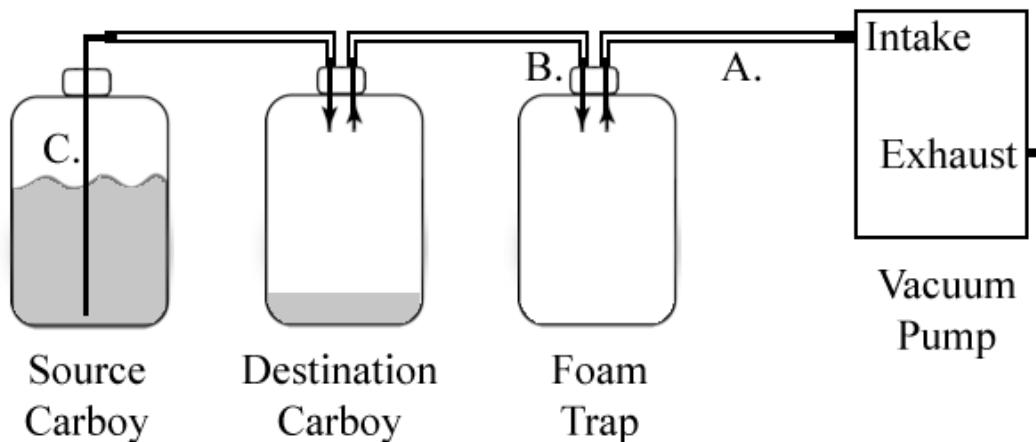


## Racking/Degassing/Filtering Wine using a Vacuum Pump

Virtually all small-scale winemakers have extensive experience manually racking their wines. This process typically involves siphoning wine from one container to another using a racking cane (rigid tube) connected to a lengthy piece of food-grade vinyl tubing. The first racking usually follows the primary fermentation and is used to separate the young wine from the gross lees. Subsequent rackings usually serve the purposes of fining and/or clarifying the finished wine.

One of the major drawbacks of traditional gravity-based siphoning methods is that the source vessel must be elevated to a height greater than the destination vessel. If you have chronic lower back problems like me even the simple act of hoisting a 6 gallon carboy full of wine from the floor to the workbench holds the potential of triggering a lengthy bout of back spasms (or worse if your back is really wrecked). However, by using a relatively inexpensive vacuum pump to create a negative pressure differential between the destination vessel and the source vessel you can quickly transfer your wine without relying upon gravity. Without the need for gravity, the height differential requirement of traditional siphoning disappears. In fact, if your vacuum pump is strong enough, you can easily transfer wine from a carboy sitting on the floor to one located atop your workbench.

**Figure 1** is a diagram that depicts the apparatus required for vacuum pump transfers of wine. Let's examine how this setup works. The intake port of the vacuum pump is fitted with a barbed brass connector that's used to attach a length of vinyl tubing between the pump and the dual-port vacuum adapter fitted on top of the Foam Trap (see **Figure 2** for examples of vacuum adapters available from ValleyVintner.com). The Foam Trap could be a large Erlenmeyer flask or a carboy. By sucking the air out of the Foam Trap a strong negative pressure (or vacuum force) builds-up in this vessel. This vacuum is transferred, in turn, to the Destination Carboy via vinyl tubing connected between the dual-port adapters on both the Foam Trap and Destination Carboy. Since the dual-port adapter of the Destination Carboy is also connected via vinyl tubing to the racking cane in the Source Carboy, the vacuum build-up in the Destination Carboy now begins to quickly suck the wine out of the Source Carboy into the Destination Carboy. Unlike the Destination Carboy and the Foam Trap, the Source Carboy should not be capped (so that incoming air can replace the wine being transferred). The Foam Trap prevents wine (or foam due to carbon dioxide out-gassing) from being sucked into the vacuum pump and damaging it.



**Figure 1. Schematic diagram of vacuum racking apparatus.**  
A=vinyl tubing; B=dual-port vacuum adapter; C=racking cane



**Figure 2. Examples of dual-port vacuum adapters for barrels (left) and carboys (right).**  
(Available from valleyvintner.com)

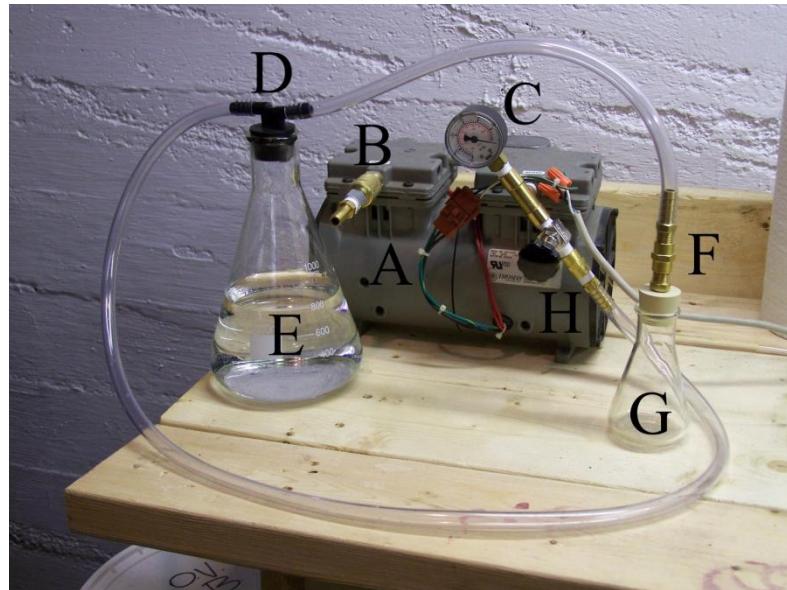
## Filtering Wine

By placing an in-line filter canister between the Source and Destination carboys shown in Figure 1, a vacuum pump wine transfer system can also be used to efficiently filter small batches of wine (see valleyvintner.com's 10-inch Filter Housing with 2 10-inch Barbed Hose Fittings – Part WE-30-4850).

## Degassing a Wine Sample

Recently fermented wine usually contains large amounts of dissolved carbon dioxide. The great majority of this CO<sub>2</sub> is usually lost due to outgassing during the bulk aging process. However, if you wish to perform certain chemical analyses to monitor the status your wine during fermentation and/or bulk aging you will need to get rid of the excess CO<sub>2</sub>. This is because excess CO<sub>2</sub> in a wine sample will inflate quantitative estimates of titratable acidity (TA), free sulfur dioxide and volatile acidity.

**Figure 3** is an annotated photograph showing how a vacuum pump can be setup to degas a small sample of wine prior to laboratory analysis. The vacuum pump is used to create negative pressure in a small flask containing approximately 50 mL of wine to be tested. When the vacuum in the flask reaches approximately -20 inches of mercury (-80 kPa) the CO<sub>2</sub> dissolved in the wine begins to rapidly bubble out of solution. The bubbling ceases (about 1-2 minutes) after all of the CO<sub>2</sub> gas has been evacuated. The vacuum passed through a foam trap prior to reaching the sample flask in order to protect the vacuum pump from any overflow resulting from the rapid CO<sub>2</sub> out-gassing.

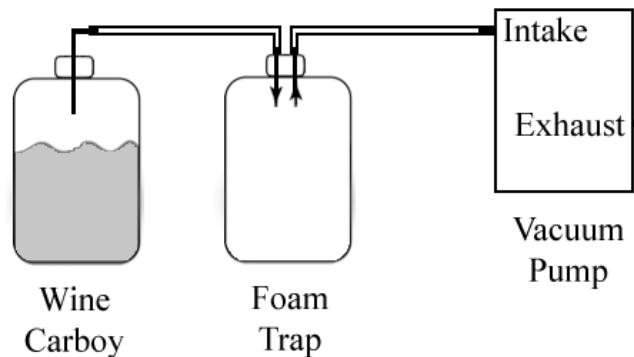


**Figure 3. Vacuum pump setup for degassing small samples of wine.**

A=Thomas Industries Model 2607 vacuum pump (29 in Hg max); B=exhaust port; C=vacuum/pressure gauge; D=dual-port vacuum adapter for foam trap flask; E=1000 mL Erlenmeyer flask; F=single-port vacuum adapter for 125 mL flask; G= 125 mL wine sample flask; H=vacuum pump intake port with adj. valve.

## Degassing a Batch of Newly Fermented Wine

If one needs to bottle a batch of wine before the CO<sub>2</sub> has a chance to outgas naturally during bulk aging, a vacuum pump can be used to artificially accelerate the outgassing process (see **Figure 4**). The Wine Carboy is connected to the vacuum pump via a large vessel that serves as a Foam Trap. Very young wine can foam violently when exposed to a vacuum so the Foam Trap is needed to prevent foaming wine from entering and damaging the vacuum pump. The vessel serving as the Foam Trap (e.g., 1000 mL Erlenmeyer flask or 3 gallon carboy) should be half-filled with water. The water will help support the walls of the vessel and prevent a possible implosion due to excessive negative pressure build-up during the degassing process.



**Figure 4. Bulk degassing using a vacuum pump.**

## Drying Vinyl Tubing

After cleaning and sanitizing the tubing used to transfer wine, it is wise to thoroughly dry it prior to storage. Otherwise, mold and other undesirable microbes may colonize the inner walls of the tubing. If the vacuum pump is equipped with a barbed brass hose fitting on the exhaust port (see Figure 3-B), clean but wet tubing can be connected to the fitting and quickly dried by the resulting air stream.

## References

Tim Vandergrift, "Operating in a Vacuum: Wine Kits", Winemaker, Feb/Mar 2007  
<http://www.winemakermag.com/component/resource/article/537-operating-in-a-vacuum-wine-kits>

ValleyVintner, Vacuum Racking Kit (Carboys)  
[http://valleyvintner.com/Merchant2/merchant.mv?Screen=CTGY&Category\\_Code=VP](http://valleyvintner.com/Merchant2/merchant.mv?Screen=CTGY&Category_Code=VP)