

Bottling Day Considerations

Preserving Your Hard Work

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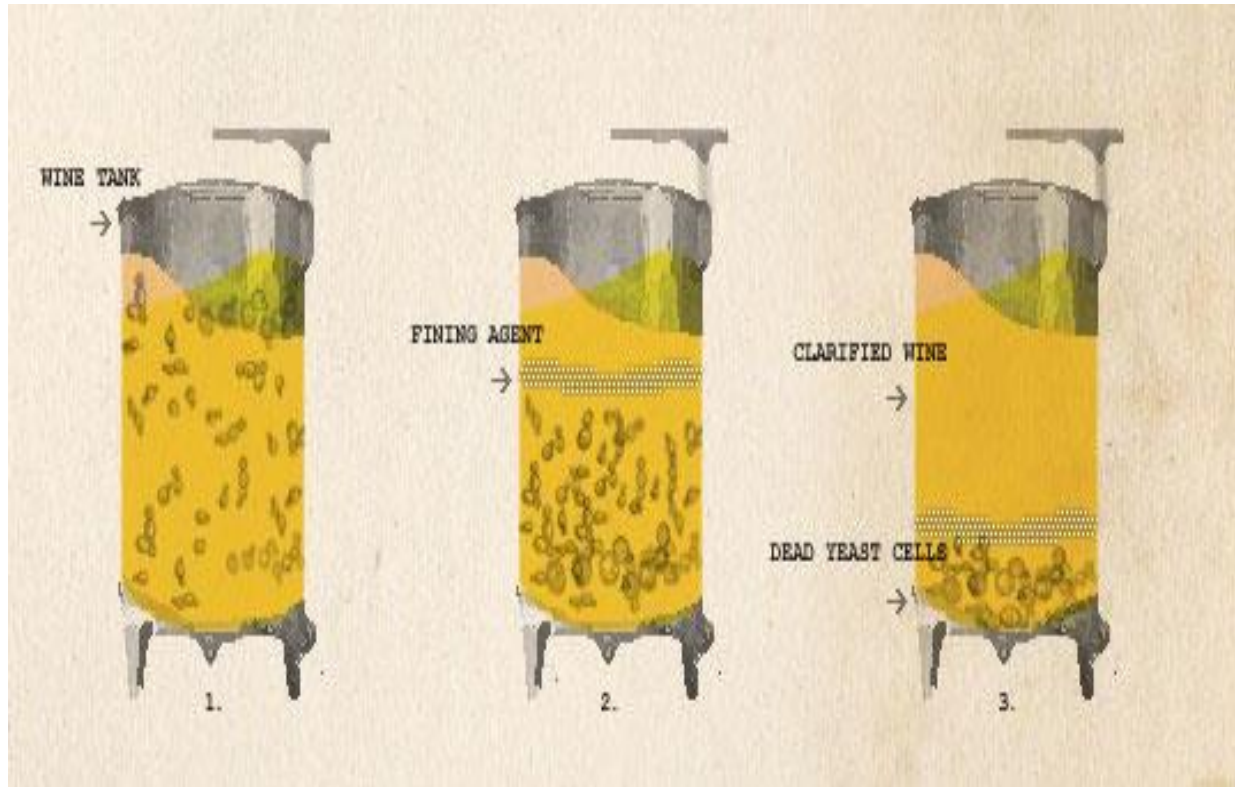
Bottling- What's the Goal?

- To package the wine and deliver the best quality, most consistent, shelf stable product to our consumers
 - This should be easy....RIGHT?!?
- This is the culmination of years worth of work!!
 - This is the Super Bowl, 4th down, 99 yard line... and we are tied...
 - Lets not fumble!!!!

The Bottling Timeline

- The timeline starts weeks, if not months before bottling day
 - Wine prep (Finish the wine):
 - Wine should be in its final blend state
 - Run full lab panel (RS, pH ,TA, FSO₂, VA, ETOH)
 - Tastings should be conducted, and any associated bench trials completed
 - Tannins: depending on which tannin you choose to use, it may take days, if not weeks to fully integrate into the wine
 - Mannoproteins: last thing to add, can be 24-72 hours before membrane filtration
 - Residual Sugar: at least 24-72 hours before membrane filtration.
 - » Concentrate: can affect tartrate stability
 - Acidity: adjustments are best made as juice. Wine adjustments must be screened for tartrate stability
 - Blending: any wine blends need to be rechecked for tartrate and protein stability

Clarification and Stabilization



Fining agents
Temperature
Gravity
Racking

The Bottling Timeline

- Chemical and physical stability
 - Protein Stability
 - Use of a nephelometer and bentonite fining trials
 - Send to Lab (such as ETS) to verify stability and/or fining trial recommendations
 - Tartrate stability
 - Filter and freeze method
 - Conductivity (either in house or outside lab)
 - CMC and Claristar
 - Colloidal stability (colloidal drama)
 - Clarification (solids and biologic material)
 - Pectins and glucans

- Chemical and physical stability

- SO₂

- Adjust according to pH
 - Buffer for binding
 - Try to make large adjustments days in advance
 - Depletion over time?

- Dissolved Gases

- CO₂
 - O₂
 - use of high purity nitrogen to modify dissolved gases

pH	% molecular SO ₂	Free SO ₂ (mg/L) required for 0.6mg/L molecular SO ₂	Free SO ₂ (mg/L) required for 0.8mg/L molecular SO ₂
2.90	7.5	8	11
2.95	6.6	9	12
3.00	6.1	10	13
3.05	5.3	11	15
3.10	4.9	12	16
3.15	4.3	14	19
3.20	3.9	15	21
3.25	3.4	18	23
3.30	3.1	19	26
3.35	2.7	22	29
3.40	2.5	24	32
3.45	2.2	27	37
3.50	2.0	30	40
3.55	1.8	33	46
3.60	1.6	38	50
3.65	1.4	43	57
3.70	1.3	46	63
3.75	1.1	55	72
3.80	1.0	60	79
3.85	0.9	67	91
3.90	0.8	75	99
3.95	0.7	86	114
4.00	0.6	100	125

The Bottling Timeline

- Separation Anxiety..... Filtration

ROUGH	POLISH	STERILE/SANITIZING
Greater than 5 micron	Between 1-5 micron	Less than 1 micron
-Turbidity reduction -Excessively cloudy -Visible solids removal -Heavy Yeast removal	-Brightness -Final clarity -Yeast Population reduction	-Brilliance -Yeast “sterility” -Bacteria log reduction or “sterility”
DE: 1 Darcy Lenticular & Pads: K700 and up Cartridges: Polypropylene	DE: 0.3-0.4 Darcy Lenticular & Pads: K100 through K300 Cartridges: Glass or PP	DE: 0.1-0.2 Darcy Lenticular & Pads: EKS through KS80 Cartridges: PES

Separation Anxiety Cont

Filtration Chart

Grade	Turbidity (NTU)	Seitz	Cuno
Coarse	< 100	900	10
Medium	< 60	700	30
	12-35	250	30-40
Fine	1-10	200	30-50
	1.0-3.0	100	60-70
	1.0-2.0	80	60-70
Sterile	< 1 NTU	EK	60-70
	< 1 (membrane)	0.45	70-90

Separation Anxiety cont

- So may wine is less than 1NTU... I'm good to go... right?

IT DEPENDS

Separation Anxiety Cont

- Clarity (NTUs) is not always a good indicator of membrane filterability
- FI = Membrane Filterability Index
 - 0-12 = Easy to Filter
 - 12-25 = Acceptable
 - 25+ = Difficult to Filter



Preparing for Sterile Membrane Filtration

- The wine should be prefiltered for membrane filtration 24-48 hours in advance, the sooner the better
 - If the time between pre filtration and membrane filtration is >48 hours, colloidal compounds can reform and plug the membrane

Timeline...THE DAY APPROACHES

- Once the wine is in its “final” resting place (bottling tank)
 - Run full lab panel (RS, pH, TA, ETOH, FSO₂, DO, CO₂, VA?)
 - Adjust FSO₂ and dissolved gases as necessary
 - Sensory Analysis
 - Copper trial?
 - Temperature (ideal is 60F-68F)
 - Easy to determine fill height and volume
 - Less issues with post bottling expansion/contraction
 - Less bottle sweating

The Importance of Dissolved Oxygen

- Dissolved Oxygen has a direct effect on the following:
 - Retention of SO₂
 - Shelf Life
 - Color (Browning)
 - “Freshness”
 - Microbial stability
 - Production of acetaldehyde
 - Bottle shock
 - Post Bottling Reduction (Volatile Sulfur Content)
 - ????

IV. Managing Oxygen During Bottling

There have been some recent concerns about the oxygen pick up during bottling. This is an extremely important issue influencing wine quality, stability, and longevity.

The concentration of molecular oxygen should be measured in the wine before bottling begins and should be less than 0.5 mg/L. If the concentration of oxygen is greater than 0.5 mg/L, it can generally be lowered by sparging with nitrogen gas (see Zoecklein *et al.*, 1995).

Just prior to bottling, air should be eliminated in all hoses, filter housing pumps and the fill bowl by using displacement gas (nitrogen, carbon dioxide, or argon). Feed tanks should be blanketed with nitrogen, CO₂ or lightly CO₂ sprayed. Bottles should be completely free of particular matter, which can occlude oxygen, and flushed with displacement gas just prior to filling. Any oxygen which remains in the bottle will result in an oxygen concentration increase. Any increase above 0.2 mg/L dissolved oxygen indicates excessive pick-up.

The loss of free sulfur dioxide in wine is proportional to the dissolved oxygen content. Producers not using vacuum filters, corkers, or bottle gas flushing can have up to 5 mL of air in the head space of their bottled wine (750 mL). This amounts to approximately 1 mL (1.4 mg) oxygen. Four mg of sulfur dioxide are needed to neutralize the effects of one mg of oxygen. Using this relationship, an additional 5-6 mg of free sulfur dioxide is needed to reduce molecular oxygen in the head space. Monitoring molecular oxygen in wine during any stage of processing is relatively easy. Several portable, hand-held meters with probes are available for measuring atmospheric and dissolved oxygen in wine. The use of displacement gases and the use of CO₂ as a sparging gas are discussed in Zoecklein *et al.*, 1995, and in the Volume 10, Number 2, March-April 1995 issue of *Vintner's Corner*. Additional copies are available upon request.

Source: <http://www.apps.fst.vt.edu/extension/enology/VC/Mar-April99.html>



It's my B-Day I can cry if I want to

- So... your wine is chemically, physically, collodially, emotionally, and spiritually stable.....

AND YOU DON'T HAVE CORKS

(OR FILL IN THE _____)!!!!!!!

^*%(\$*#&!!!!!!!

What to have on hand

- Closures
- Labels
- Bottles
- Tape
- Pallets
- Shrinkwrap
- Labor
- Gas for the forklift
- Clean 5 gal buckets
- Filters
- Velcorin/Sorbate
- Filtered water?
- Pallet sheets
- Nitrogen (160l dewar = 3000 cases, but can blow off)
- Tools?
 - Maintenance
 - Analysis
 - Setup

Bottling Day: The Great Liquid Tiptoe through the Tulips

- Quality control
 - After flushing lines and filler with inert gas, catch some wine on initial startup and hone in fill heights. You can return the caught wine to the bottling tank.
 - Regular line checks.... What to look for
 - Visual examination
 - Before and after breaks or stoppages

Bottling Day QC

- Fill height
- Glass type and MFG
- Closure type and MFG
- Capsule type and MFG
- Wine temp
- Filter pressure differential
- Hose clamp
- Dissolved gases
- Internal bottle pressure/vacuum
- Proper closure application
- Proper label application
- Proper box marking
- Total count and serial numbers
- Source tank
- Wine chemistry

Closure Application

- Contact your supplier for recommendations
 - <https://www.corkqc.com/pages/bottling-handbook>
- Screwcaps must also be applied correctly
 - Slip and removal torque, proper thread form, tuck under, reform, head pressure, etc

So you've got the wine in the bottle and you're
done!!!



Post Bottling QC and Due Diligence

- Hold Library samples for periodic tasting and analysis (chemical and sensory), depending on your distribution chain (3,6,9month)
- Send bottled samples for bottled wine sterility (especially if breakdown occurs or filter swap)
- Store the bottled wine correctly, contact your closure supplier for recommendations

