

GENCO WINEMAKING NOTES

Winemaking sanitation

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If you're like most home winemakers, you probably don't clean and sanitize your equipment the way you should, or as often as you should throughout the winemaking process. That can lead to problems with your wine. Careful attention to cleanliness and detail will minimize potential problems.

Commercial wineries take cleaning and sanitation very seriously. They have strict protocols for doing both with all their winemaking equipment at the end of each cycle and the start of a new one. A lapse in sanitation can have significant impact on the quality and marketability of the final product. And they are usually fastidious about retarding oxidation and/or microbial spoilage and preventing accidental introduction of wild yeasts and bacteria during crush, cold-soaking of grapes, fermentation, MLF, practices, or afterward during extended maceration, as well as during racking, topping up, pumping, filtering and bottling.

Cleaning involves the removal of both inorganic and organic substances from the surfaces of winery equipment. Sanitation, on the other hand, is the reduction of microbes that can cause wine defects. This is not the same as sterilization and disinfection.

Water quality can be an issue in winemaking. Most municipal water that has been properly treated to keep microorganism below harmful levels is fine to use for rinsing. Well-water may however contain high levels of bacteria that could affect your wine, unless it is properly treated. Water that has been softened, pH adjusted, UV treated and filtered is generally fine to use for rinsing. Soft water, though, may leave a residue and is not good to use for diluting must or mixing with yeast and other wine additives, like yeast nutrients, enzymes, tannins, bentonite, etc. It also has a higher sodium level that can make a wine taste salty. Bottled water that has been filtered and chlorine-free is much better to use for dilution and mixing with yeast.

Sanitation begins with keeping your cellar reasonably clean, free of debris and any working surfaces clean and regularly sanitized. Event floors should be vacuumed and mopped with a disinfectant, especially at the start of crush. Wild yeast and bacteria are all around us. They are in the air, on flat work surfaces, and on all your winemaking equipment. It is not easy or even necessary to remove or kill every bacteria or wild yeast cell that might spoil wine. It is important, though, to keep their numbers low to minimize development and the production of metabolites that create off-aroma and flavors.

In general, anything that comes in contact with harvested grapes, must, and wine should be cleaned and sanitized, within reason, including your hands, which are a great source of microorganisms such as lactic acid bacteria. There isn't much that can be done to eliminate wild yeast and bacteria on grapes, but winemakers can pick into lugs or buckets that have been cleaned of surface cleaned of debris, dirt and staining. From that point on, grapes should be

transported in clean and sanitized containers. Stemmer crushers, presses and tanks, open-top fermenters, etc., should be thoroughly cleaned and sanitized. Collection buckets, funnels, carboys, stoppers, bungs, stir rods, tools used to punch downs, etc., need to be clean and relatively sterile. Literally everything that the grapes will come into contact with need to be cleaned and sanitized.

Simply rinsing winery equipment such as siphon hoses and carboys after use does not remove all of the organic material, staining, and hard to see films or microorganism. You need to use an alkaline cleaning agent to remove organic material, staining and biofilms (a slimy material containing microbes embedded in polysaccharides) that are typically not visible. Mold often grows in the residual rinse water which contains a very dilute solution of wine-based nutrient that remains following a quick rinse. It may take 3 or 4 rinses to remove all of the wine-based residue in carboys, fermenters, tanks, gallon jugs, etc., that can be slow to dry. This may result in contamination of the next batch of wine. To prevent this, use a cleaning solution to remove films and staining, followed by a sanitizer. **Star San, SaniClean** or Iodine-based sanitizers such as **Iodophor BMP** or **Io Star**, as well as a **10% solution of PMBS** or **high proof ethanol** are all good sanitizers. Some cleaning agents can sanitize as well, after adequate contact time, but need to be rinsed. Scrubbing and brushing may be needed to remove stubborn residue and deposits. Avoid abrasive scrubbing pads on plastic to prevent scratching. Scratched and roughened surfaces are more difficult to clean and sanitize. Cleaned and sanitized containers like carboys and beer kegs should be allowed to drain upside down until there is no visible water. They can be stored with a paper cup inverted over the neck of the bottle, or a wadded paper towel placed in the bung hole. Other containers can be stored with the cover in place.

Recommended alkaline cleaning products for winery cleaning:

- **Sodium carbonate** (also called Soda ash). It's a good cleaning agent for many surfaces, but should not be used to clean barrels because it leaches key oak compounds.
- **Sodium percarbonate** (Sodium carbonate peroxyhydrate): a bleaching agent made by combining Sodium carbonate and hydrogen peroxide. When added to water it releases hydrogen peroxide, resulting in a foaming action. It is sold as Proxycarb or PeroxyClean. It has the advantage of dissolving tartrates and neutralizing acetic acid in problem barrels.
- **Powdered Brewery Wash, (B-Bright, Straight A—special formulations)** contain sodium percarbonate, sodium metasilicate, and a surfactant. They are safer than caustic cleaners and outperform them. Use 1 ounce per gallon for winery equipment. Soak equipment overnight in a PBW solution, and rinse the following morning - no scrubbing required. PBW can effectively clean items that can't be reached with a brush or sponge, and is strong enough to remove thick, difficult, caked-on organic soils. These cleaners also work well to remove labels from commercial wine bottles.
- **OxyClean- Free** (no fragrances added!) Contains sodium carbonate, sodium percarbonate, sodium metasilicate, and a surfactant. Good winery cleaner and sanitizer.

- **One-Step-No Rinse** sodium carbonate and sodium percarbonate which releases oxygen H_2O_2 . Cleans and sanitizes. Requires two minutes of contact time, and no rinsing required! Use 1 tablespoon per gallon of water.
- **Cleanskin-K** (Scott) is an alkaline detergent. This potassium carbonate-based formulation also contains a proprietary percarbonate, chelating and sequestering agents for enhanced cleaning. Cleanskin-K efficiently removes wine tartar, color, proteins and organic soil.
- **Destainex** (Scott) a sodium percarbonate- based cleaning agent with sanitizing abilities. Removes wine color, protein stains, mold, mildew, and biofilms from surfaces that wine will come into contact to: stainless steel, concrete, polyethylene, polypropylene, plastics, flexible hoses, glass and other surfaces.
- **Oak Restorer-CW** (Scott) a blend of buffered carbonate, bicarbonate and proprietary surfactants. It removes tartrate crystals, wine color, protein and organic soils from barrels using cool water (68-86°F).
- **Others chemical agents:** Sodium hydroxide, Potassium hydroxide, Sodium Silicate are caustic (high pH). Good for serious cleaning jobs, but they are caustic and need to be used with care to avoid skin or eye damage. Furthermore, they are not compatible with certain materials.
- **TDC** is a liquid acid cleaner for glass carboys and other glassware. It is unscented and comes in liquid form. Use at the rate of 1/2 Tbs. per 5 gallons of water and rinse thoroughly.
- **Never use dish soaps!** They are very hard to rinse and have an added fragrance that can taint any wine that comes into contact with it.

Common sanitizers:

- **Star San** is a common 'no-rinse' sanitizer for winery use. It's made to foam, so it's ideal for most general sanitizing duties (ex: tanks and equipment, etc.)
- **Sani Clean** is similar to Star San, but has a low-foaming formulation — ideal for sanitizing pumps, filters, and as a final acid rinse.
- Both of the above products are acid-based sanitizers and when used at their recommended concentrations are quick, odorless, tasteless and safe for glass, stainless, and plastic materials. They also don't need to be rinsed. When using Star San and Sani Clean there are no fumes and intermittent skin contact is not an issue.
- **Ethanol:** is also a good sanitizer. You can purchase high-proof 'Everclear' or Diesel vodka to use as a surface sanitizer.
- **IO Star Iodine** sanitizer: a 'no rinse' product used at the rate of 1 ounce per 5 gallons of water (25 ppm). Allow 1 minute of contact time to effectively sanitize equipment. Although, it has the same benefits as Star San and SaniClean there is a potential to stain vinyl tubing and plastic parts over time.
- **BTF Iodophor:** a 'no rinse' sanitizer for most equipment: buckets, kegs, tanks, vats, bottles and more. No residual taste or odor left behind, low foaming and gentle on hand. No-rinse concentrate requires only 1 tsp per 1 1/2 gallons of cool water 12.5ppm concentration and 2 minutes of contact time to be effective.

- **Alpet D2:** Like Star San and SaniClean, [Alpet D2](#) is a surface sanitizer. However, because Alpet D2 contains QUAT (a residual bacterial killer) it has the added benefit of keeping a surface sanitized even when dry. It's ideal for sanitizing work areas where yeast and bacteria are handled and winemaking additions are weighed and made-up.
- **Chlorox (Sodium hypochlorite)** although a good bleaching agent and sanitizer, it should never be used in the cellar or to clean or sanitize winemaking equipment. There is a real potential to cause a serious TCA taint (2,4,6-trichloroanisole) to wine that comes in contact with surfaces that have been cleaned with products containing hypochlorite (chlorine). Don't use hypochlorite anywhere in the winery or where wine is made, aged in barrels, stored in case boxes, or areas where bags of corks or wine-making supplies are kept. There is a significant threat of taint from using a hypochlorite solution or its vapors that contact wood, wood pallets, paper, cardboard, or could conceivably come in contact with wine, case boxes or equipment used in wine-making.

Cleaning and sanitizing your barrels?

- **Acidify a new barrel** once it has been filled with water and it no longer leaks. Change water daily until the swelling is complete. Citric acid, because of its low pH is an effective antimicrobial. Use 1T of Citric acid per 5 gal. of water. After sloshing the solution around the barrel, allow it to drain out, and then fill the barrel with wine.
- **After racking:** rinse thoroughly and acidify with Citric acid at the rate of 1T per 5gal. of water. Slosh, drain and refill with wine`
- **After bottling—** rinse, steam clean or fill with very hot water to remove tartarates and residue — or add Proxycarb at the rate of 4g per gal of water, fill with water and allow to stand for 2 to 4 hours. Empty, rinse and acidify (see below)
- If you have access to hot water, fill with hot water and allow to stand for 24 hours to remove deposits and tartrates, drain and acidify.
- **Short-term storage:** clean, fill with water and then for every liter (3.79 L per gal) of barrel volume, add 1 gram of citric acid and 2 grams of PMBS. If you prefer to store your barrels filled with a citric acid and PMBS solution drain and replace every couple of months as the SO₂ dissipates.
- **Long term storage:** drain, clean, and acidify, allow to drain upside down overnight and then burn a sulfur strip every 4 to 6 weeks until barrel is dry. It usually takes burning 2 wicks until the barrels are sufficiently dry and VA organisms are unable to metabolize. The standard dosage of sulfur is roughly 1/3 of a Sulfur Stick per 60 gallon barrel - roughly a 1" x 2-3" piece or a 5 gram disc (pastille). Avoid storing barrels outside or in open areas where the lead cable borer can burrow into the wood. This is a very real issue!
- **VA** - Treat any barrel that smells of VA or has off aromas with Proxycarb (4 g per gal of barrel capacity). Allow to stand for 8 to 24 hours, depending on severity of problem.
- **After storage,** add water to swell the barrel. Turn the barrel on end and add water slowly, allowing it to trickle in to hydrate the heads and ends of the staves, one at a time. After about ~4 hrs. Turn the barrel over and repeat. Once the ends no longer leak, turn the barrel on its side and begin filling slowly. It may take a while to fill the barrel because it may lose water nearly as fast as it leaks out. But within a couple of hours it

should retain most of the water. Within the ~8 hrs most leaking will subside. After 24 hours most of the leaks should have stopped. Try and keep the barrel filled until the leaks stop. Continued leaking may be the result of holes created by the lead cable borer usually in the groove where the head and staves meet, or at the edge of the metal hoops. You can use a wood matchstick or round tooth pick to plug the hole, or obtain a spiel from local barrel manufacturers or ReCoop, a barrel repair and recondition company in Sebastopol or from the Beverage people. I've had good luck stopping leaks by using barrel wax. The wax can be used to seal 'matchstick' plugs. I usually melt the wax using a propane torch, allowing it to plug areas where there is persistent seepage. It works best when the leaky area are allowed to dry for several hours. You can expose the barrel to direct sunlight or use a hair dryer to expedite drying. It not usual for the some leaks to take as long as 48 hrs for leaking to stop. Barrels with persistent leaks should be inspected and repaired as needed. It's a good idea to add PMBS to Citric acid to the barrel while it is filled with water for more than 24 hours to discourage spoilage bacteria.

- [Cleaning the exterior](#) of mold-covered barrels: apply a solution of PMBS and citric acid in water (3 T of each in 1 gal of water).

Other ways to prevent spoilage:

- Pick grapes into clean picking lugs, buckets, or micro bins. Use an alkaline cleaning agent, such as Proxycarb or PBW and rinse thoroughly.
- Wash your hands thoroughly when handling sanitized equipment and before contacting juice or wine.
- Do your best to clean your cellar and sanitize work surfaces.
- Clean and sanitize all winemaking equipment use in the winemaking process.
- Use the recommended rate of SO₂ (35 to 50ppm) after stemming/crushing reds or pressing whites. SO₂ is a strong antimicrobial agent that kills or greatly inhibits most bacteria and wild yeasts.
- Chemical and winemaking products used in winemaking should be dispensed using a freshly sanitized transfer spoon or measuring spoon.
- Use a fresh piece of wax paper to hold a chemical or material when measuring it on a scale. You can lift the paper carefully and slide the material into a clean and sanitized mixing container.
- Use bottled (filtered) to solubilize winemaking products and dilute must.
- Use yeast nutrients to ensure that your fermentation progresses to dryness and does not stick. Wine that stick are prone to oxidation and spoilage due to low SO₂ levels.
- When doing a cold soak, make sure the temperature of the must is reduced to less than 50 °F as quickly as possible by using enough dry ice or frozen water-filled plastic jugs. Yes, you have to clean and sanitize the plastic jugs.
- Maintaining adequate levels of SO₂ throughout the entire process will usually ensure a defect-free wine.
- Adjusting pH levels of finished reds to less than 3.85 and 3.5 for finished whites, make them more stable.

- Keep open-top fermenters covered during fermentation to keep fruit flies out. They carry acetobacter bacteria.
- Rinse punch-down tool after each use and clean with an alkaline cleaner and then sanitize before use.
- Keep head-space to a bare minimum in storage containers, e.g., tanks, beer kegs or carboys. You may need to blend in another variety if you don't have quite enough to top up the container.
- Make sure barrels are tightly bunged. You should hear a 'wosh' sound when you break the vacuum that forms when wine evaporated from the barrel as you remove the bung.
- 'Top' barrels every couple of weeks, or at the very least, monthly, and using an inert gas (Argon) to minimize contact with air. Excess headspace increases the loss of SO₂ (volatilization) into the head space. This is lost as soon as you open the bung. Acetobacter bacteria and film yeast are more likely to develop when there is ample head space, the SO₂ levels are low and when oxygen is able to enter through a poorly seated bung or leaks in the barrel.
- Use a good quality wine to top with, such as additional wine of the same variety and vintage. One convenient way to top is to bottle some of extra wine after it has gone through MLF and been racked once and use it for topping. You can use an older vintage or a compatible varietal, as long as it smells and tastes fine. You can also buy an acceptably good wine like 'Two Buck Chuck' to top with. If you buy a wine make sure that it acceptable.
- For best results, store wines at 60°F or less. Spoilage organisms are less likely to develop. If this is not practical, make sure that your SO₂ levels are adequate and you test for free-SO₂ regularly and adjust as needed to maintain a level high enough to prevent oxidation and inhibit spoilage bacteria.
- When cleaning stainless fermenters after fermentation, pay particular attention to the inside surface of the top of the drum and the upper portions of drum. Use a brush to make sure the thick residue of yeast and other metabolites that develops there during fermentation is loosened and then rinsed away. You can also turn the sealed drum on end, so the solution cleaner solution remains in contact with the residue to ensure adequate cleaning.
- Each time you rack, make sure your wine contains the correct level of SO₂. You'll probably lose 10 to 15 ppm of FSO₂ during the process. So it's a good idea to check your SO₂ following racking.
- Contrary to conventional thinking, wines with a pH greater than 3.7 only need about 30 ppm for stability. Use the *standard molecular SO₂* levels for wines with a pH of 3.6 and below.
- Clean and sterilize you bottler before using, and make sure your siphon is recently sanitized.
- Keep you cork in sealed plastic bags and avoid handling them with your bare hands. Use disposable use food-service or surgical-type gloves. At the very least wash your hands thoroughly and refrain from touching your face or other parts to avoid contaminating them with Lactobacillus bacteria, commonly found on skin. It may be good for cheese-making but not wine!

- Before using a pump to transfer your wine, circulate a solution of a sanitizing agent like Star San through it for a minute or two. Even when carefully rinsed, pumps will contain some water and wine residue.
- Pressure washer are very effective at cleaning large equipment, such as open-top fermenters, microbins, stemmer crushers and presses. You can add a cleaner to spray water for better cleaning.
- When bottling, sanitize the cork compression and insertion mechanism to prevent contaminating the corks and the wine. Spray with a solution of Star-San, a 10% PMBS sol or high-proof alcohol, etc. If you drop a cork on the floor be sure to sanitize it before inserting it into a bottle.

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