



## Wine Barrel Care Guide for Home Winemakers

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### Initial Barrel Hydration

Barrels should be hydrated and used almost immediately upon receipt---dry storage always comes with the risk of dehydration. A new barrel must be filled with water to make the wood swell and eliminate leaks. These leaks will often seal themselves in only a few hours, but may take a couple of days. There are different approaches to hydration depending on the water supply and equipment you have available. Commercially, steam and ozone are commonly utilized. At home, however, the cost of this type of equipment is prohibitive. The following techniques do not require them.

Before we start, it is important to consider the water itself that you will be using to care for your barrel. Regardless of the source of your water (municipal, a well, etc.), it is important to make sure that it has no chlorine or chloramines. The ideal water source would be reverse osmosis water (RO water) that has been dechlorinated and has little to no mineral content. However, you can use water that starts out with chlorine and simply remove the chlorine using the techniques listed below.

- **Hot Water Technique – Requires at least 180° F water**

This method is a best practice which we have adopted from our cooperage, Recoop Barrels. It is more effective at hydration than the cold water technique, and also has the effect of pasteurizing the wood before use.

Stand the barrel upright on the head. Pour hot water, which is at least 180° F, on top of the head and let stand for 1 hour. Ideally, the water should be de-chlorinated (see note below). At the same time, fill the barrel half-way with the same source of water to hydrate the bottom half of the inside of the barrel. Insert a silicone bung snugly in the bung hole.

After one hour, flip the barrel over and repeat the process on the other head for 1 hour. Drain the barrel and proceed with acidification and/or filling with wine.



- **Cold Water Technique**

Fill the barrel completely with cold water. Ideally, the water should be de-chlorinated (see note below). The barrel should be continually refilled until the leaks stop, and the water should be changed each day to prevent off flavors caused by rancidity or mold growth.

- **Why and how to de-chlorinate your water**

The chemical compound 2,4,6-trichloroanisole (TCA), commonly known as “cork taint”, can flourish in barrels and cause moldy, musty odors. TCA can be produced when two things are present---naturally occurring airborne fungi, and chlorophenols compounds (created from chlorine and chloramines) which they convert into TCA. Due to this risk, it is best to remove chlorine from the water which will contact your barrel. If you are working with chlorinated water, there are two common approaches to remove the chlorine from you water supply.

- **Mechanical Filtration** – In-line carbon block filters can be used to remove chlorine compounds in transit to the barrel.



Pictured above: in-line 10” cartridge filter housing

- **Chemical De-chlorination** – Chlorine and chloramines can be removed adding sulfur dioxide to the water, a common practice in waste water treatment. The theoretical dosage for dechlorination requires 0.9 ppm (parts per million, A.K.A. mg/L) of sulfur dioxide for every 1 ppm of total chlorine residual to be removed. In most operating situations, the rate used in practice will be 1:1 to ensure all chlorine is removed. The contact time, assuming good mixing, is only about 2 minutes. Municipal water will generally have a residual of 0.5 – 4 ppm of chlorine. If testing the chlorine level is not possible, it may be safest to estimate the chlorine level to be on the high side. Excess sulfur dioxide will generally not present an issue for the wine. The simplest practical treatment is with campden tablets, which offer 250 ppm of sulfur dioxide when added to one liter of liquid. We can expect one campden tablet, therefore, to neutralize 4 ppm of chlorine in approximately 62 liters, or about 16 gallons of water.



Pictured above: campden tablets

So to neutralize 4 ppm of chlorine, a:

- 15 gal barrel needs 1 campden tablet
- 20 gal barrel needs about 1.5 campden tablets
- 30 gal barrel needs 2 campden tablets
- 60 gal barrel needs 4 campden tablets

- **Acidifying a New or Used Barrel**

It is recommended that an acidic environment be created in a new barrel, which is about to receive wine for the first time, or a used barrel that may need conditioning. Dissolve in water 1.5 grams Citric Acid for every 1 gallons of barrel capacity. Alternatively, you can use tartaric to avoid contributing residual citric to your wine. Tartaric is more expensive, but is not metabolized by bacteria such as MLF bacteria. Fill the barrel and check to make sure it is properly sealed. If you can slosh the acidified water around inside the barrel, you can use much less water. In that case, 5 – 10 gallons of acidified water may be appropriate to acidify a 60 gallon barrel. After all internal surfaces have been exposed to the acidified water, drain the water and fill the barrel with wine.



## Rinsing a Barrel at each Wine Racking

At each racking, rinse the barrel thoroughly with water to remove lees debris. A barrel washer fitted with a high-pressure spinning head is very helpful with this step. After the debris is removed, rinse the barrel with an acid wash to reacidify the barrel.

- **Acid Wash**

Dissolve 8 grams (or about 2 tsp) Citric Acid in 5 gallons of de-chlorinated water. Alternatively, you can use tartaric to avoid contributing residual citric to your wine. Slosh this mixture around the interior surfaces of the barrel for 5 to 10 minutes. Drain, and refill the barrel with wine.





## Preparing a Barrel for Storage

If a barrel needs to be stored without wine for a period, additional cleaning and sanitation measures will be needed. Please take note that the best practice is to keep a barrel full of wine at all times. Storage without wine introduces risk of dehydration and/or contamination. The following techniques should be deployed only when storage with wine is not possible.

- **Cleaning a Used Barrel**

Start by removing the organic matter that has penetrated into the surface of the wood. This is done with a solution of Proxycarb, a peroxide based cleaner. Again, a barrel washer fitted with a high-pressure spinning head is also very helpful with this step.

Use 4 oz. of Proxycarb for every 15 gallons of barrel capacity. Dissolve in a small amount of de-chlorinated water, and funnel the mixture into your barrel. Fill the barrel the rest of the way with de-chlorinated water. You may leave this mixture in the barrel for as little as 20 minutes or as much as 24 hours. If the barrel has VA (volatile acidity), double the amount of Proxycarb and leave for 24-48 hours. In the case of a VA barrel, you should take additional steps. The best choices are to retire the barrel from wine use, or have the inside wood removed and re-toasted by a cooperage such as a ReCoop. If that is not possible, plan to use Bactiless and/or No Brett or similar products to inhibit the wild organisms from spreading from the wood grain into your wine.



Drain and rinse the barrel several times with de-chlorinated water, or rinse using a barrel washer. Re-acidify the barrel using the acid wash instructions above. Next, prepare the barrel for either wet or dry storage.

- **Wet Storage – Long term with required maintenance**

Wet storage will require you to create and maintain a holding solution which has similar anti-microbial properties to a stable wine. It will require topping the barrel and monitoring the holding solution for stability by occasionally testing pH and free SO<sub>2</sub> levels.



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The holding solution should be made from de-chlorinated water, which has been acidified to 3.7 pH or below. Additionally, sulfite should be added to the holding solution and the free SO<sub>2</sub> level should be maintained above 50 ppm for the entire storage period. Over time, the holding solution will evaporate, and more solution will need to be added at least once per month.

Note about pH and SO<sub>2</sub>: If the pH rises above 3.7 pH, the effectiveness of the sulfite at maintaining microbial stability is seriously diminished. Even with a proper pH level of 3.7 or below, the free SO<sub>2</sub> will become depleted over time as it binds oxygen and other compounds. Therefore, continual monitoring of the pH and free SO<sub>2</sub> levels will be necessary to avoid spoilage of the holding solution and contamination of the barrel.

### ○ Creating and Maintaining a Holding Solution

#### **Ingredients Needed:**

De-chlorinated water

Citric acid (Alternatively, you can use tartaric to avoid contributing residual citric to your wine)

Potassium metabisulfite.

#### **Equipment Needed:**

pH meter and calibration solutions

Free SO<sub>2</sub> testing equipment (or access to a wine lab)

**Mix Instructions:** Fill the barrel with de-chlorinated water. Acidify to 3.7 pH or below by dissolving Citric or Tartaric acid into water and then mixing into the water in the barrel. Add an initial addition of free SO<sub>2</sub> of at least 100 ppm.

#### **How much acid is needed to reach 3.7 pH?**

This will depend on what is in your water. A water with very little to no ion content, such as distilled or reverse osmosis water, will take much less acid to reach 3.7 pH than a water with high ion content, particularly alkalinity. You might use our staff table-top experiment as a guideline as follows.

We treated two very different water sources with Citric Acid until they dropped below 3.7 pH. One was Santa Rosa city water with about 160-180 ppm of alkalinity, the other was Reverse Osmosis water with only about 5 ppm of total dissolved solids. Here were the results:

Santa Rosa Municipal Water (160-180 ppm alkalinity)



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0.4 grams per liter of water to reach 3.61 pH

### Reverse Osmosis Water (about 5 ppm TDS)

0.1 gram per liter of water to reach 3.33 pH

In reviewing these results it should be apparent---each water source will require a different level of acid addition to reach 3.7 pH or below. We recommend a calibrated pH meter and some patience in your effort to acidify the water. Municipal and well water sources can vary widely from day to day and year to year. Some testing will be required to ensure your water source is properly acidified below a pH of 3.7. For this reason, we recommend using RO water.

**Maintenance of the Holding Solution:** Once per month, test the pH and free SO<sub>2</sub> of the holding solution. Add sulfite and acid as necessary to keep the pH at 3.7 or below, and the free SO<sub>2</sub> level above 50 ppm. The barrel should be topped up each month as well so it stays full.

If testing cannot be performed at any point, at least perform the following. Remove the bung every week or so and smell to make sure sulfur can still be detected inside the barrel. The sensory threshold for most people to detect free SO<sub>2</sub> by smell is around 50 ppm. If you cannot smell the SO<sub>2</sub>, which smells like burnt match sticks, then the level may have dropped below 50 ppm and the holding solution may be unstable.

- **Temperature of the barrel during wet storage will be important.**

Just as with wine storage, high temperatures will lead to oxidation of the SO<sub>2</sub> and potential microbial growth. Temperatures during the entire period of wet storage should be maintained below 60° F.

- **Dry Storage – 2 months maximum**

If it will be less two months before the barrel is used again, drain the barrel and burn a Sulfur Strip or Sulfur Disc in it. Remove the Strip or Disc after about 15 minutes, and bung the barrel tightly. Burning sulfur releases sulfur dioxide gas into the barrel's interior. Repeat every two weeks, as needed, until a flashlight reveals no shiny dampness in the bottom of the barrel. Bung up the barrel and store it in a dry place until needed, allowing enough time to soak up the barrel before use. Extended dry storage will make it more difficult to rehydrate the barrel later. After 2 months, we recommend the barrel be either filled with wine, or rehydrated before beginning the dry storage preparation steps again.



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- **Temperature and Humidity**

At all times, the temperature of the barrel should be maintained below 60° F. Ideal cellar temperature is traditionally about 55° F, but at least below 60° F to minimize the chance of bacterial spoilage. If you can monitor and maintain humidity, the ideal range is 65-75% relative humidity.



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