

Flaws and Faults in Wine

Description, Cause, Prevention, Treatment and Judging

1. Reduced Sulphur Compounds

a) Hydrogen Sulphide.

Description - Volatile and very potent gas (threshold is 5 parts per billion!), the gas of hot springs, redolent of rotten eggs.

Cause - Usually produced by yeast in musts that are low in nitrogen. May be related to grape variety (particularly common in Riesling, Chardonnay, and Syrah), low soil nutrients, or over-ripeness. Strongly correlated with yeast strains (e.g., D47, Y3079) that have high nutrient requirements.

Prevention - Yeasts should be rehydrated with Go-Ferm. Possibly, musts should receive an addition of diammonium phosphate within 24 hours of the start of fermentation and several more additions including Fermaid or equivalent at about 50% sugar (late in fermentation it will have little effect). Yeast strain should be 'Selected for low H₂S production. Red musts should be racked within 24 hours of pressing (even if pressed before dryness) to reduce the suspended organic material that tends to contribute to H₂S formation.

Treatment - Early in fermentation add DAP if not done already. Aerate, e.g., by racking, or bubble CO₂ or add Bocksin. Persistent cases may be treated with copper sulphate solution and filtration after biological activity is complete.

Judging - Easily confirmed by dropping a pre-1986 Canadian one cent piece into the glass (see Mercaptans) and swirling it for a few seconds before sniffing the greatly improved aroma. May be dissipated by covering glass with hand and shaking, or may dissipate spontaneously during course of judging; in those cases it is a flaw.

b) Ethyl Mercaptan.

Description - Chemically similar to hydrogen sulphide, but with one hydrogen atom replaced by an alkyl group (a carbon-hydrogen chain). Less volatile than H₂S. Odour very skunk-like, garlic-like, cabbage-like, sometimes fresh ground coffee, natural gas additive. Threshold about 1 part per million.

Cause - Formed after alcoholic fermentation by yeast acting on sulphur in the lees or from hydrogen sulphide.

Prevention and Treatment - See hydrogen sulphide.

Judging - Shaking may reduce its intensity but it usually persists. Confirmed with penny test it is a fault.

c) Thiols and Disulphides.

Description - Oxidation of ethyl mercaptan can produce diethyl disulphide with a threshold 4 ppm. Other sulphur compounds are dimethyl sulphide (25 ppm), dimethyl disulphide (29 ppm), diethyl sulphide (0.92 ppm), and ethyl sulphide (1 ppm). They have rubbery or burnt rubber odours and rubbery, soapy taste.

Cause - Usually, conversion from ethyl mercaptan.

Treatment - Cannot be removed by aeration or copper sulphate treatment.

Judging - A sulphury, rubbery character unaffected by the penny test is probably a disulphide. Such a wine has a permanent fault. *Note:* When H₂S, mercaptan or disulphides are present near or perhaps slightly below their threshold of detection, no characteristic sulphury odour is present. Instead, they tend to suppress aromas that should be typical of the wine. When a wine is strangely lacking in aroma, low level sulphur compounds should be suspected. The penny test will confirm that suspicion for H₂S or mercaptan. Such wines should be considered flawed.

2. Acetaldehyde

Description - Distinctive, straw-like, somewhat acrid character; sherry-like.

Cause - Since acetaldehyde becomes reduced (by alcohol dehydrogenase) to ethanol in the last step of the glycolytic pathway in fermentation it is not surprising to find that in the presence of excess oxygen, ethanol becomes oxidized back to acetaldehyde. Ullage in storage containers, empty fermentation locks, brutal racking, etc. can cause some ethanol to be oxidized to acetaldehyde.

Prevention - Minimize exposure of finished wines to air. Because of their higher phenolic content reds are less susceptible to acetaldehyde production than are whites. Maintain 25 ppm free SO₂. Keep fermentation locks topped up and level of wine in storage containers topped up.

Treatment - Add 50 to 100 ppm SO₂ if acetaldehyde detected. If oxidation has proceeded too far for that to be effective, treat with potassium caseinate (skim milk powder) or referment.

Judging - At barely detectable levels acetaldehyde may increase complexity but does not make a wine more enjoyable and should be considered a flaw. When readily detectable it is a fault and for most people such a wine is undrinkable. Use of the term 'oxidation' to denote the presence of acetaldehyde should be avoided because other wine components may also be come oxidized (e.g., phenolic browning by polyphenoloxidase).

3. MLF in Bottled Wines

Description - Musty, stale dishcloth, swampy characters that may, or may not, be accompanied by slight spritz. Not responsive to copper. Less objectionable in wines that have undergone MLF than in aromatic white table wines or white social wines where no MLF character might be expected.

Cause - Malolactic bacteria acting on malic acid in bottled wine. The wine was bottled with comparatively low levels and no lysozyme. Usually, the assumption has been made that MLF was completed or that since it was not deliberately added it would not occur.

Prevention - Malolactic conversion should be allowed to run its course and then be tested chromatographically to ensure no malic acid remains, or should be arrested with SO₂ and then lysozyme to prevent ML bacteria starting up again in bottle. Wines that have not undergone MLF should not be blended with those that have unless lysozyme protection is used.

Treatment - No practical solution.

Judging - Depending on intensity such characters are flaws or faults and you should score the wine accordingly. There is no diagnostic test for this problem. *Note:* bacterial contamination of lees can produce putrid odours and tastes reminiscent of decomposition. Prevention involves vigilant monitoring and stirring of wines "sur lie". There is no excuse for entering seriously contaminated wines in competition but if entered they are undrinkable and too unpleasant to taste.

4. Yeast Fermentation in Bottled Wine

Description - Yeasty, effervescent wine that may have stale, dirty characters. Not responsive to copper.

Cause - Wine bottled with residual sugar, viable yeast cells and inadequate SO₂ or sorbate. Sugar level was assumed to be too low to ferment further or was not detected.

Treatment - Disgorge and referment entire bottling.

Judging - Wines that are clearly "working" should be scored below 10 points. Slight spritz in the absence of off-characters is acceptable in a dry white table wine or social wine.

5. Ethyl acetate.

Description - The commonest ester in wines, ethyl acetate forms from the reaction of ethanol and acetic acid. It imparts the unmistakable and usually objectionable aroma of nail-polish remover (acetone).

Cause - Ethyl acetate frequently develops in grapes on the vine from contamination with *Acetobacter* spp. and other aerobic bacteria converting alcohol produced by yeasts in wounds to acetic acid. It is a frequent contaminant of thin-skinned varieties of shipping grapes and of skins of grapes pressed for juice and allowed exposure to air before being used for second runs. Acetic bacteria are

ubiquitous but their activity is greatly reduced by low pH, low temperature and anaerobic conditions. Sulphite is lethal to them.

Prevention - Grapes - particularly thin-skinned varieties should be processed as soon as possible after harvest, and for second runs, crushed skins should be sprayed with sulphite solution if they can't be submerged quickly.

Treatment - Sometimes ethyl acetate will revert to the much less evident acetic acid but usually, once detected, it is very difficult to correct. Re-fermentation in another must will reduce it to some extent and bubbling CO₂ through a sintered air-stone, then heavy PVPP fining can be effective as a last ditch measure.

Judging - A noticeable acetone character should be considered a serious fault and the wine judged as undrinkable. At almost imperceptible levels ethyl acetate may be considered a contributor to complexity, particularly in reds. Some judges are very sensitive to it and feel justified in rejecting any wine in which the slightest traces occur. (See Volatile Acidity)

6. Inadequate Settling of White Juices.

Description - A common problem in white wines is a leafy, vegetal character reminiscent of cigar butts.

Cause - Attributable to the winemaker's failure to let the juice settle adequately before fermenting. Suspended organic material is attacked by microorganisms' including wild yeasts.

Prevention - Involves light (15-25 ppm) sulphiting of juice immediately after pressing; settling cold and racking settled juice off sediment before fermentation starts.

Treatment - No practical solution.

Judging - Such characters are usually considered flaws rather than faults and the wine is scored accordingly - usually not above 12 points.

7. Tyrene

Definition - Tyrene or 2,4,6 trichloro anisole (T.C.A) is evident in both odour and flavour. It evokes the image of musty barrels, musty, dank, mouldy wood, or mouldy newspaper. Its threshold is very low - about 1.5-4 parts per billion.

Cause - Once immersed in wine, fungal spores in the lenticels of natural wine corks attack chlorine compounds that were used to bleach the cork tree bark for cosmetic purposes. T.C.A. can noticeably contaminate up to about 5% of all wines bottled under cork and produce subtle unpleasant characters in many more. T.C.A. arises infrequently in the absence of cork, sometimes from chips or barrels or winery wood treated with pentachlorophenols.

Prevention - The only reasonably certain prevention is to use artificial stoppers or Altec aggregate corks (even these may produce minor problems).

Treatment - None.

Judging – If detected, TCA should be labelled a fault. The wine is universally considered undrinkable, so is scored below 10 points. Affected wines can usually be judged and since the problem is one that is difficult for the winemaker to avoid, an attempt should be made to assess the status of the wine itself.

8. Geranium character.

Description - A strong resemblance to geranium leaves in aroma and flavour.

Cause - Malolactic bacteria acting on potassium sorbate can produce 2,3 ethoxy, 3,4 hexadiene.

Prevention - Adequate levels of sulphite when sorbate is added to prevent yeast activity in an off-dry/sweet wine act synergistically to suppress both yeast and ML activity. Winemakers should not attempt MLF in kits that may contain sorbate.

Treatment - None known.

Judging - Even very low levels of ethoxy hexadiene are inappropriate and should be assessed as a fault and the wine considered undrinkable and scored below 10 points.

9. Candida-Acetaldehyde

Description - Wine has a distinctive, straw-like sherry-like "dirty", acrid character;

Cause - A surface yeast, candida vini, an obligate aerobe, may grow on the surface of wines in storage containers -particularly when ullage is too great. At the wine's surface, the combination of available oxygen, low sulphite levels and depleted alcohol provide suitable conditions. Several genera of film-forming yeasts may be involved (pichia, Hansenula, Dekkera) and the production of acetaldehyde and other off-characters is slow and the bulk of the wine is often not affected (particularly in large containers). Films are fragile and will disintegrate easily.

Prevention - Minimize exposure of stored wines to air. Red wines are significantly more susceptible to Candida infection than are whites, perhaps simply because they tend to be handled more often and (partly as a result) may have lower levels of sulphite. Be particularly vigilant after removing samples. Monitor wines in 4-litre dark glass jugs frequently; they tend to be most vulnerable; avoid using jugs if possible. Maintain 25 ppm free S₀₂. Keep fermentation locks topped up and level of wine in storage containers topped up.

Treatment - Try to remove film. Add 25 to 50 ppm S₀₂ to render the wine less hospitable, 50 to 100 ppm if acetaldehyde detected. Spray surface with 10% sulphite solution or float pellets of metabisulphite/paraffin. If oxidation has proceeded too far, treat with; potassium caseinate (skim milk powder) or referment

Judging - At any level Candida-acetaldehyde is a fault and for most people such a wine is undrinkable and is scored below 10 points.

10. Volatile Acidity

Description - While several other volatile acids (those organic acids separable by distillation) -lactic, succinic, and propionic -occur in wine, Volatile Acidity commonly (but inaccurately) is used to refer to both acetic acid and ethyl acetate. Table vinegar is 5% (50 g/L) acetic acid whereas the threshold in wine is about 0.2 g/L. Legal limits are about 1.2 to 1.5 g/L and levels above 1.5 g/L are usually frankly vinegary. Acetic acid alone has only slight impact on aroma and bouquet but ethyl acetate is often present. The nose and particularly the flavour of acetic acid is a slightly sweet, acidic, (vinegary) character and is particularly noticeable in the aftertaste where it tends to linger.

Cause - (see Ethyl Acetate). Acetic acid bacteria (*Acetobacter* spp.) as contaminants of slightly fermenting damaged grapes will provide a large inoculum that can quickly produce a lot of vinegar especially in an unattended red wine cap.

Prevention - See ethyl acetate.

Treatment. Wine with frank acetic acid should be sulphited as soon as possible to kill the bacteria. Then it can be blended with another wine and the acetic acid diluted to a level where it is not noticeable.

Judging. When ethyl acetate is present, acetic acid is difficult to detect because it is overwhelmed by the aggressiveness of the acetate ester and because few judges will actually taste such wine. When ethyl acetate is not evident, acetic acid V.A. at levels high enough to be identified is rather rare.

11. Diacetyl (2,3 butane dione)

Description - A buttery, rancid butter or butterscotch note in aroma and flavour.

Cause - A product of malolactic bacterial metabolism particularly in the absence of yeast lees which tend to neutralize the diacetyl produced. Frequently diacetyl results from the breakdown of citric acid after the malic has been consumed.

Prevention - Citric acid should not be added to wines with ML bacteria. Wines should remain 'sur lie' until MLF is completed.

Treatment - Diacetyl may be encouraged for greater butteriness. If an objectionable excess of diacetyl has formed in a wine, it may be worthwhile to store it well sulphited on another batch of clean lees.

Judging - Often an attribute, diacetyl is seldom present at levels high enough to warrant being considered more than a flaw. In reds it can be somewhat unpleasant but the wine is almost always drinkable. If detected at levels that seem appropriate to the wine it may be considered a positive feature.

12. Brettanomyces Contamination

Description - A mousy, horsey, sweaty, wet dog, leathery, stale hamburger, barnyard character. Similar character to Belgian Lambie beer. Adds complexity at low levels.

Cause - Contamination of grapes, wines and equipment by the surface yeast, *Brettanomyces* spp. and its production of tetrahydropyridines.

Prevention - Regular rinsing of equipment and attention to sulphite levels .

Treatment. - Unknown

Judging - American wine purists consider 'Brett' a fault. At low levels it not only adds complexity but may be responsible for traditional regional characters (Rhône, Burgundy). When it occurs at levels that overwhelm fruit or varietal attributes, it should be considered a flaw. 'Brett' is often associated with high pH reds because it is only volatile at neutral or high pH. Its presence can be confirmed by rubbing some wine between clean hands and sniffing the palms for the characteristic meaty note. In the mouth it is most easily detected after swallowing or spitting the wine as the oral pH returns to neutral after the more acid wine disappears.

13. Chemical Contaminants

Description - Usually unpleasant, sometimes aromatic chemical character; very uninviting.

Cause - Plastics [e.g., a green garbage bag that was used to cover a fermenter; non-food grade containers]; cellar mustiness; chlorine; detergents (more likely a contaminant of the wine glass), volatile hydrocarbons (varsol, gasoline, kerosene, etc.) stored nearby.

Prevention - is obvious.

Treatment - No practical solution.

Judging - Their presence is a fault and renders a wine undrinkable. They fully justify not tasting the wine. Recommend winemaker discard any wine that may have been contaminated with volatiles.

14. Additive Overuse

a) High Sulphur Dioxide

Description - An acrid, tingling to burning sensation accompanied by the smell of burnt match heads or wet wool. In the mouth, a soapy character. .

Cause - Prevention,

Treatment - Although small amounts of SO₂ are produced during fermentation, high levels are always the result of inappropriate additions by the winemaker. Intense, fresh, pungent SO₂ has been recently added in excess; soapy, wet wool character indicates over sulphiting earlier.

Judging – If SO₂ is noticeably pungent it should be considered a flaw and the wine marked down for its presence. Similarly, a wet wool character is a flaw, though it seems appropriate to assess it as less offensive. Recently added SO₂ can be made more evident by capping glass with hand and agitating wine before sniffing it.

b). High Sorbate (2,3 hexadienoic acid)

Description. - A chemical, bubblegum character to which many people are oblivious, others highly sensitive.

Cause. Use' of excess potassium sorbate to prevent renewed yeast fermentation. Accepted effective dosage of sorbate is 200 mg/L (300 mg/L is BATF maximum allowed).

Prevention - Careful weighing of sorbate.

Treatment - None known.

Judging - Judges should be aware of their personal threshold and if they are sensitive much below the effective dosage that fact should be communicated to their judging partner when sorbate is suspected.) Wine with excess sorbate indicates poor management and it should be considered a flaw if its impact is insignificant or a fault if it overpowers the natural character of the wine. Excess sorbate is very unlikely to render a wine undrinkable.

Article Prepared by Chris Myers from internet research
and augmented by personal experience,
Last updated September 2011