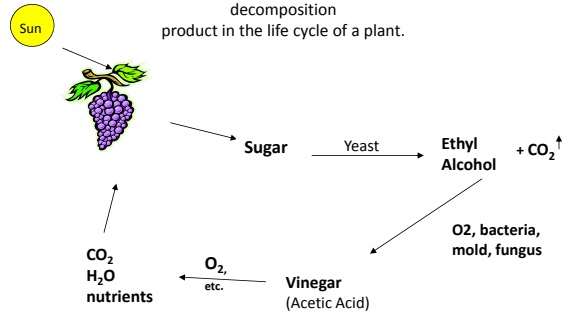
Making Your First (successful) Batch of Wine.

What Type of Wine Should I Make?

- Start with a grape wine
  - (vs. other fruit or vegetable).
- Grapes are unique in that they contain all the needed ingredients naturally, particularly sugar and acid levels, to make wine.
- Fruit or vegetable wines are actually more complicated than grape wines.

Nature's Definition of Wine

Wine is an intermediate decomposition product in the life cycle of a plant.



Fermentation – Basic Concepts

- Some or all of the sugar in the grape juice is converted to alcohol and CO2 by the yeast.
- Of the weight of sugar actually converted, you'll typically get 55% to 59% as % alcohol by volume.
- The residual sugar, if any, adds sweetness to the wine, which may or may not be desirable.

Fermentation – Basic Concepts

- In theory you can add extra sugar at the start and stop the fermentation at the desired sugar level but it's very difficult to do in home winemaking.
- It's safer to ferment dry and sweeten to taste with cane sugar. With a grape wine, the results will be very similar after a few weeks in the bottle.

Measuring Density - Brix

- Brix is a density scale based on % sugar in water. There are several other scales in common use such as specific gravity.
- A reading of 22 brix (sg 1.092) on juice, for example, might be 20.5% sugar plus 1.5% acids and other solids.
- If all the sugar is consumed, the final brix may be -1 or -2 (sg -0.992) because the density of alcohol is less than water.

Measuring Sugar

Brix is defined as the density of must or wine expressed as equivalent weight % sugar in a sugar-water solution (e.g., 10 brix = density of 10 gm sugar in 100 gm solution).

Acid:

- Two primary grape acids, Tartaric and Malic.
- Nature makes grapes tart (acidic) until seeds viable, then increasingly sweet until grape is eaten and the seed disseminated. As grape ripens, Malic acid drops and sugar increases.
- Hot climates like CA have problem with high sugar/low acid and NY the opposite.

pH and TA:

- The TA (Titratable Acidity) measures the amount of acid, the pH measures the strength of the acid. Both are important. The mouth is much more sensitive to the TA while chemical reactivity is related to pH. For example, the amount of SO2 needed for sanitation depends on pH.
- TA is measured by titration, pH with a meter. You can often get both numbers from your juice supplier.

Acid:

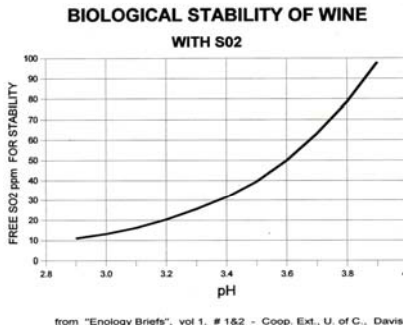
- At time of harvest, acid level is best in the 0.6% to 1.0% TA (Titratable Acidity) range. It will come down slightly during the wine making process.
- If acid is low, add Tartaric to 0.65%. If high, you can reduce it chemically but it's complicated to do it right and the result is seldom great.
- I usually let it go, then make a sweet wine, drink with pizza, or blend with a low acid wine. If you want to try de-acidifying, get a copy of the instructions from the RAHWM website.

SO2:

- Known beneficial effect since before Roman times. Used in preserving many foods at higher levels than in wine. It occurs naturally in wine even if none is added.
- Two important benefits in preserving wine: selective biocide – kills most wild yeasts and bacteria; protects wine from oxidation.
- Added as potassium metabisulfite (K-meta), 57% SO2 by weight, ¼ tsp = 40 ppm SO2.

SO2 kills harmful micro-organisms and prevents oxidation.

SO2 Needed depends on pH of Wine



SO2 and Yeast

- Wild or natural yeast can add complexity and that may not always be a good thing.
  - France hired Louis Pasteur to get away from natural yeast. He developed the process of sanitizing the must (juice or grapes) with SO2 and then inoculating with a known good yeast that's less sensitive to SO2. That's a good strategy for beginners.
- Try to maintain an SO2 level consistent with the pH, or just aim for a mid-range 50 ppm.

What yeast to use?

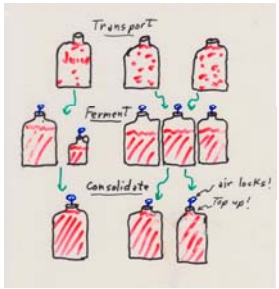
- Yeasts can affect aroma and flavor, especially in young, fruity wines, but so long as you pick a yeast appropriate for what you're making, you'll be okay.
- Search for and download "Scott Laboratories Fermentation Handbook" for a big list of recommended yeasts by wine type.
- Or, just get a recommendation from your juice supplier or local wine friend.

Source of Juice / Grapes

White Process	Red Process
1) Crush grapes	1) Crush Grapes
	
2) Press	2) Ferment
	
3) Ferment	3) Press
	

Preparing the juice:

- Add a rounded ¼ tsp/5 gal of K-meta if not already added by you or supplier (50ppm SO2).
- To provide headspace, move 3 qt. from the carboy to a separate gallon jug, or 2 carboys to 3 carboys, etc,.



Preparing the juice:

- Adjust brix to 22.5 (1.094) for whites or 23.5 (1.099) for reds with cane sugar.

  $(Brix_{Final} – Brix_{Initial}) \times Gallons / 4 = cups\ sugar.$

- Either leave the acid alone or access the RAHWM website for help.

Hydrating Yeast

- For 5 gal must , put 3 oz. water in a beaker at about 104F. Sprinkle in pack of yeast (or 1 gm/gal) and let sit 15 min. Stir well. Pour gently over must.
- Or better yet, use a re-hydration nutrient like Go-Ferm.

Hydrating Yeast with Goferm

- For 5 gal must, put 3 oz. water in a beaker at about 110F. Sprinkle in a rounded tsp (1.1 gm/gal) of Go-Ferm, stir well and let sit 10 min. Bring back to 104F, sprinkle in packet of yeast (1.0 gm/gal), stir gently to disperse, then stir again after 20 min and add to must.
- Avoid thermal shock (>15F temp difference). Blend must into yeast if necessary.

Yeast Nutrients:

- Basically fertilizer to keep the yeast healthy. I use two kinds, a balanced nutrient like Fermaid-K and a nitrogen source, diamonium phosphate (DAP), aka "junk food for yeast".
- Add 1 gm/gal each (1 tsp = 5 gm) after fermentation is well underway (e.g. when brix is in 15 – 20 range).
  - (Dissolve nutrient in small amount of water first to prevent foaming.)

Fermentation

- Monitor brix to see how your fermentation is going. An hydrometer on a thread is handy. Record values in notebook.

- When activity subsides (no foaming), consolidate wine to fill carboys.

Must Management

1. Splitting up juice.
2. Fermentation
   (the red color is real)
3. Consolidating

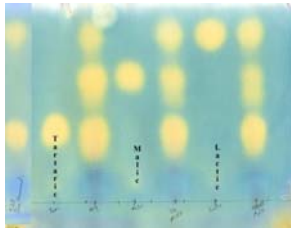
Fermentation

- When activity is negligible - < 1 bubble/minute – check brix and taste.
- Should take 1 – 4+ weeks to reach ~ 0 brix. (may go below 0 when sugar is all consumed because density of alcohol is less than water).
- Do you need to consume all the sugar, or if the wine tastes dry enough, are you done?

Malolactic Fermentation

- Bacteria converts malic into lactic acid.
- Fruit character diminished, wine smoother, more complex aromas and flavors.
- Most often used with some Chardonnays and many Reds.
- Add ML bacteria and nutrient towards end of alcohol fermentation, e.g. brix < 3, no SO2 until ML finished.

Monitor ML with Paper Chromatography



End of Fermentation

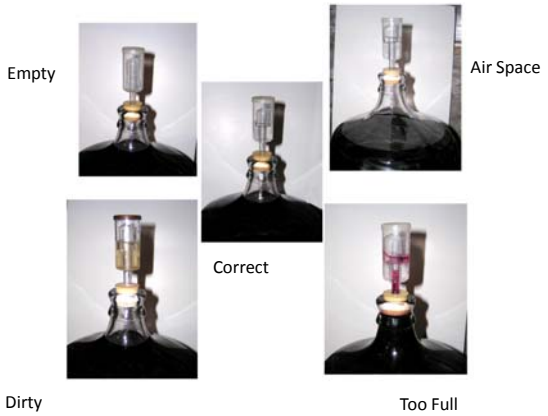
- When both fermentations are done (adequately), add 80* ppm SO2. Dissolve ½ tsp K-metabisulfite per 5 gal in a cup of the wine and add back to carboy.
  - (*new strategy)
- Stopper with air lock and let sit four or five weeks. Keep carboys topped up and air locks full.

First Racking

- After the 4-5 weeks, add another 40 ppm SO2 (1/4 tsp K-meta per 5 gal) to a clean carboy, then rack over the wine.
- Or better yet, measure SO2 level with Titrette and adjust to 50 ppm.
- Top up with other home wine (red or white blends of surpluses good) or good store wine.

Measuring SO2

Watch Your Wine Levels and Air Locks!



Fining (Whites)

- In 2 – 4 weeks, add 1 rounded tsp / 5 gal hot process Sparkolloid. Dissolve in 1/3rd cup water boiled in microwave. Stir in lightly in the top of the carboy.

Chill Proofing

- Let sit 1+ weeks after Fining, then Cold Stabilize (Chill Proof). Hold 3+ weeks at 28 – 34F to precipitate K-bitartrate (cream of tarter or wine stone). Cold temperature and the precipitate enhances and compacts the Sparkolloid lees.
- Rack while cold.

Cold Stabilization


How Not to Cold Stabilize

Sanitation

- Keep everything kitchen clean.
- Make up sanitizer solution: 2 tbsp K-meta and 2 tbsp citric acid in 1 gal of water. Treat and drain glassware and utensils. Keep solution in a spray bottle for surfaces.
- Sequentially rinse and drain bottles and carboys that have been left exposed to the air.

Prophylactic Sanitizer Spray

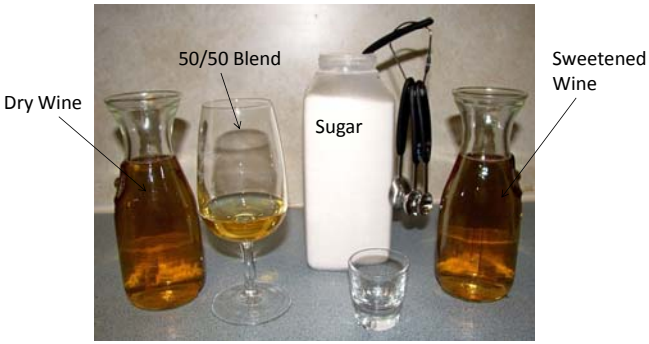


- Make up strong sanitizer solution : ½ tsp each K-meta and tartaric acid in a cup of water. Put in very fine spray bottle.
- Lightly spray surface of wine and neck of carboys every two to four weeks, especially high pH reds.
- Controls surface yeasts.
- First remove any scum with pieces of dry paper towel.

Aging

Wine is 3 - 6 months old and has been fined, cold stabilized, and racked at least twice. Additional clearing (settling), racking, and even fining may be needed. The flavor will improve dramatically during this period. Before bottling, wine should be stable, free of excess dissolved CO_2, and clear with possibly some sediment on the bottom.

Optimizing sugar level: On right, 1 tbsp sugar was dissolved in one half bottle of moderately acidic wine (~+4 brix). Let sit overnight and verify it's too sweet. Use shot glass to make 50/50 mix with base wine. Taste multiple times and multiple tasters. If too sweet, use as new "sweet point", if dry, as new "dry point".



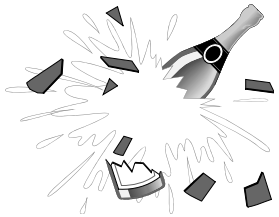
Preparation for Bottling

- Do a final racking if there's any hint of sediment on the bottom of the carboy.
- Add sugar based on your bench trial if necessary
  - Dissolve well in wine first to avoid eruption.

Preparation for Bottling

- Add 40 ppm SO_2 (1/4 tsp K-meta), or aim for 60 ppm if measuring SO_2.
  - 20-30 ppm will be consumed by dissolved and head space air in the bottle.

Biological Stabilization



- If final brix is > -1 or if sugar was added to sweeten, wine must be stabilized to prevent renewed fermentation in bottles.
- Add 1/2 tbsp fresh Potassium Sorbate per 5 gal along with the sulfite at least a couple hours before bottling.

Type of bottles/closures.

- For up to a year, synthetic corks or screw caps (flat or cone) with custom purchased bottles are fine. For longer keeping, good quality natural corks or "technical – twin disk" corks are best.

Type of bottles/closures.

- To play it safe, use crown caps with champagne bottles.

Bottling

Starting with White Grapes

- Make up a K-meta solution, 1 tsp in 1 cup water per 120# grapes. Sprinkle or spray proportionally over each lug before dumping into crusher.
- Crush and de-stem or just crush.

Starting with White Grapes

- Press into carboys, settle overnight, then rack juice into clean carboys and treat as fresh juice.

Working with Red Grapes

- Use a crusher/de-stemmer if at all possible.

- Make up a K-meta solution, 1 tsp in 1 cup water per 120# grapes. Sprinkle or spray proportionally over lugs before dumping into crusher. Remove 80-90% of stems.

Working with Red Grapes

- In fermenter, add pectic enzyme (e.g. Lallzyme EX-V) and hydrated yeast as with white juice.
- Keep covered and punch cap down at least twice a day.

Working with Red Grapes

- Add nutrient at 15-20 brix.
- Press off the juice in the 0 – 5 brix range and move to carboys. Top up when possible.



Working with Red Grapes

- Inoculate with Malolactic bacteria and ML nutrient at this point if desired.
- Monitor brix and ML progress (by paper chromatography).
- When dry and ML complete, add rounded ¼ tsp K-meta (50ppm).
  - Or better yet, measure pH and sulfite appropriately.

Working with Red Grapes

- Add oak chips if desired, ½ to 1 cup per 5 gal. Let sit 3+ weeks, then cold stabilize 3 – 4 weeks. Fining is usually not necessary.
- Rack cold, adding 1/8 tsp K-meta/5 gal.
- Finish as with whites.

Enjoy!