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A Fining Agent Primer

One of my early enology instructors described the winemaking process as removing ever smaller and smaller "lumps" from the product (wine). The fining process removes some of the smallest, undesirable compounds by creating larger "lumps" that precipitate out.

There are three reasons describing why a winemaker might wish to use a fining technique/method during the vinification of a particular wine: 1) to facilitate the removal of undesirable materials suspended within the wine; 2) to reduce an undesirable aspect of the wine, e.g. color or smell; 3) to stabilize the wine's appearance, precluding future cloudiness.

There are essentially two different methods of fining: 1) the (ionic) charge neutralization between the fining particles and the wine's particles to be eliminated and 2) adsorption onto the surfaces of the fining particles. Both methods result in a particulate conglomeration that is accumulated by gravity, and then removed from the wine.

Let's take a quick look at five prevailing fining particles.

Bentonite:

By description, bentonite is an aluminum silicate clay with a microstructure of tiny, thin plates that swells considerably when in contact with water. Bentonite comes in two chemical forms – sodium and calcium; winemakers prefer sodium-bentonite. Because most wine particles are positively charged, the negatively charged plates within the sodium-bentonite particle unite with the wine particles, form a neutralized precipitate.

Bentonite's primary use is to clarify a wine and to stabilize the wine against protein haze. Note that proteins are usually carrying a positive charge within the normal pH of wine. As the temperature of a white wine rises, proteins will typically generate a haze unless previously eliminated with bentonite binding, so use of bentonite with white wines is considered necessary.

The protein haze within red wines is less serious a problem simply because of the bonding of positive protein particles with negatively-charged tannin particles. Winemakers often use bentonite, instead, to clear out yeast sediment after the first or second racking of red wines.

It is not recommended to added bentoninte to the must prior to fermentation. The fining process may eliminate proteins that comprise the necessary yeast-assimilable nitrogen (YAN), and may have an effect on quality/completeness of fermentation due to lack of yeast nutrients. Note that if the intended wine style is sweet or semi sweet, adding bentonite prior to fermentation may be an effective way to stop fermentation at a desired residual sugar level, reducing or eliminating the need to back sweeten.

Preparation of bentonite for use as a wine fining agent: 1-2 days in advance, prepare a 5% solution in hot water (194° F – 212 ° F). Stirring periodically over the 1-2 day period, the result will be that of a slurry…a thick, highly viscous solution.

It is recommended to do a series of trials to determine the amount of bentonite to use. As is often the case, "less is more." An excess of bentonite may lead to reduced color and aroma, and/or may produce an off-flavor. Trials might include 0.25, 0.5, 0.75, and 1.0 grams/Liter, with an untreated sample as control. Well mix

the wine samples and bentonite slurry, and allow to stand overnight. The next day, filter with a 1-micron filter, and check for protein stability by heating the samples for 24 hours at 140 °F to 150 ° F. Cool to room temperature, and check with a low-intensity light, three days later. The clear sample with the least amount of bentonite addition becomes the chosen option.

When added to wine, bentonite is most beneficial in the temperature range of 59 – 77 ° F.

Gelatin:

Gelatin is a fining agent that employs its positive charge to bind with negatively charged tannins, resulting in gravitational elimination. It follows, then that young red wines, often overly astringent due to an excessive amount of tannins, would benefit from the use of gelatin as a fining agent.

In white wines, gelatin is used to remove an excessively bitter aftertaste. With white wines, the addition of gelatin is often followed by an addition of tannins to facilitate precipitation. If additional tannin is not added and non-precipitated gelatin remains within the wine, then the cloudiness of protein instability is possible, because gelatin is a protein.

To determine the amount of gelatin to use as a fining agent, try several lab tests to determine the minimum amount needed to achieve the desired results. Add 1% gelatin powder to hot water (194-212 ° F.) Stir until the mixture becomes jelly-like ("gelatinous.") White wines usually require 1 to 3 mL per L of the 1% solution, so do lab trials for using the equivalent of 1 mL/L, 2 mL/L, and 3 mL/L. Red wines usually require 3 to 10 mL/L of the 1% solution, so do lab trials equivalent to 3 mL/L, 4 mL/L…..9 mL/L, 10 mL/L.

To the samples, add the gelatin powder solution while hot; do so slowly, and with continuous mixing. If you are fining white wines, add the tannins one day prior to the gelatin lab trials. Store the wine samples at 50-77 ° F for several days, and check for results. Again, select the lowest amount of gelatin required to achieve the desired result.

When scaling up to add gelatin to the bulk wines, again store the wine at 55 – 77 ° F, and rack and filter after 2 to 3 weeks.

Egg Whites:

Used for the fining of red wines, egg whites soften astringency without any negative side effects. The winemaker adds egg whites during the barrel aging phase. The rule of thumb is to add 1-3 egg whites/60 gallon barrel, based on the astringency generating tannin level, e.g. add 1 egg white for minor softening, 2 egg whites for moderate softening, and 3 egg whites for major softening of astringency.

Procedure: separate the whites from the yolks, and add to salt water. Use 10 eggs/L of water containing 1.5 grams of table salt. Add to barrel and mix well; rack off after 1 week, no more than 2 weeks.

PVPP (Poly-Vinyl-Poly-Pyrrolidone):

PVPP is a synthetic polymer (a chemical compound) that is insoluble in water. PVPP is used in white wines to reduce tannins, to remove browned/oxidized polyphenols, and to prevent browning of white wines by partially removing an enzyme that causes the browning of white wines. PVPP also has the ability to remove slightly off aromas within white wines.

The range of required PVPP is 50-200 mg/L. Prepare a slurry solution of various ratios within that range. Do lab trials by starting with, e.g. 50 mg/L, 100 mg/L, 150 mg/L, and 200 mg/L. Using samples of the wine to be treated, hone in on the range that provides the greatest result with the least amount of PVPP. For instance, if between 100 and 150 mg, then try 115 mg/L and 130 mg/L; if best result is then between 100 and 115 mg/L, try 105 mg/L and 110 mg/L, etc. Ambient temperature between 59 and 77 ° F work well. When adding to bulk wine, use a little bentonite to facilitate rapid settling. Once settled, rack.

If off odor removal is the issue, then add a little activated carbon (below) to the mix; the combination of PVPP and activated carbon leads to quick settling also.

Activated Carbon:

Activated carbon should be used as a fining agent *only when all other methods have failed to produce the intended results*, e.g. use of copper sulfate to remove hydrogen sulfide has failed. Activated carbon absorbs the undesirable particulate and is later removed by adding a substance, e.g. bentonite that will result in gravity-driven precipitate, removable by racking.

Activated carbon is primarily used to adjust color intensity and to eliminate off aromas. Overuse may lead to two problems: elimination of desirable aroma/flavor components, and the production of its own off-flavor.

The basic process is to simply mix a measured amount of activated carbon to a measured sample of wine, allow to sit for one hour, filter immediately, and to check for improvement in color or aroma. Once successful, note the ratio of activated carbon to wine sample, and calculate the amount of activated carbon required to treat the bulk wine. Settlement should occur within 2-3 days, within an ambient temperature range of 59- 77 ° F.

The general rule is that a color issue requires 10-50 mg/L of activated carbon, while an off-odor issue requires 50-250 mg/L.

Best of luck in fining your wines!

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