

Types of Sanitizers

- Heat, w/ water or steam to saturate effect
 - Very effective anti-microbial, except some encysted forms
 - Exposure time critical
 - Non-corrosive, but energy intensive
- Chemical
 - Effectiveness varies with exposure time, temperature, concentration, microbial load, soil load
 - Can be corrosive



Chemical Sanitizers

- Chlorine-containing not recommended except for out of control microbial situations
 - Very effective anti-microbial
- Iodine-containing little used for wineries
 - Effective anti-microbial, except when diluted



Chemical Sanitizers

- Quaternary ammonium compounds
 - Attached alkyl group affects activity
 - Works well with light soils and with detergent
 - Fairly effective anti-microbial
 - Fairly environmentally friendly
 - Not tolerant of mineralized water



Chemical Sanitizers

- Acid-anionic
 - Only effective at low pH
 - Can be corrosive
 - Not tolerant of mineralized water
- Fatty acid sanitizers
 - Only effective at low pH
 - Can be corrosive
 - Can be used with acid rinse



Chemical Sanitizers

■ Peroxides

- Hydrogen peroxide, ozone (inorganic), peroxyacetic acid, peroxyborates (organic)
- Very effective anti-microbials
- Tolerant of mineralized water
- Concentration dependent
- Not corrosive
- Can remove light bio-films
- Environmentally friendly



Routine Barrel Care

- Check barrels for flaws before accepting
- Fill with water to test for leaks and MO's
- Rinse and sanitize barrel before wine
 - High pressure rinse
 - Ozone or SO_2 /citrate soak and rinse
- Clean and sanitize after wine
- Temporary empty storage with SO_2 /citrate
- Longer empty storage with sulfur pastilles
- Top off and sample regularly for MO's



Routine Tank Cleaning

- General Order: Stainless or plastic tanks, crusher-destemmers, presses, fittings
 - Cold water, high pressure rinse
 - Strong inorganic alkaline solution or paste scrub
 - Cold water, high pressure rinse
 - Cationic detergent, combined with peroxyacetic
 - Cold water, high pressure rinse
 - Hot water, high pressure rinse
 - Ozone treatment



Routine Barrel Cleaning

- General Order: Barrels free of faulty aromas or tastes
 - Cold water, high pressure rinse, 1-3 minutes
 - High pressure steam rinse, 1-3 minutes
 - Repeat cold and steam rinses twice more
 - Either refill with clean wine or
 - Fill with water
 - add ozone, if available
 - follow with filtered water + 45 ppm SO₂/90 ppm citrate
 - After 1-4 days, empty and refill with wine or empty and burn sulfur pastille, re-bung and store



Contaminated Barrel

- General Order: Barrels with faulty aromas or tastes
 - Option 1 → Remove from winery and sell for non-wine uses
 - Option 2 → ***Only if desperate***: Clean, sterilize, and re-use
 - Rinse cycles done as per barrel without faulty aromas or tastes
 - Fill with water, put steam wand in water and bring water to 160-180°F, steam to maintain temperature for 4-6 hours
 - add ozone, if available
 - follow with water + 45 ppm SO₂/90 ppm citrate
 - After 1-4 days, empty and burn sulfur pastille, re-bung and store
 - After 1-4 weeks, rinse and fill with filtered water, after 1 week, take samples and then add 90 ppm SO₂/180 ppm citrate while doing microbiological assay of samples
 - If samples are negative for spoilage microorganisms, re-use barrel, but sample periodically



Tank and Barrel Lees Management

- Light lees (1-25 microns) contact adds body and aromas
 - Proper enzymatic hydrolysis of yeast contents
- Heavy lees (>100 microns) contact can yield off-aromas
 - More reductive proteolysis of yeast
- Light lees effects greater in barrels and small tanks
 - Wine volume/yeast surface/ ratio smaller
- Heavy lees effects greater in large tanks
 - Yeast compression → more reductive proteolysis



Tank and Barrel Lees Management

- Lees Yeast Enzymatic Autolysis After Cell Death
 - Proteolysis of yeast contents
 - Amino acids, peptides, nucleotides
 - Amino acids can become complex flavor precursors
 - Breakdown of cell wall polysaccharides
 - Mannoproteins and glucans
 - Integrate with fruit and wood phenolics for structural maturation
 - More necessary for MLF/lees interactions
 - Best if MLF done soon after primary fermentation
 - Helps in clarification
 - Unstirred lees → higher amino acids and perceived fruit intensity



Tank and Barrel Lees Management

- Settle/rack off whites before fermenting
 - Non-soluble precipitates, MO aggregates, vegetative material, and protein complexes removed
 - Cleaner fermentation and less reduced sulfur
- Remove rough lees as soon as possible after fermentation
 - If leaving reds with skins, stir regularly
 - Only light lees are good for long term exposure to wine; rough lees can generate off odors



Tank and Barrel Lees Management

- Stirring lees
 - Increases lees surface area contact
 - Can increase oxidative processes
 - More frequent stirring enhances yeast sensory, lessens fruit
 - More necessary for MLF/lees interactions
 - Helps in clarification
 - Unstirred lees → higher amino acids and perceived fruit intensity



Tank and Barrel Lees Management

- Duration of Lees Contact
 - Lees promote slow, controlled oxidation
 - Stylistically driven; weeks to months
 - Usually no longer than 6 to 9 months
 - Followed by aerobic racking
 - Subsequent racking usually without aeration



Tank and Barrel Lees Management

- SO_2 and Lees
 - Early use increases total SO_2 binding over life of wine
 - Enough to inhibit MO's and limit excess oxidation
 - Not so much that slow oxidation is inhibited or aromatics are lessened by binding SO_2
 - Barrel topping and racking (oxygen) affect SO_2 needs



Tank and Barrel Lees Management

- Lees Contact for Reds and Whites
 - Anthocyanin and polyphenolic interactions differ
 - Red color intensity reduced but less browning
 - Mouthfeel, tannin astringency, and aromatic enhancements over ageing period may have greater effects in reds with high polyphenolics



Lees Exposure

Take-Home Lessons

- Light lees, not heavy
- Can have great stylistic influence
- Issues
 - Stirring
 - Oxygen/Reduction
 - SO₂ management
 - MLF
 - Duration
 - Racking
 - Whites and Reds



Take Home Lesson: Costs

- Vigorous Cleanliness, Sanitation, Microbial Monitoring is very desirable for quality maintenance
- What is cost ?
 - Sanitation cost about (\$0.50/gallon/yr)
 - Equipment cost substantial: estimate 40% extra for winery start-up or renovation, balanced by increased labor efficiency (estimated cost about \$0.75/gallon/yr)
 - Monitoring costs substantial: average \$50/sample (in-house and off-site labor or fees) and could average 100 tests year (estimated cost of about \$1/gallon/yr)
- Total cost about \$2.25/gallon/yr



Take home Lesson: Benefits

- If each gallon of wine (5 x 750 ml bottles) saved has an estimated average retail value of \$25-100, then 450 to 100 gallons saved is break-even per every 5,000 gallons sold, = 9%-2% of wine must be saved to justify cost
- After 5-10 years, extra cost drops to about \$1.50/gal/yr (inflation-adjusted dollars)
- Hidden benefits
 - Extra quality can yield extra price: to cover cost without saving any wine, need extra \$0.95/bottle for 5-10 years, and then \$0.65/bottle from then on
 - Hidden dissatisfied customers can assassinate wines' reputation, and wines highly dependent on reputation for both repeat and new customers

