neutral	to remove odors (H2S)	1 g/gal	0.198	6.08
		to completely strip wine for blending	4 g/gal	0.793	24.30
KBB Carbon	Neutral	remove unwanted color	1/2 g/gal	0.099	3.04
Bentonite	Negative	remove protein from white wine	2 g/gal	0.396	12.15
		general clarification (red or white)	1 g/gal	0.198	6.08
Casein	Positive	to remove browning	1/4 g/gal	0.050	1.52
		to remove bitter taste	1/2 g/gal	0.099	3.04
		to remove excess oak	1/2 g/gal	0.099	3.04
Chitosan	Positive	removes all solids and proteins	25 ml/gal	5 ml	153 ml
		used in combination with Kielselsol	or 4g/liter	3	92.00
Gelatin	Positive	tannin reduction in red wine	1/2 g/gal	0.099	3.04
		white wine clarification	1/8 g/gal	0.025	0.78
		Remove bitter taste in white wine	1/4 g/gal	0.050	1.52
Egg-whites	Positive	bitter tannin reduction in red wine	1/2 to 3 ml/gal	0.375 to 2.25 ml	11.5 to 69 ml
		for red wine clarification	1/2 to 2 ml/gal	0.375 to 1.5 ml	11.5 to 46 ml
Kieselsol (Silicon dioxide)	Neg. (typical) Pos.	reduce proteins and bitter tannins remove gelatin compact bentonite	1.4-2.2 ml/liter	1.05-1.65 ml	32 to 50.6 ml

	(available)				
PVPP (PolyClar)	Neutral	to remove browning	1/2 g/gal	0.099	3.04
		to remove excess color	3/4 g/gal	0.149	4.56
		to remove oxidized taste	1/2 g/gal	0.099	3.04
		to remove bitter taste	1/2 g/gal	0.297	9.11
Sparkolloid	Positive	for white wine clarification	1/2 g/gal	0.495	15.19
		as topping over bentonite	1/4 g/gal	0.050	1.52
Tannin	Negative	remove unstable proteins in white wine	1/4 tsp/gal	0.032	0.99
		used with gelatin in white wine			

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