Additives & processing aids: when things go wrong

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Inputs to Outputs: is less more?
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Consumer’s first impression

- Clarity is one of the leading consumer quality requirements

- A haze or a taint character can seriously affect perception of wine

- For the producer, economic consequences can be significant
  - Loss of brand value, reputation and confidence by the retailer
  - Recall of product, likely to be a very expensive process in export markets
Main products that cause problems

- Tartaric acid
- Copper
- Grape juice concentrate
- Enzymes
- Bentonite
- Sorbic acid
- Tannins
- Calcium
- Iron and other metals

- All materials have the potential to taint if they are themselves tainted
Universal rule

- Don’t change the composition after final stability tests are done (apart from filtration and standard additions pre-bottling.)

- Verify stability tests and analysis post last minute additions.

- Postponing bottling is not as bad as decanting, filtering and re-bottling!
Haze / Deposit investigations

Tartrate related deposits made up ~34% of all haze and deposits investigations as seen by the AWRI Help desk in the last year.
Tartaric acid–related issues

- Potassium hydrogen tartrate (KHT) deposits
- Calcium L- and DL-tartrate deposits
- 2,6-Dichlorophenol taint (rare – thankfully!)
Tartaric acid–related issues

- Potassium hydrogen tartrate (KHT) deposits
Tartaric acid–related issues

Potassium hydrogen tartrate (KHT) deposits

- Filter at stability temperature (don’t let warm up & then filter)
  - otherwise KHT can re-dissolve & render wine unstable

- Check stability post blending

- Cold stab Method
  - $-4^\circ C/3$ days best predictor of long-term stability (Leske et al 1992)

- CMC can be an ‘insurance policy’ (whites)

Tartaric acid–related issues

Calcium L-tartrate (CaT) deposits

- No reliable stability test

- Precipitation favoured at higher wine pH values
  - Operations that may increase the pH (e.g. MLF/ deacidification / blending) can increase the likelihood of instability.

- Check wine calcium level
  - Reduce to <80 mg/L (blending, electrodialysis, Calcium tartrate seeing, ion exchange - re-check all stability tests)

- Meta-tartaric acid can be effective against CaT, (although shelf life is temperature dependant).
  - CMC’s are ineffective against CaT precipitation
Tartaric acid–related issues

Potassium and Calcium DL-tartrate (K & Ca DL-T) deposits

- Results from the use of racemic (synthetic) DL-tartaric acid (beware of impure or cheap tartaric acid)
- Also can result from the use of racemic KHT seed crystals (see Holdstock et al 2007)
- Make sure filter off cold stab deposit at the stability temperature (don’t let warm up & then filter)

Grape juice concentrate (GJC)

“Did you add GJC a couple of weeks before bottling?”

- Microbiological problems – filtration issues with red wines
  - Add closer to filtration time (but make sure mixed)

- ‘Random’ protein instability – insufficient mixing before bottling
  - Take top and bottom samples and test for G+F

- KHT precipitation due to high potassium concentration in GJC
  - Be aware that addition of GJC can change cold stability
Enzymes

- Residual enzyme stable in wine A may not be stable when blended with wine B (if there is a change in pH and/or increase in ethanol concentration)

- Enzymes are proteins and can cause hazes if they remain in wine
Bentonites

- Use of calcium bentonite can increase the calcium concentration in wine and consequently increase the risk of calcium L-tartrate instability
  - Be careful in high protein years – check calcium levels (AAS)
  - Want <80 mg/L calcium

- Some sodium bentonites have elevated iron levels (Leske et al 1995)
  - Be careful in high protein years – check iron levels (AAS), especially in bentonite lees tanks
  - If >6 mg/L then greater risk of iron instabilities (ferric phosphate, ferric tannate)

Sorbic acid & geranium character

- LAB (mainly Oenococcus oeni) can metabolise sorbic acid to produce 2-ethoxyhexa-3,5-diene (geranium tone)

- Do not add sorbic acid to white wines if MLF is required

- Be careful of additions to red wines – check that sorbic acid is not present in the additive/processing aid as an antimicrobial agent (e.g. tannins)
Copper

- Number of copper hazes increased when use of screw caps increased.
- Due to adding copper at bottling ‘just in case’
- If sulfide aromas detected shortly before the pre-determined bottling date
  - re-schedule so wine can be treated in advance
- Having to decant, filter and re-bottle due to a copper haze is more inconvenient (and costly!) than re-scheduling a bottling
Copper

Copper haze at start of bottling

- Copper ions from pipes can remain in filler bowl or on filter pads
- First wines off the line high in copper
  - Copper haze
- Drain filler bowl and rinse pads with citric acid solution
## Taints from additives/processing aids

<table>
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<th>Winemaking additive/processing aid</th>
<th>Associated taint compounds</th>
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<td>Hydrocarbons, TCA</td>
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<tr>
<td>Carbon dioxide</td>
<td>Aromatic hydrocarbons</td>
</tr>
<tr>
<td>Diatomaceous earth</td>
<td>TCA, aromatic hydrocarbons</td>
</tr>
<tr>
<td>Oak chips</td>
<td>TCA, naphthalene, alkylnaphthalenes and other aromatic hydrocarbons</td>
</tr>
<tr>
<td>Perlite</td>
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<td>Tartaric acid</td>
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<td>Chlorocresol</td>
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<tr>
<td>PVPP</td>
<td>TCA, chlorophenols</td>
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</tbody>
</table>
Taints from additives/processing aids

- Always keep hold back samples pre and post bottling
- Where possible keep samples of additives and record production lot details
- Ensure there is a paper trail, so you can refer back to key processing information and when additions were made
- Implement a screening program to prevent the accidental introduction of off-flavours
- Simple soak and compare test
- Rely on more than one person to assess sensorily
Taints from additives/processing aids

www.awri.com

- Industry Support & Education (main menu)
  - Winemaking resources (sub-menu)
    - Sensory assessment (sub-menu)
      - Screening tests for commonly used winemaking chemicals and processing aids
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