NC Wine Quality Alliance: Pass Criteria Faults

Fermentation Sciences
APPALACHIAN STATE UNIVERSITY

Fault	Cause	Sensory	Reported Threshold in Wine
Protein Haze	Aggregation of proteins in wine causes a visual haze, typically removed by adsorbing proteins via bentonite fining.	Dull, oily appearance	
Tartrate Stabilization	Precipitation of potassium bitartrate and calcium tartrate from tartaric acid in wine; typically prevented through cold stabilization.	Clear crystalline sediment visible in bottle/glass	
Acetic acid (Volatile Acidity or VA)	Typically via acetic acid bacteria, (*acetobacter*) can be lactic acid bacteria; ethanol conversion to acetic acid (acetate). Requires oxygen, often associated with excessive headspace in tanks or barrels. Maintain SO_2 levels; fill storage containers, blanket with inert gas.	Sensed by nose (hence "volatile"); pungent, sweaty to sharp vinegar and nose-burn. Thin/sharp mouthfeel; often perceived on finish of wine.	200-300 + parts per million Legal limits in US: Red 1.4 parts per thousand (g/L) White 1.2 g/L
Ethyl acetate (Also considered in VA)	Microbial spoilage (e.g. *Acetobacter*) and an indicator of oxidation. Esterification of ethanol (acetaldehyde) + acetic acid.	Sweet smell at low concentrations, fruity, grape/cherry; Nail polish remover, solvent and sharp at high concentrations.	7.5 to 12+ parts per million
4-Ethyl phenol (4-EP)	Characteristic aroma from *Brettanomyces* (spoilage yeast). Proper sanitation, maintaining sulfur levels, and eliminating problem barrels is essential. Sterile bottling methods recommended for problem wines.	Wood phenolics, clove, sweet, spicy, pungent, sweaty	400+ parts per billion
4-Ethyl guaiacol (4-EG)	Characteristic aroma from *Brettanomyces* (spoilage yeast). Same precautions as 4-EG.	Warm, spicy, medicinal, band-aid, pungent, clove/spice	30+ parts per billion
Sulfur Dioxide (SO_2)	Added to wine as antioxidant and microbiological inhibitor; activity is pH dependent, does not react directly with O_2 at wine pH.	Sharp, pungent, struck match, noseburn. Due to free molecular sulfur; pH dependent.	pH dependent; 10-30 parts per million.
Acetaldehyde (Oxidation)	Associated with wine oxidation; oxidation of ethanol into acetaldehyde; often via *Acetobacter* or film yeasts. Binds readily to SO_2; possible way to screen for presence.	Reduction of varietal character; sherry, apple, green, vegetal/grassy, nutty/almond, pungent.	500 part per billion
Trichloranisole (TCA or cork taint)	Fungal reaction with chlorine (cleaner) or bromophenols (fungicide). Fungus often found in corks; can reside in winery, in paper products and wood. Avoid chlorinated solvents, bleach, and high levels of Cl^- in water.	Musty, moldy, damp cellar, wet cardboard mushroom, dirty, earthy, or rotten	1 to 250 parts per trillion

NC Wine Quality Alliance: <u>Additional Panel Input</u> Faults (Feedback Purposes Only)

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Diacetyl	Generally problematic in secondary fermentation by lactic acid bacteria (e.g. Oenococcus and especially *Lactobacillus* and *Pediococcus*); often produced from citric acid. Eliminate use of citric acid during wine production and aging, use proper MLB inoculation rates, maintain SO_2 levels in finished wines.	Buttery or earthy smell, sweet, musty, pungent	100 parts per billion
Geraniol	Typically produced by lactic acid bacteria from sorbic acid (e.g. potassium sorbate). Maintain proper levels of SO_2 to inhibit LAB when using sorbate.	Distinctive geranium odor, floral, sweet, pungent.	30 parts per billion
Sulfur Reduction: Hydrogen Sulfide (H_2S)	Reduction (by yeast) of elemental sulfur, amino acids etc. into hydrogen sulfide (H_2S); elemental sulfur can be found in grapes and soil. Yeast stress due to lack of nutrients, nitrogen, temperature stress, lack of oxygen etc. during fermentation.	Rotten egg, pungent, offensive; easily detected and dissipates quickly with aeration.	10 parts per billion
Sulfur Reduction: Ethane Thiol (Ethyl Mercaptan)	Reaction of H_2S with ethane into mercaptans (thiols); can involve yeast metabolism or chemical oxidation/reduction. Surfaces during fermentation or aging if H_2S is not removed. Can be treated via copper fining.	Rotten cabbage, vegetal, garlic/onion, burnt rubber, sweaty, fecal, putrid	1 to 30 parts per billion
Sulfur Reduction: Dimethyl Sulfide	Oxidation and stabilization of thiols (ethane thiol). Require ascorbic acid pretreatment with copper fining, not always effective.	Canned corn, cooked cabbage; garlic, burnt rubber; less pungent than thiols, harder to treat.	25 to 60 part per million
Sulfur Reduction: Dimethyl Disulfide	Oxidation and stabilization of thiols (e.g. methane thiol). Require ascorbic acid pretreatment with copper fining, not always effective.	Onion, garlic, burnt; less pungent than thiols but harder to treat.	29+ parts per million