FINISHING THE WINE: FINAL STEPS IN WINEMAKING

**STABILIZATION**

 Microbial

 Residual sugar

 Sterile filtration

 Potassium Sorbate

 Velcorin

 Malic acid

 Malolactic fermentation

 Sterile filtration

 SO2 and pH

 pH—free SO2—0.8 ppm molecular SO2

 Brettanomyces and LAB (Lactic Acid Bacteria) and AAB (Acetic Acid Bacteria)

 Chitosan for Brett (No Brett Inside)

 Lysozyme for LAB and Bactiless (chitin-glucan) for LAB and AAB

 Tartrate stability

 Tartaric acid -> H+ + bitartrate anion-

 Bitartrate anion- + Potassium+ = potassium bitartrate (cream of tartar)

 Alcohol solution (wine) lowers solubility causing crystalline sediment.

 Chill with cream of tartar (nucleation) to drop out crystals.

 Specific mannoproteins and carboxy-methyl-cellulose (CMC)

 Inhibit crystal formation.

 Test first to see if it works.

 May lose stability with age.

 Protein stability

 Protein loses solubility in alcohol solution.

 Bentonite

 Bentonite- + protein+  pulls protein out of solution.

 Danger of stripping wine if overused.

 Potential negative effect on sparkling wine bubbles.

 Color stability (red and rosé wine)

 Color stabilized by tannin (proanthocyanidins).

 Gum arabic

 Stabilizes colloidal color.

 Add when wine is bottle ready.

**TEXTURE/MOUTHFEEL**

Tannin (enological)

 Finishing tannins

 Structure and mid-palate volume

 Balance high acidity

 Balance existing harsh tannins

 Gum arabic and mannoprotein blends

 More viscous texture

 Sweet perception

 Sugar and sweeteners

 Balances acid, gives sweet impression

 Sugar needs sterile filtration and/or sorbate addition.

 Inactivated yeast

 Similar effect to lees aging

 Adds complexity and mouthfeel

 Classed as nutrient by government

 Not legal for post-fermentation addition to commercial wines.

**ACID BALANCE**

 Most acid corrections to adjust pH are done early on.

 TA vs. pH

 Late adjustments to reduce sharpness or elevate fruit and liveliness

 Deacidification

Potassium carbonate

 Acidification

 Tartaric acid

 Cold stabilization afterwards

 Malic acid

 Sterile filtration afterwards

 Citric acid

 Sterile filtration afterwards

 Additives to balance acid (see “Texture/Mouthfeel”)

 Sugar, gum arabic, inactivated yeast, mannoproteins.

**FLAVOR**

 Blending

 Always do before stabilization.

 Oak

 Oak-derived finishing tannins

 Oak chips and similar oak derivatives

 Enzymes

 Beta-glucosidase

 Releases free aromatics bound to sugars, primarily terpenes.

**FINING (see “STABILIZATION”)**

 White wine

 Casein

 Removes heavy metal haze

 Removes oxidized phenolics that may cause browning, pinking or bitterness.

 PVPP

 Removes oxidized phenolics that may cause browning, pinking or bitterness.

 Isinglass

 Clarification

 May use with silica gel to counterfine, speeding settling and compaction.

 Gelatin

 Used with silica gel for clarification (danger of over-fining).

 Bentonite

 Prevention of protein haze

 Red wine

 Gelatin

 Removes large, astringent tannins

 May strip flavor

 Egg whites

 Removes harsh tannins

 Traditionally used after barrel aging on mature tannins

 Reduced sulfur compounds

 Copper sulfate for H2S and mercaptans

 Yeast or inactivated yeast fining for low level sulfur compounds

 *Reduless,* copper-impregnated yeast cells for wide range of off-sulfur compounds

 Miscellaneous

 TCA from winery

 Casein, milk

 Fresh lees, inactivated yeast

**FILTRATION**

 Clarification and removal of yeast and bacteria

 Depth filtration

 Traps particles in complex matrix

 Not absolute, variable hole size

 Clarifies and polishes

 Membrane filtration

 Absolute, blocks all particles above guaranteed size

 0.45 microns for sterile filtration to eliminate yeast and bacteria

 Cross flow filtration

 Tangential filtration

 Although membranes are used, not considered sterile