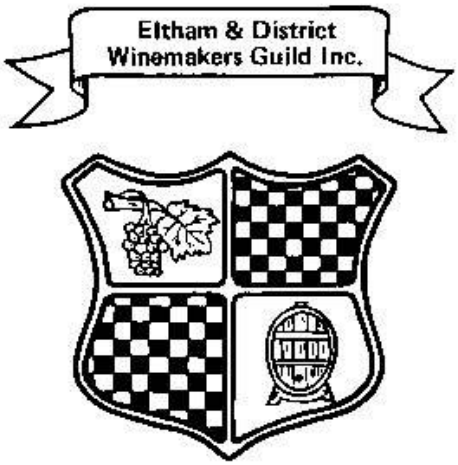
Eltham and District Amateur Winemaking Guild



Making Country Wines

V1.0

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Introduction

Country wines are fermented beverages made from edible foods produced in the garden. The source of material may be vegetables, fruits, roots, tubers, herbs or leaves. As the famous winemaker Harry Gilham says, 'If you can eat it, you can drink it". I have tasted Harry's grass wine ('*not collected in the dog run'*) as well as his Christmas Pudding wine ('*I found it at the back of the freezer when I was cleaning it out'*). Perhaps that's not strictly grown in the garden but who cares. Both were delicious and if you closed your eyes you could pick the taste of the source.

The aim of the exercise is to capture the tastes and aromas of the ingredients in a liquid form. If you don't like parsnips, don't make parsnip wine. If you don't like eating rotten fruit, don't use rotten fruit. If the thought of drinking potatoes is exciting, don't start by slurping up the drainage water as you prepare to mash the spuds: your task is to capture the essence of those potatoes and seal them in a bottle of wine. It's not my thing, but if that's what you want you won't know till you try it. There are a lot of weird people in this world and somewhere, somebody likes drinking potato wine. I'll drink to their health but with something else.

Your potentials are only limited by the produce. Every season you can find an overabundance of something when look around – plums, apricots, lemons, limes, figs, rhubarb, basil, ginger….. Even weeds such as stinging nettles have been used (if so, is it then a weed?). If you don't have a garden or neighbours with an excess, make friends or do a deal with a greengrocer who may let you select from his over-supply, but be cautious…bad fruit produces bad wine. The major restriction is to avoid poisonous products. If you can't eat it, don't try to drink it.

The advantages of making country wines are many:

- Commercial grape wines and beer are expensive because there are significant taxes on the sale of alcohol. If you ferment the wine yourself the alcohol is as cheap as sugar which we will see is the source of the alcohol we will make. If you are making the wine from your own garden produce the cost is very cheap indeed.
- So often you will see grape wine connoisseurs sniffing deeply in to the glass mouthing stuff about the aromas of cherries with a dash of liquorice. You can do the same except that if that's what you want, those are the dinky-die flavours you set out to capture.
- If you wish to live sustainably, making wines from excesses of garden produce is a way of maximising the use of scarce resources of planet earth with minimal environmental impact
- It's a fun to share your efforts with friends. People love to taste new things that they cannot buy anywhere. Getting them to guess what's in the glass can be quite a challenge.
- It's a cheap hobby. The primary equipment is simple and inexpensive to purchase. After that, the on-going costs are small, particularly if you re-cycled bottles.

And of course there can be disadvantages, each of which has a cure:

- Production costs are so small and volumes of wine can be so large that you could become an alcoholic (Know when to say no).
- If you get bitten by the winemaking bug, you could bore to all your friends (Join the Eltham and District Amateur Wine Guild and bore the other members - if you can get a word in)
- You may find as your palate senses mature you may notice some of your current predilections fade (What the hell)
- Wine snobs look down on Country Wine makers.

Sugar Additions

An early decision to make is that amount of sugar to add and there are several approaches that can be used to work out how much is required.

In Australia grapes often have enough sugar to ferment to a wine with an alcohol content that balances the complexity of the taste sensations desired. However when making country wines it is rare that the raw material will have enough sugar to bring the alcohol content to a suitable level so that the winemaker must add sugar. From the chemistry notes you can see that the more sugar that is added that higher the alcohol content of the fermented wine. This is limited by the ability of the yeast strain to continue to metabolise sugar. Some yeasts may survive 16% alcohol but many others become inoperative well below this level. If more sugar is present above the concentration of alcohol that the yeast can tolerate the wine will end up sweet. Sweet wines can be made by adjusting to taste by adding sugar, by careful calculation about the amount of residual sugar you want to have in the end wine or by tossing in too much sugar and hoping for the best. The latter is not recommended.

While refined sugar is generally used, some recipes suggest the use of other sugars such as glucose or brown sugar. These can affect the taste of the finished wine.

The simplest method of working out how much sugar to use is to read a recipe. This will give you wine that should have an acceptable alcohol level and sweetness for the type of wine you are making.

For the rest of this section we will assume the yeast will tolerate the alcohol content you are aiming for and you can ferment to dryness (no residual sugar).
When sugar is added to water the density of the solution is higher than water. A floating gauge, a hydrometer measures the density of the solution and there are several measurement scales that can be used. Most versatile winemaking hydrometers have three scales: Specific Gravity (S.G.), Baume (Be) and Brix. (See attachment) All have their uses.

Baume is useful because the measurement corresponds fairly well with the final alcohol percentage of the finished wine based on fermentation to dryness. One way of achieving this is to measure the Be of the juice and keep adding sugar till the Be reaches your desired alcohol target.

Brix is a measurement of concentration: the reading gives the number of grams of sugar that are present in 100 g (formally) of the juice. By using a number of scales it is possible to usefully control the amount of sugar and hence alcohol Suppose you want to end up with a finished dry wine of 12.5% alcohol. The Be scale of 12.5 translates into a Brix value of 23.1gm/100g of juice (or 231gm/1000g or approximately 1 L of juice) Measure the brix level of the juice. To do this you will need to strain a bit of the juice to remove floaties because they distort the reading. Suppose your juice has a brix of 10 g/100g (or approximately100g/L) . That means you will need to add 231-100 = 131 gm of sugar per L of juice. If you have 5 litres of juice you will need to add 5x131 = 565gm of sugar.

Some winemakers add all the sugar up front but others recommend a gradual addition to keep the yeast happy and avoid a stuck ferment. Some keep adding sugar progressively as S.G. drops to 1.01. But must calculate amount of sugar to add based on initial juice sugar concentration. Otherwise can keep adding sugar to taste until the yeast is exhausted.

It is best to add sugar to hot water to help dissolve it and then let it cool. A good method is to make sugar syrup. Add 1 Kg sugar to 0.5L of boiling water stir to dissolve and let it cool. Then make it up to exactly 1L of syrup. That's 1000g in 1000ml so that each ml of solution contains 1gm of sugar. If you need to add 565 gm of sugar you will need 565ml of syrup. (One litre is equivalent to 1000 millilitres)

The hydrometer is also useful to follow the progress of the ferment. However because alcohol is less dense than water the readings towards the end of the ferment don't give an accurate measurement of grams of sugar present. Pure water has a specific gravity of 1, a Be of 0 and a Brix value of 0. In the above example the Be of 12.5 has a specific gravity of 1.095. As the sugar is consumed the specific gravity (density of the solution) will decrease. It's interesting to plot the progress of the decreasing specific gravity and this may be handy is recognising if you have problems with the ferment (such as a 'stuck' ferment). A thermometer can also be used to plot progress. Some enthusiasts plot both.

A dry wine will commonly be at S.G below 1, Some experts define a dry wine as being an SG of 1.003 and a semi sweet wine will be around 1.1 and a sweet wine 1.2. They may also define a semi-sweet wine as being around 1.004 (1% sugar) and a very sweet wine being around 1.08 (20% sugar) Other winemakers consider a sweet wine would be recognised at 1+ Be. This is very subjective and it is better to use your tastebuds to select the sweetness you desire.

Remember that if you leave sugar in the wine that subsequent fermentation can still occur in the bottle leading to cloudy wines (deposits of dead yeast cells) and even explosions. Only sterile filtering can remove this potential and this is generally beyond the capability of amateur winemakers. Addition of sulphur dioxide helps but does not eliminate the potential.

Cooling to 0^0C is the best way to stop a ferment but the yeast must be eliminated to stop continued fermentation as the wine warms up again. This required sterile filtration which is beyond most amateur winemakers

Yeast

Yeast is normally purchased freeze-dried and come is a powdered form. If the manufacturer provides instructions for use, follow them. If not try the following:
Put some warm water into a wide flat dish (wide, not deep). Actively aerate the water because the yeast initially enters into an aerobic phase of respiration and they like oxygen in the water. Adjust the temperature to 37.5C. Let this settle and sprinkle the yeast evenly on the surface trying not to let it clump. About 3gms (a teaspoon) should be enough for 5L of juice. You can go over the same area after it starts to sink. Don't disturb for 15 minutes. After the temperature drops a little add half a cup of juice to the dish a few times to let the yeast get used to the nature of the juice. When the temperature of the yeast approaches the temperature of the juice (say within 5C) pour the yeast solution into the juice (probably in a bucket at this stage as it is very frothy).

Fermentation

It may look as if nothing is happening for a couple of days. This is called the lag phase. Actually the yeast is preparing itself for the task of fermentation. After a day or three, a vigorous fermentation should start. Any loose material will be carried to the surface by the bubbles of carbon dioxide and this may form a cap which will need to be plunged into the juice at least twice a day. Lots of carbon dioxide will be released so beware if the fermentation is carried out in a small space.

In warmer weather the fermentation may race ahead and be complete in a few days but generally it will take a week or two. As it slows down the solids can be strained from the developing wine and discarded. The remaining wine is placed in a demijohn under an airlock and the ferment continues to completion as anaerobic fermentation (no air). From now on the wine is subject to oxidation and any contact with air should be minimised.

Racking

Because the wine has completed its ferment under an airlock any remaining air has been replaced with a layer of carbon dioxide which protects the wine from oxidation. Dead yeast cells are distributed through the wine making it cloudy. Over time these will drop to the bottom of the demijohn and form a layer. Once the juice is clear, rack off (siphon) the clear wine from the deposit, top up the container so that it has minimal air and stopper the container. (Leave room for expansion of the wine with retention of a small air pocket. This won't be enough air to cause noticeable oxidation).

Adjustments

Many things can be added to wines at various stages of the process to make them to make them more stable and more pleasing to taste. The following are examples, depending on the circumstances.

It is good practice to always trial adjustments of acidity, tannin and mouthfeel on a small sample. Be conservative with your adjustment. Only add a fraction of what you might calculate or think that you need. It's much harder to undo the affect than it is to just add a bit more! Only treat the whole batch when you're happy with the sample's taste.

Acid Adjustment

There are a number of organic acids in country wines. Some country produce has natural high acidity (such as lemons) while others are lacking. The amount of acidity in a wine can be measured in two ways. The pH is an acid strength measurement that affects the vulnerability to spoilage organisms such as bacteria and spoilage yeasts. The lower the pH, the higher the acidity. Wines generally require a pH below 3.6 to avoid vulnerability from spoilage organisms. Titratable acidity refers to the amount of acid present in the wine and this measurement more directly relates to the level of perceived acid taste. A high TA leads to a sour tart taste while a low TA makes the wine taste "flabby". Winemakers aim to get the pH below 3.6 and the TA to be balanced with other taste sensations, particularly tannins. The most commonly added acid is tartaric acid (the natural acid of grapes), but citric and malic acids are also used and give different taste sensations.

First additions of acid quickly lower the pH but later additions take more acid for lesser effect. In contrast the TA will increase in proportion to the amount added. If you need to lower the pH with large additions of acid you may end up with a very heavy acid wine taste (I call it steely) which is out of balance and you may need to think of balancing this with other additions. There are no rules and experience is the best judge. Remember, what you are chasing is the taste of the original produce.

Tannin Adjustment

Tannins give some astringency to the taste of a wine (think of that puckering effect when a big red wine is tasted). Some country wines lack tannins and grape tannins (red or white) can be added to introduce this taste element.

Mouthfeel

Grapes have natural substances that increase the viscosity in the mouth but some country wines are lacking. Glycerol can be added to get that luscious mouthfeel. It will also make the wine sweeter.

Yeast Nutrients

Natural materials contain substances necessary for the yeast metabolism but rarely are there sufficient to enable the wine to ferment to dryness. Bulk nutrients such as nitrogen are added as well as traces of other elements that are important but used in smaller quantities

Sulphur Dioxide

Sulphur dioxide is a preservative. It helps to kill organisms such as bacteria and yeasts. A ferment can be stopped by addition of sulphur dioxide to retain the desired sweetness. Once the wine is finished its ferment the addition will stop attack by other undesirable micro-organisms. In addition it assists in limiting oxidation. Once the ferment is finished, protection can be added by the addition of two crushed Camden tablets to a 4.5 L demijon. Camden tablets must be fresh or stored airtight to avoid loss of activity.

Some sulphur dioxide attaches itself to molecules in the wine (bound SO_2) and this is not easily available for protection; only the part remaining 'free' can do this. If there are a lot of tannins in the wine or some exposure to oxygen, the sulphur dioxide may progressively become bound and it may be necessary to add further sulphur dioxide at the time of bottling. Too much SO_2 addition will spoil the aroma and taste of a wine. Some people claim SO_2 gives them headaches and hangovers. Some winemakers prefer a natural finish and drink their wines early with no addition of sulphur dioxide.

Regardless of the preference for sulphur dioxide addition for preservation, cleanliness is essential and all equipment should be thoroughly cleaned and a sulphur dioxide solution is ideal for this. Use potassium metabisulphite dissolved in water. A teaspoon (3g) in a bucket of water is OK.

Some people add ascorbic acid at the completion of ferment (0.1g/L) to prevent oxidation. However if you do this you must ensure you have free sulphur dioxide in the wine.

Fining Agents

Some wines may take years to clear and the thirst of the winemaker may drive him or her to accelerate the process by the use of fining agents. Bentonite is very effective in many cases. This is a clay which when it is dispersed in water has many charged surfaces which attract the small particles floating in the wine so that they become larger and heavy and sink to the bottom.

Bentonite is purchased as a powder and must be hydrated the day before use. Boil a litre of water and let it cool and pour into a jar with a lid. Better used hot. Add about 30 gm (ten teaspoons) of Bentonite powder into the jar and shake vigorously. Place the jar in a position where you will walk by often and whenever you pass give it a good shake. Stand overnight and just before use the next day, shake again.

After racking the wine, and if the wine is just a little hazy add a teaspoon of hydrated bentonite and stir into the wine. If it is very cloudy add up to 4 teaspoons of bentonite and stir. You should use as little bentonite as possible because it takes out flavours as well as deposits. Stir a couple of times over an hour or two and let stand. It may take a day or three for the wine to clear.

Other fining agents can also be used to remove off-tastes and odours. It is not possible to remove oxidative spoilage so avoid excessive aeration.

General Tips

- Keep everything clean but avoid chlorine bleach materials as these taint the wine.
- Keep wine storage vessels 'full' but with a small air pocket to allow for expansion and contraction of the wine as it heats and cools with the weather
- Make sure you add yeast nutrient soon after yeast inoculation. 2 days into ferment when it's needed.
- Keep air away from wine after ferment is completed. For example, when racking dribble the wine down the edge of the container rather than let it splash onto the wine introducing oxygen into the wine.
- If a cap forms during ferment, plunge it down at least twice per day
- Your aim is to capture the taste and aroma of the raw product. If you use rotting materials you will get a rotting taste. Unripe fruit will give an unripe taste.
- Avoid brass, iron or copper. Use glass, food grade plastic or stainless steel.
- Vinegar flies will introduce bacteria to turn the alcohol you make into vinegar with unpleasant tastes. Cover your ferment with cloth to keep them away.
- Once sediment forms rack it off. The gross lees should be removed as soon as it settles even if the wine is still a bit cloudy. Each racking helps to clarify the wine.
- After the gross lees are removed you can generally wait for the wine to clear itself. Sometimes years later. Only filter if you can't wait.
- A high temperature will speed up the ferment but you risk losing subtle aromatic flavours which are released at the higher temperature,
- Screw-topped bottles should only be used if you are sure the ferment is finished and there is no residual sugar. Otherwise you may experience an explosion.
- If fermenting in a demijohn, leave a large air gap above the juice. If a cap forms it may rise to the airlock and block it causing an explosion or a geyser which can reach the ceiling and make a mess.
- Make wine with Zen. Enjoy the experience. Take your time. Make decisions only after you have made a decision. If you are impatient, buy a bottle of wine to drink and don't let impatience affect your approach to the wine you are making.

Attachment 1 Equipment

You will be supplied with:

- **One Fermentation Bucket**

This is no ordinary bucket. It is made of food grade plastic so that impurities of the plastic will not contaminate the taste of the wine. It will be used for the initial stage of the ferment.

- **One Five Litre Demijon with Bung and Airlock**
- **One Two Litre Demijon with Bung and Airlock**

These two bottles will be used to finalise the ferment.

- **Racking Tube**

Racking is the winemaking term for syphoning. It will be used to take the clearer wine from the deposit of dead yeast cells on the bottom of containers.

- **3 KG Raspberries**

The raspberries were originally frozen and may be partially unfrozen by the time you get them.

- **Chemicals**

Each participant will receive a number of chemicals, some of which will be in excess of requirements for this winemaking workshop. Other chemicals will be supplied from bulk supplies retained by the Guild when required because this is more practical.

The following chemicals are relevant:
Sugar
Vitamin B tablets – yeast nutrient
Potassium Bicarbonate or Calcium Carbonate – acid adjustment
Malic Acid – acid adjustment
Tannin Sachets – White - Mouthfeel
Tanning Sachets – Red - Mouthfeel
Fermaid – yeast nutrient
Camden Tablets (SO2) – preservation of wine
Pectin – extraction of flavours
Citric Acid – acid adjustment
Tartaric Acid – acid adjustment
Diammonium Phosphate (DAP) – yeast nutrient

Attachment 2 Recipe for Raspberry Wine

Dry

3 Kg Raspberries
2 Kg Sugar
6 teaspoons Pectinase
2-4 teaspoons Yeast (Red Wine)
Yeast Nutrient - Fermaid
4 teaspoons Citric Acid

Day 1
Unfreeze raspberries. Place in fermentation bucket and pour 6 litres of boiling water over them. Add sugar, dissolved in 1L very hot water, then allow to cool to at least 30 degrees C. Add pectinase and leave to stand for 24 hrs.

Day 2
Hydrate yeast (Flat tray with water at 37.5C. Sprinkle yeast on top. Do not disturb for 15-20mins. Let temperature fall to within 5C of that of juice and inoculate.

Add citric acid, yeast and nutrients.

Days 3 - 4
Plunge cap of ferment twice daily (more if possible) for 4-5 days.

Day 5
Strain solids and discard. Place strained juice into two demijons under bubbler. Ferment to dry.

Every third Week (approx)
Rack off several times till clear. Stabilize with Camden Tablets (1 for 5L ½ for 2L) when dry

Before Bottling
Adjust final wine.
Bottle & Label

Attachment 3 Density Tables

GRAVITY TABLES - COMPARISONS

SPECIFIC GRAVITY	GRAVITY or OECHSLE	BRIX or BALLING	TWADDELL	BAUME
1.000	0	0.0	0	0.0
1.005	05	1.7	1	0.7
1.010	10	3.0	2	1.4
1.015	15	4.3	3	2.1
1.020	20	5.5	4	2.8
1.025	25	6.8	5	3.5
1.030	30	8.0	6	4.2
1.035	35	9.2	7	4.9
1.040	40	10.4	8	5.6
1.045	45	11.6	9	6.2
1.050	50	12.8	10	6.9
1.055	55	14.0	11	7.5
1.060	60	15.2	12	8.2
1.065	65	16.4	13	8.8
1.070	70	17.6	14	9.4
1.075	75	18.7	15	10.1
1.080	80	19.8	16	10.7
1.085	85	20.9	17	11.3
1.090	90	22.O	18	11.9
1.095	95	23.1	19	12.5
1.100	100	24.2	20	13.1
1.105	105	25.3	21	13.7
1.110	110	26.4	22	14.3
1.115	115	27.5	23	14.9
1.120	120	28.5	24	15.5
1.125	125	29.6	25	16.0
1.130	130	30.6	26	16.6
1.135	135	31.6	27	17.1
1.140	140	32.7	28	17.7
1.145	145	33.7	29	18.3
1.150	150	34.7	30	18.8
1.155	155	35.8	31	19.4
1.160	160	36.8	32	19.9

Attachment 4 Chemistry Background

The production of wine is an acceleration of natural cyclical processes that take place around us every day as things are made and then decay. Energy from the sun is captured by green leaves in the process of photosynthesis and is used to convert carbon dioxide and water into sugars.

6 CO_2	+	6 H_2O +	energy =	$C_6H_{12}O_6$
Carbon dioxide		Water	Sunlight	Sugar

These long chain molecules of sugar store up the energy from the sun in the chemical bonds between the atoms. At the same time other simple dissolved salts are transported to the leaves from the roots and these are also incorporated into the mixture of complex chemicals that make up the substance of the plant. When we eat the plant material these chemicals give the taste and mouth-feel so important in the sensory information we enjoy when we eat the food.

No energy is lost in the process, it is simply converted from one form of energy into another. When we ferment the plant material the sugar molecules are converted by the action of yeast cells to yield alcohol and carbon dioxide, releasing energy as the chemical bonds are partially broken down.

You will note that the sugar molecule still retains a number of chemical bonds that represent chemical energy, some of which is made available if we drink and digest it.

Grapes have very high sugar levels. Fruits of other plants often have high levels but generally not as high as grapes. Vegetable generally have relatively low levels and we need to add sugar to the ferments of most country wines. The amount of sugar you add will control the concentration of alcohol in the resultant wine

It is noted that one molecule of glucose generates two molecules of ethanol and two of carbon dioxide. 180g of sugar will produce 92g of ethanol and 88g of carbon dioxide.

Heat is liberated as the bonds in the sugar molecule are broken, releasing the energy that had been captured from sunlight in the photosynthetic process. This heat affects the rate at which the yeast can process the sugars in the juice. Different yeasts have a range of temperatures at which they can exist and grow and die, generally with a 30 degree C range within which is an optimum temperature for growth for each stain of yeast.

The sugar enters into the yeast cell and is converted into ethanol and carbon dioxide in the presence of enzymes as catalysts and they then pass out of the cell into the wine. At the same time the yeast cell is using the various nutrients for growth.

The conversion takes place as an anaerobic process without using oxygen (unlike respiration which most living things do for energy production). Most yeast cells can respire but generally do not, once they have used up the dissolved oxygen in the juice. Acetic acid bacteria are the bad microbes that make vinegar so that if you let oxygen into the wine the alcohol is converter to vinegar –yuck

This is a very simple version of the processes taking place. In fact there are various sugars involved, some of which the yeast must invert prior to conversion. There are numerous other substances that play a part in the process such as amino acids which are converted by the yeast into enzymes to assist in the conversion of sugars. The yeast cells require carbohydrates as an energy source (mainly sugars), free amino acids and ammonia ions for nitrogen sources, vitamins, and a suitable acidity (pH) for yeast activity and optimum growth. While grapes often contain most of these

additional chemicals, many garden products are deficient so we need to add chemical nutrients to feed the yeast cells

While the conversion from sugars to alcohol progresses, there are lot of other reactions taking place and these affect the tastes and aromas of the wine. This is complex chemistry. Generally the higher the temperature, the more heat is released and the faster the reactions occur. However many of the flavour chemicals have low boiling points and if the temperature of the ferment is too high, these aromatic substances that you want to retain in the wine will be liberated and the resultant concentration of flavours will be low. You need a balance between getting the ferment to proceed through to completion and the retention of flavour compounds

A Word of Caution

The process of production of carbon dioxide is the conversion of materials to a gaseous state. Carbon and oxygen (both joined by covalent bonds in sugar molecules) are released and combined in a gaseous form so that the volume they occupy is much larger. One mole of the carbon dioxide formed will occupy 22.4L at normal pressures and temperature and two moles are produced for every 180g of sugar converted, a massive increase in volume. Carbon dioxide is heavier than air and will build up in a closed room from the floor level upwards. This has implications for the room you use for fermentation and how you enter it as well as how you use the equipment.

An additional precaution is necessary. The carbon dioxide bubbles in the ferment will rise to the surface, often carrying with them the solid matter which is being fermented which forms a layer on the surface of the ferment. This frothy layer often increases the volume of the fermenting liquid and frothy cap. If the vessel does not make allowance for the rise it will flow out onto the floor. At a later stage of fermentation the ferment is often placed under a bubbler to release the carbon dioxide but preventing the entry of oxygen. More importantly, if the bubbler gets blocked by the rising cap, the pressure will continue to increase, eventually causing an explosion.

Therefore:

- *Don't die from lack of oxygen*.
- *Don't blow yourself up*
- *Don't make a mess*
- *Don't try to lick up that wine from the floor*

Attachment 5 Information Links

Links

Jack Keller Winemaking: www.winemaking.jackkeller.net
Jack from Texas - more information and recipes, particularly for country wines, than you can poke a stick at!

iWineMaker: www.iwinemaker.com
A useful reference site, provides basic winemaking information as well as calculators that provide necessary additive measurements.

Jim Alexander's Home Wine Making Page: www.home.comcast.net/~jimalexander2
Another great resource with lots of information, worth a rummage around to see what is there.

Lallemand Yeast Reference Chart: www.lallemandwine.us/products/yeast_chart
Essential reference chart to figure out the best yeast to use for your (potentially) medal winning wine !

The Home Winemakers Manual: www.home.att.net/~lumeisenman
A comprehensive manual covering all aspects of home winemaking - copyright by the author but free to read online or download.

Amateur Wine Clubs

Eltham and District Amateur Wine Guild: www.amateurwine.org

Frankston Amateur Wine Guild: www.FAWG.org.au

Alberta Amateur Winemakers: www.members.shaw.ca/AAW

Amateur Winemakers of Ontario: www.makewine.com

Commercial Links

Some links to commercial sites, mostly Australian oriented - just a short selection that may be of use to some people.

OnWine: www.onwine.com.au
Membership based wine site, "hosted" by Jeremy Oliver.

Wine Diva: www.winediva.com.au
Internet directory of many things related to the wine industry.

Wine Pros: www.winepros.com.au
Membership based wine site, "hosted" by Len Evans and James Halliday.

Wine Robot: www.winerobot.com
Search for the price/availability of a wine across a range of wine e-tailers.

WineTitles: www.winetitles.com.au
Multi media publishers to the wine industry including journals and books.