

MANAGING BARRELS FOR THE PREVENTION OF COMMON WINE FLAWS



SOUTHERN OREGON
WINE INSTITUTE®



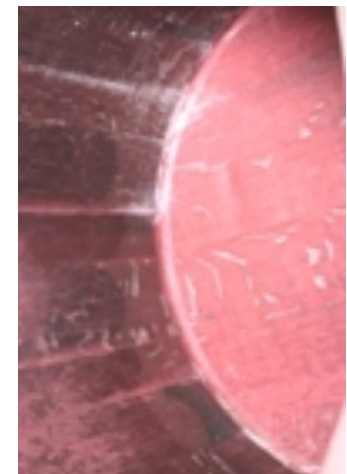
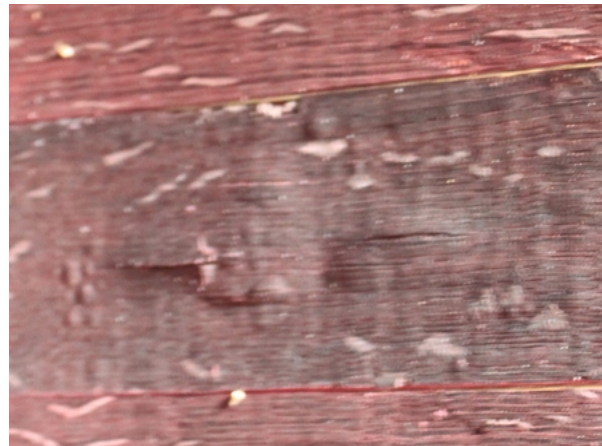
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What Could Go Wrong in a Barrel?



- ❑ Barrels are difficult, if not impossible, to sanitize:
 - ❑ Difficult for cleaning tools to reach all barrel areas through the bung.
 - ❑ Stave and head joints are great for protecting contaminants from cleaners. Without physical removal, biofilms protect microbes from cleaning agents.
 - ❑ Wood itself is porous and difficult to clean effectively.
 - ❑ Wood also has great thermal mass, so even if steam were used for cleaning it may not heat stave joints effectively.

Barrel Topography and Cleaning



What are the Spoilage Agents?

- Acetic Acid Bacteria – Acetic acid / Volatile acidity spoilage occurs with air and low sulfur dioxide levels.
- Lactic Acid Bacteria – Film growth and off-aroma generation in improperly topped barrels, growth can also occur in topped barrels with low sulfur dioxide levels.
- Brettanomyces – “Brett” loves barrels. This yeast can grow in wines with little nutrient (no RS or ML) and is somewhat tolerant to sulfur dioxide.
- Reduction – Chemical reaction with sulfur compounds from improperly cleaned barrel or heavy lees.

The Golden Rules of Barrel Mgmt.

- ❑ Keep the barrel full at all times. Barrels which are tightly sealed (bung rolled to the side), can be left for long periods. Barrels with the bung up should be topped periodically.
- ❑ Keep SO₂ levels high enough (pH dependant) to prevent spoilage organisms from growing. Check levels periodically.
- ❑ Smell test barrels before racking to avoid cross-contamination.
- ❑ Used barrels should be purchased from a trusted source and maintained correctly until use.
- ❑ Emptied barrels must be cleaned and sulfured immediately. Empty barrels need special care for long-term storage.
- ❑ Barrels stored outside are susceptible to mold and wood-boring insects.

Barrel Cleaning

- Hot water, high pressure impingement cleaning (recommended).
 - e.g. Gamajet®, Aaquablaster, others
- Steam cleaning (highly recommended). Steam is effective at melting/removing tartrate deposits and physically removing material.
- Safety: Hot water, and especially steam are very dangerous to handle directly and workers must be trained and wear appropriate PPE.
- Some novel applications exist (CO₂ “cryo-cleaning”, ultrasonic).
- Hot or cold water rinsing with low pressure is a mediocre alternative (not recommended).

Barrel Cleaning Alternatives

Cleaning Method	Pros	Cons	Cost
Low Pressure Wand	Cheap and easy to implement.	Not effective, tartrates and biofilms left in barrel. High water use.	\$250
High Pressure Head	Good cleaning with moderate water use.	Need separate high pressure and hot water system. Service life? Still need to sanitize.	\$2.5K + pressure washer
Steam	Excellent cleaning and sanitizing. Very low water use.	Probably not 100% effective sanitizer. Worker safety a concern. Requires high power.	\$4K - \$10K
Other – CO ₂ cryo-cleaning	“Greener”?, non-toxic, barrel visual check possible.	Probably not available in SO, requires barrel head removal, worker safety a concern.	???
Other – ultrasonic cleaning	Cleans and sanitizes?	Probably not available in SO, not proven commercially. High water use.	???

Barrel “Sanitizing”

- SO₂ gas is the standard, low cost approach. Although not a sanitizer, microbial growth is limited until barrel is dry or refilled.
- Steam cleaning is a possibility; probably not totally effective due to high thermal mass and microbes in stave joints / blisters.
- Ozone added to rinse water can help reduce microbial loads in barrels, but is not a replacement for sulfur dioxide.
- Ozone gas is a relatively new option in barrel management, and has been proposed as an alternative to sulfur dioxide.
- Sanitizing chemicals: sodium percarbonate, others?, chlorine not recommended (TCA risk), not effective on biofilms, citric rinse.
- Safety: SO₂ and ozone gas are toxic and levels in confined rooms should be monitored. Steam is very dangerous to handle directly and workers must be trained and wear appropriate PPE.

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Steam	Excellent cleaning and sanitizing. Very low water use.	Probably not 100% effective sanitizer. Worker safety a concern. Requires high power.	\$4K - \$8K
Ozone	Good sanitizer. Gas version proposed as replacement for SO ₂ use.	Water version not a replacement for sanitizing. Gas version is toxic, worker safety a concern.	\$5K – \$10K
Other	“Greener”, less toxic.	Probably not available in SO	???

Empty Barrel Storage & Re-use

- Empty barrels must be re-hydrated, preferably with hot water or steam before re-use.
- Barrels which have been sanitized with SO₂ should be rinsed with several gallons of citric acid solution before re-use.
- Barrels which have had reduction problems should be cleaned with several gallons of sodium percarbonate (peroxycarb), followed by a citric acid rinse, before refilling.
- Barrels which have been ozonated should be left to drain for 30 minutes before refilling.
- Barrels which have had off-aromas develop (VA or Brett-related aromas) should probably be turned into flower planters.

Empty Barrels – What to do?

Storage Method	Store Dry	Store Partially Full	Store Full
Preservation Agents	Use SO ₂ Gas / Wick / Disk	Use SO ₂ Gas / Wick / Disk + SO ₂ /citric solution	Use SO ₂ / citric solution
Details	Use SO ₂ every 6wks. – quarterly, store bunged or bung down with paper cup	Use SO ₂ every 6wks., check solution SO ₂ level, roll barrel to keep staves/head moist	Check SO ₂ every 6wks.- quarterly, store bunged.
Pros	Dry barrel less likely to support yeast or bacterial growth, limited aroma loss.	Partially wet barrel limits stave drying, also limits aroma loss.	Wet barrel eliminates stave drying, easy analysis for SO ₂ strength.
Cons	Barrels could dry out too much, and leak when refilled?	Barrel could be difficult to rehydrate. Unmanaged barrel solution will lead to off-aromas.	Storage solution will leach aroma from barrel. Unmanaged barrel solution will lead to off-aromas.